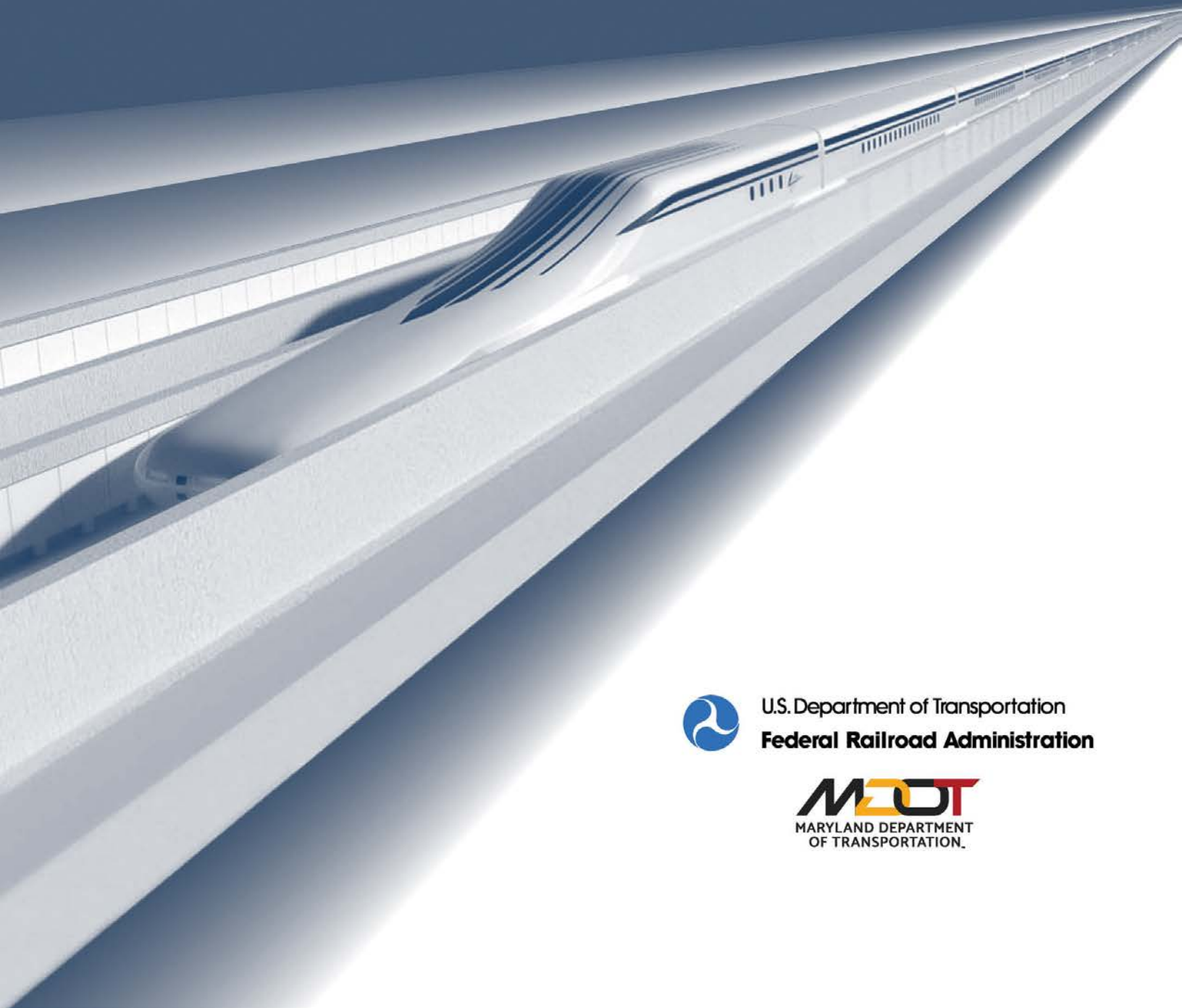
Section 4.23

Indirect and Cumulative Effects

BALTIMORE-WASHINGTON SUPERCONDUCTING MAGLEV PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION



U.S. Department of Transportation
Federal Railroad Administration

MARYLAND DEPARTMENT OF TRANSPORTATION

4.23 Indirect and Cumulative Effects

4.23.1 Introduction

This section identifies and describes the potential indirect (secondary) and cumulative effects of the Build Alternatives.

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

Cumulative effects are defined as 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). Cumulative effects include the direct and indirect impacts of a project together with the past, present, and reasonably foreseeable future actions of others.

4.23.2 Regulatory Context and Methodology

4.23.2.1 Regulatory Context

In accordance with the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq., the Council on Environmental Quality (CEQ) regulations, 40 C.F.R. Parts 1500-1508, and the Federal Railroad Administration's (FRA) Procedures for Considering Environmental Impacts, 64 Fed. Reg. 28545 (May 26, 1999) FRA assessed potential indirect and cumulative impacts from implementation of the Superconducting Magnetic Levitation Project (SCMAGLEV Project) . The assessment follows CEQ's 1997 *Considering Cumulative Effects under the National Environmental Policy Act* to address the following:

- Identify resources/topics of interest, such as noise, historic properties and wetlands;
- Establish geographic and temporal boundaries;
- Determine past, present, and reasonably foreseeable future projects to be assessed as part of the indirect and cumulative effects analyses; and
- Assess indirect and cumulative effects to resources of interest within the defined geographic and temporal boundaries.

4.23.2.2 Methodology

Market demand, local planning, and transportation-oriented development policies, land availability, and support infrastructure are factors that determine the location and type of growth in the indirect effects assessment. The indirect effects assessment focuses on the proposed SCMAGLEV Project station areas because transit–oriented development (TOD) potentially occurs around stations. The cumulative effects assessment considers planned and programmed transportation projects and non-transportation land development projects that are programmed or anticipated to occur independently of the SCMAGLEV Project. The cumulative effects assessment evaluates the role of the Build Alternatives in the cumulative effects of past, present and reasonably foreseeable future projects on the natural and human environment. When the potential effects of each Build Alternative are similar, the discussion in this section refers to the SCMAGLEV Project in general. Where effects differ among the Build Alternatives, specific discussion of each is provided.

This assessment relies on data sources described throughout Chapter 4 that focus on:

- demographic data and projections;
- land use/land cover data;
- local land use plans;
- information on planned development projects; and
- resource mapping.

4.23.2.3 Resources of Interest

As noted above, indirect effects result from changes in the natural environment or socioeconomic conditions that are caused by the Build Alternatives but occur later in time or farther removed in distance. FRA evaluated these effects as impacts to the natural and human environments. Resources selected for analysis are those that would be affected directly by the Build Alternatives, those that would be affected by potential SCMAGLEV Project-related indirect development associated with the station areas, and those that are particularly susceptible to effects from other foreseeable projects over time that, in aggregate, could result in a cumulative effect. Transportation is presented in this analysis in terms of the role it plays in affecting other resources. The resources assessed in the indirect and cumulative effects analysis are:

- Transportation
- Human Environment
  - Acquisitions and Displacements
  - Economics
  - Neighborhoods and Community Facilities
  - Parks, Recreational Land and Open Space

  - Historic properties and archaeological sites
  - Visual and Aesthetic Resources
  - Air Quality
  - Noise and Vibration
  - Environmental Justice
  - Utilities
  - Energy
- Natural Environment
  - Water Resources
  - Wetlands
  - Forests
  - Ecological Resources

4.23.2.4 Geographic Study Area Boundaries

In general, many of the indirect impacts of the Build Alternatives would be localized at and around the station areas because potential indirect effects are from the access to the transportation service provided at the SCMAGLEV stations. This would include the areas within walking distance of a station, generally approximated as being within a half-mile radius. However, potential development could also occur outside of the local station area. The geographic boundary for indirect effects thus includes the jurisdictions of Washington, D.C., Anne Arundel County, and the City of Baltimore, in which the stations are located.

The cumulative effects geographic boundary differs from the indirect effects analysis because it encompasses resources that are potentially affected by multiple projects considered in aggregate. FRA examined the effect of multiple projects on community resources, including parks, at the municipal level to determine the effect of all projects on the inventory and availability of those resources to residents in that municipality. To appropriately assess these resources, FRA defined the cumulative effects geographic boundary as encompassing the following geographic areas, as shown in **Figure 4.23-1** and described below:

- The Preliminary Alternatives Screening Report (PASR) Project Study Area – The PASR Project Study Area extends approximately 57 miles from Washington, D.C. to Baltimore, MD, and is approximately 20 miles wide. The PASR Project Study Area was used during the development and evaluation of early alternatives and is the regional context for considering potential SCMAGLEV Project benefits and effects to human and natural resources, such as transportation, property acquisitions and displacements, historic and archaeological resources, visual impacts, and noise and vibration impacts. The PASR is located at http://bwmaglev.info/index.php/project-documents/reports.

- The Watershed Boundary – The SCMAGLEV Project traverses eight watersheds within four larger drainage basins[1] as shown in Section 4.10, Figure 4.10-1. FRA examined the potential impacts of the SCMAGLEV Project and other projects on a watershed to evaluate the potential for cumulative change or loss of natural resource functions in that watershed.
- The Metropolitan Washington Council of Governments and Baltimore Metropolitan Council Boundaries[2] – The councils are the sources for data on vehicle trips. This is used as the source of travel data within the cities and counties within which the SCMAGLEV Project would be located.

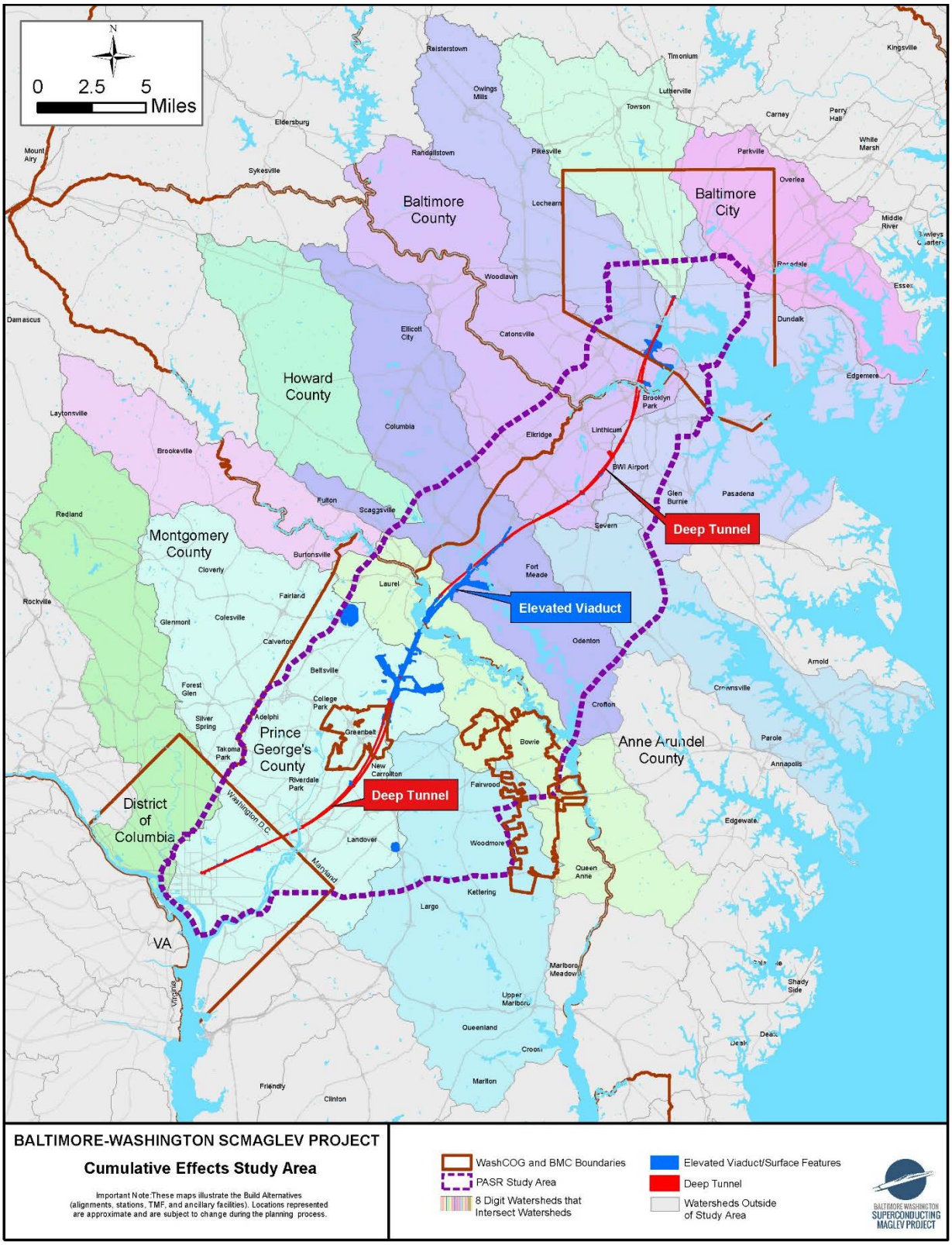
4.23.2.5 Past, Present, and Reasonably Foreseeable Future Actions

Following the end of World War II in 1945, the nationwide suburban housing boom led to significant outmigration from Washington, D.C. and Baltimore, MD to surrounding areas. In the 1950s, large Federal properties within the cumulative effects geographic boundary, such as the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center, the National Security Agency (NSA) headquarters and the Baltimore-Washington Parkway (BWP), were developed. Suburban development in central Maryland and northern Virginia continued to increase in the 1950s and 1960s. Initially, transportation access constraints limited growth, but significant efforts by Federal and state agencies began to improve regional mobility. These efforts included expanding both roadway and public transit networks such as roadways encompassing the Project Study area, the Washington Metrorail system, Amtrak and Maryland Area Regional Commuter (MARC) operations, and improved access to and allowed the development of agricultural and undeveloped properties. With better transportation access, residential development increased and will continue to increase as evidenced by the population data in Section 4.5 Environmental Justice.

[1] Both tributary basins and watersheds are areas of land that drain to a water body (e.g., lake, stream, or river). The term watershed is used to describe a smaller area of land that drains to a smaller stream, lake, or wetland.

[2] The Metropolitan Washington Council of Governments includes the following Project Study area locales: Washington, D.C., Prince George's County, the City of Greenbelt and the City of Bowie. The Baltimore Council of Governments includes the following locales: Anne Arundel County, Baltimore County and Baltimore City.

Figure 4.23-1 Cumulative Effects Geographic Boundary



Foreseeable future actions include planned and programmed transportation and non-transportation projects within the geographic boundaries of the indirect and cumulative effects analysis, and temporally out to the SCMAGLEV Project horizon year 2045. **Table 4.23-1** provides a list of other transportation and non-transportation projects that show present and reasonably foreseeable future actions within the geographic boundaries. FRA qualitatively assessed the potential effects associated with these actions.

Land Development Projects

Due to the already developed nature of most land within the geographic boundaries of the indirect and cumulative effects analysis, the primary type of development activity occurring today and planned for the foreseeable future is infill and redevelopment of lands previously converted to human uses. Focal points for development and redevelopment activity are near Baltimore-Washington International Thurgood Marshall Airport (BWI Marshall Airport) and in the cities of Washington, D.C. and Baltimore, MD. As development and redevelopment occurs, the stock of residential and non-residential uses in the analysis area would increase, as would the demand for transportation services.

Table 4.23-1: Representative Present and Reasonably Foreseeable Future Actions

Category	Representative Actions (jurisdiction)
Transportation: Aviation	• Tipton Airport Development and Runway Extension (Anne Arundel County) • BWI Marshall Airport Improvements (Anne Arundel County)
Transportation: Transit	• Metrorail Extension to Dulles Airport (Washington, D.C.) • Purple Line (Montgomery and Prince George's Counties) • Bus Rapid Transit to BWI Marshall Airport (Anne Arundel County) • Penn Line and Camden Line Service Improvements (Washington, D.C. Anne Arundel, Prince George's and Baltimore Counties, City of Baltimore)
Transportation: Freight	• National Gateway Freight Rail Corridor (Washington, D.C./various MD counties) • Howard Street Tunnel (Baltimore City)
Transportation: Maritime	• Dundalk Marine Terminal, Phase 1 Rehabilitation (Baltimore City) • Masonville Berth Construction (Baltimore City)
Transportation: Rail	• Washington Union Station Master Plan (Washington, D.C.) • Camden Yards Train Station (Baltimore City) • Northeast Corridor (NEC) FUTURE Program (Washington, D.C./various MD counties)

Category	Representative Actions (jurisdiction)
	• Long Bridge Project (Washington, D.C.) • Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) Project (Washington, D.C./various VA counties) • B&P Tunnel (Baltimore City) • BWI Marshall Rail Station Improvements and Fourth Track Project (Anne Arundel County and Baltimore County)
Transportation: Highway	• Washington, D.C. to Baltimore Loop Project (Washington, D.C. Anne Arundel, Prince George's and Baltimore Counties, City of Baltimore) • I-495 & I-270 Managed Lanes Study (Fairfax County, VA and various MD counties) • Maryland Traffic Relief Plan (projects in Prince George's and Anne Arundel Counties) • MD 198/BWP Interchange improvements (Anne Arundel County) • I-95 John F. Kennedy Memorial Highway Interchange improvements and Express Toll Lanes (various MD counties) • US 40, Pulaski Highway Improvements (MD) • US 1 Baltimore Avenue Reconstruction (MD) • MD 100, MD 175, and MD 198 Widening (various MD counties) • MD 193 Intersection Improvement (Prince George's County) • Good Luck Road Widening (Prince George's County)
Non-Transportation	• Mount Vernon Triangle and Chinatown, Large-scale Commercial and Residential (Washington, D.C.) • Odenton Town Center Master Plan (Anne Arundel County) • Demolition of 22 Buildings at the Henry A. Wallace Beltsville Agricultural Research Center (Prince George's County) • U.S. Department of the Treasury Construction and Operation of a Currency Production Facility at the Beltsville Agricultural Research Center (Prince George's County)

Sources: FRA, 2016 *NEC Future Tier 1 Final Environmental Impact Statement;* FHWA, 2019 Washington, D.C. to Baltimore Loop Project Draft Environmental Assessment; *baltimoremagazine.com; bizjournals.com; nps.gov; urbanturf.com* https://495-270-p3.com/

4.23.3 Indirect Effects Assessment

The new SCMAGLEV service provided by the Build Alternatives may enhance and encourage development and redevelopment near stations because of the connections,

convenience and reliability the new service would provide. This development could include new residences and businesses. The location of indirect development activity could be within one-half mile of the stations to attract walking riders as well as development greater than one half mile from the stations to attract riders who would drive and park at the stations. Development activities would be guided by existing and future planning and zoning as follows:

- Baltimore City's Urban Renewal Plan provides a framework for redevelopment in the Downtown Business District where the proposed Camden Yards Station would be located. The Plan is an overlay to the City's zoning and land use requirements. The framework guides the types, scale and density of development.
- Baltimore City planning and zoning provisions guide development in the Cherry Hill Station area. In similar fashion to the City's Urban Renewal Plan, these provisions guide the types, scale and density of development that occurs.
- The Mount Vernon Triangle, in Washington, D.C., is in the redevelopment planning stage in the area around the Mount Vernon Square East Station. The District of Columbia's Comprehensive Plan and zoning provisions will guide this development.
- Development around the BWI Marshall Airport Station is guided by planning and zoning provisions of Anne Arundel County (Referenced in Section 4.3 Land Use and Zoning). The County generally provides for commercial uses closest to the airport, while residential and other uses form a more distant, outer ring. The BWI Marshall Airport Master Plan and Airport Layout Plan (April 2011, with an Update Narrative Report January 2015) also identifies airfield, terminal and landside development to accommodate projected increases in future aviation travel demand.

4.23.3.1 Human Environment

The SCMAGLEV Project would contribute to social and economic forces that transform the areas around stations over time. The effects of development and redevelopment could include property premiums (see Section 4.6 Economic Resources), decreases in affordable housing opportunities, increased employment opportunities, greater availability of consumer goods and services, changes to business revenues and operations, changes in neighborhood character (such as visual change), changes in demand for community facilities, threats to historic and archaeological sites, and utilities impacts. These potential impacts could be felt more acutely by Environmental Justice populations because these populations tend to be sensitive to changes in housing values, changes in their business revenues and operations, and the availability of employment and public transportation. These impacts are discussed in detail in Section 4.5 Environmental Justice.

4.23.3.2 Natural Environment

The use of and impacts to water and ecological resources are regulated by Federal, state and local laws, which are described in Sections 4.10 through 4.14. Impacts to the natural environment from additional development have the potential to occur. Additional

development would require additional energy, thereby increasing local energy demand. Development can impact water resources by increasing stormwater runoff, negatively affecting water quality, reducing groundwater infiltration because of additional impervious surfaces, and cause impacts to streams, waterways and floodplains.

4.23.4 Cumulative Effects Assessment

Past and present land use patterns located within the cumulative effects geographic boundary tend to be urban in character within Washington, D.C. and Baltimore City, and suburban outside of these cities. Although foreseeable future development and infrastructure projects are expected to occur independently of the SCMAGLEV Project, it may have a catalytic effect on the pace, scale and geographic extent of development near proposed stations. The following resources are those that would be susceptible to cumulative effects as a result of being directly or indirectly affected by the Build Alternatives and other past, present, and reasonably foreseeable projects. In summary, the SCMAGLEV Project would reduce potential cumulative adverse effects on air quality at the regional level by diverting roadway traffic to train travel. For all other resources, including localized air quality around station locations, impacts from the SCMAGLEV Project have the potential to result in cumulative impacts when combined with past, present and reasonably foreseeable actions, as further described below.

4.23.4.1 Transportation

Increased local travel demand, traffic congestion, and demand for passenger rail and transit services are anticipated to occur. Past and present transportation projects have formed a network of local and regional roadways designed to connect Washington, D.C. and Baltimore City as focal points of activity. Each Build Alternative would help to satisfy future travel demand and divert riders from other modes (i.e., auto, rail, bus, taxi/rideshare) as shown in Section 4.2 Transportation. Other reasonably foreseeable future actions would primarily serve to accomplish similar objectives by addressing congestion and constraints in the existing roadway network and the Northeast Corridor (NEC). However, facilities proposed under the SCMAGLEV Project may also result in localized traffic effects in certain areas that could coincide with other adjacent reasonably foreseeable future actions. Directly west of the BARC West trainset maintenance facility (TMF) on property currently within BARC, the U.S. Department of the Treasury is proposing a new currency production facility. According to the U.S. Department of the Treasury, Construction and Operation Production Facility at the Beltsville Agricultural Research Center Draft EIS, the proposed facility would result in significant traffic impacts.

The SCMAGLEV Project construction activity has the potential to occur at the same time as some planned transportation projects, such as roadway improvements and advancement of the NEC FUTURE program. SCMAGLEV Project construction activity also has the potential to occur at the same time as other large-scale commercial and residential projects in Washington, D.C. and the City of Baltimore, and this may have a cumulative effect on traffic on major roadways (i.e., New York Avenue NE/US 50 in Washington, D.C). Multiple projects

that are simultaneously in the construction phase have the potential to create more disruption to transportation services than that caused by a single project. In some instances, travelers may choose alternative transportation to carry out their daily commutes. How travelers will choose to travel is unknown and would be influenced by their commuting patterns and ongoing construction of other transportation projects.

The Project Sponsor would, as a component of construction planning, consider and factor in the potential effects of SCMAGLEV Project construction activity and other transportation projects that would also be in the construction phase. The Project Sponsor would coordinate construction planning with the sponsors of the other projects, with the goal of minimizing potential cumulative construction phase impacts to the extent reasonably feasible.

4.23.4.2 Acquisitions and Displacements

As described in Section 4.3 Land Use and Zoning, each Build Alternative would require full and partial property acquisitions and displacements. The Build Alternatives would require full permanent acquisitions from a range of 114 to 120 parcels. Additional acquisitions and displacements could also occur as a result of induced growth around SCMAGLEV Project station areas.

Cumulative impacts could result where impacted properties coincide with parcels impacted by other reasonably foreseeable future actions. For example, acquisitions that may be required for the MD 198 widening may need to be coordinated with acquisitions required for the MD 198 TMF. Similarly, temporary acquisitions needed for the temporary tunnel laydown area in the vicinity of the Purple Line Beacon Heights-East Pines station may need to be coordinated with any Transit-Oriented Development (TOD) that may occur around this proposed Purple Line station. Acquisitions necessary for the BARC West TMF would need to be coordinated with the demolition of 22 buildings at BARC, some of which coincide with the location of the BARC West TMF. Likewise, cumulative impacts to neighborhoods could occur where properties within the same neighborhood are impacted by multiple projects. For example, neighborhoods in the vicinity of the MD 197/BWP interchange would be directly impacted by the SCMAGLEV Project. If those neighborhoods are impacted by other projects, such as other noted transportation projects, then they would experience cumulative effects.

4.23.4.3 Socio-Economics

The Build Alternatives would each have similar socio-economic benefits and impacts, as described in Section 4.6 Economic Resources. The SCMAGLEV Project would create jobs and wages, and traveler benefits. In addition, the SCMAGLEV Project would likely increase the potential for TOD near station locations. Negative economic effects are similar among the Build Alternatives and include potentially higher traveler costs and increased property costs around stations, which could negatively affect affordability.

Generally, other reasonably foreseeable future actions in the vicinity of the SCMAGLEV Project are anticipated to produce additional economic benefits and impacts. The

SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to result in cumulative economic impacts and influence economics in the region.

4.23.4.4 Neighborhoods and Community Facilities

As shown in Section 4.4 Neighborhoods and Community Resources, construction and operation of the SCMAGLEV Project would result in permanent adverse impacts to some neighborhoods and community facilities. Impacts would include one or more of the following: property acquisition (ranging from partial to full acquisitions), disruption to community cohesion or use of community facilities, aesthetics and visual appearance, noise and vibration, air quality, health and safety, and/or changes to access and mobility. In addition, SCMAGLEV Project-induced development around stations could incrementally increase pressure on public infrastructure and services. County and local land use plans and regulations serve to direct future growth and limit excessive pressure on public facilities and services.

Generally, other reasonably foreseeable future actions in the vicinity of the SCMAGLEV Project are anticipated to produce additional impacts on neighborhoods and community facilities, in particular commercial and residential development projects and transportation projects that may bisect communities and impact community cohesion, such as road widening projects, as well as result in additional changes in aesthetics and visual appearance, noise, and access and mobility.

The SCMAGLEV Project would have direct and indirect effects on neighborhoods, that in combination with other reasonably foreseeable future actions, would contribute to cumulative effects. Cumulative effects would be felt most in neighborhoods closer to the SCMAGLEV Project, such as communities along the BWP and around TMFs and stations.

4.23.4.5 Parks, Recreational Land and Open Space

As described in Section 4.7 Recreational Facilities and Parklands, the Build Alternatives J1 would result in a higher number and slightly more acreage of permanent impact to public recreational facilities and parklands than the Build Alternatives J. All Build Alternatives would have impacts that would be difficult to mitigate to the following parks: the BWP, Patuxent Research Refuge (PRR), Greenbelt Forest Preserve, and Patuxent River Park 1. The I-495/I-270 Managed Lanes Study would result in an Adverse Effect on the BWP. This impact combined with the proposed improvements of the SCMAGLEV Project would result in cumulative effects on the BWP.

Similar to community facilities, SCMAGLEV Project-induced development could incrementally increase demand and capacity pressure on public parks and recreation facilities around stations as well. However, development or redevelopment plans could also occur around stations, and parks could be programmed into these plans to provide capacity for additional demand. Related to the development decisions to be made at the county and

local levels, the effect on parks, recreational land and open space must also be considered as the county and local review individual development applications.

Generally, other reasonably foreseeable future actions in the vicinity of the SCMAGLEV Project could produce additional direct and indirect impacts on parks and recreational land, in particular transportation projects that may encroach on parkland to obtain additional right-of-way.

4.23.4.6 Historic Properties

As described in Section 4.8 Cultural Resources, all Build Alternatives would result in adverse effects to Mount Vernon Square Historic District and Addition, The New York, Martins Woods, the Beltsville Agricultural Research Center (BARC), and the BWP. All Build Alternatives J1 would have an adverse effect to the Greenbelt Historic District, a National Historic Landmark (NHL). Four Build Alternatives that propose the BARC Airstrip TMF would result in adverse effects to the Goddard Space Flight Center (GSFC). Eight Build Alternatives, those that include the MD 198 TMF, would result in adverse effects to the D.C. Children's Center-Forest Haven District. Build Alternatives that end at Cherry Hill Station would have an adverse effect on the Westport Historic District by being above grade, while those ending at Camden Yards Station (below grade) would have an adverse effect on the Otterbein Church. The Build Alternatives J1 would have an adverse effect to a smaller number of below-ground resources and to lower acreages of High-Moderate archaeological potential than the Build Alternatives J. Adverse effects on historic and archaeological resources could also occur as a result of induced growth around station areas.

The SCMAGLEV Project, in combination with other reasonably foreseeable future actions, would result in cumulative impacts to historic properties. Among the other reasonably foreseeable future actions, improvements to roadways and the NEC have the potential to impact historic properties, particularly where the right-of-way (ROW) expansion is planned and where induced development and redevelopment caused by those projects may occur. The proposed U.S. Department of the Treasury Currency Production Facility on property currently within BARC would result in significant adverse effects to the BARC Historic District due to visual changes. In addition, the Washington, D.C. to Baltimore Loop Project also has the potential to impact historic properties. Although Loop tunnels would be constructed approximately 30 to 90 feet below the surface to avoid these resources and tunnel boring machine launch shafts and Loop Stations would not require the demolition of existing historic buildings, adverse effects could occur if a permanent surface structure (e.g., ventilation shaft sites) were to be sited within or adjacent to a historic property. Section 106 of the National Historic Preservation Act (NHPA) regulates protection of historic properties and state, county and local regulations, where present, also provide for such protection; therefore, adverse cumulative effects can be minimized through compliance with these various regulations.

4.23.4.7 Visual and Aesthetic Resources

Each Build Alternative has the potential to result in high visual impacts in the vicinity of many resources, including but not limited to BARC, the BWP, Greenbelt, the United States Secret Service James J. Rowley Training Center, the Patuxent River and associated parks/refuge, and downtown Baltimore (see Section 4.9 Aesthetics, Visual Quality, and Light Emissions). Visual impacts could also occur as a result of induced growth around station areas.

The assessment of potential cumulative visual and aesthetic impacts focused on the SCMAGLEV Project in combination with other reasonably foreseeable future actions within the same viewshed. The analysis was focused on the portions of viaduct, station and facilities in the shared viewsheds because the tunnels would not cause visual impacts. Generally, other reasonably foreseeable future actions in the vicinity of the SCMAGLEV Project are anticipated to produce additional visual impacts, in particular projects that would result in a greater loss of trees and vegetation, for example by the addition of roadway travel lanes for the BWP widening and other roadway widening projects, and the proposed U.S. Department of the Treasury Currency Production Facility on property currently within BARC. The SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to result in cumulative visual impacts.

4.23.4.8 Air Quality

The SCMAGLEV Project has the potential to divert some existing and future road-based travelers to the SCMAGLEV service, thereby reducing vehicular emissions and benefiting air quality. However, there could be a slight increase in emissions around new stations due to increased traffic accessing the station locations.

Other reasonably foreseeable future projects include roadway improvements to address congestion and capacity improvements along the BWP and NEC. Each of these other projects would have incrementally positive or negative effects on air quality. However, since the SCMAGLEV Project would generally benefit regional air quality, it would reduce any potential cumulative adverse effects on air quality.

4.23.4.9 Noise and Vibration

As described in Section 4.17 Noise and Vibration, the Build Alternatives would have noise and vibration impacts on sensitive resources in proximity to the SCMAGLEV Project. Potential sources of noise and vibration include train operations including track, propulsion and aerodynamic noise, general noise at elevated passenger stations, fresh air and emergency egress facilities, electrical power substations, TMF sites, and maintenance of way (MOW) facilities. In addition, construction methods and equipment could result in temporary increases in noise and vibration levels at nearby sensitive receptors. Noise and vibration effects could also occur as a result of induced growth around station areas.

Generally, other reasonably foreseeable future actions in the vicinity of the SCMAGLEV Project are anticipated to produce additional noise and vibration, in particular projects that add capacity to the existing transportation system, such as airport runway extensions, new rail infrastructure, and other roadway widening projects as identified in **Table 4.23-1**. These road widenings would increase roadway capacity, which could increase noise and vibration levels. Airport improvements and runway extensions would make it feasible for larger and louder aircraft to take off and land in the area, and new rail infrastructure could allow for faster trains and a higher number of trains which could increase noise and vibration levels along the Northeast Corridor.

The SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to contribute cumulatively to noise and vibration impacts. Cumulative noise and vibration impacts would also result if construction activities for the SCMAGLEV Project and adjacent projects occur concurrently. However, during construction planning, the Project Sponsor will coordinate with other responsible parties to develop a SCMAGLEV Project construction plan that considers cumulative noise and vibration effects and identifies and implements mitigation strategies to the extent feasible. In addition, mitigation measures identified in Section 4.17 Noise and Vibration would reduce noise and vibration impacts from the SCMAGLEV Project to a large extent.

4.23.4.10 Environmental Justice (EJ)

As described in Section 4.5 Environmental Justice (EJ), FRA considered the location of block groups with EJ and non-EJ populations in relation to effects of the Build Alternatives by environmental resource. Impacts would occur along the length of the SCMAGLEV Project corridor particularly in proximity to the portions of the SCMAGLEV Project that would be constructed aboveground, including the stations, viaduct, tunnels, TMF sites, and ancillary facilities. Most environmental resources would experience some degree of direct impacts from the Build Alternatives. Generally, similar concentrations of impacts within EJ population areas would occur for each Build Alternative, as the large majority of SCMAGLEV Project Affected Environment qualifies as EJ and the Build Alternatives are in proximity of one another relative to the size of the block groups. In addition, SCMAGLEV Project-induced development could result in additional impacts on EJ populations in and around station areas.

Since the large majority of block groups surrounding the SCMAGLEV Project qualify as EJ, other reasonably foreseeable projects could have benefits and/or impacts on these populations. Potential benefits and impacts include acquisition and/or displacement, increasing or decreasing affordable housing opportunities, changing employment opportunities, affecting business operations, changing neighborhood character and access to community and park resources, visual, noise, and/or vibration effects, changing the availability of consumer goods and services, changing public health and safety conditions, changing access to transit, increasing or decreasing congestion on roadways, and air quality impacts. For example, the proposed U.S. Department of the Treasury Currency

Production Facility directly west of the BARC West TMF has been identified as having significant adverse impacts on EJ populations as a result of increased traffic.

The SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to result in cumulative impacts on EJ populations due to the high concentrations of EJ populations within the SCMAGLEV Project Affected Environment.

4.23.4.11 Utilities

As further described in Section 4.20 Utilities, each Build Alternative would require relocation, replacement, or support of existing utility infrastructure to accommodate SCMAGLEV Project elements, including viaduct, tunnel, and station and TMF construction. Such relocation would be done by and in coordination with the utility operators. In addition, SCMAGLEV Project-induced development could result in additional impacts on existing utilities in and around station areas.

All other reasonably foreseeable actions listed in **Table 4.23-1** would likely have impacts on existing utilities as they include large infrastructure and development projects and road widenings which often result in utility relocation. Thus, the SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to result in cumulative impacts on utilities. These additional effects on utility infrastructure and the need to relocate utilities must be considered in coordination with the utility operators as well as in coordination with other project sponsors where projects are co-located or affect the same infrastructure.

4.23.4.12 Energy

Suburbanization within the cumulative effects boundary and the increase in demand for housing since the end of World War II has increased energy needs to power and heat buildings, fuel automobiles and buses, and provide communications. As described in Section 4.19 Energy, the SCMAGLEV Project is expected to divert some existing and future travelers, particularly travelers that would otherwise drive. Thus, although the SCMAGLEV Project would incur an energy expenditure of approximately 4.3 trillion Btus/year, the net energy use after subtracting the 929 million – 1.025 trillion Btus/year reduction by traveler diversion would be nearly 3.3 – 3.4 trillion Btus/year. In addition, construction of the SCMAGLEV Project would consume 6 trillion Btus and additional energy may be expended as a result of SCMAGLEV Project-induced growth.

Currently committed transportation projects, other than the SCMAGLEV Project, are primarily focused on accommodating existing and future road-based and NEC rail travel. Growth in the number of automobiles and other road-based vehicles would increase demand for fuel. Foreseeable future development, such as those near the Mount Vernon Triangle in Washington, D.C, would incur greater energy demands than those experienced today.

The SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to result in cumulative impacts on energy as operation of the SCMAGLEV Project would add over 40 percent to regional transportation energy use which would also increase with the implementation of reasonably foreseeable projects as described above.

4.23.4.13 Natural Environment

Past and present development in the cumulative effects geographic boundary has impacted natural resources by converting forests, undeveloped land, and water resources including wetlands to manmade uses. Examples of impacts of past and present development impacts on the natural environment include the development and expansion of BWI Marshall Airport and its vicinity. Previously undeveloped land was converted to transportation and commercial uses, resulting in new impervious surfaces and placement of waterways in underground pipes under pavement. These actions, as well as other conversions of natural areas to human uses have reduced the area of natural floodplains and ecosystems that manage flooding, support good water quality and sustain natural productivity.

As described in Section 4.10 Water Resources, the SCMAGLEV Project would contribute to further reduction of natural areas where SCMAGLEV Project elements would be placed in undeveloped or pervious areas. Each Build Alternative would directly and permanently impact watersheds as a result of grading, vegetation clearing, new structures, and conversion of pervious to impervious surfaces. Permanent watershed impacts range from approximately 900 acres to 1,100 acres of overall watershed impact. Each Build Alternative would also introduce new impervious surfaces to the landscape, result in clearing of vegetation, and have the potential for downstream impacts within the watershed, specifically to water quality. Impacts to groundwater would also occur, particularly resulting from areas of deep tunnel in the Patapsco aquifer and Patuxent aquifer within or near well-head protection areas (WHPA) and the MD 198 and BARC Airstrip TMFs which are also located within identified WHPAs. Impacts to floodplains would occur primarily due to above ground viaduct, long-term construction laydown areas associated with the Cherry Hill Station, and construction of the MD 198 and BARC Airstrip TMFs. The Patuxent River, a state Scenic River, would be impacted by a viaduct span over the river and associated piers, and the viewshed would be altered due to clearing of vegetation and construction of viaduct and piers. Impacts to Chesapeake Bay Critical Area would also occur due to stations within the City of Baltimore and fresh air emergency egress (FA/EE) in the vicinity of the Anacostia and Patapsco Rivers. As further detailed in Section 4.11 Wetlands and Waterways, although impacts to wetlands would occur throughout many areas where surface features exist, a large amount of wetland impacts and Nontidal Wetlands of Special State Concern (NTWSSC) impacts can be attributed to the MD 198 TMF and BARC Airstrip TMF.

As described in Section 4.12 Ecological Resources, the greatest potential impacts on ecological resources would occur in areas where permanent structures would replace habitat, in areas of vegetation removal or alteration of habitat (e.g., shading of normally open areas or forest fragmentation), and destruction of individual plants or animal habitats

during construction. Depending on Build Alternative, many of the effects would occur within the PRR, City of Greenbelt property, and Maryland-National Capital Parks and Planning Commission (M-NCPPC) park property. The three TMF options would result in substantial impacts to forests, forest interior dwelling species (FIDS) habitat, and Sensitive Species Project Review Areas (SSPRA).

Other reasonably foreseeable actions listed in **Table 4.23-1**, particularly those that expand existing roadways and develop new land uses (such as the proposed U.S. Department of the Treasury Currency Production Facility at BARC), would further reduce natural areas and their functions by creating new impervious surfaces and potentially impacting water and ecological resources.

The SCMAGLEV Project, in combination with these other reasonably foreseeable future actions, has the potential to result in cumulative effects on natural resources although the SCMAGLEV Project would be compliant with Federal, state and local laws and regulations. Potential impacts on natural resources such as forests, waterways and wetlands are governed by these laws and regulations, which are intended to guide development to prevent or minimize degradation or loss of natural resources on which human health and welfare depend. As the SCMAGLEV Project design advances, and in consultation with regulatory agencies, the Project Sponsor would examine ways to avoid or minimize natural resources impacts and would mitigate SCMAGLEV Project-related impacts as required by Federal and state laws.