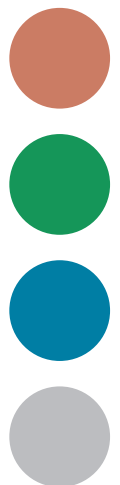




## CHAPTER IV

### *Environmental Resources and Consequences*



CORRIDOR CITIES TRANSITWAY  
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT





## Chapter IV – Affected Environment and Environmental Consequences

### Overview

This chapter presents the existing environmental conditions including natural and social/cultural/economic resources and the estimated impacts on these resources that would occur as a result of the proposed alignment modifications and Operations and Maintenance (O&M) sites described in **Chapter II**.

For some resources, such as wetlands or floodplains, the physical “footprint” of the alignment modification is important. For other impact categories, such as visual or noise, the transit mode (BRT or LRT) that is ultimately selected also makes a difference, and the results are presented to reflect this variable. Where impacts are potentially significant, prospective mitigation measures are presented.

This chapter does not reanalyze or present new data regarding the impacts or performance of the Original CCT Alignment alternative or the multimodal alternatives analyzed in previously published NEPA documents. Rather, the focus is intentionally on the proposed alignment modifications and O&M site locations presented in **Chapter II** of this document. Together, the full array of NEPA documents provides the analysis and documentation required to inform a decision on a preferred alignment and modal selection for the CCT. Where necessary, this chapter will refer the reader to an appropriate discussion in another document. All documents will be made available upon publication and distribution of this document for public review and comment. For convenience, a **CD** of the **2009 AA/EA** is included in the inside back cover of this document.

Once a locally preferred alternative (LPA)—alignment and mode—is selected, additional engineering work will be done to determine precise alignments, station layouts and equipment specifications. Final environmental impacts

will be assessed in a Final Environmental Impact Statement, and more refined mitigation commitments will be determined at that time.

### Land Use, Zoning and Future Development

This section presents an examination of changes to land use, land use planning, and zoning in the CCT corridor since the 2009 AA/EA was completed. Summaries of the findings are provided for the City of Gaithersburg and the planning areas within Montgomery County in which the proposed CCT alignment modifications fall.

#### Existing Land Use

**Figure IV-1** depicts the existing land uses within 1,000 feet to either side of the proposed alignment modifications that were not described in the 2009 AA/EA. Therefore, this section presents a review of current land uses for areas in the vicinity of the proposed new CCT alignments including Crown Farm, Life Sciences Center, and Kentlands. Existing land uses near the two O&M sites described in **Chapter II** are also documented. For a more detailed description of general land uses within Montgomery County and the City of Gaithersburg, please refer to **Chapter IV** of the **2009 AA/EA**.

**Crown Farm** is a 180-acre parcel of land bounded by Fields Road to the north, Sam Eig Highway (I-370) to the west, and Omega Drive to the east. Land uses surrounding Crown Farm include the Washingtonian Center, a large mixed-use development located north of Fields Road, and high-density residential developments located off Diamondback Drive and Decoverly Drive. Development of the Crown Farm property into residential, office and commercial development, including a mixed-use town center, is presently underway.

**Life Sciences Center (LSC)** is a rapidly-growing medical and bio-technology community within Montgomery County. Bisected by Great Seneca Highway, the eastern portion of the LSC currently

consists of mostly medical- or health-related institutional land uses including Shady Grove Adventist Hospital, Regional Institute for Children and Adolescents, Johns Hopkins University, and several large rehabilitation and radiology centers. The western portion of the LSC also consists of governmental and institutional uses, the Montgomery County Public Safety Training Academy, and high-density office buildings and laboratories.

**Belward Farm** is a 108-acre farm located on the western side of the LSC. This undeveloped parcel is owned by Johns Hopkins University. Bounded by Mission Drive to the north, Darnestown Road to the south, and Muddy Branch Drive to the west, Belward Farm is surrounded by very compact residential development on three sides.

**Kentlands**, a 352-acre community founded on New Urbanist design concepts, is located within the City of Gaithersburg and is a walkable, mixed-use neighborhood. The Kentlands Marketplace, located adjacent to the west side of Great Seneca Highway consist of commercial uses including restaurants, a large retail center and a Lowes home improvement store. On the eastern side of Great Seneca Highway, land uses consist of office and governmental/institutional uses including the MedImmune Campus.

**The Proposed Observation Drive O&M Site** is located south of West Old Baltimore Road and east of I-270. This site is currently undeveloped, inactive farmland and includes a farmhouse, two barns, and other farming-related outbuildings. Other land surrounding this site includes a stream buffer area to the east, I-270 to the west, and a small portion of Black Hill Regional Park to the northwest. To the south, a large wooded buffer separates this site from The Vistas at Millstone and Brookfield residential developments.

**The Proposed Metropolitan Grove O&M Site** is located within the City of Gaithersburg west of I-270. Land uses in this area can be characterized as industrial. Large warehouses and distribution centers are present on the south side of the rail tracks near the Metropolitan Grove MARC Station. North of the rail tracks, and closer to the terminus of Metropolitan Grove Road, Browns Station Park and the Montgomery County Police impound lot border the tracks. A large parcel of vacant property is located north

of the Metropolitan Grove Station. Land in this area is also used for other transportation-related uses such as interstate highways, arterial roadways, railroad tracks, and large surface parking areas.

### Farm Uses

As of December 2009, Montgomery County had 561 farms, approximately one-third of the County's land area. Since the publication of the 2009 AA/EA, farmland within Montgomery County has remained virtually unchanged.

The historic Belward Farm is located within the heart of the study area for the alignment modifications. This 108-acre farm is currently undeveloped except for a 19th century farmhouse and associated outbuildings. It is one of the last remaining large parcels of formerly agricultural land in this part of Montgomery County. As part of the recently-approved *Great Seneca Science Corridor Master Plan* (discussed in more detail below) Belward Farm is expected to develop into a high-density research campus that would also include employee and visitor housing and a CCT station.

The historic Crown Farm is a 180-acre parcel of land bounded by Fields Road to the north, Sam Eig Highway (I-370) to the west, and Omega Drive to the east. Development of the Crown Farm property into a variety of commercial, office and residential uses is presently underway.

The Observation Drive site is proposed on land which is currently vacant, but not an active farm. All proposed improvements on this parcel, including the CCT and an extension of Observation Drive, are planned and approved in the June 1994 *Clarksburg Master Plan and Hyattstown Special Study Area*.

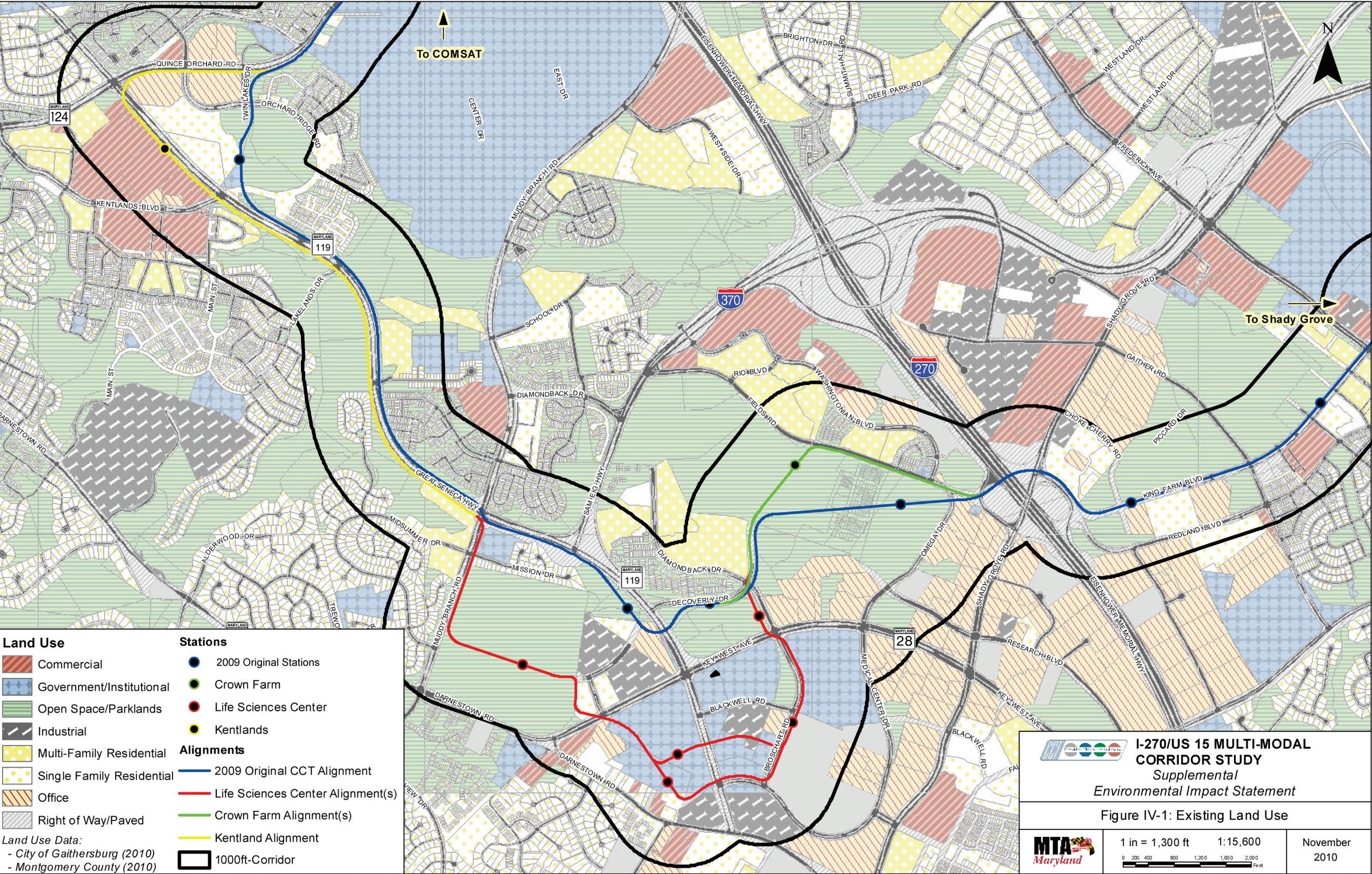
There are no farm uses at the proposed Metropolitan Grove site. It is currently occupied by the Montgomery County Police Abandoned Motor Vehicle Unit.

### Future Land Use

Local long range development plans describe future land use visions. The adopted plans for each planning area or municipality contain specific recommendations for future land use. The following presents summaries of plans that have been newly drafted or updated and adopted since the publication of the AA/EA in



Figure IV-1: Existing Land Use







May 2009. Future land use is also guided by and reflected in the zoning designations and regulations of local governments. Although the Maryland Transit Administration (MTA) is not required to meet local zoning requirements in their projects, local zoning modifications can occur and have occurred in response to major transportation projects such as the proposed CCT. Consequently, pertinent zoning trends are noted below as an indicator of how land use may evolve in the long term.

### Montgomery County

Since the publication of the AA/EA in 2009, there have been no updates to the following documents:

- *Montgomery County General Plan with Refinements* (adopted 1993)
- *Shady Grove Sector Plan* (adopted with amendments in January (2006)
- *The Clarksburg Master Plan* (1994)

On May 4, 2010, the Montgomery County Council unanimously approved the *Great Seneca Science Corridor Master Plan*. Formerly known as Gaithersburg West, this Master Plan updates the *1990 Shady Grove Study Area Master Plan* and portions of the *1985 Gaithersburg Vicinity Master Plan*. The *Great Seneca Science Corridor Master Plan* area covers 4,360 acres in the heart of the I-270 Corridor. It includes the existing LSC, the western Quince Orchard neighborhoods and enclave areas such as the National Institute of Standards and Technology (NIST) and Rosemont, which are completely or nearly completely surrounded by a municipality. The City of Gaithersburg occupies ten square miles in the center of the Plan area.

The Plan establishes the creation of a Life Sciences Center (LSC) and a live/work community in the next 25 to 35 years. The Plan recognizes, however, that sufficient infrastructure – particularly transit – would need to be in place before the overall goals and visions for the LSC can be realized. Relative to the CCT the plan states the following:

- The CCT will enable people who work at the LSC to live in nearby communities connected by transit.
- Transit is an essential element of this Plan and is the basis for the land use and zoning

recommendations. A strong public and private commitment to the Plan's transit proposals will help ensure that the LSC is connected internally, as well as to the rest of the Corridor.

- The LSC of the future will be served by a fully integrated transit system that links mid-County activity centers via the CCT. Access to high quality transit is increasingly important to businesses trying to attract knowledge-based, creative class workers. The LSC will continue to be a specialized employment center and it will be connected by transit to nearby residential communities at the Shady Grove Metro Station, the King Farm, the Crown Farm, Kentlands, and the Watkins Mill Town Center.
- The CCT is the centerpiece of the Plan's vision for the LSC.
- This Plan recommends realigning the CCT to bring transit into the heart of the LSC where it can serve more businesses, institutions, and other users than the current route.
- The Plan builds a pattern of density focused on the three LSC districts where CCT transit stations are proposed: Central, West, and Belward. Increased density is recommended at proposed transit stations and development can only proceed in stages that are linked to the provision of infrastructure, most importantly, the CCT.
  - The LSC South District is not recommended for increased densities largely because it is within the Piney Branch Special Protection Area. Realigning the CCT route into the center of the LSC will bring transit closer to LSC South, where it can serve the Universities at Shady Grove, Human Genome Sciences, and the Traville community. The proposed alignment offers two alternatives between the LSC Central and LSC West stations.
- The two current station locations – DANAC (on the south side of Decoverly Drive) and Decoverly (along Great Seneca Highway near Sam Eig Highway) are not located to serve the LSC districts with the most growth potential and the greatest number of future transit

riders. The Discoverly station would serve primarily as a park-and-ride facility since it is located along a highway rather than in the center of development. Also, the alignment near the Discoverly station would impact an environmentally sensitive wetland and stream buffer area, which could be avoided if the route is relocated.

- The Plan's three new proposed stations are located where new development and redevelopment is expected, increasing the number of potential CCT riders within a quarter mile radius, or a five-minute walk. The proposed realignment would lengthen the route by one mile.
  - If the CCT is ultimately provided as BRT, it may be possible to incorporate both the current and proposed routes, but the land use and zoning recommendations in this Plan require the realignment through the LSC to serve the proposed densities at the three new stations.
- The highest density and building height will be concentrated at the proposed CCT stations.
- Public open spaces will be provided at each CCT station
- The CCT, trails, and attractively designed sidewalks will connect the districts and adjacent neighborhoods, encouraging walking instead of driving.
- The organizing element of the LSC open space plan is a 3.5-mile, multi-use path loop connecting the districts and destinations.
  - The LSC Loop will run alongside existing streets, such as Medical Center Drive and Omega Drive, and be completed on new streets in LSC West.
  - It will incorporate the proposed multi-use path next to the CCT through LSC West and onto the Belward property.
  - The LSC Loop will link activity centers and community facilities, including the planned high school on the Crown Farm (in the City of Gaithersburg), the historic Belward Farm, and the civic green and

retail center on LSC West. CCT stations along the Loop include the Crown Farm, Belward, and LSC West.

- The Plan recommends a CCT station on Broschart Road near Blackwell Road, and those streets should be enlivened with active uses. Future development, in its design and use, should be carefully planned to take advantage of transit and contribute to creating a vibrant LSC hub.
- Reuse of the Belward Farm offers opportunities for community-serving uses such as a cultural, recreational, or educational center that could become a destination on the CCT and the LSC Loop.
- A CCT station is planned on the western side of the National Institute of Standards and Technology (NIST) facility. With 5,000 employees (2,700 permanent and 2,300 contract), this station offers an opportunity to change commuting patterns and is an important link in the future public transit network.

The *Great Seneca Science Corridor Master Plan* includes the following specific recommendations relative to the CCT:

- Realign the CCT through the LSC to provide three transit stations that will be the focal point of new development in the LSC Central, West, and Belward district
- Concentrate density, building height, and civic green spaces at the CCT stations.
- Realign the CCT with existing service between the proposed LSC CCT stations. To reduce delays for transit and vehicles, this realignment may require CCT grade separations at Key West Avenue and Great Seneca Highway.
- Realign the CCT through the LSC with a station on the Belward property along Discoverly Drive extended near the intersection with Medical Center Drive extended
  - Provide a comprehensive pedestrian network throughout Belward with an emphasis on easy and convenient access to the proposed CCT station

- Relocate the DANAC station to the east side of the property as part of the CCT alignment through the LSC. The current CCT alignment includes a station on the north side of the DANAC property.
- Actively manage parking supply and demand and promote shared parking efficiencies, particularly relieving the requirement for smaller properties to self-park. Public/private parking agreements should be encouraged as private properties redevelop and potentially act as a funding source for the CCT.
- Coordinate with NIST to plan for the proposed CCT station along Quince Orchard Road.
- Provide a continuous bikeway as part of the CCT.

In January 2008, the Montgomery County Planning Department published a report entitled *Guiding the Future of the MD 355/I-270 Corridor*, which provided guidance for all master plan and sector plans being undertaken at that time including the *Great Seneca Science Corridor Master Plan* (formerly Gaithersburg West). The report recognizes that providing a wide-range of transportation options, including the future CCT, is key to successfully addressing mobility within the MD 355/I-270 Corridor. This report also recognizes that the CCT will provide a link between activity and business centers within the corridor as well as to the region's other resources. Key CCT-related recommendations for the areas near Shady Grove and Gaithersburg include:

- Build the CCT from Shady Grove to Clarksburg.
- Find a location for all bus and rail infrastructure including garages, maintenance areas needed for additional Metrorail, Metrobus, and Ride-On services as well as the CCT and the North Bethesda Transitway.

On October 21, 2009, the Montgomery County Council adopted the *Germantown Employment Area Sector Plan* as an amendment to the 1989 *Germantown Master Plan*. The sector plan creates a vision for mixed-use communities served by the existing MARC service and the future CCT. Overall, this plan supports the CCT and recognizes the importance of linking transportation and land use. The plan also recognizes that the higher densities recommended for

the Germantown employment sectors cannot be realized without the construction of the CCT. Relative to the CCT this plan recommends the following:

- Transit Mixed-Use Zone (TMX-2) should be established on sites located in a Transit Station Development Area, which is defined by the Zoning Ordinance as "an area near a metro transit station, or along an existing or proposed transit right-of-way (ROW), which is not located within a central business district, which has been designated as a Transit Station Development Area by an approved and adopted master plan or sector plan." TMX permits a broad range of uses that can provide the variety needed to create a cohesive transit-served community with employment and housing options.
- A CCT loop bus service should be established to serve districts and increase employment on both sides of I-270.
- The CCT station previously considered along Middlebrook Road should be removed from the Plan.
- Transit stations along the CCT should be designed to provide convenient and safe pedestrian access and each should incorporate public art that conveys community identity and a sense of place.
- Potential CCT eastern alignments should be evaluated for ways to better serve the Montgomery College Campus for future phases of the CCT.

### City of Gaithersburg

Maryland municipalities establish Maximum Expansion Limits (MEL) to set boundaries for future potential annexations of unincorporated land. The Maryland State Code (Article 23A, Section 19) requires that municipalities produce a *Municipal Growth Plan* delineating the MEL. Only land within the MEL and adjoining the municipal boundaries can be considered for annexation. In 2009, the City of Gaithersburg established a new MEL as part of its adopted *Municipal Growth Element*. The City's new MEL includes nearly all of the *Great Seneca Science Corridor Master Plan* area, including the LSC.



The *City of Gaithersburg Master Plan* (Adopted December 2003) contains a Land Use Plan that describes general land use and zoning categories for properties located within the City and makes recommendations for future land use. For detailed information on this plan and its contents please refer to the **2009 AA/EA, Chapter IV**.

The City of Gaithersburg is currently undertaking an update to the Transportation Element of City's Master Plan. In response to the growth currently taking place within and in communities surrounding Gaithersburg, the new Transportation Element will highlight the link between land use and transportation and will focus on near- and long-term, multi-modal transportation options within the City. This document states that the City has been a long-time supporter of the CCT as a light-rail project rather than as bus rapid transit (BRT), and supports realigning the CCT through Kentlands and Crown Farm. In planning for the CCT, the City has obtained the majority of needed ROW and approved high-density, transit-oriented developments such as Crown Farm and Watkins Mill Town Center and adopted the *Kentlands Boulevard Commercial District Special Study Area*.

Specific to the CCT the revised Transportation Element states:

- The originally proposed "Master Plan" alignment for the CCT would have impacts on MedImmune's growth and would underserve the Kentlands Special Study Area.
- The *Great Seneca Science Corridor Master Plan* includes a recommendation of a grade separated interchange at the intersection of MD 119 and MD 124. This interchange would impact and possibly preclude the implementation of recommendations made in the Kentlands Boulevard Commercial District Special Study Area, the Kentlands Special Study Area (discussed above), the City-requested Kentlands realignment for the CCT, and expansion of the MedImmune campus.
- The City does not support any grade-separated interchanges within the City limits such as the proposed MD 124 and MD 119 interchange that may impede the implementation of the recommendations in the adopted City Master Plan, preclude the Kentlands CCT Realignment,

or conflict with any approved development site plans.

- The City will continue to support the CCT with the Kentlands and Crown Farm realignments and endorse light rail transit (LRT) as the preferred mode option for CCT.

The City of Gaithersburg adopted *Kentlands Boulevard Commercial District* in May 2008 as an amendment to the *2003 Land Use Plan*. The study area includes 80 acres located south of Great Seneca Highway with Kentlands Boulevard bisecting the area into northern and southern halves. The purpose of the plan was to provide guidance on future development within the area and to also obtain input on the CCT and its alignment along Great Seneca Highway. Relative to the CCT realignment through the Kentlands, the study identified the following:

- The CCT will impact the future development pattern within the Kentlands Boulevard Commercial District (KBCD). If the Master Plan Alignment is changed to run on the south side of Great Seneca Highway, the KBCD has the potential to evolve into a mixed-use town center.
- A parcel located between Great Seneca Highway and Market Street is a prime location for a CCT station and associated station parking facility. This site is also identified as having high re-development potential.
- A parcel located in the northwest quadrant of the intersection of Kentlands Boulevard and Great Seneca Highway is an alternate location for a CCT station and parking facility. A pedestrian bridge over Great Seneca Highway would connect Quince Orchard Park residents and MedImmune employees with the transit station.
- Two realignments of the CCT on the southwest side of Great Seneca Highway will positively impact the KBCD. However, if one of these alignments is chosen and the CCT station is relocated to the KBCD, the City of Gaithersburg would need to dispose of ten acres of City-owned property currently being reserved for a Quince Orchard Park CCT Station.

## O&M Sites

In the *Clarksburg Master Plan and Hyattstown Special Study Area* (June, 1994) the proposed BRT O&M site at Observation Drive is classified as a “Major Employment” center within the Brink Road Transition Area. Specific to the CCT and the proposed O&M site, the plan recommends low-intensity, industrial development employment uses on the almost 65 acres adjoining I-270, just south of West Old Baltimore Road. The plan states that this type of use will help provide non-office employment needs (such as warehousing, automobile repair and service, wholesale trades, etc.).

The proposed Metropolitan Grove O&M site is located within the Casey-Metropolitan Grove Special Study Area. As stated in the 2003 *Gaithersburg Land Use Plan*, this area will be designated as a large, mixed-use development centered on the CCT. The City of Gaithersburg and Montgomery County own a total of 31 acres surrounding and including this site. The City property at Browns Station Park is designated as open space. The County property land use is designated as institutional and is in use as the Montgomery County Police Abandoned Motor Vehicle Unit. The parcels owned by Montgomery County (P435) and City of Gaithersburg (P138, P404) contain a covenant that limits development to a public use. The covenant states that the parcels are to be used solely for a public use approved by the Board of Public Works of Maryland. This covenant is recorded in Montgomery County Land Records, Liber 5765 and Folio 508. The Board of Public Works would have to amend the covenant to allow private development.

Specific to the CCT and the proposed O&M facility, the plan states the following:

- As part of the CCT, there may be a need to provide a Transit Rail Yard at the Casey-Metropolitan Grove Study Area. If the Transit Rail Yard is to be located within the Casey-Metropolitan Grove Study Area, a plan must be reviewed and approved by the Mayor and City Council and Planning Commission as part of the schematic development plan (SDP) process.
- The City has proposed two alternative locations for the Transit Rail Yard as follows:
  - Alternative 1: The Montgomery County abandoned auto storage lot located north of and parallel to the CSX right-of-way

and east of Metropolitan Road extended. To locate the rail yard in this location will require the cooperation of Montgomery County and the State of Maryland for the relocation of the County auto storage. This site is surrounded by the CSX rail tracks, I-270 Interchange, Metropolitan Grove Road extended, future rail station and parking facility and the City-owned parkland which may make it difficult to provide a viable residential, commercial or office development. All the rail yard buildings, as well as adequate screening in the form of a solid wall and landscaping should be placed along the north side of the site. The intent is to screen the rail yard activity and rail car storage from the City-owned parkland.

- Alternative 2: The State of Maryland truck maintenance and anti-skid materials distribution facility located south of and parallel to the CSX right-of-way and east of Metropolitan Road extended. To locate the rail yard in this location will require the cooperation of Montgomery County and the State of Maryland for the relocation of the existing State facility. All the rail yard buildings, as well as adequate screening in the form of a solid wall and landscaping should be placed along the south side of the site. The intent is to screen the rail yard activity and rail car storage from the adjacent residential apartment community.

## Existing and Future Zoning

Zoning is the tool that implements local jurisdictions’ long-range land use plans objectives. It governs the type and form of development that occurs. In general, the counties and communities in the I-270 corridor have been updating their zoning and growth management plans in anticipation of the improvements to the transportation system that may result from this Multi-Modal Corridor Study.

## Montgomery County

Montgomery County is currently undertaking a three-year process to update their Zoning Ordinance.

The current version dates back to 1977. A detailed discussion of the current Zoning Ordinance is in the 2009 AA/EA. The updated zoning will help Montgomery County promote appropriately-scaled infill development, create sustainable neighborhoods and communities, and support smart growth principles and transit-oriented development projects.

In advance of the ordinance re-write, the Montgomery County Council adopted an amendment to the current zoning ordinance that establishes Commercial/Residential (CR) zones; including the intent, allowed land uses, development methods, general requirements, development standards, density incentives, and approval procedures for development under these zones. This amendment became effective on March 22, 2010 and will aid in the implementation of the *Great Seneca Science Corridor Master Plan* and other area master plans. The new CR zone will allow for more density and flexibility and will also promote economically, environmentally, and socially sustainable development patterns where people can live, work, and have access to services and amenities while minimizing the need for automobile use.

As mentioned above, the *Great Seneca Science Corridor Master Plan* recommends several zoning changes for the proposed developments within the LSC and Belward Farm. These proposed changes will be considered during the re-write of Montgomery County's Zoning Ordinance.

### City of Gaithersburg

The revised City of Gaithersburg Zoning Map became effective on April 25, 2010. Properties located near the proposed CCT realignment in Kentlands, between Quince Orchard Road and Muddy Branch Road, are zoned MXD (Mixed-Use Development). Parcels within Crown Farm, south of Fields Road, are also zoned MXD, with the exception of a very small parcel, which has been zoned R-6 (Medium-Density Residential).

As mentioned above, the City of Gaithersburg established a new MEL as part of its adopted *Municipal Growth Element*. The City's new MEL includes nearly all of the *Great Seneca Science Corridor Master Plan* area, including the LSC. As a result, several parcels within the LSC development could be annexed.

### Observation Drive O&M Site

The 1994 *Clarksburg Master Plan and Hyattstown Special Study Area* designates the proposed Observation Drive O&M site as I-4, low-intensity, light-industrial. This would continue the clustering of employment uses along I-270.

### Metropolitan Grove O&M Site

Properties in the vicinity of Metropolitan Grove Road, including those owned by the County and the City, have been rezoned as MXD to accommodate the proposed development that will be part of the proposed Casey-Metropolitan Grove mixed-use development.

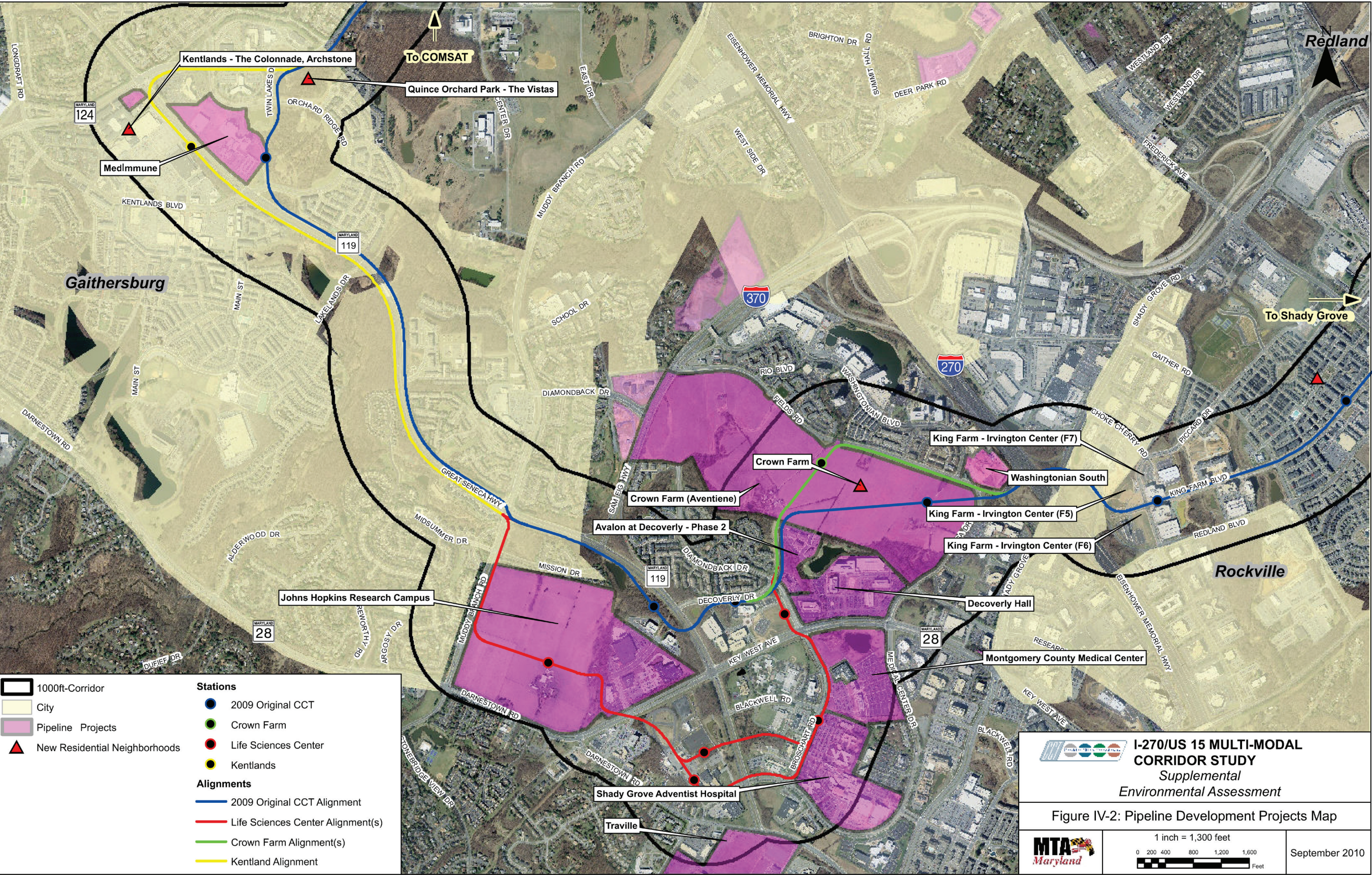
## Planned and Programmed Developments

**Figure IV-2** presents the locations of "pipeline" development projects within the 1,000-foot project corridor buffer in Montgomery County and the City of Gaithersburg, as well as the O&M facility sites at Observation Drive and Metropolitan Grove. These are projects that have been approved for construction but are not yet built or fully completed. The pipeline projects represent major planned changes in land use anticipated in the vicinity of the proposed CCT realignments and O&M facilities. Projects are considered major if they include 50 or more new residential units and/or 100,000 or more square feet of non-residential development.

**Table IV-1** presents the residential and commercial pipeline development located within the study corridor in the City of Gaithersburg and Montgomery County as well as for the O&M facilities proposed at Observation Drive and Metropolitan Grove. There are several residential and other pipeline development projects located within the 1,000-foot limit of the project corridor. The majority of these projects occur in the Kentlands/Quince Orchard Park in the City of Gaithersburg and in the area of the LSC. In the City of Rockville, the King Farm development is a prominent project, while in Gaithersburg the expansion of the MedImmune campus, as well as the planned mixed-use development at Crown Farm are most notable.



Figure IV-2: Pipeline Development Projects







## Compliance with Smart Growth Initiatives

The intent of Maryland's Smart Growth Areas Act (October 1997) is to direct state funding for growth-related projects to areas designated by local jurisdictions as Priority Funding Areas (PFAs). PFAs consist of existing communities and other locally-designated areas as determined by local jurisdictions in accordance with "smart growth" guidelines. The Act seeks to guide development to existing towns, neighborhoods, and business areas by directing State infrastructure improvements to those places. For additional information regarding Maryland's Smart Growth Initiative and the objectives of the Act, reference the 2009 AA/EA. Relative to the CCT realignments, the PFAs, as illustrated in **Figure IV-3**, have not expanded in their coverage of areas within close proximity to the CCT.

The *Planning Visions Bill*, which went into effect on October 1, 2009, modernizes the State's eight existing planning visions with 12 new visions that reflect more

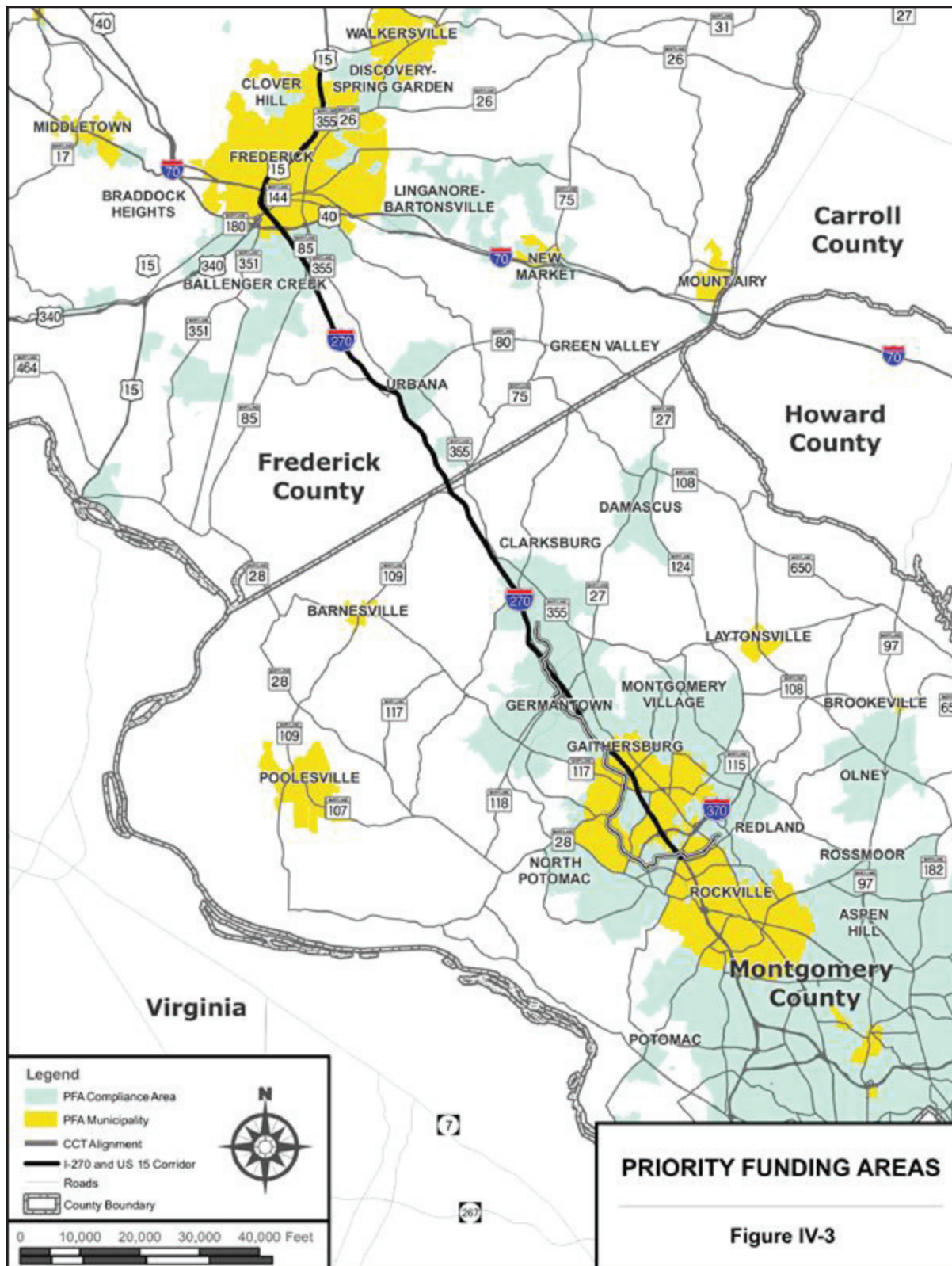
accurately Maryland's ongoing aspiration to develop and implement sound growth and development policy. The visions address:

- Quality of life and sustainability
- Public participation
- Growth areas
- Community design
- Infrastructure
- Transportation
- Housing
- Economic development
- Environmental protection
- Resource conservation
- Stewardship
- Implementation approaches

**Table IV-1: Pipeline Projects within the Project Corridor**

| PROJECT NAME                               | PROPOSED USE   |
|--|--|
| Crown Farm                                 | Mixed-use development consisting of 320,000 square feet of retail and 2,250 residential units (high-rise condominiums, townhomes, single-family home, live/work units over commercial) |
| Avalon at Decoverly – Phase 2              | 168 multi-family units   |
| Montgomery County Medical Center           | 894,636 square feet of medical offices   |
| Shady Grove Adventist Hospital             | 203,262 square foot expansion of existing facility   |
| Traville                                   | Mixed-use development consisting of 1,221,201 square feet of office; 99,299 square feet of retail; and 12,000 square feet of other uses  |
| Johns Hopkins Research Campus              | 1,800,000 square feet of industrial  |
| Quince Orchard Park – MedImmune All Phases | Expansion of existing facility   |
| Quince Orchard Park – The Meadows          | 150,000 square feet of office  |
| Quince Orchard Park – The Vistas           | 13 single-family detached units, 38 townhomes, 32 condominiums   |
| Washingtonian South (Future)               | 203,136 square feet of office  |
| King Farm – Irvington (F5)                 | 352,565 square feet of office; 10,000 square feet of retail  |
| King Farm – Irvington (F6)                 | 241,428 square feet of office; 6,605 square feet of retail   |
| King Farm – Irvington (F7)                 | 151,522 square feet of office; 3,595 square feet of retail   |
| Watkins Mill Town Center (Casey West)      | 1,066 dwelling units; 283,939 square feet of retail; 936,650 square feet of office; and 394 hotel rooms  |
| Linthicum East (Summerfield Crossing)      | 157 single family detached units and 102 townhomes   |

Figure IV-3: 2000 Priority Funding Areas





Local jurisdictions are required to include the visions in their local comprehensive plans and implement them through zoning ordinances and regulations.

The law also requires local jurisdictions to submit a report to the Maryland Department of Planning (MDP) every two years if an Adequate Public Facility Ordinance (APFO) results in a restriction in a PFA, that is, if there is not adequate infrastructure to support such public facilities as new schools, recreational or transportation facilities, and transit-oriented development. Local jurisdiction reports on PFAs and APFOs must include information about the nature of the restriction and if available, information about the proposed resolution. MDP's report on the statewide impact of APFOs has to identify:

(1) geographic areas and facilities within PFAs that do not meet local adequate public facility standards; and (2) scheduled or proposed improvements to facilities in local capital improvement programs. MDP's first report is due by January 1, 2011.

The law also authorizes local jurisdictions to establish Transfer of Development Rights (TDR) programs within PFAs to assist a local jurisdiction in the purchase of land for public facilities. Proceeds from the sale of these development rights must be used for land acquisition and public facility construction in the PFA.

The *Smart Growth Goals, Measures, and Indicators and Implementation of Planning Visions Bill* requires local planning commissions or boards to submit annual reports to local legislative bodies beginning July 1, 2011 that include specified smart growth measures and indicators and information on a local land use goal as part of the report. In addition to other planning and development information required under current law, the annual report must state which ordinances or regulations were adopted or changed to implement the State's planning visions. With the exception of jurisdictions that issue less than 50 building permits per year, the measures and indicators that must be reported include the following:

- Amount and share of growth that is being located inside and outside the PFA
- Net density of growth that is being located inside and outside the PFA
- Creation of new lots and the issuance of residential and commercial building permits inside and outside the PFA

- Development capacity analysis, updated once every three years or when there is a significant zoning or land use change
- Number of acres preserved using local agricultural land preservation funding

The bill establishes a statewide land use goal of increasing the current percentage of growth occurring within PFAs and decreasing the percentage of growth occurring outside PFAs. Recognizing that the 12 planning visions will not be realized unless local jurisdictions set their own goals to make incremental progress towards achieving a statewide land use goal, the General Assembly required local jurisdictions to develop a percentage goal towards achieving the statewide goal. The annual report filed by local jurisdictions must include a local goal, the timeframe achieving the local goal, resources necessary for infrastructure inside the PFA and land preservation outside the PFA, and any incremental progress made towards achieving that local goal.

### Project Effects on Land Use

Direct impacts to land use were evaluated based on the effect that the CCT realignments would have on compatibility of land uses, land use patterns, and access to land.

### Alignment Modifications

Although the CCT realignments would result in the loss of farmland, alignment modifications S1, S2, S2c and S3 would not result in impacts to overall community land use or zoning for the following reasons:

- Local land use plans and zoning ordinances have been updated, revised, and approved to include policies and guidelines that accommodate the realignment of the CCT and the potential for increased development that could result from the proposed transit improvements
- Although the loss of farmland would change land use patterns, the CCT realignments through Crown Farm and Belward Farm have been formally approved by the City of Gaithersburg and Montgomery County
- On these modified alignments, the CCT will facilitate the achievement of the future land

use visions included in the local land use plans by allowing the parcels within the corridor to be developed as currently planned

- As documented in local plans, communities within the project corridor generally support the realignment of the CCT through Crown Farm, the LSC, Belward Farm, and the Kentlands

Positive and/or beneficial impacts of the CCT alignment modifications include:

- On these alignment modifications the CCT will connect existing and future regional employment, residential, and commercial activity centers in Shady Grove, King Farm, Crown Farm, Watkins Mill Town Center and Kentlands.
- As currently planned, S1, S2, S2c, and S3 provide a necessary link between transportation and land use.
- On these alignments, the CCT supports state and local level smart growth policies by enhancing sustainability, providing multi-modal transportation options, and focusing growth within PFAs

### O&M Facilities

The proposed BRT O&M facility at Observation Drive in Clarksburg would not have direct effects on land use since the property was designated as an employment center in the 1994 Clarksburg Master Plan. Rezoning to I-4 is proposed for this property. This classification would allow low-intensity industrial uses such as automotive repair facilities to be located on this site. Therefore, a BRT maintenance facility will be compatible with the proposed zoning and future corridor land uses.

The proposed O&M facility location at Metropolitan Grove is currently located on County-owned property and is part of the Casey-Metropolitan Grove Special Study Area. The proposed O&M facility would not have direct effects on land use as the City of Gaithersburg has incorporated the proposed O&M facility into its 2003 Land Use Plan. Once designed, a site plan for the O&M facility would need to be approved by the County.

### Consistency with Area Master Plans

In general, master plans provide a set of comprehensive recommendations and guidelines that reflect a vision for the future development of local communities. Master plan recommendations and guidelines present a vision

for a 20-year time horizon from the date of adoption, although the plans are generally updated approximately every ten years. Local master plans identify the desirability of transportation system improvements in the project area. The Master Plans relevant to the CCT alignment modifications are:

- The *Shady Grove Sector Plan* (described in the 2009 AA/EA)
- The *Great Seneca Science Corridor Master Plan* (described on previous pages)
- The *City of Gaithersburg Master Plan* (described in the 2009 AA/EA)
- The *Clarksburg Master Plan* and *Hyattsville Special Study Area* (described in the 2002 DEIS)

### Alignment Modifications

Based on the information stated above and in the 2002 DEIS and 2009 AA/EA, Alternatives S1, S2, S2c, and S3 would be consistent with approved local land use plans. This is not unexpected as these alignment modifications were designed to correspond to the latest local plans.

### O&M Facilities

Both proposed O&M facility locations would be consistent with approved local land use plans.

The *Clarksburg Master Plan* (described in the 2002 DEIS) includes the proposed O&M facility site within its Brink Road Transition Area and recommends low-intensity industrial employment uses, such as automobile repair and service, on this site. Additionally, the site will be rezoned to I-4 to continue the clustering of employment locations along I-270 and the CCT.

The 2003 *City of Gaithersburg Land Use Plan* identifies the proposed Metropolitan Grove O&M Facility within its Casey-Metropolitan Grove Special Study Area. Although a site plan approval would be needed from the County, the proposed use is consistent with the 2003 Land Use Plan.

## Social Environment

The purpose of this section is to present information on the existing social environment in which the CCT project would be built, focusing on the alignment modifications in the Gaithersburg area. This section includes data for the Metropolitan Washington

Region, Montgomery County, and the Metropolitan Washington Council of Governments (MWCOG) forecasting region. It also includes data from the 2000 US Census, specifically information about population and households, household income and race characteristics. The section compares the growth of Montgomery County to the Region's growth and presents information about the existing neighborhoods, communities, community facilities and services, and parks and recreational facilities in the alignment modification and O&M site areas.

Potential impacts and benefits are also presented in this section. The assessment of potential impacts and benefits of each alternative includes data on displacements and relocations and an assessment of effects to environmental justice (EJ) populations, generally defined as low-income and minority populations. Potential impacts to these resources are discussed along with any potential avoidance, minimization and/or mitigation measures.

### Population and Households

The 2002 DEIS presented population and household data based on the 1990 US Census and the 2009 AA/EA presented 2000 US Census data for the original multimodal alternatives (including highway improvements along I-270/US 15, as well as transit improvements to the Original CCT Alignment). This SEA uses data from the 2000 US Census to present information for the evaluation of the alignment modifications developed after the completion of the 2009 AA/EA. **Figure IV-4** shows the census tracts and block groups in Montgomery County and within the current expanded CCT study area. **Table IV-2** summarizes the population and household characteristics for the Metropolitan Washington Region and Montgomery County.

**Table IV-3** summarizes the general median household income and race characteristics for the Metropolitan Washington Region and Montgomery County.

### Metropolitan Washington Region

The Metropolitan Washington Region includes the following jurisdictions: Washington, DC; the counties of Arlington, Clarke, Fairfax, Fauquier, King George, Loudoun, Prince William, Spotsylvania, and Stafford in Virginia; and the cities of Alexandria, Falls Church, Fairfax, Fredericksburg, Manassas, and Manassas Park

in Virginia; Jefferson County in West Virginia; and Anne Arundel, Calvert, Carroll, Charles, Frederick, Howard, Montgomery, Prince George's, and St. Mary's counties in Maryland. Ten of these counties and cities are included in the Round 7.2a forecasts, but were not included in the Round 6.4a forecasts that were presented in the 2009 AA/EA. They are:

- In Virginia: Clarke, Fauquier, Spotsylvania, and King George Counties, and the City of Fredericksburg
- In West Virginia: Jefferson County
- In Maryland: Howard, Anne Arundel, Carroll, and St. Mary's Counties

The MWCOG determined that the Metropolitan Washington Region grew by approximately 16.2 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 78 percent between 2000 and 2030, reaching almost 8.2 million persons in 2030 (this growth includes the addition of the cities and counties listed above). The agency anticipates a decline in household size from 2.70 to 2.52 persons per household between 2000 and 2030, which contributes to the growth in the number of households.

### 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 30 percent between 2000 and 2030, surpassing one million persons in 2020. The number of households is expected to increase by 33 percent between 2000 and 2030. Average household size is expected to decrease between 2000 through 2030 from 2.66 to 2.55 persons per household.

### Elderly and Disability Population Characteristics

**Table IV-4** summarizes the elderly and disability population characteristics of Montgomery County and the study area. The presence of elderly and disability populations often highlights potential locations of minority and/or low-income communities, often representative of EJ populations. Of the six block groups in the study area, one block group, census tract 7007.05 block group 4, has a higher percentage of elderly population than that of Montgomery County as a whole. Two block groups, census tract 7007.05 block

**Table IV-2: Population and Household Characteristics**

| JURISDICTION                   | 1990 | 2000 | 2010 | 2020 | 2030 | PERCENT CHANGE<br>2000-2030 |
|--------------------------------|------|------|------|------|------|-----------------------------|
| Metropolitan Washington Region |      |      |      |      |      |                             |
| Population (millions)          | 3.9  | 4.6  | 6.7  | 7.5  | 8.2  | 78.3%                       |
| Households (millions)          | 1.5  | 1.7  | 2.5  | 2.9  | 3.2  | 88.2%                       |
| Average Household Size         | 2.71 | 2.70 | 2.60 | 2.54 | 2.52 | --                          |
| Montgomery County              |      |      |      |      |      |                             |
| Population (millions)          | 0.75 | 0.88 | 0.97 | 1.08 | 1.14 | 29.5%                       |
| Households (millions)          | 0.28 | 0.33 | 0.36 | 0.41 | 0.44 | 33.3%                       |
| Average Household Size         | 2.65 | 2.66 | 2.64 | 2.60 | 2.55 | --                          |

Source: MWCOG Round 6.4a Summary Table, November 2004 and MWCOG Round 7.2a Cooperative Forecasts, November 2009

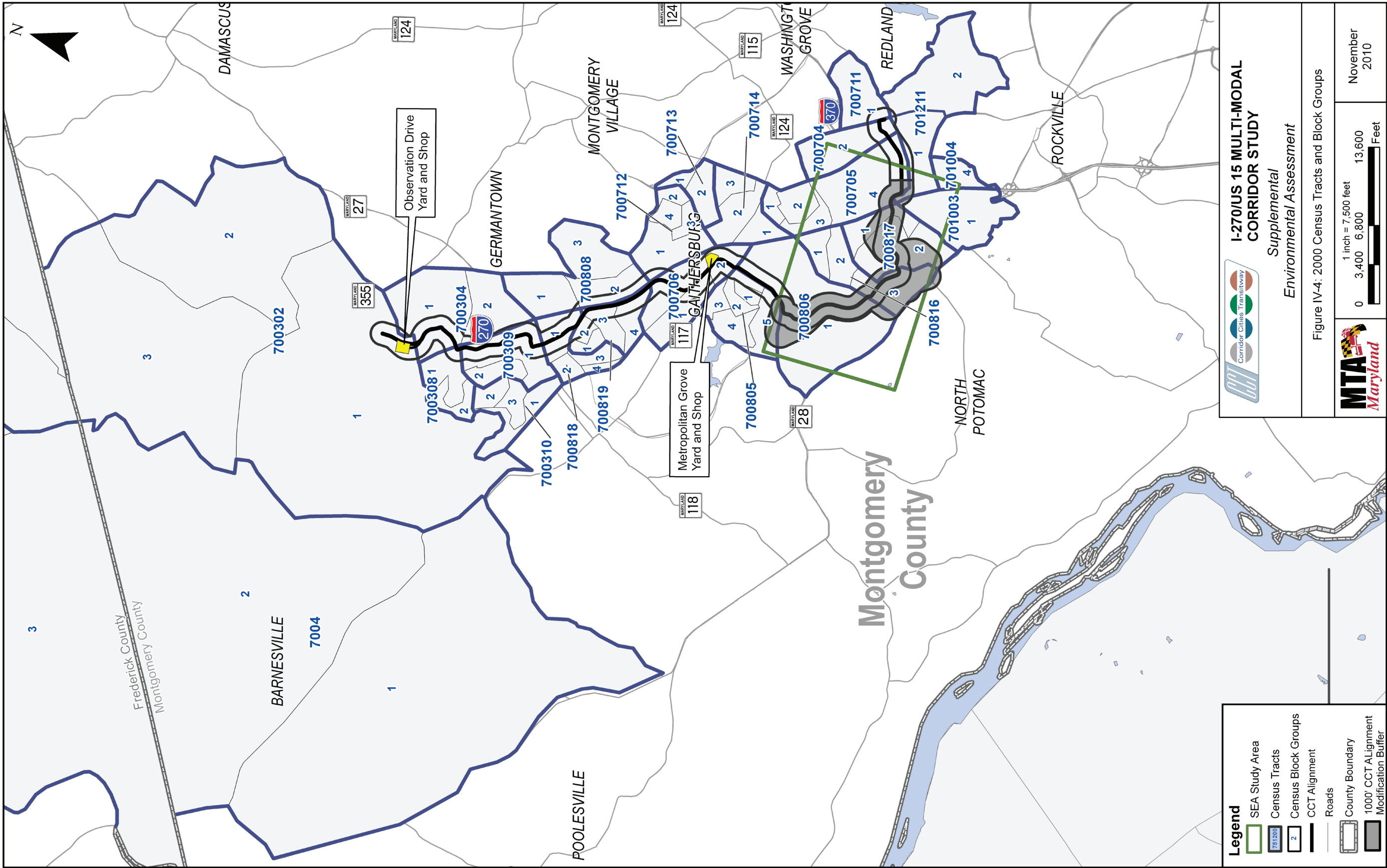
**Table IV-3: General Race Characteristics and Median Household Income in the Metropolitan Washington Region**

| JURISDICTION                                     | MONTGOMERY<br>COUNTY | TOTAL –<br>METROPOLITAN<br>WASHINGTON REGION |
|--|----------------------|--|
| Total Population                                 | 873,341              | 5,756,008                                    |
| White Alone                                      | 518,456              | 3,417,970                                    |
| Black or African American Alone                  | 128,252              | 1,365,705                                    |
| American Indian and Alaska Native Alone          | 1,837                | 15,419                                       |
| Asian Alone                                      | 97,769               | 354,753                                      |
| Native Hawaiian and Other Pacific Islander Alone | 424                  | 3,144  |
| Other  | 26,294               | 146,859                                      |
| Hispanic or Latino                               | 100,309              | 452,158                                      |
| Total Minority                                   | 354,885              | 2,338,038                                    |
| Median Household Income in 1999                  | \$71,551             | \$61,281                                     |

Source: US Census 2000



Figure IV-4: 2000 Census Tracts and Block Groups





group 4 and census tract 7008.17 block group 2, has a higher percentage of disability populations than that of Montgomery County as a whole.

## Neighborhoods and Communities

### Existing Conditions

Neighborhoods and communities may be defined in several ways. They may be designated within specific boundaries by municipal or county government for jurisdictional or planning purposes. They may also be identified by residents through their sense of community cohesion; this is the sense of unification, “belonging”, or closeness. It can relate to physical characteristics as well as the less tangible perceptions of residents about their neighborhood quality of life. Cohesive neighborhoods or communities may also be represented by citizen organizations to promote their interests. For the purposes of this study, established and emerging neighborhoods and communities are defined in one of five ways:

1. Is an incorporated place
2. Is identified as a Corridor City by Montgomery County
3. Is a locally recognized but unincorporated neighborhood or community
4. Is a neo-traditional community or- mixed-use

development that includes both residential and commercial uses; may include community facilities (i.e., a community center) and/or have a homeowners association or neighborhood association

5. A residential subdivision of 50 lots or more that are approved and programmed or under construction

Existing communities are discussed in the 2002 DEIS, both in the discussion of programmed and pipeline projects (approved but not fully built) and in the discussion of communities and neighborhoods, both found in Chapter III. This section adds new areas of large-scale residential growth (50 or more homes in a single development) that have occurred within the study area since the publication of the 2009 AA/EA. **Figure IV-5** shows the locations of all documented communities and neighborhoods within the expanded study area.

**Incorporated Places and Corridor Cities:** Relative to the proposed CCT realignments, the following municipalities, unincorporated communities, including Corridor Cities, are in the alignment modification study area:

- City of Rockville
- Shady Grove
- City of Gaithersburg
- Kentlands

**Table IV-4: 2000 Elderly and Disability Population Characteristics**

| CENSUS TRACT/<br>BLOCK GROUP | TOTAL<br>POPULATION AGE<br>65+ YEARS | PERCENT OF<br>TOTAL<br>POPULATION AGE<br>65+ YEARS | TOTAL<br>POPULATION<br>WITH DISABILITY<br>(NUMBER) | PERCENT OF<br>TOTAL<br>POPULATION<br>WITH DISABILITY |
|------------------------------|--------------------------------------|--|--|--|
| 7007.05 4                    | 107                                  | 14.2%  | 165  | 21.8%  |
| 7008.05 5                    | 90                                   | 3.3%   | 383  | 14.0%  |
| 7008.06 1                    | 488                                  | 5.5%   | 933  | 10.6%  |
| 7008.16 3                    | 68                                   | 4.5%   | 206  | 13.7%  |
| 7008.17 1                    | 139                                  | 6.3%   | 367  | 16.7%  |
| 7008.17 2                    | 195                                  | 8.7%   | 630  | 28.1%  |
| <b>Study Area</b>            | <b>1,087</b>                         | <b>6.0%</b>  | <b>2,684</b>                                       | <b>14.7%</b>   |
| <b>Montgomery<br/>County</b> | <b>97,457</b>                        | <b>11.2%</b>                                       | <b>186,580</b>                                     | <b>21.4%</b>   |

Source: US Census 2000



### Neighborhoods and Neo-Traditional Communities

Most of the area surrounding the proposed realignments of the CCT has been built out and contains older subdivisions. Newer development will include higher-density development and will focus on connections to other modes of transportation, such as biking, walking, and transit. Since publication of the 2009 AA/EA, newly emerging communities within the area of the proposed alignment modifications include:

- Crown Farm – This development is located southwest of the intersection of I-270 and I-370. It is proposed with a transit-oriented, traditional neighborhood design including a mix of types of residential units and commercial uses on 182 acres. At full build-out, it may ultimately have 2,250 residences and 370,000 square feet of commercial space. The area of the Crown Farm was annexed by the City of Gaithersburg.
- Avalon at Decoverly Phase 2 – Residential development within the Decoverly neighborhood consists of approximately 1,100 townhomes west of Diamondback Drive and multi-family residences/apartments to the east of Diamondback Drive (Avalon at Decoverly). The 168 multi-family units planned for Avalon at Decoverly Phase 2 would complete this development.
- Quince Orchard Vistas – This development is the residential component of the larger Quince Orchard Park mixed-use area in Gaithersburg. The Vistas will be located adjacent to the MedImmune campus, the planned Meadows office development, and the recently-completed Quince Orchard Crescents commercial development. When complete The Vistas will consist of 13 single-family homes, 38 townhomes, and 32 condominiums.

It should also be noted that approximately 9,000 dwelling units have been approved as part of the *Great Seneca Science Corridor Master Plan*. While these dwelling units have not yet been programmed as part of the County's pipeline development, all dwelling units will be constructed in a traditional neighborhood design and will include a mix of residence types as well as some commercial uses. Staging of this project is dependent on the staging for the CCT.

Close to the proposed Observation Drive O&M facility location is the Linthicum East/Summerfield Crossing development, which would contain 157 single family units and 102 townhomes.

Near the proposed Metropolitan Grove O&M site, the Watkins Mill Town Center is proposed for the Casey West site with 1,066 dwelling units and more than a million square feet of retail, office and hotel.

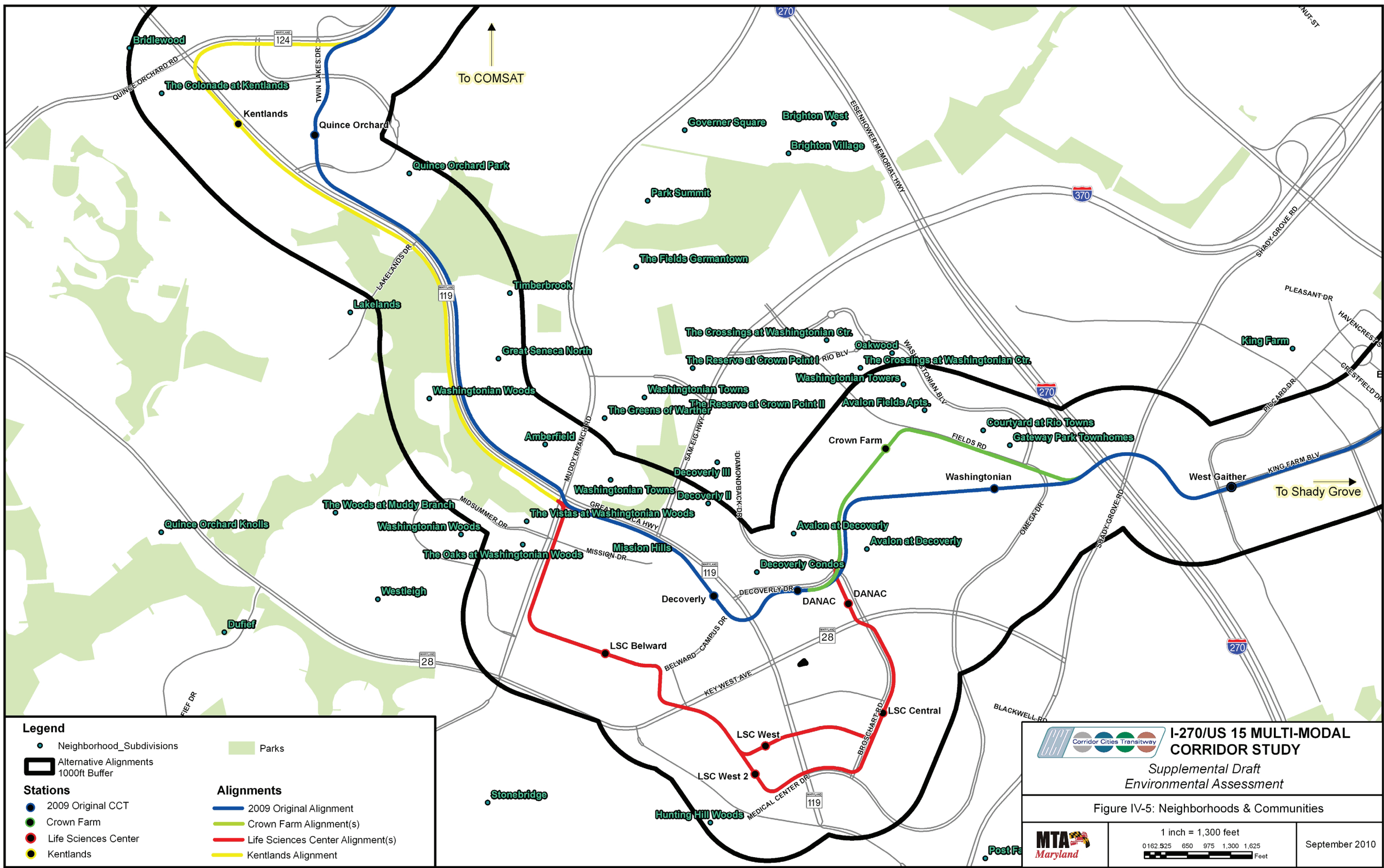
### Impacts

Physical characteristics important to neighborhoods include access to and within the neighborhood or community, common historical and/or architectural themes among buildings, and the presence of community institutions such as libraries, churches, and fire stations. To varying degrees the visual and physical impact of the proposed CCT realignments on neighborhoods and communities will be greatest at and around the station sites. These station sites create new visual elements and public activity nodes within the fabric of these neighborhoods and communities.

Access within a neighborhood is characterized by the ability to travel by a variety of modes, including walking and bicycling. In general, the proposed CCT realignments will result in greater transportation mobility for residents. Expanded mobility means greater access to employment centers, public service providers and facilities, including health care, and recreational facilities.

The proposed alignment modifications and their associated stations would have a direct effect on the emerging new communities. The station locations have been configured to serve these new communities and, in particular, to support transit-oriented development in the Quince Orchard Park and Crown Farm developments. The CCT stations, transitway alignment, and potential operations and maintenance sites have been incorporated into the new community design plans. Since the transitway would be close to residential areas there is a potential safety concern where residents may attempt to cross the transitway. The stations, transitway, and potential operations and maintenance sites would be designed with safety fencing, warning signage, lighting, and other measures where appropriate.

Figure IV-5: Neighborhoods and Communities





## Community Facilities and Services

### Existing Conditions

The I-270 Corridor is home to a wide array of community facilities and services. These are resources that support community safety, cohesion, and quality of life. They include:

- Educational facilities
- Religious facilities
- Libraries
- Health care facilities
- Major social service agencies
- Community facilities and services
- Emergency services
- Parks and recreational facilities

The community facilities located in the area around the proposed alignment modifications are shown in **Figure IV-6** and discussed in more detail below.

The 2009 AA/EA identified several community resources within the corridor, all of which remain today.

Additionally, the 2009 AA/EA identified several planned and programmed resources. Two of these, the fire station located on Key West Avenue and the planned High School in Crown Farm, remain relevant to the proposed CCT alignment modifications. In addition to these resources, new and pending community facilities in or near the study area are listed in **Table IV-5**.

### Educational Facilities

The following educational facilities are located within the area of the proposed alignment modifications and the two O&M sites:

- Academy Child Development Center – daycare center
- Katherine Thomas School – provides services for children and adults with learning disabilities and special needs
- John L. Gildner Regional Institute for Children and Adolescents – a community-based public, residential, clinical and educational facility serving children and adolescents with severe emotional disabilities
- The Ridge School of Montgomery County – provides special education and general education programs for sixth through twelfth graders with emotional difficulties
- Alfred D. Noyes Children's Center – is a state-owned and operated detention facility for juvenile males and females. General education, special education, and physical education classes are provided for all youths
- Johns Hopkins University Montgomery County – academic institution dedicated to the sciences and research

### Religious Facilities

The Hunting Hill Church, at the corner of Darnestown Road and Key West Avenue, is located within the area of the proposed alignment modifications.

### Libraries

There are no libraries located within the area of the proposed alignment modifications and the two O&M sites.

### Health Care Facilities

There are two health care facilities located in the area of the proposed alignment modifications and

**Table IV-5: Newly Built or Planned Community Facilities**

| FACILITY TYPE                   | STATUS  | LOCATION  |
|---------------------------------|---------|---|
| Fire station                    | Built   | Near the police training academy on Key West Road in Gaithersburg |
| High School                     | Planned | Washington Blvd. at Fields Road, Crown Farm, Gaithersburg         |
| Elementary School               | Planned | Life Sciences Center West, south of Key West Drive                |
| Fire Station                    | Planned | Northwest Corner of Shady Grove Road and Darnestown Road          |
| North Potomac Recreation Center | Planned | Travilah Road   |



the two O&M sites. They are the Shady Grove Adventist Hospital and the Psychiatric Institute of Montgomery County.

### **Community Facilities and Services**

There are no community facilities (community centers) located within the area of the proposed alignment modifications or the Observation Drive O&M site. However, the O&M site proposed adjacent to the Metropolitan Grove station area is located on property currently occupied by a vehicle impound lot owned and operated by Montgomery County. The MTA would need to coordinate with Montgomery County on a plan to relocate this facility.

### **Emergency Services**

The Montgomery County Public Safety Training Facility is located within the study area near S2c. The site is bordered by Key West Avenue, Great Seneca Highway, and Darnestown Road and is used as a training facility for firefighters, police officers, and operators of large vehicles. There are no other emergency service providers located within the area of the proposed alignment modifications and the two O&M sites.

### **Impacts**

Impacts to community facilities and services are assessed in terms of direct takings of land and/or buildings as well as changes to ease of access for patrons. Impacts to community facilities of the full Alternatives (with highway and transit components) are described in the 2009 AA/EA and the 2002 DEIS. Impacts related to the proposed alignment modifications are described below.

Direct impacts to community facilities and services are not expected from the alignment modifications for the following reasons:

- The proposed alignment modifications would be located on land that has been set aside for this purpose within the *Montgomery County Master Plan*.
- The taking of portions of parcels and/or buildings within the LSC has also been programmed and approved in the *Great Seneca Science Corridor Master Plan*.
- The CCT would operate on an exclusive right-of-way with limited at-grade crossings, therefore

emergency response services (police, fire, ambulance) would not be affected.

The CCT realignments, however, would have an indirect positive effect on community facilities and services by enhancing access to the existing resources. The proposed CCT realignments would also provide a direct link between activity centers and community resources located within Shady Grove, Crown Farm, all of the LSC districts, and Kentlands.

## **Parks and Recreational Facilities**

### **Existing Conditions**

Parks and recreational areas are identified in **Table IV-6**.

### **Impacts**

S1, S2 and S2c will not impact any parks or recreational facilities. S3 will impact two parks, Washingtonian Woods and Muddy Branch Stream Valley Park/Muddy Branch Park. The impacts will occur adjacent to where the alignment runs along Great Seneca Highway, which abuts both of these parks. Impacts to Muddy Branch Stream Valley Park are also discussed in **Chapter V**.

The Observation Drive O&M site would impact Black Hill Regional Park, and the Metropolitan Grove O&M site would potentially impact Metropolitan Grove Park/ Browns Station Park. Both areas of impact are undeveloped. Coordination is ongoing with the owners of the parks to determine appropriate mitigation measures should an alignment or O&M site be selected that has any direct or indirect effect on these resources.

### **Avoidance, Minimization and Mitigation**

Further design work will be done to see if impacts to Muddy Branch Stream Valley Park, Washingtonian Woods Park, Black Hill Regional Park, and Brown's Station Park can be minimized.

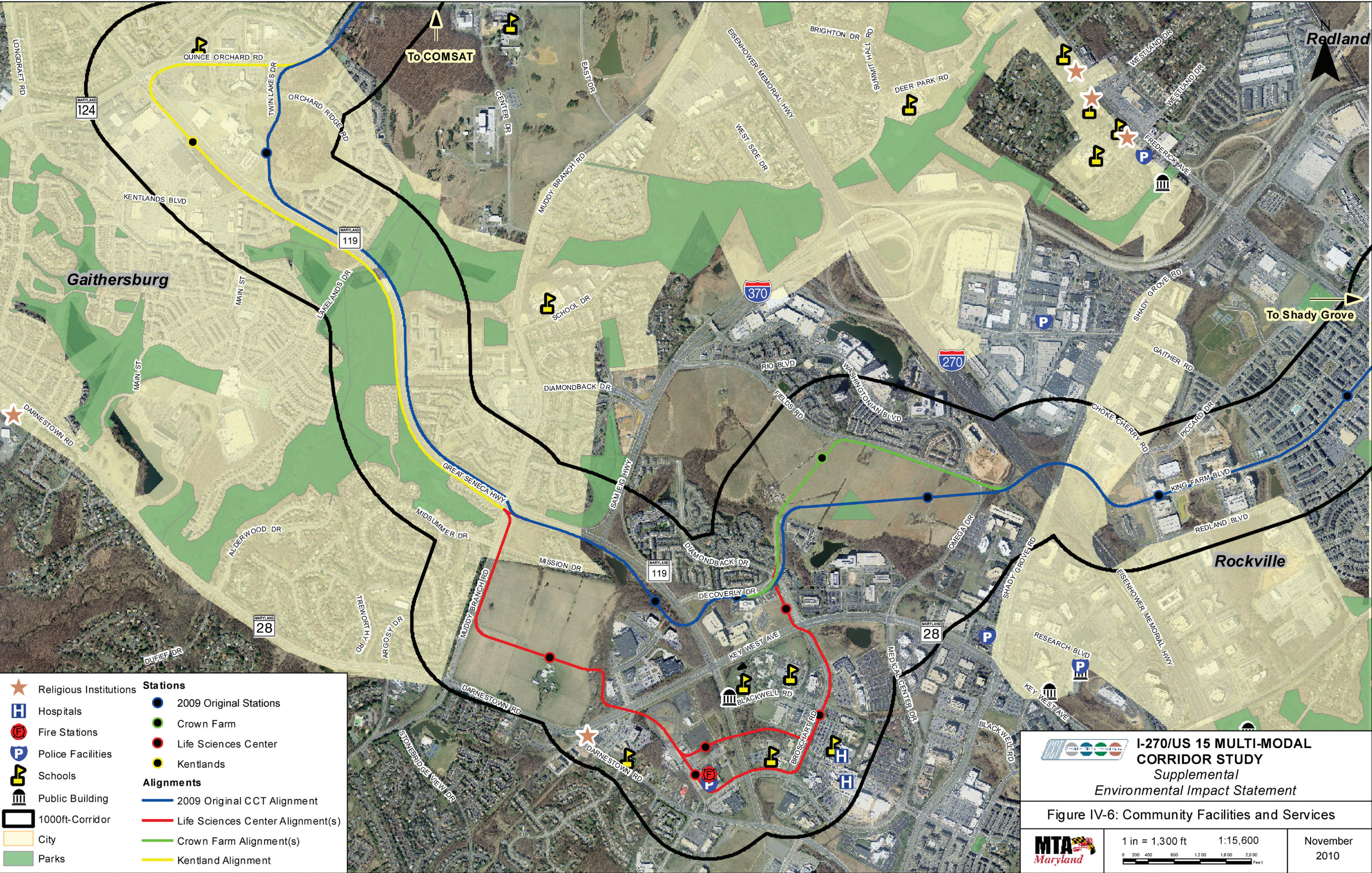
Screening will be used where needed and where feasible to reduce visual impacts of the project.

## **Displacements and Relocations**

An analysis of the potential residential and business displacements that could result from the alignment modifications through Crown Farm, LSC and Kentlands was completed based on preliminary right-of-way estimates. If a build alternative is selected, the number of actual displacements may vary from those



Figure IV-6: Community Facilities and Services









**Table IV-6: Parks and Recreational Facilities within the Alignment Modification Study Area and O&M Facility Areas**

| NAME OF PARK                                | AMENITIES   | SIZE (acres) | JURISDICTION   |
|---|---|--------------|--|
| Green Park                                  | Tot lot, play area, basketball courts, tennis court, hiking trails, dog exercise area | 14           | City of Gaithersburg                                   |
| Washingtonian Woods Park                    | Play area, basketball court, tennis courts, hiking trails                             | 22           | City of Gaithersburg                                   |
| Muddy Branch Stream Valley Park             | Passive park  | Unknown      | City of Gaithersburg                                   |
| Metropolitan Grove Park/Browns Station Park | Undeveloped   | Unknown      | City of Gaithersburg                                   |
| Fields Road Local Park                      | Investigation ongoing   | Unknown      | Investigation ongoing                                  |
| Izaak Walton League                         | Investigation ongoing   | Unknown      | Presumed private                                       |
| Black Hill Regional Park                    | Undeveloped   | 1,843        | Maryland-National Capital Park and Planning Commission |

presented here due to refinements in both the design and right-of-way requirements that will occur during the detailed engineering phase of this project. **Table IV-7** summarizes potential residential and business displacements. Potential displacements would occur as part of one or both of the LSC alignment modifications (S2 and S2c). The locations of potential displacements are identified on the Plan Sheets in **Appendix A**.

The CCT alignments have been planned to minimize property acquisitions and relocations. 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 49 CFR 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-7: Summary of Displacements along the Modified CCT Alignments**

| LOCATION                           | PLAN SHEET | ALTERNATIVES | NUMBER OF DISPLACEMENTS |
|------------------------------------|------------|--------------|-------------------------|
| Mission Drive at Muddy Branch Road | TRAN 3     | S2 and S2c   | 1 residence             |
| Broschart Road                     | TRAN 2     | S2           | 1 business              |

Note: Plan Sheets are in **Appendix A**.

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 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 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. A copy of the Summary of the *Relocation Assistance Program of the Maryland State Highway Administration* is available in **Appendix B** of the **2009 AA/EA** for further reference.

### Title VI Statement

It is the policy of the MTA to ensure compliance with the provisions of Title VI of the Civil Rights Act of 1964 and related civil rights laws and regulations that prohibit discrimination on the grounds of race, color, sex, national origin, age, religion, physical or mental handicap or sexual orientation in all MTA programs and projects funded in whole or in part by the Federal Transit Administration (FTA). The MTA will not discriminate in 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 associated with the modified CCT alignments and O&M sites.

### 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 the basis for the SEA 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)
- **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 expanded 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 County 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 help 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.

The following section presents the results of the EJ analysis.

### EJ Populations

Montgomery County contains 40.6 percent minority population. This means that block groups in the study area that meet the EJ threshold must equal or exceed 50 percent minority population (since “meaningfully greater” would be a percentage of at least 50.6 percent minority population). **Table IV-8** lists the study area block groups that meet or exceed the EJ threshold for minority populations.

**Table IV-8: Minority Population Data for Study Area Block Groups**

| CENSUS TRACT/<br>BLOCK GROUP                             | 7007.05 4 | 7008.05 5 | 7008.06 1 | 7008.16 3 | 7008.17 1 | 7008.17 2 | STUDY<br>AREA | MONTGOMERY<br>COUNTY |
|--|-----------|-----------|-----------|-----------|-----------|-----------|---------------|----------------------|
| Total Population   | 756       | 2,739     | 8,799     | 1,499     | 2,192     | 2,242     | 18,227        | 873,341              |
| White Only   | 335       | 1,873     | 6,445     | 843       | 1,348     | 1,334     | 12,178        | 518,456              |
| Black or<br>African<br>American Only                     | 90        | 236       | 348       | 147       | 141       | 257       | 1,219         | 128,252              |
| American Indian<br>and Alaska<br>Native Only             | 0         | 0         | 0         | 0         | 0         | 0         | 0             | 1,837                |
| Asian Only   | 129       | 318       | 1,206     | 328       | 476       | 385       | 2,842         | 97,769               |
| Native<br>Hawaiian and Other<br>Pacific<br>Islander Only | 12        | 0         | 0         | 0         | 0         | 17        | 29            | 424                  |
| Hispanic   | 190       | 201       | 482       | 74        | 168       | 160       | 1,275         | 100,309              |
| Other  | 0         | 111       | 318       | 107       | 59        | 89        | 684           | 26,294               |
| Total Minority   | 421       | 866       | 2,354     | 656       | 844       | 908       | 6,049         | 354,885              |
| Percent Minority   | 55.7%     | 31.6%     | 26.8%     | 43.8%     | 38.5%     | 40.5%     | 33.2%         | 40.6%                |
| Meet Minority EJ<br>Threshold                            | Yes       | No        | No        | No        | No        | No        | –             | –                    |

Source: US Census 2000

Montgomery County contains 5.4 percent low-income population. This means that block groups meeting the EJ threshold must (a) equal or exceed 50 percent low-income population or (b) contain a “meaningfully greater” percentage of at least 15.4 percent low-income population. **Table IV-9** lists the study area block groups and percent of low-income population.

All of the block groups within the study area are located within the 1,000-foot impact analysis buffer area for the transitway alignments. In addition, recognizing the transportation effects that could potentially be borne by EJ communities surrounding the corridor, the impact assessments also considered some additional block groups adjacent to the buffer area. These adjacent block groups include census tract 7007.05 block group 2, census tract 7007.05 block group 3, census tract 7008.16 block group 1, and census tract 7008.16 block group 2.

Of the six block groups analyzed in the impact analysis area, one block group, census tract 7007.05 block group 4, met or exceeded the EJ thresholds for minority populations. None of the block groups located within the impact analysis area met the EJ threshold for low-income populations. The block group that met the EJ thresholds within the impact analysis area and the adjacent areas are shown in **Figure IV-7**.

The identified EJ area is comprised of residential developments, neighborhoods, and communities. The adjacent block groups that meet the minority EJ

threshold are located between I-370 and Muddy Branch Road in Montgomery County. Targeted EJ outreach activities were completed for the purposes of this analysis for residential developments, neighborhoods and communities that are located within the block groups that meet or exceed the EJ thresholds and would be potentially affected by the project consistent with the provisions of the Executive Order on Environmental Justice 12898.

### 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 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

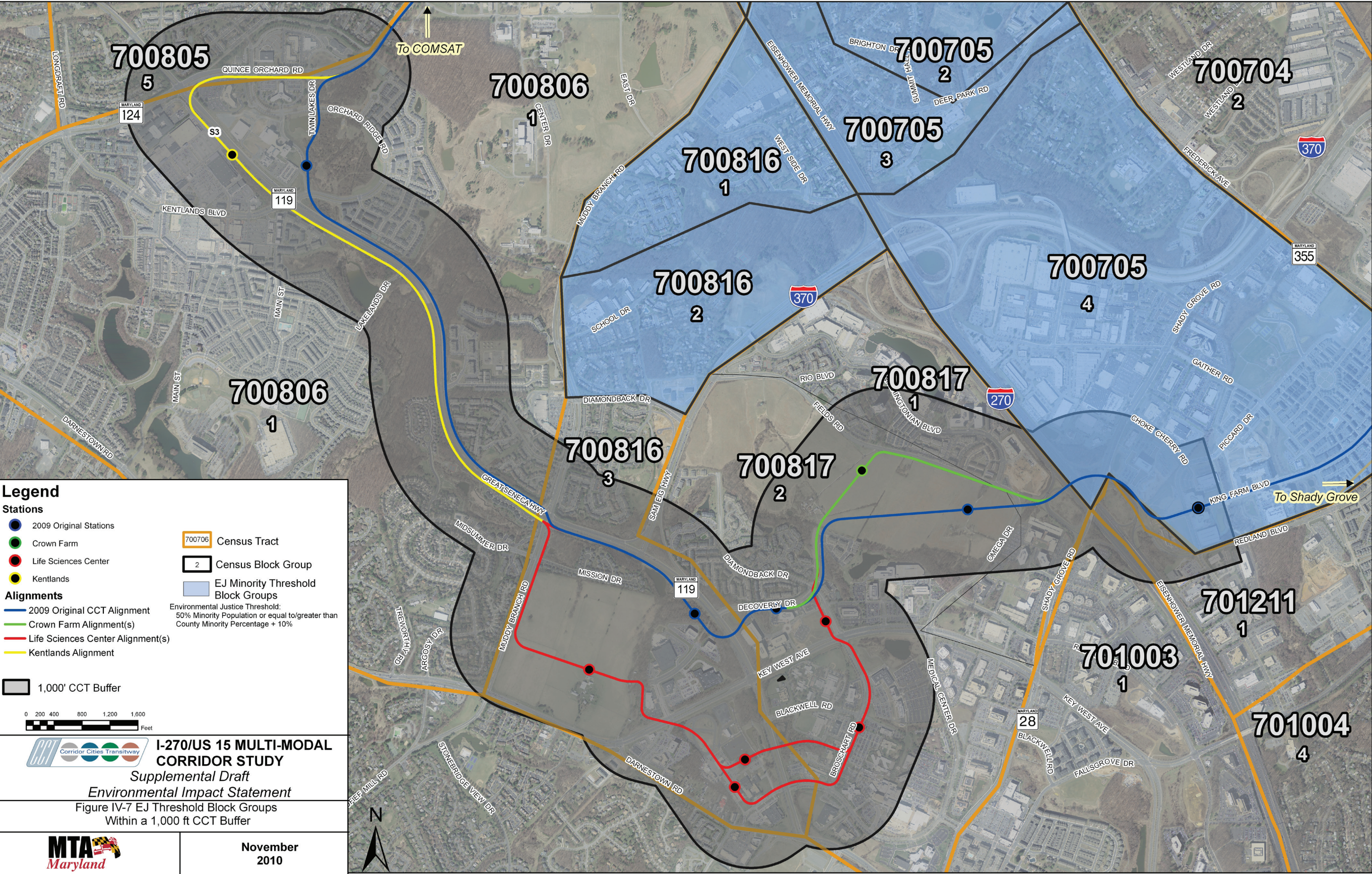
**Table IV-9: Low-Income Population Data for Study Area Block Groups**

| CENSUS TRACT/<br>BLOCK GROUP | TOTAL POPULATION | LOW-INCOME<br>POPULATION | PERCENT<br>LOW-INCOME<br>POPULATION | MEETS<br>LOW-INCOME EJ<br>THRESHOLD |
|------------------------------|------------------|--------------------------|-------------------------------------|-------------------------------------|
| 7007.05 4                    | 756              | 85                       | 11.2%                               | No                                  |
| 7008.05 5                    | 2,739            | 67                       | 2.4%                                | No                                  |
| 7008.06 1                    | 8,799            | 278                      | 3.2%                                | No                                  |
| 7008.16 3                    | 1,499            | 25                       | 1.7%                                | No                                  |
| 7008.17 1                    | 2,192            | 114                      | 5.2%                                | No                                  |
| 7008.17 2                    | 2,242            | 138                      | 6.2%                                | No                                  |
| <b>Study Area Total</b>      | 18,227           | 707                      | 3.9%                                | —                                   |
| <b>Montgomery County</b>     | 873,341          | 47,024                   | 5.4%                                | —                                   |

Source: US Census 2000



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







may be inadequate to fully address the adverse effects to minority and/or low-income communities.

### ***EJ Impacts and Mitigation***

The CCT alignment modifications were analyzed for potential impacts in the following categories on EJ populations within 1,000 feet of the transitway alignments:

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

The potential impacts on the identified EJ areas are discussed by individual impact category.

### ***Effects on Displacements and Relocations 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. One residential and one business displacement were identified, both along the LSC alignment modifications. Neither of these potential displacements is in an EJ area.

If a build alternative is selected as the locally preferred alternative, the number of actual displacements may vary from the info presented above as a result of refinements in both the design and right-of-way requirements.

### ***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 can 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.

The CCT would improve access to communities and other destinations in the corridor by increasing travel options. The transitway would offer one station in an EJ area (Metropolitan Grove station) and one potential

O&M facility (Metropolitan Grove) in the same EJ area. The addition of this facility and increased options for the communities along the Muddy Branch Road corridor near the communities of Brighton West and Brighton East would increase access to employment areas for EJ populations.

### ***Effects on Economic Activity in EJ Areas***

The CCT would improve public transit 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. This improved access would support economic development and evenly distribute benefits to surrounding communities. The analysis of potential economic effects was done on a broader (regional) geographic scale rather than on a site-specific level.

The CCT 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 expected to benefit from increased access to jobs and other destinations. An additional benefit for EJ communities is transportation choice. Many of the communities have access to local bus and the Shady Grove Metrorail Station. The addition of rapid transit service on the CCT corridor would provide additional service options along the Muddy Branch Road corridor.

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 (Source: *Impacts of Rail Transit on Property Values*, located on the web at <http://www.apta.com/research/info/briefings/documents/diaz.pdf>).

If a build alternative is selected as the Locally Preferred Alternative, 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 owners or renters in the vicinity of the stations or owners who want to stay and cannot afford the higher property taxes or rents.

#### **Effects on Visual Conditions in EJ Areas**

The CCT would have moderate visual effects since it would travel mostly at ground level. There are several locations where above-grade crossings are being considered including Great Seneca Highway at Muddy Branch Road and Quince Orchard Road at Copper Road. 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 Metropolitan Grove Station and O&M facility would add new visual elements and public activity centers within EJ areas. Specific Census data for this area are included in the 2009 AA/EA. The Metropolitan Grove O&M facility would be out of direct sight from the general viewshed, however, design decisions regarding lighting and other elements have not yet been determined. This site is 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 project. The transitway facilities would be designed to be visually compatible with the surrounding areas. The extent of potential visual effects on EJ areas would not be considered a “disproportionately high and adverse impact” under the EJ guidelines.

#### **Effects of Noise and Vibration in EJ Areas**

Potential noise effects from the project would occur in isolated areas throughout the CCT study corridor. Moderate and severe noise impacts were identified at five locations within the CCT study area for the proposed modified alignments.

Estimates of future noise were completed at 22 locations along the CCT corridor to determine the noise impacts of the alignment modifications and O&M sites. One of these locations, near the proposed Metropolitan Grove

O&M facility, is located in an EJ area. Noise modeling for this area under all build alternatives (BRT and LRT) show no impact. Therefore, no EJ areas near the transitway alignments or associated facilities are expected to be impacted using federal noise criteria.

#### **Effects on Traffic and Transportation in EJ Areas**

Traffic studies in the CCT corridor determined that two moderate impacts would occur at signalized crossings; neither are located in EJ areas. Evaluation of the Metropolitan Grove O&M facility, which is located in an EJ area, determined that operations in the area in the 2030 build condition for all alternatives (BRT and LRT) would not impact traffic negatively as all intersections would have a level of service (LOS) of D or better during peak conditions.

Residents and employees in the corridor, including those located 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 options in the area.

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.

During construction, 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 and coordinated with local jurisdictions and scheduled to minimize traffic delays and interruptions to the maximum extent possible. A Transportation Management Plan will be developed during the final design phase. After mitigation, minor traffic or transportation effects on adjacent communities, including the EJ areas, are expected from the transitway alignments and associated facilities. The extent of potential traffic effects on EJ areas would not be considered a “disproportionately high and adverse impact” under the EJ guidelines.

### Conclusion

The analysis identified those block groups where the minority or low-income populations met the EJ threshold within the 1,000-foot study area limits and adjacent to those areas where EJ populations might be impacted. To the extent they have been studied, 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 do not present an adverse impact. Therefore there would not be a “disproportionately high and adverse impact” under the EJ guidelines.

### Public Involvement

In general, support of public involvement activities from a community-wide perspective included outreach by the Multi-Modal Corridor Study project team to the general public through media, the project website, community events and several public meetings and hearings. The team also contacted public and private social service agencies, community action and religious organizations, schools and libraries to request additional information to supplement census data regarding the location and needs of EJ populations. The project team contacted these organizations through letters anticipating that groups would offer information on existing, targeted, local community outreach programs and possess knowledge of specific locations of EJ populations in 2006 and in 2007. As a result of limited feedback from the initial effort, the team launched a strategic environmental justice outreach and education program in March 2009.

The project team identified community locations and neighborhood gathering places on a base map with census tracts that showed higher concentrations of minority and low-income populations. Over several months, the team completed neighborhood field assessments and conducted in-person and telephone interviews with grassroots organizations, planners and residents.

In addition, bilingual (English and Spanish) bus placards, flyers and announcements were developed and displayed in EJ residential and business service areas including the Upcounty Regional Services Center, food banks, shelters and other facilities. Religious organizations and schools located within census tracts that exhibited higher than countywide averages for minority and low-income populations received the bilingual project flyer explaining the project, publicizing the 2009 AA/EA Public Hearings, and offering them the opportunity to meet and discuss the project with the project team. Over 600 flyers were delivered to Summit

Hall Elementary School and Fox Chapel Elementary for kindergarten through third grade in these EJ areas.

The team also contacted or attempted to contact those included on the 2008 EJ Contact List. This list was developed in 2006 to assist with the outreach letters to community groups and advocates. Three surveys were created to assist with this effort, focusing on the religious community, neighborhood groups and advocates. Of the 135 EJ contacts listed, the team reached 105 people and organizations.

The team also coordinated several community briefings and presentations for several Frederick County Neighborhood Advisory Councils (NACs) in EJ areas, the communities of Brighton West, Brighton East and Fireside including one fully bilingual presentation, and hosted a booth at a Hispanic Chamber of Commerce event. Current outreach activities also include grocery store outreach.

In addition to the above activities, the team also conducted outreach at MARC and Metrorail stations within the corridor, including the Frederick and Monocacy MARC Stations, Metropolitan Grove and Germantown MARC Stations and the Shady Grove Metrorail Station.

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 the 2009 AA/EA public hearings for this project were advertised in the following:

- *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. Additional outreach included meetings with the homeowners associations and civic associations in the corridor.

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 CCT alignment.

If a build alternative is selected as the locally preferred alternative for transportation improvements, MTA will coordinate with the affected communities to develop a mitigation program, if needed, to meet the needs of EJ areas prior to final project approval. The MTA 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.

## Economic Environment

### Existing Conditions

Both of the proposed O&M sites, as well as each of the proposed alignment modifications, including new station locations, would operate in the same economic environment described in the 2009 AA/EA and the 2002 DEIS. While more up-to-date employment numbers are available now, the general characteristics of the economy of the I-270/US 15 corridor and the surrounding economic region of which it is a part still apply.

The updated employment estimate for Montgomery County is 510,000 jobs – 10,000 more than the 2005 estimate.

In addition, the projected future employment figures have been updated as part of the revised employment and population projections developed by the Metropolitan Washington Council of Governments (MWCOCG). These updates, known as Round 7.2a Cooperative Forecasts, were approved on October 14, 2009. Round 7.2a figures are used in the modeling efforts that produced the ridership projections described in **Chapter III**. Forecasted 2040 employment for Montgomery County is estimated to be 723,000, representing 42 percent growth (213,000 more jobs) compared to 2010.

## Economic Impacts

Because the alignment modifications are relatively minor and the location of an O&M facility is relatively inconsequential from a broad economic perspective, the economic impacts will be generally the same as those described in the AA/EA and the 2002 DEIS. Overall, as stated in the AA/EA, the build alternatives will create relatively small positive economic development effects when compared with the large amount of economic growth that is forecasted to occur in the project area with or without the project.

### Impacts of Alignment Modifications

Access-related impacts on the economy as described in the AA/EA may be slightly greater with the proposed alignment modifications because the modifications are designed to bring transit stations closer to planned housing, jobs and activity centers, enhancing the potential for accessibility benefits.

By providing mobility choices that make connections between homes, jobs, and shopping opportunities faster, less expensive, or easier, the following benefits of accessibility may be enhanced with the alignment modifications:

- The workforce in the region may experience an increase in productivity (to the extent that less time is spent commuting)
- Local quality of life may be enhanced (to the extent less time or money is spent on transportation)
- Retail locations near future station areas may experience increases in sales
- Development in station areas may occur sooner or be of a higher value or density with the proposed alignment modifications, thus increasing local government tax revenues
- The job-creation effects of project construction will be increased to the extent that the alignment modifications increase project costs (described in **Chapter III**). Job creation derived from ongoing operation and maintenance of the project will be similar with or without the alignment modifications and regardless of the selection of a site for the O&M facility.

### Impacts of O&M Site Locations

The impact on the overall economy of an O&M site in one location versus another will be the same.

It should be noted that the impacts described in the AA/EA and the DEIS were impacts of the combined transit and highway components of the original alternatives. The increases in impacts described above would be of a smaller scale, representing only a part of the impact of the transit component alone.

### Avoidance, Minimization and Mitigation

No mitigation is necessary as overall benefits are expected to be positive.

## Cultural Resources

### Existing Conditions

Cultural resources include historical, architectural and archaeological sites. The 2009 AA/EA identifies and describes cultural resources found within the Area of Potential Effect (APE) of the Original CCT Alignment (see **Figure IV-8**). Both of the O&M sites are located within this APE buffer, however some of the proposed alignment modifications extend outside of the APE.

**Chapter IV** of the **2009 AA/EA** provides a detailed summary of the regulatory framework and methodology for cultural resources. A summary of all consultation that has been done to date related to Section 106 of the National Historic Preservation Act of 1966, is also included in this section.

### Impacts

The S1 alignment crosses part of the England/Crown Farm (Maryland Inventory of Historic Places #M: 20-17), which is a National Register – eligible historic site. This resource is referred to as Crown Farm throughout this document.

S2 and S2c both cross part of the proposed National Register boundary for the Ward House (Maryland Inventory of Historic Places #M: 20-21) on the grounds of Belward Farm. Impacts to these two historic properties are discussed in more detail in **Chapter V, Section 4(f)**.

In addition to historic sites, it is possible that the alignment modifications may also disturb archaeological resources given the long history of human habitation in the area.

The areas of proposed alignment modifications will require additional archaeological research and review if one or more of them is selected as part of the Locally Preferred Alternative. Further archaeological investigation will also be required on the remaining approximately 12 miles of the corridor not associated with the Gaithersburg area alignment modifications.

## Natural Environment

### Topography, Geology and Soils

#### Existing Conditions–Topography

Much of the topographic landscape within the Gaithersburg area of the CCT has been manipulated for development, such as the filling of historic wetlands along streams, raised berms for highways, and grading of topographic relief for the urban street grid. The undeveloped areas within the stream valleys of Muddy Run and its tributaries have base elevations of 335 feet while other areas are more rolling with the highest elevation at 475 feet above sea level (USGS 1985).

Topography associated with the Observation Drive and Metropolitan Grove O&M sites remains unchanged since the 2002 *Natural Environmental Technical Report for the I-270/US 15 Multimodal Study* (NETR).

#### Existing Conditions–Geology

The existing conditions for geology have not changed since the 2002 NETR. Refer to the 2002 NETR for a description.

#### Existing Conditions–Soils

Several of the soil series identified within the 2002 NETR are the same as those identified within the Gaithersburg area of the CCT corridor due to the project's close proximity to the Original CCT Alignment as shown in **Table IV-10** and **Table IV-11**. Detailed descriptions of those soil series can be found in the 2002 NETR. The new alignments within the Gaithersburg area of the CCT corridor traverse three additional soil series not previously discussed in 2002 NETR or other subsequent documents. Those soil series include Travilah silt loam (37B), Urban Land-Wheaton complex (67UB), and Urban Land (400).



### Existing Conditions—Prime Farmland Soils and Farmland of Statewide or Local Importance

The county lists for prime farmland and farmland of statewide or local importance for Montgomery County were obtained from the United States Department of Agriculture National Resources Conservation Service (USDA-NRCS) *Soil Data Mart* (USDA 2010). **Figure IV-9** shows a map of the prime farmland soils and soils of statewide importance within the Gaithersburg area of the CCT corridor.

The Glenelg silt loam with three to eight percent slopes (2B) is the only prime farmland soil identified within the Gaithersburg area of the CCT corridor. Occoquan loam (17B), another prime farmland soil, is within the Observation Drive O&M site. The detailed description of this soil series can be found within the 2002 NETR.

The proposed alignment modifications to the CCT corridor traverse three soils series identified as farmland of statewide importance that include Gaila and Glenelg

**Table IV-11: Soil Series within the O&M Facility Sites**

| MAP UNIT                | SOIL SERIES                           | SLOPE  |
|-------------------------|---------------------------------------|--------|
| Metropolitan Grove      |                                       |        |
| 1C                      | Gaila silt loam                       | 3-8%   |
| 2B                      | Glenelg silt loam                     | 3-8%   |
| 66UB                    | Wheaton-Urban land complex            | 0-8%   |
| West Old Baltimore Road |                                       |        |
| 16D                     | Brinklow-Blocktown channery silt loam | 15-25% |
| 17B                     | Occoquan loam                         | 3-8%   |
| 17C                     | Occoquan loam                         | 8-15%  |

Source: USDA, 2010

**Table IV-10: Soil Series within the Gaithersburg area of the CCT Corridor**

| MAP UNIT | SOIL SERIES                           | SLOPE  |
|----------|---------------------------------------|--------|
| 1C       | Gaila silt loam                       | 3-8%   |
| 2B       | Glenelg silt loam                     | 3-8%   |
| 2C       | Glenelg silt loam                     | 8-15%  |
| 5A       | Glenville silt loam                   | 0-3%   |
| 6A       | Baile silt loam                       | 0-3%   |
| 16D      | Brinklow-Blocktown channery silt loam | 15-25% |
| 35B      | Chrome and Conowingo                  | 3-8%   |
| 35C      | Chrome silt loam                      | 8-15%  |
| 37B      | Travilah silt loam                    | 8-15%  |
| 54A      | Hatboro silt loam                     | 0-3%   |
| 66UB     | Wheaton-Urban land complex            | 0-8%   |
| 67UB     | Urban land-Wheaton complex            | 0-8%   |
| 400      | Urban Land                            | N/A    |

Source: USDA, 2010

silt loam with eight to 15 percent slopes (1C and 2C) and Travilah silt loam with three to eight percent slopes (37B). The Gaila and Glenelg soils series are described in detail in the 2002 NETR. The Travilah series consists of moderately deep, somewhat poorly drained soils with moderately slow permeability. They formed in residuum that weathered from serpentine in the Piedmont Plateau.

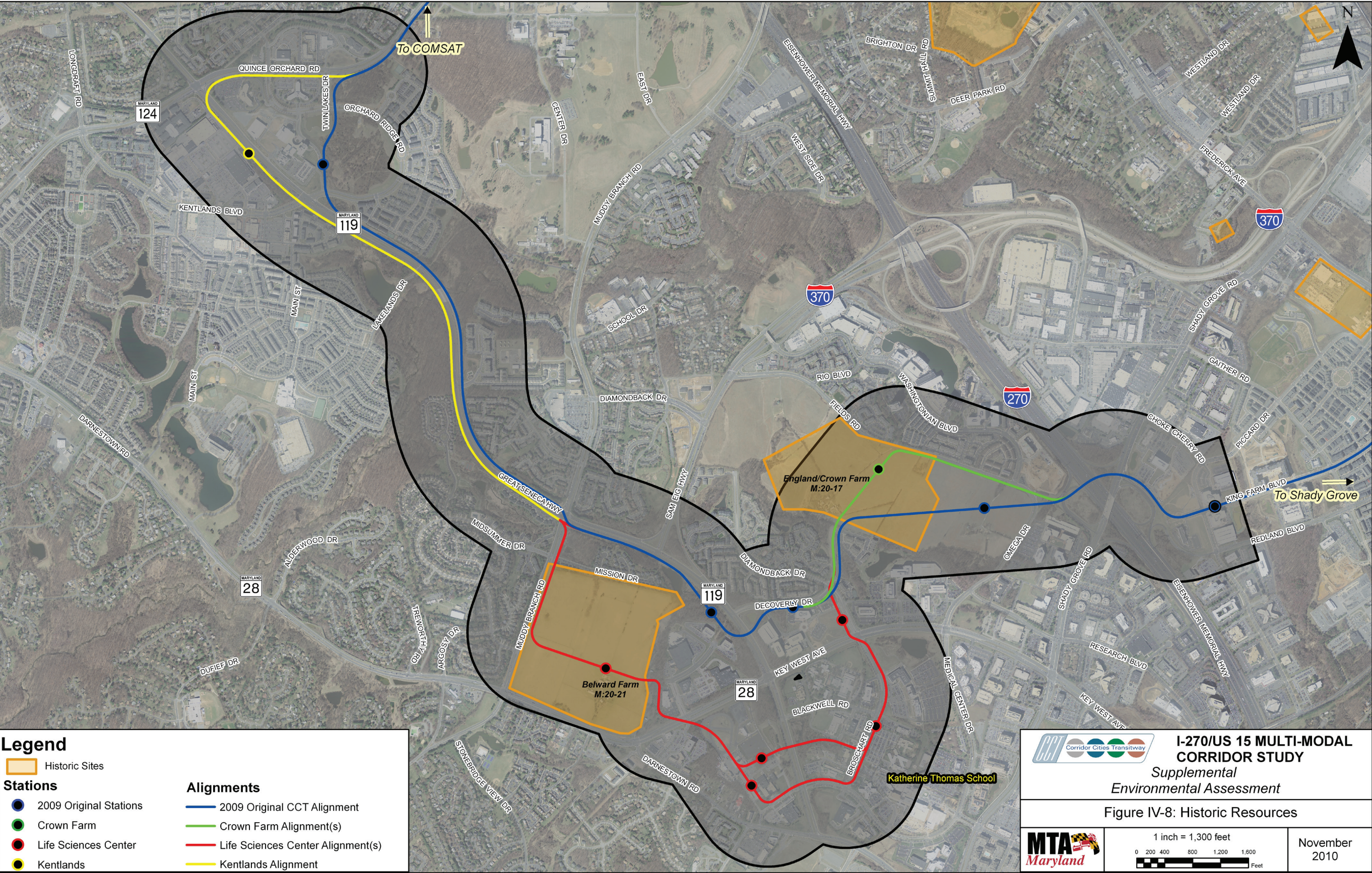
### Impacts—Topography

Topographic impacts from each of the alignment modifications are expected to be minimal. The alignments will either maintain the existing topography, as some of them occur within existing roadways or, in most cases, parallel the roadway or require grading that would amount to a relatively small incremental change to the existing topography. Changes to topography would occur primarily from reconfiguring existing roadways to support aerial crossings and tunnel options, as well as widening the existing roadway.

The Crown Farm Alignment would have the least effect on topography. The Life Sciences Center Alignment would have the greatest effect on topography due to possible tunnel options, which would be constructed using the “cut and cover” method, along with underground boring machines and possibly blasting, if rock is encountered.



Figure IV-8: Historic Resources







### O&M Facilities

The Observation Drive site would require extensive grading to make the site level as it is currently situated at the top of a hill.

Minimal grading would be required for the paved portions of the Metropolitan Grove site; however, a portion of the site is located on a steep hillside that would require extensive grading and fill to accommodate the infrastructure of an O&M facility.

### Impacts–Geology

Effects on study area geology would be greatest for the Life Sciences Center alignments due to the tunnel options. All of the tunnel options could affect the geologic resources in the corridor, although these changes would be limited to the tunnel section itself where rock would be bored and removed for construction of the tunnel.

### O&M Facilities

Minimal impacts to geologic resources are anticipated for the Metropolitan Grove site. Depending on the depth of grading required for the Observation Drive site, geologic resources may be impacted.

Detailed geotechnical investigations will be undertaken in later phases of the project to determine the specific nature of the geologic formations within the tunnel sections. This information will be used for design of the tunnel sections and for development of construction techniques tailored to the specific geologic conditions in the corridor.

### Impacts–Soils

Because of the urbanized nature of the study area, the majority of soils potentially affected by the project have already been disturbed, manipulated, or covered by development. Additional soil disturbances would occur for all of the proposed alignments. Other potential impacts that could occur include changes to drainage patterns within or adjacent to the right-of-way. However, these effects should be minimal and reduced by required Stormwater Management (SWM) facilities.

Soil types and their limitations for construction will be evaluated in detail during later phases of the project. Detailed geotechnical investigations will be conducted to determine specific soil characteristics along the selected alignment so that construction techniques and

environmental safeguards can be developed to address any limitations. To minimize potential effects from soil disturbances, proper slope and soil stabilization techniques will be used in work areas, both during and after construction, to prevent potential 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*.

### Impacts–Prime Farmland Soils and Farmland of Statewide or Local Importance

A majority of the areas surrounding the alignment modifications that are designated as potential prime farmland soils and farmland of statewide and local importance are already developed. Once developed these soils are no longer considered prime farmland and farmland of statewide or local importance.

Impacts to both categories of farmland soils are shown in **Table IV-12**.

#### Crown Farm Alignment (S1)

The Crown Farm alignment could impact between 5.20 and 6.21 acres of prime farmland soils and between 0.29 and 1.63 acres of farmland soils of statewide and local importance. A majority of these impacts would occur within the Crown Farm. For this discussion there are two possible Crown Farm alignments, as S1 can connect to either S2/S2c or to the Original CCT Alignment, with each connection impacting a different amount of farmland soils. The S1 to LSC alignment option would have the most impact to prime farmland soils and to farmland soils of statewide or local importance compared to the S1 to Original CCT Alignment.

#### Life Sciences Center Alignment Options (S2 and S2c)

The Life Sciences Center alignments could impact between 8.43 and 8.75 acres of prime farmland soils and 1.05 acres of farmland soils of statewide or local importance. The S2c alignment option would have a slightly larger effect on prime farmland soils.

#### Kentlands Alignment (S3)

The Kentlands Alignment would impact 3.75 acres of prime farmland soils and 3.40 acres of farmland soils of statewide or local importance.



### **O&M Facilities**

The O&M facilities would have a larger effect on prime farmland soils than any of the CCT alignment modifications being considered. The Observation Drive site could impact 12.76 acres of prime farmland soils and 2.20 acres of farmland soils of statewide or local importance. The Metropolitan Grove site could impact 10.19 acres of prime farmland soils and 1.73 acres of farmland soils of statewide or local importance.

### **Avoidance and Minimization**

The linear nature of the proposed CCT alignment modifications and the extensive coverage of the study area by prime farmland soils and farmland soils of statewide or local importance makes complete avoidance impossible. The impacts associated with the alignments 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 County show that many areas presently in agricultural use are zoned for development.

A Farmland Conversion Impact Rating form, in accordance with the Farmland Protection Policy Act

(FPPA), was completed for this project and submitted to the Natural Resources Conservation Service for Montgomery County. Should any of the alignment modifications become part of the LPA, this form will be revised and resubmitted as appropriate.

## **Groundwater**

### **Existing Conditions**

There are no changes to existing groundwater conditions since the 2002 DEIS and 2007 NETR.

### **Impacts**

The Alignment options and the proposed O&M facilities are not expected to substantially affect groundwater within the project areas. These alignments and O&M facilities would be completely constructed on the ground surface and only minor changes to the movements of the shallow groundwater table are likely during grading and construction. Any runoff would be treated in accordance with MDE guidelines for SWM and released to surface waters.

The Life Sciences Center alignment modifications could affect groundwater as a result of the tunnel components. Tunneling could intercept groundwater resources in the shallow aquifers of the Piedmont. Tunnel boring in the

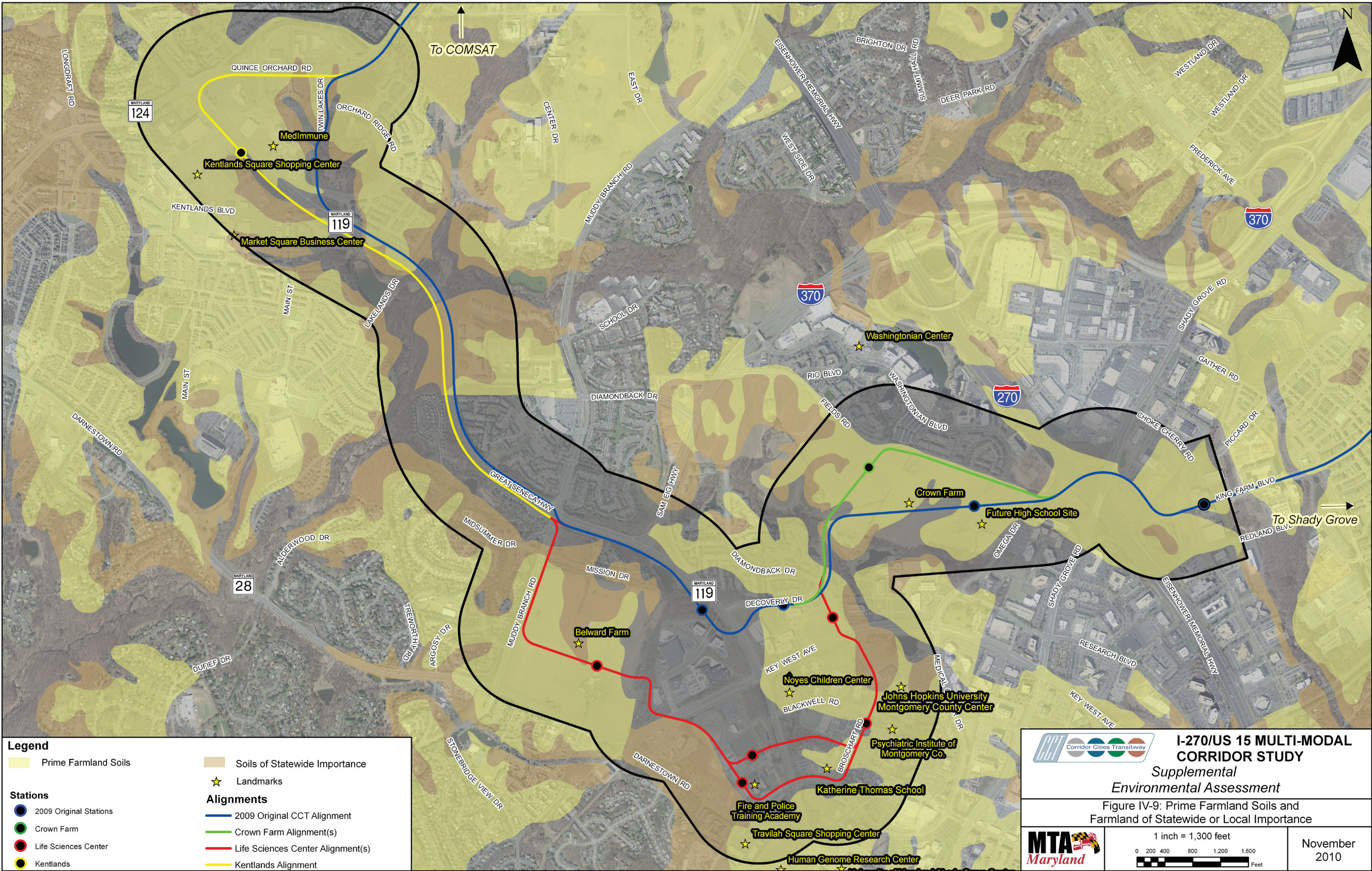
**Table IV-12: Impacts to Prime Farmland Soils and Farmland Soils of Statewide or Local Importance**

| ALIGNMENT  | SEGMENT            | PRIME FARMLAND SOILS (acres) | FARMLAND SOILS OF STATEWIDE OR LOCAL IMPORTANCE (acres) |
|--|--------------------|------------------------------|---|
| Crown Farm Alignment                             | S1 to LSC          | 6.21                         | 1.63  |
|  | S1 to Master Plan  | 5.20                         | 0.29  |
| Range of Impacts for Crown Farm Alignment        |                    | 5.20-6.21 acres              | 0.29-1.63 acres   |
| Life Sciences Center Alignments                  | S2                 | 8.43                         | 1.05  |
|  | S2c                | 8.75                         | 1.05  |
| Total Impacts for Life Sciences Center Alignment |                    | 8.43-8.75 acres              | 1.05 acres  |
| Kentlands Alignment                              | S3                 | 3.75                         | 3.40  |
| Range of Impacts for Kentlands Alignment         |                    | 3.75 acres                   | 3.40 acres  |
| Operation and Maintenance Facilities             | Observation Drive  | 12.76                        | 2.20  |
|  | Metropolitan Grove | 10.19                        | 1.73  |
| Range of Impacts for O&M Facilities              |                    | 10.19-12.76 acres            | 1.73-2.20 acres   |

Source: USDA, 2010



Figure IV-9: Prime Farmland Soils and Farmland of Statewide or Local Importance







Piedmont would likely intercept the rock fractures that are typical of this physiographic province, potentially causing a minor change in localized groundwater paths. These minor changes, however, are not expected to affect overall groundwater flows or quantities.

### **Avoidance, Minimization and Mitigation**

During the geotechnical investigations that would occur in later phases of the project a groundwater testing program would be undertaken to identify any potential groundwater or soil contaminants that could be encountered during tunnel construction.

## **Surface Waters**

### **Existing Conditions**

All methodologies and regulatory context associated with surface waters is described in detail in the 2007 NETR. There are 18 Waters of the US that were flagged within the Gaithersburg area of the CCT corridor. Of these, 10 were identified as perennial streams (WUS1, WUS6, WUS8, WUS14, WUS21, WUS22, WUS24, WUS27, WUS28, and WUS29), four as intermittent streams (WUS5, WUS7, WUS12, and WUS39), and four as ephemeral channels (WUS28, WUS31, WUS33, and WUS40). There are two palustrine, open water systems (W15 and W18) identified within the Gaithersburg area of the CCT corridor and are being described within this section as they are mitigated the same as streams. It should be noted that many of the newly identified resources are associated with the Section 4(f) avoidance alignments and not the primary alignment modifications intended to better serve the future Crown Farm and Belward Farm developments. Streams in the vicinity of the proposed alignment modifications are mapped in **Appendix A**.

There were no Waters of the US located within the proposed Observation Drive and Metropolitan Grove O&M sites. The limits of disturbance for the proposed Metropolitan Grove O&M site has been further refined since the 2007 NETR, excluding most of the streams and wetlands that were initially identified. One previously identified stream (WUS3) is no longer present as the SWM pond upslope of this barely identifiable channel is no longer draining to this area. The channel is not clearly defined and lacks bed and banks, which are the indicators typically used in identifying a perennial or intermittent stream. An ordinary high water mark, a typical indicator of an

ephemeral channel, is barely visible and upon further investigation, dissipates into the upland forest.

All of the surface waters in the study area are classified by the Maryland Department of the Environment (MDE) as Use I. See the Water Quality section in **Chapter III** of the **2002 DEIS** (e.g., **Table III-43**) for further details on Use I streams within the Gaithersburg area of the CCT corridor.

Most of the streams identified within the new alignments of the CCT corridor are first order streams ranging in size from three to six feet wide. The second order streams range in size from three to 12 feet wide. Only one third order stream, Muddy Branch, is present within the new alignments of the CCT corridor. It averages 15 feet in width. The majority of the stream channels within the expanded CCT project area are situated in forested stream valleys that are very disturbed due to the adjacent roadways and surrounding development. The forested stream valley associated with the mainstem of Muddy Branch (WUS1) is less disturbed than most within the project area.

### **Impacts**

Waters of the US are regulated under Section 401 and 404 of the Clean Water Act. Direct impacts to stream channels (**Table IV-13**) would require a permit from the US Army Corps of Engineers (USACE) as part of Section 404 for the discharge of dredge or fill material into project surface waters. A 401 Water Quality Certification is included as part of the Section 404 permit process to ensure that a project will not impact Maryland water quality standards. Any work performed within the waterway will require a waterway construction permit to assure that activities in a waterway or its floodplain do not create flooding of adjacent properties, maintain fish habitat and migration, and ensure that waterways are protected from erosive measures.

Impacts are primarily related to streams that cross perpendicular to the CCT corridor or parallel the existing roadways, and would be affected when existing roads are widened to accommodate the CCT alignments. Impacts to streams that are currently bridged would be temporary as these existing structures would be extended to accommodate widening. In streams where new culverts are proposed the impacts would be permanent.



### Crown Farm Alignment (S1)

The Crown Farm Alignment could impact 88 linear feet of perennial streams with no impacts to intermittent streams or ephemeral channels.

The Original CCT Alignment showed a larger impact to the same stream system than will potentially be impacted by the Crown Farm Alignment. However, since the publication of the 2009 AA/EA, Decoverly Drive was extended and the stream was placed in a twin box culvert reducing the original impact to this stream system.

### Life Sciences Center Alignment (S2 and S2c)

Depending upon which option is chosen, the Life Sciences Center Alignment could impact 51 linear feet of perennial streams and either 0 or 68 linear feet of intermittent streams. Impacts to ephemeral channels range between 78 and 146 linear feet. Impacts to open water areas, mainly SWM ponds, would not occur.

The Original CCT Alignment had higher impacts to perennial/intermittent streams (197 linear feet) compared to the Life Sciences Center alignments. However, impacts to ephemeral channels for the

Original CCT Alignment were lower (80 linear feet) than those anticipated for S2.

### Kentlands Alignment (S3)

The Kentlands Alignment would impact 65 linear feet of perennial streams, 51 linear feet of intermittent streams, and 18 linear feet of ephemeral channels.

The Original CCT Alignment would impact more linear feet of perennial and intermittent streams (1,824 linear feet combined) than the Kentlands Alignment. Also, ephemeral channel impacts are significantly higher in the Original CCT Alignment with approximately 960 linear feet of impact. However, recent development within the northern portion of the CCT corridor has eliminated the ephemeral streams within this area reducing the total impact to 661 linear feet for the Original CCT alignment.

### O&M sites

Impacts to perennial/intermittent streams and ephemeral channels within the Observation Drive and Metropolitan Grove sites are not anticipated.

**Table IV-13: Waterway Impacts**

| ALIGNMENT   | SEGMENT                 | PALUSTRINE<br>OPEN WATER<br>SQUARE FEET<br>(acres) | PERENNIAL<br>STREAMS<br>(linear feet) | INTERMITTENT<br>STREAMS<br>(linear feet) | EPHEMERAL<br>CHANNELS<br>(linear feet) |
|---|-------------------------|--|---------------------------------------|--|--|
| Crown Farm Alignment                                | S1 to LSC               | 0  | 88                                    | 0  | 0                                      |
|   | S1 to Master Plan       | 0  | 88                                    | 0  | 0                                      |
| Impacts for Crown Farm Alignment                    |                         | 0  | 88                                    | 0  | 0                                      |
| Life Sciences Center Alignments                     | S2                      | 0  | 51                                    | 68                                       | 146                                    |
|   | S2c                     | 0  | 51                                    | 0  | 78                                     |
| Range of Impacts for Life Sciences Center Alignment |                         | 0  | 51                                    | 0-68                                     | 78-146                                 |
| Kentlands Alignment                                 | S3                      | 0  | 65                                    | 51                                       | 18                                     |
| Range of Impacts for Kentlands Alignment            |                         | 0  | 65                                    | 51                                       | 18                                     |
| Operation and Maintenance Facilities                | Observation Drive       | 0  | 0                                     | 0  | 0                                      |
|   | Metropolitan Grove Road | 0  | 0                                     | 0  | 0                                      |
| Impacts for O&M Facilities                          |                         | 0  | 0                                     | 0  | 0                                      |

Source: USDA, 2010

### Avoidance and Minimization

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 to the proposed CCT alignments. However, impacts have been avoided or minimized wherever possible through the realignment of the transitway. Investigations of further avoidance and minimization measures are ongoing and will continue throughout all phases of engineering design for the project.

During the final design phases of the project, bridges and culverts will be sized to maintain the geomorphic stability of the stream channels as bankfull and flood-prone elevations are evaluated. Consideration will be given to the full range of crossing options including bridging and culvert designs such as bottomless arch and depressed culverts that allow for the maintenance of a natural stream bottom and reduce the risk of creating barriers to fish movement.

Short-term construction impacts will be minimized through strict adherence to MDE erosion and sediment control procedures and stormwater management regulations. These procedures include the use of BMP and structural controls such as the minimization of exposed soils through vegetative cover, use of contouring and diversion to reduce water velocities, routing of runoff to retention basins and installation of control structures such as sediment fences. For Use I surface waters, in-stream work may not be conducted during the period March 1 through June 15, inclusive, during any year. Stormwater management plans will be in compliance with MDE requirements and will be designed to treat both quantity and quality of stormwater runoff prior to discharge into receiving waters.

### Scenic and Wild Rivers

#### Existing Conditions

There are no scenic and wild rivers within the new alignment modifications under discussion or within the proposed O&M sites.

#### Impacts and Avoidance/Mitigation

Impacts to scenic and wild rivers are not anticipated, and thus no mitigation or avoidance is needed.

### Waters of the US Including Wetlands

#### Existing Conditions

All Waters of the US, including wetlands, were identified and flagged within the new alignments in the Gaithersburg area of the CCT corridor and the Observation Drive and Metropolitan Grove O&M sites using USACE regulatory guidance and *Corps of Engineers Wetland Delineation Manual* (USACE 1987). All other methods associated with the wetland delineation and waterway identification are discussed in detail in the 2007 NETR.

Due to the overlap in location between the Original CCT Alignment and the new alignment modifications within the Gaithersburg area of the CCT corridor some of the wetlands and waterways previously flagged during the 1998 and 2006 wetland delineations are also located within the right-of-way of the new CCT alignment modifications. These overlap areas were re-delineated in an effort to update any changes that may have occurred since the 1998 and 2006 delineations, including reclassifying wetlands that have transitioned to a different vegetative condition (e.g., an emergent wetland that has since converted to a scrub-shrub condition). All wetlands and waterways within the new alignments of the CCT corridor were delineated in May 2010.

Wetland functions were evaluated for each wetland system located within or in close proximity to the CCT project area that are greater than one-half acre using the Evaluation for Planned Wetlands (EPW) method. This methodology is described in detail in the 2002 NETR. The six major wetland functions evaluated by the EPW method include shoreline bank erosion control, sediment stabilization, water quality, wildlife, fish in non-tidal stream/river or pond/lake, and uniqueness/heritage.

For wetlands that did not exceed the one-half acre threshold wetland functions and values were evaluated using best professional judgment. General guidance on the types of functions and values discussed (groundwater recharge/discharge, floodflow alteration, fish and shellfish habitat, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat) can be found in the *Highway Methodology Workbook* (USACE 1999).



A jurisdictional determination (JD) for the wetlands and waterways within the footprints of the modified alignments and two O&M sites was held on July 27, 2010 with the USACE and MDE. The JD involves a field review by the regulatory agencies to finalize the boundaries and jurisdictional nature of the resources presented in this SEA. Since the 2009 AA/EA, additional guidance has been developed on jurisdictional determinations in light of the Supreme Court decision in *Rapanos v. US*, 126 S. CT. 2208 (2006), which limited the USACE's jurisdiction over ephemeral channels and some other wetland features. Based on this case, the USACE will continue to take jurisdiction over the following resources:

- Traditional navigable waterways (TNWs)
- Wetlands adjacent to TNWs
- Non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least three months out of the year
- Wetlands that abut such tributaries

However, the agencies will determine jurisdiction on a case-by-case basis over the following waters after an analysis has been performed to determine whether they have a significant nexus with a TNW:

- Non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary

A significant nexus evaluation (SNE) will be required to assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream TNWs. All jurisdictional determinations (JDs) with a significant nexus evaluation will be reviewed by the USEPA before a JD will be issued for the project.

A total of 42 numbered wetlands and waterways are located within the expanded CCT project area, which includes the Observation Drive and the Metropolitan Grove O&M sites. Wetland and waterway

characteristics are described in the summary table included in **Appendix B**. Of these numbered systems, 25 wetlands and 17 waters of the US were identified. It should be noted that many of the newly identified resources are associated with the Section 4(f) avoidance alignments (discussed in Chapter V) and not the primary alignment modifications (S1, S2, S2c and S3), which are intended to better serve the future Crown Farm and LSC/Belward Farm developments.

The expanded CCT study area traverses several tributaries and their associated wetlands that ultimately drain to Muddy Branch. A majority of the streams within the project area are classified as perennial (ten), followed by intermittent (four) and ephemeral (four), respectively. The perennial and intermittent streams, including ephemeral channels within the CCT project area, are discussed in the Surface Waters section of this document.

The 27 wetlands identified within the Gaithersburg area of the CCT corridor include palustrine emergent wetlands (W9, W10, W11, W13, W16, W19, W23, W25, W30, W36, W37, W41), palustrine scrub-shrub wetlands (W2, W3, W4, W16, W17, W34, W38, W42), palustrine open water wetlands (W15, W18, W23, W26) and palustrine forested wetlands (W20, W32, W35). These areas generally consist of floodplains, hillside groundwater seeps, and stormwater management ponds adjacent to roadways and housing developments.

No wetlands or waterways were identified within the Observation Drive O&M site. One wetland pond (W42) was flagged within the Metropolitan Grove O&M site.

The wetlands within the Gaithersburg area of the CCT corridor consist of three main types of wetlands:

- Larger, undisturbed wetlands within forested stream valleys or agricultural tracts
- Vegetated/unvegetated stormwater management ponds
- Fringe wetlands along streams

Many of the wetlands within the CCT project area are located within areas that are not currently developed, including forested stream valleys and the Crown and Belward farm areas. The wetland systems located in the more protected interior of stream valleys or agricultural tracts are generally less-disturbed and more highly

functioning than the wetlands located on the margins where encroaching development and adjacent roadways have caused more disturbance. The less disturbed wetlands include W3, W15, W16, W17, W32, W36, W37, and W38, which may be more highly functioning due to a combination of size (>0.5 acre), maturity, and/or connectivity to streams. According to the EPW method, the principal functions associated with these wetlands rank high for sediment stabilization and water quality, as the wetlands detain and infiltrate storm and floodwaters. Three wetlands (W15, W16, and W17), collectively assessed as one wetland system for the EPW method, were found to rank high for the shoreline bank erosion control due to the presence of an extensive broadleaf cattail (*Typha latifolia*) marsh and root mat that likely serves to stabilize the banks of its associated stream. These wetlands ranked moderate to low for the wildlife functions. While some of the wetlands exhibited a high level of habitat complexity (W3, W32, and W38), virtually all of them lacked important wildlife attractors and physical features such as snags, dense brush, open water and/or upland islands. Furthermore, the broader urban environment within which these wetlands are located tends to isolate wildlife populations by denying them access to other natural areas that may be required as additional habitat.

Several of the vegetated and non-vegetated stormwater management (SWM) ponds flagged within the Gaithersburg area of the CCT corridor provide wetland water quality functions, but at relatively low levels. A number of the SWM wetlands also provide fish habitat but cannot be evaluated using the EPW method due to the presence of fish passage barriers located at the upstream and downstream ends of these ponds. Those SWM wetlands that exceed one-half acre (W19, W23, and W24) can provide a wide range of functions such as water quality, sediment stabilization, wildlife and fish habitat. Wetland 19 is situated just outside of the project area, but its buffer is located within the right-of-way of the new CCT alignments and its connectivity to Wetlands 36 and 37 increases the functions that would otherwise be associated with W19. W19 ranked high for sediment stabilization and water quality and moderate for wildlife. Also located adjacent to a series of roads, parking lots and buildings is W23, which was found to perform similarly to W19 with regard to functional capacity. Wetland 34 is a densely vegetated SWM pond with an interior of emergent vegetation and a scrub-

shrub border. This wetland was found to function optimally in the sediment stabilization and water quality categories, but ranked low in wildlife habitat.

Many of the streams found to occur within the new CCT alignments have been modified by human activity such that they have become disconnected from their associated floodplains. As a result, much of the wetlands occurring along these streams are limited to stream banks and alluvial benches found within the channels. These fringe wetlands (W9, W10, W11, W12, W13, W25, W30) were all very small in nature, none of which exceeded 0.1 acre; therefore, each were assessed for functional value using best professional judgment. These wetlands may provide sediment/shoreline stabilization and floodflow alteration.

### Impacts

Waters of the US, which includes wetlands, are regulated under Section 401 and 404 of the Clean Water Act and the Maryland Non-tidal Wetlands Protection Act. The discharge of dredge or fill material into project area wetlands will require a Section 404 permit from the USACE. Any alteration of non-tidal wetlands within the project area will also require a Section 401 Water Quality Certification.

The majority of the impacts are discussed by alignment, which may incorporate multiple design options as part of the overall impact analysis for each alignment. The impacts to palustrine forested, scrub-shrub, and emergent wetlands areas are minimal with any combination of alignment options chosen, totaling less than once acre of impact to vegetated wetlands as shown in **Table IV-14**.

### Crown Farm Alignment (S1)

Depending on which options are chosen through the Life Sciences Center, the Crown Farm Alignment could potentially impact 0.004 acre of emergent wetlands. Impacts to forested and scrub-shrub wetlands are not anticipated as part of this alignment.

The Original CCT Alignment showed a larger impact to the same wetland area that will potentially be impacted by the Crown Farm Alignment. The Original CCT Alignment would impact 0.31 acre of emergent wetlands and 0.03 acre of forested wetlands. However, since the publication of the 2009 AA/EA, the development of this area has decreased the forested



**Table IV-14: Impacts to Waters of the US, Including Wetlands**

| ALIGNMENT   | SEGMENT            | PEM<br>SQUARE FEET<br>(acres) | PSS<br>SQUARE FEET<br>(acres) | PFO<br>SQUARE FEET<br>(acres) |
|---|--------------------|-------------------------------|-------------------------------|-------------------------------|
| Crown Farm Alignment                                | S1 to LSC          | 158.16<br>(0.004)             | 0                             | 0                             |
|   | S1 to Master Plan  | 158.16<br>(0.004)             | 0                             | 0                             |
| Impacts for Crown Farm Alignment                    |                    | 0.004 acres                   | 0                             | 0                             |
| Life Sciences Center Alignments                     | S2                 | 3,398.06<br>(0.08)            | 12,276.13<br>(0.28)           | 4,414.50<br>(0.10)            |
|   | S2c                | 702.82<br>(0.02)              | 0                             | 4,413.06<br>(0.10)            |
| Range of Impacts for Life Sciences Center Alignment |                    | 0.02-0.08 acres               | 0-0.28 acres                  | 0.10 acres                    |
| Kentlands Alignment                                 | S3                 | 0                             | 3,322.71<br>(0.08)            | 0                             |
| Range of Impacts for Kentlands Alignments           |                    | 0 acres                       | 0.08 acres                    | 0                             |
| Operation and Maintenance Facilities                | Observation Drive  | 0                             | 0                             | 0                             |
|   | Metropolitan Grove | 0                             | 7,405.20<br>(0.17)            | 0                             |
| Range of Impacts for O&M Facilities                 |                    | 0                             | 0.17 acres                    | 0                             |

and emergent wetland areas that once resided in this location.

#### **Life Sciences Center Alignment (S2 and S2c)**

The Life Sciences Center Alignment could potentially impact between 0.02 and 0.08 acre of emergent wetlands, while impacts to scrub-shrub wetlands would range from zero to 0.28 acre. Impacts to forested wetlands would be 0.10 acre.

The Life Sciences Center Alignment impacts more numbered wetland systems than the Original CCT Alignment. The Original CCT Alignment would impact 0.33 acre of emergent wetland with no scrub-shrub or forested wetland impacts.

#### **Kentlands Alignment (S3)**

The Kentlands Alignment would not impact emergent wetlands or forested wetlands and would potentially impact 0.08 acres of scrub-shrub wetlands.

The Original CCT Alignment traversed fewer numbered vegetated wetland areas compared to the

Kentlands Alignment within this portion of the project area, impacting 0.03 acre of scrub-shrub wetlands.

#### **O&M Sites**

Impacts to wetlands within the Observation Drive site are not anticipated. However, approximately 0.17 acre of scrub-shrub wetlands located within a SWM facility would be impacted by the Metropolitan Grove site.

#### **Avoidance and Minimization**

In accordance with federal and state regulations, efforts to avoid and minimize impacts to wetlands and other Waters of the US are ongoing. Avoidance and mitigation will continue through later phases of the project when an alignment has been selected and when more detailed design refinements can be employed to further minimize impacts.

Preliminary engineering designs will continue to be refined to address avoidance and minimization of impacts as will the practicability and effectiveness of using measures such as retaining walls, steeper fill slopes, and

reduced roadway sections. This process will continue through all phases of design and construction planning.

### Non-Tidal Wetlands of Special State Concern

There are no Non-Tidal Wetlands of Special State Concern within the new alignments of the CCT project area. Impacts to Non-Tidal Wetlands of Special State Concern by the proposed alignments are not anticipated; thus no avoidance or mitigation is required.

### Floodplains

#### Existing Conditions

The CCT corridor within the Gaithersburg area traverses the same FEMA designated 100-year floodplains as shown in the 2007 NETR, which include Muddy Branch and one of its larger tributaries that parallels the south side of Great Seneca Highway (mapped in **Appendix A**).

#### Impacts

Streams in the vicinity of the proposed alignment modifications are mapped in **Appendix A**. Any construction within the 100-year floodplain (**Table IV-15**) will require a Waterway Construction Permit from the MDE. The placement of substantial amounts of

fill in floodplain areas is not anticipated for the at-grade components of the alignment modifications. However, fill may be placed in the 100-year floodplain in areas where the existing road berm may need to be extended to support the placement of aerial structures, which includes widening of existing bridges such as the one over the mainstem of Muddy Branch, and the construction of grade separations.

#### Crown Farm Alignment (S1)

The Crown Farm Alignment is not anticipated to impact any 100-year floodplains.

#### Life Sciences Center Alignments (S2 and S2c)

The two Life Sciences Center alignment modifications could potentially impact 0.29 acre of the 100-year floodplain associated with an unnamed tributary of Muddy Branch.

#### Kentlands Alignment (S3)

The Kentlands Alignment could potentially impact 1.49 acres of the 100-year floodplain associated with the mainstem of Muddy Branch and an unnamed tributary.

#### O&M Sites

Impacts to the 100-year floodplain within the Observation Drive site or the Metropolitan Grove site are not anticipated.

**Table IV-15: 100-Year Floodplain Impacts**

| ALIGNMENT                                  | SEGMENT            | FLOODPLAIN IMPACT (acres) |
|--|--------------------|---------------------------|
| Crown Farm Alignment                       | S1 to LSC          | 0                         |
|  | S1 to Master Plan  | 0                         |
| Impacts for Crown Farm Alignment           |                    | 0 acres                   |
| Life Sciences Center Alignments            | S2                 | 0.29                      |
|  | S2c                | 0.29                      |
| Impacts for Life Sciences Center Alignment |                    | 0.29 acres                |
| Kentlands Alignment                        | S3                 | 1.49                      |
| Impacts for Kentlands Alignment            |                    | 1.49 acres                |
| Operation and Maintenance Facilities       | Observation Drive  | 0                         |
|  | Metropolitan Grove | 0                         |
| Impacts for O&M Facilities                 |                    | 0 acres                   |



### Avoidance and Minimization

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 (H&H) studies will be conducted to determine the appropriate bridge or culvert opening sizes for the various alternatives so that they will not appreciably raise flood levels.

All construction occurring within the FEMA designated 100-year floodplain must comply with FEMA approved local floodplain construction requirements. These requirements consider structural elevations, fill levels, and grading elevations. If, after compliance with the requirements of Executive Order 11988 and 11990 Floodplain Management, and with DOT Order 5650.2 Floodplain Management and Protection, new construction of structures or facilities are to be located in a floodplain, accepted flood proofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, wherever practicable, structures should be elevated above the base flood level rather than filling for culvert placement. If H&H studies indicate that impacts to flood levels will occur, project designs will be changed to avoid the impact or mitigation of the affect will be provided.

### Terrestrial Vegetation

#### Existing Conditions

The CCT corridor in the Gaithersburg area traverses an urban environment that includes mostly developed land interspersed with patches of agricultural land and forest. The portions of the CCT corridor characterized by larger tracts of natural forested habitat (>2 acres) occur within stream valleys that drain Muddy Branch and its associated tributaries. The forested areas that would be intersected by the new CCT alignments are characterized as mid-successional forests in the Tulip Poplar and River Birch-Sycamore associations (Brush et al. 1976). Several of these forested areas are experiencing edge disturbances resulting from encroachment by roadways and residential/commercial land uses. As a

result, several non-native species are dominants within these well developed forested areas including *Alliaria officinalis* (garlic mustard), *Celastrus orbiculatus* (Oriental bittersweet), and *Lonicera japonica* (Japanese honeysuckle). Detailed descriptions of the forest associations can be found in the 2002 NETR.

Two large agricultural tracts, the Crown and Belward farms, are located within the Gaithersburg area of the CCT corridor. Another large farm exists where the Observation Drive O&M site is proposed. These farms, collectively account for more than 325 acres that are at least partially bordered by forest. The remainder of the project area consists of smaller patches of mostly disturbed vegetation that occur along roadsides and near residential and commercial development.

Significant trees with a diameter at breast height (dbh) size of 30 inches or greater or with a diameter that is at least 75 percent of the state champion tree for a given species were not specifically identified within the project corridor during this stage of the planning process. This is consistent with the prior work on the Multi-Modal Corridor Study for this resource.

#### Impacts

Impacts to forested habitats and non-forested habitats, such as managed lawns, landscaped areas, agricultural land and old field habitat, would result from all proposed alignment modifications. These impacts, however, should be relatively minor as the alignments would generally follow within or along existing roadways. In general, impacts to plant communities 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. In many locations, managed lawns and landscaped areas would likely be restored following construction. Effects could also result from the introduction of invasive non-native plant species into undisturbed habitat adjacent to newly impacted sites, however, the majority of the impacts resulting from the alignment modifications will be occurring in areas that are already disturbed and dominated by invasive species. Forested habitat impacts resulting from all of the alignment modifications, as well as the two proposed O&M sites, are shown in **Table IV-16**.

Forests in Maryland are regulated under the Forest Conservation Act, Natural Resources Article, Section 5-1609, Annotated Code of Maryland. Before a sediment and erosion control permit is issued for a project, the Act requires that a Forest Stand Delineation (FSD) and a Forest Conservation Plan (FCP) be submitted and approved by the Maryland Department of Natural Resources (DNR), Forestry Division. A more detailed forest assessment, including preparation of an FSD and FCP, will need to be completed for the project once an alternative has been selected and more detailed design has been completed.

#### **Crown Farm Alignment (S1)**

The Crown Farm alignment modification could potentially impact between 0.27 and 0.38 acres of forest (the larger impact would occur if S1 connects back to the Original CCT alignment instead of S2 or S2c). These impacts occur in forest patches already disturbed due to their adjacency to existing roadways or along the edges of the Crown Farm where the forest has been previously impacted by development.

#### **Life Sciences Center Alignments (S2 and S2c)**

The Life Sciences Center alignment modifications could potentially impact between 2.19 and 3.43 acres of forest. The majority of these impacts would occur within forested areas that are less disturbed due to their

connectivity to wetlands and the floodplain along Great Seneca Highway. Additional impacts would occur to the forests that surround the Belward Farm. The S2c option has the least amount of forest impacts (2.19 acres) due to the fact that it parallels existing roadways, except for where it cuts across the Belward Farm property.

#### **Kentlands Alignment (S3)**

The Kentlands Alignment could potentially impact 7.92 acres of forest. These impacts occur to the forested stream valleys of Muddy Branch and its tributaries.

#### **O&M Sites**

The Observation Drive Site is not anticipated to have any forest impacts. The Metropolitan Grove Site could potentially impact up to 10.66 acres of well developed upland forest.

### **Terrestrial Wildlife**

#### **Existing Conditions**

The presence of terrestrial wildlife within the project area is a function of available habitats. Because of the prevalence of built up land uses in the Gaithersburg area of the CCT, native wildlife species are expected to be primarily restricted to less developed areas, such as the riparian buffers along Muddy Branch and its tributaries and agricultural land bounded by forests.

**Table IV-16: Forest Impacts**

| ALIGNMENT   | SEGMENT            | FOREST (acres)  |
|---|--------------------|-----------------|
| Crown Farm Alignment                                | S1 to LSC          | 0.27            |
|   | S1 to Master Plan  | 0.38            |
| Range of Impacts for Crown Farm Alignment           |                    | 0.27-0.38 acres |
| Life Sciences Center Alignments                     | S2                 | 3.43            |
|   | S2c                | 2.19            |
| Range of Impacts for Life Sciences Center Alignment |                    | 2.19-3.43 acres |
| Kentlands Alignment                                 | S3                 | 7.92            |
| Impacts for Kentlands Alignment                     |                    | 7.92 acres      |
| Operation and Maintenance Facilities                | Observation Drive  | 0               |
|   | Metropolitan Grove | 10.66           |
| Range of Impacts for O&M Facilities                 |                    | 0-10.66 acres   |



However, artificial or man-made habitats such as stormwater management (SWM) ponds and residential yards and hedgerows are also capable of supporting wildlife. Some of the most common wildlife species known to utilize these various habitats are summarized below. Note that due to the adaptability of wildlife living in urban settings, it is expected that many of these species occur to some degree in all of the habitats listed. For an exhaustive list of the birds, mammals, reptiles and amphibians observed or potentially occurring near the alignment modifications, refer to **Table V-3** of the **2002 NETR**.

Forests occurring in the Gaithersburg CCT project area are primarily small in nature. Consequently they are most likely to support wildlife assemblages comprised primarily of generalist species. Those more commonly encountered may include *Odocoileus virginianus* (white-tailed deer), *Didelphis virginiana* (opossum), *Peromyscus leucopus* (white-footed mouse), *Procyon lotor* (raccoon), *Sciurus carolinensis* (gray squirrel), *Accipiter cooperii* (Cooper's hawk), *Colaptes auratus* (Northern flicker), *Sitta carolinensis* (white-breasted nuthatch), *Dumatella carolinensis* (gray catbird), *Cardinalis cardinalis* (Northern cardinal), and *Thryothorus ludovicianus* (Carolina wren).

Wildlife species potentially found within agricultural land, such as the Crown and Belward Farms, include white-tailed deer, raccoon, opossum, white-footed mouse, *Corvus brachyrhynchos* (American crow), *Agelaius phoeniceus* (red-winged blackbird), *Zenaidura macroura* (mourning dove), and *Branta canadensis* (Canada goose). Other species typically found within this habitat, particularly where grasslands or meadows predominate, include *Ammodramus savannarum* (grasshopper sparrow), *Sturnella magna* (eastern meadowlark), *Microtus pennsylvanicus* (meadow vole), *Marmota monax* (groundhog), and *Vulpes vulpes* (red fox). Species that may hunt these fields or use them during the winter include birds of prey such as *Buteo jamaicensis* (red-tailed hawk) and *Falco sparverius* (American kestrel); white-tailed deer; *Passerculus sandwichensis* (savannah sparrow); and *Junco hyemalis* (dark-eyed junco).

Much of the wildlife using those areas classified as developed, such as *Sturnus vulgaris* (European starling) and *Passer domesticus* (house sparrow) are adapted to human-modified environments. Those species

that can inhabit smaller, more disturbed sites with a mix of vegetation types include gray squirrel, *Tamias striatus* (eastern chipmunk), *Baeolophus bicolor* (tufted titmouse), *Poecile carolinensis* (Carolina chickadee), Carolina wren, *Melanerpes carolinus* (red-bellied woodpecker), northern cardinal, *Mimus polyglottos* (northern mockingbird), *Spizella passerina* (chipping sparrow) and *Picoides pubescens* (downy woodpecker).

SWM ponds existing in the Gaithersburg CCT project area are typically located in open areas adjacent to forested stream valleys; therefore they are capable of attracting a variety of species such as those known to utilize the habitat types listed above. Especially prevalent within the aquatic to semi-aquatic environments characteristic of SWM ponds are amphibians and reptiles. Common herpetofauna that might be found to inhabit SWM ponds in the Gaithersburg area include *Lithobates clamitans melanota* (northern green frog), *Lithobates catesbeianus* (American bullfrog), *Anaxyrus americanus americanus* (American toad), *Chrysemys picta picta* (eastern painted turtle), *Chelydra serpentina serpentina* (eastern snapping turtle) and *Nerodia sipedon sipedon* (northern watersnake). Where SWM ponds are located in close proximity to forested riparian zones, other amphibians such as *Lithobates sylvestris* (wood frog), *Hyla versicolor* (gray tree frog), *Pseudacris crucifer* (spring peeper) and *Anaxyrus fowleri* (Fowler's toads) may also occur. Birds commonly occurring within SWM pond habitats include Canada goose and *Butorides virescens* (green heron).

### **Forest Interior Dwelling Species**

As stated previously, the Gaithersburg area of the CCT alignment is located in a developed area that contains primarily small patches of forest. However, one relatively large forest block does exist along the main stem of Muddy Branch at the Great Seneca Creek Highway bridge crossing. This area is a contiguous corridor that extends approximately 1.3 miles north and east from MD 28 to Muddy Branch Road. Although surrounded by housing developments, this area exceeds the minimum acreage and riparian buffer width necessary to be recognized as habitat for Forest Interior Dwelling Species (FIDS) (Jones et al. 2001). Guidance on FIDS and the implications of their potential occurrence in a project area can be found in the 2002 NETR. Some of the more common FIDS that might be found nesting among mature

forest stands along the main stem of Muddy Branch near the new CCT alignment include *Buteo lineatus* (red-shouldered hawk), *Strix varia* (barred owl), *Picoides villosus* (hairy woodpecker), *Dryocopus pileatus* (pileated woodpecker), *Hylocichla mustelina* (wood thrush), *Empidonax virescens* (Acadian flycatcher), *Vireo olivaceus* (red-eyed vireo), and *Seiurus motacilla* (Louisiana waterthrush).

## Impacts

### Alignment Modifications

Because the alignment modifications mostly follow existing roadway alignments, impacts to wildlife resources are anticipated to be minor, and any wildlife corridors would be maintained. Impacts to FIDS habitat are also anticipated to be minor for the same reason. The only areas of forest interior habitat occur within the Muddy Branch stream valley at the Great Seneca Highway bridge crossing. Minor encroachment on the edges of FIDS habitat would minimize impacts to the forest interior compared to what would occur if the alignment options were to bisect undisturbed FIDS habitat.

### O&M Sites

Impacts to the O&M sites are discussed in **Chapter III** of the **2002 DEIS**.

## Avoidance and Minimization

Forest impacts are regulated under the Maryland Reforestation Law. Enacted in 1989 and amended in 1992 the Maryland Reforestation Law was created to preserve existing forested lands and protect Maryland forests from being cleared without replacement. The law requires a one acre-to-one acre replacement of any forested areas that are cleared during construction of State-sponsored projects.

Before replacement is considered every reasonable effort must be made to minimize the cutting or clearing of trees. Only the minimum number of trees may be cut, and best management practices (BMPs) must be used. When prudent minimization efforts have been considered and one acre or more of forest clearing is still required, replacement of the forests must occur on a one-to-one basis. The constructing agency is required to locate state or publicly owned land of equivalent size to be reforested. The DNR is the agency in charge of the reforestation efforts.

Avoidance and minimization efforts to reduce forest impacts are ongoing for all of the alignment modifications. Efforts to minimize impacts include the shifting of alternatives away from large, contiguous blocks of forest and the reduction of fill slopes through the use of retaining walls.

## Aquatic Habitat/Species

### Existing Conditions

#### Muddy Branch Watershed

The Muddy Branch watershed originates in the City of Gaithersburg, east of MD 355. The stream system flows in a southwesterly direction through the Gaithersburg area of the CCT project area to meet the Potomac River. Within the CCT project area Muddy Branch flows generally west through Muddy Branch Stream Valley Park and is bordered by man-made lakes on the northern side. Similar to many of the other tributaries located in the Potomac basin in this portion of Montgomery County, Muddy Branch has been influenced by urbanization, particularly along major historic transportation corridors such as MD 355 and the railroad (Montgomery County Department of Environmental Protection (MCDEP) 1998). Construction associated with the new alignments of the CCT corridor would take place immediately downstream of the headwater areas surrounding Gaithersburg. The CCT corridor and upstream area is highly urbanized and contains a high-level of impervious surface cover. Based on the City of Gaithersburg study (*An Ecological Assessment of Streams in Gaithersburg, Maryland 2001-2002*), land use in the Muddy Branch watershed upstream of I-270 is approximately 60 percent urban, 21 percent agriculture, and 17 percent forest (City of Gaithersburg 2002). In contrast, the lower portion of the watershed where the stream nears the Potomac River is mostly forested within protected parkland.

Stream quality is greatly affected by land use patterns in the watershed. The upper portions of the stream system, which are dominated by residential and commercial/industrial land use types, suffer the effects of uncontrolled urban runoff from areas developed prior to stormwater management regulations. Incised stream channels, bank instability, and poor biological conditions are evidence of these effects. Downstream of Gaithersburg, stream conditions improve to “Fair”, and



then to “Good” in the lower reaches where undeveloped land uses, primarily deciduous forest, provide more favorable stream conditions (MCDEP 2003).

Total Maximum Daily Loads (TMDLs) are a tool used to determine the amount of pollutants entering a waterbody and the ability of that waterbody to assimilate those pollutant loadings. The pollutants can be metals, sediments, toxics, bacteria, or other parameters that are able to be measured to determine stream health. The 2010 integrated 303(d) list does not list a TMDL for Muddy Branch, and in 2002 Muddy Branch was a low priority watershed for TMDL development. However, Clopper Lake, which is within one mile of the CCT project area, has a phosphorus and sediment TMDL of 555 pounds/year and 129 tons/year, respectively (MDE 2002). Muddy Branch and its tributaries are classified as Use I (water contact recreation and the protection of aquatic life) streams as defined by the Code of Maryland Regulations (COMAR).

#### **Aquatic Habitat**

State and local agencies assess aquatic habitat conditions in the field when sampling the benthic macroinvertebrate and fish communities. Within the Muddy Branch Watershed, these state and local agencies include the Maryland Department of Natural Resources (MDNR) and the MCDEP.

The MCDEP habitat assessment approach was adapted and refined by MCDEP from the Environmental Protection Agency (EPA) Rapid Bioassessment Protocols (RBP) (Barbour et al. 1999). This protocol is based on

the quality of velocity/depth regime, epifaunal substrate, embeddedness, sediment deposition, frequency of riffles, channel alteration, channel flow status, bank vegetative protection, bank stability, and riparian vegetative zones.

Habitat scores throughout the Muddy Branch Watershed ranged from “Very Poor” to “Excellent/Good” (MCDEP 2002). In general, sites were often characterized by high scores for instream habitat with moderate scores for sediment deposition, bank stability, and bank vegetative protection. Habitat scores within the upper portion of the Muddy Branch watershed varied from “Very Poor” to “Good”. These streams were characterized by highly eroded banks, increased sediment deposition, and high levels of embeddedness. The habitat impairment in the headwater streams is most likely the result of high levels of impervious cover (26%) and inadequate riparian buffers (MCDEP 1999).

The best descriptor of habitat conditions within the CCT corridor is site MB-1, which was sampled by the City of Gaithersburg in 2002. MB-1 is within the CCT project area and best describes the condition of Muddy Branch that would be most affected by the transitway construction. The physical habitat at MB-1 was described as “Partially Degraded” by MBSS and “Good” by MCDEP. In addition, stream reaches close to the Observation Drive site and Metropolitan Grove Site were sampled by MCDEP in 2001. At the Observation Drive site the habitat was ranked “Good/Fair”, and the habitat at the Metropolitan Grove Site was ranked as “Good.”

**Table IV-17: MBSS BIBI Scores and Rankings**

| BIBI SCORE  | NARRATIVE RANKING | CHARACTERISTICS   |
|-------------|-------------------|---|
| 4.00 – 5.00 | Good              | Comparable to reference streams considered to be minimally impacted, biological metrics fall within the upper 50 percent of reference site conditions.  |
| 3.00 – 3.90 | Fair              | Comparable to reference conditions, but some aspects of biological integrity may not resemble the qualities of minimally impacted streams.  |
| 2.00 – 2.90 | Poor              | Significant deviation from reference conditions, indicating some degradation. On average, biological metrics fall below the 10th percentile of reference site values.   |
| 1.00 - 1.90 | Very Poor         | Strong deviation from reference conditions, with most aspects of biological integrity not resembling the qualities of minimally impacted streams, indicating severe degradation. On average, most or all metrics fall below the 10th percentile of reference site values. |

Source: MBSS (1999)

**Table IV-18: MCDEP FIBI Scores and Rankings**

| MCDEP     |           |   |
|-----------|-----------|---|
| >4.5      | Excellent | Comparable to the biological community found in reference streams. Exceptional assemblage of species with a balanced community composition. |
| 3.5 –4.5  | Good      | Decreased number of sensitive species, decreased number of specialized feeding groups with some intolerant species present.                 |
| 2.3 – 3.3 | Fair      | Intolerant and sensitive species are largely absent; unbalanced feeding group structure.  |
| ≤ 2.2     | Poor      | Top carnivores and many expected species are absent or rare; general feeders and tolerant species dominate.                                 |

Source: Van Ness 1997.

### Macroinvertebrates

Sites were sampled by the MBSS, the MCDEP, and the City of Gaithersburg. Benthic macroinvertebrate community assessments were conducted using methodologies developed by MBSS and MCDEP.

In 2005, MBSS developed a new benthic index of biological integrity (BIBI) that compares the macroinvertebrate community within a given stream to reference macroinvertebrate communities in streams classified as least-impaired by anthropogenic impacts. The MBSS BIBI is based on state-wide reference streams in each physiographic province. The BIBI for the Piedmont uses six community metrics found to characterize macroinvertebrate community health in Maryland's Piedmont streams. The metrics calculated for Piedmont streams include the total number of taxa, the number of EPT taxa, the number of Ephemeroptera taxa, the percent intolerant to urban, the percent Chironomidae, and the percent clingers. **Table IV-17** shows the scores and narrative rankings of the MBSS BIBI.

Hundreds of species of macroinvertebrates were found inhabiting the Muddy Branch Watershed including sensitive Ephemeroptera, Plecoptera and Trichoptera

(EPT) species. These organisms are indicative of overall stream conditions, provide an important food source for larger organisms, and play a large role in the ability of the stream to process nutrients. Benthic macroinvertebrate community conditions throughout Muddy Branch watershed ranged from “Poor” by the MBSS BIBI, “Poor” to “Excellent” by the MCDEP BIBI, and “Very Poor” to “Fair” by the City of Gaithersburg study. However, the macroinvertebrate community in the upper watershed was most often rated as poor, which may be the result of water quality impairment by lack of riparian buffers and flash flows in this highly developed portion of the watershed. These sites were mostly dominated by midges, oligochaetes, and common net-spinning caddisflies.

Within the CCT project area the BIBI was 2.56 or “Poor” with a total of 32 taxa most of which were pollution tolerant species of chironomids and oligochaetes. At the Observation Drive site the BIBI was “Good/Fair,” and at the Metropolitan Grove Site the BIBI was “Good.”

### Fisheries

The MBSS field protocol for electrofishing was followed for fish surveys conducted in the Muddy Branch Watershed by MDNR. The fish survey data were analyzed using tolerance value, native or introduced origin, trophic

**Table IV-19: Muddy Branch Watershed FIBI Results**

| YEAR        | AGENCY               | SCORE       | NARRATIVE         |
|-------------|----------------------|-------------|-------------------|
| 2003 - 2004 | MBSS                 | 3.33 - 5.00 | Fair to Good      |
| 2002        | MCDEP                | 1.00 - 4.10 | Poor to Good      |
| 2002        | City of Gaithersburg | 1.67 - 3.67 | Very Poor to Fair |

Source: Van Ness 1997.



status, lithophilic spawning status, and abundance to calculate metrics. The Fish Index of Biotic Integrity (FIBI) combined the following metrics: number of benthic fish species (adjusted for watershed area), the percent tolerant fish, the percent generalists, omnivores, and invertivores, the number of individuals per square meter, the biomass (g) per square meter, and the percent lithophilic spawners.

The MCDEP FIBI was developed using reference streams only within Montgomery County, and the scoring of the nine metrics used is tailored specifically to conditions within the County. Because the metrics and scoring criteria differ, the resulting FIBI scores and narrative rankings are also different between MBSS and MCDEP. **Table IV-18** above presents the MCDEP FIBI scores and rankings.

**Table IV-19** on the following page summarizes the results of the fish sampling within the project study area.

Thirty different species of fish were documented in the Muddy Branch watershed by MCDEP. A number of the larger streams are seasonally stocked with game fish to provide additional opportunities for anglers to utilize the resource. Some streams also provide vital freshwater spawning habitat for anadromous fish species. Fish community conditions within Muddy Branch were rated as “Fair” to “Good” by the MBSS FIBI, “Poor” to “Good” by the MCDEP FIBI, and “Very Poor” to “Fair” by the City of Gaithersburg study (**Table IV-19**).

It should be noted, however, that the majority of the species known to exist in Muddy Branch would not be expected to be found directly in the CCT study area. For example, two species, bluegill and blacknose dace, comprised 52 percent of the fish assemblages found in streams near or around the city of Gaithersburg. The portion of the watershed within the study area includes small headwater and middle order streams that would be expected to contain species that require less discharge, and are tolerant to impacts associated with development. The portion of Muddy Branch within the CCT study area had an FIBI ranking of 3.22 or “Fair”, and consisted of 14 species and 472 individuals. The FIBI at the Observation Drive site scored “Good/Fair”, and the Metropolitan Grove site ranked as “Good.”

### **Chemical Water Quality**

In situ water sampling data was collected with field measurement techniques utilizing water quality meters. Water quality in Muddy Branch is generally within

State standards, although extensive sampling has not been conducted in the area of the watershed that may be affected by the CCT corridor. Limited water temperature monitoring data were available for Muddy Branch, and temperatures recorded were well below the 90 F maximum standard for Use I streams. In the upper portion of Muddy Branch watershed, a general trend of increased conductivity, approximately two to three times greater than the lower portion existed. The range of conductivity values observed was from 512 to 1001 mho/cm. High conductivity is often evidence of urbanization, and impervious surface cover in the watershed.

### **Impacts**

Impacts to aquatic biota and water quality occur directly through stream channel impacts and indirectly through increases in impervious surfaces. A detailed discussion of stream channel impacts is discussed elsewhere in this chapter. Impacts to streams that are currently bridged would be temporary as these existing structures would be extended to accommodate widening. In streams where new culverts are proposed, the impacts would be expected to be more permanent. 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. The primary direct impacts to aquatic biota from the CCT 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.

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 could be negatively affected by an increase in impervious cover. However, the species expected to be impacted are adapted to urbanized settings and would be likely to colonize the area again. During operation, the alignment options would have similar potential to increase water quality degradation from stormwater runoff because greater impervious

(paved) surfaces could affect water quality. However, the small incremental impervious impacts that could be expected from the project are unlikely to affect aquatic habitat or the makeup of biological communities to an appreciable degree.

While all of the alignments have the potential to affect existing surface water to some degree, the relatively small amount of new impervious surfaces and related pollutants that the project would add to the highly urbanized setting of the corridor would be expected to cause only minimal changes, if any, in corridor water quality. During construction, wind and rain could severely erode large areas of soil that would be exposed following the removal of vegetation and naturally-occurring soil stabilizers. Erosion of these exposed soils can considerably increase the sediment load to receiving waters (Barrett 1995). After construction, impacts associated with the use of the CCT, are mainly based on the potential for contamination of surface waters by run-off from new impervious surfaces. These runoff constituents can be grouped as heavy metals, salt, organic molecules, and nutrients (Trombulak 1999).

### Avoidance and Minimization

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 to the proposed CCT alignments. However, impacts have been avoided or minimized wherever possible through the realignment of the transitway. Investigations of further avoidance and minimization measures are ongoing and will continue throughout all phases of engineering design for the project.

During construction, the potential for water quality impacts would be minimized through strict adherence to MDE approved sediment and erosion control plans, which would include best management practices such as silt fence, straw bales, sediment basins, and other methods to capture potential sediment from exposed soils.

Potential effects to aquatic habitat and water quality would be minimized by strict adherence to sediment and erosion control and stormwater management plans that would be developed in accordance with state regulations to provide long-term mitigation of potential effects from stormwater runoff. In addition, in-stream construction would not be performed during the period of fish spawning and early development from March 1 to June 15 in accordance with the state's Use 1 time of year restrictions.

## Rare, Threatened, and Endangered Species

### Existing Conditions

The US Fish and Wildlife Service (USFWS), the Maryland Department of Natural Resources (MDNR) Wildlife and Heritage Division (WHD), and the Environmental Review Unit (ERU) of MDNR were contacted in January 2010 to update the information regarding the presence of rare, threatened, or endangered (RTE) species and fisheries information immediately adjacent to the project area or within one mile of the new alignments within the CCT corridor. An online notification from USFWS was received January 27, 2010 stating that there are no federally proposed or listed endangered and threatened species known to exist within the project area (see **Appendix C**). A letter from the MDNR-WHD was received on June 15, 2010 stating that there are no state or federal records of RTE species within the project area (**Appendix C**).

### Impacts/Mitigation

Impacts to federally listed threatened and endangered species are not anticipated, as there are no RTE species within the project area. A letter was sent to the MDNR-ERU on January 27, 2010 regarding the potential for impacts on fisheries.

## Hazardous Materials

### Existing Conditions

An Initial Site Assessment (ISA) for the I-270/US 15/CCT project area was conducted in 1998 and its findings were presented in the 1999 Preliminary Screening Assessment Report and the 2002 DEIS. The ISA identified the potential areas of hazardous material on properties that could be impacted by the build alternatives. The ISA included field reconnaissance, a search of the regulatory databases, and a review of public regulatory documents.

### Results and Recommendations

The findings from the ISA are described in **Chapter III** of the **2002 DEIS**. No additional research on hazardous materials sites has been done since then.

It is recommended that more detailed environmental assessments should be performed for specific sites of concern and for large property acquisitions following approval of a build alternative and prior to right-of-



way acquisition. 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.

## Mitigation

Where it is impractical to avoid an identified hazardous materials site, examples of remediation strategies may include:

- Modified construction techniques and schedule (e.g., performing construction work under a site specific Health and Safety Plan or utilizing sediment and erosion controls)
- Underground storage tank (UST) or above ground storage tank (AST) removal
- Product recovery
- Soil containment technologies (e.g. capping, vertical barriers, horizontal barriers, and surface controls)
- Soil removal and off-site treatment or disposal
- Soil treatment technologies (e.g. vapor extraction, bioventing immobilization, dewatering, physical treatment, chemical treatment (lime neutralization), biological treatment (cultured micro-organisms, in-situ treatment/surface bio-reclamation), thermal treatment (desorption)
- Groundwater treatment (e.g. physical treatment (coagulation/flocculation, oil-water separation, air stripping, adsorption), chemical treatment (neutralization, precipitation, ion exchange, oxidation/reduction), and in-situ treatment (bioventing)

## Air Quality

### Existing Conditions

As described in the 2009 AA/EA, the Environmental Protection Agency (EPA) has established the National Ambient Air Quality Standards (NAAQS) in accordance with the Clean Air Act and Amendments. Geographic areas that are not in compliance with the NAAQS for a particular pollutant are referred to as non-attainment areas. Areas that have had a history of non-attainment but are now consistently in attainment

are called maintenance areas. Maintenance areas require a maintenance plan to show how they will stay in attainment. These efforts require transportation projects to be assessed for conformity with air quality goals before they can be approved for construction.

The proposed project is located in a maintenance area for carbon monoxide (CO), a non-attainment area for particulate matter smaller than 2.5 micrometers (PM<sub>2.5</sub>), and a moderate non-attainment area for ozone (O<sub>3</sub>). Each of these pollutants is tied to vehicular emissions.

## Impacts

The predicted impacts of the project on air quality will be the same with or without the alignment modifications. Current air quality modeling technology is not sensitive enough to reflect alignment changes of this small a scope.

Similarly, regional air quality impacts would be the same regardless of the location of the O&M site.

Projected impacts of alternatives with one or more alignment modifications and with either O&M site location are therefore expected to be the same as the impacts described in the 2009 AA/EA.

## Noise and Vibration

### Noise

This section explains FTA standards with respect to noise and then provides a description of existing noise conditions in the study area. Then, estimated effects from the CCT alignment modifications and O&M sites on the adjacent communities are presented along with possible mitigation measures.

### Sound Descriptors

Sound is measured in a variety of ways to reflect how it is perceived by the human ear. A number of factors affect sound when it is perceived as noise. These factors include the actual level of sound (or noise), the frequencies involved, exposure time interval, and the changes or fluctuations in the noise levels during exposure. Noise levels are measured in units called decibels. Since the human ear does not respond equally to all frequencies (or pitches), measured sound levels (in decibel units at standard frequency bands) are often adjusted or weighted to correspond to the frequency response of human hearing and the human perception of loudness. The weighted sound level is expressed in units called A-weighted decibels

(dBA) and is measured with a calibrated sound meter. Community noise levels in urban areas usually range between 45 dBA, the daytime level in a typical quiet living room, and 75 dBA, the approximate noise level near a sidewalk adjacent to heavy traffic.

Road traffic and transit noise and other noises found in communities tend to fluctuate from moment to moment depending on whether a noisy truck passes by, an airplane flies over, a horn blows, or children scream as they play in a nearby schoolyard. To measure this noise accurately, the noise energy (expressed in dBA) produced by different activities are averaged over a period of time in order to obtain a single number. This single number is called the equivalent noise level, or  $L_{eq}$ .

Another noise measure considers people's increased sensitivity to noise during sleeping hours. This measure is calculated by measuring noise levels over a 24-hour period to calculate what is called the day-night sound level, or  $L_{dn}$ . The  $L_{dn}$  level is determined by calculating the average daytime ( $L_{day}$ ) and average nighttime ( $L_{night}$ ) noise level. When averaging the two to determine the  $L_{dn}$  nighttime noise is increased by 10 dBA to account for the greater human sensitivity to noise during the nighttime hours.

The FTA criteria utilize both the  $L_{eq}$  and the 24-hour  $L_{dn}$  noise descriptors for noise impact assessment. The selection of which one to apply is determined by the land use type being assessed for impact.

### Human Perception to Changes in Noise Levels

The average individual's ability to perceive changes in noise levels is well documented. Generally, changes in noise levels less than three dBA will be barely perceived

by most listeners, whereas a 10-dBA change normally is considered significant and is perceived as a doubling (or halving) of noise levels.

### FTA Noise Criteria for Transit Projects

FTA noise criteria are based on land use categories. The FTA impact assessment guidelines group sensitive areas into three specific land use categories, and the noise descriptor ( $L_{eq}$  or  $L_{dn}$ ) used to complete the impact assessment is chosen based on that land use type (**Table IV-20**). The  $L_{eq}$  (1h) dBA (one hour) descriptor is utilized for land uses with primarily daytime uses, and the  $L_{dn}$  descriptor is applied when the land use involves properties where people sleep and sensitivity to noise at night is of utmost importance.

The noise impact assessment completed for this study primarily involved FTA Category 2 land uses, which consist of buildings where people normally sleep and the sensitivity to noise is of the utmost importance, such as residential buildings, hotels, and hospitals.

### Existing Noise

In accordance with FTA impact assessment requirements, twenty-four hour day-night noise levels ( $L_{dn}$  dBA) were measured at 20 representative sites identified near each of the various proposed CCT transit alignment modification corridors and at two additional representative sites near each of the proposed O&M facility locations. Noise measurements collected at ten of these locations were recorded previously as part of the efforts for developing earlier environmental documents for the I-270/US 15 Multi-Modal Corridor Study.

The representative measurement sites were selected on the basis of several factors, the most important of

**Table IV-20: 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 land used 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 primarily 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.                           |

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



which was the site's potential sensitivity and proximity to additional noise generated by transit operations. Locations therefore represent properties that are within the closest proximity to the proposed alignments and therefore provide a conservative estimate of "worst case" future projected noise exposure that can be expected adjacent to these communities. Properties adjacent to and in the general area of the measurement site will result in comparable ambient noise conditions as that measured at the representative monitoring site. Consequently, at representative properties where line operation or horn noise impacts are identified, these other adjacent nearby properties may also experience elevated noise exposure from the project, but these would likely be similar to, or less severe than, those predicted at the representative sites. All field measurements were conducted according to procedures described in *Sound Procedures for Measuring Highway Noise (Report Number FHWA-DP-45-1R May 1996)*.

**Figure IV-10** depicts the locations of the 20 noise monitoring sites near the various proposed CCT build configuration options (as well as the Section 4(f) avoidance alternatives described in Chapter V. The sites adjacent to the two proposed O&M facilities (R-21 and R-22) are located further north along the original CCT alignment and are illustrated in **Figure IV-11** and **Figure IV-12**. Monitoring locations consisted primarily of residential properties and included one medical facility and one childcare facility. **Table IV-21** provides a brief description of each monitoring location along with its measured day-night noise level.

Measured noise levels are typical of ambient conditions in suburban communities. In general,  $L_{dn}$  levels show less variability than short-term noise readings because the  $L_{dn}$  levels are time averaged over a 24-hour period. Within the proposed CCT corridor, several measurement sites are located in fairly isolated areas far removed from existing road traffic routes and other noise sources. Tranquil or low ambient noise conditions are considered to occur when measured day-night noise levels are 63 dBA or lower. Within the project study area measured day-night levels of 63 dBA or lower were recorded at 15 out of the 22 representative noise monitoring locations. Overall day-night levels ranged from 55 dBA at site R-11 (the Belward Farm) to a maximum  $L_{dn}$  level of 74 dBA at Site R-22 (Motel Six) located near the proposed Metropolitan Grove O&M site. The high measured  $L_{dn}$  level recorded

at Site R-22 is due primarily to its close proximity to an active railroad overpass near Quince Orchard Road. Lastly, peak hour ( $L_{eq}$  (h) dBA) noise levels were reported at Site R-13 (Nanda Child-care Center) because this site is limited to daytime use. The detailed hourly noise measurement survey findings collected at each site are contained in the 2010 *Corridor Cities Transitway Supplemental Noise and Vibration Technical Memorandum* available on the project website [www.i270multimodalstudy.com](http://www.i270multimodalstudy.com).

### FTA Impact Definitions

Under FTA guidelines, noise impacts are determined by comparing the estimated future noise levels generated solely by the proposed LRT or BRT transit operations against the existing ambient noise levels without the project. Impact thresholds are also based on a site's land use category (**Table IV-21**).

Project noise levels are categorized into three principal levels of impact: "No Impact", "Moderate Impact", and "Severe Impact." **Table IV-22** shows the impact criteria thresholds for each receptor site.

### Future Transit Noise Exposure Methodology and Findings

Every noise prediction must characterize three elements: the noise source, the sound propagation path, and the affected noise receptor. Vehicular noise emissions depend upon the type of vehicle as well as operating conditions (speed and pass-by frequency).

The noise exposure calculations were completed following the procedures and methodologies described in the FTA Manual (*Transit Noise and Vibration Assessment Manual*, FTA report FTA-VA-90-1003-06, May 2006).

In accordance with FTA impact assessment procedures, existing ambient  $L_{dn}$  levels measured at each monitoring location were compared with future noise levels computed from LRT and BRT transit line operations. Following the impact category thresholds in **Table IV-22**, computed future noise exposure levels at each site were compared to the measured  $L_{dn}$  levels to establish if the project noise would exceed the threshold of "moderate" or "severe" impact.

The noise analysis findings for the LRT option without horn blowing are provided in **Table IV-23**. The noise analysis findings for the BRT option are summarized in **Table IV-24**. The noise analysis findings indicate that



**Legend**

- Noise/Vibration Monitoring Site
- Landmarks

**Stations**

- 2009 Original Stations
- Crown Farm
- Life Sciences Center
- Kentlands

**Alignments**

- 2009 Original CCT Alignment
- Crown Farm Alignment(s)
- Life Sciences Center Alignment(s)
- Kentlands Alignment

**I-270/US 15 MULTI-MODAL CORRIDOR STUDY**  
**Supplemental Environmental Assessment**  
 Figure IV-10: Noise and Vibration Monitoring and Prediction Sites

1 inch = 1,300 feet  
 0 200 400 800 1,200 1,600 Feet

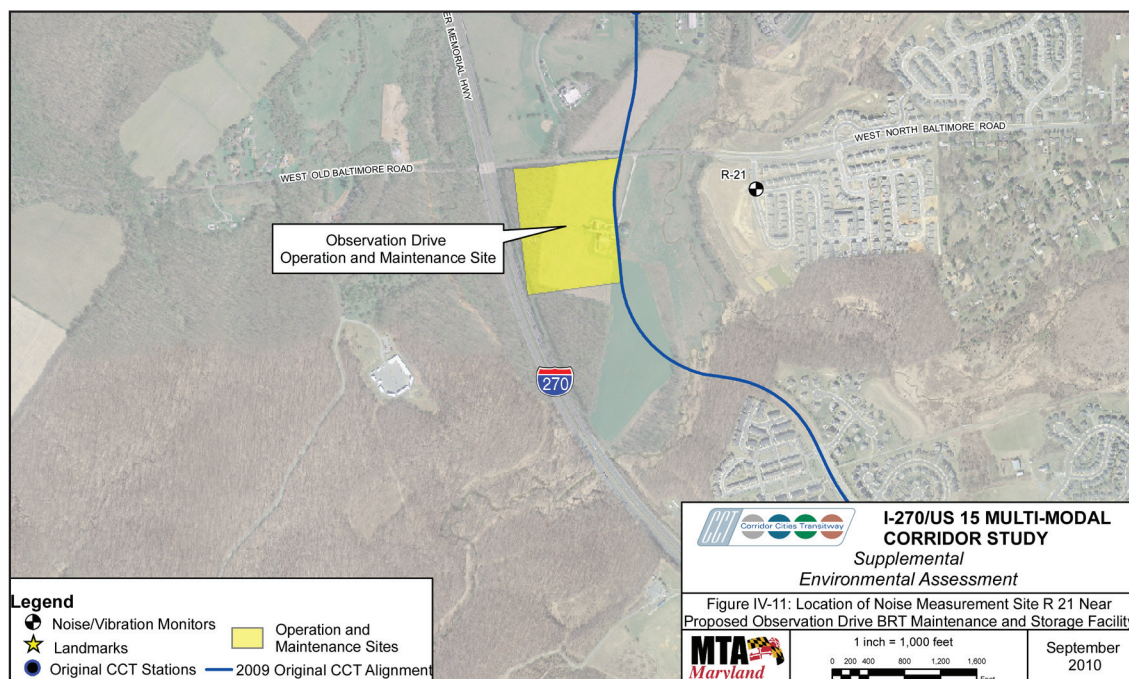
MTA Maryland

November 2010

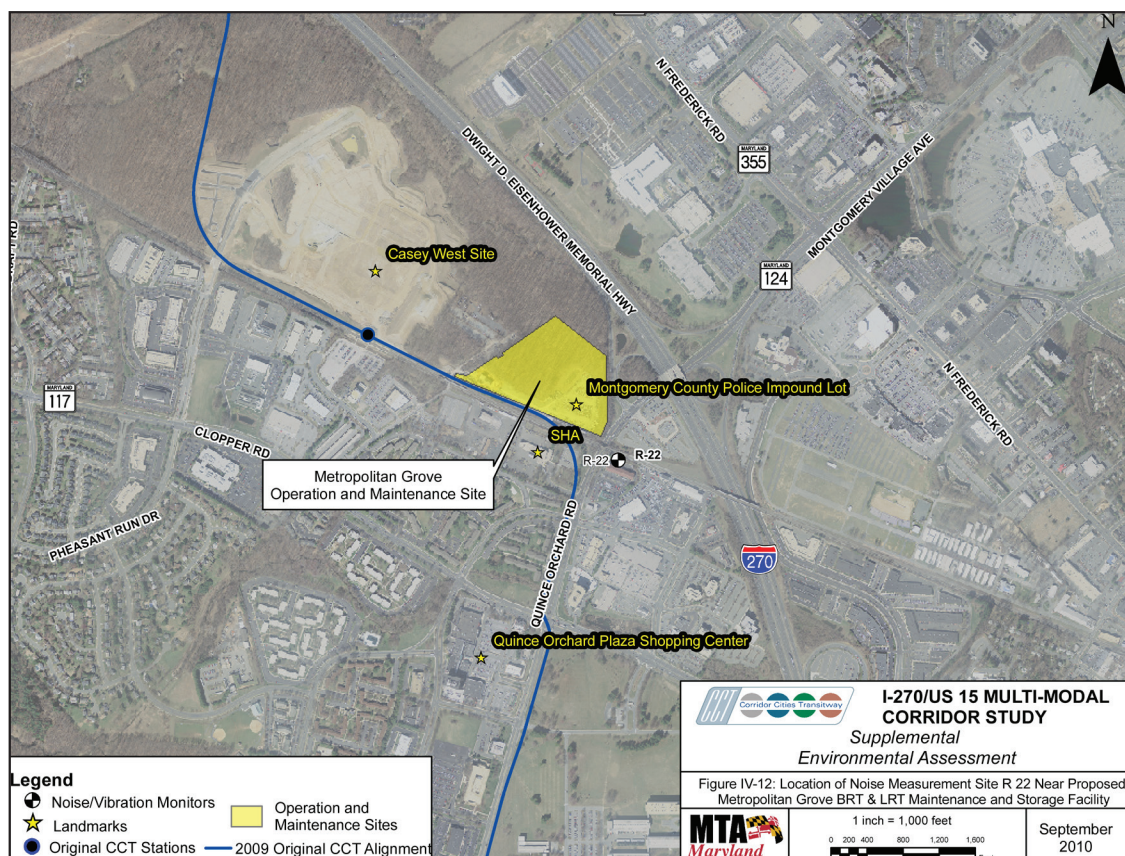




**Figure IV-11: Location of Noise Measurement Site R 21 near Proposed Observation Drive BRT Maintenance and Storage Facility**



**Figure IV-12: Location of Noise Measurement Site R 22 near Proposed Metropolitan Grove BRT & LRT Maintenance and Storage Facility**





**Table IV-21: Summary of Noise Measurements ( $L_{dn}$ ) at Residential Land Uses (FTA "Category 2" Sites) Adjacent to Proposed CCT Corridor**

| SITE # ID  |            |            | LOCATION                                     | LAND USE         | DATE    | $L_{DN}$        |
|------------|------------|------------|--|------------------|---------|-----------------|
| 2010 STUDY | 2007 STUDY | 2002 STUDY |  |                  |         |                 |
| R-1        | T-13       | T-6        | 2 Purchase Street, Gaithersburg              | Residential      | 5-15-06 | 68              |
| R-2        | NA         | NA         | Unit 12 Baybridge Court, Gaithersburg        | Residential      | 5-4-10  | 61              |
| R-3        | NA         | NA         | 130 Chevy Chase Street, Gaithersburg         | Residential      | 5-4-10  | 71              |
| R-4        | T-12       | T-N1       | 305 Swanton Lane, Gaithersburg               | Residential      | 5-17-06 | 63              |
| R-5        | T-11       | T-N4       | 300 High Gables Drive, Gaithersburg          | Residential      | 5-31-06 | 65              |
| R-6        | T-10       | T-5        | 427 Upshire Circle, Gaithersburg             | Residential      | 5-15-06 | 61              |
| R-7        | T-9        | T-4        | 309 Leafcap Road, Gaithersburg               | Residential      | 5-16-06 | 66              |
| R-8        | T-8        | T-3        | 67 Pontiac Way, Gaithersburg                 | Residential      | 5-4-10  | 61              |
| R-9        | NA         | NA         | 314 Argosy Drive, Gaithersburg               | Residential      | 5-4-10  | 58              |
| R-10       | T-7        | T-2        | 141 Mission Drive, Gaithersburg              | Residential      | 5-16-06 | 63              |
| R-11       | NA         | NA         | Belward Farm                                 | Residential      | 5-4-10  | 55              |
| R-12       | NA         | NA         | 10119 Darnestown Road, Gaithersburg          | Residential      | 5-3-10  | 58              |
| R-13       | NA         | NA         | 14910 Broschart Road, Rockville              | Nanda Child Care | 5-3-10  | 64 <sup>1</sup> |
| R-14       | T-6        | T-1        | 9963 Foxborough Circle, Gaithersburg         | Residential      | 5-17-06 | 63              |
| R-15       | NA         | NA         | 9909 Medical Center Drive, Gaithersburg      | Hospital         | 5-4-10  | 58              |
| R-16       | NA         | NA         | 9700 Oakdale Drive, Gaithersburg             | Residential      | 5-3-10  | 59              |
| R-17       | T-5        | T-N10      | 15303 Gable Ridge Court, Apt J, Gaithersburg | Residential      | 6-13-06 | 59              |
| R-18       | T-4        | T-N9       | 9800 Fields Road, Gaithersburg               | Residential      | 6-13-06 | 61              |
| R-19       | T-3        | T-N8       | 9601 Fields Road, Apt. 102, Gaithersburg     | Residential      | 6-12-06 | 67              |
| R-20       | NA         | NA         | Crown Farm Property near Omega Drive         | Residential      | 5-3-10  | 56              |
| R-21       | NA         | NA         | 13041 Seneca Ayr Drive, Germantown           | Residential      | 5-5-10  | 58              |
| R-22       | NA         | NA         | 497 Quince Orchard Road, Gaithersburg        | Motel Six        | 5-5-10  | 74              |

<sup>1</sup>Peak hour  $L_{eq}$  (h) dBA measured at this location because land use is primarily limited to daytime use.

Table IV-22: Noise Levels Defining Impact for Transit Projects

| EXISTING NOISE EXPOSURE*<br>$L_{EQ}$ (1-hr) OR<br>$L_{DN}$ (dBA) | PROJECT NOISE IMPACT EXPOSURE, * $L_{EQ}$ (1-hr) OR $L_{DN}$ (dBA) |                 |               |                  |                 |               |
|--|--|-----------------|---------------|------------------|-----------------|---------------|
|  | CATEGORY 1 OR 2 SITES  |                 |               | CATEGORY 3 SITES |                 |               |
|  | NO IMPACT  | MODERATE IMPACT | SEVERE IMPACT | NO IMPACT        | MODERATE IMPACT | SEVERE IMPACT |
| 51   | <54  | 54-60           | >60           | <59              | 59-65           | >65           |
| 52   | <55  | 55-60           | >60           | <60              | 60-65           | >65           |
| 53   | <55  | 55-60           | >60           | <60              | 60-65           | >65           |
| 54   | <55  | 55-61           | >61           | <60              | 60-66           | >66           |
| 55   | <56  | 56-61           | >61           | <61              | 61-66           | >66           |
| 56   | <56  | 56-62           | >62           | <61              | 61-67           | >67           |
| 57   | <57  | 57-62           | >62           | <62              | 62-67           | >67           |
| 58   | <57  | 57-62           | >62           | <62              | 62-67           | >67           |
| 59   | <58  | 58-63           | >63           | <63              | 63-68           | >68           |
| 60   | <58  | 58-63           | >63           | <63              | 63-68           | >68           |
| 61   | <59  | 59-64           | >64           | <64              | 64-69           | >69           |
| 62   | <59  | 59-64           | >64           | <64              | 64-69           | >69           |
| 63   | <60  | 60-65           | >65           | <65              | 65-70           | >70           |
| 64   | <61  | 61-65           | >65           | <66              | 66-70           | >70           |
| 65   | <61  | 61-66           | >66           | <66              | 66-71           | >71           |
| 66   | <62  | 62-67           | >67           | <67              | 67-72           | >72           |
| 67   | <63  | 63-67           | >67           | <68              | 68-72           | >72           |
| 68   | <63  | 63-68           | >68           | <68              | 68-73           | >73           |
| 69   | <64  | 64-69           | >69           | <69              | 69-74           | >74           |
| 70   | <65  | 65-69           | >69           | <70              | 70-74           | >74           |
| 71   | <66  | 66-70           | >70           | <71              | 71-75           | >75           |
| 72   | <66  | 66-71           | >71           | <71              | 71-76           | >76           |
| 73   | <66  | 66-71           | >71           | <71              | 71-76           | >76           |
| 74   | <66  | 66-72           | >72           | <71              | 71-77           | >77           |
| 75   | <66  | 66-73           | >73           | <71              | 71-78           | >78           |
| 76   | <66  | 66-74           | >74           | <71              | 71-79           | >79           |
| 77   | <66  | 66-74           | >74           | <71              | 71-79           | >79           |
| >77  | <66  | 66-75           | >75           | <71              | 71-80           | >80           |

Source: Transit Noise and Vibration Impact Assessment, FTA, May 2006

\*  $L_{dn}$  is used for land use where nighttime sensitivity is a factor;  $L_{eq}$  during the hour of maximum transit noise exposure is used for land use involving only daytime activities.



**Table IV-23: Existing Noise Exposure, Projected Future LRT Noise Exposure and Impact Assessment Using FTA Criteria**

| SITE NO.          | EXISTING NOISE LEVEL <sup>1</sup><br>L <sub>DN</sub> (DBA) | S1+S2+S3 ALIGNMENT <sup>2</sup>                          | S2C ALIGNMENT <sup>2</sup>                               |
|-------------------|--|--|--|
|                   |  | ESTIMATED L <sub>DN</sub> LEVEL<br>FTA IMPACT ASSESSMENT | ESTIMATED L <sub>DN</sub> LEVEL<br>FTA IMPACT ASSESSMENT |
| R-1               | 68   | 56<br>No Impact  | NA   |
| R-2               | 61   | 52<br>No Impact  | NA   |
| R-3               | 71   | 60<br>No Impact  | NA   |
| R-4               | 63   | 52<br>No Impact  | NA   |
| R-5               | 65   | 52<br>No Impact  | NA   |
| R-6               | 61   | 60<br>Moderate Impact                                    | NA   |
| R-7               | 66   | 52<br>No Impact  | NA   |
| R-8               | 61   | 44<br>No Impact  | 43<br>No Impact  |
| R-9               | 58   | 52<br>No Impact  | 45<br>No Impact  |
| R-10              | 63   | NA   | NA   |
| R-11              | 55   | 48<br>No Impact  | 47<br>No Impact  |
| R-12              | 58   | NA   | 48<br>No Impact  |
| R-13 <sup>1</sup> | 64   | 55<br>No Impact  | NA   |
| R-14              | 63   | NA   | NA   |
| R-15              | 58   | NA   | 47<br>No Impact  |
| R-16              | 59   | 45<br>No Impact  | NA   |
| R-17              | 59   | 53<br>No Impact  | NA   |
| R-18              | 61   | 56<br>No Impact  | NA   |
| R-19              | 67   | 55<br>No Impact  | NA   |
| R-20              | 56   | NA   | NA   |

<sup>1</sup> Existing L<sub>dn</sub> noise levels are derived from 24-hour measurements collected at each location. Except Site R-13, which is limited to primarily daytime use, and therefore peak-hour L<sub>eq</sub> is provided.

<sup>2</sup> Headways of 10 minutes (5 AM to 5:30 AM, 9:30 AM to 4:30 PM & 7:30 PM to 9 PM), 7.5 minutes (5:30 AM to 9:30 AM & 4:30 PM to 7:30 PM) and 12 minutes (9 PM to 1 AM) were used for the impact assessment, with no service from 1 AM to 5 AM.

NOTE: NA indicates where the alignment modification (column header) is not in proximity to the receptor site (row).

**Table IV-24: Existing Noise Levels, Projected Future BRT Noise Exposure and Impact Assessment Using FTA Criteria**

| SITE NO.          | EXISTING NOISE LEVEL <sup>1</sup><br>L <sub>DN</sub> (dBA) | S1+S2+S3 ALIGNMENT <sup>2</sup>                          | S2C ALIGNMENT <sup>2</sup>                               |
|-------------------|--|--|--|
|                   |  | ESTIMATED L <sub>DN</sub> LEVEL<br>FTA IMPACT ASSESSMENT | ESTIMATED L <sub>DN</sub> LEVEL<br>FTA IMPACT ASSESSMENT |
| R-1               | 68   | 58<br>No Impact  | NA   |
| R-2               | 61   | 55<br>No Impact  | NA   |
| R-3               | 71   | 63<br>No Impact  | NA   |
| R-4               | 63   | 55<br>No Impact  | NA   |
| R-5               | 65   | 55<br>No Impact  | NA   |
| R-6               | 61   | 63<br>Moderate Impact                                    | NA   |
| R-7               | 66   | 55<br>No Impact  | NA   |
| R-8               | 61   | 49<br>No Impact  | 47<br>No Impact  |
| R-9               | 58   | 55<br>No Impact  | 55<br>No Impact  |
| R-10              | 63   | NA   | NA   |
| R-11              | 55   | 51<br>No Impact  | 50<br>No Impact  |
| R-12              | 58   | NA   | 52<br>NO IMPACT  |
| R-13 <sup>1</sup> | 64   | 59<br>No Impact  | NA   |
| R-14              | 63   | NA   | NA   |
| R-15              | 58   | NA   | 52<br>No impact  |
| R-16              | 59   | 49<br>No Impact  | NA   |
| R-17              | 59   | 57<br>No Impact  | NA   |
| R-18              | 61   | 59<br>Moderate Impact                                    | NA   |
| R-19              | 67   | 58<br>No Impact  | NA   |
| R-20              | 56   | NA   | NA   |

<sup>1</sup> Existing L<sub>dn</sub> noise levels are derived from 24-hour measurements collected at each location. Except Site R-13, which is limited to primarily daytime use, and therefore peak-hour L<sub>eq</sub> is provided.

<sup>2</sup> Headways of 10 minutes (5 AM to 5:30 AM, 9:30 AM to 4:30 PM & 7:30 PM to 9 PM), 7.5 minutes (5:30 AM to 9:30 AM & 4:30 PM to 7:30 PM) and 12 minutes (9 PM to 1 AM) were used for the impact assessment, with no service from 1 AM to 5 AM.

NOTE: NA indicates where the alignment modification (column header) is not in proximity to the receptor site (row)



under normal operating conditions (no horn blowing) there will be no severe impacts under any of the proposed LRT or BRT alignment modifications, with moderate impacts identified only as follows:

- Under the LRT and BRT S3 alignment modification, a moderate noise impact is expected at one site (R-6), a residential property at 427 Upshire Circle
- Under the S1 alignment, a moderate noise impact is expected at Site R-18 only if the BRT mode is selected. R-18 is located near Crown Farm at 9800 Fields Road, Gaithersburg

**Table IV-25** provides a summary of the projected noise impacts that are likely to occur under LRT operations at properties near grade crossings if train horn sounding warnings were to be required. The FTA has no such requirement and looks to the states to rule on the matter of horn use at grade crossings. The additional noise impact assessment due to possible horn blowing was completed at properties that were within 1,000 feet of proposed at-grade crossings where possible horn noise annoyance could be a noise contributing factor. The analysis findings indicate that moderate or severe noise impacts are projected to occur at Sites R-8, R-15, R-16

and R-17 under all proposed alignment options that pass by these areas. Where impacts are found to be severe, the second row of buildings from the alignment may potentially experience noise levels in the FTA moderate impact category. Beyond these second row properties, shielding provided by building rows should diminish noise levels sufficiently to below the FTA moderate impact threshold.

Where impacts from horn blowing are expected to be severe, it is anticipated that measures would be put in place to eliminate the need for horn-blowing. Detailed hour-by-hour LRT and BRT noise calculations at each of the noise monitoring sites are contained in the 2010 *Corridor Cities Transitway Supplemental Noise and Vibration Technical Memorandum*.

#### Operations and Maintenance Facilities

Operations and maintenance activities, whether BRT or LRT, produce randomly occurring noises that are of a considerably different character than typical community background noise. Therefore, if the noises are 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

**Table IV-25: Locations Where Noise Impacts Are Expected if Horn Noise Soundings Are Used at Grade Crossings**

| SITE NO. | EXISTING NOISE LEVEL <sup>1</sup> $L_{DN}$ (dBA) | S1+S2+S3 ALIGNMENT <sup>2</sup>                | S2C ALIGNMENT <sup>2</sup>                     |
|----------|--|--|--|
|          |  | ESTIMATED $L_{DN}$ LEVEL FTA IMPACT ASSESSMENT | ESTIMATED $L_{DN}$ LEVEL FTA IMPACT ASSESSMENT |
| R-8      | 61   | 65<br>SEVERE IMPACT                            | 63<br>MODERATE IMPACT                          |
| R-15     | 58   | NA   | 69<br>SEVERE IMPACT                            |
| R-16     | 59   | 61<br>MODERATE IMPACT                          | NA   |
| R-17     | 59   | 72<br>SEVERE IMPACT                            | NA   |

<sup>1</sup>Existing  $L_{dn}$  noise levels are derived from 24 hour measurements collected at each location.

<sup>2</sup>Headways of 10 minutes (5 AM to 5:30 AM, 9:30 AM to 4:30 PM & 7:30 PM to 9 PM), 7.5 minutes (5:30 AM to 9:30 AM & 4:30 PM to 7:30 PM) and 12 minutes (9 PM to 1 AM) were used for the impact assessment, with no service from 1 AM to 5 AM.

NOTE: NA indicates where the alignment modification (column header) is not in proximity to the receptor site (row).

**Table IV-26: Summary of Existing, Future Noise Level Estimates and FTA Impact Assessment Due to Operations & Maintenance**

| RECEPTOR | FACILITY           | OPERATION AND MAINTENANCE USE (Transit Mode) | EXISTING DAY-NIGHT NOISE LEVEL $L_{DN}$ (dBA) | PROJECTED DAY-NIGHT NOISE LEVELS ( $L_{DN}$ dBA) DUE TO O&M<br>FTA IMPACT ASSESSMENT |
|----------|--------------------|--|---|--|
| R-21     | Observation Drive  | BRT  | 58  | 38<br>No Impact  |
| R-22     | Metropolitan Grove | BRT  | 74  | 47<br>No Impact  |
| R-22     | Metropolitan Grove | LRT  | 74  | 65<br>No Impact  |

on adjacent areas unless the separation distance between the operations and maintenance facilities and the residential area is small.

Noise generated from yard and shop related activities were calculated based on the reference Sound Exposure Levels (SEL dBA), screening distances and calculation procedures provided in the FTA Manual. Total noise from all of the operations and maintenance activities was estimated after applying distance correction from the site boundary.

Two locations were identified for O&M facilities: the Observation Drive site would serve only as a BRT facility and the Metropolitan Grove site could serve either LRT or BRT maintenance operations. Existing 24-hour noise measurements were collected at the nearest noise sensitive properties adjacent to each proposed facility. These measurement locations are identified as Site R-21 on **Figure IV-11** and Site R-22 shown on **Figure IV-12**.

**Table IV-26** provides a summary of the existing noise levels at both sites, along with projected future day-night noise levels that would be generated from operations and maintenance activities at each of the representative receptor locations. The high (existing) measured  $L_{dn}$  level recorded at Site R-22 is due primarily to its close proximity to existing active railroad tracks that pass over the area near Quincy Orchard Road. The analysis findings indicate that noise generated from maintenance and storage operations are expected to be below the FTA impact threshold at the nearest noise-sensitive properties adjacent to either proposed facility.

### Mitigation Measures

Practical noise mitigation measures that are employed in reducing noise from train operations are summarized in the FTA Manual and include the following:

- Select quieter system-wide components (e.g., continuous welded rail, tie and ballast track work, resilient wheels, skirts on the vehicle to reduce equipment noise, etc.)
- Add design features (e.g., noise barriers if adequate space is available, lubricate track at curves, track-bed isolation, movable point switch frogs, etc.)
- Tailor operation plans to provide reduction in noise and vibration levels such as reducing vehicle speed, eliminate bells/horns at grade crossings, proper vehicle maintenance, etc.

The first measures would likely be included in the project design if the LRT mode is selected to reduce overall noise. The second and third types of improvements are usually site-specific and are only considered at sites where (1) noise impacts are expected and (2) where the number of “benefitted receivers” (e.g., the number of homes or hospitals where project noise is noticeably reduced) justifies the cost of constructing the mitigation (e.g., a noise wall or crossing gates).

The noise analysis findings indicate that under normal operating conditions (no horn blowing) there will be no severe impacts from either LRT or BRT operations.

Most considerations for noise abatement are generally limited to those areas that are projected to experience



severe impacts. While impacts in the moderate range are not of the same magnitude as severe impacts, there might be circumstances that would warrant abatement consideration, such as a large cluster of residences adjacent to a proposed transit line or when moderate impacts are approaching the severe impact threshold. For this reason, potential mitigation measures at Sites R-6 and R-18 (where moderate impacts were predicted under the S1 and S3 alignment modifications as noted above) are discussed below.

Site R-18 is a single isolated property and thus would not satisfy cost effectiveness requirements and therefore noise barrier abatement is not considered feasible at this property.

Site R-6 represents a residential cluster of single family homes just north of the Washingtonian Woods Park in Gaithersburg. This area could feasibly benefit from a noise barrier if one is desired. A discussion on potential noise wall costs and effectiveness is provided in the *Corridor Cities Transitway Noise and Vibration Technical Report*. Additional engineering work is needed to determine if a noise wall is feasible near Site R-6. Furthermore, consultation with the community would be needed to determine if a noise barrier is desired. While effective at reducing noise in many situations, noise walls must be continuous to maximize their effectiveness and can therefore create an unwanted visual intrusion as well as a barrier to pedestrian, bicycle and vehicular traffic, impacting community cohesiveness.

### Train Horn Noise Mitigation Measures

Receptor sites near four at-grade crossings (R-8, R-15, R-16 and R-17) are expected to experience moderate to severe impacts generated from LRT horn noise soundings under various alignment modifications (**Table IV-26**). The most adversely affected properties are expected to be residences within 500 feet of the intersection of Muddy Branch Road and Great Seneca Highway (near Site R-8) and residences near the intersection of Diamondback and Decoverly Drives (near Site R-16). The affected residential areas and the path of each of the proposed LRT alternatives as they pass through these intersections are illustrated in **Figure IV-10**.

Where impacts are found to be severe, measures can be put in place to eliminate the need for horn-blowing. A

variety of approaches are available for reducing noise due to train horns near roadway/rail at-grade crossings. These include equipping crossings with flashing warning lights and automatic gates, as well as the use of median barriers, paired one-way streets, enforcement cameras similar to those used to ticket red-light runners, and wayside horns (where a warning horn installed at the crossing focuses an audible warning at the railroad crossing itself instead of using the horns mounted on the trains).

Depending on actual design requirements, median barriers may be expensive to install at some locations. A four-quadrant gate system would generally be more expensive than a median barrier. As with noise walls, the cost-effectiveness of any abatement measure will depend on whether or not a substantial number of homes or other sensitive receptors would be protected by the elimination of horn noise soundings and if there would be other benefits, such as safety improvements, that need to be considered in the decision-making process.

In addition to these measures, the Federal Railroad Administration (FRA) has designated the wayside horn to be a substitute for the use of locomotive horns at public highway-rail grade crossings. The system is designed to reduce the overall ambient horn noise by using a warning horn installed at the crossing that focuses an audible warning at the railroad crossing itself instead of using the horns mounted on the trains. The system is activated by the existing crossing signal system and projects a recorded train horn sound to traffic at the railroad crossing.

The final determination of the need for horn blowing will depend on whether future design modifications to an LRT alternative are considered that would meet USDOT criteria for Quiet Zones.

### Vibration Analysis

A detailed discussion of the vibration analysis, including measurement, impacts, and FTA regulations, is contained in the *2010 Corridor Cities Transitway Supplemental Noise and Vibration Technical Memorandum*.

### Existing Vibration Levels and Vibration Prediction Methodology

The major sources of vibration in the corridor today include automobiles, trucks, and buses. Typical velocity

levels generated by these types of vehicles range from 50 to 60 VdB and are generally considered below the threshold of perception. FTA vibration criteria do not require measurement of existing vibration levels to assess potential impacts of transit vibration impact. Estimated vibration levels were determined following procedures contained in Chapter 10 of the FTA Manual.

### **Vibration Impact Assessment and Mitigation Measures**

At all 20 receptor sites evaluated for the CCT alignment options in the Gaithersburg area (see **Figure IV-10**) velocity levels throughout the transit corridor stayed below the FTA thresholds under both LRT and BRT proposed operations. The LRT and BRT vibration calculations for each of the proposed CCT alignment options are contained in the *2010 Corridor Cities Transitway Supplemental Noise and Vibration Technical Memorandum*.

Analysis is not needed for the proposed O&M facility sites. The FTA manual screening distance for completing ground-borne vibration impact assessment is 150 feet or less for residential areas and 450 feet or less for more sensitive concert halls/auditoriums and TV/recording studios. All existing vibration-sensitive properties near proposed CCT maintenance facilities are beyond these distances and therefore no vibration impact assessment is necessary.

### **Mitigation**

The vibration impacts of transit operations were found to be below the FTA impact threshold for all alignment modifications and both O&M sites. Therefore, consideration of vibration mitigation measures is not necessary.

## **Visual Quality**

Visual impact assessments are routinely performed on transportation 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 NEPA and the CEQ regulations that support NEPA implementation.

### **Existing Conditions**

The visual landscape of the CCT varies considerably, from the largely rural settings of the northern portion of the alignment to the highly developed suburban

landscapes found in the southern portion of the study area. The proposed CCT alignment from Shady Grove Metro Station to COMSAT Station passes alongside several distinctive neighborhoods and diverse land uses including highway; interchanges; major and minor roads; low, medium and high-density residential areas; office and industrial parks; commercial areas; and open space.

The existing visual character of the area surrounding the CCT corridor has not changed substantially from that described in the 2002 DEIS (see pages III-305 to III-312). However, 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 the CCT would be constructed. This would include new development anticipated near the O&M sites and in the Crown Farm, Kentlands and Belward Farm areas, which are all in the area of the possible alignment modifications.

The Observation Drive site is a former farm and contains a farmhouse, two barns, and other farming-related outbuildings. Land surrounding this site includes a vacant stream buffer area to the east, and to the south, a large wooded buffer separates this site from The Vistas at Millstone and Brookfield residential developments.

The visual environment surrounding the Metropolitan Grove O&M site includes a mix of forested area and transportation uses, including the Montgomery County Police Abandoned Motor Vehicle Unit impound lot, warehouses and distribution centers, and rail tracks. It is also located within view of Browns Station Park.

### **Visual Impacts**

The infrastructure associated with the transitway varies by mode, and each 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.

The visual impact of a proposed transportation project also can vary considerably depending on the existing



character of the natural and built environment and the design elements of the proposed transportation system.

The 2002 DEIS presented the potential impacts of the project on visually sensitive areas. The alignment modifications are expected to have similar impacts as those described for the transit components (see pages III-317 to III-320).

In general, the CCT is expected to have moderate visual effects since it would travel mostly at ground level and frequently along existing transportation corridors. There are several locations where above-grade crossings are being considered, including Great Seneca Highway at Muddy Branch Road and Quince Orchard Road at Clopper Road. The transit stations and the O&M facility would have the greatest degree of visual effect.

At this point in the development of the CCT, it is difficult to assess visual impacts because many design elements are unknown, including mode, design, lighting, and landscaping of stations and park-and-ride lots. Furthermore, the design of some of the surrounding areas will be changing (e.g., the development planned for the Kentlands, Belward Farm and Crown Farm). For this reason, it is recommended that additional visual impact analysis be done after further design development is completed.

Construction along the alignment modifications through the existing undeveloped farm areas of Belward Farm and Crown Farm would result in a visual impact. It can be assumed, however, that planned developments in the Crown Farm, LSC and Kentlands areas will be designed with a future transit system in place, greatly reducing the potential visual impact of the proposed alignment modifications on the likely future landscape.

The already-developed areas through which the two LSC alignment modifications are proposed will experience some visual changes. Because both S2 and S2c would largely be traveling along existing or planned roadways and parking lots, visual impacts should be minor.

### Mitigation

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 and in consultation with adjacent communities and property

owners. 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 could use materials, colors, and other features to integrate into the surrounding landscape.

Mitigation measures for short term temporary construction impacts could include timing of construction activities and use of construction fencing.

## Construction and Operational Issues

There are some unavoidable but temporary community impacts that result from the construction of transportation projects. These typically include the following impact types:

- Noise and vibration from construction equipment
- Air quality impacts from fugitive dust as well as emissions from construction vehicles and other equipment
- Traffic impacts (where the alignment runs along or across a road)

Construction-related noise, vibration, air quality and traffic issues for the alignment modifications as well as the two proposed O&M sites would be similar to the impacts described for the Original CCT Alignment alternatives, as described in Chapter IV of the 2009 AA/EA.

The visual character of the two O&M sites would change if either were selected. Given current land uses, these effects are expected to be minor. However, the visual impacts will be assessed in greater detail during project design. With details regarding the modes and alignment designs known, better information about the scope and degree of the impacts could be assessed and design and alignment concepts for avoidance and/or mitigation can be developed.

## Indirect and Cumulative Effects (ICE) Analysis

An indirect and cumulative effects (ICE) analysis is conducted to evaluate secondary impacts and cumulative effects on the environment that may result from a project and other past, present, and reasonably

foreseeable future actions regardless of the organization or individual which may undertake such actions.

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.”

Guidance for this analysis was obtained from the following publications:

- 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

### 2002 Analysis

Indirect and cumulative effects most often occur as a result of changes in land use. For the 2002 DEIS, the SHA in cooperation with the MTA, established a panel of land use experts to develop the ICE analysis (referred to in the DEIS as the SCEA, or Secondary and Cumulative Effects Analysis). The Expert Panel Land Use was comprised of knowledgeable local and national experts who were asked to identify potential future land use in the region. The results of their analysis and the overall ICE evaluation are described in **Chapter III** of the **2002 DEIS**.

### Impacts

The Gaithersburg area alignment modifications presently under consideration and described in Chapter II are relatively minor. With differences in direct impacts to various resources being relatively small, as described in the sections above, the potential for differences in indirect and cumulative impacts to these same resources would be similarly limited.

Similarly, in the context of regional development, the selection of one O&M location over another would produce only minor differences in indirect and cumulative impacts.

There are therefore no indications that the conclusions reached in the 2002 ICE analysis would change either as a result of the proposed alignment modifications or because of the selection of one O&M facility location over the other.

### Energy

Energy is an important environmental resource, and its use contributes to the degradation of other environmental resources such as air quality and land. 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, a one-time energy expenditure.

### Existing Conditions

Existing conditions regarding energy use in Maryland are described in **Chapter IV** of the **2009 AA/EA**.

### Impacts

At this point in the study, without refined information on materials and rolling stock to be used on the CCT corridor, the direct and indirect energy impacts of the project are assumed to be the same as those presented in the 2009 AA/EA. The impacts of one or more of the alignment modifications, as well as the selection of a specific O&M site, are too minor to impact direct and indirect energy use estimates at this level of study.



### **Measures to Minimize Harm**

As noted in the 2009 AA/EA, conservation of energy could be achieved in facility planning, construction, operation and maintenance of the project. 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 maintenance. Other measures that could be applied include using high pressure sodium vapor lamps for light, solar powered lighting, and promoting carpools, vanpools, and bicycle use.