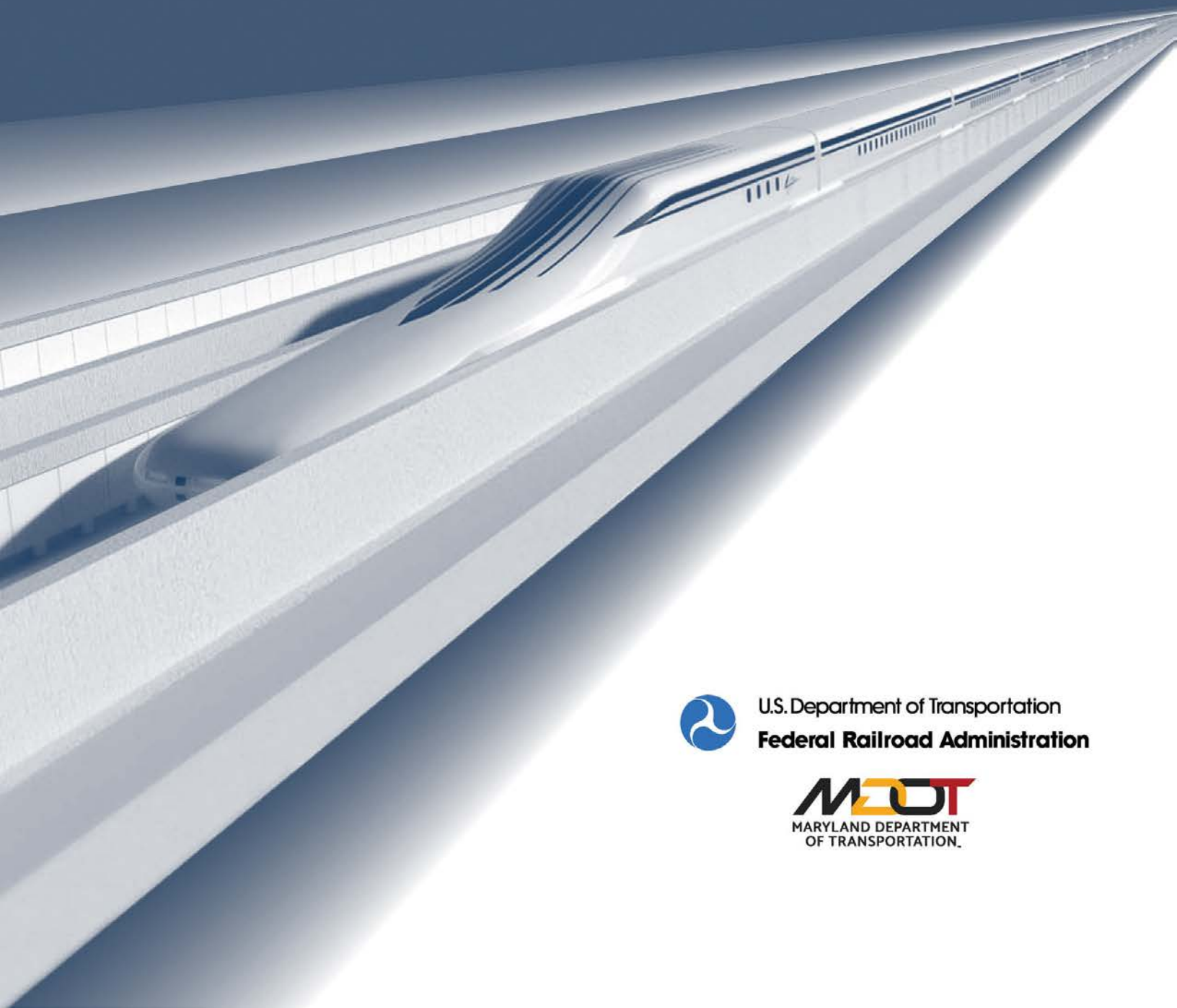
Section 4.06

Economic Resources

BALTIMORE-WASHINGTON, D.C. SUPERCONDUCTING MAGLEV PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION



U.S. Department of Transportation
Federal Railroad Administration

MARYLAND DEPARTMENT OF TRANSPORTATION

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4.6 ECONOMIC RESOURCES

This chapter describes the economic impacts that would occur with implementation of the Superconducting Magnetic Levitation Project's (SCMAGLEV Project) Build Alternatives (with respect to the No Build Alternative) within the Washington-Baltimore-Arlington, DC-MD-VA-WV-PA Combined Statistical Area (CSA). The Federal Railroad Administration (FRA) assumes that the first full year of operations would begin in 2030;[1] and economic operations and market response outcomes focus on full build-out conditions in the horizon year 2045. This economic narrative is structured to describe the economic impacts as they occur over the implementation timeline starting with construction of the SCMAGLEV Project, progressing to system operation, and ending with the broader market's reaction to the new transportation investment. Please see Appendix D.4, Economics Technical Report, for additional information.

4.6.1 Regulatory Context and Methodology

4.6.1.1 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 Rail Administration's (FRA) Procedures for Considering Environmental Impacts, 64 Fed. Reg. 28545 (May 26, 1999) FRA assessed the impacts on the socio-economic environment, including the number and kind of available jobs, impacts on commerce, including existing business districts, metropolitan areas, and impacts on local government services and revenues. For a discussion on community impacts, please see Section 4.4 Neighborhoods and Community Resources.

National and local economies are not subject to market regulation by any Federal agency. Rather, investments and policies are set in an effort to influence but not dictate market outcomes indirectly through economic policy decisions, land use regulation, and spatially-targeted incentives to spur and focus growth.

Local agencies consult and apply guidance from multiple Federal agencies on how economic assessments of transportation infrastructure should be conducted when a project is assessed. Appendix D.4 provides the list of applicable guidance documents. As SCMAGLEV is considered a new transportation mode, FRA has not published guidance for SCMAGLEV projects. However, FRA guidance for conventional passenger rail offers some indication of the types of impacts to be considered with SCMAGLEV projects.

[1] The Baltimore-Washington SCMAGLEV Project Construction Planning Memorandum (WSP, Revision 2, May 14, 2020) states that the SCMAGLEV will open at the end of 2029; therefore this chapter assumes that the first full year of operations would be 2030.

4.6.1.2 Methodology

FRA used the Baltimore and Washington, D.C. Metropolitan Statistical Areas (MSAs) to define the SCMAGLEV Project Affected Environment for which this analysis is focused. The Baltimore and Washington, D.C. MSAs are part of the broader Washington-Baltimore-Arlington, DC-MD-VA-WV-PA CSA. FRA's economic analysis describes the following categories of economic impacts for the Build Alternatives:

Short-term construction impacts – Added jobs and earnings during the construction period. Added jobs and earnings would provide a boost to the economy.

Using the Bureau of Economic Analysis (BEA) Regional Input-Output Modeling System (RIMS II) Series 2018 multipliers, FRA estimates jobs and earnings impacts (direct, indirect, and induced) resulting from construction of the Build Alternatives.

The construction activities would also generate negative impacts known as social costs. Two major parties that would incur these costs are the travelers and business community in the affected area. Due to road disruptions, travelers would experience travel delays while businesses are expected to see various levels of revenue losses or even business closures depending on the type of service they offer.

Long-term operation and maintenance impacts, and travel market impacts – Added jobs and earnings associated with SCMAGLEV operations when SCMAGLEV services are implemented.

FRA calculates the direct, indirect, and induced jobs and earnings impacts of the operation and maintenance (O&M) activities for the Washington-Baltimore-Arlington, DC-MD-VA-WV-PA CSA using BEA RIMS II Series 2018 multipliers.

In addition, this section includes travel market impacts that include value of changes in user benefits, reliability, safety, induced ridership, congestion, pavement cost, air quality, and the revenue of publicly-provided rail service (Amtrak and Maryland Area Regional Commuter-MARC). The SCMAGLEV service would provide benefits to users and nonusers that result from increases in mobility and reduced vehicle (auto) miles traveled (VMT), bus passenger miles traveled (PMT) and regional commuter rail PMT. FRA estimates a change in these operational benefits between the No Build Alternative to the Build Alternatives. The impacts (positive and negative) are monetized using outputs from the travel demand model,[2] values of time, operating costs associated with auto, bus and regional commuter rail travel, and economic values of crashes and emissions consistent with U.S. Department of Transportation (DOT) guidance.

Long-term market response to SCMAGLEV service – Changes in property value as a result of changes in transportation connectivity and accessibility within the

[2] Results from the travel demand model are summarized in the SCMAGLEV Ridership Data Request Memorandum (WSP. Baltimore-Washington Ridership Data Request, July 27, 2020).

metropolitan area, and minor negative impacts around the selected trainset maintenance facility (TMF). These impacts are measured in terms of a property premium (discount) for parcels around the Build Alternatives' stations and selected TMF. The likelihood of Transit-Oriented Development (TOD) is intensified with the addition of this mode at station locations. There is also the potential for agglomeration[3] and labor market impacts.

Construction of the SCMAGLEV requires the acquisition of some existing properties and possible changes in the properties' tax treatment in Baltimore City, Baltimore County, Anne Arundel County, Prince George's County and Washington, D.C. Any sizeable tax revenue loss may impact the ability to provide government services in the affected jurisdictions. Using parcel data from the latest records from the Assessor's Offices for Maryland and District of Columbia, FRA identifies the existing use of the "to be" acquired properties and whether part of each parcel or the full parcel would be acquired to estimate the potential property acquisition impacts. For a discussion on the community impacts, please see the discussion in Section 4.4 Neighborhoods and Community Resources.

The SCMAGLEV would have both a positive and negative impact on revenues, potentially impacting the local government services that rely on them. The increased accessibility of some properties would result in an increase in property values and therefore property taxes, while property acquisitions and losses of revenues by competing systems would result in a reduction of revenues. The net change in revenues would therefore impact the availability and scale of public services.

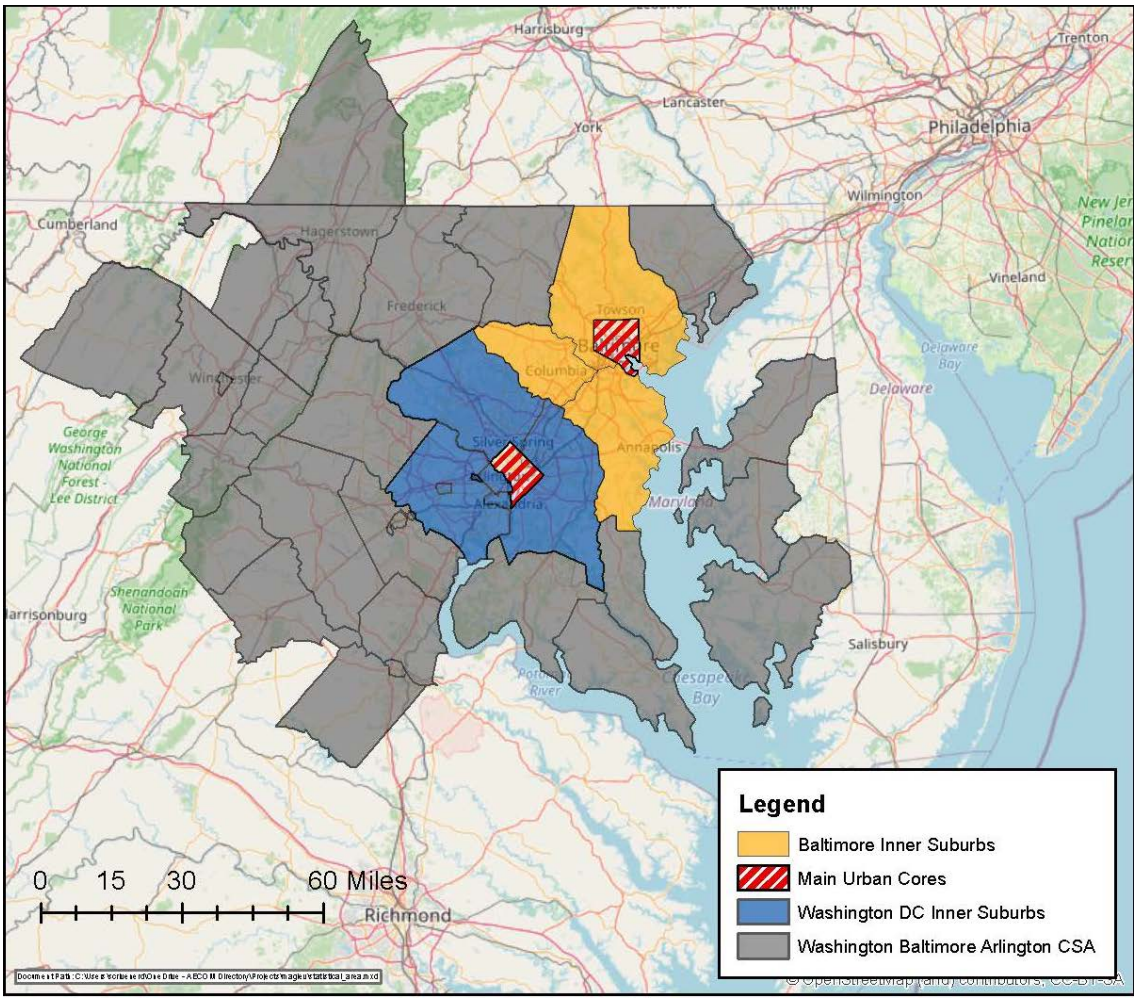
4.6.2 SCMAGLEV Project Affected Environment

The SCMAGLEV Project connects the two largest urban anchors within the Washington-Baltimore-Arlington, DC-MD-VA-WV-PA CSA (referred to as the Washington-Baltimore-Arlington CSA), which is the fourth largest CSA in the United States with nearly 10 million residents as of 2018. The CSA comprises the Washington, D.C. and Baltimore MSAs, as well as five other smaller urban areas including the Hagerstown-Martinsburg, MD-WV MSA, Chambersburg-Waynesboro, PA MSA, Winchester, VA-WV MSA, California-Lexington Park MSA and the Easton, MD micropolitan statistical area (as shown in **Figure 4.6-1**). The Washington-Arlington-Alexandria MSA (referred to as Washington, D.C. MSA) is centered on Washington, D.C. and includes five counties in Maryland; eleven counties and six independent cities in Virginia; and one county in West Virginia. The Baltimore-Columbia-Towson MSA (referred to as Baltimore MSA) is centered on Baltimore City and six nearby counties. The fast and reliable exchange of passengers between the two urban cores,

[3] Agglomeration impacts occur when the concentration of firms and employees facilitates the exchange of ideas and knowledge in the host market, fostering growth and productivity. To the degree that the SCMAGLEV reduces the impactive distance between knowledge industries, the potential for agglomeration economies rises. The economic connections between Washington, D.C. and Baltimore would intensify, allowing the two metropolitan economies to increasingly compete in the global economy with a larger footprint.

accommodated by the SCMAGLEV Project, would reinforce the existing economic integration between Washington, D.C. and Baltimore City.

Figure 4.6-1: Washington-Baltimore-Arlington Combined Statistical Area (2012)



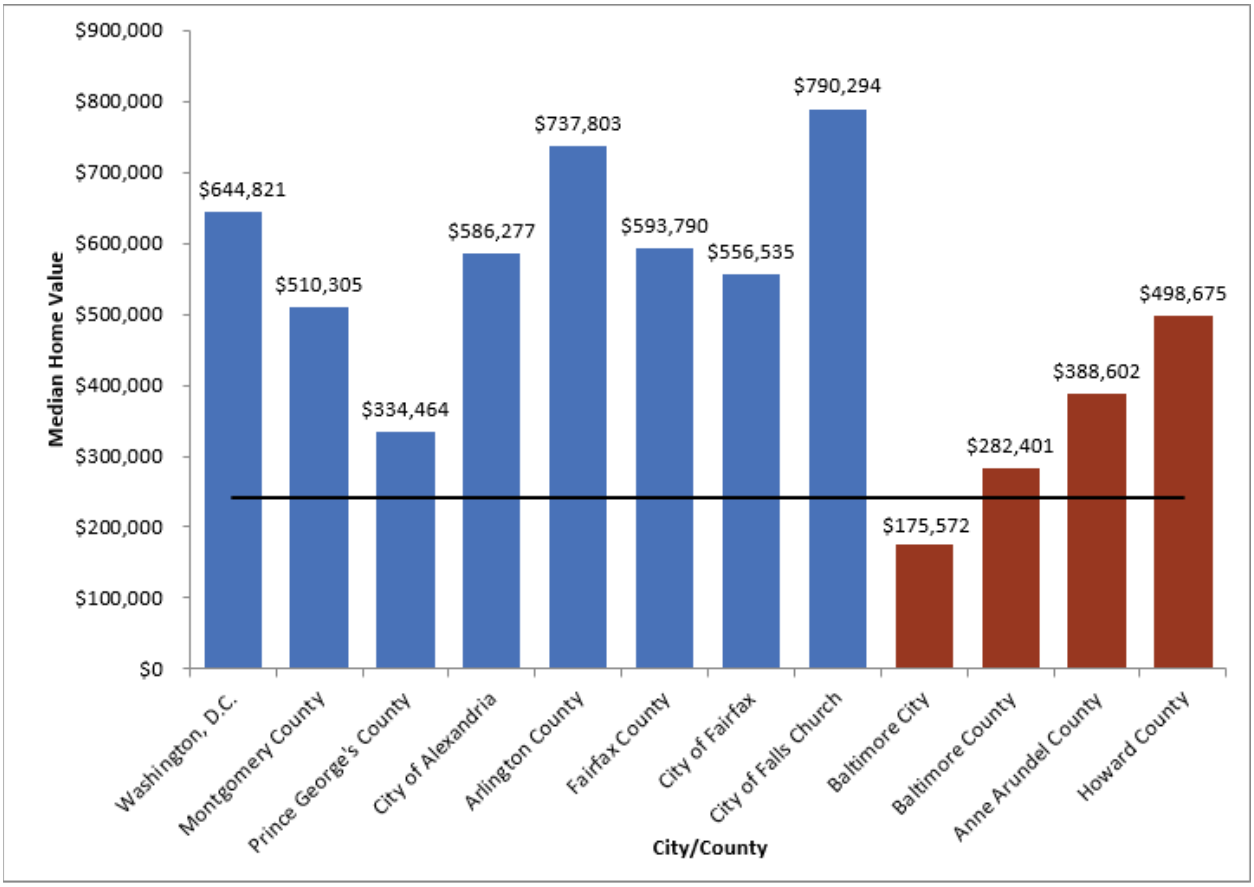
Source: US Department of Commerce Economics and Statistical Administration U.S. Census Bureau, 2012 Economic Census. https://www2.census.gov/geo/maps/econ/ec2012/csa/EC2012_330M200US548M.pdf

The SCMAGLEV Project Affected Environment, for which this analysis is focused, differs from the Project Study Area defined in the Purpose and Need as interconnections in the economy would foster economic impacts beyond the physical dimensions of the corridor.

In addition to several highways, two public transportation agencies provide service connecting Baltimore to Washington, D.C. currently. These are Amtrak and the Maryland Department of Transportation Maryland Transit Administration (MDOT MTA). These services use a different technology than SCMAGLEV and offer travelers a slower but less expensive means to travel between the two urban areas.

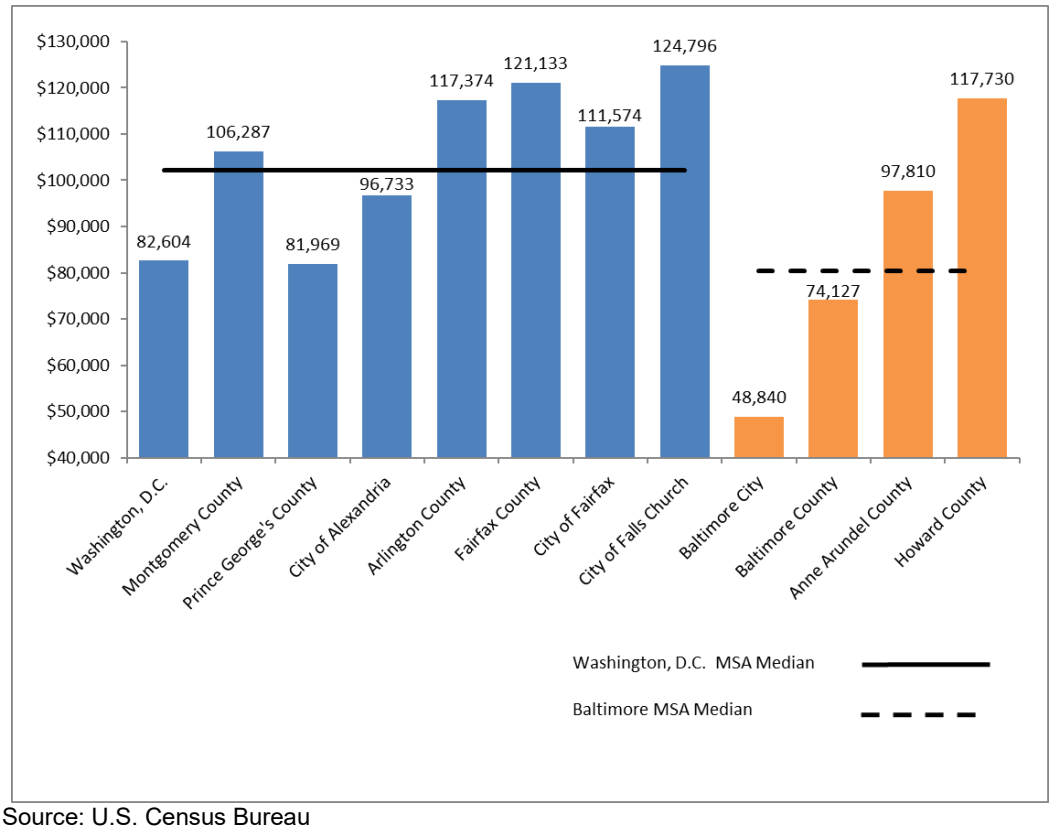
Figures 4.6-2 and 4.6-3 show the median home value and the median household income for counties in the Washington, D.C. and Baltimore metropolitan areas. Median home values and median household incomes are generally higher in the Washington, D.C. MSA compared with the Baltimore MSA. Median household income in the Washington, D.C. MSA is approximately $102,180, while in the Baltimore MSA median household income is approximately $80,470. Median house prices are also higher in the Washington, D.C. MSA compared with those in Baltimore MSA by as much as $600,000 depending on the jurisdictions.

Figure 4.6-2: Median Home Value for Washington, D.C., Baltimore City and Inner Suburbs (2019, Q4)



Source: National Association of Realtors, Median Home Value, Q4, 2019

Figure 4.6-3: Median Household Income for Washington, D.C., Baltimore City and Inner Suburbs (2018)



Source: U.S. Census Bureau

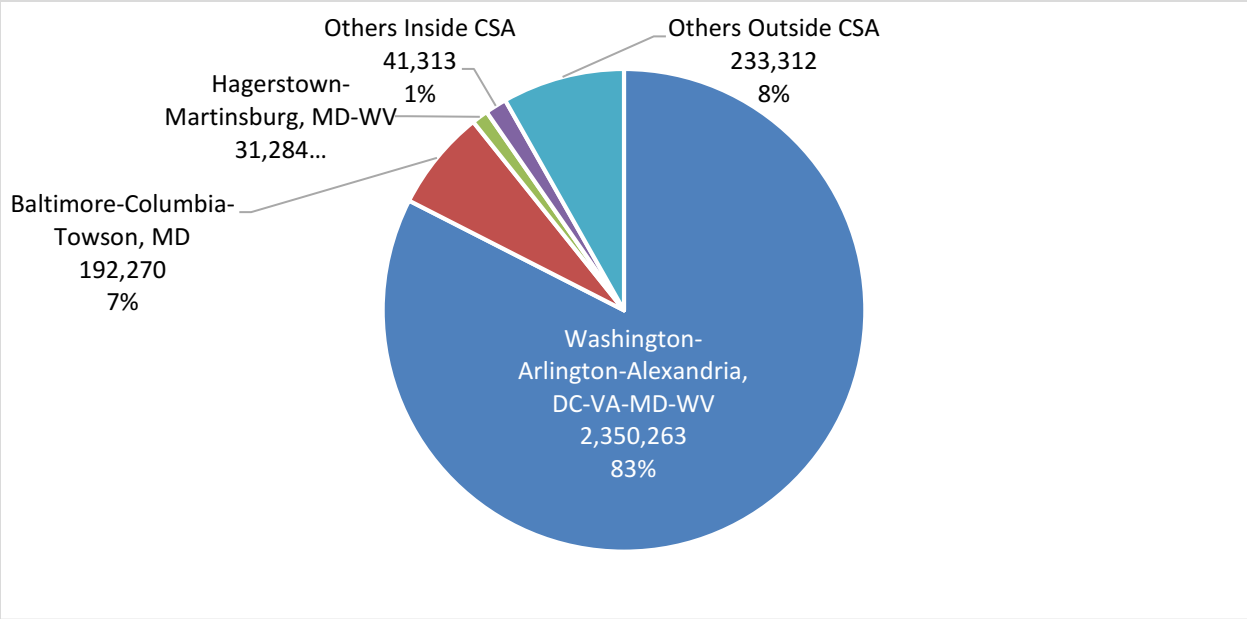
The Washington, D.C. and Baltimore metropolitan areas also differ by size in terms of job opportunities. In 2019, there were nearly 3.4 million jobs in Washington, D.C. MSA compared with nearly 1.4 million jobs in the Baltimore MSA. Comparing just the core areas that would be connected via the Build Alternatives, the District of Columbia has 798,400 jobs compared with 373,400 jobs in Baltimore City.[4]

While lower housing cost exists in the Baltimore MSA, the Washington, D.C. MSA provides generally higher wages and a larger pool of job opportunities. The different economic benefits provided by each market create incentives to live in one market and commute to the other. While the majority of each MSA's commuters live in the same MSA as they work in (83 percent in Washington, D.C. MSA and 78 percent in Baltimore MSA), a significant number of people commute between the two MSAs. Over 192,000 workers, or 7 percent of total commuters to the Washington, D.C. MSA, commute from the Baltimore MSA; and over 160,000 workers, or 13 percent of total commuters to the Baltimore MSA, commute from the Washington, D.C. MSA. These percentages provide the best estimate of the labor exchange between the two markets under the No Build Alternative and underscore the potential for greater economic integration between the

[4] Bureau of Labor Statistics. Employment statistics shown as 2019 annual average.

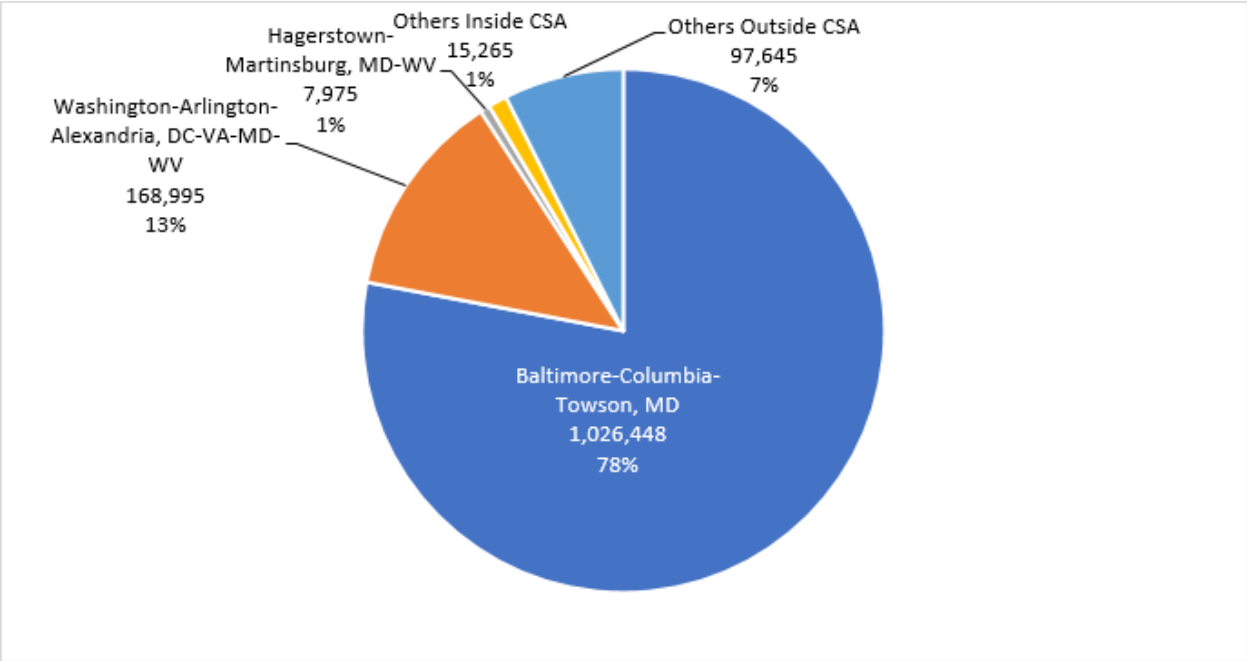
two economies if the travel time between the two were meaningfully reduced. **Figures 4.6-4 and 4.6-5** show the origin of commuters to the Washington, D.C. and Baltimore MSAs.

Figure 4.6-4: Origin of Commuters to Washington, D.C. MSA (2017)



Source: Longitudinal Employer-Household Dynamics (LEHD) database, https://onthemap.ces.census.gov/

Figure 4.6-5: Origin of Commuters to Baltimore MSA (2017)



Source: LEHD database, https://onthemap.ces.census.gov/

4.6.3 Environmental Consequences

In this section, FRA's analysis compares the environmental consequences of the SCMAGLEV Project's Build Alternatives to the No Build Alternative within the SCMAGLEV Project Affected Environment defined above for long-term impacts for opening year 2030 and future year 2045 as well as short-term impacts during Project construction. Anticipated short-term and long-term impacts to the regional economy, including direct and indirect impacts, were identified. When the analysis cannot quantify the environmental consequences, they are discussed qualitatively. FRA additionally estimates the profitability ratio associated with the SCMAGLEV Project.

Key findings include:

- Construction would have a positive impact on employment for all Build Alternative alignments and options. The Project would employ between 161,000 job-years and 195,000 job-years (i.e. one job year is one job for one person over one year) during the construction period. Additionally, the economic impacts in terms of earnings from the construction of the SCMAGLEV Project would be between $8.8 billion and $10.6 billion (2018 dollars).
- Temporary negative construction impacts to business revenues in the affected areas may be significant, ranging from $18.5 million to $311.3 million (2018 dollars).This decrease in business revenues is due to lane closures, traffic delays, and limited accessibility that would reduce the number of people frequenting the area and supporting businesses.
- The annual economic impacts from operation and maintenance of the SCMAGLEV Project for the Washington-Baltimore-Arlington CSA would result in between 390 and 440 total jobs annually, and between $24.3 and $27.4 million in earnings (2018 dollars) for all Build Alternatives.
- The availability of the SCMAGLEV would change the travel patterns in the CSA; travel pattern changes would take place for all Build Alternatives and might vary by Build Alternative. These changes include the net change in user benefits, increased reliability relative to other modes, increased safety, induced ridership, avoidance of congestion, pavement savings, reduced emissions as drivers divert to SCMAGLEV, and reduced revenue for publicly-provided regional commuter rail service as riders on these modes divert to SCMAGLEV. This analysis distinguishes impact results for riders traveling to Cherry Hill Station and Camden Yards Station.
- Over time, the market would respond to the availability of the SCMAGLEV service. Market responses may include: net change in property premium, negative fiscal impacts from acquisitions, increase in agglomeration economies, and positive labor market impacts.

4.6.3.1 No Build Alternative

Under the No Build Alternative, the SCMAGLEV Project would not be built. Therefore, short-term construction impacts would not occur, neither would long-term operation and maintenance impacts, nor long-term market response impacts. However, other planned and funded transportation projects will continue to be implemented in the area and have economic impacts such as construction and operation and maintenance impacts, and market responses.

4.6.3.2 Build Alternatives

FRA's analysis assumes that transportation network improvements included in the No Build Alternative are also included in the Build Alternatives. Therefore, this section focuses only on the additional incremental economic impacts attributable to the Build Alternatives (i.e., the differences between the future conditions under the No Build Alternative and the future conditions under implementation of the Build Alternatives).

Long-Term (Recurring) Operation and Maintenance Impacts, and Travel Market Impacts

Implementation of the SCMAGLEV service would support jobs and earnings as a result of ongoing O&M expenditures to run the service. Annual O&M costs align with each option's route length. The O&M estimates assume a cost per mile of a SCMAGLEV service between Washington, D.C. and Baltimore sourced from the 2005 Report to Congress - Costs and Benefits of Magnetic Levitation and inflated to 2018 dollars applying the gross domestic product (GDP) deflator.[5] **Table 4.6-1** shows the positive O&M cost impacts for the Build Alternatives. The employment ranges from 130 to 150 jobs per year across the Build Alternatives.

The SCMAGLEV's operation generates a variety of economic impacts for travelers, competing public and private modes of transportation, and the general public. The travel market impacts summarized in **Table 4.6-2** include the net change in user benefits, greater reliability relative to other modes, increased safety, induced ridership savings, avoidance of congestion, pavement savings, reduced emissions, and revenue loss to publicly-provided commuter rail service as riders divert to SCMAGLEV.[6]

[5] Federal Railroad Administration. Report to Congress - Costs and Benefits of Magnetic Levitation, FRA, September 2005 https://www.fra.dot.gov/Elib/Document/1176

[6] The SCMAGLEV Socio-Economic Technical Memorandum, available on the project website, provides a more in-depth analysis of these monetized impacts.

Table 4.6-1: Operations and Maintenance Impacts of Build Alternatives (2018$ million)

Build Alternatives	Employment (job years)	Earnings	Summary of Findings
J-01	130	$24.3	Option J1-04 has the highest employment and earnings impact All Build Alternatives fall in the range of 130 jobs to 150 jobs annually, and earnings in the range of $24.3 million to $27.4 million annually
J-02	130	$24.7	
J-03	130	$24.6	
J-04	140	$25.8	
J-05	140	$26.2	
J-06	140	$26.0	
J1-01	140	$25.9	
J1-02	130	$25.1	
J1-03	130	$24.8	
J1-04	150	$27.4	
J1-05	140	$26.6	
J1-06	140	$26.3	

Source: AECOM analysis based on information from the 2005 Report to Congress - Costs and Benefits of Magnetic Levitation.

Table 4.6-2: Summary of Potential Travel Market Impacts of the Build Alternatives (Recurring, 2018$ million)

Environmental Outcome	Build Alternatives	2030	2045	Summary of Findings
Travel Time Savings (User Benefits, adjusted for travel costs)	J-01, J-02, J-03 J1-01, J1-02, J1-03	$462.3	$617.7	Build Alternatives with a station at Camden Yards would have higher user benefits than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$519.7	$696.6	
Travel Cost Savings (Penalty)	J-01, J-02, J-03 J1-01, J1-02, J1-03	$(552.6)	$(704.2)	All Build Alternatives are projected to incur increased travel costs. Build Alternatives with a station at Camden Yards would lead to higher travel costs than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$(607.5)	$(773.7)	
Emissions	J-01, J-02, J-03 J1-01, J1-02, J1-03	$1.8	$2.0	Build Alternatives with a station at Camden Yards would have higher emission savings than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$2.1	$2.3	
Safety	J-01, J-02, J-03 J1-01, J1-02, J1-03	$75.2	$103.7	Build Alternatives with a station at Camden Yards would have higher safety

Environmental Outcome	Build Alternatives	2030	2045	Summary of Findings
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$83.4	$115.2	benefits than those with a station at Cherry Hill in both 2030 and 2045
Pavement	J-01, J-02, J-03 J1-01, J1-02, J1-03	$0.4	$0.6*	Build Alternatives with a station at Camden Yards would have higher pavement maintenance savings than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$0.5	$0.6*	
Congestion	J-01, J-02, J-03 J1-01, J1-02, J1-03	$31.1	$42.9	Build Alternatives with a station at Camden Yards would have higher congestion savings than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$34.5	$47.7	
Induced Ridership	J-01, J-02, J-03 J1-01, J1-02, J1-03	$13.3	$19.0	Build Alternatives with a station at Camden Yards would have higher induced ridership benefits than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$15.3	$22.3	
Reliability	J-01, J-02, J-03 J1-01, J1-02, J1-03	$19.8	$25.8	Build Alternatives with a station at Camden Yards would have higher reliability savings than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$21.9	$28.5	
Revenue Impact on Competing Public Transportation Services in the Corridor (Penalty)	J-01, J-02, J-03 J1-01, J1-02, J1-03	$(23.2)	$(29.1)	All Build Alternatives are projected to divert revenues given the data available; Build Alternatives with a station at Camden Yards would generate a higher public rail revenue loss than those with a station at Cherry Hill in both 2030 and 2045
	J-04, J-05, J-06 J1-04, J1-05, J1-06	$(24.8)	$(31.1)	

Source: AECOM analysis
Note: Pavement Savings are rounded. $0.57 million in 2030 and $0.63 million in 2045. Items shown in red text and parenthesis represent cost losses either as increases in costs or lost funds.

Under each Build Alternative, user benefits (which are used to calculate the travel time savings, take into consideration the travel cost estimates under the Build Alternatives) would amount to $462.3 million in 2030 and $617.7 million in 2045 if Cherry Hill Station is selected; or , $519.7 million in 2030 and $696.6 million in 2045 if Camden Yards is selected. The user benefits of a Build Alternative are based on cost and travel time of modes available under that Build Alternatives. Within these numbers, it is important to

note that SCMAGLEV riders are trading off time savings for higher travel costs. The increased travel costs borne by SCMAGLEV riders are estimated to be $552.6 million in 2030 and $704.2 million in 2045 if Cherry Hill Station is selected; or, $607.5 million in 2030 and $773.7 million in 2045 if Camden Yards Station is selected. The travel costs take into account the net change in vehicle operating costs, parking fee costs, toll fee costs, and fares for trips diverted to SCMAGLEV from auto, taxi/Transportation Network Company (TNC), bus, and commuter rail. A one-way $60 average SCMAGLEV fare for each Washington, D.C.-Baltimore trip was applied in the analysis. SCMAGLEV riders are trading off time savings for higher travel costs, meaning, SCMAGLEV riders would pay a high fare for a fast trip.[7] The travel time savings and travel costs are shown in **Table 4.6-2**. The underlying travel market analysis finds that SCMAGLEV travelers value their time highly; they trade the higher cost of a SCMAGLEV fare (relative to alternative modes) for the faster and more reliable trip time.[8] The ridership report[9] assumes that about 70.0 percent of business travelers in the defined catchment area and 67.0 percent of non-business travelers, which includes those making personal trips as well as commuters, between Baltimore and Washington, D.C. would choose the SCMAGLEV service if it were available.

The SCMAGLEV system would likely be more reliable than existing passenger rail services between Washington, D.C. and Baltimore. This is because the SCMAGLEV system operates on dedicated guideway specifically designed for SCMAGLEV operations. The existing passenger rail lines between Washington, D.C. and Baltimore operate on shared use corridors (passenger rail and freight rail) with limited capacity that affects reliability. As a new mode, passengers would need to judge the reliability of the SCMAGLEV system relative to other transportation modes to determine appropriate buffer time for their travel plans. However, based on its performance in other countries, it is anticipated that SCMAGLEV travelers would begin to reduce their buffer time. Buffer time is estimated for travelers diverted from current highway and rail transportation modes. The 2018 JR-Central annual report states that in 2017 their Maglev trains reported an average delayed time of 0.7 minutes per train in service, which is nearly zero delay.[10] The value of reliability impacts from diversions by reducing the travel buffer time would be $19.8 million in 2030 and $25.8 million in 2045 if Cherry Hill Station is selected; or, $21.9 million in 2030 and $28.5 million in 2045 if Camden Yards Station is selected.

The SMAGLEV Project would also present savings related to improvements in safety. The likelihood of a crash for SCMAGLEV riders (based on the operating experience in Japan) is much lower than for auto, bus and rail. This is due in part to single operations on a dedicated guideway. Safety savings would amount to $75.2 million in 2030 and

[7] Louis Berger. Baltimore-Washington SCMAGLEV Ridership Supplement, December 10, 2018
[8] SCMAGLEV Socio-Economic Technical Report, available on the project website.
[9] Louis Berger. Baltimore-Washington SCMAGLEV Project Final Ridership Report, November 8, 2018, Page 48
[10] 2018 JR-Central Annual Report. Page 18.
https://global.jr-central.co.jp/en/company/ir/annualreport/_pdf/annualreport2018.pdf

$103.7 million in 2045 if Cherry Hill Station is selected; or, $83.4 million in 2030 and $115.2 million in 2045 if Camden Yards Station is selected. The likelihood of crashes and associated deaths, injuries, and property damage is reduced because SCMAGLEV is a safer mode than auto and bus.[11]

Because there is economic value to taking a trip, the value of new trips that would not have been made but for the availability of the SCMAGLEV service is assessed. As new riders make trips, they would not have in the absence of the SCMAGLEV system, the value of induced ridership would amount to $13.3 million in 2030 and $19.0 million in 2045 if Cherry Hill Station is selected; or, $15.3 million in 2030 and $22.3 million in 2045 if Camden Yards Station is selected. Congestion savings[12] would amount to $31.1 million in 2030 and $42.9 million in 2045 if Cherry Hill Station is selected; or, $34.5 million in 2030 and $47.7 million in 2045 if Camden Yards Station is selected. These benefits accrue to travelers who remain on the roads but face less congestion as some former drivers now take SCMAGLEV. Similarly, as fewer drivers use the roads based on the ridership report estimates, pavement savings would amount to $0.4 million in 2030 and $0.6 million in 2045 if Cherry Hill Station is selected; or, $0.5 million in 2030 and $0.6 million in 2045 if Camden Yards Station is selected.

Net emissions savings would amount to $1.8 million in 2030 and $2.0 million in 2045 if Cherry Hill Station is selected; or, $2.1 million in 2030 and $2.3 million in 2045 if Camden Yards Station is selected. This calculation compares the emissions associated with production of electricity to run the SCMAGLEV and the emissions created by vehicles that are removed from corridors roads when travelers divert to SCMAGLEV. While most diverted riders switch from auto to SCMAGLEV, between 2 million to 3 million rail riders are projected to switch to SCMAGLEV, reducing traditional rail ridership and revenue. As existing rail riders divert to SCMAGLEV, rail ridership revenue impact would amount to negative $23.2 million in 2030 and negative $29.1 million in 2045 if Cherry Hill Station is selected; or, negative $24.8 million in 2030 and negative $31.1 million in 2045 if Camden Yards Station is selected. To the degree that trains in the corridor are expected to be at capacity between 2030 and 2045, these diversions free up capacity for additional travelers without making public investment to add capacity.

Long-Term (Recurring) Market Reponses

There are five elements to the long-term market response: property premium[13], fiscal impacts from acquisitions, agglomeration economies[14], ability to financially sustain

[11] Additional details are provided in the SCMAGLEV Socio-Economic Technical Report, available on the project website.
[12] As drivers divert to SCMAGLEV, congestion is reduced for those that remain on the corridor's roads; this marginal reduction of congestion refers as congestion savings.
[13] Property premium is the percentage of property value that property owners are willing to pay.
[14] Agglomeration economies are the benefits that come when firms and people locate near one another together in cities and industrial clusters. These benefits come from transport cost savings, as well as knowledge spillovers.

SCMAGLEV operations, and labor market impacts (defined in each of the subsections below).

Property Premium

SCMAGLEV would provide the properties surrounding station access points with improved access to Washington, D.C. and Baltimore regional economy. Regional access is affected most for those areas within walking distance of a station, generally approximated as being within ½-mile radius. As many businesses and people often desire to be closer to transportation access, residents and commercial enterprises would be willing to pay a premium for locations proximate to SCMAGLEV. **Table 4.6-3** shows the property tax impacts for the Build Alternatives. Since property values along the SCMAGLEV system Build Alternatives J and J1 do not vary, each Build Alternative option is identical. Note that this analysis assumes no changes in property values in the ½-mile radius around the Baltimore-Washington International Thurgood Marshall Airport Station (BWI Marshall Airport) as it is largely surrounded by airport functions.

Table 4.6-3: Property Premium and Tax Revenue of Build Alternatives (2018$ million)

Build Alternatives	Property Premium	Tax Revenue	Summary of Findings
J-01	$1,127.0	$13.7	Regardless of Build Alternatives J or J1, options 04, 05, 06 outperform options 01, 02, 03 by about the same amount. The difference between Build Alternatives J and J1 is negligible and should not affect the alternative selection decision
J-02	$1,126.3	$13.7	
J-03	$1,126.3	$13.7	
J-04	$1,356.3	$16.5	
J-05	$1,355.7	$16.5	
J-06	$1,355.6	$16.5	
J1-01	$1,127.0	$13.7	
J1-02	$1,126.3	$13.7	
J1-03	$1,126.3	$13.7	
J1-04	$1,356.3	$16.5	
J1-05	$1,355.7	$16.5	
J1-06	$1,355.6	$16.5	

Source: AECOM analysis

The trainset maintenance facility (TMF) would store the SCMAGLEV rolling stock (i.e. transit vehicle such as SCMAGLEV cars, as well as vehicles used to support the SCMAGLEV services) and would house round the clock operations and maintenance services. Externalities such as noise and vibrations that would be present at this facility would have a negative impact on values of surrounding properties with conflicting land uses (see Section 4.17 Noise and Vibration). All TMF locations have a few residential

E. L. Glaeser (February 2010). Agglomeration Economics. The University of Chicago Press. Accessed at https://www.nber.org/chapters/c7977.pdf.

developments nearby minimizing the impact on existing properties. The results from the noise and vibration chapter indicate impacts from the TMF would be minimal given the large distances between the facilities and the closest sensitive receptors. Therefore, the property premium and tax revenue impacts of the properties surrounding the TMFs would be small.

Under each Build Alternative, the total positive tax revenue impact from the property premium would range between $13.7 million and $16.5 million annually (see **Table 4.6-3**). Build Alternatives J-04, J-05, J-06, J1-04, J1-05, and J1-06 generate higher tax revenue than Build Alternatives J-01, J-02, J-03, J1-01, J1-02, and J1-03. Build Alternatives J-04 and J1-04 offer the highest property premium and the corresponding highest tax revenue.

There is also the potential for Transit-Oriented Development (TOD) around Cherry Hill Station (in the Westport area) and may be intensified in the Mount Vernon Square and Camden Yards Station areas, which is different from the property premium impact analysis mentioned above. TOD considers the potential for new development, while the property premium impact considers the potential for existing properties to gain value. The new SCMAGLEV stations represent new access points to the larger region transportation network, making them attractive for new or intensified development. Studies of this market response have found that the magnitude of new development varies widely with local conditions such as zoning, mix of business and non-business travelers, ability to assemble parcels, and other neighborhood amenities.[15,16] While some of the development around the station may be new to the local economy, some of the development around the station could be simply a transfer from another location in the same market attracted by the new station's access. As an example, development that was already slated for the Brooklyn or Westport neighborhoods in Baltimore might shift to Cherry Hill if the SCMAGLEV system were constructed with a terminus there. The development would still be within Baltimore; it is simply moving to the SCMAGLEV station to take advantage of the accessibility provided by the SCMAGLEV station. The magnitude of change in TOD activity attributable to the SCMAGLEV has not been estimated as it depends on many factors beyond the scope of this assessment, such as zoning, ability to assemble land, support infrastructure, among other factors.

Fiscal and Social Impacts from Acquisitions

The SCMAGLEV Project would require some property acquisition but the expected loss in associated tax revenues is less than 0.2 percent of the entire tax base value (see

[15] Center for Transit-Oriented Development, Capturing the Value of Transit, November 2008, page 10. Accessed: http://www.reconnectingamerica.org/assets/Uploads/ctodvalcapture110508v2.pdf
[16] Baton Rouge – New Orleans Intercity Passenger Rail Summary Report, December 2010, page 8.27. Accessed: http://www.norpc.org/assets/pdf-documents/studies-and-plans/BR-NO_Pass_Rail-Vol-1_2010.pdf

Tables 4.6-4 and 4.6-5).[17] The magnitude of the tax base loss is less than one year's average annual rate of growth in the tax base. This would not result in any impact to the jurisdictions' abilities to provide public resources and maintain assets.[18] This impact is the same across all Build Alternatives.

Table 4.6-4: SCMAGLEV Fiscal Acquisition Impacts for Build Alternatives J (2018$)

Build Alternatives	Jurisdiction*	Property Value Impact	Negative Tax Impact	Percent of Tax Revenue (County and City)	Percent of Tax Revenue (MD only)
J-01	Anne Arundel County	$35,649,000	$477,000	0.062%	0.013%
	Baltimore City	$56,563,000	$1,201,000	0.121%	
	Baltimore County	$11,729,000	$142,000	0.013%	
	Prince George's County	$21,106,000	$127,000	0.013%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$352,647,000**	**$5,517,000**		
J-02	Anne Arundel County	$12,915,000	$148,000	0.019%	0.011%
	Baltimore City	$56,563,000	$1,201,000	0.121%	
	Baltimore County	$11,729,000	$142,000	0.013%	
	Prince George's County	$69,724,000	$127,000	0.013%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$378,532,000**	**$5,187,000**		
J-03	Anne Arundel County	$12,915,000	$148,000	0.019%	0.011%
	Baltimore City	$56,563,000	$1,201,000	0.121%	
	Baltimore County	$11,729,000	$142,000	0.013%	
	Prince George's County	$35,593,000	$129,000	0.013%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$344,400,000**	**$5,188,000**		
J-04	Anne Arundel County	$35,649,000	$477,000	0.062%	0.008%
	Baltimore City	$188,012,000	$230,000	0.023%	
	Baltimore County	$11,728,000	$142,000	0.013%	
	Prince George's County	$20,731,000	$121,000	0.012%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$483,721,000**	**$4,538,000**		

[17] Depending on the Build Alternative, the number of residential (including single and multifamily), commercial, and industrial parcels impacted (temporary or permanently) would vary. Under the six options of Build Alternative J, there would be between 15 to 20 residential parcel impacted; 127 to 188 commercial parcels impacted; and 17 to 60 industrial parcels impacted. Under the six options of Build Alternative J1, there would be between 18 and 31 residential parcels impacted; 123 to 185 commercial parcels impacted; and 13 to 56 industrial parcels impacted.

Build Alternatives	Jurisdiction*	Property Value Impact	Negative Tax Impact	Percent of Tax Revenue (County and City)	Percent of Tax Revenue (MD only)
J-05	Anne Arundel County	$12,915,000	$148,000	0.019%	0.005%
	Baltimore City	$188,012,000	$230,000	0.023%	
	Baltimore County	$11,728,000	$142,000	0.013%	
	Prince George's County	$69,724,000	$127,000	0.013%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$509,980,000**	**$4,215,000**		
J-06	Anne Arundel County	$12,915,000	$148,000	0.019%	0.005%
	Baltimore City	$188,012,000	$230,000	0.023%	
	Baltimore County	$11,728,000	$142,000	0.013%	
	Prince George's County	$35,593,000	$129,000	0.013%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$475,848,000**	**$4,216,000**		

Source: AECOM analysis
Note: In Maryland, properties face county/city and state taxes, while in Washington, D.C. properties face only city taxes. Maryland county impacts include tax impacts to city within the county limits, where applicable.

Table 4.6-5: SCMAGLEV Fiscal Acquisition Impacts for Build Alternatives J1 (2018$)

Build Alternatives	Jurisdiction*	Property Value Impact	Negative Tax Impact	Percent of Tax Revenue (County and City)	Percent of Tax Revenue (MD only)
J1-01	Anne Arundel County	$56,835,000	$501,000	0.065%	0.013%
	Baltimore City	$56,563,000	$1,201,000	0.121%	
	Baltimore County	$11,729,000	$142,000	0.013%	
	Prince George's County	$15,120,000	$56,000	0.006%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$367,848,000**	**$5,468,000**		
J1-02	Anne Arundel County	$11,935,000	$144,000	0.019%	0.010%
	Baltimore City	$56,563,000	$1,201,000	0.121%	
	Baltimore County	$11,729,000	$142,000	0.013%	
	Prince George's County	$61,472,000	$41,000	0.004%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$369,301,000**	**$5,097,000**		
J1-03	Anne Arundel County	$11,935,000	$144,000	0.019%	0.010%
	Baltimore City	$56,563,000	$1,201,000	0.121%	
	Baltimore County	$11,729,000	$142,000	0.013%	

Build Alternatives	Jurisdiction*	Property Value Impact	Negative Tax Impact	Percent of Tax Revenue (County and City)	Percent of Tax Revenue (MD only)
	Prince George's County	$27,641,000	$41,000	0.004%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$335,470,000**	**$5,097,000**		
J1-04	Anne Arundel County	$56,835,000	$501,000	0.065%	0.007%
	Baltimore City	$188,012,000	$230,000	0.023%	
	Baltimore County	$11,728,000	$142,000	0.013%	
	Prince George's County	$15,120,000	$56,000	0.006%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$499,296,000**	**$4,497,000**		
J1-05	Anne Arundel County	$11,935,000	$144,000	0.019%	0.004%
	Baltimore City	$188,012,000	$230,000	0.023%	
	Baltimore County	$11,728,000	$142,000	0.013%	
	Prince George's County	$61,472,000	$41,000	0.004%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$500,749,000**	**$4,125,000**		
J1-06	Anne Arundel County	$11,935,000	$144,000	0.019%	0.004%
	Baltimore City	$188,012,000	$230,000	0.023%	
	Baltimore County	$11,728,000	$142,000	0.013%	
	Prince George's County	$27,641,000	$41,000	0.004%	
	Washington, D.C.	$227,601,000	$3,568,000	0.133%	-
	Total Impact	**$466,918,000**	**$4,125,000**		

Source: AECOM analysis
Note: In Maryland, properties face county/city and state taxes, while in Washington, D.C. properties face only city taxes. Maryland county impacts include tax impacts to city within the county limits, where applicable.

If Federal funding is used or the government's power of eminent domain is used to overcome involuntary acquisitions, the right-of-way (ROW) acquisition and relocation assistance program would be conducted in accordance with the Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970, as amended (42 USC § 4601 et seq.), commonly known as the Uniform Relocation Act. This act identifies the process, procedures, and timeframe for ROW acquisition and relocation of affected residents or businesses. The requirements of the Uniform Relocation Act apply whenever a project uses Federal dollars in any phase of a project. In addition, the states receiving Federal-aid funding from the Highway Trust Fund are required to maintain (updated every five years) a manual outlining their ROW policies and procedures as outlined in Title 23 CFR.

Although SCMAGLEV would be owned and operated by a private entity, and thus taxed, the tax base loss analysis was completed as there are several uncertainties concerning its taxation. In November 2015, the Project Sponsor, Baltimore-Washington Rapid Rail/The Northeast Maglev (BWRR/TNEM),[19] received a railroad franchise by the Maryland Public Service Commission.[20] The franchise tax in Maryland is typically calculated on a percentage of the revenues derived from sales of the utility company to customers in the service area or territory. The franchise tax is applied to public service companies[21] such as gas, electric, and telephone for the privilege of doing business in Maryland. The franchise tax is calculated in part as a percentage (2 percent) of the gross receipts derived from businesses in Maryland.[22] Since Washington, D.C. does not currently have laws that describe how the Project Sponsor would be taxed, the analysis does not include the tax revenue that jurisdictions would receive from the SCMAGLEV.

There are also social impacts from the acquisitions. Residents may require relocation to accommodate the Project. There have been 2,597 listings (single-family and townhomes) in Baltimore City over 24 months ending in July 21, 2020. In the District, the active listings was 803 over the 24 months ending in July 21, 2020.[23] Forecasts are not publicly available. Private property owners could be compensated at market value for land and would be eligible for additional benefits.

As for renters, the Department of Housing and Urban Development (HUD) considers anything under a 6 percent rental vacancy rate as a “tight” rental market (i.e., replacement rental housing may be difficult to locate). The overall rental vacancy rate, which includes single-family homes and apartments, in Washington, D.C. and Baltimore City were 7.5 percent and 13.5 percent respectively.[24]

The three largest real estate research firms that monitor the Baltimore MSA market, REIS, the United States Commercial Real Estate Services (CBRE), and Costar Group, Inc, project that overall multifamily vacancies will range between 4 percent and 7 percent between 2020 and 2022.[25] By contrast, in the Washington, D.C. MSA multifamily market, the vacancy rate is expected to range between 4 percent and 6

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[19] The Project Sponsor, BWRR/TNEM, is registered as a Domestic LLC, with Business Code 20 (Entities Other Than Corporations). Accessed: https://www.marylandtaxes.gov/business/income/tax-information.php

[20] “Baltimore Washington Rapid Rail and The Northeast Maglev Announce Approval of Railroad Franchise Request by the Maryland Public Service Commission” announcement, November 17, 2015. Accessed: https://bwrapidrail.com/wp-content/uploads/2017/01/20151117-TNEM-BWRR-Baltimore-Washington-Rapid-Rail-and-The-Northeast-Maglev-Announce-Approval-of-Railroad-Franchise-Request-by-the-Maryland-Public-Service-Commission.pdf

[21] A “public service company” is an entity engaged in telephone business in the State or engaged in the transmission, distribution, or delivery of electricity or gas in Maryland. Maryland Code Tax-General §8-401-417.

[22] State of Maryland, Public Utility Valuation and Franchise Tax Unit. Accessed https://dat.maryland.gov/businesses/Pages/franchise-and-public-utilities.aspx

[23] Zillow Homes. researched July 21, 2020. https://www.zillow.com/homes/

[24] HUD Comprehensive Housing Market Analysis. Washington, D.C. vacancy rate was reported on July 1, 2018; Baltimore City vacancy rate was reported on June 1, 2018.

[25] Multifamily Metro Outlook: Baltimore Winter 2019. Fannie Mae 2018. 2022 projection was the latest number reported.

percent over the period between 2020 and 2022, and 4 percent to 7 percent between 2020 and 2023.[26] In the year of 2019, there were 4,963 and 1,994 multifamily housing opportunities created in Washington, D.C. and Baltimore City respectively, with 13,900 and 5,373 respectively under construction and more planned over the next three years,[27] all looking to accommodate perspective residents in the area.

While residential relocations are sensitive because they may alter households' school and commute patterns, FRA also anticipates commercial acquisitions as a result of the SCMAGLEV Project (see Section 4.3 Land Use and Zoning). None of the acquisitions along the SCMAGLEV alignments are sufficiently unique in its commercial activity that the business could not find comparable building, resource, and transportation access elsewhere in the same jurisdiction. Both the Washington, D.C. MSA and Baltimore MSA markets have active retail, office, and warehouse sectors and could readily accommodate the change in commercial address.

Agglomeration Economies

Agglomeration impacts occur when the concentration of firms and employees facilitates the exchange of ideas and knowledge in the host market, fostering growth and productivity. To the degree that the SCMAGLEV reduces the effective distance between knowledge industries, the potential for agglomeration economies occurs. The economic connections between Washington, D.C. and Baltimore City would intensify, allowing the two metropolitan economies to increasingly compete in the global economy with a larger footprint.

The economy of Washington, D.C. is dominated by professional and technical services and membership associations and organizations categories, which collectively make up 186,000 jobs, or a quarter of all jobs in the city. The Washington, D.C. inner suburbs concentrate mainly on professional and technical services (20.6 percent of total workforce). Once a predominantly industrial town, Baltimore now focuses on providing services. The economy of Baltimore is dominated by educational services and hospitals categories, which make up nearly 30 percent (i.e., 95,000 employees) of all jobs in the city. The inner suburbs concentrate on professional and technical services, food services and drinking places, and administrative and support services, accounting for more than 205,000 employees (i.e., 27.1 percent of the labor force)[28] (see Appendix D.4). It is unclear how the SCMAGLEV Project would change or shift the job markets in the Washington, D.C. and Baltimore economies. However, the Project is anticipated to have an overall positive impact on job growth in the region.

As each Build Alternative has the same travel time and trip cost, the potential for agglomeration economies and productivity impacts is positive and equal across all Build

[26] Multifamily Metro Outlook: Washington Spring 2019. Fannie Mae 2019.
[27] Trends in the Mid-Atlantic Multifamily Market. CBRE 2020
[28] U.S. Bureau of Labor Statistics. Employment statistics. Accessed at https://www.bls.gov/cew/downloadable-data-files.htm

Alternatives. Agglomeration economies are a beneficial impact; they support the productivity of an economy's firms and thus the region's economic competitiveness. As described by Dr. Larry Summers (Harvard economist and former Chief Economist of the World Bank and former director of the National Economic Council) in the 2017 Brookings Institution symposium, "Infrastructure permits, in substantial part, larger interchange and reduces impactive distances, thereby facilitating trade and agglomeration, … in a world where private capital, private companies and ideas are increasingly mobile, a nation's infrastructure is "distinctively local and distinctively defining of its strength."[29]

The impact of telecommuting on agglomeration varies, depending on whether workers telecommute 100 percent of the time or split their time between work and telecommuting. If employees work from home 100 percent of the time, this diminishes the potential for agglomeration economies given the current urban structure. If the urban structure evolves over time such that telecommuting households who no longer incur commuting costs move to the urban center as they can afford a higher cost home (and work) location, the potential for agglomeration may increase as home-based workers meet for informal social and business gatherings where ideas can be exchanged. By contrast, if employees work from home two to three days a week and travel to an office location for the balance of their time, telecommuting may support agglomeration economies as it eases congestion and thereby facilitates the movement of people within the metropolitan area and the associated exchange of ideas and opportunities—supporting trade and agglomeration as outlined in the 2017 Brookings remarks cited.

Labor Market Impacts

The Washington, D.C. and Baltimore metropolitan areas also differ by size in terms of job opportunities. There are nearly 3.4 million jobs in Washington, D.C. MSA compared with nearly 1.4 million jobs in the Baltimore MSA. Comparing just the core areas that would be connected via the Build Alternatives, the District of Columbia has 798,400 jobs compared with 373,400 jobs in Baltimore City.[30]

Labor market impacts occur when travel improvements increase the number of job opportunities available to workers and workers available to firms. When this occurs, firms and workers are able to select jobs and employees that more closely match the exact job requirements or worker skills than they might in a small market with more limited options. Given the projected travel times associated with the Build Alternatives,

[29] Anna Malinovskaya and David Wessel. "Larry Summers v. Edward Glaeser: Two Harvard economists debate increased infrastructure investments," Wednesday, January 18, 2017. Accessed August 6, 2019 https://www.brookings.edu/blog/up-front/2017/01/18/larry-summers-v-edward-glaeser-two-harvard-economists-debate-increased-infrastructure-investments/

[30] Bureau of Labor Statistics. Employment statistics shown as 2019 annual average. Accessed at https://www.bls.gov/cew/downloadable-data-files.htm.

the range of opportunities within a 30-minute travel shed to 45-minute travel shed would increase substantially for many workers.

While the number of job opportunities would increase, the labor market impact is two-fold. Some workers would find jobs and transition from unemployment to employment. Some workers would find better jobs than they have currently as they now face a large selection of job opportunities. In this instance, underemployed workers would find jobs that better fit their skills with an associated increase in labor productivity and earnings. Both impacts are positive and would not require mitigation.

Substantial commuting linkages exist within the Washington-Baltimore-Arlington CSA as described in the SCMAGLEV Project Affected Environment section. The Washington, D.C. MSA and Baltimore MSA are the two largest employment centers in the CSA, attracting a substantial portion of the labor force from adjacent metropolitan and micropolitan statistical areas. However, the largest commuting flows in the CSA occur between the Washington, D.C. MSA and Baltimore MSA.

As each Build Alternative has the same travel time and cost, each Build Alternative has the same propensity to foster labor market impacts. Because trips would be faster and more reliable, it is anticipated that there would be greater commuting between the two markets under each of the Build Alternatives.

The expected average fare for SCMAGLEV would be $60 per one-way trip; however it could vary between $27 and $80[31] per trip suggesting that higher income workers would be the most likely to use SCMAGLEV for commuting. Workers that do not commute to the office 5 days a week, but rather telecommute due to congestion and travel time could also be potential users of the service. With telecommuting approved for a growing share of Washington, D.C. employers, such policies would reduce the fare's impact on household commute budgets and make SCMAGLEV an option for more commuters.[32] Those who telecommute may select SCMAGLEV as their main means of transportation when they have to go to the office as it would be faster and more reliable than other public transportation options.

There is a significant spread in travel costs per mile in the Washington, D.C.- Baltimore corridor. At the lowest cost, a MARC trip costs 19 cents per mile and takes just over an hour. At the highest cost of modes active in the corridor, an Acela trip costs $1.30 per mile or seven times the cost of a MARC trip. The higher cost saves the travelers about 30 minutes—the Acela trip takes just 32 minutes. Travelers deciding among the various

[31] One-way fare value would vary by trip length and other variables. Source: WSP. Baltimore-Washington SCMAGLEV Project Ridership Data Request, #6, 7, 18, 19, 20, 21, 22 and 23, May 6, 2020.
[32] In the Washington, D.C. MSA, telework continues a steady upward trend observed since 2007, with more than one million regional teleworkers in 2019. Source: CommuterConnections. "2019 State of the Commute Report from the Metropolitan Washington Region." June 2020. Accessed: https://www.mwcog.org/file.aspx?D=%2b0qv8i2f8F2l1MlLGLYfWp1CaYuFlZ5rwb5Ug4gcoTQ%3d&A=%2bkljc%2fnlQiqtav9hkV%2b7cN%2fnZ1nVfMkbtPLYAPGMWIU%3d

modes operating in the current Washington, D.C.- Baltimore corridor regularly trade off time for travel cost where the range between the lowest and highest cost is large—the top cost is approximately seven times the lowest fare.

Understanding the estimated average SCMAGLEV fare, the monthly travel cost would be very high for commuting five days a week by SCMAGLEV. However, with the greater prevalence of people working from home, many travelers will select going into the office fewer times per day, reducing the amount of household budget absorbed by commuting.

Short-Term (Temporary) Construction Impacts

Construction of the SCMAGLEV Project would support the local economy through the hiring of personnel, renting or purchasing equipment, and procurement of materials for the duration of the construction period, affecting the local labor and manufacturing markets. **Tables 4.6-6** and **4.6-7** show the construction and professional services impacts for the Build Alternatives. Professional services include architectural engineering, project management, and planning services.

Total construction employment[33] impacts across Build Alternatives would range between 161,000 job-years and 195,000 job-years (i.e. one job year is one job for one person over one year). Construction earnings for Build Alternatives would range between $8.8 billion and $10.6 billion. Average annual direct jobs per year, limited only to the construction industry, range between over 8,700 to over 10,560, representing between 2.7 percent and 3.3 percent of the CSA's construction[34] employment. This is not enough to cause inflationary pressures in the market. If there are other large infrastructure projects planned for the same time horizon, the region could see increased construction costs or difficulty finding workers. Build Alternatives J1-04 generates the largest employment and earnings impacts, an estimated additional 10,560 direct construction jobs per year during the construction period. These impacts are directly tied to the cost; the greater the cost, the larger the employment impact.

Short-Term (Temporary) Travel and Business Community Impacts from Construction

There are impacts associated with construction in cities that affect the life of the surrounding communities and beyond. These impacts are also known as social costs.[35] These costs refer to the monetary equivalent of consumed resources, loss of income

[33] Inclusive of the construction and professional services industries.
[34] 2018 ACS 5-yr estimate for total construction employment for the CSA.
[35] Tolga Celik, Saeed Kamali, and Yusuf Arayici. 2017. "Social Cost in Construction Projects." Environmental Impact Assessment Review, Volume 64, May 2017, pages 77-86.
https://www.sciencedirect.com/science/article/abs/pii/S0195925516303419

and loss of enjoyment experienced by parties not engaged in the construction contractual agreement.[36]

The SCMAGLEV's construction will cause travel disruptions as street lanes and sidewalks are closed, as parking space is reduced, as commercial establishments become less visible from the street, and as noise and dust levels in the vicinity of the building activity rise. There are two main types of construction impacts, defined by the groups who are most directly affected—traveler impacts and business community impacts.

[36] Andrew Gilchrist, and Erez N. Allouche. 2005. "Quantification of social costs associated with construction projects: state-of-the-art review." Tunneling and Underground Space Technology, Volume 20, Issue 1, January 2005, pages 89-104. https://www.sciencedirect.com/science/article/abs/pii/S088677980400286X

Table 4.6-6: Construction and Professional Services Impacts in Terms of Job-Years

Build Alternatives	Construction Cost ($ million)	Construction Employment Multiplier (job years/$ million)	Construction Jobs (job years)	Professional Services Costs ($ million)	Professional Services Employment Multiplier (job years/$ million)	Professional Services Jobs (job years)	Total Jobs (job years)
J-01	$10,950	11.5781	127,000	$3,280	11.9746	39,000	166,000
J-02	$10,640		123,000	$3,190		38,000	161,000
J-03	$10,640		123,000	$3,190		38,000	161,000
J-04	$12,370		143,000	$3,710		44,000	187,000
J-05	$12,060		140,000	$3,620		43,000	183,000
J-06	$12,060		140,000	$3,620		43,000	183,000
J1-01	$11,480	11.5781	133,000	$3,440	11.9746	41,000	174,000
J1-02	$11,170		129,000	$3,350		40,000	169,000
J1-03	$11,170		129,000	$3,350		40,000	169,000
J1-04	$12,900		149,000	$3,870		46,000	195,000
J1-05	$12,590		146,000	$3,780		45,000	191,000
J1-06	$12,590		146,000	$3,780		45,000	191,000

Source: AECOM analysis 2020; 2018 RIMS Type II multiplier
Note: Costs and impacts rounded. Employment impacts include construction and professional services costs.

Table 4.6-7: Construction and Professional Services Impacts in Terms of Earnings (2018$ million)

Build Alternatives	Construction Cost ($ million)	Construction Earnings Multiplier (earnings/$ million cost)	Construction Earnings ($ million)	Professional Services Costs ($ million)	Professional Services Earnings Multiplier (earnings/$ million cost)	Professional Services Earnings ($ million)	Total Earnings ($ million)
J-01	$10,950	0.605	$6,620	$3,280	0.7435	$2,440	$9,060
J-02	$10,640		$6,440	$3,190		$2,370	$8,810
J-03	$10,640		$6,440	$3,190		$2,370	$8,810
J-04	$12,370		$7,480	$3,710		$2,760	$10,240
J-05	$12,060		$7,300	$3,620		$2,690	$9,990
J-06	$12,060		$7,300	$3,620		$2,690	$9,990
J1-01	$11,480	0.605	$6,950	$3,440	0.7435	$2,560	$9,510
J1-02	$11,170		$6,760	$3,350		$2,490	$9,250
J1-03	$11,170		$6,760	$3,350		$2,490	$9,250
J1-04	$12,900		$7,810	$3,870		$2,880	$10,680
J1-05	$12,590		$7,620	$3,780		$2,810	$10,430
J1-06	$12,590		$7,620	$3,780		$2,810	$10,430

Source: AECOM analysis 2020; 2018 RIMS Type II multiplier
Note: Costs and impacts rounded. Earnings impacts include construction and professional services costs.

Traveler Impacts. These are measured in terms of the travel delay cost and loss of reliability experienced by travelers in the corridor as they wait in queues or take detours because available travel lanes and sidewalks are reduced or closed to accommodate construction.[37]

Business Community Impacts. These are measured in terms of lost sales and/or closures as travelers avoid the area to avoid the travel snarls and difficulty accessing businesses in close proximity to the construction activity. Some businesses may need to re-schedule deliveries if construction activity makes it difficult for trucks to access the facility. For complementary discussion on community impacts, please see Section 4.4 Neighborhoods and Community Resources.

In short, the economic impacts of infrastructure construction and repair projects must consider not only commuters and residents, but also businesses' level of economic activity.[38]

There is limited literature and no standard methodology that focuses on quantifying the social costs associated with the impacts that results from construction.[39, 40] For the SCMAGLEV Project, FRA forecasted that during the construction period, the main intersections around the proposed stations[41] would face similar or worse levels of service (i.e. higher seconds of delay per vehicle) than under the No Build Alternative. Around Mount Vernon Square Station, FRA estimated that vehicles could be delayed up to 12 minutes in one intersection due to construction activity for the SCMAGLEV Project. At Camden Yards Station and Cherry Hill Station, delays at intersections could be up to 5 minutes and 4 minutes per vehicle, respectively. These estimated delays would have an impact on commuters and residents by increasing travel times and commutes (see Section 4.2 Transportation).

Additionally, FRA estimated quantitatively the social impacts within a ¼-mile radius of the proposed stations and TMFs associated with construction activities linked to businesses revenue loss.[42]

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[37] Social costs take many forms including increased time and travel distance, reduced reliability, noise inconvenience, accelerated deterioration of secondary roads, increased pollutants from idling cars, increased vehicle operating cost, reduced accessibility, increased safety concerns; and under extreme circumstances residents' relocations.
[38] Diane Marie Dube. 2013-2014. "Prepare, Survive, and Thrive: A Lawyer's Guide to Advising Business Clients Facing Construction Disruption." 22 J. Affordable Housing & Community Development Law 345. https://heinonline.org/HOL/LandingPage?handle=hein.journals/jrlaff22&div=28&id=&page=
[39] Wen-Der Yu, and Shao-Sgun Lo. 2007. "Time-dependent construction social costs model." Construction Management and Economics, 23:3, pages 327-337. https://www.tandfonline.com/doi/abs/10.1080/01446190500040281
[40] Amir Ibrahim, Omar El-Anwar, and Mohamed Marzouk. 2018. "Socioeconomic impact assessment of highly dense-urban construction projects." Automation in Construction, Volume 92, August 2018, pages 230-241 https://www.sciencedirect.com/science/article/abs/pii/S0926580516304514
[41] Travel impacts at BWI Marshall Airport were not estimated.
[42] Business revenue losses at BWI Marshall Airport due to construction are assumed to be negligible and are therefore not quantitatively estimated.

The potential impacts on business revenues by the North American Industry Classification System (NAICS) code,[43] station and TMF are shown in **Table 4.6-8** for the low and high estimates, respectively, deflated to 2018 dollars. These results are on an annual basis and assume the businesses would experience similar revenues to the 2019 revenues in the future. Notably, these impacts on revenues in the affected areas may be canceled out by increased sales outside of the affected area, resulting in no net change to the region in terms of jobs, GDP, and tax revenues. However, the impact on the affected areas may be significant and long-term particularly in the cases of businesses that operate on large volumes and low margins. For some of this type of business, the loss of revenue during construction may result in permanent closure.

Table 4.6-8: Low and High Estimates of Annual Revenue Loss Impact by NAICS Code and Station/TMF, thousands of 2018 dollars

NAICS	Percentage Applied	Station			TMF		
		Camden Yards	Cherry Hill	Mount Vernon Square	MD 198	BARC West	BARC Airstrip
Low Estimate of Annual Revenue							
44-45	2%	$420	$1,430	$1,790	$260	NA	NA
71	4%	$1,910	$0	$1,180	$0		
72	7%	$5,300	$130	$14,010	$130		
TOTAL		**$7,630**	**$1,560**	**$16,980**	**$390**	--	--
High Estimate of Annual Revenue							
44-45	50%	$35,050	$35,730	$44,570	$6,450	NA	NA
71	40%	$19,110	$0	$11,800	$0		
72	70%	$53,000	$1,280	$140,090	$1,320		
TOTAL		**$107,160**	**$37,010**	**$196,460**	**$7,770**	--	--

Source: AECOM analysis
Note: NAICS codes are Retail Trade (44 and 45), Arts, Entertainment, and Recreation, (71) and Accommodations and Food Services (72).

[43] The North American Industry Classification System is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. NAICS divides the economy into 20 sectors ranging from Sector 11: Agriculture, Forestry, Fishing and Hunting, to Sector 92: Public Administration. Within each sector are subsectors and industries that are grouped into production-oriented classifications. As an example, Sector 72: Accommodation and Food Services contains Subsector 721: Accommodation, and Subsector 772: Food Services and Drinking Places.

The businesses that would be most impacted by construction are assumed to fall into four NAICS codes, including Retail Trade (44 and 45), Arts, Entertainment, and Recreation (71) and Accommodations and Food Services (72). These industries are believed to be most impacted because the ability to make comparable transactions—purchase groceries or a coffee for example—elsewhere in the community is greatest.

The construction impact on business revenue losses around Mount Vernon Square Station would range between $17 million and $196 million per year. The accommodation and food services industry accounts for 70-80 percent of the construction impact. This is due the proximity to a large number of restaurants and other retail in the central business district of Washington, D.C. Near the Mount Vernon Square Station, the FRA identified 226 businesses with the potential to be impacted from construction.[44]

At Camden Yards Station, the business revenue losses ranges from nearly $8 million to $107 million per year for the 181 potentially impacted businesses.[45] The accommodation and food services industry accounts for 50-70 percent of the impacts around the Camden Yards Station. The revenue losses around Cherry Hill Station range between $2 million and $37 million per year due to a lower concentration of retail activities in the immediate station area; FRA identified only nine businesses in the station area with the potential to be affected during construction with one retail business contributing nearly 90 percent of the impact.[46]

The impacts of construction on the TMF located at MD 198 would result in a loss of business revenues of $390,000 to $8 million per year. There are five businesses with the potential to be impacted from construction near the MD 198 TMF.[47] There are no businesses in the four NAICS categories within a quarter of a mile radius buffer of the TMF BARC West, and no businesses at all within the quarter of a mile radius buffer of the TMF BARC Airstrip. Therefore, there would be no construction impacts on business revenues around TMF BARC West and TMF BARC Airstrip locations.

[44] At Mount Vernon Square Station, there would be 68 Retail Trade (NAICS 44 and 45), 27 Arts, Entertainment, and Recreation (71), and 131 Accommodations and Food Services (NAICS 72) businesses potentially impacted in the station area.
[45] At Camden Yards Station, there would be 69 Retail Trade (NAICS 44 and 45), 18 Arts, Entertainment, and Recreation (NAICS 71), and 94 Accommodations and Food Services (NAICS 72) businesses potentially impacted in the station area.
[46] At Cherry Hill Station, there are four Retail Trade (NAICS 44 and 45), one Arts, Entertainment, and Recreation (NAICS 71), and four Accommodations and Food Services (NAICS 72) businesses potentially impacted in the station area.
[47] At MD 198 TMF, there would be three Retail Trade (NAICS 44 and 45), zero Arts, Entertainment, and Recreation (NAICS 71), and two Accommodations and Food Services (NAICS 72) businesses potentially impacted in the TMF area.

4.6.4 Potential Mitigation Strategies

4.6.4.1 Short-Term Operational Strategies

Construction Impacts

Construction would have temporary impacts on commercial and industrial businesses, particularly those near or adjacent to construction sites. Sidewalk space might be taken temporarily for station and alignment construction, thereby reducing business access. Business impacts could include reduced visibility of commercial signs and businesses. These construction impacts could in turn produce minor economic impacts to commercial establishments.

There are a number of minimization strategies and mitigation measures the Project Sponsor would undertake to temper these impacts. Some of the strategies include:

- Coordinate with individual businesses to identify business usage, delivery, and shipping patterns, as well as critical times of the day or year for business activities to aid in developing Worksite Traffic Control Plans and to ensure that critical business activities are not disrupted.
- Develop, fund, and maintain a telephone hotline during construction and one or more SCMAGLEV Field Offices with staff to address community issues and concerns as they arise. Office could be open from 9am-5pm weekdays and any weekends when work occurs. Schedule to be developed prior to construction. The office would provide a physical location where information pertaining to construction can be exchanged. Ensure that all potentially affected persons know the name and telephone number(s) of public affairs staff that they can contact if needed.
- Participate in local events to promote awareness of the SCMAGLEV Project.
- Notify property owners, businesses, and residences of major construction activities (e.g., utility relocation/disruption and milestones; re-routing of delivery trucks).
- Provide literature to public and news media, schedule promotional displays, participate in community committees, and make presentations, as needed, about the SCMAGLEV Project.
- Coordinate business outreach programs and implement promotions for businesses most affected by the construction.
- Whenever possible, develop detours for any road or sidewalks to be closed during construction. Post signs (in appropriate languages) alerting pedestrians, bicycles, and vehicles of road and sidewalk closures and detours. Ensure pedestrian detours are accessible to seniors and disabled persons. Develop Worksite Traffic Control Plans in conjunction with the county and municipal departments of transportation to accommodate automobile and pedestrian traffic.

- Maintain access to community facilities affected by construction activities.
- Provide early notification to emergency service providers of any road closures or detours.
- Develop a community outreach plan to notify local communities of construction schedules, road and sidewalk closures, and detours. Coordinate with local communities during preparation of traffic management plans to minimize potential construction impacts to community resources and special events. Consider limiting construction activities during special events.
- Develop a construction mitigation plan with community input to address construction impacts. Determine truck hauling routes and schedules that would minimize impacts on sensitive uses in all parts of the SCMAGLEV Project area.
- Engage with businesses in the Project Study Area, particularly when developing the construction phasing schedules, to ensure accessibility for customers and suppliers in order to reduce revenue losses.
- During construction, provide temporary replacement or shared parking as needed to absorb the loss of parking due to acquisitions. Temporary parking could be added by constructing surface lots on nearby vacant parcel or restriping nearby streets to allow diagonal curb parking.
- Erect barriers and provide security personnel during construction to minimize trespassing and vandalism. Barriers could be enhanced with artwork and attractive design features where possible.
- Forewarn the public of any anticipated road closures or detours due to construction activity.

Additionally, since the SCMAGLEV Project would have the potential to affect construction employment in the region, a thoughtful procurement process and construction schedule needs to be prepared. In the case that there are other ongoing regional projects, the SCMAGLEV Project could be scheduled after coordination with those projects.

Right-of-Way Acquisition Impacts

Relocation resources would be available to all residential and business relocations without discrimination. If the Project is funded with Federal dollars, the Uniform Relocation Act requires that all replacement housing would be decent, safe, and sanitary.[48] Funded by the Department of Housing and Urban Development (HUD), advisory service, payment for moving expenses and replacement housing assistance will be provided to eligible personnel, for both residents and businesses.

[48] U.S. Department of Housing and Urban Development, Office of Community Planning and Development. "Relocation Assistance to Tenants Displaced from Their Homes". https://www.hud.gov/sites/documents/tenadisp.pdf

Both the Washington, D.C. and Baltimore single-family (detached, attached and condo) housing markets are robust; the historical performance of the housing market suggests that the mix of new and existing homes on the market would allow homeowners to find a replacement dwelling in the same MSA. A key consideration for residential mitigation is providing homeowners who may want to stay in their same neighborhood/school district sufficient time to find a suitable listing within this narrower search area. For those willing to change neighborhoods, multiple options are expected to be available based on the market's recent history. Private residential property owners could be compensated at market value for land to be acquired by the Project and would be eligible for additional benefits.[49] As discussed in the fiscal and social impact section , overall, the Washington, D.C. and Baltimore rental markets do not qualify as "tight" rental markets under the HUD thresholds.

For businesses, advisory service, along with Payment for Moving and Reestablishment Expenses could be provided.[50] Depending on individuals' choice, the amount of assistance will vary based on the actual moving expense or a fixed amount of $1,000-$40,000. A business may also be eligible for a Payment for Reestablishment Expenses, up to $25,000, if choosing to be paid the amount of their actual expense. In addition, businesses could be provided with current information on available replacement locations that meet their needs, or the option to discuss their preferred replacement location with their local agency. In Maryland, this assistance is offered through The Maryland Community Development Block Grant Program (CDBG).

4.6.4.2 Long-Term Operational Strategies

Operational Impacts

No negative impacts on the region's economy have been identified in this analysis; no mitigation would be required as a consequence.

Tax Base Impacts

Around the selected stations, property values would increase, and therefore the tax base in Washington, D.C. and Baltimore City would increase. However negative property impacts around the selected TMF would slightly reduce the tax base in Anne Arundel County or Prince George's County . The state of Maryland and Washington, D.C. would experience a net increase in the tax base due to property premium. Parcel acquisitions would also have a negative impact on the affected jurisdictions reducing the entire tax base value less than 0.2 percent.

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[49] The amount of assistance on rental or purchase of housing will be based on the difference in costs of the current and replacement home, and a time period of 42 months.

[50] U.S. Department of Housing and Urban Development, Office of Community Planning and Development. U.S. Department of Housing. "Relocation Assistance to Displaced Businesses, Non-Profit Organizations and Farms." https://www.hud.gov/sites/documents/1043CPD.PDF

- Positive property premium impacts (i.e. property values around the new stations would increase) linked to the new stations would temper the negative tax base impacts due to property acquisitions in Washington, D.C. and Baltimore City. However, there are a number of mitigation measures that Anne Arundel County or Prince George's County would need to undertake to lessen the negative property premium impacts related to the TMF and the reduction of the tax base due to parcel acquisitions. These mitigations could include sound walls and landscaping to buffer the neighborhood from the visual and noise impacts, controlling access to minimize traffic impacts on the surrounding area, and selection of a physical design that minimizes the footprint and its proximity to affected parcels. The Project Sponsor would coordinate with the affected jurisdictions to reduce the negative impacts.

Development Impacts

No negative impacts on the local economy have been identified; potential economic development would be subject to existing or revised land use controls and policies and thus be consistent with local objectives and the vision for the corridor. No mitigation would be required as a consequence.