

# ***Chapter IV – Environmental Resources and Consequences***



# Environmental Resources and Consequences

## A. Land Use, Zoning and Future Development

The purpose of this section is to present the existing and future land use information for the I-270/US 15 Multi-Modal Corridor Study. The text also includes updated information to the Land Use, Zoning and Future Development information originally presented in the 2002 I-270/US 15 *Multi-Modal Corridor Study Draft Environmental Impact Statement* (DEIS). Existing land use patterns, planned and programmed developments, zoning, and long-range plans within the study corridor are discussed by jurisdiction, starting at the county level, and then by municipality within each county where appropriate. In addition, active agricultural uses are also described briefly as a distinct and significant land use activity within the two counties. The discussion of existing conditions is followed by an analysis of potential effects of the proposed project. Potential effects of the proposed alternatives on land use are assessed through the “characterization” or “evaluation” of direct and indirect effects. Potential mitigation strategies where applicable are also presented for review.

### Existing Conditions

Land use typically includes four fundamental elements:

- **Existing land use patterns** – the manner in which land is being used today including undeveloped or vacant/previously used land.
- **Zoning** – Zoning regulations carry the weight of law and establish districts or zones designated for specific types of land uses/activities. Consequently, future development can reasonably be expected to follow the allowable land uses specified for each zone and zoning mostly reflects the current goals or wishes of the community. Zoning can be changed by legislative action.
- **Planned and programmed development** – Planned and programmed projects include developments which have received zoning approval. These developments can reasonably be expected to be built and exist in the future based on their regulatory approval, but are at varied stages of completion.
- **Long-range plans and Smart Growth initiatives** – The long-range and Smart Growth plans of each of

the jurisdictions falling all or partially in the study corridor set land use policy for the future to guide implementation of the community vision.

### Existing Land Use

A review of current land uses in Montgomery and Frederick counties as of 2006 is documented in the following paragraphs. Some land use areas are similar to what was reported in the 2002 DEIS and some land uses have changed based on the growth and development that has occurred over the last few years. *Figure IV-1 (Sheets 1 through 5)* illustrates the existing land use along the I-270/US 15 Corridor.

### Montgomery County

Existing land use in Montgomery County was identified using local planning documents, data from the Maryland-National Capital Park and Planning Commission (M-NCPPC), and field surveys. In general, Montgomery County has a mix of land uses that includes agricultural, residential, parkland, institutional, industrial and commercial. The majority of suburban development is clustered along major roads and in small communities. Montgomery County currently ranks number one in the nation in agricultural land preservation with over 30 percent of the county’s entire land area set aside as parkland, agricultural, or other open space. In terms of office space, Montgomery County has more than 77 million square feet of office and research space available, with another 30 million square feet proposed for future development.

The I-270/US 15 Corridor extends across a series of so-called “Corridor Cities” including Rockville, Gaithersburg, Germantown and Clarksburg. They are linked to each other and to Washington, DC by highway and transit. These communities are the areas within the study corridor in Montgomery County that have experienced the most land use change in recent years. The current land use patterns in each of the Corridor Cities are summarized as follows:

- The City of Rockville has continued to grow in both density and intensity of development as a major employment and retail center in

Montgomery County. The city annexed King Farm and construction is continuing for a mixed-use development on the property. Several phases of construction are already complete.

- The City of Gaithersburg annexed several large parcels, including Crown Farm, and lifted a development moratorium. Consequently, the city has experienced intense development over the last two years and is considering a new moratorium on the redevelopment of older, multi-family housing for more dense residential uses.
- Germantown is an unincorporated town which has experienced considerable growth in housing development and is now close to reaching its capacity in terms of residential units.
- Clarksburg is an unincorporated town which creates a transition from the more densely developed portions of the I-270 Corridor to the south and the more rural agricultural land uses to the north. Over the last several years, Clarksburg has become increasingly attractive to businesses. Most notably, the Lockheed Martin complex is located in Clarksburg east of I-270. The Gateway 270 West project is currently under development and consists of six buildings totaling nearly 255,000 square feet of flexible office space.

### Frederick County

Frederick County is Maryland’s largest county by land area, covering more than 664 square miles. Existing land use was identified using local planning documents and field surveys. The county classifies about 68 percent of land as agricultural, undeveloped, and woodland areas – the largest proportion of land use in Frederick County. Other land uses include residential, commercial, industrial and institutional. The county, now home to 4,470 businesses, supports new business development, including the regional headquarters for State Farm Insurance Company and two of the largest warehouse/industrial buildings in the state (Georgia Pacific and Toys “R” Us).

The I-270 Corridor runs north/south through the center of Frederick County. Although still predominantly agricultural, the land use in the county has steadily changed to include a larger percentage of residential, commercial and industrial land uses. Almost all of these land use changes have occurred in and around Frederick City. Since 2000, the Urbana region of south central Frederick County has experienced an increased rate of construction, primarily for single family homes. The largest recent project in this region is the Villages of Urbana, a mixed-use, neo-traditional development located on the east side of I-270 and MD 355 and north of MD 80.

### Zoning

Zoning controls a local jurisdiction’s long-range land use objectives and influences the type and form of development that occurs over time. Local jurisdictions prepare updated zoning designations on a periodic basis. These updates are the result of property owners and land use planning requests.

### Montgomery County

The City of Rockville is currently undergoing a comprehensive update to the 1975 zoning ordinance. Notable rezoning in the corridor since the 2002 DEIS includes the master-planned King Farm and Falls Grove mixed-use developments.

The City of Gaithersburg adopted a new zoning map in July 2005. In Gaithersburg, the majority of the land located adjacent to the I-270 corridor is zoned for mixed uses (MXD). However, the city expects to annex and rezone the National Institute of Standards & Technology (NIST) property and to rezone the undeveloped parcels in the Casey-Metropolitan Grove area to MXD in coordination with the Watkins Mill Road Extended Project.

Montgomery County designated both sides of I-270 in Germantown as an employment corridor within the Technology and Business Park (I-3) zone. The proposed Corridor Cities Transitway (CCT) alignment travels near I-270 and can serve the dense development allowed by the I-3 zone.

Figure IV-1: Land Use

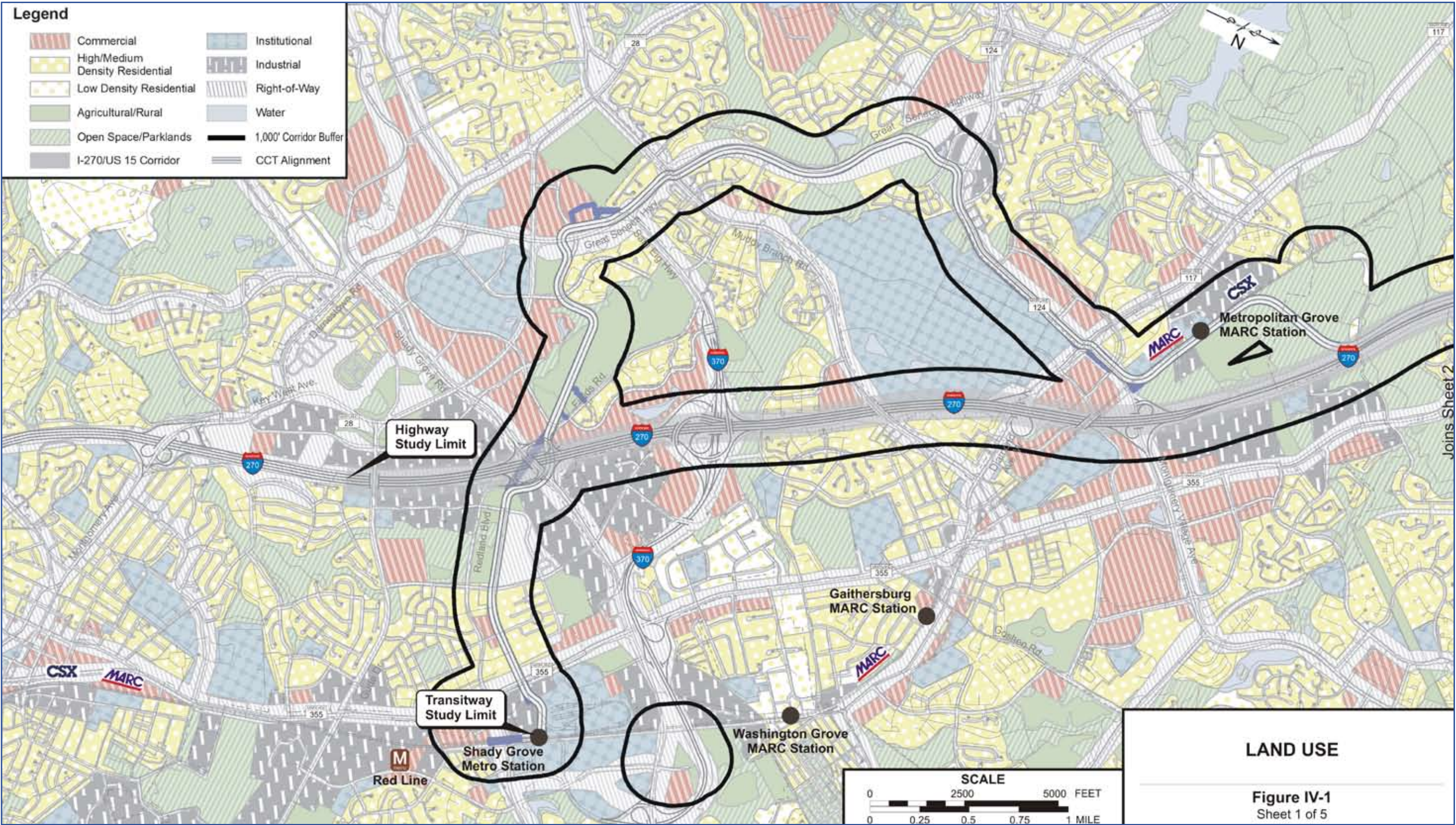


Figure IV-1: Land Use

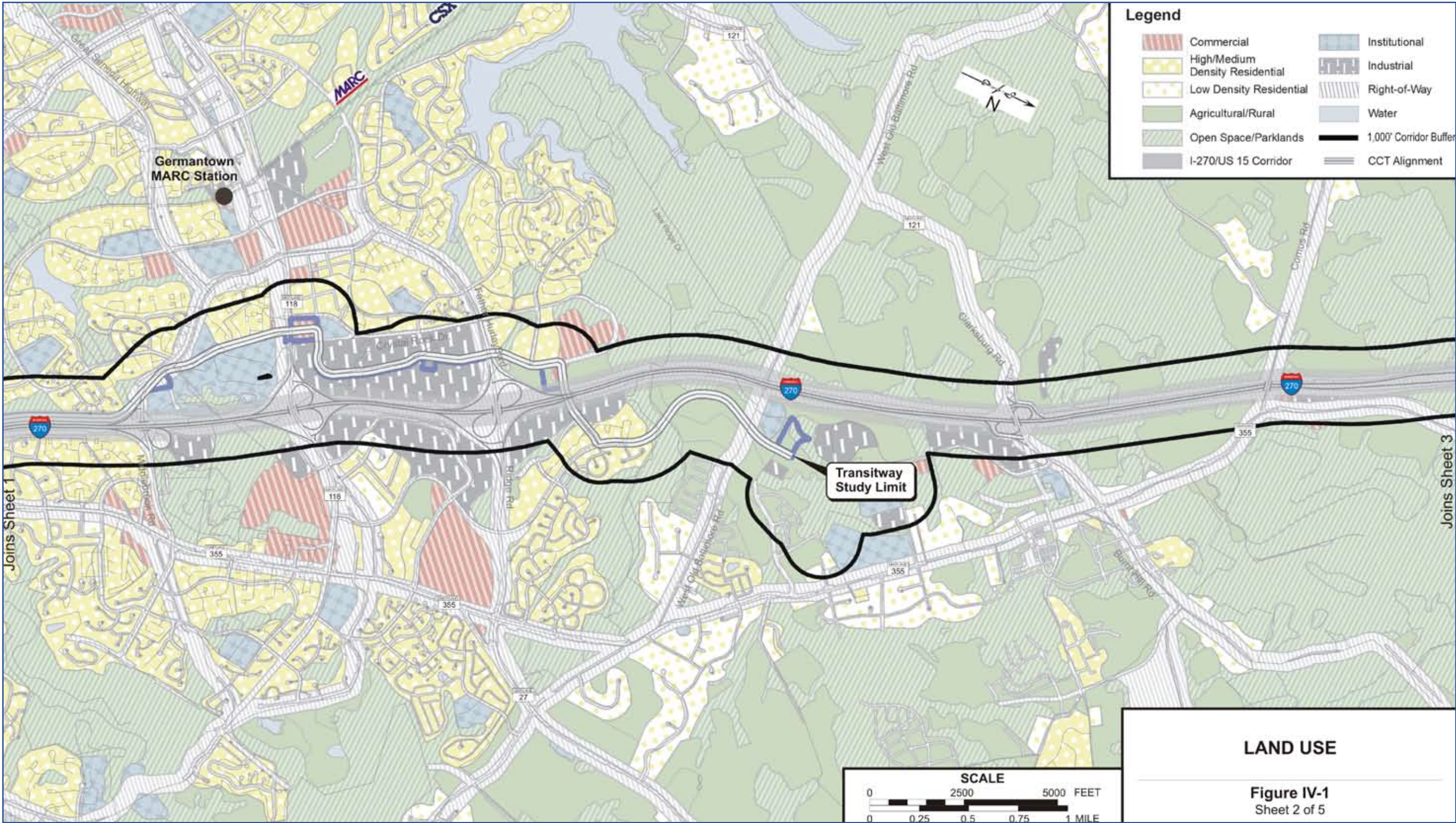


Figure IV-1: Land Use

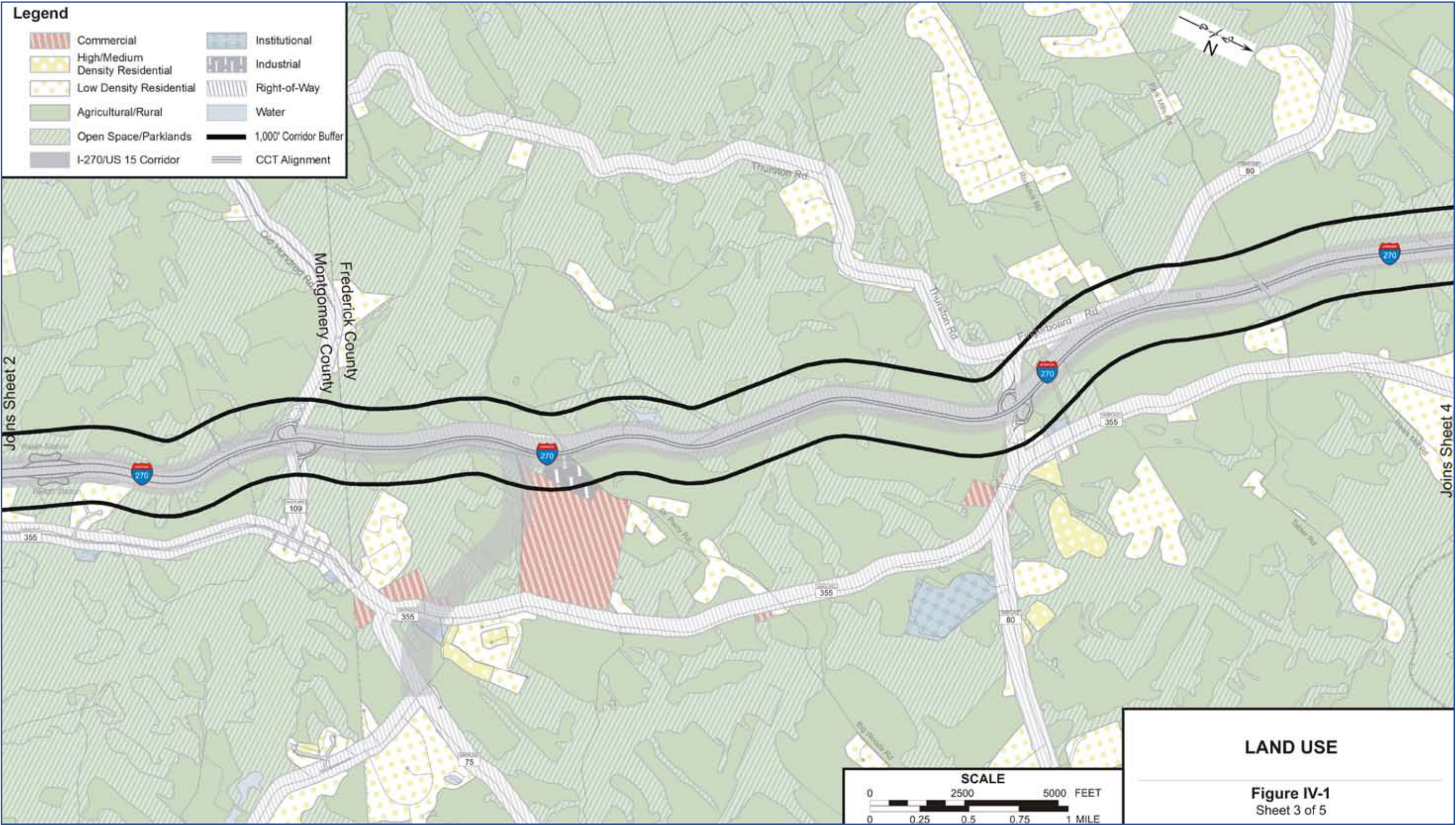


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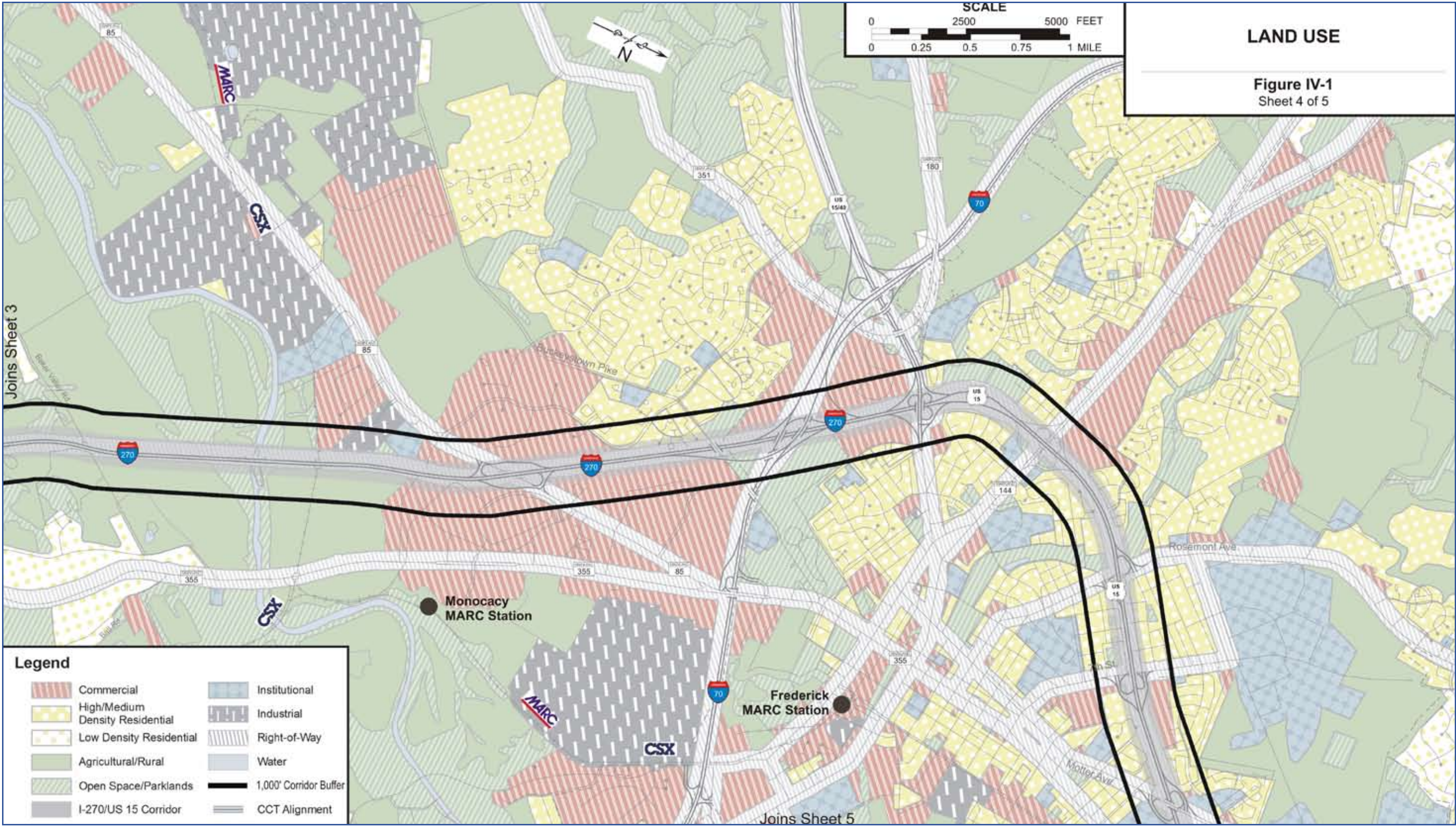


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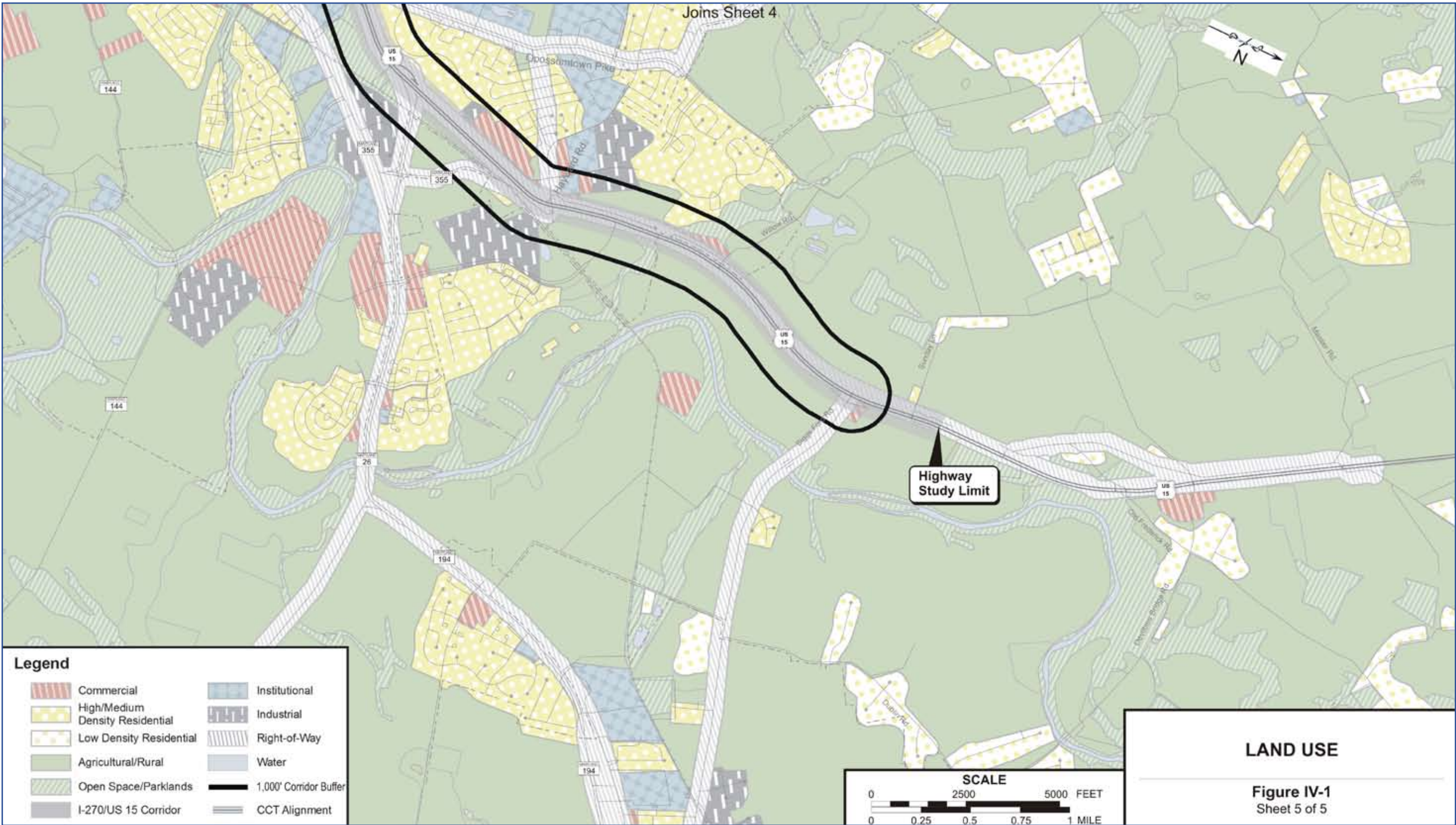




Table IV-1: Future Planned and Programmed Developments in the I-270/US 15 Corridor in Montgomery County

| LOCATION     | PROJECT NAME                                   | PROPOSED USE                                                                                                                      |
|--------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Shady Grove  | Shady Grove Metro Inspection Yard Expansion    | Expansion of existing facility                                                                                                    |
| R&D Village  | Decoverly Hall Parcel S                        | Office                                                                                                                            |
| Gaithersburg | Casey West Property (Watkins Mill Town Center) | Mixed use development                                                                                                             |
|              | Washingtonian Center Waterfront                | Mixed office and retail                                                                                                           |
|              | Washingtonian Center Waterfront Phase II       | 87,815 square feet office, 18,080 square feet retail                                                                              |
|              | Washingtonian South                            | Office                                                                                                                            |
|              | The Towns at Summit Woods                      | 130 townhouse units                                                                                                               |
| Germantown   | New Covenant Fellowship Church                 | Addition of senior apartments to church uses                                                                                      |
|              | Middlebrook Industrial Park Lots 1 and 2       | Office/Retail                                                                                                                     |
|              | Cloverleaf Center                              | Addition of 342,500 square feet office to four parcels                                                                            |
| Clarksburg   | Cabin Branch                                   | 2,100 dwelling units total [includes 210 moderately-priced dwelling units (mpdu)]; unit type to be determined at site plan review |
|              | Thompson Farm                                  | Residential units                                                                                                                 |
|              | Linthicum East Property                        | 253 residential units                                                                                                             |

Montgomery County has established an employment corridor on the east and west sides of I-270 in Clarksburg. Although the Clarksburg area is primarily rural and agricultural, the lands immediately adjacent to the I-270/US 15 Corridor have been zoned as MXD and I-3 to allow for more dense development near the highway and transit corridors.

Frederick County

Since the publication of the 2002 DEIS, Frederick County zoning designations have been modified to address the recommendations of the *Frederick Region Plan* (June 2004) and the *Urbana Region Plan* (June 2004). Major zoning modifications include:

- Adopted a MXD floating zone.
- Modified the land use and zoning map to designate approximately 100 acres of existing Light Industrial (LI) land as Office/Research/Industrial (ORI). This change will support the I-270 Technology Corridor by focusing the ORI land along I-270 and the LI land along MD 355.

Planned and Programmed Development

*Figure IV-2 (Sheets 1 through 5)* presents the locations of future “pipeline” development projects within the corridor. These are projects that have been approved for construction but are not yet built or fully completed. Information on major pipeline projects was obtained through interviews with local planning agencies. Projects are considered major developments if they include 50 or more new residential units and/or 100,000 or more square feet of non-residential development. There are numerous smaller development projects that are not identified individually but are present along the corridor. The 2008 *Socio-Economic/Land Use Technical Report* (SETR) discusses the pipeline development projects in more detail. *Table IV-1* and *Table IV-2* present the pipeline projects within the I-270/US 15 Corridor.

Smart Growth Initiatives and Long-Range Plans

Smart Growth Initiatives

The Smart Growth Areas Act (October 1997) seeks to direct state funding for growth-related projects to areas

Table IV-2: Future Planned and Programmed Developments in the I-270/US 15 Corridor in Frederick County

| LOCATION              | SITE                           | PROPOSED USE      |
|-----------------------|--------------------------------|-------------------|
| Fingerboard Road      | Mountain View Community Church | Industrial        |
| MD 355 at MD 75       | Crossroads Farms               | Residential       |
| MD 85 at I-270        | Shockley Court                 | Commercial        |
| Fingerboard Road      | Potomac Garden Center [Built]  | Commercial        |
| Thurston Road         | Greenbrier Boarding            | Commercial        |
| Hayward Road at US 15 | Northgate Retail Center        | Commercial        |
| Buckeystown Pike      | DANAC Center                   | Office/Commercial |
| Prospect Boulevard    | Frederick Mini Storage South   | Commercial        |

designated by local jurisdictions as Priority Funding Areas (PFAs). PFAs consist of existing communities and other designated areas that local jurisdictions and the Maryland Department of Planning (MDP) identify in accordance with Smart Growth guidelines. The Act guides future development to existing towns, neighborhoods, and business areas by directing infrastructure improvements to those places. The 2002 DEIS contains more detailed information regarding Maryland’s Smart Growth Initiative and the objectives of the Act. *Table IV-3* lists the PFAs, and *Figure IV-3* shows the boundaries of the PFAs. These have expanded slightly since 2002. All PFAs were confirmed using the latest information from the MDP.

Montgomery County Plans

Future land use policy was identified by reviewing local land use plans and through coordination with local planning agencies. Relevant local long-range plans include the county’s general plan [the *Montgomery County General Plan with Refinements* (1993)] and comprehensive plans for the municipalities and key

Table IV-3: Priority Funding Areas (PFAs) in the I-270/US 15 Corridor

| PFA/STATUS                            | COUNTY     | LOCATION RELATIVE TO PROJECT                                   |
|---------------------------------------|------------|----------------------------------------------------------------|
| Rockville Pre-defined Municipality    | Montgomery | Within project area; at I-270/I-370 interchange                |
| Gaithersburg Pre-defined Municipality | Montgomery | Within project area; at I-270/MD 124 interchange               |
| Germantown County Certified Area      | Montgomery | Within project area; at I-270/MD 118 interchange               |
| Clarksburg County Certified Area      | Montgomery | Within project area; at I-270/MD 121 interchange               |
| Urbana County Certified Area          | Frederick  | Within project area; at I-270/MD 80 interchange                |
| Frederick Pre-defined Municipality    | Frederick  | Within project area                                            |
| Walkersville Pre-defined Municipality | Frederick  | 3 miles east of project area limit at US 15/MD 26 interchange. |

development areas within the county including:

- *The City of Rockville Comprehensive Master Plan* (2002)
- *The Shady Grove Sector Plan* (2006)
- *The City of Gaithersburg Master Plan* [with component Land Use Plan] (2003)
- *The Germantown Master Plan* (1989)

The 2008 SETR presents specific land use policy and vision included in the planning documents listed above.

The *Montgomery County General Plan with Refinements* articulated a policy of concentrating future development in key areas, including transit stations. This general plan has not been modified and the stated policies have not changed. The general plan continues to serve as the basis for future land use policy within the corridor. Consequently, the I-270/US 15 Corridor, which extends through the center of Montgomery County, remains the primary focus of economic and transportation activity within Montgomery County.

Figure IV-2: Pipeline Projects in the I-270/US 15 Corridor

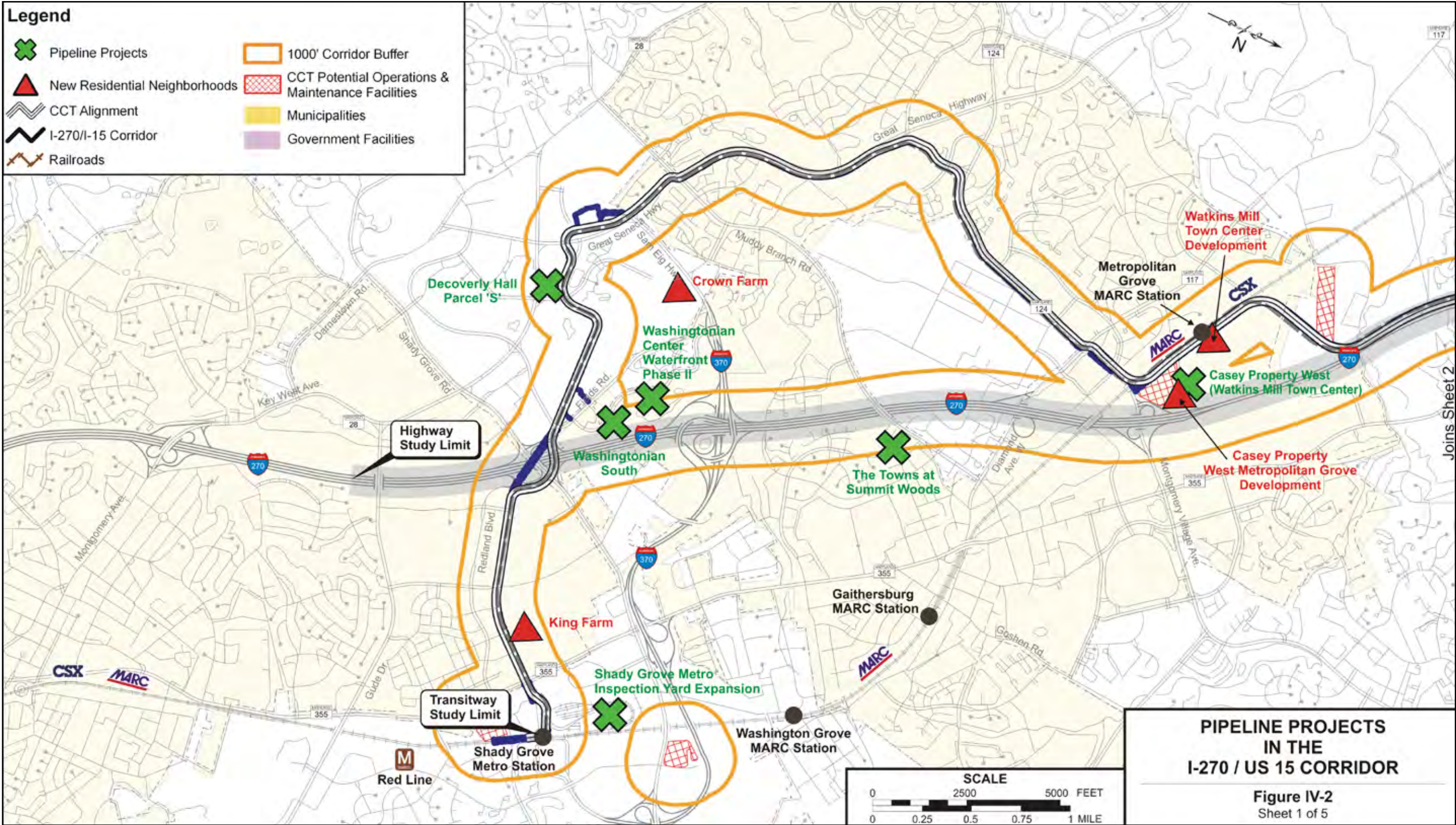


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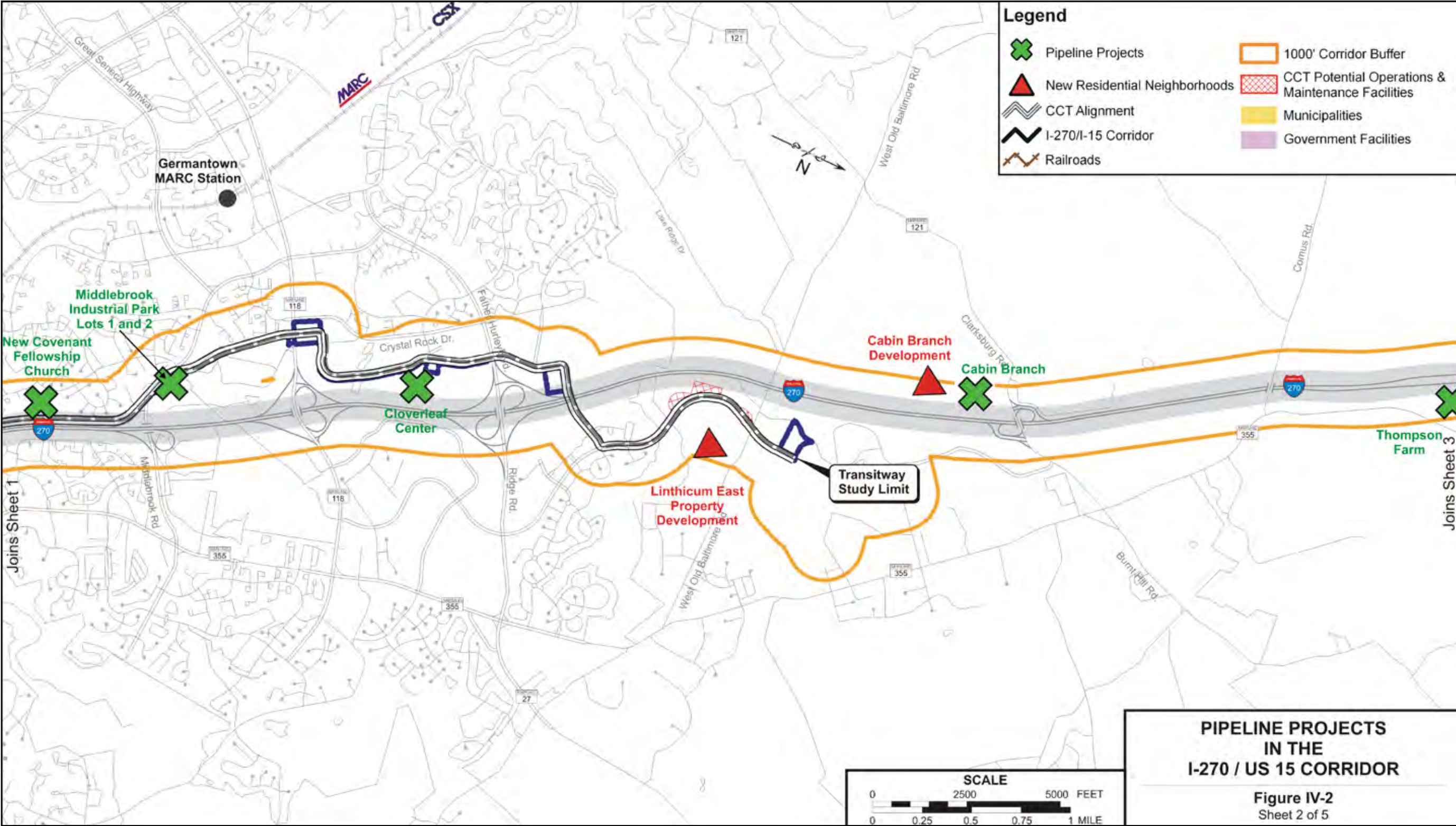


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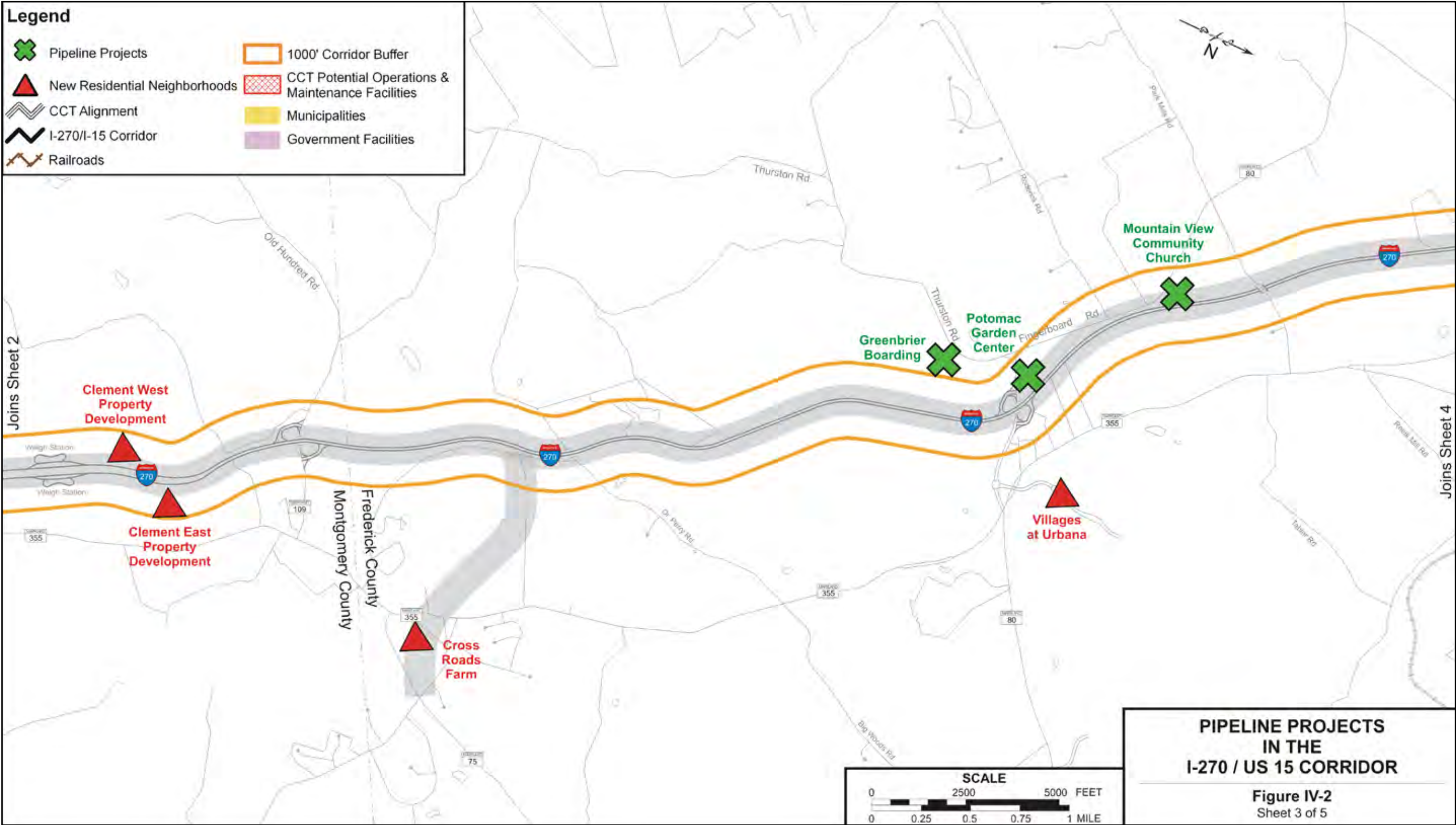


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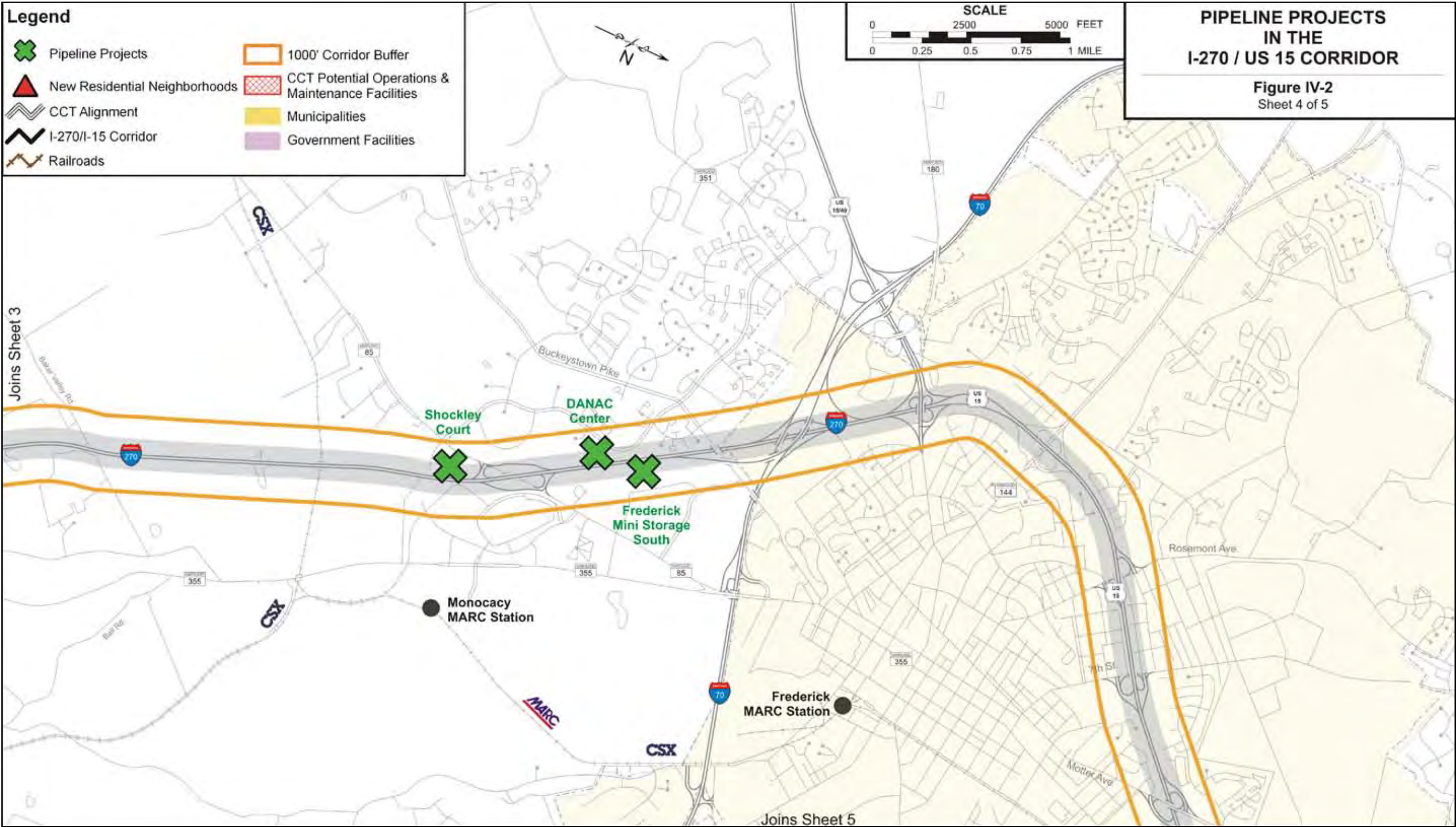


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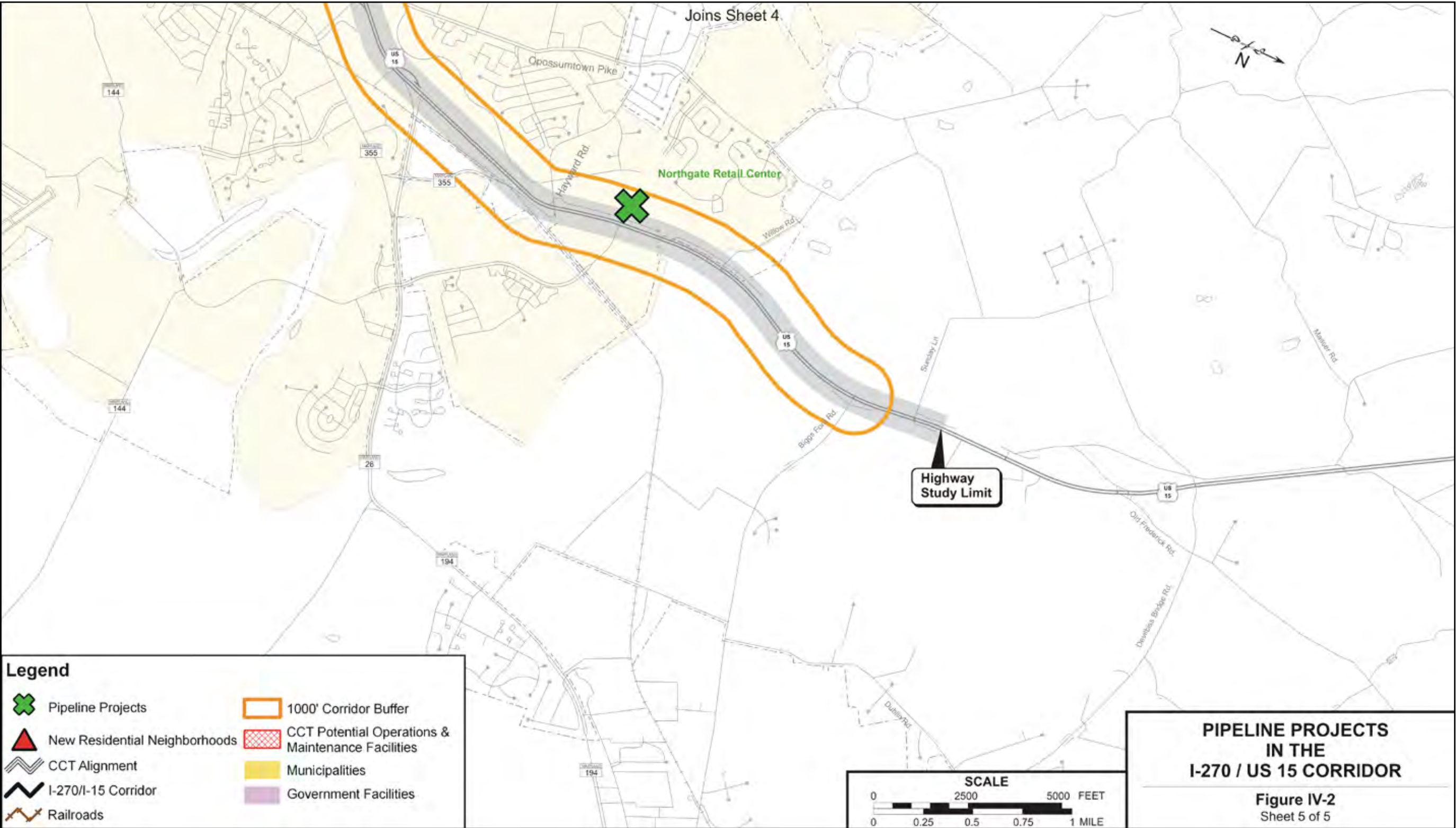
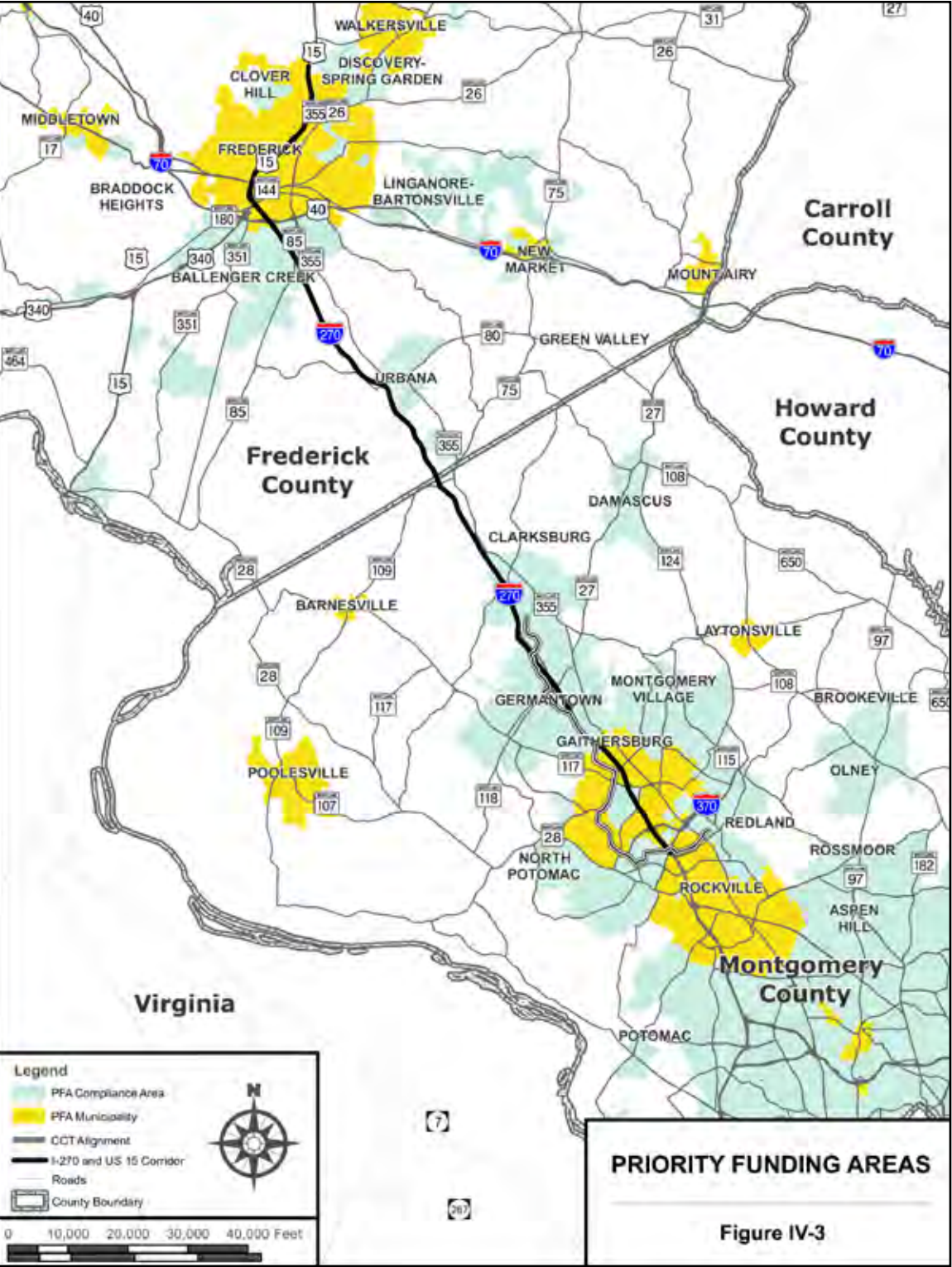


Figure IV-3: Priority Funding Areas



**Frederick County Plans**

Future land use policy was identified by reviewing local land use plans and through coordination with local planning agencies. Relevant local long-range plans are included in Frederick County’s general plan, the *Frederick Region Plan* (June 2004), and comprehensive plans for the municipalities and key development areas within the study corridor in the county including:

- *The Frederick City, Maryland Comprehensive Plan* (2004)
- *The Urbana Region Plan* (2004)

The 2008 SETR presents specific land use policy and vision included in the planning documents listed above.

The *Frederick Region Plan* reaffirms the “Community Concept” as the primary land use policy for Frederick County. The concept outlines a hierarchy of communities where growth will be centered, so that public facilities (such as water, sewer, schools, and transportation improvements) can be located in an efficient manner. The concept encourages compact and sustainable development and economic growth in suitable plan-designated areas.

The *Frederick Region Plan* recommends future land use for the northern portion of the I-270/US 15 Corridor. This plan supports all of the alternatives for the corridor. However, the plan recommends that any potential widening of the I-270/US 15 Corridor should minimize impacts to the Monocacy National Battlefield and the state-designated Civil War Battlefields Scenic Byway.

The *Urbana Region Plan* confirms the “Community Concept” with Urbana as the Regional Community, and identifies a future growth area, encompassing 1,225 acres, for the Urbana Regional Community that may be considered beyond the 20-year growth area. The plan supports development of the I-270 employment corridor and focuses office/research/industrial uses along the I-270 frontage. The plan further identifies transportation infrastructure needs including the MD 75 improvements and the I-270/MD 75 interchange, and maintains the transitway alignment, with an alternate route through the Urbana Town Center, along the east side of I-270.

**Farmland**

Active agriculture is a significant land use in the communities and counties that fall wholly or partially within the study corridor. Information on farmland soils (lands that have potential for production of high value food crops) is discussed separately in the Natural Resources section of this chapter. The amount of actively farmed land has decreased slightly within the study corridor since the 2002 DEIS, but still comprises nearly one-third of the land use in Montgomery County and about 46 percent of land use in Frederick County. These farms produce corn, wheat, hay, soybean, barley, and oats including crops that support livestock. Dairy farming is also a major activity in both counties. A listing of the existing farms and agricultural areas that are in or near the I-270/US 15 Corridor was identified in the DEIS.

**Impacts and Mitigation**

**Existing Land Use**

The No-Build Alternative would not address existing traffic congestion and safety hazards that are linked with existing land use patterns along I-270 and US 15. The No-Build Alternative would actually have an adverse impact on existing land use patterns.

In general, the proposed project would support the existing land use and travel patterns. It is being designed to address changes in traffic patterns and volumes anticipated in association with growth in development along the study corridor.

The proposed park and ride facility located at US 15 and Monocacy Boulevard is now a part of a separate project for the US 15/Monocacy Boulevard interchange. The park and ride has been moved from the west side of US 15 to the east side of US 15. The new site for the park and ride is undeveloped, and although zoned for agricultural use, is currently not actively farmed. It could be potentially developed in the future for low-density residential use (not reserved as open space). The park and ride would encourage carpooling and vanpooling, and serve existing neighborhoods and approved future developments to the south and east.

*Mitigation:* None required or proposed



Planned and Programmed Development

The planned and programmed development projects listed in *Table IV-1* and *Table IV-2* have been approved for construction by the local governments and are not impacted by the I-270 and US 15 highway alternatives (build or No-Build). Developments adjacent to the proposed CCT have been designed and approved by local governments to not preclude the master plan right-of-way as a BRT or LRT transitway.

The direct access express toll lane (ETL) ramps to proposed Metropolitan Grove Road Extended would not affect the approved Casey West/Watkins Mill development in Gaithersburg. The ramps would enhance access and travel convenience for residents.

Consistency with Smart Growth Initiatives and Long Range Plans

Both the No-Build and Alternatives 6A/B and 7A/B do not conflict with policies and goals of the Smart Growth Areas Act. The Act calls for locating new infrastructure in areas targeted for growth and away from areas to be preserved at existing development intensities. As both the No-Build and Build Alternatives concentrate new infrastructure in close proximity to the existing I-270 and US 15 corridor and to serve targeted, anticipated growth areas, they do not conflict with any Smart Growth initiatives.

The No-Build Alternative is not consistent with local master plan recommendations for future land use. The No-Build Alternative would not address traffic congestion and safety hazards along I-270 and US 15 that will occur with the planned growth in the corridor. Also, many of the adopted master plans and current development patterns have already considered the proposed highway and transit improvements within the corridor and the potential for increased development that could result from these improvements.

Alternatives 6A/B and 7A/B would be consistent with adopted local master plans. These plans include policies and guidelines that accommodate the potential increased development that could result from the proposed highway and transit improvements.

Alternatives 6A/B and 7A/B would have direct impacts in terms of consistency with local land use policy with the following exception. Local master plans already consider the interchange improvements proposed at Newcut Road, Monocacy Boulevard, Biggs Ford Road, and MD 75. These “master-planned” interchanges include the proposed highway improvements and recommended local land use and future development patterns. The proposed interchange improvements support the vision for future land use contained in these local plans.

Mitigation: None required or proposed.

Active Farmlands

The AD-1006 Farmland Conversion Impact Rating (FCIR) is used by federal agencies who wish to convert farmland to nonagricultural uses. Calculations on the form result in a farmland conversion impact rating which assesses the non-monetary value of farmlands to be converted. **Appendix C** of this document contains the initial FCIR CPA-106 form, coordinated through the state/county Natural Resources Conservation Service (NRCS), and responses received to date. Impacts to prime farmland soils are discussed in detail in the **Natural Resources** section of this chapter.

The No-Build Alternative would not impact farmland since it does not include any new roadway or transit construction.

Alternatives 6A/B and 7A/B would impact active farms located near the I-270/US 15 Corridor. Most impacts would consist of small strips of land located near the existing roadway. The ability to actively farm these lands could remain. Slightly larger impacts would occur to two farms located on either side of US 15 at the proposed US 15/Biggs Ford Road interchange and proposed park and ride lot.

Mitigation: Coordination through the FCIR CPA-106 form to ensure a process of local coordination and compensation, if called for, for loss of active farmland.

B. Social Environment

The purpose of this section is to present the existing social environment in the I-270/US 15 Multi-Modal Corridor Study. The section includes data for the Metropolitan Washington Region, Montgomery and Frederick counties, and the project study area as extracted from the Metropolitan Washington Council of Governments (MWCOG) Round 6.4a Cooperative Forecasting model and the 2000 US Census, including information about population and households, household income and race characteristics. The discussion compares the growth of Montgomery and Frederick Counties to the Region’s growth and presents information about the existing neighborhoods, communities, community facilities and services, and parks and recreational facilities in the project area. Potential impacts and benefits are also presented in this section. The assessment of potential impacts and benefits of each alternative also includes displacements

and relocations and an assessment of effects to environmental justice (EJ) populations. Potential impacts to these resources are discussed along with any avoidance, minimization and/or mitigation measures.

Population and Households

The 2002 DEIS presented population and household data based on the 1990 US Census. This document uses data from the 2000 US Census. The study area for the project, shown in *Figure IV-4 (Sheets 1 and 2)*, is the same as that used in the DEIS and includes census tracts and block groups that include and surround the I-270/US 15 and CCT corridors.

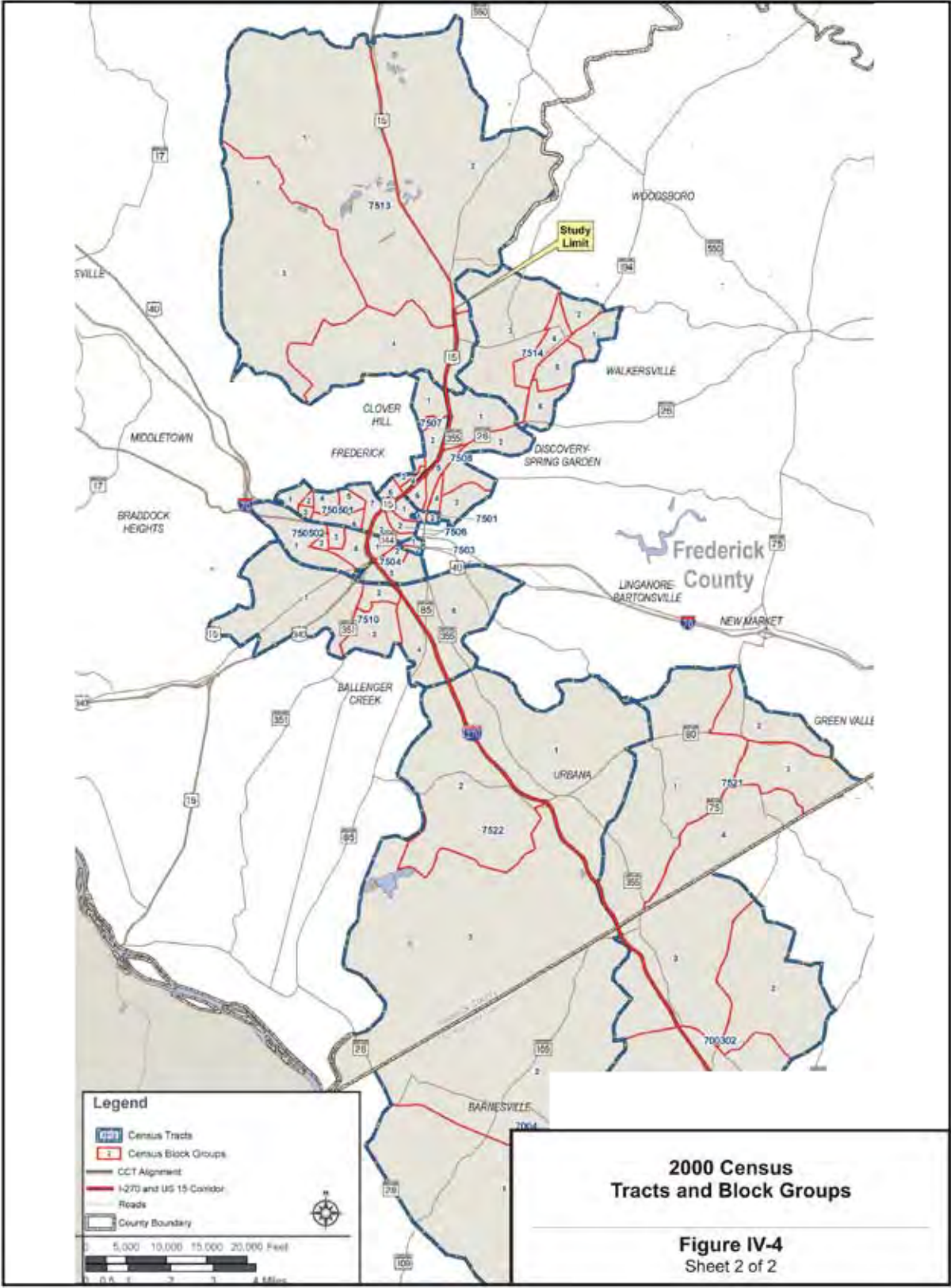
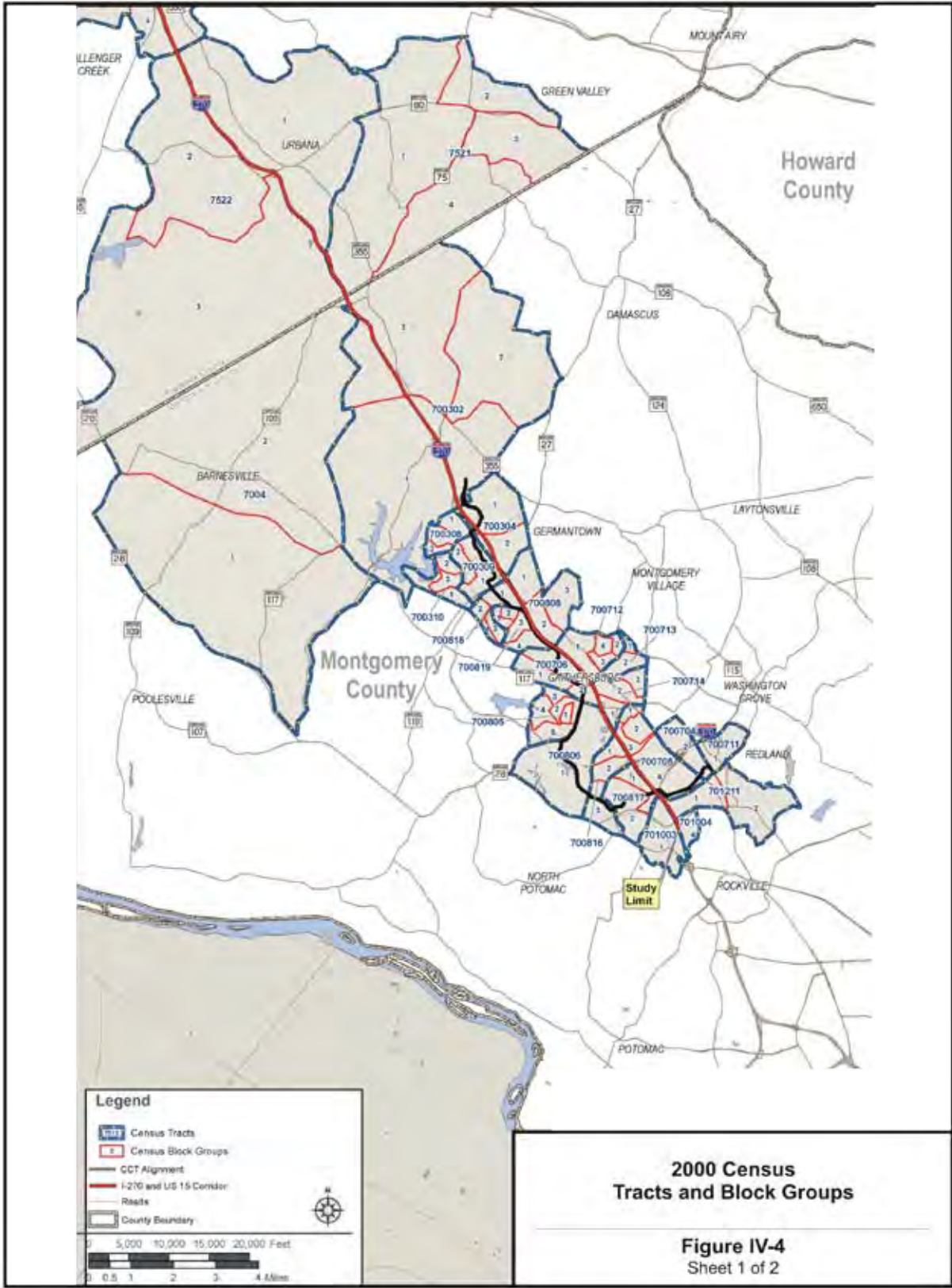
*Table IV-4* summarizes the population and household characteristics for the Metropolitan Washington Region, Montgomery County and Frederick County.

Table IV-4: Population and Household Characteristics

|                                            | 1990  | 2000 | 2010 | 2020 | 2030 | PERCENT CHANGE 2000-2030 |
|--------------------------------------------|-------|------|------|------|------|--------------------------|
| Metropolitan Washington Region             |       |      |      |      |      |                          |
| Population (in rounded millions)           | 3.9   | 4.6  | 5.4  | 5.9  | 6.2  | 35%                      |
| Number of Households (in rounded millions) | 1.5   | 1.7  | 2.0  | 2.3  | 2.4  | 41%                      |
| Average Household Size <sup>1</sup>        | 2.71  | 2.70 | 2.67 | 2.60 | 2.56 | --                       |
| Montgomery County                          |       |      |      |      |      |                          |
| Population (in rounded millions)           | 0.75  | 0.87 | 1.0  | 1.1  | 1.1  | 26%                      |
| Number of Households (in rounded millions) | 0.28  | 0.32 | 0.37 | 0.41 | 0.42 | 31%                      |
| Average Household Size <sup>2</sup>        | 2.65  | 2.66 | 2.67 | 2.60 | 2.57 | --                       |
| Frederick County                           |       |      |      |      |      |                          |
| Population (in rounded millions)           | 0.15  | 0.20 | 0.24 | 0.28 | 0.32 | 67%                      |
| Number of Households (in rounded millions) | 0.053 | 0.07 | 0.09 | 0.10 | 0.12 | 71%                      |
| Average Household Size <sup>2</sup>        | 2.78  | 2.72 | 2.68 | 2.63 | 2.60 | --                       |

<sup>1</sup>Reflects data for the “Washington Suburban Region” which includes Frederick, Montgomery, and Prince George’s counties, only (as of September 2005).  
<sup>2</sup>Reflects average person per household (as of October 2005).  
**Source:** MWCOG Round 6.4A Cooperative Forecasting (adopted Fall 2004). Round 6.4A reflects Census 2000 data. Forecasted estimates vary slightly from estimates in previous forecast rounds due to revised land use plans, changes to underlying assumptions, or new data.

Figure IV-4: 2000 Census Tracts and Block Groups





**Table IV-5** summarizes the general median household income and race characteristics for the Region and Montgomery and Frederick Counties.

Metropolitan Washington Region

The Metropolitan Washington Region includes the following jurisdictions: Washington, DC; the counties of Arlington, Fairfax, Loudoun, Prince William, and Stafford; and the cities of Alexandria, Falls Church, Fairfax, Manassas, and Manassas Park in Virginia; and Montgomery, Prince George’s, Calvert, Charles, and Frederick counties in Maryland. The MWCOG determined that the Metropolitan Washington Region grew by approximately 18 percent during the period from 1990 to 2000, from approximately 3.9 million to 4.6 million people. The MWCOG expects the regional population to increase by 35 percent between 2000 and 2030, reaching almost 6.2 million persons in 2030. This increase in population, which adds about 54,000 persons a year to the region, is a result of the long-term strength of the region’s economy and high rates of migration into the region.

The number of households in the Metropolitan Washington Region increased by 13 percent between 1990 and 2000 and is expected to increase by 41 percent between 2000 and 2030. The MWCOG credits the addition of more than 670,000 households between 2000 to 2030 to the growth in jobs, migration into the region, and an expected decline in household size from 2.70 to 2.56 persons per household between 2000 and 2030.

Montgomery County

Montgomery County’s population grew 16 percent between 1990 and 2000, from about 750,000 to 870,000 people. County population is expected to increase by almost 26 percent between 2000 and 2030, surpassing one million persons in 2030. The number of households is expected to increase by 31 percent between 2000 and 2030. Household size is expected to decrease between 2000 through 2030 from 2.66 to 2.57 persons per household.

The MDP indicates that Montgomery County authorized 4,950 housing units for construction in 2000 and 3,821 units in 2004 (a decrease of 23 percent). In 2004, the county had 353,051 housing units.

Frederick County

Frederick County’s population grew by approximately 30 percent between 1990 and 2000, from approximately 150,000 to 195,000 people. County population is expected to increase by 67 percent between 2000 and 2030, to almost 325,000 persons in 2030. The number of households is expected to increase by 71 percent between 2000 and 2030. Household size is expected to decrease between 2000 through 2030 from 2.72 to 2.60 persons per household.

The MDP indicates that Frederick County authorized 2,747 housing units for construction in 2000 and 1,773 units in 2004 (a decrease of 35 percent). In 2004, the county contained 81,504 housing units.

Elderly and Disability Population Characteristics

**Table IV-6** summarizes the elderly and disability characteristics of the population of Montgomery and Frederick counties and the study area. The presence of elderly and disability populations often highlights potential locations of minority and/or low-income (environmental justice, or EJ) populations. Of the total 109 block groups in the study area, all but 18 block groups had equal or higher percentages of populations with elderly persons and/or persons with disabilities than the respective county averages. The EJ analysis considers whether locations with high percentages of elderly persons and/or persons with disabilities can be characterized as areas with potentially affected EJ populations (EJ areas). Please refer to the **Environmental Justice** section in this chapter for more detail.

Table IV-5: General Race Characteristics and Median Household Income

| RACE                                             | METROPOLITAN WASHINGTON REGION | MONTGOMERY COUNTY | FREDERICK COUNTY |
|--------------------------------------------------|--------------------------------|-------------------|------------------|
| Total:                                           | 4,544,944                      | 873,341           | 195,277          |
| White Alone                                      | 2,437,636                      | 518,456           | 172,105          |
| Black or African American Alone                  | 1,225,575                      | 128,252           | 12,007           |
| American Indian and Alaskan Native Alone         | 12,255                         | 1,837             | 413              |
| Asian Alone                                      | 319,650                        | 97,769            | 3,296            |
| Native Hawaiian and Other Pacific Islander Alone | 2,572                          | 424               | 45               |
| Some Other Race Alone                            | 11,349                         | 2,748             | 157              |
| Two or More Races                                | 113,387                        | 23,546            | 2,656            |
| Hispanic or Latino                               | 422,520                        | 100,309           | 4,598            |
| Median Household Income in 1999                  | \$64,473                       | \$71,551          | \$60,276         |

Source: 2000 US Census

Table IV-6: 2000 Elderly and Disability Population Characteristics

|                           | TOTAL POPULATION | ELDERLY POPULATION | PERCENT ELDERLY | PERSONS WITH DISABILITIES | PERCENT OF PERSONS WITH DISABILITIES |
|---------------------------|------------------|--------------------|-----------------|---------------------------|--------------------------------------|
| Montgomery County         | 873,341          | 97,457             | 11.2%           | 98,157                    | 11.2%                                |
| Frederick County          | 195,277          | 18,779             | 9.6%            | 44,234                    | 22.7%                                |
| Study Area Total          | 191,772          | 15,625             | 8.1%            | 43,323                    | 22.6%                                |
| Montgomery County Portion | 107,321          | 7,114              | 6.6%            | 22,358                    | 20.8%                                |
| Frederick County Portion  | 84,451           | 8,511              | 10.1%           | 20,965                    | 24.8%                                |



Nearby Communities

The M-NCPPC and local planning offices in Frederick County, City of Frederick, City of Gaithersburg, and City of Rockville provided current information on communities and neighborhoods. The Montgomery County Civic Federation and the Frederick Board of Aldermen also contributed information.

Existing Conditions

This document defines neighborhoods and communities as:

- Incorporated places
- Communities identified as Corridor Cities
- Locally recognized but unincorporated neighborhoods or communities
- Neo-traditional communities – mixed-use developments that include both residential and commercial uses, may include new community facilities (i.e. community center) and/or have a homeowners association or neighborhood association formed
- Residential subdivisions of 50 lots or more that are approved and programmed or under construction.

The 2002 DEIS included most new residential subdivisions and multi-family developments as potential neighborhoods based on their concentration of new homes. Like the 2002 DEIS, this document identifies new (since 2002) areas of large-scale residential growth (defined as 50 or more homes in a single development) as potential neighborhoods. **Figure IV-5 (Sheets 1 through 5)** shows the location of communities and neighborhoods along the corridor.

Montgomery County

The 2002 DEIS identified 35 neighborhoods and/or subdivisions in Montgomery County. The county continues to see strong growth in both residential and non-residential development. New residential development is mostly concentrated in the Gaithersburg and Clarksburg areas. The following presents neighborhood and community information, by category.

*Incorporated and Unincorporated Places and Corridor Cities:* Montgomery County municipalities and unincorporated communities, including Corridor Cities, in the study area include:

- City of Gaithersburg
- City of Rockville
- Clarksburg
- Germantown
- Hyattstown
- Montgomery Village
- Shady Grove

*Neighborhoods and Neo-traditional Communities:* There are 35 neighborhoods listed in the 2002 DEIS as located in the project study area. Many have increased in intensity of development. **The Land Use, Zoning and Future Development section** in this chapter identifies five newly emerging communities within the corridor that are located in Montgomery County: Cabin Branch, Upper Rock District, Casey East, Casey West and Crown Farm.

*Subdivisions:* Most new residential subdivisions identified in the 2002 DEIS (Seneca Meadows, Martens Property, Germantown Town Center and Clarksburg Triangle) have completed construction. **Table IV-7** lists the new residential subdivisions of 50 units or more in Montgomery County in or near the corridor that have been approved since 2002.

Frederick County

*Incorporated Places and Corridor Cities:* The City of Frederick remains the only incorporated place within the I-270/US 15 Corridor in Frederick County. The city boundaries within the corridor remain the same as in 2002.

*Neighborhoods and Neo-traditional Communities:* The 2002 DEIS listed 19 neighborhoods in the Frederick County portion of the project area; many have increased in intensity of development. The Villages of Urbana, a major planned growth area south of the City of Frederick, has continued to expand. Since 2002, the City of Frederick has formed 12 Neighborhood Advisory Councils (NAC). Each NAC area closely overlaps with established voting districts and census tracts. Seven of the NAC areas either touch or fall partially within the

Table IV-7: New Subdivisions in the I-270/US 15 Corridor in Montgomery County–2002-2006

| NAME                                     | LOCATION                                                     | TOTAL UNITS |
|------------------------------------------|--------------------------------------------------------------|-------------|
| Summerfield Crossing; Linthicum Property | Old Baltimore Road, Clarksburg                               | 418         |
| Woodcrest                                | Frederick Road north of Clarksburg Road, Clarksburg          | 86          |
| Clarksburg Ridge                         | Clarksburg Road west side of Columbia Drive, Clarksburg      | 159         |
| Highlands at Clarksburg                  | SE quadrant of Frederick Road at Clarksburg Road, Clarksburg | 594         |
| Gateway Commons                          | Hammerhill Road and Frederick Road, Clarksburg               | 292         |
| Observation Heights Woods                | 70 West Deer Park Road, Gaithersburg                         | 130         |

I-270/US 15 Corridor. The NACs recommend solutions to neighborhood, traffic, safety, zoning, and capital improvements issues, and comment on development review requests and Board of Appeals cases.

*Subdivisions:* Most residential subdivisions identified in the 2002 DEIS (Prospect View, Fairfield, Tuscarora Knolls, Willowbrook, and Wormans Mill Pond) have completed construction. There are no new residential subdivisions of 50 lots or more in Frederick County approved since 2002.

Impacts and Mitigation

Alternatives 6A/B and 7A/B will result in greater transportation mobility and access for residents. Enhanced mobility mean that residents will have a greater range of choice and access to employment centers, shopping areas, public facilities and services including health care, and recreational facilities. Alternatives 6A/B and 7A/B would create visual effects due to the presence of additional pavement and ramps. The most visual effects will occur near transit stations. There will be residential displacements adjacent to the existing highway and at station sites. There will be noise impacts to residences adjacent to the highway and transitway alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, would have an impact on community sustainability and access, as it would not address the growing congestion and safety hazards along I-270 and US 15.

Alternatives 6A/B and 7A/B

If a build alternative is selected as the preferred alternative, then temporary effects to neighborhoods and communities during the construction phase will occur from traffic lane diversions, possible loss of parking, and noise, vibration and airborne dust from construction equipment and materials.

Highway Alignment

The highway alignment will displace a large number of residences and requires minor property takings along I-270. Overall, these displacements will have limited impacts on cohesion due to their locations at the outside boundaries of the affected neighborhoods or communities as defined for this analysis. Yet, as the project displaces some properties, their physical removal will, in turn, expose other residences to the newly widened highway. These remaining residents may experience more noise, light, and an altered visual setting as a result of the increased exposure to the

Figure IV-5: Neighborhoods and Communities in the Study Area

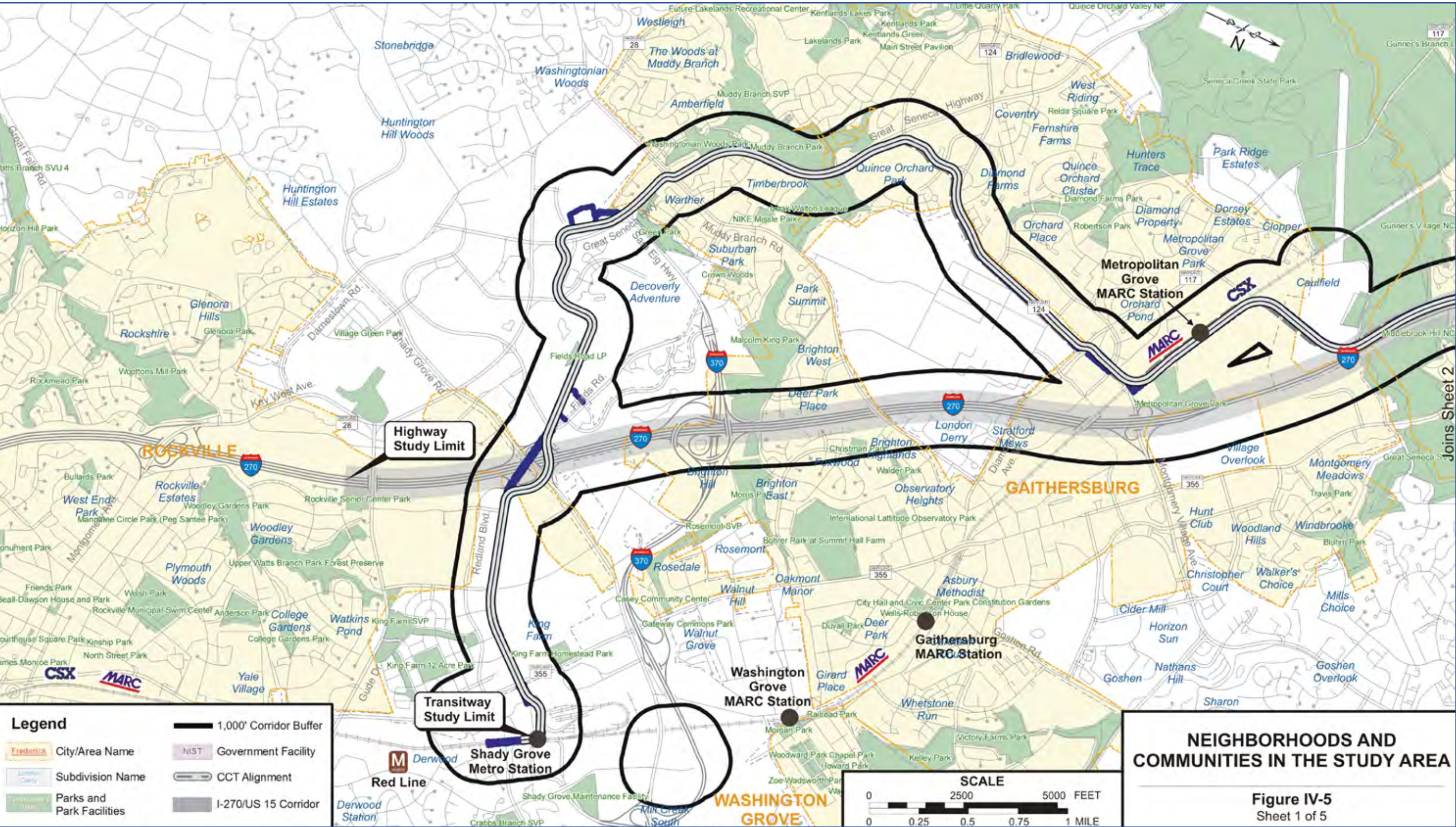


Figure IV-5: Neighborhoods and Communities in the Study Area

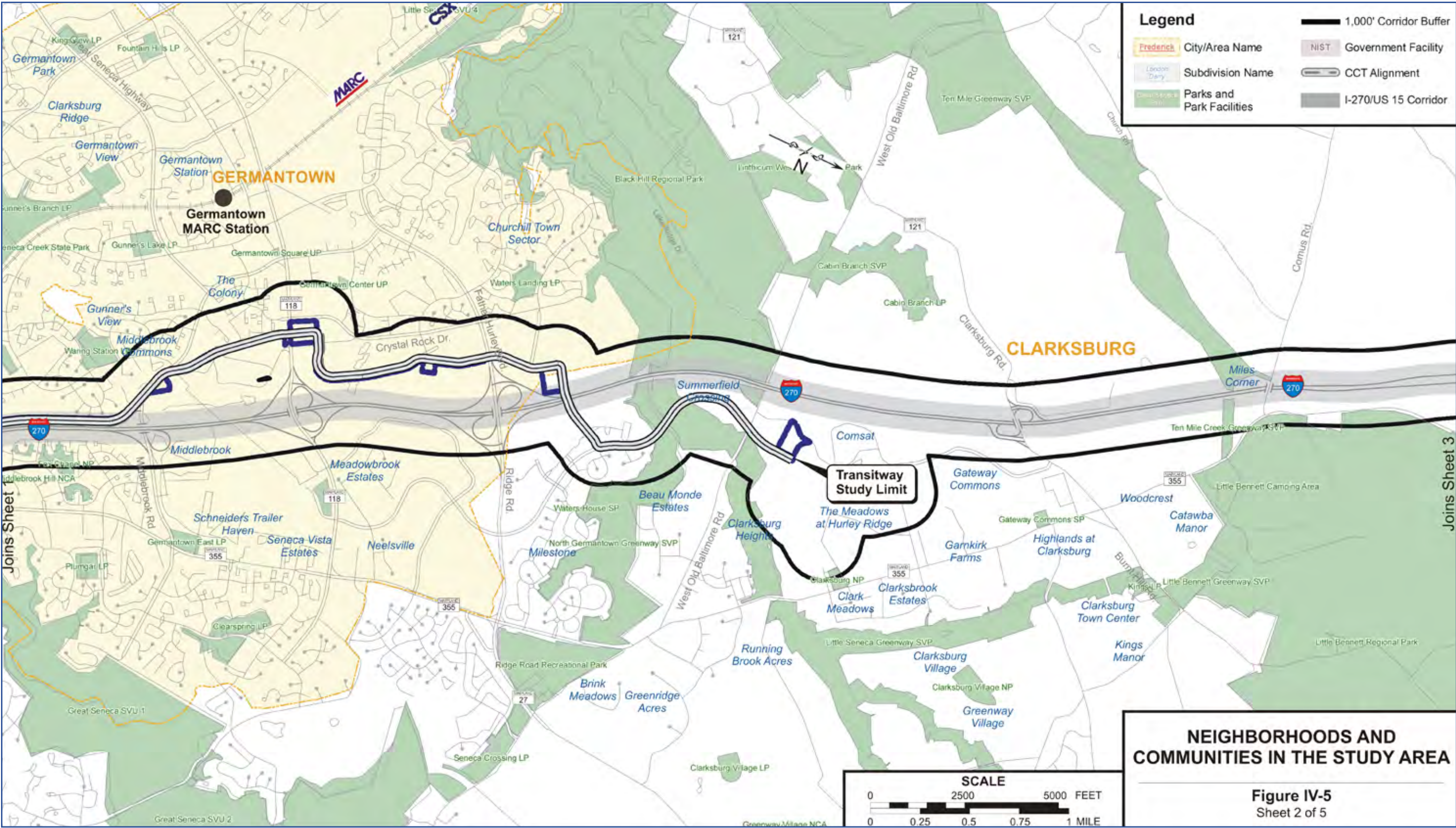


Figure IV-5: Neighborhoods and Communities in the Study Area

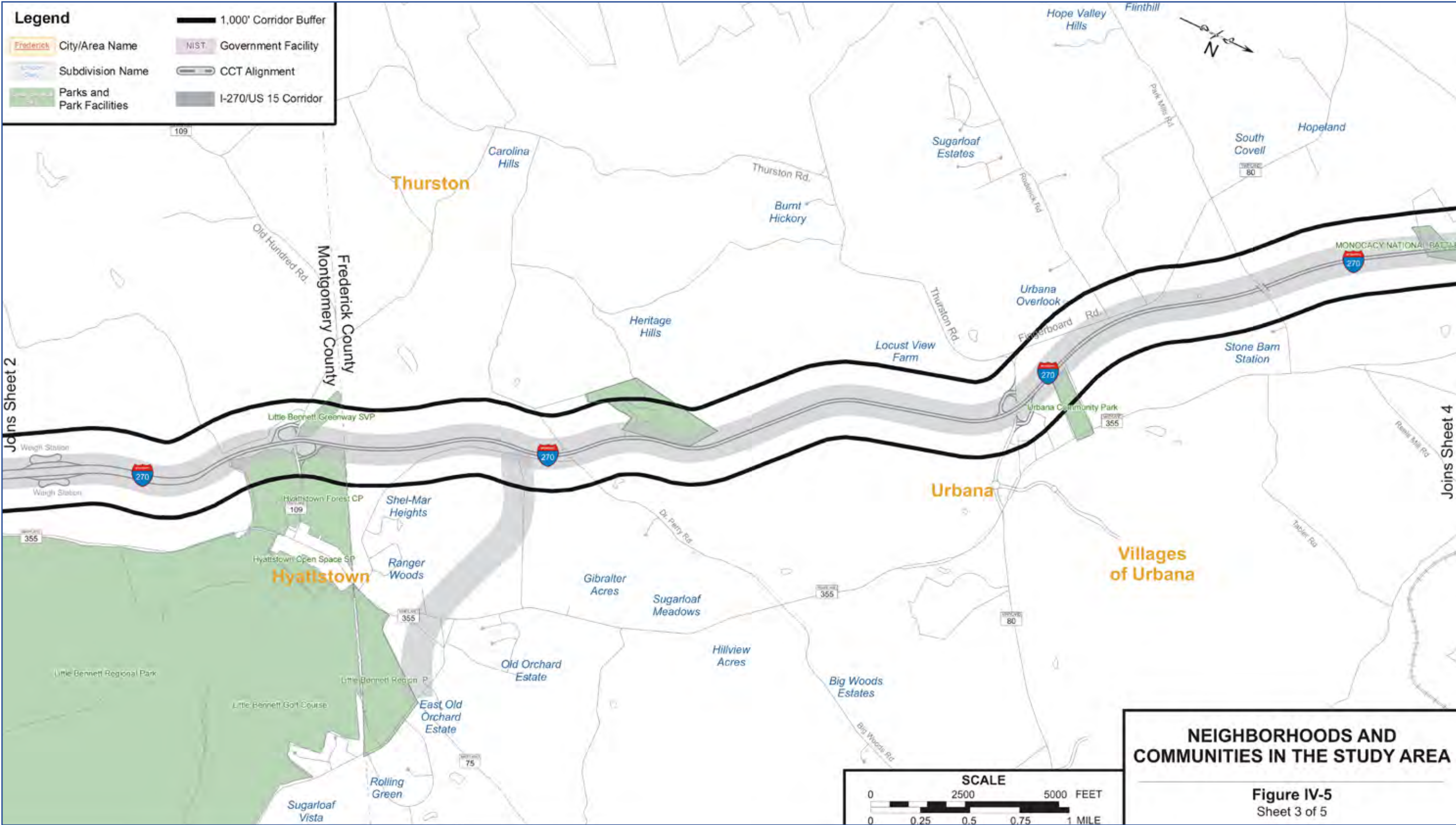


Figure IV-5: Neighborhoods and Communities in the Study Area

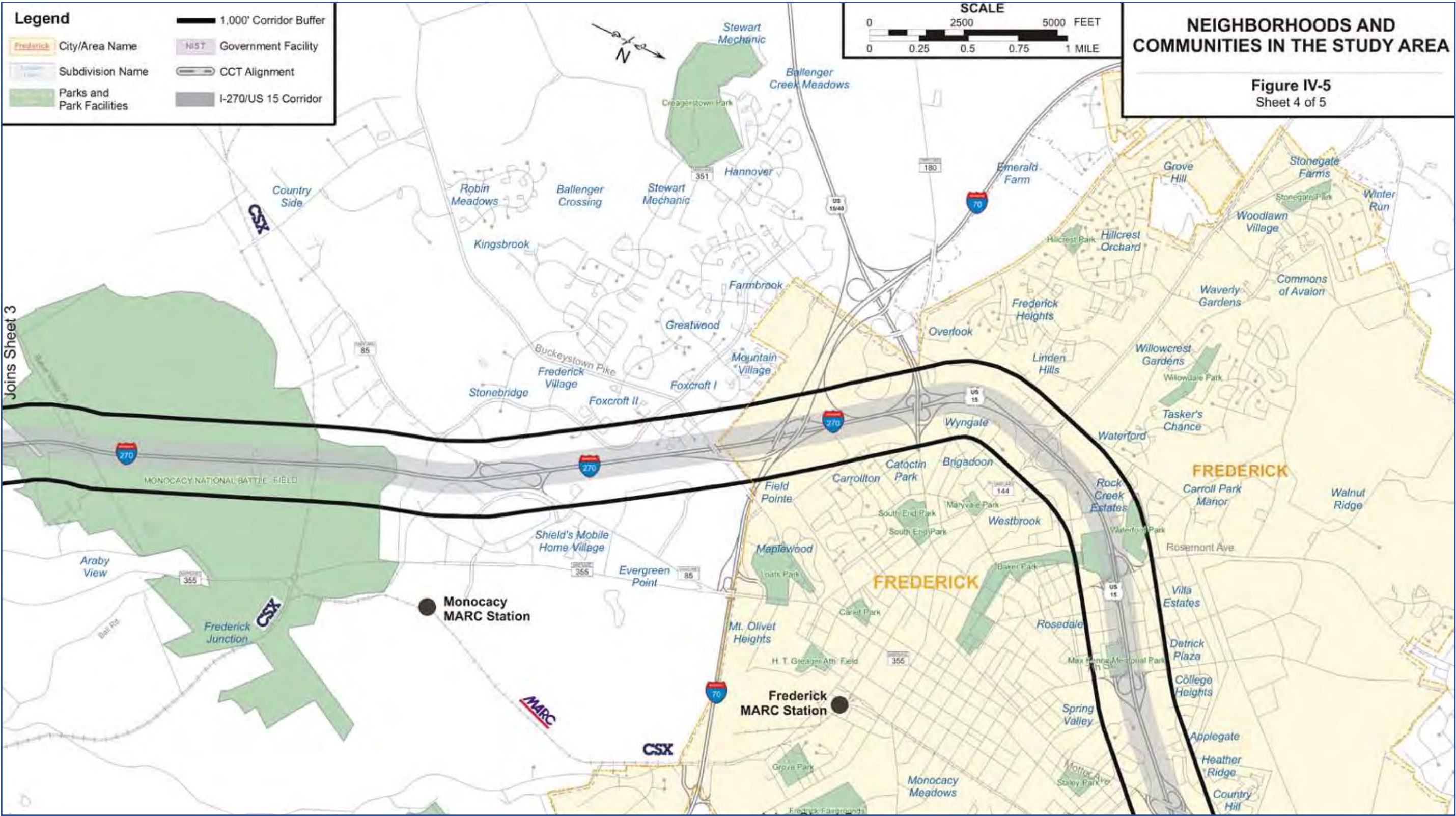
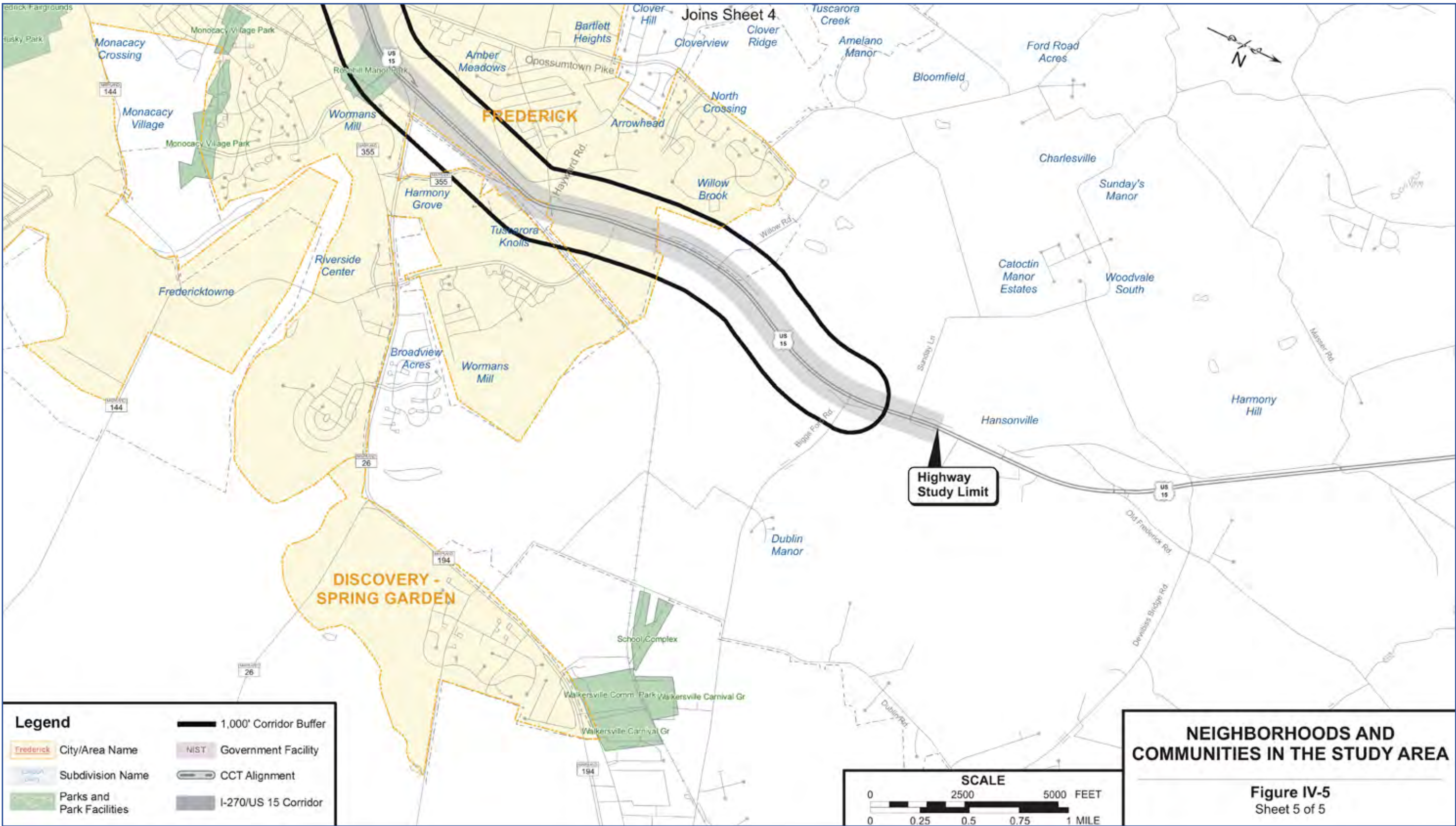


Figure IV-5: Neighborhoods and Communities in the Study Area



new improvements. In addition, the loss of residences may have an indirect impact on neighborhood social interaction and sense of unity as some neighbors are relocated.

**Transitway Alignment**

The proposed transit lines and stations would benefit the communities in Montgomery County by providing enhanced access to employment and activity centers. The transitway stations would serve the communities and support transit-oriented development in those areas along the corridor for which it is appropriate.

At transitway stations, pedestrians would have to cross the tracks or roadway to reach the opposite platform. Since the transitway would be close to residential areas, there is a potential safety concern in areas where residents might attempt to cross the transitway.

**Potential Mitigation Measures**

Retaining walls and smaller highway shoulders to reduce the number of potential displacements will be evaluated during final design. Noise barriers and landscaping will be considered to minimize potential visual and noise impacts to neighborhoods and communities.

The transitway stations, alignment, and potential operations and maintenance (O&M) facility sites would be designed to complement surrounding communities as much as possible. Safety fencing, warning signs, lighting, and other measures would lessen potential accidents. Educational awareness programs, provided by the transit agency, would help familiarize area residents, school officials, emergency response authorities and students with transit operations and safety plans. To increase safety at stations, signs and crosswalks would direct pedestrian movements at each end of the stations and discourage crossings at locations other than the station platforms. For LRT, gates and pavement markings would prevent access to the track from an approach walk. The transitway operator’s on-board signals would be used to alert patrons to oncoming transit vehicles.

Community Facilities and Services

Existing Conditions

The I-270/US 15 Corridor is home to a wide array of community facilities and services. These are resources that support community safety, cohesion, and quality of life. **Figure IV-6 (Sheets 1 through 5)** shows the locations of these existing resources within the corridor. There are 12 schools, two libraries, 16 places of worship, three post offices, six public safety departments (police/fire/rescue), and eight hospitals within the corridor. These were identified in the 2002 DEIS. Some new community facilities have been constructed in the study area since 2002 and a number are planned or programmed for construction. **Table IV-8** lists the new community facilities in or near the study area since the 2002 DEIS.

Impacts and Mitigation

Alternatives 6A/B and 7A/B would provide additional access points for emergency vehicles through the introduction of new interchanges and service roads, and allow for shorter response times by easing congestion. No adverse change to direct access is expected to any community facility or resource.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, could have a minor adverse impact to the effective functioning of public safety facilities in the corridor as response times may be slowed by continued growth in traffic and congestion on I-270, US 15 and its interchanges and associated approach roads.

Alternatives 6A/B and 7A/B

The impacts to community facilities of Alternatives 6A/B and 7A/B would include the acquisition of land from several community resources including one cemetery, one planned police station, the Montgomery County Correctional Facility, two schools, one church, one fire station, and two government facilities. None of these takings will affect the activities of these facilities. The alternatives may impact the access road to the Montgomery County Correctional Facility. Refer to the

Table IV-8: Newly Built, Planned, or Programmed Community Facilities in the I-270 Corridor

| FACILITY TYPE                           | STATUS             | LOCATION                                                                                      |
|-----------------------------------------|--------------------|-----------------------------------------------------------------------------------------------|
| Montgomery County                       |                    |                                                                                               |
| Clarksburg High School                  | Opened 2006        | MD 355 (22500 Wims Road), Clarksburg                                                          |
| Fire Station                            | Programmed         | MD 355 at MD 121, Clarksburg                                                                  |
| Fire Station                            | Programmed         | Near the fire academy on Key West Road in Gaithersburg                                        |
| Fire Station                            | Planned            | Gateway Center Drive in Gaithersburg                                                          |
| Senior Center                           | Planned            | Casey East development                                                                        |
| 6 <sup>th</sup> District Police Station | Planned            | NW corner of Watkins Mill Road and proposed I-270 on-ramp., Casey East property, Gaithersburg |
| High School                             | Planned            | Washington Boulevard at Fields Road, Crown Farm, Gaithersburg                                 |
| Regional Library                        | Opened 2007        | 19840 Century Boulevard, Germantown                                                           |
| Frederick County                        |                    |                                                                                               |
| Urbana District Park                    | Under construction | Urbana Pike and Tabler Run                                                                    |
| Centerville Elementary School           | Opened 2005        | East of Urbana High School along Fingerboard Road (MD 80)                                     |
| Urbana Middle School                    | Opened 2006        | Pontius Court, Ijamsville                                                                     |
| Crestwood Middle School                 | Opened 2004        | Foxcroft Drive, Frederick                                                                     |
| Middle School and Police Station        | Planned            | New Design Road – Frederick                                                                   |
| Library and community center            | Under construction | Villages at Urbana near the MD 80/355 junction                                                |

**Section 4(f) section** in this chapter for a description of impacts to the Urbana Elementary School recreation area.

Potential avoidance/minimization efforts will include the evaluation of retaining walls, reduced shoulder widths and minor shifts in alignments during the final design effort to avoid or minimize impacts.

Figure IV-6: Community Facilities and Services

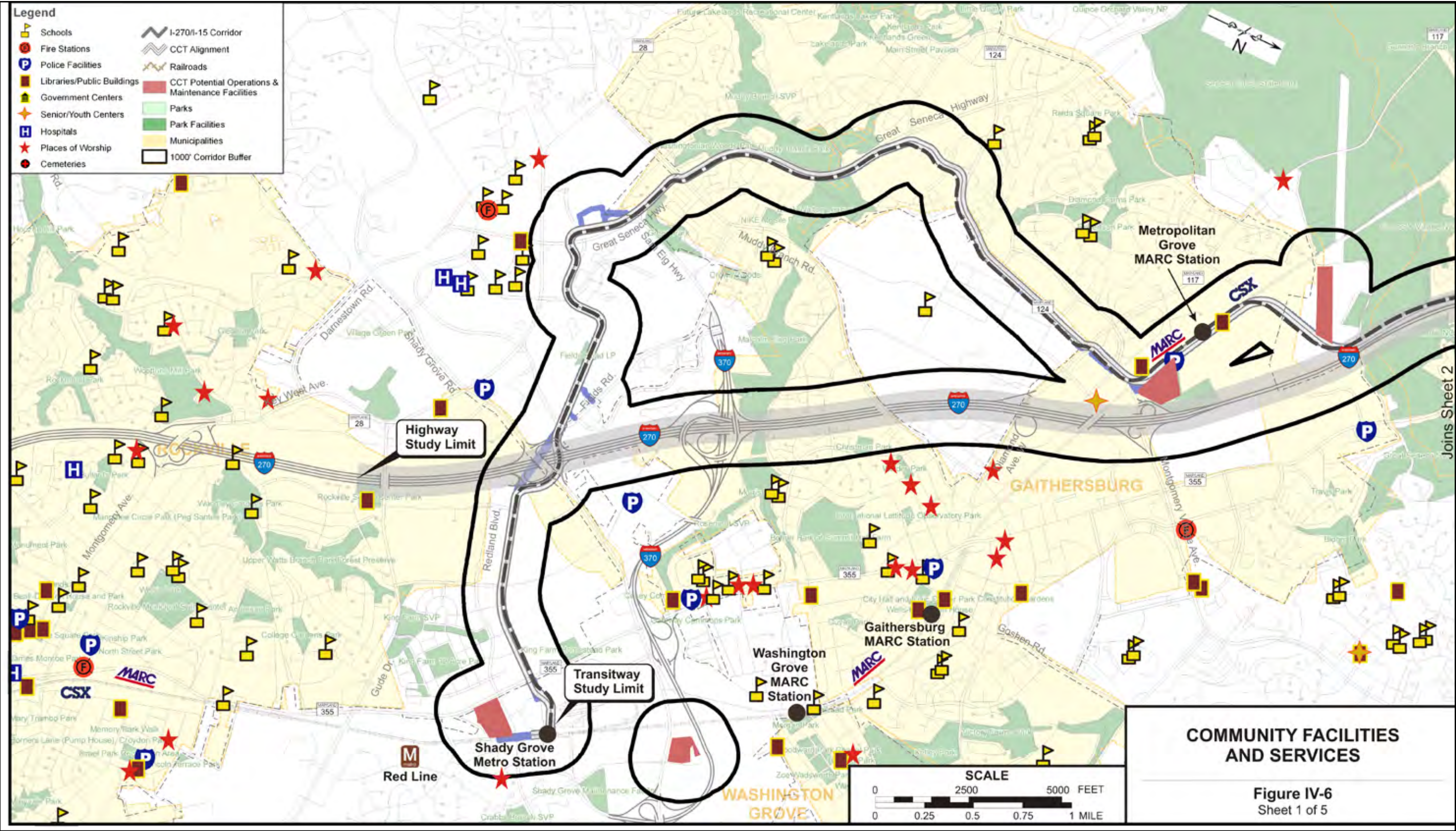


Figure IV-6: Community Facilities and Services

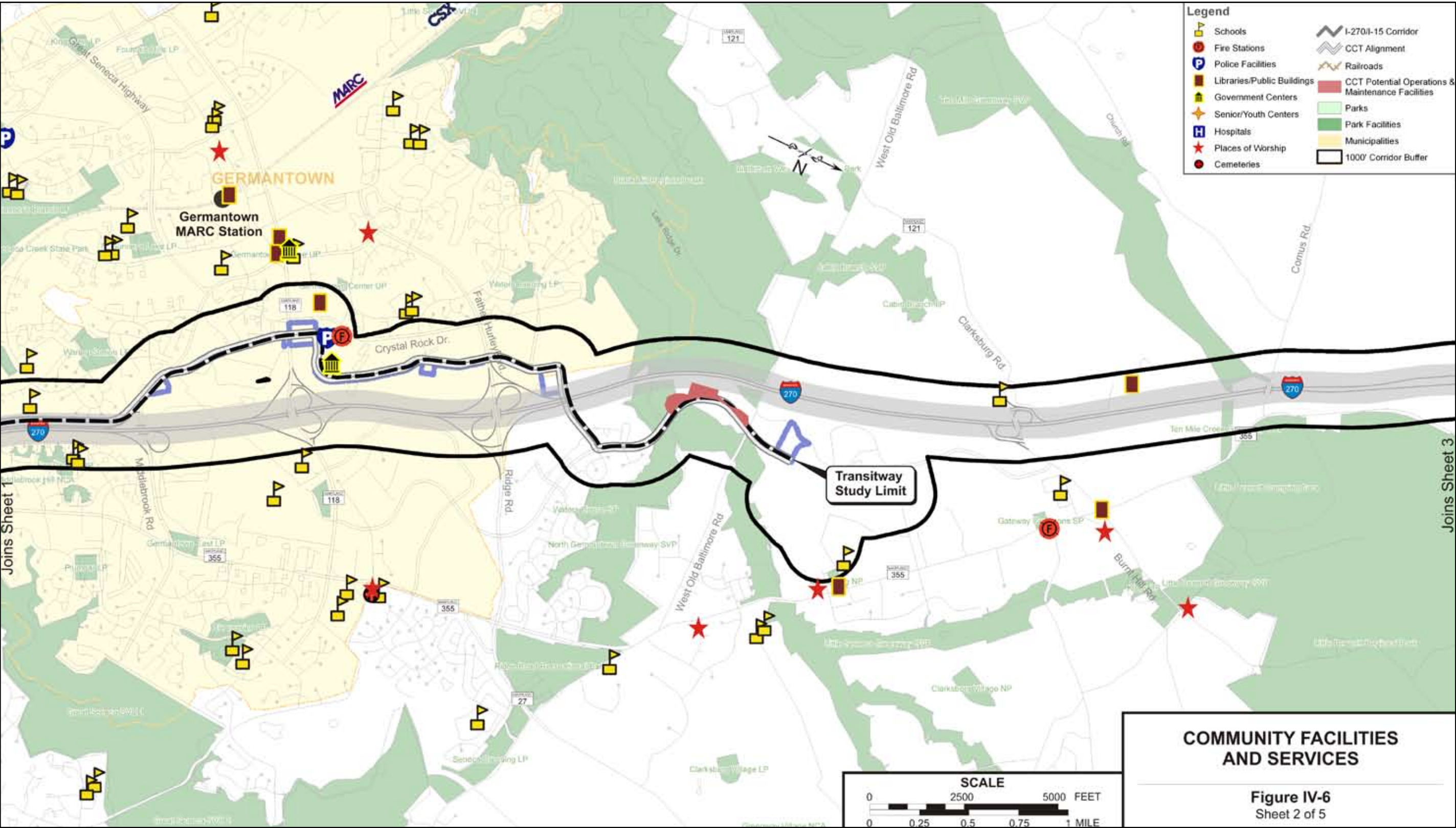
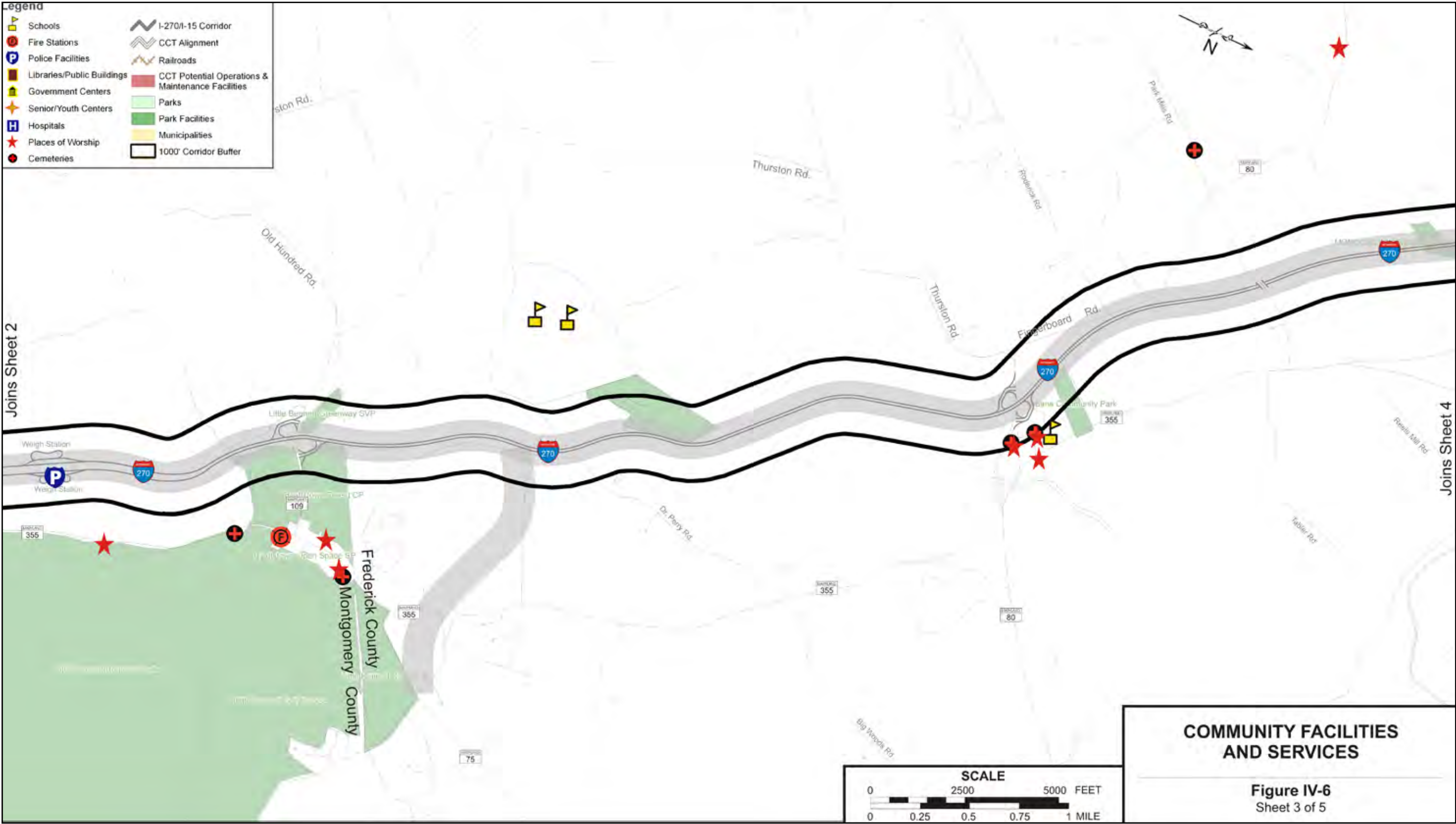


Figure IV-6: Community Facilities and Services



### Figure IV-6: Community Facilities and Services

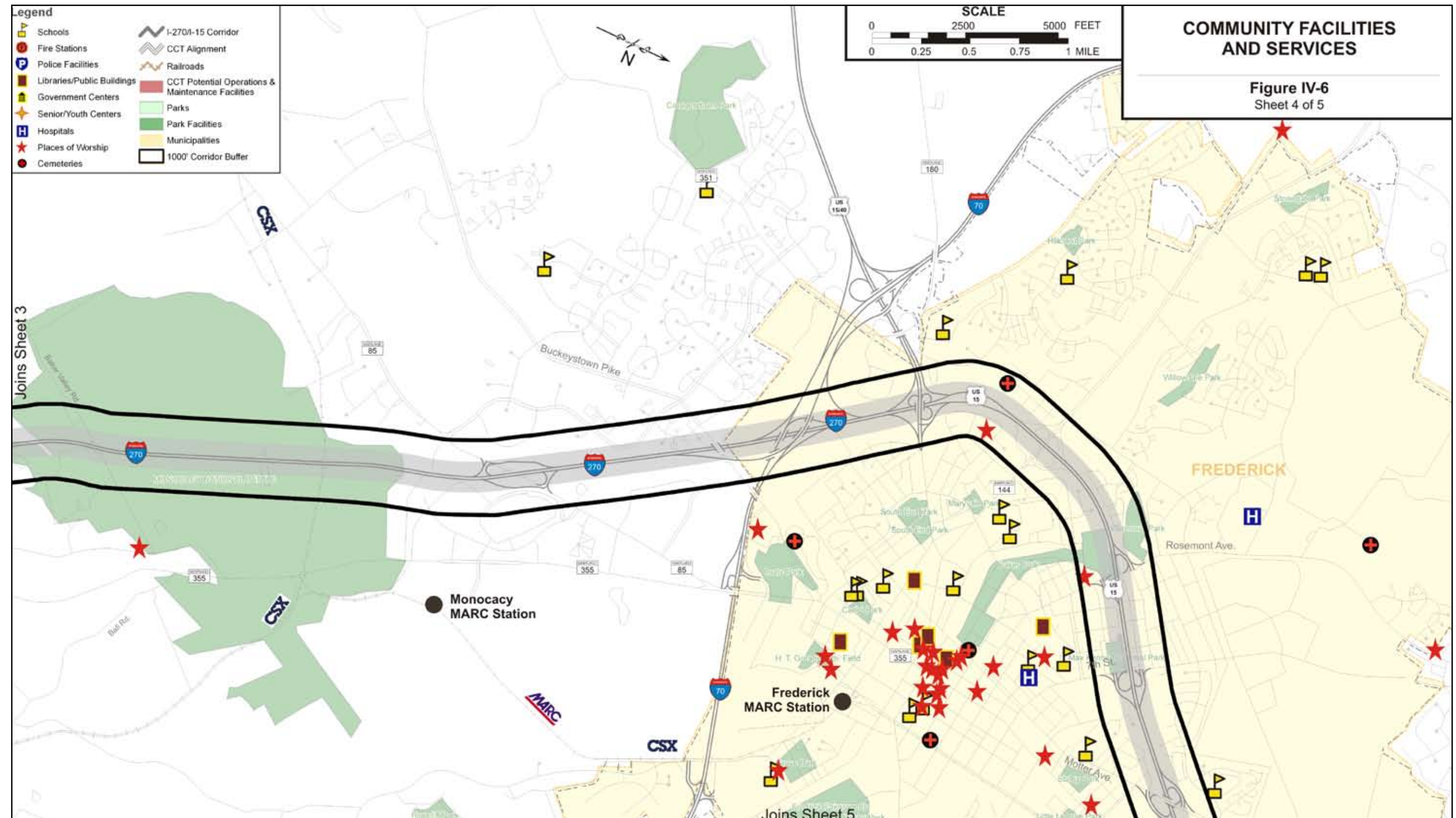
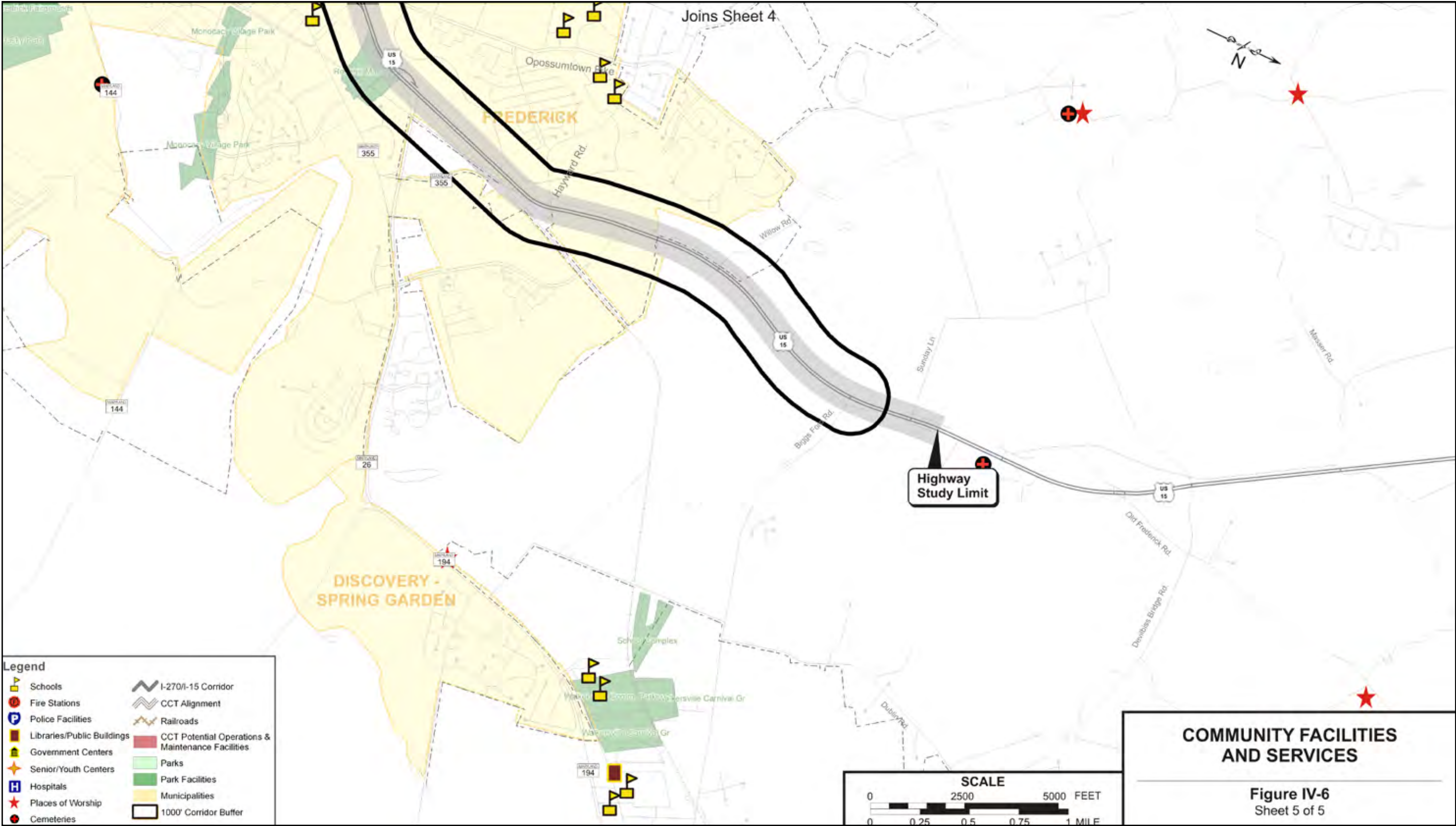


Figure IV-6: Community Facilities and Services



Parks and Recreational Facilities

Existing Conditions

The I-270/US 15 Multi-Modal Corridor contains many park and recreational facilities that offer a diverse range of activities. *Table IV-9* and *Figure IV-6 (Sheets 1 through 5)* show the parks and recreational facilities located adjacent to, or within a 1,000-foot buffer of, the proposed improvements. More extensive descriptions of each park/recreational facility are included in the 2008 SETR.

Montgomery County

Seventeen parks/recreational facilities are located within the project study area in Montgomery County, including three of the largest parks in the Corridor: Seneca Creek State Park, Little Bennett Regional Park and Black Hill Regional Park. A number of bikeways and trails exist or are planned in the I-270/US 15 Corridor as well. Local master plans encourage the provision of new recreation areas and open space within new developments.

Frederick County

Eleven parks/recreation areas are located within the project study area in Frederick County. The largest park, Monocacy National Battlefield Park, is bisected by I-270. Pedestrian and bicycle facilities are also being planned for existing and new communities. Refer to the 2008 SETR for more detailed information.

Impacts and Mitigation

The No-Build Alternative will not affect any parks and recreational facilities along the project corridor.

Alternatives 6A/B and 7A/B may require potential property acquisition from 13 public parks and recreational areas within the corridor, shown in *Table IV-10*. Potential impacts include loss of acreage and loss of buffer landscapes adjacent to the highway/transitway. A full discussion of potential parks impacts and avoidance and minimization measures being considered is included in the Section 4(f) section of this Chapter.

Table IV-9: Parks and Recreational Facilities within the Project Study Area

| NAME OF PARK                                                                      | AMENITIES                                                                                                                              | SIZE (ACRES) | JURISDICTION                                    |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------|
| King Farm Public Park System (King Farm Homestead Park, Stream Valley Park (SVP)) | Passive parkland (47 acres) and active uses (45 acres) including athletic fields, tennis courts, basketball, playgrounds, picnic areas | 92           | City of Rockville                               |
| Green Park                                                                        | Tot lot, play area, basketball courts, tennis court, hiking trails, dog exercise area                                                  | 14           | City of Gaithersburg                            |
| Washingtonian Woods Park                                                          | Play area, a half basketball court, tennis courts, hiking trails                                                                       | 22           | City of Gaithersburg                            |
| Muddy Branch SVP/ Lakelands Development                                           | Passive park, trails                                                                                                                   |              | City of Gaithersburg                            |
| Diamond Farms Park                                                                | Tennis courts, basketball courts, handball/tennis practice wall, tot lot, picnic tables, play equipment                                | 23           | City of Gaithersburg                            |
| Morris Park                                                                       | Basketball, baseball and soccer fields, playground, tennis courts, picnic tables                                                       | 37           | City of Gaithersburg                            |
| Malcolm King Park                                                                 | Basketball and tennis courts, playground, picnic tables, hiking trail                                                                  | 73           | City of Gaithersburg                            |
| Christman Park                                                                    | Picnic tables, fishing pond                                                                                                            | 4            | City of Gaithersburg                            |
| Metropolitan Grove Park                                                           | Undeveloped                                                                                                                            |              | City of Gaithersburg                            |
| Great Seneca SVP                                                                  | Hiking trails                                                                                                                          | 1,649        | Montgomery County                               |
| Seneca Creek State Park                                                           | Biking, hiking and riding trails, boating, skiing, fishing, canoeing, hunting, playground, visitor's center with exhibits              | 6,290        | Maryland Department of Natural Resources (MDNR) |
| Middlebrook Hill Park                                                             | Undeveloped                                                                                                                            | 12           | M-NCPPC                                         |
| Fox Chapel Park                                                                   | School, playground, softball field, tennis court, picnic area and shelter                                                              | 16           | M-NCPPC                                         |
| Waring Station Local Park                                                         | Soccer, playground, basketball, multi-use field                                                                                        | 17           | M-NCPPC                                         |
| North Germantown Greenway SVP                                                     | Undeveloped                                                                                                                            | 300          | M-NCPPC                                         |
| Black Hill Regional Park                                                          | Playground, picnic areas, lake, visitor's center, exhibits                                                                             | 1,843        | M-NCPPC                                         |
| Little Bennett Regional Park                                                      | Camping, trails, golf course                                                                                                           | 3,648        | M-NCPPC                                         |
| Urbana Lake Fish Management                                                       | Undeveloped                                                                                                                            | 70           | MDNR                                            |
| Urbana Elementary School                                                          | Ball field, soccer field, tennis/basketball courts, playground                                                                         | 21           | Frederick County                                |
| Urbana Community Park                                                             | Pavilions, picnic tables, baseball, soccer fields, playground, tennis courts                                                           | 20           | Frederick County                                |
| Monocacy National Battlefield                                                     | Auto tour and walking trails, visitor center with exhibits                                                                             | 1,920        | National Park Service                           |
| Linden Hills Neighborhood Park                                                    | Playground                                                                                                                             | 0.2          | Frederick City                                  |
| Waterford Park                                                                    | Undeveloped                                                                                                                            | 18           | Frederick City                                  |
| Baker Park                                                                        | Playground, tennis courts, softball, football, pavilion                                                                                | 53           | Frederick City                                  |
| Apple Avenue Park                                                                 | Undeveloped                                                                                                                            | 2            | Frederick City                                  |
| Max Kehne Park                                                                    | Ball fields, tennis, playground, pavilion                                                                                              | 9            | Frederick City                                  |
| Rosedale Park                                                                     | Pavilion restrooms, playground equipment, basketball                                                                                   | 3            | Frederick City                                  |
| Rose Hill Manor Park                                                              | Carriage, farm, and children's museums, history tours                                                                                  | 43           | Frederick County                                |

Table IV-10: Impacts to Parks and Recreational Facilities

| PARK/RECREATION FACILITY         | SIZE (ACRES) | ALTERNATIVE 6A/B OR 7A/B IMPACTS (ACRES) |
|----------------------------------|--------------|------------------------------------------|
| Morris Park                      | 37.2         | 0.21                                     |
| Malcolm King Park                | 72.9         | 0.75                                     |
| Seneca Creek State Park          | 6,290        | 12.09*                                   |
| Middlebrook Hill Park            | 11.5         | 2.13                                     |
| North Germantown Greenway        | 300          | 0.78                                     |
| Black Hill Regional Park         | 1,843        | 8.61                                     |
| Little Bennett Regional Park     | 3,648        | 0.29                                     |
| Urbana Fish Lake Management Area | 70           | 1.23                                     |
| Urbana Elementary School         | 21           | 1.78                                     |
| Urbana Community Park            | 20           | 0.44                                     |
| Monocacy National Battlefield    | 1,647        | 14.50                                    |
| Baker Park                       | 53           | 0.26                                     |
| Rose Hill Manor Park             | 43           | 1.04                                     |

All impacts represent use of a 2:1 slope design for roadway embankment.  
\* Includes both transitway and highway impacts.



Displacements and Relocations

An analysis of the potential residential and business displacements that would result from Alternatives 6A/B and 7A/B was based on preliminary right-of-way estimates. If a build alternative is selected, the number of actual displacements may vary from those presented due to refinements in both the design and right-of-way requirements that will occur during the detailed engineering phase of this project. **Tables IV-11 and IV-12** summarize the potential residential and business displacements that may occur because of the construction of Alternatives 6A/B or 7A/B. The potential displacements are the same for either alternative, as the physical footprint of the alternatives is identical. The locations of potential displacements are identified on the **Plan Sheets** in **Appendix A**. There are no displacements required for the No-Build Alternative.

The I-270/US 15 Corridor highway and transit improvements have been planned to minimize property acquisitions and relocations. Though the highway and transitway alignments travel along existing streets and undeveloped parcels for much of their length, there are areas along I-270, particularly between I-370 and Muddy Branch Road, that contain large numbers of displacements. Construction of a retaining wall in certain locations could reduce the number of displacements. The project team will continue to coordinate with municipalities during the planning phase of this project as property acquisitions are subject to change as the project plans are refined.

Relocation Process

Affected property owners will receive relocation assistance in accordance with federal and/or state requirements depending on the funding source. The Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, with implementing regulations at 49CFR Part 24, requires that the project shall not proceed into any phase that will cause the relocation of any persons or businesses or proceed with any construction project, until it has furnished assurances that all displaced persons will be satisfactorily relocated to comparable decent, safe and sanitary housing within their financial means, or that

Table IV-11: Summary of Residential Displacements – Alternatives 6A/B and 7A/B

| LOCATION                                                                                | PLAN SHEET COUNTY<br>Appendix A | MAXIMUM DISPLACEMENTS<br>WITHOUT MINIMIZATION                            | MINIMIZED DISPLACEMENTS WITH MINIMIZED<br>SHOULDERS AND/OR RETAINING WALLS <sup>1</sup> |
|-----------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Highway Residential Displacements                                                       |                                 |                                                                          |                                                                                         |
| I-270 Southbound, North of I-370 Brighton West Townhouses                               | HWY 1 (Montgomery)              | 81 residences                                                            | 6 - 10 residences                                                                       |
| I-270 Northbound, North of I-370 (with I-370 direct access ramps) Fireside Condominiums | HWY 1 (Montgomery)              | 0 residences <sup>2</sup>                                                | 0 residences <sup>2</sup>                                                               |
| I-270 Northbound, South of MD 117 London Derry Apartments/ Montgomery Club              | HWY 2 (Montgomery)              | 150 residences                                                           | 0 - 61 residences <sup>3</sup>                                                          |
| I-270 Southbound, South of Great Seneca Creek/ Game Preserve Road                       | HWY 2 (Montgomery)              | 1 residence <sup>4</sup>                                                 | 0 residences                                                                            |
| I-270 Northbound, North of Great Seneca Creek Fox Chapel                                | HWY 3 (Montgomery)              | 0 residences <sup>5</sup> (retaining wall included in conceptual design) | 0 residences <sup>5</sup>                                                               |
| I-270 Northbound, South of Comus Road                                                   | HWY 6 (Montgomery)              | 2 residences                                                             | 1 residence                                                                             |
| I-270 Southbound, South of Comus Road                                                   | HWY 6 (Montgomery)              | 1 residence                                                              | 1 residence                                                                             |
| I-270 Southbound, North of MD 80 interchange Fingerboard Road Residence                 | HWY 9 (Frederick)               | 1 residence                                                              | 1 residence                                                                             |
| I-270 Southbound, South of I-70 Princeton Court Apartments                              | HWY 11 (Frederick)              | 12 residences                                                            | 0 residences                                                                            |
| US 15 Northbound, South of Rosemont Ave. Mercer Place Residences                        | HWY 13 (Frederick)              | 2 residences                                                             | 0 residences                                                                            |
| US 15 Southbound, North of Rosemont Avenue along Biggs Avenue                           | HWY 13 (Frederick)              | 1 residence                                                              | 0 residences                                                                            |
| Total Highway Residential Displacements                                                 |                                 | 251 residences                                                           | 9 - 74 residences                                                                       |
| Transitway Residential Displacements                                                    |                                 |                                                                          |                                                                                         |
| MD 124 Eastbound between Great Seneca Highway and MD 117                                | TRAN 3 (Montgomery)             | 1 residence                                                              | 1 residence                                                                             |
| I-270 Southbound, South of Great Seneca Creek/ Game Preserve Road                       | TRAN 4 (Montgomery)             | 1 residence <sup>4</sup>                                                 | 1 residence <sup>4</sup>                                                                |
| Game Preserve Road (Potential O&M Site, if chosen)                                      | TRAN 4 (Montgomery)             | 4 residences                                                             | 4 residences                                                                            |
| I-270 Southbound, South of Middlebrook Road                                             | TRAN 5 (Montgomery)             | 3 residences                                                             | 3 residences                                                                            |
| W. Old Baltimore Road (Potential O&M Site, if chosen)                                   | TRAN 6 (Montgomery)             | 1 residence                                                              | 1 residence                                                                             |
| Total Transitway Residential Displacements                                              |                                 | 5 - 9 residences <sup>6</sup>                                            | 5 - 9 residences <sup>6</sup>                                                           |
| Highway and Transit Displacements in Montgomery County                                  |                                 | 240 - 244 residences                                                     | 12 - 83 residences                                                                      |
| Highway and Transit Displacements in Frederick County                                   |                                 | 16 residences                                                            | 0 - 1 residence                                                                         |
| Total Highway and Transitway Residential Displacements                                  |                                 | 256 - 260 residences                                                     | 12 - 83 residences                                                                      |

Notes: <sup>1</sup>Preliminary impacts are based on both a 25-foot and a 10-foot buffer beyond the proposed cut/fill line or the proposed retaining wall respectively, as well as an assessment of minimum/maximum structure displacements for townhouse units.  
<sup>2</sup>The proposed roadway would not impact the Fireside Condominium residences, however, further detailed engineering study is needed to determine if the existing highway stormwater system is adequate and the existing Fireside boiler room/distribution piping remain unaffected by EA Alternatives 6A/B and 7A/B.  
<sup>3</sup>Construction of a retaining wall in London Derry would lower the number of displacements to 61 residential units. However, zero displacements would require the potential MD 117 direct access ramps be modified or not carried forward through design; shoulder widths along I-270 are minimized; and the retaining wall is constructed.  
<sup>4</sup>This residence along Game Preserve Road will be impacted by the proposed highway widening without a retaining wall and would be avoided if a retaining wall were constructed; however, the transitway alignment will impact this residence under all scenarios.  
<sup>5</sup>The conceptual design will require FHWA review and approval of potential design exception.  
<sup>6</sup>There is a range of potential displacements since only one or possibly none of the O & M sites listed in this table will be chosen.



such housing is in place and has been made available to the displaced person. Reasonable moving expenses are also provided for displaced persons or businesses. The Federal Uniform Relocation Assistance and Real Property Acquisition Policies would be executed in a timely and humane fashion. Comparable housing and business space exists on the open market for relocation housing within the same area and can be completed with minimal effects to the economic well being of those directly affected by the project.

In the event comparable replacement housing is not available for displaced persons or available replacement housing is beyond their financial means, additional financial compensation will be provided through “housing as a last resort” to assure that comparable replacement housing of be available for displaced persons. Based on relocation studies, it is anticipated that “housing of a last resort” would be utilized to accomplish the re-housing requirements for the build alternatives under consideration. **Appendix B** of this document contains a *Summary of the Relocation Assistance Program of the Maryland State Highway Administration* – revised June 10, 2005 for further reference.

Title VI Statement

*It is the policy of the SHA and the Maryland Transit Administration (MTA) to ensure compliance with the provisions of 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 the SHA and MTA programs and projects funded in whole or in part by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). The SHA and MTA will not discriminate in highway or transit planning, design, construction, the acquisition of right-of-way, or the provision of relocation advisory assistance. This policy has been incorporated into all levels of the transportation planning process in order that proper consideration may be given to the social, economic and environmental effects of all transportation projects.*

Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, directs federal agencies to “promote nondiscrimination in federal programs substantially affecting human health and the environment, and provide minority and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment.” The order directs agencies to ensure that:

- They do not discriminate on the basis of race, color, or national origin.
- They identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income communities.
- They provide opportunities for community input in the NEPA process, including input on potential effects and mitigation measures.

This EJ analysis determines whether there are disproportionately high and adverse human health and environmental effects on minority and low-income populations.

Method for Identifying EJ Populations

Executive Order 12898 does not define the terms “minority” or “low-income.” However, the Council on Environmental Quality (CEQ) describes these terms in the context of an EJ analysis. The following definitions are unique to and are the basis for the EJ analysis:

- *Minority Individual* – The US Census Bureau classifies a minority individual as belonging to one of the following groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black (not of Hispanic Origin), and Hispanic.
- *Minority Populations* – CEQ Guidelines identify minority populations where either (a) the minority population of the affected area exceeds 50 percent or (b) the percentage of a minority population in the affected area is meaningfully greater than the percentage of minority population in the general population (or other appropriate unit of geographic analysis).

Table IV-12: Summary of Business Displacements – Alternatives 6A/B and 7A/B

| LOCATION                                                                              | PLAN SHEET<br>COUNTY<br>Appendix A | MAXIMUM<br>DISPLACEMENTS<br>WITHOUT<br>MINIMIZATION | MINIMIZED<br>DISPLACEMENTS<br>WITH RETAINING<br>WALLS <sup>1</sup> |
|---------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------|
| Highway Business Displacements                                                        |                                    |                                                     |                                                                    |
| I-270 northbound, south of I-370 (beginning of ETL facility)                          | HWY 1<br>(Montgomery)              | 1 business                                          | 0 businesses                                                       |
| I-270 southbound, north of I-370 (Festival at Muddy Branch Shopping Center)           | HWY 1<br>(Montgomery)              | 3 businesses                                        | 0 - 2 businesses                                                   |
| I-270 southbound, north of MD 117                                                     | HWY 2<br>(Montgomery)              | 1 business                                          | 0 businesses                                                       |
| I-270 northbound, north of Comus Road                                                 | HWY 6<br>(Montgomery)              | 1 business                                          | 1 business                                                         |
| I-270 southbound at proposed MD 75 interchange                                        | HWY 7<br>(Frederick)               | 1 business                                          | 1 business                                                         |
| I-270 southbound, south of MD 85                                                      | HWY 11<br>(Frederick)              | 1 business                                          | 0 businesses                                                       |
| US 15 southbound, north of MD 26 interchange along Thomas Johnson Drive               | HWY 14<br>(Frederick)              | 2 - 3 businesses                                    | 0 businesses                                                       |
| Total Highway Business Displacements                                                  |                                    | 10 - 11 businesses                                  | 2 - 4 businesses                                                   |
| Transitway Business Displacements                                                     |                                    |                                                     |                                                                    |
| Redland Road / MD 355 (Potential O&M Site – if chosen)                                | TRAN 1<br>(Montgomery)             | 29 businesses                                       | 29 businesses                                                      |
| MD 124 eastbound between Great Seneca Highway and MD 117                              | TRAN 4<br>(Montgomery)             | 1 business                                          | 1 business                                                         |
| Metropolitan Grove Road (Police Impound Vehicle Lot – Potential O&M Site – if chosen) | TRAN 4<br>(Montgomery)             | 2 businesses                                        | 2 businesses                                                       |
| North of MD 118 in Germantown Transit Center                                          | TRAN 5<br>(Montgomery)             | 2 businesses                                        | 2 businesses                                                       |
| Total Transitway Business Displacements                                               |                                    | 3 - 32 businesses <sup>2</sup>                      |                                                                    |
| Total Highway and Transitway Business Displacements                                   |                                    | 13 - 43 businesses <sup>2</sup>                     | 5 - 36 businesses <sup>2</sup>                                     |

**Notes:** <sup>1</sup> Preliminary impact ranges are based on a 25-foot and a 10-foot buffer beyond the proposed cut/fill line or the proposed retaining wall respectively, as well as an assessment of minimum/maximum business displacements.  
<sup>2</sup> There is a range of potential displacements since only one or possibly none of the O & M sites listed in this table will be chosen.



Table IV-13: Study Area Block Groups that Meet EJ Threshold for Minority Populations

| CENSUS TRACT      | BLOCK GROUP | POPULATION | WHITE   | BLACK   | HISPANIC | AMERICAN INDIAN AND ALASKA NATIVE | ASIAN  | NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER | OTHER  | TOTAL MINORITY | PERCENT MINORITY |
|-------------------|-------------|------------|---------|---------|----------|-----------------------------------|--------|--------------------------------------------|--------|----------------|------------------|
| Montgomery County |             | 873,341    | 564,890 | 130,849 | 100,309  | 2,593                             | 97,994 | 489                                        | 76,526 | 408,760        | 46.8%            |
| 7007.05           | 2           | 2,195      | 542     | 350     | 916      | 0                                 | 335    | 0                                          | 52     | 1,653          | 75.3%            |
| 7007.05           | 3           | 2,802      | 909     | 560     | 979      | 0                                 | 302    | 0                                          | 52     | 1,893          | 67.6%            |
| 7007.05           | 4           | 756        | 335     | 90      | 190      | 0                                 | 129    | 12                                         | 0      | 421            | 55.7%            |
| 7007.06           | 1           | 1,437      | 683     | 297     | 192      | 0                                 | 165    | 0                                          | 100    | 754            | 52.5%            |
| 7007.06           | 2           | 1,832      | 727     | 368     | 323      | 0                                 | 275    | 0                                          | 139    | 1,105          | 60.3%            |
| 7007.12           | 1           | 1,848      | 411     | 527     | 367      | 0                                 | 377    | 0                                          | 166    | 1,437          | 77.8%            |
| 7007.14           | 1           | 2,869      | 971     | 850     | 494      | 0                                 | 495    | 0                                          | 59     | 1,898          | 66.2%            |
| 7008.05           | 1           | 1,298      | 523     | 195     | 339      | 0                                 | 164    | 0                                          | 77     | 775            | 59.7%            |
| 7008.05           | 2           | 1,343      | 476     | 401     | 347      | 0                                 | 71     | 0                                          | 48     | 867            | 64.6%            |
| 7008.08           | 1           | 1,127      | 491     | 150     | 178      | 0                                 | 300    | 0                                          | 8      | 636            | 56.4%            |
| 7008.16           | 1           | 4,133      | 1,110   | 949     | 1,149    | 18                                | 750    | 0                                          | 157    | 3,023          | 73.1%            |
| 7008.16           | 2           | 1,995      | 906     | 224     | 519      | 7                                 | 261    | 0                                          | 78     | 1,089          | 54.6%            |
| 7008.18           | 1           | 1,988      | 913     | 381     | 352      | 0                                 | 257    | 0                                          | 85     | 1,075          | 54.1%            |
| Frederick County  |             | 195,277    | 174,293 | 12,191  | 4,598    | 466                               | 3,327  | 45                                         | 4,955  | 25,582         | 13.1%            |
| 7504              | 3           | 2,016      | 1,296   | 473     | 98       | 0                                 | 61     | 5                                          | 83     | 720            | 35.7%            |
| 7505.01           | 7           | 1,604      | 1,152   | 286     | 40       | 14                                | 68     | 0                                          | 44     | 452            | 28.2%            |
| 7505.02           | 4           | 3,088      | 2,130   | 387     | 273      | 0                                 | 254    | 0                                          | 44     | 958            | 31.0%            |
| 7507              | 3           | 2,043      | 1,463   | 457     | 31       | 25                                | 9      | 0                                          | 58     | 580            | 28.4%            |
| 7507              | 4           | 591        | 264     | 98      | 96       | 18                                | 115    | 0                                          | 0      | 327            | 55.3%            |
| 7508              | 6           | 1,384      | 1,037   | 225     | 57       | 8                                 | 31     | 0                                          | 26     | 347            | 25.1%            |
| 7510              | 4           | 1,778      | 1,010   | 569     | 50       | 0                                 | 93     | 0                                          | 56     | 768            | 43.2%            |
| 7510              | 5           | 485        | 340     | 117     | 0        | 0                                 | 28     | 0                                          | 0      | 145            | 29.9%            |

Source: 2000 US Census  
Note: Table presents only those block groups that meet or exceed the minority EJ threshold population (50+ minority percentage or equal to/greater than the county minority percentage plus 10 percent, representing “meaningfully greater”) for each respective county.

- *Low-income Population* – The US Department of Health and Human Services sets poverty income guidelines. Low-income populations are identified as either a group of low-income individuals living close to one another or a set of individuals who share common conditions of environmental exposure or effect.

This EJ analysis evaluates the racial and income characteristics of persons within the study area. The evaluation consists of the following two steps to determine whether each study area block group meets the “EJ threshold” for further analysis:

- *Step 1: Calculate minority or low-income populations*
  - The 2000 US Census provided data for each block group in the study area and for Montgomery and Frederick counties including: (1) the total population, (2) the total minority population, and (3) the total low-income population. These raw numbers helped to determine the percentage of persons in each minority group and persons below the poverty level.
- *Step 2: Determine if EJ threshold is met* – The baseline minority and low-income populations helped to identify specific block groups that meet the EJ threshold. Block groups would meet the EJ threshold if:

- the minority or low-income population in the block group equals or exceeds 50 percent of the population in that block group, or
- the percentage of the minority or low-income population is at least 10 percent higher than the minority or low-income population percentage for Montgomery County or Frederick County.

The following section presents the initial results of the EJ analysis.

EJ Populations

Montgomery County contains 46.8 percent minority population. This means that block groups in the Montgomery County portion of the study area that meet the EJ threshold are either 50 percent minority or at least 56.8 percent minority. In this instance, any Montgomery County block group that is 50 percent minority or greater would be considered a block group that meets or exceeds the EJ threshold for minority populations. Frederick County contains 13.1 percent minority population. This means that block groups in the Frederick County portion of the study area that meet the EJ threshold are either 50 percent minority or at least 23.1 percent minority. **Table IV-13** lists the study area block groups that meet or exceed the EJ thresholds for minority populations.

Table IV-14: Study Area Block Groups that Met EJ Threshold for Low-Income Populations

| CENSUS TRACT      | BLOCK GROUP | POPULATION | LOW-INCOME | PERCENT LOW-INCOME |
|-------------------|-------------|------------|------------|--------------------|
| Montgomery County |             | 873,341    | 47,024     | 5.4%               |
| 7007.14           | 3           | 2,000      | 316        | 15.8%              |
| Frederick County  |             | 195,277    | 8,550      | 4.4%               |
| 7501              | 1           | 1146       | 379        | 33.1%              |
| 7503              | 1           | 1033       | 223        | 21.6%              |
| 7505.01           | 2           | 865        | 153        | 17.7%              |
| 7505.01           | 3           | 423        | 124        | 29.3%              |
| 7507              | 3           | 2043       | 322        | 15.8%              |

Source: 2000 US Census  
Note: Table presents only those block groups that meet or exceed the minority EJ threshold population (50+ minority percentage or equal to/greater than the county minority percentage plus 10 percent, representing “meaningfully greater”) for each respective county.

Montgomery County contains 5.4 percent low-income population. This means that block groups meeting the EJ threshold are either 50 percent low-income or at least 15.4 percent low-income. Frederick County contains 4.4 percent low-income population. This means that block groups meeting the EJ threshold are either 50 percent low-income or at least 14.4 percent low-income. **Table IV-14** lists the study area block groups that meet or exceed the EJ thresholds for low-income populations.

Of the 109 blocks within the study area, only 61 block groups are located within the 1,000-foot impact analysis buffer area for the highway and transitway alignments. Of the 61 block groups, **Table IV-15** lists the 21 block groups that meet or exceed the EJ thresholds for minority populations. Only one block group located within the impact analysis area met the EJ threshold for low-income populations. This block group, 7507.03, met the first and second low-income threshold calculation with 15.8 percent of its population being low-income. Block groups within the impact analysis area meeting the EJ thresholds are also shown in **Figure IV-7**.

These EJ areas are comprised of residential developments, neighborhoods, and communities. The block groups that met the minority EJ threshold are located adjacent to the corridor between I-370 and MD 124 in Montgomery County and north of MD 80 in Frederick County. Although targeted EJ outreach activities were not completed for the purposes of this analysis, residential developments, neighborhoods and communities that are located within the block groups that meet or exceed the EJ thresholds, and that would be directly impacted, are identified as potential EJ areas. The potential impacts on these EJ areas are discussed by impact category in the following section.

Method for Assessing EJ Impacts

Executive Order 12898 requires federal agencies to identify and address, “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” To comply with the order, the project team considered the location and severity of potential effects on minority

Table IV-15: Block Groups within Impact Analysis Area that Met EJ Thresholds for Minority and/or Low-Income Populations

| MONTGOMERY COUNTY |             |
|-------------------|-------------|
| Census Tract      | Block Group |
| 7007.05           | 2           |
| 7007.05           | 3           |
| 7007.05           | 4           |
| 7008.16           | 1           |
| 7008.16           | 2           |
| 7007.14           | 1           |
| 7008.05           | 1           |
| 7008.05           | 2           |
| 7007.12           | 1           |
| 7007.06           | 1           |
| 7007.06           | 2           |
| 7008.08           | 1           |
| 7008.18           | 1           |
| FREDERICK COUNTY  |             |
| Census Tract      | Block Group |
| 7510              | 4           |
| 7510              | 5           |
| 7504              | 3           |
| 7505.02           | 4           |
| 7505.01           | 7           |
| 7507              | 3           |
| 7507              | 4*          |
| 7508              | 6           |

\*Also met EJ threshold for low-income populations

and low-income populations within the study area and determined whether the effects were disproportionately high in relation to other areas in the corridor.

The assessment of disproportionate effects was based on a comparison between affected and non-affected (or less-affected) areas, and determined whether impacts fall predominantly or more severely on minority and low-income communities. The EJ analysis is intended to identify any adverse effects that disproportionately occur to minority and/or low-income populations as well as any situations in which proposed mitigation may be inadequate to fully address the adverse effects to minority and/or low-income communities.

EJ Impacts and Mitigation

Alternative 1: No-Build Alternative

The No-Build Alternative includes only general highway maintenance, and operational and signage improvements. The No-Build Alternative is not consistent with adopted land use plans and current development patterns which have already occurred in response to the potential highway and transit improvements within the corridor. The No-Build Alternative would have an adverse impact on future traffic conditions and transportation access throughout the corridor. The No-Build Alternative would not address the congestion and safety hazards along I-270 and US 15, particularly at the existing interchanges, that are expected to occur with the growth anticipated in the corridor by the year 2030. Other than the above, the No-Build Alternative is not expected to have direct impacts on EJ areas.

Alternatives 6A/B and 7A/B

Alternatives 6A/B and 7A/B were analyzed for potential impacts in the following categories on EJ populations within 1,000 feet of the highway and transitway alignments:

- Displacements and relocations
- Community cohesion and access
- Economic activity
- Visual conditions
- Noise and vibration
- Traffic and transportation

Effects on Displacements and Relocation in EJ Areas

The EJ areas were assessed for potential property acquisition and/or displacements of residential and commercial buildings. The analysis used preliminary right-of-way estimates, which was the same method used to analyze the build alternatives in the 2002 DEIS. The engineering *plan sheets* in **Appendix A** of this document identifies the locations of potential displacements. If a build alternative is selected as the preferred transportation improvement, the number of actual displacements may vary from those presented as a result of refinements in both the design and right-of-way requirements and the use of retaining walls.

Highway Alignment

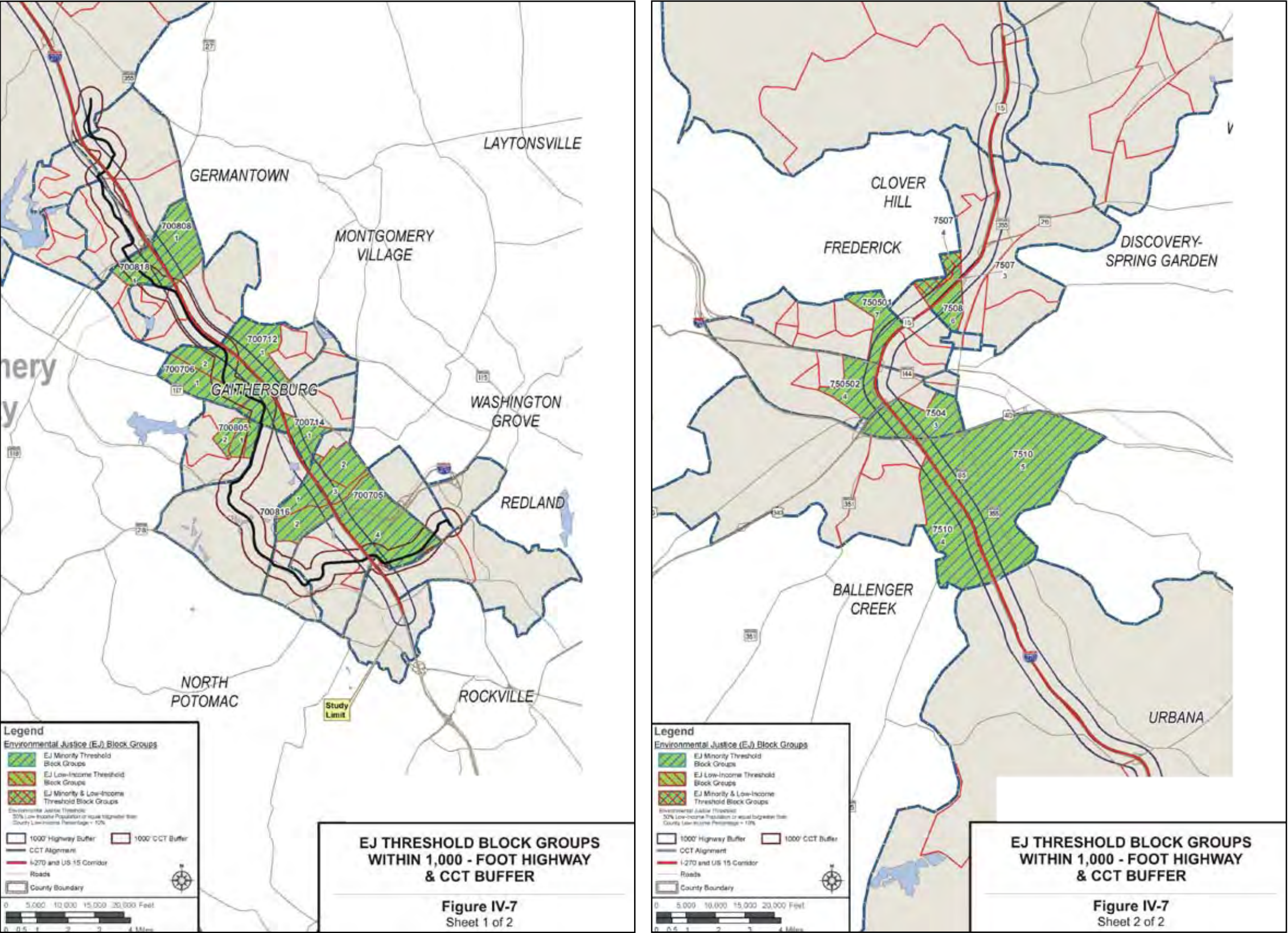
The highway alignment would potentially displace residences (single-family homes, townhouses, condominiums and apartment units) and businesses in EJ areas. The 2002 DEIS noted the following potential displacements in EJ areas: 119 residences under Alternatives 3A/B and 4A/B; 120 residences under Alternatives 5A/B; and 224 residences under Alternative 5C. Over 90 percent of these displacements would have occurred within three EJ areas currently located on both sides of I-270 in Gaithersburg: Brighton West, Fireside, and London Derry/Montgomery Club. As these alternatives may move forward, further design refinements, including the use of retaining walls along portions of the highway alignment, could largely reduce the overall number of highway displacements in these areas.

In comparison, Alternatives 6A/B and 7A/B could displace up to a total of 244 residences in EJ areas. Potential displacements could be reduced by using additional retaining walls and/or reducing shoulder widths in the following EJ areas:

Montgomery County

- Census Tract 7008.16 – Block Group 1, Brighton West, I-270 southbound, north of I-370 (**Sheet HWY 1, Appendix A**). The highway widening would displace (81) townhouse units within this EJ area. Use of a 2,300-foot retaining wall and reduced shoulder widths could reduce displacements to approximately 10 residential units.

Figure IV-7: EJ Threshold Block Groups within 1,000-foot Highway & CCT Buffer



- Census Tract 7007.14 – Block Group 1, London Derry/Montgomery Club, I-270 northbound, south of MD 117 (**Sheet HWY 2, Appendix A**). The widening of I-270 and potential direct access ramps to MD 117 would displace up to 150 apartments within this EJ area. Construction of a 1,700-foot retaining wall could lower the number of displacements to 61 units. The project could preserve all residential units if it eliminated the ramps at MD 117 and reduced the shoulder widths along I-270.
- Census Tract 7007.06 – Block Group 2, Caulfield (**Sheet HWY 2, Appendix A**). The highway widening would displace one residence, located off of Game Preserve Road near I-270 southbound, but could preserve it by constructing a retaining wall. However, the transitway alignment would displace this residence under all scenarios.

#### Frederick County

- Census Tract 7510 – Block Group 4, Princeton Court Apartments, I-270 southbound, south of the I-70 interchange along Fox Croft Drive (**Sheet HWY 11, Appendix A**). The widening of I-270, the construction of an auxiliary lane connecting I-70 and MD 85, and the acceleration ramp lane from I-70 would displace up to 12 apartment units within one building in this EJ area. Construction of a 500-foot long (minimum length) retaining wall could preserve these apartment units. The design and cost of this retaining wall will be investigated in later stages of the project. An additional business would be displaced in the Harding Farm community, I-270 southbound, south of Shockley Drive.

Although the overall number of potential displacements has been reduced since the 2002 DEIS, the displaced residences would still be concentrated in two EJ areas (Brighton West and London Derry/Montgomery Club) located on either side of I-270 between I-370 and MD 117 in Montgomery County. The number of potential property displacements in minority and low-income communities compared to the number of potential property displacements in non-EJ areas along the corridor suggests a disproportionately high or adverse impact because many minority communities border I-270 on both sides.

The design refinements and retaining walls for the highway alignment are potential mitigation measures. The *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (Uniform Act) provides assistance for people affected by federally funded projects. People whose real property is acquired, or who move as a result of projects receiving federal funds, will be treated fairly and equitably and will receive assistance in moving from the property they occupy.

#### Transitway Alignment

The transitway alignment is generally located on vacant and undeveloped land that Montgomery County has reserved for the transitway alignment in its Master Plan. The reserved Master Plan alignment minimizes the potential number of displacements. However, the transitway alignment would displace one residence located in the Caulfield community off of Game Preserve Road (**Sheet TRAN 4, Appendix A**). A potential O&M site in this same census tract would displace up to four additional residences in this area. The final location of an O&M facility for the transitway has not yet been identified, and this site may not be chosen.

#### Effects on Community Cohesion and Access in EJ Areas

Community cohesion refers to stability, interdependence and social interaction among persons or groups in a community. In some instances, the construction of a transportation facility could have an effect on community cohesion by increasing the amount of physical separation (barriers) between parts of an established community or by creating physical or psychological isolation of residents from one another. As noted previously, the widening along I-270 under Alternatives 6A/B and 7A/B would displace residences in the Brighton West, Fireside, London Derry/Montgomery Club, and Caulfield communities, which are located in EJ areas in Montgomery County, and the Princeton Court Apartments located near the Foxcroft II subdivision that is located in Frederick County.

The proposed highway alternatives, without additional mitigation measures, would displace a large number of residences along I-270 and remove some open space, especially for those residences that border the roadway.

The highway improvements are proposed along the edges of the affected communities and, therefore, would not split any communities or separate residents from reasonable access to any community facilities and services. Although existing I-270 and US 15 are physical barriers to vehicle and pedestrian movements between communities located on either side of the highways, relationships still could occur among neighbors living on the same side of the highway. By displacing residences in EJ areas on both sides of I-270, Alternatives 6A/B and 7A/B could remove some residents from other residents located on the same side of I-270 and possibly disrupt social interactions and community cohesion. Further coordination with potentially affected residents would identify the extent of effects to social interactions and community cohesion.

Homes generally border I-270 along their backyards. For the most part, this condition will continue. However, in some locations, the highway alternatives will remove the existing residences closest to I-270 and expose the newly widened highway to other residences that were previously shielded by the displaced residences. Alternatives 6A/B and 7A/B would not change existing access by motor vehicles, bicycles, and walking, into or within neighborhoods and to community facilities or services. In general, Alternatives 6A/B and 7A/B would ease travel for residents by providing open access areas and direct access ramps for interchanges. The proposed interchanges would enhance access to and from residential and business developments along and beyond the corridor, all of which are within easy vehicle access of the highway.

The transitway would improve access to and from the King Farm, Orchard Pond and Caulfield communities and other destinations by increasing travel options. The transitway would offer three stations in EJ areas (East Gaither, West Gaither, and Metropolitan Grove stations) that would increase access to employment areas for EJ populations.

#### Effects on Economic Activity in EJ Areas

The I-270/US 15 project would support economic development and improve access throughout the corridor while remaining as community-friendly as possible. Workers would benefit from reduced travel times and improved connections since they can access a wider geographic area for jobs in the same amount of travel time. The project would benefit even those users who cannot or choose not to pay toll charges. Alternatives 6A/B and 7A/B would keep existing general purpose travel lanes and the transitway alignment would provide improved public transit access in the corridor. This improved access will encourage greater economic development and evenly distribute benefits to surrounding communities.

The project analyzed potential economic effects on a broader (regional) geographic scale rather than on a site-specific level. The highway alignment is expected to support economic development by improving accessibility to employment areas. Alternative 7A/B tends to increase accessibility and economic development potential better than Alternative 6A/B although the differences are slight.

If Alternative 6A/B or 7A/B is selected as the preferred transportation improvement, later phases of the project should consider, in greater detail, the following items related to EJ populations:

- The potential for increased housing costs in historically minority/low-income neighborhoods in or near the City of Frederick as a result of improved access with the highway improvements.
- The extent that low-income people use and benefit from the ETL Alternatives. If general purpose lanes become congested due to more travelers choosing not to pay the toll, this might burden low-income populations with longer commutes or not allow them to enjoy the full benefits of the added roadway capacity (considering that low-income people might be less capable/willing to pay the ETL tolls).

The transitway alignment is expected to support economic development by improving access to employment areas. This increased access through transit will be especially beneficial for those persons who do not drive or own a car. The neighborhoods and communities near the proposed transit stations are



King Farm Reserved Transitway

expected to benefit from increased access to jobs and other destinations. They include King Farm, Orchard Pond, Caulfield, Middlebrook, and The Colony condominiums.

In general, proximity to rail is shown to benefit property values due to the increased transit access. This conclusion was based on several measures of property value such as sales prices of single-family homes, apartment rents, and median home value. The benefits of increased property values occur within a reasonable walking distance from the station, generally one-quarter mile to one-half mile. Beyond this distance, the effect of nearby rail transit on property values was negligible *Impacts of Rail Transit on Property Values*, located on the web at <http://www.apta.com/research/info/briefings/documents/diaz.pdf>

If the transitway alternative is selected as the preferred transportation improvement, later phases of the project should consider, in greater detail, the potential for property values to increase near stations along the transitway alignment. This could be an advantage for property owners in EJ areas who are willing to move but a potentially large issue if there are any low-income renters in the vicinity of the stations or owners who want to stay and cannot afford the higher property taxes.

Effects on Visual Conditions in EJ Areas

Alternatives 6A/B and 7A/B would increase the visual presence of the highway with additional lane(s), retaining walls (recommended for minimizing potential displacements), and noise barriers (for noise reduction). Alternatives 6A/B and 7A/B are expected to have similar visual effects although Alternative 7A/B consists of two additional lanes between MD 121 and north of MD 80

in Frederick County, rather than the one additional lane under Alternative 6 A/B.

Residents are likely accustomed to the traffic and view of existing I-270. Alternatives 6A/B and 7A/B would add new visual elements in the form of retaining walls and noise barriers. The new retaining walls and noise barriers will vary in length and height, and the effects would be site-specific. The retaining walls and noise barriers would be visible from the vehicles traveling along the highway. However, the EJ areas on either side of I-270, between I-370 and Muddy Branch Road, generally have two- and three-story townhouse, apartment and condominium properties with some wooded areas along the highway. The wooded areas would partially screen the view of the new retaining walls and noise barriers from residences. After mitigation, minor visual effects are expected on residential land uses in EJ areas.

The transitway alignment will have moderate visual effects since it would travel mostly at ground level. The potential transit station sites would have the greatest degree of visual effect on EJ areas. These station sites will use land within several new and emerging communities. The East and West Gaither Stations and the Metropolitan Grove Station would add new visual elements and public activity centers within EJ areas.

Two of the six potential O&M facility sites, the PEPCO and Police Impound Lot sites, are located in EJ areas near Metropolitan Grove. Potential O&M sites are also located in the Caulfield community. These sites are generally surrounded by wooded areas, which lessen the potential for visual intrusion on surrounding areas.

Using appropriate mitigation techniques, minimal visual effects on all areas, including EJ areas, are expected to occur from the transitway facilities as these would be designed to be as visually compatible with the surrounding areas, as possible.

Effects of Noise and Vibration in EJ Areas

Highway Alignment

Several residential properties within EJ areas are located near I-270 and US 15 and are predicted to experience increased noise levels as a result of the proposed highway improvements included in Alternatives 6A/B and 7A/B.

The following EJ areas are anticipated to require noise abatement:

Montgomery County

- Census Tract 7007.14 – Block Group 1, London Derry and Stratford Mews, I-270 northbound, south of MD 117 (*Sheet HWY 2, Appendix A*). Two noise receptors (H-4 and H-5) located adjacent to these areas indicate a noise impact. The area meets SHA’s criteria for a noise barrier that would provide lower noise levels at 51 residences.

Frederick County

- Census Tract 7510 – Block Group 4, Princeton Court Apartments, I-270 southbound, south of the I-70 interchange along Fox Croft Drive (*Sheet HWY 11, Appendix A*). Two noise receptors (H-31 and H-32) located adjacent to these communities indicate a noise impact. The area meets SHA’s criteria for a noise barrier that would provide lower noise levels at 37 residences.
- Census Tract 7505.02–Block Group 4, Linden Hills, US 15 southbound, south of US 40 (*Sheet HWY 12, Appendix A*). One receptor (H-36) located adjacent to this area indicates a noise impact. The area meets SHA’s criteria for a noise barrier that would provide lower noise levels at 13 residences.
- Census Tract 7505.01 – Block Group 7, Waterford and Rock Creek Estates, US 15 southbound, south of Rosemont Avenue (*Sheet HWY 13, Appendix A*). One receptor (H-38A) located adjacent to this area indicates a noise impact. The area meets SHA’s criteria for a noise barrier that would provide lower noise levels at 47 residences.
- Census Tract 7507 – Block Groups 3 and 4, Applegate, US 15 southbound, south of Opposumtown Pike (*Sheet HWY 13, Appendix A*). One receptor (H-44) located adjacent to this area indicates a noise impact. The area meets SHA’s criteria for a noise barrier that would provide lower noise levels at 29 residences.
- Census Tract 7508 – Block Group 6, Spring Valley, US 15 northbound, south of Motter Avenue (*Sheet HWY 13, Appendix A*). One receptor (H-45) located adjacent to this area indicates a noise impact.

The area meets SHA’s criteria for a noise barrier that would provide lower noise levels at 31 residences.

Transitway Alignment

The transitway alignment travels along the border of The Colony condominiums, an EJ area, located in Census Tract 7008.18 - Block Group 1 (*Sheet TRAN 5, Appendix A*). A noise receptor (T-20) located adjacent to this area indicates the need for a noise barrier to lower the projected noise levels to within acceptable levels. A proposed noise barrier, 1,700 feet long and 3½ feet high, would protect 24 residences.

Potential Mitigation Measures

Potential noise effects from the project would occur throughout the corridor. However, noise barriers could reduce adverse noise effects from the project. Noise abatement measures will be provided where feasible and reasonable. After mitigation, no further noise impacts are anticipated on EJ areas from the highway or transitway alignments or associated facilities. Therefore, the extent of the projected impacts to the EJ areas identified would not be considered a “disproportionately high and adverse impact” under the EJ guidelines.

Effects on Traffic and Transportation in EJ Areas

All residents in the corridor, including those who live in EJ areas, can expect to benefit from the project through improved transportation access and a modest reduction in traffic on local roads with the provision of more public transportation to the area.

Highway Alignment

Alternatives 6A/B and 7A/B include improvements to existing interchanges, construction of new interchanges, and construction of access roads in several locations that will improve traffic, transportation access, and safety. The access improvements would benefit all travelers within the corridor including those who live and work in EJ areas. Of the total 10 interchange improvement locations, the following four are located in EJ areas: the I-270/ Middlebrook Road and I-270/MD 118 interchanges in Montgomery County and the I-270/MD 85 and US 15/Jefferson Street/US 340 interchanges in Frederick County. No new interchanges would be located in EJ areas.

Effects from construction activities will be temporary. During various stages of construction, the hauling of construction debris, excavation, and building materials will generate additional traffic. Construction will be restricted to the designated station sites, construction staging areas, and alignment sections.

### Transitway Alignment

Residents and employees in the corridor can expect transportation benefits from the project. With the transitway, area residents will have improved access throughout the corridor and the surrounding area can expect a modest reduction in traffic on local roads with the provision of more public transportation to the area.

### Mitigation Measures

Standard traffic control devices would manage vehicle movements at intersections and near transitway stations. Gates or flashing signals and audio signals, such as horns, would be considered. A temporary fence will be used to shield construction activities and equipment from residences and limit pedestrian and vehicular movements to prevent accidents.

Appropriate signage will be used to notify travelers of road closures and detours. Road access would be restored as soon as possible, following completion of work in an area. Emergency vehicle access will be maintained at all times.

Maintenance of traffic and construction staging will be planned, coordinated with local jurisdictions, and scheduled to minimize traffic delays and interruptions to the maximum extent possible. Maintenance of traffic plans for I-270, US 15, and adjacent state and local roads will be developed during the final design phase and refined prior to construction. After mitigation, minor traffic or transportation effects on adjacent communities, including the EJ areas, are expected from the highway or transitway alignments or associated facilities.

### Conclusion

The potential effects to land use, community facilities and services, air, noise, public health and safety, visual effects, and traffic and transportation with regard to EJ areas are comparable to other locations throughout the corridor. The extent of the proposed impacts for these resource topics would not be considered a “disproportionately high and adverse impact” under the EJ guidelines.

However, the number of property displacements and potential adverse effects to community cohesion in EJ areas before minimization options are included, when compared to non-EJ areas along the corridor, suggests a disproportionately high or adverse impact as a result of the proposed transportation improvements.

Alternatives 6A/B and 7A/B follow existing I-270 and include relatively equal widening on both sides of the roadway for the entire length of the project. The highway design is similar in other areas along the corridor but results in more adverse effects between I-370 and MD 117 (in Brighton West, Fireside and London Derry/Montgomery Club developments and/or communities) due to the physical nearness and density of the residences to the highway. The widening of I-270 in this area would have unavoidable adverse effects to EJ areas on both sides of the roadway. Given that the corridor widening is relatively equal on both sides of the existing roadway, the potential impacts to adjacent EJ areas will be generally distributed equally on both sides, with no intent to have greater impacts to one side of the roadway and avoid impacts to the other side. The larger number of potential displacements in these EJ areas (compared to other areas along the corridor) partially reflects the uncertainty of the design of the retaining walls at this stage in the project development process. Additional investigation of retaining walls may further reduce the number of potential displacements in these EJ areas.

Actual EJ populations have not been identified at this time. The analysis identified those census block groups where the minority or low-income populations meet the EJ threshold and where EJ populations might be impacted.

The identification of a disproportionately high and adverse effect on EJ populations does not preclude a project from moving forward. FHWA’s *Actions to Address Environmental Justice in Minority Populations and Low-income Populations* (December 2, 1998) indicates that a disproportionately high and adverse effect may be carried out under the following conditions:

- Programs, policies, and activities that will have disproportionately high and adverse effects on minority populations or low-income populations will be carried out only if further mitigation measures or alternatives that would avoid or reduce the

disproportionately high and adverse effects are not practicable. In determining whether a mitigation measure or an alternative is “practicable,” the social, economic (including costs) and environmental effects of avoiding or mitigating the adverse effects will be taken into account.

- Respective programs, policies or activities that have the potential for disproportionately high and adverse effects on populations protected by Title VI (“protected populations”) will be carried out only if:
  - (1) A substantial need for the program, policy or activity exists, based on the overall public interest; and
  - (2) Alternatives that would have less adverse effects on protected populations have either:
    - (a) adverse social, economic, environmental, or human health impacts that are more severe; or
    - (b) would involve increased costs of an extraordinary magnitude.

### Public Involvement

The project team contacted public and private social service agencies, community action and religious organizations, schools and libraries to request additional information to supplement census data on the locations of EJ populations. The project team assumed that these organizations offer existing, targeted, local community outreach programs and possess knowledge of specific locations of EJ populations.

The project team identified community locations on a base map with census tracts that showed higher than county averages for minority and low-income populations. The project team sent correspondence requesting assistance in identifying locations of EJ populations to those entities located within census tracts that exhibited higher than county averages for minority and low-income populations. In addition, religious organizations and schools located within census tracts that exhibited higher than countywide averages for minority and low-income populations received correspondence and a newsletter explaining the project and offering them the opportunity to meet and discuss the I-270/US 15 project with the project team.

Public involvement has been integrated throughout this project planning study. The purposes of the public involvement process are to reach out to all populations that would be directly and indirectly affected by the project, including minority and low income populations, to provide information and to generate input on the project. Advertisements for all of the public information meetings held for this project were advertised in:

- *The Baltimore Sun*
- *The Washington Post*
- *The Montgomery Gazette*
- *The Montgomery Journal*
- *The Afro-American (Washington, DC)*
- *El Montgomery*
- *The Asian Fortune*
- *The Washington Jewish Weekly*
- *The Frederick News Post*
- *The Frederick Gazette*

Notices were also distributed to a mailing list that included all property owners and residents within and slightly beyond the study area. This includes churches, elected officials, community associations, and businesses.

Additional outreach since the 2002 DEIS included meetings with the homeowners/civic associations of the Fox Chapel community (August 25, 2003), the Brighton West community (April 20, 2006) and attending the Asian Spring New Year Celebration (February 17, 2007) and the Annual Latino Festival de Frederick (September 28, 2008) both located in Frederick County. Chapter VII in this document summarizes the outreach meetings. The project mailing list has also been expanded to encompass a wider area and includes all census block groups identified for the study area. The list includes a 1½-mile corridor surrounding the transitway alignment and continues east of I-270 to include addresses on both sides of MD 355.

If a build alternative is selected as the preferred for transportation improvements, SHA will coordinate with the affected communities to develop a mitigation program tailored, to the extent practical, to meet the needs of EJ areas prior to final project approval. SHA will reassess the preliminary conclusions of this analysis based on input from the public involvement program. The project team will continue to involve minority and low-income populations in the project planning process during later stages of the project.



## C. Economic Environment

Transportation and the economy are closely linked. Citizens and stakeholders make choices regarding where they work, live, or conduct business based on the ability to access those locations. Therefore, an important relationship exists between the level of economic productivity and the quality of transportation services and facilities in a given region. This section discusses how the proposed improvements included in the I-270/US 15 Multi-Modal Corridor study would impact that relationship.

### Current Economic Profile of the Project Area

The I-270/US 15 Corridor is one of the premier economic regions in Maryland. Frederick and Montgomery Counties account for 21.8 percent of all jobs in Maryland [(US Bureau of Labor Statistics (BLS), 2004)]. Many of those jobs are located directly along the I-270/US 15 and CCT alignments, with the highest concentrations in central Montgomery County.

Workers in the corridor are also well-paid compared with the rest of the state. Although they account for 21.8 percent of jobs in Maryland, workers in Montgomery and Frederick counties actually take home over a quarter (25.4 percent) of the state’s total wages. Median annual household income figures reinforce this finding. According to the US Census Bureau, the 2006 median annual household income for Maryland was \$65,144, compared to the median annual household income in Frederick County of \$74,029 and in Montgomery County of \$87,624.

#### Montgomery County

The Montgomery County economy is led by three industries: professional and business services; education and health services; and trade, transportation and utility-related industries. These three industries make up over half of the county’s total employment. Within that employment base, the best paying industries are professional and business services, and education and health services whose employees earn over 40 percent of the county’s total payroll (BLS).

Montgomery County’s portion of the I-270/US 15 corridor has become the favored location for many high-tech businesses, especially biotechnology and information technology firms. Montgomery County leads the state in the number of high-tech firms. Over one-fifth of all the state’s high-tech businesses, 2,530 establishments, were located in Montgomery County in 2002. Within Montgomery County, the Rockville-Gaithersburg-Germantown portion of the I-270/US 15 Corridor has the highest concentration of high-tech employers.

In the recent past, Montgomery County has seen some very minor decreases in employment, losing 1,198 jobs countywide from 2001 to 2004 (a minus 0.1 percent change). Nonetheless, some sectors continued to see employment increases in the county with education and health services and the construction industry leading the way in hiring.

#### Frederick County

The Frederick County economy is led by four key industries: education and health services; trade, transportation and utilities; professional and business services; and construction. Together, these four industries account for well over half of the county’s employees and 63.8 percent of the county’s earnings (BLS).

Seeking to capitalize on the boom in high-tech companies locating in the corridor, Frederick County’s Office of Economic Development is developing the Mount St. Mary’s Bio Park and creating the Jefferson Tech Park, an advanced technology park in the southern portion of the county. There are already several major bio-tech employers in Frederick County, including the US Army Medical Research Institute of Infectious Diseases at Fort Detrick.

Unlike Montgomery County, employment actually increased by four percent in Frederick County from 2001 to 2004. This growth was much larger than in the state as a whole, where employment grew by only one-half of one percent over the same period. In Frederick County, the professional and business services industries

and the financial activities industries led the way in terms of growth rates.

### Major Employment Centers in the Project Area

The I-270/US 15 Corridor is home to numerous employment centers, many of which are in office park settings, but some of which have denser environments. In general, development remains concentrated primarily toward the southeastern end of the corridor and thins out toward the northwest. Most of the major job centers are located in Montgomery County. Heading northwest along I-270 from the I-495 Capital Beltway, these centers are:

- North Bethesda (68,179 employees in 2005 according to the M-NCPPC)
- Rockville (75,261 employees)
- Gaithersburg (82,965 employees)
- Germantown (24,184 employees)
- Clarksburg (5,293 employees)

In contrast, the only major employment center in Frederick County is the City of Frederick, located at the northwest end of the I-270 corridor. There were 47,266 people employed in the City of Frederick in 2006.

### Economic Impacts

Overall, the build alternatives will create relatively small positive economic development effects when compared with the large amount of economic growth forecasted to occur in the project area, with or without the project. Nonetheless, the congestion relief provided will make a difference with regards to the accessibility of people, goods, and markets, thus helping the area maintain its economic edge. Some project alternatives will also contribute more to promoting economic development than others, although the differences are not expected to be great. **Table IV-16** summarizes the projected economic impact of each of the proposed project alternatives, including how the project impacts accessibility and the economic health of consumers, workers, and local governments.

### Accessibility

A key measure used in **Table IV-16** to summarize project economic impacts is accessibility. Accessibility is a measure that helps us understand how easy it is to get from one location to another. The more work and/or shopping destinations that can be reached easily and quickly from a given location, the higher that location’s accessibility is rated. Many people choose to live in locations with high accessibility because people can reach their work or shopping destinations easily from these places. For example, a home in downtown Washington DC has very high accessibility, whereas a home on the edge of the urban area typically has much lower accessibility. As a result, housing densities and rents are much higher in downtown because many people wish to live there to take advantage of the close-in location.

Three types of accessibility measures are used in this study:

- commuter personal accessibility/business labor market accessibility
- consumer personal accessibility
- retail business accessibility

Commuter personal accessibility (or, from a business’ perspective, business labor market accessibility) measures how easy it is for residents to get to employment destinations: the more jobs that can be reached faster from a given point, the higher the commuter accessibility measure for that place. Consumer personal accessibility measures how easy it is for residents to access shopping destinations: the more shopping destinations nearby, the higher the consumer accessibility figure for a given place. Finally, retail business accessibility takes a business perspective and measures how easy it is for potential customers to access a given business location: the more people with higher disposable incomes nearby that can reach a destination quickly, the higher that place’s score.

Impacts to Consumers

As **Table IV-16** shows, both Montgomery and Frederick county residents along the I-270/US 15 corridor will have better access to shopping destinations with the project. Frederick County consumers will benefit the most since they will be able to access the large number of retail centers in Montgomery County more easily with the addition of ETLs. Alternative 7A/B, with its greater roadway capacity near Frederick, will increase consumer accessibility to a greater degree than Alternative 6A/B, especially for Frederick County residents.

Impacts to Businesses

Retail businesses in both counties could potentially benefit from the broader customer base who can reach their stores in a shorter amount of time. **Table IV-16** shows that Frederick County businesses might benefit the most from the project. This is because the ETLs would put Frederick County businesses along the corridor within easier reach of the large population centers in Montgomery County; where many residents also have higher disposable incomes than residents in Frederick County. Although Montgomery County businesses also stand to benefit from the project, their retail business accessibility scores are lower because they are only gaining better access to the smaller and comparatively less wealthy population center of Frederick.

Impacts to Workers

There are two major economic impacts of the project from a worker’s perspective: (1) short-term employment impacts related to construction and (2) changes in commuter accessibility. As **Table IV-16** indicates, both ETL highway options are expected to provide about the same number of construction jobs. However, building the light rail is expected to require hiring about 400 more workers than would be required to develop the bus rapid transit line. The short-term economic impacts to the region will tend to be magnified with the light rail alternative as those extra employees spend the money they earn and it filters throughout the economy.

In the long term, Frederick County commuters will benefit the most with the addition of ETLs due to the

increased accessibility of the many major employment centers in Montgomery County. Curiously, the model indicated that Alternative 6A/B would provide slightly better benefits to Frederick County commuters than Alternative 7A/B. This figure is within the error margins of the model, which could explain this counterintuitive finding.

Impacts to Local Governments

Local government property tax revenues could be influenced in three ways by the project: (1) through direct takings of property off the tax rolls to construct the improvements, (2) the stimulation of new development which would increase property tax revenues, and (3) general property value increases associated with the accessibility improvements. As **Table IV-16** shows, property tax losses from the taking of land to construct the project are expected to be near zero. This is because most of the tax revenue lost with the displacements will be regained once the residents and businesses relocate to new sites, likely within the same taxing jurisdiction.

Both highway options are expected to increase the value of, and development potential for, open lands along the corridor, especially in northern Montgomery County and central and southern Frederick County. This new development can be expected to give a modest boost in tax revenue to the two counties. Existing homes and businesses near the corridor, especially in Frederick County, may also see their values rise because of the accessibility benefits the project offers.

The transit options also have the potential to increase transit oriented development opportunities. Transit oriented development potential is typically seen as being greater with light rail than with bus rapid transit. This is because the greater, perceptually more permanent, investment in infrastructure with a rail line is thought to make developers more willing to take the risks associated with doing high-density mixed-use developments. Thus, the potential for increased tax revenues from new high-density, mixed-use developments may be greater with light rail than with bus rapid transit.

Table IV-16: Comparison of the Build Alternatives and Their Relative Impacts for the Different Economic Impact Categories

| MEASURE                                              | UNITS                                                                              | ALT. 6A   | ALT. 6B   | ALT. 7A   | ALT. 7B   |
|------------------------------------------------------|------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| CONSUMER IMPACTS                                     |                                                                                    |           |           |           |           |
| Consumer Personal Accessibility: Montgomery County   | % Change in Personal Accessibility (not available by transit alternative)          | + 0.4%    | + 0.4%    | + 0.5%    | + 0.5%    |
| Consumer Personal Accessibility: Frederick County    |                                                                                    | + 2.0%    | + 2.0%    | + 3.5%    | + 3.5%    |
| Consumer Personal Accessibility: Entire Region       |                                                                                    | 0.0%      | 0.0%      | 0.0%      | 0.0%      |
| BUSINESS IMPACTS                                     |                                                                                    |           |           |           |           |
| Retail Business Accessibility: Montgomery County     | % Change in Retail Business Accessibility (not available by transit alternative)   | + 0.7%    | + 0.7%    | + 0.7%    | + 0.7%    |
| Retail Business Accessibility: Frederick County      |                                                                                    | + 1.4%    | + 1.4%    | + 2.3%    | + 2.3%    |
| Retail Business Accessibility: Entire Region         |                                                                                    | + 0.1%    | + 0.1%    | + 0.0%    | + 0.0%    |
| Business Disruption Caused by Construction           | Qualitative                                                                        | --        | --        | --        | --        |
| Supply Chain Productivity                            | Qualitative                                                                        | +         | +         | ++        | ++        |
| WORKER IMPACTS                                       |                                                                                    |           |           |           |           |
| Commuter Personal Accessibility: Montgomery County   | % Change in Commuter Personal Accessibility (not available by transit alternative) | - 0.2%    | - 0.2%    | 0.0%      | 0.0%      |
| Commuter Personal Accessibility: Frederick County    |                                                                                    | + 5.2%    | + 5.2%    | + 4.4%    | + 4.4%    |
| Commuter Personal Accessibility: Entire Region       |                                                                                    | 0.0%      | 0.0%      | 0.0%      | 0.0%      |
| Supported Employment (Annualized: Direct + Indirect) | Person-Years of New Employment                                                     | 8,274     | 7,791     | 8,274     | 7,791     |
| New Employment (Annualized: Direct + Indirect)       |                                                                                    | 3,804     | 3,399     | 3,804     | 3,399     |
| LOCAL GOVERNMENT FISCAL IMPACTS                      |                                                                                    |           |           |           |           |
| Property Tax Revenues: Property Takings (Net)        | Qualitative                                                                        | no change | no change | no change | no change |
| Property Tax Revenues: New Development               | Qualitative                                                                        | ++        | +         | ++        | +         |
| Property Tax Revenues: Property Values               | Qualitative                                                                        | ++        | +         | ++        | +         |

++ Positive      + Slightly Positive      no change Negligible Change      - Slightly Negative      -- Negative



## D. Cultural Resources

This section explains the regulatory framework for identifying effects to significant cultural resources located within the project’s Area of Potential Effect (APE). The APE is defined as the area within which the impacts of the alternatives (property acquisition, noise, visual, and other) would affect each identified cultural resource. Following the regulatory framework and methodology, existing historic properties within the APE are listed and the effects (adverse effect, no adverse effect, or no effect) are identified. The section closes with a summary of consultation that has occurred to date and a discussion of archeological resources.

### Regulatory Framework and Methodology

Historic properties are defined as prehistoric or historic districts, sites, buildings, and structures significant in American history and listed in, or eligible for, the National Register of Historic Places (NRHP). The National Historic Preservation Act (NHPA) of 1966, as amended, the National Environmental Policy Act (NEPA) of 1969, and other applicable federal, state, and local legislation govern the identification, analysis, and treatment of historic resources. The lead federal agencies, FHWA and FTA, are required to take into account the effect of their proposed project on historic properties. The NRHP was established at the Federal level by NHPA to record resources significant in our understanding of American history and culture. For purposes of this discussion, archeological resources (sites) refer to cemeteries, prehistoric, historic, and underwater archeological sites, while historic resources refer to buildings, structures, or districts.

All historic and archeological resources identified during cultural resource studies for the I-270/US 15 Corridor were evaluated and coordinated with the Maryland State Historic Preservation Officer (MD SHPO), for their opinion on NRHP eligibility. These properties were evaluated using the criteria of the NRHP, as described in the 2002 DEIS. This document presents newly identified historic resources since the 2002 DEIS and evaluates the potential for Alternatives 6A/B and 7A/B to have an adverse effect on all of

the historic properties. Historic and archeological resource identification and evaluation studies have been completed through coordination with the MD SHPO. A list of correspondence documenting this coordination is included in **Appendix D**.

The effects of the project were assessed in accordance with Section 106 of the NHPA and the implementing regulations of the Advisory Council on Historic Preservation (ACHP) (36 CFR §800.5). The regulations provide that a project will have an effect on a resource when the “undertaking may alter 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. For the purpose of determining effect, alteration to features of property’s location, setting, or use may be relevant depending on a property’s significant characteristics and should be considered” (36 CFR §800.5(a)(1)). In addition, 36 CFR §800.10(a) provides “... that the agency official, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any National Historical Landmark that may be directly and adversely affected by the undertaking.”

The focus of the assessment done for the project was to determine whether the undertaking has an effect, and subsequently, if that effect is adverse. Using the Criteria of Adverse Effect, 36 CFR §800.5(a)(1), and the Definition of Effect specified in 36 CFR §800.16(i) and 36 CFR §800.4(d)(1), three basic findings can be made:

- No Effect: there is no effect, either harmful or beneficial, on the historic property.
- No Adverse Effect: there could be an effect, but the effect would not be harmful to those characteristics that qualify the property for inclusion in the NRHP.
- Adverse Effect: there could be an effect, and that effect could diminish the integrity of such characteristics.

Seven conditions are specified in 36 CFR §800.5(a)(2) (i-vii) that are considered adverse effects:

- Physical destruction or damage to all or part of the property;

- Alteration of a property that is not consistent with the Secretary of Interior’s *Standards For The Treatment of Historic Properties* (36 CFR Part 68) and applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property’s use or physical features within the property’s setting that contribute to its historic significance;
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property’s significant historic features;
- Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance.

Effects that otherwise would be adverse, may be considered to be “not adverse” if one or more of the following conditions are met:

- When the property is of value only for its potential contribution to archeological, historical, or architectural research, and when such value can be substantially preserved through appropriate research, and such research is conducted in accordance with applicable professional standards and guidelines;
- When the undertaking is limited to rehabilitation of buildings and structures in a manner that preserves the historical and architectural values, or
- When the undertaking is limited to the transfer, lease or sale of historic properties and adequate restrictions or conditions are included to ensure preservation of the property’s significant historic features.

### Existing Historic and Archeological Resources

Thirty historic properties that are in, or are eligible for inclusion in, the NRHP were identified during the cultural resources survey and were described in the 2002 DEIS. Of these, seven were determined to be within the APE for Alternatives 3A/B, 4A/B and 5A/B/C, and are also within the APE of Alternatives 6A/B and 7A/B. Three additional properties, previously unevaluated, were identified within the APE of Alternatives 6A/B and 7A/B and have subsequently been determined eligible for inclusion in the NRHP. The locations of all of the historic properties are shown on **Figure IV-8** with their Maryland Inventory of Historic Places (MIHP) numbers. Listed below are the ten historic properties within the APE of Alternatives 6A/B and 7A/B as well as within the APE of Alternatives 3A/B, 4A/B, and 5A/B/C. The ten historic properties are:

- England/Crown Farm (M:20-17),
- Belward Farm (M:20-21),
- Atomic Energy Commission (AEC) Building (M:19-41),
- Monocacy National Battlefield (F-3-42),
- Schifferstadt (F-3-47),
- Rose Hill Manor (F-3-126),
- Harmony Grove Union Chapel (F-3-197),
- Worman House (F-3-198),
- Spring Bank (F-3-22), and
- Birely-Roelkey Farm (F-3-134).

Archeological sites that are listed or eligible for the NRHP are not mapped to protect the confidentiality of these sensitive resources. No additional archeological investigations have been undertaken for the project since the 2002 DEIS.

Figure IV-8: Historic Resources

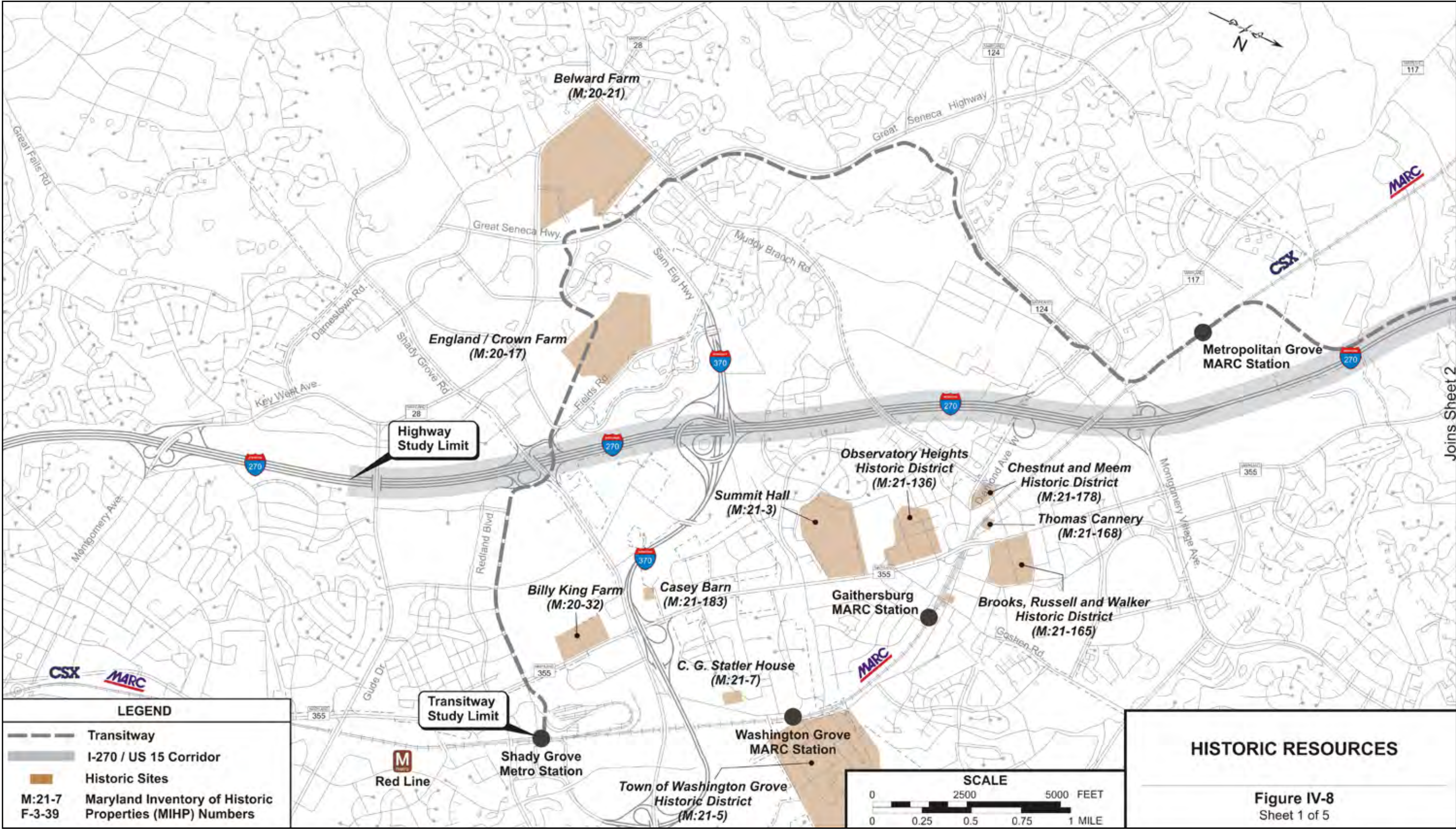


Figure IV-8: Historic Resources

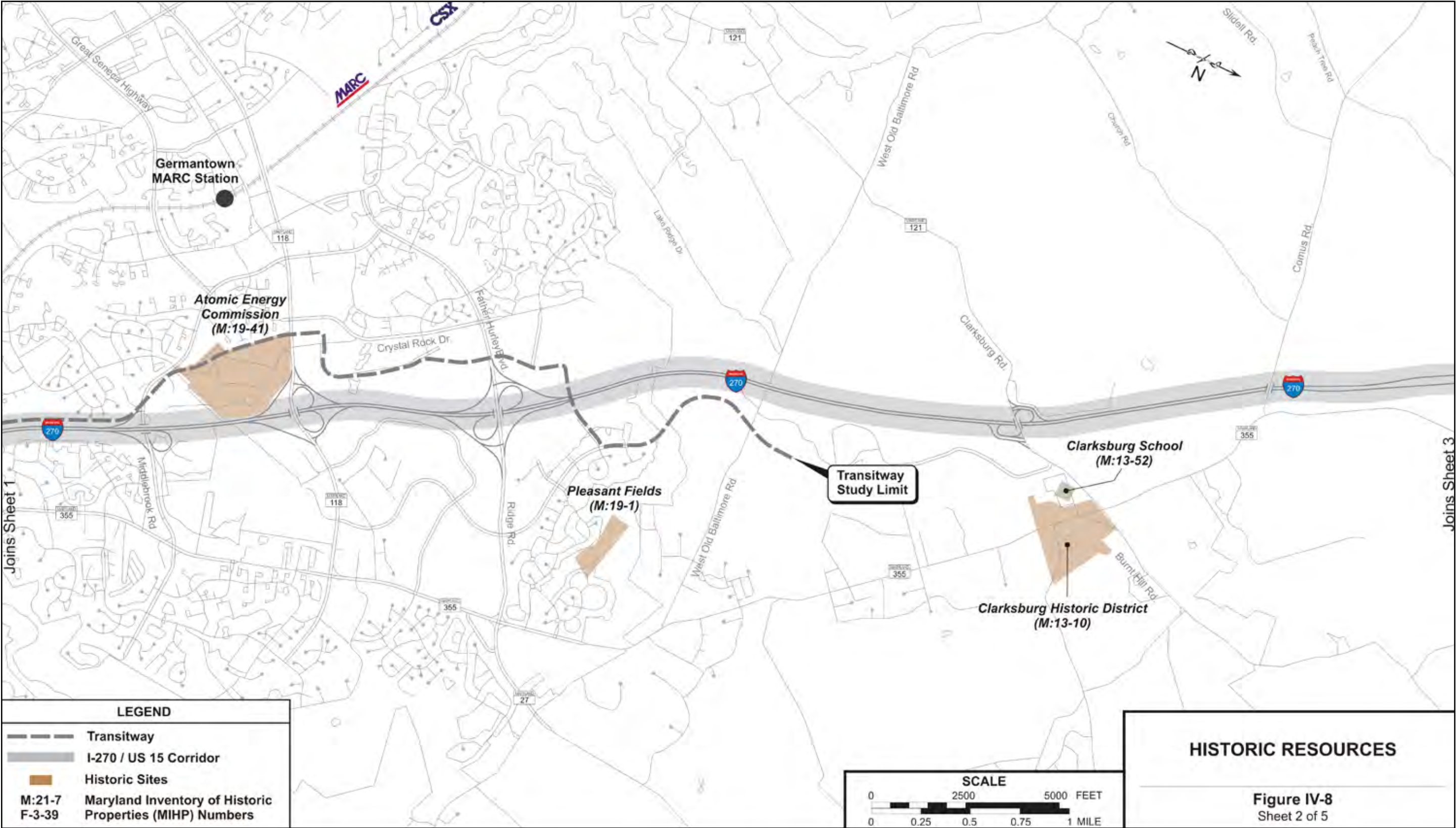


Figure IV-8: Historic Resources

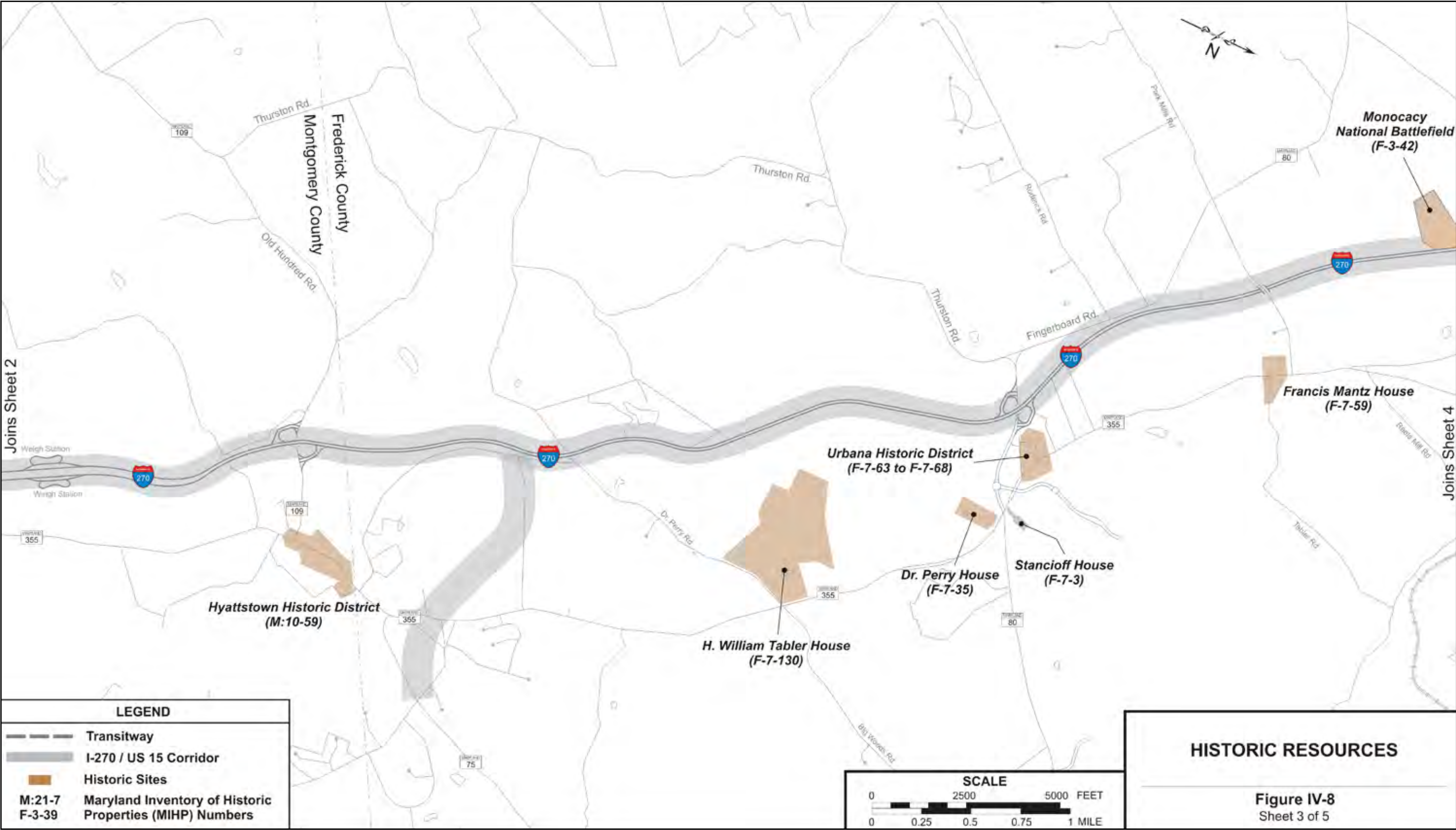


Figure IV-8: Historic Resources

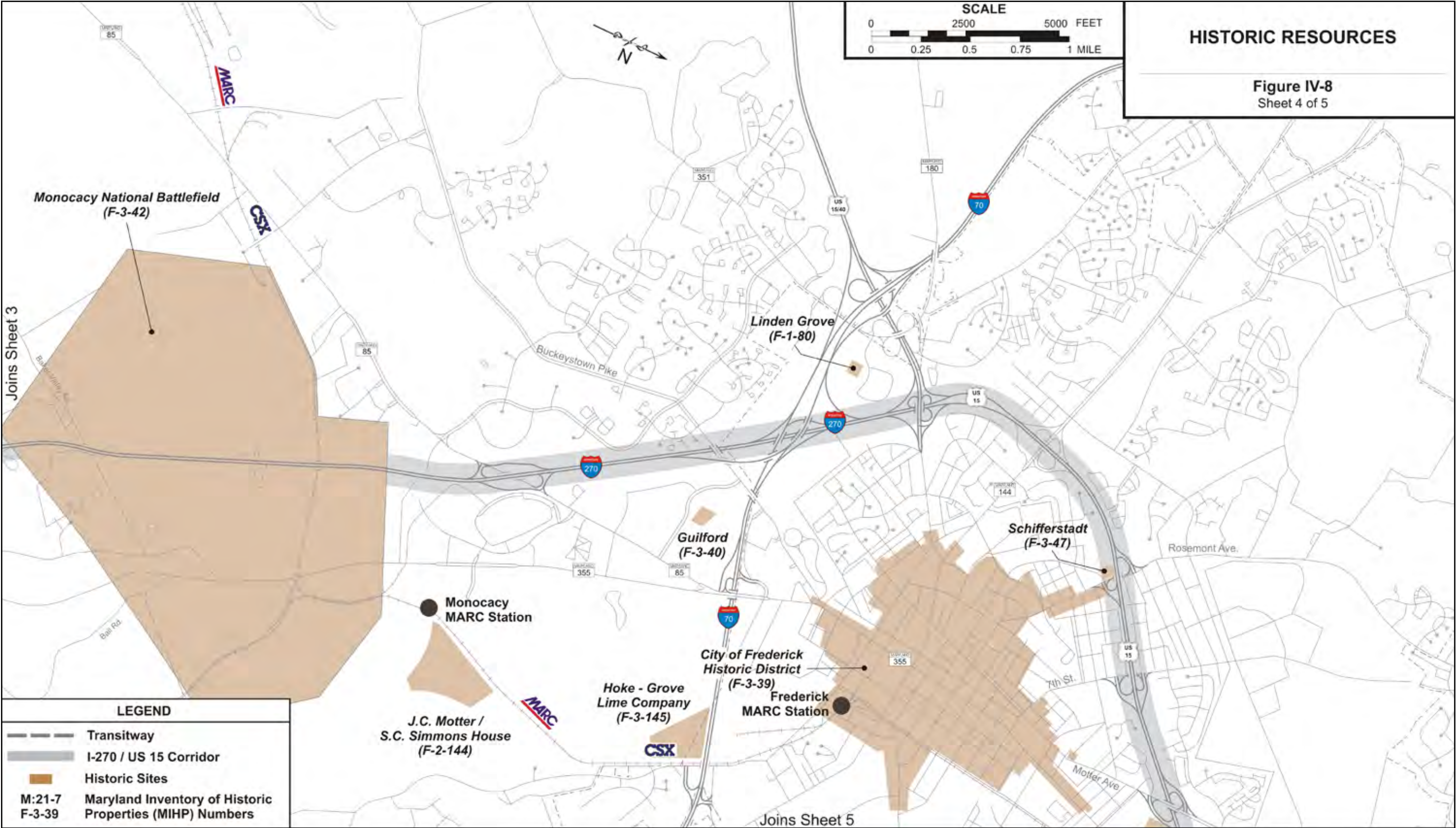
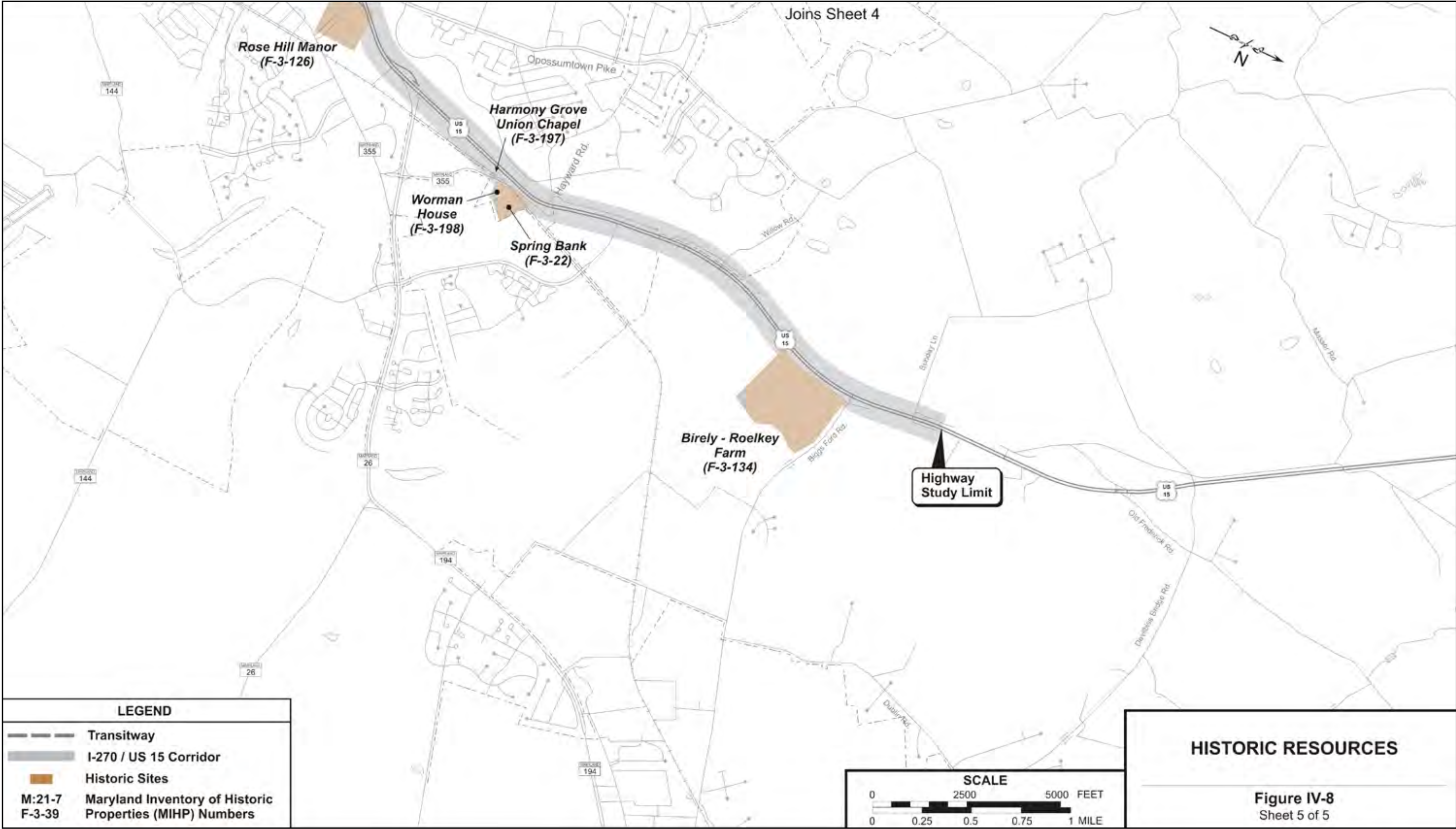


Figure IV-8: Historic Resources





SCENIC BYWAY AND HERITAGE AREAS  
IN THE I-270/US 15 CORRIDOR

Three scenic byway and heritage areas are located within the I-270/US 15 Corridor study limits. The Catoctin Mountain Scenic Byway, the Heart of the Civil War Heritage Area and the Journey Through Hallowed Ground were designated following the 2002 DEIS. The project team will continue coordinating the proposed alternatives with the Corridor Management Plans of these resources.

Catoctin Mountain Scenic Byway

The Catoctin Mountain Scenic Byway follows US 15 in Frederick County, Maryland. The route was designated as a National Scenic Byway on September 22, 2005. This byway is the gateway to mid-Maryland’s historic, scenic, and natural recreational opportunities along the Catoctin Mountains. For more byway information review the Corridor Management Plan at [www.co.frederick.md.us/index.asp?NID-1447](http://www.co.frederick.md.us/index.asp?NID-1447).

Heart of the Civil War State Heritage Area

The Heart of the Civil War Heritage Area is a state-certified heritage area encompassing Carroll, Frederick and Washington Counties. The area played a significant role during the Civil War ranging from military engagements, to troop field stations and hospitals that dotted the region during much of the war. The heritage area highlights and

promotes the stewardship of these historic, cultural and natural Civil War resources as well as the visitor and educational experience. The heritage area management plan was completed in 2006. For more heritage area information, review the management plan at [www.heartofthecivilwar.org/about-the-heritage-area/management-plan](http://www.heartofthecivilwar.org/about-the-heritage-area/management-plan).

Journey Through Hallowed Ground National Heritage Area

The Journey Through Hallowed Ground (JTHG) follows US Route 15, US Route 15 Business and Virginia Routes 20, 231, 22 and 53 from Gettysburg, Pennsylvania, to Monticello in Charlottesville, Virginia. The JTHG National Heritage Area was designated on May 8, 2008. The Journey makes it easy for the visitor to discover “Where America Happened” and includes nine Presidential homes, the largest concentration of Civil War Battlefield sites in the country, 18 historic Main Street communities along with the magnificent views, historic sites and the natural Piedmont landscapes. The JTHG corridor management plan includes Maryland SHA strategies developed and approved as part of the Catoctin Mountain Scenic Byway Corridor Management Plan. For more information on the JTHG go to [www.hallowedground.org](http://www.hallowedground.org)

Additional Historic Properties Evaluated

Worman House (F-3-198)

The Worman House is a two-story brick main pile with a rear wing dwelling, dating from between 1850 to 1870 by the Frederick County Landmarks Foundation. Additional outbuildings, all with vertical board and batten siding and dating to ca. 1890, include a small frame barn, a frame privy, and garden shed. The property also contains an unoccupied log building that is believed to have been a slave quarter. The Worman House retains excellent integrity and significant architectural distinction and is eligible for inclusion in the NRHP under Criterion C (architecture).

Harmony Grove Union Chapel (F-3-197)

Harmony Grove Union Chapel is a one-story frame church on the west side of Worman’s Mill Road. It has German siding and a gable façade with double entrances. The building is three bays long and has an interior chimney. The windows are six over six sash and some have louvered shutters. MHT determined the building to be eligible for the NRHP under Criterion A because of its association with early Methodism and Criterion C as an example of a type of rural church.

Atomic Energy Commission (AEC) Building (M:19-41)

The Atomic Energy Commission (AEC) Building, US Department of Energy, is a 109-acre property in the southwest quadrant of the I-270/MD 118 interchange. It is eligible for the NRHP under Criterion A because of its association with the development of new nuclear sciences from 1957 to 1975. The AEC Building is also eligible for the NRHP under Criterion C, as an example of a mid-twentieth century office building designed by Voorhees, Walker, Smith & Smith, a prominent architecture firm from New York City. Voorhees, Walker, Smith & Smith were well known for creating this kind of scientific research office park. The AEC Building also meets the requirements for Criterion Consideration G because of the significant activities that occurred within the building extending to 1975. During this period, more than one hundred nuclear power plants and ships were constructed or planned for construction in the United States. Its

design provides a campus or park-like setting for the office building that is an important physical contrast with the scientific work that occurs inside the building.

Additional Properties Evaluated for Eligibility in the NRHP

The Metropolitan Branch of the Baltimore & Ohio (B&O) Railroad (M:37-16) extends through the project area. Two SHA bridges, No. 1514800 and No. 1509600, that carry the CSX tracks over MD 124 and I-270, respectively, were evaluated for eligibility in the NRHP. Both were determined to be individually not eligible for inclusion in the NRHP as they do not contribute to the significance of the B&O Metropolitan Branch.

One additional property, 8435 Woodville Road, was evaluated and determined eligible for listing in the NRHP. The property is eligible under Criterion A for its association with the early agriculture history of Fredrick County and under Criterion C for the architectural design of the buildings, which retain good integrity of materials, workmanship, setting, feeling and association. The property is outside the APE and contains a potential wetland mitigation site. Because of the eligibility of this site, it may not be considered further as a potential site for mitigation purposes. However, as a final mitigation package is completed, this site may be evaluated for project impacts as needed. A second evaluated property at 8374 Woodville Road, (F-8-160) containing another potential wetland mitigation site, was determined not eligible.

Seneca Creek State Park (M:19-38) is a 6,290-acre resource traversed by both the I-270 highway and the CCT corridors and was also considered for eligibility. The area of the park through which the transportation corridor travels is undeveloped, and consists of the creek and second growth forest with a few open areas. There are no buildings, trails, or visitor amenities in this part of the park, nor are there any NRHP-listed or eligible historic standing structures. In coordination with the MD SHPO and in consideration of the large size of the park and the comparatively nominal right-of-way requirement (12.09 acres) for this project, a determination of eligibility was not undertaken at this time and there is no impact.



Impacts and Mitigation Measures

In their letter to the MD SHPO of January 10, 2008, SHA requested concurrence that Alternatives 6A/B and 7A/B will have an adverse effect on eight historic properties:

- England/Crown Farm (M:20-7),
- Belward Farm (M:20-21),
- Atomic Energy Commission Building (M:19-41),
- Monocacy National Battlefield (F-3-42),
- Schifferstadt (F-3-47),
- Rose Hill Manor (F-3-126),
- Spring Bank (F-3-22), and
- Birely-Roelkey Farm (F-3-134).

Impacts include the physical taking of a portion of the property within the historical boundary as well as visual and/or audible effects to the properties. Alternatives 6A/B and 7A/B will have no adverse effect on two properties:

- Harmony Grove Union Chapel (F-3-197) and
- Worman House (F-3-198).

It was also noted in the January 10, 2008 letter that Alternatives 3A/B, 4A/B, and 5A/B/C would have an adverse effect on the AEC Building, but have no adverse effect on Worman House or Harmony Grove Union Chapel. Alternatives 3A/B, 4A/B, and 5A/B/C continue to have adverse impacts on England/Crown Farm,

Belward Farm, Monocacy National Battlefield, Rose Hill Manor, and Birely-Roelkey Farm, as described in the 2002 DEIS, and would have a similar adverse effect on Schifferstadt as Alternatives 6A/B and 7A/B.

In their letter to the MD SHPO on April 4, 2008, SHA requested concurrence that two SHA bridges over the Baltimore and Ohio Metropolitan Branch were not individually eligible for listing in the NRHP. SHA also notified the MD SHPO that a determination of eligibility form was not completed for Seneca Creek State Park because of the nature of the resource and the project’s impact on the resource.

The MD SHPO completed their review and responded to both the January 10, 2008 and April 4, 2008 letters on June 26, 2008, concurring that the project would have an adverse effect on historic properties and confirmed those properties located within the project APE as listed above. *Table IV-17* summarizes the historic properties within the APE of Alternatives 6A/B and 7A/B and the effect that the project may have on each property.

All individual private landowners, as well as the General Services Administration (GSA), the Department of Energy, the National Park Service (NPS) and appropriate interested parties, have been notified of the potential adverse effect of Alternatives 6A/B and 7A/B on their respective historic properties and have been asked to join as consulting parties in the Section 106 process. Ongoing consultation will develop appropriate mitigation for adverse effects that cannot be avoided, including noise abatement measures and visual screening. An MOA will be entered upon by the MD SHPO, FHWA, FTA, SHA, and MTA that will contain stipulations to address the adverse effects at each historic property. As appropriate, the consulting parties may be invited to sign the MOA.

Archeological Resources

At this time, no further archeological investigations have been undertaken for Alternatives 6A/B and 7A/B because archeological impacts from these two alternatives are similar to previously investigated Alternatives 4A/B and 5A/B. Archeological review of the current project design

indicates that no identified NRHP eligible archeological sites within the APE will be impacted by the project, with the possible exception of 18FR30 (Monocacy National Battlefield). No significant archeological deposits associated with 18FR30 were found to extend into the APE. However, SHA assumes the presence of significant archeological resources within this NRHP listed property, which is also a National Historic Landmark, and will minimize and avoid impacts to the Landmark property to the maximum extent possible. Where additional impacts from previously unanticipated design features are identified, SHA will perform further archeological investigations. Temporary fencing to define the ultimate limits of disturbance is recommended during all phases of construction to ensure protection of significant archeological resources beyond the limits of the investigated APE.

SHA provided the results of its additional review to the MD SHPO on January 10, 2008. SHA will undertake further archeological investigation upon the resolution of ongoing design changes and following the identification of a Locally Preferred Alternative. Additional Phase I surveys are required for the newly identified O&M facility sites, park and ride lots, and other areas added to the APE since the 2002 DEIS. Further investigations will also be required in areas impacted by stormwater management ponds and mitigation sites, once those locations have been identified, and for other design changes made since the 2002 DEIS. The MOA, referenced previously, will include the commitment to undertake further necessary archeological investigations, including those identified in the preceding paragraph.

Table IV-17: Adverse Effects of Alternatives 6A/B and 7A/B

| HISTORIC PROPERTY<br>MIHP NUMBER             | NRHP<br>STATUS | EFFECT  | DESCRIPTION OF IMPACT/EFFECT                                                                          |
|----------------------------------------------|----------------|---------|-------------------------------------------------------------------------------------------------------|
| Atomic Energy Commission Building<br>M:19-41 | NRE            | Adverse | Highway requires 2.97 acres for right-of-way (ROW); CCT requires 7.87 acres for ROW                   |
| England/Crown Farm<br>M:20-17                | NRE            | Adverse | CCT requires 3.60 acres for ROW                                                                       |
| Belward Farm<br>M:20-21                      | NRE            | Adverse | CCT requires 0.64 acre for parking facility and hiker-biker trail                                     |
| Monocacy National Battlefield<br>F-3-42      | NHL            | Adverse | Highway requires 14.50 acres for ROW<br>Noise impact of 76 dBA                                        |
| Spring Bank<br>F-3-22                        | NR             | Adverse | Noise impact of 69 dBA                                                                                |
| Rose Hill Manor<br>F-3-126                   | NR             | Adverse | Highway requires 0.19 acres for ROW<br>Noise impact of 75 dBA                                         |
| Schifferstadt<br>F-3-47                      | NR             | Adverse | Highway requires 0.09 acre outside of the sewer & drainage easement for ROW<br>Noise impact of 68 dBA |
| Birely-Roelkey Farm<br>F-3-134               | NRE            | Adverse | Highway requires 13.42 acres for ROW                                                                  |

*Note: There will be visual impacts to all properties listed as having adverse effects.  
NR = listed in the National Register  
NRE = eligible for listing in the National Register  
NHL = National Historic Landmark*

## E. Section 4(f) Summary

This section provides a summary of the regulatory framework and methods used to evaluate Section 4(f) properties, followed by a summary description of existing parks/recreation areas and historic properties in Montgomery and Frederick Counties. Existing conditions, impacts, avoidance alternatives and measures to minimize harm are summarized for each of the thirteen publicly-owned public parks and recreation areas and seven significant historic properties that may be impacted by Alternatives 6A/B and 7A/B. A summary of the coordination to date finishes the section. Details of the Section 4(f) evaluation can be found in the *I-270/US 15 Multi-Modal Corridor Study Draft Section 4(f) Evaluation* (March 2009).

### Regulatory Framework and Methodology

Section 4(f) of the U.S. Department of Transportation Act of 1966, 49 USC 303(c), as implemented through 23 CFR 774 jointly by the Federal Highway Administration (Administration) and the Federal Transit Administration (Administration), requires that the proposed use of land from any publicly-owned public park, recreation area, wildlife and/or waterfowl refuge, or any significant historic site, as part of a federally funded or approved transportation project is not permissible unless:

- a) The Administration determines there is no feasible and prudent avoidance alternative to the use of land from the property, and the action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 774.3(a)); or
- b) The Administration determines the use of the Section 4(f) property, including any measures to minimize harm (such as avoidance, minimization, mitigation, or enhancements measures) committed to by the applicant, will have a *de minimis* impact on the property [SAFETEA-LU Section 6009(P.L. 109-53) and 23 CFR 774.3(b)].

Further, Section 4(f) defines the use of property as:

- Land from a 4(f) resource is permanently incorporated into a transportation facility;

- A temporary occupancy of land that is adverse in terms of the Section 4(f) statute’s preservationist purposes;
- A constructive use; or
- A *de minimis* impact on the property, as defined in 23 CFR 774.17:
  - (1) For historic sites, *de minimis* impact means that the Administration has determined, in accordance with 36 CFR part 800, that no historic property is affected by the project or that the project will have “no adverse effect” on the historic property in question.
  - (2) For parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Further, constructive use is only possible in the absence of permanent incorporation or temporary occupancy of the type that constitutes a use of 4(f) land. Constructive use only occurs where, including mitigation, the proximity impacts of a project on Section 4(f) property are so severe that the activities, features or attributes that qualify the property for protection under Section 4(f) are substantially impaired (diminished).

Any final action requiring the use of such land will document and demonstrate that the proposed action includes all measures to minimize harm to the property as a result of such use. This evaluation also provides notification of the Administration’s intent to pursue *de minimis* impact findings for some park properties. Per 23 CFR 774.3(b), an analysis of feasible and prudent avoidance alternatives is not required for properties that would incur a *de minimis* impact, as a *de minimis* impact determination inherently includes the requirement for all possible planning to minimize harm (23 CFR 774.17).

The methodology to evaluate Section 4(f) resources included the following steps: identification of resources (including field verification of existing conditions and coordination with the agency with jurisdiction over the resource); identification of potential uses (impacts) of Section 4(f) properties caused by Alternatives 6A/B and 7A/B (potential property acquisition, potential

impacts to activities, other potential impacts such as noise and visual effects); exploring potential avoidance alternatives; and evaluating planning to minimize harm. Quantitative efforts included measurements of property acreage impacts, predicting future noise levels, and projecting future air quality in the project corridor. Qualitative efforts included an assessment of visual impacts, including those from mitigation efforts. Throughout the Section 4(f) process, SHA and MTA have consulted with the SHPO, owners of the historic resources, and parks officials in matters of potential impacts, potential avoidance and minimization efforts. The project team, through ongoing consultation with appropriate park jurisdictional officers, intends to pursue *de minimis* findings for the following public parks: Malcolm King Park, Morris Park, Seneca Creek State Park, Middlebrook Hill Neighborhood Conservation Area, North Germantown Greenway, Black Hill Regional Park, Little Bennett Regional Park, Urbana Lake Fish Management Area, and Urbana Community Park. Correspondence documenting the consultation process is summarized at the conclusion of this section.

### Section 4(f) Properties

#### Publicly-Owned Public Parks and Recreation Areas

Montgomery County has 66,067 acres of parklands, recreation areas and open space. This total includes approximately 32,700 acres of M-NCPPC parkland, 12,000 acres of state-owned parkland and 3,100 acres of national parkland. Two-thirds of the land in regional parks remains undeveloped in its natural state to help protect the environment. The M-NCPPC owns more than 400 developed parks that provide diverse active and passive recreational opportunities.

Frederick County has 32,187 acres of parklands including municipal, county, state, federal and school sites. Almost 62 percent of this is state (11,267 acres) and federal (8,681 acres) parkland. The City of Frederick owns over 60 parks and recreation areas of various size and amenities. Frederick’s parks offer a variety of resources for active recreation or provide for the preservation of areas in their natural, undeveloped state.

The departments of education of both counties provide recreational areas for public use, and some private organizations also provide for open space/parklands for citizens to enjoy. (Section 4(f) does not consider the use of privately-owned parklands.)

Many parks and recreation areas abut the existing I-270/US 15 corridor and/or proposed CCT alignment, thus making total avoidance of these resources challenging. I-270 bisects several parks, most notably the Monocacy National Battlefield. The thirteen publicly-owned public parks and recreation areas that would be impacted by Alternatives 6A/B and 7A/B are listed in **Table IV-18** and shown on **Figure IV-9 (Sheets 1 through 5)**. The table includes information about each park and the potential impacts that would occur with the implementation of Alternative 6A/B or 7A/B. Each potentially impacted park is also shown on the **Plan Sheets** in **Appendix A**.

Malcolm King Park is located in eastern Gaithersburg, northwest of the I-270/I-370/Sam Eig Highway interchange (**Sheet HWY-1, Appendix A**), adjacent to a multi-unit residential community. The 72.9-acre park is bordered on the east by I-270. The majority of this park acreage remains in its natural wooded state. Park amenities include one basketball court, a 1¼-mile hiker-biker trail, fitness trail, picnic tables, playgrounds, two tennis courts, and tot lots.



Malcolm King Park



Table IV-18: Section 4(f) Parks and Recreation Areas Impacted by Alternatives 6A/B and 7A/B

| PARK NAME<br>PARK OWNER                         | PARK<br>OWNER         | SIZE        | FUNDING<br>SOURCES <sup>1</sup>              | IMPACT <sup>2</sup>                         | USE                                                                                 | LAND USE OF<br>AREA<br>IMPACTED                                             | AVOIDANCE<br>OPTION <sup>3</sup> | MINIMIZATION OPTIONS               |                   | PLAN<br>SHEET       | IMPACT AS<br>PERCENT OF<br>TOTAL ACRES | AMENITIES                                                                                                                                                                  |
|-------------------------------------------------|-----------------------|-------------|----------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------|------------------------------------|-------------------|---------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 |                       |             |                                              |                                             |                                                                                     |                                                                             |                                  | 6:1 SLOPE<br>OPTION <sup>2,4</sup> | RETAINING<br>WALL |                     |                                        |                                                                                                                                                                            |
| Malcolm King Park                               | City of Gaithersburg  | 72.9 acres  | POS                                          | 0.75 acre                                   | SB widening to add ETL direct access ramp & one SB lane; extend accel/decel lanes   | Embankment: grassy edge with some trees                                     | Retaining Wall                   | 1.28 acres                         | n/a               | HWY-1               | 1.03 %                                 | Basketball court, hiking trail, fitness trail, picnic tables, playgrounds, tennis courts, tot lots                                                                         |
| Morris Park                                     | City of Gaithersburg  | 37.2 acres  | POS                                          | 0.21 acre                                   | Realign I-370 ramp to NB I-270 to access new NB lane                                | Mature forest edge                                                          | Retaining Wall                   | 0.23 acre                          | n/a               | HWY-1               | 0.56 %                                 | Football/soccer field, basketball court, tennis courts, baseball fields, playground areas, picnic tables, grills                                                           |
| Seneca Creek State Park                         | MDNR                  | 6,290 acres | LWC, POS                                     | H-6.93 acres<br>T-5.16 acres<br>12.09 total | Outside widening to add one new lane in each direction                              | Forested floodplains and upland forest; crosses Seneca Creek                | n/a                              | H-14.27 acres                      | H-1.65 acres      | HWY 2&3<br>TRAN 4&5 | 0.19 %                                 | Biking trails, boat rental, cross-country skiing, campfire programs, fishing, flat water canoeing, hiking trails, hunting, playground, disk golf course, riding trails     |
| Middlebrook Hill Neighborhood Conservation Area | M-NCPPC               | 11.5 acres  | POS                                          | 2.13 acres                                  | Outside widening to add one new lane in each direction                              | Natural forest buffer edge                                                  | n/a                              | 2.86 acres                         | 0.21 acre         | HWY-3               | 18.52 %                                | Neighborhood conservation area; undeveloped                                                                                                                                |
| North Germantown Greenway                       | M-NCPPC               | 300 acres   | Developer Funding                            | 0.78 acre                                   | Outside widening to accommodate barrier-separated ETLs                              | Hardwood forest                                                             | n/a                              | 1.40 acres                         | 0.28 acre         | HWY-4               | 0.26 %                                 | Athletic field, playground, picnic area, basketball court, trail (construction in progress)                                                                                |
| Black Hill Regional Park                        | M-NCPPC               | 1,843 acres | POS, Mont. Co Capital Program, Mont Co bonds | 8.61 acres                                  | Outside widening to accommodate barrier-separated ETLs                              | Mature forest                                                               | n/a                              | 19.52 acres                        | 4.09 acres        | HWY 4&5             | 0.47 %                                 | Fishing, boating, hiking, picnicking and nature center, mooring sites and equestrian trails                                                                                |
| Little Bennett Regional Park                    | M-NCPPC               | 3,648 acres | POS, Mont Co Capital Program                 | 0.29 acre                                   | Outside widening to accommodate barrier-separated ETLs                              | Floodplain and pasture; crosses Bennett Creek                               | Centerline Shift                 | 1.13 acres                         | 0.05 acre         | HWY-7               | 0.01 %                                 | Golf, camping, picnicking, hiking                                                                                                                                          |
| Urbana Lake Fish Management Area                | MDNR                  | 70 acres    |                                              | 1.23 acres                                  | Outside widening to accommodate barrier-separated ETLs                              | Hardwood forest and wetlands                                                | Centerline Shift                 | 2.42 acres                         | 0.41 acre         | HWY-8               | 1.76 %                                 | Recreational fishing area                                                                                                                                                  |
| Urbana Elementary School                        | Frederick County      | 21 acres    |                                              | 1.78 acres                                  | Extend ramp from MD 80 to NB I-270                                                  | Wooded hedgerow; softball field                                             | n/a                              | 1.98 acres                         | 0.42 acre         | HWY-8               | 8.48 %                                 | Ball fields, soccer field, tennis/basketball courts, and playground                                                                                                        |
| Urbana Community Park                           | Frederick County      | 20 acres    | POS                                          | 0.44 acres                                  | Extend ramp from MD 80 to NB I-270                                                  | Grasses and minor shrub vegetation buffer                                   | n/a                              | 0.55 acre                          | 0.01 acre         | HWY-9               | 2.20 %                                 | Ball fields, grills, horseshoe pits, picnic shelters, play equipment, soccer fields, tennis courts, volleyball courts                                                      |
| Monocacy National Battlefield                   | National Park Service | 1,647 acres | NPS – various                                | 14.50 acres                                 | Addition of one (Alt 6) or two (Alt 7) GP lanes through outside widening on SB side | Hardwood forest, hedgerows, farm fields and pasture; crosses Monocacy River | n/a                              | 23.63 acres                        | 3.71 acres        | HWY-9-<br>,10,11    | 1.43 %                                 | Landscape of historic Civil War battlefield; historic structures throughout battlefield area; interpretive exhibits and visitor center.                                    |
| Baker Park                                      | City of Frederick     | 53 acres    | Frederick City funded                        | 0.26 acres                                  | Expansion of US 15 from two to three lanes plus auxiliary lane in each direction    | Grassland and hedgerow                                                      | n/a                              | 1.08 acres                         | 0.02 acre         | HWY-13              | 0.49 %                                 | Band shell, playgrounds, swimming pool, softball fields, a little league field, tennis courts, a covered bridge, a lighted ice-skating area, picnic area with 10 pavilions |
| Rose Hill Manor Park                            | Frederick County      | 43 acres    | POS                                          | 1.04 acres                                  | Expansion of US 15 from two to three lanes plus auxiliary lane in each direction    | Grassland and wooded hedgerow                                               | n/a                              | 2.60 acres                         | 0.16 acre         | HWY-13,14           | 2.42 %                                 | Picnic facilities; carriage museum; antique farm museum                                                                                                                    |

Notes: <sup>1</sup>POS = Program Open Space; LWC = Land and Water Conservation Funds  
<sup>2</sup>The highway design includes the use of steeper 2:1 slopes at all parks and recreation area locations (rather than conventional 6:1 slopes) to minimize impacts. The transitway design includes a minimized cross section and retaining walls in appropriate locations to minimize impacts.  
<sup>3</sup>Installation of retaining walls may impact the visual and aesthetic character of parks.  
<sup>4</sup>This column shows the impact that would have occurred using the conventional 6:1 slope design and identifies minimization efforts already included in the current design.  
Additional information regarding impacts to parks and recreation areas (noise and/or visual impacts) may be found in the **Social Resources, Noise and Vibration**, and **Visual Quality Sections** of this chapter.

Figure IV-9: Section 4(f) Resources

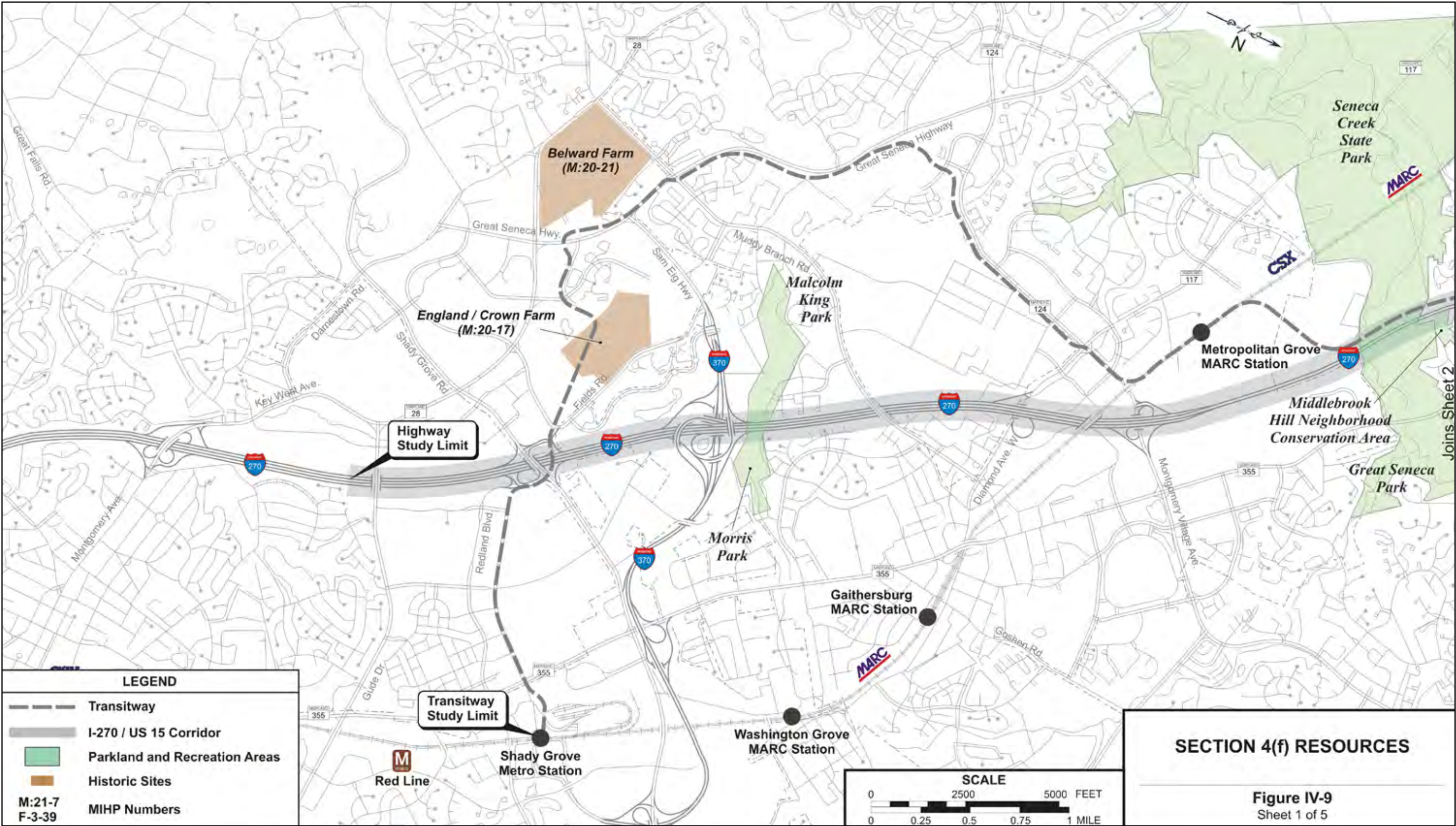


Figure IV-9: Section 4(f) Resources

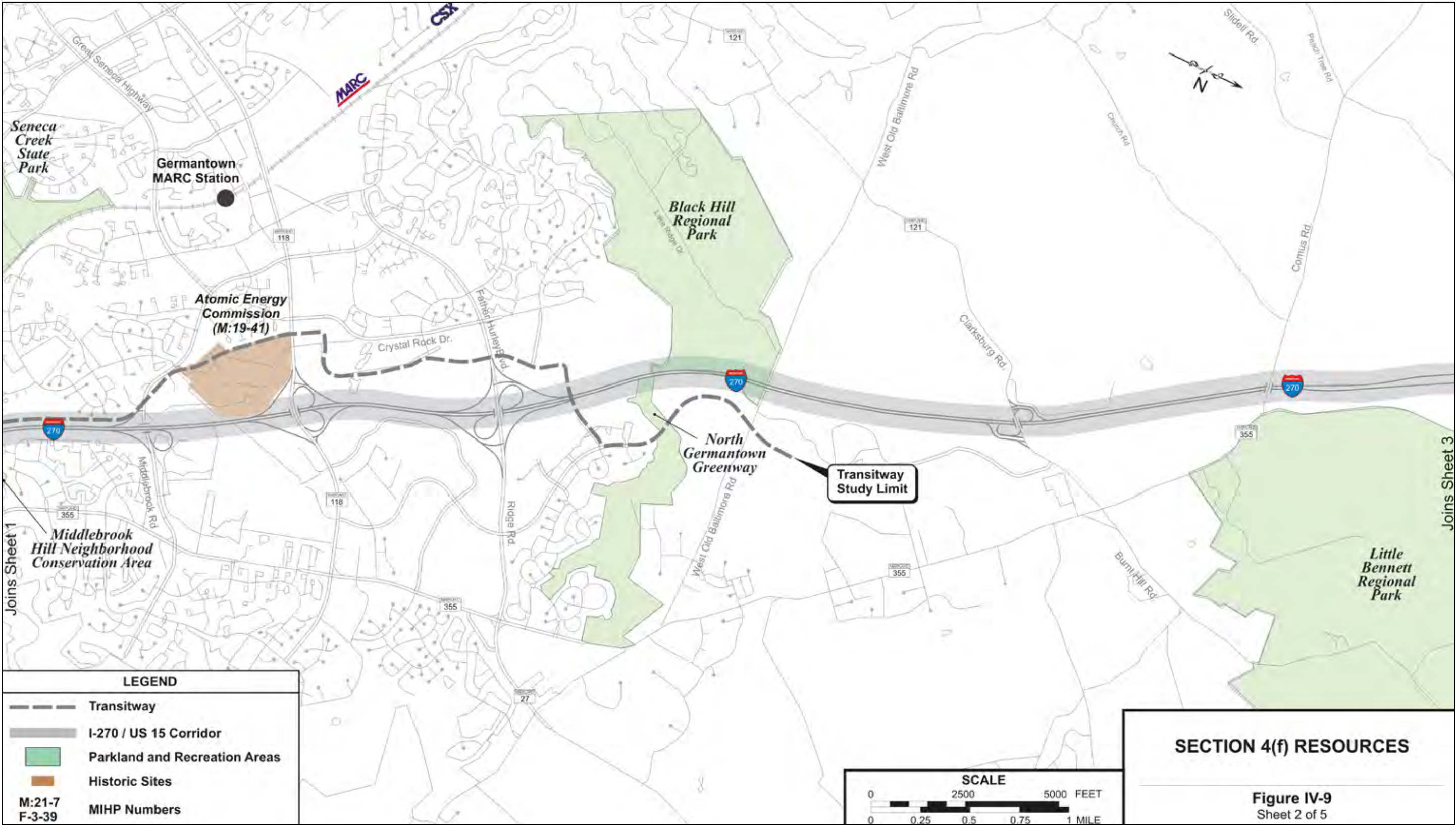


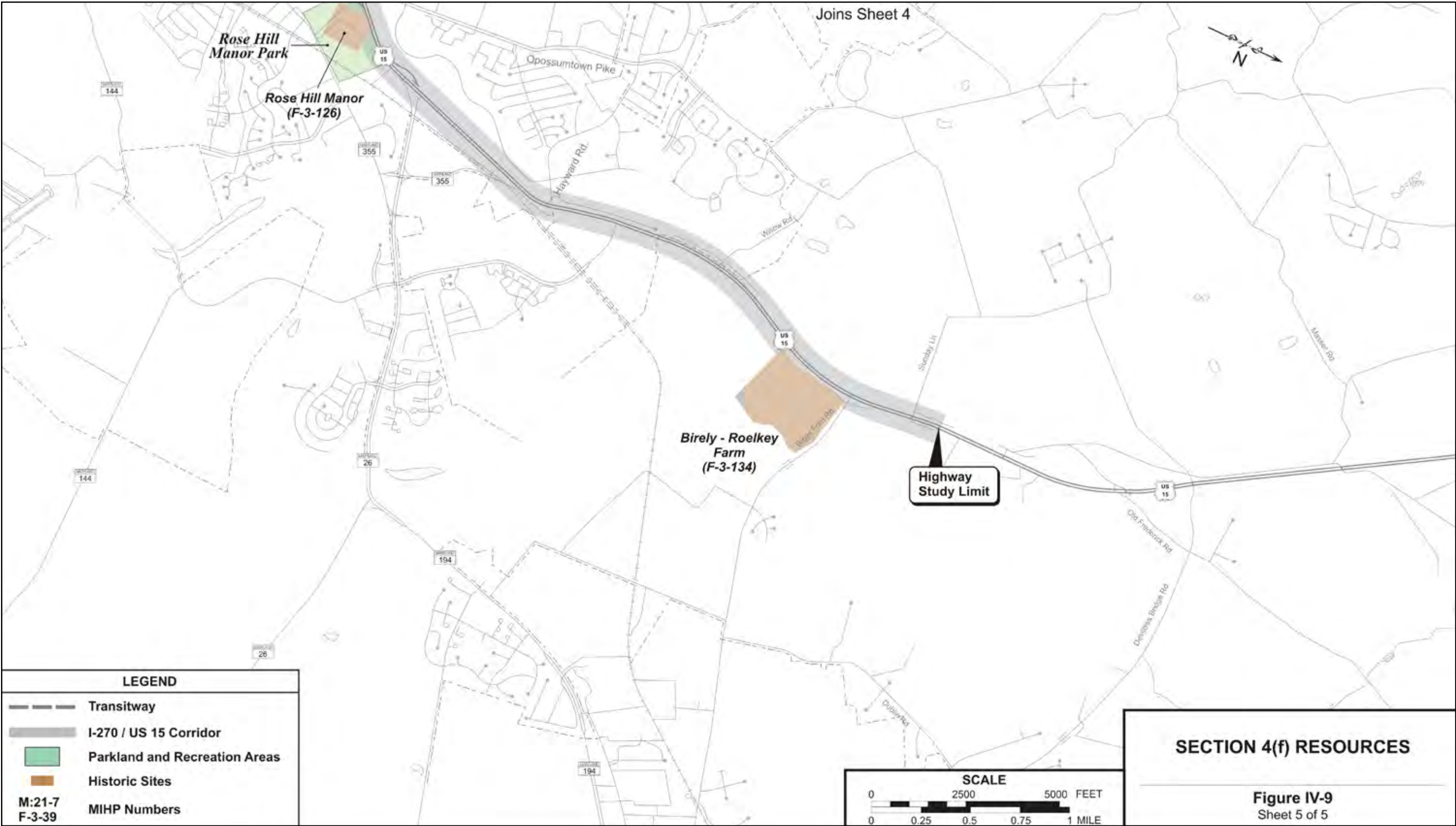
Figure IV-9: Section 4(f) Resources



Figure IV-9: Section 4(f) Resources



Figure IV-9: Section 4(f) Resources



MONOCACY NATIONAL BATTLEFIELD

Monocacy National Battlefield lies in Frederick County, Maryland, in the heavily populated Baltimore-Washington metropolitan area, approximately 3 miles south of the center of Frederick, the second largest city in Maryland. Although this area of the county is rapidly building up, the national battlefield is remarkably free of intrusive elements. Only the modern Interstate Highway 270 (I-270) intrudes on the historic landscape, essentially bisecting the battlefield.

The national battlefield’s boundaries encompass most of the lands upon which the Battle of Monocacy was fought. Six farmsteads that existed during the battle still exist within the national battlefield and retain essentially their Civil War era landscape appearance. Surrounding agricultural fields retain the feel of the Civil War era landscape, with few changes to field configurations and fence rows. Crops have gradually changed over the years from small grains to hay and corn, but the overall agricultural environment remains remarkably intact. Forested areas include Brooks Hill and lands along the Monocacy River and Bush Creek. These form an exceptional buffer from development outside the boundaries.

Approximately 2 miles of the Monocacy River runs through the national battlefield. The CSX Railroad (Baltimore & Ohio during the Civil War) also extends through the national battlefield, paralleling the Monocacy River and Bush Creek. Historic Urbana Pike (Maryland Highway 355) runs north-south through the eastern part of the national battlefield.

Urbana Pike also is the main access for visitors to the battlefield. This highway is heavily used by commuters, residents, business vehicles, and trucks. In the national battlefield, the highway is two lanes with paved shoulders on the north side of the Monocacy River, and on the south side of the river it is two lanes with narrow, unpaved shoulders. South



of the national battlefield it remains two lanes with narrow, unpaved shoulders. Urbana Pike provides much of the access to important features, and the heavy volumes and high speeds of commuter traffic and commercial vehicles create a safety problem and encroach upon the visitor experience.

The original on-site visitor contact station was replaced by a new visitor center completed in 2007. Much of the national battlefield has remained closed to visitors as historic features were rehabilitated or restored. As a result, visitation figures (about 14,700 in 2003) reflect the low level of knowledge in the community and the nation that Monocacy National Battlefield exists or is open. With land acquisition nearly complete, opening of more of the national battlefield to visitation probably will increase visitation considerably.

[Excerpted from the *Draft General Management Plan Environmental Impact Statement*, National Park Service, US Department of the Interior: (2008)]

Morris Park is located in eastern Gaithersburg, northeast of the I-270/I-370/Sam Eig Highway interchange (**Sheet HWY-1, Appendix A**), adjacent to the Summit Hall Elementary School and multi-use residential communities. The 37.2-acre park is bordered on the west by I-270 on the west. Park amenities include a football/soccer field, basketball court, three tennis courts, two baseball fields, playground areas, picnic tables, and grills.

Seneca Creek State Park encompasses 6,290 acres and is located in Montgomery County between Gaithersburg and Germantown (**Sheets HWY-2, HWY-3, TRAN 4 and TRAN 5, Appendix A**). The park is traversed by existing I-270 as it crosses Seneca Creek. Much of the park remains in a natural state extending along Seneca Creek. Park amenities include biking trails, boat rental, cross-country skiing, campfire programs, fishing, flat-water canoeing, hiking trails, hunting areas, a playground, a disc golf course, and riding trails.

Middlebrook Hill Neighborhood Conservation Area (NCA) is located in Montgomery County north of Seneca Creek State Park and adjacent to the existing I-270 corridor on the northbound side (**Sheet HWY-3, Appendix A**). The park is a wooded, undeveloped parcel of land that is being managed as a conservation area and does not offer active recreational opportunities.

North Germantown Greenway is a stream valley park (SVP) located on several parcels of land between I-270 and Blunt Road in Montgomery County. The park is located east of I-270 between Father Hurley Boulevard and West Old Baltimore Road (**Sheet HWY-4, Appendix A**), adjacent to Black Hill Regional Park. The SVP incorporates the Ridge Road Recreational Park east of MD 355, which is currently under construction and will include recreational facilities such as an athletic field, playground, picnic area, basketball court and a trail. The portion of the North Germantown Greenway adjacent to I-270 has recreational trails and is composed of mature forest.

Black Hill Regional Park is located west of I-270 between Germantown and Clarksburg (**Sheets HWY-4 and HWY-5, Appendix A**). The park includes the 505-acre Little Seneca Lake. Black Hill Regional Park lies adjacent to southbound I-270 for approximately 4,000 feet south of West Old Baltimore Road, and a small



Black Hill Regional Park

portion of the park is located along northbound I-270 south of West Old Baltimore Road. The portion of the park adjacent to I-270 is mature forest.

Little Bennett Regional Park is located to the east of I-270 in northern Montgomery County, just south of the Frederick County line and the I-270/MD 109 interchange (**Sheet HWY-7, Appendix A**). Little Bennett Regional Park amenities include a golf course, camping and picnic areas, hiking and equestrian trails. A concept plan includes more extensive camping areas, trails, and passive recreation facilities. The portion of the park adjacent to I-270 is undeveloped. An additional 59 acres adjacent to I-270 was acquired on January 30, 2007. M-NCPPC has not yet established the park’s boundary within this parcel, but they have indicated land adjacent to I-270 right-of-way will not be included within the park’s boundary.



Little Bennett Regional Park

The Urbana Lake Fish Management Area is adjacent to I-270 southbound between Urbana and Hyattstown, north of the proposed MD 75 interchange (**Sheet HWY-8, Appendix A**). The area’s sole amenity is the opportunity to fish.

Urbana Elementary School is located in northwestern Urbana, just north of the I-270/MD 80 interchange (**Sheet HWY-8, Appendix A**). The recreation area is open to public use and includes two ball diamonds, soccer field, tennis/basketball courts and a playground. The intramural ball field is located west of the school building and is bordered by I-270 at its western edge. Coordination with the school has emphasized the importance of not impacting public recreational uses of school property, e.g., the activities that take place on the field adjacent to I-270.



Urbana Elementary School Recreation Area



Urbana Community Park

Urbana Community Park is located in northwestern Urbana (**Sheet HWY-9, Appendix A**). The park is bordered on the west by I-270. Park amenities include ball fields, grills, horseshoe pits, picnic shelters, play equipment, soccer fields, tennis courts, and volleyball courts.



Monocacy National Battlefield

Monocacy National Battlefield is a National Historical Landmark (NHL) in Frederick County and is under the jurisdiction of the National Park Service (NPS). The park’s 1,647 acres are bisected by I-270 (originally constructed in the 1950s as US 240), running from the northwest to the southeast (**Sheets HWY-9, HWY-10 and HWY-11, Appendix A**). The battlefield was established in part by an Act of Congress in 1934 and through deed transfers between private owners, land trusts and NPS. Open space and the I-270 Technology Business Park are situated to the north, open space to the south and east, and Omega Center, McKinney Industrial Park, and

Dudrow Business Park to the west. The battlefield was listed in the National Register of Historic Places (NRHP) in 1966 and listed as a National Landmark in 1973. It was the location of an important Civil War battle, the Battle of Monocacy, as judged by its consequences: Union forces conducted a strong defense that delayed the advance of Confederate forces under General Jubal Early on July 9, 1864.

The battlefield, which receives more than 18,000 visitors each year, is a historic landscape that encompasses land valued and utilized for farming and transportation, retaining many of the traditional landscape features, such as farm fields, roads, drives, lanes, fords, bridges and road traces. Historical use by the military for troop encampments and one camp established during the Civil War also figure in the significance of the landscape and existing structures. Examples of the structures that are key features relative to the Civil War battle are Hermitage (a.k.a. Best Farm), Araby Mill, Edgewood, Thomas Farm, Lewis Farm, Gambrill Farm, Worthington Farm and Baker Farm. The battlefield landscape remains largely unchanged from when the Confederate and Union troops fought aside from the presence of I-270. NPS is proceeding with development of a General Management Plan that will include interpretive plans. The new Visitor Center at Best Farm opened on June 27, 2007.



Baker Park

Baker Park is located in the City of Frederick on 53 acres of land (**Sheet HWY-13, Appendix A**). The linear park borders US 15 to the west and extends to the east. Park amenities include a band shell, playgrounds, a swimming pool, softball and baseball fields, tennis courts, a covered bridge, a lighted ice-skating area, and a picnic area with 10 pavilions. Some of the park’s notable features are its

bell tower, a gazebo, a lake with a boathouse, and a 1913 armory which has since been converted to a recreation center. In addition to the park features, the historic Schifferstadt home is located within the Baker Park boundaries.

Rose Hill Manor Historic Park lies in northern Frederick City, just east of Fort Detrick (**Sheets HWY-13 and HWY-14, Appendix A**). The park’s 43 acres are bordered on the west by US 15. The park amenities include museum facilities, picnic facilities, and open space. The park features the Frederick County Museum, former Maryland Governor Thomas Johnson’s retirement home (Rose Hill Manor), and other historic buildings.



Rose Hill Manor Historic Park

Significant Historic Resources

The National Register of Historic Places (NRHP) has recorded information on 2,200 historic sites in Montgomery County that are included in or eligible for inclusion in the NRHP. Historic properties can be buildings, landscapes, districts, or archeological sites. Many are privately owned, and many are open to the public for interpretive tours and historical programs. In Frederick County, there are over 2,500 sites listed in or eligible for listing in the National Register. As the MD SHPO, the Maryland Historical Trust (MHT) assists the people of Maryland in identifying, studying, evaluating, preserving, protecting and interpreting the state’s significant prehistoric and historic districts, sites, structures, cultural landscapes, heritage areas, and artifacts.



Table IV-19: Historic Resources Impacted by Alternatives 6A/B and 7A/B

| PROPERTY NAME                     | MIHP NUMBER <sup>1</sup> | NRHP STATUS | ELIGIBILITY CRITERIA <sup>2</sup> | SIZE        | PUBLIC/ PRIVATE <sup>3</sup> | POTENTIAL IMPACT <sup>4</sup> | USE                                                                                                                                             | USE OF AREA IMPACTED                                                                         | AVOIDANCE OPTION <sup>5</sup>           | MINIMIZATION OPTIONS <sup>5</sup> |                                                        | PLAN SHEET      | OTHER IMPACTS    | COMMENTS                                                                                                                                 |
|-----------------------------------|--------------------------|-------------|-----------------------------------|-------------|------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------|--------------------------------------------------------|-----------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |                          |             |                                   |             |                              |                               |                                                                                                                                                 |                                                                                              |                                         | 6:1 SLOPE OPTION <sup>6</sup>     | RETAINING WALL                                         |                 |                  |                                                                                                                                          |
| England/Crown Farm                | M:20-17                  | Eligible    | A                                 | 76 acres    | Private                      | T-3.60 acres                  | T-Exclusive transitway alignment to accommodate LRT or BRT                                                                                      | Fallow farm field; scheduled for development                                                 | n/a                                     | n/a                               | Realign from Master Plan (developer option) 3.43 acres | TRAN-2          | Noise and visual | Property under development; historic boundary may be reduced                                                                             |
| Belward Farm                      | M:20-21                  | Eligible    | A                                 | 107 acres   | Private                      | T-0.64 acre                   | T-Parking structure and hiker/biker trail                                                                                                       | Fallow farm field; scheduled for development                                                 | Design Modification                     | n/a                               | n/a                                                    | TRAN-3          | Noise and visual | Property under development (JHU Campus); historic boundary was reduced in 2002.                                                          |
| Atomic Energy Commission Building | M:19-41                  | Eligible    | A, C                              | 109.2 acres | Private                      | H-2.97 acres<br>T-7.87 acres  | H-Outside SB widening, ramp relocation & ETL direct access ramps<br>T-Exclusive transitway alignment west of building to accommodate LRT or BRT | Hedgerow and trees, walking path; transitway crosses access driveway and impacts outbuilding | n/a                                     | H-10.20 acres                     | H-1.44 acres                                           | HWY-3<br>TRAN-5 | Noise and visual | NR boundary limited to tax parcel area. Transitway impacts west property boundary; highway impacts are on the east side.                 |
| Monocacy National Battlefield NHL | F-3-42                   | Listed      | A                                 | 1,920 acres | Public                       | 12.52 acres                   | Addition of one (Alt 6) or two (Alt 7) GP lanes through outside widening on SB side                                                             | Hedgerows, farm fields and pasture; crosses Monocacy River                                   | n/a                                     | 20.01 acres                       | 3.50 acres <sup>7</sup>                                | HWY-9,10,11     | Noise and visual | NR boundary not coincident with park boundary. Preliminary consultation resulted in impacts on west (southbound) side of I-270 only.     |
| Schifferstadt                     | F-3-47                   | Listed      | C                                 | 1.5 acres   | Public                       | 0.09 acre                     | Expansion of US 15 from two to three lanes plus auxiliary lane in each direction                                                                | Grass and hedge-row                                                                          | Retaining wall within drainage easement | 0.67 acre                         | n/a                                                    | HWY-13          | Noise and visual | 37 ft wide drainage and sewer easement adjacent to US 15 MHT holds a preservation easement on Schifferstadt.                             |
| Rose Hill Manor                   | F-3-126                  | Listed      | B, C                              | 30 acres    | Public                       | 0.19 acre                     | Expansion of US 15 from two to three lanes plus auxiliary lane in each direction                                                                | Grassland and wooded hedgerow                                                                | n/a                                     | 0.58 acre                         | 0.01 acre                                              | HWY-14          | Noise and visual | NR boundary established in April, 1971 is not coincident with boundary of Rose Hill Manor Historic Park and predates US 15 construction. |
| Birely-Roelkey Farm               | F-3-134                  | Eligible    | A, C                              | 110.3 acres | Private                      | 13.42 acres                   | Construction of interchange at US 15 and Biggs Ford Road                                                                                        | Farm field                                                                                   | Design Modification                     | 14.71 acres                       | 12.01 acres                                            | HWY-15          | Noise and visual | Design modification would impact farm fields, four businesses and one residence                                                          |

Notes: <sup>1</sup>Maryland Inventory of Historic Properties Number  
<sup>2</sup>Criteria for eligibility include: Criterion A for association with the agrarian past; Criterion B for association with important people or events; and Criterion C for architectural style or association with an historically important architect.  
<sup>3</sup>Ownership does not affect Section 4(f) status or consideration.  
<sup>4</sup>The highway design includes the use of steeper 2:1 slopes at all historic resource locations (rather than conventional 6:1 slopes) to minimize impacts. The transitway design includes a minimized cross section and retaining walls in appropriate locations to minimize impacts.  
<sup>5</sup>Installation of retaining walls may impact the visual and aesthetic character of historic properties and may not be suitable for minimization.  
<sup>6</sup>This column shows the impact that would have occurred using the conventional 6:1 slope design and identifies minimization efforts already included in the current design.  
<sup>7</sup>Consultation with the National Park Service has indicated that a retaining wall may not be compatible with the historic landscape and viewshed in some locations.  
Additional information regarding effects to historic resources may be found in **Chapter IV, Sections D and J.**

MD SHPO has concurred that 10 historic sites are within the area of potential effects for Alternatives 6A/B and 7A/B. Of these, seven sites would require the acquisition of property. The MD SHPO has concurred that the project will have an adverse effect on these seven properties, listed in **Table IV-19** and shown on **Figure IV-9**. The table includes information about each of the resources' NHRP status, size, and the nature of the potential impacts. Each potentially impacted historic resource is also shown on the **Plan Sheets** in **Appendix A**.

England/Crown Farm (M:20-17) is located within the Gaithersburg City limits and is eligible for listing in the NRHP under Criterion A for its association with the agrarian history of Montgomery County (**Sheet TRAN-2, Appendix A**). The dwelling is part of a well-preserved early to mid-twentieth century farm complex originating with the England family in the late nineteenth century. It exhibits architectural significance because of its detailing, and the presence of a log dwelling, possibly originating as a tenant house during the ownership by the Hunter family predating the England family ownership. The property is in the early stages of subdivision. The England/Crown farm has been identified as a rare link to the agrarian past of the Gaithersburg area, which is increasingly overrun by subdivision construction. The MD SHPO concurs that the project will have an adverse effect on this resource.



England/Crown Farm



Belward Farm

Belward Farm (M:20-21), located on the north side of MD 28 west of Key West Avenue in the vicinity of Gaithersburg, is eligible for the NRHP (**Sheet TRAN-3, Appendix A**). It is significant under Criterion A for its strong association with the agrarian history of Montgomery County. The historic site is a remnant of a dairy farm, continuously operated by members of the same family who established it in the mid-nineteenth century. The farmhouse is an excellent example of an 1890s Victorian frame dwelling. Since early 1998, a portion of the historic site located east of the farmstead building cluster has undergone office park/research development near the Great Seneca Highway/Key West Avenue intersection. The MD SHPO concurs that the project will have an adverse effect on this resource.

The Atomic Energy Commission (AEC) Building (M:19-41; Department of Energy) site is located in Montgomery County, southwest of the I-270/MD 118 interchange (**Sheets HWY-3 and TRAN-5, Appendix A**). The building served as AEC headquarters from 1957 to 1975. Between 1946 and 1975, the AEC, an independent federal commission overseeing nuclear sciences, conducted research and development programs or regulated the research of nuclear weapons, propulsion reactors, and technology for scientific, medical and industrial purposes. The building is eligible for the NRHP under Criterion A for its association with the development of new nuclear sciences and as the first post-World War II government agency to be located outside of Washington, DC. The building

is also eligible under Criterion C for its design by prominent architects Vorhees, Walker, Smith & Smith, exemplifying the well-planned office and laboratory buildings for which the firm was known. The AEC Building also meets Criterion Consideration G, as a building of extraordinary significance for the activities that occurred there, such as oversight of the planning and construction of over one hundred nuclear power plants in the United States. The MD SHPO concurs that the project will have an adverse effect on this resource.



Atomic Energy Commission Building

Monocacy National Battlefield NHL (F-3-42) is located south of the City of Frederick (**Sheets HWY-9, HWY-10 and HWY-11, Appendix A**) (see previous description in this Section). The park boundary is not coincident with the NHL boundary. The battlefield retains much of the rural character of the mid-nineteenth century when it gained significance under Criterion A as the location of an important Civil War battle and as a rural historic landscape. Within the pastoral landscape of this portion of the Monocacy River valley roads, railroad and river come together. It was the site of a July 9, 1864 engagement of Union and Confederate forces that bought the time necessary for the Union army to successfully fortify Washington, DC against Confederate capture. The MD SHPO concurs that the project will have an adverse effect on this resource.



Monocacy National Battlefield

Schifferstadt (F-3-47) is located in Baker Park in the City of Frederick (**Sheet HWY-13, Appendix A**) and is listed in the NRHP under Criterion C because it embodies the distinctive characteristics of German building traditions transported to Maryland. The MHT holds a historic preservation easement on Schifferstadt which is coterminous with the historic boundary. This large stone house is outstanding architecturally as an exceptionally well-preserved example of a vernacular building tradition, providing a palpable link to the traditions and patterns of early German settlement in this region. The grounds of Schifferstadt are well groomed, with mature trees adjacent to existing roadways. The MD SHPO concurs that the project will have an adverse effect on this resource.



Schifferstadt



Rose Hill Manor

Rose Hill Manor (F-3-126), located in the City of Frederick, is listed in the NRHP (**Sheet HWY-13, Appendix A**). This large, imposing, porticoed country mansion built near the turn of the nineteenth century is significant architecturally under Criterion C for its late Georgian-Greek Revival transitional style. It is also significant under Criterion B as the home of Maryland's first elected governor, Thomas Johnson. The MD SHPO concurs that the project will have an adverse effect on this resource.

Birely-Roelkey Farmstead (F-3-134), eligible for listing in the NRHP, is located in the southeast corner of the US 15/Biggs Ford Road intersection (**Sheet HWY-15, Appendix A**). It was built about 1851 by John W. Birely, a prominent local businessman and cashier

of the Farmers and Mechanics National Bank in the late nineteenth century. The property constitutes an important link to the agrarian tradition of Frederick County and is eligible under Criterion A for its association with the broad patterns of American history. Most of the contributing outbuildings date from the periods of the Birely and Roelkey ownerships. It is also significant under Criterion C for the buildings, for the architectural style of the main dwelling and an increasingly rare type of agricultural outbuilding, the blacksmith shop. The MD SHPO concurs that the project will have an adverse effect on this resource.



Birely-Roelkey Farmstead

### Section 4(f) Uses

Alternatives 6A/B and 7A/B would require the use of property from 13 parks/recreation areas and from seven historic properties. Right-of-way from each resource would be required for the construction of additional

lanes, ramps and intersections along the I-270/US 15 corridor. Most of these impacts would require the acquisition of a strip of land adjacent to the highway from the Section 4(f) resource. The uses and impacts are shown on **Table IV-18** and **Table IV-19**. Several of the engineering elements to minimize harm are also identified in the tables.

### Avoidance Analysis

The No-Build Alternative (Alternative 1) and the TSM/TDM Alternative 2 completely avoid impacts to the potentially impacted resources, but they are not feasible and prudent because they do not meet the project purpose and need. Complete avoidance of all Section 4(f) properties would neither be prudent nor feasible, because it would require identifying a new alignment location to the east or west to provide additional capacity or upgrading an existing alternate route, such as MD 355. Avoidance options that would completely avoid large parklands would likely impact other historic resources and would cause other severe problems of a magnitude that substantially outweigh the importance of protecting the Section 4(f) properties.

### Least Overall Harm Analysis

SHA and MTA intend to pursue a *de minimis* finding for the following resources: Malcolm King Park, Morris Park, Seneca Creek State Park, Middlebrook Hill Neighborhood Conservation Area, North Germantown Greenway, Black Hill Regional Park, Little Bennett Regional Park, Urbana Lake Fish Management Area, and Urbana Community Park. The final Section 4(f) Evaluation will include the analysis of the alternatives included in the 2002 DEIS and those included in the 2009 AA/EA.

Avoidance options were evaluated for each individual resource, including highway engineering designs with steeper side slopes, retaining walls, narrowed shoulders, and shifting the roadway centerline. For the CCT, the typical section has been narrowed to the minimum width, and steeper side slopes and retaining walls have been incorporated in sensitive areas. By incorporating

a retaining wall in the design, the project would avoid the use of property from Malcolm King Park, Morris Park, and Schifferstadt. A centerline shift could be incorporated into the design to avoid the use of property from Little Bennett Regional Park and the Urbana Lake Fish Management Area. Other design modifications could be employed to avoid the use of property from Belward Farm (adjusting the footprint of the parking facility and/or realigning the hiker-biker trail) and the Birely-Roelkey Farm (shifting the interchange ramps to the northeast quadrant).

For several resources, no prudent and feasible avoidance options were identified. For Seneca Creek State Park, Black Hill Regional Park and Monocacy National Battlefield, the existing parklands are located on both sides of the existing roadway. No feasible and prudent avoidance is possible when widening the existing roadway within the park boundaries. Although a roadway centerline shift could eliminate impacts to Middlebrook Hill Park and North Germantown Greenway, it would increase impacts to Seneca Creek State Park and Black Hill Regional Park, respectively. Eliminating highway impacts by shifting the centerline adjacent to Urbana Elementary School Recreation Area, the Atomic Energy Commission Building, Baker Park, Rose Hill Manor and Rose Hill Manor Park would require reconfiguration of nearby interchanges and incur extraordinary costs and impact additional resources.

The impacts to Urbana Community Park could possibly be avoided during further engineering studies; otherwise, an alignment shift to the west would further impact homes along Fingerboard Road (including potential displacements) and is not considered prudent. Impacts to Schifferstadt could be avoided by construction of a retaining wall within the sewer and drainage easement if that decision is agreed upon during consultation with the owner of the resource.

Avoiding impacts to the England/Crown Farm would require realignment of the transitway along Omega Drive, Key West Avenue and Diamondback Road, impacting the parking facilities (eliminating spaces and impeding access) for buildings in the Decoverly Hall

Office Park. A transitway avoidance of the Atomic Energy Commission Building would also require realignment along public streets that could impact between 30 and 60 homes (relocations and partial acquisitions). These options are not considered prudent because of social impacts and costs. The relocation of the Biggs Ford Road interchange to the north is also not considered prudent as it would require relocation of four businesses and one residence located there.

Measures to minimize harm were considered for each individual resource where avoidance was not deemed feasible or prudent. Options would be determined in continued consultation with the owners of each resource. Engineering options considered for avoidance would also serve to minimize harm to individual resources.

The same engineering options were employed to minimize the use of property from each Section 4(f) resource, including reducing the side slopes from the usual 6:1 design to a 2:1 design, designing retaining walls, and other modifications. Constructing a retaining wall would substantially reduce the impacts at Seneca Creek State Park, Middlebrook Hill NCA, North Germantown Greenway, Black Hill Regional Park, Urbana Elementary School, Urbana Community Park, Monocacy National Battlefield, Baker Park, and Rose Hill Manor Historic Park.

Likewise, the use of retaining walls would reduce impacts to historic properties, such as Monocacy National Battlefield, Schifferstadt, and the Birely-Roelkey Farm; however, retaining walls are not always compatible with the historic landscape or viewsheds of historic properties. Consultation with the National Park Service (NPS) has indicated that retaining walls might be inappropriate in some locations. Consultation with the owners of Rose Hill Manor and Schifferstadt has led to the consideration of retaining walls.

A summary of the results of the application of each of the engineering avoidance and minimization options is included in **Table IV-18** and **Table IV-19**. **Table IV-20** provides a preliminary comparison of all of the build alternatives, based upon preliminary engineering with 2:1 slopes and minimal clearances between LRT and BRT elements.

Table IV-20: Comparison of All Build Alternatives

| ALTERNATIVE | SECTION 4(F)<br>RESOURCE<br>AVOIDANCE      | MEETS<br>PURPOSE<br>AND NEED | WETLAND<br>IMPACTS  | STREAM<br>IMPACTS <sup>1</sup> | FLOODPLAIN<br>IMPACTS | FARMLAND<br>SOILS IMPACTS | FOREST<br>IMPACTS     | PROPERTY<br>IMPACTS <sup>2</sup>  | HISTORIC<br>PROPERTIES<br>ADVERSELY<br>EFFECTED <sup>3</sup> | PARKS/<br>RECREATION<br>AREAS<br>IMPACTS |
|-------------|--------------------------------------------|------------------------------|---------------------|--------------------------------|-----------------------|---------------------------|-----------------------|-----------------------------------|--------------------------------------------------------------|------------------------------------------|
| 3A/B        | No – Use of parks<br>& historic properties | Yes                          | Yes –<br>10.7 acres | Yes –<br>14,185 lf             | Yes –<br>23 acres     | Yes – 651.6<br>acres      | Yes –<br>183<br>acres | Yes –<br>64-127 R;<br>4-11 B      | 7 properties                                                 | 11 parks;<br>37 acres                    |
| 4A/B        | No – Use of parks<br>& historic properties | Yes                          | Yes –<br>10.7 acres | Yes –<br>14,185 lf             | Yes –<br>23 acres     | Yes – 651.6<br>acres      | Yes –<br>183<br>acres | Yes –<br>64-127 R;<br>4-11 B      | 7 properties                                                 | 11 parks;<br>37 acres                    |
| 5A/B        | No – Use of parks<br>& historic properties | Yes                          | Yes –<br>11.6 acres | Yes -<br>16,331 lf             | Yes –<br>24 acres     | Yes – 682.1<br>acres      | Yes –<br>199<br>acres | Yes –<br>64-128 R;<br>4-12 B      | 7 properties                                                 | 12 parks;<br>44 acres                    |
| 5C          | No – Use of parks<br>& historic properties | Yes                          | Yes –<br>10.7 acres | Yes -<br>13,407 lf             | Yes –<br>21 acres     | Yes – 547.3<br>acres      | Yes –<br>180<br>acres | Yes –<br>127-385<br>R;<br>2-11 B  | 5 properties                                                 | 13 parks;<br>48 acres                    |
| 6A/B        | No – Use of parks<br>& historic properties | Yes                          | Yes –<br>15.6 acres | Yes -<br>24,204 lf             | Yes –<br>28.4 acres   | Yes –1204.2<br>acres      | Yes –296<br>acres     | Yes –<br>256-260<br>R;<br>13-43 B | 7 properties;<br>43.28 acres                                 | 13 parks;<br>43 acres                    |
| 7A/B        | No – Use of parks<br>& historic properties | Yes                          | Yes –<br>15.6 acres | Yes -<br>24,204 lf             | Yes –<br>28.4 acres   | Yes –1204.2<br>acres      | Yes –<br>296<br>acres | Yes –<br>256-260<br>R;<br>13-43 B | 7 properties;<br>43.28 acres                                 | 13 parks;<br>43 acres                    |

NOTES: All impacts are based upon engineering designs with 2:1 slopes as shown on the Plan Sheets in the 2002 DEIS and 2009 AA/EA. Impacts do not include the transit O&M facilities, as they do not impact Section 4(f) properties.

<sup>1</sup>Stream impacts do not include ephemeral streams, as these were not identified for the DEIS alternatives. lf = linear feet

<sup>2</sup>Numbers indicate relocations. R = residential; B = business

<sup>3</sup>Number is based upon current evaluation, including newly evaluated resources. See Section D.



Other minimization measures could include:

- Providing replacement land of equal or greater natural resource and economic value as per Program Open Space and Section 6(f) funding requirements.
- Erosion and sediment control measures would be provided and strictly enforced to minimize water quality impacts.
- Use of stormwater management (SWM) Best Management Practices, including the potential use of underground SWM facilities, would be employed to control runoff.
- Impacted wetlands would be replaced.
- Vegetation mitigation, such as removal of non-native plant species and replanting of native plant species to create historic landscape buffer.
- Additional appropriate mitigation measures, such as landscaping with viewshed considerations (where applicable with respect to the resource), will be developed through coordination with the jurisdictional agency.
- Relocation of facilities or installation of new facilities within the resource boundaries, as appropriate, may be developed through coordination with the jurisdictional agency.

**Table IV-21** provides a summary of the preliminary least overall harm analysis. This analysis sets the framework for the presentation and analysis of all of the build alternatives, selection of a Locally Preferred Alternative, and completion of a Tier I Final Environmental Impact Statement and Section 4(f) Analysis that will culminate in a Record of Decision for the project.

Consultation and Coordination

Coordination and consultation has been ongoing with the NPS, MD SHPO, MDNR, M-NCPPC, the Frederick County Landmarks Foundation (FCLF) and Frederick County Department of Parks & Recreation, the Frederick County Historic Preservation Commission, the Frederick City Historic Preservation Commission, the General Services Administration and the private owners of the properties that would be

impacted by the project. Coordination has included requests for information, submittal of cultural resources inventory, park and cultural resource boundaries, and review of the proposed transportation improvements. Coordination will continue with these organizations throughout the NEPA process and through design and construction to further identify options for additional minimization of impacts. Coordination letters are listed in **Appendix D** and included in the *Draft Section 4(f) Evaluation*. Descriptions of coordination meetings are found in **Chapter VII**. The correspondence further chronicles the coordination activities of the Project Team with the Section 4(f) property owners.

The project team has conducted individual coordination with the NPS (Monocacy National Battlefield), MDNR (Seneca Creek State Park), M-NCPPC (Black Hill Regional Park), FCLF (Schifferstadt), GSA/DOE (Atomic Energy Commission Building), Johns Hopkins Real Estate (Belward Farm), Frederick County Division of Parks and Recreation (Rose Hill Manor), Spring Bank, LLC (Spring Bank), and Crown Farm Village (England/Crown Farm) regarding potential impacts to their facilities and to provide an overview of the transportation alternatives and potential impacts under consideration.

**Table IV-22** presents a list of coordination and consultation meetings that have taken place since publication of the 2002 DEIS. A number of these meetings include coordination for both the Section 106 and Section 4(f) process. The following discussion highlights some of the consultation and coordination that has taken place to date.

Team coordination meetings are held on a monthly basis to discuss current topics and to review the project’s progress and issues. Coordination with the NPS has occurred throughout the project as they are represented on the Project Team, both prior to the 2002 DEIS and since. Since 2002, meetings with NPS were held on November 8, 2007, February 15, 2008 and August 21, 2008. Additional meetings with NPS are listed in the table below. In their April 18, 2008 response to SHA’s January 17, 2008 letter inviting the NPS to be a consulting party in the Section 106 process, the NPS indicated potential mitigation should include, among

Table IV-21: Preliminary Least Overall Harm Analysis

| 23CFR774.3(C)(1)<br>FACTOR                                                                                                                                                    | ALT. 1<br>NO-BUILD                                                        | ALT. 2<br>TSM/TDM                                                              | ALTERNATIVES EVALUATED IN THE 2002<br>DEIS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |         |         |         |         |         | AA/EA ALTERNATIVES |         |         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|--------------------|---------|---------|---------|
|                                                                                                                                                                               |                                                                           |                                                                                | 3A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 3B      | 4A      | 4B      | 5A      | 5B      | 5C      | 6A                 | 6B      | 7A      | 7B      |
| i. The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property)                                     | Least able to lower increasing noise impacts due to increasing congestion | Limited ability to lower increasing noise impacts due to increasing congestion | All build alternatives are mostly able to mitigate impacts through engineering minimizations, such as retaining walls and centerline shifts, and other measures, such as providing replacement land, enhancement of buffer areas, elimination of invasive species, re-vegetation of adjacent land. Alternative 5C may be slightly more able as it does not have transitway impacts. Appropriate measures will be considered as consultation with jurisdictional officer (JO) continues.                                                                                                                                                                                                                                                                |         |         |         |         |         |         |                    |         |         |         |
| ii. The relative severity of the remaining harm, after mitigation, to the protected activities, attributes or features that qualify each Section 4(f) property for protection | Not applicable                                                            | Not applicable                                                                 | Because the locations of each alternative’s impacts are substantially the same (the transitway alignment is identical for build Alternatives 3A/B, 4A/B, 5A/B, 6A/B and 7A/B, and the highway improvements are adjacent to the existing highway), the relative severity of remaining harm is similar for all alternatives except Alternative 5C, which would have less as it does not have transitway impacts.                                                                                                                                                                                                                                                                                                                                         |         |         |         |         |         |         |                    |         |         |         |
| iii. The relative significance of each Section 4(f) property                                                                                                                  | Not applicable                                                            | Not applicable                                                                 | The Monocacy National Battlefield is a National Historic Landmark, and, therefore is deemed more significant than the other resources because of its national significance. Most of the remaining resources have equal significance, and, therefore, the options are substantially equal for this analysis factor.                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |         |         |         |         |         |                    |         |         |         |
| iv. The views of the officials with jurisdiction over each Section 4(f) property                                                                                              | Not applicable                                                            | Not applicable                                                                 | SHA and MTA are in continuing consultation with the jurisdictional officers of each resource, addressing issues as they are presented. Some of the views and issues already addressed are presented in the Consultation and Coordination section.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |         |         |         |         |         |                    |         |         |         |
| v. The degree to which each alternative meets the purpose and need for the project                                                                                            | Does not meet purpose and need: continued and increasing congestion       | Does not meet purpose and need: continued and increasing congestion            | These build alternatives meet the project’s purpose and need.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |         |         |         |         |         |                    |         |         |         |
| vi. After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f)                                                              | Not applicable                                                            | Not applicable                                                                 | Because the locations of each alternative’s impacts are substantially the same (the transitway alignment is identical for build Alternatives 3A/B, 4A/B, 5A/B, 6A/B and 7A/B, and the highway improvements are adjacent to the existing highway), the relative magnitude of adverse impacts to resources not protected by Section 4(f) is similar for all alternatives except Alternative 5C, which would have less as it does not have transitway impacts. Regulated mitigation measures for natural resources will essentially mitigate all impacts to wetlands, streams, and forests. Relocations will be mitigated through the Federal relocation assistance program. Farmland soils impacts will not be mitigated and may be considered moderate. |         |         |         |         |         |         |                    |         |         |         |
| vii. Substantial differences in cost among the alternatives*                                                                                                                  | \$0                                                                       | \$33                                                                           | \$2,662                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | \$2,597 | \$2,662 | \$2,597 | \$2,955 | \$2,890 | \$2,519 | \$4,656            | \$4,329 | \$4,656 | \$4,329 |

NOTE: Least overall harm analysis is not completed. This analysis sets the framework for the presentation and analysis of all of the build alternatives, selection of a Locally Preferred Alternative, and completion of a Tier 1 Final Environmental Impact Statement and Section 4(f) Analysis that will culminate in a Record of Decision for the project.

\* Capital costs are provided in millions of 2001 dollars for the DEIS alternatives and in millions of 2007 dollars for the AA/EA alternatives.



Table IV-22: Section 106/Section 4(f) Coordination Meetings

| MEETINGS BETWEEN NPS AND SHA | MEETINGS BETWEEN M-NCPPC AND MTA | SHA AND/OR MTA MEETINGS WITH OTHER CONSULTING PARTIES |                 |                                                        |
|------------------------------|----------------------------------|-------------------------------------------------------|-----------------|--------------------------------------------------------|
| May 2, 2002                  | September 12, 2007               | July 10, 2007                                         | MTA             | Johns Hopkins/Belward Farm                             |
| June 17, 2002                | May 9, 2008                      | October 1, 2007                                       | MTA             | Johns Hopkins/Belward Farm                             |
| July 15, 2002                | May 23, 2008                     | February 9, 2008                                      | MTA             | Johns Hopkins/Belward Farm Community Planning Workshop |
| June 26, 2003                | May 30, 2008                     | July 18, 2008                                         | MTA             | Johns Hopkins/Belward Farm                             |
| November 8, 2007             |                                  | April 11, 2008                                        | SHA             | FCLF/Schifferstadt                                     |
| February 15, 2008            |                                  | July 18, 2008                                         | MTA             | England/Crown Farm                                     |
| July 11, 2008                |                                  | July 21, 2008                                         | SHA             | Spring Bank & Birely-Roelkey Farm                      |
| August 21, 2008              |                                  | July 25, 2008                                         | SHA             | Rose Hill Manor                                        |
| September 24, 2008           |                                  | September 5, 2008                                     | Noise Committee | Schifferstadt & Rose Hill Manor                        |
|                              |                                  | October 2, 2008                                       | SHA/MTA         | GSA/DOE (Atomic Energy Commission Building)            |

other suggestions, replacement lands contiguous to the battlefield, removal of non-native vegetation, and traffic noise reduction efforts. Traffic noise reduction suggestions included using a lower noise road surface, vegetative or hard sound barriers, and lowering speed limits through the battlefield. Viewsheds are also a concern of NPS and will be considered as the NEPA process continues. Coordination with NPS is continuing.

Coordination with MDNR has occurred throughout the project with requests for information and verification of resource boundaries. On July 17, 2001, the Project Team met with MDNR to review the possible impacts to Seneca Creek State Park from the improvements. MDNR indicated that lands needed for the proposed improvements should be replaced on a 1:1 basis and the land should be contiguous to the state park.

Coordination with M-NCPPC has occurred throughout the project as they are represented on the Project Team. Team coordination meetings are held on a monthly basis to discuss current topics and to review the project’s progress and issues. In addition, an individual coordination meeting was held on September 5, 2001 to discuss the potential impacts to Black Hill Regional Park. M-NCPPC indicated they would prefer equal right-of-way impacts to both the east and west sides of I-270 along the park boundary. M-NCPPC also commented that right-of-way mitigation should include replacement lands on a 1:1 basis contiguous to the park.

Coordination regarding impacts to the Schifferstadt museum and grounds has evaluated the issues of property ownership and noise impacts likely indoors.

F. Natural Environment

This section details the existing natural resources in the project study area and identifies the impacts of Alternatives 6A/B and 7A/B on each of these resources. Natural resources evaluated include: topography, geology and soils; groundwater; surface waters and surface water quality, including Scenic and Wild Rivers; floodplains; waters of the US including wetlands; terrestrial vegetation and wildlife, including forests; aquatic habitat and species; and rare, threatened and endangered species. For each resource, existing conditions are updated from the 2002 DEIS where the ETL highway right-of-way or transitway right-of-way extends outside of the DEIS right-of-way, or where new or updated information exists for natural environmental resources. In general, only the updated information is included in this document. The impacts of Alternatives 6A/B and 7A/B on each resource are discussed individually as well as summarized in *Tables IV-23* and *IV-24* that begin the section. A discussion of possible avoidance, minimization and/or mitigation of impacts completes the discussion of each of the natural resources. Further details can be found in the *I-270/US 15 Multi-Modal Corridor Study Natural Environmental Technical Report (NETR)* (June 2007).

Topography, Geology and Soils

Existing Conditions

Topography

The topography of the I-270/US 15 Corridor is characterized by a level floodplain within the Monocacy Valley in the north and rolling terrain in the south. Elevations range from about 240 feet at the Monocacy River rising to 650 feet between Comus Road and MD 121.

Geologic Formations

The project extends from southeast to northwest through much of the Piedmont physiographic province. The western edge of the Piedmont province within the Corridor is comprised of the Frederick Valley, which includes the Monocacy River floodplain. This area is generally underlain by limestone and dolomite, which are not very resistant to erosive forces. The remainder of the I-270/US 15 Corridor is composed of bedrock formed

from metamorphic processes. Metamorphic processes are heat and pressure that cause profound physical and/or chemical change. The segment of the I-270/US 15 Corridor that starts at Shady Grove and cuts through Gaithersburg contains the Sykesville Formation, Morgan Run Formation, and Conowingo Diamictite Formation. Moving northwest along the I-270/US 15 Corridor to the edge of the Monocacy River, seven geologic formations occur from oldest to youngest: Marburg Formation, Cash Smith Formation, Araby Formation, Ijamsville Formation, Urbana Formation, Gillis Formation, and Sams Creek Formation. Grove and Frederick Limestone underlie the last section of the Corridor, which crosses the Monocacy River and connects with US 15.

Soils

General Characteristics

A soil association is a landscape that has a distinctive proportional pattern of soils and normally consists of one or more major soils and at least one minor soil. The segment of the I-270/US 15 Corridor that starts at Shady Grove and cuts through Gaithersburg contains the Sykesville Formation, Morgan Run Formation, and Conowingo Diamictite.

The soil associations mapped for Frederick County have been renamed since the 2002 DEIS. The renamed soil associations, from south to north, in Frederick County include Mt. Airy-Glenelg-Blocktown, Linganore-Hyattstown-Conestoga, Bagtown-Stumptown-Edgemont, Codorus-Hatboro-Combs, Myersville-Catoctin-Mt. Zion, Cardiff-Whiteford, Penn-Klinesville-Reaville, Rowland-Bermudian-Bowmansville, and Duffield-Hagerstown-Ryder. Details on each soil association and their characteristics are located in the NETR .

Prime Farmland Soils and Soils of Statewide Importance

Prime farmland soils and soils of statewide importance have been identified using soil classifications from the Montgomery County and Frederick County Soil Surveys. *Figure IV-10 (Sheets 1 through 5)* shows a map of the prime farmland soils and soils of statewide importance within the highway and transitway portions of the project study area.

Table IV-23: Summary of Natural Resource Impacts of Alternatives 6A/B and 7A/B

| RESOURCE                                                                            |                                           | ALTERNATIVE 6A/B <sup>1</sup>                                                   | ALTERNATIVE 7A/B <sup>1</sup>                                                   |
|-------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Natural Environment</b>                                                          |                                           |                                                                                 |                                                                                 |
| Prime Farmland Soils                                                                | Highway component<br>Transitway component | 642 acres<br>100.6 acres                                                        | 642 acres<br>100.6 acres                                                        |
| Soils of Statewide Importance                                                       | Highway component<br>Transitway component | 460 acres<br>28.7 acres                                                         | 460 acres<br>28.7 acres                                                         |
| Number of Active Farms<br>(Acres of Farmland from Active Farms)                     |                                           | 38<br>191 acres                                                                 | 38<br>191 acres                                                                 |
| <b>Floodplains – Total</b>                                                          |                                           | <b>28.4 acres</b>                                                               | <b>28.4 acres</b>                                                               |
|                                                                                     | Highway component<br>Transitway component | 25.6 acres<br>2.8 acres                                                         | 25.6 acres<br>2.8 acres                                                         |
| <b>Forest – Total</b>                                                               |                                           | <b>295.8 acres</b>                                                              | <b>295.8 acres</b>                                                              |
|                                                                                     | Highway component<br>Transitway component | 268.6 acres<br>27.2 acres                                                       | 268.6 acres<br>27.2 acres                                                       |
| Rare, Threatened and Endangered Species                                             |                                           | Potential <sup>2</sup>                                                          | Potential <sup>2</sup>                                                          |
| <b>Waters of the US – Total Streams</b><br><b>Waters of the US – Total Wetlands</b> |                                           | <b>24,204 linear feet<sup>5</sup></b><br><b>15.6 acres wetlands<sup>5</sup></b> | <b>24,204 linear feet<sup>5</sup></b><br><b>15.6 acres wetlands<sup>5</sup></b> |
| Highway Component                                                                   |                                           |                                                                                 |                                                                                 |
| Streams                                                                             |                                           | 20,198 linear feet                                                              | 20,198 linear feet                                                              |
| Ephemeral channels <sup>3</sup>                                                     |                                           | 10,812 linear feet                                                              | 10,812 linear feet                                                              |
| Wetlands                                                                            |                                           | 13 acres                                                                        | 13 acres                                                                        |
| Transitway Component                                                                |                                           |                                                                                 |                                                                                 |
| Streams                                                                             |                                           | 4,006 linear feet                                                               | 4,006 linear feet                                                               |
| Ephemeral channels <sup>3</sup>                                                     |                                           | 1,646 linear feet                                                               | 1,646 linear feet                                                               |
| Wetlands                                                                            |                                           | 2.6 acres <sup>4</sup>                                                          | 2.6 acres <sup>4</sup>                                                          |

<sup>1</sup>Alternatives 6 and 7 have identical highway footprint.

<sup>2</sup>Potential direct and indirect impacts to two fish species: pearl dace and comely shiner.

<sup>3</sup>Since 2002, the US Army Corps of Engineers (USACE) has broadened the definition of waters of the US to include ephemeral streams (channels). Ephemeral streams were not considered in the DEIS.

<sup>4</sup>Values for transitway areas include all of the impacts from all potential O&M facilities sites; actual impact is lower as only one of the sites would be constructed.

<sup>5</sup>Does not include ephemeral streams.

Table IV-24: Summary of Natural Resource Impacts of the Potential O&M Sites

| RESOURCE                       | PRIME FARMLAND SOILS, ACRES | SOILS OF STATEWIDE IMPORTANCE, ACRES | FLOODPLAINS, ACRES | WETLANDS, ACRES | STREAMS, LINEAR FEET | FOREST, ACRES |
|--------------------------------|-----------------------------|--------------------------------------|--------------------|-----------------|----------------------|---------------|
| Redland Road LRT               | 7.4                         | 7.4                                  | 0                  | 0               | 0                    | 0             |
| Redland Road BRT               | 5.89                        | 0.0                                  | 0                  | 0               | 0                    | 0             |
| Crabbs Branch Way BRT          | 8.23                        | 0.72                                 | 0                  | 0               | 0                    | 0             |
| PEPCO LRT                      | 2.68                        | 12.03                                | 0                  | 0               | 660                  | 18.7          |
| Police Vehicle Impound Lot LRT | 12.48                       | 1.92                                 | 0                  | 0               | 486                  | 10.2          |
| Police Vehicle Impound Lot BRT | 12.48                       | 0.55                                 | 0                  | 0               | 486                  | 10.2          |
| Observation Drive BRT          | 6.29                        | 5.74                                 | 0                  | 0               | 0                    | 0.8           |

NOTE: Only one site will be chosen for an O&M Site. Any of the appropriate O&M sites (LRT sites for alternatives ‘A’ and BRT sites for alternatives ‘B’) could be constructed with any of the build alternatives (3A/B, 4A/B, 5A/B, 6A/B, or 7A/B).

Table IV-25: Comparison of Farmland Soils Impacts

| FARMLAND SOILS                       | FARMLAND SOILS IMPACTS (ACRES) BY ALTERNATIVE |                   |                   |
|--------------------------------------|-----------------------------------------------|-------------------|-------------------|
|                                      | ALTERNATIVE 1 NO-BUILD                        | ALTERNATIVE 6A/B* | ALTERNATIVE 7A/B* |
| Prime Farmland Soils                 | 0                                             | 742.6             | 742.6             |
| Soils of Statewide Importance        | 0                                             | 488.7             | 488.7             |
| <b>Total Farmland Soils Impacted</b> | <b>0</b>                                      | <b>1,231.3</b>    | <b>1,231.3</b>    |

\*Soils located under I-270, US 15 and other developed areas are included in the total for Alternatives 6A/B and 7A/B, but were not included for Alternatives 3A/B, 4A/B and 5A/B/C in the 2002 DEIS.

Prime farmland soils for the Montgomery County and Frederick County portions of the project area are the same as reported in the 2002 DEIS (Section III.E.2.a, page III-126) with two notable additions within the Montgomery County portion of the CCT alignment. These two newly added soils include Glenelg silt loam, 3 to 8 percent slopes (2A) and Occoquan loam, 3 to 8 percent slopes (17B). The soils of statewide importance for Montgomery County are also reflected in the 2002 DEIS (Section III.E.2.b, page III-128). The Frederick County soils of statewide importance, which were not available at the time of the 2002 DEIS, have been obtained from the Frederick County Soil Conservation District.

Prime farmland soils mapped within the I-270/US 15 Corridor include the following soil series: Adamstown, Bermudian, Buckeystown, Duffield, Glenelg, Glenville, Hagerstown, Legore, Lindside, Myersville, Springwood, Elioak, Neshaminy, Gaila, and Occoquan. Soils of statewide importance within the Corridor include the following series: Brinklow-Blocktown, Gaila, Glenelg, Linganore-Hyattstown, Occoquan, Bermudian, and Hagerstown.

Impacts

Topography

The topography of the I-270/US 15 Corridor will not be affected by Alternative 1 (No-Build Alternative). Topography within the project corridor will be affected by the build alternatives. The highway components

of Alternatives 6A/6B and 7A/7B will require grading of existing land surface and the placement of fill in various locations for ramps, bridge approaches and extensions, and other new roadway components. The transit component of the build alternatives will traverse a less manipulated landscape than that of the highway component, resulting in a greater impact to topography. A more detailed discussion of impacts to topography is discussed in the 2007 NETR.

Geology

The geology of the I-270/US 15 Corridor will not be affected by Alternative 1 (No-Build Alternative) or the highway or transitway components of Alternatives 6A/B and 7A/B.

Soils

Alternative 1, the No-Build Alternative, would not impact soils in the project study area. Alternatives 6A/B and 7A/B will have the same prime farmland and statewide important soils impact, as both alternatives are on the same physical footprint (**Table IV-25**). The highway component of the alternatives will impact approximately 642 acres of prime farmland soils and 460 acres of soils of statewide importance. The transitway component of the alternatives will impact 78.7 acres of prime farmland soils and 23.5 acres of soils of statewide importance. Impacts from the O&M facilities sites currently under consideration are identified separately (**Table IV-24**), because the location of a preferred site has not been determined.

Figure IV-10: Prime Farmland Soils and Soils of Statewide Importance

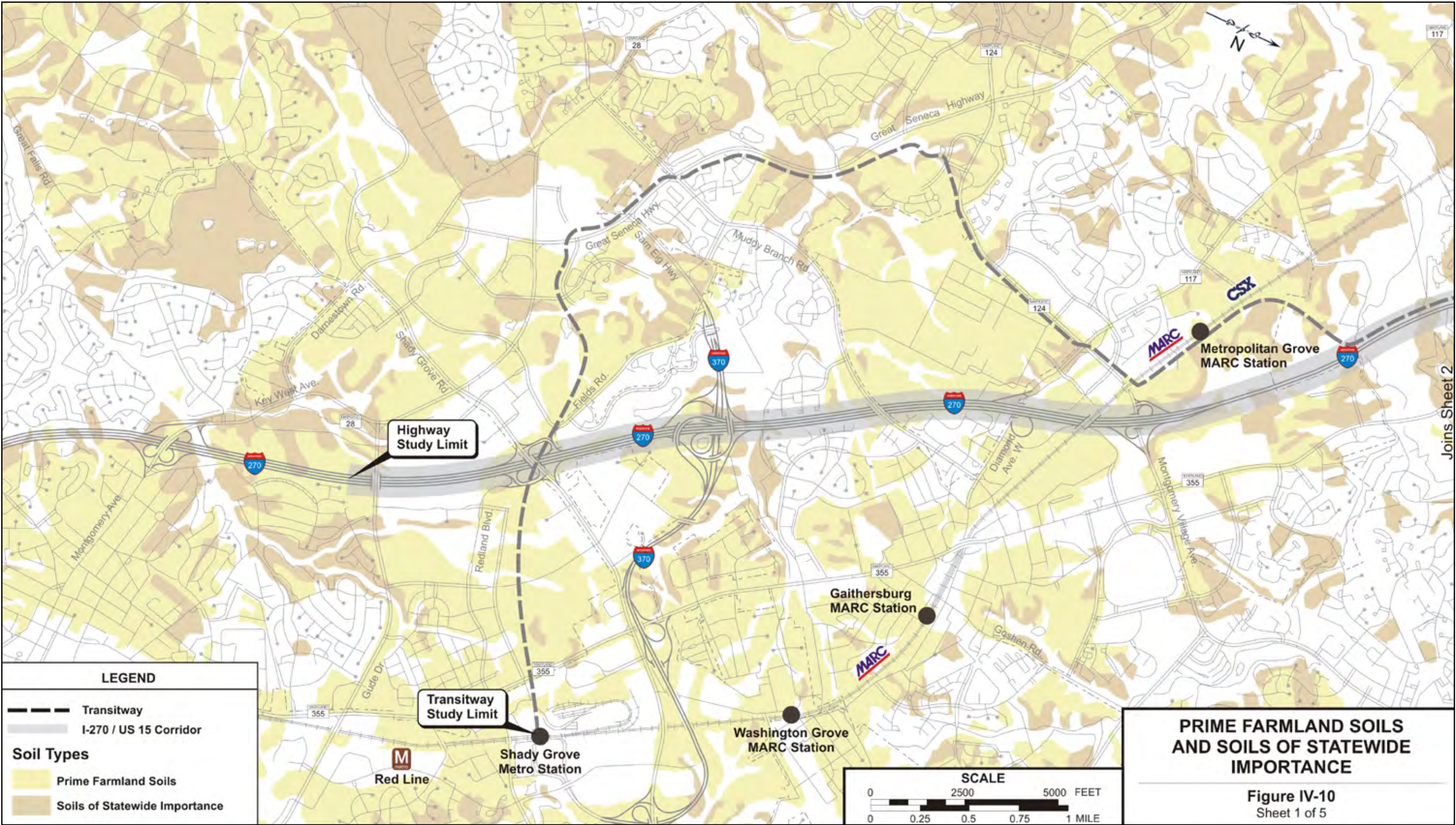


Figure IV-10: Prime Farmland Soils and Soils of Statewide Importance

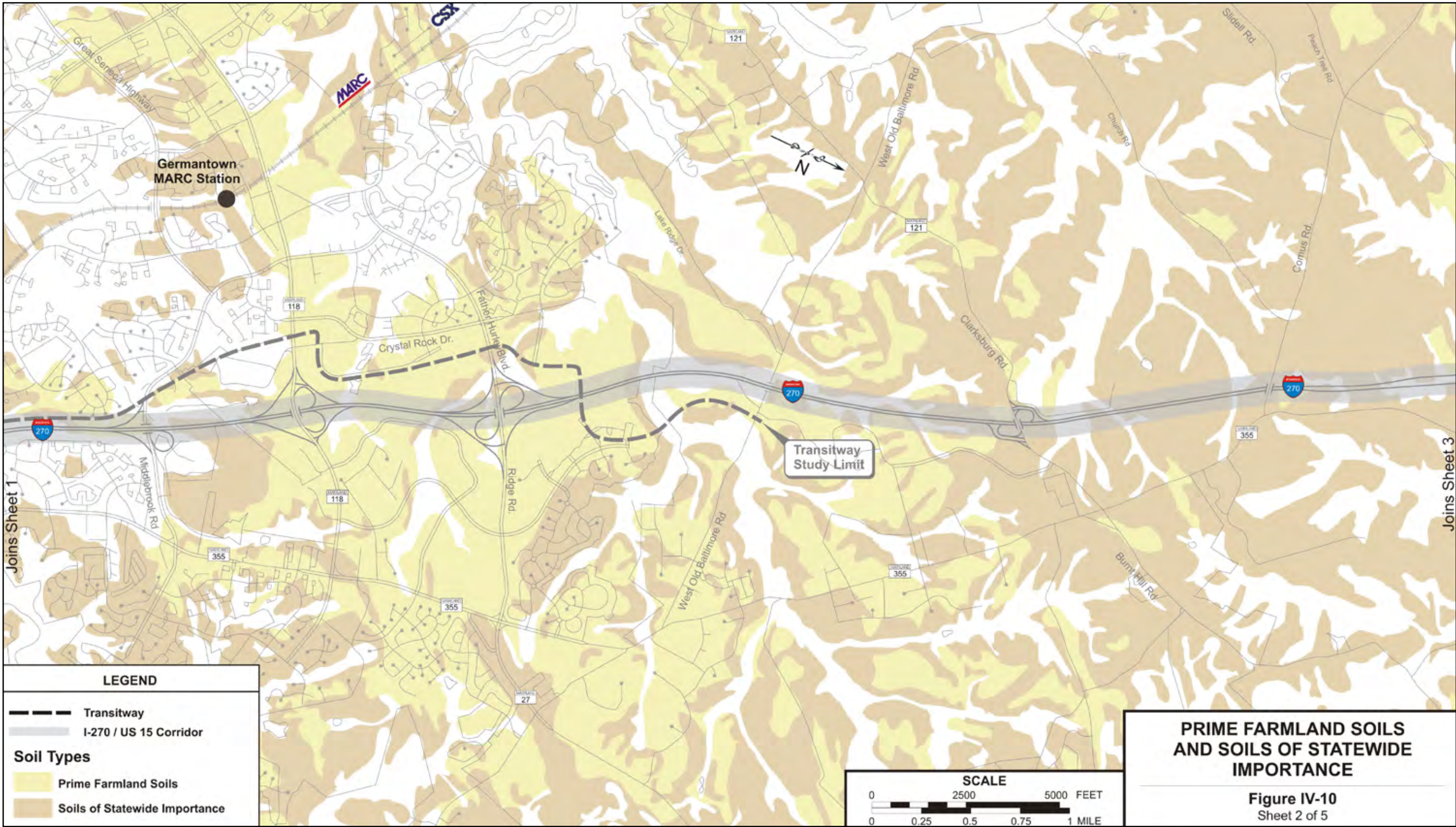


Figure IV-10: Prime Farmland Soils and Soils of Statewide Importance

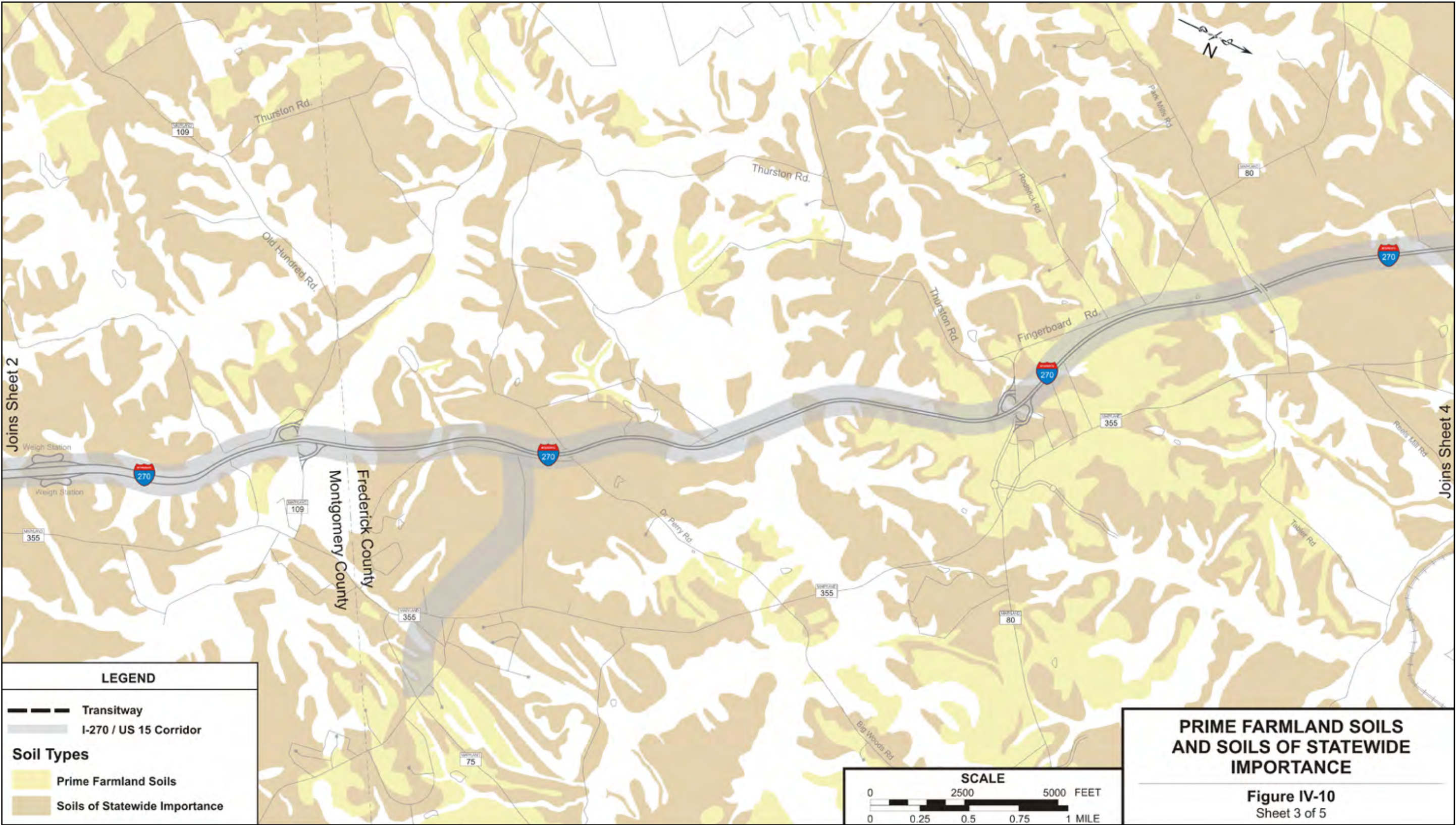


Figure IV-10: Prime Farmland Soils and Soils of Statewide Importance

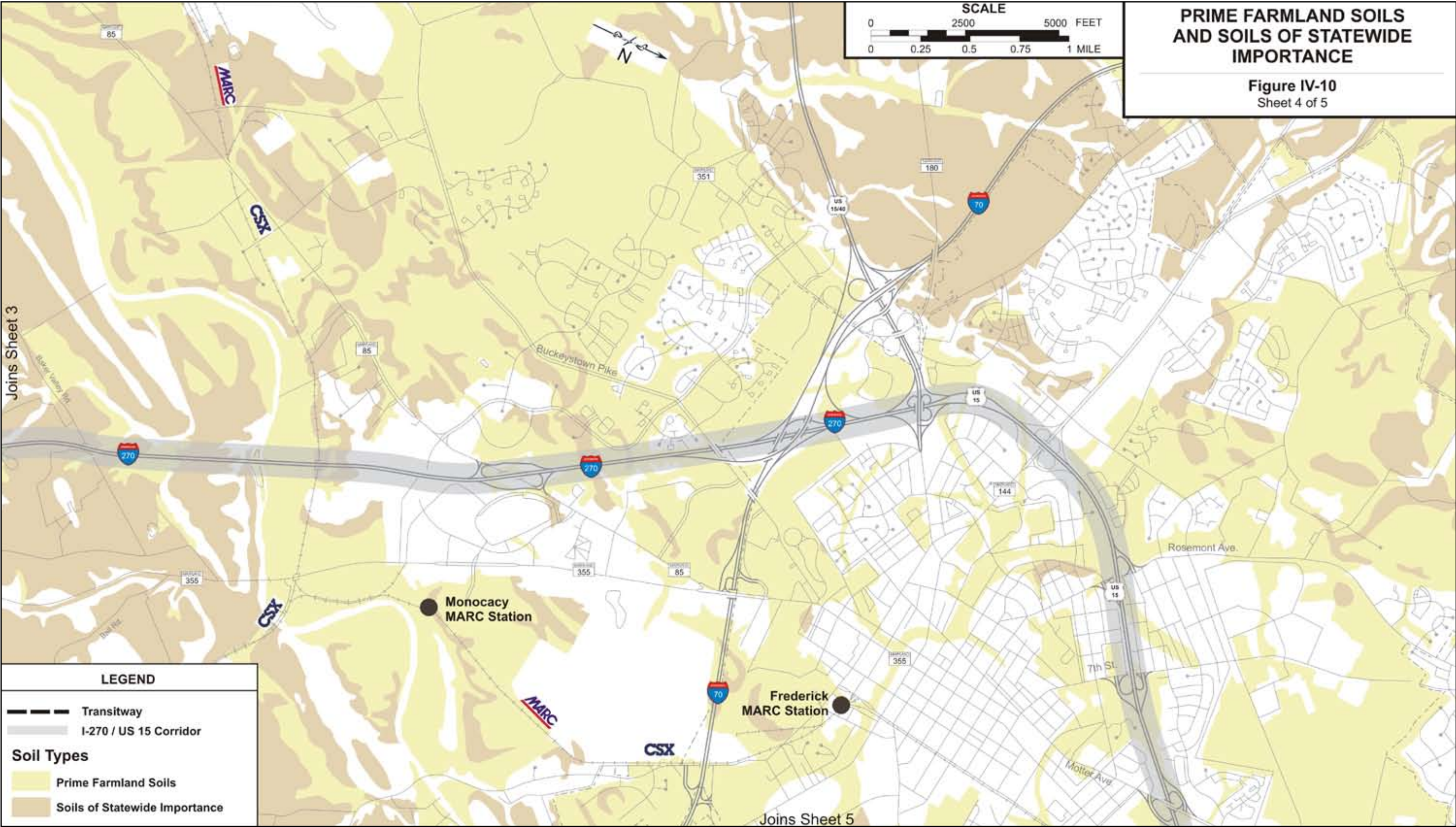
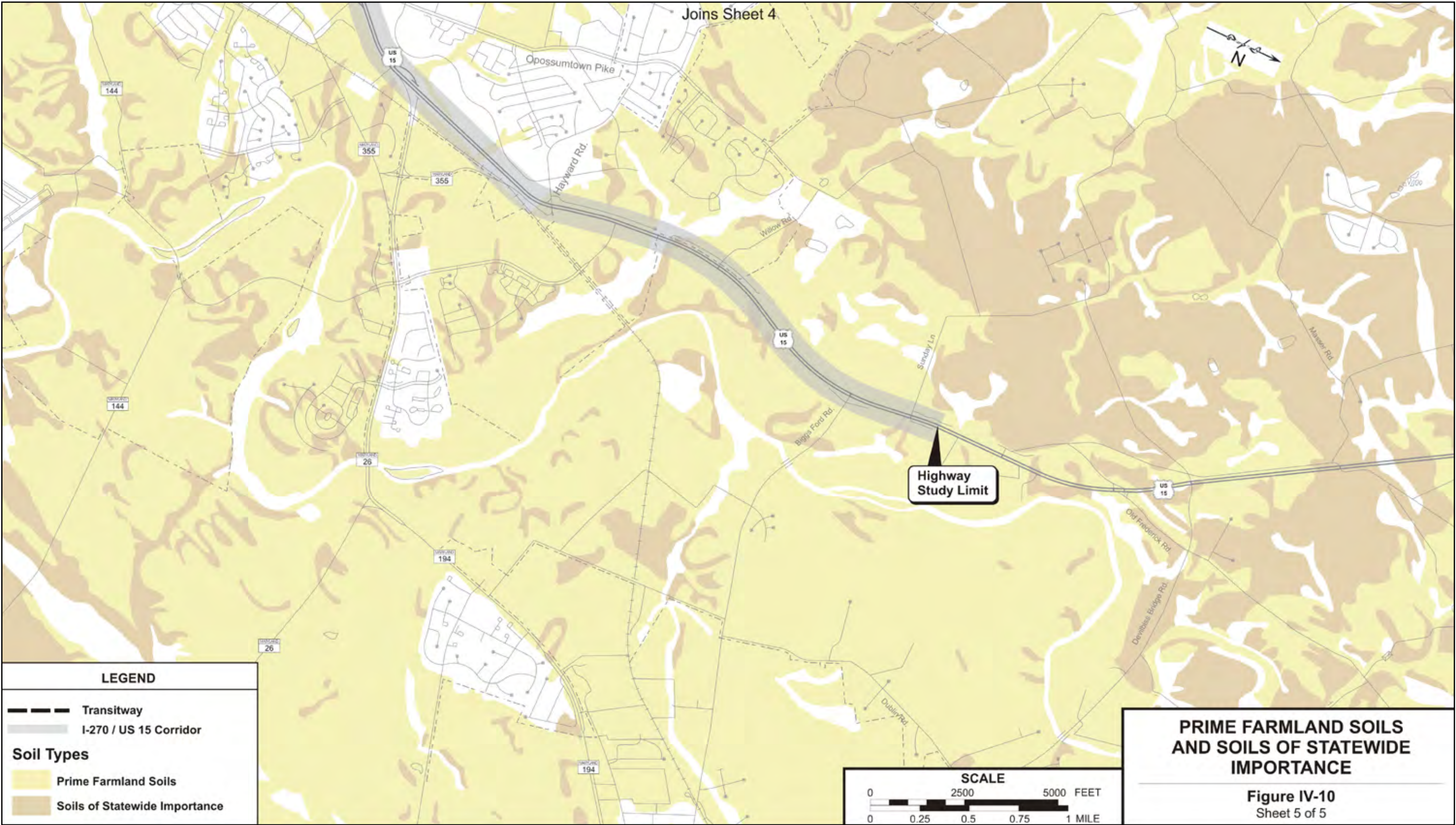


Figure IV-10: Prime Farmland Soils and Soils of Statewide Importance



### Avoidance, Minimization and Mitigation

Proper slope and soil stabilization techniques will be used in work areas, both during and after construction, to prevent sedimentation of nearby waterways. Sediment and erosion controls and SWM facilities will be implemented in the project area in accordance with the Maryland Department of Environment (MDE) *2000 Maryland Stormwater Design Manual, Volumes I & II*.

With respect to prime farmland soils and soils of statewide importance, the long, linear nature of the proposed highway and transitway components of both alternatives and extensive coverage of the study area by these soils, make complete avoidance impossible. The impacts associated with the build alternatives are not anticipated to interrupt viable farm operations or jeopardize the financial stability of these businesses. It should be noted that master plan documents for Montgomery and Frederick counties show that many areas presently in agricultural use are zoned for development.

## Groundwater

### Existing Conditions

The principle aquifers found within the project area are shown on Figure 8 of the 2007 NETR. Three principal types of bedrock aquifers underlie the Piedmont province: crystalline rock, aquifers in early Mesozoic basin, and carbonate-rock aquifers.

The boundaries of the Maryland Piedmont Sole Source Aquifer (SSA) have been extended by the US Environmental Protection Agency (EPA) since the 2002 DEIS. The extended area includes a portion of the Piedmont aquifer system, designated as the Poolesville Area Aquifer System that underlies Poolesville and the surrounding area in lower western Montgomery County, and is shown on Figure 9 of the 2007 NETR.

### Impacts and Avoidance/Minimization Efforts

Alternative 1 (No-Build Alternative) will not have an impact on groundwater within the project corridor. Proposed highway improvements included in the build alternatives will occur at-grade with the existing I-270/US 15 roadway, reducing the depth of excavation needed to construct these road improvements and preventing any alteration of groundwater flow within

the corridor. However, potential sources of groundwater contamination from highway deicing, urban runoff, and fuel tank leakages may seep into groundwater supplies as the movement of water between surface water and groundwater provides a major pathway for chemical transfer between the terrestrial and aquatic systems.

The transitway components of the build alternatives will require a greater depth of excavation as they cross a less manipulated terrain. Several tributaries to Great Seneca Creek may be affected due the increase of impervious surfaces from construction of the transitway. The impervious surfaces reduce or redirect the amount of water from entering the aquifers, ultimately reducing the available groundwater in these areas.

All build alternatives for both the highway and transitway alignments will traverse the Piedmont SSA within the Little Seneca Creek, Little Bennett Creek and Bennett Creek basins. Indirect impacts to the aquifer may occur as highway constituents, such as those described above, enter groundwater supplies during storm events. However, the use of Best Management Practices (BMPs) for SWM facilities will decrease the amount of constituents that reach the aquifer and diminish the contamination to a level that does not pose a public health hazard.

## Surface Waters

As identified in the 2002 DEIS, the I-270/US 15 Corridor traverses the Washington Metropolitan and Middle Potomac River sub-basins. There are 13 major surface water bodies along the I-270/US 15 Corridor, which are shown on *Plan Sheets* in **Appendix A**.

### Major Streams/Hydrology

#### Existing Conditions

Several major surface water bodies are located along the I-270/US 15 Corridor. The major streams within Montgomery County include Mill Creek, Gunners Branch, Muddy Branch, Great Seneca Creek, Little Seneca Creek, unnamed tributary to Ten Mile Creek, Wildcat Branch, and Little Bennett Creek. The remaining streams are located within Frederick County and include Bennett Creek, Urbana Branch, Monocacy River, Quarry Branch, Arundel Branch, Rock Creek, Carroll Creek, unnamed tributary of the Monocacy

River, Tuscarora Creek, and Muddy Run. The proposed transitway alignment occurs completely within Montgomery County and crosses four of the same streams as the highway alignment. These streams are Muddy Branch, Great Seneca Creek, Gunners Branch, and Little Seneca Creek.

### Impacts

Alternative 1 (No-Build Alternative) will not have an impact on major stream systems within the project corridor. Alternatives 6A/B and 7A/B will have the same impacts to the major stream systems within the project study area, as both alternatives have the same physical footprint. The direct impact to streams is greater for Alternatives 6A/B and 7A/B when compared to the alternatives assessed in the 2002 DEIS, as the footprint to accommodate Alternatives 6A/B and 7A/B is greater.

### Highway Impacts

There will be 20,198 linear feet of impacts to riverine systems within the highway alignment. These alignments impact a total of 77 streams and tributaries of various sizes (refer to the 2007 NETR for the full list of streams and tributaries). The major streams impacted are: Muddy Branch, Great Seneca Creek, Little Bennett Creek, Bennett Creek, Monocacy River, Muddy Run, Rock Creek (tributary of Monocacy River), Mill Creek, Carroll Creek, Tuscarora Creek, Ballenger Creek, and Little Seneca Creek. Direct impacts to stream channels, are associated with culvert or bridge extensions in portions of the stream already disturbed by the existing crossing.

### Transitway Impacts

Within the transitway alignment, 4,006 linear feet of stream impact would occur from the alignment and transit stations. Potential O&M facilities at the Police Impound Lot site or PEPCO site would impact an additional 486 linear feet or 660 linear feet, respectively, if constructed. A more detailed discussion of impacts to streams for the highway and transitway components is located in the 2007 NETR.

### Avoidance, Minimization and Mitigation

Complete avoidance of impacts to surface waters is not possible due to the number of these systems in the project area and their orientation perpendicular



Monocacy River

to the proposed alternatives. However, impacts have been avoided or minimized wherever possible through the realignment of the transitway and the shift of lane additions to one side of the existing highway or another. Investigations of further avoidance and minimization measures are ongoing and will continue throughout all phases of engineering design for the project.

Direct impacts to stream channels will require a Section 404 permit from the US Army Corps of Engineers (USACE) and a waterway construction permit from MDE. Mitigation for stream channel impacts will require a one to one replacement ratio as discussed in the 2002 NETR.

## Surface Water Quality

### Existing Conditions

The Code of Maryland Regulations (COMAR) sets forth water quality criteria specific to designated uses [Title 26, §08.02.02 and §08.02.08 (2006)]. All stream segments within the project area are designated as Use Class I-P (water contact recreation and the protections of aquatic life and public water supplies), Use Class III-P (natural trout waters and the protection of public water supplies), or Use Class IV-P (recreational trout waters and the protection of public water supplies). Table 7 of the 2007 NETR details the water quality parameters associated with each stream class designation.

Based on available water quality data, the streams located within the project study area were all within Maryland state standards for temperature. Several pH readings within Little Bennett Creek, Little Seneca Creek, Muddy Branch, and Mill Creek were slightly more acidic than the 6.5 Maryland standard. The average pH for all these watersheds was well within the acceptable range. Average dissolved oxygen values for Tuscarora Creek, within the project study area, were well above the standard. Conductivity values within the project study area ranged from 0.144 mS/cm to 0.550 mS/cm. The higher conductivity values were generally found in more impervious, urbanized watersheds.

Impacts

The No-Build Alternative will have no effect on the surface water quality of the study area watersheds. Both Alternatives 6A/B and 7A/B have the potential to affect the surface water quality in the project area. Direct impacts to streams include sediment releases and vegetation removal. Sediment releases can damage fish and macroinvertebrate habitat or cause fish mortality. Tree removal reduces shade to the stream causing in-stream temperatures to rise, which can affect sensitive fish species, such as trout, that have cooler temperature requirements.

Avoidance, Minimization and Mitigation

Total avoidance of impacts to surface water quality cannot be avoided because of the large area of watershed affected by the project and the numerous stream systems that cross the project corridor. However, effects can be minimized and mitigated with the construction of stormwater management (SWM) facilities to handle increased stormwater runoff that may occur with the construction of additional highway surfaces. During construction activities, the use of sediment and erosion control measures will be employed to prevent surface water contamination.

Scenic and Wild Rivers

The Monocacy River, which flows perpendicular to the I-270/US 15 Corridor south of Frederick in Frederick County, is designated as a State Scenic River based on the criteria established within the Scenic and Wild Rivers Act of 1968. The Monocacy River is identified on the *Plan Sheets* provided in **Appendix A**.

Alternatives 6A/B and 7A/B will directly impact the Monocacy River (approximately 75 linear feet by 8 feet wide) for a new bridge pier to accommodate the roadway widening.

Prior to the implementation of either build alternative, project plans would be provided to MDNR for review in compliance with the Maryland Scenic and Wild Rivers Act. The MDNR will review how these direct impacts diminish the character of the Monocacy River. Coordination with MDNR regarding potential impacts to the Monocacy River is ongoing and will continue through all phases of the project.

Floodplains

Existing Conditions

US Department of Transportation Order 5650.2 entitled *Floodplain Management and Protection* prescribes policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of floodplain impacts. The Federal Emergency Management Agency (FEMA) estimated floodplain limits for 100-year storm events using Flood Insurance Rate Maps for Montgomery and Frederick counties. Since the 2002 DEIS, the Federal Emergency Management Agency (FEMA) has developed a Floodplain Mapping Study for Frederick County in which the 100-year floodplain boundaries for Carroll Creek, Monocacy River, Bennett Creek, and Urbana Branch have changed. Boundaries for 100-year floodplains are shown on the *Plan Sheets* in **Appendix A**. No changes were made to the Montgomery County 100-year floodplains.

The FEMA designated 100-year floodplains within the I-270/US 15 Corridor highway alignment parallel the main stems of Muddy Branch, Long Draught Branch, Great Seneca Creek, Gunners Branch, Little Bennett Creek, Bennett Creek, Monocacy River, Rock Creek, Carroll Creek, Tuscarora Creek and their tributaries.

The transitway alignment traverses many of the same 100-year floodplains associated with the I-270 Corridor highway alignment due to its north-south alignment along the roadway. In areas where the transitway is situated within the I-270 right of way, similar portions of the floodplain are crossed for Great Seneca Creek, Gunners Branch and their tributaries. Other portions

of the 100-year floodplains for Muddy Branch and its tributary are intersected as the transitway deviates east and west of the I-270 right-of-way to the proposed station locations.

Impacts

The significance of floodplain encroachment was evaluated with respect to the criteria in Executive Order 11988 *Floodplain Management*. The total floodplain impacts associated with Alternatives 6A/B and 7A/B will be the same, because the physical footprint for each alternative is the same. The floodplain impact for the highway component of the alternatives is 25.6 acres, while the transitway component impact is 2.8 acres. All construction occurring within the FEMA designated 100-year floodplain must comply with FEMA approved local floodplain construction requirements.

Avoidance, Minimization, and Mitigation

Efforts to minimize and avoid impacts to 100-year floodplains will continue throughout the planning and engineering process. Techniques that will be investigated to further minimize or avoid impacts may include alignment shifts to ensure the narrowest possible crossing, and bridging of floodplains to further reduce encroachment and allow for unrestricted passage of floodwaters. Hydrologic and hydraulic studies will be conducted to determine the appropriate bridge or culvert opening sizes for the various alternatives that will not appreciably raise flood levels. Should culverts need to be replaced, additional impacts to waters of the US could occur. All construction occurring within the FEMA designated 100-year floodplain must comply with FEMA approved local floodplain construction requirements.

Waters of the US including Wetlands

Existing Conditions

All waters of the US, including wetlands, were identified and flagged within the proposed right-of-way for Alternatives 6A/B and 7A/B highway and transitway alignments, park and ride lots, transitway stations, and O&M facilities using USACE regulatory guidance and *Wetland Delineation Manual* (USACE 1987). All other



Great Heron Wetland at Urbana Elementary School

methods associated with the wetland delineation and waterway identification are discussed in detail in the 2007 NETR.

Due to the overlap in the design between Alternatives 6A/B and 7A/B and the 2002 DEIS Alternatives 3A/B, 4A/B and 5A/B/C, between I-370 and I-70, a majority of the waters of the US previously flagged during the 1998 wetland delineation are also located within the right-of-way for Alternatives 6A/B and 7A/B. The 2002 DEIS includes a detailed discussion of those wetlands and waterways that have remained unchanged since the 1998 wetland delineation. Those wetlands and waterways delineated within Alternatives 6A/B and 7A/B are discussed in detail in the 2007 NETR.

No delineations for the highway and transitway park and ride lots and O&M facilities were included in the 2002 DEIS, as the designs were not completed. Delineations for these facilities were completed for Alternatives 6A/B and 7A/B and can be found in the 2007 NETR. Existing SWM ponds within the project corridor were identified from project mapping but were not delineated in the field. These facilities are shown on *Plan Sheets* in **Appendix A**.

A total of 143 numbered wetlands/waterways were flagged within the highway alignment and park and ride areas, while a total of 54 systems were flagged within the transitway alignment, transit stations, and



Table IV-26: Summary of Highway and Transitway Wetland and Waterway Impacts

| ALTERNATIVES 6A/B & 7A/B | WETLAND <sup>1</sup> AND WATERWAY CLASSIFICATION |                |                |                                        |                            |
|--------------------------|--------------------------------------------------|----------------|----------------|----------------------------------------|----------------------------|
|                          | PEM<br>(ACRES)                                   | PSS<br>(ACRES) | PFO<br>(ACRES) | RIVERINE <sup>2</sup><br>(LINEAR FEET) | EPHEMERAL<br>(LINEAR FEET) |
| Highway                  | 6.9                                              | 2.0            | 4.1            | 20,198                                 | 10,812                     |
| Transitway <sup>3</sup>  | 1.2                                              | 0.3            | 1.1            | 4,006                                  | 1,646                      |
| Total                    | 8.1                                              | 2.3            | 5.2            | 24,204                                 | 12,458                     |

<sup>1</sup>Wetland classes are: PEM = Palustrine emergent, PSS = Palustrine scrub-shrub, PFO = Palustrine forested,

<sup>2</sup>Includes perennial and intermittent streams

<sup>3</sup>Includes transit stations

O&M facilities sites. The locations of the wetlands and waterways are shown on plan sheets included in **Appendix A**. Routine wetland delineation field data sheets, stream features sheets, and wetland functional assessment forms for each numbered wetland and waterway are included in the 2007 NETR.

Impacts

Waters of the US, including wetlands, are regulated under Sections 401 and 404 of the Clean Water Act and under the State of Maryland Nontidal Wetlands Protection Act. Impacts to these resources require a Section 401 Water Quality Certification from MDE and a Joint Federal/State permit for discharge of dredged or fill material into Waters of the US including wetlands.

The No-Build Alternative will have no effect on the Waters of the US, including wetlands, within the I-270/US 15 Corridor.

Wetland and waterway impacts associated with Alternatives 6A/B and 7A/B are the same, as the two alternatives would have the same physical footprint. A summary of wetland and waterway impacts by highway and transitway alignments and transit stations is shown in **Table IV-26**. **Table IV-24** summarizes the impacts associated with the potential transit O&M facilities. These impacts are not added to the total, as only a single site may be selected.

Emergent wetlands (PEM) are the wetland class that would be most affected by Alternatives 6A/B and 7A/B. Many of these emergent areas are connected to larger wetland systems that include Great Seneca Creek, Little Seneca Creek, Monocacy River, Rock Creek, Carroll Creek, and Tuscarora Creek. Forested wetlands would have the next highest impacts, and would include wetlands associated with the Monocacy River and Little Seneca Creek. These wetlands ranked high for the uniqueness/heritage values due to their affiliation with national (Monocacy National Battlefield) and state (Black Hill Regional Park) parks that have significant aesthetic and historical value.

Transitway alignment impacts for Alternatives 6A/B and 7A/B would be somewhat less than those for Alternatives 3A/B, 4A/B, and 5A/B/C because of shifts in the alignment that have occurred since the 2002 DEIS. The greatest decrease in wetland and waterway impacts has occurred just to the north of the proposed Metropolitan Grove Station.

Additional transitway impacts could occur from construction of a proposed O&M facility to service the transitway operations. Five potential sites are currently being investigated, but only a single site would be needed. Of the five potential sites, none would have wetland impacts and only the Police Vehicle Impound Lot and PEPCO Transmission Lines sites would have waterway impacts (**Table IV-24**).

Avoidance, Minimization and Mitigation

The No-Build Alternative would not impact waterways and wetlands, but would not meet the project’s purpose and need. Complete avoidance of impacts to surface waters and wetlands is not possible with a build alternative due to the quantity of these systems in the project area and their orientation perpendicular to the proposed alternatives. However, impacts have been avoided or minimized wherever possible through the initial placement of alignments to avoid unnecessary crossings. Investigations of further avoidance and minimization measures are on-going and will continue throughout all phases of engineering design for the project. Short-term construction impacts will be minimized through strict adherence to SHA erosion and sediment control procedures and MDE SWM regulations.

Mitigation planning for unavoidable wetland and waterway impacts of the I-270/US 15 Multi-Modal Corridor project have followed the guidelines of the *Maryland Compensatory Mitigation Guidance* (1994) and Section 404 requirements. On March 31, 2008, EPA and the USACE issued revised regulations governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters of the US under Section 404. These regulations are designed to improve the effectiveness of compensatory mitigation to replace lost aquatic resource functions and area, expand public participation in compensatory mitigation decision making, and increase the efficiency and predictability of the mitigation project review process. The main differences between the guidance and the revised regulations include the mitigation preference hierarchy, the watershed approach to mitigation, and the mitigation plan approval process. The mitigation preference, based on the revised regulations, is mitigation banks, in-lieu fee, and permittee-responsible mitigation, while the past guidance only recommended permittee-responsible mitigation. Past guidance accepted on-site mitigation as meeting the mitigation requirement, but the new regulations state that a watershed approach is necessary to replace lost aquatic functions. The new regulations require that a final mitigation plan with the 12 required elements be approved before a permit can be issued for the

project, while past guidance only required a conceptual mitigation plan. Another important component to this ruling is that stream reestablishment is being discouraged but compensation for stream corridor restoration and enhancement is required. A more detailed discussion of the mitigation process and how it relates to this project are located in the 2007 NETR. Current guidance with regard to climate change will be monitored and included as appropriate (Transportation Research Board: *Special Report 290: Potential Impacts of Climate Change on US Transportation*.)

Identification of potential mitigation sites was described in the 2002 DEIS; no further investigations were completed for this study.

Wetlands of Special State Concern

As stated in the 2002 DEIS, one Wetland of Special State Concern, the Germantown Bog, is located approximately 400 feet upstream of the project area. The information presented in the 2002 DEIS is unchanged. Because the limits of Alternatives 6A/B and 7A/B do not exceed those of Alternatives 3A/B, 4A/B and 5A/B/C, there are still no anticipated impacts to the special state concern wetland.

Terrestrial Vegetation and Wildlife

Existing Conditions

Due to the overlap in the design between Alternatives 6A/B and 7A/B and the 2002 DEIS alternatives, the terrestrial plant communities and wildlife described in the 2002 DEIS are generally the same for Alternatives 6A/B and 7A/B.

The main types of communities within the highway alignment are agricultural land, developed land, and old field habitat. The types of wildlife found within agricultural land include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), white-footed mouse (*Peromyscus leucopus*), American crow (*Corvus brachyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), Canada goose (*Branta canadensis*), and ring-necked pheasant (*Phasianus colchicus*). Other species common within this habitat include grasshopper sparrow (*Ammodramus savannarum*), red-winged



blackbird, Eastern meadowlark (*Sturnella magna*), meadow vole (*Microtus pennsylvanicus*), groundhog (*Marmota monax*), and red fox (*Vulpes vulpes*). Species that may hunt these fields or use them during the winter include birds of prey such as red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and barn owl (*Tyto alba*); white-tailed deer; savannah sparrow (*Passerculus sandwichensis*); and dark-eyed junco (*Junco hyemalis*).

Much of the wildlife using those areas classified as developed, such as the European starling, is adapted to human-modified environments. These species that can inhabit smaller, more disturbed sites with a mix of vegetation types include gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), tufted titmouse (*Baeolophus bicolor*), Carolina chickadee (*Poecile carolinensis*), Carolina wren (*Thryothorus ludovicianus*), red-bellied woodpecker (*Melanerpes carolinus*), and downy woodpecker (*Picoides pubescens*).

Within the study area, wildlife species commonly occurring in old field habitats include white-tailed deer, meadow vole, shrew, fox, groundhog, eastern cottontail (*Sylvilagus floridanus*), black rat snake (*Elaphe obsoleta*), eastern garter snake (*Thamnophis sirtalis*), field sparrow (*Spizella pusilla*), gray catbird (*Dumetella carolinensis*), brown thrasher (*Toxostoma rufum*), common yellowthroat (*Geothlypis trichas*), yellow-breasted chat (*Icteria virens*), and house wren (*Troglodytes aedon*). Where small mammal populations are abundant, birds of prey such as red-tailed hawk and American kestrel are also common.

The same terrestrial habitats were identified along the transitway alignment as along the I-270/US 15 Corridor highway alignment, including agricultural, developed, old field, and forest.

Forests

Forest habitats occur as small strips between developments or farm fields and larger tracts along stream valleys, within wetlands, on steep-sloped areas, and within parklands. The dominant forest types are deciduous except where earlier successional stands contain a predominance of pine. While considerable

development has occurred along the corridor, particularly at the southern end, large forested tracts still remain within protected parkland. From south to north along the corridor, larger tracts of forest occur along Muddy Branch (Summit Hall and Muddy Branch Parks), within Brown’s Station Park, along Great Seneca Creek, along and adjacent to Little Seneca Creek (Black Hill Regional Park), along Little Bennett Creek, and along the Monocacy River (Monocacy National Battlefield). Smaller woodlots occur elsewhere along the corridor.

Impacts

Impacts to plant communities and wildlife associated with Alternatives 6A/B and 7A/B will be the same, as the two alternatives will have the same physical footprint. In general, impacts to plant communities by project build alternatives include direct losses from clearing within rights-of way and changes in plant community structure and composition. Effects to terrestrial resources will involve the conversion of habitat to impervious road, rail, or other associated facilities. The transitway O&M facilities are mostly proposed on undeveloped land adjacent to the transitway alignment, as are portions of the proposed transitway alignment between Metropolitan Grove Station and the proposed COMSAT station.

Potential forest impacts associated with Alternatives 6A/B and 7A/B include 268.6 acres for the highway component and 27.2 acres for the transitway component. Of the five O&M facilities, three would have forest impacts. The specific forest stands potentially impacted by Alternatives 6A/B and 7A/B are similar to those described in the 2002 DEIS.

Avoidance, Minimization and Mitigation

Before a sediment and erosion control permit is issued for a project, the Maryland Forest Conservation Act requires that a Forest Stand Delineation (FSD) and a Forest Conservation Plan (FCP) must be submitted and approved by the MDNR, Forestry Division. A more detailed forest assessment, including preparation of a FSD and FCP, would need to be completed for the project once an alternative has been selected and

more detailed design has been completed. All forest impacts would be addressed and mitigated requiring the minimization of clearing and cutting of forests and mitigation in compliance with the Forest Conservation Act (FCA). The discussion of mitigation options for unavoidable forest impacts would be the same as was described in the 2002 DEIS, including the requirements of the state FCA and Reforestation Law Natural Resource Article 5-103 for state funded projects.

Aquatic Habitat/Species

Existing Conditions

Aquatic habitat assessment is generally completed by state and local agencies alongside benthic macroinvertebrate and fish community field assessments. New aquatic community assessment locations were sampled by the MDNR, Maryland Biological Stream Survey (MBSS), the Montgomery County Department of Environmental Protection (MCDEP), and the Frederick County Department of Public Works (FCDPW) since the 2002 NETR was published. In addition, new aquatic habitat assessments were conducted by SHA during the fish and macroinvertebrate community sampling periods of summer 2006 and spring 2007.

Physical Habitat Assessment

Physical habitat assessment results from SHA sampling during 2006 and from county and state agency samplings are summarized in the text below. Additional discussion of physical habitat and aquatic species can be found in the 2007 NETR.

This habitat assessment was based on February 2001 MBSS guidelines, and was conducted within each of the 75-meter segments sampled for fish during 2006. Each of the 75-meter segments was evaluated for instream habitat, epifaunal substrate, velocity/depth diversity, pool/glide/eddy quality, riffle/run quality, embeddedness, shading, remoteness, bank stability, the amount of instream woody debris/rootwads, and the abundance of trash and human refuse.

Habitat scores and Index of Biotic Integrity (IBI) scores are positively correlated, with high habitat scores usually predicting high IBI scores. The physical habitat assessment methods were developed using parameters selected from the 1994-2000 MBSS data. Although a number of parameters are evaluated, for Piedmont sites, eight individual physical habitat metrics were determined to be most important in discriminating reference sites from degraded sites: remoteness, shading, epifaunal substrate, instream habitat, total number of instream woody debris and rootwads, embeddedness, riffle/run quality, and bank stability. Four categories of habitat health were established for the physical habitat index (PHI) as follows:

- Scores of 81 to 100 are rated “Minimally Degraded”
- Scores of 66 to 80.9 are rated “Partially Degraded”
- Scores of 51 to 65.9 are rated “Degraded”
- Scores of 0 to 50.9 are rated “Severely Degraded”

Physical Habitat Index (PHI) scores for sites newly sampled by SHA ranged from severely to partially degraded. The highest PHI scores were found in Carroll Creek, just downstream of I-270/US15. Aquatic habitat scores for Tuscarora Creek all fell within the Severely Degraded range. PHI scores within Muddy Run all fell within the Severely Degraded range. Habitat scores in Bennett Creek ranged from Degraded upstream of I-270 to Partially Degraded downstream of I-270. A detailed discussion of these scores can be found in the 2007 NETR.

Existing habitat data were available from the Montgomery County Department of Environmental Protection (MCDEP) aquatic assessments within the project study area. Within Little Bennett Creek, aquatic habitat was rated as Good by the MCDEP habitat assessment. The large number of sites sampled within Little Seneca Creek resulted in highly variable individual habitat assessment scores. Aquatic habitat within Great Seneca Creek ranged from Good/Fair to Good, while habitat scores within Muddy Branch were rated as Good by MCDEP. Aquatic habitat within Mill Creek was rated as Good by MCDEP and Poor by SHA. A detailed discussion of these scores can be found in the 2007 NETR.

### Aquatic Communities Assessment

Benthic macroinvertebrate community quality varied throughout the project study area. Little Seneca Creek and Little Bennett Creek contained the least impaired communities, while Carroll Creek and Rock Creek (Monocacy River tributary) were the most impaired. Benthic Index of Biotic Integrity (BIBI) scores from these watersheds are summarized in Table 19 of the 2007 NETR.

The MCDEP and the MBSS Fish Index of Biotic Integrity (FIBI) rated the fish communities highest within the Carroll Creek, Bennett Creek, and Ballenger Creek watersheds, while Muddy Run, Rock Creek, and the Monocacy River tributaries generally scored lowest. FIBI scores at sites sampled by SHA in 2006 ranged from Poor to Good. Table 21 in the 2007 NETR summarizes the results of the fish sampling within the project study area.

Detailed discussions of the fish communities found within the project area streams are presented in the 2007 NETR. Two Maryland state threatened fish species were collected within project area watersheds. *Margariscus margarita* (pearl dace) was collected in Carroll Creek, Monocacy River, and Rock Creek watersheds. *Notropis amoenus* (comely shiner) was collected in Bennett Creek and not found in any other project area watersheds. These collections are discussed further in the next section.

### Impacts

The No-Build Alternative will not have an effect on the aquatic biota of the study area watersheds. All of the build alternatives have the potential to affect aquatic biota in the project area.

Direct impacts include changes that cause an immediate and obvious alteration of the resources. The primary direct impacts to aquatic biota from Alternatives 6A/B and 7A/B would be mortality of aquatic organisms during construction of stream crossings from heavy equipment, and loss of natural habitat from placement of culvert pipes and other in-stream structures.

Direct impacts to stream channels require a Section 404 permit from the USACE, as well as a Section 401 water quality certification from MDE. A waterway construction permit from MDE would also be required for work in streams and floodplains.

The fish communities are more mobile than macroinvertebrates and can respond to short-term water quality or flow impacts through avoiding sections of the stream and relocating. However, long-term changes in flow regimes and habitat from imperviousness could eventually alter the diversity of resident fish communities. Sensitive fish species within the study area such as brown trout and rainbow trout and state threatened species such as the comely shiner and pearl dace could be negatively affected by an increase in impervious cover.

### Avoidance and Minimization

Complete avoidance of impacts to aquatic habitat and species is not possible with a build alternative due to the quantity of streams and stream crossings within the project area. The No-Build Alternative would avoid impacts, but does not meet the project's purpose and need. Impacts have been avoided as much as possible by the placement of the alternatives to avoid additional unnecessary crossings and linear crossings of aquatic habitats. Investigations of further avoidance and minimization measures are on-going and will continue throughout all phases of engineering design and construction for the project.

## Rare, Threatened, and Endangered Species

### Existing Conditions

The US Fish and Wildlife Service (USFWS) and the MDNR Wildlife and Heritage Division (WHD) were contacted in February 2006 to update the information regarding the presence of rare, threatened, or endangered (RTE) species immediately adjacent to the project area or within one mile of the highway corridor and transitway alignments. Response letters were

received from MDNR in February and May of 2006 and the USFWS letter was received in September 2006.

There are no federally proposed or listed endangered or threatened species known to exist within the project impact areas. Therefore, no biological assessment or further Section 7 consultation is required with the USFWS.

The RTE species information relating to state listed species as discussed in the 2002 DEIS is updated to include two newly-listed state threatened species: pearl dace and comely shiner. Both species were not mentioned in the MDNR response letter, but both specimens were caught during the fish sampling of Carroll Creek and Bennett Creek conducted in the summer of 2006 by SHA. The MDNR-WHD list of RTE animals states that both species are state ranked as rare with a threatened status in Maryland. The fish sampling techniques used in each of these streams is described in detail in the Water Quality section of the 2007 NETR. These two records have since been reported to MDNR-WHD for comment and cataloging.

The *Arabis shortii* (short's rockcress) status has been downgraded since the 2002 NETR was issued. The short's rockcress no longer has a state threatened status and is now listed as a watch list species. Species that are on the watch list are rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland.

The Germantown Bog is a Wetland of Special State Concern that lies over 1,000 feet east of the I-270/US 15 Corridor within an unnamed tributary to Little Seneca Creek. The listed species within the Germantown Bog include *Sanguisorba canadensis* (Canadian burnet), *Sphenopholis pennsylvanica* (swamp-oats), and *Carex buxbaumii* (Buxbaum's sedge). A new RTE survey for the state listed threatened species known to occur within the Germantown Bog was conducted on June 29, 2007, during the corresponding flowering periods for these species (May to October). None of the listed species were observed within the I-270 project study area or a nearby emergent wetland.

### Impacts

The No-Build Alternative will avoid impacts to the RTE species within the I-270/US 15 Corridor, but would not meet the project's purpose and need.

Selection of a build alternative for the I-270/US 15 Corridor project has the potential to negatively affect the RTE fish species located within the study area. Impacts to the comely shiner and pearl dace would likely be similar to the impacts to other aquatic biota.

### Avoidance, Minimization and Mitigation

Avoidance, minimization, and mitigation of these impacts to the comely shiner and pearl dace can be accomplished using different methods. To help avoid impacts, all in-stream work for culverts and bridges will be carried out in compliance with MDE requirements related to state-mandated stream closure periods for the designated use class of the stream, which is administered by MDE. In-stream work is prohibited, for the protection of aquatic species, in Use I streams from March 1 through June 15, Use III streams from October 1 through April 30, and Use IV streams from March 1 through May 31. In response to potential impacts to RTE fish species on other projects, stream closure periods during construction activities have been extended. In Use III streams, such as Carroll Creek, the mandatory stream closure period may be extended to October 1 through April 30 or July 31. Other measures recommended by resource agencies to minimize impacts to these species include the use of BMPs for erosion control, on-site environmental inspectors to ensure erosion and sediment control compliance, and improvements to existing water quality and stream channel degradation in these watersheds through mitigation and environmental stewardship. Unavoidable direct impacts to stream channels would be mitigated in accordance with state and federal regulations through projects aimed at improving water quality.



## G. Hazardous Materials

This section explains the methods and analyses used to investigate the potential for hazardous material sites within the project study area. These sites may or may not be impacted by the build alternatives. Investigation results and recommendations for potential next steps are also identified.

### Methods and Analyses

An Initial Site Assessment (ISA) for the project area was conducted in 1998 and its findings presented in the 1999 Preliminary Screening Assessment Report and the 2002 DEIS. The ISA identified the potential areas of hazardous material on properties that would be impacted by the build alternatives. The ISA included field reconnaissance, a search of the regulatory databases, and a review of public regulatory documents. The assessment was conducted in general accordance with applicable portions of the American Standard for Testing and Materials (ASTM) guidance titled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E1527-05). It should be noted the ISA was intended to support planning level decisions related to the alternatives and not intended to directly facilitate any potential right-of-way acquisitions.

### Results and Recommendations

The ISA did not identify any sites where construction of the proposed transportation alternatives would be expected to encounter severe soil or groundwater contamination. Modest levels of soil or groundwater contamination were documented at five facilities and suspected at four facilities within the project area. These facilities include six Leaking Underground Storage Tank sites, such as service stations, which are under MDE regulation, and three No Further Remedial Action Planned sites regulated by EPA. Information regarding

these sites and others identified in the ISA is available in the 2002 DEIS in Chapter III.I (page III-224). An additional nine Potential Sites of Concern, which were not included in the regulatory databases as contaminant release sites, were identified during field work. These locations of potential contamination were identified based on their proximity to the proposed alignments and observation of site operations (heavy equipment storage and maintenance, underground storage tank replacement, monitoring well installation or electrical power distribution). These sites could be considered as potential sources of environmental contamination during construction of a build alternative.

The 2002 DEIS identified six of these sites that could be impacted by Alternatives 3A/B, 4A/B, or 5A/B/C. The six sites included three sites of potential concern where heavy equipment is stored and/or maintained, two sites where leaking underground storage tanks had been identified by MDE, and one former gasoline spill site. Alternatives 6A/B and 7A/B may also impact these sites.

It is recommended that more detailed environmental assessments should be performed for specific sites of concern and large property acquisitions following approval of a build alternative and prior to property acquisition and negotiation. A regulatory database search should be performed to update the documentation on known contaminant releases along the alignment. Where appropriate, based on site observations and available documentation, assessment efforts may include Phase II Site Investigations with soil and/or groundwater sampling and analysis.

## H. Air Quality

This air quality section begins with the regulatory framework for the study of the project area air quality and includes a listing of the National Ambient Air Quality Standards. Regional air quality, attainment status and regional conformity are then discussed. Ambient air quality in the study area is identified, followed by a discussion of the pollutants for analysis. The regional analysis is followed by a summary of the updated local, or microscale, analysis of the project area for Alternatives 6A/B and 7A/B (carbon monoxide assessment). A qualitative analysis of PM<sub>10</sub> and PM<sub>2.5</sub> (fine particles 10 and 2.5 micrometers or smaller, respectively), and Mobile Source Air Toxics (MSATs), both updated requirements since the 2002 DEIS, is included. Further information about the air quality analysis and results can be found in the June 2007 *I-270/US 15 Multi-Modal Corridor Study Air Quality Technical Report (AQTR)*.

### Regulatory Framework for Study Area Air Quality

Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. The Clean Air Act and Amendments of 1990 (CAAA) and the Final Transportation Conformity Rule (40 CFR Parts 51 and 93) direct the EPA to implement environmental policies and regulations that will ensure acceptable levels of air quality. The EPA has established the National Ambient Air Quality Standards (NAAQS) in accordance with the requirements of the CAAA and requirements of the Conformity Rule. These standards are summarized on **Table IV-27**.

In addition to the criteria pollutants for which there are NAAQS, EPA also regulates air toxics. Toxic air pollutants are pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). The Clean Air Act (CAA)

identified 188 air toxics. In 2001 the EPA identified 21 MSATs and highlighted six of these as priority MSATs.

Since 2001, EPA has conducted an extensive review to produce a list of compounds identified in the exhaust or evaporative emissions from on-road and non-road equipment, as well as alternative fuels. This list currently includes approximately 1,000 compounds, many emitted in trace amounts. In February 2007, EPA finalized a rule to reduce hazardous air pollutants from mobile sources (*Control of Hazardous Air Pollutants from Mobile Sources*, February 9, 2007). The rule limits the benzene content of gasoline and reduces toxic emissions from passenger vehicles and gas cans. EPA estimates that in 2030 this rule would reduce total nationwide emissions of MSATs by 330,000 tons and volatile organic compounds (VOC) emissions (precursors to ozone and PM<sub>2.5</sub>) by more than one million tons.

### Regional Air Quality, Attainment Status and Regional Conformity

Section 107 of the 1977 CAAA requires that EPA publish a list of all geographic areas in compliance with the NAAQS, referred to as attainment areas, as well as those areas not in attainment, referred to as nonattainment areas, of the NAAQS. The designation of an area is made on a pollutant-by-pollutant basis. Areas that have had a history of nonattainment, but are now consistently in attainment are called maintenance areas. Maintenance areas require a maintenance plan to show how they will stay in attainment. The State Implementation Plan (SIP) is the state's air quality plan that demonstrates how the state plans to meet EPA air quality attainment deadlines. The SIP includes both mobile source (transportation) programs and stationary source programs.

The I-270/US 15 study area is part of a maintenance area for carbon monoxide (CO), a nonattainment area for PM<sub>2.5</sub> and a moderate nonattainment area for ozone (O<sub>3</sub>). The area must come into attainment for PM<sub>2.5</sub> and O<sub>3</sub> by April 2010 and June 2010, respectively. Attainment status PM<sub>2.5</sub> standards will be based on monitored data collected in 2007-2009. Area designations will be issued in 2010.

Table IV-27: National Ambient Air Quality Standards

| POLLUTANT                               | PRIMARY STANDARDS                   |                                                     | SECONDARY STANDARDS               |                     |
|-----------------------------------------|-------------------------------------|-----------------------------------------------------|-----------------------------------|---------------------|
|                                         | LEVEL                               | AVERAGING TIME                                      | LEVEL                             | AVERAGING TIME      |
| Carbon Monoxide (CO)                    | 9 ppm 10 mg/m <sup>3</sup>          | 8 hour <sup>a</sup>                                 | None                              |                     |
|                                         | 35 ppm (40 mg/m <sup>3</sup> )      | 1-hour <sup>a</sup>                                 |                                   |                     |
| Lead (Pb)                               | 0.15 µg/m <sup>3</sup> <sup>b</sup> | Rolling 3-month average                             | Same as Primary                   |                     |
|                                         | 1.5 µg/m <sup>3</sup>               | Quarterly Average                                   | Same as Primary                   |                     |
| Nitrogen Dioxide (NO <sub>2</sub> )     | 0.053 ppm (100 µg/m <sup>3</sup> )  | Annual (Arithmetic Mean)                            | Same as Primary                   |                     |
| Particulate Matter (PM <sub>10</sub> )  | 150 µg/m <sup>3</sup>               | 24-hour <sup>c</sup>                                | Same as Primary                   |                     |
| Particulate Matter (PM <sub>2.5</sub> ) | 15.0 µg/m <sup>3</sup>              | Annual <sup>d</sup> (Arithmetic Mean)               | Same as Primary                   |                     |
|                                         | 35 µg/m <sup>3</sup>                | 24-hour <sup>e</sup>                                | Same as Primary                   |                     |
| Ozone (O <sub>3</sub> )                 | 0.075 ppm (2008 std)                | 8-hour <sup>f</sup>                                 | Same as Primary                   |                     |
|                                         | 0.08 ppm (1997 std)                 | 8-hour <sup>g</sup>                                 | Same as Primary                   |                     |
|                                         | 0.12 ppm                            | 1-hour <sup>h</sup> (Applies only in limited areas) | Same as Primary                   |                     |
| Sulfur Dioxide (SO <sub>2</sub> )       | 0.03 ppm                            | Annual (Arithmetic Mean)                            | 0.5 ppm (1300 µg/m <sup>3</sup> ) | 3-hour <sup>3</sup> |
|                                         | 0.14 ppm                            | 24-hour <sup>a</sup>                                |                                   |                     |

<sup>a</sup>Not to be exceeded more than once per year.  
<sup>b</sup>Final rule signed October 15, 2008.  
<sup>c</sup>Not to be exceeded more than once per year on average over 3 years.  
<sup>d</sup>To attain this standard, the 3-year average of the weighted annual mean PM<sub>2.5</sub> concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m<sup>3</sup>.  
<sup>e</sup>To attain this standard, the 3-year average of the 98th percentile of the 24-hour concentrations at each population- oriented monitor within an area must not exceed 35 µg/m<sup>3</sup> (effective December 13, 2006).  
<sup>f</sup>To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).  
<sup>g</sup>(1) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.  
(2) The 1997 standard-and the implementation rules for that standard – will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.  
<sup>h</sup>(1) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤1.  
(2) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.  
Source: [www.epa.gov/air/criteria.html](http://www.epa.gov/air/criteria.html) (October 30, 2008)  
Abbreviations: ppm = parts per million; mg/m<sup>3</sup> = milligrams per cubic meter; µg/m<sup>3</sup> = micrograms per cubic mete

Table IV-28: Project Area Ambient Air Quality Summary, 2003 - 2005

| POLLUTANT         | NUMBER OF MONITORING LOCATIONS | AVERAGING TIME | STANDARD             | MAXIMUM RECORDED <sup>1</sup> |       |       | NUMBER OF EXCEEDANCES <sup>2</sup> |                |                |
|-------------------|--------------------------------|----------------|----------------------|-------------------------------|-------|-------|------------------------------------|----------------|----------------|
|                   |                                |                |                      | 2003                          | 2004  | 2005  | 2003                               | 2004           | 2005           |
| CO                | 2                              | 1-hour         | 35 ppm               | 3.6                           | 3.7   | 2.7   | 0                                  | 0              | 0              |
|                   |                                | 8-hour         | 9 ppm                | 2.8                           | 2.5   | 1.9   | 0                                  | 0              | 0              |
| PM <sub>10</sub>  | 1                              | 24-hour        | 150 µ/m <sup>3</sup> | 52                            | 48    | 48    | 0                                  | 0              | 0              |
| PM <sub>2.5</sub> | 3                              | 24-hour        | 35 µ/m <sup>3</sup>  | 53                            | 45    | 41    | 0                                  | 0              | 1              |
| NO <sub>2</sub>   | 2                              | Annual mean    | 0.053 ppm            | 0.023                         | 0.018 | 0.017 | 0                                  | 0              | 0              |
| O <sub>3</sub>    | 5                              | 8-hour         | 0.08 ppm             | 0.116                         | 0.109 | 0.100 | 3 <sup>3</sup>                     | 3 <sup>3</sup> | 3 <sup>3</sup> |

<sup>1</sup>Indicates the maximum recorded at any one of the number of stations providing that data.  
<sup>2</sup>Indicates the highest number of days the standard was exceeded at any one of the stations providing that data.  
<sup>3</sup>For ozone, more than one of the monitoring stations reported multiple days that the standard was exceeded.  
Source: EPA Office of Air Quality Planning and Standards (AIRS Data) website [www.epa.gov/air/data/geosel.html](http://www.epa.gov/air/data/geosel.html)

Frederick and Montgomery counties are part of MWCOG, which provides daily reports and forecasts of regional air quality. Through the MWCOG, the Metropolitan Washington Air Quality Committee (MWAQC) prepares the air quality plan for the DC-MD-VA metropolitan area. The National Capital Region Transportation Planning Board (TPB) is the federally designated Metropolitan Planning Organization (MPO) for the region. The TPB prepares metropolitan transportation plans and programs that are used as the basis for the Statewide Transportation Improvement Program (STIP) which the federal government must approve in order for federal-aid transportation funds to flow to the Washington region.

A transportation project is analyzed as part of a regional transportation network developed by the county or state in metropolitan areas. The projects included in this network are found in the regional Transportation Improvement Plan (TIP), also prepared by MWCOG. The TIP is the basis for the regional mobile source air quality analysis which utilizes vehicle miles traveled (VMT) and vehicle hours traveled (VHT) within the region to determine daily “pollutant burden” levels. The results of this analysis help determine if an area is in conformity with regulations set forth in the Final Conformity Rule.

The I-270/US 15 project is an element of the 2007 CLRP and the FY 2008-2013 TIP, which were adopted by the TPB on April 16, 2008. FHWA and FTA approved the TPB’s conformity determination related to these documents on June 11, 2008.

Ambient Air Quality in the Study Area

The Air and Radiation Management Administration, within MDE is responsible for implementing and enforcing regulations to assure that the air Maryland citizens breathe is clean and healthful. MDE monitors the six criteria pollutants year round at 33 monitoring sites. The Office of Air Quality Monitoring within the Virginia Department of Environmental Quality is responsible for seeing that the Virginia ambient air monitoring network is maintained and operated in accordance with State and Federal guidelines. The MWCOG collects and distributes air quality data from monitors located throughout the Washington DC, Virginia and Maryland area. **Figure IV-11** shows the location of the monitors within the DC-VA-MD metropolitan area, relative to the project’s study area. Monitored air quality data for criteria pollutants within or near the study for the years 2003-2005 is summarized in **Table IV-28**.

Air quality monitoring stations that may reflect area pollutant levels include those at Cub Run Lee Road and Lewinsville/McLean in Fairfax County, Virginia; Broad Run High School in Ashburn, Loudoun County, Virginia; Rockville, Montgomery County, Maryland; and Frederick Municipal Airport, Frederick County, Maryland.

Figure IV-11: Air Quality Monitors Within the DC-VA-MD Area

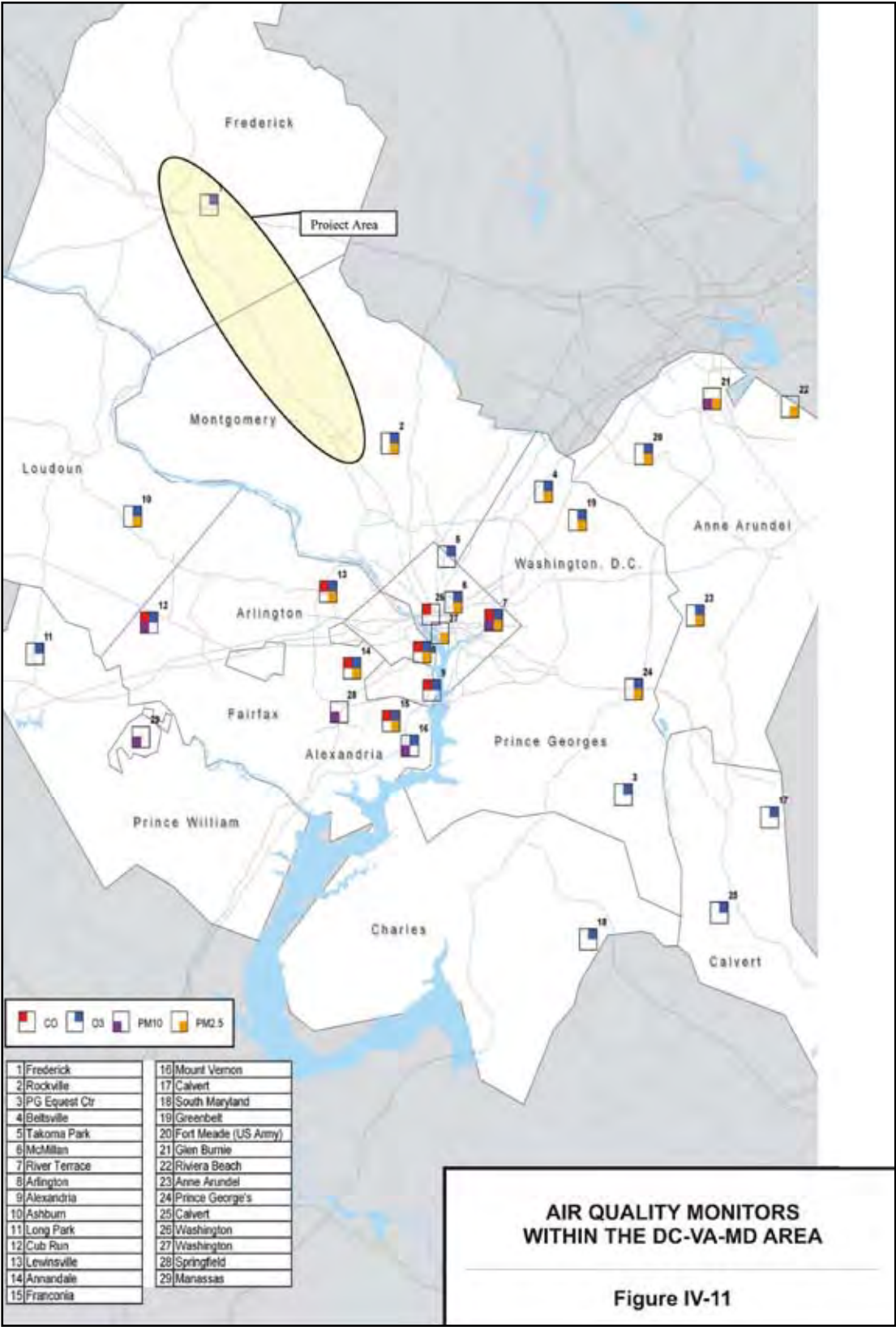


Table IV-29: Regional Pollutant Burden (Kg/day)

| YEAR/ALTERNATIVE       |                   | 2015       |            |            | 2030       |            |            |
|------------------------|-------------------|------------|------------|------------|------------|------------|------------|
|                        |                   | NO-BUILD   | ALT 6A/B   | ALT 7A/B   | NO-BUILD   | ALT 6A/B   | ALT 7A/B   |
| VMT                    |                   | 34,681,505 | 34,915,117 | 34,994,629 | 40,557,948 | 40,950,909 | 41,020,351 |
| % Change from No-Build |                   |            | 0.67%      | 0.90%      |            | 0.97%      | 1.14%      |
| Pollutant:             | CO                | 110,996    | 111,715    | 111,967    | 116,733    | 117,352    | 117,331    |
|                        | NO <sub>x</sub>   | 16,207     | 16,372     | 16,404     | 8,288      | 8,350      | 8,334      |
|                        | PM <sub>10</sub>  | 1,337      | 1,349      | 1,352      | 1,372      | 1,391      | 1,392      |
|                        | PM <sub>2.5</sub> | 662        | 668        | 669        | 632        | 641        | 642        |
|                        | VOC               | 11,447     | 11,617     | 11,640     | 9,384      | 9,383      | 9,395      |
| Kg/day                 |                   |            |            |            |            |            |            |
| % Change from No-Build |                   |            |            |            |            |            |            |
|                        |                   |            | 0.6%       | 0.9%       |            | 0.5%       | 0.5%       |
|                        |                   |            | 0.8%       | 1.0%       |            | 0.4%       | 0.3%       |
|                        |                   |            | 0.7%       | 0.9%       |            | 1.0%       | 1.1%       |
|                        |                   |            | 0.7%       | 0.9%       |            | 1.0%       | 1.1%       |
|                        |                   |            | 1.1%       | 1.3%       |            | -0.3%      | 0.1%       |

Pollutants for Analysis

Pollutants that can be traced principally to motor vehicles and buses are relevant to the evaluation of the project impacts. These pollutants include CO, VOC, nitrogen oxides (NO<sub>x</sub>), O<sub>3</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and MSATs. Transportation sources account for a small percentage of regional emissions of sulfur oxides (SO<sub>x</sub>) and lead (Pb); thus, a detailed analysis is not required.

VOC and NO<sub>x</sub> emissions from vehicles are a concern primarily because they are precursors in the formation of ozone and particulate matter. Ozone is formed through a series of reactions which occur in the atmosphere in the presence of sunlight. Since the reactions are slow and occur as the pollutants are diffusing downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. Therefore, the effects of VOC and NO<sub>x</sub> emissions generally are examined on a regional basis.

CO impacts are generally localized. Even under the worst meteorological conditions and most congested traffic conditions, high concentrations are limited to within a relatively short distance (300 – 600 feet) of heavily traveled roadways. Vehicle emissions are the major sources of CO. Since the proposed project could change traffic patterns within the study area, it is appropriate to predict concentrations of CO on both a regional and a localized or “microscale” basis.

PM<sub>10</sub> and PM<sub>2.5</sub> impacts are both regional and local. A significant portion of particulate matter, especially PM<sub>10</sub>, comes from disturbed vacant land, construction activity and paved road dust. PM<sub>2.5</sub> also comes from these sources. Motor vehicle exhaust, particularly from diesel vehicles, is also a source of PM<sub>10</sub> and PM<sub>2.5</sub>. Thus it is appropriate to address impacts of PM<sub>10</sub> and PM<sub>2.5</sub> on a regional basis.

MSAT impacts are both regional and local. Through the issuance of EPA’s *Final Rule Regarding Emission Control of Hazardous Air Pollutants from Mobile Sources* [EPA420-F-07-017] in February 2007, it was determined that many existing and newly promulgated mobile source emission control programs would result in a reduction of MSATs. FHWA projects that even with a 64 percent increase in vehicle miles traveled (VMT), the programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent. As a result EPA has concluded that no further motor vehicle emission standards or fuel standards are necessary to further control MSATs.

Regional Analysis

To determine the project’s regional impact, a regional analysis was conducted based on overall regional VMT and VHT. As shown in **Table IV-29**, the build alternatives are expected to generally increase regional

Table IV-30: Air Quality Analysis Sites

| SITE # | SITE DESCRIPTION                           | SITE # | SITE DESCRIPTION                       |
|--------|--------------------------------------------|--------|----------------------------------------|
| 1      | Muddy Branch Road and Great Seneca Highway | 20     | MD 121 and MD 355 (Historical Church)  |
| 2      | Field Road and Sam Eig Highway             | 21     | Little Bennett Regional Park           |
| 3      | MD 355 and Shady Grove Road                | 22     | 8546 Fingerboard Road – Residence      |
| 4      | MD 117 and MD 124                          | 23     | MD 80 and I-270 Ramps                  |
| 5      | I-270 ramps at MD 117                      | 24     | Urbana Community Park                  |
| 6      | MD 117 and Perry Parkway                   | 25     | 8358 Fingerboard Road – Residence      |
| 7      | MD 355 and Montgomery Village Avenue       | 26     | MD 85/Spectrum Avenue                  |
| 8      | MD 355 and Watkins Mill Road               | 27     | I- 270 ramps and MD 85                 |
| 9      | New Covenant Fellowship Church             | 28     | 5819 Farmgate Court – Residence        |
| 10     | Staleybridge Road – Residence              | 29     | Monocacy National Battlefield          |
| 11     | MD 355 and Middlebrook Road                | 30     | Jefferson, Prospect, and Pearl Streets |
| 12     | MD 118 southbound and Middlebrook Road     | 31     | Waterford Park                         |
| 13     | Crystal Rock Drive and MD 118              | 32     | Fairfield Park                         |
| 14     | I-270 northbound ramps and MD 118          | 33     | Residence near Waterford Park          |
| 15     | MD 118 and Observation Drive               | 34     | US 15 and Rosemont interchange         |
| 16     | Milestone Apartments                       | 35     | US 15 ramps at 7 <sup>th</sup> Street  |
| 17     | MD 355 and Father Hurley Boulevard (MD 27) | 36     | Rose Hill Manor                        |
| 18     | Black Hill Regional Park                   | 37     | MD 26 and Trading Lane                 |
| 19     | I-270 ramps at MD 121                      |        |                                        |

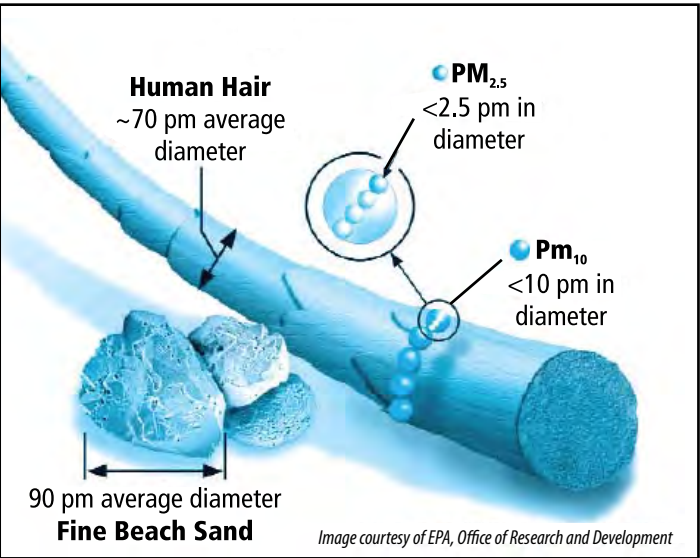
pollutant burdens when compared to the No-Build Alternative. These increases are due to increased VMT for each build alternative, compared to the No-Build Alternative, and associated speed fluctuations. In 2015, Alternative 7A/B is predicted to have the larger increase in regional pollutant burden levels when compared to Alternative 6A/B, using the No-Build Alternative as a base. This increase ranges from 0.7 percent in PM<sub>10</sub> and PM<sub>2.5</sub> to 1.3 percent for VOC regional levels.

In 2030, Alternative 7A/B is predicted to have the larger increase in PM<sub>10</sub> and PM<sub>2.5</sub> regional levels, the same impact on CO levels and a smaller increase in NO<sub>x</sub> levels, as compared to Alternative 6A/B, using the

No-Build Alternative as a base. Both build alternatives are predicted to reduce VOC levels by 2030, as is the No-Build Alternative. Differences in 2030 VOC levels between the No-Build, Alternative 6A/B and Alternative 7A/B are not significant.

The predicted changes to regional pollutant levels are relatively small overall, ranging from an increase of 1.1% to a reduction of 0.3%. Based on these changes, the project alternatives are predicted to have a minimal effect on regional pollutant levels.

Figure IV-12: Relative Particulate Matter Size



Project Area Carbon Monoxide Assessment

Air quality modeling was performed using the most recent version of the EPA mobile source emission factor model (MOBILE6.2) and the CAL3QHC (Version 2) air quality dispersion model to estimate future CO levels at selected locations in the study area for the No-Build Alternative and Alternatives 6A/B and 7A/B.

The locations chosen for air quality monitoring were selected through a screening methodology based on intersection volumes, levels of service, project-induced changes in traffic conditions, areas of community concern and/or locations of sensitive receptors such as residences, schools, parks, and churches. The sites chosen for analysis are listed in **Table IV-30** and shown on the **Plan Sheets** in **Appendix A**. CO levels were estimated at 37 sites within the study area using the CAL3QHC (Version 2) model. Of the sites, 23 are intersections and 14 are free flow locations. Analysis locations were chosen in accordance with the guidelines found in EPA’s *Guidelines for Modeling Carbon Monoxide from Roadway Intersections* (EPA-454/R-92-005) and with respect to the unique geometry of each analysis site.

Maximum one-hour and eight-hour CO levels were predicted at each of the 37 sites. No violations of the NAAQS (greater than 35 ppm for the one hour standard or greater than 9 ppm for the 8 hour standard) are predicted in any year under any alternative. There are no impacts to CO levels predicted to result from the implementation of Alternatives 6A/B or 7A/B.

Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

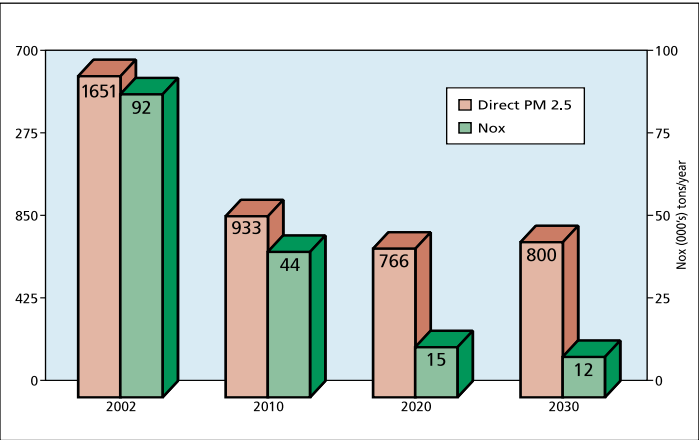
On March 10, 2006, EPA issued a Final Rule regarding the localized or “hot-spot” analysis of PM<sub>2.5</sub> and PM<sub>10</sub> (40 CFR Part 93). This rule requires that PM<sub>2.5</sub> and PM<sub>10</sub> hotspot analysis be performed only for transportation projects with significant diesel traffic in areas not meeting PM<sub>10</sub> or PM<sub>2.5</sub> air quality standards. The project area is in attainment for PM<sub>10</sub> and in a nonattainment area for the 1997 PM<sub>2.5</sub> standards. As such, the Transportation Conformity requirements of 40 CFR Part 93 apply to this project.

To fulfill these requirements, analyses of the Locally Preferred Alternative (LPA) will be undertaken to ensure that it does not cause any violations of the 1997 health-based standard for PM<sub>2.5</sub> nor contribute to any existing violations. Until an LPA is selected however, information on the potential impacts of the proposed project alternatives will be qualitatively discussed and compared.

Particulate pollution is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. PM<sub>2.5</sub> refers to the particles whose diameter is less than or equal to 2.5 microns. **Figure IV-12** illustrates the relative size of these small particles compared to a human hair and a grain of sand. These small particles are of particular concern as they can penetrate the human respiratory system and damage the respiratory tract. Recent research also suggests a potential health impact due to PM<sub>2.5</sub> emissions associated with near-roadway exposure.

The project is located in an area designated in 2005 by the EPA as not meeting the 1997 PM<sub>2.5</sub> 24-hour air quality standard of 65 µg/m<sup>3</sup>. The standard was revised to 35 µg/m<sup>3</sup> in 2006. Designations based on these revised standards are not expected until 2010 and will be based on 2007-2009 data, and conformity

Figure IV-13: PM<sub>2.5</sub> Emission Trends



requirements of 40 CFR Part 93 for the revised standard do not apply until one year after the effective date of new designations. 2003-2005 monitoring data near the project area indicates no exceedances of the 24-hour standard. It does appear, however, that the current 2006 standard of 35 µg/m<sup>3</sup> was exceeded several times.

As shown in **Figure IV-13**, recent estimates by MWCOG show decreasing emissions of PM<sub>2.5</sub>. The area is required to demonstrate attainment to the 1997 standard by 2010. The MWCOG projects that the area will reach attainment by 2009. The area, therefore, is expected to meet the 1997 health based standard before the project opens.

Based on currently available data, the region appears likely to be designated nonattainment for the 2006 standards. However, EPA projections show the area as meeting this standard by 2015, the year the project opens<sup>1</sup>. In addition, it is important to note that national vehicle and engine standards promulgated by the EPA, which include the 2007 heavy duty engine/fuel rule<sup>2</sup>, are anticipated to decrease emissions from motor vehicles in the coming years.

The purpose of the I-270/US 15 Multi-Modal

<sup>1</sup> See [http://www.epa.gov/oar/particlepollution/pdfs/20061025\\_graphsmaps.pdf](http://www.epa.gov/oar/particlepollution/pdfs/20061025_graphsmaps.pdf)

<sup>2</sup> See <http://www.epa.gov/fedrgstr/EPA-AIR/2001/January/Day-18/a01a.pdf>

Corridor Study is to investigate options to relieve congestion and improve safety conditions along the I-270/US 15 Corridor. The proposed project is expected to improve access, highway capacity and safety conditions, and accommodate anticipated traffic growth in the area. The project is not predicted to significantly increase diesel vehicles/trucks along the project corridor. The main air quality difference between the alternatives under consideration is the use of a Bus Rapid Transit (BRT) system or a Light Rail Transit (LRT) system. The LRT system will be electrically powered and is not expected to increase PM<sub>2.5</sub> levels due to the LRT operation. The operation of the BRT system has the potential to introduce more diesel vehicles into the study area as compared to the LRT system. However, with the emission control measures already implemented, including the *Clean Diesel Truck and Bus Rule* which will put the cleanest running heavy-duty trucks and buses in history on the roads, the BRT fleet will be 95 percent cleaner than today's trucks and buses. The impact of the additional buses under the BRT alternatives is predicted to be minimal. In addition, the use of alternative fueled buses is also a consideration for the project.

Both the LRT and BRT alternatives have the potential to increase the number of diesel vehicles at station locations and possibly maintenance facilities. The implementation of previously discussed emission control measures is predicted to minimize any potential impact on PM<sub>2.5</sub> emission levels due to stations and maintenance facilities.

An analysis of the locally preferred alternative will be undertaken to ensure that it does not cause any violations of the 1997 health-based standard for PM<sub>2.5</sub> nor contribute to any additional violations. This analysis will be conducted to ensure that the project demonstrates a satisfactory capacity to meet all applicable requirements related to Transportation Conformity, including an assessment of any localized (or hot-spot) PM<sub>2.5</sub> emission impacts.

Analysis of MSAT

Technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSAT at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSAT, it can give a basis for identifying and comparing the potential differences in MSAT emissions, if any, from the alternatives. The qualitative assessment, which will compare VMT between alternatives, is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at: <http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm>

The amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same. The VMT estimated for the build alternatives is slightly higher than that for the No-Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts vehicle trips from elsewhere in the transportation network. The change is expected to be less than 1.2 percent. The increased VMT would lead to higher MSAT emissions for the build alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is also offset somewhat by lower MSAT emission rates due to increased speeds, because according to EPA's MOBILE6.2 emissions model, emissions of all of the priority MSAT except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models. In addition, construction of the project is predicted to decrease travel times, thus reducing idling, thereby reducing emissions.

The additional travel lanes contemplated as part of the project alternatives may have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under Alternatives 6A/B and 7A/B than under the No-Build Alternative. However, as discussed previously, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models.

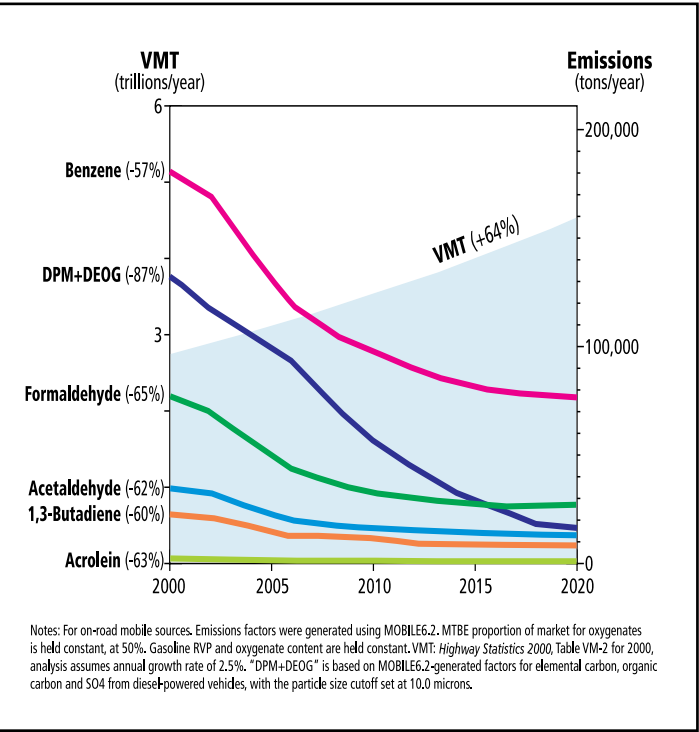
In summary, when new travel lanes are constructed, the localized level of MSAT emissions for the build alternatives could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion, which are associated with lower MSAT emissions. Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

Sensitive receptors include facilities most likely to contain large concentrations of the more sensitive populations, such as hospitals, schools, licensed day care facilities, and elder care facilities. Dispersion studies have shown that the roadway air toxics start to drop off at a distance of about 100 meters (328 feet). By 500 meters (1640 feet), most studies have found it very difficult to distinguish the roadway from background toxic concentrations in any given area.

Available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives analyzed for this project. Therefore, it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

Emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and

Figure IV-14: Vehicle Miles Traveled versus Mobile Source Air Toxics



2020 (**Figure IV-14**). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

MSAT Analysis Results

This section has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that the project build alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

I. Noise and Vibration

This section summarizes the evaluation of noise impacts predicted to occur as a result of the implementation of Alternatives 6A/B or 7A/B along the I-270/US 15 highway corridor and on the proposed CCT alignment. Following the introduction and overview, highway noise criteria and methodology are provided. Existing noise levels and predicted traffic noise impacts for noise sensitive areas are summarized on **Figure IV-15**. A summary of potential traffic noise mitigation at locations where an impact would occur completes the highway noise portion. A summary of transit noise methods, existing noise, impacts and mitigation follows, with a visual of transit noise impacts included on **Figure IV-15**. A summary of the transit vibration analysis, including methodology, ambient conditions, predicted impacts and mitigation completes the section.

Construction of additional capacity on I-270/US 15, construction of the CCT and the operation of either buses or light rail vehicles has the potential to increase noise levels in sensitive locations throughout the length of the corridor. To determine these potential increases, existing noise levels were measured according to procedures described in *Sound Procedures for Measuring Highway Noise* (Report Number FHWA-DP-45-1R May 1996) and in *Transit Noise and Vibration Impact Assessment* (May 2006). Highway noise impacts were evaluated in accordance with FHWA and SHA *Traffic Noise Criteria* (2007), using the FHWA Traffic Noise Model (TNM version 2.5). Transit noise and vibration analyses were performed in accordance with FTA *Transit Noise and Vibration Assessment Guidelines* (2006), WMATA *Construction Noise and Vibration Design Criteria* (2001), and FTA *Construction Noise Impact Criteria* (2006). Further information and technical data associated with this noise analysis can be found in the January 2008 *Noise and Vibration Technical Report* (NVTR).

Overview

Factors affecting sounds perceived as noise include the actual level of noise, the frequency, exposure time, interval, and the fluctuations in the noise levels during exposure. Distance, time of day, intervening buildings

Table IV-31: Noise Abatement Criteria for Highway Projects\*

| ACTIVITY CATEGORY | DBA* LEQ (1HR) | DESCRIPTION OF ACTIVITY                                                                                                                                                                                                    |
|-------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                 | 57             | Lands on which serenity and quietness of extraordinary significance serve an important public purpose and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. |
| B                 | 67             | Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.                                                                          |
| C                 | 72             | Developed lands, properties, or activities, not included in Categories A or B.                                                                                                                                             |
| D                 | —              | Undeveloped lands.                                                                                                                                                                                                         |
| E                 | 52             | Interior spaces of Category B, where applicable.                                                                                                                                                                           |

Source: Federal Highway Administration 23 CFR 772  
\*Approach noise abatement criterion in Maryland is 1 dBA less than the noise abatement criteria levels shown.

and/or vegetation, and height differences (topography) between the roadway and receiver also influence the noise level. The principal source of existing noise throughout most of the corridor is motor vehicles. Most of the community areas directly adjacent to the proposed transit alignment are already exposed to at least moderate levels of traffic noise from nearby roadways.

Highway noise is measured in decibels. To account for human sensitivity to noise, decibels are measured on the “A-scale”, abbreviated dBA. Generally, changes in noise levels of less than 3 dBA will be barely perceived by most listeners, while a 10 dBA change normally is perceived as a doubling of noise levels. The general principle on which most noise acceptability criteria is based is that a change in noise is likely to cause annoyance wherever it intrudes upon the existing, or ambient, noise from all other sources.

Noise levels for highway and transit vehicle impacts are described using equivalent sound level ( $L_{eq}$ ), which is the average sound exposure over a one-hour period. Transit impacts are also measured using day-night sound level ( $L_{dn}$ ), which is the average day and night noise level over a 24-hour period. Day-night sound level is used where people normally sleep and there is sensitivity to nighttime sounds.

Highway Noise

Highway Noise Criteria and Methodology

Noise criteria, as they apply to highway and transit projects, provide a general determination of noise levels that would adversely impact a community. **Table IV-31** presents FHWA (23 CFR 772) and SHA Noise Abatement Criteria (NAC) for different land use categories. The NAC are considered to be maximum noise levels for outdoor activities, and for certain indoor activities. If noise levels approach or exceed the maximum, a noise impact occurs, and noise abatement will be considered. The “approach” noise abatement criterion level in Maryland is 1 dBA less than the noise abatement criteria levels shown in **Table IV-31**. A substantial increase is defined as a 10-decibel increase in noise levels over existing conditions.

Existing Highway Noise

Existing noise levels were recorded at 55 sites, or noise sensitive areas (NSAs), adjacent to the proposed highway improvements. **Figure IV-15 (Sheets 1 through 5)** shows the locations of the highway noise monitoring locations within the project study area. Highway monitoring locations (NSAs) are identified with the letter “H” and include residential, commercial, and historic buildings representative of typical uses within the corridor.

Highway noise monitoring locations are the same as described in the 2002 DEIS, with the following exceptions:

Figure IV-15: Noise and Vibration Monitoring Sites and Noise Analysis Results

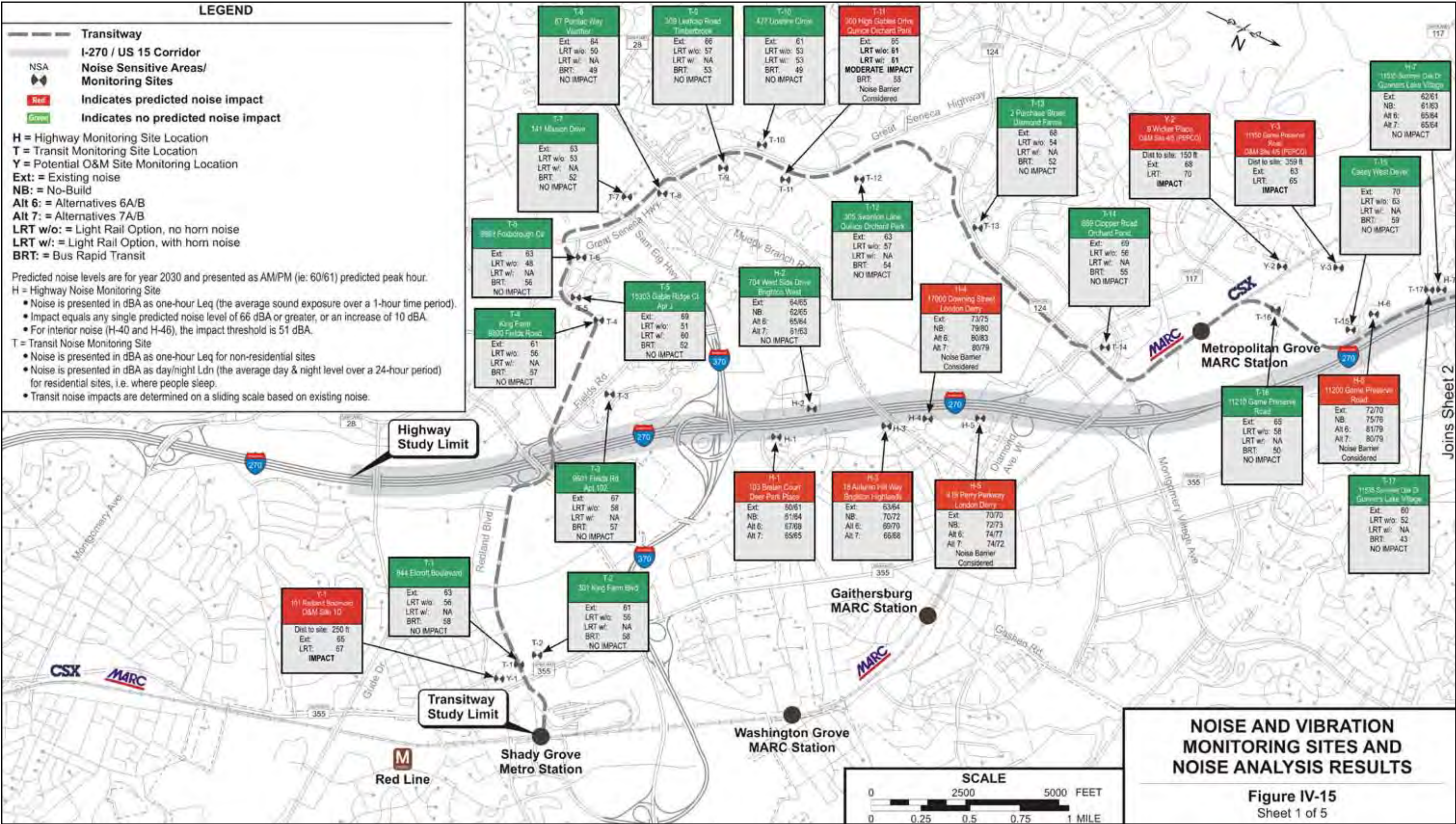


Figure IV-15: Noise and Vibration Monitoring Sites and Noise Analysis Results

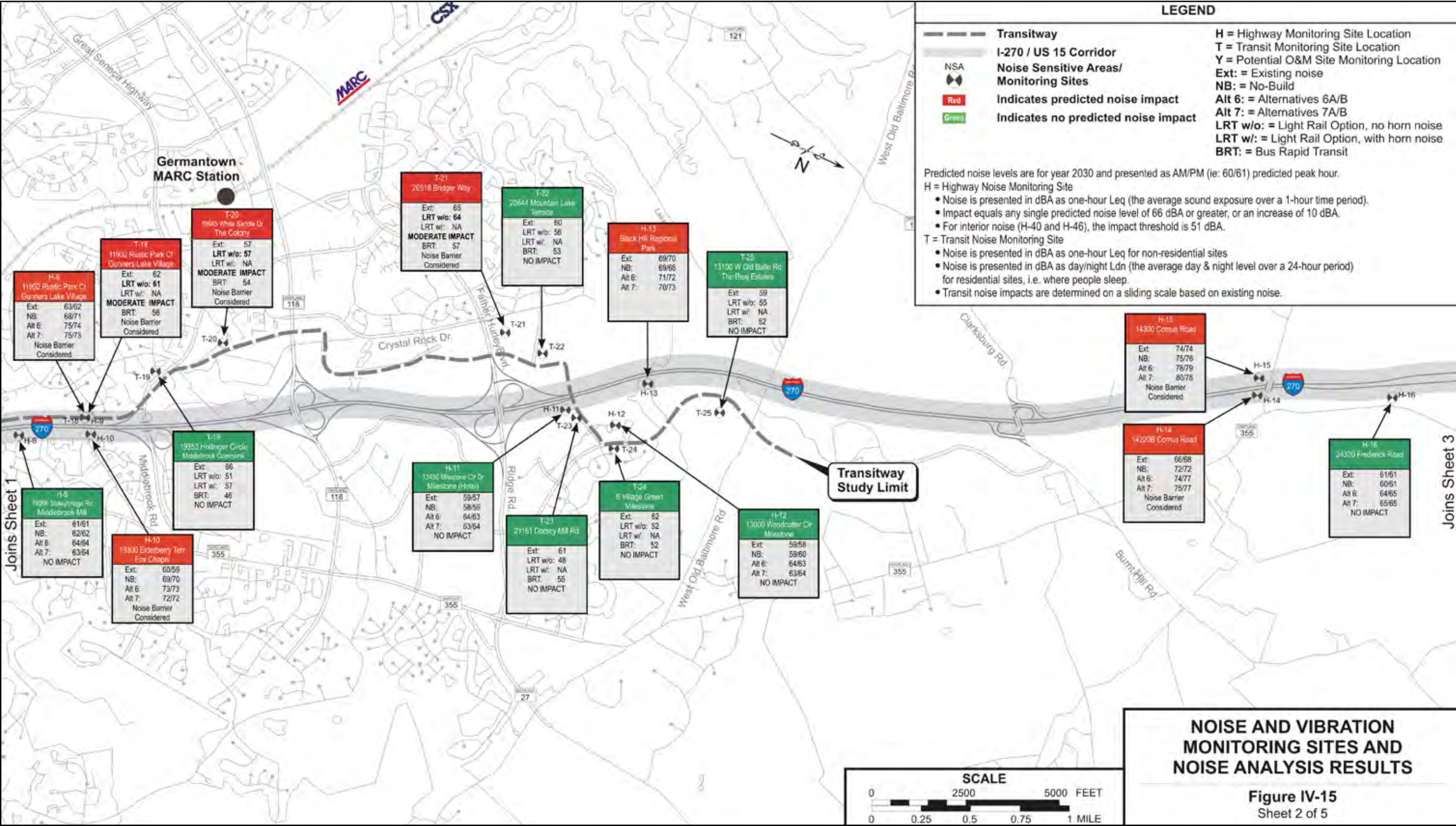


Figure IV-15: Noise and Vibration Monitoring Sites and Noise Analysis Results

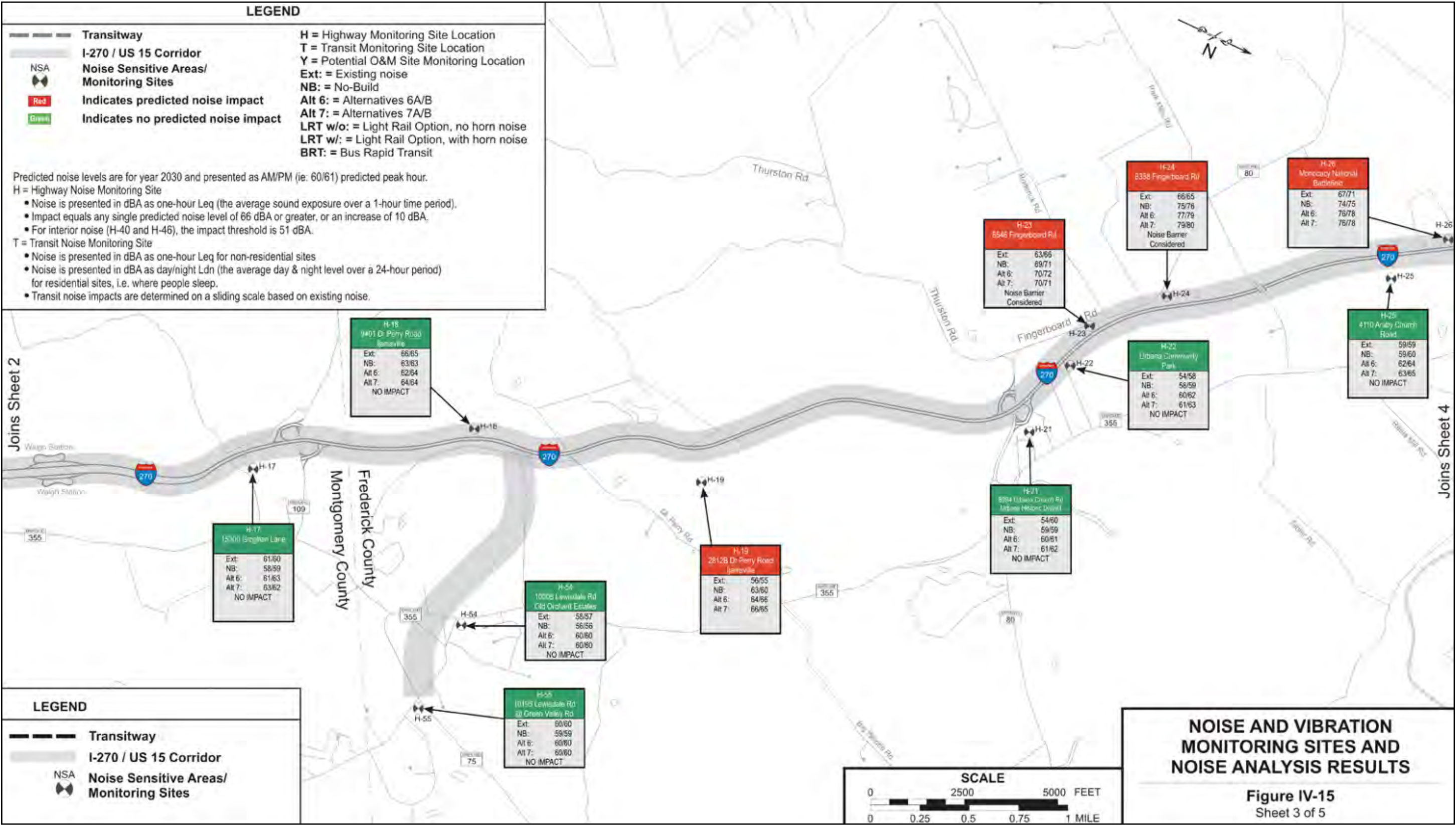


Figure IV-15: Noise and Vibration Monitoring Sites and Noise Analysis Results

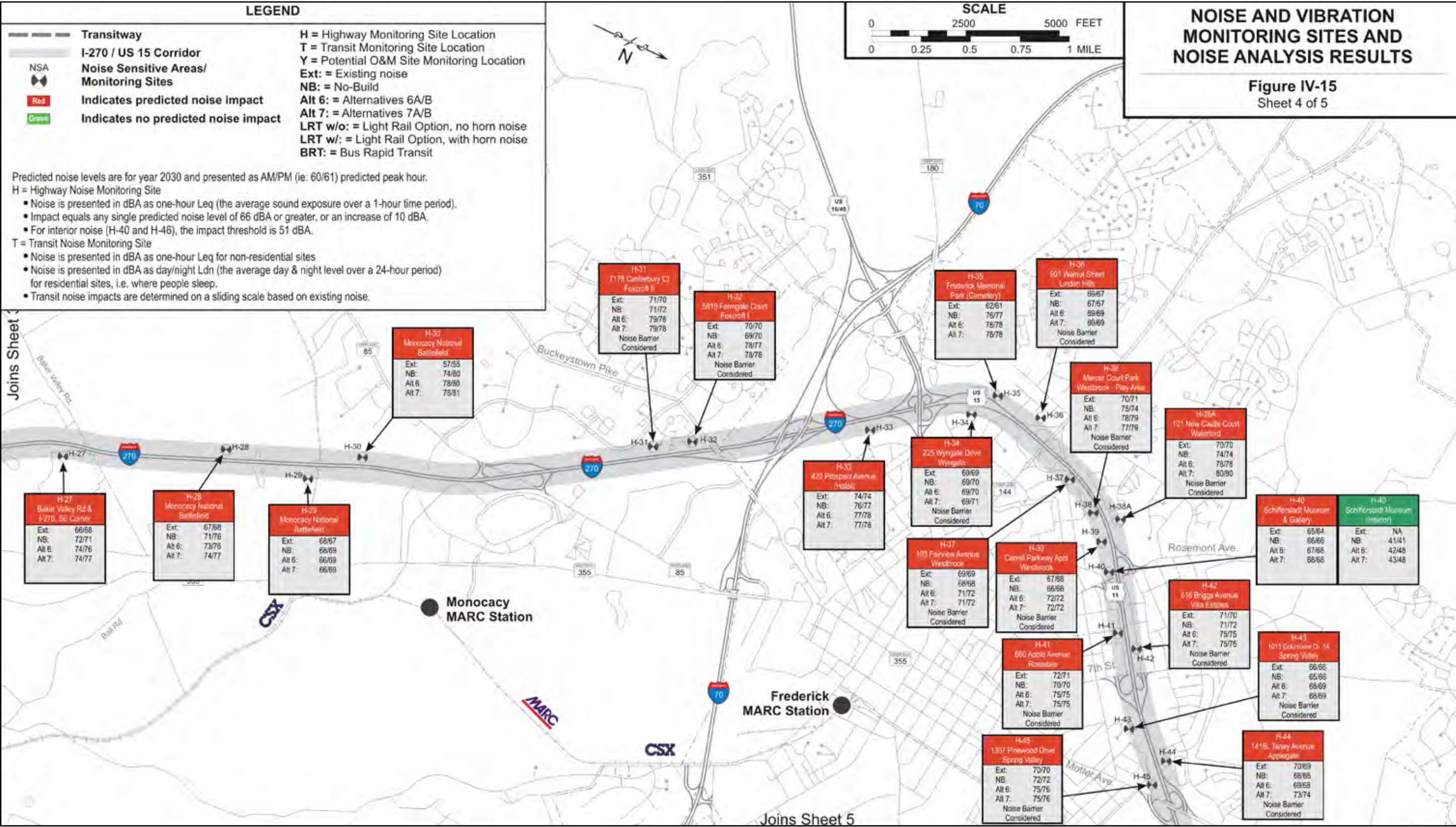
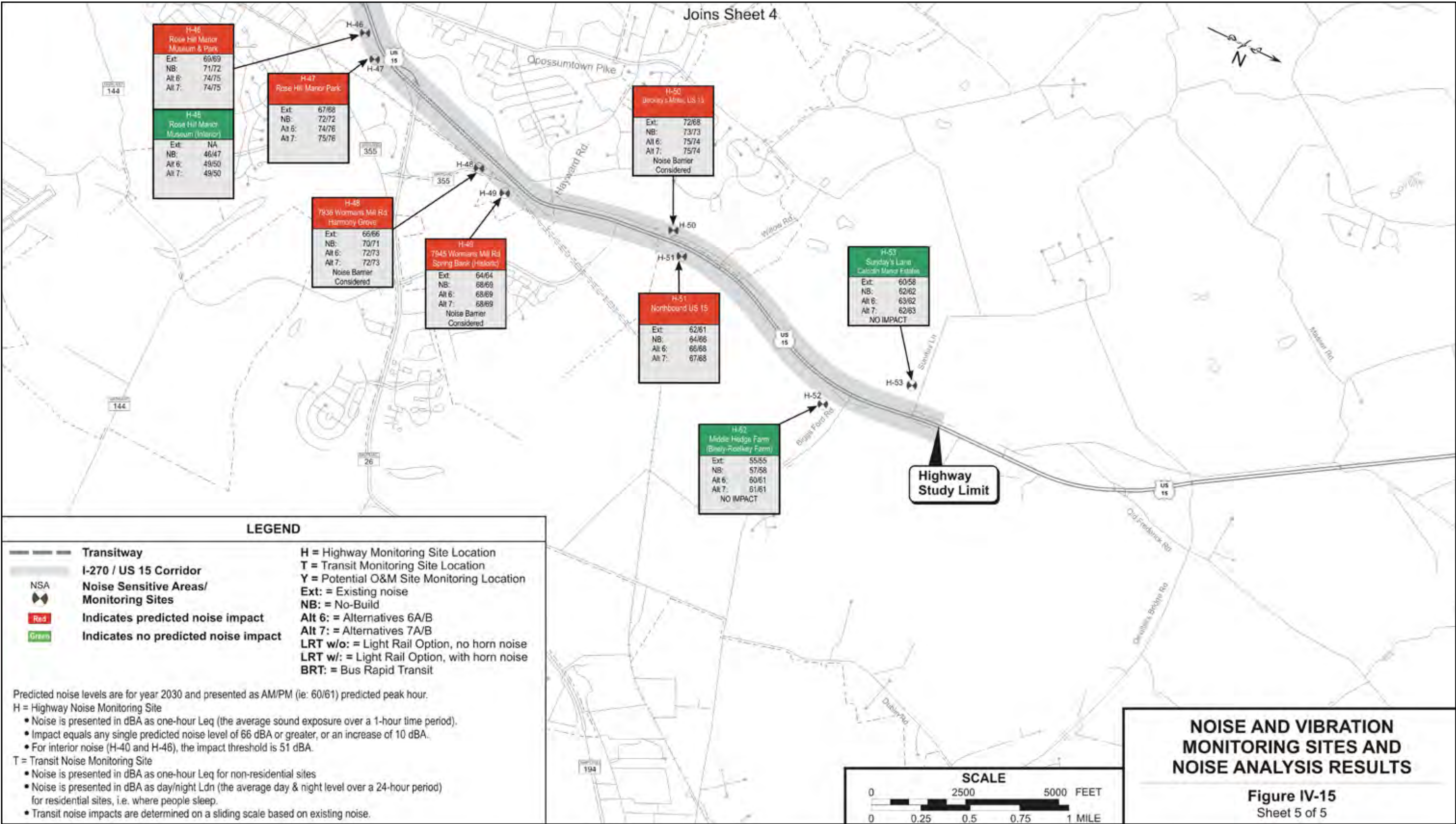


Figure IV-15: Noise and Vibration Monitoring Sites and Noise Analysis Results



- One additional representative noise monitoring location, H-38A, was identified and added to the 2006 data collection effort
- Site H-20 was removed from the study because this residential property no longer exists

Nine of the 55 highway sites are historic properties:

- Sites H-27, H-28, H-29 and H-30 are located within Monocacy National Battlefield
- Site H-21 is in the Urbana Historic District
- Site H-40 represents Schifferstadt
- Site H-46 represents Rose Hill Manor
- Site H-49 is located on the Spring Bank historic site
- Site H-52 is located on the Birely-Roelkey Farm

AM and PM period peak noise levels were measured/recorded during different alternative design stages of the project. Noise level measurements were taken during June and July, 2001, and during May and June, 2006. One measurement, collected in 1998, was not repeated for this current effort.

Traffic Noise Impacts

Figure IV-15 (Sheets 1 through 5) shows the design year 2030 predicted noise levels during morning and evening peak periods (AM/PM) for the No-Build Alternative 1 (NB) and for Build Alternatives 6A/B (Alt 6) and 7A/B (Alt 7) at all of the 55 highway sites along the proposed highway improvement corridor.

For Alternatives 6A/B, predicted year 2030 noise levels exceed the 66 dBA noise abatement criteria at 40 of the 55 representative noise monitoring locations. There are predicted noise impacts at 27 locations representing residential NSAs (nine in Montgomery County and 18 in Frederick County), with the greatest concentration occurring in the northern portion of the corridor. Noise impacts are also projected to occur at 13 non-residential NSAs, including parks (H-13, H-38, & H-47), a hotel (H-33), the Monocacy National Battlefield (H-26 through H-30), a cemetery (H-35), one historic site formerly used as a bed and breakfast (H-49), and two historic sites being used as museums (H-40, H-46). At NSAs H-9, H-10, H-19, H-24, H-30, and H-35, noise level increases of 10 dBA or more over existing conditions are predicted for at least one peak hour time period.

For Alternatives 7A/B, predicted year 2030 noise levels exceed the 66 dBA noise abatement criteria at 39 of the

55 representative noise monitoring locations. There are predicted impacts at 26 locations representing residential NSAs (eight in Montgomery County and 18 in Frederick County), with the greatest concentration also occurring in the northern portion of the corridor. Noise impacts are also projected to occur at 13 non-residential noise sensitive land uses, including parks (H-13, H-38, & H-47), a hotel (H-33), the Monocacy National Battlefield (H-26 through H-30), a cemetery (H-35), one historic site formerly used as a bed and breakfast (H-49), and historic sites used as museums (H-40, H-46). At NSAs H-9, H-10, H-19, H-24, H-30, H-35, and H-38A, noise level increases of 10 dBA or more over existing conditions are predicted for at least one peak hour time period.

The impact of the alternatives on indoor noise levels was also evaluated at two locations within the project area. Rose Hill Manor (H-46) and Schifferstadt (H-40) are both historic sites operating as museums and frequently offer indoor programs with open windows. The two sites were assessed as indoor spaces where frequent human activity occurs as described by the FHWA Category E land use as shown in Table IV-31. At a Category E land use site, noise impact occurs when interior noise levels exceed 51 dBA. Although both museums have some central or window air conditioning, programs are held inside during milder weather with open windows. With open windows, interior noise levels would exceed the FHWA Category E impact at both locations, and mitigation would be considered. None of the predicted closed-window interior noise levels exceeds the 51 dBA threshold, based on an average 25 dBA noise reduction that can be expected to occur as traffic noise transmits through double glazed windows. Under these conditions, future build interior noise levels estimated at the two museums would be below the FHWA Category E impact threshold. Estimated interior noise levels with windows closed at these two sites are shown on Figure IV-15 (Sheets 4 and 5).

Traffic Noise Mitigation

Locations that showed traffic noise impacts were considered for mitigation and are shown on Figure IV-15 as red monitoring locations. Primary consideration is given to outside areas that are frequently used, where a lowered noise level would be of benefit. In these areas, a reasonable effort should be made to obtain substantial noise reductions.

Alternative abatement measures were evaluated to determine their effectiveness in substantially reducing the predicted design year noise levels in exposed segments of the project corridor. These measures include:

- Traffic management measures
- Alteration of roadway horizontal or vertical alignments
- Acquisition of undeveloped property for use as buffer zones
- Construction of noise barriers within the right-of-way

Traffic management measures include enforcing lower speed limits and/or limiting the highway to automobiles and medium trucks. Speeds would have to be lowered 15 to 20 mph to achieve a noticeable (5 dBA) reduction. For interstate highways and access-controlled expressways, such restrictions would not be practical.

Alteration of roadway alignment is not practical because the project involves improvements to an existing alignment. Acquisition of property for buffer zones can reduce noise impacts, where unimproved property exists between noise sensitive receptors and the corridor. No such opportunity exists along the affected segments of the project corridor.

Consequently, the only reasonable available abatement measure for the I-270 project consists of erecting noise barriers within the right-of-way. Noise abatement measures should be feasible and reasonable in that they provide a substantial reduction in noise levels and can be implemented at a reasonable cost.

SHA noise abatement policy states that the decision to provide noise barriers will be made after an evaluation of the feasibility and reasonableness of constructing each barrier. Barriers that meet all of SHA’s feasibility and reasonableness criteria will be approved for consideration. The SHA noise abatement policy guidelines for this project are summarized in Table IV-32. Noise barriers were evaluated at each appropriate location. Noise barrier implementation will be finalized during and prior to final project engineering.

For areas which do not meet all of the feasibility and reasonableness criteria, alternative mitigation will be considered on a case-by-case basis consistent with Federal guidelines. Alternative mitigation could include soundproofing of publicly-owned noise sensitive structures with interior noise levels equal to or exceeding 52 dBA,

Table IV-32: SHA Criteria for Determination of Feasibility and Reasonableness of Noise Abatement

| FEASIBILITY CRITERIA                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Noise levels can be reduced by 7 dBA or more at impacted receptors                                                                                                                  |
| 2. Placement of a barrier will not restrict pedestrian or vehicular access                                                                                                             |
| 3. Construction of a barrier will not cause safety or maintenance problems                                                                                                             |
| 4. Noise barrier can be constructed given topography, drainage, utilities, etc.                                                                                                        |
| 5. Noise barrier will not have significant adverse impact on Section 4(f) resource                                                                                                     |
| 6. There are no non-highway noise sources that would reduce barrier effectiveness                                                                                                      |
| REASONABLENESS CRITERIA                                                                                                                                                                |
| 1. Majority of impacted receptors will receive a 7 dBA or greater noise reduction                                                                                                      |
| 2. 75% or more of impacted and benefited residents approve of the proposed noise abatement                                                                                             |
| 3. A 3dBA or greater change in design year build noise levels over design year no build noise levels is expected to result from the proposed action                                    |
| 4. The cumulative effects of highway improvements in the design year build noise levels at receptors that existed when prior improvements were made is equal to or greater than 3 dBA. |
| 5. Noise levels equal or exceed 72 dBA at impacted receptors                                                                                                                           |
| 6. Noise barriers will not have significant negative visual impact at impacted receptors                                                                                               |
| 7. The cost of noise abatement is equal to or less than \$100,000 per residence, impacted and benefited                                                                                |
| 8. There are special circumstances, i.e. historical/cultural significance at this NSA.                                                                                                 |



Table IV-33: FTA Guidelines Land Use Categories and Metrics for Transit Noise

| LAND USE CATEGORY | NOISE METRIC (DBA)    | DESCRIPTION OF LAND USE CATEGORY                                                                                                                                                                                                                                                     |
|-------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                 | Outdoor $L_{eq}(h)^*$ | Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. |
| 2                 | Outdoor $L_{dn}$      | Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.                                                                                               |
| 3                 | Outdoor $L_{eq}(h)^*$ | Institutional land uses with primary daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material.                                  |

\*  $L_{eq}$  for the noisiest hour of transit-related activity during hours of noise sensitivity.

purchasing impacted residences, or installing landscape screening or privacy fencing.

Twenty-six noise barrier locations (15 high-density residential areas and 11 low-density residential areas) were evaluated for feasibility and reasonableness following SHA 2006 noise abatement policy guidelines. A summary of the noise abatement analysis indicates that:

- Under Alternative 6A/B, 20 out of 25 evaluated noise barrier locations satisfied SHA feasibility and reasonableness requirements, benefiting a total of 466 dwellings.
- Under Alternative 7A/B, 19 of 25 evaluated noise barrier locations satisfied SHA feasibility and reasonableness, benefitting a total of 449 dwellings.

The estimated noise reduction with a barrier at most receptor locations ranges between 8 and 15 dBA. Potential highway noise barrier locations are depicted on the *Plan Sheets* in **Appendix A**.

For those locations identified on *Figure IV-15* where predicted year 2030 noise levels exceed the 66 dBA noise abatement criteria but are not identified as considered for noise barriers, one or more of the SHA criteria for feasibility and reasonableness was not met. These locations include: H-13, H-19, H-26 through H-30, H-33, H-35, H-40, H-46, H-47 and H-51. Locations H-1 and H-3 already have a noise barrier wall in place.

For those locations where there are special circumstances (Criterion 8), SHA will consider noise abatement when

the usual feasibility and reasonableness criteria are not met. Receptors H-27, H-28 and H-30 represent areas in Monocacy National Battlefield where quiet is an important cultural feature. Areas of the battlefield adjacent to I-270 will be considered for alternative methods of noise abatement to reduce noise impacts as consultation continues. Receptors H-40 and H 46 represent historically significant structures (Schifferstadt and Rose Hill Manor) where noise impacts would interfere with historically-oriented outdoor programs held there. For these properties, SHA has developed a “counts as ten residences” approach to determining cost effectiveness, where the noise barrier cost is divided by ten. The owners of both Schifferstadt and Rose Hill Manor would consider a noise barrier appropriate to reduce noise for outdoor activities. Further consultation will determine whether noise barriers or alternative mitigation would be considered.

Transit Noise and Analysis

Transit Noise Criteria and Methodology

FTA provides similar guidance regarding noise impacts, as shown in *Table IV-33*. The FTA noise impact criteria were used to assess impacts at sensitive sites near the proposed transit facilities. FTA guidelines assess noise impacts for various land use categories using different noise metrics ( $L_{eq}$  or  $L_{dn}$ ).

The FTA noise impact criteria assesses potential transit noise impacts by comparing the existing outdoor noise

levels ( $L_{eq}$  or  $L_{dn}$  depending on land use category) with the noise generated solely by the transit noise source. Project impacts are categorized as “No Impact”, “Moderate Impact”, or “Severe Impact” as determined from the increase in project noise over existing ambient noise levels for each of the three primary land use categories.

Existing Noise in the CCT Corridor

Noise monitoring within the proposed transit corridor was performed at 25 representative residential locations (FTA Category 2) for a continuous duration of 24 hours to determine the average day-night  $L_{dn}$  noise level at each location. Field measurements were taken between June 25 and August 7, 2001, on September 30, 2005, and between May 15 and June 2, 2006. *Figure IV-15 (Sheets 1 and 2)* depicts the locations of the transit noise monitoring sites along the CCT corridor. Monitoring locations are identified with the letter “T”. Fifteen of the sites are the same as those monitored in the 2002 DEIS, and an additional ten sites were added for this study. No additional sensitive receptor sites were identified near any of the new proposed O&M facilities to warrant consideration in this transit impact assessment. Three O&M location sites (identified as Y-1, Y-2 and Y-3 on *Figure IV-15*) were evaluated in the 2002 DEIS and are included in this study.

Measured day-night ( $L_{dn}$ ) noise level conditions at or below 63 dBA were recorded at 14 of the 25 noise monitoring locations scattered throughout the transit corridor. Within the proposed transit corridor, day-night levels range from a low measured level of 57 dBA at site T-20 to a maximum  $L_{dn}$  level of 70 dBA at site T-15. The existing 24-hour, day-night noise level measurements are shown on *Figure IV-15 (Sheet 1)*.

Two of the currently proposed O&M sites, the Redland Road Site in the Shady Grove Area and the PEPCO Site in the Metropolitan Grove Area, were evaluated for noise, as they are within 350 feet of residential land uses. The measured noise levels, shown on *Figure IV-15 (Sheet 1)* as Y-1 (Redland Road Site) and Y-2 and Y-3 (PEPCO Site), are typical of outdoor noise levels near moderate to heavy traffic on nearby roads.

Transit Noise Impacts

*Figure IV-15* shows the design year 2030 predicted noise levels for LRT on the CCT with (LRT w/) and without (LRT w/o) horn noise and for the BRT at the 25 transit monitoring locations. Horn noise impact assessment was completed at sites T-5, T-10, T-11, T-19 and T-20, located within 1,000 feet of proposed at-grade crossings. Noise impacts were determined by applying the FTA guidelines contained in *Transit Noise and Vibration Impact Assessment* (FTA, May 2006).

Noise impacts from LRT operations with or without horn noise are projected to occur at four residential properties (T-11, T-18, T-20 and T-21) within the transit corridor. These four impacted properties were determined to be within the FTA “Moderate Impact” classification. Horn noise contributions will not cause any additional impacts to occur at sites where horn noise contribution is a factor.

No noise impacts were predicted for the BRT option.

At the O&M facilities, the principal sources of noise that are likely to generate annoyance in residences nearby include moving transit cars with auxiliary equipment; trains negotiating tight curves (wheel squeal noise); car wash facilities; pings, clicks and bangs which occur as the wheels pass through switches and over frogs and joints in the special track work included in the yard; train car coupling impacts; maintenance and storage operations; and the outdoor public address system. These sources produce randomly occurring noises that are of considerably different character than typical community background noise, and therefore, if higher than the background noise level, they can be noticeable and intrusive. Most of the noises produced by the transit vehicles are controlled to a level that would avoid impact on adjacent areas unless the separation distance from the O&M facilities with the residential area is small (less than 300 feet).

*Table IV-34* indicates typical train noise levels expected from two-car trains stopped or moving on tangent yard tracks, with and without sound barrier walls, at 50, 100, 300, and 600 feet. At receptors Y1, Y2, and Y3, train noise levels alone in the O&M facilities will be considerably reduced, even without a noise wall, and in all cases, they will satisfy the allowable maximum noise limits in residential areas, where train noise levels will be masked by the existing noise from traffic and other community sources.



Table IV-34: Noise Levels from Two-Car Trains Operating on Yard Tracks

| NOISE SOURCE                                  | DISTANCE FROM TRACK CENTERLINE<br>(NOISE MEASURED IN L <sub>DN</sub> ) |        |        |        |
|-----------------------------------------------|------------------------------------------------------------------------|--------|--------|--------|
|                                               | 50 FT                                                                  | 100 FT | 300 FT | 600 FT |
| Car Stationary<br>Auxiliaries Operating       | 61                                                                     | 57     | 47     | 41     |
| Train Moving at<br>20 mph<br>Aerial Structure |                                                                        |        |        |        |
| – No Shielding                                | 73                                                                     | 69     | 60     | 54     |
| – With Sound Barrier<br>Wall                  | 68                                                                     | 64     | 55     | 49     |
| Ballast and Tie                               |                                                                        |        |        |        |
| – No Shielding                                | 70                                                                     | 66     | 57     | 51     |
| – With Sound Barrier<br>Wall                  | 62                                                                     | 58     | 49     | 43     |
| – Deep Cut                                    | 55                                                                     | 51     | 42     | 36     |

Maintenance activities will be performed inside enclosed buildings, and noise from the indoor maintenance activities is not expected to impact residential properties. Outdoor maintenance operations will produce random noises in addition to the noise of moving transit vehicles. After applying distance correction from the site boundary, total noise from all of the O&M activities is estimated at 67 L<sub>dn</sub> at Y1, 70 L<sub>dn</sub> at Y2, and 65 L<sub>dn</sub> at Y3, and therefore will result in noise impacts at all three sites.

Transit Noise Mitigation

In conjunction with the FHWA, the FTA has issued a regulation implementing the NEPA general policy on environmental mitigation, which states that measures necessary to mitigate adverse impacts are to be incorporated into the project. While NEPA provides broad direction, a more explicit statutory basis for mitigating adverse impacts is contained in the federal transit laws. Before approving a construction grant under Section 5309, FTA must make a finding that “...the preservation and enhancement of the environment, and the interest of the community in which a project is located, were considered; and no adverse environmental effect is likely to result from the project, or no feasible or prudent alternative to the effect exists and all reasonable steps have been taken to minimize the effect.”

Mitigation of noise impacts from rail projects may involve treatments at three fundamental components of the noise problem:

- At the noise source
- Along the source-to-receiver propagation path
- At the receiver (generally, the transit agency has the authority to treat the source and some elements of the propagation path, but may have little or no authority to modify anything at the receiver end)

Practical noise mitigation measures that are employed in reducing noise from train operations are summarized in the *FTA Guidance Manual Transit Noise and Vibration Impact Assessment* (May 2006).

Mitigation options include the following:

- Select quieter system-wide components such as continuous welded rail, tie and ballast track work, resilient wheels, and skirts on the vehicle to reduce equipment noise
- Tailor operation plans to provide reduction in noise and vibration levels such as reducing vehicle speed, eliminating bells at at-grade crossings, and maintaining vehicles properly
- Add design features such as noise barriers if adequate space is available; lubricate track at curves, employ track-bed isolation, and use moveable point switch frogs

Based on the minor level of noise impact predicted to occur under the proposed LRT alternative, mitigation measures required to eliminate these impacts can be accomplished by implementing one or more of the abatement measures outlined above. The noise abatement strategies investigated to accomplish these goals are discussed in greater detail in the 2008 NVTR.

The major source of wayside rail noise at moderate to high operating speeds is wheel-rail noise. An effective method to control wheel-rail noise is to construct noise barriers along the track at close distance to the track. The performance of noise barriers depends on the relative heights of the noise source, the barrier type, and the sensitive area. The typical wheel-rail noise reduction ranges from 5 to 15 dBA. Barriers typically perform better in higher speed operating areas, where wheel-rail noise

Table IV-35: FTA Ground-borne Vibration Impact Criteria<sup>1</sup>

| LAND USE CATEGORY                                                                      | VIBRATION VELOCITY IMPACT LEVELS |                                | NOISE IMPACT LEVELS          |                                |
|----------------------------------------------------------------------------------------|----------------------------------|--------------------------------|------------------------------|--------------------------------|
|                                                                                        | FREQUENT EVENTS <sup>2</sup>     | INFREQUENT EVENTS <sup>3</sup> | FREQUENT EVENTS <sup>2</sup> | INFREQUENT EVENTS <sup>3</sup> |
| Category 1: Buildings where low ambient vibration is essential for interior operations | 65 VdB <sup>4</sup>              | 65 VdB <sup>4</sup>            | NA <sup>5</sup>              | NA <sup>5</sup>                |
| Category 2: Residences and buildings where people normally sleep                       | 72 VdB                           | 80 VdB                         | 35 dBA                       | 43 dBA                         |
| Category 3: Institutional land uses with primarily daytime use                         | 75 VdB                           | 83 VdB                         | 40 dBA                       | 48 dBA                         |

<sup>1</sup> Vibration levels expressed in VdB are 1 micro inch/sec and noise levels in dBA.

<sup>2</sup> “Frequent Events” is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

<sup>3</sup> “Infrequent Events” is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.

<sup>4</sup> This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscope.

<sup>5</sup> Ground-borne noise criteria are generally applicable to vibration generated by wheel-rail interaction in rail systems.

dominates.

Train noise barriers are evaluated based upon the SHA criteria identified in *Table IV-32*. Train noise barriers meet all SHA criteria for NSAs T-11, T-18, T-20 and T-21 and will be considered prior to and during final design of the transit system, if an LRT option is selected.

Though the O&M activities’ noise levels would generally be acceptable during the daytime at most of the residential sites, noises would be unacceptable during nighttime. Mitigation measures include limiting noise-producing O&M activities to daytime hours. However, some of the O&M noise, such as wheel squeal and switch frog noise, are known to generate high levels of pure tone and impulse noise with distinguishable audible characteristics, and could be annoying to residents within 350 feet. Mitigation methods that could be considered to reduce noise from wheel squeal and switch frogs include wheel and rail lubrication and using spring frogs or moveable point frogs.

Vibration Analysis

Vibration Criteria and Methodology

The objective of this analysis is to evaluate vibration effects of Alternatives 6A/B and 7A/B on the adjacent community and the ability to avoid, minimize or mitigate predicted impacts that may occur as a result of transit improvements (LRT or BRT on the CCT alignment, stations, and potential O&M facilities). *FTA Transit Noise*

*and Vibration Impact Assessment* (FTA-VA-90-1003-06, 2006) procedures were used to predict transit generated noise and vibration levels. For additional information, refer to the 2008 NVTR.

FTA uses vibration criteria to measure potential vibration impacts generated by a transit project. FTA guidelines apply to transit vehicles operating on the transit corridor, near stations and near other supporting transit facilities. The criteria are based on the maximum vibration levels in decibels (vibration decibels or VdB) for three land use categories generated by a single pass-by event. *Table IV-35* provides FTA ground-borne vibration criteria for different land uses.

Vibration noise levels were evaluated at the same 25 locations throughout the CCT corridor as was noise.

Existing Vibration Environment

The major sources of vibration in the transit corridor are those generated predominately from automobiles, trucks, and buses. Typical velocity levels generated by these types of vehicles range from 50 to 60 vibration decibels (VdB) and are well below the threshold of annoyance.

Vibration Impacts and Mitigation

No vibration impacts were identified at any location analyzed. No mitigation is required.

## J. Visual Quality



I-270 at the southern end of the study area



I-270 in Montgomery County adjacent to Little Bennett Park

Visual Impact Assessments are routinely performed on projects to ascertain the effects of proposed projects on the visual environment, including the natural, historic, and human environments. Visual quality is one of many resources protected by the NEPA of 1969 and the CEQ regulations that support NEPA implementation.

This section examines the relationship of the proposed improvements to the I-270/US 15 corridor in relation to the visual quality and character of the corridor environment. The section begins with a description of the existing visual qualities of the corridor and follows with a discussion of visually sensitive areas – areas of particular interest as they pertain to potential impacts by the proposed project alternatives. Lastly, the section describes potential impacts and opportunities for mitigation by the proposed highway and transit alternatives.

### Existing Visual Quality

The existing visual character of the area surrounding the I-270/US 15 Corridor has not changed substantially from that described in the 2002 DEIS (see pages III-305 to III-312). The visual landscape varies considerably, from the largely rural settings of the northern portion of the study area to the highly developed suburban landscapes found in the southern portion of the study area. Large, mixed-use developments, such as those in downtown Germantown adjacent to the transit center, were constructed after 2002 and have altered the visual landscape. In other areas, new office, residential and commercial developments are being planned or are under construction. These will similarly change the visual landscape by the time this project would be developed. This would include new developments anticipated near the Metropolitan Grove and Washingtonian stations.

### Visually Sensitive Areas

Visually sensitive areas are defined as those where viewers are likely to notice changes within the viewshed. In general, areas of high visual sensitivity within the corridor include the following:

- *Parks, Trails, and Natural Areas* – Development within or near these areas is generally more likely to be noticed than development in more urbanized environments.
- *Historic Resources* – Development adjacent to, or on, historic properties may have visual effects if it obstructs or obscures views of historic structures, or includes new design elements that are not complementary with the style, scale, or proportion of the surroundings.
- *Design Sensitive Areas* – Development in design sensitive areas, such as residential communities and “Main Street” style streetscapes, could have visual effects if it is inconsistent with the existing design theme, scale, or proportion within the area.

### Visual Impacts and Mitigation

The 2002 DEIS presented the potential impacts of the project on visually sensitive areas. Alternatives 6A/B and 7A/B are expected to have similar impacts as those described within the DEIS for Alternatives 3A/B, 4A/B, and 5A/B/C (see pages III-313 to III-320).

The visual impact of a proposed transportation project varies considerably, depending on the existing character of the natural and built environment and the design elements of the proposed transportation system.

The introduction of new transportation systems often causes visual impacts. For example, the I-270/US 15 project includes new highway lanes, interchanges, bridges, and electronic toll collection infrastructure. All have the potential to alter the visual environment. The infrastructure associated with the transitway, which varies by mode, would affect the visual environment differently. For example, an LRT system includes catenary wires and poles that are not components of a BRT system. Vehicle types and design, station designs, park and ride lots, maintenance facilities and the guideways all have elements that will alter the visual landscape.



US 15 at Biggs Ford Road

Negative impacts would occur in places where proposed facilities would detract from, or obstruct, the view of existing visually sensitive areas. Mitigation measures would be implemented, where appropriate, for addressing these impacts. Mitigation measures could include landscaping and tree replacement to reduce the visual effects of the transportation system. In addition, the design of transit stations and facilities, bridges and other structures would use materials, colors, and other features to integrate into the surrounding landscape as much as possible.

The proposed highway and transit improvements have the potential to enhance existing areas of low visual quality within the corridor. The addition of transportation structures with a high quality design and landscaping would improve existing low visual quality areas by removing derelict structures, debris, or overgrown vegetation.

K. Construction and Operational Issues

This section discusses the potential for temporary impacts that could occur during the construction of a build alternative. Identifying potential construction impacts of the alternatives considered is important in understanding potential impacts to resources and to minimize impacts during construction activities. The degree of construction impacts is anticipated to be similar for all of the build alternatives, including those presented in the 2002 DEIS. Impacts to the natural and human environment that occur during construction could be related to noise, vibration, air quality, and changes to traffic patterns. In addition to the information presented here, please see Pages III-321 through III-324 in the DEIS.

Construction Noise

One of the major impacts to the human environment in the vicinity of construction activities is noise. Noise impacts from construction activities are a function of:

- Noise generated by construction equipment
- The proximity of construction activities to sensitive land uses
- The duration of construction

Construction Noise Sources

Construction noise at construction sites can come from both mobile and stationary sources. Mobile equipment such as dozers, scrapers, graders, etc., may operate in a cyclic fashion, in which a period of full power is followed by a period of reduced power. Equipment such as trucks produce steady noise and are generally associated with supply of materials to construction sites and disposal of waste materials from construction sites.

Stationary equipment stays in one general area and includes items such as pumps, generators, compressors, etc. This equipment operates at a constant noise level under normal operation and is classified as non-impact equipment. Other types of stationary equipment, such as pile drivers, jackhammers, and pavement breakers, or blasting operations produce variable and sporadic noise levels and produce impact-type noises. Blasting operations are not expected during the project construction.

Table IV-36: Construction Equipment Noise Emission Levels

| EQUIPMENT            | TYPICAL NOISE LEVEL (dBA)<br>50 FT FROM SOURCE |
|----------------------|------------------------------------------------|
| Air Compressor       | 81                                             |
| Backhoe              | 80                                             |
| Ballast Equalizer    | 82                                             |
| Ballast Tamper       | 83                                             |
| Compactor            | 82                                             |
| Concrete Mixer       | 85                                             |
| Concrete Pump        | 82                                             |
| Concrete Vibrator    | 76                                             |
| Crane, Derrick       | 88                                             |
| Crane, Mobile        | 83                                             |
| Dozer                | 85                                             |
| Generator            | 81                                             |
| Grader               | 85                                             |
| Impact Wrench        | 85                                             |
| Jackhammer           | 88                                             |
| Loader               | 85                                             |
| Paver                | 89                                             |
| Pile Driver (Impact) | 101                                            |
| Sonic                | 96                                             |
| Pneumatic Tool       | 85                                             |
| Pump                 | 76                                             |
| Rail Saw             | 90                                             |
| Rock Drill           | 98                                             |
| Roller               | 74                                             |
| Saw                  | 76                                             |
| Scarifier            | 83                                             |
| Scraper              | 89                                             |
| Shovel               | 82                                             |
| Spike Driver         | 77                                             |
| Tie Cutter           | 84                                             |
| Tie Handler          | 80                                             |
| Tie Inserter         | 85                                             |
| Loader               | 85                                             |
| Paver                | 89                                             |
| Truck                | 88                                             |

Source: FTA Guidance Manual for Transit Noise and Vibration Impact Assessment, May 2006.

Table IV-37: WMATA Construction Noise Specifications

| AFFECTED STRUCTURE OR AREA                                                   | MAXIMUM ALLOWABLE CONTINUOUS NOISE LEVEL (dBA) |           |
|------------------------------------------------------------------------------|------------------------------------------------|-----------|
|                                                                              | DAYTIME                                        | NIGHTTIME |
| Single Family Residential                                                    | 60                                             | 50        |
| Multifamily residential including hospitals or residential along an arterial | 65                                             | 55        |
| In semi-residential/commercial areas including hotels                        | 70                                             | 60        |
| In semi-residential/commercial areas including schools                       | 70                                             | 65        |
| In commercial areas with no nighttime residency                              | 75                                             | 70        |
| Industrial – All locations                                                   | 80                                             | 80        |

Table IV-38: Intermittent Noise

| AFFECTED STRUCTURE OR AREA                                                   | MAXIMUM ALLOWABLE CONTINUOUS NOISE LEVEL (dBA) |           |
|------------------------------------------------------------------------------|------------------------------------------------|-----------|
|                                                                              | DAYTIME                                        | NIGHTTIME |
| Single Family Residential                                                    | 75                                             | 60        |
| Multifamily residential including hospitals or residential along an arterial | 75                                             | 65        |
| In semi-residential/commercial areas including hotels                        | 80                                             | 70        |
| In semi-residential/commercial areas including schools                       | 80                                             | 60        |
| In commercial areas with no nighttime residency                              | 85                                             | 85        |
| Industrial – All locations                                                   | 90                                             | 90        |

Typical noise levels from construction equipment are shown in *Table IV-36*.

WMATA Construction Noise Specifications

Washington Metropolitan Area Transit Authority (WMATA) specifications establish different limits for continuous and intermittent construction noise at the affected structure or area. The WMATA construction noise specifications appear in *Table IV-37*. For stationary sources, parked mobile sources or any sources

or combination of sources producing repetitive or long-term noise lasting more than two hours, the maximum allowable noise levels are shown in *Table IV-38*.

**Intermittent Noise:** Limits shown in *Table IV-38* are applicable to noise from non-stationary mobile equipment operated by a driver or from any source of non-scheduled, intermittent, and non-repetitive, short-term noises not lasting more than two hours.



Table IV-39: Noise Emission Limits on Construction Noise

| Type of Equipment                                                                 | MAXIMUM NOISE LIMIT<br>DATE EQUIPMENT ACQUIRED |                    |
|-----------------------------------------------------------------------------------|------------------------------------------------|--------------------|
|                                                                                   | Before 1/1/90                                  | On or after 1/1/90 |
| All equipment other than highway trucks, including hand tools and heavy equipment | 90 dBA                                         | 85 dBA             |
| Highway trucks in any operating mode or location                                  | 83 dBA                                         | 80 dBA             |

Note: Peak levels due to impact pile drivers may exceed the above noise emission limits by 10 dBA.

**Special Zones or Special Construction Site:** In areas outside of construction limits where the the contractor has obtained a designation as a Special Zone or Special Construction Site from the agency having jurisdiction, the noise limitations for buildings in industrial areas apply. In zones designated by the local agency having jurisdiction as a special zone, special premise or special facilities, such as hospital zones, the noise level and working time restrictions imposed by the agency shall apply. The contractor shall obtain these zones and work hour restrictions from the local agency.

**More Than One Limit Applicable:** Where more than one noise limit is applicable, the contractor will use the more restrictive requirement for determining compliance.

**Noise Emission Restrictions:** The contractor will use only equipment meeting the allowed maximum noise emission limits described in *Table IV-39* as measured at a distance of 50 feet from the equipment in conformity with the provisions of the latest revisions of SAEJ366b, SAEJ88, and SAEJ952b or in accordance with the measurement procedures specified in this section.

Construction Techniques and Methods

Stations, shafts, cut-and-cover tunnels and portals require very similar construction techniques. Noise from excavation associated with the cut and cover construction would include noise from construction equipment such as backhoes, bull dozers, cranes, concrete mixers, concrete delivery trucks, dump trucks, delivery trucks, front-end loaders, pile drivers and jack hammers.

CCT Construction Noise Criteria

Maryland and WMATA residential limits for continuous construction noise levels are the same and both limit daytime noise level to 65 dBA and nighttime noise level to 55 dBA. These limits are applicable for the CCT construction. For commercial areas the applicable daytime and nighttime limits are 67 dBA and 62 dBA and for industrial areas the limit is 75 dBA for both daytime and nighttime. Maryland’s maximum daytime construction noise level shall not exceed 90 dBA in all areas and maximum nighttime noise level shall be limited to 55 dBA in residential areas, 62 dBA in commercial areas, and 75 dBA in industrial areas.

CCT Construction Noise

Noise generated from CCT construction activities of either the proposed LRT and BRT alternatives would be similar. Construction noise associated with the BRT option is generally similar to highway construction noise associated with the transitway foundation. However, with the LRT option, noise would include that associated with laying trackbed and track and raising overhead structures associated with the catenary system.

Noise Control Requirements

Notwithstanding the specific noise levels already specified, the noise control measures listed below can be used to minimize, to the greatest extent feasible, the noise levels in all areas outside the construction limits.

- Use shields, impervious fences or other physical sound barriers to reduce noise
- Use sound retardant housings or enclosures around noise producing equipment

- Use effective intake and exhaust mufflers on internal combustion engines and compressors
- Line or cover hoppers, storage bins and chutes with sound absorbing material
- Do not use air or gasoline driven saws
- Conduct truck loading, unloading and hauling operations so that noise is kept to a minimum
- Route construction equipment and other vehicles carrying spill, concrete or other materials over streets and routes that will cause the least disturbance to residents
- Advise the engineer in writing of the proposed haul routes prior to securing a permit from the local government
- Subject to the approval of the engineer, place stationary equipment to minimize noise impact on the community

Construction-Generated Vibration

Construction activities have the potential for producing high vibration levels that may be perceptible. Some construction activities can generate vibration levels enough to cause architectural and structural damage. Even where vibration levels are lower or imperceptible, vibrations can produce ground-borne noise. Construction activities typically producing the highest vibration and ground-borne noise levels are those involving the use of impact equipment. The effects of ground-borne vibration may include rattling of windows, and shaking of items on shelves or hanging on walls. In extreme cases, the vibration can cause damage to buildings. The vibration of floors and walls may cause rattling of such items as windows or dishes on shelves. The vibration of building surfaces and objects within the building can also result in a low-frequency rumble noise. The rumble is the noise radiated from the vibration of the room surfaces, even when the vibration itself cannot be felt. This is called ground-borne noise.

Recognizing the possibility that some damage could occur to adjacent structures, a pre-construction survey, including a detailed photographic record of existing structures, would be conducted and restitution or repairs made based on actual damages if they are determined to be a result of construction activities.

Construction staging considerations could include limiting the hours for loading and hauling operations, stockpiling excavated materials in the excavation station during non-haul hours and the use of rubber-tired excavation equipment in lieu of tracked equipment.

Vibration Prediction Methodology

The FTA guidance manual provides some simple screening methodologies for determining where there is a significant potential for vibration impact from construction activities. Such activities include pile driving, demolition, drilling, excavation, or blasting in close proximity to a sensitive structure. The procedure includes: (1) selecting the equipment and determining the vibratory levels at a distance of 25 feet; (2) determining peak particle velocity at a receptor location using a formula that accounts for the peak particle velocity of the equipment and the distance from the receptor; and (3) if consideration of annoyance or interference with vibration-sensitive activities is of concern, estimate the vibration level and apply the vibration impact.

Source Vibration Levels for Construction Equipment

Listed in *Table IV-40* are vibration source levels from heavy construction equipment. These levels are average source levels under a wide variety of construction activities. This information can be used while predicting vibration levels at various receptor distances from the operation of construction equipment. Damage and annoyance assessment will follow the FTA procedures.

WMATA Construction Vibration Specification Limits

Damage risk criteria would be developed and applied during the construction phase of the project. Generally, annoyance effects may be expected during construction near sensitive sites within approximately 200 feet of the construction activity. Actual distances at which effects would occur will depend on the type of construction equipment used and soil characteristics in the area. In order to minimize the annoyance or interference to occupants of affected buildings, the contractor shall conduct construction activities in such a manner that ground vibration at the nearest occupied buildings does not exceed the following peak particle velocity (PPV) magnitudes in any direction:

Table IV-40: Source Levels for Construction Equipment Vibration

| EQUIPMENT                         | PPV* AT 25 FT (in/sec) | APPROXIMATE $L_v$ AT 25 FT **<br>(VDB RE $10^{-6}$ in/sec) |
|-----------------------------------|------------------------|------------------------------------------------------------|
| Pile Driver (impact, upper range) | 1.518                  | 112                                                        |
| Pile Driver (impact, typical)     | 0.644                  | 104                                                        |
| Pile Driver (sonic, upper range)  | 0.734                  | 105                                                        |
| Pile Driver (sonic, typical)      | 0.170                  | 93                                                         |
| Clam shovel drop (slurry wall)    | 0.202                  | 94                                                         |
| Large bulldozer                   | 0.089                  | 87                                                         |
| Caisson drilling                  | 0.089                  | 87                                                         |
| Loaded trucks                     | 0.076                  | 86                                                         |
| Jackhammer                        | 0.035                  | 79                                                         |
| Small bulldozer                   | 0.003                  | 58                                                         |

Source: Guidance Manual for Transit Noise and Vibration Impact Assessment, May 2006

\*Peak Particle Velocity

\*\*RMS (Root Mean Square) Velocity in decibels (VdB)

- Sustained (greater than or equal to 1hr/day) 0.03
- Intermittent (less than or equal to 1 hr/day) 0.07
- Intermittent (less than 10 min/day) 0.10

To avoid physical damage to buildings, the contractor shall conduct construction activities in such a manner that the maximum ground-borne vibration at all times does not exceed 0.2 in/sec (PPV) in any direction for buildings which are in generally sound condition. For historical monuments, the contractor shall conduct construction activities in such a manner that the ground vibration magnitude at all times does not exceed 0.12 in/sec (PPV) in any direction.

Vibration Control Requirements

Notwithstanding the specific vibration levels already specified, the contractors will use vibration control measures listed below to minimize to the greatest extent feasible the vibration levels in all areas outside the construction limits:

- Use vibratory pile drivers or auguring for setting piles in lieu of impact pile drivers
- If impact pile drivers must be used, their use is restricted to the hours from 8 AM to 5 PM weekdays in residential and in semi-residential/commercial areas

- Specify realistic vibration limits in contract documents
- Develop a monitoring program during construction
- Monitor vibrations at nearest sensitive locations throughout the construction period
- Inform people living and working in the vicinity about the construction method, possible effects, quality control measures and precautions to be used, and the channels of communication available to them

Additional vibration control plans and practices would include routing truck traffic and heavy equipment to avoid impacts to sensitive receptors, properly securing street decking over cut-and-cover excavations, scheduling work to limit nighttime impacts in residential areas, and minimizing the duration of vibration impacts.

Air Quality Construction Impacts

Construction effects of the project would be limited to short-term increased fugitive dust and mobile-source emissions. State and local regulations regarding dust control and other air quality emission reduction controls should be followed.

Fugitive Dust Emissions

Fugitive dust is airborne particles, generally of a relatively large size. Construction-related fugitive dust would be generated by haul trucks, concrete trucks, delivery trucks, and earth-moving vehicles operating around the construction sites. Fugitive dust would be caused primarily by particles that are “kicked up” by vehicles moving over paved and unpaved roads, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks.

Generally, the distance that particles drift from their source depends on their size, the emission height, and the wind speed. Small particles (30–100 micron range) can travel several hundred feet before settling to the ground. Most fugitive dust, however, is comprised of relatively large particles (that is, particles greater than 100 microns in diameter). These particles are responsible for the reduced visibility often associated with this type of construction. Given their relatively large size, these particles tend to settle within 20 to 30 feet of their source.

In order to minimize the amount of construction dust generated, the guidelines below should be followed:

Site Preparation

- Minimize land disturbance
- Use watering trucks to minimize dust
- Cover trucks when hauling dirt
- Stabilize the surface of dirt piles, if they are not removed immediately
- Use windbreaks to prevent accidental dust pollution
- Limit vehicular paths and stabilize these temporary roads
- Pave all unpaved construction roads and parking areas to road grade for a length no less than 50 feet from where roads and parking areas exit the construction site. This prevents dirt from washing onto paved roadways

Construction

- Cover trucks when transferring materials
- Use dust suppressants on unpaved traveled paths
- Minimize unnecessary vehicular and machinery activities

- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.

Post-Construction

- Re-vegetate any disturbed land not used
- Remove unused material
- Remove dirt piles
- Re-vegetate all vehicular paths created during construction to avoid future off-road vehicular activities

Mobile Source Emissions

Since CO emissions from motor vehicles generally increase with decreasing vehicle speed, disruption of traffic during construction (such as the temporary lane closures and traffic back-ups) could result in short-term, elevated concentrations of CO. In order to minimize the amount of emissions generated, every effort should be made during the construction phase to limit disruption to traffic, especially during peak travel hours.

Transportation Management Plan

A Transportation Management Plan, or TMP, will be developed for this project. A TMP is a document that is used to present a coordinated transportation management strategy that will most effectively minimize the work zone impacts of a project. The contents of the TMP will include:

- Temporary Traffic Control Plans, which are used to show how traffic will be re-routed during the various stages of a project,
- Traffic Operations Plan, which identifies “intelligent transportation” initiatives that could be used to either divert traffic or move it through the work zone more effectively, and
- Public Information and Outreach Plan, which outlines the methodology for distributing project information to the public and interested stakeholders, both prior to and during the construction of the project.

It is anticipated that this project will be constructed in several segments, and each segment will have its own final TMP.

## L. Indirect and Cumulative Effects (ICE) Analysis

This section describes briefly the Indirect and Cumulative Effects (ICE) Analysis completed for Alternatives 6A/B and 7A/B, which serves as a companion to the 2002 Secondary and Cumulative Effects Analysis (SCEA) that was performed for Alternatives 3A/B, 4A/B, and 5A/B/C. The section summarizes the regulatory framework for the analysis, changes within the ICE boundary since the 2002 DEIS SCEA, and the potential indirect and cumulative effects of Alternatives 6A/B and 7A/B within the ICE boundary. The section then summarizes the conclusions of the analysis and compares the conclusions drawn from the current analysis to those of the 2002 SCEA.

### Regulatory Framework and Analytical Methods

An ICE analysis is completed to evaluate whether the project would cause additional impacts to resources because it induced changes in land use or other effects that were not planned and would not occur if the project is not completed (indirect effects). The ICE analysis also evaluates whether the project’s impacts, plus those of other actions, contribute substantially to the accumulated impacts to resources in the area that will be influenced by the project.

The ICE analysis completed for Alternatives 6A/B and 7A/B is based upon guidance from:

- Council on Environmental Quality’s (CEQ) regulations (40 CFR Sections 1500 – 1508) implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC Sections 4321 et seq.).
- Council on Environmental Quality 1997 guidelines, *Considering Cumulative Effects under the National Environmental Policy Act*.
- Maryland State Highway Administration’s Internal *Indirect and Cumulative Effects Analysis Guidelines*, Revised 2007.
- Federal Highway Administration Position Paper: *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*, April 1992.

The CEQ regulation (40 CFR § 1508.8(b)) describes indirect, or secondary, impacts as “...caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.”

The CEQ regulations (40 CFR § 1580.7) define cumulative effects as “...an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal, or non-Federal) or person undertakes such other actions.”

The regulations also define the steps to be completed in performing the analysis, as described in the following sections.

### Scoping

The scoping step establishes the geographic and temporal boundaries to be considered for the analysis, the resources to be evaluated, and the analytical methods to be used.

The geographic boundary is the area within which the effects of the project might influence changes. The boundary, shown in **Figure IV-16**, was determined for the 2002 SCEA through overlaying a series of area maps including the project study area, transportation analysis zones, census tract boundaries, watersheds and sub watersheds, water and sewer service limits, Priority Funding Areas, and areas of traffic influence. The current ICE boundary duplicates the 2002 SCEA boundary and encompasses 531 square miles.

The temporal boundary, 1970 to 2030, estimates the time frame during which the I-270/US 15 Corridor could have influenced growth and change within the region in the past and that a build alternative could continue to influence change in the foreseeable future. The past temporal boundary was selected based upon the history of I-270 and US 15 as well as the past population and employment growth within Montgomery and Frederick Counties, and the future temporal boundary is identified as the planned design year of the project, 2030.

The resources analyzed are those upon which the project has direct effects: communities, parklands,

Figure IV-16: ICE Boundary



historic resources, surface water, wild and scenic rivers, floodplains, waters of the US (including wetlands), terrestrial and aquatic habitats and species, and farmland.

The analysis methods used include trends analysis, overlay mapping and interviews. The analysis also reviewed the report of the 2002 Land Use Expert Panel (the Panel) that was engaged to review and provide their insight on potential future land use changes.

### ICE Analysis

#### Past, Present and Future Land Use Conditions

Indirect and cumulative effects most often occur as a result of changes in land use. For the 2002 SCEA, SHA established a panel of land use experts, knowledgeable

local and national experts, to identify potential future land use in the region. The Land Use Expert Panel was provided with a comprehensive set of background materials that included projections of future land use from which to estimate differences that could result from alternative highway and transit improvements proposed along the I-270/US 15 Corridor. The Panel was asked to allocate future employment and population growth (for the year 2025) to 19 identified forecast areas for transportation alternatives that were developed as part of the Corridor Study. These forecasts were then compared to local land use plans and master plan forecasts. The differences were deemed to indicate where the I-270 alternatives could result in future land uses not anticipated by the local land use forecasts.

Overall, the Panel did not find substantial differences in future development between the local land use plans and their projections, but did identify some locations where there might be increased pressure for development greater than were identified in the various master plans.

- The Panel identified the potential for residential and business development in some of the forecast zones that straddle the corridor that is in excess of what the master plans describe; the Panel concluded that these areas may develop differently than as planned for in the county master plans. These include areas surrounding the corridor in Frederick County (Urbana, Frederick City, and to the northwest of Frederick City) and in Montgomery County in the Corridor Cities areas (Gaithersburg, Germantown and Clarksburg), east in the Damascus/Brookville area and southwest in the area surrounding MD 118.
- The Panel attributed some development differences between the LRT and BRT alternatives in the Frederick City, Germantown, and Gaithersburg areas.
- Given the counties’ commitments to preservation of parklands, development accounted for in the county Master Plans can be expected to occur in a manner that preserves these resources. Based on the land use forecasts for these zones by the M-NCPPC, a substantial amount of the existing open space, parkland, conservation and agricultural acreage will

be developed by 2025. While it is assumed that many of the planned changes will affect agricultural lands, a strong stewardship of parklands will be required to protect these resources.

It is important to note that the Panel stated that most of the additional development would occur regardless of the alternative, including the No-Build. As a result of the Panel's findings, most of the future land use, as derived in the then current master plans, was used in the analysis of indirect and cumulative effects on resources.

### Population and Employment Growth Trends

Population in Montgomery County is projected to continue to increase, but at a fairly steadily declining rate of growth. The greatest population density within the ICE boundary is predicted to be within the Corridor Cities of Gaithersburg, Germantown and Clarksburg and towards the northeast in the Damascus area. Frederick County's population is also projected to increase at a steadily declining rate of growth. The greatest growth in Frederick County is expected to be within and around the City of Frederick, with additional growth in Urbana, Mount Airy, New Market and Walkersville.

Employment in both counties is projected to continue to increase at a fairly steady but declining rate of growth. Employment growth is planned mainly along the I-270/US15 corridor in Montgomery County and Frederick County, with additional growth in Montgomery County near Poolesville and in Frederick County on the south and east side of Frederick City extending to Walkersville.

Growth in population and employment within the two counties would result in a projected increase in residential land use within the ICE boundary of approximately 47 percent and a projected increase in employment land uses (commercial/industrial/institutional) of approximately 34 percent between 2002 and 2030.

### Transportation Improvements and Development Projects

A review of the current transportation planning documents (MWCOG 2007 CLRP; MDOT CIP 2008-2013, and the Montgomery County Ten-Year

Transportation Plan September 2007) provided a list of future transportation projects within the ICE boundary, including the completion of I-70 improvements, interchange improvements along I-270 and US 15, improvements to major commuter routes within the ICE boundary, and the approval and beginning construction of the Intercounty Connector. None of the projects will be induced by or are dependent upon the I-270 project.

Residential and non-residential development was identified within the ICE boundary (projects that plan 50 or more residential units and at least 100,000 square feet of non-residential space) that includes:

- Almost 28 million square feet of commercial development planned for Montgomery County Growth Policy Areas wholly or partially within the ICE boundary.
- More than 5,600 acres planned for residential and mixed-use development in Montgomery County, with over 21,000 single or multiple family dwellings to be constructed.
- Over 7,200 dwelling units on over 844 acres in Frederick County along with more than 4.4 million square feet of non-residential space that includes a Prime Outlet Mall.

None of the residential and non-residential projects within the ICE boundary are dependent upon the I-270/US 15 project, although some approvals are predicated upon the presence of other interchange improvements or access permits from the SHA.

### Results of the Analysis

The current analysis evaluated the potential indirect and cumulative effects to communities, parklands, historic resources, surface water, wild and scenic rivers, floodplains, waters of the US (including wetlands), terrestrial and aquatic habitats and species, and farmland. The effects are expected to be minimal because the work is occurring on an existing, as opposed to a new roadway alignment, and the CCT is proposed to be constructed on a reserved master plan alignment. The conclusions reached are summarized in the following paragraphs.

### Indirect Impacts

Indirect impacts are not anticipated to affect communities, as the direct effects are expected to take place on the edges of those existing communities adjacent to the highway. Indirect effects to community cohesion and access are therefore not expected as a result of the build alternatives. Positive indirect effects will occur as a result of the benefits of shorter travel time and increased access to mass transit use.

Indirect impacts to parklands are not anticipated, because parklands are protected by the counties through development guidelines and by federal regulations including FHWA Section 4(f) regulations.

Section 106 considers audible and visual impacts as elements to be considered in determining effects to historic properties. The indirect effects of noise and visual impacts would, therefore, be subject to potential minimization and mitigation during consultation with the SHPO representing historic resources affected by the project. No further indirect effects to historic resources are reasonably foreseeable as a result of the project.

Indirect effects to surface waters and surface water quality would likely occur as a result of contamination by runoff from new impervious surfaces associated with new paved highway and transitway alignment and associated station and parking facilities. Indirect effects are not anticipated due to the inclusion of mitigation for direct impacts to streams and protection of surface water quality through the use of erosion and sediment controls, SWM facilities and BMPs to prevent contamination from roadway and transitway runoff.

The Monocacy River is the only wild and scenic river impacted by the project. Currently, the Monocacy River is directly impacted by I-270 where I-270 crosses over the Monocacy River within the Monocacy National Battlefield, and the river's tributaries are crossed by the I 270/US 15 corridor in numerous locations. The proposed improvements are not anticipated to cause indirect effects to the attributes that qualify it as a wild and scenic river. Future development adjacent to the Monocacy River's banks may negatively impact the river, as parkland buffers protect only a few areas. Some of the portions that are not protected by parkland serve as the border to the areas of Urbana, Frederick City, and northwest of Frederick City where

the Panel estimated faster growth than Frederick County's master plans projected. The result of development in these areas may negatively impact the river aesthetically, physically, and biologically.

Seneca Creek is the only river in the project area that is designated as highly significant by the 1984 Maryland Water Resources Administration's rivers study. Except for the portion of Seneca Creek that is directly impacted by the I-270 improvements, no other portion of this stream is anticipated to be impacted, as the whole of Seneca Creek is already protected within surrounding parkland area, except for an approximate 3-mile segment north of MD 124 in the Brookville/Damascus area. The Panel identified this area as parkland, however, giving it the protection status offered by parklands.

Indirect effects to floodplains would likely occur as a result of the increased impervious surfaces or due to clearing, fill placement, retaining walls and piers included in the design and construction of the alternatives. Indirect impacts to floodplains are similar to those that occur to surface waters, based on the potential for contamination by runoff from new impervious surfaces. There are state, federal and local regulations discouraging development in 100-year floodplains, and any floodplain encroachment would require authorization by MDE under a Waterways Construction Permit.

Substantial indirect impacts to Waters of the US and aquatic habitats and species, including the two newly-listed state threatened comely shiner and pearl dace, are not expected to occur, as direct impacts will be offset by the proposed project mitigation package. Most instream activities that would occur during construction of a build alternative would occur in areas already disturbed by development, and the use of BMPs and rigorous enforcement of established riparian buffer zones will minimize overall impacts.

The highway element of the project is not anticipated to have indirect effects caused by fragmentation of existing forests within the ICE boundary, because the alternatives are located along existing alignments of I-270 and US 15. The project would slightly reduce the size of forested tracts associated with the stream valley parks, but would not affect their suitability as forest



interior dwelling species (FIDS) habitat. The stream valley park associated with Great Seneca Creek would be indirectly affected by the transitway as it crosses adjacent to the highway, increasing the removal of forest edge. This area is ideal FIDS habitat and likely supports many species of mammals, reptiles and amphibians. Location of an O&M facility could also cause indirect impacts associated with forest fragmentation. Other indirect effects could result from physical and chemical changes in the forest edge adjacent to the roadway, but the likelihood of indirect effects from chemical pollution from roadway runoff will be decreased through the use of erosion and sediment controls and SWM facilities. The project will have no effect on the current trends within the ICE boundary in decreasing forest area or forest fragmentation. Direct impacts to forest resources in the project area will be offset by mitigation completed in accordance with the Forest Conservation Act and Maryland’s Reforestation Law. The project mitigation will help to stabilize forest trends in the region.

The project is not anticipated to indirectly affect farmlands to the extent that it would cause the cessation of farming on any of the active farm parcels adjacent to the project, as impacts are mostly strip takings adjacent to the existing highway. The transitway is proposed on a reserved master plan alignment; therefore, indirect effects to farmland greater than those accounted for in the master plans are not anticipated. Farms within the ICE boundary will continue to be converted to residential and non-residential development. Greater development above what the county master plans illustrate, as identified by the Panel, would place increased pressure on the development of remaining farmlands.

Cumulative Effects

Direct impacts on the environment from the alternatives are added to the impacts of past, present and future actions to result in cumulative impacts to communities, parklands, historic resources, surface water, wild and scenic rivers, floodplains, Waters of the US, terrestrial habitat, aquatic habitat/species and farmlands. These resources have historically been impacted by development and would be further impacted by the project alternatives. All areas surrounding the Monocacy River and its tributaries are anticipated to

experience a substantial increase in both population and employment over the next 25 years. Impacts to these resources from other future actions may result in cumulative effects.

The project would add an increment to the impacts on existing communities, by requiring relocations of residents and businesses in the project area. This incremental impact may be offset as displaced residents and businesses would likely find new locations within the ICE boundary because of the continued growth and development expected. Noise impacts to communities would be mitigated by the construction of noise barriers. Any of the build alternatives would increase the visual presence of both highway and transit infrastructure. The transitway would have a moderate visual effect since it would travel mostly at ground level. Visual effects may be somewhat offset by designing transit stations to be visually compatible with surrounding neighborhoods. All of the project-related impacts or effects, when added to other transportation projects and improvements by others within the ICE boundary, would add to cumulative effects.

The contribution of the project to cumulative impacts on parklands is anticipated to be minimal as developments on parklands are rarely permitted.

Development pressures associated with population and employment growth may affect existing historic resources or properties that may be determined historically significant in the future. Both Montgomery and Frederick counties have historic preservation commissions that work to ensure that planned future development protects these resources to the greatest extent possible. The project may add incrementally to impacts on the significant resources of the Catoctin Mountain Scenic Byway, Heart of the Civil War Heritage Area, and Journey Through Hallowed Ground. Management plans for these scenic byway and heritage areas may provide opportunities for mitigation that will support the plans’ goals.

The conversion of open space and forested areas to impervious areas or manicured landscapes would be expected to increase surface runoff and peak storm flows as well as introduce sediment and other pollutants into surface waters, including the Monocacy River, a Wild and Scenic River. These effects would be somewhat mitigated by required compliance with water quality protection regulations administered by MDE.

The project may make an incremental contribution to cumulative 100-year floodplain effects. The effect will be minimized to some extent within the area through mitigation sites that would enhance local floodplain function.

In the past, many Waters of the US, including wetlands, have been altered, compromised, or lost as a result of urban and suburban development in the region, and an initial lack of enforcement of waterways protection regulations. The initial construction of I-270 played a role in this trend. Waters of the US are expected to be minimally impacted overall. The proposed mitigation package for wetlands and waterways impacts, however, will help stabilize overall impact trends.

Cumulative impacts to forest resources, forest habitats/species and State Champion Trees may occur; however, the project’s role should be minimal, given the amount of existing, planned, and forecasted urban development anticipated in the next 20 plus years. Local master plans for the region anticipate an increase in housing stock and housing density regardless of the completion of the I-270 project. Additionally, nearly all of the forests within the ICE boundary have been harvested in the past, and most of the currently existing forest areas are under local, state, or federal protection.

Minor cumulative impacts to aquatic species, including the state-listed comely shiner and pearl dace, or aquatic habitats are anticipated; however, the use of BMPs and erosion and sediment controls, in addition to time-of-year restrictions on in-stream construction activities, will minimize these impacts.

Completion of a build alternative would directly impact some farm properties through right-of-way acquisition. Still, the pressure for further development to support the growing population will impact farms indirectly. As the cycle of development perpetuates, greater demands are

placed on agricultural land to be developed for non-farm uses. Cumulative effects in the southern portion of the ICE boundary will be minimal, because there is little farmland left undeveloped. Residential and commercial growth within the ICE boundary will account for most of the cumulative effects and continue the decline in the number of farms and acreage used for farming.

Conclusions

The conclusions reached by the ICE analysis show that there are, overall, minor indirect effects to resources as a result of the implementation of Alternatives 6A/B or 7A/B. There are no transportation or development projects that are dependent upon the I-270/US 15 improvements. The analysis also showed that the project would add an incremental amount of impacts to the cumulative impacts of all other projects planned for the area within the ICE boundary.

The current ICE analysis agrees with the projections of the 2002 Land Use Expert Panel in stating that some locations in the region may experience future development beyond that planned for Montgomery and Frederick Counties, and that the additional development would occur whether or not the project was constructed. Both the Panel’s conclusions and the current ICE analysis are based on projected locations of population and employment growth as identified in area master plans.

There are incremental changes in current and proposed land uses since the 2002 DEIS, based on construction in planned development areas, current area zoning, and area master plans. The boundaries of PFAs have been modified slightly to accommodate new development. In the intervening years, planned development projects have been constructed and new projects have received approval for construction within the designated development areas.

There are no indications that the conclusions reached in the 2002 SCEA have changed, because no major changes in future land use have occurred since its publication. The region is continuing to experience substantial growth, and resources in some locations may be under unanticipated development pressure from that growth.

M. Energy

This section of Chapter IV addresses the use of energy that is anticipated by the proposed project alternatives. Energy is an important environmental resource, and its use contributes to the degradation of other environmental resources such as air quality and land. This section begins with a discussion of how energy is measured for the purposes of this analysis, continues with a discussion of the potential impacts and measures to minimize harm related to the proposed project alternatives.

Energy is commonly measured in terms of British thermal units, or BTUs. A BTU is the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. For transportation projects, energy usage is predominantly influenced by the amount of fuel used.

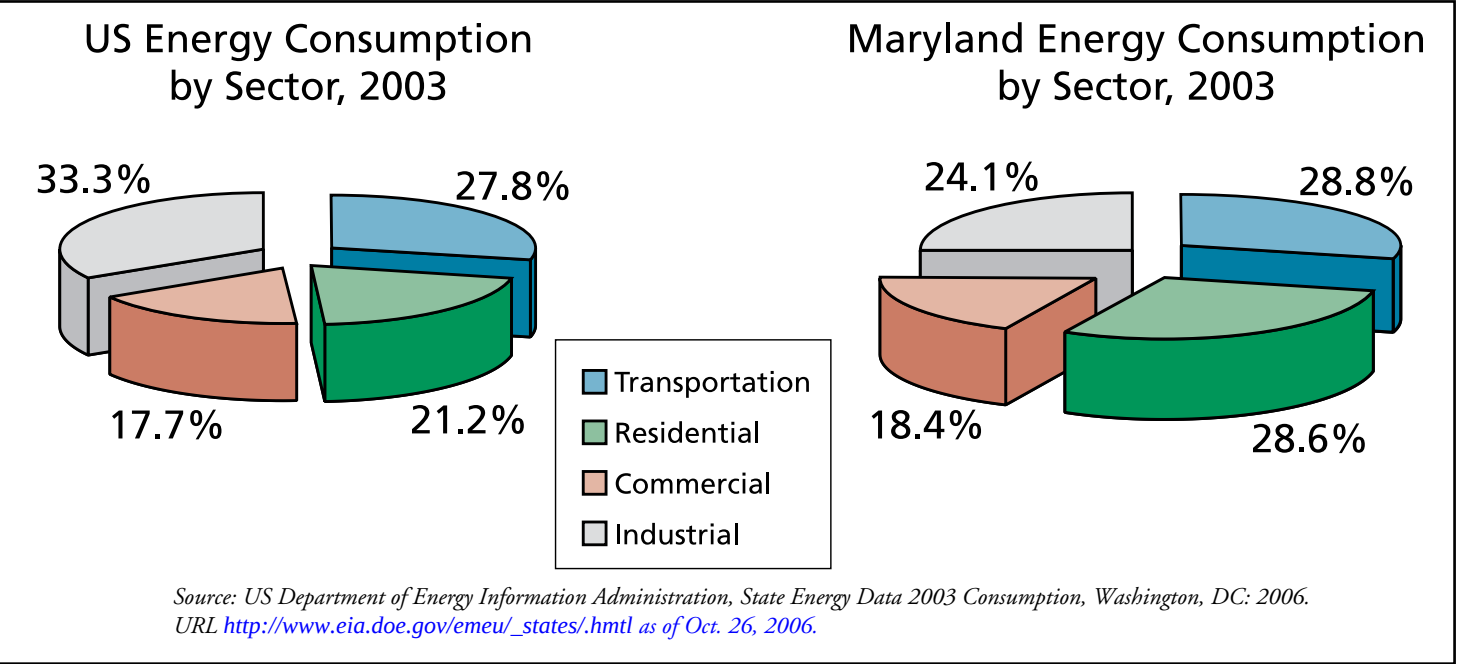
As shown in **Figure IV-17**, transportation is the second largest source of energy consumption in the United States. In Maryland, the transportation sector is the largest source of energy consumption. On a per capita basis, Maryland’s transportation energy consumption is 75.3 million BTUs, which is below the United States per capita average of 93.1 million BTUs (USDOT, 1993). Petroleum (e.g., gasoline, diesel fuel, jet fuel) is the predominant source of energy for transportation in Maryland, as shown in **Figure IV-18**.

Transportation energy is generally discussed in terms of direct and indirect energy. Direct energy is the energy used to operate vehicles. The amount of energy used is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix, and thermal value of the fuel being used. Indirect energy is the energy needed to construct the project. This is a non-recoverable, one-time energy expenditure.

Impacts and Measures to Minimize Harm

This section provides an assessment of the project’s impact on transportation-related energy consumption in the study area. Two data sources were applied to estimate the project’s energy consumption. For roadway energy, the analysis techniques and data discussed in the reports *Energy and Transportation Systems* (California Department of Transportation (Caltrans) and the U.S. Federal Highway Administration (FHWA), 1983) and *Urban Transportation and Energy: The Potential Savings of Different Modes* (Congress of the United States, 1977)

Figure IV-17: Energy Consumption by Sector



As shown in **Table IV-42**, overall energy levels are predicted to decrease with the project. Alternative 7B is predicted to have the largest overall energy reduction of approximately 0.7 percent, followed by Alternative 7A with a reduction of approximately 0.6 percent. Alternatives 6A and 6B are both predicted to reduce estimated transportation energy requirements by approximately 0.5 percent. All changes in energy consumption are less than 1.00 percent, making them essentially immeasurable.

Indirect Energy

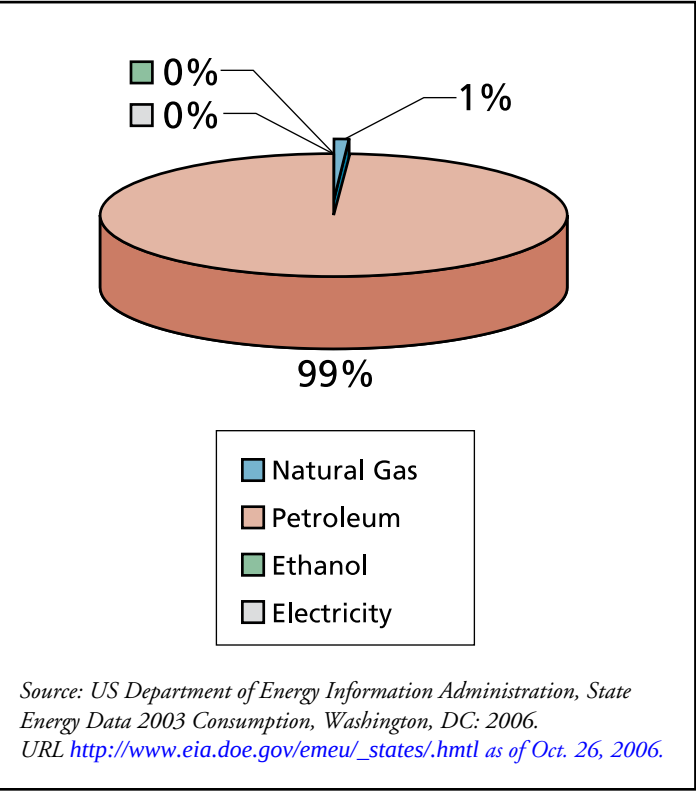
Accurate indirect energy costs are extremely difficult to estimate given the uncertainty of field variables at this point in the analysis. The indirect energy values calculated should be considered as an indicator between alternatives, rather than absolute values. Construction energy factors estimate the amount of energy necessary to extract raw materials, manufacture and fabricate construction materials, transport materials to the work site and complete construction activities.

The analysis is based on the number of lane miles (or track miles) to be constructed for each alternative. Estimates of construction energy reflect at-grade, elevated and below grade construction. As shown in **Table IV-43**, indirect energy expenditures are predicted to be highest for the BRT Alternatives. This is due to the higher energy requirements estimated for constructing one elevated roadway mile as compared to one elevated track mile.

Measures to Minimize Harm

Conservation of energy could be achieved in facility planning, construction, operation and maintenance. Conservation could also be applied to recycling pavements, hardware items (guardrails, signals, tires, right-of-way, etc.), using indigenous plants for landscaping, and applying Best Management Practices in roadway maintenance. Other measures that could be applied include using high pressure sodium vapor lamps for light, solar powered lighting, promoting carpools, vanpools, and bicycle projects.

Figure IV-18: Transportation Energy Consumption by Energy Source



were applied. This methodology takes into account vehicle mix and speed fluctuations between the alternatives. For LRT and BRT energy estimates, energy usage factors from the *Transportation Energy Data Book, Edition 26* (U.S. Department of Energy, 2007) were applied.

Direct Energy

As shown in **Tables IV-41** and **IV-42**, the project is predicted to have less than a one percent effect on overall energy consumption. **Table IV-41** highlights the project’s impact on transportation energy levels within the study corridor (I-270 and a 1.5 mile radius around it). **Table IV-42** highlights the project’s impact on transportation energy levels within the entire region. As these tables show, transportation energy usage is predicted to slightly increase within the immediate study area while regionally, transportation energy usage is predicted to slightly decrease due to the project. The increase within the study corridor is due to vehicles traveling to the station locations. The study corridor projections do not include the vehicle miles traveled VMT savings as a result of the project because the trips saved are outside of the boundaries of the study corridor. These savings are shown in the VMT projections for the region, and shown in **Table IV-42**. The regional values are used to discuss project impacts since they encompass the full impact of the project.



Table IV-41: Predicted 2030 Transportation Energy Usage within Study Corridor

| MODE                                          | ALTERNATIVE 1<br>(NO-BUILD) | ALTERNATIVE 6A | ALTERNATIVE 6B | ALTERNATIVE 7A | ALTERNATIVE 7B |
|-----------------------------------------------|-----------------------------|----------------|----------------|----------------|----------------|
| Roadways                                      |                             |                |                |                |                |
| Daily VMT                                     | 40,557,948                  | 40,950,909     | 40,950,909     | 41,020,351     | 41,020,351     |
| Daily Average Speed                           | 21.9                        | 22.2           | 22             | 22.4           | 22.4           |
| Total Roadway BTUs (millions)                 | 321,867                     | 323,333        | 323,333        | 323,411        | 323,411        |
| % Change from No-Build                        | –                           | 0.46%          | 0.46%          | 0.48%          | 0.48%          |
| LRT                                           |                             |                |                |                |                |
| Daily VMT                                     | 0                           | 5355           | 0              | 5355           | 0              |
| Total Electric Propulsion BTUs (millions)     | 0                           | 459            | 0              | 459            | 0              |
| BRT                                           |                             |                |                |                |                |
| Daily VMT                                     | 0                           | 478            | 10,375         | 478            | 10,375         |
| Total BRT BTUs (millions)                     | 0                           | 20             | 443            | 20             | 443            |
| Annual Direct Energy Consumed BTUs (millions) | 321,867                     | 323,813        | 323,776        | 323,890        | 323,854        |
| % Change from No-Build                        | –                           | 0.60%          | 0.59%          | 0.63%          | 0.62%          |

Table IV-42: Predicted 2030 Regional Transportation Energy Usage

| MODE                                          | ALTERNATIVE 1<br>(NO-BUILD) | ALTERNATIVE 6A | ALTERNATIVE 6B | ALTERNATIVE 7A | ALTERNATIVE 7B |
|-----------------------------------------------|-----------------------------|----------------|----------------|----------------|----------------|
| Roadways                                      |                             |                |                |                |                |
| Daily VMT                                     | 231,985,079                 | 231,472,024    | 231,472,024    | 231,456,046    | 231,456,046    |
| Daily Average Speed                           | 19.3                        | 19.5           | 19.5           | 19.5           | 19.5           |
| Total Roadway BTUs (millions)                 | 1,933,262                   | 1,922,391      | 1,922,391      | 1,920,398      | 1,919,804      |
| % Change from No-Build                        | –                           | -0.56%         | -0.56%         | -0.67%         | -0.70%         |
| LRT                                           |                             |                |                |                |                |
| Daily VMT                                     | 0                           | 5355           | 0              | 5355           | 0              |
| Total Electric Propulsion BTUs (millions)     | 0                           | 459            | 0              | 459            | 0              |
| BRT and Feeder Bus                            |                             |                |                |                |                |
| Daily VMT                                     | 0                           | 478            | 10,375         | 478            | 10,375         |
| Total BRT BTUs (millions)                     | 0                           | 20             | 443            | 20             | 443            |
| Annual Direct Energy Consumed BTUs (millions) | 1,933,262                   | 1,922,870      | 1,922,834      | 1,920,878      | 1,920,247      |
| % Change from No-Build                        | –                           | -0.54%         | -0.54%         | -0.64%         | -0.67%         |

Table IV-43: Indirect Energy Consumption

| TYPE OF CONSTRUCTION | ALTERNATIVE 6A |               | ALTERNATIVE 6B |               | ALTERNATIVE 7A |               | ALTERNATIVE 7B |               |
|----------------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|
|                      | Track miles    | Roadway miles | Track miles    | Roadway miles | Track miles    | Roadway miles | Track miles    | Roadway miles |
| at grade             | 12.4           | 0             | 0              | 12.4          | 12.4           | 0             | 0              | 12.4          |
| elevated             | 0.9            | 0             | 0              | 0.9           | 0.9            | 0             | 0              | 0.9           |
| below grade          | 0.1            | 0             | 0              | 0.1           | 0.1            | 0             | 0              | 0.1           |
| Total BTUs Consumed  | 207,891        |               | 297,893        |               | 207,891        |               | 297,893        |               |

Notes:  
Urban Transportation and Energy, US Senate Committee on Environment and Public Works, December 1977.  
Surface track construction = 12,290 million BTUs/track mile.  
Elevated track construction = 55,460 million BTUs/track mile.  
Subway track construction = 99,510 million BTUs/track mile.  
Surface highway construction = 13,885 million BTUs/lane mile.  
Elevated highway construction = 130,379 million BTUs/lane mile.