3. Environmental Resources, Consequences and Mitigation

3.1 Introduction

This EA considers the Project's potential for effects on the socioeconomic, natural, and cultural environmental features to determine if effects will be significant, and therefore, require an Environmental Impact Statement. This chapter presents the existing environmental conditions, the anticipated effects from the Build Alternative (as described in **Chapter 2**), and measures to mitigate any adverse effects. The resources assessed for effects in this chapter include the following:

- Land Use
- Neighborhoods
- Community Facilities
- Property Acquisitions and Displacements (Right-of-Way)
- Economy
- Visual Resources
- Environmental Justice including Demographics
- Parks and Recreational Facilitates
- Cultural Resources (Historic Properties and Archeology)
- Forests
- Street Trees / Individual Trees
- Groundwater
- Water Resources
- Wetlands and Waters of the US
- Habitat Rare, Threatened, and Endangered Species
- Noise and Vibration
- Air Quality
- Energy
- Hazardous Materials
- Utilities
- Traffic and Transportation Network
- Pedestrian and Bicycle Facilities
- Safety and Security
- Indirect and Cumulative Effects

3.2 Land Use

3.2.1 Introduction and Methodology

The CCT study area corridor is an intensely developed suburban corridor which includes portions of Rockville and Gaithersburg, roughly parallel to I-270. It is home to many commuters to Washington, DC and surrounding locations, and is also a rapidly growing employment center. The study area has experienced significant growth of employment, households, and population in recent decades. Forecasts predict these growth trends will continue into the foreseeable future.

The analysis boundary used in the following land use evaluation is the *study area buffer*, defined as a 0.5-mile buffer around the Build Alternative alignment. The study area buffer is shown on **Figure 3-1**. The distance of 0.5-miles has been chosen for two reasons: first, the FTA *Final Policy Statement on the Eligibility of Pedestrian and Bicycle*

Study Area Buffer Definition:

The study area buffer is defined as the 0.5-mile buffer around the Build Alternative alignment. This buffer area was used to evaluate the majority of the resources assessed in this EA.

Improvements Under Federal Transit Law (FTA, 2011), is the distance the average pedestrian can and is willing to walk to a transit station; secondly, 0.5-miles encompasses the area immediately adjacent to the transportation right-of-way that this Project would utilize. Land use data presented herein has been collected using Montgomery County Geographic Information System (GIS) data and field verification. Refer to **Section 3.26**, the *Socioeconomic Technical Report,* and the *Indirect and Cumulative Effects Technical Report* for additional information on land use.

3.2.2 Existing Conditions

The study area buffer falls mostly within the larger boundary of the City of Gaithersburg, as well as a small segment of the City of Rockville; portions of it also fall under unincorporated Montgomery County. Land use within the study area buffer is guided by five land use master plans. The *Shady Grove Sector Master Plan,* the *Great Seneca Science Corridor Master Plan,* and the *Potomac Subregion Master Plan* cover all of the unincorporated portions of the study area buffer, and the Cities of Rockville and Gaithersburg each develop their own master plans. Existing land use is shown on **Figure 3-2**.

Within the study area buffer, the transportation and utilities land use category (paved roadways, sidewalks, and parking lots) accounts for the largest portion of land use, at approximately 695 acres (22 percent). Commercial uses and residential uses compose the next largest land uses, at 623 acres (19 percent) and 590 acres (18 percent), respectively. Vacant sites, such as those under development at Crown Farm and Watkins Mill, are placed under the vacant/undeveloped land use category and consist of 430 acres (13 percent). One percent of the current land use is recognized as mixed commercial/residential.

3.2.3 Future No-Build Conditions

As dictated in the Gaithersburg, Great Seneca Science Corridor, Shady Grove, and Rockville Master Plans, future development around the study area buffer, especially in the residential sector, will manifest through infill redevelopment and municipal annexations. Future housing units are planned to be mostly higher-density units, such as garden apartments, high-rise condominiums, and townhouses. They will be sited within or near commercial centers and transportation nodes, and zoning codes will change to reflect an incorporation of multiple land uses.

The No-Build Alternative is not consistent with the land use and zoning recommendations contained within the local master plans. The No-Build Alternative may slow the pace of development due to inadequate infrastructure, so the goals of current land use plans would not be realized.

Figure 3-1: Socioeconomic Study Area Buffer

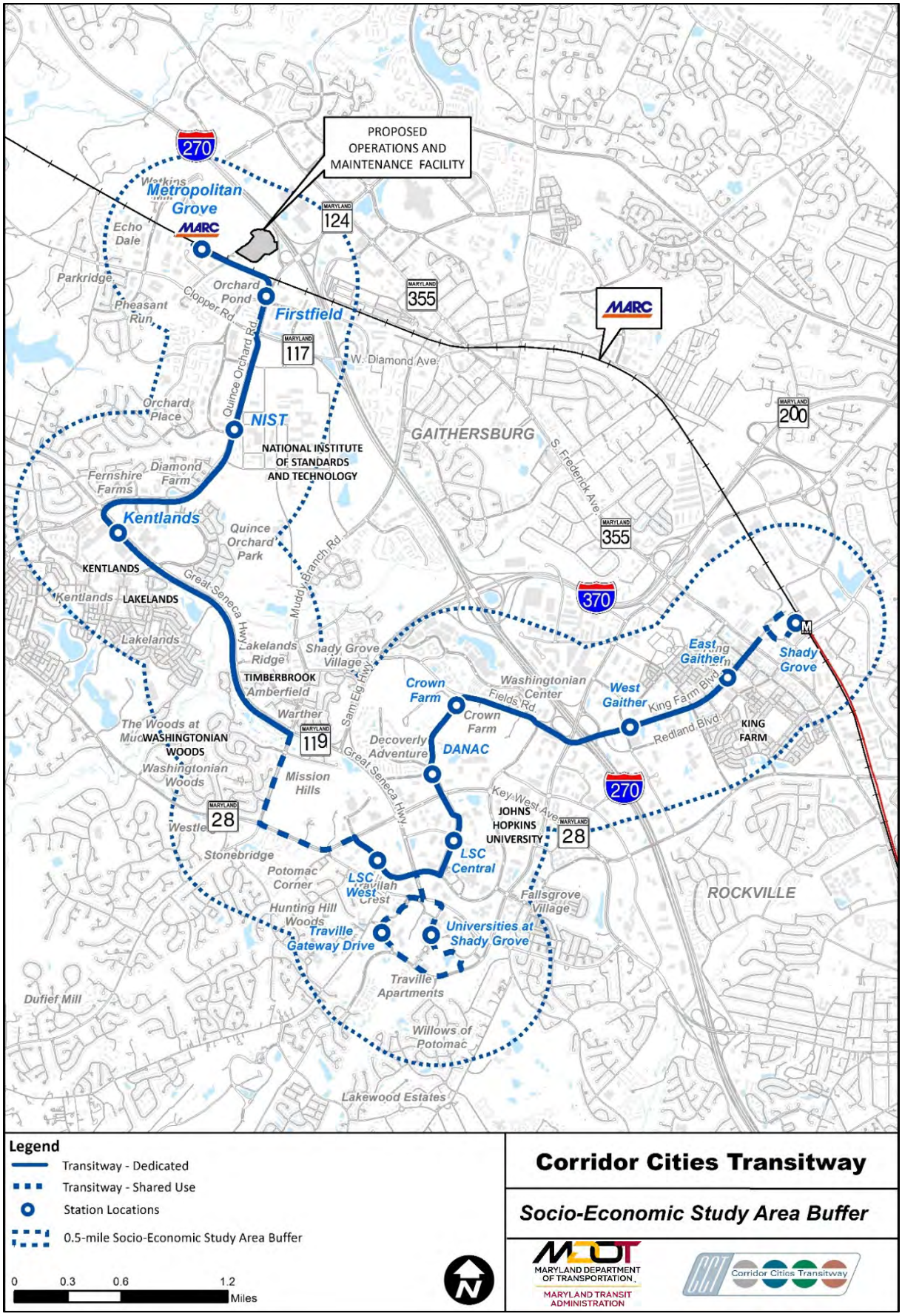
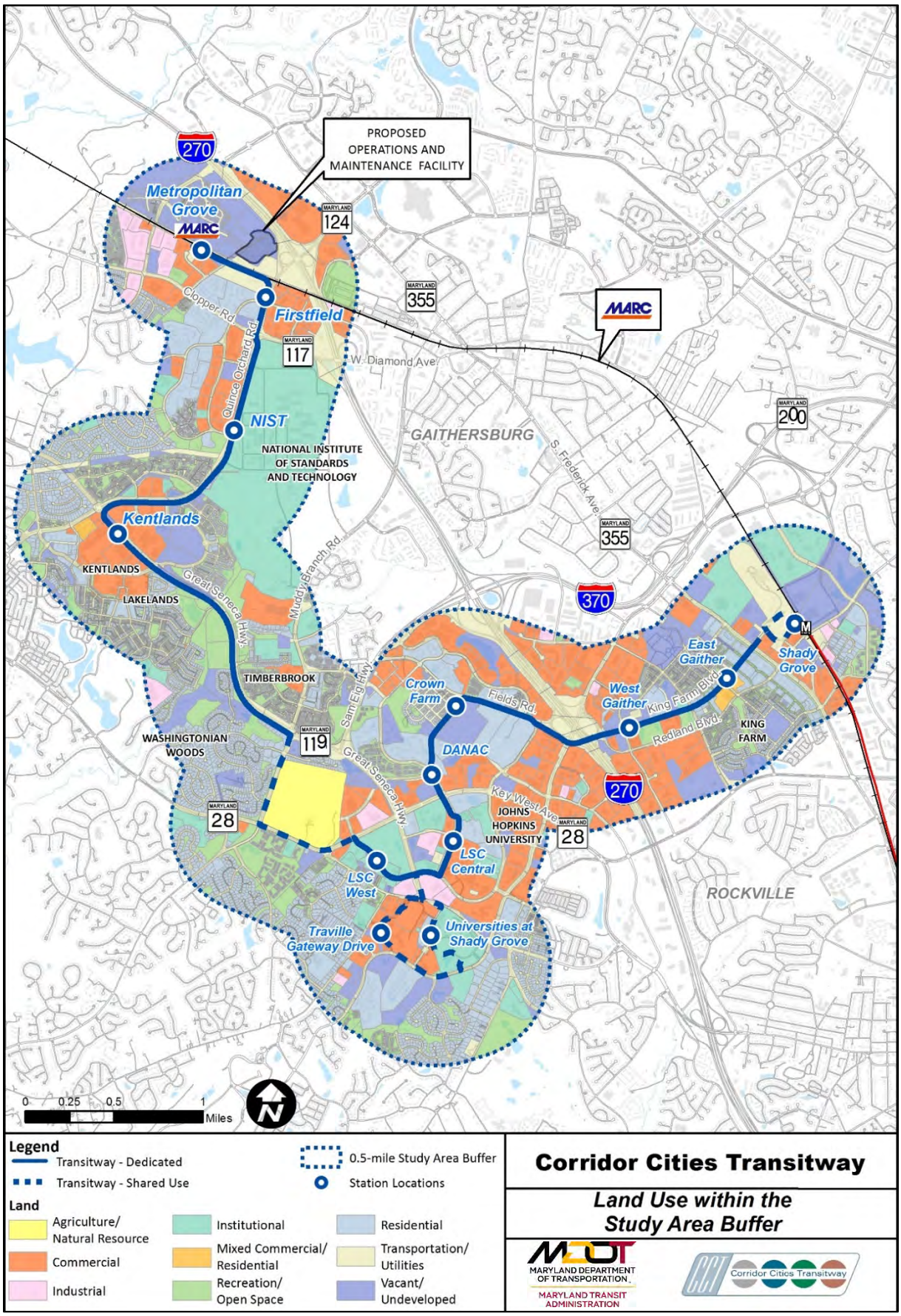


Figure 3-2: Land Use within a Half-Mile Study Area Buffer



The No-Build Alternative may also slow planned development because county subdivision staging polices require adequate infrastructure prior to development approval. Additionally, the No-Build Alternative would not provide the transportation network connectivity to support this type of growth and densification, thereby allowing increased strain on the already congested transportation network.

3.2.4 Build Alternative

Long-term Effects

Of the 6,352 total acres comprising the study area buffer, 98 acres would be acquired for transportation land use for the Build Alternative. As shown in **Section 3.5, Table 3-1**, 31 acres of the Build Alternative would be converted from other land uses (which include recreation/open space and vacant/undeveloped land uses). The majority of the property acquisitions would be "sliver takes," or narrow strips of property located directly adjacent to the proposed Project. Many of the sliver takes would be partial acquisitions, meaning the majority of the property would remain with the current owner and, in most cases, the acquisition would not affect the use of the property. Refer to **Appendix B** for a detailed list of property impacts by address along the corridor.

Twenty-eight of the 31 acres of property converted to transportation use consists of land that is existing transportation right-of-way. Seventeen acres of institutional land use would be acquired. This includes the 14 acres of right-of-way required from the NIST Headquarters campus and about two acres from the PSTA property which is slated for redevelopment. The impacts to the NIST property include a narrow strip of right-of-way along Quince Orchard Road, construction of a station, and modification of its access from Quince Orchard Road. This would entail 12.5 acres of permanent impacts and 1.5 acre of temporary impacts. The majority of the area proposed for use consists of lawn and sparse trees, which would be converted to a transportation use. The existing access and gate at North Drive and Sound Road would be closed. A new access and gate would be provided on the east leg of the Quince Orchard Boulevard / Quince Orchard Road intersection by connecting to the service drive. A new security gate would be constructed at Quince Orchard Road. The NIST Station would be constructed adjacent to the new gate and would not further impact traffic, pedestrians, bicyclists, or the neighborhoods. North Drive and Sound Road would remain open while the new access road and gate are being constructed. The access road to the substation and South Drive would remain open during and after construction.

The Build Alternative would require 13 acres of commercial land use, which is primarily parking lots associated with the Quince Orchard Plaza Shopping Center, Kentland Shopping Center, MedImmune, Adventist Hospital, and other medical buildings adjacent to the corridor. These parking lot impacts would not adversely affect these businesses as there is ample parking.

Four acres of industrial land uses would be converted to transportation land use. The majority of this industrial property is land adjacent to the CSX Metropolitan Grove railroad corridor, the SHA Maintenance Facility, and land-zoned for mixed-use that is slated for the O&M Facility. Refer to **Appendix B** for a detailed list of property impacts by address along the corridor.

The Build Alternative would convert five acres of residential property to transportation use. One residential property is displaced from the Project, along Quince Orchard Road. The rest of the residential property impacts are strip takes to land that serves as a buffer between single-family and multi-family properties and the roadways. Refer to **Appendix B** for a detailed list of property impacts by address along the corridor.

Because the Build Alternative would physically impact a relatively small portion of the study area (1.5 percent) which are predominately transportation uses, the remaining proposed land use conversions would not result in change to the overall existing and planned pattern of residential, commercial, institutional, industrial, and other land uses. Land use master plans for Gaithersburg, Rockville, Great Seneca Science Corridor, and Shady Grove Sector recognize the necessity of increased transit service and capacity, and express support for transit as a means of supporting new growth in the study area buffer. Existing land use, as well as planned developments and zoning in the study area buffer, have already responded to the anticipated transit improvements through increased densities and clustering of mixed-uses around proposed transit station locations.

The 2014 Montgomery County Zoning Code and zoning map designate the 138-acre Belward Farm, formerly an agricultural property, as part of the LSC. The LSC development at this location has been planned to accommodate the Build Alternative, per the 2006 *Shady Grove Sector Plan* and the 2010 *Great Seneca Science Corridor Master Plan*. The Build Alternative, therefore, supports future land use planning and zoning.

Short-term Effects

Overall impacts to land use during construction are expected to be temporary and limited to the three- to four-year duration of construction. The short-term land use changes anticipated during construction would result from the easements needed for construction access and temporary parking loss. As shown in **Table 3-1**, a total of 10 acres are expected to be impacted temporarily via construction easements. While the construction activities may impact individual parcels or businesses (as described in other sections of **Chapter 3**), these activities are not expected to impact existing land use patterns.

Mitigation

No mitigation is proposed.

3.3 Neighborhoods

3.3.1 Introduction and Methodology

An inventory of residential neighborhoods that overlap and are proximal to the study area buffer was compiled using Montgomery County GIS parcel data and site visits. The analysis boundary used in the following neighborhood evaluation is the study area buffer, defined as a 0.5-mile buffer around the Build Alternative alignment (**Figure 3-1**). Refer to the *Socioeconomic Technical Report* (**Appendix F**) for additional information on neighborhoods.

Neighborhood terminology used here has been updated from the *Socioeconomic Technical Report* to maintain consistency with the Environmental Justice analysis (**Section 3.8**). Neighborhood areas within the study area boundary have been determined, and each of these includes representative neighborhoods/subdivisions.

3.3.2 Existing Conditions

There are 76 neighborhoods/subdivisions within the study area buffer comprised of apartments, townhomes, and single-family detached homes. Many residential neighborhoods have typical suburban characteristics, with a range of medium to high density and heavy reliance on automobile transportation. Most neighborhoods are solely residential and thus possess a suburban character.

In recent decades, the land within and immediately surrounding the study area corridor has seen an influx of new mixed-use Transit Oriented Development (TOD) with a high-density mix of housing types and walkable urban design, particularly along the I-270 corridor and surrounding the Metrorail and MARC rail transit stations. The Kentlands neighborhood area, located south of Great Seneca Highway along Kentlands Boulevard, and the King Farm neighborhood area along King Farm Boulevard are examples of this kind of high-density, mixed-use development.

3.3.3 Future No-Build Conditions

Because no CCT-related construction would be associated with the No-Build Alternative, there would be no short- or long-term effects to neighborhoods from property acquisition, noise and vibration impacts, or changes to neighborhood character or cohesion.

3.3.4 Build Alternative

Long-term Effects

The use of existing transportation corridors for most of the Build Alternative alignment minimizes the Build Alternative's impacts on neighborhoods. Impacts to neighborhoods occur where the neighborhoods meet existing transportation right-of-way, such as landscaped roadside buffers, parking facilities, and tie-ins to existing roadways for vehicle access. Property acquisition proximal to neighborhoods would be required only along the edges of communities parallel to existing roadways, or in strips of undeveloped land designated for transportation use. Strip takes from neighborhoods would be required from Orchard Pond Apartments, Diamond Farm, Kentlands, Lakelands, Washingtonian Woods, the Vistas, and King Farm.

The alignment would traverse the King Farm neighborhood through the existing transportation right-of-way of King Farm Boulevard. However, the transitway, including its proposed stations, would not negatively affect the neighborhood character as the community was designed as a TOD to accommodate the CCT Project. Because the Build Alternative would be constructed along existing, high-traffic roadways, no adverse changes in social interaction or community cohesion would be expected.

The following residential neighborhood areas and representative neighborhoods/subdivisions would experience "medium" or moderate visual changes due to the CCT Project:

Kentlands/Lakelands, Timberbrook, Washingtonian Woods, Mission Hills, Stonebridge, Potomac Corner, Crown Farm, Washingtonian Center, and King Farm (refer to **Section 3.7** for additional information on visual impacts.)

Minimal noise and vibration impacts would result from transitway operations. Most residential neighborhoods along the corridor would experience no noise impact, per FTA guidelines, except for three receptors within the Washingtonian Woods neighborhood which would experience moderate noise impacts (**Section 3.18**.)

No vibration impacts on neighborhood areas would result from the transitway operations.

Please refer to **Sections 3.2, 3.3, 3.7, 3.18**, and corresponding technical reports for additional details on long-term effects on neighborhoods.

Short-term Effects

As discussed in **Chapter 2, Section 2.7**, construction will result in temporary reduction in neighborhood access from temporary access restrictions and/or sidewalk closures. Additionally, temporary visual impacts associated with construction would occur, including the presence of construction equipment, fencing, signage, and temporary walls would be placed at the Orchard Pond Apartments, the Vistas, Washingtonian Woods, the Crown Farm neighborhood, as well as the communities along King Farm Boulevard. Temporary noise and vibration impacts, also resulting from construction, would occur in these communities. These impacts would conclude when construction is complete.

For all communities adjacent to the CCT alignment where sidewalks would be closed during construction, pedestrians and bicyclists will be detoured to use the sidewalk on the other side of the road. Sidewalks and shared-use paths impacted during construction will be returned to their pre-construction condition. For additional information on pedestrian and bicycle facilities and impacts refer to **Section 3.24**.

Mitigation

No mitigation is proposed.

3.4 Community Facilities

3.4.1 Introduction and Methodology

The study area buffer contains educational, law enforcement, health care, religious, fire and rescue, government, and other community facilities. An inventory of community facilities within the study area buffer was created using Montgomery County GIS data, Google searches, and field visits. The analysis boundary for the community facilities evaluation is the study area buffer, defined as a 0.5-mile buffer around the Build Alternative alignment (**Figure 3-1**). Refer to the *Socioeconomic Technical Report* (**Appendix F**) for additional details.

3.4.2 Existing Conditions

The area along the I-270 corridor, including the study area buffer, is an important center of development and economic activity, and thus has several large facilities serving the county and region. Clustered education and healthcare facilities are particularly prevalent, as they are integral to the local economy's strong focus on life sciences and biotechnology. An inventory of community facilities within the study area buffer reveals 21 educational facilities, 12 health care facilities, 13 religious institutions, four law enforcement facilities, four fire and rescue facilities, and nine government facilities.

3.4.3 Future No-Build Conditions

The No-Build Alternative would not have a physical effect on community facilities and services in the study area buffer. However, the No-Build Alternative would not address existing or future traffic congestion problems, which could result in an overall decline in facility accessibility in the area. Community facilities and services could be negatively impacted by increased traffic congestion, especially those that rely on the local roadway network to provide efficient service.

3.4.4 Build Alternative

Long-term Effects

The Build Alternative would not affect the operation of community facilities or services in the study area buffer. Because the Build Alternative alignment mostly follows existing transportation corridors, nearly all of the right-of-way impacts consist of linear strips adjacent to existing roadways. The right-of-way impacts mostly consist of landscaped roadside buffers, parking facilities, and tie-ins to existing roadways for vehicle access. As such, these impacts are not expected to permanently affect operation of the identified community facilities, with the exception of the Montgomery County PSTA property.

A portion of the Build Alternative alignment would require right-of-way which is currently part of the Montgomery County PSTA, located at 9710 Great Seneca Highway. However, the PSTA is currently planned for relocation in order to expand and modernize the facility. The new PSTA is planned for construction at a site on Snouffer Road in Gaithersburg, outside of the study area buffer. Therefore, the Build Alternative would not negatively impact any services provided by the facility as it would likely be relocated prior to construction of the CCT.

Short-term Effects

Access to community facilities may be temporarily re-routed or closed by construction of the Build Alternative; however, access will be restored upon completion of construction. Vehicular access to the entrance of the PSTA on Great Seneca Highway would be temporarily limited, but access to the property during construction would still be provided.

Along Medical Center Way, the two driveways to Shady Grove Adventist Hospital will be closed during and after construction and access will be provided via Medical Center Way and Blackwell Road.

Mitigation

No mitigation is proposed.

3.5 Property Acquisitions and Displacements

3.5.1 Introduction and Methodology

This section summarizes the property acquisitions and displacements associated with the Build Alternative. Property impacts were determined by comparing the limit of disturbance (LOD) of the Build Alternative to the available existing right-of-way, which was obtained from Montgomery County.

Based on the design needs, cut/fill limits were established for necessary slopes or edge of structures along the Build Alternative. Along a majority of the corridor, a 30-foot setback was applied beyond the cut/fill line for further design refinements, erosion and sediment control, and construction-related activities. The setback line represents the LOD required for the construction and operation of the Build Alternative. The LOD was overlaid with the existing right-of-way file. Areas where the LOD exceeded the existing public right-of-way were identified throughout the study area corridor and are considered a property impact.

3.5.2 Existing Conditions

As described above, property parcels along the study area corridor were established. Detailed meets and bounds surveys will be completed as the CCT Project moves forward to identify property acquisition and easement needs.

3.5.3 Future No-Build Conditions

Under the No-Build Alternative, there would be no transportation improvements beyond those already planned and programmed. The No-Build Alternative would not involve any Project-related construction; therefore, there would be no Project-related impacts (permanent or temporary) to properties within the Project study corridor. Additionally, no construction-related easements would be required.

3.5.4 Build Alternative

The Build Alternative is predominately located within public right-of-way or on land that has been set aside by the local jurisdictions for the future transitway. However, there are portions of the Build Alternative LOD that would extend beyond the existing right-of-way. These extended areas require the acquisition of private or institutional property. The property would either need to be acquired or granted an easement for construction and maintenance of the Build Alternative. Properties would have both permanent (long-term) right-of-way acquisition and temporary easements. A total of 145 individual parcels would be affected. Refer to **Appendix B** for a table summarizing the permanent and temporary property impacts related to the Build Alternative.

Long-term Effects

The property impacts described in this section summarize the permanent acquisitions and easements that would result from the Build Alternative. Based on the current 30 percent design for the Build Alternative, a total of 145 properties would require either partial or total permanent

right-of-way acquisition, totaling 98 acres of property. **Table 3-1** presents the permanent acquisitions by land use type for the Build Alternative. Refer to **Appendix B** for additional details on the properties impacted.

The majority of the property acquisitions would be "strip takes," or narrow strips of property located directly adjacent to the proposed Project. Many of the strip takes would be partial acquisitions, meaning the majority of the property would remain with the current owner and, in most cases, the acquisition would not affect the use of the property.

Table 3-1: Permanent and Temporary Property Acquisition by Land Use for the Build Alternative

Land Use	Permanent (acres)	Temporary (acres)
Residential	5.2	1.0
Commercial	12.7	2.1
Industrial	3.7	0.6
Institutional	17.0	2.1
Transportation/ Utilities	28.3	1.9
Other	31.0	2.6
Total	**97.9**	**10.3**

Two properties would be permanently acquired and the occupants would be displaced. These properties are summarized in **Table 3-2**.

Table 3-2: Property Displacements with the Build Alternative

Land Use	Location	Property Description
Residential	Quince Orchard Road	Single-family home
Commercial	Quince Orchard Road	Business that was formally a single-family home

Short-term Effects

A temporary easement is the use of private property without the transferring of ownership. Temporary easements are necessary for project construction, and access is granted for a certain period of time (typically the time of construction activities). Specific activities requiring temporary surface easements may include grading, vehicular/equipment access, worker access, etc.

Based on the current 30 percent design, a total of approximately 10.3 acres of temporary easements would be needed for the Build Alternative. The temporary easement requirements would impact 87 properties. Refer to **Table 3-1** for the temporary acquisitions by land use type for the Build Alternative. Refer to **Appendix B** for a list of properties by address that would have a temporary easement as a result of the Build Alternative.

During construction, it would be necessary to limit or curtail vehicular and pedestrian access in certain areas to address public safety and to accommodate the variety of machinery, storage areas, and construction activities that would occur. MDOT MTA will coordinate with the occupants concerning the affected locations and relocation options. MDOT MTA will restore

properties affected through a temporary easement to an acceptable pre-construction condition following construction activities, in accordance with the individual easement agreements.

Mitigation

Property acquisition activities, including relocations, will be performed in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (*Uniform Act*), as amended; FTA Circular 5010.1D, Grant Management Requirements; FTA Circular 5010.1E, Award Management Requirements; and all applicable Maryland State laws that establish the process through which MDOT MTA may acquire real property through a negotiated purchase or through condemnation.

Displaced persons and businesses within the area needed for the Project may be eligible for benefits under Maryland's Relocation Assistance Program. Benefits could include advisory services, moving and reestablishment costs, and other payments and services as provided by law.

All activities related to acquisitions and displacements would be conducted in conformance with the following:

- *Uniform Relocation and Real Property Acquisitions Policies Act of 1970* (42 United States Code [USC] 4601), as amended (*the Uniform Act*), and *Public Law 105-117*. These statutes mandate that certain relocation services and payments be made available to eligible residents, businesses, and nonprofit organizations displaced as a direct result of projects undertaken by a federal agency or with federal financial assistance. *The Uniform Act* provides for uniform and equitable treatment for persons displaced from their homes and businesses, and it establishes uniform and equitable land acquisition policies.
- *The Real Property Article of the Annotated Code of Maryland*, Title 2, Section 2-112 and Titles 12, Subtitle 2, Sections 12-201 to 12-212 govern relocation and assistance for displacements associated with state actions.

3.6 Economy

3.6.1 Introduction and Methodology

The 0.5-mile buffer around the Build Alternative alignment was used in the economic evaluation (**Figure 3-1**). Economic information was collected from MWCOG publications, the ACS Five-Year Estimates (2008-2012), and other local government publications. Refer to the *Socioeconomic Technical Report* (**Appendix F**) for additional data related to economic conditions and impacts.

3.6.2 Existing Conditions

Employers in the study area corridor include government, academic, and private industry research facilities. The study area's local economy is strongly focused on life sciences and biotechnology. Three of these employers within the study area buffer have over 2,000 employees: the NIST, MedImmune, and the National Cancer Institute's Shady Grove Campus. In addition to these, many smaller businesses and academic and government institutions are located within the study area buffer.

3.6.3 Future No-Build Conditions

The No-Build Alternative would not cause any physical impacts to businesses within the study area buffer. The primary long-term economic impact of the No-Build Alternative would be to slow the pace of development in the study buffer area. Some development plans, including the *Great Seneca Science Corridor Master Plan*, have staging requirements tied to the implementation of the Build Alternative. Under the No-Build Alternative, the milestones may not be met and planned development would not occur. This may limit growth of existing business and prevent new space from being constructed to house new businesses and employees.

3.6.4 Build Alternative

Long-term Effects

One business, the Kitchen and Bath Studio, located at 895 Quince Orchard Road in Gaithersburg would be displaced under the Build Alternative. This business space is located in a converted single-family house and is currently vacant. Most of the property and the building would be impacted by the Build Alternative. Property acquisition will be done in accordance with the federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act* of 1970, as amended. All impacted persons, regardless of ethnicity or income, would be fairly compensated for property impacts that occur as a result of implementation of the Build Alternative and would be assisted in relocation, where applicable.

Permanent jobs associated with operating and maintaining the Build Alternative would be created following construction. Implementation of the CCT Project would result in new residents and new and expanding employers in the study area buffer due to staging requirements of the *Great Seneca Science Corridor Master Plan*. The addition of residents and employers in the study area would generate economic benefits. Furthermore, the Build Alternative has the potential to provide economic benefits by improving mobility and offering new, convenient options for accessing jobs, local economic destinations, and regional transit facilities.

Short-term Effects

In the short-term, disruptions to businesses adjacent to the construction site would occur. Temporary effects from construction could include:

- Decrease in roadway capacity that results in delays, congestion, and detours;
- Alterations to property access;
- Loss of parking;
- Airborne dust;
- Noise and vibrations from construction equipment and vehicles; and
- Loss of visibility of businesses to their customers.

At the Kentlands Shopping Center near the Kmart, a portion of the parking lot would be closed during construction of the station, but the majority of the parking spaces would be maintained following construction. Access to the Sheraton Hotel driveway on King Farm Boulevard west of Piccard Drive would be temporarily impacted during construction; however, access to the hotel will be maintained at all times.

Temporary construction easements, traffic lanes or road closures, or other property restrictions could have negative impacts to some businesses, thus negatively affecting the economy within the study area. Losses of parking and difficulty accessing businesses could deter customers and disrupt deliveries. Small businesses in particular could have difficulty withstanding the resulting loss of commerce. MDOT MTA is committed to supporting local businesses in the study area corridor during construction.

Ways the MDOT MTA could support businesses during construction include:

- Construction of the Project in segments, to keep disruption to a small area at a time;
- Maintaining access to business during construction both for customers and deliveries;
- Maintaining or relocating bus stops;
- Maintaining parking lot access;
- Providing directional signage; and
- Developing "Open for Business" marketing and advertising tools for use during construction.

Mitigation

MDOT MTA will minimize disruption to businesses during construction. The MDOT MTA will continue to coordinate with businesses along the corridor during design and construction, especially those adjacent to the Build Alternative alignment, to avoid or minimize temporary disruptions to parking, access, or delivery. Emissions of noise and vibration during construction will be minimized and mitigated through design, monitoring, and enforcement.

3.7 Visual Resources

3.7.1 Introduction and Methodology

Visual impacts from a project arise when changes in visual context occur and viewer's response is positive or negative. These responses or the level of impact can depend upon three factors: the incompatibility of the project's components to the existing environment, the amount of visual landscape change that would occur, and the amount of viewer sensitivity and exposure that would result from the change. These factors may individually have high, medium, or low ratings, and were considered collectively to determine an overall visual effect. Refer to the *Visual Analysis Technical Memorandum* (**Appendix F**) for additional details.

Three Characteristics Used to Describe Visual Impacts

Contextual Incompatibility – describes the project components' compatibility with or deviation from existing elements in the study area corridor.

Visual Change – describes the changes to or interruption of identified views or visual resources within the project viewshed.

Viewer Sensitivity – describes the level of expected response to the introduction of project components based on the frequency and duration of the exposure of the viewer to the project components.

To assess the potential changes to the visual landscape, the study area corridor was divided into six sections. Each section was characterized by a section description, viewer groups, details about the transitway and stations, and a visual analysis. This visual description begins at the northwestern terminus

(Metropolitan Grove Station) and travels generally to the southeastern terminus (Shady Grove Station). The impacts were assessed by evaluating each of the three characteristics used to describe visual impacts: contextual incompatibility; visual change; and viewer sensitivity. Using these three measures, an overall visual effect rating for each section may be determined.

The nature of the introduced component may be viewed positively or negatively, but the overall visual impact rating is made irrespective of that subjective viewpoint. While a visual impact may be rated as low, medium, or high, this will be done based on the three characteristics alone, not reflecting any judgment of the quality of the component.

3.7.2 Existing Conditions

The visual landscape of the CCT Project is an intensely developed suburban corridor. New transit-oriented developments such as Crown Farm, Watkins Mill Town Center, and the Johns Hopkins Belward Research Campus project are planned or under construction. The corridor is home to several large employment centers including the LSC and the NIST.

3.7.3 Future No-Build Conditions

The future No-Build condition consists of the existing road and transit network, as well as planned and programmed improvements in the approved regional plan. No new visual impacts related to the CCT Project and its components would occur.

3.7.4 Build Alternative

The components of the CCT Project are the physical elements that make up the project, including: the transitway, buses, stations, lighting, crosswalks, landscaping, signals, etc. The project setting or "viewshed" is the physical context in which the project components are located and the views to and from that context that may be impacted.

Long-term Effects

The viewshed to and from the Build Alternative may be impacted by components such as the transitway, stations, bridges, etc. **Table 3-3** summarizes the level of impact or response (high, medium, or low) rated for the Project's contextual incompatibility, visual landscape change, viewer sensitivity, and overall visual effect. These effects are expected to be long-term changes to the landscape.

In general, the Build Alternative would add Project components to the viewshed that are compatible and in context to the existing roadway and surrounding land uses. Most ratings were either low or medium, where medium effects were due to elevated structures such as bridges, retained fill, or grade-separated stations. For example, Project components added to the viewshed in Metropolitan Grove and Shady Grove sections are very similar in appearance to what is currently in the viewshed, which are views of commuter rail stations, parking facilities, and other transit-related components.

Table 3-3: Summary of Effects to Visual Resources

Section	Project Components	Contextual Incompatibility	Visual Landscape Change	Viewer Sensitivity	Overall Visual Effect
Metropolitan Grove	At-grade station, parking lot, fencing, retaining walls, building	Low	Medium	Low	Low
Quince Orchard Road	Retaining walls, bridge, aerial station	Low	Medium	Medium	Medium
Great Seneca	Two bridges, aerial station, retaining walls	Low to Medium	Low to Medium	Medium	Medium
Crown Farm	Two stations, bridge, retaining walls	Low to Medium	Medium	Low	Medium
King Farm	Retaining walls, two stations	Medium	Medium	Medium to High	Medium
Shady Grove	Station, parking	Low	Low	Low	Low

Changes to the visual landscape are rated in the low to medium range. In most of the alignment sections, the Project components would visually change the existing landscape with the addition of at-grade stations along the transitway. More significant changes occur when bridges, aerial stations, and retaining walls would be constructed which block the view from adjacent properties.

The least overall visual effects are anticipated in the Metropolitan Grove and Shady Grove areas. Although many structures would be built at these locations, they are transit-oriented elements in an environment with predominantly transitory users and existing transit facilities. Quince Orchard, Great Seneca, Belward Farm, LSC, Crown Farm, and King Farm have overall visual effects of low-medium to medium. Metropolitan Grove and Shady Grove user groups are currently exposed to transit-oriented elements due to the transitory nature of the area, and therefore, received low ratings due to the limited exposure of these components. However, the King Farm section is comprised of high-density residential development with the potential of high-viewer sensitivity to the permanent exposure of Project components. Therefore, the King Farm section rated medium-high for viewer sensitivity.

Short-term Effects

Temporary visual impacts associated with construction would occur, including the presence of construction equipment, fencing, signage, and temporary walls would be placed at the Orchard Pond Apartments, the Vistas, Washingtonian Woods, the Crown Farm neighborhood, and the communities along King Farm Boulevard. These activities are short-term and construction materials would be removed from the study area after construction is complete.

Mitigation

The stations would be modern facilities with materials, colors, lighting, landscaping, and pedestrian facilities designed to minimize negative visual impacts on the surrounding streetscape. During final design and construction, existing tree buffers would be preserved to the maximum extent possible. Additional trees and landscaping would be included where available

land exists throughout the Project. Lighting for the stations would be selected to minimize light pollution to surrounding residential communities. Stairs, retaining walls, and platforms, would be designed in a manner compatible with each of the respective visual districts in which they would be located.

3.8 Environmental Justice

3.8.1 Introduction, Regulatory Overview, and Methodology

Executive Order 12898, *Federal Actions to Identify and Address Environmental Justice in Minority and Low-Income Populations* (1994), 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." This Environmental Justice (EJ) analysis was prepared in accordance with the definitions, methodologies, and guidance provided in Executive Order 12898; the CEQ's *Environmental Justice Guidance Under the National Environmental Policy Act* (1997); the United States Department of Transportation's (USDOT) Order 5610.2(a) *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (2012 update); and FTA Circular 4703.1 *Environmental Justice Policy Guidance for Federal Transit Administration Recipients* (2012).

The FTA EJ Circular identifies three principles which guide USDOT and FTA actions:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Key Definitions Used in an EJ Analysis

***Minority*:** persons who are American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, and Native Hawaiian and other Pacific Islander.

A ***minority population*** is any readily identifiable group or groups of minority race/ethnicity persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed or transient persons who will be similarly affected by a proposed FTA program, policy, or activity.

***Low-Income Person*:** a person whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines. [The Circular notes that FTA grant recipients are encouraged to use a locally developed threshold or a percentage of median income for the area, provided that the threshold is at least as inclusive as the HHS poverty guidelines.]

The FTA EJ Circular sets forth these principles as goals to be achieved throughout transportation planning and project development process, and through all public outreach and participation efforts conducted by FTA, its grantees, and subgrantees. To ensure that these principles are properly incorporated throughout the NEPA process, the FTA EJ Circular recommends steps for conducting an EJ analysis to determine whether disproportionately high and adverse effects would be borne by EJ populations.

These general steps include:

- Identification of EJ Populations using the appropriate demographic data;
- Integration of public involvement tools to engage EJ populations;
- Determination of potential adverse impacts to EJ populations and assessment of potential benefits; and
- Identification of potential mitigation strategies to address adverse effects.

Delineation of EJ Analysis Study Area

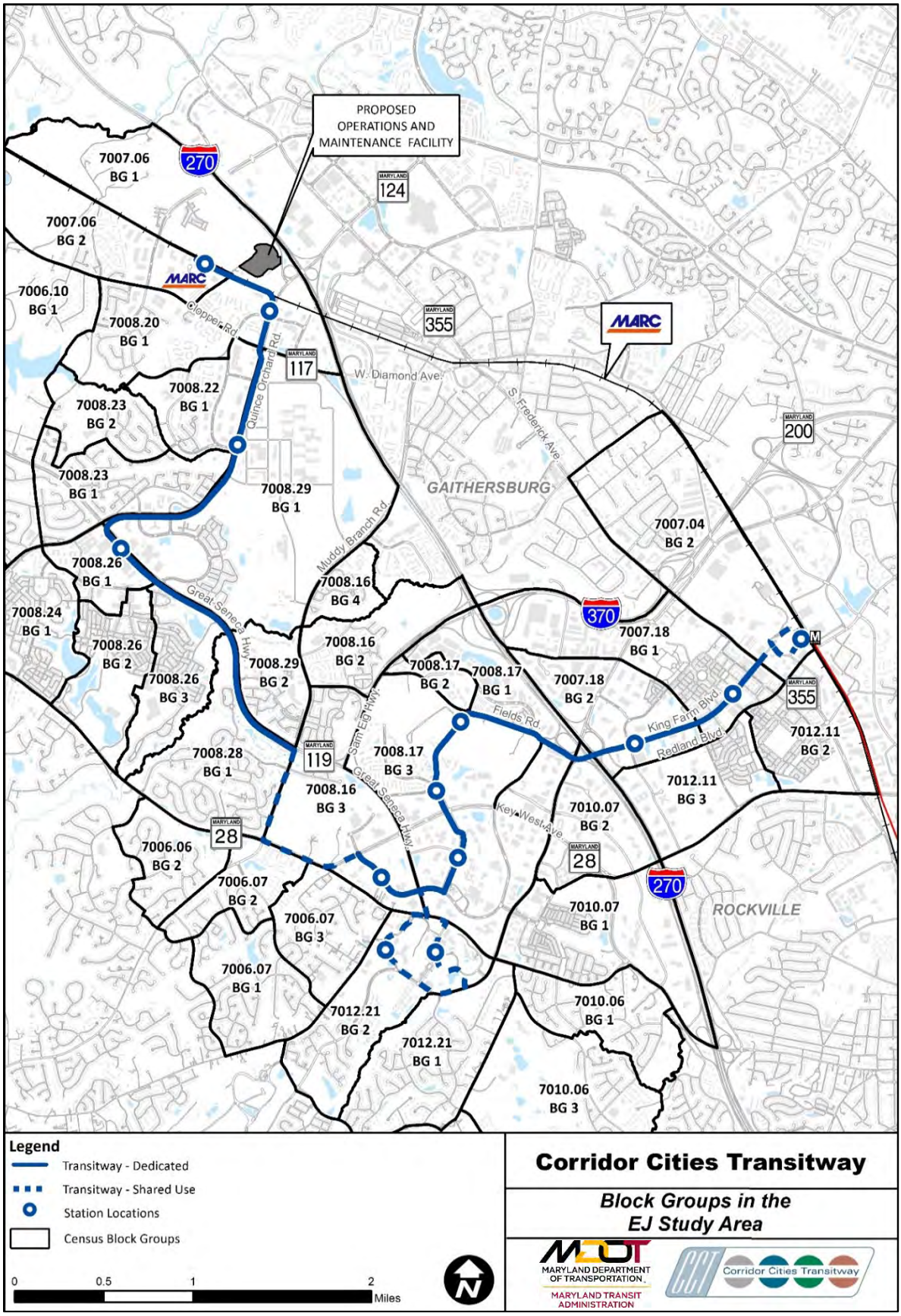
A GIS platform was used to identify a 0.5-mile study area buffer from the centerline of the transitway alignment for the EJ analysis. A 0.5-mile study area buffer was used to encompass and account for improvements associated with the Build Alternative in the context of potential effects on EJ populations who may be concentrated in or dispersed throughout a Census Block Group. The EJ analysis buffer also encompasses the presence of EJ populations within a walkable distance (understanding that the average walking distances are between ¼ mile and ½ mile) to existing transit facilities which includes stations and parking lots.

In addition, the results of the technical studies conducted for the CCT Project were analyzed to identify the physical locations of potential adverse impacts, and a map analysis was conducted to determine whether patterns or concentrations of potential adverse effects occurred in Block Groups with EJ populations.

Data Sources

The US Census Bureau data were used to quantify minority and low-income populations at the Block Group level, which is the appropriate geographic unit for which race and ethnicity data are both available at the same census level. For this evaluation, the percentages of persons of minority and low-income populations, as defined previously in this section, were collected from the US Census Bureau's ACS 2008-2012 Five-Year Estimates. Refer to **Figure 3-3** for the Census Block Groups within the 0.5-mile study area.

Figure 3-3: Block Groups in the Environmental Justice Study Area



3.8.2 Environmental Justice Populations in the Study Area

Minority Populations

The EJ analysis study area contains 35 block groups and the total population in the EJ study area was 65,396 persons. White persons accounted for 52.7 percent of this population. Of the minority population, Black or African American persons accounted for 10.0 percent; American Indian and Alaska Native persons accounted for 0.4 percent; Asian persons accounted for 23.2 percent; persons of another race and/or multiple races accounted for 3.2 percent; and Hispanic or Latino persons accounted for 10.5 percent. A total of 30,925 minority persons were estimated to be living in the EJ study area. **Table 3-4** presents the total minority composition of block groups in the EJ study area.

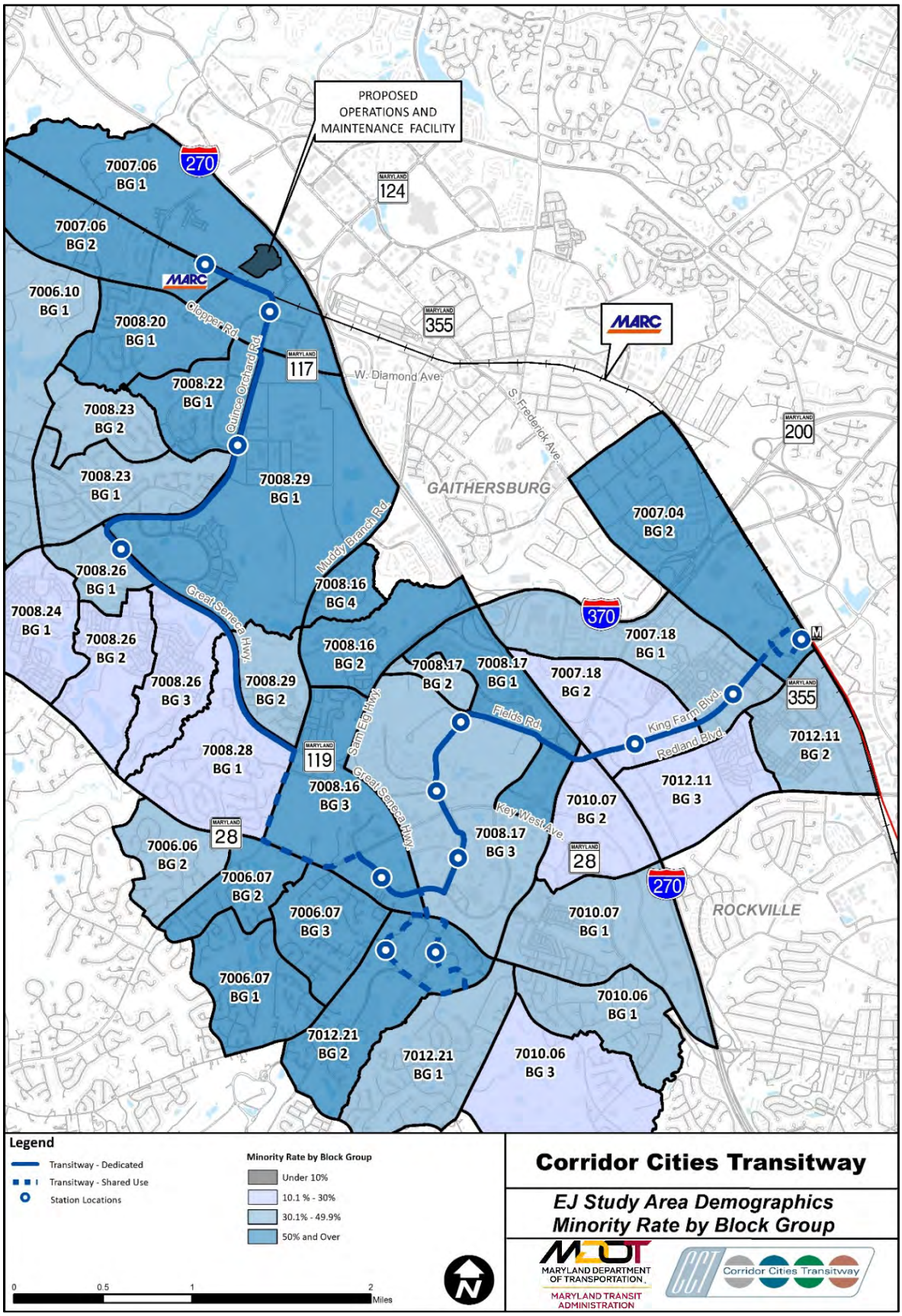
Table 3-4: Minority, Race and Hispanic or Latino Populations by State, County and EJ Study Area

Geographic Area	Total Population	White Alone[1]	Black or African American Alone[1]	American Indian & Alaska Native Alone[1]	Asian Alone[1]	Other Race and/or Multiple Races[1,2]	Hispanic or Latino[3]	Percent Minority (%)
Maryland	5,785,496	3,163,295	1,675,532	12,165	321,501	138,552	472,285	45.3
Montgomery County	974,824	479,708	162,939	1,678	135,573	28,664	166,124	50.8
EJ Study Area Block Groups (Total)	65,396	34,471	6,535	236	15,186	2,118	6,850	47.3

[1] These categories do not include Hispanic or Latino individuals.
[2] Other includes American Indian/ Alaskan Native, Native Hawaiian and Other Pacific Islander, and some other race alone.
[3] Hispanic can be any race.
Source: U.S. Census Bureau, American Community Survey 2008-2012 Five-Year Estimates: Table B03002, Hispanic or Latino Origin by Race.

The EJ study area has a comparable percentage of minority population in comparison to Montgomery County as a whole, and a slightly lower percentage of low-income population than the overall county. Of the 35 block groups analyzed, 14 had minority populations of 50 percent of more (**Figure 3-4**).

Figure 3-4: EJ Study Area Demographics – Minority Rate by Block Group



Low-Income Populations

Table 3-5 presents the total low-income population of block groups in the EJ study area. Low-income persons composed 3.4 percent of the population of the 35 block groups in the EJ study area. The State of Maryland contains a lower percentage of minority population and a higher percentage of low-income population than both Montgomery County and the EJ study area. No Block Groups in the EJ study area contained low-income populations of 50 percent or more.

Table 3-5: Low-Income Population by State, County and EJ Study Area

Geographic Area	Total Population	Income Below Poverty Level[1,2]	Percent
Maryland	5,645,390	532,116	9.4%
Montgomery County	966,636	63,154	6.5%
EJ Study Area Block Groups (Total)	65,396	2,202	3.4%

[1] Poverty status is determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old (American Fact Finder, factfinder.census.gov).

[2] Because of the unavailability of Poverty data from the 2010 US Census, current poverty status data has been derived from the ACS, 5-Year Estimate. Please note that ACS data has a margin of error and does not cover 100 percent of the geographies used for this report.
http://www.census.gov/acs/www/Downloads/data_documentation/Accuracy/MultiyearACSAccuracyofData2010.pdf
Source: American Community Survey (ACS) Five-Year Estimates, 2008-2012: Table B17021, Poverty Status of Individuals in the Past 12 Months by Living Arrangement.

Environmental Justice Populations Analyzed by Neighborhood

To better account for dispersion of EJ populations and to document outreach and potential impacts to these populations, neighborhood areas and representative or sample subdivisions or smaller neighborhoods were identified within the block groups. This allows residents, who may not know the Census Block Group that they live in, to determine the potential effects and benefits by their respective neighborhood or subdivision name instead of their Census Block Group. **Table 3-6** presents the socioeconomic composition of all block groups by neighborhood located in the EJ study area.

Table 3-6: Population Characteristics by Neighborhood for Block Groups in the EJ Study Area

Neighborhood Areas	Representative Neighborhoods/Subdivisions	Block Group	Total Minority	Percent Minority	Below Poverty Level	Percent Low-Income
North Potomac	Dufief, Westleigh	7006.06 BG 2	376	30.4	0	0.0
	Stonebridge, Barrington	7006.07 BG 1	1,284	**62.6**	49	2.4
	Dufief Mill	7006.07 BG 2	936	**61.1**	139	9.1
	Hunting Hill Woods, Stonebridge, Garden Grove	7006.07 BG 3	1,138	**69.4**	25	1.5
Quince Orchard	Parkridge, Pheasant Run, Relda Square, Fernshire Woods, Quince Orchard, Quince Orchard Manor,	7006.10 BG 1	608	30.6	58	2.9
Shady Grove	No residential developments are located in the direct impact area surrounding the Shady Grove Metrorail Station.	7007.04 BG 2	726	**54.5**	63	4.7
Metropolitan Grove	Caulfield, Orchard Pond	7007.06 BG 1	1,738	**78.2**	187	8.4
	Clopper, Parkridge Estates, Bennington, Hamilton Estates/Dorsey Estates	7007.06 BG 2	756	**54.1**	99	7.1
King Farm	King Farm, The Residences at King Farm	7007.18 BG 1	1,774	45.3	167	4.3
	Ingleside at King Farm	7007.18 BG 2	89	23.9	10	2.7
Shady Grove Village	The Fields at Germantown, The Reserve at Crown Point I	7008.16 BG 2	1,085	**52.9**	95	4.6
Belward	Mission Hills, Washingtonian Towns, The Greens of Warther The Reserve at Crown Point II	7008.16 BG 3	895	**67.4**	73	5.5
Park Summit	Park Summit/Governor Square	7008.16 BG 4	1,887	**87.6**	91	4.2
Washingtonian Center	Gateway Park Townhomes, Avalon Fields Apts.	7008.17 BG 1	1,213	**81.2**	89	6.0
	The Crossings at Washingtonian Center, Washingtonian Towers	7008.17 BG 2	659	42.5	86	5.6
Crown Farm	Decoverly Condos, Decoverly II, Decoverly III, Avalon at Decoverly, Crown Farm	7008.17 BG 3	854	40.1	212	11.1

Neighborhood Areas	Representative Neighborhoods/Subdivisions	Block Group	Total Minority	Percent Minority	Below Poverty Level	Percent Low-Income
Orchard Place	Orchard Hills, Pheasant Run, Seneca Mews, Grove Park	7008.20 BG 1	2,070	**69.0**	243	8.3
	Potomac Oaks, Brown Station Estates, Orchard Place	7008.22 BG 1	1,022	**61.2**	409	24.5
	Hidden Orchard, Fernshire Farms, Bridlewood, Diamond Farms	7008.23 BG 1	1,059	42.2	81	3.2
	Longdraft, Hunter's Trace, West Riding	7008.23 BG 2	342	38.3	50	5.6
Kentlands/ Lakelands	Kentlands, The Orchards	7008.24 BG 1	867	28.1	50	1.6
	The Colonade at Kentlands	7008.26 BG 1	486	32.1	89	5.9
	Lakelands	7008.26 BG 2	505	24.0	0	0.0
	Lakelands, Market Square	7008.26 BG 3	600	25.7	0	0.0
Washingtonian Woods	The Woods at Muddy Branch, Washingtonian Woods, The Vistas at Washingtonian Woods, Westleigh	7008.28 BG 1	658	26.8	62	2.5
Quince Orchard Park	Quince Orchard Park	7008.29 BG 1	824	**57.8**	59	4.1
Great Seneca	Timberbrook, Amberfield, Great Seneca North	7008.29 BG 2	717	47.3	0	0.0
Glenora Hills	Glenora Hills	7010.06 BG 1	458	30.8	102	7.7
Rockshire	Rockshire	7010.06 BG 3	441	27.4	0	0.0
Fallsgrove	Post Fallsgrove, Fallsgrove	7010.07 BG 1	1,194	45.0	1	0.0
	Camden Fallsgrove, Fallsgrove	7010.07 BG 2	111	20.0	23	4.1
King Farm	King Farm Condominiums, The Huntington at King Farm	7012.11 BG 2	1,402	47.6	173	5.9
	Watkins Pond	7012.11 BG 3	252	27.7	17	1.9
Universities at Shady Grove	The Willows of Potomac	7012.21 BG 1	720	31.6	79	3.5
	The Willows, Avalon	7012.21 BG 2	1,179	**57.2**	186	9.0
TOTAL		---	**30,925**	**47.3**	**3,067**	**4.7**
EJ Study Area Block Groups (Total Population)		**65,396**	---	---	---	---

Source: U.S. Census Bureau ACS 2008-2012, Five-Year Estimate.

Shaded cells indicate a percentage more than 50 percent of total population in the Census Block Group.

3.8.3 Environmental Justice Related Outreach Efforts and Outcomes

Public information and outreach efforts for the CCT Project began under previous NEPA studies and have continued after the LPA was announced by Governor O'Malley in May 2012. In an effort to continue to reach stakeholders, a variety of public outreach tools have been implemented. MDOT MTA has provided opportunities for residents and business owners to learn more about the Build Alternative and other elements of the CCT Project through 2013 Public Open House Meetings. In addition, public outreach and engagement has occurred through community meetings, interviews, and data gathered as part of station area pre-planning via the Area Advisory Committees that met between March 2014 and June 2015. Refer to **Chapter 4** for additional information.

Extensive public outreach has occurred with communities along the study area corridor (**Appendix C, Table 1**). Meetings ranged from Public Open House Meetings held by the MDOT MTA that were widely advertised and open to the public, to individual meetings that MDOT MTA and Project staff attended at the request of business owners and resident groups in the study area, as well as community events targeted in areas with EJ populations.

The study area corridor contains a large Asian and Hispanic or Latino population in comparison to Montgomery County as a whole. Taking this into account, several grassroots outreach strategies were employed that are not captured in **Appendix C, Table 1.** Those strategies included: language translation services in Spanish, Mandarin Chinese, and Sign Language for meeting attendees; door-to-door business outreach; transit center outreach at Shady Grove Metrorail Station and Germantown Transit Center; bilingual postcards, flyers, and distribution of posters at community centers, social services offices, libraries, and other public facilities; and meetings with community advocates.

As a result of public outreach and engagement activities, several concerns were identified through these efforts that resulted in additional studies or design changes. Many stakeholders have expressed concerns regarding noise impacts, visual impacts, and the location of the transitway in the Washingtonian Woods / Great Seneca area in addition to comments regarding the location on preserved right-of-way through Belward Farm. **Appendix C, Table 2** presents EJ community concerns and actions taken by MDOT MTA to address those concerns.

3.8.4 Assessment of Effects on Environmental Justice Populations

Methodology

The USDOT has defined a "disproportionately high and adverse effect" on minority and low-income populations as an adverse effect that:

- Is predominantly borne by a minority population and/or a low-income population; or
- Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

Determinations of whether a project will have disproportionately high and adverse effects must take into consideration "mitigation and enhancements measures that will be taken and all offsetting benefits to the affected minority and low-income populations…" (USDOT Order, Section 8.b). The FTA Circular explains how benefits are considered in making this determination:

> "…your analysis also should include consideration of offsetting benefits to the affected minority and low-income populations. This is particularly important for public transit projects because they often involve both adverse effects (such as short-term construction impacts, increases in bus traffic, etc.) and positive benefits (such as increased transportation options, improved connectivity, or overall improvement in air quality). The NEPA EJ analysis will include a review of the totality of the circumstances before determining whether there will be disproportionately high and adverse effects on EJ populations."
> (FTA Circular 4703.1, p. 46)

Adverse Effect is defined in the FTA EJ Circular 4703.1 (page 17) as: the totality of significant individual or cumulative human health or environmental effects to human health, the natural and social environment, community function, etc. It also includes the denial, reduction, or delay in receiving benefits, which are addressed like any other impact.

As a tool for evaluating the proportionality of impacts and benefits, this analysis identified and compared areas that were predominately comprised of EJ populations versus areas that were not within the study area corridor. The Build Alternative was then evaluated with respect to each environmental category. Environmental studies found to have potential effects were then carried forward to another level of analysis to determine whether those effects were high or disproportionate to EJ populations.

Environmental Studies with No Disproportionately High and Adverse Effect on EJ Populations

The following environmental studies, which are often evaluated as part of the EJ analysis, were found to have no potential disproportionately high and adverse effects on EJ populations because they presented no direct or indirect effects in the study area corridor.

- **Community Facilities and Services:** The Build Alternative would not displace any community facilities. All major routes providing access to these community services would remain open after the completion of the CCT Project.
- **Air Quality:** A regional analysis was performed for the Project using the latest version of the EPA's Motor Vehicle Emission Simulator (MOVES) emissions program. The Build Alternative is predicted to decrease all regional pollutants by approximately 0.1 percent to 0.2 percent. The Build Alternative has a low potential for effects on Mobile Source Air Toxins (MSAT) since the CCT Project would utilize diesel-electric hybrid buses, which emit fewer pollutants than diesel buses. Also, based on the eight-hour values used in the microscale carbon monoxide (CO) analysis, the Build Alternative is predicted to have no change on CO levels in 2035, when compared to the No-Build Alternative. The Build Alternative is not predicted to cause or exacerbate a violation of the NAAQS for CO. Since there would be no long-term effects to air quality with the Build Alternative, there would be no disproportionately high and adverse effects on EJ populations.

- **Hazardous Materials:** The majority of the proposed construction for the Build Alternative would be at-grade, with excavations extending no deeper than existing pavement sections. Therefore, substantial contact with soil contaminants or hazardous materials is not anticipated and the majority of the potential contamination (based on the location of the recognized environmental conditions (RECs)) would be encountered outside of the proposed limits of disturbance. Since there would be no long-term effects to hazardous materials with the Build Alternative, there would be no disproportionately high and adverse effects on EJ populations.
- **Safety and Security:** MDOT MTA's priority is to provide a safe and secure transit environment. The Build Alternative would feature current safety and security systems and procedures to protect passengers and workers, as well as the community. Federal, state, and local authorities institute safety requirements. The Build Alternative would be designed, constructed, and operated in accordance with the MDOT MTA's System Safety Program Plan (SSPP), which would be updated to include specific requirements for the CCT Project.

Assessment of Potential Disproportionately High and Adverse Effects on Minority and Low-Income Populations

No-Build Alternative

The adverse effects of the No-Build Alternative, such as increasing congestion and travel time, would be similar for all communities, regardless of race or income. The No-Build Alternative would not entail any changes to the physical environment, such as displacements or loss of resources. Therefore, the No-Build Alternative would not result in disproportionately high and adverse effects to EJ populations. However, the positive effects of the Project would also not be realized, such as improved transit travel times, frequency of service, and improved transfers, as well as quality pedestrian access to high-speed transit that connects to the largest job concentrations in the region, many educational institutions, retail, government, and health services.

Build Alternative

Displacements

The Build Alternative would displace one residential property and one business property, all located within Block Group 7008.29 BG 3, an area with a predominate EJ population. This has the likelihood of impacting EJ households, but would not be considered a disproportionately high and adverse impact on EJ populations.

Property Acquisition

The Build Alternative would require 98 acres of permanent property acquisition and 10.3 acres of temporary acquisition (generally in "strip" takes). However, the Build Alternative would not impact the current overall pattern of residential land use within the study area corridor. Due to the measures to preserve land for the CCT Project over the last 30 years, the number of property owners that would be impacted is very low. These sliver takes do not represent an adverse impact to EJ populations. The residential property acquisition constitutes one home, apart from a neighborhood, and does not constitute an individual community. Therefore, the overall impact

is not an adverse impact to EJ populations living in the study area. The property acquisitions would not be considered a disproportionately high and adverse impact on EJ populations.

Visual Effects

The visual analysis evaluated six sections of the study area. The overall visual effects of the Build Alternative would range from low to medium in severity. The block groups would experience one "low" visual effect and three "medium" visual effects compared with the five non-EJ areas that would experience one "low" and three "medium" visual effects.

Since the visual effects in predominate and non-predominate EJ areas would be comparable, there would be no disproportionately high and adverse impact on EJ populations.

Traffic and Transportation

The Build Alternative would have the following effects:

- New traffic signals installed or existing traffic signals modified at 29 intersections. (Several intersections bordered on more than one Block Group.)
- Seventeen intersections with median or entrance closures. (Only three of the 17 intersections are located near predominate EJ block groups.)
- Three intersections with new left- or right-turn lanes.
- Diminished level of service (LOS) compared to No-Build conditions in 2035, during both the morning and evening peak hours at a similar number of intersections located in many areas used by EJ and non-EJ drivers. The traffic analysis evaluated 35 intersections for changes in LOS. An additional ten intersections would remain unchanged; however, sixteen intersections showed improved LOS in the evening peak hour.
- Improved pedestrian and bicycle facilities in 17 locations, which would benefit EJ and non-EJ populations.

Since the Build Alternative has comparable effects for both EJ and non-EJ populations, there would be no disproportionately high and adverse impact on EJ populations. The Build Alternative will promote safety for all users of the transportation network.

3.8.5 Summary of Effects on Environmental Justice Populations

Although 14 of the 35 block groups in the study area (40 percent) were identified as having a minority population of 50 percent or more, several of those block groups contain large institutional uses such as the NIST, Johns Hopkins University, or the LSC. These institutional land uses limit the extent of potential adverse effects on EJ populations, although one residential and one commercial displacement are located in Block Group 7008.29 BG 1, which also contains the NIST facility.

The Build Alternative would bring benefits to the communities it serves, some of which are predominantly EJ block groups. EJ populations within the study area would also experience limited adverse effects from implementation of the Build Alternative. However, if the Build Alternative were moved outside of the EJ areas to avoid the adverse impacts, those communities

would be deprived of the benefits. Therefore, the extent of the adverse impacts must be weighed against the benefits.

The Build Alternative is located largely within predominately EJ populated block groups and there are minimal impacts in areas with lower EJ concentrations identified through additional study area mapping and public engagement and outreach efforts. These areas include the Kentlands, Crown Farm, and King Farm neighborhoods, all of which have preserved land set aside for the CCT Project. Therefore, EJ populations would experience both the limited adverse effects and overall beneficial effects. MDOT MTA has made efforts to avoid and minimize adverse impacts wherever possible. When further avoidance and minimization are not reasonable or feasible, MDOT MTA is committed to applying mitigation measures equally through the Project study area.

Offsetting Benefits

While some adverse effects would occur in EJ areas, the Build Alternative would also benefit EJ populations in the following ways:

- More reliable, more frequent, and higher capacity service for transit riders;
- Improved connectivity and access to transit;
- Improved mobility throughout the study area;
- Improved pedestrian and bicycle connections and access; and
- Improved access to employment, educational, recreational, shopping, and cultural opportunities.

Potential for Denial of Benefits

In an effort to assess the potential for the possible denial of benefits to EJ populations by the construction and operation of the proposed transit system, an analysis was completed to address location and access.

The Build Alternative would provide accessibility to locations throughout the study area and to the Metrorail and MARC systems. The Build Alternative station locations were selected based upon the density of residential development, activity centers, and creation of transfer points to other transit services. These locations are evenly distributed along the alignment and serve all populations equally, including EJ populations. Therefore, EJ populations will not be denied the benefits of the Build Alternative.

Full and Fair Participation

Full and fair access to meaningful involvement by low-income and minority populations in project planning and development is an important aspect of EJ. Ensuring full and fair access means actively seeking the input and participation from those typically under-represented groups throughout all the project stages. Residents can provide important information on community concerns, special sites, and unusual traffic, pedestrian, or employment patterns in the study area. This information can be used in the design and evaluation of alternatives, to avoid negative impacts to valued sites, and to support the development of safe, practical, and attractive transportation options that are responsive to the concerns of EJ populations.

3.8.6 Findings of Environmental Justice Analysis

Considering the factors evaluated in this EJ analysis, the MDOT MTA and FTA have concluded that the Build Alternative, as a whole, would not have "disproportionately high and adverse effects" on EJ populations. Nonetheless, MDOT MTA and FTA recognize that some of the specific impacts of the Build Alternative may adversely affect EJ populations. Therefore, where possible, the alignment options have been refined through the NEPA process to minimize impacts to both the human and natural environment.

Environmental commitments and mitigation measures identified throughout this EA will address impacts from CCT operations and construction activities that may affect EJ populations. MDOT MTA will mitigate adverse impacts throughout both EJ and non-EJ areas and will provide enhanced outreach to EJ populations, particularly Spanish-speaking communities with limited English proficiency, to implement mitigation strategies effectively in those communities.

3.9 Parks and Recreational Facilities

3.9.1 Introduction and Methodology

The boundary used in the parks and recreational facilities evaluation is the study area buffer, defined as a 0.5-mile buffer around the Build Alternative alignment (**Figure 3-1**). Public park services in the study area buffer are provided by the City of Gaithersburg, the City of Rockville, and Montgomery County. An inventory of facilities was created using Montgomery County GIS data, Google searches, and field visits.

3.9.2 Existing Conditions

Parks and recreational facilities include indoor and outdoor facilities and parklands designed for both active and passive recreational activities. Seven park and recreational facilities were identified within the study area buffer:

- Mattie J.T. Stepanek Park
- Diamond Farms Park
- Gaithersburg Upcounty Senior Center
- Muddy Branch Park
- Washingtonian Woods Park
- Pleasant Park
- Green Park

Within the study area buffer, there are small neighborhood parks with sports fields and playgrounds, as well as parcels of natural forested land with walking trails and picnic areas. Several parks, including Washingtonian Woods Park and Muddy Branch Park, exist within preserved natural land along stream corridors.

3.9.3 Future No-Build Conditions

The No-Build Alternative would not cause any physical impacts to parks and recreational facilities. As with the other community facilities, the No-Build Alternative would not address existing or future traffic congestion problems, which could result in an overall decline in facility accessibility in the area.

3.9.4 Build Alternative

Long-term Effects

The Build Alternative would impact two public parks: Washingtonian Woods Park and Muddy Branch Park. The Build Alternative would require narrow strips of right-of-way from both parks located along Great Seneca Highway to be convert parkland to transportation use. The Build Alternative would require approximately 0.7 acres permanently from Washingtonian Woods Park and approximately 4.2 acres permanently from Muddy Branch Park. Other impacts associated with this conversion, including visual and noise, are not expected to adversely affect the recreational function of the parks. The impacts to the City of Gaithersburg's park properties and forest impacts were presented to the City of Gaithersburg's Mayor and City Council on August 31, 2015. During this presentation, the MDOT MTA stated the intent of seeking concurrence from the City that the impacts to their property would not adversely affect the structures, landscape, or quality of either Washingtonian Woods Park or Muddy Branch Park.

Noise and visual impacts to parks are expected to be relatively minor, as the impacted areas would be adjacent to the existing Great Seneca Highway corridor. Retaining walls and bridges would constitute the most noticeable visual impacts along the Great Seneca Highway portion of the alignment. For more information, refer to **Section 3.7:** Visual Resources and **Section 3.18**: Noise and Vibration.

Short-term Effects

During construction, there would be temporary aesthetic/visual effects adjacent to and visible from the park and recreational facilities adjacent to the Build Alternative. The Build Alternative would require approximately 0.3 acres temporarily from Washingtonian Woods Park and approximately 0.5 acres temporarily from Muddy Branch Park. Visual impacts may include silt fencing, security fencing, construction markings, and temporary walls surrounding proposed construction staging and laydown areas. These visual changes would only occur during construction of the Build Alternative.

The park and recreational facilities adjacent to the Build Alternative would also experience construction-related noise and vibration impacts. These impacts are difficult to predict as they would vary depending on the type and duration of the construction activity. Noise generated from construction activities associated with the construction of the Build Alternative would be short-term in duration and move from place to place as the construction activities proceed forward along the alignment. Therefore, construction noise would, in general, likely be masked in some cases by ambient noise conditions or remain below the criteria.

Vibration impacts during construction would consist of ground vibrations that spread through the surrounding ground. Pile driving, which may be utilized during construction of retaining walls, typically generates the most severe vibration impacts. A retaining wall would be constructed adjacent to the Washingtonian Woods Park and therefore vibration impacts during construction may be expected.

Mitigation

The level of mitigation to be provided would be considered commensurate with the severity of the impacts to the park and recreation facilities. Related mitigation efforts would be determined through consultation with the City of Gaithersburg. Mitigation measures may include, but are not limited to: design modifications; replacement of land or facilities of comparable value and function; or monetary compensation to enhance the remaining property or to mitigate the adverse impacts of the Project in other ways. For example, a retaining wall was incorporated into the Build Alternative design at Washingtonian Woods Park to reduce impacts to the parkland. Any impacted trail segments at Washingtonian Woods will be relocated to maintain pedestrian connectivity, and parkland vegetation will be replaced where possible.

3.10 Cultural Resources

3.10.1 Historic Properties – Introduction and Methodology

Historic properties, defined as properties that are listed or eligible for listing on the National Register of Historic Places (NRHP), are evaluated pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. §306108). FTA, in coordination with MDOT MTA, the Project sponsor, has identified historic properties within the area of potential effects (APE) of the Build Alternative and preliminarily assessed the effects of the undertaking on these historic properties. The APE is shown on **Figure 3-5**. This process has been done in consultation with the State Historic Preservation Officer (SHPO), other parties, and the public.

Research Methods

Background research was conducted to identify previously documented architectural properties in the APE, and to help establish a context for the potential significance of historic properties. Research material from the Maryland Historical Trust (MHT) Library, located at 100 Community Place, Crownsville Maryland (March 19, 2013 visit) and information from previous Section 106 documents, namely those for the I-270/US 15 Multi-Modal Corridor Study, were used to identify previously documented resources and gather any data concerning possible historic properties not yet identified within the APE (36 CFR § 800.4(a)(2)). The record search included a review of all previously identified historic resources, such as those listed on or eligible for the NRHP, and those documented on the Maryland Inventory of Historic Properties (MIHP).

In addition to the record search at the MHT Library, general and property-specific contextual research was conducted of the Project area to identify significant local historical events and personages, development patterns, and unique interpretations of architectural styles. Historic maps and photographs, deed records, newspapers, and other resources related to the history, geography, and architecture of the Project area were consulted during the research.

Field Methods

Between 2013 and 2015, field visits were conducted on foot and by auto to help delineate the historic architectural APE. Photographs and notes were taken based on the potential LOD for the undertaking, as well as the indirect effect potential, namely visual, atmospheric, and audible.

Architectural field surveys were conducted after studying record search results from the MHT Library, the APE, photographs and notes taken during the APE field visit, and historic and contemporary maps. The purpose of the field surveys was to identify any buildings, structures, objects, sites, or features located within the APE that are greater than 45 years of age. The Secretary of the Interior guidelines for NRHP listing and eligibility are generally for buildings, structures, objects, sites, and districts 50 years of age or older. However, the age limit was lowered for this undertaking to account for lead-time between the preparation of environmental documentation and actual Project construction in approximately 2018 (depending on funding).

Consulting Parties and Public Involvement

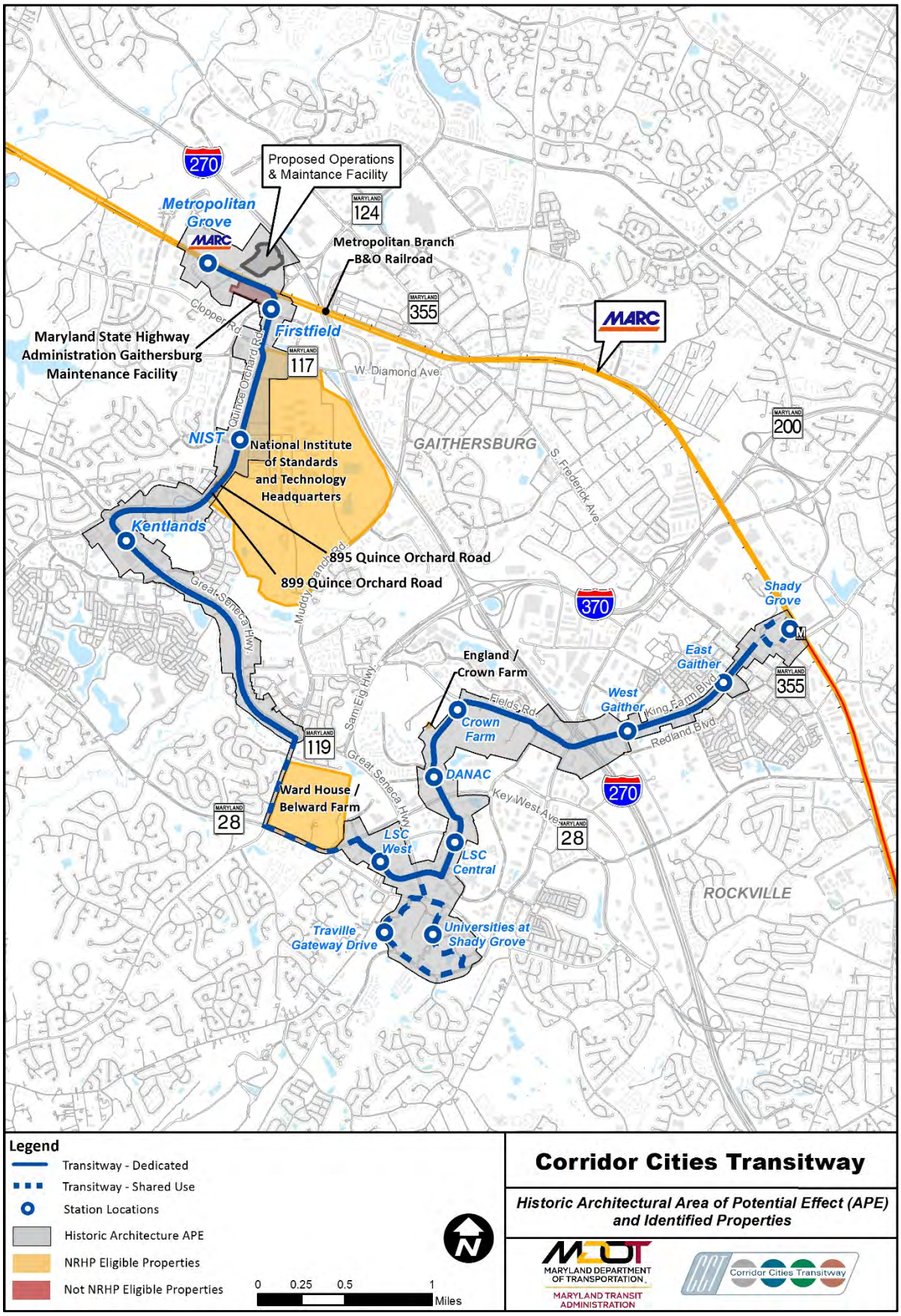
FTA initiated Section 106 consultation for the CCT Project with the MHT on April 18, 2014, with concurrence received on June 10, 2014 (**Appendix A**). On behalf of FTA, MDOT MTA invited entitled parties to be consulting parties, including local governments, to participate in the Section 106 compliance process for the CCT Project. Consulting Parties for the CCT include:

- City of Gaithersburg
- Johns Hopkins University
- National Institute of Standards and Technology
- Mr. Tim Newell
- Peerless Rockville
- Gaithersburg-North Potomac-Rockville Coalition

The *Identification and Evaluation of Historic Architectural Properties Technical Report*, the *Phase I Archeological Survey Technical Report,* and the *Section 106 Effects Assessment* were shared by MDOT MTA with the consulting parties. (Refer to **Appendix F** for these reports.)

Public involvement is an ongoing process, comprised of public meetings and a Project website that includes a summary of the cultural resources process and findings with comments solicited from the public in accordance with 36 CFR § 800.2(d).

Figure 3-5: Area of Potential Effect



3.10.2 Existing Conditions

An examination at the MHT Library of previously identified historic resources, field work, and additional research identified three historic properties in the APE (**Figure 3-5**). The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. The APE has been determined and documented using information gathered from the field visit and from readily available resource mapping. The generally heavy developed nature of the suburban and semi-urban communities in Gaithersburg and Rockville was taken into consideration. On average, the APE extends one tax parcel beyond the study area corridor, including the aerial crossings. However, in instances where parcels are very large, the APE boundary is reduced to reasonably reflect the undertaking's potential for indirect effects. The APE along the western portion of the CCT Service via USG is narrower because the Build Alternative would be entirely within the existing roadway alignment in that area. The APE is wider along the undeveloped former agricultural fields near the Watkins Mill Town Center development, England/Crown Farm properties, and the Montgomery County PSTA, corresponding to the property boundaries.

Three historic properties are located within the APE: the Metropolitan Branch of the Baltimore and Ohio (B&O) Railroad (M: 37-16), England/Crown Farm (M: 20-17), and the NIST Headquarters (M: 20-47). The Metropolitan Branch of the B&O Railroad was previously identified as being NRHP eligible under Criteria A and C. The England/Crown Farm was also previously identified as eligible under the same criteria. However, recent multi-use development changes and demolition due to a fire have altered the property. Former farm fields are being developed and numerous ancillary buildings are now gone. While the property is no longer eligible under Criterion A, it is still eligible under Criterion C because the Victorian farmhouse retains integrity to remain a well-preserved example of high Victorian vernacular building forms of the period. The revised eligible boundary is the same as the current parcel containing this building and two remaining ancillary buildings. The NIST Headquarters (M: 20-47) was evaluated for the NRHP as part of this undertaking, and found to be eligible under Criteria A and C. Three other properties more than 45 years old were also evaluated, but found not to be eligible: the Maryland SHA Maintenance Facility (M: 21-263), 895 Quince Orchard Road, and 899 Quince Orchard Road. The Project avoids the Ward House / Belward Farm property.

3.10.3 No-Build Alternative

The No-Build Alternative would not have any effect on architectural historic properties. As the CCT would not be constructed under the No-Build Alternative, no Project-related impacts to historic properties would occur.

3.10.4 Build Alternative - Finding of Effect

The potential of the Build Alternative to diminish the integrity of the historic properties' location, design, setting, materials, workmanship, feeling, or association was assessed. The following is an evaluation of effects for the four architectural historic properties located within the APE of the Build Alternative (**Table 3-7** and **Figure 3-5**).

Table 3-7: Potential Effects to Architectural Historic Properties

MIHP#	Name/Location	NRHP Category	NRHP Eligibility	NRHP Criteria	Diminished NRHP Integrity
M: 37-16	**Metropolitan Branch, Baltimore and Ohio Railroad** Extending through Montgomery County, from Takoma Park Northwest to Dickerson	District	Eligible	A and C	No
M: 20-17	**England/Crown Farm** 605 Steinbeck Avenue, Gaithersburg	Buildings	Eligible	C	No
M: 20-47	**National Institute of Standards and Technology Headquarters** 100 Bureau Drive, Gaithersburg	District	Eligible	A and C	No
M: 20-21	**Ward House/Belward Farm** 10425 Darnestown Road (MD 28), Rockville	District	Eligible	A and C	No

In the vicinity of the Metropolitan Branch of the B&O Railroad, the Build Alternative would parallel the railroad right-of-way and connect to the Metropolitan Grove Station. The Build Alternative would also slightly realign and pave an at-grade existing crossing at Metropolitan Grove Road, and grade roads adjacent to the rail right-of-way for access to the proposed O&M Facility. The Build Alternative would physically affect only the railbed in a limited area, preserving the existing grade of the extant crossing. In addition, no new visual, atmospheric, or audible elements would be introduced to the historic property, located in what is already a developed suburban environment. Therefore, the direct and indirect effects would not diminish the integrity of character-defining features that qualify the district for the NRHP.

The Build Alternative would be in the median of Decoverly Drive, over 200 feet to the southeast of the NRHP-eligible portion of England/Crown Farm, namely the current parcel boundary. A new multi-use development under construction on this former farm property has recently diminished the historic building's integrity of setting, feeling, and association. No new visual, atmospheric, or audible elements would be introduced to the historic property from the Build Alternative, located in what is already a developed suburban environment. Therefore, the direct and indirect effects would not diminish the integrity of character-defining features that qualify the buildings for the NRHP.

At the NIST Headquarters, the Build Alternative would permanently acquire a narrow 12.5-acre strip of right-of-way of lawn, mature trees, and segments of NIST roads along the western edge of the 579.5-acre property bordering Quince Orchard Road. Existing access and a gate at Sound Road would be closed, a portion of the north-south oriented Service Drive would be removed to

construct the CCT NIST Station, and a new access and gate would be provided by extending Research Drive to Quince Orchard Road. While small portions of the landscaping and NIST roads, which are contributing elements of the NIST historic district, would be removed, this directly affected area is only a small percentage of the total property. No buildings would be altered or demolished, and the character of this district would be maintained. In addition, no new visual, atmospheric, or audible elements would be introduced to the historic property, located in what is already a developed suburban environment. Therefore, the direct and indirect effects would not diminish the integrity of character-defining features that qualify the district for the NRHP.

The Build Alternative avoids the Ward House / Belward Farm property by operating on a shared alignment on Muddy Branch Road and Darnestown Road. No new visual, atmospheric, or audible elements would be introduced to the historic property from the Build Alternative, located in what is already a developed suburban environment. Therefore, the direct and indirect effects would not diminish the integrity of character-defining features that qualify the property for the NRHP.

Pursuant to 36 CFR 800.5, FTA applied the criteria of adverse effect to historic properties identified within a revised APE based on recent refinements to the Project. FTA has found that the proposed CCT Project would have no adverse effect on historic properties because it would not diminish the integrity of the character-defining features that qualify the Metropolitan Branch, B & O Railroad, England/Crown Farm, and the NIST Headquarters for the NRHP. In a letter dated, March 8, 2016, the MHT concurred with FTA's finding that the undertaking will have a no adverse effect on historic properties (refer to **Appendix A**).

3.10.5 Mitigation

No mitigation is proposed.

3.10.6 Archeology

A Phase I Archeological Survey was conducted for the CCT Project to locate and identify any archeological resources that may be affected by the proposed undertaking. The archeological APE is defined as the LOD for the Project (refer to **Appendix E**). The survey was performed between September and December 2013, and February and July 2014, and documented the evidence of both prehistoric and historic activity within the APE. A total of six archeological sites were identified (18MO720 to 18MO725). Subsequent changes to the alignment resulted in the Project APE avoiding Site 18MO720. Site 18MO722 and 18MO724 are prehistoric sites of undetermined temporal affiliation. The remaining sites contained nineteenth to post-twentieth century historic artifact scatters and three had remnants of historic structures. None of the identified sites met the criteria of eligibility for listing in the NRHP and therefore the proposed undertaking would have no effect upon significant archeological resources (**Appendix A**). Based on these results, no further archeological investigation is warranted for the Build Alternative. Refer to the *Phase I Archeological Survey Technical Report* (**Appendix F**) for additional details.

3.10.7 Section 106 Consultation

The *Identification and Evaluation of Historic Architectural Properties Technical Report*, *Phase I Archeological Survey Technical Report, and the Section 106 Effects Assessment* were shared with the consulting parties. Comments were received from NIST indicating their disagreement with the NIST NRHP evaluation results and the agency's upcoming plans for a separate evaluation. MHT provided comments on January 12, 2015, refining the NRHP-eligible boundary of England/Crown Farm revised by FTA/MDOT MTA, but otherwise concurring with the historic architectural findings. MHT requested edits for the archeology report, but concurred with its findings.

Comments were received from the following consulting parties after their review of the *Section 106 Effects Assessment*: Johns Hopkins University, NIST, Tim Newell, and Donna Baron. NIST replied with 'no comments' regarding the *Section 106 Finding of Effects Report*. Mr. Tim Newell had no issues with the document. Ms. Donna Baron expressed her concerns about the loss of historic farms at Belward and Crown Farm to development. The letter from Johns Hopkins University described their plans to develop the Belward Farm into a biotechnology business park and set aside ten to 12 acres around the Ward House to preserve this resource. (Refer to **Appendix A** for copies of these responses.)

3.11 Section 4(f) Resources

3.11.1 Introduction and Methodology

Section 4(f) of the US Department of Transportation Act of 1966, 49 USC 303(c) is a Federal Law that protects publicly-owned parks, recreation areas, wildlife and/or waterfowl refuges, or any significant historic sites, whether privately or publicly owned. Section 4(f) requirements apply to all transportation projects that require funding or other approvals by the USDOT. As a USDOT agency, FTA must comply with Section 4(f). FTA cannot approve a transportation project that uses a Section 4(f) property, unless:

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

Consideration of Section 4(f) resources has been prepared pursuant to Section 4(f) of the US Department of Transportation Act, 49 U.S.C. 303(c), and with the FTA's Section 4(f) regulations in 23 CFR, Part 774.

Pursuant to 23 CFR 774.17, a "use" of Section 4(f) property occurs:

- When land is ***permanently incorporated*** into a transportation facility;
- When there is a ***temporary occupancy*** of land that is adverse in terms of the statute's preservation purpose as defined in 23 CFR 774.13(d); that is, when one of the following criteria for temporary occupancy are not met:
    - The duration of the occupancy must be less than the time needed for the construction of the project, and no change of ownership occurs.
    - Both the nature and magnitude of the changes to the Section 4(f) land are minimal.
    - No permanent adverse physical changes, nor interference with activities or purposes of the resources on a temporary or permanent basis, are anticipated.
    - The land must be returned to a condition that is at least as good as existed prior to the project.
    - There is documented agreement with the appropriate Federal, State, or local officials having jurisdiction over the land that the above conditions have been met.
- When there is a ***constructive use*** of a Section 4(f) property. As defined in 23 CFR 774.15, a constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.

The FTA must consider alternatives that completely avoid the use of a Section 4(f) property. The avoidance analysis applies the Section 4(f) feasible and prudent criteria (23 CFR 774.17(2) and (3)). An alternative is not **feasible** if it cannot be built as a matter of sound engineering judgment. An alternative is not **prudent** if:

- It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
- It results in unacceptable safety or operational problems;
- It causes severe social, economic, or environmental impacts even after reasonable mitigation; severe disruption to established communities; severe disproportionate impacts to minority or low income populations; or severe impacts to environmental resources protected under other Federal statutes;
- It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
- It causes other unique problems or unusual factors; or

- It involves multiple factors above that while individually minor, cumulatively cause unique problems, or impacts of extraordinary magnitude.

For publicly-owned public parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that will not adversely affect the activities, features, or attributes of the property. For historic sites, a *de minimis* impact means that FTA has determined (in accordance with 36 CFR §800) that either no historic property is affected by the project or that the project will have "no adverse effect" on the historic property. A *de minimis* impact determination does not require analysis to determine if avoidance alternatives are feasible and prudent, but consideration of avoidance, minimization, mitigation, or enhancement measures should occur.

3.11.2 Existing Conditions

Efforts to identify Section 4(f) properties in the Build Alternative study area corridor included consultation with relevant public resource managing agencies, accessing available mapping, and field surveys. Through these efforts, the following six Section 4(f) properties were identified in the study area:

Public Park/ Recreation Areas:

- Muddy Branch Park
- Washingtonian Woods Park

Historic Properties:

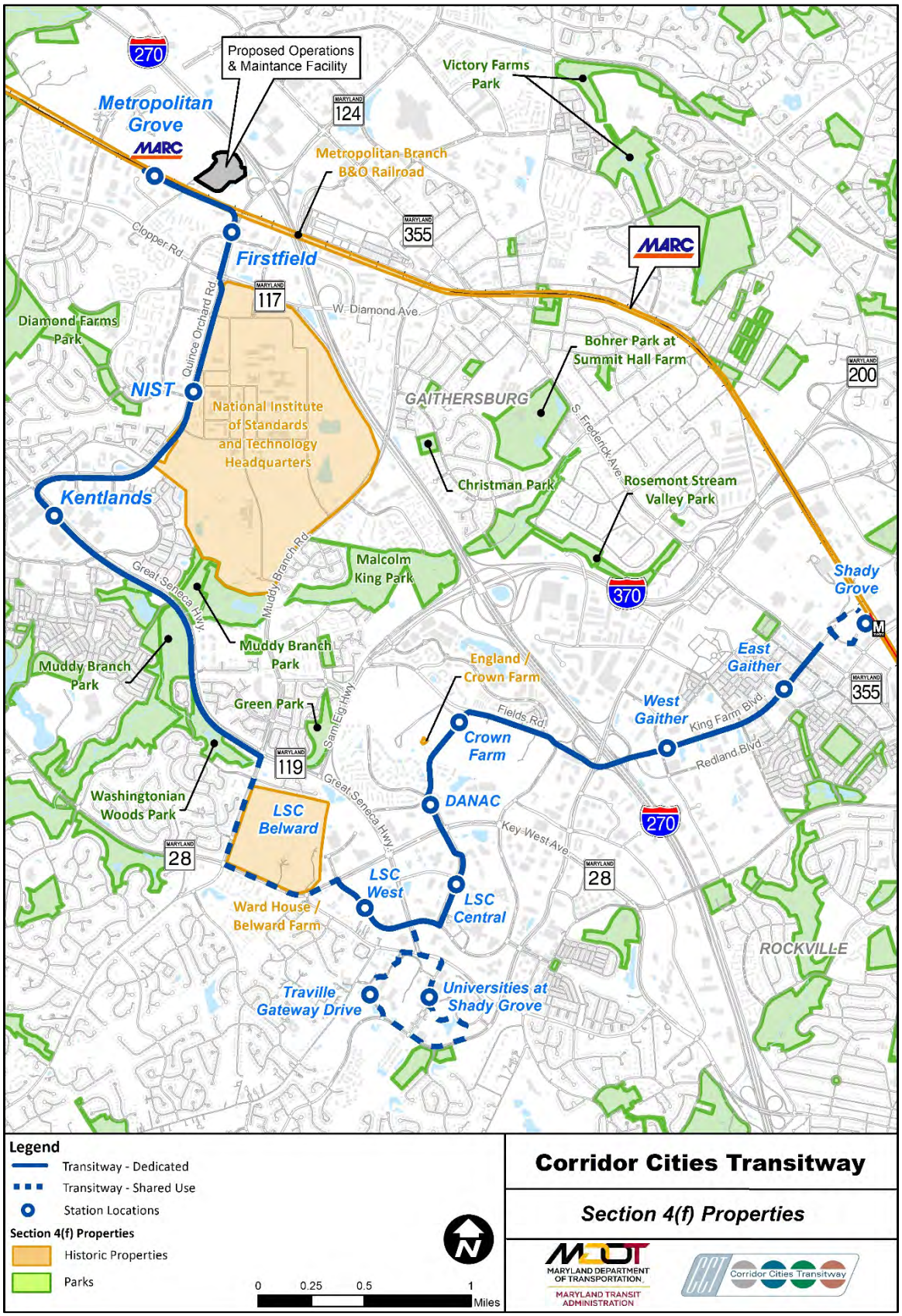
- Metropolitan Branch, B&O Railroad
- NIST Headquarters
- Ward House / Belward Farm
- England/Crown Farm

These properties are individually described below and shown on **Figure 3-6**.

Muddy Branch Park

Muddy Branch Park consists of approximately 124 acres of land, including a noncontiguous area just north of Great Seneca Highway. This park is owned and managed by the City of Gaithersburg. Muddy Branch Park is informal, and comprised of environmentally-sensitive land owned by the City of Gaithersburg that does not contain any recreational facilities in the portion potentially affected by the Build Alternative. It is publicly accessible for passive use and there are no formal access points or pathways in the park.

Figure 3-6: Section 4(f) Properties



Washingtonian Woods Park

Located south of Great Seneca Highway just west of Muddy Branch Road, Washingtonian Woods Park is approximately 22.3 acres (**Figure 3-6**). The property is mostly surrounded by residences on Midsummer Drive and Hillside Lake Terrace. The park is owned by the City of Gaithersburg and administered by their Department of Parks, Recreation, and Culture. Washingtonian Woods Park features a half basketball court, two tennis courts, a playground, and approximately one mile of hiking trail. The property also contains a pond in which public fishing is permitted. The park facilities are used by the general public, and can be accessed by vehicle or on foot via Upshire Circle, Midsummer Drive, or Hillside Lake Terrace.

Metropolitan Branch, Baltimore & Ohio Railroad

The Metropolitan Branch of the B&O Railroad is a double-track railroad. Within the Project area it extends from the Metropolitan Grove MARC Station to the Shady Grove Metrorail Station (**Figure 3-6**). The historic rail corridor traverses the entire length of Montgomery County, traveling roughly 30 miles northwest from Washington, DC into Frederick County. The Metropolitan Branch is eligible for listing on the NRHP for association with historic events (Criterion A) and its various structures and stations are eligible as representative of a historically important type, period, and method of construction (Criterion C). Today, Metropolitan Branch is owned by CSX Transportation and is currently used by CSX for the movement of freight and used by MARC for commuter trains.

National Institute of Standards and Technology Headquarters

The NIST Headquarters property includes an approximately 300-acre developed area on a 579.5-acre parcel (**Figure 3-6**). The property is bounded by West Diamond Avenue to the north, I-270 and Muddy Branch Road to the east, the Quince Orchard Park residential neighborhood and a wooded buffer to the south, and Quince Orchard to the west. The Headquarters includes a number of buildings and structures in a campus setting dedicated to scientific research.

Ward House / Belward Farm

The Ward House / Belward Farm (M: 20-21) historic property consists of an approximately 107-acre farmstead bounded by residential development to the north, the Johns Hopkins Belward Campus to the east, Darnestown Road to the south, and Muddy Branch Road to the west. The Ward House / Belward Farm property is accessed by vehicles and on foot via two entrances on Darnestown Road: the main entrance serves the farmstead core and a second less formal entrance serves the eastern portion of the farmstead in the vicinity of the tenant homes.

Belward Farm is slated for development as part of the Johns Hopkins Belward Campus Expansion project, which would convert the property into a mixed-use research campus. The Ward House / Belward Farm property is located in the LSC Belward District, one of five districts defined in Montgomery County's Great Seneca Science Corridor Master Plan. Stage 1 of the proposed plan for the five LSC Districts would allow an additional 400,000 square feet of commercial space and

2,500 additional dwelling units in the LSC Districts. The Master Plan would extend Belward Campus Drive west to Muddy Branch Road in approximately the middle of the farmstead. The development proposed for Stage 1 may occur regardless of whether the CCT is constructed. Further stages of the development plan are partially contingent on the funding and completion of the CCT. At build-out, the plan calls for a total of 17.5 million square feet of commercial development and 9,000 dwelling units in the LSC Districts. For more detailed information and future stages of proposed development at the LSC, see the *Socioeconomic Technical Report.* Approximately seven acres of the property's historic Belward Farm, including the 1891 farmhouse, barns, and outbuildings would remain and be managed for alternative use by the development, such as an interpretation and activity center. The Ward House / Belward Farm property will remain eligible or potentially eligible until its eligibility is revisited at such time the campus has been redeveloped.

England/Crown Farm

The historic England/Crown Farm (M:20-17) property consisted of 47 acres of land bounded by Fields Road to the north, Omega Drive to the east, a wooded buffer to the south, and Sam Eig Highway to the west. The England/Crown Farm property is also currently undergoing development. The property is in the process of being converted to a mixed-use development containing approximately 337 townhomes, 60 single-family detached homes, 1,149 multi-family units, and 257,400 square feet of commercial space. Construction is in progress in a former farm field portion of England/Crown Farm northwest of Decoverly Drive. While the southeast portion of the property is planned for later stages of the development, this area is now bordered by fencing, and has a large fill pile and excavation site for the development's communal building.

3.11.3 Properties with No Section 4(f) use

Under the Build Alternative, the historic England/Crown Farm (M:20-17) would not require a Section 4(f) use. The proposed alignment for the CCT in the vicinity of this property would be in the median of previously constructed Decoverly Drive, over 200 feet to the southeast of the eligible property. No Section 4(f) use of this property would therefore occur.

During preliminary design in support of this EA document, an alignment was considered in the median of Muddy Branch Road and through the Ward House / Belward Farm Campus. The Ward House / Belward Farm is a historic property consisting of a farmstead, approximately 107 acres, and is eligible for listing on the NRHP and therefore also subject to Section 4(f). The property is owned by Johns Hopkins University.

During preliminary review of the Belward Campus alignment, FTA determined that there was a feasible and prudent alternative which avoided use of the Ward House / Belward Farm historic resource. Therefore, this alignment was dropped from further consideration. The Build Alternative avoids the Belward property by operating on a shared alignment on Muddy Branch Road and Darnestown Road.

3.11.4 Potential De Minimis Impacts

Implementation of the Build Alternative would require the use of four Section 4(f) properties. The following section discusses those properties which would potentially incur a *de minimis* impact. No parks funded with Project Open Space or Capper Cramton Act Funds are located in the study area.

In some cases, even if there is a use of a resource protected by Section 4(f), FTA may determine that a use is *de minimis.* FTA may make a *de minimis* determination on a historic site only if, pursuant to the Section 106 consultation process:

- The transportation program or project will have no adverse effect on the historic site, or there will be no historic properties affected by the transportation program or project; and
- FTA's finding has received written concurrence from the applicable SHPO; and
- FTA has developed its finding in consultation with parties consulting as part of the Section 106 consultation process.

With respect to parks, recreation areas, or wildlife or waterfowl refuges, FTA may make a finding of *de minimis* impact only if:

- After public notice and opportunity for public review and comment, FRA finds that the transportation program or project will not adversely affect the activities, features, and attributes of the park, recreation area, or wildlife or waterfowl refuge eligible for protection under this section; and
- The finding has received concurrence from the officials with jurisdiction over the park, recreation area, or wildlife or waterfowl refuge.

A *de minimis* impact determination is made for the net impact on the Section 4(f) property. A *de minimis* impact determination may be made for permanent incorporation or temporary occupancy of a Section 4(f) property.

Table 3-8 lists the potential impacts of the Build Alternative to Section 4(f) properties. The Project avoids the Ward House / Belward Farm property and would be located within an already developed road within the England/Crown Farm property. As shown in the table, due to the nature and level of permanent and temporary impacts at each of the Section 4(f) properties, the FTA intends to seek a *de minimis* impact finding for each property.

Table 3-8: Section 4(f) Use

Section 4(f) Property (Official with Jurisdiction)	Section 4(f) Resource Area			*de minimis Impact*
		Permanent Impacts	Temporary Impacts	
Muddy Branch Park City of Gaithersburg	123.7 acres	4.2 acres	0.5 acres	✓
Washingtonian Woods Park	20.3 acres	0.7 acres	0.3 acres	✓

Section 4(f) Property (Official with Jurisdiction)	Section 4(f) Resource Area			*de minimis Impact*
		Permanent Impacts	Temporary Impacts	
City of Gaithersburg				
Metropolitan Branch, Baltimore & Ohio Railroad Maryland State Historic Preservation Officer	325.9 acres*/28.1 linear miles*	3.1 acres/2,700 linear feet	0.5 acres	✓
National Institute of Standards and Technology Headquarters Maryland State Historic Preservation Officer	579.5 acres	13.1 acres	0.8 acres	✓

**Includes Montgomery County only*

As shown in **Table 3-8**, the Build Alternative would result in a Section 4(f) use of four properties. A *de minimis* impact determination requires agency coordination and public involvement as specified in 23 CFR 774.5(b) and noted above.

FTA intends to make a *de minimis* impact determination for the two historic resources; Metropolitan Branch, B & O Railroad and NIST Headquarters, pursuant to Section 4(f) with concurrence of no adverse effect from the MHT in a letter dated March 8, 2016 (**Appendix A**).

An evaluation of avoidance alternatives and an analysis of least overall harm are not required for properties that incur a *de minimis* impact determination.

For the two park properties, Washingtonian Woods Park and Muddy Branch Park, MDOT MTA will seek concurrence from the official with jurisdiction (the City of Gaithersburg) that, pursuant to 23 CFR 774.3(b), implementation of the Build Alternative would not adversely affect the activities, features, or attributes that make the parks eligible for Section 4(f) protection and thus FTA would make a *de minimis* impact determination.

Muddy Branch Park

This park property would incur use totaling approximately 4.7 acres of the park's total 123.7-acre area, including 0.5 acres of temporary use and 4.2 acres of permanent use. The Build Alternative alignment would follow the south side of Great Seneca Highway which is straddled by this park where it crosses the Muddy Branch stream. Access to the park would not be affected throughout the three- to four-year construction period. No existing park amenities would be impacted by the Build Alternative as the proposed use area is currently wooded with no formal facilities.

Based on the limited use of Muddy Branch Park (4.7 acres out of 123.7 acres), the impacts from the Project would not adversely affect the activities, features, or attributes of the park, so only a *de minimis* impact to the Section 4(f) property would occur under the Build Alternative. FTA intends to seek a *de minimis* finding for Muddy Branch Park from the City of Gaithersburg as the Build Alternative would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Washingtonian Woods Park

This park property would incur use totaling approximately 1.0 acre of the park's total 20.3-acre area, including 0.3 acres of temporary use during construction and 0.7 acres of permanent parkland converted to transportation use. The Build Alternative alignment follows the south side of the Great Seneca Highway directly north of the park. Use of the park would be limited to an area adjacent to the existing Great Seneca Highway corridor. The Build Alternative incorporates a retaining wall in the vicinity of the tennis courts to avoid impacts to this park amenity. The hiking trail would not be impacted.

Other temporary impacts could occur intermittently throughout the construction process. Temporary closure of the tennis courts may be necessary while construction activities are underway. During this time, the trail system, other park facilities, and park access would be unaffected. The pedestrian connection between Upshire Circle, Hillside Lake Terrace, and Midsummer Drive would be unaffected.

Based on the limited use of Washingtonian Woods Park (1.0 acre out of 20.3 acres), the impacts from the Project would not adversely affect the activities, features, or attributes of the park, so only a *de minimis* impact to the Section 4(f) property would occur under the Build Alternative. FTA intends to seek a *de minimis* finding for Washingtonian Woods Park from the City of Gaithersburg as the Build Alternative would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Metropolitan Branch, Baltimore & Ohio Railroad

Implementation of the Build Alternative would result in a Section 4(f) use of the Metropolitan Branch of the B&O Railroad (M:37-16). The Build Alternative would entail improvements to Metropolitan Grove Road where it crosses the B&O railway corridor, totaling 3.1 acres of permanent impacts, and grading adjacent to the north and south of the railroad for approximately 2,700 feet.

The railway corridor is currently in use for rail transport purposes, and the location of the existing Metropolitan Grove Road rail crossing would be unchanged. Metropolitan Grove Road transitions from pavement to gravel at the railroad tracks. Improvements to the crossing would involve widening the pavement a maximum of 10 feet on either side of the centerline and adding new pavement at the existing grade. The grading parallel to the rail trackway would not physically impact any features of the railroad or its setting, feeling, or association (refer to **Section 3.10.4**). The improvements to Metropolitan Grove Road would allow for roadway access to the proposed O&M Facility to be located between the railroad and I-270.

Pursuant to 36 CFR §800.5, the Build Alternative would have no adverse effect on the Metropolitan Branch of the B&O Railroad, concurred by MHT on March 8, 2016 (**Appendix A**). This letter from MHT also acknowledged FTA's intent to pursue a *de minimis* impact on the Metropolitan Branch of the B&O Railroad. Therefore, the FTA will likely make a *de minimis* impact determination for this property.

National Institute of Standards and Technology Headquarters

Implementation of the Build Alternative would result in a Section 4(f) use of 14 acres of the NIST Headquarters campus by acquiring a narrow strip of right-of-way along Quince Orchard Road, construction of a station, and modification of its access from Quince Orchard Road. This would entail 12.5 acres of permanent impacts and 1.5 acres of temporary impacts during construction. The majority of the area proposed for use consists of lawn and sparse trees, which would be converted to a transportation use. The existing access and gate at Sound Road would be closed, the north to south-oriented Service Drive would be removed to construct the CCT NIST Station, and a new access and gate would be provided on the east leg of the Quince Orchard Boulevard / Quince Orchard Road intersection by extending Research Drive to Quince Orchard Road. A new secure gate would be constructed at Quince Orchard Road. Area for a southbound left turn-lane on Quince Orchard Road at the proposed new access road is already available, but a northbound turn lane into the new access would be constructed. Access to the facility from Quince Orchard Road would be maintained throughout construction. Temporary use would be from construction easements.

MDOT MTA and NIST have been coordinating regarding the design of this new entrance area, and coordination will continue throughout the study process. Close coordination with NIST has ensured that the Build Alternative would not negatively affect the character of the campus. As a consulting party, NIST has been given opportunity to provide early input on the property's Determination of Eligibility (DOE) form, at in-person meetings which were held in May and August of 2014, and review of the Section 106 Effects Assessment Report. NIST has also cooperated in providing property access and information regarding the historic campus.

While small portions of the landscaping and NIST roads, which are contributing elements of the NIST historic district, would be removed, this directly affected area is only a small percentage of the total property. Vegetation and landscaping in the impacted area would be restored to their original condition to the extent possible. No buildings would be altered or demolished, and the character of this district would be maintained. The Build Alternative would be located entirely along an existing roadway in what is already a developed suburban environment. Therefore, the direct and indirect effects are not expected to diminish the integrity of character-defining features that qualify the building for the NRHP. A no adverse effect determination was made by MHT, pursuant to 36 CFR §800, for the Project, per a letter dated March 8, 2016 (**Appendix A**). This letter from MHT also acknowledged FTA's intent to pursue a *de minimis* impact on the NIST Headquarters. Therefore, the FTA will likely make a *de minimis* impact determination for this property.

3.11.5 Coordination

Officials with Jurisdiction – The officials with jurisdiction over park and historic properties in the study area are the City of Gaithersburg and the Maryland Historical Trust. The results of this evaluation have been circulated to the officials with jurisdiction. Preliminary coordination has also occurred with the following:

- *City of Gaithersburg*: The MDOT MTA will seek concurrence from the City of Gaithersburg, pursuant to 23 CFR 774.3(b), that implementation of the Build Alternative would not adversely affect the activities, features, or attributes that make the parks eligible for Section 4(f) protection. Consultation is ongoing.

- *Maryland Historical Trust (MHT):* MHT is the Maryland SHPO. Coordination has included identification of the APE, identification of historic properties pursuant to 36 CFR Part 800, and the effects assessment. To date, MHT has reviewed the *Identification and Evaluation of Historic Architectural Properties Technical Report*, *Phase I Archeological Survey Technical Report, and the Section 106 Effects Assessment*. MHT provided comments on January 12, 2015, refining the NRHP-eligible boundary of England/Crown Farm revised by FTA/MDOT MTA, but otherwise concurring with the historic architectural findings. The Section 106 Effects Assessment was sent to the MHT on January 27, 2016. In a letter dated, March 8, 2016, the MHT concurred with FTA's finding that the undertaking will have a no adverse effect on historic properties (refer to **Appendix A**).

- *Section 106 Additional Consulting Parties*: Coordination is ongoing with Section 106 consulting parties, including representatives of NIST and Johns Hopkins. The *Identification and Evaluation of Historic Architectural Properties Technical Report* was provided to all additional consulting parties in October, 2014. Comments were received from NIST indicating their disagreement with the NIST NRHP evaluation results and the agency's upcoming plans for a separate evaluation. The Consulting Parties received a copy of the *Section 106 Effects Assessment* on January 27, 2016 when the report was transmitted to the MHT.

- *Locality*: The study is located within the Cities of Rockville and Gaithersburg. Representatives from both cities have participated in study scoping in accordance with NEPA. Both cities will receive copies of this EA for review and comment.

- *Public*: The public will have an opportunity to review and comment on this Section 4(f) Evaluation with the EA. Comments from the public related to the Section 4(f) analysis will be responded to in the Final NEPA document.

3.12 Forests

3.12.1 Introduction and Methodology

In this analysis, forest stands, tree cover, hedgerows, and specimen trees were delineated. Refer to the *Natural Resources Technical Report* (**Appendix F**) for a detailed definition of each. The *State Forest Conservation Technical Manual* (Manual), Third Edition (Howell and Ericson, 1997) outlines the requirements for Forest Stand Delineation (FSD) and a Forest Conservation Plan (FCP) preparation and submittal. A desktop assessment was done prior to the initiation of field work to approximate the potential boundaries of existing stands through review of current aerial photography. Field investigations utilized the walk-through analysis method to inventory stands as described in the Manual. Areas that lacked the tree cover density or size to meet the Manual

definition of forest were characterized as either tree cover or hedgerows. Photographs were taken to document the condition of the areas. In addition, specimen trees were inventoried, located with the Global Positioning System unit and noted for their species and condition. The data collection methodology for the forests, tree cover, and hedgerows included the use of portable computers to digitize field data.

The linear portion of the Build Alternative will be reviewed under Maryland Reforestation Law. The law requires a 1:1 acre replacement on public land 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.

The O&M Facility will be reviewed under the Maryland Forest Conservation Act. The Maryland Forest Conservation Act applies to any activity requiring application for subdivision, a grading permit, or a sediment control permit for an area 40,000 square feet or greater. Applicants following the Forest Conservation Act are required to submit a FSD and a FCP to the Maryland Department of Natural Resources (MDNR) or the local reviewing agency for review and approval.

The forest inventory was conducted during December 2013 and January-February 2014. The purpose of this inventory was to document existing forest resources, including forest stands, tree cover, hedgerows, and specimen trees. Refer to the *Natural Resources Technical Report* (**Appendix F**) for a more detailed description of the forest inventory. Street trees/individual trees are discussed in **Section 3.13**.

The forest inventory included dominant canopy and understory species, dominant size class, percent canopy closure, stand successional stage, stand condition, invasive cover, woody debris, wildlife passage, impacts to Forest Interior Dwelling Species Habitat (FIDS), and impacts to Green Infrastructure.

Forest stand boundaries were identified in the field and drawn over aerial photographs. Forest stand impacts were calculated using ArcMap 10 software. The forest stand GIS shapefile was intersected with the LOD shapefile to calculate the area (square feet) of each forest stand located within the LOD, or the proposed impact area for each stand. Specimen tree removals would require a variance in compliance with the 2009 Maryland Forest Conservation Act amendment, No Net Loss of Forest Policy (Senate Bill 666), which would be coordinated with MDNR during final design.

3.12.2 Existing Conditions

Twenty-one forest stands totaling approximately 106 acres were delineated within the study area corridor. The forest stands delineated were commonly surrounding streams, wetlands, county facilities, or within parks. Common forest stand associations within the study area include Tulip Poplar, Sycamore-Green Ash-Boxelder-Silver Maple, and Chestnut Oak-Bear Oak. Dominant canopy species include tulip poplar, sycamore, green ash, northern red oak, black locust, red maple, black cherry, white oak, pignut hickory, and mockernut hickory. Dominant understory

species include wineberry, greenbrier, flowering dogwood, highbush blueberry, eastern red cedar, Morrow's honeysuckle, American holly, and American hornbeam.

Areas dominated by trees and/or brush that did not meet the stem-density or width requirements of a forest, as defined by MDNR, were classified as hedgerows. Hedgerows are located along steep embankments, separating housing communities from roadways, and along the railroad within the study area corridor. Dominant hedgerow species include black locust, princess tree, Callery pear, boxelder, black cherry, red maple, loblolly pine, eastern red cedar, persimmon, and white mulberry.

Areas that were greater in width than a typical hedgerow, but otherwise lacked the definition of a forest, were classified as tree cover. Tree cover areas within the study area corridor include many of the same dominant species as the forest stands, but also include Callery pear, pin oak, white mulberry, persimmon, catalpa, and eastern white pine. Common locations of these smaller treed areas include railroad tracks, surrounding streams, and adjacent to stormwater facilities.

Specimen trees are defined by MDNR as "trees having a diameter at breast height (dbh) of 30-inches or more, or trees having 75 percent or more dbh of the current State champion of that species." The majority of the specimen trees in the study area corridor are tulip poplar and white oak.

Existing forest resources in the study area corridor are shown in **Appendix D**.

3.12.3 Future No-Build Conditions

Maintenance and development activities for existing and proposed developments within or adjacent to the study corridor would be expected to continue under the No-Build conditions. No specific impacts to existing forest stands, tree cover, hedgerows, or specimen trees would be expected.

3.12.4 Build Alternative

Long-term Effects

The Build Alternative would impact approximately 28.0 acres of forest stands, 6.8 acres of tree cover, 1.3 acres of hedgerows, and approximately 252 specimen trees. The greatest area of forest impacts is at the proposed O&M Facility (**Figure 3-7**). The study area corridor is heavily suburbanized, with many existing vectors for the spread of invasive species such as inadvertent seed dispersal by wild animals and humans. Invasive plants can also spread by accidental dispersal of plant matter during invasive species clearing efforts or forest clearing due to construction. Invasive plant species are opportunistic and take advantage of any newly cleared ground by quickly spreading to cover these areas.

Short-term Effects

The Build Alternative would temporarily impact approximately 2.9 acres of forest stands, 1.1 acres of tree cover, 0.1 acres of hedgerows, and approximately 13 specimen trees. Short-term forest, hedgerow, and tree cover effects could result from sunscald and windthrow of individual trees growing along the recently exposed edges of retained forest/hedgerow/tree cover areas. Sediment and/or concrete washout releases into forest/hedgerow/tree cover retention areas could also affect the health and vigor of edge trees. Short-term forest/hedgerow/tree cover effects would likely be limited since temporary staging and stockpile areas during construction would be sited in non-forested areas, or within forests that would be permanently impacted. Staging and stockpiling areas located within forests would be replanted whenever possible following construction.

Mitigation

Avoidance and minimization efforts to reduce forest impacts will be refined during final design. These will include reducing fill slopes through the use of retaining walls and other additional best management practices to be implemented as appropriate, such as: (1) tree protection fencing installed along the outside edge of the limits of disturbance to prevent access by construction equipment and staging and stockpiling of materials within forest retention areas; (2) root pruning along the edge of the LOD where excavation is required to cleanly cut the roots of retained forest and/or specimen trees, thereby reducing stress and damage; (3) branch pruning to adjacent trees to reduce construction stress, provide equipment clearance, and correct any construction-related limb damage; and (4) supplemental watering, fertilization, and mulching to reduce tree stress and promote tree health. Additional construction techniques may be warranted to avoid and minimize forest/specimen tree effects including tree wells, air spading, root aeration matting, and tunneling for utility installation. Additionally, seed and mulch would be applied along newly cleared forest edges to minimize the spread of invasive species to these areas during clearing and construction.

Forest mitigation for the CCT Project will include: 1) 1:1 reforestation acreage required by Maryland Reforestation Law for impacts along the linear transportation portion of the Project and to street trees and 2) 1:1 reforestation acreage required by the Forest Conservation Act for impacts at the O&M Facility site. The City of Gaithersburg has identified approximately 47 acres of potential reforestation area, mostly along Muddy Branch and its tributaries that would maximize tree canopy benefit by providing a riparian corridor. Project planners will discuss the potential for use of some of this land as mitigation to apply to Reforestation Law mitigation requirements for the CCT. MDOT MTA has purchased 85 forest mitigation bank credits in the Washington Metropolitan Watershed, and some of these may be available to apply to Forest Conservation Act requirements of the CCT Project. Coordination for forest mitigation with DNR, MDOT MTA, and the City of Gaithersburg will be ongoing as Project design continues.

Figure 3-7: Forested Area at the Proposed Operations and Maintenance Facility Site

3.13 Street Trees/Individual Trees

3.13.1 Introduction and Methodology

The Maryland Roadside Tree Law was passed in 1914 to ensure that roadside trees were properly protected and cared for, and to ensure compatibility with public utilities. A Roadside Tree Care Permit must be obtained from MDNR prior to pruning, fertilizing, removing, planting, or caring for any roadside tree in public right-of-way. Any work (including removal) conducted on a roadside tree that is 20 feet or larger in height must be performed by a Maryland Licensed Tree Expert. A Roadside Tree Permit applies to trees in the public right-of-way that are not within forest stands. In this analysis, street trees or individual trees are those having a dbh greater than or equal to two inches are located in the study area corridor, and are not included as part of a forest, tree cover, or hedgerow area. As per direction from MDNR, all street trees ≥6" diameter at breast height were recorded within the study area corridor.

Most frequently these trees occur along roadways either between the road and a sidewalk or within a center island planting area between two roadways (as along King Farm Boulevard). Mapping for Street Trees / Individual Trees is provided in **Appendix D**. An inventory was conducted to document the location, size, and condition of these existing trees.

The Roadside Tree Law does not apply if the Reforestation Law Threshold of impact is 1 acre or greater of forest. The CCT Project would impact more than 1 acre of trees and therefore, Maryland Reforestation Law applies to this Project.

3.13.2 Existing Conditions

Individual and street trees were identified within the LOD of the Build Alternative, relatively equally distributed between native and non-native species. The majority of the individual trees are roadside trees in planting boxes or planting beds, and there is an even distribution of native and non-native species. Dominant individual tree species in the study area corridor include white pine, London plane, honey locust, sycamore, and Kwanzan cherry. Street/individual trees are shown in mapping in **Appendix D**.

3.13.3 Future No-Build Conditions

Maintenance and development activities for existing and proposed developments within or adjacent to the study corridor would be expected to continue under the No-Build conditions, with possible impacts from removal, relocation, filling and compaction, or grading operations. No specific impacts to existing street trees or individual trees would be expected.

3.13.4 Build Alternative

Long-term Effects

The Build Alternative may impact street and individual trees through removal, temporary, and permanent activities in the critical root zone, such as filling and compaction, and changes in soil moisture regimes because of grading operations. The Build Alternative may result in long-term effects to approximately 1,717 individual/street trees in the study area.

Short-term Effects

Approximately 173 individual/street trees would be impacted during construction. Short-term effects would result from removal and replacement of trees to accommodate maintenance of traffic during construction, underground utility relocations, erosion and sediment control devices, and staging and stockpiling areas. Refer to the *Natural Resources Technical Report* (**Appendix F**) for a summary of individual/street tree impacts. Tree decline and/or mortality would result from significant critical root zone (CRZ) disturbance, tree limb damage, soil compaction, placement of fill in the CRZ, and changes in soil moisture regimes because of grading operations and other construction related activities conducted directly adjacent to retained street/individual trees. Additional short-term tree effects could result from accidental spills, sediment and/or concrete washout releases into tree protection areas, and staging and stockpiling of construction materials within CRZs.

Mitigation

A large portion of the Build Alternative will be constructed within urbanized road rights-of-way, which limits opportunities for avoidance and minimization of street/individual tree effects. Specific impact avoidance and minimization measures and best management practices similar to those discussed in **Section 3.12** will be detailed in an FCP developed in the final design. Coordination with MDNR and Montgomery County Forestry staff will help to identify street tree planting locations within road right-of-way in the immediate vicinity of the impact areas, parks, schools, and other county property. Mitigation of impacts in the proposed right-of-way would be on a 1:1 basis, pursuant to the Roadside Tree Law, and individual trees would be considered on private property where practicable, as negotiated by MDOT MTA and the property owner. Landscaping and street tree replacement would be considered within the immediate vicinity of the resource effects, where possible.

3.14 Groundwater

3.14.1 Introduction and Methodology

Information about groundwater in the study area corridor was obtained from previously published material from the United States Geological Survey Maryland-Delaware-DC Water Science Center (http://md.water.usgs.gov) for Montgomery County and from previous environmental technical reports such as the 2010 *Corridor Cities Transitway Supplemental Environmental Assessment* (CCT-SEA), 2014 *Natural Environmental Technical Report*, and 2002 DEIS. The available information was compiled and interpreted by a qualified hydrogeologist to enhance its applicability to the study area corridor.

3.14.2 Existing Conditions

The aquifer underlying the study area corridor is crystalline rock. Groundwater recharge is highly variable in the Piedmont region and depends heavily on local precipitation, runoff, and the capacity of the land surface to accept infiltrating water. Most of the groundwater withdrawals in Montgomery County are used for domestic purposes, but domestic wells are rare in the Gaithersburg area because the study area is within the urbanized Washington Suburban Sanitary

Commission service area. Groundwater levels vary considerably in the study area corridor based on topography and proximity to large bodies of water, with large seasonal response in groundwater levels, particularly in unconfined aquifers in the county.

3.14.3 Future No-Build Conditions

Maintenance and development activities for existing and proposed developments within or adjacent to the study corridor would be expected to continue under the No-Build conditions, possibly resulting in changes to drainage patterns or groundwater movement. No specific impacts to groundwater resources would be expected.

3.14.4 Build Alternative

Long-term Effects

The Build Alternative, including the O&M Facility, would result in small changes to drainage patterns or minor localized changes in shallow groundwater movement because it would be constructed, for the most part, on the ground surface. Impacts to groundwater quality may occur due to runoff from the O&M Facility, deicing new roadways, and urban runoff that could potentially infiltrate into the subsurface.

Short-term Effects

The Build Alternative would be constructed on the ground surface and only minor and temporary changes to the movements of the shallow groundwater table are likely during grading and construction. Any runoff would be treated in accordance with the Maryland Department of the Environment (MDE) guidelines for SWM and released to surface waters.

Mitigation

Required SWM facilities will be constructed for the Build Alternative to treat pollutant-loaded runoff. The SWM features proposed with the 30 percent design are shown on plans included in **Appendix E** of this document.

3.15 Water Resources

3.15.1 Introduction and Methodology

Water resources include surface water such as natural and man-made streams, rivers, ponds, lakes, and floodplains. Water quality standards have been set for the State of Maryland by the US EPA as part of compliance with the Clean Water Act (CWA). Total Maximum Daily Loads (TMDLs) for impaired waterways are developed as part of state requirements under the CWA. A TMDL plan is developed to determine the maximum amount of a pollutant that a waterbody can receive and meet the ambient water quality standards set forth by Section 303 of the CWA, and state requirements. Published data from MDE was consulted to determine which streams in the study area corridor had been designated as water quality limited segments (WQLs) or had a submitted or approved TMDL.

The MDNR Scenic and Wild Rivers program was developed to protect the scenic, recreational, and aquatic habitat values of the state's wild and scenic rivers under the National Wild and Scenic River Act (16 U.S.C §§ 1271-1287). This Act provides the state with the authority to designate a

river as wild and scenic. Information on designated rivers in Maryland was obtained from the MDNR website (http://dnr.maryland.gov/land/stewardship/scenicrivers.asp).

The locations of streams and their associated watershed limits within the study area corridor were determined using MDNR third-order watershed GIS files. Information on watershed conditions was gathered from published data sources available from MDNR, the Chesapeake Bay Program (CBP), and MDE.

The USDOT Order 5650.2, entitled Floodplain Management and Protection, prescribes policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of adverse floodplain effects. On January 30, 2015, President Obama issued EO 13690, a revision of EO 11988, and proposed new Federal Flood Risk Management Standards. Data from the Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM) was obtained and overlaid on GIS mapping of the Build Alternative to identify regulated floodplains within the study area corridor (refer to mapping in **Appendix D**). Floodplains are also regulated at the state level by MDE. Any construction in nontidal floodplains would require a Waterway Construction Permit from MDE.

3.15.2 Existing Conditions

The entire study area is contained in the Potomac River watershed with five, 12-digit watersheds: Middle Great Seneca Creek, Lower Great Seneca Creek, Muddy Branch, Watts Branch, and Upper Rock Creek (**Figure 3-8**). Refer to the *Natural Resources Technical Report* for detailed discussion of water resources.

All watersheds within the study area corridor, with the exception of Upper Rock Creek are categorized as Use I-P waters defined as “water contact recreation, protection of aquatic life, and public water supply.” Upper Rock Creek is characterized as Use IV waters, defined as “recreational trout waters” (MDE, 2007). Throughout the study area corridor, many of the streams have been straightened and armored to some degree to limit bank erosion and convey high storm flows. Muddy Branch remains a naturalized stream corridor surrounded by a substantial forest buffer.

The majority of the study area corridor is located in high-density developed areas that include some older developments with few SWM controls. Consequently, runoff generated by existing impervious surface in these areas is conveyed directly to streams within the study area corridor through storm drains, with little or no quantitative or qualitative treatment. Based on data gathered by the Maryland Biological Stream Survey (MBSS), Montgomery County’s Department of Environmental Protection, and the CBP, these conditions and other impacts related to urbanization have led to chemical water quality impairments in study area corridor streams.

Several WQLs have been identified by MDE under Section 303 of the CWA. Clopper Lake is impaired by excess phosphorous and sediment. Seneca Creek watershed is impaired by total suspended solids (TSS), chlorides, ammonia, and sediment. The Potomac River, Montgomery County watershed (including Muddy Branch and Watts Branch) is listed as impaired for polychlorinated biphenyls (PCBs) in fish tissue, chlorides, total phosphorous, sediment/TSS, and

sulfates. The Rock Creek watershed is impaired by sediment, fecal bacteria, and excess phosphorous that are major stressors to biological communities. No water quality data exists for the portion of the Middle Great Seneca watershed located in the study area corridor. Refer to **Figure 3-8** for watershed mapping within the study area corridor.

3.15.3 Future No-Build Conditions

Maintenance and development activities for existing and proposed developments within or adjacent to the study corridor would be expected to continue under the No-Build conditions, possibly resulting in physical alterations to water resources. Normal hydrologic processes such as erosion and sedimentation would continue. Accidental spills and sediment releases are possible but, no specific impacts to surface water resources would be expected.

3.15.4 Build Alternative

Long-term Effects

The Build Alternative would impact 0.7 acres of floodplains. (Impacts to streams are discussed in **Section 3.16**.) Water quality impacts associated with the operation of the Build Alternative after construction are mainly based on the potential for contamination of surface waters by runoff from new impervious surfaces. Impervious surface runoff can include numerous individual chemicals but can generally be grouped as heavy metals, salts, organic molecules, and nutrients (Trombulak and Frissell, 2000).

Short-term Effects

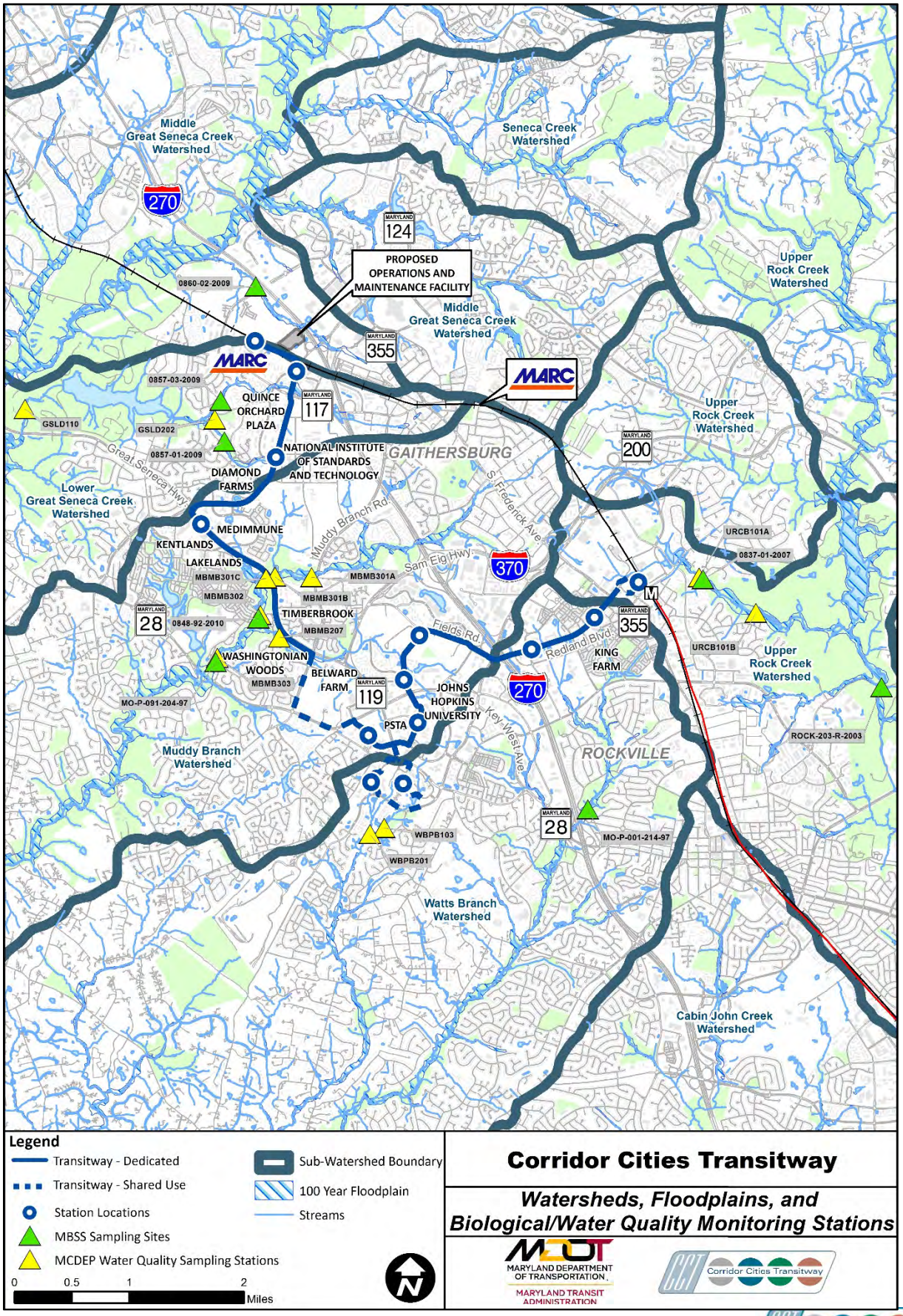
The Build Alternative would temporarily impact 0.3 acres of floodplains. Potential impacts to water quality during construction include physical disturbances or alterations, accidental spills, and sediment releases that can affect aquatic life.

Mitigation

For Use I surface waters, in-stream work may not be conducted during the period March 1 through June 15 and from March 1 through May 31, in accordance with the State's Use IV time of year restrictions applicable to Upper Rock Creek watershed, inclusive, during any year to protect aquatic resources. (**Appendix A**, MDNR Letter, December 4, 2013).

Based on current MDE SWM Guidelines, the Build Alternative would require approximately 52 acres of impervious surface to be treated to meet SWM requirements. The transitway would not be expected to increase impervious surface-related contaminants to surface waters to an appreciable degree, because proposed MDE-approved Erosion and Sediment Control Plans and stormwater treatment best management practices would treat contaminated runoff from the roadway before it enters surface waters. Proposed SWM features are shown on mapping in **Appendix E**.

Figure 3-8: Watersheds, Floodplains, and Biological/Water Quality Monitoring Stations



Compliance with TMDLs for the study area corridor will be coordinated through the MDE stormwater and sediment and erosion control permitting process, as required under Maryland's Erosion and Sediment Control (Code of Maryland Regulations [COMAR] 26.17.01) and SWM regulations (COMAR 26.17.02). A Hazardous Materials Spill Prevention Plan will be developed to prevent hazardous materials such as fuel and lubricants from contaminating surface water. Proposed SWM features are shown on mapping in **Appendix E**.

All storm drain conveyance systems such as pipes and culverts will be designed in accordance with the MDOT SHA (as adopted by MDOT MTA), and/or Montgomery County criteria, and would maintain current drainage patterns. Site disturbance would be minimized by maintaining and utilizing segments of the existing storm drain network as practicable. SWM facilities will manage runoff for all disturbances caused by the Build Alternative in accordance with criteria established by MDE at all Points of Investigation (POIs) for surface segments where drainage leaves the study area corridor. Approximately 65 POIs have been identified throughout the study area corridor. Regulatory development conditions were established for each individual POI to determine upslope SWM requirements per Maryland's Stormwater Management Act of 2007 and design criteria of the Revised Chapter 5 of the *Maryland Stormwater Design Manual* (2000).

3.16 Wetlands and Waters of the US

3.16.1 Introduction and Methodology

Waters of the US, including wetlands, are regulated under Section 401 and 404 of the CWA. EO 11990: Protection of Wetlands was issued to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands; to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative; and to "avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use." The State of Maryland regulates these resources under the Maryland Tidal Wetlands Act and the Maryland Non-tidal Wetlands Protection Act. Unavoidable effects to non-tidal resources may require a Maryland Non-tidal Wetlands Permit, a Section 401 Water Quality Certificate, and a Waterway Construction Permit from the MDE, as well as a Section 404 permit from the USACE for the discharge of dredged or fill material into Waters of the US, including wetlands.

USACE regulates structures that are located in, under, or over navigable Waters of the US under Section 10 of the Rivers and Harbors Act of 1899. "Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 C.F.R Part 329.4). The USACE Baltimore District was consulted to confirm the presence of navigable waters in the study area corridor.

Wetlands and other Waters of the US in the study area corridor were identified and flagged in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (USACE, April 2012). This manual employs a

three-parameter approach to wetland identification using hydrology, hydrophytic vegetation, and hydric soils. All three parameters must be present for an area to be considered a jurisdictional wetland under Section 404 of the CWA. Areas not meeting these three parameters may still be regulated and include, but are not limited to: SWM ponds, palustrine open water (ponds), stream systems (waterways), and some disturbed areas. All wetlands and waterways in the study area corridor were delineated in fall 2013 and summer 2014.

At the current stage of design, calculated impacts are based on the anticipated LOD and include both long-term, permanent impacts from Project structures and facilities needed for operation of the CCT, and short-term, temporary impacts from Project construction. As Project design progresses, short- and long-term effects would likely be reduced further through minimization.

3.16.2 Existing Conditions

The LOD for the Build Alternative traverses several tributaries and their associated wetlands, which ultimately drain to Muddy Branch. During the field investigation, a total of 30 Waters of the US were delineated within the LOD of the Build Alternative, including 11 wetlands/stormwater management ponds and 19 waterways. The 11 wetlands/stormwater management ponds include fringe wetlands along streams, depressional wetlands, wetlands in forested stream valleys, and SWM ponds adjacent to roadways and housing developments. Of the waterways identified, six were classified as perennial streams, three as intermittent channels, and ten as ephemeral channels. Refer to **Appendix D** for mapping of these resources. Refer to the *Natural Resources Technical Report* for a detailed discussion of each wetland and Waters of the US identified within the study area corridor.

All of the wetlands and waterways in the study area corridor have been influenced to some extent by development, and the majority of the systems have been manipulated; all are also non-tidal. All waterways described within the LOD of the Build Alternative have undergone jurisdictional determination by USACE and MDE, except for two features located near the Shady Grove Metro Station for which property access has been denied. Twenty-three Waters of the US were determined to be jurisdictional within the LOD, including six wetlands/stormwater management ponds and 17 waterways. (Refer to **Appendix A**, for the preliminary jurisdictional determination issued by the USACE on December 15, 2014.)

3.16.3 Future No-Build Conditions

Maintenance and development activities for existing and proposed developments within or adjacent to the study area corridor would be expected to continue under the No-Build conditions, possibly resulting in physical alterations to wetlands and Waters of the US. Normal hydrologic processes such as erosion and sedimentation would continue. Accidental spills and sediment releases are possible. No specific impacts to water resources would be expected.

3.16.4 Build Alternative

Long-term Effects

The Build Alternative would impact approximately 2,102 linear feet of jurisdictional waterways (424 linear feet of perennial streams, 384 linear feet of intermittent streams, and 1,266 linear

feet of ephemeral streams). The Build Alternative would impact 0.4 acres of jurisdictional wetlands (0.3 acres of SWM) area, <0.1 acre of palustrine forested (PFO) wetland, and no acres of palustrine emergent (PEM) wetland). Complete avoidance of impacts to waterways is not possible due to the number of these systems in the study area corridor and the perpendicular orientation of waterways to the Build Alternative. The majority of wetland and waterway impacts would occur where existing roads would be reconfigured or expanded to accommodate the Build Alternative, including fill and placement of culverts. The discharge of dredge or fill material into study area corridor wetlands would require a Section 404 permit from the USACE. Any alteration of non-tidal wetlands in the study area corridor would also require a Section 401 Water Quality Certification (**Appendix D**).

Short-term Effects

Temporary impacts resulting from the Build Alternative would include approximately 145 linear feet of jurisdictional waterways (29 linear feet of perennial streams, 77 linear feet of intermittent streams, and 37 linear feet of ephemeral streams). The Build Alternative would temporarily impact 0.11 acres of jurisdictional wetlands (0.11 acres of SWM), 0 acres of PFO wetland, and 0 acres of PEM wetland / palustrine scrub-shrub (PSS)). Potential impacts to wetlands and Waters of the US during construction include physical disturbances or alterations, accidental spills, and sediment releases that can affect aquatic life.

Mitigation

Engineering designs will continue to be refined to address avoidance and minimization of impacts as would the practicability and effectiveness of using measures such as retaining walls, steeper fill slopes, and reduced roadway sections. Consideration would 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.

Strict adherence to MDE erosion and sediment control procedures and SWM regulations will minimize impacts to waterways and wetlands from soil disturbance associated with construction and any increase in runoff from expanded impervious surfaces related to the Build Alternative. These procedures include the use of best management practices 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 and from March 1 through May 31 in accordance with the State's Use IV time of year restrictions, applicable to Upper Rock Creek watershed, inclusive, during any year to protect aquatic resources.

When all practicable measures have been taken to avoid and minimize impacts to aquatic resources, mitigation may be required in the form of establishment/creation, enhancement, or preservation to replace the loss of wetland, stream and/or other aquatic resource functions. Wetland mitigation options under both the federal rule and state mitigation guidelines could include mitigation banking credits, in-lieu fees, or permitee-responsible mitigation using a

watershed approach, in that order of preference. The decision to replace function, acreage, or both may be adjusted at the discretion of the USACE or MDE, depending on the practicability of the proposed mitigation. Compensatory stream mitigation projects to replace stream functions considered at the discretion of MDE and USACE may include stream channel improvements, removal of fish blockages, riparian buffer enhancements, and water quality improvements. The USACE would review a Conceptual Mitigation Plan and determine whether it includes acceptable sites to adequately mitigate for anticipated Build Alternative impacts to Waters of the US, including jurisdictional wetlands. Coordination with MDE would continue until concurrence on proposed mitigation is obtained. The Final Mitigation Plan will be initiated following a Finding of No Significant Impact (FONSI), if appropriate, and is required to be complete prior to issuance of the federal wetlands and waterways permit.

3.17 Habitat and Rare, Threatened and Endangered Species

3.17.1 Introduction and Methodology

Terrestrial habitats investigated in the study area corridor include forests, individual trees, and wetlands. Aquatic habitats in the study area corridor include streams, wetlands with surface water, floodplains, and SWM ponds. The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service regulate and protect federally-listed endangered and threatened species under the Endangered Species Act of 1973. State and federally-listed rare, threatened, and endangered species (RTE) are regulated in Maryland through the MDNR Wildlife and Heritage Service.

Terrestrial habitat in the study area corridor was assessed through aerial mapping and a field investigation conducted between October 2013 and July 2014. The field investigation included an inventory of existing forest, tree cover areas, and individual street trees, as well as other potential wildlife habitat, such as lawns and maintained park areas. A desktop investigation of mapped information was conducted and state and federal agencies were consulted to assess RTE species and plant and wildlife habitat, prior to beginning the field investigation.

There is a growing awareness of the conservation needs for FIDS throughout the state. Potential FIDS habitat is defined as a contiguous forest area that is greater than 50 acres in size and contains at least 10 acres of forest interior greater than 300 feet from the nearest forest edge (MDNR, 2000). FIDS are regulated at the state level through the protection of forest interior habitat (COMAR 27.01.09.04C). FIDS impacts of the Build Alternative were determined quantitatively by overlaying a GIS layer of FIDS habitat parameters onto forest stands in the study area corridor to determine the square footage of impacted habitat.

This analysis focuses on three terrestrial wildlife and plant groups that are of particular interest in the study area corridor, namely, FIDS, deer and RTEs, because of their respective regulatory importance and safety concerns. Terrestrial species data from Montgomery County, USFWS, and MDNR were analyzed to determine potential impacts to FIDS, RTEs, and deer. Refer to the *Natural Resources Technical Report* (**Appendix F**) for more detail.

3.17.2 Existing Conditions

The study area corridor is located in mixed-use development areas, but includes both terrestrial and aquatic plant, fish, and wildlife habitat. Dominant terrestrial vegetation, forested, riparian, and wetland areas and associated wildlife are described in detail in the *Natural Resources Technical Report.*

Terrestrial habitat in the study area corridor is inhabited by a variety of plant and animal species including: songbirds, woodpeckers, raptors, water birds, forest-dwelling mammals, and many native and exotic trees, shrubs, and herbaceous vegetation species.

No FIDS habitat exists within the study area corridor. A large forested area located along the main stem of Muddy Branch at the Great Seneca Creek Highway bridge crossing is contiguous; however, because the widest part of the forest stand in the study area corridor is about 240 feet, it does not include any interior habitat.

No designated Biodiversity Areas[1] are located within the study area corridor. The nearest Biodiversity Area to the study area corridor is the Quince Orchard Biodiversity Area, which is located on Muddy Branch about 0.5 miles downstream of the study area corridor.

Consultation with the USFWS, by letter dated March 14, 2016, concluded the Project is "not likely to adversely affect" the northern long-eared bat as long as forest clearing occurs outside of the period of April 1 to August 31. Refer to **Appendix A** for USFWS correspondence. Consultation with MDNR revealed state-listed terrestrial endangered plant species Potato Dandelion (*Krigia dandelion*) is in proximity to the Build Alternative in the Traville Gateway Drive area.

The aquatic habitat in the study area corridor includes streams, SWM ponds, wetlands with standing water, and in some cases, floodplains, which provide habitat for many species of fish and macroinvertebrates. The majority of the aquatic species found there are pollution-tolerant or moderately pollution-tolerant, because the study area corridor has been highly impacted by development. **Section 3.15** (Water Resources) describes the watersheds and chemical water quality issues in the study area corridor potentially impacting aquatic habitat and wildlife, and the *Natural Resources Technical Report* discusses water quality and aquatic habitat and wildlife in detail.

3.17.3 Future No-Build Conditions

Maintenance and development activities for existing and proposed developments within or adjacent to the study area corridor would be expected to continue under the No-Build conditions,

[1]M-NCPPC (2013) defined Biodiversity Areas as areas of parkland containing one or more of the following:

- Large areas of contiguous, high quality forest and/or wetland which show little evidence of past land-use disturbance;
- RTE or watch list species;
- Exceptional examples of notable plant communities found in Montgomery County; or
- Areas of exceptional scenic beauty.

possibly resulting in changes to aquatic and terrestrial habitat such as increases in impervious surfaces or reduction of forested area. No specific impacts to habitat would be expected.

3.17.4 Build Alternative

Long-term Effects

The Build Alternative would impact 36.2 acres of forest habitat. Impacts to forests, hedgerows, tree cover, and individual street trees would be mitigated, as discussed in **Sections 3.13** and **3.16**. These forests are of relatively small size and are primarily inhabited by generalist wildlife species. Wildlife corridors would be maintained and impacts to terrestrial wildlife resources would be minor because the Build Alternative would mostly follow existing roadway alignments.

The Build Alternative would not impact the Potato Dandelion species in the Traville Gateway Drive area, because impacts would be located entirely within existing roadway pavement and/or in landscaped areas where the Potato Dandelion does not occur. Officials at MDNR have concurred that direct impacts to the Potato Dandelion would not result from the proposed Project due to a lack of suitable habitat within the LOD (refer to **Appendix A** for correspondence).

Approximately 2,102 linear feet of streams would be permanently impacted by the Build Alternative, including perennial, intermittent, and ephemeral waters.

Long-term changes in flow regimes and habitat from increased runoff and pollutant offloading associated with increased imperviousness could eventually alter the diversity of resident fish communities and impact particularly sensitive species. However, available MBSS data do not indicate the presence of highly-sensitive fish species near the study area corridor. The species expected to be impacted are adapted to urbanized settings, and would be likely to colonize the area again.

Short-term Effects

Approximately 145 linear feet of streams would be impacted by the Build Alternative during construction. Impacts to aquatic biota and water quality could occur directly through loss of habitat from Build Alternative culvert construction, sediment releases and vegetation removal associated with construction grading, and mortality from instream construction with heavy equipment.

Fish are more mobile than macroinvertebrates and can respond to short-term water quality or flow impacts by avoiding sections of the stream and relocating.

Mitigation

Consultation with MDNR identified resident fish species in several streams in the study area corridor (**Appendix A**). In accordance with state restrictions, in-stream construction would not be performed in Use I streams during the period of fish spawning and early development from March 1 to June 15 and from March 1 through May 31, in accordance with the State's Use IV time of year restrictions applicable to Upper Rock Creek watershed. Stream and wetland mitigation would be implemented as described in **Sections 3.15.4** and **3.16.4**.

No RTE mitigation measures would be required, as the Build Alternative would not impact the Potato Dandelion or any other RTE species. Consultation with the USFWS, by letter dated March 14, 2016, concluded the Project is "not likely to adversely affect" the northern long-eared bat as long as forest clearing occurs outside of the period of April 1 to August 31. Refer to **Appendix A** for the agency coordination letters.

3.18 Noise and Vibration

3.18.1 Introduction and Methodology

This section documents the noise and vibration impact assessment findings associated with the operation of the Build Alternative. The initial review of the aerial maps of the proposed transit alignment was completed to determine the identification of noise-sensitive land uses and/or receivers of interest within the Project study area corridor.

The noise criteria and descriptors required by FTA to determine potential noise impacts depend on land use type. The FTA criteria groups noise-sensitive land uses into the three categories as listed in **Table 3-9**.

Table 3-9: FTA Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)$*	Tract of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
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. Places for meditation or study associated with cemeteries, monuments, museums campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

Land use Categories 1 and 3 (primarily daytime uses) were assessed using the hourly equivalent noise level ($L_{eq}(h)$) descriptor, while land use Category 2 (daytime and nighttime use) was assessed using the previously-described L_{dn} descriptor. Both the L_{eq} (h) and L_{dn} descriptors report noise levels in A-weighted sound decibel (dBA). The FTA criteria do not generally apply to industrial or commercial areas since those areas are generally not considered noise sensitive and are compatible with places consistent with higher ambient noise conditions.

Vibration-Sensitive land uses along the study area corridor were identified using aerial photography and available GIS mapping and were subsequently field verified. Additional existing

site conditions, including other potential vibration-sensitive receptors were noted during field visits. As defined in the FTA Manual, section 8.1.1, vibration-sensitive receptors are defined as those building structures where the effect of exterior vibration levels may result in annoyance to occupants. These may include residential and or institutional land uses. However, most of the sensitive receptors analyzed for this Project were residential in character. Receptors were then grouped together based on their location relative to the proposed alignment and other geographic factors that might influence Project-related vibration levels. Within each grouping, a representative receptor location was determined for modeling purposes.

The screening area for the vibration analysis depends upon the FTA-defined land use categories. For residential land uses, the screening distance is a 150-foot assessment zone defined from the alignment. This distance is reduced to 100 feet for institutional uses and expanded to 450 feet for special buildings, such as concert halls and recording studios, which may be particularly sensitive to vibration. Accordingly, only receptors that could be potentially affected by the proposed BRT Project were considered in the assessment.

The noise and vibration impact assessment was completed in accordance with the methodologies and procedures outlined in the FTA *Transit Noise and Vibration Impact Assessment* (May 2006) manual. The following section discusses the projected future build noise exposure from the operation of the proposed BRT system on the present ambient noise environment and compares those noise levels to the relevant FTA noise impact criteria. For vibration, Project-generated peak vibration levels generated from daily operations are compared to appropriate FTA impact thresholds. Refer to the *Noise and Vibration Technical Report* for more detail.

3.18.2 Existing Conditions

Within a given land use category, noise measurements recorded at one site may be representative of existing conditions and future noise exposure at other similarly located nearby sites. Therefore, noise readings collected at one monitoring location were used to provide site equivalence to other nearby sites exposure to similar background noise conditions. Physical and operational parameters that would produce the worst-case noise exposure on nearby land uses, such as, train speed and distance to track, were factors used in selecting the representative noise measurement sites. Corridor-wide, there were a total of 41 representative noise receptor sites within the study area corridor, as depicted in **Figure 3-9**. These sites were chosen for noise monitoring and noise and vibration impact assessment.

A summary of the measured day-night noise levels (Ldn) is provided in **Table 3-10**. In general, lower day-night noise levels occurred in residential communities farther away from active roadways, while the higher noise levels typically occurred in more urban settings adjacent to active roadways. The Ldn values ranged from approximately 56 dBA at Receptor sites R13 (Belward Farm) and R14 (daycare facility), both located along Darnestown Road in Gaithersburg, to a maximum noise Ldn level of 76 dBA at Receptor Sites R05, R06 (single-family residence along Chevy Chase St, Gaithersburg), and R15 (single-family residence at 14240 Alta Oak Drive, Rockville). Existing noise levels measured near the proposed Metropolitan Grove O&M Facility were on the higher end of the measurement range with Ldn levels reaching 70 dBA.

Figure 3-9: Representative Noise Receptor Sites

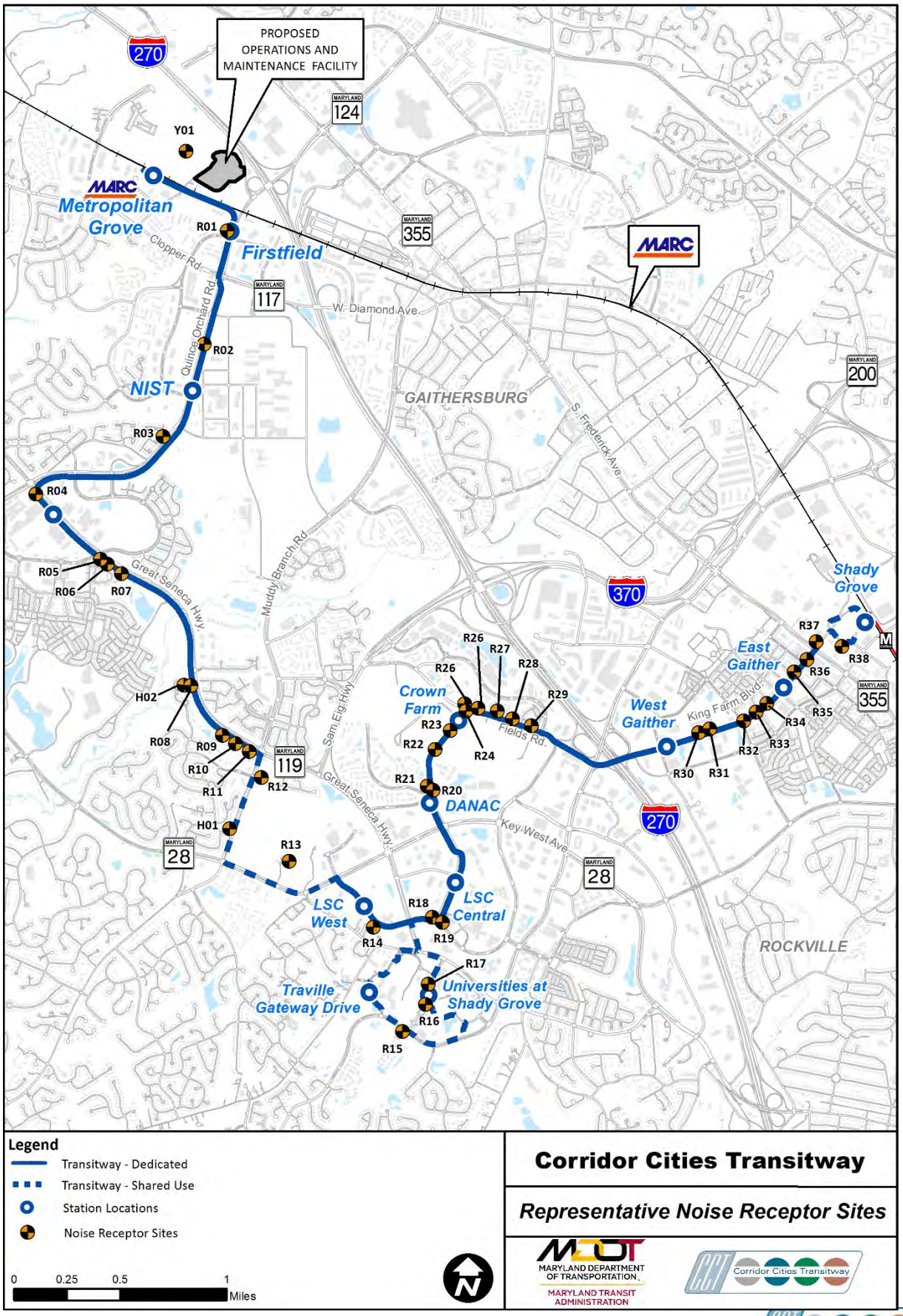


Table 3-10. Summary of Existing Measured Sound Levels

Site ID	Description of Measurement Location	Measurement Date	Land Use	Existing Noise Levels (Ldn dBA)
R01	Orchard Ponds Apartment, 865 Clopper Road, Gaithersburg	2/27/2014	Residential	73
R02	NIST Sound building/daycare, 100 Bureau Dr, Gaithersburg	1/16/2014	Daycare	73*
R03	2 Purchase St, Gaithersburg	1/15/2014	Residential	75
R04	Kentland Square Shopping Center for 1 Bostwick Ct, Gaithersburg	2/26/2014	Residential	71
R05	110 Chevy Chase St, Gaithersburg	1/15/2014	Residential	76
R06	120 Chevy Chase St, Gaithersburg	1/15/2014	Residential	76
R07	130 Chevy Chase St, Gaithersburg	1/15/2014	Residential	66
R08	421 Upshire Cir, Gaithersburg	1/9/2014	Residential	61
R09	1083 Hillside Terr, Gaithersburg	1/16/2014	Residential	57
R10	1015 Hillside Terr, Gaithersburg	1/16/2014	Residential	58
R11	943 Hillside Terr, Gaithersburg	1/16/2014	Residential	62
R12	102 Mission Dr, Gaithersburg	1/16/2014	Residential	62
R13	Belward Farm, 10515 Darnestown Rd, Gaithersburg	2/27/2014	Residential	56
R14	Daycare, 10111 Darnestown Rd, Gaithersburg	1/7/2014	Daycare	56*
R15	14240 Alta Oak Dr, Rockville	2/27/2014	Residential	76
R16	14401 Traville Gardens Cir, Rockville	2/26/2014	Residential	72
R17	14421 Traville Gardens Cir, Rockville	2/25/2014	Residential	73
R18	Katherine Thomas School, 9975 Medical Center Dr, Rockville	2/27/2014	School	65*
R19	Adventist Rehabilitation Hospital, 9909 Medical Center Dr	2/27/2014	Hospital	66*
R20	9700 Oakdale Dr, Rockville	2/25/2014	Residential	60
R21	15305A Gable Ridge Ct, Rockville	2/25/2014	Residential	64
R22	731 Crown Park Ave, Gaithersburg	1/18/2014	Residential	68
R23	219 Decoverly Dr, Gaithersburg	1/18/2014	Residential	65
R24	Pulte home site 19 on Decoverly Dr, Gaithersburg	1/18/2014	Residential	65
R25	9723 Fields Rd, Gaithersburg	1/18/2014	Residential	67
R26	9639 Fields Rd, Gaithersburg	1/9/2014	Residential	67
R27	15608 Athens Pl, Gaithersburg	1/8/2014	Residential	58
R28	9601 Fields Rd, Gaithersburg	1/8/2014	Residential	74
R29	9423 Fields Rd, Gaithersburg,	1/8/2014	Residential	71
R30	701 King Farm Blvd, Rockville	2/6/2014	Residential	59
R31	701 King Farm Blvd, Rockville	2/6/2014	Residential	59
R32	502 King Farm Blvd, Rockville	2/6/2014	Residential	67
R33	501 King Farm Blvd, Rockville	2/6/2014	Residential	68
R34	411 King Farm Blvd, Rockville	2/6/2014	Residential	64
R35	231 King Farm Blvd, Rockville	2/25/2014	Residential	68
R36	104 King Farm Blvd, Rockville	2/25/2014	Residential	69
R37[1]	King Farm Blvd Residential Construction, Rockville	2/25/2014	Residential	69
R38[1]	Kid Stop Child Development Ctr., 15910 Somerville Dr, Rockville	2/25/2014	Daycare	68*

Site ID	Description of Measurement Location	Measurement Date	Land Use	Existing Noise Levels (Ldn dBA)
H01	102 Midsummer Dr, Gaithersburg	1/9/2014	Residential	67
H02	420 Upshire Cir, Gaithersburg	1/9/2014	Residential	61
Y01	456 Exchange Ave, Gaithersburg	1/7/2014	Residential	70

*Notes: * Peak hour Leq (1hr) dBA*

[1] Because property access could not be obtained, day-night (Ldn) levels for sites R37 and R38 were estimated based on noise measurements collected at nearby noise measurement site R36.

3.18.3 Future No-Build Conditions

Noise levels under the future No-Build scenario are assumed to be similar or the nearly the same as those measured under the existing conditions.

3.18.4 Build Alternative

Long-term Effects

The future sound levels from daily transit operations of the Build Alternative are summarized in **Table 3-11** for each of the representative noise receptor locations identified along the study area corridor. The predicted future noise levels were compared to the measured noise levels to determine if future noise generated from the CCT Project would result in an impact.

The FTA impact assessment is determined by comparing the noise generated solely from the proposed BRT daily service operations against the ambient noise environment where it's being introduced. Therefore, the present ambient noise environment plays a critical role in establishing if impact would occur. As illustrated in **Figure 3-10**, the severity of noise impact is characterized by two curves that allow for higher Project noise exposure where there are higher levels of existing background noise, up to a threshold level beyond which Project noise exposure would result in an impact. In communities with a higher existing ambient environment, less noise exposure from Project noise can be tolerated. Project-generated noise levels within the "No Impact" range are not likely to be perceptible to most listeners and are considered acceptable by the FTA; therefore, no mitigation is required. At the other end of the spectrum, Project noise-exposure levels that are within the FTA "Severe Impact" range represent conditions with the need for mitigation and would result in those effected living in the area to be highly annoyed by the new transit noise source.

Table 3-11: Comparison of Projected Transit Noise Exposure Levels and FTA Impact Criteria for Proposed CCT BRT Service Operations

Site #	Receptor Site Description	FTA Land Use Category	Existing Noise Level (Ldn (dBA))	FTA Impact Threshold Levels[1] (Ldn (dBA))		Project Noise Exposure (Ldn (dBA))	FTA Impact Determination
				Moderate	Severe		
R01	Jefferson's at Orchard Ponds Apartment, 865 Clopper Road, Gaithersburg	Residential	73	66-71	>71	59	No Impact
R02	NIST Sound building/daycare, 100 Bureau Dr, Gaithersburg	Daycare	73*	71-76*	>76*	51*	No Impact
R03	2 Purchase St, Gaithersburg	Residential	75	66-73	>73	53	No Impact
R04	Kentland Square Shopping Center for 1 Bostwick Ct, Gaithersburg (Receptor use for nearby residential area)	Residential	71	71-75	>75	49	No Impact
R05	110 Chevy Chase St, Gaithersburg	Residential	76	66-74	>74	56	No Impact
R06	120 Chevy Chase St, Gaithersburg	Residential	76	66-74	>74	61	No Impact
R07	130 Chevy Chase St, Gaithersburg	Residential	66	62-67	>67	60	No Impact
R08	**421 Upshire Cir, Gaithersburg**	**Residential**	**61**	**59-64**	**>64**	**60**	**Moderate Impact**
R09	**1083 Hillside Terr, Gaithersburg**	**Residential**	**57**	**57-62**	**>62**	**58**	**Moderate Impact**
R10	**1015 Hillside Terr, Gaithersburg**	**Residential**	**58**	**57-62**	**>62**	**57**	**Moderate Impact**
R11	943 Hillside Terr, Gaithersburg	Residential	62	59-64	>64	56	No Impact
R12	102 Mission Dr, Gaithersburg	Residential	62	59-64	>64	57	No Impact
R13	Belward Farm, 10515 Darnestown Rd, Gaithersburg	Residential	56	56-62	>62	49	No Impact
R14	Daycare, 10111 Darnestown Rd, Gaithersburg	Daycare	56*	61-67*	>67*	45*	No Impact
R15	14240 Alta Oak Dr, Rockville	Residential	76	66-74	>74	49	No Impact
R16	14401 Traville Gardens Cir, Rockville	Residential	72	66-71	>71	53	No Impact
R17	14421 Traville Gardens Cir, Rockville	Residential	73	66-71	>71	56	No Impact
R18	Katherine Thomas School, 9975 Medical Center Dr, Rockville	School	65*	66-71*	>71*	54*	No Impact
R19	Adventist Rehabilitation Hospital, 9909 Medical Center Drive	Hospital	66*	62-67*	>67*	53*	No Impact
R20	9700 Oakdale Dr, Rockville	Residential	60	58-63	>63	56	No Impact
R21	15305A Gable Ridge Ct, Rockville	Residential	64	61-65	>65	56	No Impact
R22	731 Crown Park Ave, Gaithersburg	Residential	68	63-68	>68	57	No Impact
R23	219 Decoverly Dr, Gaithersburg	Residential	65	61-66	>66	56	No Impact
R24	Pulte home site 19 on Decoverly Drive, Gaithersburg	Residential	65	61-66	>66	58	No Impact
R25	9723 Fields Road, Gaithersburg	Residential	67	63-67	>67	59	No Impact
R26	9639 Fields Road, Gaithersburg	Residential	67	63-67	>67	56	No Impact
R27	15608 Athens Place, Gaithersburg	Residential	58	57-62	>62	54	No Impact
R28	9601 Fields Road, Gaithersburg	Residential	74	66-72	>72	58	No Impact

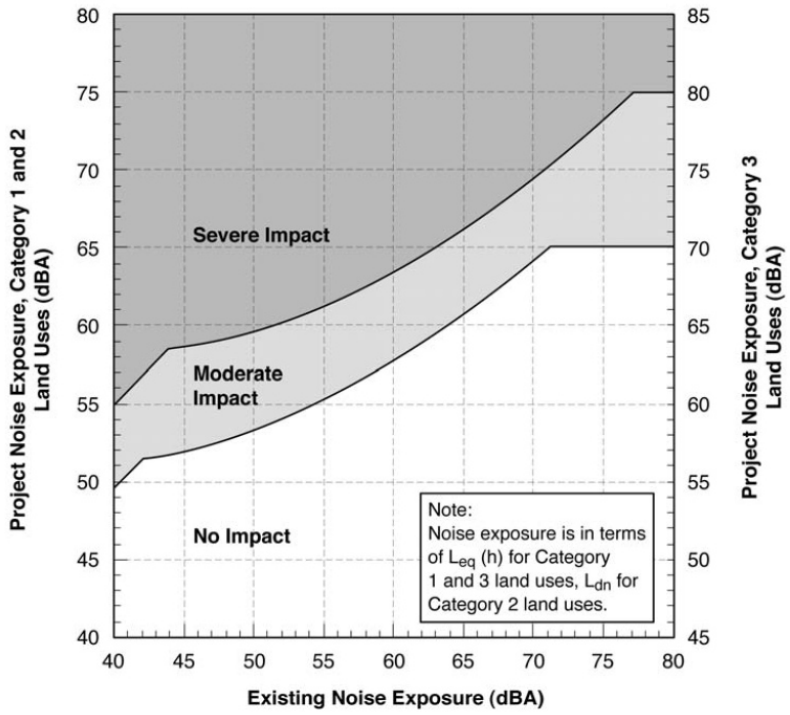
Site #	Receptor Site Description	FTA Land Use Category	Existing Noise Level (Ldn (dBA))	FTA Impact Threshold Levels[1] (Ldn (dBA))		Project Noise Exposure (Ldn (dBA))	FTA Impact Determination
				Moderate	Severe		
R29	9423 Fields Road, Gaithersburg,	Residential	71	66-70	>70	59	No Impact
R30	701 King Farm Blvd, Rockville	Residential	59	58-63	>63	55	No Impact
R31	701 King Farm Blvd, Rockville	Residential	59	58-63	>63	55	No Impact
R32	502 King Farm Blvd, Rockville	Residential	67	63-67	>67	59	No Impact
R33	501 King Farm Blvd, Rockville	Residential	68	63-68	>68	55	No Impact
R34	411 King Farm Blvd, Rockville	Residential	64	61-65	>65	55	No Impact
R35	231 King Farm Blvd, Rockville	Residential	68	63-68	>68	56	No Impact
R36	104 King Farm Blvd, Rockville	Residential	69	64-69	>69	59	No Impact
R37[2]	King Farm Blvd, Rockville, (Ongoing construction / address not available)	Residential	69	64-69	>69	54	No Impact
R38[2]	Kid Stop Child Development Ctr., 15910 Somerville Drive, Rockville	Daycare	69*	69-74*	>74*	51*	No Impact
H01	102 Midsummer Drive, Gaithersburg	Residential	67	63-67	>67	50	No Impact
H02	420 Upshire Circle, Gaithersburg	Residential	61	59-64	>64	51	No Impact
Y01	456 Exchange Ave, Gaithersburg	Residential	65	61-66	>66	48	No Impact

*Notes: *Peak hour leq (1hr) dBA (as per FTA category 3 land use criteria)*

1- FTA Impacts Threshold Levels refer to Figure 3-14.

2 - Because property access could not be obtained, day-night (Ldn) levels for sites R37 and R38 were estimated based on noise measurements collected at nearby noise measurement site R36.

Figure 3-10: Noise Impact Criteria for Transit Projects



Noise exposure from the Build Alternative at the vast majority of residential and other noise-sensitive properties along the study area corridor are expected to remain below the FTA impact threshold. Noise impacts identified from daily operations were limited to clusters of residential properties located adjacent to the southbound side of Great Seneca Highway from approximately High Cables Drive to Muddy Branch Road. These clusters of properties are identified as receptor sites R8, R9, and R10 (**Figure 3-11**), with Project noise exposure levels reaching the low-end range of the FTA Moderate impact category. Noise impacts at these sites largely occur because the Build Alternative encroaches closer to these residential areas.

Lastly, no impacts are expected at the nearest noise-sensitive properties from operations at the Metropolitan Grove O&M Facility. Noise levels generated from daily operations at the nearest noise-sensitive property are expected to be more than 10 dBA below ambient levels and therefore, are well below the FTA impact threshold.

Projected vibration levels throughout the CCT study area corridor are expected to remain below the FTA 72 velocity decibel (VdB) impact threshold. This outcome is not unusual because unlike rail transit systems where train wheels rolling on the rails create vibration energy that is transmitted un-damped through the track support system directly into the ground, buses are supported by rubber tires and suspension systems, which provide vibration isolation, ensuring little vibration is transmitted to the pavement. The highest projected vibration levels are expected to occur at residential receptor site R17 (Traville Garden Circle), where vibration levels are expected to reach a maximum level of 65 VdB. Though below the FTA 72 VdB impact threshold, vibration levels reach 65 VdB due to the relatively close proximity of the residences building along Traville Gateway Drive to the proposed CCT alignment. Refer to the *Noise and Vibration Technical Report* for more detailed information on vibration.

Short-term Effects

Noise from construction activities associated with the Build Alternative would result in short-term noise exposure at any given location throughout the study area corridor and would involve a wide range of activities, including clearing the right-of-way, construction of grade crossings, bridge construction, yard and maintenance facility construction, laying track, and construction of stations and other system elements.

Noise levels during construction are difficult to predict, and they vary depending on the duration of construction activity and the number and type of equipment used during each stage of work. More importantly, the distance between sensitive receptors and the construction activity and the duration of the construction would greatly affect the potential for noise impact. Some specialized construction work does have a greater potential to create noise impacts. This includes the following types of work:

- Pile driving;
- Heavy equipment use for the construction of retaining walls, underpasses, and overpasses; and
- Noise associated with other fixed location activities such as construction laydown areas and the location where excavated materials are brought to the surface.

Noise generated from construction activities associated with the Build Alternative will be short-term in duration and move from place to place as the construction activities progress along the alignment. The noise from these activities could cause annoyance primarily to the closest properties to the construction. In general, the existing noise levels are typically high at representative receptors which reflect the urban/commercial ambient noise environment. Therefore, construction noise would likely be masked in some cases by ambient noise conditions or remain below the FTA criteria thresholds for construction activities.

Construction of the proposed Build Alternative may cause an increase in ground vibrations that spread through the surrounding ground. While these vibrations tend to diminish over distance, depending upon the type of construction equipment and duration of the activity, nearby sensitive receptors could be affected. Human annoyance from construction is typically dependent upon the extent, distance, and duration of the vibration-generating activities. Construction-related vibration rarely causes structural damage to normal building structures. However, some building damage could occur when construction-related activities are near older, more fragile historic buildings. Construction activities that typically generate the most severe vibration include blasting and impact pile driving. For the proposed Project, no blasting is expected; however, pile driving may be utilized at various locations along the BRT Project corridor where bridges, retaining walls, and other structural challenges would require them. To mitigate these impacts, approved control measures will be considered during Final Design.

Mitigation

As shown in **Table 3-12**, the noise analysis findings indicate that no community would experience severe noise impacts from daily service operations. In general, most considerations for noise mitigation are generally limited to those areas that are projected to experience severe noise impacts. Nevertheless, two clusters of residential properties located along Great Seneca Highway from approximately High Cables Drive to Muddy Branch Road are projected to have a noise exposure in the moderate impact range. Moderate noise impacts are projected to occur at receptor sites R8, R9, and R10, as shown on **Figure 3-11**. To consider mitigation for these moderate impacts, FTA's guidance recommends noise mitigation pursuant to state noise policies. Therefore, for the CCT Project, a noise barrier analysis was completed in accordance with SHA's Highway Traffic Noise-Abatement Policy.

The SHA Traffic Noise-Abatement Policy establishes feasibility and reasonableness criteria requirements for abatement consideration. Engineering feasibility is defined as the ability to provide acoustically effective noise reduction without limiting a driver's visual line-of-site on the road or causing restrictions to driveway property access. Noise barrier cost-effectiveness is determined by calculating the square footage per benefited residence. A proposed noise barrier is considered cost-effective if the area of wall provided per benefited residence is equal to, or less than, 2,700 square feet. A maximum noise barrier height of eight feet would suffice to satisfy SHA criteria.

The noise impacted communities, as represented by receptor sites R8, R9, and R10, are depicted on **Figure 3-11**. The receptor sites consist of two individual clusters of Noise-Sensitive Areas (NSAs), which would benefit from two possible noise barriers as illustrated by the solid red line on **Figure 3-11** and identified as Noise Barriers 1 and 2. Due to daily BRT operations, noise-exposure levels at R8, R9, and R10 are projected to exceed anywhere from 2 to 3 dBA to the FTA moderate impact threshold.

A summary of each barrier's cost and acoustic effectiveness is provided in **Table 3-12**. A 10-foot-high noise barrier would reduce noise levels by 7 dBA at more than 50 percent of the benefiting ground-level residences behind each proposed noise barrier. In addition, for both proposed noise barriers, the square footage cost per benefiting residence is well below the 2,700-square-foot maximum. Therefore, both proposed noise walls would satisfy SHA feasibility and reasonableness requirement. Further, in response to community concerns, the MDOT MTA has committed to pursuing these noise barriers. Second-row residential properties, such as those represented at measurement Site H02 (refer to **Figure 3-11**), are not impacted and do not receive a 5-decibel noise reduction from the barrier because these properties are too far away from the wall to receive much benefit.

For the next step in pursuing these noise barriers, the MDOT MTA will evaluate benefited property owner viewpoints. In the event that MDOT MTA receives opposing viewpoints against a proposed noise barrier from at least 25 percent of benefited residents within a given NSA, a voting process will be required. The voting process will require that more than 50 percent of benefited residents within the NSA oppose the proposed sound barriers for the abatement to be deemed not reasonable. If the voting process results in benefited residences supporting the noise barriers, the MDOT MTA is committed to constructing the noise barriers as mitigation for the CCT Project.

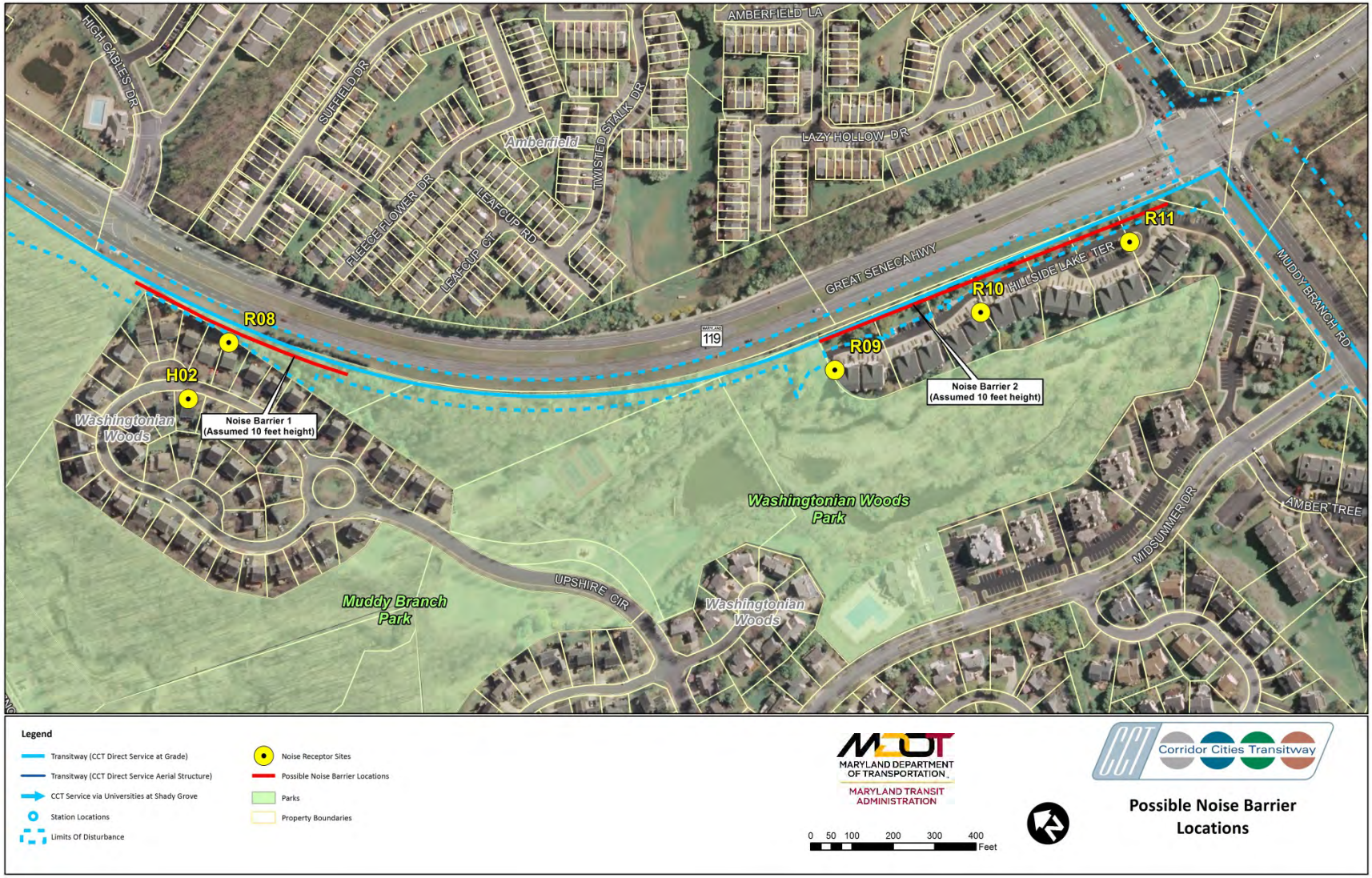
Table 3-12: Noise Barrier Analysis Findings at Impacted Noise-Sensitive Areas

Barrier ID [1]	Nearest Monitoring Receptor Location	Noise Reduction Achieved [2] (dBA)	Barrier Length (Ft)	Barrier Height (Ft)	Number of Benefiting Residences [3]	Estimated Square Footage per Benefited Residence (Ft^2)	Barrier Effectiveness		MSHA Criteria Satisfied (Yes/No)
							Acoustic [4] (Yes/No)	Cost [5] (Yes/No)	
SB01	R8	7	600	10	9	533	Yes	Yes	Yes
SB02	R9 & R10	7	1,000	10	14	571	Yes	Yes	Yes

Notes:

1. *Noise barriers to be located at Project right-of-way line.*
2. *Noise reduction is maximum value at the most protected property.*
3. *Determined based on the total number of impacted and non-impacted sites that achieve a 5 dBA or greater noise reduction.*
4. *Acoustic effectiveness of a barrier system was determined by establishing if 50 percent of the impacted residences in a defined NSA achieve a 7 dBA or greater noise reduction.*
5. *Cost effectiveness of a barrier system was determined based on a maximum square footage of 2,700 square feet per benefiting residence.*

Figure 3-11: Proposed Noise Barrier Locations



Short-term Noise Mitigation

As part of the CCT Project specification documents, MDOT MTA will establish performance standards for construction equipment to reduce noise associated with the construction activities. MDOT MTA is committed to managing construction activities in accordance with its own noise emission performance standards, which would include, but not necessarily be limited to, the following:

- Conduct construction activities during the daytime whenever possible.
- Conduct truck loading, unloading, and hauling operations in a manner that minimizes noise.
- Route construction equipment and other vehicles carrying spoil, concrete, or other materials over routes that would cause the least disturbance to residents in the vicinity of the activity.
- Locate site stationary equipment away from residential areas to the extent reasonably feasible within the site/staging area.
- Employ the best available control technologies to limit excessive noise when working near residences.
- Adequately notify the public in advance of construction operations and schedules including methods such as construction-alert publications and a Noise Complaint Hotline to handle complaints quickly.

Vibration Mitigation

Estimated vibration levels from Project operations along the proposed study area corridor were projected to be below the FTA 72 VdB impact threshold throughout the study area corridor; therefore, no vibration mitigation measures are necessary.

3.19 Air Quality

3.19.1 Introduction and Methodology

The CAA Amendments of 1990 and the Final Transportation Conformity Rule [40 CFR Parts 51 and 93] direct the EPA to implement environmental policies and regulations that would ensure acceptable levels of air quality. As required by the CAA, NAAQS have been established for six major criteria air pollutants: CO, nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2) and lead (Pb). In addition to the criteria pollutants for which there are NAAQS, the EPA also regulates air toxics.

Section 107 of the 1977 CAA Amendment requires that the EPA publish a list of all geographic areas in compliance with the NAAQS, plus those not attaining the NAAQS. Areas not in NAAQS compliance are deemed non-attainment areas. Areas that have insufficient data to make a determination are deemed unclassified and are treated as being attainment areas until proven otherwise. Refer to the *Air Quality Technical Report* (**Appendix F**) for more information.

3.19.2 Existing Conditions

The Project study corridor is in Montgomery County, Maryland. **Table 3-13** shows the attainment status for Montgomery County. As shown in the table, Montgomery County is classified as a

nonattainment area (NAA) for O_3 and a maintenance area for annual $PM_{2.5}$. The portion of Montgomery County in which the Project is located is classified as a maintenance area for CO. The county is in attainment for all other pollutants.

Table 3-13: Project Area Attainment Status

Pollutant	Montgomery County
Ozone (O_3)	Nonattainment
Nitrogen Dioxide (NO_2)	Attainment
Carbon Monoxide (CO)	Attainment-Maintenance
Particulate Matter (PM_{10})	Attainment
Particulate Matter ($PM_{2.5}$) Annual / 24-Hour	Maintenance / Attainment
Lead (Pb)	Attainment

Source: EPA Green Book; http://www3.epa.gov/airquality/greenbook/

The CAA requires that a state implementation plan (SIP) be prepared for each nonattainment area and a maintenance plan be prepared for each former nonattainment area that subsequently demonstrated compliance with the standards. A SIP is a compilation of a state's air quality control plans and rules that are approved by EPA. Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP. The state and U.S. EPA's goals are to eliminate or reduce the severity and number of violations of the NAAQS and to achieve expeditious attainment of these standards.

Montgomery County is part of the MWCOG, a regional organization of Washington area local governments. MWCOG is composed of 20 local governments surrounding the nation's capital, plus area members of the Maryland and Virginia legislatures, the US Senate, and the US House of Representatives. Among other responsibilities, the MWCOG provides daily reports and forecasts of regional air quality. Through the MWCOG, the Metropolitan Washington Air Quality Committee (MWAQC) prepares the air quality plan for the District of Columbia, Maryland, and Virginia metropolitan areas as regulated under Section 174 of the CAA. The Transportation Planning Board (TPB), housed within the MWCOG, is the organization that brings together key decision-makers to coordinate planning and funding for the region's transportation system. TPB members (staffed by the MWCOG) include local officials, representatives of state transportation agencies, the WMATA, state legislators, and others. The TPB is designated as a Metropolitan Planning Organization and is therefore responsible for meeting federal metropolitan planning requirements for transportation.

The TPB produces two basic documents. The first is the *Financially Constrained Long-Range Transportation Plan* (CLRP) which includes all major transportation projects and programs that are planned in the Washington region over the next 25 years. The second document, the *Transportation Improvement Plan* (TIP), lists projects and programs that will be funded in the next six years. The TIP serves as the basis for the regional mobile source air quality analysis, which

utilizes vehicle miles traveled (VMT) and emissions factors to determine emissions estimates for the entire transportation system. The analysis results, presented under the Transportation Conformity Rule, demonstrate that the CLRP and the TIP are consistent with the goals of the *State Implementation Plan* (SIP). The SIP includes a list of measures to reduce pollution in order for the area to become attainment by a designated date.

The CCT Project is listed in the 2014 CLRP, which was approved on October 15, 2014. The CCT Project is also listed in the Washington Metropolitan Region's FY 2015-2020 TIP (approved on October 15, 2014), where it is identified as TIP ID # 3468.

This Project comes from a conforming transportation plan and TIP that conforms with the SIP's purpose. MWAQC and TPB developed an Air Quality Conformity Report (MWCOG, *Air Quality Conformity Analysis of the 2014 Constrained Long Range Plan and FY 2015-2020 Transportation Improvement Program,* 2014*)*, which contains emissions ceilings (called "mobile emissions budgets") to which the TIP must conform. The analysis of the FY 2015-2020 TIP and the 2014 CLRP, which both include the Project, was approved by the TPB on October 15, 2014. The analysis in the Air Quality Conformity Report demonstrates that mobile source emissions estimated for the TIP and for each analysis year of the long-range plan adhere to all CO, ozone season VOC, NO, and fine particle ($PM_{2.5}$) pollutant (direct 2.5 and precursor nitrogen oxide) emission budgets established by the MWAQC, which are either approved or under review by the EPA. These results provide a basis for a determination of conformity of the 2014 CLRP and the FY 2015-2020 TIP (MWCOG, *Air Quality Conformity Analysis of the 2014 Constrained Long Range Plan and FY 2015-2020 Transportation Improvement Program,* 2014*).*

3.19.3 Future No-Build Conditions

The No-Build Alternative would not result in a reduction in VMT; therefore, improvements to air quality are not anticipated. More detail on the No-Build condition is included in the *Air Quality Analysis Technical Report* (2014). Refer to **Appendix F**.

3.19.4 Build Alternative

Long-term Effects

Regional Analysis

A regional analysis was performed for the Project using the latest version of the EPA's Motor Vehicle Emission Simulator (MOVES) emissions program, MOVES2014. MOVES2014 incorporates project-generated VMT as well as specific MOVES input factors, such as inspection and maintenance programs, fleet mix, and speed profiles, for the traffic network being analyzed. MOVES input factors were obtained from the MWCOG for Montgomery County.

The emission burden analysis of a project determines the annual "pollutant burden" levels for each of the project alternatives, as well as the No-Build Alternative, in order to provide a basis of comparison for regional emissions of each of the criteria pollutants under the Build Alternative. The 2035 VMT and emission burdens (in metric tons) for the No-Build and Build Alternative are presented in **Table 3-14**.

Table 3-14: 2035 Daily Regional Emission Burden Assessment (Metric Tons)

Alternative	VMT	Hydrocarbons (HC)	Nitrogen Oxides (NOx)	Carbon Monoxide (CO)	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
No-Build	192,751,638	1.88	24.01	143.65	16.12	2.70
Build	192,621,562	1.88	24.00	143.48	16.09	2.69
% Change from No-Build	-0.07%	-0.11%	-0.06%	-0.11%	-0.20%	-0.17%

Source: Air Quality Technical Report, October 2015

As shown in the table, the Build Alternative is predicted to decrease all regional pollutants by approximately 0.1 percent to 0.2 percent, which will contribute to MWCOG's goals of reducing greenhouse gases in their jurisdictions in Maryland; Washington, DC; and northern Virginia.

Mobile Source Air Toxins Analysis

The Build Alternative has a low potential for MSAT effects. The amount of MSATs emitted would be proportional to the VMT, assuming the vehicle mix does not change. The Project would utilize diesel-electric hybrid buses, which emit fewer pollutants than diesel buses. Under the Build Alternative emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great that MSAT emissions in the study area corridor are likely to be lower in the future.

Microscale CO Analysis

A screening evaluation was performed on the 79 intersections identified in the study area corridor as the most congested and most affected by the Build Alternative. Out of the 79 intersections, the following three intersections were chosen for detailed analysis due to poor LOS, high volumes, proximity to sensitive receptors, and geographical representation:

- **#40 - Great Seneca Highway and Medical Center Road** - goes from un-signalized to signalized from No-Build to Build conditions, along with a change from LOS A to LOS F from No-Build to Build in AM conditions; has the highest delay under Build AM conditions; is located adjacent to a school and hospital.
- **#67 - Great Seneca Highway and Muddy Branch Road** - has the 2nd highest volume under Build PM conditions; is LOS F under Build AM and PM conditions; is located adjacent to homes.
- **#78 - Quince Orchard Road and Clopper Road** - has high volumes under Build AM and PM conditions; is LOS E and F under Build AM and PM conditions, respectively; is located adjacent to homes.

Maximum one-hour and eight-hour CO levels were predicted for the existing year (2013) and design year (2035) at the three intersections selected for analysis. Based on these levels, the Build Alternative is predicted to have no change on CO levels in 2035, when compared to the No-Build Alternative. No violations of the NAAQS are predicted for any of the future analysis years. The Build Alternative is not predicted to cause or exacerbate a violation of the NAAQS for CO.

$PM_{2.5}$ Analysis

The Project is located in Montgomery County, Maryland, which has been classified as a maintenance area for the annual standard for $PM_{2.5}$. The EPA issued its final area designations for the 2012 annual national air quality standard for fine particulate matter ($PM_{2.5}$) and its initial assessments of the attainment status of states and counties in December, 2014. Montgomery County, MD is designated as a Moderate NAA for the 1997 annual $PM_{2.5}$ NAAQS (15 µg/m3) and unclassifiable/attainment for the 2012 annual $PM_{2.5}$ NAAQS (12 µg/m3). Even though EPA promulgated a clean data determination for the counties in the Washington DC-MD-VA NAA in 1997, the area still has state implementation plan obligations under the 1997 standard and has not been redesignated to attainment. Coordination with MWCOG, EPA, FHWA, FTA, and MDE has occurred regarding whether the CCT Project is one of air quality concern. Through this coordination, the Project was not classified as a "Project of Air Quality Concern," and that a quantitative $PM_{2.5}$ hot spot analysis would not be required.

Greenhouse Gas Analysis

The Build Alternative would decrease regional roadway emissions of carbon dioxide equivalents (CO_2e) by approximately 0.1 percent, as compared to the No-Build Alternative. On a global scale, the regional reduction in roadway emissions of CO_2 associated with the Build Alternative is not considered significant.

Short-term Effects

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

Since CO emissions from motor vehicles generally increase with decreasing vehicle speed, disruption of traffic during construction (such as a temporary reduction of roadway capacity and increased queue lengths) could result in short-term, elevated concentrations of CO.

Mitigation

To minimize the amount of construction dust generated, the mitigation measures include:

- Site Preparation:
  - Use watering trucks to minimize dust
  - Cover trucks when hauling dirt
  - Stabilize the surface of dirt piles if they are not removed immediately
  - Use windbreaks to prevent accidental dust pollution

  - Limit vehicular paths and stabilize temporary roads
  - Pave all unpaved construction roads and parking areas to road-grade for a length no less than 50 feet from where such roads and parking areas exit the construction site to prevent dirt from washing onto paved roadways
- Construction:
  - Cover trucks when transferring materials
  - Use dust suppressants on unpaved traveled paths
  - Minimize unnecessary vehicular and machinery activities
  - Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.
- Post-Construction:
  - Re-vegetate any disturbed land not used
  - Remove unused material
  - Remove dirt piles
  - Re-vegetate all vehicular paths created during construction to avoid future off-road vehicular activities

3.20 Energy

3.20.1 Introduction and Methodology

Under the CEQ regulations for implementing NEPA, consideration of energy efficiency is specifically required. Under Section 1502.16(e) regarding the requirements for analyzing and documenting environmental consequences, agencies are required to discuss "energy requirements and conservation potential of various alternatives and mitigation measures." Section 1502.16(f) requires agencies to consider the "natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures." Energy, in terms of a transportation project, could be: transportation energy, operation energy, or construction energy.

- **Transportation energy** is the energy required to move people and goods from place to place, and is generally discussed in terms of operational and construction energy consumption.
- **Operational energy** consumption, also known as “direct” energy, involves all energy consumed by vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix, and the heat value of the fuel being used. Operational energy consumption also includes the fuel required to operate the BRT system and energy to maintain the associated transportation facilities, such as lighting and ventilation systems, stations, and maintenance facilities.

- **Construction energy** consumption, also known as "indirect" energy, involves the non-recoverable, one-time energy expenditure involved in constructing the physical infrastructure associated with a project.

Energy is commonly measured in terms of British thermal units, or Btu. A Btu is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. MMBtu stands for one million Btu. For transportation projects, energy usage is predominantly influenced by the amount of fuel used. The average Btu content of fuels is the heat value (or energy content) per quantity of fuel, as determined from tests of fuel samples.

This analysis considers the CCT Project's direct, or operational, energy impacts, which are a result of changes in regional traffic between the No-Build and Build Alternatives. Direct energy was estimated by obtaining energy usage rates from EPA's MOVES2014 model, using inputs provided by MWCOG. Refer to the *Energy Technical Memorandum* (**Appendix F**) for more information.

3.20.2 Existing Conditions

Transportation is the second largest source of energy consumption in the United States (28 percent in 2013), second only to the industrial sector (32 percent in 2013). In Maryland, the transportation sector is the largest source of energy consumption totaling approximately 431 trillion Btu in 2013. On a per capita basis, Maryland's transportation energy consumption is 73.8 million Btus, which is below the United States per capita average of 85.1 million Btus (US Energy Information Administration, 2012). Petroleum (e.g., gasoline, diesel fuel, jet fuel) was the predominant source of transportation energy consumption in Maryland in 2011, at 98 percent. Natural gas and electric vehicles accounted for the remaining 2 percent of transportation energy consumption.

Maryland currently relies on imported energy for most of its energy needs, as the state lacks indigenous fossil fuel resources. All petroleum and natural gas products are transported to Maryland via pipeline or through other entry points, such as the Port of Baltimore or Maryland's liquefied natural gas facility, Cove Point, on the Chesapeake Bay's western shore.

3.20.3 Future No-Build Conditions

Under the No-Build Alternative, travelers in the area would continue to rely on existing roadways, bus service, and rail stations as they are currently configured with no substantial changes. **Table 3-15** presents the direct energy use of the roadway network for the No-Build. The direct energy was estimated by obtaining energy usage rates from EPA's MOVES2010b model, using inputs provided by MWCOG.

Table 3-15: Daily Direct Energy Use of the Regional Roadway Network – No-Build (MMBtu)

Alternative	Vehicle Miles Traveled	Energy (MMBtu)
No-Build	192,751,638	970,730

Source: CCT Energy Analysis Memorandum, 2015

3.20.4 Build Alternative

Transportation energy is generally discussed in terms of direct and indirect energy. Direct energy involves all energy consumed by vehicles. This energy is a function of traffic characteristics such as volume, speed, distance, vehicle mix, and thermal value of fuel type used. Indirect energy consumption involves the non-recoverable, one-time energy expenditure involved in construction of the project infrastructure. Accurate indirect energy costs are difficult to estimate given the uncertainty of field variables at this point in the analysis. As such, indirect energy is qualitatively discussed under *Short-term Effects*.

Long-term Effects

The long-term impacts of the Build Alternative are associated with the direct, or operational, energy impacts, which are a result of changes in regional traffic between the No-Build and Build Alternatives. **Table 3-16** provides a comparison of the direct energy use of the roadway network for the No-Build and Build Alternatives in 2035. As shown in the table, the Build Alternative is predicted to reduce regional energy use by 0.13 percent, as compared to the No-Build Alternative. As a hybrid vehicle BRT system, the Build Alternative is consistent with Maryland's policies to reduce transportation energy demand.

Table 3-16: Daily Direct Energy Use of the Regional Roadway Network – No-Build and Build (MMBtu)

Alternative	Vehicle Miles Traveled	Energy (MMBtu)
No-Build	192,751,638	970,730
Build	192,621,562	969,472
Percentage Change from No-Build	*-0.07%*	*-0.13%*

Source: CCT Energy Analysis Memorandum, 2015

Short-term Effects

The short-term impacts of the Project are associated with the non-recoverable, one-time energy expenditure involved in constructing the physical infrastructure associated with the Build Alternative. These short-term impacts include increased fuel usage for construction equipment and worker and material delivery trips.

Mitigation

Conservation of energy could be achieved by use of newer and more fuel-efficient construction equipment, and recycling of pavement and other hardware items. No mitigation is specified for the Project, as the long-term impacts to energy consumption would be beneficial.

3.21 Hazardous Materials

3.21.1 Introduction and Methodology

A Phase I Environmental Site Assessment (ESA) was conducted for the CCT Project to identify RECs related to sites that are within the study area corridor. The Phase I ESA was done in accordance with the methodology developed by the American Society for Testing and Materials, E 1527-13 standard.

The evaluation of current site conditions, with respect to potential impacts to soil or groundwater from petroleum products or other hazardous substances, consisted of a review of federal and state databases and records, a reconnaissance of potential sites of concern for visible environmental issues, and interviews with site personnel. Refer to the *Hazardous Materials ESA Phase 1 Technical Report* (**Appendix F**) for more information.

3.21.2 Existing Conditions

The review of federal and state environmental databases and records, obtained from Environmental Data Resources, Inc., included all potential sites of concern, and identified 72 sites as having a historical association with petroleum or other hazardous substances that may impact construction of the proposed alignment. A non-intrusive site reconnaissance was performed for each of the 72 sites to confirm locations and evaluate existing conditions. Sites with evidence of potential contamination risks were identified based on the results of database review and site reconnaissance. The sites were classified as constituting a slight, moderate, or high risk for contamination issues that may impact the proposed alignment. These factors were then used to classify the sites as a slight, moderate, or high risk for contamination.

What is a Recognized Environmental Condition (REC)?

A REC is defined as the presence, or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or material threat of a release of any hazardous substance or petroleum products into structures along the study area corridor or into the ground, groundwater, or surface water of the study area corridor.

Of the 72 sites visited during the site reconnaissance, a total of 34 sites were classified as having a slight risk for contamination issues, 23 sites were classified as having a moderate risk, and 15 sites were classified as having a high risk. **Table 3-17** summarizes the RECs by classification for the 72 sites identified during reconnaissance. The values identify the number of sites that contained at least one REC out of the total sites for each classification (34 slight risk, 23 moderate risk, and 15 high risk sites). For example, of the 34 sites identified as having a slight risk for environmental concern, 15 of those sites had at least one above ground storage tank (AST) identified within it.

Table 3-17: Summary of Sites by Contamination Classification and Source

Classification	Source of Contamination								
	ASTs[1]	Chemical Storage	Drum Storage	Dry Cleaners	Dumping Sites	Gas Stations	Oil/ Water Separators	Pad-Mounted Transformers	USTs[2]
Slight – (of the 34 sites)	15	6	6	4	0	0	2	24	1
Moderate – (of the 23 sites)	9	1	6	1	3	2	4	14	4
High – (of the 15 sites)	4	3	5	0	2	4	2	7	4
Total by Source	**28**	**10**	**17**	**5**	**5**	**6**	**8**	**45**	**9**

Notes: [1] Aboveground Storage Tank (AST); [2] Underground Storage Tank (UST)

3.21.3 Future No-Build Conditions

The No-Build Alternative would not result in any property acquisitions or Project-related construction; therefore, no effects to hazardous materials are anticipated.

3.21.4 Build Alternative

Long-term Effects

Based on the results of the Phase I ESA, sampling and data collection activities are recommended at the sites that would be fully or partially acquired and in areas adjacent to high or moderate risk sites where substantial regrading or excavation activity may occur. Higher contaminant concentrations are anticipated in areas that require deeper excavation or dewatering. However, the majority of the proposed transitway construction would be at-grade, with excavations extending no deeper than existing pavement sections. Therefore, substantial contact with soil contaminants or hazardous materials is not anticipated and the majority of the potential contamination (based on the location of the RECs) would be encountered outside of the LOD.

The proposed O&M Facility site had minor detections of arsenic above MDE non-residential cleanup standards, but their magnitude was within anticipated background concentration levels for Maryland. There were some other minor contaminant detections, but based on the available data there were no large-scale contaminant releases on the site.

A Phase II ESA was conducted to evaluate and delineate potential subsurface contaminant risks that could impact construction of the CCT alignment. For the Phase II ESA, the geotechnical boring locations were screened and/or sampled in the vicinity of high or medium priority properties identified in the Phase I ESA or in areas where a larger amount of excavation activity is anticipated, which may occur at station locations.

The majority of the proposed construction is anticipated to occur at-grade or in the shallow subsurface, with excavations extending no deeper than existing pavement sections. Therefore, substantial contact with soil contaminants or hazardous materials is not anticipated. For deeper

excavations, such as utility relocations, storm water management structures, building construction, regrading or tunneling, soil and groundwater contamination could be encountered in the moderate and high risk areas noted in the Phase I ESA (MDOT MTA 2014)

The Phase II ESA subsurface investigation found no indication of the presence of total petroleum hydrocarbons (TPH) and gasoline-range organics, TPH diesel range organics, VOCs, semi-volatile organic compounds, PCBs, or pesticides within the limits of disturbance of the proposed CCT alignment. Due to the nature of contaminant fate and transport, residual soil contaminants may, however, be present in localized hot spots along portions of the study area corridor.

Chromium and arsenic concentrations above the MDE non-residential clean-up standard were identified within the study area corridor. Based on recent EPA findings (EPA, 2015), the arsenic concentrations are likely associated with naturally occurring background concentrations in an urban environment.

The single chromium exceedance may be indicative of a localized deposit in the vicinity of the proposed LSC West station. Based on this finding, soils excavated in this area should be monitored for potential chromium impacts and precautions implemented to minimize worker contact with soils in this area.

Short-term Effects

The potential exists for unidentified petroleum or hazardous chemical spills to impact construction activities; therefore, a materials handling plan would be implemented prior to field mobilization should contamination be found within the construction zone.

Mitigation

Mitigation measures would be incorporated throughout the Project to limit the effect from hazardous materials. Measures should be in place to minimize potential exposure and risk to human health, safety, and the environment, such as:

- Design and implementation of a screening and monitoring program for the identification and segregation of impacted materials using a photo ionization detector, visual and/or olfactory evidence, as needed. Impacted materials may require additional testing and/or immediate off-site disposal. The monitoring program should include applicable containment measures for preventing distribution of potentially impacted soils.
- Creation of an impacted materials handling plan for the excavation, segregation, transportation and disposal of potentially contaminated soils. The plan should include health and safety requirements, including personal protective equipment, dust control, and safety requirements for workers who may be exposed to metals-impacted soils. Excavated and/or displaced materials are subject to regulatory requirements for appropriate management and disposal.

3.22 Utilities

Location of existing utilities has been determined in accordance with the American Society of Civil Engineers (ASCE), ASCE-38-02, Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data, commonly referred to as ASCE SUE (Subsurface Utility

Engineering). Public utilities are located throughout the study area corridor. The utilities include both above- and below-grade power lines, gas mains, communication lines, water mains, and sewer mains.

The No-Build Alternative would not result in any property acquisitions or Project-related construction; therefore, no effects to utilities are anticipated. Long-term impacts associated with the Build Alternative to utilities would include relocation or protection such as encasing utilities in concrete or steel sleeves. Possible short-term impacts to utilities could include short-term shut downs, temporary connections, and moving overhead wires to provide adequate clearance for construction equipment.

Outages may be required to complete connections of relocated utilities to existing utilities. These outages would require advance notice to, and coordination with, the utility owner in order to minimize potential effects to customers. Outages would be scheduled to occur during non-peak periods in order to minimize potential effects to the utility owners and customers. Proper planning and implementation of mitigation techniques would be essential to address and limit the utility effects associated with the Build Alternative. Utility disruptions have the potential to affect residents and commercial businesses throughout the Project study area corridor and beyond.

MDOT MTA has coordinated with and would continue to work with the utility companies to identify existing services that could be impacted by the CCT and to develop ways to mitigate these potential impacts.

3.23 Traffic and Transportation Network

3.23.1 Introduction and Methodology

Traffic analysis was used to provide information about future traffic conditions for decisions relative to design modifications and operational elements. Two methodologies were used for traffic analysis: Critical Lane Volume (CLV) Analysis and VISSIM micro-simulation modeling. The network of roadways included in the analysis consists of all intersections along the study area corridor as well as other adjacent intersections along the corridor that could affect or be affected by CCT operations. Specific parameters were used to compare traffic conditions for general motorists in the year 2010 Existing Conditions, with the Build Year 2035 No-Build Conditions and the Build Year 2035 Build Alternative. These factors include, but are not limited to, LOS, queue lengths, and vehicular delay. Further, travel times of the CCT bus generated by the VISSIM models were also used to compare alternatives.

3.23.2 Existing Conditions

VISSIM analysis was used to model existing conditions for the year 2010 and the traffic signals were updated for the year 2015. Data from 2015 for some of the key project corridors were obtained from the SHA's Internet Traffic Monitoring System. This data was reviewed against the 2010 existing conditions data to determine the applicability of these traffic volumes. This review determined that the 2010 volumes used with the corrective growth factors that were derived

from MWCOG data, have provided a reasonable baseline of existing conditions to predict traffic conditions in both the build and no-build VISSIM models.

Table 3-18 includes a summary of the Existing Conditions LOS analysis for all intersections along the study area corridor for both the AM and PM peak periods. Queue lengths and vehicular delays were also determined by the models but are not presented below.

What is Level of Service (LOS)?

LOS is defined by the Highway Capacity Manual (HCM), 2000 edition, as a metric to provide a quantitative measure to characterize operational conditions within a traffic stream. Generally, it is used to evaluate such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. For signalized intersections, LOS is directly related to the average control delay per vehicle in seconds for the entire intersection.

Table 3-18: Existing Conditions LOS Results

Intersection	AM LOS	PM LOS
Quince Orchard Rd (MD 124) at Firstfield Rd	B	E
Quince Orchard Rd (MD 124) at Bank St and North Dr	A	C
Quince Orchard Rd (MD 124) at Sound Rd	A	B
Quince Orchard Rd (MD 124) at Quince Orchard Blvd	B	C
Quince Orchard Rd (MD 124) at Twin Lakes Dr	B	A
Quince Orchard Rd (MD 124) at Orchard Ridge Dr and Sioux Ln	B	B
Great Seneca Hwy (MD 119) at Kentlands Blvd and Orchard Ridge Dr	C	C
Great Seneca Hwy (MD 119) at Lakelands Dr	C	B
Great Seneca Hwy (MD 119) at Muddy Branch Rd	E	C
Muddy Branch Rd at Mission Dr and Midsummer Dr	F	E
Muddy Branch Rd at Midsummer Dr (South)	B	A
Key West Ave (MD 28) at Johns Hopkins Dr	D	A
Great Seneca Hwy at Medical Center Dr	A	A
Medical Center Dr at Broschart Rd	A	A
Broschart Rd at Medical Center Way	A	A
Broschart Rd at Hospital Entrance	A	A
Broschart Rd at Blackwell Rd	A	A
Broschart Rd at Johns Hopkins Entrance	A	A
Key West Ave (MD 28) at Broschart Rd and Diamondback Dr	D	C
Diamondback Dr at Decoverly Dr	A	A
Fields Rd at Washingtonian Blvd	A	A
Fields Rd at I-270 Off-Ramp	A	A
King Farm Blvd at Sheraton Entrance	A	A
King Farm Blvd at Piccard Dr	A	C
King Farm Blvd at Entrance to Ingleside - East	A	A
King Farm Blvd at Gaither Rd	A	B
King Farm Blvd at Reserve Champion Dr	A	A
King Farm Blvd at Pleasant Dr	A	A
King Farm Blvd at Grand Champion Dr	A	A
King Farm Blvd at N Frederick Rd (MD 355)	E	C
Great Seneca Hwy at Darnestown Rd	A	B
Darnestown Rd at Traville Gateway Dr	A	A
Shady Grove Rd at Traville Gateway Dr	A	A

3.23.3 Future No-Build Conditions

The future No-Build conditions reflect a large increase in development and traffic volumes (based on the MWCOG growth factors and improvements identified in the CLRP) which leads to diminished traffic operations and more congestion in an already heavily congested area. The No-Build VISSIM models used for analysis were created by updating the Existing Conditions models to include projected future traffic volumes for both the Opening Year of 2020 and the Build Year of 2035, as well as new traffic signals associated with expected development, such as in the areas of Crown Farm and the PSTA redevelopment. New signals were only assumed for intersections affected by certain development and were not included in the model solely based off the projected traffic growth, thus, for most existing intersections, the No-Build models maintained intersection controls from the existing models. These models were then used for the analysis of the No-Build conditions. **Table 3-16** includes a summary of the Build Year 2035 No-Build conditions LOS analysis for all intersections along the study area corridor for both the AM and PM peak periods, and a comparison to the results for the Build Year 2035 Build Alternative.

In the No-Build Conditions, there is projected to be an adverse effect to LOS at seven intersections in the AM peak hour and twelve intersections in the PM peak hour when compared to existing conditions. These changes in LOS are expected, due to the increase in traffic volumes between the year 2010 and the year 2035.

3.23.4 Build Alternative

Under the Build Alternative, design modifications to the existing roadway network would be necessary for both traffic operations and safety. Design modifications would include new traffic signals, median closures, entrance closures, extended turn bays, new turn lanes, and changes in signal phasing operations.

The Build Alternative VISSIM models that were developed for analysis reflect the 30 percent design plans, including the transitway and all necessary design modifications. These models reflect similar traffic volumes as those used in the future No-Build conditions models, with the exception of re-routed traffic due to median and entrance closures. The Build Alternative models do not take into account any reduction in motorists as a direct result from the construction of the Build Alternative.

Table 3-19 includes a summary of the LOS analysis for the intersections analyzed in the AM and PM peak periods for the Build Year 2035 Build Alternative in comparison to Build Year 2035 No-Build Conditions.

Table 3-19: Future 2035 No-Build and Build LOS Results

Intersection	No-Build AM LOS	Build AM LOS	No-Build PM LOS	Build PM LOS
Quince Orchard Rd (MD 124) at Firstfield Rd	E	E	F	E
Quince Orchard Rd (MD 124) at Bank St and North Dr	A	F	F	E
Quince Orchard Rd (MD 124) at Sound Rd	A	E	F	C
Quince Orchard Rd (MD 124) at Quince Orchard Blvd	B	E	F	D
Quince Orchard Rd (MD 124) at Twin Lakes Dr	A	C	F	F

Intersection	No-Build AM LOS	Build AM LOS	No-Build PM LOS	Build PM LOS
Quince Orchard Rd (MD 124) at Orchard Ridge Dr and Sioux Ln	C	C	E	E
Great Seneca Hwy (MD 119) at Kentlands Blvd and Orchard Ridge Dr	E	F	F	D
Great Seneca Hwy (MD 119) at Lakelands Dr	D	F	F	C
Great Seneca Hwy (MD 119) at Muddy Branch Rd	F	F	F	F
Muddy Branch Rd at Mission Dr and Midsummer Dr	A	A	E	C
Muddy Branch Rd at Midsummer Dr (South)	C	D	E	D
Key West Ave (MD 28) at Johns Hopkins Dr	D	C	C	D
Great Seneca Hwy at Medical Center Dr	A	F	F	C
Medical Center Dr at Broschart Rd	A	B	F	B
Broschart Rd at Medical Center Way	A	A	C	A
Broschart Rd at Hospital Entrance	A	A	A	A
Broschart Rd at Blackwell Rd	A	B	A	B
Broschart Rd at Johns Hopkins Entrance	A	A	A	A
Key West Ave (MD 28) at Broschart Rd and Diamondback Dr	E	B	F	B
Diamondback Dr at Decoverly Dr	A	C	C	C
Decoverly Dr at Crown Park Ave	A	B	A	B
Decoverly Dr at Fields Rd	A	B	A	B
Fields Rd at Washingtonian Blvd	A	B	B	B
Fields Rd at I-270 Off Ramp	F	D	C	B
King Farm Blvd at Sheraton Entrance	A	A	A	A
King Farm Blvd at Piccard Dr	A	C	A	C
King Farm Blvd at Entrance to Ingleside – East	A	B	A	B
King Farm Blvd at Gaither Rd	C	C	F	D
King Farm Blvd at Reserve Champion Dr	A	B	A	A
King Farm Blvd at Pleasant Dr	A	C	A	B
King Farm Blvd at Grand Champion Dr	A	C	A	C
King Farm Blvd at N Frederick Rd (MD 355)	D	D	B	C
Great Seneca Hwy at Darnestown Rd	C	**E**	F	E
Darnestown Rd at Traville Gateway Dr	A	A	F	F
Shady Grove Rd at Traville Gateway Dr	A	C	F	A

In the Build Alternative, there is projected to be an effect to the LOS at 24 intersections in the AM peak hour and at 25 intersections in the PM peak hour, as compared to the No-Build conditions. These impacts are mainly associated with the addition of new signals and the modification of existing signals.

While the addition of a new traffic signal at an existing intersection would lead to higher delays and a decline in LOS for vehicular traffic at some intersections, new signals are necessary for the safety of vehicles, pedestrians, and bicycles crossing the transitway, particularly for side street traffic and turning movements on the mainline. In additional to the safety benefits, at some other intersections, the addition of a new traffic signal will improve operations because the projected traffic volumes in the year 2035 meet the volume thresholds identified by the Maryland Manual on Uniform Traffic Control Devices (MDMUTCD) to warrant a signal. Note that these particular signals, which were warranted on projected volumes, were proposed in the Build Alternative

models but may not have been included in the No-Build models. This also serves as a reason for the difference in LOS observed between the Build and No-Build models. Similarly, a modification to the existing signal in order to allow safe bus operations, such as restricting right turn on red movements or providing a new signalized pedestrian crossing, may also have an adverse effect to the LOS at an intersection.

Long-term Effects

In the Build Year 2035 Build Alternative, several design elements would impact existing traffic conditions. Design modifications would include new traffic signals, changes in signal phasing operations, median and entrance closures, new pedestrian and bicycle signalized crossings, extended turn bays, new turn lanes, improvements to existing signing and lighting, and/or the introduction of transit signal priority.

The CCT Project would maintain an existing signal and/or propose a new signal at all intersections that would cross the alignment. Some minor driveways along the transitway would not require a new signal, but may operate with dynamic signing and/or stop signs. CCT vehicles would operate exclusively in the dedicated transitway (except along Muddy Branch Road, Darnestown Road, and the USG route where it will travel in the roadway with general motorists) and would receive a green signal when adjacent motorists have a green signal and/or when other non-conflicting movements at the intersection have a green signal.

The following 12 intersections would require new signals under the Build Alternative:

- Key West Ave (MD 28) at Johns Hopkins Drive
- PTSA at East
- Medical Center Drive at Great Seneca Highway (MD 119)
- Medical Center Drive at Broschart Road
- Broschart Road at Blackwell Rd
- Diamondback Road at Decoverly Drive
- Decoverly Drive at Crown Park Drive
- Fields Road at I-270 Off Ramp and Omega Drive
- King Farm Boulevard at Piccard Drive
- King Farm Boulevard at Ingleside East Entrance
- King Farm Boulevard at Reserve Champion Drive
- King Farm Boulevard at Grand Champion Drive

Signals are categorized as new, major modification or minor modification. A major modified signal is assumed where an existing signal needs 50 percent or more of reconstruction. A minor modified signal is assumed where an existing signal needs less than 50 percent of reconstruction. Signal reconstruction includes: modifications to underground infrastructure, such as pole foundations, conduits, cables, and other miscellaneous features; modifications to above-ground equipment, such as signal heads, countdown pedestrian signals, accessible pedestrian signals,

and other miscellaneous features; as well as modifications to pavement markings associated with the intersection, ADA ramps, and any additional concrete island work.

The following 14 intersections would be major modified signals under the Build Alternative:

- Quince Orchard Road (MD 124) at Firstfield Road
- Quince Orchard Road (MD 124) at Clopper Road (MD 117) / West Diamond Ave
- Quince Orchard Road (MD 124) at Bank Street / North Drive
- Quince Orchard Road (MD 124) at Quince Orchard Boulevard
- Quince Orchard Road (MD 124) at Twin Lakes Drive
- Quince Orchard Road (MD 124) at Sioux Lane / Orchard Ridge Drive
- Quince Orchard Road (MD 124) at Great Seneca Highway (MD 119)
- Great Seneca Highway (MD 119) at Kentlands Boulevard /Orchard Ridge Drive
- Great Seneca Highway (MD 119) at Lakelands Drive
- Great Seneca Highway (MD 119) at Muddy Branch Road
- Key West Avenue (MD 28) at Diamondback Road / Broschart Road
- Decoverly Drive at Fields Road
- Fields Road at Washingtonian Boulevard
- King Farm Boulevard at North Frederick Road (MD 355)

The following three intersections would be minor modified signals under the Build Alternative:

- Quince Orchard Road (MD 124) at Pepco Sub Station
- King Farm Boulevard at Gaither Road
- King Farm Boulevard at Pleasant Drive

To install a new signal or maintain an existing signal, all conflicting vehicular movements with the transitway would be controlled by the signal, where necessary. Left turns that would cross the transitway and have permissive movements in existing conditions would become protected signalized movements in the Build Alternative. Right turns that have free right movements in existing conditions and right turns on red, which are allowed in existing conditions but cross the transitway, would be restricted altogether or signalized with a separate indication to prohibit movements when the CCT vehicle is present. These movements may be signalized with a solid red arrow indication for a full restriction or a flashing red arrow indication that would switch to a solid red arrow when a bus is present. The turn signals may be supplemented with additional static or dynamic blank-out signs that display turn restrictions when a bus is present in the transitway. Some intersections would require a separate CCT phase where no vehicular traffic can operate at the same time as the bus.

Due to access management guidelines and an effort to maintain rapid bus travel times, many medians and entrances along the transitway would be closed in the Build Alternative. Intersections that have median or entrance closures may have midblock pedestrian crossings in

the Build Alternative. The following 18 intersections would have median closures, entrance closures, and/or restricted turn movements in the Build Alternative:

- Quince Orchard Road (MD 124) at North Drive – East leg closed, NIST exit moved to Quince Orchard Road (MD 124) at Quince Orchard Boulevard
- Quince Orchard Road (MD 124) at Sound Road – East leg closed, NIST entrance moved to Quince Orchard Road (MD 124) at Quince Orchard Boulevard
- PSTA at West
- Broschart Road at Medical Center Way – Restricted turn movements
- Broschart Road at both entrances to Shady Grove Adventist Hospital – East leg closed
- Broschart Road at two entrances to Johns Hopkins University – Entrances closed
- Broschart Road at one entrance to Johns Hopkins University – Restricted turn movements
- Broschart Road at entrance to DANAC development – West leg closed
- Decoverly Drive at Skyhill Way – Median closed
- Decoverly Drive at Steinbeck Road – Median closed
- Fields Road at Winners Drive – Median closed
- Fields Road at Marathon Circle – Median closed
- Fields Road at Case Street – Median closed
- King Farm Boulevard at entrance to Sheraton – Northbound through movement closed
- King Farm Boulevard at entrance to Irvington – Median closed
- King Farm Boulevard at west entrance to Ingleside – Median closed
- King Farm Boulevard at Crestfield Drive – Median closed
- King Farm Boulevard at Elmcroft Boulevard – Median closed

To accommodate future traffic demands relative to both future growth and changes in traffic patterns due to design modifications for the transitway, several intersections would require new left- or right-turn lanes. The following intersections are assumed to include new left- or right-turn lanes in the Build Alternative:

- Quince Orchard Road (MD 124) at Firstfield Road – Southbound right-turn lane
- Quince Orchard Road (MD 124) at Quince Orchard Boulevard and NIST Entrance – Southbound left-turn and northbound right turn lanes
- King Farm Boulevard at North Frederick Road (MD 355) – Eastbound left-turn lane and westbound right-turn lane

All standard roadway signs including regulatory, warning, direction, route makers, and/or destination signing impacted by the transitway are assumed to be replaced to meet current MDMUTCD standards at the time of design. Further, all signing and pavement markings necessary for the proposed geometric conditions and addition of the transitway will be installed.

All standard roadway lighting and fixtures including all underground facilities, wiring, connector kits, foundations, manholes, and any equipment for the system that would be impacted by the Build Alternative are assumed to be replaced to meet current standards at the time of design. Additional lighting and continuous roadway lighting that would extend the entire length of the transitway are not being proposed for this Project except as necessary at stations.

To maintain the balance of serving general motorists in the roadway network and providing a rapid bus system for the CCT bus, transit signal priority (TSP) and pre-emption are being proposed. In the Build Alternative, to implement TSP, signals along the transitway may require controller upgrades along with TSP hardware and software. Additional software for communications between the buses, traffic signal controllers (field devices), stations, CCT operations control center, and existing Montgomery County operations control center would be provided to monitor the bus headways and automatic passenger counters, as well as maintain vehicular progression and operations throughout the corridor for both the CCT bus and general motorists.

What is Transit Signal Priority?

Transit signal priority (TSP) is an operational strategy that facilitates the movement of transit vehicles through traffic signal-controlled intersections to help meet the objectives of reduced travel time for buses and improved headway consistency.

Local Bus Service Effects

Local bus routes in the CCT corridor would likely be modified or adjusted to serve the CCT stations, or to respond to service redundancy and improve efficiency. These adjustments could include modifications to headways, routes, or hours of service. Some bus routes currently run on routes parallel to portions of the Build Alternative and potentially could have their service levels adjusted or could be eliminated. However, it should be noted that while the routes may be parallel, the service is generally not identical because the bus stops tend to be spaced closer together than the CCT stations. Examples of bus routes that could be adjusted or eliminated include the following Ride On Routes: 43, 54, 56, 61, 66, 67, 71, 74, 76, 78, and 79. MDOT MTA will coordinate with Montgomery County on decisions about these route changes and service prior to the start of the CCT service.

Short-term Effects

During construction of the Build Alternative, temporary impacts such as lane shifts, lane reductions, partial or full closures of road and/or bicycle and pedestrian facilities, shoulder closures, or temporary detours may be needed to construct portions of the Projects (**Chapter 2, Section 2.7**).

A Draft Transportation Management Plan (TMP) has been developed based on the 30 percent design plans, in accordance with the Maryland SHA Guidelines for Development, Implementation, and Assessment of TMPs for major projects. The Draft TMP details work zone impact management strategies, including maintenance of traffic, public information, and outreach strategies and incident management during construction. It includes a Traffic Control Plan, which addresses construction sequencing, traffic safety, and traffic control throughout the work zone, following guidance from SHA and federal standards.

The MDOT MTA, in coordination with its contractor, would be responsible for the plan's Public Information and Outreach program, which is intended to inform motorists, residents, businesses, schools, emergency service and delivery providers, and the public regarding temporary changes to traffic patterns and detours. Changes in traffic, bicycle, and pedestrian routes, will be announced in the print and electronic media. Appropriate lines of communication would be maintained with emergency service providers throughout construction regarding current and upcoming construction activities, potential issues, and planned route changes. Pedestrian access to adjacent properties and access to adjacent parking facilities would be maintained during construction. Whenever existing movements cannot be maintained, alternate routing would be designated with appropriate signing.

Mitigation

No mitigation is warranted for impacts to traffic as a result of the CCT.

3.24 Pedestrian and Bicycle Facilities

3.24.1 Introduction and Methodology

Data on existing pedestrian and bicycle facilities was provided by Montgomery County and was field verified along the study area corridor. Proposed pedestrian and bicycle facility data was gathered from the *Great Seneca Science Corridor Master Plan*, *Countywide Bikeways Functional Master Plan*, MDOT CTP, City of Rockville, and City of Gaithersburg. Facilities were identified, including sidewalks and shared-use paths that are directly parallel or intersect the study area corridor. Potential effects to pedestrian and bicycle facilities were evaluated through an analysis of the 30 percent design plans along with field reviews, where applicable.

3.24.2 Existing Conditions

Pedestrian sidewalks and shared-use paths are located throughout the study area corridor. Existing facilities are summarized in **Table 3-20** and shown in **Appendix E**.

Table 3-20: Existing Pedestrian and Bicycle Facilities

Roadway	Segment / Location	Facility Type
Quince Orchard Rd (MD 124)	North of Clopper Road – East side	Sidewalk
	South of Clopper Road – West side	Sidewalk
	South of Quince Orchard Drive – West side	Sidewalk
	South of Twin Lakes Drive – East side	Shared-use path
	South of Twin Lakes Drive – West side	Sidewalk
Clopper Road / W. Diamondback Avenue (MD 117)	North side	Sidewalk
	South side	Shared-use path
Great Seneca Highway (MD 119)	From MD 124 to Muddy Branch Road – East side	Shared-use path
	From MD 124 to Lakelands Drive - West side	Sidewalk
Key West Avenue (MD 28)	North side	Shared-use path
	South side	Sidewalk
N. Frederick Road (MD 355)	East side	Sidewalk
	West side	Sidewalk
Muddy Branch Road	East side	Sidewalk
	West side	Shared-use path
Medical Center Drive	North side	Sidewalk
	South side	Sidewalk
Decoverly Drive	South of Skyhill Way – East side	Shared-use path

Roadway	Segment / Location	Facility Type
	South of Skyhill Way – West side	Sidewalk
	North of Skyhill Way – East side	Shared-use path *
	North of Skyhill Way – West side	Sidewalk
Fields Road	East of Washingtonian Boulevard – North side	Sidewalk
	East of Washingtonian Boulevard – South side	Shared-use path *
	West of Washingtonian Boulevard – North side	Sidewalk
	West of Washingtonian Boulevard – South side	Shared-use path *
Broschart Road	East side	Sidewalk
	West side	Sidewalk
Diamondback Drive	East side	Sidewalk
	West side	Shared-use path *
King Farm Boulevard	North side	Sidewalk
	South side	Sidewalk

** Under construction or to be constructed, as per master plans / annexation agreements.*

3.24.3 Future No-Build Conditions

Under the No-Build condition, existing pedestrian and bicycle facilities within the study area corridor would not be affected. The proposed pedestrian and bicycle improvements outlined in both the *Great Seneca Science Corridor Master Plan* and the *Countywide Bikeways Functional Master Plan* would be completed as funding becomes available. If the CCT is not constructed, the bicycle and pedestrian improvements associated with the Build Alternative are unlikely to be implemented.

3.24.4 Build Alternative

Long-term Effects

The CCT Project supports pedestrian and bicycle mobility and access, and seeks to provide connections for all modes to the proposed transitway and stations. The Build Alternative would not require permanent closure of any existing pedestrian or bicycle facilities. The CCT Project would include new sidewalks and shared-use paths throughout the study area corridor, in accordance with the 2010 *Great Seneca Science Corridor Master Plan*, where applicable. The Master Plan encourages a more connected pedestrian and cyclist environment by linking the CCT, LSC Loop, and local and regional trails. In some locations, the CCT Project would include design measures to allow for pedestrian and bicycle facilities to be constructed by others in the future. The proposed improvements are summarized in **Table 3-21**.

Table 3-21: Improvements to Pedestrian and Bicycle Facilities

Roadway	Segment / Location	Facility / Improvement Type
Quince Orchard Rd (MD 124)	North of Clopper Road – West side	New sidewalk
	South of Clopper Road – East side	New shared-use path
	South of Quince Orchard Drive – East side	New shared-use path
	South of Twin Lakes Drive – East side	Reconstruct shared-use path
Clopper Road / W. Diamondback Avenue (MD 117)	South side	Design would accommodate shared-use path (to be constructed by others)

Roadway	Segment / Location	Facility / Improvement Type
Great Seneca Highway (MD 119)	From MD 124 to Main Street – West side	New shared-use path
	From Main Street to Lakelands – West side	Reconstruct sidewalk
N. Frederick Road (MD 355)	West side	Design would accommodate shared-use path (to be constructed by others)
Medical Center Drive	From Key West Avenue to Broschart Road – South side	New cycle track and sidewalk
Decoverly Drive	South of Steinback Avenue – East side	Shared-use path
	South of Steinback Avenue – West side	Reconstruct sidewalk
Fields Road	East of Washingtonian Boulevard – North side	Shared-use path and structure over I-270 and Shady Grove Road
Broschart Road	East side	New shared-use path
Diamondback Drive	From Key West Avenue to Decoverly Drive – East side	New sidewalk and new shared-use path
Diamondback Drive	From DANAC platform to Decoverly Drive – West side	New sidewalk and shared-use path
King Farm Boulevard	From N. Frederick Road (MD 355) to Somerville Drive – East Side	New sidewalk and new shared-use path
King Farm Boulevard	From N. Frederick Road (MD 355) to Somerville Drive –West Side	New shared-use path
Somerville Drive	Around Shady Grove Metro Station Parking Lot	New shared-use path

Short-term Effects

As described in **Chapter 2, Section 2.7**, short-term effects to pedestrian and bicycle facilities include temporary closures and changes in access during construction. To the extent possible, access to existing bicycle and pedestrian facilities would be maintained during construction or alternative options would be provided. Areas along the corridor where sidewalks and shared-use paths would be temporarily closed during construction and detoured to use the sidewalk on the opposite side of the street include:

- Westside of Quince Orchard Boulevard from the SHA Maintenance Facility to Clopper Road
- Eastside of Quince Orchard Boulevard from West Diamond Avenue / Clopper Road to Great Seneca Highway
- Westside of Great Seneca Highway from Quince Orchard Road to Lakelands Drive
- Southside of Medical Center Drive from Great Seneca Highway to Broschart Road
- Eastside of Broschart Road from Medical Center Drive to Blackwell Road
- Westside of Broschart Road from Blackwell Road to Key West Avenue
- Westside of Diamondback Road from Key West Avenue to Decoverly Drive
- Eastside of Decoverly Avenue from Diamondback Drive to Steinbeck Avenue

Mitigation

The Build Alternative will be constructed in accordance with ADA requirements and will include easy-to-read and consistent signage, pedestrian-friendly design, bicycle storage and racks where possible, wayfindings signage, and safety and security measures.

3.25 Safety and Security

This section identifies general safety and security considerations related to the design, construction, and operation of the Build Alternative. The Build Alternative would feature current safety and security systems and procedures to protect passengers, workers, and adjacent communities. This section describes general safety procedures that would be in place once the Build Alternative is in operation, as well as those to be implemented during its construction.

Safety requirements come from state and federal authorities. The FTA guidelines for "New Start" projects and "Major Capital Projects" include specific provisions for system safety and security. The system safety, fire, and life safety and security design criteria development process is governed by the MDOT MTA multi-modal SSPP, and by the MDOT State Safety Oversight Standard and oversight process. The MDOT MTA also participates in programs managed by other federal departments such as the Department of Homeland Security.

The Build Alternative would be designed, constructed, and operated in accordance with the MDOT MTA's SSPP, which will be updated to include specific requirements as the Project advances into final design and construction. However, possible safety and security concerns that have been considered during the development of the 30 percent design include features to address pedestrian and bicycle safety, vehicular safety, station and park-and-ride lot safety, and safety and security during construction.

- **Pedestrian and Bicycle Safety:** The types of pedestrian and bicycle controls that would be installed at signalized intersections under the Build Alternative include countdown pedestrian signals and audible pedestrian pushbuttons which are consistent with current SHA standards and are familiar to drivers, pedestrian, and cyclists in the corridor. Safety provisions would be made to minimize conflicts between transit vehicles, automobiles, bicyclists, and pedestrians. Crossings and bicycle lanes would be clearly marked with signing and pavement markings, and would be limited to dedicated locations.
- **Vehicular Safety:** Drivers are familiar with transit vehicles operating in general purpose traffic in the corridor, but not with transit vehicles operating in dedicated transit lanes adjacent to the roadway, as would occur under the Build Alternative. Turning restrictions, signing and marking, and signal phasing adjustments would be installed to allow safe bus operations along the corridor. The types of traffic controls, turning restrictions, and other techniques that would be used throughout the corridor under the Build Alternative would be consistent with SHA standards, and familiar to drivers in the corridor.
- **Stations and Park-and-Ride Facilities:** Emergency phones would be available at stations and park-and-ride facilities. The ticket vending machines would contain passenger-assistance telephones that link to the central control center.

- **Construction Activities:** The safety and security of construction workers and the general public would be a key element of construction activities associated with the CCT Project. Standard construction safety practices, as established by government regulations and codes, as well as MDOT MTA specifications, would minimize the potential for accidents and other safety problems.

The development of safety and security plans and procedures for the CCT Project will continue through planning, design, construction, testing, and revenue service. The MDOT MTA will develop a Safety and Security Management Plan, which will identify specific safety and security procedures to be carried out by MDOT MTA for the CCT Project.

3.26 Indirect and Cumulative Effects

The CEQ regulations set forth in 40 CFR Part 1500 identify three types of environmental effects that must be addressed and considered to meet NEPA requirements: direct, indirect, and cumulative effects. The terms "effects" and "impacts" are synonymous, as used in the CEQ regulations. Definitions of direct, indirect, and cumulative effects are as follows:

- Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.8[a]).
- Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR § 1508.8[b]).
- Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

Direct effects of the CCT Project are identified in Sections 3.1 through 3.25 of this EA. Indirect effects of the CCT Project could include growth inducing effects. A cumulative impact of the CCT Project may occur from combining the direct or indirect effects of the CCT Project with the effects of other development projects to a particular resource, such as to wetlands. If a given resource is not either directly or indirectly affected by the Build Alternative, then no incremental or cumulative impacts to that resource would result.

The initial steps of an indirect and cumulative effects analysis include establishment of the geographic and temporal boundary (or "time frame") in which the full analysis is conducted. The analysis includes determination of other past, present, near-future, and reasonably-foreseeable future development projects and, ultimately, an analysis of indirect and cumulative effects to resources within the defined geographic and temporal boundaries.

3.26.1 Geographic and Temporal Boundaries

The geographic boundary for analysis is the area in which indirect and cumulative effects could occur. The boundary for this analysis was formed using a series of map overlays of relevant sub-boundaries for resources which could be indirectly or cumulatively affected by the CCT Project. These sub-boundaries include 2010 US Census tracts and block groups, planning areas, community analysis zones, traffic analysis zones, and sub-watersheds. The sub-boundaries were overlaid with the Build Alternative alignment, area neighborhoods, and roads to develop the overall analysis boundary. The indirect and cumulative effects analysis area is shown on **Figure 3-12**.

The temporal boundary for analysis begins in 1980 and extends to 2040. The past time frame was selected based on available Census data, historic events, development trends, and population changes. Many past transportation and other projects have contributed to development and the pattern of growth in the indirect and cumulative effects analysis boundary since approximately 1980. Some of the most influential include the NIST and MedImmune, opening of the Metropolitan Grove Station for MARC service and the Shady Grove Metro Station for Red Line Metro service, construction of I-270 and I-370, and opening of the Intercounty Connector extending from I-370 to I-95.

The future time frame was selected because it encompasses the 2035 design year for the Build Alternative and existing regional plans and projections have been forecasted through 2040. Known future development also informs the temporal boundary selected for analysis; refer to **Section 3.2** and the *Socioeconomic Technical Report* (**Appendix F**) for more specific future development information. Potential future development beyond 2040 is not considered reasonably foreseeable.

3.26.2 Resources Considered

Resources that would be impacted directly and indirectly by the Project form the basis for resources examined in this analysis. If an alternative has no direct or indirect impact to a given resource, then no incremental or cumulative effect to that resource would occur from implementation of that alternative. Resources included in this indirect and cumulative effects analysis include:

- socioeconomics
- parks, recreation, & open space
- aquatic and terrestrial habitat
- surface water
- wetlands
- floodplains
- forests, street trees
- air quality
- noise
- cultural resources
- hazardous materials

3.26.3 Land Use, Zoning, and Other Development Projects

The entire CCT study area corridor and analysis boundary are located in a designated state Priority Funding Area. The 1997 Priority Funding Areas Act capitalizes on the influence of state

expenditures on economic growth and development, and directs state spending to existing communities and places where local governments want state investment to support future growth. The analysis area is in the metropolitan Washington region where the historical land use trend has been an increase in population and development, and a corresponding decrease in natural or open lands. According to the Maryland Department of Planning, the majority of land use in the analysis area is residential (33 percent), followed in frequency by forest (18 percent) and commercial and institutional uses (14 percent each). The remaining uses are industrial, agricultural, open urban land, transportation, and water/wetland. Montgomery County recently estimated only 4.8 percent of the county land remains vacant. Substantially, more acreage is zoned residential (62 percent) in Montgomery County, with an additional 16.5 percent zoned for commercial and mixed use, 10.6 percent acres zoned for the LSC, 6.5 percent identified for light industrial purposes, and nearly 5.0 percent dedicated for transit oriented mixed use.

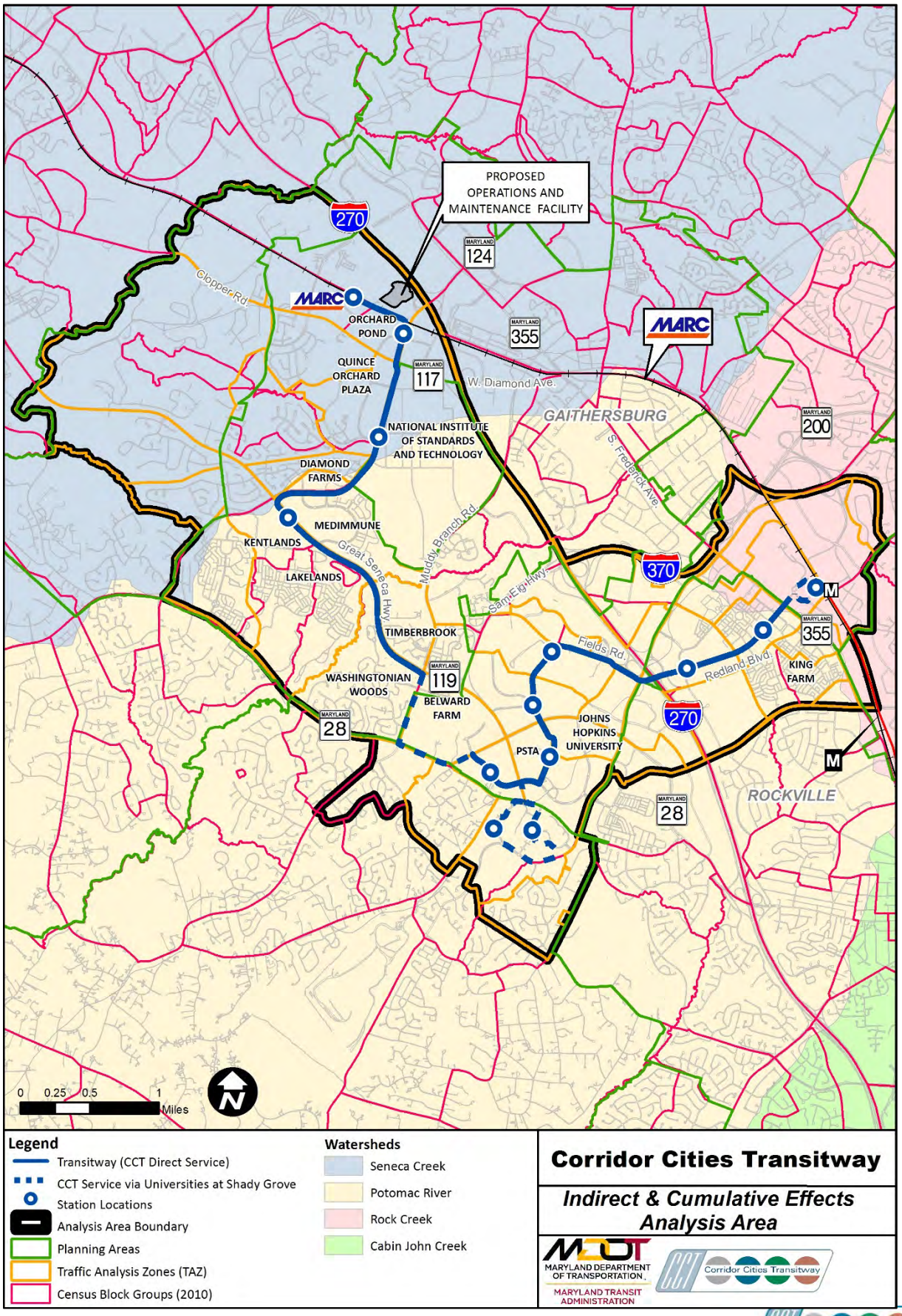
Land use and development is guided by area planning and zoning ordinances. The Montgomery County, City of Gaithersburg, and City of Rockville master plans provide general goals and objectives for growth in their communities. The objectives set forth in the current plans focus on concentrating employment centers and associated higher density housing in the I-270 corridor (particularly near transit stations), concentrating intensive land use at transportation nodes, and coordinating residential, employment, and retail development in order to create mixed-use communities. Additionally, transportation projects are planned and programmed at the federal, state, and local government levels and private development is tracked by local governments.

Indirect Effects

Two private developments, the Great Seneca Science Corridor and the Watkins Mill Town Center, will be constructed regardless of the CCT Project; however, the ability to expand and have greater densities of development are linked to the approval and construction of the CCT. Therefore, these two developments have indirect impacts related to the CCT Project.

- The Great Seneca Science Corridor stages growth in its five LSC Districts near proposed CCT stations for an additional 4.6 million square feet of commercial space (26.2 percent of the total) and 3,200 dwelling units (35.5 percent of the total). Based on implementation of the CCT, LSC Belward District would be rezoned from a Research and Development Zone to the revised LSC Zone to allow higher densities and building height. The LSC North District would be rezoned to achieve higher density mixed use near the proposed CCT station (Montgomery County Planning Department, 2010).
- At Watkins Mill Town Center, near the Metropolitan Grove MARC Station, the fully completed CCT Project would allow approval of an additional office building (83,200 square feet or 8.8 percent of the total) and a second condominium (276 units or 25.7 percent of the total) near the proposed CCT station (Gaithersburg City, 2012).

Figure 3-12: Indirect and Cumulative Effects Analysis Area



There are also other requirements not related to the CCT Project that must be met prior to approval of each of these developments' stages and other factors, such as, the economy may influence the decision to proceed with these additional stages. The increased density related to the CCT would occur later in time than direct effects, and thus could cause indirect effects to environmental resources.

Cumulative Effects

Other future developments with potentially cumulative impacts when combined with those of the CCT Project include 12 non-residential (commercial), six residential, and six mixed-use projects. Detailed information regarding these plans and development "pipelines" is found in the *Indirect and Cumulative Effects Analysis Technical Report* (**Appendix F**). Based on analysis of area master plans, transportation plans, and planned developments, the trend of increased development and redevelopment in built-out areas in the analysis area will continue for the foreseeable future.

3.26.4 Indirect and Cumulative Effects to Resources under the No-Build Alternative

Indirect and reasonably foreseeable cumulative effects of the No-Build Alternative are identified to provide a baseline of comparison to the potential indirect and cumulative effects of the Build Alternative. No direct impacts to socioeconomic, environmental, or cultural resources would occur from the No-Build Alternative.

Indirect Effects

Future staging of development based in part on approvals and completion of CCT Project would not occur at the LSC Districts and the Watkins Mill Town Center under the No-Build Alternative. However, private development may still occur within the LSC Districts and Watkins Mill Town Center though it would not be related to approvals associated with the CCT Project. The No-Build Alternative would have no beneficial indirect effect to socioeconomic resources (such as employment and increased business services) or the transportation system. However, any benefit to natural resources from not constructing the indirectly related development phases would be relatively small as the additional development sites would be located adjacent to proposed CCT stations, and in some cases, site preparation for the entire development has already been completed by the developers.

Cumulative Effects

The No-Build Alternative would not meet area planning objectives. Under the No-Build Alternative, travelers in the analysis area would continue to rely on existing roadways, bus service, and rail stations as they are currently configured with no substantial changes; however, the previously described indirect effects of this alternative would slow the pace of development at LSC Districts and Watkins Mill Town Center, thus altering the cumulative growth pattern in the area. This could occur because near-term and long-range plans anticipate completion of the CCT Project as a means to realize land use objectives that would concentrate growth along the I-270 corridor at transit nodes. The No-Build Alternative could therefore contribute to a cumulative impact to the local economy by reducing the potential number of future households and

businesses, and reducing planned community mobility. This could also slow any planned increase in area employment and the tax base. The No-Build Alternative would also slow planned development because county subdivision staging polices require adequate infrastructure prior to approving new development. Additionally, the No-Build Alternative would not provide the transportation network connectivity to support this type of growth and densification, thereby allowing increased strain on the already congested transportation network.

3.26.5 Indirect and Cumulative Effects to Resources Under the Build Alternative

Socioeconomic Resources

Indirect Effects

Expenditures associated with the Build Alternative, staged development at LSC Districts and Watkins Mill Town Center related to the CCT Project, would result in induced personal and business expenditures, which positively impacts the local economy, employment, and tax base. Because a corridor has been preserved for the Build Alternative and only minor right-of-way would therefore be acquired, fewer business and residential displacements would occur, minimizing potential indirect effects to the local economy and tax base from loss of business and households.

Additional growth to be concentrated near proposed CCT stations at LSC Districts and Watkins Mill Town Center would have minor effects to community cohesion and facilities. Development has already been approved and partially constructed at both locations. The permits require inclusion of design elements compatible with nearby communities, adequate parking, constructing public recreation facilities, and providing access to their facilities, goods, and business services, thereby minimizing potentially adverse impacts to community cohesion and facilities. The additional commercial and residential space based on approval and then construction of CCT Project would be small in comparison to the total approved development at the two locations (approximately 26.2 percent of commercial space and 35.5 percent of dwelling units at LSC Districts; and 8.8 percent of office space and 25.7 percent of dwelling units at Watkins Mill Town Center), with modest benefits to the local economy.

Cumulative Effects

As discussed in **Sections 3.4** and **3.8** of this EA, the Build Alternative would have minimal impacts to communities in the form of relocations, access to business or community services, and availability of community facilities. Two relocations (one residential and one business) and small slivers of right-of-way would be acquired which would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, minimizing adverse effects to property owners and communities. Other growth and development in the analysis area, when added to the direct effects of the Build Alternative, could have a cumulative impact on community cohesion and access to business and community services, as well as increase use and demand for community facilities, but this potential is minimized by: (1) local planning and zoning; (2) Montgomery County's Adequate Public Facilities Ordinance to ensure adequate infrastructure and facilities are maintained; and (3) individual building permit

conditions. Increased mobility and access to goods and business services associated with the CCT would also enhance the local economy while meeting area planning objectives.

Past, present, and foreseeable growth and development would benefit employment, the local economy, and the tax base in the analysis area, depending on where and when local planning and zoning would allow.

Parks, Recreation, and Open Space

Indirect Effects

Minor indirect effects to parks, recreation, and open space would occur as a result of the Build Alternative. Staged development at LSC Districts and Watkins Mill Town Center related to the CCT would not affect existing park, recreation, or open space areas because this would occur in the urban core adjacent to the proposed CCT stations. The Build Alternative would indirectly benefit recreation as a result of the potential bicycle and pedestrian trails to be built by Montgomery County and others, which may be incorporated in the right-of-way for the Build Alternative.

Cumulative Effects

The Build Alternative would have a minimal cumulative contribution to parks, recreation, and open space impacts when considered in conjunction with other development projects. The Build Alternative would acquire minimal right-of-way from two parks, namely, Washington Woods Park and Muddy Branch Park. These impacts would not adversely affect the type or capacity of visitor use of these parks and would have *de minimis* impacts (refer to **Section 3.9**). Other development projects would potentially increase visitor use of existing parks and recreational facilities; however, this increase in use is accounted for in local area recreational planning. Moreover, locally issued development permits would minimize the potential for overuse of existing facilities, and would call for constructing new facilities where needed. Given the limited amount of vacant land in the analysis area, new facilities would mostly be built in areas with some other current land use as planned by area local governments.

Air Quality

Indirect Effects

Based on available qualitative information, no negative impacts to air quality are anticipated from developments indirectly related to the Build Alternative. Future staged development at the LSC Districts and Watkins Mill Town Center would be required to comply with the Montgomery County Outdoor Air Quality Ordinance (Code of Montgomery County Regulations (COMCOR) Chapter 3, adopted by the City of Gaithersburg), and establish requirements applicable to developments for visible emissions, airborne particulate matter, and odors. Similarly, expansion of a BRT from Metropolitan Grove to COMSAT (CCT Phase II) would be included in the area CLRP and TIP that are also required to conform to regional air quality plans under the CAA. Concentrated development near proposed CCT stations in the LSC Districts and Watkins Mill Town Center, coupled with completion of Phase II of the CCT, could benefit air quality by reducing VMT and associated emissions.

Cumulative Effects

No adverse cumulative impacts to air quality are expected from the Build Alternative. As discussed in **Section 3.19**, detailed quantitative and qualitative analysis of the Build Alternative's effect on air quality indicate it would benefit regional air quality and have no substantial negative effects. However, other unrelated development could potentially impact air quality, thereby offsetting the incremental benefits of the Build Alternative. All federal actions, federal transportation projects, and air pollution generated by development that is permitted by the EPA must be in conformity with regional air quality plans prior to their approval. Additionally, the Montgomery County Outdoor Air Quality Ordinance (COMCOR Chapter 3) establishes requirements applicable to developments for visible emissions, airborne particulate matter, and odors, also adopted by the cities of Gaithersburg and Rockville.

Noise

Indirect Effects

Staged development at LSC and Watkins Mill Town Center, based in part on approvals and construction of the CCT, would potentially increase noise in their vicinity. Zoning combined with local noise regulations (City of Gaithersburg's Section 15-8, Disturbing the Peace; City of Rockville Article III Section 13-54, Noise; and Montgomery County's Chapter 31B, Noise Control), however, would require measures to minimize and mitigate noise to typical suburban/urban setting levels. Potential increased noise from CCT Phase II is currently unknown and would be identified during more detailed environmental studies for that phase.

Cumulative Effects

No substantial cumulative noise impacts would occur from the combination of the Build Alternative with other past, present, and reasonably foreseeable actions. The overall impacts of the Build Alternative to the noise environment in the analysis area would be minimal and would have minor potential to contribute to cumulative noise impacts when combined with noise from other development. As described in **Section 3.18**, the CCT Project would result in increased noise in some locations, but detailed study of the existing noise environment and projection of noise levels generated by construction and operation of the CCT Project indicate noise levels would remain below the FTA impact threshold at the majority of sensitive noise receptors along the proposed CCT corridor. Three sites are projected to have noise levels in the moderate impact range. The Maryland Environmental Noise Act of 1974, administered by local governments, would take into account potential noise pollution of state and local government projects. Developer permits issued by local governments in the analysis area would also be regulated for potential noise pollution by Montgomery County's Noise Ordinance providing location and design guidelines for noise control (§31B-1.b.4, §31B-6, and §31B-8), which have been adopted by the cities of Gaithersburg and Rockville. Noise-sensitive areas are also addressed in the master plans of these communities.

Hazardous Materials

Indirect Effects

No substantial indirect effects from hazardous waste and materials are expected to occur from staged development at LSC Districts and Watkins Mill Town center, based in part on completion of the CCT Project. Any hazardous materials or waste found during construction at these developments would be treated, benefiting the human environment. Moreover, any hazardous materials use and waste from development of future projects would be in accordance with the Federal Resource Conservation and Recovery Act, COMAR Title 26, Subtitle 13, and Montgomery County's Executive Regulation 3-12 governing hazardous materials use, storage, and transport, minimizing potential adverse impacts.

Cumulative Effects

The proposed Build Alternative would not substantially contribute to cumulative hazardous waste and materials impacts in the analysis area and would potentially improve conditions. The Build Alternative has little potential to encounter contaminants. Those moderate and high risk sites potentially impacted by deeper excavations have been recommended for additional investigation as the alignment and design are refined. Past, present, and future growth and development in the analysis area increase the potential for human and wildlife exposure to hazardous materials and waste. Future land use and transportation projects would be required to comply with applicable local (Montgomery County Executive Regulation 3-12), state (COMAR Title 26, Subtitle 13), and federal (under the Resource Conservation and Recovery Act) hazardous waste management plans, ordinances, and regulations related to hazardous materials. Such compliance would minimize the potential for adverse hazardous material impacts caused by other developments. Additional development independent of the Build Alternative would increase the potential for greater discovery of hazardous material deposits and could also result in remediation of those areas, which would be a positive impact.

Natural Resources

Natural resources evaluated in this section include: streams, wetlands, floodplains, aquatic and terrestrial habitat, forest, and street trees.

Indirect Effects

The Build Alternative would have minimal indirect impacts on evaluated natural resources. The Build Alternative, staged development at LSC Districts and Watkins Mill Town Center, could impact soil through grading, loss of topsoil, compaction, and increased erosion. This potential would be minimized by implementing required Soil Erosion and Sediment Control plans and use of Best Management Practices such as stockpiling topsoil, use of erosion control structures and blankets, periodically wetting exposed soils, and establishing vegetated covers. These measures are specified by the National Pollutant Discharge Elimination System; Maryland's Erosion Control Law; Montgomery County's Code 19-2; and City of Gaithersburg's municipal code, Section 8-2.

The increase of impervious surface and grading for construction of the Build Alternative could have indirect downstream impacts to surface water, aquatic habitat, wetlands, and floodplains

farther removed from the Project in both geography and time. These impacts could occur from increased stormwater runoff potentially resulting in increased erosion, sedimentation, and pollutants entering downstream. Any potential adverse effects would be minimized by using Best Management Practices during construction and mitigation achieved by constructing SWM facilities for the Build Alternative per National Pollutant Discharge Elimination System requirements. Staged development at LSC Districts and Watkins Mill Town Center would also increase impervious surfaces in the analysis area, potentially increasing stormwater impacts. This potential would also be limited by National Pollutant Discharge Elimination System permit requirements and the municipal code of the City of Gaithersburg at Chapter 8-2: Erosion and Sediment Control and Stormwater Management.

Of the LSC Districts, Stage 2 and 3 actions at the presently undeveloped Belward Farm in the LSC Belward District would have the most potential to effect streams. Belward Farm is transected south to north by two streams totaling approximately 2,900 linear feet. Although the precise extent of impacts to streams and wetlands at the LSC Districts is unknown, it would likely be minor as most Stage 2 and 3 development would occur in areas already impacted by development, close to the proposed LSC West, Traville Gateway Drive, USG, LSC Central, and DANAC Stations. Also, mitigation would be required for any impacts under existing laws such as the CWA and the Maryland Non-tidal Wetlands Protection Act. At Watkins Mill Town Center, streams are present, but nearly all grading for the development is already complete with little potential for additional stream impacts. As the staged development at Watkins Mill Town Center would occur in the urban core, no impacts to wetlands would occur. No impacts to protected 100-year floodplains would occur at either development. All of these developments would be required to comply with applicable federal and state water and wetland regulations and permits, as described above.

Because additional staged development at LSC Districts and Watkins Mill Town Center would occur after the majority of the planned developments are completed, only minimal impacts to forest, street trees, or terrestrial wildlife habitat may occur. State regulations under the Maryland Forest Conservation Act limit impacts to forests and roadside trees by requiring developments larger than approximately 0.91 acres to complete a forest conservation plan and to offset forest loss on a 1:1 basis. The Maryland Roadside Tree law also requires management measures to preserve roadside trees and to replace in-kind if removal is required, minimizing impacts to terrestrial habitat. Regulations outlined in the City of Gaithersburg's Code Chapter 21: Trees and Vegetation are applicable to staged development at the LSC Districts and Watkins Mill Town Center which would address forest and tree impacts. Montgomery County's 2014 Forest Conservation law extends additional protections to forest and trees from non-exempt development impacts of 5,000 square feet and above.

Cumulative Effects

Minor cumulative impacts to the evaluated natural resources would occur under the Build Alternative. Limited impacts to soil quality would occur from grading and construction associated with the Build Alternative, minimized by use of Best Management Practices and implementing

Soil Erosion and Sediment Control Plans, as described above. This incremental impact, when added to the effects of other development, would have no substantial adverse cumulative effects to soil in the analysis area. This would be based on soil conservation measures implementation as required by the National Pollutant Discharge Elimination System, Maryland's Erosion Control Law, Montgomery County's Code 19-2, City of Gaithersburg's Code Section 8-2, and City of Rockville's Code Chapter 19-5.

Past actions until passage of the CWA in 1977 and EO 11988 have substantially impacted surface water, wetlands, and floodplains in the analysis area through encroachment, loss, and declining water quality. As described in **Sections 3.14, 3.15,** and **3.16**, minor direct impacts to surface water, streams, wetlands, floodplains, and aquatic habitat would occur under the Build Alternative. Other development would be required to comply with the CWA, the Maryland Non-tidal Wetlands Protection Act, EO 11988 regarding floodplains, Montgomery County Code Chapter 19-3 and Executive Regulation 108-92 governing construction activity in or near a 100-year floodplain, and Section 10 Floodplain Management code of Gaithersburg and Rockville, limiting the potential for substantial future adverse cumulative effects. These laws protecting surface water, wetlands, and floodplains, adhere to Soil Erosion and Sediment Control plans, construction of stormwater management structures, and use of Best Management Practices to minimize potential cumulative adverse effects.

Terrestrial habitat in the analysis area principally consists of forests, landscaping, and roadside trees. The Build Alternative would have minor incremental effects to these resources because a forest conservation plan re-establishing forest would be implemented, and impacted street trees would be replaced in-kind. No impacts to interior forest species would occur. Because incremental effects of the Build Alternative to natural resources would be minimal, it would not substantially contribute to adverse cumulative impacts of other development to forests, interior forest habitat, street trees, or terrestrial habitat. The impacts of other development to these resources are minimized under the Maryland Reforestation Law; the Maryland Forest Conservation Act and Maryland Roadside Tree Law; Montgomery County's Forest Conservation Law; City of Gaithersburg's Code Chapter 21: Trees and Vegetation; and City of Rockville's Section 10.5, Forest and Tree Preservation ordinance.

Cultural Resources

Indirect Effects

Indirect impacts to historic properties could occur from the additional phases at the LSC Districts and Watkins Mill Town Center related to the CCT Project. These developments would be required to comply with the Historic Preservation Elements of Gaithersburg's Master Plan that seeks to minimize impacts to historic resources. Further, Section 4(f) of the Department of Transportation Act applies to federal transportation projects and requires demonstration of no feasible and prudent alternative to the use of historic properties important for preservation in place.

Cumulative Effects

Other development may adversely impact cultural resources, but impacts would be limited by federal historic preservation laws such as the National Historic Preservation Act, the state Maryland Historical Trust Act of 1985, historic preservation as regulated by the M-NCPPC Historic Preservation Master Plan, the Montgomery County Historic Preservation Ordinance (COMCOR 24-A), and Historic Preservation Elements of master plans of the cities of Rockville and Gaithersburg. Overall, effects from the Build Alternative would potentially contribute to the cumulative effects on cultural resources in the analysis area, but the CCT Project is a small part of the development pattern that is ongoing and planned, and is consistent with regional and local master planning.

3.26.6 Mitigation

Direct impacts to any environmental resources resulting from the Build Alternative would be addressed through permitting and agency coordination. Following appropriate avoidance and minimization efforts, mitigation measures would be required for the indirect impacts of the Build Alternative to soil quality, surface water, and floodplains from soil grading, increased impervious surface, and increased drainage. These measures would include implementation of: (1) soil erosion and sediment control plans; (2) use of Best Management Practices; (3) placement of feasible vegetated filter strips and vegetated drainage swales (rather than lined ditches); and (4) stormwater management structures that reduce the volume and velocity of runoff while preventing pollutants entering downstream.

As the incremental impacts of the Build Alternative to the evaluated resources would be minimized and mitigated by the CCT Project and are not substantial, there would be no additional mitigation requirements for indirect or cumulative impacts. The potential impacts of other future development projects would be avoided, minimized, or mitigated by others in accordance with applicable federal, state, and local laws, regulations, and permits.

3.27 Mitigation Measures

Mitigation measures have been considered as part of the Build Alternative in order to lessen the effects. The following is a summary of the mitigation measures presented in this chapter for the applicable resources. Mitigation commitments will be finalized in the FONSI, incorporating input from regulatory agencies, stakeholders, and the public.

3.27.1 Neighborhoods and Community Facilities

Potential mitigation measures for visual impacts on neighborhoods will include:

- The preservation of existing tree buffers and addition of trees and landscaping to the maximum extent possible;
- The selection of station lighting that minimizes light pollution; and
- The design of transitway structures that is compatible with the surrounding visual elements.

Mitigation for moderate noise impacts will be considered for two residential clusters of properties located along Great Seneca Highway.

3.27.2 Parks and Recreational Facilities

Mitigation measures for effects to parks and recreational facilities will include (but are not limited to):

- Design modifications;
- Replacement of land or facilities of comparable value and function; and
- Monetary compensation to enhance the remaining property or to mitigate the adverse impacts of the Project in other ways.

Related mitigation efforts will be determined through consultation with the officials having jurisdiction over these resources.

3.27.3 Economy

The MDOT MTA will coordinate with affected businesses to identify strategies to minimize the effects to temporary construction easements, lane and road closures, and other property restrictions on existing corridor businesses.

3.27.4 Property Acquisitions and Displacements

Property acquisition activities, including relocations, will be performed in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (*Uniform Act*) as amended; FTA Circular 5010.1D, Grant Management Requirements; FTA Circular 5010.1E, Award Management Requirements; and all applicable Maryland State laws.

Displaced persons and businesses within the area needed for the Project may be eligible for benefits under Maryland's Relocation Assistance Program. Benefits could include:

- Advisory services;
- Moving and reestablishment costs; and/or
- Other payments and services as provided by law.

3.27.5 Visual Resources

In order to minimize and mitigate for any visual effect from the Build Alternative, the following measures will be considered during final design and construction:

- Existing tree buffers would be preserved to the maximum extent possible;
- Additional trees and landscaping would be included where available land exists throughout the Project;
- Lighting for the stations would be selected to minimize light pollution to surrounding residential communities; and
- Stairs, retaining walls, and platforms, would be designed in a manner compatible with each of the respective visual districts in which they would be located.

The MDOT MTA will require construction contractors to utilize best management practices to maintain an orderly appearance of active work zones and staging areas.

3.27.6 Environmental Justice

The MDOT MTA will continue to ensure environmental justice populations have full and fair access to meaningful involvement in the development of the CCT Project.

3.27.7 Cultural Resources

No mitigation is proposed.

3.27.8 Forests

Forest mitigation will be developed in accordance with the Forest Conservation Act, which requires preparation of a forest stand delineation and a forest conservation plan by a Maryland-qualified forest professional, submitted to the MDNR or the local reviewing agency for review and approval. The forest conservation plan will be developed during final design in accordance with the State Forest Conservation Technical Manual, Third Edition (Howell and Ericson, 1997). The Maryland Reforestation Law applies to the linear portions of the proposed Build Alternative and the Maryland Forest Conservation Act to the proposed O&M Facility property.

Avoidance and minimization efforts to reduce forest impacts will be refined during final design and may include reducing fill slopes through the use of retaining walls and other additional best management practices to be implemented as appropriate, such as:

- Tree protection fencing installed along the outside edge of the LOD to prevent access by construction equipment, staging, and stockpiling of materials within forest retention areas;
- Root pruning along the edge of the LOD where excavation is required, to cleanly cut the roots of retained forest and/or specimen trees, thereby reducing stress and damage;
- Branch pruning to adjacent trees to reduce construction stress, provide equipment clearance, and correct any construction-related limb damage;
- Supplemental watering, fertilization, and mulching to reduce tree stress and promote tree health; and
- Additional construction techniques, which may be warranted to avoid and minimize forest/specimen tree effects, including tree wells, air spading, root aeration matting, and tunneling for utility installation. Additionally, seed and mulch would be applied along newly cleared forest edges to minimize the spread of invasive species to these areas during clearing and construction.

Further, MDOT MTA will ensure that necessary forest clearing will occur outside of the period of April 1 to August 31.

3.27.9 Street Trees/Individual Trees

Mitigation of impacts to street trees within the proposed right-of-way will be replaced on a 1:1 basis, pursuant to the Roadside Tree Law. Mitigation to individual trees could be considered on private property where practicable, as negotiated by MDOT MTA and the property owner. Landscaping and street tree replacement will be considered within the immediate vicinity of the resource effects, where possible.

3.27.10 Groundwater

A Hazardous Materials Spill Prevention Plan will be developed to prevent hazardous materials such as equipment fuel and lubricants from contaminating forest retention areas and other adjacent resources. Required SWM facilities will be constructed for the Build Alternative to treat pollutant-loaded runoff.

3.27.11 Water Resources

Minimization and mitigation to water resources will be achieved through compliance with TMDLs and the MDE stormwater and sediment and erosion control permitting process, as required under Maryland's Erosion and Sediment Control (COMAR 26.17.01) and SWM regulations (COMAR 26.17.02). A Hazardous Materials Spill Prevention Plan will be developed to prevent hazardous materials such as fuel and lubricants from contaminating surface water. Site disturbance will be minimized by maintaining and utilizing segments of the existing storm drain network as practicable. SWM facilities will manage runoff for all disturbances caused by the Build Alternative in accordance with criteria established by MDE at all POIs for surface segments where drainage leaves the study area corridor.

3.27.12 Wetlands and Waters of the US

Engineering designs will continue to be refined to address avoidance and minimization of impacts as would the practicability and effectiveness of using measures such as retaining walls, steeper fill slopes, and reduced roadway sections. 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.

Strict adherence to MDE erosion and sediment control procedures and SWM regulations will minimize impacts to waterways and wetlands from soil disturbance associated with construction and any increase in runoff from expanded impervious surfaces related to the Build Alternative. These procedures include the use of best management practices and structural controls, such as:

- The minimization of exposed soils through vegetative cover;
- Use of contouring and diversion to reduce water velocities; and
- Routing of runoff to retention basins and installation of control structures such as sediment fences.

Mitigation will be required in the form of establishment/creation, enhancement, or preservation to replace the loss of wetland, stream, and/or other aquatic resource functions. Wetland mitigation options under both the federal rule and state mitigation guidelines could include:

- Mitigation banking credits in-lieu fees; and/or
- Permitee-responsible mitigation using a watershed approach, in that order of preference.

Compensatory stream mitigation projects to replace stream functions considered at the discretion of MDE and USACE may include:

- Stream channel improvements;
- Removal of fish blockages;

- Riparian buffer enhancements; and
- Water quality improvements.

3.27.13 Habitat and Rare, Threatened and Endangered Species

Stream and wetland mitigation will be implemented as applicable and described above. No RTE mitigation measures would be required, as the Build Alternative would not impact the Potato Dandelion or any other RTE species. MDOT MTA will ensure that necessary forest clearing will occur outside of the period of April 1 to August 31 in order to avoid impacts to the habitat of the northern long-eared bat.

3.27.14 Noise and Vibration

Long-term Noise Mitigation

A noise barrier analysis was completed in accordance with SHA's Highway Traffic Noise-Abatement Policy. A ten-foot-high noise barrier would reduce noise levels by 7 dBA at more than 50 percent of the benefiting ground-level residences behind each proposed noise barrier for the two clusters of residential properties along Great Seneca Highway where moderate noise impacts are projected.

The MDOT MTA will evaluate benefited property owner viewpoints. In the event that MDOT MTA receives opposing viewpoints against a proposed noise barrier from at least 25 percent of benefited residents within a given NSA, a voting process will be required. For the abatement to be deemed not reasonable, the voting process will require that more than 50 percent of benefited residents within the NSA be opposed to the proposed sound barriers.

Short-term Noise Mitigation

The MDOT MTA will establish performance standards for construction equipment to reduce noise associated with the construction activities. MDOT MTA is committed to managing noise emissions during construction in accordance with its own performance standards, which would include, but not necessarily be limited to, the following:

- Conduct construction activities during the daytime whenever possible;
- Conduct truck loading, unloading, and hauling operations in a manner that minimizes noise;
- Route construction equipment and other vehicles carrying spoil, concrete, or other materials over routes that would cause the least disturbance to residents in the vicinity of the activity;
- Locate site stationary equipment away from residential areas to the extent reasonably feasible within the site/staging area;
- Employ the best available control technologies to limit excessive noise when working near residences; and
- Adequately notify the public in advance of construction operations and schedules including methods such as construction-alert publications and a Noise Complaint Hotline to handle complaints quickly.

3.27.15 Air Quality

To minimize the amount of construction dust generated, the following mitigation measures to minimize short-term air quality effects during construction could include:

- Site Preparation:
  - Minimize land disturbance;
  - Use watering trucks to minimize dust;
  - Cover trucks when hauling dirt;
  - Stabilize the surface of dirt piles if they are not removed immediately;
  - Use windbreaks to prevent accidental dust pollution;
  - Limit vehicular paths and stabilize temporary roads; and
  - Pave all unpaved construction roads and parking areas to road-grade for a length no less than 50 feet from where such roads and parking areas exit the construction site to prevent dirt from washing onto paved roadways.
- Construction:
  - Cover trucks when transferring materials;
  - Use dust suppressants on unpaved traveled paths;
  - Minimize unnecessary vehicular and machinery activities; and
  - Minimize dirt track-out by washing or cleaning trucks before leaving the construction site; an alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.
- Post-Construction:
  - Re-vegetate any disturbed land not used;
  - Remove unused material;
  - Remove dirt piles; and
  - Re-vegetate all vehicular paths created during construction to avoid future off-road vehicular activities

3.27.16 Hazardous Materials

Mitigation measures will be incorporated throughout the Project to limit the effect from hazardous materials. During final design and construction, if contaminated soils are identified and encountered, off-site remediation, chemical stabilization, or other treatments and disposal options would be evaluated.

Construction contractors will be required to develop and implement a site-specific health and safety plan. The plan will address the anticipated contamination, including:

- Equipment and procedures to protect the workers and general public;
- Monitoring of contaminant exposures; and
- Identifying the contractor's chain of command for health and safety.

3.27.17 Traffic and Transportation

A TMP has been developed based on the 30 percent design. The MDOT MTA will continue to update the plan as the Project advances into design and construction. The MDOT MTA will inform motorists, residents, businesses, schools, emergency service and delivery providers, and the public during construction of temporary changes to traffic patterns and detours.

3.27.18 Pedestrian and Bicycle Facilities

The MDOT MTA will ensure the Project is constructed in accordance with ADA requirements and will include easy-to-read and consistent signage, pedestrian-friendly design, bicycle storage and racks where possible, wayfindings signage, and safety and security measures.