



## **Exhibit E**

# **Avoidance-Minimization-and-Impacts-Report**

# Avoidance, Minimization, & Impacts Report

## Introduction

The Baltimore-Washington Superconducting Magnetic Levitation (SCMAGLEV) Project Avoidance, Minimization, and Impacts Report (AMR) describes the process of avoiding and minimizing impacts to wetlands, their buffers, waterways, and the Federal Emergency Management Agency (FEMA) 100-year floodplain to the greatest extent practicable and presents justifications for impacts that were unavoidable.

The Federal Railroad Administration (FRA) is preparing an Environmental Impact Statement (EIS) for the SCMAGLEV Project jointly with the Maryland Department of Transportation (MDOT). The Project consists of the construction and operation of a high-speed SCMAGLEV train system between Washington, DC and Baltimore, MD with an intermediate stop at Baltimore/Washington International Thurgood Marshall (BWI) Airport. FRA and MDOT are developing the EIS in compliance with the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321 *et seq.* The Project encompasses portions of the District of Columbia (Washington, DC), Prince Georges County, Anne Arundel County, Baltimore County, and Baltimore City. The Project traverses 15 Maryland 12-digit watersheds.

In November 2015, the Maryland Public Service Commission approved the Baltimore-Washington Rapid Rail's (BWRR) application to acquire a passenger railroad franchise to deploy a SCMAGLEV system between Baltimore, MD and Washington, DC. BWRR is a private corporation and as the Project sponsor and developer of the proposed SCMAGLEV service between Baltimore, MD and Washington, DC, has been working with Federal and state agencies to carry out the Project. As the Project sponsor and developer, BWRR is the applicant for permits to construct the Project.

Efforts have been made throughout the Project planning process to avoid and minimize impacts to wetlands, their buffers, waterways, and the FEMA 100-year floodplain to the greatest extent practicable while maintaining a corridor wide enough to support a constructible project. Avoidance and minimization of impacts to these resources is an integral part of the permitting process and is required by state and federal regulations. The AMR is submitted with the Joint Permit Application (JPA) in accordance with the NEPA of 1969, Executive Order (EO) 11990, May 24, 1977 (42 FR 26961), which states that each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds: (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.

The AMR summarizes the study alignment and the Project and other Build Alternatives; explains how the Project and other Build Alternative Limits of Disturbance (LODs) were established based on a corridor-wide stepwise process of avoidance and minimization of impacts; and describes the targeted avoidance and minimization of impacts to resources in specific areas of the Project alignment and associated ancillary facilities. The AMR then presents impact reductions resulting from the avoidance and minimization process and provides justifications for unavoidable impacts. Impacts were avoided and minimized to the greatest extent practicable at a planning level design for all ADEIS alternatives through collaboration between the BWRR, the NEPA team and resource agencies.

## The Regulatory Context

Sections 1101(a)(18) and 1307 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA–LU) (Pub. L. 109–59), as amended by section 102 of the SAFETEA–LU Technical Corrections Act of 2008 (Pub. L. 110–244), authorized funding for pre-construction planning activities for eligible Maglev transportation projects. In 2016, FRA awarded \$27.8 million in SAFETEA–LU Maglev funds to MDOT to prepare preliminary engineering and a NEPA analysis for the Proposed Action.

The Maryland Department of the Environment (MDE) regulates the alteration of floodplains, wetlands, their buffers, and waterways under the Maryland Nontidal Wetlands Protection Act, Tidal Wetland Act, and Section 401 of the Clean Water Act (CWA). The U.S. Army Corps of Engineers (USACE) regulates Waters of the U.S. under Section 404 of the CWA. Meanwhile, USACE regulates the construction of any structure in or over any navigable water of the United States under Section 10 of the Rivers and Harbors Act. Meanwhile, the River and Harbors Act (33 USC 408) provides that USACE may grant permission for another party to alter a Civil Works project upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the Civil Works project. For more information about the individual permits required by these agencies, please see the ADEIS.

Per 23 U.S. Code § 139, Efficient environmental reviews for project decision making:

*to the maximum extent practicable and consistent with Federal law, all Federal permits and reviews for a project shall rely on a single environment document prepared under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) under the leadership of the lead agency.*

The coordination on avoidance and minimization of impacts has occurred under the Maryland “Highway Methodology” for integrating NEPA and the Joint Permit Application review processes. Specifically, the Project has attained two concurrence points: purpose and need, and alternatives. Additional Project details are found in the ADEIS.

## Build Alternatives and BWRR’s Preferred Alternative

### Build Alternatives

The Project is planned to provide approximately 15-minute service between a new Baltimore terminal station located in the Cherry Hill section of the City and a Washington terminal station located immediately east of Mount Vernon Square, with an intermediate stop under the central terminal area of BWI airport. The SCMAGLEV system will run on a new, high-quality guideway with bi-directional service, an automatic train control system, and no at-grade crossings. The Project is being designed for potential future extension north of Baltimore for which there would be a separate NEPA process and permit applications.

In coordination with the NEPA team, BWRR established initial limits-of-disturbance (LOD) for each Build Alternative by implementing typical section and other design criteria for the SCMAGLEV system, refining each LOD by applying an avoidance and minimization process, and then targeting location-specific avoidance and minimization. The team defined the LOD of each Build Alternative to avoid and minimize impacts to adjacent resources to the maximum extent practicable while maintaining a constructible area for the various construction activities.

The Build Alternatives encompass three principal components:

1. Alignment Build Alternatives – The alignment carries the two guideways for mainline running service between the passenger stations. The alignment is comprised of two main configurations: guideways on elevated structure and guideways in deep bored tunnel. Transition portals provide the connection between the deep tunnel and elevated structure portions of each route. The transition portals are comprised of cut-and-cover tunnels and depressed guideway sections supported by retaining walls on each side. FRA and MDOT, with BWRR, initially identified and evaluated potential alignment alternatives in a study area approximately 40 miles long and 10 miles wide, bounded on the west by Interstate 95 and on the east by the former Washington-Baltimore & Annapolis Electric Railroad alignment.

Two Build alternative alignments were ultimately identified for detailed analysis in the ADEIS. The two Build alternative alignments are referred to as J and J1. The above-ground sections of J and J1 are on viaduct structure and each of the alternative alignment's above-ground section generally abuts Route 295 (Baltimore-Washington Parkway) to the east and the west, respectively. Traveling south to north, the above-ground sections of the J and J1 alignments begin at points north of Route 193 (Greenbelt Road). The above-ground section of the J alignment returns to a tunnel section immediately north of Route 32 and the J1 alignment returns to a tunnel south of Route 198. Outside of the distinct above-ground sections, the J and J1 alignments essentially share the same alignment. Each alignment alternative has associated fresh air/emergency egress facilities in tunnel sections of the alignment, electric power substations, maintenance of way facilities, and other SCMAGLEV system support facilities. Please refer to the ADEIS for additional details on the alignment Build alternatives.

BWRR's preferred alternative for the alignment component of the Project is the J alignment alternative.

2. Baltimore Station Build Alternatives – Conceptually, the SCMAGLEV system was planned to have three stations – one in Baltimore, one at BWI Airport, and one in Washington. Connection with fixed guideway rail and other public transportation was among the chief station site location criteria. In addition, each station needed to be located on a “point on a straight line” site to be consistent with the purpose and need criterion of achieving optimal operating speeds between stations.

The NEPA and preliminary engineering identified and evaluated several Baltimore and Washington station alternative locations, while coordinating with BWI airport on the optimal location in the BWI central terminal area for intermodal connection and consistency with the BWI master plan. It was established at the alternatives concurrence point that there were no other practicable alternative station location sites in Washington and at BWI than those proposed by BWRR. Neither the Washington station nor the BWI station involve wetland or stream impacts as each is in densely developed areas.

The ADEIS is evaluating in detail for purposes of NEPA one Washington station location as the Build alternative, Mount Vernon Square (MVS) East; one BWI station location as the Build alternative; and two Baltimore station locations as Build alternatives: Cherry Hill and Camden Yards. Cherry Hill is planned as an above-ground station in the vicinity of the Maryland Transit Administration's Cherry Hill light-rail station and Route 295. Camden Yards would be an underground station near Camden

Station (MARC Camden Line-MTA Light Rail) and I-395. Please refer to the ADEIS for additional details on the Baltimore station Build alternatives.

BWRR's preferred alternative for the Baltimore station component of the Project is the Cherry Hill Station.

3. Trainset Maintenance Facility Build Alternatives – The function of the TMF is for trainset storage, inspection, light maintenance, and heavy trainset overhaul and repair. The SCMAGLEV system requires one TMF between Washington and Baltimore with storage yard, inspection shop, repair shop, and heavy maintenance shop. Such a facility requires a footprint of approximately 180 acres. BWRR coordinated with FRA and MDOT on a corridor-wide search of potential sites that could meet the size requirement, as well as the requirement to be adjacent to the alignment to minimize the cost of train “dead-heading” and the requirement to be located on non-residential land.

There are three trainset maintenance facility (TMF) Build alternatives, with two of the alternatives located on portions of the USDA Beltsville Agricultural Research Center: BARC West (west of Route 295), BARC East-Airstrip (east of Route 295), and MD 198 (east of Route 295 and north of MD Route 198). BARC refers to the). Each TMF Build alternative can be connected via ramps to and from each of the mainline Alignment Build alternatives. Please refer to the ADEIS for additional details on the TMF Build alternatives.

BWRR's preferred alternative for the TMF component of the Project is the BARC West TMF alternative.

#### BWRR's Preferred Alternative (The Project)

Out of the 12 Build Alternative combinations being evaluated in the ADEIS – alignments, Baltimore stations, and TMFs – the Project on which BWRR is submitting a Joint Permit Application is comprised of these principal components: J Alignment alternative, the Cherry Hill Baltimore Station alternative, and the BARC West TMF facility, along with the other two passenger stations common to all 12 Build Alternative combinations: the MVS East station in Washington and the BWI station.

## Wetlands and Waterways

The NEPA natural resource team delineated a total of 302 wetland features totaling 9,206,213 SF of nontidal wetlands and 223 stream segments totaling 85,538 linear feet within the area encompassed by the Build alternatives. The Wetland Delineation Data include specific information regarding these features. NEPA natural resource team field leads conducted a function and value assessment of delineated features based on parameters outlined in the *USACE Highway Methodology Workbook Supplement* (USACE, 1999) and best professional judgement. Function and Value datasheets were completed for each wetland and included in The Wetland Delineation Data. The team assessed wetland function and value based on the following parameters:

- Groundwater Recharge/Discharge
- Floodflow Alteration
- Fish and Shellfish Habitat
- Sediment/Toxicant Retention
- Nutrient Removal
- Production Export
- Sediment/Shoreline Stabilization
- Wildlife Habitat

- Recreation
- Education/Scientific Value
- Uniqueness/Heritage
- Visual Quality/Aesthetics
- Endangered Species Habitat
- Relative Value in Urban Landscape

The team completed waterways datasheets for each stream segment delineated in the field and prepared a qualitative function and value assessment considering parameters such as bank erosion, stability, and incision; hydrologic connectivity; level of alteration; channel substrate; vegetation cover of banks and riparian buffer; fish and wildlife habitat; relative value in an urban landscape; and recreational value. The function and value assessments were helpful in prioritizing the conservation of resources in areas where impacts were unavoidable and minimization choices between resources were necessary due to the confined nature of the study corridor.

## Minimization of Impacts

### Alignment-wide Avoidance and Minimization

One of the principal ways that the Project has avoided and minimized wetland and waterway impacts is through designing extensive tunneled sections to convey the guideway underground. Indeed, approximately 67.9% (22.2 miles of tunnel excluding DC station) of the 32.7-mile alignment between Washington and Baltimore is underground in tunnel. Tunneling avoids impacts to the Anacostia River (navigable water and USACE civil works project, in addition to being a waters of the U.S.) and Patapsco River main stems and adjacent wetlands and floodplains, as well as to several named and unnamed streams and tributaries (namely, Brier Ditch, Dorsey Run, and Stony Run). Further tunneling would not be practicable from a cost perspective and operations perspective as the 180-acre TMF needs to be above ground. Additionally, it would be inconsistent with the expressed intent of Congress in authorizing the Maglev Deployment Program that the Maglev system supported by MDP funds would need to demonstrate the functioning of Maglev under different operating conditions (with above ground operating conditions having distinct challenges from underground operating conditions).

Incorporating the J alignment alternative rather than J1 into the Project results in fewer permanent wetland impacts from the alignment component of the project. Even though alternative alignment J1 has approximately 15% higher percentage in tunnel than the alternative alignment J (BWRR-preferred), for essentially the same alignment length, preferred J alignment has approximately 2 fewer acres of unavoidable permanent wetland impacts (11 acres) than the J1 alignment alternative (13 acres) and, therefore, results in overall net avoidance and minimization of permanent wetland impacts.

The MOW, FA/EE, and substation facilities spacing along the alignment was required to comply with SCMAGLEV criteria for adequate nightly inspection of the entire guideway (MOW facility), tunnel ventilation and emergency egress requirements in tunnel sections (FA/EE), and system operation (substations). To avoid and minimize impacts, BWRR applied a project-specific criterion of locating such facilities in commercial or otherwise previously disturbed areas where feasible. The co-location of power substations with FA/EE facilities minimizes land disturbance (and associated wetland impacts), and provides for better operational efficiency, than would occur if the substation and FA/EE facilities were at separate locations. In addition, because the J alignment alternative has shorter tunnel length than J1, J has six FA/EE facilities rather than seven FA/EE facilities required for J1, which reduces the wetland impact

an additional FA/EE. The wetland impact of an additional FA/EE is accounted for in the alignment alternative J1.

A substation and a maintenance-of-way facility are co-located within the LOD of the TMF. By co-locating facilities with different functions, the Project plan minimizes land disturbance (and associated wetland impacts), and provides for better operational efficiency, than would occur if the TMF, substation, and MOW facility were at separate locations. Meanwhile, the numerous SCMAGLEV system support facilities along the elevated alignment have been placed under the viaduct, where possible. By so doing, the placement of such facilities avoids and minimizes impacts.

### Targeted Avoidance and Minimization

One way in which the design was modified to avoid and minimize wetland and stream impacts is through relocating the south portal section where, traveling south to north, the alignment transitions from tunnel to elevated guideway over approximately 0.7 miles. The initial location of the south portal would have impacted Beck Branch and associated wetlands. Impacts were reduced by relocating the portal to the south and further away from Beck Branch.

The stormwater management design in the vicinity of the south portal was also redesigned to minimize wetland and stream impacts. Also, in the actual viaduct section, stormwater will also be entirely managed on site within the LOD which will avoid impacts from siting stormwater management facilities outside the LOD of the viaduct.

Incorporating the BARC West TMF alternative into the Project with the J alignment alternative results in 4 to 23 acres of permanent wetland impact avoidance and minimization as compared with pairing J to the BARC East-Airstrip and MD 198 TMF alternatives, respectively. The BARC West TMF paired with the J alignment has 10 acres of permanent wetland impact (same for J1), the BARC East-Airstrip TMF paired with the J alignment would have 14 acres of permanent wetland impact (and paired with J1, 13 acres), and the MD 198 TMF alternative paired with the J alignment would have 33 acres of permanent wetland impact (and paired with J1, 38 acres). Based on the analysis, the BARC West TMF alternative also results in fewer wetland and stream impacts than the alternative sites resulting in an overall net minimization of wetland and stream impacts associated with the TMF.

In the location where an FA/EE facility could not be located on commercial property, the Route 410 FA/EE, the design was revised to reduce wetland impacts resulting in a reduction of 0.2 acres of wetland impacts and reduction of 0.19 acres of waterway impacts. Meanwhile, the location of the I-895 FA/EE and substation facility was revised resulting in increasing the distance between the FA/EE and wetland adjacent to the Patapsco River by 214 feet (was 66 feet and now is 280 feet).

The Cherry Hill location for the Baltimore station is predominately located on a brownfield area to avoid and minimize impacts to less than one acre of permanent wetland impact. While the alternative Camden Yards station location has no wetland or stream impacts, for reasons described in section of this application – Alternative Site Analysis – the Camden Yards location has substantial cost, construction logistics, and historic and other property impacts, that far outweigh the relatively minor wetland impact of the Cherry Hill Station.

### Avoidance and Minimization of Construction Impacts

The Construction Plan was developed to avoid and minimize impacts, where possible, thereby reducing temporary impacts on wetlands and streams. Construction access to tunnel boring machine launch and retrieval sites for personnel, materials, equipment, and spoils retrieval will be entirely by way of locations

that will be permanently disturbed for the eventual construction of FA/EE facilities. As noted above, with two exceptions, FA/EE facilities have been located on previously disturbed commercial properties where possible. By using sites eventually to be disturbed for FA/EE facilities for tunnel construction access, the Construction Plan avoids and minimizes wetland and stream impacts that would otherwise have occurred. In addition, all the construction access sites are adjacent to major roadways and the on-site access to these roadways for vehicles will be within the same general footprint as the permanent on-site roadway for the eventual FA/EE, further minimizing impacts.

Construction access to the viaduct work zone will similarly take advantage of major roadways to minimize on-site disturbance that would otherwise be created by end-to-end construction roadways in the viaduct section. In a few cases, short gravel access roads linking existing major roads to the permanent R/W of the elevated viaduct will be provided. The method of viaduct construction will employ cranes mounted on initially constructed viaduct sections, where possible, so that the viaduct construction can progress sequentially with minimal ground disturbance and wetland impact.

It is estimated that the Project's construction will generate approximately 25 million cubic yards of spoils, mostly from tunneling excavation. Excess spoils from tunnel boring and land grading will be disposed of in ways that avoid and minimize impacts on wetlands and streams. BWRR is coordinating with Maryland agencies on potential beneficial use of spoils on Chesapeake Bay shoreline and island enhancement projects. Otherwise, contractors will be required to dispose of spoils at permitted upland locations.

## Impacts

### Unavoidable Impacts

The ability to avoid and minimize impacts on wetlands and streams through means typically available to other linear infrastructure projects, e.g., re-routing or design criteria exceptions, is generally not available to this Project because of the purpose and need. Specifically, the purpose and need stipulates the following:

*The purpose of the SCMAGLEV Project is to evaluate, and ultimately construct and operate, a safe, revenue-producing, high-speed ground transportation system that achieves the optimum operating speed of the SCMAGLEV technology to significantly reduce travel time in order to meet the capacity and ridership needs of the Baltimore-Washington region. To achieve the operational and safety metrics needed for a SCMAGLEV system, the Project must include: (1) Infrastructure, vehicles, and operating procedures required for the SCMAGLEV system. (2) An alignment which allows the highest practical speed that can be attained by SCMAGLEV technology at a given location and which avoids the need for reduction in speed other than that imposed by the normal acceleration and braking curves into and out of stations.*

The optimum operating speed required for SCMAGLEV translates into strict horizontal and vertical curvature design criteria which greatly limit the practical ability to re-route the alignment to avoid or minimize impacts. SCMAGLEV is also required to operate with two guideways for the safe passing of trains in each direction. The two-guideway requirement translates into a specific typical section.

To operate safely, the spans supporting the SCMAGLEV guideway are required to be highly rigid. The span deflection requirements translate into specified pier spacing between spans of 125 feet to 165 feet.

The resulting unavoidable impacts of the Project (BWRR preferred alternative) on wetlands and waterways are identified in the following table<sup>1</sup>.

Category	Total Permanent	Total Temporary	Notes
<b>Wetland</b>	22 acres	7 acres	Wetland classifications of Permanent impacts: PUB = 1 ac.; PEM = 3 ac.; PFO = 18 ac.
<b>Non-tidal Wetlands of Special State Concern</b>	9 acres	3 acres	
<b>Stream</b>	12,896 feet	3,546 feet	Stream type of Permanent impacts: Ephemeral = 1,549 ft.; Intermittent = 5,385 ft.; Perennial = 5,962 ft.
<b>Floodplain</b>	46 acres	7 acres	

Temporarily impacted wetlands, streams, and floodplains will be restored following completion of construction.

### Impact Types

The Project’s unavoidable impacts stem from the following activities:

- Roadway/Parking (construction access and staging; buildings access and employee parking; viaduct and other system support maintenance access)
- Buildings (TMF, FA/EE, Substations, Other System Support)
- New Bridge/Pier Foundations (guideway viaduct)
- Retaining Walls (tunnel portal transitions)
- Stormwater Outfalls (facility roadway and parking, tunnel portal transitions, and viaduct)
- Relocated Channel (facility roadway and parking, tunnel portal transitions, and viaduct)
- Construction Access (facility roadway and parking, tunnel portal transitions, and viaduct)
- Hydrology Loss (impervious surface for roadway, parking, and buildings; stream channel relocation)

### Conclusion

BWRR has consistently sought ways to avoid and minimize impacts while complying with the SCMAGLEV criteria in designing the alignment and in locating stations, the trainset maintenance facility, maintenance of way facilities, fresh air/emergency egress facilities, substations, other system support facilities, and construction laydown and access.

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<sup>1</sup> Note: values for calculated impacts in this and other wetlands tables are preliminary and are based on the assumption that all LOD’s constitute a loss of resource. Habitat conversions, e.g., from PFO to PEM are not considered. Impact quantities will be updated based on a more advanced design as part of the Joint Permit Application (JPA).