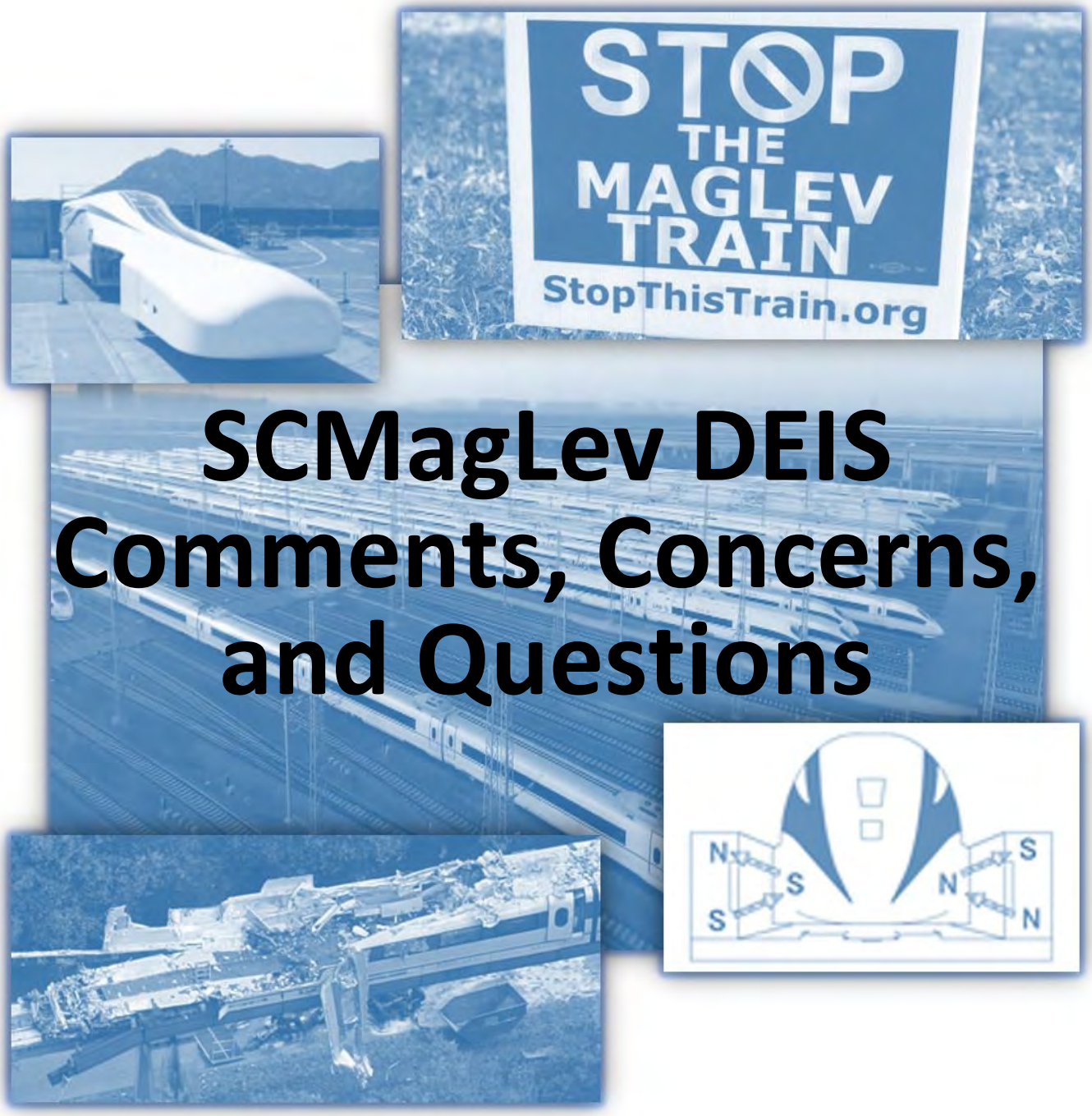
Citizen's Against the SCMagLev *and*
Maryland Coalition for Responsible Transit



SCMagLev DEIS Comments, Concerns, and Questions

Submitted to:
The Federal Railroad Administration and
The Maryland Department of Transportation

May 20, 2021

Date: May 20, 2021

MARYLAND COALITION FOR RESPONSIBLE TRANSIT

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In Re: MCRT-CATS Comments on the SCMagLev DEIS

The Maryland Coalition for Responsible Transit (MCRT) and the Citizens Against the SCMagLev (CATS) have reviewed, researched, and assembled the attached comments on the SCMagLev Draft Environmental Impact Statement (DEIS).

We find the DEIS to be woefully inadequate. We find the DEIS significantly understates the negative impacts building and operating the SCMagLev will have on our communities' residents and our counties' environment. We find the DEIS to be deficient and misleading in six principal areas:

1. The DEIS fails to adequately address federal and Maryland environmental laws and requirements.
2. The DEIS understated and omitted environmental impacts.
3. The DEIS fails to adequately present data on the safety and crashworthiness of the SCMagLev and its support structures and systems.
4. The DEIS fails to provide the required financial, ridership, job creation, and other data and analyses to substantiate their benefit claims and the viability of their financial model and forecasts.
5. The DEIS understates and fails to address the impact on residents and communities through which the SCMagLev will travel.
6. The DEIS fails to compare the SCMagLev system to other similar and comparable ground-transportation based systems, both existing and planned.

We ask:

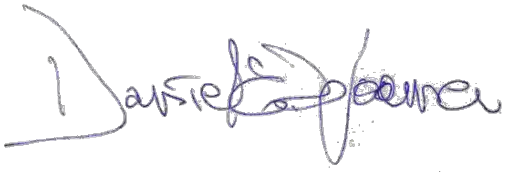
- Before any record of decision is made to approve the building of the SCMagLev, Rules of Particular Applicability must be established and the SCMagLev crashworthiness, structures, and systems must undergo the same rigorous test and evaluation process applicable to other American ground-based rail systems.

- Given the current number of errors, missing information, and missing critical analyses needed to make an informed decision, a ***supplemental*** DEIS must be developed to address the long list of issues, questions, and concerns detailed in our comments.

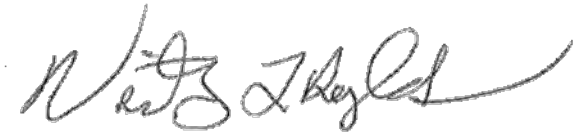
Please feel free to contact us should you have any questions about our submission or whether you would like further information about the MCRT and our work. Our website is www.mcrt-action.org. Our email is MCRTaction@gmail.com.

Thank you for your efforts and consideration of the issues we describe in our submission.

Respectfully,



Daniel E. Woomer
President



Victoria Reynolds
Vice President

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I. Introduction

We, the Maryland Coalition for Responsible Transit (MCRT) and the Citizens Against the SCMagLev (CATS), submit these comments and raise serious concerns and questions about approving the Baltimore-Washington Rapid Rail (BWRR) plan to build a Superconducting Magnetic Levitation (SCMagLev) system between Baltimore and Washington, D.C., as presented in the Draft Environmental Impact Statement (DEIS) released on January 15, 2021. We provide detailed comments prepared by our expert team, including an independent analysis of various aspects of the project sponsor's (BWRR's) claims, promises, and statements. Taking into consideration the DEIS's serious legal and technical deficiencies, we strongly ***urge the Federal Railroad Administration (FRA) to withdraw and redo the DEIS and identify the NO BUILD alternative as preferable to the Proposed SCMagLev Project.***

II. MCRT and CATS

The Maryland Coalition for Responsible Transit (MCRT) a Non-Profit organization formed in 2020 as more and more communities and organizations joined forces to oppose the building and operation of the SCMagLev. MCRT's mission is to evaluate transit projects for social equity, environmental justice, economic viability, and community accessibility. The MCRT believes the Baltimore-Washington SCMagLev must be stopped to allow the implementation of future transit projects that meet the criteria of accessibility and affordability for residents, and much less risk and impact to their communities. Therefore, we support the SCMagLev's No Build option and are working to stop this project through the National Environmental Policy Act (NEPA) process, specifically by building public capacity to respond to the DEIS. The MCRT is actively gathering and sharing information on the environmental, ecological, community, and financial impacts building and operating the SCMagLev will have on communities, counties, and the state of Maryland. The MCRT is actively hosting and participating in community meetings and town halls, including with elected officials, to share accumulated knowledge and information. See MCRT's SCMagLev concerns and questions at our Facebook page https://www.facebook.com/MCRTaction and our website at www.mcrt-acrtion.org. Contact the MCRT at mcrtaction@gmail.com.

Citizens Against the SCMagLev is an organization formed in 2016 when the initial BWRR and Northeast Maglev (TNEM) proposal to build the first phase of Japan's SCMagLev train between Baltimore, Maryland, and Washington, D.C. BWRR's long-term goal is to build the SCMagLev systems to New York City, New York, by way of Philadelphia, Pennsylvania, and on to Boston, Massachusetts. Community residents and activists began attending the BWRR presentations and hearing details about their building plans and the operation of the SCMagLev. As many questions were raised and not answered by the BWRR, community concerns arose. Residents came together to represent the interests of their communities and form CATS. CATS has evolved into a confederation of scientists, engineers, experts, community organizations, and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better appropriated to maintain and improve the transportation infrastructure needed and used daily by all

residents, businesses, and commercial entities. CATS has written numerous articles and provided testimony on legislation in Annapolis and has met with elected officials in Washington, D.C., to share information that challenges the promises and claims made by the BWRR. CATS has identified better high-speed rail and commuter rail alternatives, and presented analyses on the extreme environmental, ecological, community, and financial costs and impacts that building and operating the SCMagLev will have on communities, counties, and the state of Maryland. See our CATS Facebook page at www.facebook.com/groups/citizensagainstscmaglev and our Stop This Train website at www.stopthistrain.org.

III. Executive Summary

CATS and the MCRT assembled a team of experts from various fields and disciplines to review the SCMagLev DEIS. Short bios of our team are attached. Their research, findings, comments, concerns, and questions are presented in this report. We submit that the DEIS is deficient in the following areas:

- The DEIS fails to adequately address the requirements of federal and state law.
- The DEIS understates and omits environmental impacts in key areas of water quality, wetlands, climate change, air quality, parkland, historic sites, and endangered and threatened species, among others.
- The DEIS Statement of Purpose and Need and Alternatives Analysis impermissibly favors the SCMagLev Project over Viable Transit Alternatives outlined in the No Build Alternative.
- The DEIS Violates NEPA Segmentation Principles by limiting the scope of analysis to the Washington-to-Baltimore Corridor and ignoring the Project's Sponsor's clear plan to eventually extend the SCMagLev to the New York and Boston.
- The DEIS fails to adequately address the greenhouse gas impacts from the tremendous energy use needed for the project.
- The DEIS fails to adequately analyze the project's Impacts on meeting the Chesapeake Bay clean-up goals.
- The FRA failed to prepare an adequate Draft Section 4(f) Report to assess the project's use of parkland and historic resources.
- The DEIS is deficient by failing to provide sufficient information and analysis on the project's serious impacts to protected streams, wetlands, groundwater, and forest areas. The DEIS fails to include the Project Sponsor's Joint Permit Application, making it difficult to provide meaningful comments for permits needed to authorize those impacts.

- The DEIS does not adequately analyze the project's serious impacts on federal and state listed rare, endangered, and threatened species.

- The DEIS economic and ridership analysis is based on inaccurate assumptions and outdated traffic data. In particular, the FRA provided a heavily redacted ridership and demand study that makes it extremely challenging to provide meaningful comments and analysis.

- The DEIS analysis of the project's safety contains serious errors and omissions. The DEIS fails to adequately present data on the safety and crashworthiness of the SCMagLev and support structures and systems.

- The DEIS fails to provide the financial, ridership, job creation, and other required data and analyses to substantiate their benefit claims and the viability of their financial model and forecasts.

- The DEIS Environmental Justice Analysis is seriously deficient. The DEIS understates and fails to address the impact on residents and communities through which the SCMagLev will travel.

Considering these deficiencies, the FRA must address a long list of findings before any consideration of building the SCMagLev moves forward. These issues include, but are not limited to:

- The need for U.S. expert assessment of the safety of the train system, in a manner akin to the safety and crashworthiness assessments of Amtrak and other U.S. rail transportation systems.

- The need for the FRA to develop Rules of Particular Applicability (RPA) for the independent assessment of the SCMagLev system BEFORE the FRA completes and publishes their Record of Decision (ROD).

- The need for a full, independent expert assessment of the serious and irrecoverable environmental and ecological damage and destruction building the SCMagLev will bring to one of the last preserved research spaces on the East Coast so that the full cost to our state, counties, communities, and residents is identified.

- The need for a full independent expert assessment of the potential danger to human and wildlife health from emissions and pollution building and operating the SCMagLev will bring so these impacts are known and quantified.

- The need for an independent expert assessment of the financial viability of building and operating of the SCMagLev without the need of government subsidiaries (unlikely). If government subsidies are required (likely), quantify the full scope and size of the subsidies needed and identify the source of funds.

- The need for an independent expert assessment comparing the capabilities, negative consequences, costs, and benefits of building the SCMagLev versus continuing the enhancement and integration of

the FRA's approved Amtrak Northeast Corridor (NEC) *Future Plan*. This assessment needs to include identifying, quantifying, and weighing the levels of integration these two competing systems have (or will have) with regional rail, bus, and other commuter services (such as the D.C. Metro), as well as the level of access and scope of the services offered to communities along the respective system's routes.

- An independent expert assessment of the impact on Amtrak from ridership and financial losses with the building and operating of the SCMagLev is needed. To maintain Amtrak viability, such ridership and financial loss will need to be addressed through increased government subsidies. The level of increased subsidies, identifying the source of funding for increased subsidies, and the impact the loss of these funds will have on addressing other higher-priority transportation infrastructure projects (e.g., roads, bridges, tunnels) needs to be identified and quantified.

Detailed Comments:

IV. The FRA's Statement of Purpose and Need and Its Analysis of Alternatives to the SCMagLev Project Violates NEPA

Under the Council on Environmental Quality (CEQ) regulations, the statement of purpose and need is essential to the NEPA process because it guides the agencies scope of review.[1] An agency is not permitted to "contrive a purpose so slender as to define competing "reasonable alternatives "out of consideration." *Simmons v Corps* 120 F.3d. 664, 666 (7th Cir. 1997). An agency cannot unreasonably narrow the objective of the proposed action to limit the range of alternatives considered. *Friends of Southwest's Future v. Morrison*, 153 F. #d. 1059, 1066 (9th Cir. 1998). Here, the FRA's definition of Purpose and Need and analysis of alternatives violates these principles.

The FRA cites the SAFETEA-LU Act (P.L. 109- 59) authorized funding to study magnetic levitation transportation projects and identifying the Baltimore-Washington corridor as the location for its evaluation of SCMagLev project "due to the area's high level of congestion, economic importance, increased development and the need for connectivity between the two cities."[2] Yet instead of a defining Purpose and Need without favoring any one alternative, the FRA's definition of project purpose presumes that the concerns Congress cited can only be met by a high speed ground transportation system that meets the optimum operating speed of the SCMagLev. In the FRA's view, the SCMagLev is the only viable alternative to improving existing rail, highway and public transit to address serious mobility problems for the Baltimore to Washington corridor. However, the DEIS's list of transportation challenges does not lead to such a conclusion. Rather, the DEIS essentially dismisses the fact that the corridor's increased population and employment, growing demands on the existing transportation network, inadequate capacity of the existing transportation network and increased travel times could be addressed by alternatives other than the maglev technology.

[1] see 40 CFR 1502. 13.
[2] DEIS Chapter 2, Section 2.2. Page 2.2.

From the beginning, the FRA's alternatives development process focused on screening design options and possible routes for the SCMagLev project and not on whether other transit alternatives might address the corridor's transportation challenges.[3] As a result, the DEIS cites but "downplays" the FRA's ongoing study of less costly and disruptive alternatives while presuming that they will not address the transportation challenges as would the SCMagLev. The DEIS cites the FRA's Northeast Corridor FUTURE (NEC FUTURE) Tier I Final EIS that documented the increasing demand for improved rail service and identified service and performance objectives to improve rail service on the NEC. That ROD recommended a number of improvements covering chokepoint relief projects, new track capacity, signal upgrades, replacement of the Baltimore and Potomac Tunnel, improvements to the Baltimore-Washington International Marshall Airport Rail Station, and the Fourth Track Project. The DEIS also listed a number of improvements in local transit service, including improvements to the MARC Commuter Rail Service and to the AMTRAK intercity rail service on the NEC between Boston, Massachusetts, and Washington, D.C.[4] Further, the next generation of Acela trains will travel at speeds of up to 200 miles-per-hour and Amtrak will continue to replace and upgrade tracks along the Northeast Corridor to safely accommodate these faster trains.

As a result of the FRA's "skewed "approach to alternatives, the FRA' "leaps" to the conclusion that the "No Build" alternative" would not likely fully achieve the capacity needed to keep pace with the region's population and employment growth" as would the SCMagLev. Yet the FRA concedes that "other planned and funded transportation projects . . . would result in improved capacity of the regional transportation network for existing modes."[5] However, the FRA's conclusion is based on inaccurate financial assumptions and outdated traffic data. The traffic and population data do not incorporate the impact of COVID-19 and existing and future traffic patterns such as remote working (see Section 4). Most significantly, the ridership demand study provided is heavily redacted and does not reveal the critical data needed to analyze whether riders would even use the SCMagLev as an alternative to other transit modes (see Section 4). Indeed, the DEIS cost-and-service data expressly contradict its conclusion, noting that the $60 one-way cost of the SCMagLev trip is "seven times the cost of the existing MARC commuter fare between Baltimore and Washington D.C." and that such a cost "would be prohibitive for some low income populations."[6] Further, unlike the MARC commuter system which has 16 intermediate stops, the SCMagLev does not have any stops along the corridor. It only stops in Baltimore, at BWI Marshall Airport and in Washington D.C.[7] Thus, it would not be readily usable by commuters living in points between the two cities who could access stops much closer to home and reach their destinations at a much lower cost.

Further, the FRA should now take into account the changed infrastructure priorities of the Biden Administration. The President's recent Infrastructure Jobs Plan for Maryland notes "Marylanders who take public transportation spend an extra 66.3% of their time commuting and non- white households are 2.7 times more likely to commute via public transportation. 23 % of trains and other transit vehicles in

[3] DEIS Chapter 3, Section 3.2.
[4] DEIS Chapter 3, Section 3.3.1 (No Build Alternative).
[5] DEIS Chapter 3, Section 3.3.1.2. Page 3-11.
[6] DEIS Chapter 4, Section 4.5. Page 4.5-18.
[7] DEIS Section 3.3.2.4, Table 3.4-4. Page 3-26.

the state are past their useful life." Yet, rather than proposing the SCMagLev as a solution, the Administration states that it "will modernize public transit with an $85 billion investment."[8]

In short, the FRA's "skewed" approach is a classic case of "unreasonably "narrowing the objective of the proposed action so as to limit the range of alternatives considered. The FRA's approach violates NEPA's fundamental rule that the "alternatives section is the heart of the EIS" and "must rigorously explore and objectively evaluate all reasonable alternatives."40 CFR 1502. 14. CEQ's Questions and Answers About the NEPA Regulations, Q. 1 a. (CEQ, 1981.)[9]

V. The FRA's Limitation of the Project's Study to the Baltimore to Washington Corridor Improperly Segments the Scope of Analysis from the Project Sponsor's Plan to Extend the SCMagLev to the Entire Northeast Corridor

The BWRR, the project sponsor, consistently describes the SCMagLev as part of an overall Washington-to-New York business model and their unsubstantiated supporting data appears to be based on this overall system. The Northeast Maglev LLC (TNEM) project's website notes that the proposed SCMagLev system "ultimately will be extended to New York City."[10] The plan to go onto New York City and Boston has been repeated many times over these past years by TNEM representatives.[11] Thus, the D.C.-to-Baltimore route is just one phase of a project that is planned to go to New York City and possibly even Boston. In effect, by limiting the scope of analysis just to the Washington-to-Baltimore corridor, the FRA has improperly segmented the project and foreclosed the consideration of other transit alternatives if the D.C.-to-Baltimore segment was extended to the full Northeast corridor.

The prohibition on improper segmentation of an overall project is central to the NEPA. Under established case law and guidance, to avoid improper segmentation, a proposed project (1) must have logical termini, (2) must have substantial independent utility, (3) may not foreclose the opportunity to consider alternatives, and (4) does not irretrievably commit funding of closely related projects.[12] As one court stated: "The purpose of considering connected actions in one EIS is to assure that the decisionmakers, as well as the public, are aware of the environmental impacts of the entire connected project, as an interconnected whole so as to avoid an irretrievable commitment to the entire project on the strength of a segmented analysis of the impacts . . ."[13]

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[8] "American Jobs Plan - The Need for Action in Maryland." White House. www.whitehouse.gov/wp-content/uploads/2021/04/AJP-State-Fact-Sheet-MD.pdf.
[9] 46 Federal Register18026. March 23, 1981.
[10] Northeast Maglev Common Questions - General Questions. 2021. https://northeastmaglev.com/faq/#general.
[11] TNEM plan to continue onto New York City and Boston has been repeated and reported many times, see: Appendix - Article Reprint: Diffendal, Theresa. "Maglev Route Deliberations: Decision Due This Summer." May 2, 2019. Greenbelt News Review; Appendix - Article Reprint. Zaleski, Andrew. "Crazy Train: Is the proposed 300-mile-per-hour maglev train Baltimore's future? Or fantasy?" Baltimore Magazine. September 2019; Appendix - Article Reprint. Zaleski, Andrew. "Crazy Train: Is the proposed 300-mile-per-hour maglev train Baltimore's future? Or fantasy?" Baltimore Magazine. September 2019.
[12] See One Thousand Friends v. Mineta, 364 F.3d. 890, 894 (8th Cir. 2004). See FHWA Regulations at 23 CFR 771.111 (f).
[13] *Northwest Bypass Group v. Corps,* 552 F. Supp. 2d. 97,122 (D.N.H 2008), see also *Thomas v. Peterson,* 753 F.2d. 754, (9th Cir. 1985).

From the beginning of this project, the FRA has treated the D.C.-to-Baltimore segment as independent and unrelated to the real possibility that approval of this project would incentivize the efforts of the project sponsor to eventually extend the SCMagLev to New York and possibly even Boston. The FRA relies on its decision to identify the D.C.-to-Baltimore segment for study to implement the Congressional language in Section 1307 of the SAFETEA- LU Act authorizing funding to study magnetic levitation projects. As a result, the FRA's definition of Purpose and Need has focused on the SCMagLev as the only viable alternative to address the serious transportation needs of the corridor and downplayed other viable alternatives as "No Build" even though planned major upgrades to Amtrak and MARC service are underway. Thus, the DEIS focuses on the foreseeable impacts of SCMagLev in the corridor as if the project would essentially end in these connected cities. In so doing, the FRA has essentially "closed its eyes" to the foreseeable consequence that approving the SCMagLev would inevitably lead to extending that technology to New York and even Boston as federal financial and other resources were diverted from alternative transit improvements to the SCMagLev. Indeed, it is entirely likely that FRA's failure to fully consider other transit upgrades as alternatives would also result in limiting the scope of such consideration once the Project was built and operational between Washington, D.C., and Baltimore.

Further, under CEQ's definition, the effects of future extension of the SCMagLev up the Northeast Corridor are not speculative and must be considered under NEPA. CEQ defines 'effects' as "changes to the human environment from the proposed actions or alternatives that are reasonably foreseeable and have reasonably close causal connection to the proposed actions or alternatives . . . . and may include effects that are later in time or farther removed in distance from the proposed action or alternatives."[14] The "effects" definition is very broad including ". . . ecological (such as effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic and cultural, economic (such as effects on employment) social or health effects. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial."[15] The one major limitation is that "effects should generally not be considered if they are remote, or the product of a lengthy causal chain . . . [and] do not include effects that the agency has no ability to prevent due to limited authority or would occur regardless of the proposed action."[16]

Under this definition, it is entirely foreseeable that extending the SCMagLev beyond the D.C.-to-Baltimore corridor would have broad effects. Such approval would clearly require FRA authorization and likely federal funding so any such impacts would not be remote or beyond the ability of the FRA to address. That is, such effects would not result from purely private or non-federal actions. Indeed, the scope of likely effects tied to the future extension of the SCMagLev are likely to cover many factors such as air and water quality, land use, growth, climate change, and economics, including transit-oriented development. One could easily envision a future extension impacting urban areas, wetlands, streams, water quality, forests, and protected species in Northern Maryland, Pennsylvania, Delaware, New Jersey, and New York (depending on the chosen alignment). Further, consideration of the cumulative and

[14] 40 CFR 1508. 1(g).
[15] Ibid at 1508.1 (g) (1).
[16] Ibid at 1508.1 (g) (2).

indirect harm to all these resources from this extension would be precluded as a result of the improper segmentation of the Project only to the D.C.-to-Baltimore corridor. See *Sierra Club v. FERC* (Sabal Trail), 867 F. 3d. 1357 (D.C. Circuit, 2017) in authorizing construction of a pipeline, NEPA require F required the Federal Energy Regulatory Commission (FERC) to consider the downstream effects of greenhouse gas emissions from power plants serviced by the pipeline. The improper segmentation would also foreclose comprehensive consideration of meeting the clean-up goals of the Chesapeake Bay program that requires cooperation and coordination between federal agencies and six states to meet specific clean goals set by the Bay Total Maximum Daily Load (TMDL) program as upheld by the Third Circuit in *American Farm Bureau Federation v. EPA*, 792 F. 3d. 281 (3rd Circuit 2015).

Further, even though there is no formal federal plan to extend the SCMagLev beyond the D.C.-to-Baltimore corridor, a programmatic EIS covering the Northeast Corridor would be very beneficial. CEQ's Forty Questions Memorandum guidance under the NEPA states that "preparation of an area- wide or overview EIS may be particularly useful when similar actions, viewed with other reasonably foreseeable or proposed agency actions, where a common timing or geography are in place *or* exist."[17] Agencies have used discretionary programmatic EISs effectively. In particular, the Federal Highway Administration (FHWA) used a Programmatic EIS to advance a new 149-mile interstate highway in Indiana. Here, the FRA has already prepared the Northeast Corridor (NEC *Future Plan*) EIS and issued a ROD with recommended improvements to grow the role of rail within the transportation system of the Northeast. As the ROD states: "The selected alternative prioritizes a corridor wide commitment to the existing NEC, brings it to a state of good repair and provides the additional capacity and service enhancements necessary to address passenger rail needs through 2040 and beyond."[18] It would be logical and advisable, and make perfect sense for the FRA to delay any further action on the SCMagLev EIS and move to preparation of a programmatic EIS looking at maglev technology in relation to the NEC ROD, laying out transportation improvements for the entire Northeast Corridor to provide the kind of comprehensive analysis that the NEPA requires.

VI. The DEIS Fails to Adequately Address Greenhouse Gas Impact of the Project

The FRA relies on the now-rescinded 2019 CEQ Draft Climate Change Guidance[19] and fails to adequately consider greenhouse gas (GHG) impacts from the significant increase in energy use of the Project.[20] The DEIS admits that the operation of the SCMagLev would significantly increase GHG emissions but claims that "the reduction of overall regional Vehicle Miles Travelled (VMT) from the Project as compared to No Build will likely result in a regional GHG emissions reduction on a regional scale."[21] As described in

[17] Volume 46 Federal Register 18033 (3/23/81) Q. 24b.
[18] "NEPA Litigation Guide" Second Edition 2012. The American Bar Association. pages 87-88.
[19] DEIS Chapter 4.16, section 4.16.2. Page 4.16-1
[20] The DEIS approach to climate change is reflected in the statement that "the potential effects of GHG emissions are by nature global and cumulative as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change" see DEIS Section 4.16.4.2.
[21] DEIS Chapter 4.19.

Section 4 of this submission, and in the report by Dr. Owen Kelley,[22] this conclusion is faulty and fails to accurately assess the increased emissions from both the construction and operation of the project. It also understates the social cost of carbon (SCC) from these increases by applying the rescinded CEQ Draft Guidance and the much lower SCC figure no longer being used. The FRA must reassess the project's GHG impacts, applying the recently reinstated 2016 CEQ GHG NEPA guidance, and calculate the true SCC generated by the Project's increased energy use.

To begin with, the DEIS conclusion that the Project would result in an "overall reduction in GHG emissions"[23] relies heavily on highly questionable traffic data and modeling provided by the BWRR in finding an "overall reduction in GHG emissions."[24] We dispute the data and modeling relied on (see Section 4). Yet, aside from that failure, the DEIS analysis severely understates and fails to accurately analyze the cumulative GHG impacts from the project's increase in energy consumption during construction (6 trillion Btus/year) and operation (4 trillion Btus/year) in calculating the project's overall GHG impacts. The DEIS even admits that the Project would increase net transportation energy consumption by approximately 3.0 BTUs/year, enough to power an estimated 88,900 average homes.[25] Putting this into context, the vast increase in energy consumption would account for nearly 40 percent of the region's total transportation energy consumption per year as compared with 0.1 percent and 1 percent for bus and rail travel.[26]

As discussed by Dr. Kelley, the DEIS GHG analysis is deficient and misleading regarding both the construction and operation of the SCMagLev project. By focusing heavily on the GHG emissions from operating the Project, it does not accurately analyze the GHG emissions from constructing the SCMagLev which he estimates to be between 316 and 815 MKG of CO_2. Dr. Kelley's estimate is based on his analysis of the emissions from manufacturing the concrete and steel to build the SCMagLev's track, tunnel and other facilities. He did not even attempt to estimate the CO_2 emissions from constructing the SCMagLev control stations, control facility or train-maintenance facility. The DEIS even admits that "an increase in GHG emissions would likely result."[27] It then states that "it did not quantify the power plant emissions required for the maglev train operation and facilities" (page 4.16-3). Dr. Kelley concludes that, just the operation of the Project by itself would increase net CO_2 emissions by 286 to 336 MKg /year relative to the No Build alternative. Thus, the DEIS finding that any increase in GHG emissions will be offset by VMT reduction is seriously flawed and did not give a full picture of the true climate change impacts of the Project.

The FRA can no longer rely on the prior proposed CEQ GHG guidance which was recently rescinded by the Biden Administration. The FRA must now conduct a complete and accurate GHG analysis under reinstated final 2016 CEQ NEPA guidance.[28] In directing a "whole of government" approach to the climate crisis, the reinstated guidance requires a broad-based cumulative analysis of GHG impacts in the

[22] Kelley. O. " Proposed Baltimore-Washington Maglev Would Increase Greenhouse Gas Emissions." Issues Forum, PG County Group, Sierra Club. April 14, 2021. www.sierraclub.org/maryland/prince-georges/issues-forum.
[23] DEIS Chapter 4.16, Section 4.16.4.2.
[24] Ibid.
[25] DEIS Chapter 4.19, Section 4.19.3.2. Page 4.19.11.
[26] Ibid.
[27] DEIS Chapter 4.16. Page 4.16-11.
[28] CEQ NEPA website. see 86 Federal Register 10252. February 19, 2021.

NEPA process. While recognizing that "climate change is a particularly complex challenge," that Guidance explains the application of the NEPA principles and practices to the analysis of GHG emissions and climate change with a number of key recommendations to federal agencies relevant to the SCMagLev project:

- Quantifying a proposed agency's projected direct and indirect GHG emissions, taking into account available data and GHG quantification tools suitable for the proposed agency action.

- Use projected GHG emissions (to include where applicable, carbon sequestration implications associated with the proposed agency action) as a proxy for assessing potential climate change effects when preparing a NEPA analysis.

- Where agencies do not quantify a proposed agency action's project GHG emissions because tools, methodologies, or data inputs are not reasonably available to support calculations for quantitative analysis, agencies include a qualitative analysis in the NEPA document and explain the basis for determining that quantification is not reasonably available.

- Discuss methods to appropriately analyzes reasonably foreseeable, direct, indirect and cumulative GHG emissions and climate effects.

- Guides the consideration of reasonable alternatives and recommends agencies consider the short- and long-term effects and benefits in the alternatives and mitigation analysis.

- Counsels agencies to use the information developed during the NEPA review to consider alternatives that would make the actions and affected communities more resilient to the effects of climate change.

Federal climate policy now requires that such an analysis be conducted. The DEIS has already identified the tremendous increase in energy consumption from the project. It certainly seems reasonable to require the FRA to go to the next step of accurately quantifying GHG emissions for both construction and operation of the project. Further, the DEIS failures are exacerbated by its reliance on the prior administration's calculation of the true social cost of carbon of GHG effects. The DEIS uses an extremely low calculation of the value of emissions of $1 in 2030 and $2 in 2045[29] that severely understates the Social Cost of Carbon (SCC). The "SCC is the monetary value of the net harm to society associated with adding a small amount of GHG to the atmosphere in a given year. It includes the value of all climate change impacts and reflects the societal value of reducing emissions of the GHG in question by one metric ton. The purpose of this calculation is to reflect the best available science and work towards approaches that take into account the climate risk, environmental justice and intergenerational equity." The Biden Administration recently issued an interim report on this issue and reinstated a $51/metric ton social cost of carbon (SCC) calculation that would increase up to $85/metric ton by 2050, pending

[29] DEIS Appendix D.04, Table D.4-39. Page D-50.

further review and comment.[30] Thus, not only must the FRA correct the DEIS serious GHG calculation flaws, but it must also conduct a true analysis of the real social costs of the Project. This broad analysis will provide a true picture of the SCMagLev's direct, indirect, and cumulative GHG impacts.

The federal courts have consistently held that the NEPA requires agencies to disclose and consider the climate impacts in their reviews. (see *Center for Biological Diversity v. NHTSA* 538 F. 3d. 1172 (9th Cir. 2008)). In so doing, the FRA is obligated to consider the indirect and cumulative effects of GHG emissions on the climate as essential to ensure that the goals of the NEPA are met. The Supreme Court in *Kleppe v. Sierra Club*, 427 U.S. 390, 413- 14 (1976) emphasized the critical importance of assessing cumulative impacts.

Over the years the courts and the CEQ have been working on how to evaluate cumulative effects, NOT whether to evaluate them. The CEQ addressed these issues in its 1997 Guidance, "Considering Cumulative Effects under the National Environmental Policy Act" ("the passage of time has only increased the conviction that a cumulative effects analysis is essential to effectively managing the consequences of human activities on the environment. The purpose of cumulative effects analysis, therefore, is to ensure that federal decisions consider the full range of consequences of actions.")[31]

The 2016 CEQ Guidance is another key step in meeting this NEPA mandate. This requirement is especially critical when addressing reasonably foreseeable GHG impacts as addressed by the D.C. Circuit in *Sierra Club v. FERC*, 867 F.3d. 1357, 1372 where the court held that FERC's EIS for the pipeline project must consider the downstream effects of GHG emissions from power plant serviced by the pipeline. The court held that it was "reasonably foreseeable" that the authorizing the pipeline to transport natural gas will result in the gas being burned and "that burning natural gas will release into the atmosphere the sorts of carbon compounds that contribute to climate change." Here, it is certainly reasonably foreseeable that the tremendous increase in energy needed to build and operate SCMagLev will result in likely increases in GHG emissions directly attributable to the project.

In short, the DEIS is critically deficient in failing to adequately analyze the GHG effects and the true costs to society from the tremendous increase in energy consumption generated by the construction and operation of the SCMagLev Project.

VII. The FRA Failed to Conduct and Adequate Draft Section 4(f) Report Needed for Public Comment

The FRA's Section 4(f) of the DEIS violated the NEPA and Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 in four ways:

[30] "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, Interim Estimates under Executive Order 13990" page 2. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.
[31] Ibid.

First, the FRA did not adequately analyze and balance the severe impacts to section 4(f) properties with the avoidance and minimization analysis of transportation Improvements under the No Build Alternative.

Second, the DEIS's analysis of constructive uses of Section 4(f) properties was inadequate.

Third, the DEIS did not identify all section 4(f) properties that might be affected by the SCMagLev Project. Thus, the report did not provide sufficient information and analysis for the public to provide meaningful comments. The DEIS must be redone to correct these serious errors and reissued for additional public comment.

Fourth, the FRA's discussion of the required mitigation of impacts is so vague and uncertain the public cannot evaluate the actual impacts to protected resources and, therefore, are prevented from providing meaningful comments. Thus, the report did not provide sufficient information and analysis for the public to be able to provide meaningful comments. Because of these substantial deficiencies, the DEIS must be redone to correct these serious errors and reissued for additional public comment.

1. Analysis of impacts and Alternatives

Section 4(f) of the DOT Act created a clear Congressional mandate to identify, analyze, and avoid the use of all public parkland, recreational areas, wildlife and waterfowl refuges and significant historic sites.[32] The Supreme Court affirmed this overriding preservation purpose in *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 414- 414. Agency action that does not carefully consider these factors before approving use of a section 4(f) property may be set aside under the section 706 of the Administrative Procedure Act, 5 U.S.C. 706.[33] The DEIS acknowledges the preservation purposes of the Act noting that "if there is no feasible or prudent avoidance alternative to the use of a Section 4(f) resource and multiple alternatives would use Section 4(f) resources, FRA approves only the alternative that causes the least overall harm in light of Section 4(f)'s preservation purpose. FRA's least overall harm analysis requires a balancing of seven factors when determining which alternative and options would cause the least overall harm."[34]

Based on the information in the report, it is clear that the FRA has not overcome the strong presumption against the use of the many section 4(f) properties identified. The Project's Build Alternatives would cause extensive direct impacts, especially to federally protected wildlife and park sites. Even with mitigation, Build Alternatives would result in permanent impacts on over 23 acres and temporary impact on 25 to 29 acres to the Patuxent Research Reserve (PRR). It would also permanently incorporate over 88 acres of the BW Parkway under the jurisdiction of the National Park Service. These are but a few of the many physical and constructive uses of other federal, state and local section 4(f) properties resulting

[32] See 49 USC. 303 (c).
[33] Section 4(f) language.
[34] DIES Appendix F. Page F-F-5.

from the Build Alternatives as detailed by the City of Greenbelt and the Maryland-National Capital Park and Planning Commission (M-NCPPC), among others.[35]

The impacts to the PRR are particularly serious. The Refuge was established in 1936 by President Roosevelt's Executive Order 7514 as a "wildlife experiment and research refuge to effectuate the purposes of the Migratory Bird Conservation Act. 43 Stat. 1222." The PRR is also designated as one of the nation's 567 National Wildlife Refuges. The Refuge's General Plan elaborates on the vital purpose of the Reserve.[36]

In 1991, Public Law 101- 519 of the Military Construction Appropriations Act authorized the Secretary of the Army to transfer 7,600 acres of Fort Meade to the Department of the Interior to administer "consistent with wildlife conservation purposes . . . under the conditions that the use was to be for the preservation of wildlife habitat research and compatible public use. Significantly, Section 126(c) states that the "Secretary of Interior may not convey, lease, transfer, declare excess or surplus or otherwise dispose of any portion of the property transferred . . . **unless approved by law.**"[37] The Draft report concedes that "the U.S. Fish and Wildlife Service (USFWS) will require Congressional approval for impacts to the PRR allowing the transfer of land to this transportation use [and] that it is anticipated that the USFWS will also require preparation of a Compatibility Determination."[38]

The DEIS notes the USFWS's strong opposition to the use of the PRR for this project commenting that "the project alignment within the PRR property would be incompatible with the property mission of wildlife research and wildlife conservation. The USFWS expressed concern with the SCMagLev Project effects of noise, air displacement . . . of the PRR property." [39,40] The USFWS objections are consistent with the DEIS's findings on the serious impacts to the PRR. The DEIS states that the land to be incorporated into the project for this alignment (J) and ancillary facilities is "forested; publicly accessible amenities . . . include hunting areas for deer and turkey [and] access to fishing at Blue Heron Pond. Build Alternatives J would result in noise and visual intrusion caused by the viaduct that would affect viewing wildlife in an area of a refuge intended for such viewing and the ecological intrusion would substantially diminish the value of wildlife habitat and substantially reduce wildlife use with the wildlife refuge . . ."[41] The FRA notes "However, under the FRA's 4(f) factors of the "relative significance of the property " and

[35] The DEIS notes that the Project would also involve impacts to the Beltsville Agricultural Research Center (BARC) that would also require congressional approval for conversion of parkland to transportation use requiring compliance with section 6 (f) of the Land and Water Conservation Fund Act, 16 USC 4601-4 to 4601- 11).
[36] The 2019 Final Plan states that "the chief purpose of the refuge is to assist in the restoration of wildlife-one of our greatest natural resources. The Mission is to help through research on critical environmental problems and issues" (Sect. 1.1) see www.fws.gov.Patuxent.
[37] The express language and plain meaning of the phrase "unless approved by law" means that the statute itself must clearly provide authority for the Secretary of Interior to "transfer…or otherwise dispose" of the 25.53 acres of the PRR needed for all the Build Alignments. However, P.L does not have such express language without first obtaining express Congressional approval. Further, P.L 101- 519 cannot be read as providing "implied authority." Rather, the overall language and intent of the statute limits the use of the 7600 acers transferred for wildlife habitat research and compatible use." Using the 25.23 acres for the Build alignments would certainly not meet the intent of the Statute authorizing the original transfer.
[38] DEIS Appendix D. Page D.1-1.
[39] DEIS Appendix F, Table F 18. Page F-121.
[40] At the December 17, 2017, Interagency Meeting, the FWS representative Chris Guy stated that "the USFWS cannot allow third party uses of the PRR unless those uses are compatible with and support wildlife research . . . [and] consideration of a land exchange is off the table."
[41] DEIS Appendix F. Page F- 55.

the "relative severity of the remaining harm after mitigation" a compatibility finding will be extremely difficult if not impossible to make allowing the use of the PRR for the project.[42]

The FRA's failure to adequately address No Build as an alternative to these severe impacts further demonstrates its violation of its section 4(f) mandate. The DEIS merely references the impacts to non-construction alternatives such as roadway improvements and new or expanded transit and rail service and concludes that current plans will still result in use of the BW Parkway a section 4(f) property.[43] The FRA does so without any real analysis as required under its own factors. As we discuss in our critique of the FRA's statement of Purpose and Need, its approach to alternatives mentions but essentially dismisses the other "planned and funded transportation projects that would result in improved capacity of the regional transportation network" by presuming that the SCMagLev Project is the only viable alternative that would meet Congress's concerns regarding the regional transportation system. Consequently, the FRA did not engage in the proper analysis of factors required to find that there are no feasible and prudent alternatives to the use of section 4(f) resources.

2. The Draft Report's Constructive Use Analysis Was Deficient

As the FRA notes, a constructive use occurs when the proximity impacts from the project are so severe that the protected attributes, activities, or features that qualify a property for protection under section 4(f) are substantially impaired, even though the property is not physically incorporated into the project. Examples include noise and vibration impacts. As the court ruled in *Allison v. DOT*: "A project that respects a park's territorial integrity may still, by means of noise, air pollution and general unsightliness dissipate it aesthetic value, crush its wildlife, defoliate is vegetation and take it in every practical sense."[44]

The DEIS identified 24 parks, trails and recreation areas and 44 historic properties with potential constructive use impacts but did not seriously look at the full range of uses and values that would be affected by the Project. The DEIS notes that nearly 2,000 acres of federal, state and local recreational facilities and parkland occur within the Project's affected environment. However, the DEIS uses an arbitrary 800-foot center line distance from the alignments as the limiting factor in assessing impacts to parkland sources while minimizing impacts from station, Train Maintenance Facilities (TMFs), and their ancillary facilities. This limitation prevents the FRA from assessing the full range of potential impacts, including noise, vibrations, visual impairment, and destruction of forests to name few, by locating a 300 mile-per-hour SCMagLev train near parkland and historic sites.

The FRA's deficient noise analysis is a case in point.[45] The FRA found that only the PRR and Greenbelt Forest Preserve "have noise sensitive uses including wildlife viewing" but concluded that "the noise associated with the SC MAGLEV System operations would not result in impacts that would substantially

[42] DEIS Appendix F. Page F-F-5.
[43] DEIS Appendix F. Page F- 118.
[44] *Allison v. DOT*, 908 F2d. 1024, 1028. D.C. Circuit 1990. Also see NPCA v. FAA, 998 F2d. 1523 (10th Circuit 1993), Adler v. Lewis, 675 F.2d. 1085, 1092 (9th Circuit 1982), Morongo Band of Mission Indians v. FAA 161 F.3d. 659, 583 (9th Circuit 1998).
[45] "For the purpose of section 4 (f) noise that is inconsistent with a parcel of land's continuing to serve its recreational, refuge or historic purpose is a "use" of land, *City of Grapevine v. DOT*, 17 F. 3d. 2502, 1507 (D.C. Circuit 1994).

interfere with noise sensitive uses."[46] Yet, the FRA's use of the arbitrary 800-foot Limits of Disturbance (LOD) distance prevented the FRA from looking broadly at the true reach of noise impacts on these resources. Aside from this arbitrary limit, the FRA never conducted any quantitative noise modeling and analysis for parkland resources - a necessary first step to determine whether the projected noise levels measured in Day-Night Average Sound Level (DNL)[47] exceed the noise levels compatible with the of Section 4(f) property uses and values. In fact, the Federal Aviation Administration (FAA) limited noise analysis to 20 non parkland locations[48] according to the FAA guidelines (FRA's sister agency), parks are compatible with DNL levels up to 75 decibels.[49]

The FRA's narrow approach undermines its duty to assess the Project's Environmental Justice (EJ) impacts, and properly calculating noise impacts especially impacts on EJ communities. As the DEIS notes, "the vast majority of project impacts occurs in these areas as most of the project's affected environment qualifies as such areas (46.6% Black or African American and 13.1% Hispanic).[50] These communities use and enjoy parkland and historic resources. The FRA should be required to prepare a legally adequate EJ analysis that addresses the misleading and inadequate information, discloses the full extent of the Project's impacts, and explores alternative means of mitigating those impacts. See *NRDC v. U.S. Forest Serv.* 421 F.3d. 797, 811-12 (9th Circuit 2005) finding that remand is required if "error was sufficiently significant that it subverted NEPA's purpose of providing decision makers and the public with an accurate assessment of the relevant information." Under the Biden Administration's new EJ policies, such a broad analysis is required in determining if these communities will be disproportionally impacted by the Project. [51]

3. The FRA Failed to Property Identify All Parklands Protected by Section 4(f)

The FRA failed to comply with Section 4(f)'s clear Congressional mandate: to identify and avoid the use of all public parkland, recreational areas, wildlife and waterfowl refuges and significant historic sites.[52] The M-NCPPC has identified 16 parkland and historic sites, a number of parks and historic sites that is inconsistent with the number the FRA identified as Section 4(f) properties. [53] A number of these sites such as Colmar Manor Park, the Bladensburg Waterfront Park, and Cherry Hill Cemetery would be impacted by underground tunneling. Other sites such as Montpelier Mansion and South Laurel Park, would face visual impacts so central to their use and enjoyment, that their essential public benefit would be damaged. Indeed, South Laurel Park would be blitzed by the noise and visual impact to the toddler

[46] DEIS Appendix F. Pages F 67- 74 and Tables F- 11 and F-12.
[47] Day-Night Average Sound Level - represents the total accumulation of all sound energy, but spread out uniformly over a 24-hour period.
[48] DEIS Chapter 4, Section 4.17.3, Table 4.17.6. Page 4.17.9.
[49] See 14 C.F.R. Part 150.
[50] DEIS Section 4.5.2.2. Page 4.5-6 and Table 4.5-2.
[51] President Biden's omnibus Executive Order 14008 directs federal agencies to develop programs and policies to address the disproportionate health, environmental and economic and climate impacts on disadvantaged communities. That January 27, 2021 EO calls for the development of a geospatial Climate and Environmental Justice Screening Tool in six months building off EPA's EJSCREEN and to annually publish interactive maps highlighting disadvantaged communities.
[52] 49 U.S.C. 303(c).
[53] M-NCPPC list of Parkland and Sites of Potential Concern include: Colmar Manor Park, Anacostia Tributary Trail, Bladensburg Waterfront Park, Bladensburg South Park, Public Playhouse Cultural Center, Cherry Hill Cemetery, Good Luck Estates Park, , Springfield Road Park, Patuxent River 1, South Laurel Park, Muirkirk Park, Montpelier Hills Park, Montpelier Park, Montpelier Historic Site, Montpelier Arts Center.

playground and public use area. Further, the proposed construction of a five-story FA/EE facility adjacent to the historic Bladensburg Waterfront Park and a power substation adjacent to the South Laurel Neighborhood Park will certainly impact the environmental setting and usability of these parks. These are but a few examples of the park and historic resources insufficiently identified in violation of Section 4(f)'s mandate.

4. The FRA's Mitigation Discussion is so Vague and Uncertain that the Public Cannot Provide Meaningful Comments.

The FRA's discussion of minimization and mitigation is very vague and largely consists of a "laundry list" of measures that it will consider taking in the future after additional coordination and consultation. Comments such as "seeking input from stakeholders," "using existing transportation and utility corridors as feasible," "avoiding or reducing impacts," "visual buffering," "design refinements," and "noise abatement as reasonably feasible,"[54] provide no specific information to which the public can respond. The FRA even "considers several impacts to public recreational facilities and parklands to be difficult to mitigate due to extensiveness of impact and/or uniqueness of park features."[55] Moreover, the FRA makes no commitment that it will enforce any final measures adopted after the FEIS and ROD. Because any final mitigation plan will only be released with the FEIS, it thus appears the FRA is not allowing the public to have any meaningful opportunity to provide informed comments on the inadequacy of such unspecific measures.

The Supreme Court has held that "mitigation be discussed in sufficient detail to ensure that the environmental consequences have been fairly evaluated."[56] While the NEPA does not require a complete mitigation plan to be "actually formulated and adopted," CEQ's NEPA regulations creates an affirmative duty to mitigate impacts and states that the agency "shall adopt and summarize where applicable a monitoring and enforcement program for any enforceable mitigation requirements or commitments."[57] Most significantly, the regulations require that monitoring and mitigation commitments "established in the EIS or during its review and committed as part of the decision" actually be implemented.[58] CEQ guidance suggests that agencies establish monitoring systems to ensure that mitigation actually takes place."[59] The courts have made clear that "where an agency commits to mitigation in its decision, rather than discussing it in a NEPA analysis, that commitment may bind the agency."[60]

These NEPA requirements especially apply to the Section 4(f) — a statute with a strong affirmative obligation to avoid use of a section 4(f) property unless there are no feasible or prudent alternatives and to adopt the "least harm alternative" if avoidance is impossible. This DEIS does not even provide a

[54] DEIS Appendix F, Section F.7.1. Pages 118.
[55] DEIS Section 4.7.4. Page 4.7.7.
[56] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989).
[57] 40 CFR 1506.2 (a) (3).
[58] 40 CFR 1503.
[59] See generally Memorandum form Nancy H. Sutley, CEQ Chair regarding "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact" (Jan. 14, 2011) see Mitigation and Monitoring Guidance http://ceq/hss.doe.gov/current_developments/docs/Mitigtion.
[60] See *Tyler v. Cisneros*, 136 F.3d. 603, 608 (9th Circuit 1998) (Discussed in NEPA Litigation Guide (Second. Ed. Pages 283- 284).

meaningful discussion of alternative transit improvements to justify why total avoidance cannot be met. The DEIS then fails to provide any meaningful identification and analysis of all the potential uses of section 4(f) properties. The public has no real clue as to what measures will be adopted, whether those measures avoid and minimize uses to the maximum extent possible and whether any mitigation measures ultimately adopted will even be enforced by the FRA or the Project proponent. In short, these are serious failures of both the NEPA and Section 4(f) requirements.

VIII. The DEIS Fails to Adequately Analyze the Project's Impacts on Meeting the Chesapeake Bay Clean-Up Goals

The Chesapeake Bay Clean-up Plan "TMDL" is a comprehensive plan to address the years long decline in Bay water quality and to restore the Bay waters to meet the federal Clean Water Act "fishable and swimmable" goal, the specific mandate for Cleaning up the Bay in Section 117 of the Act "to ensure that management plans are developed and implemented to achieve and maintain the goals and requirements" of the Bay Program.[61] In 2010, the Environmental Protection Agency (EPA), in coordination with six Bay states, developed the TMDL as a "pollution diet" encompassing the 64,000 square-mile watershed and identifying required pollution reductions for major sources of nitrogen, phosphorus, and sediments across the District of Columbia, Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia. The TMDL included detailed Watershed Implementation Plans (WIPs) by each of the seven jurisdictions to meet pollution reduction goals. By 2025 the pollution diet calls for reduction of 25 percent for nitrogen, 24 percent for phosphorus and 20 percent for sediment. Urban and suburban storm water pollution is a major source of pollution in the Bay. In 2015, the U.S. Court of Appeals for the Third Circuit upheld the Bay TMDL.[62] Municipal Separate Storm Sewer Permits (MS4) are critical in meeting these goals. [63]

The DEIS describes the serious impacts of the SCMagLev on the aquatic environment without even mentioning their overall impact on the Bay Program's goals. The DEIS notes that each build alternative would directly and permanently impact affected watersheds as a result of grading, vegetative clearing, new structures, and conversion of pervious to impervious surfaces ranging from 900 to 1,100 acres of overall disturbance.[64] The greatest total impact occurs in the Anacostia Watershed, the longest segment for the proposed tunnel and aqueduct for build alternatives J and J1. This would result in approximately 12.5 aces of new impervious surfaces. The Patuxent River Watershed would also have severe impacts, including to high value Tier II waters. Further, 37,000 linear feet of waterway crossings, increasing up to 43,000 feet, will be impacted, depending on the build alignment selected.[65] The DEIS also notes that several waterways are "notable for their position as headwater or first order tributaries with significant riparian habitat supported RTE species identified."[66] Wetlands impacts would range from 22 to 45 acres, including wetlands of special state concern. The DEIS also states that "the Project has the potential to

[61] 33 U.S.C. 1267 (g) (1).
[62] *American Farm Bureau Federation v. EPA* 792 F.3d. 281 (3rd. Circuit 2015).
[63] Maryland Department of the Environment v. City Commissioners of Carrol County 214 A 3d. 61, 100 (Md 2019).
[64] DEIS Chapter 4, Section 4.10-13.
[65] DEIS Chapter 4, Section 4.11.3.2.
[66] Ibid.

impact groundwater through many of the same direct and indirect ways as it would surface waters, including but not limited to the increase of impervious surfaces and therefore potential decrease in the amount of natural precipitation connecting with the ground surface, the potential for dewatering during construction and a potential for greater stormwater runoff contributing to potential groundwater contamination."[67]

The DEIS does not conduct any serious analysis of the Project's impacts on the Chesapeake Bay program goals. Rather, it essentially seeks to minimize the impacts stating that "the effects of the alignments alone may contribute to the overall impairment of nearby waterways as a result of the build alternative but are not expected to affect a designated waterway status . . . [and that] such increases in runoff and/pr thermal impacts are not anticipated to be as significant in areas of greater urbanization . . . "[68] The DEIS then delays any real analysis by simply stating that the "Project sponsor will evaluate Environmental Site Design (ESD) measures to 'trap runoff . . . along the alignments" and develop "stormwater and erosion and sediment control Best Management Practices (BMP)s to minimize and mitigate impacts."[69] It also suggests that "it anticipates that MDE[70] would prioritize the Little Patuxent and Anacostia Rivers for TMDL requirements and potential status changes to waterways."[71] This approach completely ignores the importance of conducting a comprehensive analysis up front as part of the NEPA process.

The DEIS failure is especially critical given the current status of the Bay Program. Maryland has submitted its Phase III Watershed Implementation Plan (WIP) and is currently working to reissue MS4 permits to Maryland jurisdictions. As noted in recent comments on MDE proposed permits, [72] Maryland has failed to make necessary reductions in urban stormwater pollution. In fact, stormwater loads have increased. Specifically, between 2009 and 2019, the loads of nitrogen, phosphorus and sediment delivered to the tidal Bay via urban stormwater runoff increased from 2 to 5 percent. This was explored in detail in a recent report by the Environmental Integrity Project.[73] Maryland counties have invested in a variety of stormwater reduction strategies. These have had some impact, but progress has been more than offset by new growth in developed land, which increased by over 6 percent between 2009 and 2019. Where a source of pollution is growing when it should be declining, one might expect an increase in the level of regulatory effort. Yet in Maryland we see the opposite.[74]

Maryland's Phase III WIP revised the 2025 targets — the stormwater loads that Maryland hopes to achieve by 2025. The new targets are 20 to 40 percent higher than the previous, Phase II targets, signifying Maryland is now planning to accept 20 to 40 percent more pollution than they were willing to accept a few years ago. The following table summarizes the change in target loads between the two

[67] DEIS Chapter 4, Section 4.10.4.2.
[68] DEIS Chapter 4, Section 4.10.17
[69] DEIS Chapter 4, Section 4.10.5.1
[70] MDE - Maryland Department of the Environment.
[71] DEIS Section 4.10- 19.
[72] Comments of the Chesapeake Accountability Project on the Tentative Determination for the NPDES MS4 Discharge Permit for Baltimore City at pages 6-7. January 21, 2021.
[73] The report is available at: https://environmentalintegrity.org/reports/stormwater-backup-in-the-chesapeake-region/.
[74] Data from Chesapeake Assessment Scenario Tool (CAST, https://cast.chesapeakebay.net/).

WIPs. As a point of comparison, we also provide the same estimates for Virginia, where planning targets have become more stringent.

Stormwater pollution targets for 2025 in Phase II and Phase III WIPs from the "developed" sector).[75]

	Maryland			Virginia		
	Phase II WIP	Phase III WIP	change	Phase II WIP	Phase III WIP	change
Nitrogen	7.8	9.3	+19%	10.3	9.7	-6%
Phosphorus	0.48	0.66	+37%	1.24	1.19	-4%
Sediment	289	394	+36%	514	476	-7%

The Phase III WIP targets for nitrogen and sediment are even higher than the TMDL baseline loads from 2009. The TMDL is a groundbreaking pollution reduction program, yet the nitrogen and sediment load from developed land in Maryland will be higher at the end of the TMDL than they were at the beginning. The Phase III WIP clearly shows Maryland backsliding on its stormwater reduction plans and the proposed MS4 relax the impervious surface restoration requirements. According to the Bay Program's Chesapeake Assessment Scenario (CAST) [76] tool, where MDE was once assuming 30,000 acres of restored impervious surface by 2025, the Department is now planning for only 199 acres.[77] Modeling outputs used as an example of analysis MDE should have been done to address loads to receiving waters and Waste Load Allocations (WLA) that would meet water quality standards with a local TMDL, especially where two or more jurisdictions contribute loads.

In short, the DEIS failure to critically analyze the Project's impacts on the Bay TMDL violates the NEPA by not providing the public and the decisionmakers the key information and analysis needed to make a fully informed decision.

IX. The DEIS is Deficient in Relying on Future Compliance with Federal and State Water Quality and Wetlands Permitting

The DEIS details serious and pervasive impacts to extremely sensitive wetlands and stream systems from the build alternatives including wetlands of special state concern (as identified in the Nontidal Wetlands of Special State Concern (NTWSSC)), and state designated Tier II waters, entitled to the highest level of protection. Yet, while stating that the FRA "anticipates" that the project's joint application for federal and state permits will be "included" in the DEIS Section 4.1-7, it is notably absent. This failure makes it extremely difficult for the commenters to provide meaningful comments on these grave impacts. A

[75] Ibid. Version CAST-2019, scenarios "2025 WIP2" and "WIP 3 Official Version."
[76] Chesapeake Assessment Scenario Tool. https://cast.chesapeakebay.net/.
[77] BMP Summary Report.

review of the information in the DEIS on these issues demonstrates how such a failure undermines the NEPA process.

The DEIS Table ES4.3-1 describes the Build Alternatives considerable environmental resource impacts from the alternative alignments studied. Total acres of permanent wetlands impacts range from 22 to 45 acres and include nontidal wetlands of special state concern. This DEIS table also describes extensive stream impacts ranging from 9,946 to 12,659 linear feet. Indeed, the BWRR's preferred alternative (J-03) would impact 22 wetlands acres, 9 acres of NTWSSC, and 12,896 linear feet of stream. The DEIS also notes impacts to NTWSSC located along Beaverdam Creek, Beck's Branch, and the Patuxent River, which provide habitat for several Rare, Endangered and Threatened (RTE) species. In section 4.10.3.2, the DEIS especially notes the serious impacts to high-value Tier II waters in the Anacostia and the Patuxent Upper Watersheds. The direct and indirect impacts of the build alignments are especially serious, noting that each build alternative would directly and permanently impact watersheds as a result of grading, vegetative clearing, new structures and conversion of pervious to impervious surfaces. These impacts may have the potential to alter watershed functions such as storage of rainfall and habitat for wildlife and aquatic species and downstream water quality. As noted in DEIS Section 4.10.4.2, permanent watershed impacts range from approximately 900 acres to 1,100 acres of overall watershed disturbance. These serious impacts especially have the potential for making it more difficult for the state to meet the important targets of the Chesapeake Bay TMDL restoration program.

Given these serious impacts, the BWRR will have a very heavy burden to obtain federal and state permits. Under Section 404 of the Clean Water Act, the Army Corps of Engineers (Corps) must apply EPA's Section 404 (b) (1) Guidelines, 40 CFR Part 230 that "no discharge of dredge or fill material into a water of the United States (including wetlands) shall be permitted if there is a practical alternative that could have less adverse impacts on the aquatic environment and that alternative does not have other significant adverse environmental consequences."[78] For non-water dependent projects such as the SCMagLev, a heavy burden is placed on the applicant to overcome the presumption there are no practicable alternatives available that would avoid impacts to the aquatic environment. In addition to meeting this heavy burden, the Corps must also find that the proposed discharge will not cause or contribute to "significant degradation" of the aquatic ecosystem.' The Corps applies detailed chemical, biological and physical evaluations and testing protocols under the Guidelines for judging the impact of the discharge along with proposed actions to minimize adverse effects. Even if these presumptions could be overcome, the Corps must still find that the project satisfies its "public interest criteria" covering twenty-one (21) factors.[79] Where damage to wetlands is involved, the Corps must determine the extent of the public versus private benefit to be in the public interest and also must find that the project complies with NEPA, the Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA). Further, the Corps must apply the NEPA regulations in its scope of analysis and consider

[78] See 40 CFR 230.20-230.61 See Liebesman, "the Role of EPA's Guidelines in the Clean Water Act's Section 404 Program---Judicial Interpretation and Administrative Application, 14 Env. Law Rptr. 10272 (July 1984). Courts have affirmed the presumption and binding effect of the guidelines. *Buttrey v. US* 690 F. 2d. 1170, 1180 (5th Cir. 1982), *Bersani v. EPA*, 850 F.2d. 36 (2d. Cir. 1988), *B & B Partnership v. US* 133 F.3d. 913 (4th Cir. 1997)

[79] These factors include conservation, economics, aesthetics, general environmental concerns historic values, flood damage prevention, water supply, water quality and energy. See 33 CFR 320. 4 (a). www.usace.army.mil. See also Liebesman "*The Water Suppliers Guide to Wetlands Regulation and Management*." Chapter 5. American Water Works Association. 1995.

reasonably foreseeable indirect and cumulative impacts to aquatic resources, such as growth-inducing effects of the SCMagLev project.

Compliance with state law will also involve many hurdles. The MDE would have to issue a Water Quality Certification (WQC) under Section 401 of the Clean Water Act (CWA) certifying the project will not violate State Water Quality Standards.[80] Maryland's nontidal wetlands regulations also require that any permitted activity will not "cause or contribute to a degradation of ground waters or surface waters" and that "a permitted activity may not cause an individual or cumulative effects" that degrades an aquatic ecosystem."[81] Further, section 5-907 of the Environment Article also sets forth preconditions to the grant of a nontidal wetlands permit similar to the Corps 404 program creating a presumption against impacting wetlands for a non-water dependent project and ensuring alternatives have been adequately considered. The regulations list no fewer than twenty-three (23) categories of information that must be provided on a proposed project and its impact. Maryland's Antidegradation Policy must also be satisfied.[82] The Policy provides that in order to maintain existing water quality, new and existing point sources must achieve the highest applicable statutory and regulatory effluent requirements and nonpoint sources must achieve all cost-effective and reasonable best management practices for nonpoint source control. The policy implements federal requirements that "in designating uses of a water body and appropriate criteria for those uses, the state shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.[83] Where, as here, high value Tier II waters are proposed to be impacted, the regulations are especially stringent. An applicant planning to discharge into Tier II waters, must consider alternatives that "do not require direct discharge to a Tier II waterbody and must select a no direct discharge alternative if a cost-effective alternative is available."[84] Where the "assimilative capacity "of a Tier II water has been met, the applicant must conduct extensive water quality testing and analysis and provide a detailed economic and social justification for degrading such a high-value water which would be very difficult and expensive to meet.

As the above discussion demonstrates, the information in the DEIS raises many questions that cannot be adequately addressed in public comments. The release of the DEIS prior to submission of the permit applications with the needed information and analysis is a serious error.

[80] The Section 401 certification is 'one of the primary mechanisms through which states may assert the broad authority reserved to them to preserve and protect the primary responsibilities and rights of states to prevent, reduce and eliminate pollution Keating v. FERC, 927 F. 2d. 616 *(DC Cir. 1991). State certifications "are essential in the scheme to preserve state authority to address the broad range of pollution." *S.D. Warren v. Maine* 547 U.S. 370, 386 (2006).
[81] Code of Maryland Regulations (COMAR) 26.08.02.04 C.
[82] COMAR 26.23.02.04.
[83] 40 CFR 131. 10 (b).
[84] COMAR 26.08.02.04- G (1).

X. The Project Will Seriously Impact Federal, and State Listed Rare, Threatened and Endangered (RTE) Species and Their Habitat

The ecological resources impacted by the Project are extensive and serve as habitat for a number of federally and state listed Rare, Threatened and Endangered (RTE) species protected under the Federal Endangered Species Act and State Law. In addition, this habitat is also the home of migratory birds protected in the Migratory Bird Treaty Act (MBTA). The FRA and Project proponents will have a very heavy burden to overcome to justify taking these listed species through both direct and indirect impacts and habitat modification and destruction.

The ecological resources impacted by the project include terrestrial, aquatic and forested habitat, fields and meadows, scrub shrub areas, and aquatic environments.[85] Forests and forest fragments are common throughout the Project's affected environment and provide nesting, foraging and refuge for wildlife including birds, fish, mammals, insects, reptiles and amphibians.[86] The habitats that support RTE species most notably in larger natural-forested tracts in Anne Arundel and Prince Georges Counties and include the following federal and state listed species and imperiled habitats:[87]

- Northern Long – Eared Bat (F, S)
- American Peregrine Falcon (S)
- White catfish
- Two RTE fish species and One RTE plant species:
  - White fringed orchid and northern pitcher plant—RTE
  - Swamp Pink (F, S)
  - Glassy Darter (S)
- Pine barrens pine-oak woodland—globally rare/ imperiled. A globally critically imperiled natural community of coastal plan – piedmont acidic seepage swamp
- Ten Odonate (Dragonfly and damselfly) species
- Coastal Plain Oak forest—Globally rare
- Coastal plain acidic seepage fen—globally imperiled
- Stronghold Watershed of Upper Beaverdam Creek
- American Brook Lamprey (S)
- Yellow Lance (F)
- American Brook Lamprey (S)[88]

In addition, the USFWS and DNR staff have notified the FRA of the presence of vernal pools, spring fed wetland complexes, and forest stream complexes containing RTE and other at-risk plant and animal species.[89] The DEIS notes that "RTE species are typically associated with high quality, contiguous habitats and are sensitive to habitat disturbance and fragmentation. Therefore, potential RTE species habitat, beyond those areas identified above, may occur within the SCMAGLEV Project Affected Environment in

[85] DEIS Section 4(f). 4.12.3 and Table 4.12-1. Pages 4-12-3 and 4.
[86] DEIS Section 4(f). 4.12.3.1. Page 4.12-5.
[87] DEIS Section 4(f). Pages 4.12-18 - 4.12.-19.
[88] DEIS Chapter 4.12. Page 18. And, DEIS Appendix D.7.
[89] DEIS Section 4(f). Page 4.12-9.

large undeveloped areas and corridors, . . ."[90] The DEIS notes the serious impacts of the project on the habitats supporting RTE species. "The greatest potential impact would occur in areas where permanent structures would replace habitat in areas of vegetation removal or alteration of habitat (e.g. shading of normally one area or forest fragmentation) and destruction of individual plants or animal habitats during construction.[91] Indirect impacts incudes degradation of water quality or hydrologic changes on aquatic organisms." [92] The DEIS notes that the FRA has examined operational impacts resulting from ongoing, routine, and occasional activities associated with the project and related services, as well as short-term impacts during construction, such as changes in migratory patterns, and accessibility of habitat, current conditions of natural habitats, and proximity to the Project, and how, that could change important habitat characteristics, the type and amount of habitat, and potential impacts by direct removal, filling, hydrological interruption, and the sensitivity of ecological conditions.[93]

The ESA that protects a number of these species has been described by the Supreme Court as "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation" and is intended "to halt and reverse the trend toward species extinction whatever the cost.[94] The FRA recognizes that it must undergo the Section 7 consultation process with the USFWS. Section 7 is often called the "Heart of the Act" and establishes a process "to ensure that any action authorized, funded or carried out by and agency is not likely to jeopardize the continued existence of any listed species or result in destruction or modification of critical habitat."[95] The "effects" analysis is quite broad and covers direct, indirect and cumulative effects of activities that are interrelated and interdependent [96] — **a particularly significant requirement in this context, given the extent of ecosystem impacts from the Build Alignments.** This analysis also requires consideration of climate change impacts.[97] In addition, Section 7 (a) requires federal agencies to "affirmatively act within the scope of their authority for the conservation of listed species."[98] 'Conservation "is the key goal and means "to use all methods and procedures necessary to bring any endangered or threatened species to the point at which the measures in the Act are not a longer necessary."[99] Thus the ESA creates a strong obligation on the FRA to ensure that this Project will not jeopardize the federally listed species or adversely modify their critical habitat.

The FRA also must comply with the MBTA, enacted in 1918, making it unlawful to "pursue, hunt, take, capture, kill, possess . . . Any migratory bird of any product . . . unless permitted by regulations."[100] The Act provides civil and criminal penalties. Most recently, the Biden Interior Department withdrew a Trump DOI solicitor's opinion and rescinded the Trump Administration's January 7, 2021 rule allowing for incidental and unintentional take of a MBTA species. This means that a person can be charged for

[90] DEIS Section 4(f). Page 4.12.10.
[91] DEIS Section 4.22- 4.
[92] Ibid.
[93] Ibid.
[94] *TVA. V. Hill* 437 U.S. 153, 180 (1978).
[95] See Liebesman and Petersen, *The Endangered Species Deskbook* (2d. Ed.) (ELI) Chapter VI.
[96] 50 CFR 402.02.
[97] See In re, *Polar Bear Endangered Species List and 4(d) Rule Litigation, 709* F.3d. 1 (D.C. Circuit 2013).
[98] *Sierra Club. v. Glickman*, 156 F.3d. 606 (5th Circuit 1996).
[99] 16 U.S.C. 536 (a) (1).
[100] 16 U.S.C. 703- 711.

indirect and unintentional conduct that harms a migratory bird species.[101] Given the migratory bird species within the Project area that could be impacted by above ground structures, this will create duty on FRA and the Project sponsor to avoid or minimize take of these species.

In addition, the Maryland Nongame and Endangered Species Conservation Act protects any federal and state listed species of wildlife and plants. The Act prohibits a person from exporting, taking or possessing any endangered species of wildlife and defines "take" as to "harass, harm, pursue, hunt or shoot . . ."[102] The protected endangered or threatened species includes any species of wildlife or plants so determined under federal or state law. The Act also prohibits violations of any regulation pertaining to the conservation of the species . . . unless a person has a permit" and imposes fines or imprisonment for any violations. The Department of Natural Resources (DNR) administers this Act and has established programs including the acquisition of land or aquatic habitat necessary "for the conservation of nongame, threatened or endangered species of wildlife or plants."[103]

The DEIS discussion of minimization and mitigation measures to ensure compliance with these important federal and state statutes is just a "laundry list" of measures such as off-site plantings, wetland mitigation, and onsite re-establishment of forest habitat where feasible, purchasing forest and wetland complexes for placing perpetual easements and funding ecological research.[104] The FRA then refers to its continued coordination and consultation with the USFWS and DNR. These measures are a far cry from the commitments that the FRA and the Project sponsor will need to meet the stringent criteria for avoiding and compensating for take of these species. Indeed, under the ESA's formal consultation process, the extent of take of listed species from habitat modification will have to be determined based on a USFWS Biological Opinion and Incidental Take Statement (ITS) that specifies the number of listed species actually taken directly or indirectly through habitat modification by federal action. The ITS must then implement any "reasonable and prudent measures that the Service considers necessary or appropriate to minimize such impact" with terms and conditions that must be complied with to implement these measures. [105]. The FRA and the Project sponsor will then have to commit enforceable conservation terms and conditions to compensate for any authorized take of the species. [106]

In short, the likely impacts to federal and state RTEs and their habitat will require the FRA and the Project sponsor to commit to much more specific and detailed avoidance, minimization and mitigation measures than identified in the DEIS.

[101] The Biden Interior Department vacated DOI's Solicitor Op. M- 37050 allowing for incidental take on March 3, 2021. On May 7, 2021, DOI issued a proposed rule that prohibits such take. This action follows on a ruling by the New York Federal Court holding that the Trump interpretation violated the MBTA. *NRDC v. DOI* 478 F. Supp. 3d. 469 (S.D.N.Y.) (8/11/20).
[102] Md Code Ann. Nat. Res. Section 10- 2A- 02(a) (1991).
[103] Ibid. At section 10- 2A-05.
[104] DEIS Section 4(f). 4.12.5.1. Pages 4.12-21 - 4.12-26.
[105] 16 U.S.C. 1536 (b) (4).
[106] 50 CFR 402.14 (i) (5).

XI. Environmental Issues and Concerns

The DEIS understates and omits major environmental impacts of the project, both temporary associated with the construction phase and permanent related to the footprint of the SCMagLev infrastructure and its daily operations. If the SCMagLev is built, the consequences and impact on the area's ecosystems would be significant and could not be mitigated. In specific instances, certain ecosystems and habitats would be unrecoverable; that is, once the destruction occurs, these ecosystems and habitats can never be restored, recovered, or created elsewhere. The SCMagLev DEIS fails to fully discuss these impacts and is therefore deficient. In some cases, the DEIS itself calls out major environmental impacts, such as increased power usage with resulting increase in greenhouse gas production, but fails to provide a detailed mitigation plan. The negative findings of the DEIS, as well as its glaring deficiencies, must lead the FRA to choose the No Build option.

XII. Rare, Threatened, and Endangered Species and Habitats; Ecosystems Research

- The DEIS states that the Project sponsor will mitigate impacts to aquatic species, habitat, and fisheries, but postpones providing detailed mitigation plans until the final design and construction planning phase.
  - The mitigation considerations for species that are identified are inadequate.
  - The DEIS fails to adequately analyze impacts to Forest Interior Dwelling Species and habitat located within the City of Greenbelt's forests and the Beltsville Agricultural Research Center (BARC) forests.
  - The DEIS fails to adequately analyze impacts to the Greenbelt's forests.
  - The DEIS fails to address impacts to the Greenbelt Forest Preserve. The DEIS estimates that 40 acres of Greenbelt's forest habitat would be adversely impacted if any of the J1 alternatives is built, but it fails to consider how impacts to these forests can be mitigated if one of these alternatives is selected.
  - The DEIS does not analyze how removal of these 40 acres would impact the local ecology and environment.

- The airport area of BARC and the Patuxent Research Refuge (PRR) has been particularly important for rare birds. Over the years, nationally and regionally extremely rare species have been reported nesting in and transiting these areas. They include the Northern Shrike, Short eared Owl, Whip-poor-will, Merlin, LeConte's Sparrow, and Dickcissel. Virtually absent elsewhere in the area, the airport still retains nesting and breeding Eastern Meadowlarks and Grasshopper Sparrows. In general, raptors and grassland species heavily use this area as transitional habitats because these species have been destroyed elsewhere.

- The construction of the SCMagLev along the alignment and its associated infrastructure will result in the loss of or damage to sensitive habitats and plant communities that harbor rare, threatened, and endangered flora and fauna.

- Many of the habitats that would be impacted along the SCMagLev alignment and its associated infrastructure contain plant communities that are rare within Maryland. The existence of these habitats depends on underlying geological structures and soil substrates (Maryland Department of Natural Resources, 2015). These communities are irreplaceable and cannot be recreated elsewhere. As outlined in the DEIS, the rare and sensitive habitats and plant communities that will be impacted include the following:[107]
  - Acidic seepage swamp and bogs
  - Bald cypress community
  - Coastal plain oak/floodplain forest community (globally rare)
  - Coastal plain-piedmont acidic seepage fen natural community (globally imperiled)
  - Coastal plain-piedmont acidic seepage swamp (globally critically imperiled)
  - Floodplain forest community dominated by swamp chestnut oak, red maple, black gum, and tulip tree
  - Forest communities supporting pitch pine and dwarf chinquapin oak
  - Forest stream complexes
  - Lowland pine barrens forest
  - Pine barrens/pine-oak woodland community (globally rare/imperiled)
  - Pitch pine and sphagnum moss seepage areas supporting rare species such as small white-fringed orchid
  - Sandy woodland gaps and edges supporting rare species such as grass-leaved golden-aster
  - Spring-fed wetland complexes
  - Upland depression swamp/pin oak—swamp white oak seasonal pond community
  - Vernal pools

- In destroying sensitive habitats, the SCMagLev project would imperil specific Rare, Threatened, and Endangered (RTE) species, as identified by the U.S. Fish and Wildlife Service (USFWS) and the State of Maryland. The RTE species discussed in the DEIS include:
  - 9 species of mammals
  - 12 species of birds
  - 2 species of reptiles
  - 3 species of fish
  - 11 species of odonates (dragonflies and damselflies)
  - 18 species of lepidoptera (butterflies, skippers, moths)
  - 2 species of freshwater mussels (one federally endangered)
  - 7 species of plants[108,109]

However, the DEIS discussion of RTE species is incomplete. For example, it mentions the Annotated List of the Flora of the BARC that lists 901 plant species, of which 17 percent (153 species) are rare. However, it does not enumerate these plants or their specific locations, making it impossible to judge the entire impact of the SCMagLev. Further, the DEIS relies heavily on information from only a few sites in the impacted area, including the PRR, BARC, and the Baltimore-Washington (BW) Parkway. There is no

[107] DEIS Chapter 4.12.3.3, Appendix D.7; Attachment B; Attachment C; Attachment F.
[108] DEIS Chapter 4.12, Section 4.12.3.3. Pages 4.12-8 to 11.
[109] DEIS Appendix-D.7, Attachment A; Attachment B; Attachment C; Attachment F.

analysis of RTE species at the Greenbelt Forest Preserve, the Maryland City Park, the Springfield Road Park, Fort Meade, or Goddard Space Flight Center, or in outlying areas that will be impacted by the SCMagLev, such as Konterra, the site of a proposed large lay-down area. An obvious omission is the Short-eared Owl, a state-endangered species that winters at Konterra Fields, as well as at the BARC. Additionally, because many of the proposed Train Maintenance Facilities (TMFs) and trackways would destroy (and impact adjacent) habitat conditions such as bogs, seeps, and barrens that are known to contain and harbor rare plants and animals but are often unevaluated at the specific locations pinpointed at impacted areas, the true costs are unknown.

In fact, the DEIS analysis of RTE species only focused on the above-ground portion of the proposed SCMagLev. There was no evaluation for sites along the tunneled portion of the proposed route. The DEIS states that "potential RTE species habitat, beyond those areas identified above, may occur within the SCMAGLEV Project Affected Environment in large undeveloped areas and corridors, as illustrated in Appendix B.3 Natural Resources Mapping Atlas, including aquatic and upland forested areas near Fort Lincoln Park; along the Anacostia River and its adjacent floodplain parks (including Bladensburg South Park), along Veterans Highway near Martins Wood Park, south of the southern tunnel portals, between BARC and PRR, on Fort George G. Meade military base, along Stony Run and tributaries south of Baltimore-Washington International Thurgood Marshall Airport (BWI Marshall Airport), and along the Patapsco River and its adjacent floodplain parks. As Build Alternatives are refined, the Project Sponsor will coordinate with Maryland Department of Natural Resources (MDNR) and USFWS to identify areas for more detailed surveys for RTE and sensitive species and habitats."[110]

In other words, the project sponsor is seeking to move forward with the project before conducting a full analysis of RTE species within the entire project impact area. RTE species that might exist at proposed fresh air/emergency egress (FA/EE) sites, power substations, lay-down areas, miscellaneous support buildings, parking lots, ramps and access roads, and road relocation and power relocation areas have not been identified. This oversight applies to 75 to 86 percent of the route (corresponding to the relative proportion of the tunneled section versus the entire route), depending on the alternatives to be chosen. This is an unacceptable oversight.

XIII. Public Lands

If built, the natural lands lost to the proposed TMF and support infrastructure sites cannot be recreated and mitigated elsewhere. The BARC and PRR represent some of the most biologically diverse and well-studied landscapes in the world, with data going back over 100 years. The BARC, in particular, is the largest agricultural research center in the world. Both research centers represent the largest scientific field stations for their respective agencies. Hundreds of government scientists have worked here, many describing hundreds of new species, and most doing research related to the agriculture and natural areas retained by these properties. As part of their duties, lists of species were created and their status documented, physical collections made and accessioned to the National Collection, and the biological functions and processes documented and monitored across many decades. Impacts of the creation of the TMF site and the viaducts on research, science, and scientific projects are not documented in the

[110] DEIS Chapter 4, Section 4.12.3.3. Page 4.12-10.

DEIS. Such impacts are large and represent a loss of long-term public investment in these sites for research. These impacts need to be documented and contrasted with the long-term good of retaining these lands as public lands in a natural state.

Many species of animals, plants, and fungi were first identified and described from the BARC and PRR lands by researchers located on those facilities. So many that this integrated site represents one of the most important discovery locations in the world and, thus, one of the most important on the North American continent. The fill count of the type specimens to date exceeds 100 species, from the BARC alone. Taxonomically, a "type" is the specimen used as the definitive exemplar of a species. When doing molecular and taxonomic studies, it is typical for researchers to return to the location where the type was first found and identified to collect additional specimens for study. The importance of these landscapes as repositories for biological populations of described species needs to be reported in the DEIS and the impacts documented. Simple documentation of destruction of woodlands and wetlands is far too superficial in the case of the research landscapes.

- **Biodiversity.** This region has retained much of its original biodiversity. PRR has retained almost all its breeding bird species with the exception of a small number of birds, for example, Henslow's Sparrow and Northern Bobwhite, which have declined throughout Maryland." Similar results exist for other groups of plants, fungi, insects, and vertebrates. The combined protected landscapes of several government agencies have created an integrated refuge for the region's plant, animal, fungi, and microorganisms. The extensive and interconnected nature of these landscapes allows for these species to ebb and flow in space and time without becoming locally extinct due to small parcel sizes. The importance of this is not made clear in the DEIS. Specifically, more site-specific documentation needs to occur that evaluates the impacts of direct loss of these landscapes, fragmentation of existing landscapes, and loss of corridors and interconnectivity.

- **Fragmentation and Underrepresentation.** The DEIS does discuss the impacts of fragmentation, primarily in the context of birds. However, it underestimates the amount of fragmentation occurring despite the ability to assess this via GIS modeling. Of primary importance is to document the access roadways that will be built on these conservation areas to both bring in building materials and to afterward permit the maintenance and access for safety vehicles. These roadways in the DEIS are considered "temporary," but actually will be permanent features of the landscape because they (1) cannot be removed, and (2) will have the same environmental consequences and damage in regard to destruction, hydrology, and fragmentation as the viaduct and the TMFs. The linear length of the new roads would be expected **to be greater** than the overall length of the viaducts. Thus, the true impact and extent of damage to the region is far greater. Finally, the current calculations of fragmentation[111] are insufficient because it is measured in terms of outright loss of forested habitat for birds, yet does not account for the fact that huge tracts of forested land will be isolated from other tracts by the viaducts, the undocumented service roads, and the TMF. For example, the viaduct will run parallel to the BW Parkway and the entire woodland between the viaduct and the parkway will become a huge fragment that no longer supports forest interior bird species and will be invaded by invasives that construction, maintenance, and the opening up of the site entails. This is

[111] DEIS Chapter 4.12, Sections 4.12-10 to 4.12.5. Pages 4.12-15 to 25.

just one example of fragmentation impact and results in loss of functionality of the landscape in the conservation of the plants and animals it currently harbors.

Request:

- A detailed investigation of these analyses in the DEIS is needed to ascertain the full impact and true impacts of all construction, disruption, fragmentation, and destruction building the SCMagLev will bring to these protected areas and their inhabitants. This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

- **Temporary Roads are Actually Permanent.** To emphasize their importance, let us be clear that some of the most impactful parts of the SCMagLev project are not being documented. The access roads used in building the trainways will remain for maintenance and safety reasons. The impacts of these roads must be documented. They are clearly not temporary and while they will not be "public," they have huge negative consequence to the region. It must be made clearer in the DEIS that under discussion is a sensitive *landscape*, not simply a set of mechanical and physical issues that can be resolved by engineering.

This area's past and current study sites cannot be recreated elsewhere. With the building of the SCMagLev, once the landscape is altered, with anthropogenic disturbances to the soils and vegetation removed and replaced with man-made structures, the land is dead for all practical purposes to scientists and all the original plant and animal inhabitants.

The BARC has 901 plant species documented. The Patuxent Wildlife Research Center (PWRC) has collected 282 species of birds, 217 species of bees, 72 species of butterflies, and thousands of insect specimens from the combined properties of the BARC and PRR.[112] The biodiversity of these combined research centers is more studied, more completely known, and of greater taxonomic important than any national park or wildlife refuge in the United States. In addition, studies have shown that the BARC Central and East Natural areas are the southernmost points in the world of the New Jersey Pine Barrens ecotype.[113] A more complete listing of the species involved needs incorporation into the DEIS for the public to see. A contrast of these species' lists with the surrounding landscape, which retains only a fraction of these species, and a contrast with other regional conservation areas needs to be made. The federal lands are not simply a landscape absent of people. It is a landscape that protects for the American public many species that would be absent if these lands are destroyed.

Making federally-owned land available to private companies sets a dangerous precedent. Other private corporations, landfills, and mining companies, for example, could claim "public good" and destroy land owned by the BARC, Patuxent Wildlife Refuge, and NASA, and create an unnecessary and inconveniently located industrial zone, as well as impact federally-owned land in other parts of the United States. This is not discussed in the DEIS, yet it may become a major part of the impact of the project. Building the SCMagLev on public lands opens them up for similar development. Industrial development for private

[112] Terrell, Edward E. "Annotated list of the flora of the Beltsville Agricultural Research Center, Beltsville, Maryland." United States. 2000. Agricultural Research Service.
[113] Simmons, R.H., J.M. Parrish, M.D. Tice, and M.T. Strong. 2008. Conservation Priorities and Selected Natural Communities of the Upper Anacostia Watershed. Marilandica 12. Pages 1–22.

corporations currently is not permitted in these landscapes; therefore, this potential policy alteration needs to be documented in the DEIS as an additional impact of the SCMagLev project. Just as the SCMagLev is touted as providing future good to the region the SCMagLev also sets the stage for future loss and diminishment of this remnant conservation land. Some of the impacts are:

- If built, the last and largest green space between Baltimore and Washington, D.C., will be weakened and partially disassembled. Green Corridor—the area that covers Greenbelt Park, the Greenbelt Forest Preserve, the BARC, and PRR—is the largest span of contiguous forest and conservation lands in the Baltimore-Washington region.

- If built, recreational runners, walkers, and bicyclists will lose a large part of what is a relatively safe, nature-focused public road network where they can exercise in a healthy environment.

The Land and Water Conservation Fund of 1965 (LWCF), Section 6(f), requires the National Park Service (NPS) to approve any conversion of lands purchased with LWCF assistance. According to the Greenbelt Forest Preserve Advisory Board's January 25, 2018, memo on legal projections for the Greenbelt Forest Preserve, Parcel 1 of the Greenbelt Forest Preserve was purchased in part by LWCF funds, through Maryland's Program Open Space.[114] The NPS will consider conversion of an LWCF property only if certain requirements are met. Prerequisites for conversion approval include, but are not limited to, the NPS determining that all practical alternatives to the conversion have been evaluated and that the proposed replacement property is of equal usefulness. Although replacement properties do not have to be adjacent to or close by the converted site, generally the property should serve the same community. However, it may be difficult for a replacement site to serve the same community, given the lack of nearby private greenspace that could meet the same use as Parcel 1.

The SCMagLev project will directly and negatively impact up to 88.9 acres of property owned by the NPS. All these impacts will be focused around the historic and scenic BW Parkway. The BW Parkway was established in 1950 by Congress. The legislation designated the new road as "a limited access road primarily to provide a protected, safe, and suitable approach for passenger-vehicle traffic to the National Capital . . . "[115] More importantly, this 1950's legislation gave the authority to "the Secretary of the Interior, with the concurrence of the Secretary of Commerce" to "control the location, limit the number of access points, and regulate the use of said parkway . . . "[116] The DEIS highlights that impacts to the BW Parkway would be "difficult to mitigate." We view this assessment to be greatly understated. These impacts would be impossible to mitigate. Massive viaducts along the BW Parkway will permanently alter the historic and scenic nature of the BW Parkway as a scenic entrance into our nation's capital. There are numerous portions along the BW Parkway where the viaducts will be visible in perpetuity, and any screening will lose its efficacy for six months of the year. These impacts are in complete contradiction of the 1950 enabling legislation for the BW Parkway. It is not in the authority of the FRA to issue a permit allowing construction and permanent impacts to the BW Parkway. That authority is vested in the Secretary of the Interior.

[114] Forest Preservation Advisory Board. "Legal Protections against the Construction of the BWRR Superconducting Maglev within the Greenbelt Forest Preserve." Report# 2018-01. January 25, 2018.
[115] 1950 enabling legislation on BW Parkway. www.loc.gov/law/help/statutes-at-large/81st-congress/session-2/c81s2ch525.pdf.
[116] Ibid.

The DEIS fails to address construction impacts on the BW Parkway. Because the BW Parkway was constructed for cars, the heavy trucks and machinery required to construct the SCMagLev are not compatible with the construction of the BW Parkway. This would likely require access from dirt tracks on the PRR or BARC. Existing dirt roads on the PRR and BARC would have to be widened for truck passage and more base material added to increase strength and stability. Other state roads would see increased truck traffic, thus requiring improvements and specific traffic management plans.

Request:

- The FRA must identify how impacts to the BW Parkway from truck traffic will be managed. Furthermore, it must identify how impacts to nearby roads and properties will be impacted and what mitigation measures will be taken to lessen impacts. This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Impacts on Human Activities at the Patuxent Research Refuge

The PRR was established in 1936 by Executive Order of President Franklin Delano Roosevelt and is part of the National Wildlife Refuge System (NWRS) under the USFWS. It provides extensive amenities and programs for visitors interested in nature and the outdoors. The PRR is arguably the most highly-used, nature-related facility in the Baltimore-Washington region in terms of annual visitation. The PRR serves a wide range of visitors, including hikers, runners, dog-walkers, hunters, naturalists such as lepidopterists and herpetologists, photographers, fishermen, and families with children of all ages. In particular, the PRR is a hub for the birding community in Maryland, which has documented over 260 bird species there.[117]

Both the North and South Tracts of the PRR host a full range of public programs each year, offering nature immersion activities for all ages. These include fishing events, bird walks, nighttime creature experiences, an annual Pollinator Festival, and other programs that bring families into nature. As part of the USFWS's Urban Refuge Program, the PRR serves a diverse population and sponsors programs that bring inner-city youths and their families to this natural setting, perhaps for their first-ever such experience.

Over the past five fiscal years, the PRR has served 1,078,186 visitors, averaging 215,637 visitors each year, with a significant increase to 248,448 during 2020 and the COVID pandemic. These visitors include 4,565 to 5,957 hunters who annually use the public hunting area at North Tract—hunting sites are a rare commodity in the highly-developed Baltimore-Washington corridor. "Also included in the total visitation are 11,079 to 91,039 annual visitors who come to enjoy the Refuge's North Tract wildlife drive, hiking trails, fishing ponds, and pollinator gardens; again, the higher number (91,039) represents North Tract visitation during the 2020 COVID pandemic."[118]

[117] eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Data for Patuxent Research Refuge, Available: https://ebird.org/region/USFWS_157?yr=all. (Accessed: May 7, 2021).
[118] Appendix - PRR Visitation Data FINAL: Internal records, Patuxent Research Refuge. National Wildlife Visitation Center.

The proposed SCMagLev TMF at Route 198, as well as the tracks of the J1 alignment, will impinge on the North Tract hunting area, the public hiking trail system, and at least one fishing pond. These areas will be lost to public visitation, and indeed the entire North Tract will become less attractive to visitors who seek the peace and quiet of the natural world. Further, the TMF, with its round-the-clock operations, will bring an unwanted heavy-industry environment of noise and light pollution.

Visitors to the National Wildlife Visitor Center on the PRR's South Tract would also be impacted by the SCMagLev. The TMF proposed for Springfield Road would lie mostly on BARC property, but the east end would overlap by several acres onto PRR property. Judging from the interactive map on the BWRR website, the east end of the TMF would come within 1,500 yards of the National Wildlife Visitor Center (NWVC) and within 450 yards of the entrance drive. The 24-hours-a-day, seven-days-a-week noise and light pollution from the TMF would directly impact the wildlife in the forests of the South Tract, as well as the human visitors. It would also impinge on human research and recreational activity, as the TMF site hosts BARC research and serves as a public hunting area. The proposed viaduct would be tall enough to tower above the tree canopy, meaning that it would be visible from the NWVC and would impose a significant visual disruption to the preserved natural environment.

The NWVC, which opened in 1994, was built with a $15 million appropriation from Congress, as well as additional local funds.[119] The NWVC is the showcase of the entire NWRS, covering not just research conducted at the PWRC, but all wildlife research of the USFWS. The NWVC houses environmental exhibits and educational displays, an interactive kiosk, a wildlife art gallery, a bookstore and gift shop, an auditorium, and conference rooms, which are available to the public for meetings.

The outdoor areas around the NWVC include a pollinator garden, a bird feeder viewing area, a patio and viewing area overlooking one of the lakes, and the trailhead for the South Tract public hiking trail system. A tram tour leaving from the front of the NWVC takes visitors on a route through the surrounding forest to view the PRR's varied habitats.

The number of visitors to the NWVC ranges annually from 37,281 to 151,583.[120] As with North Tract, visitors to the South Tract and NWVC come to enjoy the peace and quiet of nature, which would be disrupted by the nearby presence of the SCMagLev.

Even if the TMF location at the BARC East is chosen, visitors to the NWVC will be impacted because the TMF would be located within the line-of-sight from the BW Parkway and Powder Mill Road interchange, which is the exit used by visitors to the PRR. The SCMagLev would tower over this interchange. This intrusion of modern technology into the natural environment would be at odds with the stated purposes of the PRR:

1. ". . . as a wildlife experiment and research refuge"—Executive Order 7514, dated December 16, 1936.

[119] Perry, Matthew C. "The Evolution of Patuxent as a Research Refuge and a Wildlife Research Center." Patuxent Research Refuge 65th Anniversary, 2001. www.fws.gov/uploadedFiles/Region_5/NWRS/South_Zone/Patuxent_Research_Refuge/history_Patuxent_65th_anniversary.pdf.
[120] Internal records, Patuxent Research Refuge. National Wildlife Visitation Center.

2. ". . . recreation, conservation, wildlife preservation, and related scientific and educational activities"—Executive Order 11724, dated June 27, 1973.
3. ". . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds"—16 U.S.C. 715d, dated February 18, 1929 (Migratory Bird Conservation Act).
4. ". . . to conserve fish, wildlife and plants, including those which are listed as endangered species or threatened species—16 U.S.C. 1534, dated December 28, 1973 (Endangered Species Act).
5. ". . . particular value in carrying out the national migratory bird management program."16—U.S.C. 667b, dated May 19, 1948 (An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes).
6. ". . . (b) The Secretary of the Interior shall administer the property transferred pursuant to subsection (a) consistent with wildlife conservation purposes and shall provide for the continued use of the property by Federal agencies to the extent such agencies are using it on the date of the enactment of this Act."—Public Law 101-519 Sec. 216, 104 Stat. 2247, dated November 5, 1990 (Defense Appropriation Act – including transfer of the North Tract from Fort Meade).[121]

XIV. Green Space and the "Green Wedge"

The SCMagLev project will require the removal of trees and other vegetation along the route and for associated infrastructure. The loss of vegetation will negatively impact water and air quality by reducing ecosystem services. This needs to be emphasized as one of the benefits of the No Build option and discussed directly and not left to the interpretation from tables of lands lost. A great deal of time is spent in the DEIS looking at the purported benefits of the SCMagLev (based on information not provided for review by the public) but similar studies and projects of the impacts to communities of the positive consequences of leaving these lands alone are not shared or discussed.

This, and many other examples provided in this submission identify the appearance of bias in the development of the DEIS. Benefits of building the SCMagLev are extolled, whereas cost and impacts are understated or missing. The DEIS is deficient as it does not provide information about the full extent of the losses suffered if the SCMagLev is built.

Request:

- The FRA should provide independent, well-researched, and well-documented information on the full impacts to these preserved and protected lands. This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Other TMF options. The DEIS states that changes in the design of the SCMagLev project resulted in longer trains, with the consequence that a TMF site in an industrial area of northern Anne Arundel County was dropped from the list.

[121] U.S. Fish and Wildlife Service, Patuxent Research Refuge Comprehensive Conservation Plan, Appendix C - Findings of Appropriateness and Compatibility Determinations. October 2013.

The DEIS is deficient because it does not:

- Explain the rationale for the longer trains.
- Explain the rationale for no longer considering an industrial site for building the project.
- Additionally, present alternative sites available for trainyards, which should be included.
- Explain the apparent rationale or perspective that public protected land is preferred for the TMF sites because they are convenient and do not require the taking of private property.

Request:

- The FRA needs to research and document alternatives that include the taking of private property for location of TMF sites. In addition, there should be a complete and detailed explanation of why siting the TMF in other industrial areas is not preferable to siting it in protected conservation areas. This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Vegetation will be removed along the proposed approximately 40-mile SCMagLev route itself, at the sites of the approximately 200-acre TMF, three new stations, nine FA/EEs, new power substations, permanent lay-down lots, parking lots for multiple facilities, and multiple small support structures, such as those housing signal equipment, as well as along new access roads and ramps. In addition, vegetation will be temporarily removed for road and power station relocation and at other construction areas. The following will be impacted:

- Table ES4.3-2 from the DEIS displays the acres of permanent and temporary impacts.
- The total acreage that would be permanently impacted ranges from 861 to 1,053. Another 120 to 252 acres will be temporarily impacted.
- Removal of vegetation has direct environmental impacts apart from impacts to sensitive habitats and the RTE species discussed above. The removal of vegetation, in and of itself, would result in a direct negative effect on the air and water quality in terms of removing ecosystem services such as reduction of stormwater runoff, flooding control, groundwater recharge, uptake of nutrients, reduction of air pollutants (both particulates and gases), and carbon sequestration (Campbell et al., 2017).[122]

  The DEIS is deficient because it fails to:
  - Fully model the positive values for the No Build option. Instead of well-researched and -modeled benefits of the No Build, the DEIS provides a short listing that appears to have been mentioned in passing.
  - The train ridership and other aspects were reported as having been modeled. Equal weight needs to be given to the loss of environmental functionality. The following questions should be answered:
    - How many tons of carbon storage will be lost?
    - How much additional loss and contamination of the drinking water supply will be expected?
    - How many tons of oxygen and air-cleaning capacity will be lost?

[122] Campbell, E., Marks, R., and Conn, C. 2017. "Accounting for Maryland's Ecosystem Services: Integrating the value of nature into decision making." Maryland Department of Natural Resources, Chesapeake and Coastal Service Center for Economic and Social Science. https://dnr.maryland.gov/ccs/Documents/AMESreportFinal_MDDNR.pdf.

- This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

The Green Wedge: Federal Lands Ranging from the BARC to the PRR
The following section is a letter submitted to the MTA by Richard Orr.

There are concerns that the proposed Transit Maintenance Facilities (TMFs) would negatively impact the large and relatively intact forests, wetlands and grasslands that fall within the various contiguous Federal Lands ranging from BARC to PRR, areas that have been referred to as the Green Wedge. A Green Wedge is an area that is protected from urban development.

The importance of the Green Wedge has long been recognized as the last remaining large biological preserve in the region.

"The Green Wedge is a national treasure, the largest expanse of continuous deciduous forest remaining between Norfolk, Virginia, and Boston, Massachusetts. It serves as the lungs and kidneys for the Washington, D.C., metropolitan area in the bay's watershed, with vegetation and wetlands that filter out pollutants. BARC streams deliver clean water to the bay. In fact, Upper Beaverdam Creek, on BARC land, sets state standards for clean water. One of the many ways the partnership keeps these waters so clean is by planting trees along the streambanks as buffers."[123]

The Green Wedge contains the largest contiguous forest in the Piedmont and Coastal Plain of Maryland. In addition, the area maintains a diverse and extensive system of semi-pristine and managed wetlands including the Patuxent and Little Patuxent rivers, streams, lakes, ponds, marshes, swamps, and even rare acidic bogs.

The Green Wedge has been sheltered from urban development by government ownership for a hundred years. It has become an island of native habitat within the Washington D.C. and Baltimore metropolitan corridor. The Green Wedge contains geological and biological elements of both the Piedmont and Coastal Plain and is situated at the biological interface (ecotone) of the Upper Austral Zone and Lower Austal Zone. These attributes make the Green Wedge of national importance because of its wealth in biodiversity.

The intrusion of one or more of the proposed TMFs would fragment and compromise the biological diversity of the Green Wedge. The impact would be serious. Not only would the TMFs themselves become massive wounds in the Green Wedge, but the TMFs' impacts would extend outward far beyond their boundary fences. The increased light pollution, changes in hydrology and runoff, extensive noise and unintended air, ground and water pollutants would impact the surrounding wildlife and compromise the area's natural habitats.

[123] USDA. "Federal Forest Still Protecting Chesapeake Bay After 100 Years." USDA ARS Online Magazine Vol. 59, No. 2. Retrieved May 6, 2021.

The argument might be made that the BARC airport has already compromised the integrity of the Green Wedge and that building the TMF at this site would have little additional environmental impact. The airport provides a corridor for wildlife movement that would be lost if the TMF were built. In addition, the areas around the old airport (BARC, PRR, NASA) are biologically diverse and would be negatively impacted by the light and noise pollution if the TMF was built.

Two of the proposed TMFs (BARC-West and BARC-Airport) sites drain into Beaverdam Creek. Beaverdam Creek and its associated wetlands near these proposed TMF sites support several dragonfly and damselfly species including the Treetop Emerald (*Somatochlora provocans*), Sable Clubtail (*Stenogomphus rogersi*), Laura's Clubtail (*Stylurus laurae*), and Selys's Sundragon (*Helocordulia selysii*).

The Treetop Emerald is ranked as S1 (Critically Imperiled/Highly State Rare) and the other three species as S2 (Imperiled/State Rare) by DNR.[124] Plus, an additional seven dragonfly/damselfly species assigned as S3 (Vulnerable/Watchlist) have also been recorded from Beaverdam Creek, or its adjacent wetlands, near where the two proposed TMFs are located. One of the Vulnerable/Watchlist Species, the Brown Spiketail (*Cordulegaster bilineata*) utilizes the small stream that crosses within the proposed TMF BARC-Airport site. These species could be negatively impacted, along with other unidentified aquatic organisms, during and after the construction of the proposed TMFs.

The proposed TMF at MD 108, located just north of Patuxent Research Refuge, is a major concern. The sections of PRR land residing just south of the MD 108 site are relatively untouched and would be compromised if the TMF was built due to the replacement of the current, less impactive buffer, with a TMF that would significantly increase light, noise, and contaminants along with modifying the area's hydrology. Four dragonfly species of conservation interest are known to occur in the aquatic habitats where the Powerline Right-of-Way (ROW) cross Refuge property just southwest of the proposed TMF. Two of the species, Sable Clubtail (*Stenogomphus rogersi*) and Arrowhead Spiketail (*Cordulegaster obliqua*) occur along a small stream within the ROW. Both species are listed by DNR as S2 (Imperiled/State Rare) in Maryland. A third species, Little Blue Dragonlet (*Erythrodiplax minuscula*) occurs in the adjacent still water habitats within the ROW. The Little Blue Dragonlet is listed as a S1 (Critically Imperiled/Highly State Rare). In addition, the dragonfly, Mocha Emerald (*Somatochlora linearis*) utilizes the streams in the forested area below the proposed TMF for completing its life cycle. The Mocha Emerald is listed as an S3 (Vulnerable/Watchlist). The upland forested area southwest of the proposed TMF is also home to a large population of the Brown Elfin butterfly (*Callophrys augustinus*).[125] Although the Brown Elfin is not listed in Maryland as rare, this PRR population is significant since large populations within Maryland are uncommon and are becoming scarcer.

Another major concern is the rerouting of the Little Patuxent River to the east during the construction of the proposed MD-108 TMF. Even when the rerouting of the river is completed, long-term changes to the quantity and quality of surface runoff and ground water flow from the TMF would impact the river. Three dragonflies of conservation importance occur just downstream in the Little Patuxent River from the proposed TMF site, at Patuxent Research Refuge; all of which are in low enough numbers that they could easily expire by subtle changes in the river. The most significant is the Appalachian Snaketail

[124] Maryland Department of Natural Resources. "Dragonflies and Damselflies of Maryland." Microsoft Word - Odonates of MD 2003.doc (maryland.gov). Retrieved May 6, 2021.
[125] Ibid.

(*Ophiogomphus incurvatus incurvatus*). This dragonfly is listed as S1 (Critically Imperiled/Highly State Rare) and carries the State Status of "Endangered" in Maryland. This species is on the edge of disappearing from the PRR and its future is of foremost concern. The other two species, Laura's Clubtail (*Stylurus laurae*) and Selys' Sundragon (*Helocordulia selysii*) are nearly of equal interest. Both have the rank of S2 (Imperiled/State Rare) plus Selys' Sundragon also carries the State Status of "Threatened" in Maryland.[126]

The placement of the TMFs would further fragment the Green Wedge which would place additional stress on those organisms that can exist only as metapopulations (organisms that do not depend on any single specific location to survive but require multiple breeding sites spread over the landscape to maintain their population and existence). For example, several dragonfly species that exist as metapopulations within the Green Wedge include the primitive Gray Petaltail (*Tachopteryx thorei*) a S3 (Vulnerable/Watchlist Species), the large colorful Comet Darner (*Anax longipes*) a S3 (Vulnerable/Watchlist Species), and the exceedingly rare Spatterdock Darner (*Rhionaeschna mutata*) a S1 (Critically Imperiled/Highly State Rare species with a State Status of "Endangered").[127]
While dragonflies and are just a hint of the totality of the biodiversity contained within the Green Wedge, they should be viewed as a reflection of a much larger, more taxon-rich environment than just the dragonflies and damselflies.

Size Comparisons for SCMagLev Train Yard. The train yard will be:

- It's about one-and-one-fifth times as big as Disneyland.
- It's about six times as big as The Pentagon.
- It's about 50 times as big as The Kennedy Center.
- It's about 150 times as big as a Football field.
- It's about 1,500 times as big as a Basketball court.
- It's about 3,000 times as big as a Tennis court.
- You could fit in 55,000 parking spaces (RFK Stadium only had 12,000 parking spaces).

XV. Groundwater

Groundwater resources
The DEIS fails to sufficiently examine how tunnel and viaduct construction (and SCMagLev operation) may impact the Patapsco Aquifer (especially Lower Patapsco Aquifer)—the aquifer with the most significant surface outcrop along all the proposed Build Alternatives (footnotes 1, 2, and 3 support this). As represented in the DEIS, both proposed tunnel and surface infrastructure alignments are located on the recharge zone for Lower Patapsco Aquifer.[128] The current SCMagLev DEIS is ambiguous about these risks and impacts that could be significant for all eastern Maryland residents who use groundwater from deep aquifers as their primary or sole public water supply. The overlay of the proposed SCMagLev alignments is shown in the DEIS as coinciding with the relatively narrow (estimated to be less than 8 km

[126] Ibid.
[127] Ibid.
[128] DEIS Appendix D.7-42, Section D.7C.3.3. Page D.7-41.

at its widest point) outcrop of the Patapsco Aquifer.[129] "Ground water in Maryland's Coastal Plain is derived from rain and snow that falls within the outcrop area of the aquifers (that is, the area where the aquifers reach the surface)."[130]

Additionally, there is risk of impacts from SCMagLev alignments to aquifer-confining layers where SCMagLev infrastructure is proposed (including both tunneling and viaduct construction). The level of this risk needs to be assessed. Based on the FRA and BWRR SCMagLev DEIS overlay of alignment routes, the following layers are likely to be represented at the surface and just beneath the surface along all the proposed SCMagLev alignments (along with the Lower Patapsco Aquifer): the Calvert Confining Unit, the Nanjemoy Confining Unit, the Severn Confining Unit, the Matawan Confining Unit, and the Magothy-Patapsco Confining Unit. A potential danger of tunneling in the Coastal Plain region is the breaching of low permeability (clay) layers that function as confining layers that may cease to function in that capacity if they are breached. This could pose problems, such as the release of hydrologic pressure of confined units and the loss of pressure or available water in down-gradient wells, which are screened in the confined aquifer located beneath the confining layer.

Studies are needed to identify possible long-term impacts of disruptions to the public water supply during the SCMagLev construction phase and during ongoing operation and maintenance. In the event that infrastructure must be built to prevent interruption of the water supply during construction, the unfortunate outcome may be the creation of a permanent dependence on imported water or on water purification for affected communities, rather than the much-preferred preservation of aquifer resources. Projects such as these threaten communities with permanent dependence on corporate water filtration in lieu of the perpetual legal protection of their water supply aquifers. Communities whose residents currently trust their well water would not choose this option and should be informed about and have input into the discussion about possible impacts.

The DEIS fails to sufficiently examine potential losses to groundwater recharge to nearby and distant down-gradient supply wells. One of the many specific issues of concern is impacts to the Anne Arundel County Water supply and the City of Annapolis water supply. "Anne Arundel County DPW customers enjoy an abundant water supply from underground wells (150 to 1,550 feet deep) in the Patapsco, Patuxent, and Aquia Aquifers. Combined, our treatment facilities provide roughly 12 billion gallons of clean drinking water every year."[131] "The City of Annapolis' water supply originates from eight wells. These wells range from 250 to 1,000 feet deep. The wells are drilled into three aquifers: the Magothy, Upper Patapsco, and Lower Patapsco."[132]

Requests:

- Provide the analysis of the risk of potential losses to groundwater recharge to nearby and distant down-gradient supply wells.

[129] DEIS Appendix D.07, Section D.7C.3.3, Figure D.7-8. Page D.7-42.
[130] Maryland Geological Survey. "Ground Water and Wells in the Maryland Coastal Plain." MGS Fact Sheet 20.cdr (md.gov). Retrieved May 5, 2021.
[131] Anne Arundel County. Annual Water Quality Report, Reporting year 2018. www.aacounty.org/departments/public-works/utilities/forms-and-publications/WaterQuality2018.pdf. Retrieved May 2, 2021.
[132] City of Annapolis City Water. https://www.annapolis.gov/733/City-Water. Retrieved May 2, 2021.

- Provide the NEPA-required analysis and findings to the public with sufficient time for review and comment before any consideration on a decision to move the SCMagLev project forward.

The public water supply for Washington D.C., provided by DCWater, comes from the Potomac River.[133] The public water supply for much of Montgomery and Prince George's Counties is provided by the WSSC (originally The Washington Suburban Sanitary Commission) and comes from the Potomac River and/or Patuxent River.[134]

Request:

- The FRA must complete an independent assessment to assure that critical fresh-water supplies are not damaged and/or contaminated with the building and operation of the SCMagLev, resulting from changes in surface and subsurface water collection and flows and from changes in water quality and water chemistry.

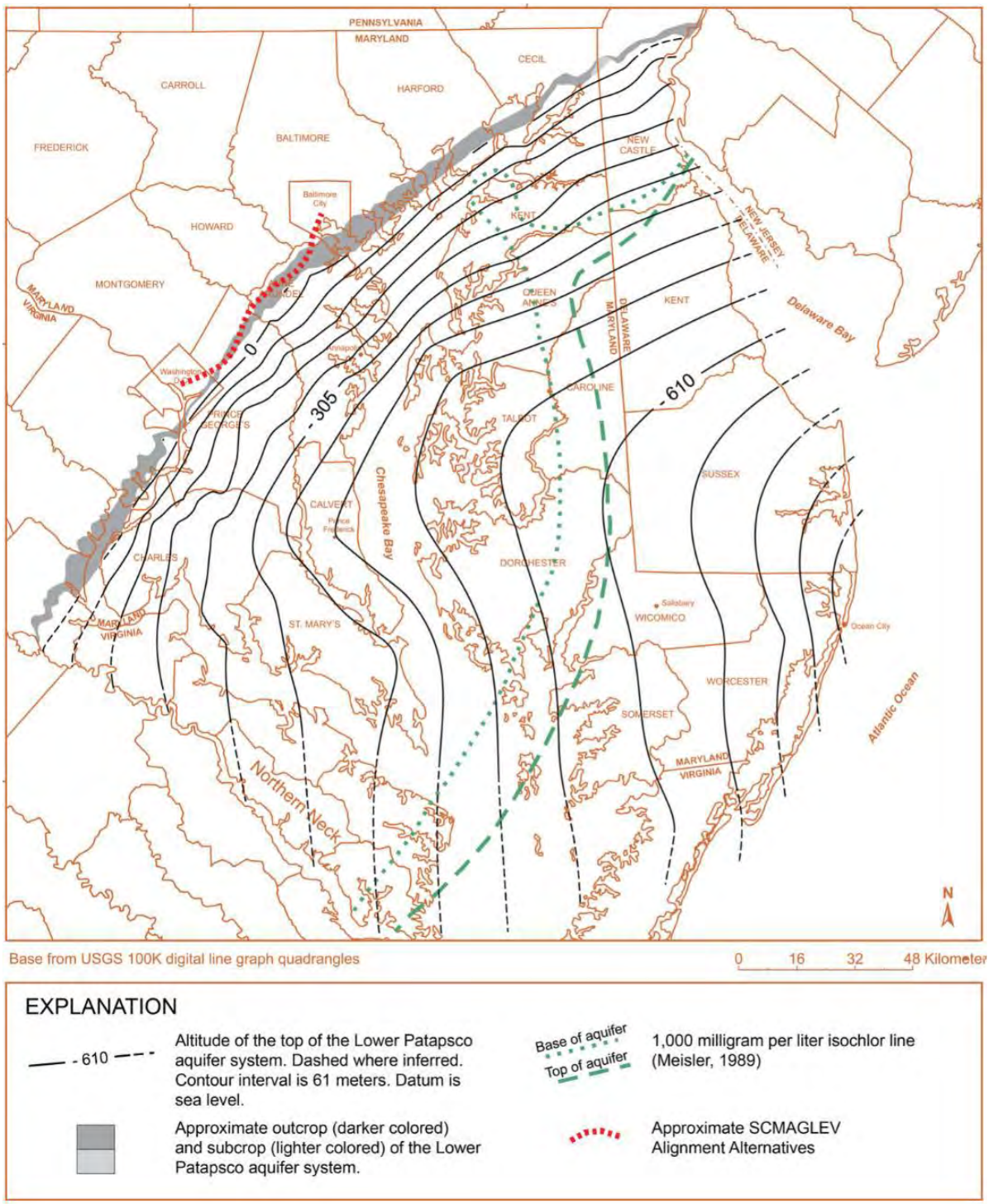
The DEIS fails to examine the risk of frac-out (a term used to describe what happens when drilling fluid penetrates fractured bedrock or seeps into the bedrock or aquifer and fluids are inadvertently released to the surface) and how any frac-out events could impact waterways and groundwater.

Request:

- The FRA must provide an independent analysis of the risk of frac-out and how any frac-out events could impact waterways and groundwater.
- The FRA must provide the NEPA required analysis and findings to the public, with sufficient time for review and comment, before any consideration on a decision to move the SCMagLev project forward.

As stated in the DEIS: "Aquifers form in geologic formations, which are distinct rock units consisting of either single or interrelated rock layers. As previously described in the DEIS Section D.7B Geology, the geologic formations of the Potomac Group that would be encountered by the proposed Build Alternatives are (from shallowest to deepest) the Patapsco Formation, the Arundel Formation, and the Patuxent Formation. The Patuxent and Patapsco Formations represent important regional aquifers. See Figure D.7-8 for an illustration of the Patapsco aquifer system in relation to the SCMagLev Alignment Alternatives. Regional groundwater studies indicate a shallow groundwater table within the SCMagLev Project Affected Environment. (See reference 22) The depth to groundwater ranges from approximately 10 to 15 feet below ground level however, local variations in the groundwater are expected. FRA has identified the areas where these aquifers overlap with the Build Alternatives guideway tunnels as primary locations where effects to groundwater could occur."[135]

[133] DCWater is Life. https://www.dcwater.com/drinking-water. Retrieved May 2, 2021.
[134] WSSCWATER. https://www.wsscwater.com. Retrieved May 2, 2021.
[135] DEIS Appendix D.07, Section D.7C.3.3. Page D.7-41.



DEIS Figure D.7-8: Patapsco Aquifer in Relation to the SCMAGLEV Alignment

The assertion that depth-to-groundwater ranges from approximately 10 to 15 feet below ground level is questionable. Groundwater levels have been increasing over the last five years, according to the U.S. Geologic Service's (USGS's) report," Ground water levels for monthly water conditions in the State of

Maryland." With a higher water table (closer to the surface), more water management and pumping than what has been considered will be required.[136]

Requests:

- The FRA must conduct independent groundwater analysis reflecting the depths as shown in the USGS reports.
- The FRA must provide the NEPA-required analysis and findings to the public with sufficient time for review and comment before any consideration on a decision to move the SCMagLev project forward.

In the DEIS, "Groundwater Resources" or "Aquifers" should be considered Geologic Resources.[137] The significant groundwater resource that would be affected by this project are part of the Northern Atlantic Coastal Plain Aquifer system, according to the Groundwater Atlas of the United States.[138] Not including the major groundwater resource as a "Geologic Resources" is a way of diverting attention from and minimizing the impact this project would have on parts of the Northern Atlantic Coastal Plain Aquifer.

Requests:

- The FRA must include identifying and providing a complete description of potentially impacted groundwater resources and aquifers as "Geologic Resources" in assessing the environmental and human health risks of building the SCMagLev.
- The FRA must provide the NEPA-required analysis and findings to the public, with sufficient time for review and comment, before any consideration on a decision to move the SCMagLev project forward.

The Groundwater section does not provide specific outcomes of aquifer impacts imposed at different spatial and time scales, during the construction phase and into the future.[139] Compromise of groundwater sources could require short- or long-term replacement of access to water for the various impacted homes and businesses. Examination of cumulative impacts is required in the NEPA review and may include the compromise of confining layers and confined aquifers, both of which could impact public supply wells.

Requests:

- The FRA must provide the specific outcomes of aquifer impacts imposed at different spatial and time scales, during the construction phase and into the future.
- The FRA must provide the NEPA-required analysis and findings to the public, with sufficient time for review and comment, before any consideration on a decision to move the SCMagLev project forward.

We note the following DEIS statement: "Modeling may demonstrate that nearby supply wells that obtain groundwater from deeper depths than the proposed Build Alternatives, obtain groundwater

[136] "Maryland and Delaware - Climate Response - Water Table Wells." USGS https://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/. Retrieved May 2, 2021.
[137] DEIS Chapter 4.13, Section 4.13.2.2. Page 4.13-2.
[138] U.S. Geological Survey. Hydrologic Atlas 730. https://doi.org/10.3133/ha730. www.usgs.gov/mission-areas/water-resources/science/principal-aquifers-united-states. Retrieved May 2, 2021.
[139] DEIS Appendix D.07, Section D.7C.4.2. Page D.7-58.

beneath confining layers, or are not hydraulically connected to the area of impact, have no predicted loss of recharge."[140] The intent is to obscure issues associated with the care of and methods to protect groundwater. Investigations of potential groundwater impacts must be completed to innumerate risks to specific aquifers by SCMagLev construction, operations, and likely malfunctions due to reasonably foreseeable natural disasters. This practice is standard NEPA protocol since the proximity to community and individual water supplies exceeds the bounds of Wellhead Protection Areas identified in the SCMagLev DEIS. These aquifers, which provide valuable and irreplaceable groundwater, **must not become a casualty** of a project that will not benefit the impacted population or the majority of residents in the region.

Requests:

- The FRA must provide the oversight of this modeling process and verify the resulting data and information.
- The FRA must provide this NEPA-required analysis and findings to the public, with sufficient time for review and comment, before any consideration on a decision to move the SCMagLev Project forward.

Groundwater Chemistry Concerns

Exchange of water between separate confined areas of an aquifer system with otherwise separate areas of aquifer or with surface water is an issue of concern. When water from a confined aquifer is exposed to surface conditions and mixed with water of different chemistry, there are frequently chemical changes as the water adjusts to different conditions. This change in chemistry could take the form of precipitate formation (often iron oxide), which causes clogging of equipment, or acidic waters which could result in the corrosion of equipment or concrete.[141] This is addressed in a very general way in the DEIS with no analysis of aquifers and water chemistry. These issues need to be analyzed and solutions identified.

Requests:

- The FRA must provide detailed analyses and unredacted results of these groundwater chemistry concerns.
- The FRA must provide this NEPA-required analysis and findings to the public, with sufficient time for review and comment, before any consideration on a decision to move the SCMagLev Project forward.

Wellhead Protection Program Lack of Relevance

The focus of the wellhead protection program is misrepresented in the DEIS. The inclusion of the wellhead protection areas in the DEIS is done in such a way to imply that if the designated wellhead protection areas are protected, there is no reason for concern. This is not true and is misleading. The proximity to community and individual water supplies exceeds the bounds of wellhead protection areas identified in the DEIS. The Wellhead Protection Program is not designed to protect from a general

[140] DEIS Appendix D.07, Section D.7.5.1. Page D.7-68.
[141] U.S. Geologic Survey. https://pubs.usgs.gov/circ/circ1139/htdocs/boxd.htm. Retrieved May 5, 2021.

disruption of hydrologic setting. In Figure 4.10-2 on page 4.10-10, Groundwater Wellhead Protection Areas, it is implied that these are the only areas that need protection from contamination.[142]

In contrast to the implication, the entire recharge area along the proposed SCMagLev route is vulnerable to disruptions, as seen in DEIS Appendix in Figure: D.7-8: "Patapsco Aquifer in Relation to the SCMAGLEV Alignment."[143]

XVI. Watersheds, Waterways, and Wetlands

According to the DEIS, eight major watersheds would be impacted by the SCMagLev: [144]

Sub-Watershed Name	Geographic/Land Use Description	Watershed 8-digit Hydrologic Unit Code	MDNR Watershed Name	MDNR Watershed 6-digit Code	Overall Watershed Size (acres)	Watershed Area within SCMAGLEV Project Affected Environment* (acres)
Anacostia River	Urbanized developed areas in Washington, D.C. to rural or undeveloped areas in Prince George's County	02140205	Middle Potomac	021402	116,511	820-1,067
Patuxent River Upper	Forested, urban, and agricultural development. Within Anne Arundel County and Prince George's County	02131104	Patuxent	021311	56,446	114-157
Little Patuxent River	Forested, industrial/commercial, and residential, and drains much of the urbanized areas of Howard County	02131105	Patuxent	021311	66,214	82-421
Severn River	Single family residential and forest being the most prevalent land use	02131002	Lower Western Shore	021310	51,744	10
Patapsco River Lower North Branch	Densely populated and urbanized watersheds within and surrounding Baltimore County and Baltimore City	02130906	Patapsco Back River	021309	75,755	231-346
Baltimore Harbor	Densely populated and urbanized watersheds within and surrounding Baltimore County and Baltimore City	2130903	Patapsco/ Back River	021309	74,899	117-125
Gwynns Falls	Densely populated and urbanized watersheds within and surrounding Baltimore County and Baltimore City	2130905	Patapsco/ Back River	021309	41,711	23-45
Jones Falls	Densely populated and urbanized watersheds within and surrounding Baltimore County and Baltimore City	2130904	Patapsco/ Back River	021309	37,282	0-7

[142] DEIS Chapter 4.10, Section 4.10.3.3, Figure 4.10-2. Page 4.10-10.
[143] DEIS Appendix D.07, Section D.7C.3.3, Figure D.7-8. Page D.7-68.
[144] DEIS Appendix D.07, Table D.7-9. Page 36.

Quoting from the DEIS: "Build Alternatives J-01 and J-04 would have a water resources impact to the Little Patuxent River Watershed, river, and its surrounding natural habitat within the watershed. Due to proposed viaduct piers, SCMAGLEV systems, and TMF located within two locations of this resource, these Build Alternatives would directly affect floodplain functions, riparian habitat, NTWSSC [Nontidal Wetlands of Special State Concern], water quality, surface hydrology, and wildlife and aquatic species (including rare, threatened or endangered species or species of concern)."[145]

Further, permanent impacts "would be more evident in the Little Patuxent River Watershed, Anacostia River Watershed, and the Patuxent River Watershed. Permanent impacts would be greater for alignments associated with J-01 through J-06 due to the greater proposed above ground features. This difference between Build Alternatives is most significantly found within the Little Patuxent River watershed, where the Build Alternatives J alignments are proposed largely above ground and Build Alternatives J1 alignments are in deep tunnel. . . Direct and indirect impacts . . . include removal of vegetation within wetlands and riparian forest, construction within the floodplain, and potential affect to water quality. . . Due to these proposed impacts to water resources and the indirect effects to the surrounding natural environment . . . Build Alternatives J alignments may have an adverse effect to the Little Patuxent River Watershed . . ."[146]

All the proposed TMF locations would have significant watershed impacts. Of particular concern is the Route 198 TMF, which would affect approximately 200 acres. "Due to the significant new impervious surface and the significant amount of fill required to the landscape, it is possible that the boundary defining the drainage area of the Little Patuxent River Watershed could be altered. As described in Chapter 3, the TMF site slopes downward toward the Little Patuxent River to the north and east. Current design indicates the need to provide up to 154 feet of fill to raise the site to a level grade. The fill would be supported by perimeter retaining walls. This results in a significant change to the landscape and to the drainage pattern of the adjacent Little Patuxent River and its upstream and downstream tributaries. This facility is located less than one-half mile upstream from the PRR, and with the added impervious surface, fill within the floodplain and wetlands, and loss for forest canopy, it is expected to indirectly affect resources located within PRR."[147]

Further, it is stated: "With approximately 200 acres of permanent impact proposed for any of the TMFs, it is anticipated that both the Anacostia and the Little Patuxent Watersheds will experience a change in . . . their ability to filter and store water in the soil, and may risk a change in status of Stronghold Watershed. Hydrology patterns in and surrounding any of the TMF sites will also be altered, which may influence seeps and low-lying areas that may support sensitive species . . . "[148]

Given the aforementioned importance of the landscapes within the PRR, BARC, and adjacent areas in supporting RTE species, rare habitats, and plant communities, as well as providing drinking water for millions of people in the Baltimore-Washington region, this level of impact to the watersheds is patently unacceptable.

[145] DEIS Appendix D.07, Section D.7C.4.2. Page D.7-50.
[146] DEIS Section 4.10.4, Subsection 4.10.4.2. Page 4.10-15.
[147] Ibid.
[148] Ibid. Page 4.10.16.

- According to the DEIS, the SCMagLev would have significant impacts on waterways and wetlands in the project area, including Non-Tidal Wetlands of Special State Concern. See DEIS Table 4.11-1 next.

Table 4.11-1: Affected Environment Wetlands and Waterways Summary

Build Alternative	Wetlands* (acres)	Wetlands designated as NTWSSC** (acres)	Waterways* (linear feet)
J-01	83	12	37,371
J-02	69	30	41,859
J-03	62	19	40,910
J-04	82	12	38,348
J-05	68	30	42,837
J-06	61	19	41,887
J1-01	89	7	38,363
J1-02	67	23	40,077
J1-03	58	9	39,256
J1-04	89	7	39,341
J1-05	66	23	41,054
J1-06	57	9	40,234

* All Build Alternative alignments include the long-term laydown area near MD 200 and I-95, which accounts for over 21 acres of wetlands and 10,500 linear feet of waterways, as identified through published data. No vegetated tidal wetlands are present within the Affected Environment. Waterways represent all systems, both tidal and nontidal crossed by the SCMAGLEV Project.
**NTWSSC acreages are not in addition to the wetland acreage presented, but are a separate analysis of impacts based on state-published boundaries, not field-delineated boundaries.

As previously discussed, these wetlands support rare plant communities and a diverse set of RTE plant and animal species. In addition, the area has provided a singular location for ecological research over the last century. Given the State of Maryland's mandate to protect biodiversity,[149] the impact to these unique waterways and wetlands is unacceptable. Any damage to these resources cannot be mitigated, as the ecosystems that have developed over millennia cannot be recreated elsewhere.

Dewatering Effects on Vegetation

Dewatering of surface wetlands during critical seasons may result in the permanent loss of habitat for locally threatened species. Skunk cabbage has lost significant habitat to Japanese stilt grass in the valleys of Greenbelt National Park in recent years. This loss of a native species to a prolific invader will be exacerbated by dewatering during the spring season of skunk cabbage.

[149] Maryland Department of Natural Resources. 2016. Maryland State Wildlife Action Plan. Chapter 4 Maryland's Key Wildlife Habitats. Annapolis, Maryland. https://dnr.maryland.gov/wildlife/Pages/plants_wildlife/SWAP_home.aspx.

Effects of Vegetation Removal on Water Quality

The SCMagLev project will require the removal of trees and other vegetation along the route and for associated infrastructure. The loss of vegetation will negatively impact water quality, as well as air quality, as discussed below, by reducing ecosystem services provided by plants.

Vegetation will be removed along the proposed approximately 40-mile SCMagLev route itself, at the site of the approximately 200-acre TMF, three new stations, nine FA/EEs, new power substations, permanent lay-down lots, parking lots for multiple facilities, and multiple small support structures such as those housing signal equipment, and along new access roads and ramps. In addition, vegetation will be temporarily removed for road and power station relocation and at other construction areas.

Table ES4.3-2 from the DEIS displays the acres of permanent and temporary impacts.

Table ES4.3-2: Build Alternatives Engineering Resource Impacts

Resource	Build Alternative											
	J-01	J-02	J-03	J-04	J-05	J-06	J1-01	J1-02	J1-03	J1-04	J1-05	J1-06
Linear Miles of Guideway	39	38	38	41	39	39	40	38	38	41	39	39
Total Number of Parcels Permanently Impacted	312	294	297	207	189	192	334	313	314	229	208	210
Total Acres of Permanent Impacts	1,000	1,066	1,019	852	918	871	1,009	1,053	1,009	861	905	861
Public Property Acres of Permanent Impacts	210	63	63	203	58	58	260	108	698	255	102	104
Federal Property Acres of Permanent Impacts	57	293	245	57	293	245	26	248	201	26	248	201
Total Number of Parcels Temporarily Impacted	162	170	167	113	123	120	167	183	178	121	134	132
Total Acres of Temporary Impacts	203	239	214	216	252	228	120	161	133	134	174	147
Public Property Acres of Temporary Impacts	49	48	48	55	54	54	40	43	68	46	49	46
Federal Property Acres of Temporary Impacts	50	87	63	50	87	63	14	50	25	14	50	25
Project Construction Cost ($ Millions)	10,950	10,640	10,640	12,370	12,060	12,060	11,480	11,170	11,170	12,900	12,590	12,590

Notes: Parcels Permanently Impacted and Acres of Permanent Impacts: includes Full and Partial Permanent property impacts
Number of Parcels Temporarily Impacted and Acres of Temporary Impacts: property impacts that would occur during construction.

The total acreage that would be permanently impacted ranges from 861 to 1,053. Another 120 to 252 acres will be somewhat temporarily impacted as it unlikely that the land will be restored to its original condition after the SCMagLev construction is completed.

Removal of vegetation has direct environmental impacts apart from impacts to sensitive habitats and RTE species as discussed above. The removal of vegetation, in and of itself, would result in a direct negative effect on the air and water quality in terms of removing ecosystem services, such as the reduction of stormwater runoff, flooding control, groundwater recharge, uptake of nutrients, reduction

of air pollutants (both particulates and gases), and carbon sequestration.[150] The DEIS is seriously deficient in not providing a detailed quantitative analysis of the negative effects of loss of ecosystem services.

The mitigation plans presented in Chapter 4 of the DEIS are covered in various sections dealing with different types of habitat but, in general, the plans rely on both onsite and offsite replacement of vegetation. But offsite plantings would not in any way provide a replacement for the roles of the existing vegetation within the existing ecosystem. For example, a tree planting at, for example, the Lake Artemesia Natural Area is not going to mitigate the impacts of removing ecosystem services at the BARC, PRR, BW Parkway, or other areas directly impacted by the proposed SCMagLev.

Surface Water Quality and Flow Disruptions

Water table and surface water systems are connected. The degree to which they are connected varies, but in sediments such as the Upper Patapsco Aquifer, they are likely to be closely-connected. This means that if you pump from a well next to the river, the water in the river will go down in an almost immediate reaction. How much reduced would be the flow in a river depends on the amount of pumping and the duration of pumping. Any change in water level (in a river), aside from normal seasonal or periodic fluctuations, would have a negative impact on aquatic organisms. Frequent large changes in water level would also have a negative impact. This would apply to any area where tunneling is planned.

Stormwater management is not thoroughly covered in the DEIS Section 3.3.2.11 Stormwater Management. The DEIS says: "At the current level of design, the following types of stormwater management strategies were considered: vegetated swales, ditches, and channels; piped drainage; and drainage basins. Regulatory design criteria prescribe the conditions under which stormwater management facilities would be required and dimensions."[151]

Disruptions and impacts to surface water bodies are discussed in a general way—listing techniques that are typically used, that laws would be in effect, and permits would be obtained. However, the details have not yet been considered and are not presented in the DEIS. The construction phase and transition phase might be most impactful, with changes to drainage systems, new drainage routes, piped drainage, and temporary relocation of surface water bodies. These changes will impact the turbidity (amount of sediment) in the river, the amount of flow in the river (it could be down to a trickle or it could be at flood stage, depending on how stormwater or groundwater is managed), and the temperature of the river.

High turbidity, water temperature standard exceedances, and extremes in flow levels are well recognized as essential factors in the quality of a river. These three factors (turbidity, temperature, and flow) have huge impacts on aquatic life and on the cultural and social aspects of our precious rivers. The general public thinks of “pollution” as toxic chemicals, yet they are not always aware of impacts of sedimentation, changes in flow, and temperature. The temperature and turbidity of surface waters are regulated by law through the EPA Water Quality Standards program; however, flow is not currently regulated. The construction phase of areas within the Anacostia Watershed would continue for years

[150] Campbell, E., Marks, R., and Conn, C. 2017. Accounting for Maryland’s Ecosystem Services: Integrating the value of nature into decision making. Maryland Department of Natural Resources, Chesapeake and Coastal Service Center for Economic and Social Science. https://dnr.maryland.gov/ccs/Documents/AMESreportFinal_MDDNR.pdf.
[151] DEIS Chapter 3, Section 3.3.2.11. Page 3-38.

and these impacts would be worse for every year there are "temporary" disruptions to flow, temperature, and sedimentation. Cumulative effects of these impacts have not been considered in the DEIS.

Request:

- The FRA must provide detailed analysis and results of these impact topic studies to the public, with sufficient time for review and comment, prior to any consideration on a decision to move the SCMagLev project forward.

Other Concerns

- With this project being proposed from Washington, D.C., through Maryland, there easily could be confusion about jurisdiction, and this confusion could be a loophole for compliance.

- Impacts to surface water and groundwater will be significant and unavoidable and will have immediate effects on sensitive and endangered species of vegetation. This specific concern has been identified at the proposed BARC-West TMF. Fill material (estimated up to 50-feet deep) will level the top of the hill and destroy the spring structure of the plant communities on the east side that contain Maryland endangered species such as White-fringed Orchid. Other rare or endangered vegetation is likely to be affected at this site.

- The DEIS needs to explicitly document the loss of those seeps and springs due to the construction of the site and the greater hydrology loss. This information needs to be researched and documented, then shared with the public for review and comment before any consideration on a decision to move the SCMagLev Project forward.

XVII. Clean Air and Climate Change

Although numerous sections of the DEIS state that vegetation will be removed in the course of construction of the SCMagLev, it is astonishing that Appendix D.9, Air Quality Technical Report, contains no mention of the effects of removal of vegetation on air quality. This is a massive oversight by the FRA. Removal of vegetation has direct impacts on air quality in terms of removing essential ecosystem services, such as carbon monoxide removal, nitrogen dioxide removal, sulfur dioxide removal, ozone removal, particulate matter removal, carbon sequestration, and nitrogen uptake.[152] The late Senator Paul Sarbanes famously referred to the PRR as the "lungs of the Baltimore-Washington Region,"[153] in reference to the significant contribution of the forests of the PRR to air quality. And yet, the DEIS fails to take this function into account. The lack of a qualitative and quantitative analysis of the impact of removal of vegetation on air quality within the project impact area must be fully studied by the FRA, or the FRA must reject the proposal to build the SCMagLev and select the No Build option.

[152] Campbell, E., Marks, R., and Conn, C. 2017. Accounting for Maryland's Ecosystem Services: Integrating the value of nature into decision making. Maryland Department of Natural Resources, Chesapeake and Coastal Service Center for Economic and Social Science. https://dnr.maryland.gov/ccs/Documents/AMESreportFinal_MDDNR.pdf.
[153] Perry, Matthew C., Editor. 2016. The history of Patuxent—America's wildlife research story. U.S. Geological Survey Circular 1422. https://doi.org/10.3133/cir1422.

As identified in the DEIS, construction of the SCMagLev will not reduce greenhouse gas emissions contrary to the assertions of the BWRR and TNEM. The DEIS highlights that the various alternatives would consume significant quantities of energy, both during construction (6 trillion Btus) and operation (4 trillion Btus per year). Increased energy consumption for train operations would account for 38 to 39 percent of the region's total transportation energy consumption per year. To date, the BWRR has not provided substantiated data to back up their claim that the project would reduce greenhouse gas emissions.

The DEIS is deficient in the following areas that must be addressed by the FRA:

- The FRA does not estimate the emissions caused by energy demand during construction. Given that construction will be done by heavy machinery operating diesel engines, impacts to local air quality must be measured. The DEIS also does not address PM2.5 or dust emissions from construction. These must be measured and documented before any consideration to begin construction is moved forward.

- The DEIS fails to analyze the additional air quality emissions resulting from the increased power generation the project would require. The FRA must review these potential impacts on energy consumption, the burning of fossil fuels, and air quality.

- The DEIS claims that the PJM (a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia[154]) plans to meet this required additional demand with temporary standby generation facilities and existing power generation. However, it simply defies logic to assume that an additional 3.07 trillion BTUs of energy consumption would not require the addition of new power generation in the long term. The FRA must analyze this claim to determine the long-term impacts on grid reliability and additional necessary power generation to meet the demands of the SCMagLev.

- The FRA and MTA must show the specific inputs used and the derivation methodology of claims of reducing traffic congestion and, subsequently, how the numbers being shown as greenhouse gas and emissions are generated.

- Constructing the SCMagLev would release a considerable amount of carbon dioxide. Constructing the 40 miles of tunnel and elevated track would cause significant emission largely because of the carbon dioxide released to manufacture the required amount of concrete and steel.[155] As estimated in DEIS Appendix A of the source article, 316 to 815 million kilograms of carbon dioxide are estimated to be released because of the construction. The FRA must address this issue.

- Operating the SCMagLev would be responsible for additional greenhouse gas emission because carbon dioxide would be released to generate the electricity to run the SCMagLev. Operating the SCMagLev might result in a net decrease in emission, but only if a large fraction of the miles traveled on the train replaced miles that otherwise would have been traveled in gas-powered cars. SCMagLev

[154] PJM. www.pjm.com.
[155] "World Energy Outlook 2019." IEA - International Energy Agency. November 2019. Page. 57. www.iea.org/reports/world-energy-outlook-2019.

technology is not carbon free—it just emits somewhat less carbon dioxide per passenger-mile than does a gas-powered vehicle. The FRA must address this issue.

- The DEIS highlights that the project would be significantly less energy-efficient than bus and rail travel in terms of people miles traveled. In fact, it is "37 and 20 percent less efficient than existing bus and passenger rail, respectively."[156] This admission contradicts the entire project's purpose and need statement, given that more efficient means of mass transportation already exist. The FRA must address this contradiction.

- The assertion in the DEIS that a hot-spot analysis is not required because construction-related activities are short term (less than five years) is likely incorrect for at least some sites, such the stations and the TMFs. For example, construction of the potential Camden Yards station would require the demolition of four buildings and partial demolition of the convention center. Moreover, it does not change FRA's obligation under the NEPA to consider construction emissions. The FRA must fully examine these impacts and provide this information to the public, with sufficient time to review and provide comments, before any consideration of moving forward with building the SCMagLev is given.

- The DEIS claims the project would reduce potential cumulative adverse effects on air quality at the regional level by diverting roadway traffic to train travel. However, it ignores impacts from increased emissions caused by construction and the substantial amounts of electricity needed to operate the system, as described in Section I.G.1 above. In addition, the DEIS does not address how this increased energy use would be consistent with Maryland's commitment to reduce GHG emissions under the Greenhouse Gas Reduction Act. Although the DEIS claims there is available existing capacity through the grid power pool in the region, the DEIS does not evaluate other potential impacts of this increased electricity demand. The FRA must address this issue.

XVIII. Fossils

This Baltimore-Washington area is part of a rich strata of dinosaur bones and associated fossils and, perhaps even more rare, dinosaur trackways. Significant finds have been found on the BARC at the Swampoodle Site. The region (known as Dinosaur Alley) was the primary source of Maryland dinosaur bones in the 19th century, and these were collected by both the Yale Peabody Museum and local collectors, with many bones residing now in the Smithsonian. Other well-known locations occur on NASA Goddard and in nearby Muirkirk at the Maryland-National Capital Park and Planning Commission's (M-NCPPC) Dinosaur Park, bracketing the BARC sites. At least 16 type specimens of dinosaurs and fossils are named from these collective sites and there are almost certainly more.

Of even greater importance was the type specimen of *Astrodon johnstoni* found in the 1800s and designated as the state dinosaur of Maryland. The region has been described as follows: "Dinosaur Park is the best place to find Cretaceous dinosaur bones in the Eastern United States, and as it happens the

[156] DEIS Chapter 4.19, Section 4.19.3.2. Page 4.19-10.

best place to find Cretaceous dinosaur footprints on this side of the Mississippi River is only ten miles away. Avocational fossil hunter Ray Stanford first started finding dinosaur tracks near College Park, Maryland in the early 1990s. With the help of professionals and other amateurs (including Dinosaur Park's own David Hacker), over 300 specimens have been recovered to date."[157] These same trackways have been found on Goddard and similar rock formations occur throughout the impact sites.

Both proposed viaduct lines and all three TMF sites are within the fossil strata mentioned above. However, despite the verification of material and those strata by local fossil hunting clubs, the Maryland Dinosaur Park, and Sam Droege (USGS biologist) on these sites, the DEIS has not made any recommendation or effort to investigate the quality and quantity of fossil material in danger of being destroyed during construction. Without thorough and systematic investigation, we would never know the extent of the loss to Maryland's paleontological record if the SCMagLev is permitted to destroy these fossil deposits. The sites must be thoroughly documented and the fossils removed and preserved.

Requests:

- The FRA must initiate an independent investigation of this critical and historic fossil reserve to determine the full extent of damage and disruption building the SCMagLev will have on this area and fully scope the loss of access to future generations of scientists, paleontologists, and others.
- The FRA must provide this research and findings to the public, with sufficient time for review and comment, before any consideration on a decision to move the SCMagLev project forward.

XIX. Light Pollution

Some alternatives would have moderate or high visual impacts to the Greenbelt Observatory, Northway Field, and James N. Wolfe Field. Lighting associated with the SCMagLev system would impede operation of the astronomical observatory.

NASA Goddard Space Flight Center (GSFC) has operations that could potentially be affected by the environments created by the SCMagLev project during construction and operation. This includes traffic, lighting, vibrations, acoustic, radio frequency (RF), electromagnetic field (EMF), and seismic environments. As previously expressed, any impacts from the SCMagLev project on our science and mission would be of great concern.

One area of particular concern is the Goddard Geophysical and Astronomical Observatory (GGAO). The Goddard Geophysical and Astronomical Observatory, located off of Springfield Road, is a remote facility that support a number of NASA activities that require minimal disturbances from vibration, artificial lighting, and electromagnetic interference. The site is one of the few places in the world to have all four space geodesy techniques co-located at a single location: Satellite Laser Ranging (SLR), Very Long Baseline Interferometry (VLBI), Global Navigational Satellite System (GNSS), and Doppler Orbitography and Radio-positioning Integrated by Satellite (DORIS). These systems are used to track satellites,

[157] Maryland-National Capital Park and Planning Commission. "College Park Dinosaur Tracks." Dinosaur Park (mncppcapps.org). Retrieved May 6, 2021.

measure the Earth's rotation and orientation in space, and establish a global reference point that is used to accurately determine the orbits of satellites and geolocate their Earth observations.

The 50-year history of the site is particularly important in establishing this stable reference that is used to tie together historical and new data sets. The site also hosts several optical telescopes, an X-Ray beam-line, neutron spectroscopy experiments, and several other experimental facilities. A laser communication system is also being installed at the site to communicate with satellites using lasers.

The stability of the site and the quality of the observations are essential to support a wide variety of NASA missions. The remote location of the site was chosen to protect the NASA systems from disturbances and human activities. The very close proximity of the proposed TMF has the potential for severely and negatively impacting the operations of these systems jeopardizing the quality of the measurements on which all satellite missions rely. Specific potential impacts to these systems include:

- Light pollution from artificial lighting at the TMF or any nighttime lighting for construction near GGAO would negatively impact the optical systems including the 1.2-meter telescope, the SLR systems, and several optical astronomical facilities.

- Radio Frequency Interference from Wi-Fi and any other transmitting device that operates in the 2-20GHz range at or near TMF would negatively impact the VLBI observations and in some situations has the potential to damage the sensitive detector in the VLBI antenna.

- Vibration from operational activities or construction at or near the TMF would negatively impact nearly all the systems operating at GGAO.

- The proposed rerouting of the roads near GGAO may negatively impact nearly all the systems operating at GGAO due to increased light pollution and vibration from changes in the traffic patterns. It may also impact the ease and safe access of the site to large trucks due to the limited number of other large truck-friendly roads leading to the site.

- Significant EMF from the TMF or the SCMagLev system may negatively impact the sensitive equipment used for many of the systems at GGAO."[158]

XX. Greenbelt Former Landfill Excavation and Disposal

"The DEIS does not show awareness of, and does not consider impacts related to the former landfill site in Greenbelt, Maryland. The J1 Alternative would take land which is currently Northway Fields, also known as the James N. Wolfe Athletic Fields. These were the former site of a sanitary landfill. Surrounding areas also appear to have been a dumpsite in earlier times, including what are now woods in the Greenbelt City Forest Preserve (portions of which would also be taken for the SCMagLev J1 alternative). Old barrels, appliances and other materials are visible in the woods and around the edge of

[158] SCMAGLEV Alternatives Report. Appendix F. "Agency Comments on the August 2018 Draft SCMAGLEV Alternatives Report." Comment 12A. Page 12.

the embankment of the athletic fields. This is the area where the SCMagLev would transition from tunnel to the surface, so a substantial portion of the old landfill would have to be excavated and the material safely disposed of. The DEIS does not provide any specific plans regarding transport and disposal of excavated material, making it impossible to understand or assess what impacts there might be from truck traffic, exposure to toxic waste, or other impacts."[159]

The DEIS is deficient because it does not provide answers to the following questions:

- What contaminants are found in the sanitary landfill?
- How will the contaminated soil be moved and treated?
- How and where will the extract contaminates be disposed of?
- How and where will the treated soil be disposed of?
- How will workers, residents, anyone nearby, and wildlife be protected from the contaminated soil and the contaminates?

Requests:

- The FRA must conduct an independent evaluation of the proposed tunneled areas to determine the level and type of contaminates present.
- The FRA must present the process or processes to be employed to decontaminate the soil removed during the boring process.
- The FRA must present a detailed process on how water used during and as a result of the boring process will be tested for contaminates and, if found to be contaminated, what process or processes will be used to decontaminate the water.
- The FRA must present a detailed plan on how and where the extracted contaminates will be disposed of in an environmentally safe manner.
- The FRA must commit to sharing the results of these studies with the public and provide sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

XXI. The DEIS Fails to Adequately Present Data on the Safety of the SCMagLev Vehicles and Infrastructure.

Safety should be the highest priority when considering whether to approve the construction and operation of a new transportation system, especially one currently in development and not yet in commercial operation.

The need for safety and crashworthiness assessment of the SCMagLev based on American standards was made apparent from the example of the German government and their certification that their maglev train was safe. Then, on September 22, 2006, twenty-three people (constituting 70 percent of the passengers riding in the lightly-loaded maglev train) were killed at Lathen, Germany, in a crash the promoters of that system declared could not happen. (See photos in this Section.)

[159] Bruns, Bryan. DEIS Comment Form on Baltimore Washington SC Maglev Project. March 19, 2021.

We hear the same assurances from the promoters of the SCMagLev. However, to avoid an incident resulting in the death of a trainload of passengers, the safety and crashworthiness of any train system, including the SCMagLev, requires independent U.S. Department of Transportation (USDOT) assessment to assure the safety of the passengers, employees, and public. As a ground-based transportation system, the SCMagLev should not be exempt from the same evaluation and testing as required of Amtrak and any other passenger rail system. The FRA needs to develop Rules of Particular Applicability (RPAs), employing the Rail Safety Advisory Committee (RSAC) process, to fully assess all safety aspects of the SCMagLev and its supporting structures and systems. This includes, but is not limited to, the safety of the vehicles, guideway, guideway switches, elevated structures, operating system(s), train management system(s), safety system(s), and operating practices of the SCMagLev. The FRA needs to complete an independent assessment of the electromagnetic radiation danger (discussed in Section 5 of this commenting document) and what measures are needed to assure that people and wildlife are protected from exposure to the strong electromagnetic fields required to levitate and propel the multi-ton SCMagLev, and that the protection measures employed are adequate and robust.

While TNEM, BWRR, and their surrogates echo that the SCMagLev is safe. It is important to understand that the Japanese government and the Central Japan Railroad Company (JRC) have a huge financial stake in bringing their system to the United States. If successful, it will mean a sizable profit for both. If TNEM builds the SCMagLev and puts it into operation, their investors will make a sizeable profit.

A full series of FRA safety and crashworthiness evaluations and assessments of the SCMagLev could lead to their choice of the No Build option. Construction of any part of the SCMagLev should not be permitted to begin until the FRA has fully evaluated the SCMagLev and its systems based on American standards. With independent analyses and evaluations completed and reviewed, the FRA would have sufficient information on which to base their decision to build or not. The SCMagLev DEIS fails to provide this critical, independently verified information and is therefore deficient. As such, without additional information, the FRA should choose the No Build option.

XXII. Safety

1. **The Need for Rules of Particular Applicability**
   Rules of Particular Applicability for safety need to be completed before the Final Environmental Impact Statement (FEIS) is approved and a ROD issued. Besides being common sense, this order of priorities to put safety first as called out in the U.S. Department of Transportation's "Pathways to the Future of Transportation."[160] The RPAs need to be developed by the FRA through a public comment process (preferably including a Railroad Safety Advisory Committee (RSAC) with representatives of stakeholder groups) for the vehicles, the guideways (including switches), the bridges, the operating systems, operating practices, and limits on (and shielding from) electromagnetic radiation.

   The DEIS is deficient because it fails to address the following question:

[160] "Pathways to the Future of Transportation." Page 3. U.S. Department of Transportation. July 2020. www.transportation.gov/policy-initiatives/nett/pathways-future-transportation.

- What RPAs need to be developed to assure U.S. maglev safety standards corresponding to those currently applied to U.S. rail systems and equipment, including to maximize SCMagLev's passenger safety and survival in a crash?

2. Structural Safety

There are serious concerns about the vehicle structural safety standards for the SCMagLev. Passenger crashworthiness standards for the safety of passengers need to be developed and applied to the SCMagLev in the same manner as those for U.S. steel-wheel railcars and equipment.

Photo of the September 22, 2006, German Transrapid International maglev crash in Lathen, Germany.

The existing FRA vehicle strength standards in 49CFR part 238. Regulation 238.703, for instance, requires a basic vehicle compressive strength. There are many additional requirements relevant to the SCMagLev that should be assessed prior to any ROD.

Photo of the September 22, 2006, German Transrapid International maglev crash in Lathen, Germany.

The DEIS lacks adequate research and safety reports. Japanese safety experience with high-speed steel-wheel rail trains since 1964 does not transfer to the SCMagLev technology any more than German high-speed wheel-rail (ICE) technology did to its maglev. In the German example, the accident in Lathen occurred after the safety of the system had been certified by the German government. A similar accident could possibly occur should the SCMagLev be allowed to proceed without the proper independent assessment with American safety standards.

By comparison, the SCMagLev technology is currently being tested on a 26-mile track in rural Japan, mostly in tunnels, a ***vastly different*** environment than the high-frequency service (above and underground) planned for the densely populated Baltimore-Washington region.

The DEIS is deficient because it fails to address the following questions:

- What RPAs need to be developed to assure the SCMagLev meets the crashworthiness standards required of other U.S. passenger rail systems to assure passenger survivability in case of a crash?
- To echo statements that an accident could not happen ignores real-world experience. The proposed SCMagLev will be in full commercial operation from Baltimore to Washington, D.C., not running on a test and development track. Are there safety assessments, evaluations, and data, and descriptions of the methodology employed to acquire this information?

- If such research exists, who conducted the research?
- Can we be assured any such research was independently compiled, or is there an appearance of bias and influence?

3. Crashworthiness Standards

Promoters of the SCMagLev might argue that present crashworthiness standards for wheel-rail passenger vehicles were needed because freight trains and commuter trainsets are operating on the same rail systems, whereas the SCMagLev is a dedicated passenger system and such safety measures are not required. However, the response to this argument would be that there is a long list of different and additional reasons the required compressive strength for SCMagLev vehicles should be at least as high or even higher than those for Amtrak trains.

The SCMagLev will be confined within the sidewalls of the guideway. In any collision with objects in the guideway resulting in a damaged guideway, a misaligned switch, or the need for maintenance or emergency equipment, for example, the SCMagLev has no other alternative than to absorb energy. Steel-wheeled trains absorb/dissipate the energy of a crash by jackknifing, plowing ground, and so forth. In the case of the SCMagLev, the entire energy of the crash must be absorbed by the crushing of vehicles and/or them buckling in a vertical direction, which could lead to the vehicle becoming airborne and leaving the guideway. Accidents involving trailing point moves through the straight side of switches in case of a switch misalignment or switch signal malfunction are another reason vehicle strength safety regulations should not be relaxed or allowed to be less safe simply because the train is maglev.

Again, the maglev crash in Lathen, Germany, occurred on an elevated guideway of their “dedicated” system. If anything, such crashworthiness assessments of the SCMagLev are far more critical when considering the speed at which the trainset will be traveling. It should be noted that just prior to the accident at Lathen, the train operator saw the obstruction and attempted to stop. The accident occurred as the maglev was slowing down; however, as you can see from the photos, the front of the trainset was virtually disintegrated.

Another argument sometimes heard against the need for maglev crashworthiness standards is that no one is going to survive a collision travelling at 300 or more mph no matter the vehicle strength. While this could be debated, even if true, there are potential accidents that could happen at lower speeds. As noted earlier, the operator of the maglev at Lathen, Germany, had slowed the speed of the train set to 106 mph before the impact with the object on the guideway. If the vehicle had been built to accepted railway crashworthiness standards, there would likely have been many more survivors.

In 2007, Kemp and Smith detailed the arguments for crashworthiness in maglev vehicles. In referring to the German “Transrapid” maglev, they state: “The Transrapid policy is that vehicles do not need inherent crashworthiness as they will be under close computer control and thus will not crash. The

Lathen accident (which killed 23 people on September 22, 2006) reinforces the fact that, even if there are rigorous procedures to prevent an accident, they are never foolproof." [161]

The DEIS is deficient as it fails to address the following questions:

- How would the control system(s) prevent a crash?
- How have the control systems been tested to assure they will not allow a crash?
- If tested, how independent was the testing organization?
- What are the maintenance requirements and associated costs to maintain the control and related safety systems?
- Given the current unsubstantiated claims of the SCMagLev promoters, would SCMagLev and the passengers riding on the SCMagLev fare any better than the passengers who were killed or injured riding the German maglev?
- Were crash tests conducted on the SCMagLev train designs?
- If so, what kind of tests were conducted?
- What were the results and findings of these tests?
- How independent were the organizations that conducted these tests?
- Will JRC provide equipment that can be crashworthiness tested in the United States at the FRA's Transportation Technology Center (TTC) in Pueblo, Colorado?
- What testing will be needed to assure SCMagLev safety levels are comparable with safety assurances that resulted from testing Amtrak's Acela at the High-Speed Ground Test Center prior to the Acela being approved for revenue service in 2000 and the current testing of the next generation Acela?
- What is the schedule for such testing?
- What is the cost for such testing?
- Who will pay for such testing?

The DEIS is deficient as it:

- Does NOT include or provide accessible references to the SCMagLev safety research and findings to substantiate claims that the SCMagLev is safe.
- Does NOT provide the research on and describe results of system-wide tests (the Yamanashi test track, not predecessors, unless relevant), including the results from performance, identified problems, and solutions.

Required:
Before any ROD, TNEM and JRC must provide the research and results of system-wide tests (Yamanashi test track, not predecessors, unless relevant), including the results from performance, identified problems, and solutions tested and implemented, and the retest of the modifications/enhancements.

4. SCMagLev Operation and U.S. Safety Standards

[161] Kemp, R. and R. Smith. "Technical issues raised by the proposal to introduce a 500 kph magnetically-levitated transport system in the UK." [Note: 500 kph = 311 mph.] Imperial College - London, Lancaster University. June 17, 2007. https://trid.trb.org/view.aspx?id=855679.

If the FRA finds the crashworthiness of the SCMagLev to be insufficient, and the redesigned SCMagLev weight is increased to meet U.S. safety standards, the question arises whether the technology can still operate with the acceptable crashworthiness design? If the crashworthy SCMagLev design that meets crashworthiness and occupant protection standards cannot be supported by the technology, this would be a **fatal flaw in the project**. The Japanese, as the Germans before them, appear to be refusing to provide vehicle compressive strengths. The present course of action appears to be an all-out effort by the promoters to gain project approval before FRA vehicle safety regulations for the SCMagLev are established. This effort is in direct violation of the order of priorities to put safety first as presented in the USDOT "Pathways to the Future of Transportation."[162]

The FRA should:
Not allow the project to start until RPAs are established and the SCMagLev designs, structures, and systems are thoroughly and independently assessed and evaluated.

5. Guideway Hardware Fixation Standards

There are concerns regarding the fixation of hardware on the inner vertical surfaces of the SCMagLev guideway. If such fixtures become loose, they could jam between the vehicle and the side of the guideway, with consequences that would likely compromise the integrity of the passenger compartment at high speed or bring the train to a high G-force stop, with high heat or even fire generated by the friction involved between the contacting components. Thus, there is a need for an RPA regarding this feature of the guideway. An RPA would also be needed for the components on the sides of the vehicle that interact with the guideway.

The DEIS is deficient as it fails to address the following questions:

- What are the construction standards being used to build the SCMagLev, guideways, and support systems?
- How do these compare with American building standards?
- What are the applicable FRA standards and/or how are they being developed and applied?

[162] "Pathways to the Future of Transportation." Page 3. U.S. Department of Transportation. July 2020. www.transportation.gov/policy-initiatives/nett/pathways-future-transportation.

XXIII. The DEIS Fails to Adequately Present Information on the Generation, Storage, and Procedures Needed for the Safe Handling of Liquid Helium.

As presented and discussed by Kowalski, complex refrigeration systems are needed to liquefy and store liquid helium (*He*) at -452°F[163], however, the DEIS Figures and discussion in the DEIS Section 3 do not show any such systems at the Train Maintenance Facility (TMF). In the DEIS Section 3.3.2.6 Power Facilities, it states that liquid *He* (hereafter *LHe*) "would be supplied in sealed, temperature-controlled containers that would be transported to the SCMagLev project and stored in the TMF,"[164] but there is no other discussion of *LHe* in the DEIS. Nevertheless, according to the DEIS Appendix D.11 references, it is apparent each superconducting (SC) magnet bogie must have its own refrigeration system.[165]

1. **Local Helium Supply Capacity Implications**
   There are many local commercial *LHe* suppliers. Deliveries are usually done by truck to a variety of customers (e.g., scientific use and medical magnetic resonance imaging (MRI), etc.).

   The DEIS is deficient as it fails to address the following question:
   - Do local suppliers have sufficient capacity to provide the required *LHe* and still meet obligations to other customers?

2. **SCMagLev Magnet and Coil Helium Filling Procedure**
   The magnet refrigeration systems have *LHe* storage tanks containing superinsulation and liquid Nitrogen (LN_2) used to prevent the rapid warming and boil-off to gas that would otherwise occur if *LHe* was exposed directly to room temperature.

   The DEIS is deficient as it fails to address the following question:
   - Do the SC magnets and SC coils arrive at the TMF prefilled with *LHe*?

3. **Loss of Power for Refrigeration Units and Loss of Helium Issue**
   These refrigeration systems (often called cryogenic) are a closed-loop system that must be continually supplied with electricity; otherwise, enough heat from the ambient environment would eventually conduct inward to boil the LN_2 and then the *LHe*. Reliquefying the entire contents of a storage tank that has gone completely gaseous is energy intensive and, depending on the system's structure and capabilities, it may not be possible without removing the gas to a separate facility.

   The DEIS is deficient as it fails to address the following questions:
   - Can the planned *LHe* storage reliquefy the contents of the storage tank(s) or will the gaseous *He* need to be pulled off and reliquefied at another facility?
   - How long can a refrigeration unit remain without power and still be able to maintain the *LHe*?

[163] Appendix - Reprint: Kowalski, M. "SCMaglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021.
[164] DEIS Section 3.3.2.6 Power Facilities, page 3-33.
[165] DEIS Appendix D.11, page 10.

- While the refrigeration systems are closed-loop (sealed) systems, small amounts of gas boiled off from residual heat can escape the system. How often do the *LHe* systems have to be "topped off"?

4. Cost of Helium for a Cryogenic System

As discussed in Helmenstine[166] and in Kramer,[167] *He* gas is perhaps the most non-renewal of all non-renewable materials, and alternatives for achieving low temperatures are both still in development and more expensive. While *He* is the second-most abundant element in the universe it is relatively rare on planet Earth. Even worse is *He* gas is so light that when released to the atmosphere it floats to the top and eventually leaves planet Earth. Moreover, the *He* atom also diffuses through many materials, such as the rubber/plastic of a birthday balloon. So, every *He* birthday balloon that has ever been inflated is contributing to the irretrievable loss of *He* from the planet. About 10 percent of current *He* gas usage is in balloons.

He gas is a byproduct of natural gas mining but only a few mines produce it. The United States is fortunate to have good mining capacity and to have built a strategic government reserve in the early 20th century. Unfortunately, the government reserve is being privatized, which has produced extraordinary volatility in the price of *He* gas. Of course, *LHe* includes both the cost of the gas and the sizeable cost-per-unit-volume of liquefying the gas. With COVID-19 temporarily reducing the demand for birthday balloons, the price of *LHe* has temporarily stabilized to about $20/liter. Unless new sources external to the United States can make up the difference, the price is expected to rise rapidly after the pandemic. Proven reserves suggest that the world supply of *He* might last from 25 to 200 years at present consumption rates, perhaps less if large SCMagLev systems become common.

The DEIS is deficient as it fails to address the following questions:

- How much *LHe* is used in each SC magnet and each SC coil refrigeration system?
- How much total *LHe* is used by each train?
- Given the total number of trains in use and the expected replenishment rate, how much *LHe* is needed yearly for operations?

5. Alternative Cooling Agents

As noted in Section 6 of this commenting submission, the technology to use supercooled materials to produce superconducting magnets was first introduced by James Powell and Gordon Danby at the U.S. Department of Energy (DOE) Brookhaven Nation Laboratory in the 1960s. SCMagLev technology is based on their work and patents. There have been significant advances in superconducting materials research over the past 60 years. So-called "high temperature" superconducting materials that require refrigeration—but NOT to the low temperatures required for *LHe* or even LN_2—are in development at the DOE National Laboratories and other facilities. One favored material is Bi2Sr2CaCu2O8+δ. There are many technical hurdles, but research continues and great strides have been made.

[166] Helmenstine, A. "Will We Run out of Helium?" ThoughtCo. January 28, 2021. www.thoughtco.com/will-we-run-out-of-helium-3975959.
[167] Kramer, D. "Helium Users are at the mercy of suppliers." *Physics Today* 72:4, 26. 2019. https://doi.org/10.1063/PT.3.4181.

The DEIS is deficient as it fails to address the following questions:

- Are alternative superconductors being considered?
- Can the proposed 60-year-old SCMagLev superconducting technology be retrofitted with high temperature superconductors in the future?
- If not, what is the alternative? It would be a serious problem if the system became obsolete shortly after construction was completed.

6. Alternative DEIS Incorrect Referencing

In the DEIS Section D.11.1.5.3,[168] the text appears to misquote reference 33 (Ohsake, H.). The text reads: "a 16-car SCMagLev train would be comprised of 34 total superconducting magnets and 136 superconducting coils. The magnets use Bi2223 superconducting wires, each with a maximum flux density of 5.2 T." The numbers of magnets and coils are taken from slides 8 and 9 of that reference, but in that case the superconducting wire is Nb/Ti, which requires *LHe* cooling. Bi2223 is discussed in slides 16-20 of the reference, but (a) the "wires" are actually implanted in a resin and (b) there is no need for *LHe* cooling. Since the proponents have indicated on their websites and in the DEIS the need for *LHe*,[169] we conclude this is a misquotation—one, however, that does not affect the argument in this section, which is that the only operative number is the maximum flux density of approximately 5 T. It is assumed that that Nb/Ti wires and *LHe* cooling are being used.

XXIV. The DEIS Fails to Adequately Present Information on the Emergency Procedures to Address Cryogenic Storage or Systems Failure.

There are standard Materials Data Safety Sheets (MSDS) with routine safety procedures for handling *LHe* and LN_2 cryogens and transferring these liquids into storage tanks. However, there are at least two critical safety issues the DEIS fails to address.

1. Cryogenic Storage Tank Rupture

The first concerns rupture of storage tanks from, for example, physical damage caused by incidents, whether accidental (e.g., train wreck) or intentional (e.g., vandalism or terrorist attack). *LHe* boils to gas explosively on contact with normal air temperature when storage units are ruptured. Thus, there is both a shock hazard AND an asphyxiation hazard as the *He* gas displaces breathable oxygen, the extent of both hazards depending upon the amount of *LHe* in the system being ruptured. There are similar issues for LN_2 in the storage tank insulation jacket. The DEIS Appendix G.6 requires the project to identify hazards and develop safety plans.[170] Note, as presented in the DEIS, that LN_2 is also used for cooling SCMagLev equipment in addition to superconducting magnet refrigeration systems.[171]

[168] DEIS Appendix D.11, page 13.
[169] DEIS Section 3.3.2.6.
[170] DEIS Appendix G.6, Section 4.21, Safety.
[171] DEIS Section 4.18, Table 4.18-3, Broadband Emissions row, page 4.18-9.

The DEIS is deficient as it fails to address the following questions:

- What is the burst pressure of the *LHe* storage tanks?
- What pressure and crashworthiness tests have been made on the *LHe* storage tanks?

2. SCMagLev Magnet Quench

The second critical question involves superconducting magnet "quench." One reference in the DEIS Appendix D.11 describes these magnets as "quench free," but no details are provided.[172] This claim must be verified. If the superconducting magnets reach a temperature greater than the material (Nb/Ti) transition temperature, the material instantly transitions to the normal temperature resistive state, hence losing its functionality. This also releases the tremendous amount of energy stored in the current, which may be sufficient to damage or destroy the magnet and nearby equipment, perhaps including the *LHe* storage tanks, thus causing a secondary explosion.

The DEIS is deficient as it fails to address the following questions:

- What guards are in place to prevent magnet quench, especially during operation of the SCMagLev?
- If such an event occurs during operation at high speed, what procedures are taken by the system to minimize effects and preserve life? The DEIS gives no details beyond a high-level discussion about the command/control system. These operation issues and safety concerns requires greater elaboration in any FEIS.

Note:

The cryogenic safety and emergency procedure needs to be fully addressed and understood to assure the safety of the SCMagLev system, employees and passengers, environment, and potentially affected comminutes before any ROD is made and any construction of the SCMagLev starts.

XXV. The DEIS Fails to Adequately Present Information on the Generation, Transmission, and Full Energy Costs to Build and Operate the SCMagLev.

1. Substation Placement and Cost

On average, a substation is provided every 25 km to perform voltage conversion, and a phase and frequency variable high-power inverter facility that drives the electric cable is arranged. As noted in the work of Santaro: "The initial investment of these substations, inverter equipment, and switching circuits will be enormous and will be costly to maintain.[173]

[172] DEIS Appendix D.11, Section D.11.1.5.1, Reference 24, page 10.
[173] Santaro, Joe. "Linear Force #3: linear motor control and operating number constraints." 2019-02-06. Retrieved 2021-02-10. リニアの強引無理ニア #3：リニアモーター制御と運転本数の制約 https://joe3taro.com/?p=2483.

2. Wind Power

BWRR has an ambitious plan to power the SCMagLev by developing, in partnership with an experienced affiliate, approximately thirteen wind-powered electric stations in western Maryland.[174] Existing transmission grids would be used to deliver power, and the total output would be 905 MW. None of these systems has been built yet. However, since they are small (70 MW) the approval process to obtain a Certificate of Public Convenience and Necessity (CPCN) exemption is not complex, although public hearings are still required. The likelihood of final approval for this auxiliary wind power is not clear, but the question has little relevance as energy generation is not the driving constraint. The energy from the wind farms could be used to reduce fossil fuel needs even if the SCMagLev is not built.[175]

3. Energy Consumption

Each train requires 35 MW during acceleration, which is 0.02 percent of the PJM generating capacity.[176] Since eight (8) trains during peak periods are only 0.16 percent, it appears that existing generation resources are likely sufficient to meet the SCMagLev need even without resorting to additional wind power. The estimated total of 4 trillion MMBtus/year would represent an increase of 3.3-3.4 trillion MMBtu/year over existing consumption in transportation after subtracting the expected decrease in auto traffic. This is about 3 percent of the yearly energy requirements for the combined Baltimore-Washington area, as noted in the DEIS,[177] a sizeable fraction for a single user, which should therefore be viewed with concern.

The DEIS is deficient as it fails to address the following questions:

- In times near peak loads who gets priority?
- As electric cars use becomes more prevalent or even dominant, the SCMagLev will be competing with their demands for the same resources, making it certain that demand could not be met with current transmission grids, capacity, and perhaps even electrical energy generation.[178]
- What are the costs electricity generation companies, and their customers, will bare to upgrade generation capacity and transmission capacity, relate to powering the SCMagLev?

4. Transmission Capacity

The *critical* constraint is not electricity generation, rather transmission capacity, which is congested in the Baltimore-Washington area. With multiple SCMagLev trainsets needing power rapidly, the energy needs are complex, as cited in the DEIS, especially at peak periods, which overlap the PJM peak demands from other customers. [179] The question turns to the transmission capability for the seven (7) proposed substations (and another depending on the choice of TMF), as outlined in the DEIS.[180] None of these issues are presented or discussed in the DEIS.[181]

[174] DEIS Appendix G10, pages 6-27.
[175] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 38.
[176] Pennsylvania-New Jersey-Maryland Interconnection.
[177] DEIS Section 4.19-2, Table 4.19-2, page 4.19-4.
[178] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 38-39.
[179] DEIS Section 4.19.3.2, Figure 4.19-5, page 4.19-13.
[180] DEIS, Section 3.3.2.6, pages 3-34.
[181] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 39.

The DEIS is deficient as it fails to address the following questions:

- What is the expected transmission (kW) time profile at each of the seven (7) proposed substations?
- What is the maximum transmission (kW) capability for each of the seven (7) proposed substations?
- What is the switching time required at each substation to handle additional load?

5. Grid System Upgrades

To accommodate the SCMagLev, PJM would respond to the project sponsor's application for long-term service by initiating a Transmission Feasibility Study (TFS). This might require grid system upgrades to mitigate adverse impacts on regional grid reliability, some parts of which are stressed during peak summer demands. These modifications will require additional expenditures, responsibility, and construction time. Recent events in Texas have highlighted the fundamental, but perhaps little appreciated, importance of grid reliability and its vulnerabilities to weather and other unanticipated events.

The inherent risk that the SCMagLev poses to grid reliability is as yet unknown. It could be unacceptably large and, thus, the project could not be approved before a TFS determines impacts and solutions, if any, and implements the upgrade prior to any consideration by the FRA of building the SCMagLev.

The DEIS is deficient as it fails to address the following questions:

- What is the electrical usage during the maintenance period from 11:00 p.m. to 5:00 a.m. for the following operations?
  - Each ancillary facility (substations, MOW, FA/EE, operations center, signals, and communications)?
  - Train subsystem (e.g., superconducting magnet and superconducting coil refrigeration)?
  - TMF activities?
  - Train transport to/from the TMF?
- For energy usage on less-than-yearly scales, including:
  - What is the SCMagLev daily energy usage (integral under the curve of Figure 4.19-5, added to the usage during the maintenance period)?
  - What is the weekly energy usage (as weekends have reduced train operations)?

6. Grid Isolation

There is no technical detail on how the maglev electricity needs are buffered from the grid. Obviously, surges to other customers must be avoided.

The DEIS is deficient as it fails to address the following questions:

- If, for example, superconducting magnets quench, will power be dumped back onto the grid?
- What level of surge suppression is needed to prevent damage to the grid and to other customers? For example, could solar panels be damaged?

- As noted in the DEIS, in the case of partial power outage, the system is supposed to switch to a different power substation.[182] Could alternate substations handle the added power requirement, especially during peak service? The assurances are not included.

NOTE: Apparent discrepancy in the DEIS:
The DEIS Appendix G.10, page 5, pie chart sum is 186,788 MW installed generation capacity.
The Tables Grand Total is 199,439.5 MW installed capacity (underlined here for emphasis).

- Why this discrepancy?

XXVI. The DEIS Fails to Adequately Provide Information on Several Key Aspects of the SCMagLev Technology, Operations, and Safety Assurance Testing Verification.

1. Super Conducting Technology Heritage

The true heritage of superconducting magnet technology lies not in transportation but in high-energy physics particle colliders. The levitating aspect of the SCMagLev is a new application, but the principles of propulsion and guidance of beams of subatomic particles have long been known to physicists. While dozens of small colliders exist, spread across the world, the current pinnacle of success is the internationally supported European Council for Nuclear Research (CERN) high-energy physics collider in Europe. This system is 27 km in circumference and contains nearly 10,000 state-of-the-art superconducting magnets, which are much larger than those designed for the SCMagLev. These superconducting magnets are maintained by an army of scientists, engineers, and technicians, who are leaders in the field of superconducting technology. While the SCMagLev has much more modest goals, the question of employing staff members with adequate science/engineering expertise is still important.

The DEIS is deficient as it fails to address the following questions:

- How many staff, engineers, and technicians are needed and what are the specific technical skills required to maintain the SCMagLev?
- Where will these skilled employees come from?
- How many positions will be filled by Japanese experts and technicians?

2. Missing Testing and Deviation Safety Studies

Standards applied to testing and deviations from the baseline Yamanashi test track are absent.

The DEIS is deficient as it fails to provide the following information:

- Description of the standards of testing in Japan and comparability to U.S. standards.
- Description of any deviations (e.g., dimensions, materials, usage, and values) between the Japanese system (e.g., superconducting elements, train cars, guideway, and turning radius) and those proposed for the SCMagLev in the United States.

[182] DEIS Section ES.3.1, Table ES3.1-1, page ES-8.

3. Importing the Culture of Safety

The reviewers of the SCMagLev DEIS acknowledge and salute Japanese achievements and the safety record of their wheel-rail trains. However, as noted earlier, that record does not transfer automatically to their own maglev technology or its transference to other cultures. The idea presented by TNEM and BWRR and in the DEIS of "importing the culture" is not guaranteed. Compliance Measures #1 - #5 as presented in the DEIS outline elements of a comprehensive safety program.[183] Training is an essential part of the System Safety Program and Emergency Preparedness Plan if an adequate handoff of experience and understanding is going to be achieved. Compliance Measure #3 - Inspection, Testing, and Maintenance, involves a high-level of technical expertise.

The DEIS is deficient as it fails to provide the following information:

- How long is the training period? The challenges of achieving an experience level equivalent to 50 years should not be underestimated.
- How many JRC representatives will assist in this training, testing, and commissioning?
- How many JRC representatives will remain during operations?
- Will JRC representatives be paid from project funds for training, testing, and commissioning?
- Will JRC be available for consultation after operations commence?
- The top-level schedule presented in the DEIS Appendix G7 shows slightly less than two (2) years of testing and commissioning. [184] New trainees will not have access to a working U.S. system for training before this time. Will U.S. trainees go to Japan to obtain hands-on experience prior to operations?
- What staffing of U.S. professionals with experience in SC technology is required during construction and during operation?

4. Additional Technical Design Concerns

Guideway Barriers

There are no physical barriers in the guideway hardware to prevent the SCMagLev from rising up out of the guideway.

Underside Air Pressure

An object that gets wedged under the front of the vehicle at high speed could lift the nose of the vehicle and subject its underside to **tremendous air pressure**, sending it airborne, *especially if the vehicle is designed to be much lighter than a steel-wheeled rail vehicle*.

Material Deflection

The lower part of the front-end shape of the SCMagLev is **not designed to deflect material**. Its tapered, rounded design makes it more likely that debris could become wedged under or on the sides of the vehicle.

[183] DEIS Section 4.22.5, pages 4.22-19 to 4.22-22.
[184] DEIS Appendix G7, Section 3.1, Figure 2, page 6.

The DEIS is deficient as it fails to provide the following information:

- Description of the aerodynamics of the nose on the end train cars. Does the nose shape produce any Bernoulli effect resulting in aerodynamic lift?
- The rounded nose does not appear to function as a debris plow and could deflect debris downward under the train carriage. What is done to mitigate such damage?
- Deflected debris might damage train car undersides, wheels (if deployed during the impact), and wheel doors when wheels are retracted (perhaps leading to non-deployment when needed).
- The intense magnetic fields will draw ferrous metal debris (e.g., metal food cans) toward the strong fields of the train's superconducting magnets at the precise time the train is moving through the guideway. What is done to mitigate damage?

5. Loss of Phasing with Propulsion Coils

At 300 mph, a train will cover 440 feet in one second. If a switch to an alternate substation takes even 100 msec, the train has moved 44 feet, approximately half a train car length and has thus lost phasing with the propulsion coils.

The DEIS is deficient as it fails to provide the following information:

- How much time does the switch to an alternate substation take?
- Will the train location device be able to find a train that is not where it is expected to be?
- What happens if a total grid collapse occurs?

6. Operational Sensitivity to Guideway Debris

Debris posing a risk may include anything from snow accumulation (no room to move it) to wind-blown debris, a suicidal person, a trapped deer, and any debris thrown into the vehicle path, as has occurred with AMTRAK and MARC trains. For example, on October 1990, a People-Mover train in Detroit was derailed at Cadillac Center station when a sewer gas explosion blew a 200-pound manhole cover onto the aerial guideway structure.[185]

The DEIS is deficient as it fails to provide the following information:

- At 300 mph, how would the train react to a bowling-ball-sized rock launched onto the guideway or a deer that had vaulted over the fence (even for a 10-foot fence, it has happened when a deer has vaulted from a slightly elevated mound)? What tests have been performed to evaluate such an event? Are there reports? If so, where are they?
- High-speed collisions with birds are likely, especially given the proximity to the Patuxent Research Refuge (PRR), thus possibly causing damage to the undercarriage. What tests have been performed to evaluate such an event? Are there reports? If so, where are they?
- Large amounts of autumn leaves and occasionally larger tree branches will be blown into the guideway. What tests have been performed to evaluate such an event? Are there reports? If so, where are they?

[185] Train Pulse for March/April 1991 Volume VII, Number 6, and noted in Allen, Robert and Baldas, Tresa. "People Mover's first fatality is Detroit man, 53" Detroit Free Press. May 16, 2016. https://www.freep.com/story/news/local/michigan/detroit/2016/05/16/police-man-dies-after-being-struck-by-detroit-people-mover/84433236/.

- Given the proximity of the PRR, insect collisions will be common. Most notably, Brood X of the 17-year cicada will emerge in 2021 and again in 2038. It is the largest brood in the United States with densities up to 1.5 million/acre. Cicadas can easily fly to viaduct heights, especially from nearby trees. Their tymbal frequency is 4.3 kHz, but they are attracted to lawnmowers, weed-whackers, leaf blowers, power drills, and anything else that vibrates. Thus, it is very likely that the viaduct would be covered with cicadas in astronomical numbers, perhaps curtailing operations. They are most active during the day and their lifecycle is 4-6 weeks. What tests have been performed to evaluate such an event? Are there reports? If so, where are they?
- Could the rubber wheel systems be damaged, making deployment impossible for one or more cars? What tests have been performed to evaluate such an event? Are there reports? If so, where are they?
- How would train cars react if one or more wheels were damaged or did not deploy? What tests have been performed to evaluate such an event? Are there reports? If so, where are they?

The DEIS does not describe the snow/ice removal process in detail. Obviously, snow events can occur during operations. The Northeast Maglev website suggests that hoods and a warm-water sprinkler system might be used.[186]

The DEIS is deficient as it fails to provide the following information:

- How does such a system drain to stormwater to prevent refreezing hazards elsewhere?
- How much power is required to de-ice the entire viaduct portion of the guideway?
- How much water is used?
- What are the systems to be used to contain the contaminated water from running into the surrounding environment and affecting downstream ecology and environments?
- What are the snowfall precipitation limits beyond which the system cannot be maintained in a de-iced condition?
- Partial icing of the guideway coils may change their di-electric properties. What are the consequences for the propulsion, guidance, and alignment systems?
- What water-ion content is required (tap water or distilled water)?

7. Grade Changes and Safety/Comfort

In the DEIS Appendix G, Part E, on page 55, the viaduct elevation plan drawing shows change in grade from 2.43 percent at STA 122+800 to - 0.51 percent at STA 123+800.

The DEIS is deficient as it fails to provide the following information:

- A system may be safe but still provide an uncomfortable ride. What are the G-forces to which the passengers will be subjected?
- What are the 3-axis (pitch, yaw, roll) accelerometer spectrum research and findings?
- Are these results safe for people with medical conditions (e.g., heart problems, vertigo, etc.)? Are there studies and what are the results?
- How do the planned Baltimore-Washington SCMagLev grades and G-forces compare with those in the Yamanashi test tract?

[186] Northeast Maglev. “Technology.” FAQ - Common Questions. 2021. https://northeastmaglev.com/faq/#Technology.

- In an emergency, will passenger restraints be available, such as seat/lap/shoulder belts?
- If conducted, were these research studies/assessments conducted by JRC or an independent entity?

The FRA should independently assess these issues prior to issuing any ROD.

8. Driverless Train

Intended operation without a driver on the train raises many safety issues. This will be the first time the FRA is being asked to approve a passenger train operation without a human driver (engineer) on each train. Cybersecurity is an issue that needs to be addressed for such a system.

The DEIS is deficient as it fails to provide the following information:

- What are the guidelines the FRA will implement to review and approve this driverless, high-speed train?
- What precautions will exist to prevent a cyberattack that takes control of the SCMagLev?
- What independent agency(ies) or federal-government-approved agency(ies) will assess and evaluate the safeguards in place to defend against a cyberattack? How will this cyberattack defense be maintained and independently evaluated? What happens if TNEM fails the cyber security review?

The DEIS Section 4 mentions the presence of an on-board crew, with SCMagLev drivers/engineers not included (as mentioned above).[187]

The DEIS is deficient as it fails to provide the following information:

- How many individuals per train?
- What are their functions?
- Where are they located?
- Is passage between cars possible to provide first aid?

9. Electromagnetic Radiation

The intensity of the electromagnetic radiation from the SCMagLev train varies in complicated patterns *with unknown effects on human (and wildlife) health from long-term exposure*. The SCMagLev generates a higher level of electromagnetic radiation than the German maglev. The DEIS relies on data provided by JRC to determine whether the project meets International Commission on Non-Ionizing Radiation Protection guidelines for limiting exposure to electromagnetic fields (EMFs).

The *Final Alternatives Report* states there would be a ". . . need to maintain a minimum distance of 20-feet below the magnets along the guideway and people traversing below."[188] Radiation emitted from the SCMagLev is so strong that *people will not be allowed to be closer than 20 feet* from the guideway when underneath it.

[187] DEIS Section 4. page 4.22-16.
[188] "SCMagLev Final Alternatives Report." Page 42. November 2018. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf.

No mention is made in the DEIS of this 20-foot figure. It is noteworthy that the DEIS states the electromagnetic radiation from the SCMagLev may limit the range of cell phones, interfere with self-driving cars, and cause shocks to people from metal buildings.[189] The DEIS also says the SCMagLev electromagnetic radiation can affect heart rhythms in certain cardiac pacemakers.[190]

The DEIS is deficient as it fails to provide the following information:

- If the electromagnetic radiation is safe, why is so much shielding needed at stations, as shown in the DEIS Figure 4.18-1? This implies high levels of radiation emitting from the source. What are these levels, which could affect wildlife during normal operation, as well as bystanders, if something causes a gap in the shielding?
- As the electromagnetic radiation levels associated with the operation of the SCMagLev are much higher than those generated by the German Transrapid maglev, is the 20-foot "Avoidance Zone" sufficient?
- Also noted in the *Final Alternatives Report* are explanations of how passengers will walk under the guideway in tunnel sections during emergency tunnel egress (page 10; also see Figure B-3).[191]
- How would the passengers be shielded from the SCMagLev's electromagnetic radiation, considering that the distance below the guideway is less than 20 feet? The same applies to concourses under the guideway at stations (as shown in Figure B-2).[192]
- How would safety from electromagnetic radiation be assured for employees inspecting the bogies? As Joe and Santaro note:

  > ". . . even when the SCMagLev returns to the depot on a daily basis, the superconducting magnetic (SCM) keeps the magnetic field of about 1T (Tesla) and keeps the refrigerator running. Both "degaussing" (zeroing the superconducting current to eliminate the magnetic field) and "exciting" (returning the superconducting current) require labor, time, and energy . . . The mechanic should not approach the dolly unless it is degaussed. If you inadvertently wear magnetic metal, it will be attracted to the magnet . . . The strong magnetic field of SCM is a serious obstacle to the inspection and maintenance work around the dolly. That's why "automatic inspection" is necessary, but is it developed so that it can be inspected properly? You won't be able to find the problem just by checking the camera image. JR Tokai should disclose the technical information of inspection and maintenance to show the certainty of inspection, but no material can be found. It's too late to say "I couldn't do an automatic inspection because it was unexpected" after the accident."[193]

A more in-depth discussion about EMFs and the impacts on human and wildlife is presented in Section 5 - Community Impact of this commenting document.

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[189] DEIS Table 4.18-3, page 4.18-9.
[190] DEIS Appendix D11, page 15.
[191] "SCMagLev Final Alternatives Report." Pages 10 and 91. November 2018. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf.
[192] Ibid. Page 87.
[193] Santaro, Joe. "Linear forcible near # 2: There are 4 types of wheels even though they are floating! ??" リニアの強引無理ニア #2：浮上なのに車輪が4種類！？ https://joe3taro.com/?p=2212.

10. Electromagnetic Interference by the SCMagLev

Electromagnetic interference (EMI) can be described as ". . . a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction. The disturbance may degrade the performance of the circuit or even stop it from functioning. In the case of a data path, these effects can range from an increase in error rate to a total loss of the data."[194] And as Mathur and Raman noted: "EMI leads to the obstruction or degradation of the performance of any electrical equipment by inducing unwanted currents and voltages in its circuitry."[195]

The first potential source of EMI interference involves cars traversing entrance/exit ramps under the viaduct. For the J-alignment, cars on the northbound Baltimore-Washington (BW) Parkway exit ramp to MD197 are traveling approximately 14 meters under the viaduct for a distance of 334 meters (1,102 feet). If one includes all three (3) segments (directly under, just east, and directly under the viaduct) of that exit ramp, the distance is 609 meters (2,010 feet). For an exit speed of 30 mph, the car transits in 25 or 46 seconds for the two choices, respectively. However, an SCMagLev train of a length of 396 meters (1,300 feet)[196] and moving at 500 km/hour (300 mph) will completely traverse its own length over a car in approximately three (3) seconds. This traverse event where cars are under or near the viaduct for the entire duration of the train passage will be quite common, especially at rush morning and evening hours.

11. Vehicle System Susceptibility to Magnet Fields

Any vehicle (e.g., cars, trucks, and motorcycles) systems susceptible to a magnet field varying at 8 Hz may be threatened. As the majority of vehicles on the road today contain digital circuitry, EMI interference is a concern. As cited in the "SCMagLev Final Alternatives Report" a minimum safe distance from the viaduct is 20 feet[197] for humans, and while there are discussions about interference to sensitive receivers, there is no discussion about vehicles passing under or near the operating SCMagLev.

According to the DEIS Table D.11-6, the measured electromagnetic field strength 7.5 meters from the Yamanashi train was 2,680 mG. [198] Applying the inverse square law for the 14-meter distance of the vehicle, this electromagnetic field strength is reduced to 769 mG at the vehicle on the roadway, a value that is 128 times larger than that of the vehicle itself (6 mG), as cited in the DEIS Table D.11-7.[199] A second measurement of 200 mG in the DEIS Table D.11-8 at 6.7 feet horizontal, 26 feet vertical distance is reduced to 81 mG at the car, still a factor of 13 greater than the vehicle itself.[200]

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[194] "Electromagnetic Interference." Wikipedia. December 22, 2020. https://en.wikipedia.org/wiki/Electromagnetic_interference.
[195] Mathur, Phalguni, and Sujith Raman. Electromagnetic Interference (EMI): Measurement and Reduction Techniques." *Journal of Electronic Materials*, Volume 49:5, page 2976. 2020. https://link.springer.com/content/pdf/10.1007/s11664-020-07979-1.pdf.
[196] DEIS Appendix G4, Table 4.1, page 4.
[197] "SCMagLev Final Alternatives Report." November 2018. Page 42. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf.
[198] DEIS Appendix D.11, Section D.11.1.5.1, Table D.11-6, page 11.
[199] Ibid.
[200] DEIS Appendix D.11, Section D.11.1.5.1, Table D.11-8, page 12.

While these values are comparable to or less than that of the Earth's natural background magnetic field of 470 mG, it is their time-varying nature (8 Hz) that makes them a potential threat.

One such car system is the anti-lock braking, which has a magnetic Hall-effect sensor in each wheel and triggers braking at 15 Hz, close to the 2nd harmonic of 8 Hz. "An anti-lock braking system (ABS) sensor is used for determining wheel rotation speed to prevent wheel lock up when braking. The Hall effect ABS sensor consists of a permanent magnet with a Hall effect sensor next to it. The magnetic field strength changes when a magnetism sensitive object passes through the magnetic field of the magnet. This changing of the magnetic field causes the output of the Hall effect sensor to change."[201] In most cases, the object used to influence the magnetic field is a disk or ring with evenly distributed teeth, mounted on the driveshaft or in the bearing. When the wheel is rotating, the teeth are passing the sensor and the pattern in which they are placed is visible in the ABS sensor signal. Each period of the signal is a tooth passing the sensor. The frequency of the signal depends on the rotation speed of the wheel and the number of teeth on the disk or ring. The danger is with SCMagLev electromagnetic field strength in the range 81-769 mG there is a probability of the SCMagLev passage causing a malfunction of the anti-locking braking system.

While the Doppler of the approaching SCMagLev trains will increase the fundamental frequency (and decrease it for receding trains), the shift is infinitesimal for electromagnetic radiation, even at the maximum train velocity. Roadways directly under the viaduct are prime areas for ice to collect in cold weather, with water dripping off the viaduct and the roadways shaded by the viaduct structure, making it critical to have properly functioning anti-lock brakes. The Northeast Maglev website's suggested use of warm water to remove snow and ice[202] from the guideway might lead to extremely hazardous conditions on roadways beneath if the water is not properly channeled to drainage systems as part of the stormwater removal process.

For the J-1 alignment, similar arguments hold for the approximate 590-meter (1,947-foot) stretch of the southbound BW Parkway and for the 459-meter (1,515-foot) southbound MD197 entrance ramp to the BW Parkway.

There may be other vehicle systems susceptible to EMI from the SCMagLev. Using databases of materials, equipment, and designs from vehicle manufacturers, a thorough investigation involving theory, modeling, and testing should be made of all car systems operating at or near 8 Hz and the 8 Hz harmonics.

12. Line of Sight Interference Ignored

According to the DEIS Appendix D.11.1.6.2: "No impact would be expected, as the SCMagLev project would operate on different frequency bands. The FCC allocates different bands of the electromagnetic spectrum for different uses where cellular phones, radio control equipment and other communication devices have dedicated bands so EMI cannot occur."[203] While the premise

[201] "Measuring a Hall Effect ABS Sensor." TiePie. www.tiepie-automotive.com/en/articles/abs-sensor-hall#:~:text=An%20anti%20lock%20braking%20system%20%28ABS%29%20sensor%20is,output%20of%20the%20Hall%20effect%20sensor%20to%20change.
[202] Northeast Maglev. "Technology" FAQ - Common Questions." 2021. https://northeastmaglev.com/faq/#Technology.
[203] DEIS Appendix D.11, pages 14-15.

presented in the DEIS is correct, the conclusion ignores another class of problems, namely that of line-of-sight interference.

The elevated viaduct is a large, dense structure (filled with grounded rebar). It has large currents flowing for propulsion, levitation, and guidance, and its coils are likely surrounded with grounds. Thus, it has the potential to block direct line-of-sight signals from television transmission towers, cellphone towers, and direct satellite transmission. These signals have much higher frequency than 8 Hz and, thus, have much lower acceptance angles for reception.

For the South Laurel communities, lines of sight from rooftop antennae to both Washington and Baltimore television transmission towers would cross the viaduct and, depending on elevation transmissions, may well be degraded or blocked. A sizeable number of active television antennae have been installed in these communities, as cable providers have lost their popularity with their increasing costs and the availability of improved digital antennae. Moreover, lines-of-sight signals to and from the Crystal plaza cellphone tower may also be degraded or blocked.

Homes close to the viaduct on its north side (e.g., in Montpelier Hills, Maryland City, and Russet) might have blockage of direct satellite reception, as satellites are at relatively low altitudes in the southern sky.

The DEIS is deficient as it fails to address the following question:

- Will TNEM compensate homeowners for the degradation and loss of the satellite reception?

The cell phone tower in Crystal plaza sits near a laydown area for the J-1 alignment.

The DEIS is deficient as it fails to address the following question:

- Would this transmitter have to be moved? If so, where would it be relocated?

For the J-1 viaduct, homes close to the viaduct on its north side would experience a shadow from the viaduct. Any investment by homeowners in solar panel energy would be reduced in value.

The DEIS is deficient as it fails to address the following question:

- Will TNEM compensate the homeowners for the loss in electric generation?

13. Guideway Maintenance

Minor guideway maintenance and repair activities will need to take place during periods of operation. What if a piece of debris is reported and someone goes out to remove it? That person will need to be inside the guideway and have no ability to quickly step to the side.

With larger repairs/maintenance, large equipment will be needed. Again, such equipment and operating personnel will be inside the guideway and not be able to move aside. Work requiring the presence of employees in the guideway cannot realistically be confined to non-operating hours; therefore, “road worker” safety regulations are needed, just as they are for existing rail workers.

Operational plans currently call for a nightly inspection, maintenance, and cleaning between 11:00 pm to 5:00 a.m.[204] Note: If the SCMagLev does not operate during this time period, users of Baltimore-Washington International (BWI) Airport will not be able to use the SCMagLev to get to and from their early-morning and late-night scheduled flights.

The DEIS is deficient as it fails to provide the following information:

- If the SCMagLev is not operating during 11:00 p.m. to - 5:00 a.m., how does this impact their ridership projections?
- Do safety procedures exist for the protection of employees working on the guideway?
- If they do exist, where can these procedures be found?
- How do these safety procedures compare to U.S.- mandated procedures?
- Has the FRA reviewed and approved these procedures?
- If not, when will the FRA review and approve these procedures?

14. TMF and Switching

As previously noted, operational plans currently call for a nightly inspection, maintenance, and cleaning between 11:00 pm to 5:00 a.m.[205]

The DEIS is deficient as it fails to provide the following information:

- Are all trains stored nightly in the TMF or are some stored at end stations after TMF processing in advance of next-day operations?
- How many trains can be stored in the TMF? How many trains can be stored nightly at end stations?
- Are all trains processed (cleaned, inspected) every night in the TMF?
- How many spare trains, if any, are present and where are they stored?
- What is a train-speed profile as it leaves a guideway for the TMF? As it enters a guideway?
- In keeping with right-hand running[206] it appears that for all TMF choices the entrances appear to be from the northbound guideway and exits to the southbound guideway. Is this accurate?

- **Request:** To fully assess the impact of the SCMagLev on the surrounding environment and communities, the FRA should provide a complete description of the inspection process, including train elements inspected, duty cycle, number of employees involved, lighting needed, noise generated, etc.

15. Train Movement Requirements, Methodologies, Issues, and Numbers

Using the train-speed profiles, Figures A2-1 and A2-2,[207] and a 20-minute turnaround,[208] a single train will complete a loop of the system (hence, 1 train passage in each direction) in 70 minutes. Thus, more than eight (8) trains would be required to maintain peak period service unless train

[204] DEIS Section 3.1.2, pages 3-4.
[205] DEIS Section 3.1.2, pages 3-4.
[206] DEIS Appendix G4, Table 4.1, No. 5, page 4.
[207] DEIS Appendix D.10, Section D.10.6, pages 10.6-28 and 10.6-29.
[208] DEIS Appendix G.4, Section 4, Table 4.1, Item 13, page 5.

turnaround time is kept to 15 minutes at both ends. The minimum turnaround time appears to be 10 minutes.[209]

The DEIS is deficient as it fails to provide the following information:

- Do the end stations have sufficient room to house a spare train during peak service?
- What are the average and the minimum train-to-train distances during peak service?
- At 300 mph, what is the minimum train stopping distance?
- Even under computer control, there must be a margin of safety to avoid train back-end collisions. This, plus passenger boarding considerations, will set the maximum hourly service rate. What is this margin of safety in distance and in time?
- What is the maximum hourly service rate?
- In the event a train becomes disabled but makes it to an end station, is the intent to add spare trains from the TMF without interrupting service?
- How are trains removed if they cannot make it on their own to an end station? What is the anticipated time the SCMagLev system will be shut down?

Request:

- To fully assess the impact of the SCMagLev on the surrounding environment and communities, the FRA should provide a complete description of the emergency stop procedure and the impacts on the continued operation of the SCMagLev system.

16. Viaduct Roadway Crossing Hazards

A viaduct crossing over the BW Parkway presents hazards to drivers on the BW Parkway and nearby roadways. As stated in the DEIS, the SCMagLev will produce ". . . significant aerodynamic noise . . . and turbulence . . . "[210] Specifically:

(1) Sudden noise onset when the SCMagLev crosses over at speed can startle/distract drivers and be the cause of accidents, potentially fatal.

(2) Debris falling from the viaduct onto the roadways (ice, struck wildlife, other debris) potentially hitting and damaging vehicles, again startling/distracting drivers and causing accidents.

The DEIS is deficient as it fails to provide the following information:

- How will the sudden noise of the train passing at speed be mitigated to not startle and/or otherwise distract vehicle operators on the BW Parkway or any other roadways the SCMagLev crosses or parallels?
- How will debris falling from the elevated sections of the SCMagLev system, such as ice, struck animals, struck birds, etc., dropping or being thrown off by the passing SCMagLev be mitigated as to not threaten vehicle operators on the BW Parkway or any other roadway the SCMagLev crosses or parallels?

[209] DEIS Section 3.3.2.9, Table 3.4-5, page 3-37.
[210] DEIS Section 4.17.2.2, page 4-17-8, and DEIS Section 4.17.4.2 page 4-17-12.

Noise generated by the SCMagLev is more deeply discussed in Section 5 - Community Impact of this commenting document.

17. Cooling System Failure

Components of the SCMagLev vehicles must be kept at a temperature of around -450°F.

The DEIS is deficient as it fails to provide the following information:

- What happens to the helium cooling system if electric power fails during operation?
- What are the safety consequences if the elements containing the supercooled liquid are ruptured in an incident?

18. Rubber Tire Safety

Up to 93 mph, the system runs on rubber tires that need to be extended and retracted before and after each station stop. According the *Final Alternatives Report*, in the event of a loss of power the rubber wheels will automatically descend.[211] This could occur at the full 311-mph speed. Thus, according to this report, the rubber-tired wheels must be able to safely handle supporting the vehicle at 311 mph, as well as the near-instantaneous speed change of the rubber tire and wheel rim from zero to 311 mph. This is a higher requirement than tires during commercial aircraft landings, which have a landing speed of between 150 mph and 165 mph.[212]

If a weight-supporting tire is punctured, this could lead to the side guide wheels climbing the sidewall of the guideway. If there is a loss of superconductivity at high speed, it could lead to vehicle contact with the sidewall where the guide wheel would grip the sidewall and climb over it.[213]

The DEIS is deficient as it fails to provide the following information:

- Do analyses exist evaluating the sudden loss of power and the impact on the SCMagLev?
- If such analyses exist, where can they be found?
- If they do not exist, how is the passenger safety assured if there is a sudden loss of power and the SCMagLev falls onto its retracted rubber tires?

19. Train Breakdowns

In the real world it is inevitable a SCMagLev trainset will break down between stations.

The DEIS is deficient as it fails to provide the following information:

- What happens and what are the procedures when an SCMagLev train set has a mechanical issue that causes it to be stopped between stations?
- What procedures would be used to retrieve the stranded train?

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[211] "SCMagLev Final Alternatives Report." Page 36. November 2018. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf.

[212] "How Fast Do Commercial Airplanes Go? (during Takeoff, Flight, Landing)." AircraftCompare.com. 2021. www.aircraftcompare.com/blog/how-fast-do-airplanes-go.

[213] Santaro, Joe. "Linear forcible near # 2: There are 4 types of wheels even though they are floating! ??" リニアの強引無理ニア #2：浮上なのに車輪が4種類！？ https://joe3taro.com/?p=2212.

- How would the safety of other trains on the line be assured while the non-maglev rescue locomotive hauls the disabled train down the guideway to the maintenance area?

20. Traffic Safety Issues During Construction and Operation Understated in DEIS

The DEIS Section D.4D.2.4.7 discusses in quantitative detail the benefits produced by reduced accident rates because of the predicted decrease in auto traffic when the SCMagLev becomes active. This analysis ignores the likelihood the vehicle accident rate along the BW Parkway, as well as feeder roads, would increase as a result of vehicles being added during SCMagLev construction and as passengers travel to Cherry Hill, BWI Airport, and the Mount Vernon stations. There are certainly data that can be used to quantify the accident rate during highway construction. The mitigation of accidents resulting from the "startle" effect caused by aerodynamic noise at portals during SCMagLev operations is discussed in the DEIS.[214] However, while there may be less noise, the close proximity of the elevated SCMagLev to the BW Parkway will make each and every train passage visible to the vehicles.[215] Train passes will be comparable to landing large jet aircraft, but at much closer distances than at airports. For the J-alignment, the viaduct and train passages will both cast a shadow on the BW Parkway at times in the morning, particularly during winter months. For the J-1 alignment options, the afternoon sun will cast shadows, particularly during summer months. Motorists will be distracted by train passages both by direct observation and by shadow, resulting in an increase in vehicle accidents.

The DEIS is deficient as it fails to provide the following information:

- What is the projected increase in vehicle accidents on the BW Parkway because of the SCMagLev passings, which will distract drivers?

Prior to any ROD, the FRA should investigate the likelihood of increased vehicle accidents caused by driver distraction as the SCMagLev passes, as well as report on the anticipated accident rate increase in comparison with independent claims of vehicle accident rate reductions.

XXVII. The DEIS is Lacking in Security and Terrorism Attack Planning.

1. Terrorist Attack

In addition to the cybersecurity concerns cited previously under the section "Driverless Train," the terrorism analysis presented in the DEIS[216] would be laughable if the issue were not so serious and did not require the development of a serious security plan. The plan provided is confined to Maryland and Washington, D.C., for the period 2000-2017, and at the national level discusses only attacks on rail stations. The DEIS cites the SCMagLev as a low-incidence level of potential as a target, and suggests that attacks on other types of targets are more likely. These are gross oversights and negligent. Low-Frequency High-Severity events[217] are the hardest to predict but are very applicable

[214] DEIS Section 4.17 pages 4.17-11-13 and 4.17-19.
[215] Such as presented in the DEIS Appendix D.6, Section D.6.1.3.3, Figures D.6-32 and 33, pages 6-14 at BW Parkway - Powder Mill Road, and DEIS Figures D.6-38 and 39, pages 6-44 at BW Parkway alignment.
[216] DEIS Section 4.22.3.3, page 4.22-7.
[217] Such as those presented in the DEIS Table 4.22-1, page 4.22-5.

to the SCMagLev. Note that attacks may be based on long-held or historic grievances. Relevant examples involving transportation infrastructure or conveyances include:

- Foreign Terrorism in the United States
  Sept. 11, 2001
  Mass transportation devices (aircraft) used as weapons.
  World Trade Centers destroyed; over 2,000 killed and approximately 10,000 injured.
- Pentagon Attack
  September 11, 2001
  Section of Pentagon destroyed; 125 military personnel and civilians killed, as were the 64 passengers on American Airlines Flight 77.
- Thwarted attempt presumed to target the U.S. Capitol Building: Had it succeeded, the event would have only then been qualified for inclusion in the analysis in Section 4.22.3.3. Forty-four people died when United Flight 93 hit the ground at upward of 500 mph.
- Domestic terrorism in the United States
  April 19, 1995
  Oklahoma City, Truck bomb outside of Murrah Federal Building
  Murrah Federal Building virtually destroyed: 168 killed, including 19 children, several hundred injured.
- Domestic/Foreign terrorism in London:
  July 7, 2005
  Coordinated bombings in the subway; 52 U.K. residents were killed and more than 700 were injured.
- Domestic terrorism in Tokyo
  March 20, 1995
  Sarin chemical attack in the subways; killing 12 people and injuring over 5,000.
- Foreign terrorism in Madrid
  March 11, 2004
  Coordinated bombings in the subway; killed 193 people and injured approximately 2,000.

These previous incidents and many more that have occurred during these past two decades suggest a higher probability of attack than presented in the DEIS. Unlike existing rail systems, the SCMagLev is a high-value target. Causing the SCMagLev to crash while at full speed would virtually guarantee the death of everyone on board, and anyone unfortunate to be at ground level at the moment of the crash. Possible motivating factors are easily identifiable, including:

- The SCMagLev is a U.S. partnership with a foreign country.
- The technology may be perceived as eliminating U.S. jobs.
- The technology is cutting edge.
- The system may be seen as a symbol, being the first of its kind in the United States.
- Two high-value targets are nearby: The National Security Agency (NSA)and the U.S. Secret Service/James J. Rowley Training Center.
- Multiple Low-to-Medium Value targets are nearby: BW Parkway traffic, homes, and buildings, both over the tunnel sections and near the viaduct.

2. SCMagLev Vulnerabilities

The guideway does not physically constrain the maglev train. The train is ALREADY airborne. If for any unanticipated reason the guideway is breached or the train encounters a large, heavy foreign

object; a damaged (misaligned) guideway section; or a guideway switch lined for the wrong direction, it will fly in whatever direction physics dictates. At 300 mph, the cone of destruction will be long, and it will widen considerably as debris scatters off objects on the ground.

- Estimated SCMagLev Kinetic Energy
  - Assume: 1,000 tons maximum fully loaded train, sum of passenger, luggage, and train cars[218]
  - Speed: 500 km/hour
  - Kinetic Energy: 2,100 MJ

  As a comparison:
  - 767/200 used in the Sept. 11, 2001 attacks
  - South Tower impact Kinetic Energy: 3,658 MJ
  - North Tower impact Kinetic Energy: 2,540 MJ

  Conclusion: Traveling at 500 km/hour, the SCMagLev has approximately the same kinetic energy as that of the aircrafts that impacted the two World Trade Center buildings. Damage to objects on the ground can be expected to be comparable.

3. Inadequate Defenses

The mostly passive defenses (fences, camera monitoring) described in the DEIS[219] are more appropriate for criminal activity and vandalism. The defenses cited are inadequate for resisting terrorists and terrorist attacks.

- Fences 10 feet in height will do nothing to deter vandals or terrorists from launching heavy objects onto the viaduct guideway that are larger than the gaps between train and guideway walls and floor.
- Commercially available drones can lift 40 pounds of debris, explosives, and so forth, onto the viaduct guideway, or fly head-on into the SCMagLev.
- The long viaduct makes it both hard to defend and to monitor completely. Response times to remote areas under attack will likely take much more time to arrive at than for the attack to be completed. The number of security personnel (60-70) cited in Appendix G15 of the DEIS is far too small to guard the system 24/7 effectively in addition to their other duties, such as screening of passengers.
- Unlike other types of rail systems, maglev passengers essentially sit inside the engine, close to critical parts (e.g., SC magnets and SC coils), that themselves have explosive potential.

Obvious nightmare scenarios:

- While the train velocity vector normally points along the viaduct, an experienced terrorist team could blow up a viaduct mounting in advance of a train and collapse the guideway toward their target of choice. Even with power cut-off, the train's momentum will do the rest according to the laws of physics.
- There is a single command/control center. Disable or destroy this center and as many as eight or more trains, and all of the passengers are in jeopardy.

[218] "Quantum Leap in Transportation SCMAGLEV." JR Central. https://scmaglev.jr-central-global.com/about/design/.
[219] DEIS Section 4.22.

- There are numerous communications relays, any of which could be a targeted by itself or in conjunction with other attacks.
- Suicide terrorist bringing a bomb onto the train.
- Terrorist breaching TMF security and hiding a timed bomb on the train.
    - Note: Extensive and careful screening of all personnel is necessary to prevent a terrorist from recruiting a worker or becoming a worker.

All these scenarios or similar ones can be commonly found in video games, movies, and of course, on the Internet. There is nothing unthinkable, classified, or particularly imaginative in any of them. While similar scenarios can be constructed for aircraft and normal trains, the maglev's unique status should be cause for additional and higher levels of caution.

4. Sensitive Targets and Velocity Vector ate Defenses

For the MD198 TMF, the train's velocity vector near MD198 (STA 130+000) temporarily points directly at the NSA, although two miles distant.

The DEIS is deficient as it fails to provide the following information:

- What is the train velocity on the exit ramp to this TMF?
- Are they on rubber wheels at this location?

5. Control/Command System Software Vulnerabilities

As described, the control/command system software will be vulnerable to cyber and other threats:

The DEIS is deficient as it fails to provide the following information:

- How are the command/control systems isolated or shielded from the Internet and unauthorized access?
- What redundancy in computer systems are planned to protect or quickly take over critical systems?
- What is the planned power backup system should a utility blackout occur?

6. Inadequate Passenger Screening

It appears that Transportation Security Administration (TSA) airport-level screening will only occur at the BWI terminal. Given the probabilities and vulnerabilities to sabotage and terrorist attack noted before, it may be prudent to install "TSA-like" passenger screening at the end stations as well.

The DEIS is deficient as it fails to provide the following information:

- How are passengers to be screened?
- What systems will be used?
- What is the likely response time to an incident or multiple, coordinated or uncoordinated incidents?

XXVIII. The DEIS SCMagLev Performance and Technical Information is Missing or Inadequate.

The Japanese system uses Nb/Ti superconducting magnets; Nb (niobium) and Ti (titanium) are commonly available elements with a wide variety of applications. The Nb/Ti alloy has a transition temperature to superconductivity of approximately 10^{o}K, thus requiring liquid Helium (*He*) as a refrigerant. These magnets appear to be mounted in bogies (modules). SC magnetic bogies (and SC coils) are located only on the train and are used for propulsion and work in conjunction with propulsion coils on the guideway, the latter being powered at 8 Hz. Levitation and guidance coils within the guideway are passive. When the train exceeds 90 mph, the induced magnetic forces are sufficient to both lift the train and keep it centered in the guideway. At lower speeds, below 93 miles per hour,[220] the train rolls on rubber wheels, which are retracted once it levitates. A location sensor allows each train to travel in its own electromagnetic bubble with no power applied to the guideway propulsion coils in locations without a train.[221]

An example of the some of the basic data the DEIS lacks was published in 1994 by the U.S. Department of Energy's (USDOE's) Office of Science and Technical Information (OSTI) for versions of the MLU001 and MLU002 SCMagLev trains, but these data are now obsolete. [222] Some overall dimensions of the train cars are given in the DEIS.[223] Notwithstanding the references in the DEIS,[224] many technical questions remain that need to be addressed before any ROD is considered. The information needed includes:

(1) SCMagLev Magnets

A 16-car maglev train has 34 SC magnets and 136 SC coils. Figures are shown and data are given for the magnets.

The DEIS is deficient as it fails to provide the following information:

- It appears from the figures that each train car (including the nose cars) has an SC magnet on both sides, accounting for 32 SC magnets. What is the purpose for the other two?
- Where are they located?

(2) SCMagLev Coils

The DEIS is deficient as it fails to provide the following information:

- What is the purpose of the SC coils?
- Where are they located?
- What do they look like?
- Where is the relevant data?
- How many joules of energy are stored by the current circulating in each SC magnet and coil?

[220] "Quantum Leap in Transportation SCMAGLEV." JR Central. https://scmaglev.jr-central-global.com/about/.
[221] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 2.
[222] He, J. L., D.M. Rofe, and H. T. Coffey. "Study of Japanese electrodynamic-suspension maglev systems." U.S. Department of Energy - Office of Science and Technical Information. January 4, 1994. www.osti.gov/biblio/10150166.
[223] DEIS Appendix G4, Table 4.1, page 4.
[224] DEIS Appendix D.11, Section D.11.1.5.1, Reference 24, page 10, and Reference 30, page 11.

(3) SCMagLev Forces Data

The DEIS is virtually devoid of SCMagLev forces data.

The DEIS is deficient as it fails to provide information such as:

- What nominal forces (newtons) are exerted by the SC elements during acceleration?
  - At maximum speed?
  - During deceleration?
- What nominal forces are exerted by guidance and levitation elements at maximum speed?
  - During turns?
- What maximum forces (newtons) are exerted by the SC elements?
  - How close is this to the design limit for the SC elements?

(4) SCMagLev Magnet and Coil Manufacturing and Fabrication Questions

The DEIS is deficient as it fails to provide the following information:

- Where are the SC magnets and coils fabricated (in Japan or in the United States under license)?
- What is the expected lifetime of SC magnets and coils?
- How sensitive is train operation to degradation or failure of single or multiple SC magnets and SC coils?
- How sensitive is train performance to SC magnet or SC coil replacement?
- What procedures are required to replace failed SC magnets and SC coils?
- Do replacements require precise physical alignment or magnetic field trim and/or calibration?
- Are repairs to SC magnets, SC coils, guideway coils, communication equipment, and so forth done at the TMF or are these elements returned to Japan?
  - In either case, how many spare units of all types are kept on hand for fast replacement?
- Is any of the SC technology proprietary?
  - If so, what items and are these to be sole-sourced from Japan?
  - If not sole sourced, what are the sourcing options?

(5) SCMagLev Train Car and Train Set Missing Data

The DEIS does not contain the train car and trainset descriptive data.

The DEIS is deficient as it fails to provide the following information:

- What is the width and weight of train cars (not given in Appendix G4)?
- What gaps exist between train cars?
- How do gaps affect performance?
- How do gaps affect train noise production?
- How are the train cars kept centered on the guideway when the tires are being used?
- Train weight data are absent.
  - What is the total weight of a train unloaded?
  - What is the total weight of a train loaded with passengers/luggage to total capacity?
  - The kinematic performance of trains will vary with train weight. Does the system modify propulsion forces to accommodate different train weights?
- Is there any “checked luggage”?

- Where is it stored? What is the available volume per car?
- What are luggage weight and volume allowances, carry-on and checked (if any)?
- Where are the train cars fabricated (in Japan or in the United States under license)?
- Does the rolling stock arrive with SC elements already mounted or is this done in the TMF?
- Is any of the train car technology proprietary?
  - If so, which items are proprietary technology?

Request: Describe the rubber wheel system for velocities < 90 mph (e.g., number of wheels, locations, deployment mechanism, door mechanism, and deployment time).

(6) Inductive Power Collection System

Describe in detail the Inductive Power Collection System used to provide on-board power in train cars for, e.g., lighting, air conditioning, electronics, etc.

The DEIS is deficient as it fails to provide the following information:

- Is any of this technology proprietary and to whom, and what are the conditions under which it is being used?

(7) Communication and Control Systems

The DEIS does not provide a full detailed description of the communication/control system (e.g., hardware, software, operating modes, etc.).

The DEIS is deficient as it fails to provide the following information:

- Is any of this technology proprietary and to whom, and what are the conditions under which it is being used?

(8) Guideway Propulsion Components

The DEIS does not provide descriptions of the guideway propulsion coils, levitation coils, and guidance coils: e.g., materials, dimensions, weight, and nominal current and current limits, etc.

The DEIS is deficient as it fails to provide information like:

- How many of each type are there along the alignments?
- Where are they fabricated (in Japan or in the United States under license)?
- Are they installed in the guideway sections prior to mounting or after mounting?
- Guideway Electrical Supply:
  - Where is the description of the electrical and signal connections along the guideway?
  - Are all cables on the inside of the guideway?
  - If the cables are on the outside or underside of the guideway, where is this described?
  - Are coils grouped in sectors? If so, where is the description of the groupings?
  - If one sector loses power, how much time is required to switch to an alternate interconnection?

(9) Guideway Section Component Attributes

Obviously, guideway sections will not be all identical as the guideway has to bridge rivers, ramp up and down different grades, and slowly curve both to the left and to the right over the 40-mile run.

The DEIS is deficient as it fails to provide the following information:

- What alignment tolerances are required on mounting guideway sections?
- What are the guideway loading values?

The DEIS provides only the top-level schedule,[225] and item 13 shows that guideway/system installation is a long process, lasting from Qtr1/Yr1through Qtr1/Yr7. Elements for both the tunnel and the viaduct sections may be precast or cast onsite using traditional methods; installation may involve subcontractors. Pre-cast substructure elements will be staged at identified laydown areas.

The DEIS is deficient as it fails to provide the following information:

- Where are guideway sections fabricated and by whom?
- Are there multiple U.S. companies that can craft the sections?
  - If so, which?
  - If not, why not?
  - What effort was made to identify multiple potential sources for these items?

Request: Provide descriptions and diagrams of the guideway switching mechanisms

- At stations
- At TMF entrance/exit

The majority of Yamanashi test track heritage is within mountain tunnels affording stable climate conditions. As noted in the DEIS, only about 5 km (3 miles) of the run do not have overburden,[226] which is split into five main segments each about 1 km long. There are also a number of much shorter segments without overburden. Three of those km-long segments are within about 8 km of the start, where the train has not yet have achieved maximum velocity. In contrast, for example, the J alignment, the single Maryland viaduct section, is much longer, approximately 21 km (13 miles), and all of it is operated at maximum velocity.

Climate data show that the prefecture including the Yamanashi test track has an average temperature range of 36 °F to 84 °F, while the average for Maryland is 23 °F - 87 °F. However, the standard deviation and extremes must also be considered.

The DEIS is deficient as it fails to provide the following information:

- Have Maryland climate conditions been compared with those for the Yamanashi test track and/or the Japanese EIS for its extension?

[225] DEIS Appendix G.7, Figure 2, Section 3, page 0.
[226] Uno, Mamoru. "Development of Japanese High-speed Rail Network - Chuo Shinkansen Project using Superconducting Maglev System." *Japan Railway & Transport Review*:68. Figure 11. October 2016. www.ejrcf.or.jp/jrtr/jrtr68/pdf/14-25.pdf.

  - Such comparisons are necessary to determine whether required tolerances can be maintained. What is the likely long-term weathering of the guideway in Maryland's climate as compared with Japan's?
- How often must guideway sections be replaced in the viaduct?
- What is the nominal horizontal distance between train cars and the guideway?
- What is the minimum distance between train cars and the vertical guideway wall on curves at 300 mph (give both values, if different for left-hand and right-hand curves)?
- What is the minimum curve radius (give both values, if different for left-hand and right-hand curves)?
- How do the applied power curves and force curves vary for left-hand and right-hand curves?
- Is the guideway banked to accommodate turns? If so, give bank angle and curve radius relation.

Note: Train-guideway distances are absent from the DEIS.
Request: Provide the train-guideway distances.

It appears that elevation plan drawings in the DEIS[227] do not provide guideway turn radii at appropriate locations. Inspection shows that over the total distance of both alignments, northbound trains will execute at least four (4) yaw maneuvers; yaw-left, yaw-right, yaw-left, and yaw-right.

The DEIS fails to answer the following questions:
- Is any of the guideway technology proprietary and to whom, and what are the conditions under which it is being used

XXIX. Unsubstantiated Claims

The Northeast Maglev (TNEM) and the Baltimore-Washington Rapid Rail (BWRR) have made many claims of the benefits that building and operating the SCMagLev will bring to the Northeast Corridor (NEC). These claims include statements such as the following:

- The operation of the system will generate the ridership and revenue sufficient to pay for itself.
- The construction of the system will bring tens to hundreds of thousands of jobs to the Maryland and the nation.
- The system will reduce current levels of vehicle traffic.
- The system is green and will reduce greenhouse gases.

The data and analyses needed to substantiate these claims are required to be provided in the DEIS so that independent review can clearly ascertain the reliability and accuracy of these statements. The SCMagLev DEIS fails to provide this information and is therefore deficient. With these glaring deficiencies, the Federal Railroad Administration (FRA) should require a supplemental DEIS or choose the No Build option.

[227] DEIS Appendix C, Part D.

XXX. Financial Sustainability

The following section analyzes the claim that operating and maintenance costs are projected to be completely offset by revenues.[228]

To date, the BWRR and TNEM have not provided any analyses or data to validate that the SCMagLev project is financially feasible and able to generate sufficient revenue to be self-sustainable and to cover the costs of the system's operation, maintenance, and loan servicing.

The DEIS does not support BWRR's claim that the system will generate sufficient revenues to pay for the operation and maintenance of the system. Even if the data were available, one must ask if those projections can still be accurate given the global pandemic and the move to telecommuting by a significant portion of the workforce. It is difficult, if not impossible, to disentangle the financial shortfalls of the project from the lack of ridership data.

Ridership data are critical to understanding the financial sustainability of the project. To date, meaningful ridership data have not been provided. The Maryland Coalition for Responsible Transit (MCRT) filed a FOIA request for ridership and other data in April 2021. The ridership data document received, later posted by the BWRR at its website after a special announcement, was so heavily redacted that it was rendered unusable. Much as the DEIS on the topic of useful and meaningful ridership information, these data are an empty "shell" document with the important numerical values deleted and the input assumptions obfuscated or missing entirely. The same is true of any analysis contained therein that should include intermediate and detailed final results. For a person intending to use the DEIS to evaluate a true ridership study from the BWRR, Louis Berger, or the FRA, the DEIS appears to contain zero percent of the data values and information that would be needed to evaluate the plausibility of the official ridership forecast.

Without sufficient ridership and revenue, the project is destined to be financially unsustainable. Without substantiated ridership data and analysis information, the DEIS is a disservice to the public by obfuscating and constitutes a failure to share ridership information specific to Washington, D.C., and the Baltimore segment being studied in this EIS process.

The DEIS is deficient as it fails to address the following questions:

- How is input data and information such as the number of people from specific, named communities proprietary? The assumptions, input parameters, and results should be made public to determine (and to prove) that this information is valid and specific to the segment between Washington, D.C., and Baltimore.
- While this information may be algorithmically proprietary and specific to the modeling software used, the input and output should not be withheld. Withholding and obfuscating this information gives a very strong, deeply concerning, and distinct impression of deep impropriety and bias.

[228] "Common Questions - Economics." Northeast Maglev. 2021. https://northeastmaglev.com/faq/#Economics.

The BWRR repeatedly asserts the price of tickets will be on par with Amtrak's Acela train (although they have stated many times that they are not in competition with Amtrak or MARC). Further, the BWRR continually talks about serving the NEC, which Amtrak currently serves. Other terminology employed by the BWRR includes that they are providing "options," while still claiming they are not taking away riders from Amtrak.

Requests:

- The BWRR and MTA must provide the ridership information they assert validates their claim(s) that the SCMagLev ridership will not be drawn from current and future Amtrak or MARC ridership. These analyses must include community-by-community ridership onboard and offboard data and projections. Such information should demonstrate that SCMagLev ridership is not being taken from Amtrak or MARC and should support their claim(s) of "non-competition" with Amtrak and MARC.
- This information then must be shared with the public, with sufficient time given for public review and comment before any consideration on a decision to move the SCMagLev project forward.

However, contrary to BWRR's claims of non-competition, Appendix D.4 of the DEIS does show diversion of passengers from Amtrak and MARC.[229] Passengers from MARC and Amtrak would decrease the economic vitality and viability of these more affordable services on which a far larger portion Marylanders depend. Table D.4-47 of the DEIS displays the ridership and revenue for the three rail systems in 2030 and the forecasted rail systems' revenue loss resulting from passenger diversions to the SCMagLev.[230] Such losses would need to be made up with larger taxpayer-funded subsidies; in effect the SCMagLev indirectly would be taking taxpayer dollars far better used on higher-priority transportation projects.

The DEIS ridership estimates premised on the SCMagLev in operation in 2030 is based on a 57.3 percent diversion of riders from each of the three rail lines to the SCMagLev if the Cherry Hill Station is selected, and 61.3 percent diversion of riders from each of the three rail lines to the SCMagLev if the Camden Yards Station is selected. In 2030, Amtrak Acela, Amtrak regional rail, and the MARC commuter rail system are expected to accumulate a revenue loss of $23.2 million annually at full build out if the Cherry Hill Station is selected, and a revenue loss of $24.8 million annually at full build out if the Camden Yards Station is selected.

The DEIS shows that 44.6 percent of the ridership would come from the non-business segment, which is not defined. However, we know it excludes commuters, business, and airport travel. The inability to unpack the assumptions behind this number and the consequences of an overestimate will have serious consequences for the economic and commercial viability of the system. Given the size of this segment and its vagueness, one must question whether the project will be able to generate revenues sufficient to cover the costs of running the operation, maintaining the system, servicing loan debt, and paying required taxes.

[229] DEIS Appendix D-4. Page D-54.
[230] DEIS Appendix D-4, Table D.4-47. Page D-55.

In DEIS Section 4.2.4.4, the predicted diversion of MARC ridership to the SCMagLev is 32 percent of the annual MARC ridership on the Penn and Camden lines.[231] In DEIS Section 4.2.5.4, the predicted diversion of Amtrak ridership to the SCMagLev is 94 percent of Amtrak ridership at the three stations.[232] For MARC and Amtrak, these reductions may prove catastrophic. Bus systems also suffer losses, but these can adapt more readily by changing routes.

The consequences described above are wholly inconsistent with the Biden Administration's stated goal of moving "Amtrak into the 21st Century with Sustained Investment."[233]

The DEIS is critically deficient in that it compares the theoretical SCMagLev of 2021 to the current Amtrak and Acela services. The appropriate comparison should be to compare the SCMagLev to Amtrak and Amtrak Acela of 2023 to 2024 and beyond, when the SCMagLev is projected to be operational and by which time Amtrak and Acela will have undergone many phased-in improvements. Amtrak is operation and moving forward with many system enhancements and renewal projects. The next generation of Acela currently is undergoing final approval testing and is planned to be placed in service as soon as 2022.

XXXI. Cost to Build

The DEIS provides no details on the capital costs for this project.

The SCMagLev website currently predicts that the project would cost $10 to $15 billion without cost overrun[234] (a more recent statement states $16 billion[235]). California's bullet train, which was originally estimated to cost $6 billion, has surged to a price tag of $10.6 billion. If we apply this rate of cost overrun to the SCMagLev, we can realistically expect the project to cost $17.6 to $26.5 billion. Even at its current price tag, the "SCMagLev would still be one of the most expensive rail lines ever built on a per-mile basis, at an estimated cost of $250 million per mile."[236]

Only $5 billion has been pledged by the Bank of Japan toward construction. This means up to $10 billion or more will be needed under the current price tag, and up to $21.5 billion or more with the likely schedule delays and cost overrun. That money will likely be taxpayers' dollars. The BWRR has not hesitated in asking for government subsidy: "Yes, we'll go raise private investment but it can't all be private investment. We can't rebuild our infrastructure 100 percent privately."[237]

[231] DEIS Chapter 4.02, Section 4.2.4.4. Page 4.2-10.
[232] DEIS Chapter 4.02, Section 4.2.5.4. Page 4.2-12.
[233] "Passenger Trains > Biden's Proposed 2022 Budget for Amtrak." Moves Amtrak into the 21st Century with Sustained Investment. https://www.trainorders.com/discussion/read.php?4,5232094.
[234] The Baltimore-Washington SuperConducting Maglev Project. FAQs (bwmaglev.info). Retrieved April 26, 2021.
[235] Ibid. Also see: Tulkin, Josh. "Proposed Maryland Maglev's has unacceptable costs COMMENTARY." Capital Gazette. May 10, 2021. https://www.capitalgazette.com/opinion/columns/ac-ce-column-josh-tulkin-2021510-20210510-mwak6qqblvabtpnflmcu36aeuy-story.html.
[236] Appendix - Article Reprint: Park, Carol. "Maglev: A high speed train to higher taxes". February 7, 2018. The Maryland Public Policy Institute.
[237] Ibid.

"The private sector is unlikely to invest in a project that has no evidence for profitability. . . Maglev would target the elite business travelers and be out of reach of most residents of Maryland or D.C., due to its high-ticket prices."[238]

In addition to MARC and Amtrak, a variety of private bus companies already provide affordable trips between D.C. and Baltimore. With such narrow ridership prediction, it seems reasonable to be quite pessimistic about the SCMagLev's revenue stream, profitability, and bankability.

With the immense cost estimate of the SCMagLev and no private partners that seem excited to step in, the SCMagLev project is doomed to become an expensive failure. In addition, using general taxpayers' money to build a high-speed rail system that will be mainly used by high-income residents will only exacerbate Maryland's transportation systems' inequality.

Instead of wasting money, time, and energy experimenting with dangerous projects like the SCMagLev, we should redirect our efforts to finding more efficient ways to allocate taxpayers' money to improve the safety of the existing transit systems in Maryland. Making maximal use of scarce budgetary resources and taxpayers' dollars to improve Maryland's transit network for the majority of residents and commuters should be the priority.

Given that federal funds will likely be sought for this project, one must ask if this is the best use of those funds. "For the cost of building this train—not operating and maintaining, but merely building it—you could fund both the Washington Metro and the Maryland Transit Administration through 2024 without asking taxpayers or riders to pay a single dime toward either system."[239]

In addition, it has been shown that the optimal domain for high-speed ground transportation systems is on long interstation lengths, 100 km (60 miles) or more. On shorter distances, the gains in travel time are so small that it is difficult to justify the high investment.[240] A SCMagLev between Baltimore and Washington, D.C. falls far short of this minimum distance.

The BWRR states that the operation and maintenance will be totally paid for by the riders.

The DEIS is deficient as it fails to address the most basic of business financial questions, such as:

- Specifically, how will the project be financed?
- Where will the funds come from to service their debt?
- What is the detailed projection of Operation and Maintenance (O&M), taxes, loan service, and other costings?
- How do projected debits match up to projected income?
- What is the Return-on-Investment (ROI)?
- What are the projected balance sheets for each of the first ten years of operation?
- What are the sources of the projection numbers and how are they validated?

[238] Ibid.
[239] Appendix - Articles Reprint: Boehm, Eric. "Proposed Baltimore-to-D.C. Maglev Train Would Cost as Much as Building 1,500 Miles of Highway." October 18, 2017. Reason.
[240] Appendix - Articles Reprint: Vujan, Vukan and Casello, Jeffrey M. "An Evaluation of Maglev Technology and Its Comparison With High-Speed Rail." March 2002. Transportation Quarterly.

- What is the level of accuracy for the data used?
- This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XXXII. Cost to Use

The DEIS states, there are three types of travelers: those traveling for business, those traveling for non-business activities, and those commuting to work. According to the DEIS, only 15.45 percent of the estimated ridership would be business travelers.[241] By reporting this small percentage, TNEM is admitting that only a small segment of the population demographic would have the income to afford the high-ticket prices as a frequent passenger riding the SCMagLev.

The DEIS further states: "The net extra cost associated with SCMAGLEV use for travelers that divert is estimated to be between $432.3 million and $478.8 million in 2030, and $555.2 million and $614.6 million in 2045. Those travelers that divert are willing to pay more for the time savings, reliability, and amenities of the new mode."[242] Reliability and amenities disappear when compared to the next generation Acela scheduled to start operation in 2022. Costs are a wash. But station access strongly favors Amtrak and Amtrak's Acela with station in downtown Baltimore, instead of a 15-minute or more trip from downtown Baltimore to Cherry Hill. Taking into account the travel time to Cherry Hill, Amtrak and Amtrak Acela stations in Baltimore reduces the "total time spent in transit," again increasing the favorability to make use of Amtrak and Amtrak Acela.

In other words, travelling on the SCMagLev is expensive; one must not be cost sensitive to make use of this proposed system, and be willing to spend the additional travel time to get to the planned stations locations, and from the destination station the additional cost to travel the rider's final destination. The economics of taking the SCMagLev over the alternatives simply do not work in most situations. Yet, the DEIS shows that business travelers, those who may be the least concerned about the cost because they are able to afford it, represent only 15.45 percent of the projected ridership. And this number may now be even smaller given the increase in successful use of remote working opportunities during the COVID-19 lockdowns.

Unlike other transit systems, the SCMagLev would not serve other common transportation needs, such as school, shopping, or medical appointments, because of the lack of local stops and high-priced tickets. Riders might use it for leisure activities or cultural events, but the ticket prices make it cost-prohibitive for most families. Driving and parking is a much more affordable option for a multi-occupant vehicle.

If the average round-trip ticket cost was $100, a commuter would pay $24,000 a year to ride the SCMagLev. This would be $12,900 more than the annual cost of commuting by car between Baltimore and Washington, D.C., based on the IRS's estimate of the per-mile cost of driving.[243] Most American

[241] DEIS Appendix D.4, Table D.4-19. Page D-35.
[242] DEIS Appendix D.4. Page D-43.
[243] Internal Revenue Service. Standard Mileage Rates. Standard Mileage Rates | Internal Revenue Service (irs.gov). Retrieved April 26, 2021.

families have trouble saving for the future, so would they really choose to spend an extra $12,900 a year to upgrade from car commuting to SCMagLev commuting?[244]

For most families, the SCMagLev would be an unattractive option on a family outing. A D.C.-area family of four going to a downtown Baltimore attraction would expect to pay $60 to $140 for the entire family to take the trip using conventional transit. It is very unlikely this same family would be willing to pay an additional $100 per person, $400 for the whole family, to make the same trip via the SCMagLev.[245]

Washington, D.C., attracts tourists, but for most of these families, a side trip to Baltimore would not seem more attractive should the SCMagLev be built. Studies, such as the one cited in the *Business Insider* estimate that the average American family spends $2,000 on its annual vacation.[246] If an out-of-state family visited Washington, D.C., for their vacation, would they be willing to spend an extra $400 on transportation if they decided to make a side trip to Baltimore? In contrast, the existing bus and commuter-rail service cost under $10 one way and renting a car for an entire week can cost under $500.[247]

XXXIII. Infrastructure Capacity Accommodation

The operations plan developed in Appendix G4 of the DEIS assumes 16-car trains (each approximately 1,300 feet long), which is what that station platforms can accommodate.[248] (Note that the Baltimore-Washington International [BWI] airport station is somewhat shorter, which implies that passengers to and from this SCMagLev station will be segregated into designated cars.) The service plan in Table 5.1 of this appendix calls for eight (8) trains per hour during peak periods. Given dwell times for boarding at the BWI airport station and for the desired turnaround time of 20 minutes or less at the end stations, it appears that eight (8) trains per hour is at or near maximum capacity.

The DEIS is deficient because it fails to address the following questions:

- How many total trains will the proposed SCMagLev need to function at peak periods?
- What is the maximum number of trains the system can accommodate?
- How many trains can the TMF accommodate?
- How many trains will normally be stored in the TMF overnight?
- How many trains are stored overnight at the end stations?
- How many reserve trains and cars are kept on hand?
- Are any reserve trains kept at the end stations during daytime operations?

[244] In 2020, the cost of commuting by car is 58 cents per mile according to the IRS, and one might assume an 80-mile round trip, D.C. to Baltimore. A 48-week work-year is 240 days. By car, $0.58/mile x 80 miles/day x 240 day/year. By SCMagLev, $100/day x 240 day/year.
[245] At Fort McHenry National Monument, Port Discovery Children's Museum, Maryland Science Center, and National Aquarium admission for 2 adults and 2 children is approximately $30-$60, $72, $96, and $140, respectively.
[246] McDowell, Erin. "People spend an average of $1,979 annually on summer vacations — here are 4 ways to save money on your next trip." Business Insider. August 9, 2019. www.businessinsider.com/average-american-spending-on-vacations-2019-8.
[247] Ibid.
[248] DEIS. Appendix G, Part K, Table 4.1. Page 4.

- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Summing over rows of DEIS Appendix D.2 Table D.2-1, the system capacity is 79,248 passengers per day in both directions, for a total of 158,496.[249] The forecasted ridership in Table D.2-2 is 70,069 or 77,764, depending on the Baltimore station location chosen, respectively. Hence the forecasted ridership is either 44 or 49 percent of this capacity.

Capacity can only be increased by adding cars, which may not be possible for the given station lengths or by increasing the rate of trains. If the system is eventually extended to points north (Wilmington, Delaware; Philadelphia, Pennsylvania; New York City, New York; Boston, Massachusetts) as advertised, how much of the original designed capacity is needed to accommodate passengers boarding in Washington, D.C., for these destinations?

To create additional capacity, trains could certainly be added during off-peak times, but the system is advertised as making regular commuting to these locations possible, so off-peak times may not be popular. However, reducing the allocation of tickets to local (Washington, D.C. to Baltimore) commuters would violate the basis on which the original system was approved. The operators would therefore have to sequester tickets for local commuters at the level prior to any line extensions. It should be noted that if FRA's reported analysis in the DEIS is correct, local commuters would suffer a loss in access to other transit systems after the SCMagLev would cause ridership and financial losses by pulling ridership from these systems. Express trains are considered in Appendix G4; however, outside these stations, there is only a single "track" in each direction in the Baltimore-Washington, D.C., corridor. The SCMagLev system might not be expandable, as currently designed, to meet the new requirements. Horizontal expansion of the alignment in both the tunnel and viaduct sections would be both prohibitively expensive and come with further adverse environmental and social impacts, surpassing the original construction. Moreover, additional trains might require expansion of the TMF and/or the addition of other TMFs further north.[250]

Another deficiency of the DEIS is TNEM's plan to build a second set of guideways from New York to Washington, D.C. At its February 27, 2019, BWI Business Partnership meeting, BWRR representative David Henley presented alignment diagrams showing another set of guideways between New York City and Washington, D.C., with no stops in Maryland - in effect, an express from New York to Washington, D.C. Building such a second set of tunnels and elevated guideways would multiply the costs to residents, communities, and our environment, as presented and discussed throughout this submission.

[249] DEIS Appendix D.2, Table D.2-1. Page A-2.
[250] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 35.

XXXIV. Economic

A recent article reported that TNEM was formed in 2010 and is "being run with about $120 million that Rogers has raised so far in startup capital, all from Individuals—all of whom wish to remain anonymous."[251]

Requests:

- For transparency and openness for the project, the FRA should identify the TNEM financial backers so the public can be assured that no undue political pressures are being brought into play in the proposal review and decision process.
- This information must be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

Wayne Rogers, Chairman and CEO of TNEM (Northeast Maglev LLC) was quoted in the same article: "Yes, we'll go raise private investment but it can't all be private investment. We can't rebuild our infrastructure 100 percent privately."[252] While the article listed the $5 billion loan from the state-owned Japan Bank for International Cooperation, he added: "The rest would need to come from a mix of private and public sources."[253] This opens the door for significant state and federal subsidies, and the burden will fall on taxpayers, the majority of whom will likely never use the system but will subsidize a train for the benefit of the elite.

The DEIS is deficient because it fails to address the following questions:

- Without solid ridership and revenue studies that show the potential financial success of this venture, what private investors will be willing to participate?
- To qualify for a U.S. Department of Transportation (USDOT) loan, these private investors will need an investment grade rating from two nationally recognized rating agencies. Does TNEM have such a credit rating?
- TNEM and the BWRR are expecting funding from the federal government (public/private partnership) and a very substantial, minimum $5 billion loan from the Japanese. How does this project make the United States a technological leader in transportation infrastructure, as has been suggested, when it is satisfying the Japanese desire to create a U.S. market for Japanese technology and their manufacturers and labor force?
- How is this proposal in keeping with the spirit and intent of Executive Order 13788, "Presidential Executive Order on Buy American and Hire American" (April 18, 2017)? The requirements of the executive order should apply. No exemption for a high-price train system for the elite should be granted, especially when doing so would further disadvantage the majority of middle- and lower-income communities, residents and commuters.

[251] Terry, Robert J. "Do high-speed rail plans in the Baltimore-Washington region stand a chance?" Washington Business Journal. January 19, 2018. www.bizjournals.com/washington/news/2018/01/19/3-plans-for-high-speed-rail-aim-to-connect.html.
[252] Appendix - Articles Reprint: Park, Carol. "Maglev: A high speed train to higher taxes". February 7, 2018. The Maryland Public Policy Institute.
[253] Roberts, Terry. "Do high-speed rail plans in the Baltimore-Washington region stand a chance?" January 19, 2018. Washington Business Journal. The Baltimore-Washington region looks to the future of high-speed rail - Washington Business Journal (bizjournals.com).

Over the past century, several technological innovations were transformational but were not viable in the long term. The Zeppelin airship, the Concorde Supersonic Transport (SST), and the Shuttle are just a few. It is interesting that, while it was viewed as "transformational" by those who wanted to establish it, the SST was never profitable. It proved to be an unsuccessful venture from a profitability and ridership aspect. With many similarities in claims and promises with the SCMagLev proponents, the SST is a valid comparison to the current proposal, having failed financially for lack of ridership.

SCMagLev technology is one type of high-speed, ground-based transportation system technology, many of which are in commercial operation today. However, the SCMagLev has not been proven viable as a fully commercially operational system anywhere in the world. Japan opened a test track in 1997, but its first commercial-scale SCMagLev train line is not expected to begin operations until 2027, and this date is slipping. Advertising by the project proponents that the SCMagLev is a proven, commercially viable system is false and misleading.

A plan for upgrading and expanding rail infrastructure in the Northeast Corridor (NEC) is already underway, financed in part with a $2.5 billion Railroad Rehabilitation and Improvement Financing (RRIF) loan. The NEC plan does not include building an SCMagLev system. In fact, the SCMagLev project would directly compete with its recommendations. The FRA, through the NEC Future Plan program has already developed a long-term vision and investment program for the NEC with regional stakeholders. Billions of dollars have already been committed and major upgrades to the existing Acela equipment are expected to be in place and operational by 2022.

Also note that during the long and costly FRA study that led to the approval of Amtrak's NEC Future Plan, building an additional rail alignment was considered, but it was found to be too expensive and unnecessary when plans for the existing systems upgrades and enhancements were considered.

The DEIS is deficient because it fails to address the following question:

- Does it make sense for the USDOT to consider approving a new project that would undermine the success of another project it has already funded and will be completed very soon?
- This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

To repeat, the SCMagLev would have a negative impact on Amtrak's ability to repay the RRIF loan. As discussed in the "Economics and Financial Feasibility" section, the DEIS states: "In 2030, Amtrak Acela, Amtrak regional rail, and the MARC commuter rail system are expected to accumulate a revenue loss of $23.2 million annually at full build out if Cherry Hill Station is selected, and a revenue loss of $24.8 million annually at full build out if Camden Yards Station is selected."[254] Table D.4-47 in the DEIS displays the ridership and revenue for the three rail systems in 2030 and the forecasted revenue loss resulting from passenger diversions to SCMagLev. The ridership estimates for SCMagLev in 2030 is based upon a 57.3 percent diversion of riders from each of the three rail lines to SCMagLev if the Cherry Hill Station is

[254] DEIS Appendix D.04, Section D.4D.2.4.9, Table D.4-47. Page D-54.

selected, and 61.3 percent diversion of riders from each of the three rail lines to SCMagLev if the Camden Yards Station is selected."[255]

It should be noted that the MCRT SCMagLev DEIS Review Team finds it very interesting that the DEIS provides forecasts on ridership losses for Amtrak and MARC if the SCMagLev is built, but says nothing about the SCMagLev's ridership projections and the associated revenue. Why are the SCMagLev's ridership and financials not provided? What is in this information that TNEM does not want the public to know?

The DEIS is deficient because it fails to address the following questions:

- Does it make sense for the FRA to consider approving a new ground-based transportation project that would undermine the success of another project it has already funded and will be completed very soon?
- Has the FRA considered how SCMagLev's diversion of Amtrak ridership would be contradictory to the Biden Administration's budget proposal that seeks to move "Amtrak into the 21st Century with Sustained Investment? The discretionary request provides $2.7 billion for Amtrak, a 35-percent increase, to provide improvements and expansion on the Northeast Corridor and throughout the Nation's passenger rail network."[256]
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Japanese researchers Anki and Kawamiya state that the SCMagLev "constitutes not only an extraordinarily costly but also an abnormally energy-wasting project, consuming in operation between four and five times as much power as the Tokaido Shinkansen (the Japanese wheel-rail high-speed train)."[257]

The DEIS is deficient because it fails to address the following question:

- From the operation of the Japanese experimental SCMagLev, this question should be easy to answer: What is the annual cost of electricity per mile to operate the train?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

The economic arguments contained in the DEIS seriously underestimate adverse long-term (recurring) market responses on communities in Prince George's and Anne Arundel Counties, particularly along the viaduct portion.[258] Calculations are done only for regions around the three choices for the TMF and around the Washington, D.C. and Baltimore stations. The region around the BWI station is ignored because of the prevalence of airport functions. The impact radius chosen for calculations is only one-

[255] Ibid. Page D.55.
[256] Young, Shalanda D. Letter: to The Honorable Patrick Leahy, Chairman Committee on Appropriations, United States Senate. "President's request for fiscal year (FY) 2022 discretionary funding." Executive Office of the President - Office of Management and Budget. April 9, 2021. https://www.whitehouse.gov/wp-content/uploads/2021/04/FY2022-Discretionary-Request.pdf. Page 27. Also see: "Passenger Trains > Biden's Proposed 2022 Budget for Amtrak." Moves Amtrak into the 21st Century with Sustained Investment. https://www.trainorders.com/discussion/read.php?4,5232094.
[257] Appendix - Articles Reprint: Aoki, Hidekazu, and Kawamiya, Nobuo. Cited in Harding, Robin. "Japan's new maglev train line runs headlong into critics." Financial Times. October 17, 2017. Page 2.
[258] DEIS Appendix D.04, Section D.4D.2.5. Page D-58.

quarter (1/4) to one-half (1/2) mile. Together these choices produce: (a) increases in property values around the stations, as people are willing to pay more for housing within walking distance of transit, and (b) negligible losses in property value at both BARC site TMFs and minor losses at the MD 198 TMF. Further, the discussion emphasizes effects on the tax base, mostly ignoring losses in residential property values.[259]

A passage in the DEIS Appendix D.4 (Economics Impact Analysis) states: "Parcel record shapefiles obtained from Washington, D.C. and Maryland provide assessments of property values for parcels within a ¼-mile and ½-mile radius of the proposed transit stations. A property premium based on empirical research on property value outcomes in other locations is applied to the base parcel values. Studies have shown that an increase in property values near transit lines can range from 2 percent to over 167 percent, depending on the property type, transit mode, and proximity."[260] The footnote referenced (footnote 64) goes to the following source: Center for Transit-Oriented Development, Capturing the Value of Transit, November 2008.[261]

That same publication in the next paragraph states this about the above-referenced passage: "Tables 2.2 and 2.3 also show that not every study of transit and property values has found a positive correlation. For example, a 1995 study by John Landis found that values for single family homes within 900 feet of light rail stations in Santa Clara County was 10.8 percent lower than comparable homes located farther from light rail stations. The same study found that there was no value premium for office and retail property located within one-half mile of BART stations in the East Bay."[262]

The DEIS appears to ignore the underlying driver for property value increase is not just access to the transportation system, but the affordability to make use of the transportation by a majority of the surrounding population. This is where the cost to ride the SCMagLev negates the proximity of the system driving property values. Also, with the proximity of the far-lower-cost MARC option at the newly rebuilt $4.7 million BWI Rail Station, there are few travelers in the BWI area who can or would select the SCMagLev over using the comfortable, convenient, much less expensive, and covered-parking provided, MARC.

The Purple Line debacle was an object lesson in how inscrutable giant contracts with private corporations can leave the public held responsible for the cost. The state budget cannot tolerate the risk of another Purple Line. The costs of coronavirus already have led to a veto of long-awaited, critically needed education reform (Kirwan Commission). Huge, crippling state budget cuts are looming due to Congress's refusal to provide further financial support to state governments in end-of-year pandemic aid.

For a current example of overpromising and underperforming, one need look no further than California's experience with its high-speed rail system, which has become a financial nightmare. It has a record of

[259] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 13.
[260] DEIS Appendix D.04, Section D.4D.2.5.1. Page D-58.
[261] "Capturing the Value of Transit." Center for Transit-Oriented Development. November 2008. Page 10. www.reconnectingamerica.org/assets/Uploads/ctodvalcapture110508v2.pdf.
[262] Landis, J. et al. "Rail Transit Investments, Real Estate Values, and Land Use Change: A Comparative Analysis of Five California Rail Systems," Institute of Urban and Regional Development, UC Berkeley, 1995. https://escholarship.org/uc/item/4hh7f652.

massive overruns, building delays, and homes, businesses, and private properties taken, with still no working system.

XXXV. DEIS Incomplete Cost Evaluations of Helium Requirements

Dollar values should be reflected in the spreadsheets provided in the DEIS Appendix G.9, but they are not.[263]

The DEIS is deficient because it fails to address the following questions:

- Current world market prices for helium (*LHE*) are in flux. What value has been assumed for the cost per liter of *LHe* and what are the margins to accommodate market fluctuations?
- Given the total amount of *LHe* required for system charge and for replenishment, if any, what are the total costs?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XXXVI. DEIS's Wide-Ranging Cost Estimates

The total capital cost column (rightmost) in DEIS Table D.4-8 ranges from $13.8 to $16.2 billion over the 12 alignments.[264] The Project's construction costs in Table ES4.3-2[265] and on spreadsheets (including escalation) in Appendix G.9 are in the range $10.6 to $12.59 billion.[266]

The DEIS is deficient because it fails to address the following question:

- What is the cause for these differences in estimates?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XXXVII. Discrepancy in "Positive" Jobs Economic Impact

The DEIS gives the total positive jobs economic impact produced by the SCMagLev as 390 to 440, as shown in DEIS Section ES.4.3.1.[267] Appendix 15 puts the total manpower requirement as 690 to 750.[268]

The DEIS is deficient because it fails to address the following questions:

- What is the source of this apparent discrepancy in positive jobs economic impact?
- What are the correct estimates?

[263] DEIS Appendix G, Part K. Appendix G9. Pages 198 to 203.
[264] DEIS Appendix D.4, Table D.4-8. Pages D-21 to D-22.
[265] DEIS Chapter 0, Section ES.4.3.1, Table ES4.3-2. Page ES-20.
[266] DEIS Appendix G, Part K, Appendix G9. Pages 198 to 229.
[267] DEIS Chapter 0, Section ES.4.3.1. Page ES-15.
[268] DEIS Appendix G, Part L. Pages 214 to 215.

- How were these estimates derived?
- What methodologies were used to derive these estimates?
- What is the level of validity of the modeling employed to derive these estimates?
- What is the level of accuracy and validity of the data used to derive these estimates?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XXXVIII. DEIS Lacks Transparency in Operation and Maintenance Costs

Appendix G15 states that operation and maintenance (O&M) cost information is proprietary, and thus the FRA has agreed to accept an O&M staffing analysis. Specifically: "Based on a call with FRA on January 28, 2020, FRA agreed to accept an O&M staffing analysis in lieu of proprietary O&M cost information."[269] Given that a significant amount of taxpayer funds likely will be solicited, financial viability is a major concern and important details (such as debt service costs) need to be disclosed.[270]

The DEIS is deficient because it fails to address the following questions:

- What are the detailed projected O&M costs?
- How were these costs identified and how was the level of cost determined?
- What measure(s) of accuracy and validity are employed to assure the accuracy of these projections?
- Why is this information critical for assessment of the financial viability of the SCMagLev proposal not provided?
- When will the FRA make this information available, in a clear, complete, and unredacted form?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XXXIX. Capital and Construction Costs

In Appendix G.9 (Capital and Construction Costs), items 50-100 are blank.[271] The elements are:

- Systems
- Row, Land, Existing Improvements
- Vehicles
- Professional Services
- Unallocated Contingency
- Finance Charges

These elements book the costs of rolling stock, presumably including their superconducting magnet bogies. None of the sub-elements of element 10 Guideway and Track seem to book their superconducting magnets. Yet the grand totals (after including escalation costs) are in rough agreement

[269] DEIS, Appendix G, Part L Page 213.
[270] Appendix - Reprint: Kowalski, M. “SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0.” 2021. Page 18.
[271] DEIS Appendix G-9. Page 199.

with the $10 to $12 billion total costs shown for top-level project construction costs in the bottom row of Table ES4.3-2.[272] It strains credulity to expect that the SCMagLev critical components and the rolling stock together are negligible costs.[273]

The DEIS is deficient because it fails to address the following questions:

- Where are the costs of these critical components booked?
- Are these components (in kind) part of the $5 billion loan from the Bank of Japan?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XL. Project Risk Management, Risk Buy Down, Failure, and Decommissioning

There are serious concerns regarding a number of project management issues. The lack of transparency and substantiation of realistic project cost estimates, timelines, and employment claims are not acceptable. That the BWRR and TNEM can be allowed to hide ALL meaningful information behind claims of "proprietary" is simply not believable. And, the range of estimates that have been presented vary so widely that the project management qualifications should be questioned.

An example would be that in 2015, when the BWRR was providing testimony to the Maryland Public Service Commission (PSC), the direct testimony stated: "BWRR estimates that the construction phase would lead to the creation of 74,000 "job-years" in Maryland."[274]

Since the release of the DEIS, this employment "claim" has risen from 74,000[275] to between 161,000 and 195,000 job years,[276] while the projected cost has barely changed with the addition of approximately 120,000 jobs. How is this possible? While some may become encouraged by the increase in the number of jobs, it is indicative of a deeply concerning and serious issue: The estimate changes demonstrate quite clearly that there is a serious lack of project management knowledge in terms of the level of effort required to build this system. This has a direct impact on the cost of the project that will be in the billions of dollars. According to the Bureau of Labor Statistics, the mean average wage in the construction and extraction industries is $53,940 per year.[277] The range of project cost for salaries and wages alone would be incredibly significant, from $4.69 to $6.53 billion dollars.

Low end of the range: 161,000 job years – 74,000 job years = 87,000 job years
87,000 job years X 53,940$ per year = $4,692,780,000.

[272] DEIS Chapter 0, Table ES4.3-2. Page ES-20.
[273] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages. 4-5.
[274] Louis Berger Group, The. "Ord87248, pp 7/31." Maryland Public Service Commission Testimony. October 14, 2015.
[275] Appendix V -Articles. Article Reprint: Smith, Mark. "Will Maglev be rolling soon?" November 11, 2020. The Business Monthly.
[276] DEIS Chapter 4.06, Section 4.6.3. Page 4.6-8.
[277] U.S. Bureau of Labor Statistics. Occupational Employment and Wage Statistics. May 2020. Construction and Extraction Occupations (bls.gov). Retrieved April 27, 2021.

High end of the range: 195,000 job years – 74,000 job years = 121,000 job years
121,000 job years X 53,940$ per year = $6,526,740,000.

These calculations use the figure of $53,940 for ALL employees, which is a very low dollar figure. The average salary would increase considerably were the executive, technical, and consulting wages to be factored in. As it stands, the job description classification information and associated hours per task have not been made available for independent assessment and evaluation. This lack of information is a serious deficiency in the DEIS and it denies public review and comment on this critical aspect of the SCMagLev proposal. Without this critical information, the number of jobs purported by the SCMagLev appears to be in support of their marketing effort rather than the need to provide honest, accurate, and valid data.

Also missing from the DEIS are those project management documents that provide any substantiation to these job years claims. Notwithstanding that work breakdown structures and schedules are not available, or in proof of existence, the range of miscalculation in the level of effort increases the cost of the project by an almost additional 50 percent. And the project has not even been approved. What will be the amount of the next level of effort estimation? Those who receive government funding should be good stewards of the government's money (our tax dollars). Included in that is transparency in all stages of a project.

The risk management portion of this project's management is lacking. In a supplemental SCMagLev DEIS, otherwise in the final EIS (FEIS), this information needs to be available prior to the rule of decision (ROD):

Request:

- The FRA must direct the BWRR to develop, implement, and publish an ongoing risk management assessment throughout all phases of the SCMagLev project life—planning, construction, operations, maintenance, upgrade, decommissioning, and possible failure of the SCMagLev. This assessment must be transparent to stakeholders, including the public, and proactively address internal and external risks to the project itself. This is distinct from SCMagLev Project-sourced risks to the community: Health & Safety, Section 4(f), and so forth, which are addressed elsewhere in the DEIS. This ongoing risk management assessment must provide:
  - ISO 31000.[278]
  - Initial and annual itemized risk buy-down budget (regardless of funding source).
- The FRA must provide an independent assessment of the work breakdown analyses and estimated labor hours and associated number of jobs, over the construction and operation phases.
- The FRA must direct the BWRR to publish and implement an SCMagLev Decommissioning Plan and itemized decommissioning budget (regardless of funding source).

  Because it is not clear that should the SCMagLev system fail and/or go bankrupt, that any other company would take over sponsorship and operation of the SCMagLev. The SCMagLev uses

[278] "IWA 31:2020 Risk management — Guidelines on using ISO 31000 in management systems." TC > ISO/TC 262. July 2020. www.iso.org/standard/75812.html?browse=tc.

proprietary, exotic, sole-source, and foreign-sourced technology, and potentially toxic, difficult, and costly-to-dispose materials and excavations.

- This information must be shared with the public, with sufficient time for public review and comment, before any consideration on a decision to move the SCMagLev project forward.

A decommissioning plan needs to be developed and shared with the public that addresses how impacted communities will be fully restored to their status before construction began, including environmentally safe removal of all above-ground, at-grade, underground structures and facilities, and RODs, to name a few, including restoring impacted residents and community facilities within or outside the limit of disturbance. This goes beyond usual construction and performance bonds.

Decommissioning costs would be included with total SCMagLev lifecycle costs (regardless of funding source), for comparison with the total lifecycle costs of other relevant transportation systems and their decommissioning costs, and their likelihood and difficulty of decommissioning. This would also include a plan and budget and identify funding sources for:

- Removal of all SCMagLev equipment and facilities.
- Restoration of all SCMagLev rights-of-way to status quo ante.

To date, there has not been a comprehensive cost versus benefit analysis provided. This analysis is a standard for any project management team but has yet to be presented to the public for the SCMagLev project. Only snippets of unsubstantiated claims of success and impact have been presented. The BWRR has failed to present the "how" any of this is going to be achieved. The NEPA process demands that such a high-dollar and high-negative impact project be presented with plans and documentation from a much higher-caliber project management team.

XLI. Employment

For a few years, the BWRR has been showing a slide claiming that building the SCMagLev will create 74,000 jobs. The slide below (slide #19) was taken from the presentation given by TNEM to the Prince

George's County Planning Board's Countywide Planning meeting on January 17, 2019.

The slide following (# 20) indicates that TNEM signed a Memorandum of Understanding with the North American Building Trades Union (NABTU), promoting the same misinformation.

However, in 2015, when the BWRR was providing testimony to the Maryland Public Service Commission (PSC), the direct testimony stated: "BWRR estimates that the construction phase would lead to the creation of 74,000 "job-1 years"(footnoted number 17) in Maryland".[279] Footnote number 17 in the BWRR written testimony gave the definition of "job-years": "A job year is equivalent to a year of full time employment; a worker employed half time for 5 years is enjoying 2.5 job-years, and a full time worker working for ten years represents ten job-years. Data are from pages 4-5 of Exhibit B of the Direct Testimony of Witness Racciatti."[280]

What this means is that if it takes eight years to build the SCMagLev, then the number of full-time jobs will be 9,250, that is: 74,000 job-years divided by 8 years equals 9,250 jobs. The BWRR and TNEM have continued past the release of the DEIS to use this grossly inaccurate, misleading terminology in project analysis and public promotion. In order to protect the integrity of the NEPA process, especially with public comments specific to what is represented in the DEIS, correct, accurate, and consistent terminology must be used. Anything less has the clear appearance of an attempt to obfuscate the truth.

With the release of the DEIS, employment projections climbed up to a potential 195,000 job years, with only a small increase of the projected total costs of the SCMagLev. There have been instances of using that number as "jobs" versus "job years," which is misleading. In an article from the *Southern Maryland Chronicle*, TNEM quotes up to 195,000 jobs, which is not what the DEIS states.[281] The DEIS clearly states

[279]Maryland Public Service Commission Testimony. Case No. 9355. Direct Testimony of C. Shelley Norman, PhD. October 14, 2015. Page11.
[280]Ibid.
[281] Cox, Jeremy. "High-Speed Train Could Go Through 'Irreplaceable' Land In Maryland." The Southern Maryland Chronicle. March 3, 2021. https://southernmarylandchronicle.com/2021/03/03/high-speed-train-could-go-through-irreplaceable-land-in-maryland/.

"job years" and not "jobs,"[282] yet TNEM and the BWRR continue misrepresenting the benefits of the project.

The lack of transparency and the marketing of the "job opportunities" is misleading in other ways. These figures give the impression that these numbers reflect new, full-time employment opportunities. In project management, the level of effort that is represented by "job years," in addition to new jobs, includes existing jobs that "touch" the project:

- ALL of the current BWRR and TNEM employees including executives, administrative staff, support staff, technical, and engineering staff.

- Currently employed full-time staff at consulting technical companies.

- Currently employed manufacturing line employees, such as those in Japan who work for Central Japan Railway Company (JRC), the maker and manufacturer of the trains and the technology that support the train.

- Currently employed JRC executives, administrative staff, support staff, and technical and engineering staff.

- Currently employed support and service industry employees, e.g., those who work for food, delivery, cleaning, printing, and advertising services.

If not employed by the SCMagLev project, the unions would have other jobs lined up to support the Amtrak infrastructure improvements, as well as MARC and other transportation infrastructure improvements. This project would not have the impact touted by its proponents, and it is not going to have any measurable impact on reducing unemployment.

In other DEIS job creation estimate inconsistencies (Section ES.4.3.1[283]), the number of permanent jobs created by the SCMagLev is given as 390 to 440. In Appendix G15,[284] the employment range is given as 1,350 to 2,080.

The DEIS is deficient because it fails to provide the following information, which leads to the following questions:

- Why are these discrepancies present in the various job estimates?
- What is the source of this apparent discrepancy?[285]
- What are the actual number of jobs, temporary and permanent?
- What methodologies are employed to generate these estimates?
- What are the sources of these data?
- How are the data for these models validated?

[282] DEIS Appendix-D.04, Table D.4-6. Page D-18.
[283] DEIS Section ES.4.3.1. Page ES-15.
[284] DEIS Appendix G15, Table 1. Page 2.
[285] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 3031. Page 13.

- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Request:

- The FRA must independently produce and/or validate the jobs projections and provide the methodologies and data sources used to produce these jobs projections.
- This information must be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

While neither MARC nor Amtrak have made service plans to mitigate the ridership losses predicted in the transportation analysis, it is apparent that jobs will be lost. However, without specific plans these losses cannot be quantified. In fairness, they should also not be ignored.

The DEIS should state if Amtrak and MARC do lose jobs resulting from the ridership losses to SCMagLev, then any estimated positive jobs economic impact of 390 to 440 permanent jobs produced by the SCMagLev would be reduced by job losses suffered by Amtrak and MARC. The potential job losses and the actual net job impact of the SCMagLev has yet to be quantified.[286] Without precise job categories, it is not yet possible to determine whether workers at MARC and Amtrak can transfer their job skills to the SCMagLev, or even if the SCMagLev jobs at the displaced skill level will be filled by American workers. Thus, it is possible that there may be no net gain in transportation jobs produced by the SCMagLev, and as Japanese workers are part of the labor mix, it is possible the net impact could be job losses for American workers. With the information available, it looks more likely there will be a net loss. Moreover, the $24.3 to $27.4 million in earnings from the SCMagLev[287] is approximately offset by competing transportation systems losses of $23.2 to $24.8 million (year 2030), as shown in DEIS Table 4.6-2.[288] Similar calculations might offset gains predicted for the SCMagLev in other parameters such as emissions. In effect, the SCMagLev may be approximately neutral, providing no significant gain in the transportation sector other than the time saved, for which SCMagLev users will pay a premium.[289]

XLII. Ridership

Much of the analysis appears to depend on ridership data requests, with multiple reports referenced for over several years. The DEIS and its appendices do not appear to include these reports or the data, nor can they be found on the BWRR or TNEM websites. However, like the origin and destination (O/D) pairs chosen, without their inclusion it is impossible for the public to understand the basis on which the economic arguments have been made to support building and operating the SCMagLev. For such a large project as the SCMagLev, full transparency should be required, and the ridership data should be included for public review and comment.

[286] DEIS Section ES.4.3.1. Page ES-15 and elsewhere.
[287] DEIS Chapter 0, Section ES.4.3.1. Page ES-15.
[288] DEIS Section 4.6.3.2. Page 4.6-1.
[289] Appendix - Reprint: Kowalski, M. “SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0.” 2021. Page 16.

On March 25, 2021, the MCRT sent a FOIA request asking for the ridership data used by TNEM to project their ridership and ridership revenue, a critical component to assess the validity of TNEM claims that the SCMagLev will generate the revenues needed to offset operational, loan payment, loan servicing, and taxes. In late April, the MCRT reviewed a copy of the document, finding the "reports" and "data tables" so heavily redacted that they were rendered useless. The BWRR posted the same document on its website with a public announcement. To emphasize - as a source of information to substantiate the ridership claims made by BWRR and TNEM, this document is useless. To date, none of the requested information has been provided. Transparency in the EIS process has been dismal and the project sponsor has been able to hide behind a very generous and inappropriate use of the word "proprietary."

The DEIS is critically deficient because it:

- Does not include the ridership data or analyses. Nor does the DEIS identify the methodologies used to generate the ridership projection, nor does it present information to substantiate and validate the data sources, the appropriateness of the applied methodologies, nor does it provide information on the accuracy of the ridership projections.
- This information must be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

XLIII. Ticketing

There appears to be no discussion about the ticketing process, which may affect passenger processing and, therefore, system operations.[290]

The DEIS is deficient because it fails to provide the following information that could answer these questions:

- Do riders buy a reserved ticket for a destination and a given train time or do they just buy a ticket and pick the next available train?
- In the former case, what do passengers do if their assigned departure train is unavailable because of a service disruption?[291]
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XLIV. Incomplete Modeling Results

DEIS Tables D.2-15 and D.2-16 do not give a complete picture of the modeling results.[292] They should both be split into two tables that show ante meridiem (AM) and post meridiem (PM) hours that include the peak periods (rush hour). Given its proximity to the SCMagLev, it is surprising that more entries along the BW Parkway were not included in these tables. Motorists mitigate backups by choosing

[290] Ibid. Page 35.
[291] Ibid. Pages 11-12.
[292] DEIS Appendix D.2. Pages A.5-25 to -26.

suitable alternate routes, which may require a decision at each and every interchange along a freeway, depending on their final destination ("bailout traffic"). Without higher fidelity in the presented data, it is difficult to obtain a complete picture. The following links along major North-South roads should be included: BW Parkway[293]@MD197 BW Parkway@I95, BW Parkway@MD410, BW Parkway@New York Avenue (Kenilworth-MD50 split), I95@MD32, I95@MD198, I95@MD200, MD29@MD32, MD29@MD198, MD29@ MD200. Finally, a summation row should be included at the bottom of each table.

Nevertheless, the current results presented in these tables do NOT support the claim that the SCMagLev reduces regional roadway traffic volumes in the 2045 Horizon Year compared with the No Build option. Indeed, for the BW Parkway@MD198 entry, the predicted volume increases compared with the No Build by 1.79 and 0.24 percent for the Cherry Hill and Camden station alternatives, respectively. There are few negative values in the percent change column between No Build and Build for the Cherry Hill option, and all the negative values for the Camden option are less than 1 percent. Thus, SCMagLev operations do nothing to decrease traffic congestion problem on the BW Parkway and, in fact, the data presented in the DEIS suggest building and operating the SCMagLev may make traffic matters slightly worse.

Finally, it is difficult to reconcile the results in Table 4.2-3[294] for the row "Diverted from Auto" with the results in Tables D.2-15 and -16. The results in Table 4.2-3 for 2045 are 14,877,281 and 16,480,393, depending on the Baltimore station location. This is a daily average of 40,759 and 45,152, lumping weekday and weekends together. The net daily changes in Tables D.2-15 total show a few thousand.

One of the many questions the DEIS fails to answer is:

- What are the origin points of the riders who diverted from automobiles and other vehicles (e.g., trucks and motorcycles)?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

It appears to be somewhere other than the regions reported in Tables D.2-15 and -16, which samples primarily the intercity corridor and not the Baltimore and Washington, D.C., city cores.[295]

The SCMagLev does not provide a commuter transportation system that supports a need in terms of real travel time, while touting a dubious travel time of 15 minutes from "DC to Baltimore" (sic) generically. For purposes of proper comparison of SCMagLev travel time with existing passenger rail between Washington, D.C., and Baltimore, the time purported by the SCMagLev as overall travel time should be measured as a trip between Mt. Vernon Square (D.C.) to Cherry Hill (Baltimore). There are several additional time periods left out of BWRR's specious 15-minute claim for the SCMagLev:

- Time to travel (car, taxi, Metro, bus ride, walk) in congested traffic from home or work to the station/parking where the Mt. Vernon Square station is not co-terminus with the NEC.
- Time to enter the Mount Vernon Square station.

[293] "BWP" as used in the DEIS stands for the Baltimore-Washington Parkway. MCRT uses the term "BW Parkway" to clarify references to the Baltimore-Washington Parkway.
[294] DEIS Section 4.2.3.4. Page 4.2-7.
[295] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 11-12.

- Time to get in line to pass through security.
- Time to walk from security to the train platform.
- Waiting for the train to arrive to onboard.
- Waiting for the train to leave.
- Once at the destination (Cherry Hill, which is not in downtown Baltimore and not co-terminus with the NEC), offboarding the train.
- Time to walk to the outside of the station to obtain transportation (car, bus, light rail). Walking is not considered a viable option due to the distance to the downtown Baltimore area from the Cherry Hill station.
- All these “left out” time segments add many minutes to the supposed “15-minute” trip from Washington, D.C., to Baltimore, not to mention any additional costs of parking or public transportation needed to get to and from stations in relation to the starting point and ultimate destination.

Any reference in the DEIS that promotes the inaccurate and misleading "15-minute" SCMagLev travel time between D.C. and Baltimore should be removed. This misinformation incorrectly conflates high-train speed with short passenger travel time, both in project analysis and public promotion. In order to protect the integrity of the NEPA process, particularly accurately informed public comments on the DEIS and decisions made by public representatives and officials, this misinformation needs to be corrected.

XLV. Traffic Analysis

Do the Metropolitan Washington Council of Governments (MWCOG) and Baltimore Metropolitan Council (BMC) regional traffic models accurately reproduce the present traffic count rates and reliability indices? In Section D.2E.2,[296] the project sponsor adapted these models for the SCMagLev traffic analysis. To determine potential ridership, the project sponsor identified travel volumes between key O/D pairs.[297] The choice of O/D pairs might influence ridership results and many pairs spanning the entire Baltimore-Washington corridor are necessary to understand traffic flow sufficiently.

The DEIS is deficient because it does not answer the following questions:
- What O/D pairs is the project sponsor using in projecting ridership?
- What methodologies are employed?
- How accurate is the modeling data?
- What are the validity assessments for the data and the modeling systems employed?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

[296] DEIS Appendix D.2, pages E-115 to -118.
[297] DEIS Appendix D.2, page B-104.

The ridership results in Table D.2-2 are 70,069 for the Cherry Hill station choice and 77,764 for the Camden Yards station choice. [298] These are critical values of ridership to ascertain the financial viability and economics sustainability of the SCMagLev.

The DEIS is deficient because it does not answer the following question:

- What is the sensitivity of those results to the input parameters (e.g., O/D pairs, ticket cost)?

This sensitivity might be expressed by putting an uncertainty range on the values, based on an accuracy measure of the input data and an assessment of the validity on the modeled results.[299]

XLVI. Ground Truth Validation

SCMagLev alignments are parallel to the BW Parkway throughout the entire viaduct and much of the tunnel sections. Therefore, for commuter car traffic between Baltimore and Washington, D.C., the SCMagLev will have its greatest effect, better or worse, on this major artery. Model analysis is often validated using direct experience (ground truth) and the application of common sense. The observations and conclusions summarized below come from the principal reviewer of this document, who commuted for 32+ years (1985-2017) from South Laurel (BW Parkway/Rt197 or BW Parkway/Powder Mill interchange) to the U.S. Naval Research Laboratory in southeast Washington, D.C., along the BW Parkway to the "split" and then on Kenilworth Avenue (DC 295), a distance of 21 miles. Note also that this reviewer habitually listened to WTOP traffic reports every 10 minutes for the duration of the commute, which is factored into the observations:

- From the MD197 southward, the bulk of traffic is going south in the AM rush hour and north in the PM rush hour.

- Local centers of employment (e.g., Fort Meade/NSA and NASA/Goddard) and local commuting within Prince George's and Anne Arundel Counties account for a smaller but significant stream of traffic that may be opposite to the rush hour bulk directions.

- Overall, there has been a steady and even increase in traffic density and decline in reliability. Commuters have shifted travel times to accommodate so that "rush hour" is longer than an hour. In 1985, the typical commute was 30 minutes going south and 35 minutes going north. In 2017, that commute had increased about 10 minutes in both directions. (Note that about half of this commute time was on Kenilworth Avenue/DC295, which itself has gone through various phases of upgrade and repair.)

- Significant traffic backups and reduced reliability are generally caused not by high-traffic density alone, but by accidents, which may occur more frequently with high-traffic density. Accidents mostly occur at or near interchanges, where turbulence to the traffic flow is introduced by merging vehicles.

[298] DEIS Appendix D.2, Section D.2A.2.1, page A-3.
[299] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0" 2021. Page 8.

- The accident rate decreased markedly after BW Parkway refurbishments of the federal portion (18 miles south of MD175) were completed, the first major repair campaign to be done since the roadway was opened in 1954.

    - Repair, reconstruction, or replacement of all bridges, except for the I-95 bridge over the BW Parkway (which is owned by the State of Maryland) and the NASA exit bridge (which is owned by the National Aeronautics and Space Administration).

    - Reconfiguration or reconstruction of six interchanges (MD32, MD197, MD410, MD193, MD202/450, US/MD201), excluding the I95 and NASA interchanges.

    - Repair of underlying concrete slabs and joints, as well as recoating with asphalt, and widening shoulders on both sides of travel lanes.

    - While a third travel lane was not added, a long northbound exit lane from Powder Mill Road to MD 197 was added. The exit lane is critical in drawing off significant amounts of northbound PM rush hour traffic headed for points in Greater Laurel.

    - The work was completed over a three-year period (1999-2002) in phases, which successfully minimized traffic flow impacts.

- Overall, the BW Parkway refurbishments reduced accidents, particularly because of improved (longer) merge lanes. Traffic flow greatly improved as compared with the level of service in 1985.

- Note the presence of a third traffic lane on the state portion nearer to I695 and on southbound of MD202 to the “split,” which also improves traffic flow in those portions.

- The present level of service on the BW Parkway has slipped from the level in 2002 to that shown for the PM rush hour reliability index in the DEIS,[300] which is about the same as that just prior to the 1999-2000 refurbishments. This figure chosen for the DEIS, taken from the 2019 Maryland State Highway Mobility report, is something of a worst-case scenario. The AM case is less severe, and this report has many informative figures and tables. There are several causes for this loss in level of service, among them:

    - A relatively higher accident rate at the Powder Mill and Route 197 interchanges, especially southbound during peak AM, primarily because of the large number of vehicles entering the highway from the Greater Laurel area. The Powder Mill interchange was not included in the 1997-2002 refurbishment.

    - The failure to regularly maintain the BW Parkway surface. At one point in March 2019, speed limits between MD197 and MD198 were dropped to 40 mph because a plethora of potholes had

[300] DEIS Appendix D.4, Section D.4D.2.4.2. Page D-39.

disabled many vehicles. This situation persisted for several months until emergency funds were found to resurface the road.

- Growth in traffic volume.

The principal reviewer's experience is not unique. Along the SCMagLev viaduct section, two regional entities can be defined (data taken from United States Zip Codes.org[301]):

- Greater Laurel, including the incorporated City of Laurel, all zip codes that touch the BW Parkway, and/or zip codes for those regions often referred to as satellites of the City of Laurel.
  - For ZIP codes 20707, 20708, 20723, 20734, 20705, 20763, 20755
  - Population: 140,303

- Housing units (non-rental): 54,469
  - Greater Greenbelt, including the incorporated City of Greenbelt and one other zip code north of the BW Parkway/I95 interchange that touches the BW Parkway.
  - For Zip Codes 20770, 20769
  - Population: 31,777
  - Housing units (non-rental): 13,557

- A good fraction of the residents in these regions use the BW Parkway in commuting in the AM to points southward and entering at MD32, MD198, MD197, Powder Mill Road, and MD193. It goes against common sense to expect any of them to drive north to the SCMagLev stations in Baltimore or at BWI to then go south to Washington, D.C. A similar argument holds for the reverse direction.

In summary, obvious conclusions can be drawn from these observations:

- Refurbishing BW Parkway interchanges (and those of other north-south arteries: I95, MD29) can increase level of service.
- Adding a third lane to the BW Parkway throughout its entire length would produce a high level of service without the SCMagLev.
- All roads require regularly scheduled maintenance to perform at design parameters.
- Commonsense arguments belie any hope that residents of Greater Laurel or Greater Greenbelt will use the SCMagLev for daily commuting.

Finally, in DEIS Section D.2A.15.2, the mitigation discussion for every single work site subsection requires regional roads to be maintained in good repair.[302] Funding for road maintenance is traditionally done using fuel taxes on trucks, but there is no guarantee that such taxes are obligated to any project. With the SCMagLev, massive construction will be going on more or less simultaneously along the whole alignment for at least three years. Thus, road degradation will exceed the available resources to keep impacted roads in good repair.[303]

[301] United States Zip Codes.org. 2021. www.unitedstateszipcodes.org/.
[302] DEIS Appendix D.2, Section D.2A.15.2. Pages A-62 - A-83.
[303] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 8-11.

XLVII. Synopsis of Problems in Japan with SCMagLev

SCMagLev technology under consideration in the DEIS in all alternatives except the No Build option has numerous limitations that make it a questionable choice for an expensive, impactful megaproject that will take at least seven years to implement. Multiple problems have come to light with the ongoing construction of the Linear Chuo-Shinkansen in Japan that could impact the implementation of the SCMagLev technology in the United States and lead to a very expensive and wasteful boondoggle. Chief among these issues is that the sole implementation of this technology is on a test "track" configuration in Japan. This only implementation of SCMagLev technology is not commercially operational and will not be until at least 2027, and likely later, long after the current planned release of the SCMagLev FEIS and ROD by the U.S. FRA. Current total ridership on the test track in Japan is approximately 300,000,[304] which is about the number of riders on MARC in a week (Pre COVID-19).

Another risky characteristic of the SCMagLev technology is that it is proprietary, unique to one provider, with only one incomplete system in prototype. Its choice for implementation of any alternative other than No Build will result in a transit system that is highly vulnerable. As Philepsen points out:

> In a time when there is a lot of talk about resilience, vulnerable systems are questionable. High-speed systems of any kind are far more vulnerable than traditional trains but Maglev poses its own set of vulnerability. Dependence on one single manufacturer and its patent is a huge vulnerability. The fact that Maglev trains can't derail, can't collide with each other (at least not on the same track) and may be thus safer than conventional trains doesn't eliminate its vulnerability as a monopoly.[305]

Not only is the Japanese implementation of SCMagLev Linear Chuo-Shinkansen proprietary, but on analysis, it is infeasible according to several other key aspects. "In his intensive analysis on the feasibility of the Linear Shinkansen plan, Hashiyama Rejiro considered three aspects; economic feasibility, technological reliability, and environmental appropriateness. He concluded that it was deficient in all three."[306] The build alternatives set forth in the DEIS, all involving the SCMagLev technology, should be independently evaluated against these three criteria to determine the feasibility of this technology as a better alternative to the No Build option.

Another development in the construction of the Linear Chuo-Shinkansen that could impact the implementation of SCMagLev technology in the United States is the refusal of the governor of the Shizuoka prefecture to allow construction because of environmental concerns. These concerns include "the construction's potential impact on 290 species of local flora and fauna as water levels at the local Oi River are expected to become lower due to earth moving work to build a tunnel, as well as the effects of

[304] Patterson, Torkel. "High Speed Rail: Supporting Sustainable Development and Economic Growth." Global Railway Review. April 6, 2020. Retrieved from High-speed rail: Supporting sustainable development and economic growth on May 1, 2021. www.globalrailwayreview.com/article/99036/high-speed-rail-sustainable-economic-development/.
[305] Philepsen, Klaus. "Can Maglev trains make the US a leader in high speed rail?" Community Architect Daily. October 29, 2018. http://archplanbaltimore.blogspot.com/2018/10/can-maglev-trains-make-us-leader-in.html.
[306] Hidekazu, Aoki & Nobuo, Kawamiya. "End Game for Japan's Construction State - The Linear (Maglev) Shinkansen and Abenomics." The Asia-Pacific Journal 15 June 2017. https://apjjf.org/2017/12/Aoki.html.

water pollution on the environment."[307] The concerns raised by the citizens of Shizuoka prefecture highlight the need for further analysis of the environmental impact of the tunneling used with the SCMagLev before any consideration is given to move forward with the project.

Finally, as in the United States, transit patterns have changed due to the precautions adopted in response to the COVID-19 pandemic that may impact the availability of funding and support for the completion of the Linear Chuo-Shinkansen SCMagLev project in Japan, which is so expensive it will have to be subsidized with revenue from the high-speed rail service.

> Commuting and travel patterns shaped by the rise of the Shinkansen are in flux, thanks to the growth of remote work during the pandemic. That's delivering a jolt to Japan's hidebound office culture, and potentially transforming the role and purpose of the rail network that serves it. In particular, major shifts in demographics and national travel patterns might complicate the arrival of the long-awaited next generation of the rail network: the $84 billion Linear Chuo Shinkansen, which could travel at more than 300 mph.
>
> The scale of the current ridership crash is indeed huge. For the quarter ending June 30, Central Japan Railway Company (JR Central), which operates the Tokaido Shinkansen, the oldest and most profitable bullet train service, reported a revenue drop of almost 73% compared to 2019. Ridership on the Tokaido Shinkansen for the period of August 7 through 17 — typically one of the busiest travel periods of the year — was down 76%. Another company, JR East, posted its first-ever loss in the first quarter of 2020 and cut Shinkansen services by 40% starting in May; the company also slashed fares by 50% through March 2021. The company is projecting its largest net loss since Japan's railways were privatized in 1987, with estimated losses for FY2020 coming in at $3.96 billion (its FY2019 profit was $1.9 billion).[308]

The lack of a fully operational SCMagLev in Japan could cause severe impacts in the United States if the technology is implemented prematurely. Many property owners wonder if they even could obtain homeowner's insurance if an immature, partially developed technology runs under or close to their homes, or if premiums would be raised to cover unforeseen problems. **The final EIS should address the problems surfacing in Japan as reflected in the credible sources cited and described within this comment. It also should consider the level of risk the alternatives using SCMagLev technology pose in light of these problems when making a final decision. The No Build option should be favored over any alternative using SCMagLev technology thus far presented.**

[307] Yamada, Hideyuki. "Maglev train tunnel construction could affect habitat for 290 species: central Japan pref." The Mainichi. July 7, 2020. https://mainichi.jp/english/articles/20200707/p2a/00m/0na/011000c.
[308] Sieloff, Sarah. "Japan's Bullet Trains Are Hitting a Speed Bump." Bloomberg 14 October 2020. www.bloomberg.com/news/features/2020-10-07/can-japan-s-bullet-trains-get-back-up-to-speed.

XLVIII. Covid-19 Impact

Resulting from the pandemic and the implemented "lock downs," many knowledge-based workers have been teleworking from home. Over this past year, we have witnessed a massive expansion in the use of virtual meeting apps and, with the explosion in their use, these apps—Zoom, Skype, GoToMeeting, and others—have made significant improvements in reliability and access. This forced experience has clearly shown employers and employees, especially knowledge-workers, that work can be performed at required levels of performance from home or other remote locations.

Even before the pandemic, the advent of telework had already begun to reduce office space requirements, improve employee work life balance, and reduce funds expended for rent. Telework has now come to the fore. Coupled with future office planning incorporating "hot seating," open space, common work areas, and the next generation of workers who are comfortable with virtual meetings and the related technologies, employees will only come into "the office" on a weekly, bi-weekly, or monthly basis. Covid-19 has accelerated this evolution, which will allow agencies and their support contractors to reduce their office space, furnishings, and utility costs requirements, and plow the savings back into mission-related work. This development, coupled with federal agencies located in Washington, D.C., moving portions of their operations to other parts of the country, has and will continue to impact projected daily ridership of all forms of commuting in and out of our nation's capital.

These changes will have significant impact on projected ridership of all existing transportation systems. As such, it raises more questions as to the need to build the SCMagLev.

The DEIS is deficient because it fails to provide the information that leads to the following questions:

- What are the ridership projections considering the impact of increasing use of teleworking?
- How have the ridership projects changed as a result of agencies and support contractor experiences with maintaining ongoing operations during COVID-19 lockdowns?
- What level of taxpayer subsidy will now be needed to operate the SCMagLev? What is the projected increase in subsidies?
- What is the projected impact on Amtrak and MARC ridership and their respective subsidy requirements?
- SCMagLev's funding is reportedly a loan from a Japanese bank; how has the coronavirus affected that pledge?
- This information must be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

XLIX. Demand, Costs and Impacts

In response to the questions posed at the outset of this section, below are our summary findings:

1. What is the problem the SCMagLev will solve?
The BWRR lays out the argument that with the projected population growth in the Northeast Corridor the need for a high-speed, ground-based transportation system like the SCMagLev is warranted. But BWRR's claims analyses and the DEIS are deficient in establishing what percentage of this population would likely use the SCMagLev. The analyses needed for an independent assessment of BWRR's claims is not included in the DEIS.

Conclusion:
While the regional population growth will likely occur, there is insufficient information to assess if the increase in population will translate into substantial numbers of potential riders for the SCMagLev to generate the revenue needed to cover its expenses. Looking at worldwide experiences with such systems, there is a high likelihood that the SCMagLev will require tax dollars in the form of subsidies to meet operating and maintenance costs, as well as all loan servicing obligations, and meet tax obligations.

2. Is there sufficient demand to generate the revenue needed to maintain and operate the SCMagLev?
As discussed earlier, analyses from the Maryland Public Policy Institute[309] raises serious questions about who within the demographics of Baltimore residents would have the level of income to use the SCMagLev, instead of the MARC or bus services, and who live in the immediate surrounding neighbors, that is the geographic areas from which SCMagLev use is an option. The results are clear, given the lower income level of the population within the potential ridership service zone, the likelihood is low to very low. To sate this another way: SCMagLev is unlikely to be used by the majority of the existing Baltimore population. Add this limiting factor to the potential ridership population, and the massive rise in the use of telework by knowledge-based workers (from the remaining population who might use SCMagLev) as the result of COVID-19 lockdowns, and the potential number of riders for the SCMagLev crumbles.

Conclusion:
It is unlikely that in this scenario the SCMagLev will have (if they ever did have) the numbers of riders needed to maintain the financial stability of the operation.

3. What is the total cost to build this SCMagLev?
The total cost to build the SCMagLev can only be derived from investigating not only the financial costs, but also the costs to communities, businesses, alternative systems, and the environment. An assessment of the costs to residents, communities, and our environment to build the SCMagLev is not adequately provided in the DEIS. Much more detailed, independently verified information needs to be provided. This submission by the MCRT attempts to identify and discuss the full costs of building and operating the SCMagLev. From the results of our research and investigations, and from what information we have been able to assemble, the findings are clear:

[309] Appendix - Article Reprint: Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." The Maryland Public Policy Institute. December 7, 2018

The cost residents, communities, and environment to build and operate the SCMagLev is extreme.

With all the missing and obfuscated information, the lack of transparency about the real and total costs to build and operate the SCMagLev, and the presence of real, operational, affordable, and superior rail systems like Amtrak and MARC, the FRA should no longer waste resources on considering building the SCMagLev and instead choose the No Build Option.

So, in the final equation for the SCMagLev:
Baltimore income demographics limit potential ridership
+ PLUS +
Geographic area surrounding the SCMagLev stations limit on potential ridership
+ PLUS +
Costs to ride the SCMagLev versus alternative bus or the MARC system
+ PLUS +
Expansion of teleworking use and capabilities
+ PLUS +
The coming generation of workers comfortable with telework and virtual meetings
+ PLUS +
The high cost to build and operate the SCMagLev
+ PLUS +
Safety and crashworthiness concerns with the SCMagLev
+PLUS +
The environmental destruction the SCMagLev will bring to Maryland
+ PLUS +
Better alternatives using existing Amtrak and MARC
= **EQUALS** =
SCMagLev is too unproven, has safety and crashworthiness issues,
and is far too costly financially and environmentally,
compared with existing systems and their planned improvements.
The only SOLUTION is the No Build Option.

L. The DEIS Fails to Address the Impact on Residents and Communities Through Which the SCMagLev Will Travel

The DEIS is woefully lacking in adequately presenting the known and potential negative consequences building and operating the SCMagLev will bring to communities, businesses and residents. The BWRR claims the construction will bring minor inconveniences and the operation of the SCMagLev will be hardly noticeable. However, independent assessment and research presents a far different picture. These impacts are ignored, or significantly downplayed in the DEIS. The actual impacts need to be

known and clearly articulated prior to any decision by the FRA. The SCMagLev DEIS fails to provide this information and is therefore deficient. With these glaring deficiencies, the FRA should choose to No Build option.

LI. The Building and Operation of the SCMagLev Will Have Significant and Potentially Health Harming Impacts on Human and Wildlife and Property

1. Tunnel Ventilation - Potential Toxins, Carcinogens, and Radioactive Gas Release

The BWRR planning calls for the building of ground-level fresh air and emergency egress FA/EE structures. The BWRR has stated the ventilation facilities are needed to:

(1) Allow workers into the tunnel for maintenance.
(2) Provide a way for passengers to leave in case of an emergency, and allow emergency personnel to enter.
(3) In case of fire, ventilation facilities will exhaust the smoke out of the tunnel.

The BWRR plans to build one of these surface facilities every three (3) to four (4) miles along the tunnel segments. With FA/EEs located every three (3) to four (4) miles along the tunneled section of the SCMagLev, in case of an emergency passengers and emergency personnel would have to walk up to two (2) miles. They would also need to descend or ascend 80 to 150 feet to reach the surface.

The DEIS is deficient as it does not answer the following questions:

- How is this going to work for a firefighter carrying 50 to 70 pounds of gear?
- How will a disabled passenger exit?

At the October 17, 2017, BWRR-Maryland Transit Administration (MTA) Open House, Ms. Cosema Crawford, PE, Senior Vice President representing Louis Berger (the engineering firm hired to study the building of a superconducting maglev train between Washington, D.C., and New York), provided the following information:

> The ventilation facilities' primary purpose is to clear smoke in case there is a fire in the tunnel. The ventilation units will force air into the tunnel on one side of the tunnel section with smoke, and the next ventilation facility will exhaust the smoke-filled air from the tunnel. In other words, one ventilation facility will pressurize the tunnel ahead of the section of the tunnel with smoke and the alternate ventilation facility will depressurize the tunnel to exhaust the smoke to the atmosphere.

What Kind of Fire Could Occur in a SCMagLev Tunnel Section?

If the fire resulted from a train accident or some type of electrical event, the fuel for the fire would likely be lubricants, plastics, and electrical wire insulation. A Massachusetts Institute of Technology School of Engineering article states: "When plastic is burned, it releases dangerous chemicals such as

hydrochloric acid, sulfur dioxide, dioxins, furans and heavy metals, as well as particulates." [310,] As noted on the American Cancer Society website, many of the compounds that would be generated by such an electrical fire ". . . are known to cause respiratory ailments and stress human immune systems, and they're potentially carcinogenic.".[311]

The DEIS is deficient as it does not answer the following questions:

- How will the smoke, containing known toxins and carcinogenic compounds, exhausting into the atmosphere be mitigated to protect people and wildlife near the FA/EE?
- Will the residents and anyone near the FA/EE exhausting smoke be alerted that smoke from an SCMagLev fire is venting into their community?
- What are the potential and likely health risks to humans and wildlife exposed to and breathing in the smoke being vented out of the tunneled section and into the atmosphere?
- Property near the FA/EEs will lose value because of the undesirability of living near a structure that at any time could spew out smoke filled with toxic and carcinogenic compounds. What is the likely property value loss, and will the affected property owners be compensated by TNEM?
- On what determinants will compensation be based, and will property owners be compensated?
- What is the likely property tax loss? How will this be calculated? Will the affected jurisdiction be compensated by TNEM for the loss in property taxes resulting from the devalued property?

What About Radon Gas?

The proposed tunneling route from Baltimore to BWI and onto southern Anne Arundel County, and under Prince George's County into Washington, DC, includes areas with known radon gas levels of .02 pCi/L to 4.0 pCi/L. [312,313]

Maryland is a radon gas "hot spot." Average measurements across the state range for 0.2 pCi/l to 61 pCi/L.[314] Radon (symbol Rn, atomic weight 86) is a radioactive gas released from the normal decay of the elements uranium, thorium, and radium in rocks and soil. It is an invisible, odorless, and tasteless gas that seeps up through the ground and diffuses into the air. In a few areas, depending on local geology, radon dissolves into ground water and can be released into the air when the water is used. Radon gas usually exists at very low-levels outdoors. However, in areas without adequate ventilation, such as underground mines, radon can accumulate to levels that substantially increase the risk of lung cancer."[315] The same would likely be true for the SCMagLev tunnel. According to the Environmental Protection Agency (EPA), "Radon in air is ubiquitous (existing or being everywhere at the same time). Radon is found in outdoor air and in the indoor air of buildings of all kinds. EPA recommends homes be fixed if the radon level is 4 pCi/L or more. Because there is no known safe

[310] Biemiller, A. "Can we safely burn used plastic objects in a domestic fireplace? No, you can't. Don't even think about it…" School of Engineering, Massachusetts Institute of Technology. Posted March 12, 2013. https://engineering.mit.edu/engage/ask-an-engineer/can-we-safely-burn-used-plastic-objects-in-a-domestic-fireplace/
[311] To see the current list of known and probable cancinogenic substances from the American Cancer Society, go to: www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html.
[312] About Radon Levels in Anne Arundel County. www.county-radon.info/MD/Anne_Arundel.html - Radon levels in Anne Arundel County average 3.3 pCi/L, with a range from under 2 pCi/L to 61 pCi/L. (Note: pCi/L stands for Picocuries Per Liter.)
[313] About Radon Levels in Prince Georges County. www.county-radon.info/MD/Prince_Georges.html - Radon Levels for Prince George's County also range from 2 pCi/L to over pCi/L. (Note: pCi/L stands for Picocuries Per Liter.)
[314] Radon Levels Across Maryland. phpa.health.maryland.gov/OEHFP/EH/Pages/Radon.aspx.
[315] "Radon and Cancer." American Cancer Society. Last reviewed December 6, 2011. www.cancer.gov/about-cancer/causes-prevention/risk/substances/radon/radon-fact-sheet.

level of exposure to radon, EPA also recommends that Americans consider fixing their home for radon levels between 2 pCi/L and 4 pCi/L."[316]

Consider the miles-long, 43-foot diameter tunnel, 80 to 150 feet below ground level, starting in Baltimore and ending in southern Anne Arundel County, as well as the miles-long tunneled section starting in Prince George's County and running under Washington, D.C., to the Mount Vernon station, and the potential collection of radon gas. As high-speed trains run through the tunnel, the air pressure wave at the front of the train will build, forcing air displacement to the sides and over the top of the train, as will other lower air pressure areas, including ventilation shaft openings to the surface. If this radioactive radon gas is present, it will be pushed out into the community through the ground-level ventilation facilities, exposing anyone in nearby homes, businesses, and schools, as well as people living, playing, and working in the area. While the level of radioactive gas will likely be low, the impact on the property values near these facilities will be negatively affected.

The DEIS is deficient as it does not answer the following questions:

- Will the exhausted air displaced by the running of the SCMagLev in the tunnel be tested for radon gas?
- Will radon gas be continuously monitored or periodically tested? If periodically, how frequently?
- Who will conduct the tests? What is their relationship with TNEM, the BWRR, and anyone associated with the SCMagLev?
- If radon gas is found at the ventilation stations, what is the mitigation plan?
- If found, will residents near the facility be notified of the presence and concentration of the radon gas?
- What are the potential and likely short- and long-term health risks to humans and wildlife exposed to and breathing the radon gas present at the FA/EEs?
- Property near the FA/EEs will lose value because it is undesirable to live near a structure that at any time could spew radioactive gas. What is the likely property value loss, and will the affected property owners be compensated by TNEM?
- On what determinants will compensation be based, and will property owners be compensated?
- What is the likely property tax loss? How will this be calculated? Will the affected jurisdiction be compensated by TNEM for the loss in property taxes resulting from the devalued property?

2. Electromagnetic Fields Exposure and Human-Wildlife Health

Electromagnetic fields (EMFs) surround us. Some EMFs occur naturally and some are man-made. While the medical and scientific communities take the general position that the evidence is inconclusive, the effects of increased exposure to man-made non-ionizing EMFs on human health is a growing concern. Current research is finding connections between EMF exposure and disease. A growing body of recent studies have found that long-term exposure to man-made EMFs negatively affects human health. Considering the increasing level of electromagnetic energy to which people are exposed, concerns about the additional exposure to the high-level of electromagnetic energy generated by the SCMagLev system needed to lift and propel the multi-ton train and its potential to

[316] "What is EPA's Action Level for Radon and What Does it Mean? U.S. Environmental Protection Agency. 2021. www.epa.gov/radon/what-epas-action-level-radon-and-what-does-it-mean.

impact our health need to be well researched and quantified before any consideration of building and operating the SCMagLev is considered.

Over the last century, there has been increasing exposure to higher levels of man-made sources of non-ionizing EMFs. Recent technological developments have made the electromagnetic environment more prominent in our lives. Present both in occupational environments and daily life, these EMF-generating technologies include, but are not limited to, industry equipment (e.g., welding machines, induction heaters), telecommunications (e.g., television, radio broadcast stations), medical diagnostic tests, and in daily life (e.g., microwaves, mobile phones and mobile phone base stations, Wi-Fi, Bluetooth, etc.).

The adverse health effects of exposure to EMFs are a growing source of great concern within governmental and non-governmental organizations responsible for public health. Ongoing studies include an explanation of non-thermal effects of radiofrequency electromagnetic fields (RF EMFs) on human health.

Questions and Concerns

(1) What are electromagnetic radiation and electromagnetic fields?
The EPA defines electromagnetic radiation (EMR) and EMFs:[317]

- Electromagnetic Radiation (EMR) consists of waves of electric and magnetic energy moving together through space. An example of electromagnetic radiation is visible light. Electromagnetic radiation can range from low to high frequency, which is measured in hertz, and can range from low to high energy, which is measured in electron volts. Wavelength, another term associated with electromagnetic radiation, is the distance from the peak of one wave to the next.

- There are two general kinds of electromagnetic radiation: ionizing radiation and non-ionizing radiation. Ionizing radiation is powerful enough to knock electrons out of their orbit around an atom. This process is called ionization and can be damaging to a body's cells. Non-ionizing radiation has enough energy to move atoms in a molecule around and cause them to vibrate, which makes the atom heat up, but not enough to remove the electrons from the atoms.

- Electromagnetic fields (EMF) associated with electricity are a type of low frequency, non-ionizing radiation, and they can come from both natural and man-made sources. For example, lightning during a thunderstorm creates electromagnetic radiation because it creates a current between the sky and the ground. Surrounding that current is an electromagnetic field. One example is the Earth's magnetic field. We are always in the Earth's magnetic field, which is generated at the Earth's core. This magnetic field makes compasses work and is also used by pigeons and fish to navigate.

(2) What is the best way to assess the effects of EMFs on human health and why should we be concerned?

[317] U.S. Environmental Protection Agency. "Electromagnetic Radiation (EMR)" and "Electromagnetic Fields (EMF)." www.epa.gov/radtown/electric-and-magnetic-fields-power-lines.

Recent epidemiological studies provide evidence of the possible health effects of EMF exposure:

- In 2020, research studies reported the association between maternal exposure to magnetic field non ionizing radiation during pregnancy and the risk of Attention-Deficit/Hyperactivity Disorder (ADHD) in their offspring. The study was conducted at Kaiser Permanente Northern California with 1,482 mother-child pairs participating and EMF exposures captured during pregnancy in two studies conducted from October 1, 1996, to October 31, 1998, and from May 1, 2006 to February 29, 2012. The offspring were followed from May 1, 1997 to December 21, 2017. The main outcomes from the two studies showed physician-diagnosed ADHD and immune-related comorbidities (having multiple medical conditions) of asthma or atopic dermatitis up to 20 years of age in the offspring. These findings reveal probable new risk factors now prevalent in our modern-day life and should necessitate more scrutiny, possible restrictions, and at least more research on EMF.[318]

- Another study evaluated Electromagnetic Hypersensitivity Syndrome (EHS), characterized by a variety of nonspecific symptoms that can vary with individuals. The symptoms are real and vary in severity. EHS can be disabling for affected individuals. It is classified as a functional impairment in Sweden. Spain has recognized EHS as a permanent disability. (Note: The U.S. government has not recognized EHS as a disability as of the date of this submission.) Below are the reported symptoms from individuals exposed to EMF:[319]

Abdominal pain	Headache	Numb limbs
Anxiety	Head pressure	Phosphenes
Appetite loss	Heart eat irregularity	Rash
Arousal decreased	Heart palpitation	Restlessness
Blood pressure increase	Hormonal disorder	Skin burning
Breathlessness	Hypersensitivity to medication	Skin redness
Chest pain	Hypersensitivity to noise	Skin tingling
Concentration difficulties	Intestinal trouble	Sleep disturbance
Crankiness	Irregular bowel movement	Stress
Daytime sleepiness	Irritation	Sweating
Digestive problems	Itching skin	Swollen eyes
Dizziness	Limb pain	Swollen joints
Dry skin	Metabolic disorder	Tachycardia
Exhaustion	Mood changes	Tenseness
Faintness	Mood depression	Tiredness
Fatigue	Muscle cramps	Toothache
Fear	Muscle pain	Trembling
Feebleness	Nausea	Unfeelingness

[318] De-Kun l., H. Chen, J.R. Ferber, et al. "Association Between Maternal Exposure to Magnetic Field Nonionizing Radiation During Pregnancy and Risk of Attention-Deficit/Hyperactivity Disorder in Offspring in a Longitudinal Birth Cohort." Journal of the American Medical Association. March 24, 2020. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2763232.

[319] Leitgeb, N. Chapter 5: Electromagnetic hypersensitivity. In: Advances in Electromagnetic Fields in Living Systems: Volume 5, Health Effects of Cell Phone Radiation, J.C. Lin, ed. New York, New York: Springer. 2009. http://gnusha.org/~nmz787/biological%20radio%20research/Electromagnetic%20Hypersensitivity.pdf.

Feeling hot	Neck pain	Vision blurring
Forgetfulness	Neuralgia	Vomiting
Hair loss	Neurasthenia	Weariness

(3) What other medical studies have been reported to support the negative impact of EMFs on human health?
Studies have been done worldwide on the effects of EMF exposure on human health. A key finding of these studies is that the closer the proximity to the source of the EMF, including a broadcast transmitter or a single phone base transmitter, the more symptoms were reported, including sleep disorders. Also, the type of EMF and its strength and duration can diminish or intensify with the variability of the RF EMFs. Some of these studies are described in the bullets below.

- As reported in 2019, the International Agency for Research on Cancer classified RF EMFs as a possibly carcinogenic to humans (group 2B) in May 2011.[320]

- In 2015, the Scientific Committee on Emerging and Newly Identified Health Risks reported on the effects of EMF exposure in frequencies already used by mobile telephone companies. In this report, epidemiological studies were completed on RF EMF exposure. Researchers found an increased risk of glioma (tumor in the brain or spine) and acoustic neuroma (a benign tumor that develops on the balance (vestibular) and hearing, or auditory (cochlear), nerves leading from your inner ear to the brain), in heavy users of mobile phones.[321]

- A 2017 study by Yang, et al., indicated long-term (over ten years) use (exposure) of the mobile phone increases the risk of intracranial tumors, mostly gliomas, particularly in the case of the same-side exposure. This means if the user has the phone to the right ear predominantly (not necessarily all the time), then the glioma occurs on the right side of the brain.[322] Additional 2017 research studies regarding the risk of mobile phone use and health impacts include Bortkiewicz et al., Carlberg and Hardell, Momli et al., and Prasad et al. (See the Sources section at the end of this section for the references.)

- In 2019, an advisory committee of the International Agency for Research on Cancer (IARC) recommended the agency reassess the cancer risks involved with RF EMFs and recommended this research should be “high priority.” “The group, with 29 members from 18 countries, suggests that the new evaluation take place between 2022 and 2024. In May 2011, an IARC

[320] Moskowitz, J.M. Electromagnetic Radiation Safety: International Agency for Research on Cancer (WHO) Position on Radiofrequency Radiation. November 4, 2019. www.saferemr.com/2019/11/IARC-RFR-cancerrisk.html. Röösli, M. “Radiofrequency electromagnetic field exposure and non-specific symptoms of ill health: A systematic review,” Pages 277-287 in Environmental Research 107. 2008. https://media.ellinikahoaxes.gr/uploads/2017/04/rsli2008.pdf.
[321] Scientific Committee on Emerging and Newly Identified Health Risks. “SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks), Potential health effects of exposure to electromagnetic fields (EMF).” January 27, 2015. Download available at: www.researchgate.net/publication/291329105_SCENIHR_Scientific_Committee_on_Emerging_and_Newly_Identified_Health_Risks_Potential_health_effects_of_exposure_to_electromagnetic_fields_EMF_27_January_2015.
[322] Yang, M., W. Guo, C. Yang, J. Tang, Q. Huang, S. Feng, A. Jiang, X. Xu, and G. Jiang. “Mobile phone use and glioma risk: A systematic review and meta-analysis.” PLoS One 12, e0175136. May 4, 2017. pubmed.ncbi.nlm.nih.gov/28472042/.

expert committee classified RF radiation as possible human carcinogen [Group 2B]. Since then, the evidence has grown stronger."[323]

(4) What other medical issues are related to EMF exposure and human health?
Within the modalities of medical diagnostic testing, specifically magnetic resonance imaging (MRI), patients with cardiac pacemakers, as well as those with implantable cardioverter-defibrillators (ICDs), are cautioned before having an MRI. The electromagnetic field generated by the MRI can interfere with the functioning of these devices and can alter or stop the functioning of the apparatus while exposed to the electromagnetic field. The current information from the Mayo Clinic[324] and Johns Hopkins[325] states that even with the newer models of pacemakers, the MRI electromagnetic field strength should not exceed 1.5 Tesla, along with other considerations, including the type of pacemaker and manufacturer, what type of leads are being used, the duration of the scan, and the type of scan. Type of scans are functional MRI, breast MRI, magnetic resonance angiography, magnetic resonance venography, and cardiac MRI. These same criteria apply to patients with embedded ICDs. Exposure to the electromagnetic field during an MRI can heat up leads on the older models of pacemakers. If not carefully controlled, the MRI can interfere with the functioning of the embedded devices, including altering or stopping their functioning.

(5) How do EMF exposure and health issues relate to the SCMagLev?
The same concerns of the malfunctioning of cardiac pacemakers and ICDs could potentially arise with exposure to the far stronger 15 Tesla-strength electromagnetic field needed to lift and propel the SCMagLev. (Remember 1.0 Tesla to 1.5 Tesla is the maximum for an MRI EMF strength to safeguard the patient with a pacemaker or ICD.) People with pacemakers and ICDs should be wary of riding the SCMagLev. The U.S. Department of Transportation (USDOT), Federal Railroad Administration (FRA), and Maryland Department of Transportation (MDOT) Draft Environmental Impact Study (DEIS), states:

- "The electric fields associated with the SCMAGLEV may be of sufficient magnitude to impact operation of a few older-model pacemakers; in such cases, the older-model pacemakers may revert to an asynchronous pacing while in the presence of the SCMAGLEV Project. Cardiovascular specialists do not consider prolonged asynchronous pacing to be a problem. Cardiovascular specialists commonly use asynchronous pacing to check pacemaker operation; therefore, while the SCMAGLEV project's electric field may impact operation of some older-model pacemakers while in the presence of the SCMAGLEV, the result of the interference would be of short duration and not considered harmful. Pacemakers revert to their normal mode of operation once out of the immediate area of the SCMAGLEV Project."[326]

[323] Microwave News. IARC Urged to Revisit RF Risk: Animal Studies Prompt Calls to Upgrade Classification to "Probably Carcinogenic" or Higher. Last updated October 30, 2019. https://microwavenews.com/short-takes-archive/iarc-urgedreassess-rf.
[324] "New protocols allow for MRI in selected patients with pacemakers." Mayo Clinic. September 5, 2013. www.mayoclinic.org/medical-professionals/cardiovascular-diseases/news/new-protocols-allow-for-mri-in-selectedpacemaker-patients/mac-20430571.
[325] "Living with a Pacemaker or Implantable Cardioverter Defibrillator ICD." Johns Hopkins Medicine. www.hopkinsmedicine.org/health/wellness-and-prevention/living-with-a-pacemaker-or-implantable-cardioverter-defibrillator-icd.
[326] DEIS Chapter 4(f), Section 18, Table 4.18-3. Page 9.

The DEIS is deficient as it does not answer the following questions:

- Who are these cardiovascular specialists and where are their reports?
- How independent were they in conducting their research?
- The DEIS has references dating back to 1996 to support their statements. Much research and a better understanding about the relationships between EMF exposure and human health have been found over the past two and a half decades. What current research references can TNEM and the FRA present to support their position?

As stated in the DEIS: "Unlike high voltage transmission lines, EMF exposure from the SCMagLev project would not be constant. EMF exposure would only occur as the train passes by. Additionally, the exposure level would be lower than a high-voltage transmission line, as the Shinkansen website states that the train reportedly complies [*underline added*] with the International Commission on Non-Ionizing Radiation Protection standards. As previously stated, the EMF inside the train and along the tracks is approximately one third of the International Commission on Non-Ionizing Radiation Protection guidelines and is safe for persons with medical pacemakers."[327]

The DEIS is deficient as it does not answer the following questions:

- Note the phrase "reportedly complies." When was this research done? There are no references provided to back up these statements.
- Again, who are the authors, when was this research conducted, and where are the reports?

(6) Are the EMFs generated by the SCMagLev a potential health issue?
With the implications of current research on EMF exposure and disease and the increasing impact on human health, adding exposure to the far stronger EMFs generated by the high-powered electromagnets used to operate the SCMagLev, there is the potential for increased, additional, and more severe health issues.

The USDOT-FRA-MDOT *Final Alternatives Report* states: ". . . superconducting maglev (SCMAGLEV) technology, which differs from other maglev systems (such as the German Transrapid system) in that SCMAGLEV accelerates and decelerates through an electromagnetic force generated between superconducting magnets on the vehicle and reaction coils on the guideway sidewalls. The superconducting magnetism is much stronger than ordinary normal conducting electromagnets."[328]

Depending on the proximity of the person to the guideway and the number of exposures, the symptoms, conditions, and/or diseases discussed here have the potential to become intensified due to the strength of the electromagnets used to levitate, propel, and brake the SCMagLev train.

Note: The *Final Alternatives Report* states that people must maintain a minimum distance of 20 feet from the guideway because of the electromagnetic field strength.[329] DEIS Appendix D.11 indicates:

[327] Ibid. Appendix D.11-15.
[328] USDOT, FRA, and MDOT. Final Alternatives Report. November 2018. p. 42. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-BC_Nov2018.pdf.
[329] Ibid. Chapter 1, page 1, footnote 1

"The American Conference of Governmental Industrial Hygienists also recommends that workers with pacemakers should not exceed 1 Gauss (1,000 mG or 0.1 µT)."[330] Note that they refer to the safety of the workers, but what about the safety of the passengers? How is this distance going to be assured, especially if there is an emergency and passengers are exiting the train, and emergency personnel are at the scene to provide emergency services? Also, as we indicated earlier, the DEIS itself notes the detrimental effect of being in proximity to the SCMagLev if one has a cardiac pacemaker or cardioverter-defibrillator.

(7) Besides passengers and maintenance employees, should anyone else be concerned with the SCMagLev EMF exposure?
Although the personnel representing the SCMagLev recommend that people (passengers and maintenance workers) do not come within 20 feet of the guideway during operation of the SCMagLev, there is a concern for the residents and businesses near the SCMagLev system. Besides the potential danger coming from the ventilation structures (exposure to toxins, cancer-causing compounds, and radioactive gas released into the atmosphere and surrounding areas; see the 2021 MCRT-CATS report about the impact of the SCMagLev on communities[331]), the EMFs generated by the SCMagLev, in addition to the increasing amount of the man-made EMFs continuously injected into our environment, have the potential to increase the negative health consequences of those living and working in proximity to the SCMagLev system.

While the BWRR cites the Japanese report that states the SCMagLev's generated EMFs are safe[332], we have not seen the research to corroborate this statement. Further, with such potential adverse health effects from SCMagLev EMF exposure, safety claims should be independently assessed applying U.S. standards of rigor, and not be accepted from a source with a significant financial stake bringing the SCMagLev to the United States. If one accepts the statements that the EMF exposure from the SCMagLev operation would be at an acceptable level, the addition of the SCMagLev EMF to an environment increasingly saturated with man-made EMFs may well act as a multiplier of the negative human health effects already identified by ongoing international research, findings, and issued precautions.

Many questions that have arisen require sufficient and replicated independent research to assure that exposure to the EMFs required for the SCMagLev to operate is safe.

The DEIS is deficient as it does not address the following questions:

- How will the maintenance workers for the train system who are constantly exposed be protected? Note, in stand-by mode, the superconducting magnets maintain enough charge to generate 1 Tesla. This is further discussed in Section 3.
- What kind of exposure will SCMagLev riders have and what are the long-term or cumulative health effects?

[330] DEIS Section 4(f) Appendix D.11.1.4. Page 10.
[331] Appendix - Reprint: Woomer, Dan. "What Impact Would the SCMagLev Have on Our Communities?" CATS-MCRT White Paper. January 11, 2021
[332] JP Central. Superconducting Maglev's magnetic field has no health impact. https://scmaglev.jr-centralglobal.com/about/magnetic/.

- What is the exposure for the workers constructing the train system (over years)? What is the cumulative effect on their health? How will their safety be maintained? What happens if the system is powered up and workers are present?
- What is a safe distance from electromagnets for homes and businesses along the train's route?
- Is there research to define and substantiate the "safe" distance?
- The FRA should conduct or assemble independent research to address these questions, and share this information with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev Project forward.

Aside from questions about the safety and crashworthiness of the train itself (see Part 2 of the MCRT-CATS report on SCMagLev safety)[333], statements and assessments about EMF safety from the SCMagLev builder and operator—JR Central and the BWRR, respectively—do not constitute independent, unbiased reviews. If the FRA approves building the system, the BWRR, JR Central, and the Japanese government stand to make a profit as the builders and operators. Passengers, maintenance workers, humans and wildlife in proximity to the system will then become the test subjects to determine if the system has little to no effect on human or wildlife health.

Forthcoming research studies will probe further into EMF exposure and its negative effects on the human body, particularly as EMF-producing technologies continue to be developed and expand into the future. The additional electromagnetic radiation introduced with the operation of the SCMagLev could be a multiplier of the impact on human health from the increasing levels of man-made EMFs. As shown in the recent studies cited above, exposure to more EMFs will likely put more people at risk of experiencing the symptoms previously stated, including the possibility of experiencing more intense symptoms, conditions, and disease. Furthermore, we have not yet considered the effects of continuous exposure to the SCMagLev's high-level EMF impact on the health of wildlife.

It is anticipated that additional studies will provide stronger evidence of the correlation between our EMF-rich environment, human exposure, and human health problems. Our already non-ionized, radiation-rich environment is replete with man-made and naturally occurring EMFs.

Question:

- What kind of additional or increased instances of human and wildlife health issues will likely manifest with the addition of the SCMagLev's high level of EMFs into our environment and communities?

This section highlights concerns about impacts on human and wildlife health from the addition of high-level electromagnetic fields needed to operate the SCMagLev train system. It should give the reader pause when considering that only a small number of people will use this transportation system, one that does not provide services to our communities. The reader may ask whether, along with the destruction of irreplaceable natural research areas and lands, unanswered questions about the safety of the train system and structures, and the potential of impacts on human and wildlife health, is it worth building a transportation system only the more affluent can afford to ride?

[333] Appendix - Reprint: Woomer, Dan. "Is the SCMagLev Safe? (Part 2)." CATS-MCRT White Paper. January 11, 2021

LII. Noise and Vibration Issues and Impact

The BWRR asserts that there is no issue with noise and vibration. However, actual data, observations, and experiences with the SCMagLev train in Japan directly challenge these misrepresentations.

The DEIS is deficient as it does not provide actual SCMagLev noise and vibration data and measurements.

Request:

- The MCRT Review Team requests the FRA, MDOT and BWRR, through an independent source, provide actual data, as well as sound and vibration measurements, using the SCMagLev operating in Japan as the source. Data and research originating from the Japanese government, JR Central, and/or TNEM is inherently subject to bias because of the large financial investment and benefits to be accrued should they be successful in bringing the SCMagLev to the United States.
- To provide some degree of confidence, the MCRT Review Team requests the SCMagLev proposal be assessed following the guidance found in the FRA's September 2012 publication *High-Speed Ground Transportation Noise and Vibration Impact Assessment* (DOT/FRA/ORD-12/15).

1. Noise and Vibration Impacts and Disproportionality Analysis Missing From DEIS

The DEIS indicates that the vast majority of the impacts would occur in environmental justice (EJ) population areas. However, the FRA has not shown a substantial need for the project or described the necessary steps to avoid these impacts. For example, over 99 percent of the impacted noise receptors and 100 percent of the severe vibration impacts would be located in EJ population areas.[334] The DEIS says the FRA will continue to refine its EJ analysis, complete a disproportionality analysis, and develop mitigation in the final EIS (FEIS). These steps should already have been completed to allow for public comment.

Waiting until the FEIS denies the opportunity for public comment and full FRA consideration of all comments before making any decision to move forward toward a build decision. The DEIS is deficient in that it does not contain the disproportionality analysis and information required to make a fully-informed decision that would allow a review of all relevant information to develop comments on the full range of costs versus benefits.

Request:

- The FRA must issue a completed disproportionality analysis prior to the FEIS and before the Record of Decision (ROD).

[334] DEIS Chapter 4.05, Section 4.5.4.2. Pages 4.5-15 to 16.

2. Missing Noise and Vibration Measures

Vibration control measures are not as well understood as other mitigation measures, due to the uniqueness of the magnetic levitation technology for transportation projects.[335]

The DEIS is deficient in that noise and vibration data are missing. These data are readily available from the system operating in Japan.

- Why were actual sound and noise measurements not included in the DEIS?
- Using the SCMagLev in Japan, why were sound and noise levels, as well as assessments of results of sound and vibration mitigation attempts, not included in the DEIS?
- What are the lessons learned about noise and vibration mitigation by JR Central? If JR Central has developed techniques to address the unique nature of the SCMagLev's generation of noise and vibration, these should be included in the DEIS, if they wish to sell the SCMagLev to the United States.
- Have the results of noise and vibration mitigation efforts been independently verified?
- How do the noise and vibration measurements stack up against U.S. standards?

Noise and vibration from both temporary construction activities and long-term operations exceed the FRA criteria at several receptors in the Project Study Area. Although the FRA identifies noise and vibration control measures that could reduce potential impacts, the DEIS's general statements do not explain if and where these will be implemented and what would be their effects. Yet, the DEIS states that "vibration impacts are concentrated along the viaduct. As such, 100 percent of the severe vibration impacts would be located in EJ population areas."[336] The FRA should have evaluated these control measures as part of the DEIS and should not have used the unique nature of the SCMagLev technology as an excuse. The data and information exist and should be verified by independent testing and provided in the DEIS. The DEIS appears to leave consideration and implementation of these controls up to the project sponsor (BWRR).

The DEIS is deficient as it does not assess the noise and vibration impact of the SCMagLev construction and operation on nearby communities in a meaningful, data driven manner.

Request:
The BWRR and MTA must include an analysis of their proposal in the DEIS, following the guidance found in the previously cited September 2012 FRA publication. Furthermore, they must make public all UNREDACTED data modeling inputs, parameters, outputs, and reports.

[335] Ibid.
[336] Ibid.

3. Sounds of Distant Thunder

Repeated claims have been made by the project sponsor that the SCMagLev does not make noise as do steel-wheel trains, and that it would be "creating no more noise than that already produced by the highway," referring to the BW Parkway.[337] Others would disagree and would also comment on the how many times an hour the noise was heard. "The sound when the linear Shinkansen comes out of the tunnel is considerably great though the tunnel is made so big and the car body is made small. Although it is a slightly distant thunder (sound), it is heard more than 10 times an hour (if it is a commercial operation). Since the train is pushing the air, the pressure increases at the beginning when entering the tunnel. Because it travels faster than the train, the maximum sound is sounded as a 'Rumble' when the train leaves the tunnel. This phenomenon is called 'microbaric wave.' The wave plane gradient of the compressed wave due to tunnel entry is proportional to almost three times the train speed."[338] As reported by Rector: "The 91-year-old Suzuki said when the first tests began in 1997, the train caused such a massive boom each time it emerged from its tunnel that homes shook violently."[339] JR Central developed and installed "hoods" to go over the track at the tunnel exit to reduce noise and vibration. However, as Rector observed, even after the "hoods" were installed as the SCMagLev passes by "it shakes the cinderblock walls of 91-year-old Moriyoshi Suzuki's tidy family home." [340] This is clear evidence that the SCMagLev is not noise and vibration-free system the BWRR claims.

4. Masonry and Concrete Structures

With the evidence that disproves statements from the BWRR that the SCMagLev is noise and vibration free, what will be the effect on structures (e.g., homes and businesses) near the SCMagLev during building and operation? Masonry and concrete structures (e.g., foundations and foundation walls, as well as drywall, masonry or poured concrete walls) do not respond well to vibrations; that is, such structures tend to crack as they do not uniformly vibrate. Cracks in foundation walls result where the vibration energy finds a weak point. Such cracks weaken the support for the structure above and lead to water infiltration. In other words, ground and/or surface water (rain and downspout runoff) seeps into the basement. Wet basements bring additional damage to the structure and anything located in the basement (such as furnaces, washers and dryers, and furniture). The increased moisture creates dangerous mold and other serious health and safety problems for people who live in single-family homes and apartment complexes, as well as for those who work or play in commercial or other types of buildings (e.g., schools, churches).[341]

The DEIS is deficient in failing to provide independently verified data and analyses on the vibration levels and dispersion area of the SCMagLev. Again, the data are readily available as they can be assessed using the existing SCMagLev in Japan.

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[337] "Sounds of Distant Thunder". Footnote: TNEM. Presentation to Greenbelt City Council. "SCMAGLEV PROJECT UPDATE." Powerpoint Presentation, Slide 16. April 3, 2018.
[338] Santaro, Joe. Linear Forcible Near #5: Tunnels and Noise, Withers, Evacuations. Page 2. 2019-02-06. Retrieved May 10, 2021. https://joe3taro.com/?p=2333&fbclid=IwAR2ciF_AhZpw_U_JPkG6lSThwN6MehRstQ1NdTrBDRcvYVJPhLaibfWFVI4.
[339] Appendix - Article Reprint: Rector, Kevin "'It can be done': Futuristic Japanese maglev train could revolutionize travel from DC to Baltimore, and beyond." October 27, 2018. The Baltimore Sun.
[340] Ibid.
[341] Appendix - Reprint: Woomer, Dan. "What Impact Would the SCMagLev Have on Our Communities?" CATS-MCRT White Paper. January 11, 2021.

5. Operation Phase Noise Impacts

Background noise was measured at the locations of 20 receptor locations involving 4,000 receptor sites within an 800-foot screening distance.[342] The DEIS is missing "count" units in the discussion in section D.10.4.2.1, and in the counts in Table D.10-6 the units are not given.[343]

The DEIS deficient in that the provided information is incomplete and, as such, does not allow independent assessment of the potential impact. The question is:

- Are the data presented as counts per day or some other unit of time?

The DEIS contains incomplete "counts" for receptor locations. It appears that the results given in Table D.10-6 above are the predicted total counts (moderate/severe) summed over all receptors, thus for the alignments. If so, then the predicted counts at each receptor location should be given.

The DEIS is deficient as it does not provide the noise information from the receptors in a manner that allows for a proper review of noise impacts on the various areas and communities along the SCMagLev's path.

- What are the counts for each receptor location?

The DEIS contains discrepancies in train passage counts, which has a direct noise impact implication. There are 104 train passages each day in both directions for a total of 208.[344] There are nine (9) receptor locations (N3-N9) in the viaduct region (disregarding N20 at the MD198 train maintenance facility), all at locations where the SCMagLev is moving at maximum speed. One would expect a total of 9x208 = 1,872 counts daily (moderate + severe). Yet the totals over the alignment are in the approximate range 500-660.[345]

The DEIS is deficient as it does not answer the following questions:

- Is there a range of noise output for every train passage?
- What is the range?
- How do these noise data compare with aircraft noise data as measured by the FAA using DNL[346] standards?
- Will the noise generated by the SCMagLev be held to a different standard than that of aircraft noise? If so, why? If not, how will USDOT (FRA's sister agency) apply noise measures?
- As noted above, why are there discrepancies in the measurement of noise in the DEIS?
- Will the noise generated by the SCMagLev be held to a different standard that of aircraft noise? If so, why? If not, how will FRA sister USDOT agency's noise measures be applied?
- As noted above, why does the discrepancies in the DEIS of train, and resulting incidents of noise, exist in the DEIS?

[342] DEIS Appendix D.10, Table D.10-6. Page 10-14.
[343] DEIS Appendix D.10, Section D.10.4.2.1. Pages 10-16 -17.
[344] DEIS. Appendix D.10, Section D.10.6. Table A1. Pages 10.6-27 to 28.
[345] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 25.
[346] *DNL* is the *standard* noise metric used for all FAA studies of aviation noise exposure in airport communities.

Airborne Noise

The FRA predicted airborne noise up to 2,100 ft from the guideway.[347] This impact distance is due to a combination of the aerodynamic effects of high-speed train operations, the elevated guideway. and the low background noise level." In footnote #7 of App-D.10. Noise and Vibration (ref 7) states: "The FRA impact criteria are based on a sliding scale whereby low background noise level result in more stringent thresholds." The net effect is that most if not all in the South Laurel communities will likely be able to hear the train passages 208 times every weekday of the year (somewhat less on weekends) regardless of whether the noise levels exceed the formal definition of moderate or severe. Note that this is a periodic noise source, which is much more annoying than a random source.[348]

Sound Attenuation Walls

Proposed mitigation measures include track design, tunnel portal design, augmented parapet walls, and sound attenuation walls. The first three of these are probably more effective but more costly. Some of them would be difficult or impossible to implement once the line is built and in operation. The last measure, sound attenuation walls, is the most common, but would effectively destroy the scenic view that defines the BW Parkway. Moreover, the train's minimum elevation of 10 meters over grade might render such barriers ineffective. In summary, the DEIS does not address the noise problem sufficiently. Sound attenuation barriers and non-impulsive equipment must be mandatory.[349]

6. Operation Phase Vibration Impacts

Ground Water Wells, Sceptic Systems, Geothermal Heat Pumps Sensitivity Not Assessed

The methodology is based on the FRA's *High-Speed Ground Transportation Noise and Vibration Impact Assessment* guidelines.[350] These guidelines do not assess the sensitivity of ground water wells, septic systems, or geothermal heat pumps. As such the impacts on those systems are missing from the DEIS.

At least four properties in the Montpelier Woods community in South Laurel have geothermal heat pumps at distances in the range of 2,300 to 2,800 feet from the guideway. More are planned, and it is possible they exist in the other South Laurel communities or elsewhere along the alignments. All implemented systems use vertical ground loops of depths in the range 300 to 600 feet. Geothermal heat pumps represent considerable financial investment by the property owners.

The full extent of well usage and septic systems near the SCMagLev alignments is not known to the reviewers of the DEIS.

The DEIS is seriously deficient as it does not provide thorough analyses of the groundwater impacts building and operating the SCMagLev will potentially bring.

[347] DEIS Appendix D.10, D.10.4.2.2. Pages 10-18.
[348] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 25 - 26.
[349] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 26.
[350] Federal Railroad Administration (FRA), 2012: *High-speed Ground Transportation Noise and Vibration Impact Assessment*, final report, September 2012. U.S. Department of Transportation, DOT/FRA/ORD-12/15. Available online at https://www.fra.dot.gov/eLib/details/L04090.

Requests:

- The needed surveys must be completed before the FEIS and released to the public for review and comment, prior to the FEIS and ROD.
- It is mandatory that a survey of properties along the entire alignment be made, especially in tunnel areas, to ensure that no geothermal heat pump loops, wells, or septic systems are damaged.
- Many residents get their water from wells. The potential for damaging the wells and the damage caused to the aquifer by the building and operating of the SCMagLev. need to be assessed.
- In addition, the water usage during the building phase needs to be assessed to determine if SCMagLev water usage will remove sufficient groundwater as to cause subsidence issues in the aquifer and damage to the water flow needed for proper well operation.
- This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

Geologic Conditions Not Well Documented

The analysis is based on "typical" soils.[351] The FRA guideline states: "It is well known that there are situations in which ground-borne vibration propagates much more efficiently than normal. The result is unacceptable vibration levels at two to three times the normal distance. Unfortunately, the geologic conditions that promote efficient propagation have not been well documented and are not fully understood. Shallow bedrock or clay soils are often involved. One possibility is that shallow bedrock acts to keep the vibration energy near the surface. Much of the energy that would normally radiate down is directed back toward the surface by the rock layer, with the result that the ground surface vibration is higher than normal."[352]

Appendix G13 of the DEIS gives extensive geotechnical profiles along both alignments but it is not clear how far these profiles extend in directions toward communities near the alignments.

Other geological databases might be used if they cover the affected communities with sufficient spatial resolution.

In summary, the vibration analysis should be redone for communities near the alignments, assuming "efficient" soil propagation if no other data are available. Lacking guidelines, calculations should be based on first principles and/or on analogous systems.[353]

The FRA needs to determine the answers to the following questions and make this information available to the public for review and comment:

- At what distance from the SCMagLev is it safe to use wells and geothermal heat pumps?

[351] DEIS Appendix D.10, Section D.10.2.2.2. Pages 10-12.
[352] Federal Railroad Administration (FRA), 2012: *High-speed Ground Transportation Noise and Vibration Impact Assessment*, final report, September 2012. U.S. Department of Transportation, DOT/FRA/ORD-12/15. Available online at https://www.fra.dot.gov/eLib/details/L04090. Page 8-5.
[353] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 26-27.

- When will this information be made available, not only to the public, but also to county permitting offices to inform those members of the public who are applying for permits to install such systems?

7. Operation Phase Noise-Induced Vibration Impacts

One of the potentially serious impacts, unlikely to be mitigated, is the impact of sound and vibration from the SCMagLev building and operation on NASA's Goddard Geophysical and Astronomical Observatory's (GGAO) ability to continue its operations.

The GGAO is "one of the few sites in the world to have all four geodetic techniques co-located at a single location: Satellite Laser Ranging (SLR), Very Long Baseline Interferometry (VLBI), Global Navigation Satellite Systems (GNSS) and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS). Sites like GGAO provide scientists a unique opportunity to assess system performance and perform multi-technique analysis. Co-located techniques are an integral part to the maintenance of the International Terrestrial Reference Frame (ITRF), a set of points with their 3-dimensional cartesian coordinates which realize an ideal reference system."[354]

Proximity of these systems allows for calibration of mobile systems, "repeated measurements on a marker with mobile systems . . . changes in antenna location for GNSS or DORIS . . . and co-locations between instruments . . . "[355] This supports "one-way laser ranging experiments to the Lunar Reconnaissance Orbiter, neutron spectroscopy experiments, search for optical sources of gamma ray bursts, the X-Ray beam-line," to name a few. "NASA's satellite missions and field experiments, Global Modeling and Assimilation Office (GMAO) generates near-real time atmospheric products using Goddard Earth Observing System (GEOS) and distributes them to a broad community of users. While these products emphasize the traditional aspects of weather analysis and forecasting, they have a broader scope that includes aerosols and trace gases. To enhance the quality of these near-real-time products, GMAO conducts research and development activities into atmospheric data assimilation and forecast model development."[356]

The DEIS is deficient because the likely impacts on the continuation of NASA's research facility operation is not included. Questions such as the following need to be answered before any consideration of moving forward with building the SCMagLev is considered.

- How will the SCMagLev affect NASA's weather and prediction analysis?
- Will the GGAO be able to operate as it does at present when subjected to the light, noise, and vibrations generated by the SCMagLev and its support and maintenance facilities operations?

[354] "SGP: Space Geodesy Project." NASA. March 2, 2021. https://space-geodesy.nasa.gov/NSGN/sites/GGAO/GGAO.html#:~:text=The%20Goddard%20Geophysical%20and%20Astronomical,VLBI%2C%20GNSS%2C%20and%20DORIS.
[355] National Aeronautics and Space Administration. Space Geodesy Project. SGP: NASA's Space Geodesy Network. Retrieved may 8, 2021. https://space-geodesy.nasa.gov/NSGN/sites/GGAO/GGAO.html.
[356] National Aeronautics and Space Administration. Goddard Geophysical and Astronomical Observatory. GGAO Home Page (nasa.gov). Retrieved May 4, 2021.

Effects on Seasonal-Decadal Analysis and Prediction?
Reanalysis - "Long-term, model-based analyses of multiple datasets using a fixed assimilation system are a major focus in the GMAO. Building on the success of the atmospheric reanalysis conducted with GEOS, current research and development activities are directed at producing a major Earth System Reanalysis, including atmosphere, land, ocean, and ice."[357] As well as Mesocale - "Current computing capacity enables GMAO to simulate the entire globe at spatial resolutions previously only possible with regional models.

These "global mesoscale model" simulations serve as forefront evaluations of model performance and form the basis for Observing System Simulation Experiments."[358]

Finally, as we are dealing with foretelling our future climate: "GMAO's mission to provide modeling support for NASA's satellite observations encompasses the need to examine the impacts of different observation types in weather and climate prediction. It also requires the ability to simulate potential new observation types, in order to assess their cost benefit, based on their likely impacts on prediction."[359]

Building an uncommercially proven, non-integrated, ground-based high-speed transportation system that only the wealthier among us can afford to use and that has a high potential to disrupt ongoing vital science and research at NASA, PRR, and BARC facilities makes no sense. A lower-cost, commercially proven, well-integrated high-speed train system already exists, is in operation, and is being enhanced, and it would have far less impact on our environment and the ongoing operation of these vital facilities. The FRA should choose the No Build option before the SCMagLev irreversibly damages our state's prized and valued assets.

LIII. Construction Issues and Impact

1. Incomplete Construction Impact Assessments

The DEIS Section D.4D.2[360] discusses short term impacts on business during the construction phase.[361] (Note that in Section 4.6.3.2, page 4.6-20, there appears to be an omission because there is no discussion of the business impacts at the Route 197/BW Parkway interchange, despite nearby Crystal Plaza.)

The DEIS again is incomplete because it does not provide a discussion on the impact on businesses located at and around the Route 197/BW Parkway interchange.

- Why is the interchange not included in the business impact discussion?

[357] National Aeronautics and Space Administration. Goddard Space Flight Center. https://gmao.gsfc.nasa.gov/reanalysis/. Retrieved May 4, 2021.
[358] National Aeronautics and Space Administration. Goddard Space Flight Center. https://gmao.gsfc.nasa.gov/global_mesoscale/. Retrieved May 4, 2021.
[359] National Aeronautics and Space Administration. Goddard Space Flight Center. https://gmao.gsfc.nasa.gov/observing_sys_science/. Retrieved May 4, 2021.
[360] and DEIS Appendix D.4. Page D-17.
[361] Ibid.

Regarding business losses, it is stated on page D-27 that: "There is limited literature and no standard methodology that focuses on quantifying the social costs associated with the impacts that results from construction."[362] References are cited. The results in Table D.4-6 (pages D-17 to D-18) show a wide range of uncertainty for every choice of Build Alternative (e.g., $18.5 to $233.5 million for the preferred J-03 alternative).[363]

The DEIS statements appears to obfuscate the information needed to make an informed decision about the impacts. The FRA needs to answer the following questions:

- Is this wide range a result of the methodology or does it reflect uncertainty in the input values?
- What methodology or methodologies were used?
- What data were used?
- How valid and accurate are the data?
- Why are these results not broken down into separate geographical areas along the alignment where local impacts can be more easily seen?[364]

2. Negative Monetary Impact on Travelers During Construction Ignored

More importantly, despite the extremely detailed discussions on the significant value of monetized time saved by SCMagLev users, there is only one qualitative paragraph in the DEIS[365] and no quantification of the monetized time lost during construction by travelers not associated with the project during construction (a large portion of whom are likely to be nearby residents).

It is neither sufficient nor reasonable to evaluate time benefits quantitatively without also evaluating time costs.

The DEIS is deficient because it fails to provide these analyses.

- Where are these analyses?

The FRA must provide this information along with the studies and data that support the provided answer(s)[366] to present a balanced picture of the impacts and not just the purported benefits of the SCMagLev.

3. Loss of Revenue for Businesses Impacted by Construction Incomplete

Regarding losses for businesses (e.g., food and entertainment) during construction, the DEIS contains a few statements that provide a strong contrast in attitude with the numerous mitigations promised throughout: "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. By contrast, professional services transactions are less likely to be tempered as people

[362] DEIS Appendix D.04. Page D-27.
[363] DEIS Appendix D.04. Table D.4-6. Page D-17.
[364] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 15-16.
[365] DEIS Appendix D.04. Page D-24.
[366] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 14-15.

are less willing to change dentists, lawyers or hair stylists once they have found a professional with whom they are comfortable. They are more willing to accept the travel inconvenience to visit the dentist that makes them comfortable and knows them."[367] The first sentence is Darwinian, and the second leaves affected residents with the realization of the grim choices forced upon them. Together they introduce considerable doubt about the sincerity of promises for community involvement.[368]

4. DEIS Grossly Underestimates Construction Phase Impacts

The DEIS has grossly underestimated construction phase impacts. The discussion is confined largely to the 500-foot Limit of Disturbance (LOD). All communities south of the BW Parkway/MD197 interchange will be severely impacted during the construction phase.

5. South Laurel communities south of the BW Parkway/MD197 interchange:[369]

- Townhouse/Single Family: Pheasant Run (north side of MD197)
- Single Family: Montpelier Woods (north side of MD197), Snowden Pond (south side)
- Condominiums/Apartments: Applewalk, Laurelwood, The Villages at Montpelier (south side of MD197)
- Other: Halltown, and approximately a dozen homes along Snowden Road and MD197 apparently unaffiliated with homeowners' associations.
- Population (July 2020)[370]
    - 1,544 north side of MD197
    - 2,439 south side of MD197
    - Total: 3,983 residents

Construction Traffic

The traffic impact on the BW Parkway/MD197 worksite is shown in Table D.2-33 of the DEIS.[371] A total of 51 trucks per day and 190 worker vehicles will be arriving and leaving for viaduct and electrical substation construction.[372] This is an enormous amount of traffic concentrated in a very small region, amounting to 1 truck every 11 minutes, in the unlikely event that truck arrivals are evenly spaced throughout the day. Workers will arrive at 7:00 a.m. and the construction area will be active from 7:00 a.m. to 4:00 p.m. daily. Viaduct construction is scheduled to last 34 months over years two through four and substation construction for 24 months over years two through six. For the J alignment there will also be a 200 x 90-meter laydown at the present Harley Davidson site. The laydown for the J1 alignment will be at the Suburban Airport site accessed by Brock Bridge Road. Both alignments will have a laydown at Powder Mill with 45 trucks and 90 workers arriving daily. An additional 44 to 56 trucks and 90 to 112 workers will arrive at Beaver Dam Road if either the BARC West or BARC East site is selected, along with 145 trucks and 150 workers for the South Portal Construction site. Greenbelt and Soil Conservation Roads will provide access to this site.[373]

[367] DEIS Appendix D.04. D.4D.2.2.1. Page D-28.
[368] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 16.
[369] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 19.
[370] HomeTownLocator. Maryland Gazetter. https://maryland.hometownlocator.com.
[371] DEIS Appendix D.2, Section D.2A.15.2. Page A.15-86.
[372] DEIS Appendix D.2. Table D.2-33. Section D.2A.15.2. Page A.15-86.
[373] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 19-20.

The DEIS quotes daily traffic counts on MD197 of 28,700, but with the following description: "MD 197 is two lanes in each direction, with the two directions separated by a grass median."[374] It should be clarified that the grassy medium disappears within about 100 meters north and south of the interchange. Also, as the laydown is on the south side of MD197, vehicles must cross MD197 to bring these materials to work sites north of MD197. Moreover, for the J alignment there are construction activities for Support Facilities SCM SVS 07 (adjacent to the northbound BW Parkway/MD197 exit lane) and SCM SVS 08 (west of southbound MD197 and between the northbound flyover exit lane and northbound BW Parkway). **Together with the laydown activities, there will be severe traffic impacts during the construction phase on the northbound MD197 exit lane from the BW Parkway.[375]**

A traffic count of 28,700 vehicles daily for MD197 is not trivial. Moreover, MD197 narrows to a single lane each direction just south of the South Laurel Drive intersection, which is well within the LOD. All six South Laurel communities listed above access areas outside their neighborhoods only through MD197. Those on the north side have three minor roads accessing MD197, only one of which has traffic signals (Snowden Road). Those on the south side have only two access roads, also only one of which has signals (South Laurel Drive). All but two access points to MD197 for these six communities are essentially within the 500-foot LOD, and the two exceptions (Basswood Drive, Snowden Pond Road) do not have signals, despite repeated appeals by residents to install them. Residents leaving their homes will encounter huge delays just accessing MD197. These delays will introduce uncertainties in all travel, whether, for commuting to work, basic trips for shopping, or medical appointments, for example.[376]

Their travel problems will not end even after escaping the local BW Parkway/MD197 tangle, for in almost all directions they will encounter additional construction traffic and activity at other construction sites and more delays—at Powder Mill Road and Brock Bridge Road (for the J-1 alignment), and at Contee Road, MD198, and construction-related congestion on the BW Parkway in both directions. Even the only escape route to the nearest alternate grocery stores in Bowie (at a distance of less than six miles) along MD197 will share the construction traffic up to Powder Mill Road. Weekends will not be exempt, as roadblocks are scheduled to be set up on four weekend days, closing ***both*** MD197 and the BW Parkway at the alignment, something that was never done during the 1999-2003 refurbishment of this interchange. There are also a host of road closures scheduled at or near the BW Parkway and Powder Mill Road, as well as the BW Parkway and MD198 interchanges, and other roads.[377] **In summary, the approximately 4,000 residents of South Laurel will be effectively cut off from the outside world during the construction phase for an estimated 34 months.[378]**

Finally, much of the Washington Suburban Sanitary Commission (WSSC) facility at Canadian Way in South Laurel is well within the 500-foot LOD for Alignment J viaduct construction and the additional

[374] DEIS. Appendix D.2. D.2A.15. Page A-56.
[375] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 19-20.
[376] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 20.
[377] DEIS. Appendix G8, Part K. Table 23. Page 35.
[378] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 20-21.

six meters of work area appears to abut the WSSC boundary.[379] Support facility SCM SVS10 sits just west of the viaduct. Appendix G7 of the DEIS states: "Discussions have been initiated with the Washington Suburban Sanitary Commission (WSSC) about the potential use of a parking lot for one of its administrative facilities as a TBM[380] retrieval shaft and future FA/EE location. No major WSSC infrastructure is expected to be impacted."[381] The second sentence, underlined here for emphasis, strains believability. Also, Canadian Way, which will be heavily used for access to the worksite, is the sole access for WSSC workers. There is no other discussion about the South Laurel WSSC facility in the DEIS.[382]

6. Traffic Impacts During Operations

Even after construction, viaduct crossovers on the entrance/exit lanes of the BW Parkway/MD197 interchange will continue to have great adverse impacts on car traffic flow, thus contributing to accidents on both roads and degraded Line of Sight (LOS).

J Alignment[383]

The northbound BW Parkway exit ramp at MD197 serves northbound MD197 by way of a flyover ramp and bridge over MD197 southbound. Approximately 334 meters of that is under the viaduct. Thus, the viaduct elevation at STA124+400 is planned to be approximately 14 meters above the flyover ramp grade and approximately 28 meters above the southbound MD197 grade.[384] The flyover ramp is at a slight angle to the viaduct and emerges from under it for another approximately 222 meters (although displaced eastward no more than 18 meters) before finally curving to the left to merge with the MD197 northbound. The merge comes right at the location where the flyover ramp again ducks under the viaduct for a distance of approximately 53 meters.[385] Thus, the right-hand merge with the northbound MD197 traffic comes at highway velocity in permanent shadow from the viaduct. **Under these conditions there is an extremely high probability for accidents.**

The northbound BW Parkway also serves MD197 southbound by an additional lane that splits to the right (east). There is approximately 230 meters of travel under the viaduct before the additional lane curves to the right, around what is planned to be the laydown area, until it reaches a point perpendicular to MD197 at a traffic signal, allowing traffic to turn left or right. A left turn at this light allows residents of Pheasant Run to turn right on Mallard Drive to access their community. Going straight along Snowden Road allows access to Montpelier Woods. Turning right and traveling short distances allows subsequent right turns at South Laurel Drive (for Applewalk, Laurelwood, and The Village at Montpelier), at Snowden Pond Road (for Snowden Pond), or to continue on towards Powder Mill or points further south on MD197 (Bowie).

[379] DEIS Appendix G, Part B. Attachment 2. J1. Page 36.
[380] TBM - Tunnel Boring Machine.
[381] DEIS Appendix G7, Section 17.3. Page 79.
[382] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Page 21.
[383] Distances measured from DEIS Appendix G, Part A. Pages 34-35.
[384] DEIS Appendix G, Part E. Page 56.
[385] DEIS Appendix G, Part A. Attachment 2. Pages 34-35.

- The entrance lane from northbound MD197 to the northbound BWP would have a similar length of 90 meters directly underneath the viaduct beginning right at the split from northbound MD197 thru traffic.

J-1 Alignment[386]
The southbound exit from the BW Parkway to MD197 will go under the viaduct for a distance of approximately 58 meters before emerging several hundred meters before the signaled intersection with MD197, now reunified into two-lanes in both directions.

The loop entrance from northbound MD197 to southbound BW Parkway will have an approximate 61-meter section under the viaduct.

The viaduct is within 10 meters of the southbound BW Parkway travel lanes for a distance of approximately 590 meters starting just north of the MD 197 southbound exit until the viaduct crosses over southbound MD197.

The entrance ramp to the southbound BW Parkway from southbound MD197 is long and will be directly under the viaduct for approximately 459 meters.

Common to Both Alignments
The long stretches of roadway in excess of 38 or even up to 50 meters directly underneath the viaduct do not permit the use of single hammerhead column supports for the guideway as shown in the DEIS drawings TY01 and -02.[387] Rather, straddle bent mountings (TY-04) will be required. In the constricted geometry around the interchange, it is not clear whether even these mountings will fit. However, any modifications of the exit/entrance roadways to snake around viaduct mountings would defeat the careful engineering of the BW Parkway interchange refurbishment, introduce dangerous conditions that lead to accidents, and likely result in slowing exit traffic from the BW Parkway to the point where backups would occur onto the BW Parkway.[388]

Similar analyses to the above for the BW Parkway/MD 197 interchange can be done for the Powder Mill, MD198, and MD 32 interchanges. The latter two, along with the MD197 interchange, were part of the BW Parkway refurbishment (1999-2002) and were designed to minimize accidents and improve traffic flow. Traffic impacts might be marginally less severe for the MD32 (full cloverleaf) and MD198 (half-cloverleaf) interchanges because of the design of their on/off ramps and because the BW Parkway crosses them at an angle closer to perpendicular.

However, in summary, the overall picture is that the proximity of the SCMagLev viaduct to the BW Parkway introduces complicated challenges to motorists at the interchanges, leading to the considerable potential for accidents and significantly degraded LOS flow on the BW Parkway and on all four roads that have interchanges with it (Powder Mill Road, MD197, MD198, and MD32). Moreover, the viaduct mountings will essentially lock in the proposed modified design of the

[386] Distances measured from DEIS Appendix G, Part B. Pages 35-36.
[387] DEIS Appendix G, Part D. Drawings TY-01 – TY-02.
[388] Appendix - Reprint: Kowalski, M. “SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0.” 2021. Pages 21-23.

interchanges, making it virtually impossible to correct any flaws or even to modify them in the future.[389]

7. Aesthetic Community and Property Impact

Aesthetic impacts were evaluated along both alignments, including the entire viaduct and the TMF locations.

High Common Aesthetic Area (CAA) #5 - #13 Evaluations

There are nine Common Aesthetic Areas (CAA) (#5 - #13) used in Appendix D.06 of the DEIS to evaluate aesthetic impacts along the viaduct and the TMF locations.[390] Figures D.6-6 through D.6-14 map the locations. Regardless of the chosen alignment, Tables D.6-7 through D.6-9 show H (high) impacts for over half the locations evaluated, with the remaining locations split approximately evenly between M (moderate), L (low), and RI (relatively imperceptible). The H locations are split about evenly between the alignments. As might be expected, resources on the north side of the BW Parkway show visual impacts for the J-1 alignment and resources on the south side show higher values for the J alignment.[391]

Moderate to High CAA #7 Evaluation

CAA #7 South Laurel residential areas show generally H visual impact with moderate to high sensitivity for the J alignment.[392]

Snow Hill Manor and Montpelier Mansion

Members of the Snowden family were early colonists of Maryland arriving in the 17th century. The family owned much of the land through which the SCMagLev would traverse. They were friends of George and Martha Washington (who really did lodge there on his trips north). Some of their iron mining operations, among the first in America, were located near where Brock Bridge Road crosses the Patuxent River. Active historic homes still dot the landscape and are on the National Register of Historic Places. These homes are operated by the Maryland-National Capital Parks and Planning Commission (M-NCPPC).

- Snow Hill Manor at Contee Road and MD197 is 4,000 feet from the BW Parkway, but the view is blocked by trees.

- Montpelier Mansion, located at Muirkirk Road and MD197, is the historical and cultural centerpiece, with a full, yearly program of events, many of which are located on the east lawn toward the BW Parkway. The mansion sits on a small hill approximately a half-mile from the BW Parkway, and thus has a direct view of the SCMagLev J-1 alignment from across Montpelier Park. While this distance is formally just outside the 2,000-foot criteria, the lawn area is not.

[389] Ibid
[390] DEIS Appendix D.6, Figure D.6-1, Section D.6.1.1.2. Page 6-7.
[391] DEIS Appendix D.6, Figure D.6-1. Page 6-6 to 6-7.
[392] DEIS Appendix D.6, Figure D.6-8: CAA #7. Page 6-22.

- **Request:** The MCRT Review Team believe that the mansion's historical significance warrants an exception and request that it be included in the noise and vibration analysis.

8. Incomplete and Deceptive Viaduct Illustrative Renderings

In DEIS Section D.6.1.3.3 of Appendix D.06 the illustrative renderings along the viaduct are incomplete and deceptive.

- While the airplane views are useful in understanding the relationships between the guideway and its facilities to the existing environment, aesthetics are evaluated on ground views. There are only three ground views along the viaduct, all of which are located from the perspective of a traveler on the BW Parkway, not from a resident. This perspective reduces the incongruity of the SCMagLev by putting it in the context of another transportation artery, thus giving a favorable but unfair picture. Given the high visual impacts determined for residential neighborhoods additional renderings (before/after) are needed for both alignments:
    - J: Parking lot of New Life Christian Center (Pheasant Run) looking directly west toward the MD197 flyover ramp; alternate location is parking lot of nearby 7-Eleven; a 3- or 5-photo mosaic would give a true picture of the immensity of the viaduct compared with its surroundings.
    - J: Just at the east edge of the cul-de-sac on Pheasant Run Court looking directly west toward MD197.
    - J: Northbound MD197 100 yards south of Canadian Way looking toward the split between northbound MD197 and the northbound entrance ramp to the BW Parkway.
    - J: Southern parking bay for 11742 S. Laurel Drive apartments, looking west-southwest (260 degrees east of north) toward 11746 S. Laurel Drive apartments.
    - J: North side of the gymnasium building belonging to Tabernacle Church on S. Laurel Drive (south side of power right of way) looking west-northwest (280 degrees east of north) toward BW Parkway.
    - J-1: Corner of Apache Tears Court/Ispahan Loop looking east-northeast (20 degrees north of east) toward Montpelier Hills townhomes at Ivory Fashion Court.
    - J-1: Corner of Muirkirk Road/Hermosa Drive looking southeast (120 degrees east of north) toward Montpelier Hills Recreation area.
- Two of the three renderings—Figure D.6-33 (on page 6-41) and Figure D.6-39 (on page 6-44)—show the base of the mounting piers, which is open and free.[393] Exact fencing locations are not provided in the DEIS but, given safety and security concerns, it is unlikely that viaduct piers such

[393] DEIS Appendix D.6, Figure D.6-33: CAA #5. Page 6-41.

as those in Figures D.6-33 and D.6-44 can remain unfenced because of their close proximity to the viaduct (an easy baseball throw) and the potential for vandalism. Figure D.6-33 and perhaps one more of the existing or additional renderings should show fencing. Finally, fencing degrades with time. Without regular trimming, it will become an eyesore with growth of invasive vines and weeds and trash (see the photos below), seriously detracting from the natural landscape for which the BW Parkway was built. Proper maintenance of fences and surrounding grounds is often reduced or eliminated when budgets become restricted.

- It is disingenuous to use renderings in summer months when tree leaves partially provide camouflage. Deciduous trees are leafless approximately five months of the year. To be fair, worst-case impacts (winter months) should be shown throughout. (The burden of proof should be on the proposers.)[394, 395]

SCMagLev promotors provide aesthetically pleasing imagery of the elevated sections as seen from the BW Parkway.

View from BW Parkway onto Powder Mill Road.

DEIS artist image of an aesthetically pleasing viaduct.

What follows are the "Real World" photos of the fenced in areas under the SCMagLev elevated section in Japan.

Reality - SCMagLev viaduct fencing in Japan - photo 1.

Reality - SCMagLev viaduct fencing in Japan - photo 2.

[394] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 27-29.
[395] DEIS artist image of an aesthetically pleasing viaduct see: DEIS Appendix D.06, Figure D.06-33 t0 33. Page 4.19-14.

9. The BARC West Train Maintenance Facility Option was Added Without Public Notification

The West Train Maintenance Facility Option was added to the planned SCMagLev build options without public notification. The DEIS states the following reason for this unannounced addition: "Added a BARC West TMF; the large land area of BARC enables the standardized TMF size and configuration to be accommodated on a single parcel of land without the constraints of existing development, public, roadways, waterways, and other existing infrastructure."[396]

The DEIS again is misleading and missing important information:

- Why was the public not notified of the change prior to the release of the DEIS?
- While the location may not have the "constraints of existing development, public, roadways, waterways, and other existing infrastructure," nothing is said about the impacts to BARC, the ongoing research, and so forth. Why are the actual destruction and disruptions to the surrounding areas not included?

10. Viaduct Rights-of-Way Broadened Without Public Notification

Again, without public notification, the ROW for the viaduct were broadened by another 20 feet and a permanent road was added in that new right of way for permanent access to the trainline.[397]

The DEIS again is misleading and missing important information:

- Why was the public not notified of the change prior to the release of the DEIS?

11. No Impact Study of Electrical Transmission Line Changes

The DEIS mentions that the BWRR is planning to move transmission lines below ground or increase elevation where they cross the trainline, but there is no information on the impacts of these actions.[398]

The DEIS again is misleading and missing important information:

- Why is this impact study not in the DEIS?
- When will it be made available for public review and comment?

LIV. Tunnel Boring Machine Launch/Retrieval Sites

The DEIS fails to describe the full impact to the sites chosen for FA/EE construction that also will be used as Tunnel Boring Machine (TBM) launch retrieval sites. In Section 4.4.5.1, the DEIS states that examples of design minimization techniques are consolidating temporary TBM launch sites, storage, and staging areas with permanent FA/EE facilities or substations.[399] Yet, what the DEIS describes as a design

[396] DEIS Appendix C. Page C-28.
[397] DEIS Appendix C. Page C-29.
[398] DEIS Appendix C, Section C.3.8. Page C-36.
[399] DEIS Chapter 4.04, Section 4.4.5.1. Page 4.4.20.

minimization technique constitutes added and disproportionate impacts to those who reside in the EJ neighborhoods and roads impacted by tunnel construction.

The DEIS should clearly identify, separate from the discussion of the FA/EEs, a written narrative of the nature of the TBM launch/retrieval sites, listing the specific sites that are to be used as TBM Launch Sites. It is presumed that these sites' locations and sizes include:

- New York Avenue NW at Montana Avenue NW, Washington, D.C.: 3 acres
- Kenilworth Avenue near Lloyd Street, Hyattsville, MD: 3 acres
- Riverdale Road near Auburn Avenue, Riverdale, MD: 3 acres
- North of Connector Road, Fort Meade, MD: 3 acres
- Railroad Avenue at MD 176, Harmans, MD: 7 acres
- Harman's Road at MD 100, Hanover, MD (new site): 3 acres
- Mathison Way, BWI Marshall Airport, MD (new site): 3 acres
- MD 170 at South Camp Meade Driver, BWI Marshall Airport, MD: 3 acres
- I-895 near Annapolis Road, Halethorpe, MD: 6 acres (from DEIS, Section 3.3.2)400

Nowhere is it confirmed in a written narrative that all these sites also will be used for TBM launch/retrieval. The additional amount of acreage required at each site for tunnel boring launch/retrieval is not listed, nor is the total acreage required for the combined functions.

Request:

- Before considering any decision to move the SCMagLev Project forward, the FRA need to provide a fully detailed listing and explanation of any, and all construction activity for all FA/EE sites, and identify the sites that will include any TBM activity. This information needs to be provided to the public with sufficient time to review and provide comments.

- Before considering any decision to move the SCMagLev project forward, the FRA must provide a fully-detailed listing and explanation of all construction activity for all FA/EE sites, and identify the sites that will include any TBM activity. This information needs to be provided to the public with sufficient time to review and provide comments.

A TBM launch retrieval site is planned for the Martin's Woods neighborhood in Lanham, MD, as well as in other EJ neighborhoods. The DEIS does not adequately describe the extreme stress to which this neighborhood, as well as the others, will be exposed during construction that will last at least three years. The stress will result from the following:

- 24-hour onslaught of noise and vibration from drilling.
- Transport of truckloads of dirt and muck continuously throughout the neighborhoods.
- Damage to home interiors, especially drywall cracks (interior walls and ceilings,) developing from the constant movement of heavy vehicles such as dump trucks running throughout the neighborhoods.
- Environmental impact from runoff into tributaries.
- Dirt and dust in the air.

[400] DEIS Chapter 3, Section 3.3.2.5. Page 3-32.

- Impacts to the area from the industrial layout of the type of facility necessary to accommodate a drill of up to 50 feet in diameter and all related construction equipment.

The DEIS is deficient because it does not address the following questions:

- Is TNEM liable for the interior damage to homes as a result of this continuous running of heavy trucks and the related vibration to homes and businesses?
- Neighborhood roads are not designed for the continuous heavy vehicle traffic the SCMagLev construction would bring. Is TNEM liable to repair/replace damaged roads, or are we the taxpayers stuck with cleaning up the mess?
- What are the potential health risks to nearby residents exposed to the additional airborne dust and dirt?
- What are the potential health impacts on residents exposed to 24-hour-a-day, seven-days-a-week noise and vibration?
- What is the anticipated polluted runoff into the local streams and waterways? What process will be used to mitigate these impacts? How effective are these mitigation processes?

The DEIS also does not discuss reclamation and rehabilitation of land beyond what is necessary to support the FA/EEs once construction is complete. This would be 10 to 12 acres for the TBM launch/retrieval site versus approximately three acres once construction is complete.

Request:

- The supplementary DEIS should describe what will be done to recover and restore the acreage destroyed with the TBM sites before and during tunnel boring, and what will have to be done to return it to normal use on construction completion. This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

Some of the impacts mentioned in the DEIS should be described in further detail along with meaningful mitigation efforts to minimize these impacts on the communities. The DEIS states that “at the height of construction activity there will be 560 to 690 daily truck departures/arrivals at this work site, which will be active 24 hours per day. In addition, there will an estimated 425 autos carrying workers arriving and departing over the 24-hour period.”401 The DEIS states the construction will also contribute diesel emissions from the temporary standby generation facilities powering the tunnel boring machines, which the DEIS contends will use 4.9 trillion MMBtus of energy.[402,403]

The DEIS is deficient because:

- It does not provide the required analysis of how this amount of additional traffic will affect local traffic or tie up major roadways such as Riverdale Road, Kenilworth Avenue/Route 201, or Veterans Highway.

[401] DEIS Appendix D.02, Section D.2A.15.2 Page A-65.
[402] DEIS Chapter 4.19, Section 4.19.3.3. Page 4.19-14.
[403] Appendix - Articles Reprint: Beacon Heights Civic Association; Woodlawn Community Association. “Comments on Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation (EIS No. 20210010).” April 23, 2021. Page 6.

- It does not discuss meaningful mitigation efforts that might include modification of 24 hours-a-day, seven days a week operations or curtailment of construction traffic during rush hours.
- It does not discuss the concentrated number of apartment complexes within the affected section of Martin's Woods. There are at least three major complexes in the immediate vicinity of this construction with several more east and west of the TBM launch and retrieval site along Riverdale Road. These apartment complexes contribute to traffic along that road; their residents also will be severely impacted by the massive increase in traffic due to construction.

These neighborhoods also will be exposed to "deep boring, pile driving, and possibly blasting."[404] This type of continuous construction activity will cause increased vibrations in the area and possible structural impacts.

Because the DEIS fails to discuss in necessary details the severe conditions EJ and other communities will experience with tunnel boring and construction, the full impacts should be described in a supplementary DEIS, so that the impacted communities and the community at large have a chance to comment and modify these plans. A conceptual layout illustration similar to the one included for the TMF in Figure 3.4-5, page 3-21 should be provided for each TBM launch and retrieval site, as well as conceptual illustrations and photos that show the full extent of the planned TBM launch retrieval area along with the access roads. In other words, the TBM launch and retrieval sites should be documented in the same manner as the TMF with the following:

- total acreage requirements.
- total amount of impervious surfaces created at each site.
- amount of natural clearance.
- nature of run-off and effects on surrounding environment.
- mitigation efforts necessary for muck and soil handling procedures.
- disposal arrangements of muck and other potential hazards to the immediate community.[405]

Two of the planned sites are located close to rivers, Kenilworth Hyattsville on the Anacostia River and I-895 near Annapolis Road, Halethorpe on the Patuxent River.

Request:

- The FRA needs to provide a description of the effects on the Anacostia and Patuxent Rivers from constant runoff and tunneling over a three-year or more period, and any mitigation plans. This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

Finally, this type of facility seems entirely inappropriate for the almost exclusively residential setting of Martin's Woods and other primarily residential settings. Serious consideration should be given to finding more suitable locations.

[404] DEIS. App-D.10. Section D.10.4.3.2. Page 10.4-23.
[405] DEIS Chapter 3, Section 3.3.2.2, Figure 3.4-5. Page 3-21.

The full environmental and community impact to the TBM Launch Retrieval Sites should be documented in a supplementary DEIS so those communities and public officials can comment and respond to the entire scope of impacts the combined functions these sites will present to the surrounding environment and the community.

LV. Soil from Tunneling and Soil Hauling

The DEIS states that, overall, 75 percent of the alignments are underground, and the tunnel will be approximately 50 feet in diameter.[406,407] Tunneling will begin at a point north of Greenbelt and go south to Washington, D.C., as well as at a point south of Linthicum/BWI Airport, going north to Baltimore. Assuming a wall thickness of 18 inches, the amount of soil removed would be approximately 11,000,000 cubic yards. For an average dump truck capacity between 10 to 14 cubic yards per load, 790,000 to 1.1 million dump truck trips, respectively, will be required.

Requests:

- As part of a supplemental DEIS, the MTA and BWRR must provide a thorough, unredacted cost and engineering analyses of how to run both current route alternatives entirely in tunnels versus, as currently, using above-ground guideways. These analyses must be at a level of detail appropriate to this phase of the DEIS, subject to FRA guidance, to inform communities and residents mere feet outside the above-ground LODs (such as in South Laurel) what will be the full cost and impact on their communities, homes, businesses, and environment.
- A detailed list of all sites approved or awaiting approval or recommended in name as a disposal site for any soils, spoils, muck, dirt, or sediments of any kind that have been excavated must be provided.
- As part of the supplemental DEIS, the MTA and BWRR provide a thorough cost and engineering analysis of how to avoid or processes to be employed to treat and neutralize all pollution from tunneling and other removed dirt and soil before disposal.
- This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

LVI. Haul Routes

Haul Routes are needed to remove soil and other debris and for materials and move in precast structures (as much as 10.5 ft in width) to staging areas (e.g., Konterra), to worksites, and laydown areas. The haul routes are discussed qualitatively in Section D.2A.15[408] and mapped in Figures 17-19 and Tables 13-15 in Appendix G.7.[409]

They show that both Greater Laurel and Greater Greenbelt will be flooded with several hundred trucks daily traversing all or portions of every major artery including MD193, MD197, MD198, MD201, and

[406] DEIS Appendix G.13, Part L, Section 2.1. Page 3 (86 of 215).
[407] DEIS Appendix G, Part K, Section 6.3. Page 17.
[408] DEIS Appendix D.02, Sections D.2A.15.1 and D.2A.15.2. Pages A-62 to A.15-91.
[409] DEIS Appendix G, Park K, Section 7.4. Pages 24 to 31.

Route 1. Even smaller roads, some single lane each direction, will be pressed into service including Riverdale, Powder Mill, Contee, Muirkirk, Odell, Springfield, Soil Conservation, Beaver Dam, and Brock Bridge. Some of these roads are inadequate in size and load bearing capability (e.g., Beaver Dam, and Brock Bridge) and will have to be upgraded.

In Appendix 11, the Alternatives Comparison Matrix (page 10), for the sponsor's preferred alternative (J3) would require 2.25 million truck trips[410], an unfathomable number. As most construction is complete by the end of year six, this would amount to 1,500 trucks per day, although during peak years (two to four) the daily rate might be much higher. Moreover, these trucks would not be spread out evenly along the alignment, but concentrated along haul routes, at laydown locations, and at work sites.

Traffic control maps in Appendix G.2 Part I (TCP 13 to TCP 41) show how traffic control restrictions will affect both NASA GSFC and NSA.[411] Road closures will require long detours. Depending on the selected alignment and location of the TMF, not all these roads will be used. However, most of the proposed haul routes are common to both alignment choices and any choice of the TMF. Several mitigation measures (e.g., truck lanes, truck turning lanes, retiming signaled intersections, traffic studies, dedicated contact number) are proposed, but there is a high likelihood that extensive backups will be created daily starting with the morning rush hour as workers arrive and, because of the truck traffic, would not dissipate during the day, thus extending to after the traditional evening rush hour. Note that many haul routes from staging to laydown areas have turns at narrow intersections, thus making the transportation process both difficult and slow.

In summary, the synergism produced by so much construction traffic (workers and trucks) will likely produce extensive gridlock in major parts of Greater Laurel, Greater Greenbelt, and Greater Hyattsville and Riverdale, thus drastically reducing quality of life for many of their combined 172,080 residents and lasting at least 34 months.

Requests:

- A detailed impact survey and plan must be provided, that details the disruption caused by roadway improvements to accommodate both the physical load (weight) and the increased traffic.
- A part of a supplemental DEIS, the MTA and BWRR must provide a thorough cost and engineering analysis of how to avoid all such pollution from fill dirt and soil removal, and a milestone chart/project schedule for formulating a tunnel soil disposal plan.
- This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

[410] DEIS Appendix G, Section 7.4. Page 10.
[411] DEIS Appendix G, Part D. 2, Drawing 1.

LVII. Tunnel Evacuation

Question:

- Does the SCMagLev tunnel evacuation design meet federal standards, as well as applicable local standards?

The SCMagLev has a similar evacuation design to that of the previously proposed Hyperloop. FA/EEs are three to four miles apart. The Gotthard Base Tunnel (longest rail tunnel in the world) has escape passageways spaced about every 1,000 feet. The Hyperloop call for access and passages no farther than 10,500 feet between emergency exits. SCMagLev emergency access and exits would be between 3.1 to 3.7 miles apart.[412]

The facilities for passengers to escape during an emergency, whether from a breakdown, fire, flooding, or terrorism, leave much to be desired. There will be riders ranging from newborns to senior citizens and individuals with disabilities on the SCMagLev train; therefore, what BWRR is proposing would not pass muster.

Should a fire break out at the worst possible place, passengers could face upward of a two-mile walk, if the SCMagLev is half-way between two FA/EEs exits and then up several stories to reach surface and the ventilation shaft exit. The worst-case scenario could occur if an accident or some other event blocked the tunnel right after passing an exit, preventing people from reversing course to the closer exit. This would result in up to a four-mile walk. A power failure or other catastrophic incidents could also render the elevator useless.

To comply with NFPA standards for rail tunnels, the SCMagLev would need at least 74 exits in each tunnel between Baltimore and D.C. Even this standard of 1,000 feet between exits is weak. Smoke from fire in an enclosed, below-grade area has a high propensity to kill people and create numerous problems for anyone trying to exit and emergency personnel trying to enter and assist. When passengers eventually reach the ventilation shafts, their challenges may not be over. The tunnel floor will be 44 to 104 feet (or more) below the surface. One or more means of vertical access (e.g., elevator, man basket, stairs, or ladder) would be needed for ingress and egress.

At the top of each shaft will be either a shed housing ventilation equipment or a flat steel grate. This will not work for a 70-year-old person who has just traveled thousands of feet and then has to climb a ladder to exit.

Such long and inconvenient escape routes would also hamper incoming firefighters, who typically have only a 30-minute supply of air, at most, for their breathing apparatus. According to Edenbaum, “ingress becomes a concern with very long tunnels . . .” a tunnel fire and ventilation engineering consultant based in Toronto, Canada. “Long tunnels are rare in the United States, a country that has more experience with fires in tall buildings than deep underground. All of our research in terms of stairwells

[412] DEIS Chapter 3, Section 3.1.2. Page 3-4.

has been done with downward motion. What's not been well studied are situations where people might have to walk a significant amount."[413]

LVIII. Other Tunnel Issues

There are numerous properties along the proposed routes that rely on well and septic system or have a geothermal system installed.

The DEIS is deficient in that it does not provide the information for the following question:

- How are these properties being identified, and the owners notified?
- What are the proposed mitigation measures for each property?
- If damage to the well or the water flow occurs with the building and operation of the SCMagLev, what level of compensation will TNEM provide to the affected homes and businesses?
- This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

Ground water removal (pumping) entering the tunnels is a concern in terms of contaminants in the water being pumped into the environment.

The DEIS is deficient in that it does not provide the information for the following questions:

- What type of water removal systems will be implemented in the tunnels?
- Where will water that infiltrates the tunnel going to be disposed of?
- What decontamination systems and processes will the BWRR build into this system?
- How effective are these systems and processes in removing containments?
- How will the extracted containments be treated to neutralize the containments identified?
- Where and how will the resulting decontaminated materials be disposed of?

During the boring and construction of the tunnels, followed by the operation of the SCMagLev, the tunnels will provide a collection system for radioactive Radon and other potentially dangerous gasses. As noted by Woomer, "Maryland is a radon gas "hot spot." Average measurements across the state range for 0.2 pCi/l to 61 pCi/L."[414] During SCMagLev operation, any accumulating gases will be pushed into the atmosphere at the next ventilation facility. The ventilation facility has a smaller cross-sectional area as compared to the SCMagLev tunnel, which will concentrate Radon and any other gases collected in the tunneled section to be released into the open atmosphere at the ventilation facility. People and wildlife living, working or playing near the ventilation facilities will be exposed to Radon and any other gas.

[413] Edembaum, Justin. Found in "Review of Elon Musk's DC-to-Baltimore 'Loop' system reveals safety concerns -From insufficient emergency exits to problematic escape ladders." https://techcrunch.com/2019/05/22/review-of-elon-musks-dc-to-baltimore-loop-system-reveals-safety-concerns/. Also see NFPA 101®: Life Safety Code®. National Fire Protection Association. www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=101.
[414] Appendix - Reprint: Woomer, Dan. "What Impact Would the SCMagLev Have on Our Communities?" CATS-MCRT White Paper. January 11, 2021.

In addition, in case of a fire, "The ventilation facilities' primary purpose is to clear smoke in case there is a fire in the tunnel. The ventilation units will force air into the tunnel on one side of the tunnel section with smoke, and the next ventilation facility will exhaust the smoke-filled air from the tunnel. In other words, one ventilation facility will pressurize the tunnel ahead of the section of the tunnel with smoke and the alternate ventilation facility will depressurize the tunnel to exhaust the smoke to the atmosphere."[415] A fire would likely be "some type of electrical event, the fuel for the fire could be lubricants, plastics, and electrical wire insulation. 'When plastic is burned, it releases dangerous chemicals such as hydrochloric acid, sulfur dioxide, dioxins, furans and heavy metals, as well as particulates. These emissions are known to cause respiratory ailments and stress human immune systems, and they're potentially carcinogenic." (Biemiller, quoting Noelle Eckley Selin, Massachusetts Institute of Technology, 2013)."[416]

The DEIS is deficient in that it does not provide the information for the following questions:

- How is radon, and other dangerous or inert gas accumulation going to be addressed?
- How are people near the FA/EE facilities going to be warned of a fire incident in the tunnel releasing toxic and cacogenic compounds into the atmosphere?
- Who and what kind of independent monitoring of the exhaust from the FA/EE will be in place?
- How will the information of the finds be released to the public?
- What is the plan if the exhaust show unsafe levels of gases are present?
- What is the long-term plan to monitor gases entering and exhausting for the tunneled section?

LIX. Viaduct Issues and Impact

There are numerous residential properties along the proposed route Alternatives which will be impacted by extremely close proximity to the proposed SCMagLev Limit of Disturbance (LOD) in the DEIS, and in 4(f) and DEIS maps cited below. The following comments address representative impacts from the J1 (west) viaduct along the northern extent of Alternate J1 (west). But the already once-extended DEIS review period still did not allow time for a more complete analysis of the J1 and J viaducts' impact on communities end-to-end by residential volunteers.

The impacts described here are by example in Montpelier Hills Homeowners Association (MHHA) and Recreation Association (MHRA), 501(c)3, zip code 20708. MHHA consists of 365 32-year-old town homes and 211 final phase townhouse lots to be built (M-NCPPC Specific Design Plan SDP-0510) approved in 2006 by Maryland-National Capital Park and Planning Commission - Prince George's County Planning Board. The eastern boundaries of the MHHA, including homes and common grounds owned by MHHA/MHRA, run very close, within a few yards along the west boundary of the BW Parkway, with which the proposed SCMagLev viaduct alternative J1 (west) is in conflict. MHHA/MHRA are served by U.S. Congressional District 5 and District 4; Maryland Assembly District 23; Prince George's County Council District 1, and Prince George's County Police District VI.

[415] Description provided by Cosema Crawford, PE, Senior Vice President - Louis Berger at the October 17, 2017, BWRR-Maryland Transit Administration (MTA) Open House.
[416] Appendix - Reprint: Woomer, Dan. "What Impact Would the SCMagLev Have on Our Communities?" CATS-MCRT White Paper. January 11, 2021.

- After our review of the SCMagLev DEIS and 4(f) we (MCRT/CATS) support the "No Build" alternative and have serious concerns about the impacts to homeowners of the J1 (west) and J (east) "Build" alternatives. The proposed J1 (west) viaduct and J (east) viaducts both are totally unacceptable, and J1 (west) and J (east) tunneling would be only slightly less onerous than a viaduct, for reasons of construction, operations, potential failure, and eventual decommissioning of the SCMagLev.

Section 4(f) 4.4-12 (below) lists residential properties that would experience acquisition. The DEIS states "The viaduct would require the removal of a forested buffer between these communities and the BWP and would present a stark change from current views. The viaduct would be as close as 65-feet to residences and would impact residents due to increased noise, vibration, and changes to aesthetics. For Build Alternatives J1-02, J1-03, J1-05, and J1-06, the LOD extends into residential property on Elmshorm Way, Frensham Court, and Ivory Fashion Court and would eliminate parking; alter access to residences from Hermosa Drive and Muirkirk Road; and eliminate open space and picnic tables. Residents in these areas would experience property acquisition, changes to access, and impacts to community cohesion. The Villages at Montpelier Apartments and Evergreens at Laurel Apartments east of the BWP would also experience impacts due to increased noise."[417] Yet, the companies wanting to build the SCMagLev continue to say that property takings are not required, as they did in April 2021 in a letter to the Anne Arundel County Council: ". . . all SCMAGLEV Build alternatives under review will require ***zero residential displacements***."[418]

While many impacted residential homeowners may escape forced "displacement," per se, many will be forced to consider "**self-displacement**," because, according to the SCMagLev DEIS, they will find themselves within mere feet of the SCMagLev Limit of Disturbance (LOD), just beyond even the relief of eminent domain.

If your home is 65 feet from a viaduct (see below) but outside the LOD, it is cold comfort to be told in the DEIS Executive Summary that: "Build Alternatives J-01 to J-06 [east] include 25 percent viaduct and 75 percent tunnel, whereas Build Alternatives J1-01 to J1-06 [west] include 14 percent viaduct and 86 percent tunnel."[419] And similarly for residents along the extent of J1 (west) and J (east). The roughly 60-foot-high J1 concrete viaduct would loom permanently over even three-story townhomes. When SCMagLev trains do come, the passengers will be able to glimpse through windows, onto decks, and down into backyards; an unquantifiable loss of privacy and quality-of-life expected to significantly reduce home market values. Homeowners who invested in their now-impacted homes decades ago will now be living under the shadow of a SCMagLev viaduct, akin to the elevated "L-train" tracks in Chicago.

We are also concerned that SCMagLev trains on viaduct through communities like Montpelier Hills will not only induce vibrations directly into our proximate home foundations and underlying soil (at the same ground level, not in deep tunnels), but also sympathetically reverberate with vibration-sensitive, wood-frame, dry-wall-finished town homes, windows, and walls and increase potentially persistent noise risk of sensitive car alarms and home security sensors triggering with each passing SCMagLev train.

[417] DEIS. Chapter 4.04. Section 4.4.4.2. Page 4.4-12.
[418] Appendix - Letters Reprint: Rogers, Wayne. BWRR Letter to Anne Arundel County Council. April 16, 2021.
[419] DEIS Section 4(f), Page ES-13.

Proposed noise/sound mitigations seem to be prospective in the nearer field proximity between homes like in Montpelier Hills, and viaducts, along J1 (west), and by extension J (east).

The SCMagLev *Final Alternatives Report* states: "BWRR did not develop a fully tunneled alternative concept as the alignments were refined to minimize environmental impacts to the extent practicable. The additional billions of cost from tunneling to go beyond minimization of impact to complete avoidance of impact along the BW Parkway is a substantial amount of capital expenditure that would severely jeopardize the financial viability of the project. In addition, some extent of above-ground operation is needed to demonstrate the feasibility of Maglev technology to the public [*emphasis added*], other than riders, consistent with the Maglev Deployment Program as authorized in TEA-21 [Transportation Equity Act] and to provide riders the experience of above-ground travel. With the BWP already being in transportation use, the section along the BWP is the logical location to provide the above-ground demonstration of Maglev (above ground running in any other section of J or J1 would result in substantial residential or business impacts). In addition to being not prudent or feasible, placing the entire project in tunnel would be unreasonable. The Section 4(f) Evaluation of the recent Baltimore & Potomac (B&P) Tunnel Project in Baltimore, that was extensively in tunnel, concluded it was not prudent or feasible to avoid the use of nine Section 4(f) properties. The DEIS will expand further on the Section 4(f) analysis for this SCMAGLEV project, including a full tunnel option for comparison."[420]

Not unreasonably, we are not convinced by the above rationale for not providing a full tunnel option in Section 4(f) of the DEIS.

Request:
The SCMagLev DEIS and Section 4(f) must provide supplemental analysis of a fully-tunneled, end-to-end Alternate Route J1 (west) and J (east), with no viaducts, and with budget estimates for comparison with all other alternates.

If full end-to-end tunnel Alternatives J (east) and (J1 west) would have "billions of cost from tunneling" and "severely jeopardize" SCMagLev "financial viability," there would still not seem to be any systems engineering reason to not perform a supplemental full-tunnel, end-to-end analysis for equally thorough "comparison" with the other alternatives, including a further analysis of costs, to more fully inform the FEIS and the FRA ROD. Any full-tunnel alternative would only be approved by the FRA if it were in fact the best, most cost-effective alternative, rather than an undocumented prejudgment.

Further, per the BWRR (see above): "In addition, some extent of above-ground operation is needed to demonstrate the feasibility of Maglev technology to the public, other than riders, consistent with the Maglev Deployment Program as authorized in TEA-21 [Transportation Equity Act] and to provide riders the experience of above-ground travel."

- The MCRT/CATS Review Team believes that being "consistent with **the Maglev Deployment Program as authorized in TEA-21" [Transportation Equity Act] is not an overarching mandate** for a problematic viaduct through communities like MHHA/MHRA, at the cost of hurtful impacts on homeowners and residents along the full length of Route J and Route J1, especially for underserved

[420] Final Alternatives Report. Section D. November 2018. Page 63.

people in Transportation Equity Act designated areas who cannot even board the SCMagLev train in their own community or anywhere in Prince George's and Anne Arundel Counties (other than at the SCMagLev's BWI airport station).[421]

For each community, the categories below of multiple, overlapping impacts and concerns are within the fiduciary responsibility of impacted homeowners' associations (condominiums, etc.) for their member homeowners, during construction and operation, and ultimate decommissioning, or potential failure of SCMagLev.

Representative concerns, exemplified in Montpelier Hills (Community comments submitted separately)

- MHHA 576 fee-simple townhouse lots (just over 1,500 residents based on a 2.63 average persons per household in 2018:[422] MHHA enforces outward maintenance, noise, nuisance).
- MHHA common grounds: landscaping, parking, sidewalks, paths, equipment, amenities, tot lots.
- MHRA property and facilities (e.g., pavilions and tennis courts).
- Nearby non-Montpelier Hills properties and facilities, such as:
  - Proposed SCMagLev system elements: e.g., Support Facilities, Interconnection Switch Yard (power)
  - Montpelier Elementary School
  - County roads' sole ingress and egress to Montpelier Hills
- Other entities and services in and near MHHA, such as:
  - Three Prince George's County stormwater management facilities are within MHHA.
  - Nearby Crystal Plaza shopping center

Viaduct Impact Examples in Montpelier Hills

- **12101 Ivory Fashion Court, Laurel, MD 20708**

Lat: 39.055738 Lng: -76.841045
Elevation: 215.59 feet Above Sea Level (from latlongdata.com/elevation).[423]
Note the newly-added, 20-foot wide "temporary" (7-years?)" construction phase access road touching residential property. All seven other residential properties in that town home row are also a mere few feet from that construction road and the LOD. Consider also the surrounding Home Owner Association (HOA)-owned common grounds here and elsewhere in Montpelier Hills, which is where the construction road and LOD would "transect."

On-site video interview of homeowner on Ivory Fashion Court, Montpelier Hills, MD 20708; (See: bit.ly/MagLevIvoryFashionVideo) shows properties to be impacted by J1 (west) viaduct.

[421] U.S.DOT. FHWA. www.fhwa.dot.gov/tea21/summary.html. Retrieved May 5, 2021.
[422] Fry, Richard. "The number of people in the average U.S. household is going up for the first time in over 160 years " Pew Research Center - Factank News in Numbers. October 1, 2019. www.pewresearch.org/fact-tank/2019/10/01/the-number-of-people-in-the-average-u-s-household-is-going-up-for-the-first-time-in-over-160-years/.
[423] DEIS. Appendix G, Part D. Page 30.

Viaduct Impact Examples on Elmshorn Way

- **11414 Elmshorn Way, Laurel, MD 20708**

Lat: 39.047403 Lng: -76.845701
Elevation: 163.85 feet; from latlongdata.com/elevation[424]
All eight of the town homes on Elmshorn Way are similarly impacted by the new, SCMagLev "temporary" extended 20-foot-wide construction access road, subsuming common grounds up to the parking lot, taking away the HOA's amenities for residents, like the permanent community picnic table, which the SCMagLev LOD subsumes, leaving that table in the middle of the access road when the construction access road is eventually decommissioned. Then Elmshorn Way homeowners will be only 20 feet farther from the viaduct.

- On-site video interview of homeowner on Elmshorn Way, Montpelier Hills, MD 20708; (See: http://bit.ly/MagLevElmshornVideo) shows properties to be impacted by J1 (west) viaduct.

- On-site Video interview of homeowner on Frensham Court., Montpelier Hills, MD 20708; (See: http://bit.ly/MagLevFrenshamVideo) shows properties to be impacted by J1 (west) viaduct.

- On-site Video interview of homeowner on Oregold Court., Montpelier Hills, MD 20708; (See: http://bit.ly/MagLevOregoldVideo) shows properties to be impacted by J1 (west) viaduct.

Likewise on Sea Pearl Court and Blue Moon Court, in Montpelier Hills, MD 20708, along the J1 (west) viaduct at the BW Parkway's western boundary.

The SCMagLev seemingly could not have wedged its proposed J1 (west) viaduct into any narrower passage than between Montpelier Hills east boundary and the near-contiguous BW Parkway west boundary.

- Given that the DEIS puts the J1 (west) viaduct so close to homes, as noted above, the MCRT/CATS Review Team are concerned that Section 4(f), page F-F-7, asserts: "SCMAGLEV trains levitate between the walls of a unique U-shaped concrete structure that guides the trains along the alignment, which has walls surrounding the trains on both sides, making the system free [sic] from derailment." We disagree that the viaduct is "free from derailment." See the MCRT/CATS DEIS Comments Section concerning safety, and the safety white papers found in the appendices of this submission.

Questions based on the lack of needed information in the DEIS include:

- Is there any "safe" distance from SCMagLev-sourced EMFs/EMR for homes with adults and children, and common grounds amenities (walkways, tot lots, etc.), mere feet beyond the LOD of the proposed viaducts?
- On Alternative Routes J (east) and J1 (west) what are the safe distances? (See the MCRT/CATS DEIS Comments Section in this submission concerning Community Impact.)
- Can cellphones or other electronic devices be reliably operated on SCMagLev; that is, will there be WiFi in deep underground tunnels, on viaducts, and at grade?

[424] DEIS. Appendix G, Part D. Page 29.

- Will cellphone use be prohibited in any circumstance? Cellphone use is obviously imperative for riders and may affect ridership.
- Are these forms of communication not viable because of the EMF field needed to levitate and propel the SCMagLev? If so, what is the affected range of SCMagLev EMF interference to communications and transmissions?
- This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

MCRT/CATS abhors all 4(f) community impacts along the entire length of J1 (west) and J (east), as exemplified by these impacts in Montpelier Hills.

See: Section 4(f) 4.4-7 through 4.4-13, extracts below.

- The Build Alternatives could cause community disruption in the following areas due to adverse permanent impacts further described in this section: Elmshorn Way, Hermosa Drive, and Frensham Court in the Montpelier Hills community, as well as Ivory Fashion Court, Blue Moon Court, and Sea Pearl Court (Build Alternatives J1-01 thru J1-06).[425]

- Residences west of the BW Parkway on Elmshorn Way, Hermosa Drive, Fairlane Place, and Frensham Court in the Montpelier Hills community in South Laurel would experience impacts due to increased noise from train pass-by along the viaduct, as would residences on Ivory Fashion Court, Blue Moon Court, and Sea Pearl Court.[426]

- Residents along Frensham, Dortmund, and Vanfleet Courts would be within 500 feet of the buildings and would experience increased noise.[427]

- The viaduct and a system building would be located between the BW Parkway and the Crystal Plaza Shopping Center (north of the BW Parkway/MD 197 interchange). The Crystal Plaza Shopping Center includes multiple retail stores, restaurants, two gas stations, and a hotel. The systems building and viaduct would be as close as 100 feet to a hotel and shopping center stores. The Montpelier Post Office and the businesses within the shopping center would experience increased noise and changes in visual quality.[428]

LX. The DEIS Understates the Impact on Historic Sites and Cultural Resources

The introduction to Chapter 4.08 of the DEIS does not clearly state how the National Historic Preservation Act (NHPA) defines “historic properties.”

[425] DEIS Chapter 4.04, Section 4.4.4.2. Page 4.4-7.
[426] DEIS Chapter 4.04, Section 4.4.4.2. Page 4.4-11.
[427] DEIS Chapter 4.04, Section 4.4.4.2. Page 4.4-12.
[428] DEIS Chapter 4.04, Section 4.4.4.2. Page 4.4-13.

- The first paragraph of the introduction provides the definition of "cultural resources" under NEPA; that is, "any prehistoric or historic structures, buildings, objects, sites, districts (a collection of related structures, building, objects, and/or sites), landscapes, natural features, traditional cultural properties (TCPs) and cemeteries."
- The second paragraph then states that "cultural resources that meet the National Register of Historic Places (NRHP) significance criteria qualify for consideration under the National Historic Preservation Act (NHPA) (54 U.S.C. § 300101 et seq.) and its implementing regulations (36 C.F.R. Part 800)."
- The third paragraph then states that "both cultural resources, as defined above, and historic properties, as defined by NHPA, are addressed in this section."[429]

However, it should be stated in the second paragraph that "cultural resources that meet the National Register of Historic Places (NRHP) significance criteria" are defined as "historic properties" under NHPA. This is important to understand how this chapter coordinates both NEPA and NHPA requirements.

Overall, the DEIS does not provide enough information to evaluate which of the build alternatives would have the least impact on cultural resources. Several problems have created this situation:

1. Ideally, the cultural resources component of an EIS is coordinated with NHPA Section 106 review such that the NHPA Section 106 review is completed prior to the agency's ROD.[430] As noted in DEIS Section 4.8.2.1 (Regulatory Context), the steps of Section 106 review are: (1) identifying and evaluating historic properties, (2) assessing effects to those properties, and (3) resolving any adverse effects. However, the cultural resources studies for this project have not even completed the identification and evaluation of historic properties prior to the preparation of the DEIS.

   The DEIS states that further cultural resources studies will be accomplished after the ROD through a Programmatic Agreement (PA) that is being developed for this project. **This planned phasing of fieldwork forecloses the option of avoiding impacts to significant historic properties rather than mitigation.** The DEIS states that this phasing is authorized under the published regulations of the Advisory Council on Historic Preservation (ACHP) that guide federal agencies and other participants in the Section 106 process (36 CFR Part 800). Specifically, section 4.8.2.2 of the DEIS cites 36 CFR § 800.14(b) as allowing a PA "when the effects on historic properties cannot be fully determined before a Federal agency approves an undertaking."[431] However, the DEIS fails to explain how this specific project qualifies as a "complex undertaking" in which "the effects on historic properties cannot be fully determined before a Federal agency approves an undertaking." An explanation is needed.

[429] DEIS Chapter4.08, Section 4.8.1. Page 4.8-1
[430] NEPA and NHPA: A Handbook for Integrating NEPA and Section 106. www.achp.gov/digital-library-section-106-landing/nepa-and-nhpa-handbook-integrating-nepa-and-section-106.
[431] DEIS Chapter 4.08, Section 4.8.2.2. Pages 4.8-2 to 3.

Request:
We call on the FRA to provide the information to evaluate which of the build alternatives would have the least impact on cultural resources prior to any decision moving forward with building the SCMagLev.

2. Large portions of the project are excluded from cultural resources studies based on faulty assumptions. The areas covered by cultural resource studies are called the "affected environment" under NEPA and the "area of potential effect" (APE) under NHPA. This DEIS defined separate APEs for above-ground resources (such as historic structures, buildings, objects, districts, landscapes, natural features, TCPs, cemeteries, and local government-designated landmarks and historic districts) and archaeological resources (such as prehistoric or historic sites, TCPs, cemeteries, and local government-designated sites). There are issues with how each APE is delineated for this DEIS.

   A. Tunnel sections of the alignments are not included in either APE.
      i. The above-ground APE does not include the tunnel portions of the project because the DEIS (pages 4.8-4 to 4.8-5) asserts that "the potential for construction of the deep tunnel portions of the SCMAGLEV system to result in impacts on above-ground resources is low based on the extremely low probability of collapse of a deep tunnel to such an extent that the ground surface is breached, or that vibration or noise from the deep tunnel reaches the surface."[432] However, in Appendix D.10 (Section D.10.4.2.3 Ground-borne Vibration and Ground-borne Noise Effects) the FRA predicts vibration impacts up to 225 feet from tunnel guideways and ground-borne noise impacts up to 250 feet from tunnel guideways.[433] Chapter 4.13 of the DEIS (Topography and Geology) raises additional concerns that "groundwater pumping could result in topographic subsidence and ground compaction" (page 4.13-6) and the possibility that construction of the tunnels could result in micro-seismic activity (page 4.13-7).[434] The exclusion of the tunnel portions of the project from the above-ground APE needs to be reconsidered in light of the information cited here from Appendix D.10 and Chapter 4.13, because vibrations, subsidence, and/or micro-seismic activity could negatively impact historic properties. The tunnel portions of the project would run directly under numerous known historic properties, including (but not limited to):

         a. Twin Oaks/Linthicum House (AA-113), a NRHP-eligible property in northern Anne Arundel County that is not discussed in the DEIS.
         b. Linthicum Heights Historic District (AA-990), a NRHP-listed district in northern Anne Arundel County that is not discussed in the DEIS.
         c. Martin's Woods (PG:72-68), a NRHP-eligible property in Prince George's County.
         d. Cherry Hill Cemetery (PG:69-21), a potentially-NRHP-eligible property in Prince George's County that is not discussed in the DEIS.
         e. Fort Lincoln Cemetery (PG:68-15), a NRHP-eligible property in Prince George's County that is not discussed in the DEIS.

[432] DEIS Chapter 4.08, Section 4.8.4. Pages 4.8-4 - 5.
[433] DEIS Appendix D.10, Section D.10.4.2.3. Page 10.4-20.
[434] DEIS Chapter 4.13, Section 4.13.4. Pages 4.13-6 – 7.

Request:
All APEs, along the alignments that are subsurface and elevated must be identified and assessed to determine the potential and likely impacts building the SCMagLev would have on the structures. This information must be made available for public review and comment before any consideration is given to moving the building of the SCMagLev forward.

ii. The archaeological APE does not include the tunnel portions of the project because the DEIS (page 4.8-5) asserts that there is an "extremely low probability of collapse of a deep tunnel to such an extent that the ground surface is breached."[435] The exclusion of the tunnel portions of the project from the archaeological APE needs to be reconsidered in light of the information cited above from Appendix D.10 and Chapter 4.13, because vibrations, subsidence, and/or micro-seismic activity could negatively impact archaeological resources. There are undoubtedly known archaeological sites and many acres with medium/high sensitivity for archaeological resources above the tunnel portions of the project.

B. The above-ground APE along the viaduct portions of the project in Maryland is delineated in the DEIS at 150 feet of the LOD. This narrow APE needs to be reconsidered to account for the visual impact of the proposed tall viaduct structures.

LXI. DEIS Fails to Identify Other Significant Cultural Resources

Lack of consultation with county offices has resulted in the DEIS not identifying significant cultural resources. The comments from the M-NCPPC discuss the historic properties not identified in the Phase IA archaeology report and the DEIS: the Hamilton Family Cemetery (PG:67-003-03c) and the Pleasant Grove Methodist Church Site and Cemetery (PG:64-016). Consultation with the M-NCPPC and other local jurisdictions is needed to obtain information on historic properties not yet listed on the Maryland Historical Trust's (MHT) Medusa database.[436]

The DEIS is deficient as it does not identify and discuss the impacts to all significant cultural resources and historic properties. The FRA should not consider any decision to move forward with the building of the SCMagLev until these historic and cultural assets are fully identified, the impacts on building and operating the SCMagLev are assessed and reported, and the public is allowed sufficient time to review and make comments.

[435] DEIS Chapter 4.08, Section 4.8.2.3. Page 4.8-5.
[436] Medusa - Maryland Historical Trust's online database of architectural and archaeological sites and standing structures. https://mht.maryland.gov/secure/medusa/.

LXII. DEIS Fails to Identify Potentially Significant Cultural Resources

Lack of sufficient consultation with the public has resulted in the DEIS not identifying potentially significant cultural resources. Local community residents have knowledge of prehistoric and historic artifacts and features in the Greenbelt Forest Preserve, some of which appear to be within the proposed SCMagLev LOD. These potential historic properties are not listed on MHT's MEDUSA database, but consultation with these residents would have yielded this information. It is highly likely that residents in other communities along the proposed alignments have similar knowledge and information that has not been recorded on MHT's MEDUSA database.

LXIII. DEIS Fails to Provide Completed Maryland and Washington, D.C., State Historic Preservation Office Information

The DEIS was issued for public review before the Maryland and Washington, D.C., State Historic Preservation Offices (SHPOs) had completed their reviews of the Phase IA archaeology reports. As a result, the DEIS relies on information that has not yet been validated by SHPO review.

The SCMagLev DEIS is premature in being reviewed because the necessary information from the SHPOs is not included, which further reduces the information needed to identify, quantify, and assess the full extent of the negative impacts building and operating the SCMagLev will have on our communities and residents. This missing information, along with other missing information noted in this submission, makes the assessment of benefits versus costs increasingly difficult, artificially biasing the reviewer toward viewing them favorably because they are not openly informed of the full costs and impacts.

LXIV. DEIS Lacks Clear and Accurate Description of Greenbelt National Historic Landmark

The DEIS is deficient as it lacks a clear and accurate description of the Greenbelt Historic District National Historic Landmark (NHL). This leads the DEIS to ignore impacts to defining features of the NHL. This must be corrected for the NHL to be appropriately considered in the alternative selection process.

The Greenbelt Historic District is the only NHL in the alignments under consideration. Most of the description of the Greenbelt Historic District NHL is in the Section 4 (f) evaluation in Appendix F, where it is split between discussion of the NHL (pages F-81 and F-82) and the Forest Preserve (pages F-36 to F-39).[437] Although Appendix F states that the Forest Preserve is part of the NHL, this division makes it seem that the Forest Preserve is not part of the NHL. These sections need to be combined and the importance of the Forest Preserve as an integral part of the NHL needs to be recognized. In addition, the following corrections are needed:

[437] DEIS Chapter 4.23. Pages F-81 to 82, and Pages F-36 to 39).

- On page F-36, the DEIS states that "The Greenbelt Forest Preserve consists of 200 acres of woodland owned and administered by the City of Greenbelt within four tracts – the Boxwood, North Woods, Hamilton Woods, and Belle Point Tracts." This is not correct, as the Greenbelt Forest Preserve consists of 254.8 acres of woodland with five tracts including the four listed by the DEIS and the Sunrise Tract.[438]
- Page F-82 of the DEIS states that ". . . the Greenbelt Forest Preserve (North Woods and Hamilton Tracts), . . . includes the Northway Fields . . ." This is not correct, as the ballfields are in a parcel that is not part of the Greenbelt Forest Preserve.[439] However, the ballfield parcel qualifies separately as a Section 4(f) park property.
- Section F.9 (References; pages F-123 to F-125) includes no references to the Greenbelt Historic District NHL. Citations of both the NRHP nomination[440] and the NHL nomination document[441] should be included in Section F.9.
- The descriptions of the NHL in the main text of the DEIS (Chapter 4.8) and in Appendix D.5 are more muddled:
  - The main text of the DEIS provides an incorrect description of the NHL; Tables 4.8-4 and 4.8-5 (on pages 4.8-21 and 4.8-26) state that "only a sliver of the historic district is within the APE." This appears to be ignoring the inclusion of the North Woods and Hamilton Woods tracts of the Greenbelt Forest Preserve in the NHL. This is also minimizing the proposed impacts within the Forest Preserve; maps in the DEIS indicate that approximately 65 acres of the Forest Preserve would be impacted by the proposed Maglev J1 alignment, which represents approximately 25 percent of the entire Forest Preserve. Hardly a "sliver." **These proposed impacts to the Greenbelt NHL could not be mitigated.**
  - The Greenbelt Historic District NHL encompasses 756.8 acres, so the proposed SCMagLev LOD with the NHL is about 8 percent of the total NHL. Also, hardly a "sliver."
  - Appendix D.5 provides a muddled description of the NHL due to its reliance on the NRHP nomination form and its ignoring of the NHL nomination document. The NHL nomination document supersedes the NRHP form. For example, the period of significance was expanded to 1935-1946 in the NHL nomination document.

Request:
Considering these errors, misstatements, and apparent obfuscations in the current DEIS, the FRA should identify, assess, and report on the full impact building and operating the SCMagLev would have on all historic districts along all proposed SCMagLev alignments. This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

[438] "Forest Preserve Stewardship Guidelines." City of Greenbelt, Maryland. 2019. Appendix A. Greenbelt City Code, Chapter 12 Parks and Recreation, Article IX. Forest Preserve "Page 1. https://www.greenbeltmd.gov/home/showdocument?id=16685.
[439] Maryland State Archives, Prince George's County Circuit Court Plat Book NLP 129, p. 55, Northway Fields Park, Parcel A; Greenbelt City Code, Chapter 12 Parks and Recreation, Article IX. Forest Preserve. https://www.greenbeltmd.gov/Home/ShowDocument?id=7734.
[440] Hauenstein, Thomas. Greenbelt Historic District, National Register of Historic Places Inventory -Nomination Form, November 25, 1980. https://mht.maryland.gov/secure/medusa/PDF/PrinceGeorges/PG;67-4.pdf.
[441] Lampl, Elizabeth Jo. Greenbelt Historic District, National Historic Landmark Nomination, December 2, 1996. https://npgallery.nps.gov/pdfhost/docs/NHLS/Text/80004331.pdf.

- The main text and appendices ignore the potential impact of noise and vibration on the Greenbelt Historic District and ignores the district's contributing elements in and/or near the proposed LOD, including:
  - The Hamilton Cemetery and the associated Hamilton Farmstead site, which are located extremely close to the proposed LOD (and within the Affected Environment as defined in Chapter 4.4). These historic properties are not listed on MHT's MEDUSA database, but consultation with the Maryland-National Capital Park and Planning Commission's (M-NCPPC's) staff archaeologist and/or the City's Department of Planning and Community Development would have yielded this information.
  - The original allotment gardens, which are contributing elements of the NHL, are located extremely close to the proposed LOD. The Hamilton Gardens section of the allotment gardens are within the Affected Environment as defined in Chapter 4.4.
  - Local community residents have knowledge of prehistoric and historic artifacts and features in the Forest Preserve, some of which appear to be within the proposed SCMagLev LOD. These potential historic properties are not listed on MHT's MEDUSA database, but consultation with these residents and the M-NCPPC's staff archaeologist would have yielded this information.

Request:
When all the issues with the current DEIS are identified, assessed, and reported by the FRA, make the information available so the public has sufficient time to review and provide comments before any decision to move forward with the building of the SCMagLev is considered.

LXV. Programmatic Agreement Needs to Consult with More Stakeholders Regarding Greenbelt National Historic Landmark

The proposed Programmatic Agreement (PA) needs to bring more stakeholders into the consultation about impacts to the Greenbelt NHL. Page 4.8-1 of the DEIS cites the requirement "that prior to the approval of any Federal undertaking which may directly and adversely affect an NHL, the Federal agency shall, to the maximum extent possible, undertake such planning and actions necessary to minimize harm to the NHL" and consult with both the ACHP and the Secretary of the Interior (36 CFR § 800.10(c)).[442] The DEIS goes on to state that the "FRA is coordinating with the MD SHPO, NPS, and the Department of the Interior regarding SCMAGLEV Project effects to the Greenbelt Historic District in the context of Section 106 and Section 4(f) (Section F.8)" and that "the Final Section 4(f) Evaluation will report the outcome of coordination with MD SHPO and NPS regarding the Build Alternatives and the Greenbelt Historic District."[443] Public and city perspectives should be part of this consultation.

The DEIS (on page 4.4-13 and in Appendix D.3) states that "two cemeteries would be impacted by the elevated viaduct."[444, 445] Discussion of the impacts to and possible mitigation measures for these cemeteries is hampered by a lack of necessary information.

[442] DEIS Chapter 4.08, Section 4.8.1. Page 4.8-1. Also see: https://ecfr.io/Title-36/Section-800.10.
[443] DEIS Appendix F. Page F-82.
[444] DEIS Chapter 4.04, Section 4.4.4.2. Page 4.4-13.
[445] DEIS Appendix D.03, Section D.3D.3.2.1. Page D-98.

- Pages 4.4-13 and D-98 go on to state that "the Snowden Cemetery, within the PRR, would be acquired and displaced. The cemetery and the remains of those buried there would be relocated outside of the LOD. All state and local laws and applicable USFWS regulations regarding burial transfer would need to be followed." However, Page D-110 (in Appendix D.3) states that this impact and relocation is not certain: "The Project Sponsor will coordinate with federal (PRR/US Fish and Wildlife), state (Maryland Historical Trust) and local (Anne Arundel County) agencies if impacts to Snowden Cemetery cannot be avoided and graves would need to be relocated. All applicable laws and regulations, including Maryland Burial Law, would be followed."[446] Review of the Phase IA archaeological report and information from the Maryland Historical Trust's MEDUSA online database indicates that the Snowden Cemetery is not within the LOD for this project. This assumes that the area of currently existing fence encloses the entire cemetery, while it is possible that unmarked graves may be present outside the current fence. The lack of field investigations leaves uncertainty about the project's possible impact to this cemetery.

  Request:
  Before any decision to move forward with the building of the SCMagLev is considered, the FRA should independently verify the existence (or lack thereof) of unmarked or marked grave sites outside of any currently existing fence line (or lack thereof) and their inclusion in the current DEIS, and provide the public with the appropriate NEPA analysis and sufficient time to provide comments.

- Pages 4.4-13 and D-98 go on to state that "the Training School Cemetery, within the Maryland City neighborhood, is immediately adjacent to the viaduct. The viaduct would impact cemetery visitors due to increased noise and changes to aesthetics." This cemetery is a contributing element to the NRHP-eligible D.C. Children's Center-Forest Haven District (AA-2364).[447] However, the only mention of the cemetery in the main DEIS is in Tables 4.8-1 (Resources in the Above-ground APE by Build Alternative) and 4.8-15 (Potential Adverse Effects on Above-Ground Historic Properties by Build Alternative) where this historic property is listed as a "hospital campus with cemetery."[448] The discussion of the D.C. Children's Center-Forest Haven District in Appendix F (Draft 4(f) Evaluation) fails to mention the cemetery. The Determination of Eligibility Form on file at MHT includes a detailed description of this cemetery, concluding that it is NRHP-eligible under Criterion A.[449] This document describes the Training School Cemetery as "an unmarked cemetery of approximately half an acre, used from 1927-1982" with a single large monument stone that "was added to the cemetery after the fact as a memorial erected by families of former residents at the DC Children's Center" and states that "there is no plan of interment locations in the cemetery available, nor is there any permanent marking of the cemetery boundaries." The lack of documentation of the boundaries of this cemetery leaves uncertainty about the project's possible impact to this cemetery. Both archival and archaeological investigations are needed to define the cemetery's boundaries.

[446] DEIS Appendix D.03, Section D.3D.3.4.1. Page D-110.
[447] D.C. Children's Center-Forest Haven District (AA-2364) https://mht.maryland.gov/secure/medusa/PDF/AnneArundel/AA-2364.pdf.
[448] DEIS. Chapter 4.08, Section 4.8.3. Page 4.8-10 to 15 and 4.8-15.
[449] Pdf page 348 of 355 in D.C. Children's Center-Forest Haven District (AA-2364) https://mht.maryland.gov/secure/medusa/PDF/AnneArundel/AA-2364.pdf.

Request:
Before any decision to move forward with the building of the SCMagLev is considered, the FRA should independently plot, identify subsurface remains and artifacts, and then develop a full description of the cemetery, according to NEPA regulatory requirements.

LXVI. A Majority of the SCMagLev Project Impacts Will Be in Environmental Justice Population Areas

The FRA identified impacts associated with multiple environmental resources in relation to the Build Alternatives and population areas. The vast majority of the SCMagLev Project impacts would occur in EJ population areas because most of the SCMagLev Project Affected Environment qualifies as EJ. Thus, the DEIS statement that "the SC Maglev would positively affect the labor market"[450] is very misleading when viewed in the context of the overall adverse impact of the Project on disadvantaged populations.

Minority populations comprise 69.6 percent of the total population, and low-income populations make up 12.7 percent of the SCMagLev Project Affected Environment.[451] There will be both permanent, long term, as well as shorter-term impacts from the SCMagLev Build Alternatives on EJ populations, including:

- Decreased Level of Service (LOS) in residential areas, changes to local access or mobility.[452]
- 18 of the 20 community facilities impacted are in EJ communities.[453]
- Impacts to recreational facilities and parklands: 12 of the 14 parks affected are in EJ communities.[454] (impacts to the Maryland City Park and the Greenbelt Forest Preserve would have the greatest impacts to the nearby EJ populations).
- Of the 56 locations identified as moderate- or high-sensitivity aesthetic impacts, 47 would be located in EJ population areas.[455]
- The SCMagLev Project could potentially have gentrification and displacement impacts.[456]
- Most cultural resources (historic and archaeological resources) impacts occur within EJ groups.[457]
- Potential spills of hazardous materials are more likely to occur in EJ communities.[458]
- Most of the frequent and severe noise and vibration impacts will occur in EJ communities.
  - 99 percent of the noise impacts.[459]
  - 100 percent of the severe vibration.[460]
- 80 percent of the parcels that would be impacted by land use conversion, rezoning, and property acquisitions are in EJ communities.[461]

[450] DEIS Chapter 4- 05, Section 4. 5.4.2. Page 4.5-12.
[451] DEIS Chapter 4.05, Section 4.5.3. Page 4.5-5.
[452] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-9.
[453] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-10.
[454] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-11.
[455] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-13.
[456] Ibid.
[457] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-14.
[458] Ibid.
[459] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-15.
[460] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-16.
[461] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-15.

- The cost to ride the SCMagLev system would be prohibitive for some, notably low-income populations in EJ areas near stations.[462]
- Localized increase to mobile force air emissions around stations due to increased traffic.[463] Mobile source air emissions do not stay local; rather, they disperse into surrounding areas, sometimes at distances.[464] The air emissions could have significant impact throughout the communities near the sites.
- Construction impacts would occur at varying locations and for varying durations during the construction period, up to 24 hours per day for one to seven years.[465] Impacts during construction, as well as while the train is running, is not limited to a one-, or even a five-mile buffer around the route. Disruption in transportation, spills, air pollution, or economic impacts on commercial business (e.g., shut down or difficult to access during the construction period) will impact the town or community far beyond the buffer zone. Calculating the amount of these disruptions based on the buffers significantly underestimates the actual impacts.
- Each community is different in demographics and environmental variables, but the EJ areas cover most of Prince George's, while these communities are infrequent in Anne Arundel County. Beyond that, communities within each county are different. Bladensburg for example, has across the line one of the highest percentile environmental impacts in the county, as well as one of the lowest per capita income. Yet, the proposed route would have a large impact on this EJ area.
- Negative impacts to neighborhood cohesiveness and the disruption of interaction between people and groups within a community.[466]

  The DEIS is deficient as it fails to provide a reasonable answer to the following question:
  - How are any of these an equitable situation and set of conditions, especially considering it is all but certain that few of the residents in these areas would likely use the SCMagLev due to the cost of a ticket?

At what point will the benefits to the wealthy stop intruding on the basic rights (or what *should be the rights*) of those living in the EJ areas?

The DEIS is deficient as it fails to provide a reasonable answer to the following questions:
- How are any of these impacts cited above acceptable, given that most of the residents of these areas are most likely to NEVER use the SCMagLev because it does not provide localized regional commuter services?
- How are any of these above listed items beneficial to these residents, who will NOT be recipients of any of the very highly-suspect, but "promoted" and unproven, economic benefits?

The SCMagLev would disproportionately harm EJ communities with the numerous negative impacts listed above. Although it would go through minority and low-income communities, it would not provide services to these communities. It would increase air and water pollution, as well as noise and vibration,

[462] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-18.
[463] DEIS Chapter 4.05, Section 4.5.4.2. Page 4.5-19.
[464] European Environment Agency. "Dispersal of Air Pollutants". April 20, 2016. https://www.eea.europa.eu/publications/2599XXX/page005.html.
[465] DEIS Chapter 4.05, Section 4.5.4.3. Page 4.5-21.
[466] Ibid.

potential harmful exposure to EMFs, toxins, carcinogenic compounds, and radioactive gas (radon collected in the tunneled sections and exhausted out into the community near the FA/EEs) adversely affecting the health of minority communities along its route. Travel times to and from the communities and accessibility in and out of these communities will be negatively impacted during the estimated seven to eight years of construction. During this time, road congestion will not only impact vehicles and travel time, but also public transportation on which a substantial part of the Prince George's community relies. The statement that reduced travel times in 2030 would make up the disruptive impacts for the seven to eight years of disruption is not tenable.

Public transportation is important not only for work and school commutes, but for many it is the only mode of transportation for accessing grocery stores, doctors, and other basic needs. Disruption of bus service and routes over a period of several years will have a significant impact on health and job security. “Commuting is often a key consideration for individuals’ employment choices. Helping people to understand their options for a new job or mode of transportation can have a very meaningful impact in someone’s life. The connections between transportation, health/wellbeing, and environment really inspired me to get into this field and help people adopt new transportation habits.”[467]

Public transportation includes movement across the communities and is especially important in EJ communities. Bus routes in Central Maryland show similar ridership demographics; ridership is predominately Black, used by full-time employees, ages 25-49, incomes $25,000 or less, with no car ownership.[468]

These adverse impacts must also be viewed through the lens of the Biden Administration’s increased emphasis on EJ. In response to President Biden’s Climate Executive Order 14008, the Administration created the “Justice -40 Initiative” that set a goal that 40 percent of the overall benefits from federal investments will flow to disadvantaged communities demonstrating the administration’s attention to revitalization of and prioritizing resources to EJ communities.[469] The executive order directed the Council on Environmental Quality (CEQ) to develop a Climate and Economic Justice Screening Tool to “highlight disadvantaged communities” that can be used to prioritize disadvantaged communities. The executive order also set up the White House Environmental Justice Interagency Council (WHEJIC) of federal agencies to address current and past environmental injustices and develop clear performance metrics to ensure accountability.[470]

These new policies create an even stronger mandate for the FRA to address the project’s clear impacts on disadvantaged communities. The FRA can no longer rely on the EJ analysis in the DEIS. Instead, it must take an even harder look at these impacts once CEQ develops its EJ screening tool and begins to implement the administration’s EJ initiative. These new policies demonstrate that the SCMagLev DEIS’s

[467] King, Stacey. “Commuter’s Choice.” Maryland Department of Transportation. www.mdot.maryland.gov/OPCP/RSC_Spotlight_PG.pdf. Retrieved May 2, 2021.
[468]Maryland Department of Transportation, Maryland Transit Administration. Central Maryland Transit Development Plan Final Report. January 2018. https://rtp.mta.maryland.gov/docs/Connecting_Our_Future_RTP_CentralMD.pdf.
[469] The White House Fact Sheet “President Bident takes Executive Action to Tackle the Climate Crisis at Home and Abroad, Create Jobs and Restore Scientific Integrity Across Federal Government.” https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/27/fact-sheet-president-biden-takes-executive-actions-to-tackle-the-climate-crisis-at-home-and-abroad-create-jobs-and-restore-scientific-integrity-across-federal-government/.
[470] Ibid.

analysis likely does not describe the true adverse impact of the project on these EJ communities and must be redone.

LXVII. Environmental Justice Communities Are More Often Exposed to Air and Noise Pollution

EJ populations, communities of color, and low-income communities, are more often exposed to elevated levels of air, water, and noise pollution because hazardous facilities and infrastructure have intentionally been disproportionately located in their communities.[471] Air and noise pollution are more lethal to communities of color due to the cumulative impacts of exposure to higher levels of these pollutants and the chronic stress from racial discrimination.[472]

To complicate this even more, climate change will bring about increased temperatures and extreme weather events like heat waves, leading to even higher rates of air pollution.[473] The SCMagLev's excessive use of electricity, with a large proportion derived from fossil fuels,[474] and the increased diesel and other traffic-related emissions during the project construction will only add to the already poor air quality along its route.

A recent *Washington Post* article notes that "nearly every source of the nation's most pervasive and deadly air pollutant disproportionately affects Americans of color."[475] The communities along the train route are particularly vulnerable to air pollution. The American Lung Association has given a grade of **F** for ozone to all three of the counties along the route, Anne Arundel, Baltimore, and Prince George's. Of the 14 counties in the state, six received a grade of **D** or **F**, and the nine others are a grade of **C** or higher.[476]

[471]Velasco, Gabriella. "How Transportation Planners Can Advance Racial Equity and Environmental Justice." https://www.urban.org/urban-wire/how-transportation-planners-can-advance-racial-equity-and-environmental-justice. August 18, 2020.
[472] Varanasi, Anaradhi. "Over 14 million people of color in the US live in counties with high air pollution." https://www.forbes.com/sites/anuradhavaranasi/2020/04/27/over-14-million-people-of-color-in-the-us-live-in-counties-with-high-air-pollution/?sh=64985d2c5301. April 27, 2020.
[473]Fowlie, Walker, and Wooley. "Climate policy, environmental justice, and local air pollution." https://www.brookings.edu/research/climate-policy-environmental-justice-and-local-air-pollution/. October 26, 2020.
[474] ". . . about 75 percent of Maryland's electricity is generated from nuclear and natural gas." U.S. Department of Energy, Energy Information Administration. "Maryland State Profile and Energy Estimates." October 15, 2020. www.eia.gov/state/analysis.php?sid=MD.
[475] Eilperin, Juliet and Fears, Darryl. "Deadly air pollutant 'disproportionately and systematically' harms Americans of color, study finds." Washington Post 28 April 2021.
[476]American Lung Association. "State of the Air Report Card." www.lung.org/research/sota/city-rankings/states/maryland. Retrieved May 2, 2021.

LXVIII. Noise and Vibration Have Proven Adverse Impacts on Human Health

Research has found that exposure to noise can lead to cardiometabolic diseases, which further increase the adverse health effects of classical risk factors that disproportionately affect EJ populations, such as hypertension, diabetes, hypercholesterolemia, and others.[477]

"Whole-body **vibration** can cause fatigue, stomach problems, headache, loss of balance and 'shakiness' shortly after or during exposure."[478] "Alterations of sleep rhythm and sleep depth are reported for amplitudes of vibration as low as 0.4 mm/s (this is a frequency weighted route mean square (rms) value). Cardiovascular reactions are reported for amplitudes from .3 millimeters per second."[479]

LXIX. Noise and Vibration Impacts and Disproportionality Analysis Missing from DEIS

The DEIS finds the vast majority of the impacts would occur in EJ population areas, but the FRA has not shown a substantial need for the project or described the necessary steps to avoid these impacts.

The DEIS says the FRA will continue to refine its EJ analysis, complete a disproportionality analysis, and develop mitigation in the FEIS. **These steps should have been completed already to allow for public review and comment. Indeed, the Biden Administration's new EJ policies require the FRA to revise and reissue its EJ analysis to allow the public to have adequate time to review and provide comments as required under NEPA.**

Request:

- Before any decision to move forward with the building of the SCMagLev is contemplated, the FRA should issue a supplemental DEIS addressing the many issues, concerns, and questions raised in the CATS-MCRT review of the SCMagLev's DEIS. The public should be given adequate time to review and provide comments before considering issuing a ROD.

The DEIS is deficient in addressing the health impacts of decreased air quality from the construction and operation of the SCMagLev on communities already disproportionately affected by poor air quality.

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[477] Münzel, Thomas; Sørensen, Mette; Schmidt, Frank; Schmidt, Irwin; Steven, Sebastian; Kröller-Schön, Swenja; and Daiber, Andreas. U.S. National Library of Medicine, National Institutes of Health. "The Adverse Effects of Environmental Noise Exposure on Oxidative Stress and Cardiovascular Risk." www.ncbi.nlm.nih.gov/pmc/articles/PMC5898791/. March 20, 2018.

[478] Canadian Centre for Occupational Health and Safety. "Vibration and Health Effects." www.ccohs.ca/oshanswers/phys_agents/vibration/vibration_effects.html#:~:text=Whole%2Dbody%20vibration%20can%20cause,long%20car%20or%20boat%20trip. Retrieved May 2, 2021.

[479] Waddington, David; Woodcock, James; Jansson, Sabine; Smith, Michael G.; Persson Waye, Kerstin. The National Academies of Sciences, Engineering, and Medicine. "CargoVibes: human response to vibration due to freight rail traffic Railway Induced Vibration-Human perception of vibration." October 2015. Page 233-248. www.researchgate.net/publication/281063022_Cargovibes_Human_response_to_vibration_due_to_freight_rail_traffic. Also see: Peris, E., Woodcock, J., Sica, G. and Waddington, D., Effect of situational, attitudinal and demographic factors on railway vibration annoyance in residential areas, JASA 135, 2014. https://uic.org/IMG/pdf/uic-railway-induced-vibration-report-2017.pdf.

Request:

- Included in a supplemental DEIS, the FRA independently must conduct an assessment to determine the list of the potential health risks to EJ communities from the construction and operation of the SCMagLev. Without this assessment, the public cannot make an informed decision concerning the full cost as opposed to the proposed benefit the building and operation of the SCMagLev would bring.

LXX. The SCMagLev Would Have Disproportionately High and Adverse Effects on Environmental Justice Communities

As stated in the DEIS, [480] the USDOT Order 5610.2(a), Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (2012), requires that **any activities that will have a disproportionately high and adverse effect on populations** protected by Title VI ("protected populations") will only be carried out if:

1. A substantial need for the activity exists, based on the overall public interest.

2. Build Alternatives that would have less adverse effects on protected populations (and that still satisfy the need identified in item 1 above), either:
   - Would have other adverse social, economic, environmental, or human health impacts that are severe; or
   - Would involve increased costs of extraordinary magnitude.[481]

Request:
A supplemental DEIS must present:

- A detailed, data-based analysis of need for the project based on overall public interest.
- 2. Present Build Alternatives that have less adverse effects on protected populations.
- This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

USDOT Order 5610.2(a), drawing from the framework established by Title VI and the National Environmental Policy Act (NEPA) of 1969 also establishes principles to ensure nondiscrimination in federally-funded activities:

1. Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects—including social and economic effects—on minority populations and low-income populations.

[480] DEIS Chapter 4.05, Section 4.5.2.1. Page 4.5-1.
[481] DEIS Chapter 4.05, Section 4.5.2, Subsection 4.5.2.1. Page 4.5-1.

2. Ensure full and fair participation by all potentially affected communities in transportation decision-making processes.[482]

Racial or ethnic minority groups and low-income communities have poorer health outcomes than others. They are more frequently exposed to multiple environmental hazards and social stressors, including poverty, poor housing quality, and social inequality. We conclude that current environmental policy, which is focused narrowly on pollutants and their sources, should be broadened to take into account the cumulative impact of exposures and vulnerabilities encountered by people who live in neighborhoods consisting largely of racial or ethnic minorities or people of low socioeconomic status.[483]

LXXI. Is Construction of the SCMagLev Justified Under the Requirements of United States Department of Transportation Order 5610.2(a)?

No, Absolutely Not. Construction of the SCMagLev is not justified under the requirements of USDOT Order 5610.2(a). The SCMagLev DEIS does not address other Build Alternatives. SCMagLev does not fulfill the public's need for equitable and efficient mass transit and does not serve the many communities along its route that would suffer disproportionately if this project were built.

The Beacon Heights-Woodlawn Community Groups' comments on the DEIS include the following reasons why they believe the DEIS for the SCMagLev project fails to meet NEPA requirements:

"The DEIS fails to adequately assess the effects that air emissions, stormwater runoff, noise and vibration, and electric and magnetic fields, from both construction and operation of the train, will have on the surrounding communities. Second, the environmental impacts of the SCMAGLEV Project are not reasonable in light of the purpose and need for the Project. Third, the DEIS pushes the responsibility for assessing these environmental and community impacts to a 'later design phase' or to the permitting process, which largely excludes public participation. Further, the SCMAGLEV Project is an unnecessary addition to the multiple methods of transportation that already service residents from Washington D.C., Baltimore, MD, and Baltimore-Washington International Airport."[484]

In a recent *Washington Post* opinion piece, Prince George's County Councilmembers Jolene Ivey District 5) and Danielle Glaros (District 3) wrote: "As our country confronts our historic — and current — mistreatment of black and brown people at the hands of police and the criminal justice system, we must acknowledge and address the ways that land use, development and transportation projects have affected these exact same communities in a discriminatory way." [485]

[482] DEIS Chapter 4.05, Section 4.5.2, Subsection 4.5.2.1. Page 4.5-2.
[483] Morello-Frosch, Rachel; Zuk, Miriam; Jerrett, Michael; Shamasunder, Bhavna; Kyle, Amy D. RESEARCH ARTICLE HEALTH AFFAIRS, VOL. 30, NO. 5: ENVIRONMENTAL CHALLENGES FOR HEALTH. "Understanding The Cumulative Impacts Of Inequalities In Environmental Health: Implications For Policy." www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2011.0153. May 2011.
[484] Appendix - Articles Reprint: Beacon Heights and Woodlawn Community Groups. "Comments on Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation (EIS No. 20210010). April 23, 2021. Pages 1-2.
[485] Appendix - Article Reprint: Ivey, Jolene & Glaros, Dannielle. "Opinion: Prince George's County won't stand for the maglev – another destructive project for our people." Washington Post 23 April 2021.

Glaros and Ivey continue: "Today it is the Northeast Maglev — a superconducting magnetic-levitation train, known as SCMagLev or maglev — that would wreak havoc, eliminate green space, pollute our air, suffocate our businesses and siphon off significant business from MARC commuter rail and Amtrak. Prince George's County would bear the brunt of these negative impacts while realizing no balancing benefits to our community. Again, a project is planned through a majority-minority community where the land is cheap and the homes less expensive." [486]

In another article in the University of Maryland newspaper *The Diamondback*, Janna Parker, a resident from Temple Hills is quoted: "It doesn't even stop in the county that it wants to build through. It essentially seems just like another project that is being done at the expense of people of color, in regards to their ownership of land and property as well as their ability to make decisions about what happens on the land and property they own, and subsequently should govern." [487]

Ed Anderson's corner townhouse in South Laurel is about 100 feet from the proposed SCMagLev's route. "'I definitely would never want that eyesore. You think I would've bought this property knowing that?' Some of the strongest opposition to the project continues to come from residents such as Anderson who live near the routes under consideration. The luster of a high-speed maglev train wears off when they consider the impact construction might have on their homes: boring machines chewing earth, trucks hauling off tons of dirt, tunnels beneath their streets, and ever-present viaducts supporting trips north and south every 10 minutes."[488]

In an April 15, 2021, letter, the Prince George's County Board of Education expressed its opposition to the SCMagLev, stating that two possible routes "have the potential for significant impacts on public schools located in Prince George's County . . . The proximity of these schools to what is expected to be approximately seven years of construction could present several challenges to the education provided to countless Prince George's County Public School (PGCPS) students. Over the seven-year time span, children could be subjected to construction noises, ground movements, debris, construction traffic, pollution, and other byproducts of ongoing construction. This would be detrimental to a conducive learning environment."[489] Prior to Prince George's County School Board announcement, the Anne Arundel County School Board in 2017 issued a statement of their opposition to building the SCMagLev, stating in part the SCMagLev ". . . is disruptive to our schools and surrounding communities."[490]

And finally, in video testimony on the SCMagLev, NAACP Committee on the Environment and Health member Sonja Wyatt emphatically notes that Prince George's County is a dumping ground for the state's polluting infrastructures, and that Prince George's County has already received an **F** for air quality from the American Lung Association. "The SCMagLev is yet another project with overwhelmingly negative effects on health, environmental sustainability and quality of life in Prince George's County." [491]

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[486] Ibid.
[487] Appendix - Article Reprint: Truss-Williams, Anaya. "Community members say MAGLEV train would be overpriced, destroy local environments." The Diamondback April 22, 2021.
[488] Appendix - Article Reprint: Zaleski, Andrew. "Crazy Train: Is the proposed 300-mile-per-hour maglev train Baltimore's future? Or fantasy?" Baltimore Magazine. September 2019.
[489] Prince Georges County Public Schools. "SCMagLev." 15 April 2021.
[490] Anne Arundel County School Board. November 2017.
[491] Wyatts, Sonja. "SCMAGLEV Testimony." www.youtube.com/watch?v=A-9seVJUR50. April 2021.

In summary, the DEIS is deficient in satisfying USDOT Order 5610.2(a), which requires that:

- a substantial need for the activity exists, based on the overall public interest, and
- build alternatives that have less adverse effects on protected populations be examined.

The Build Options for the SCMagLev would not provide the equitable mass transit solutions our communities need, would cause an extreme level of ecological and social disruption along its route, and would disproportionately harm the health and well-being of EJ community residents. The DEIS is deficient in addressing these issues. The **No Build Option** is the only choice for those committed to environmental justice in transportation projects.

LXXII. Use of Eminent Domain Especially Felt by the Environmental Justice Communities

1. Insufficient or Inaccurate Evaluations Must Be Recalculated

To obtain a true evaluation of the effect building and operating the SCMagLev will have on residential and business property values, the calculations must be redone to include:

A. ALL Infrastructure

MOW, Tunnel Portals, FA/EE facilities, and all portions of the tunnels and viaduct should be included.

B. Inappropriate Risk Analysis Radius for Tunnel Portions

A radius of one-quarter mile is appropriate to tunnel portions since the primary risk to residents is the effect of vibration on building foundations and basements, manifesting in cracks, shifting, and settling, as well as storm and groundwater leakage and the resulting deterioration of the foundation and basement wall structures.

2. Inappropriate Risk Analysis Radius for Viaduct Portions

Along the viaduct that radius should be increased, as suburban residential areas have less density and generally larger properties. Real estate agents use radii up to 1 to 3 miles in calculating residential property value "comparables"; a radius of 1.5 miles is a fair compromise. It is well known that properties near train rails are not as highly valued: ". . . not every study of transit and property values has found a positive correlation. For example, a 1995 study by John Landis found that values for single family homes within 900 feet of light rail stations in Santa Clara County was 10.8 percent lower than comparable homes located farther from light rail stations. The same study found that there was no value premium for office and retail property located within one-half mile of BART stations in the East Bay."[492]

Building and operating the SCMagLev will generate noise, vibration, and visual impacts. The DEIS includes a long list for both J and J-1 alignments of community regions in Prince George's and Anne

[492] Landis, J. et al. "Rail Transit Investments, Real Estate Values, and Land Use Change: A Comparative Analysis of Five California Rail Systems," Institute of Urban and Regional Development, UC Berkeley, 1995. https://escholarship.org/uc/item/4hh7f652.

Arundel Counties with adverse aesthetic impacts, many evaluated as H (High) to M (Moderate). [493] These will change the nature and feel of whole communities, from suburban to urban/industrial, with a consequential and permanent negative impact on property values.

Many of the impacts are permanent and will be more than "moderate." The codes for the table and the types of impact dealt to these communities will be:

- PA = Property Acquisition
- D = Displacement
- N = Noise
- V = Vibration
- VQ = Aesthetics/Visual Quality
- AM = Access and Mobility
- CC = Community Cohesion[494]

While only a relatively small number of residents may be displaced, it is ironic that those who remain will be the unlucky ones because of their proximity to the SCMagLev. Along the viaduct, a radius of 1.5 miles will capture losses in entire communities, including Greenbelt, Greenbriar, Applewalk, Laurelwood, Pheasant Run, Montpelier Woods, Montpelier Hills, Montpelier, Snowhill Estates, Briarwood, Maryland City, and Russett. Results from all added regions (MOWs, portals, FA/EE, tunnel and viaduct) should be included in Tables D.4-51 and D.4-52 (Appendix D.04, Section D.4D.2.5.1, pages D-64 to D-65) and in the discussion. Moreover, results in those tables should be separated into business and residential losses. This will give a complete, accurate, and fair picture of all tax revenue and property value changes.[495]

Request:

- Rework the impacts on residential and commercial structures and communities to break out the potential losses for residences from businesses, to provide better insight in tot the full impact cost of build and operating the SCMagLev.
- This information then needs to be shared with the public and given sufficient time for public review and comment before any consideration on a decision to move the SCMagLev project forward.

3. Property Value Loss

Property value losses are unusual in that they are incurred as early as the date that the SCMagLev is approved, as realtors are obligated to inform potential buyers of potential adverse impacts. This certainly applies to the SCMagLev in Anne Arundel and Prince George's Counties, given both the SCMagLev's short- and long-term impacts. However, losses are not accrued until the owner sells the house. It is even possible that losses could put some property mortgages "underwater." Indeed, adverse traffic consequences during the construction phases will be apparent to buyers; many will not care to wait years until construction ends and will buy elsewhere, the losses to the seller then becoming obvious.

[493] DEIS Chapter 4.04, Table 4.4-1. Pages 4.4-5 to 4.4-7.
[494] Ibid. Page 4.4-7
[495] Appendix - Reprint: Kowalski, M. "SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021. Pages 14-15.

Owners who then reluctantly decide to sell, that is "to get out" while they can, at a loss, will also pay an additional penalty (as do renters) for moving expenses, as well as the challenges of uprooting a family and finding suitable housing that fits their job (commute) and personal situation.
Owners who wait longer hoping for property values to recover might not be rewarded because the nature and feel of the community has changed irretrievably. Of course, owners also pay less in property tax, but simple calculations reveal that this offset comes nowhere near compensating for the loss in home value, even after decades. Sadly, long-term owners may not even realize they have suffered a loss in property value unless they have carefully tracked home value and tax assessments year by year.

In summary, residential homeowners along the entire length of either SCMagLev alignment will likely suffer a real monetary loss from SCMagLev proximity. To be fair, these losses should be calculated and booked against claimed benefits. Just as important, these losses are not shared evenly in their county (or city) but suffered only by those who had the great misfortune to have bought a home without foresight that its location would one day be near or above the SCMagLev.[496]

The DEIS mentions potential increases in property values near stations but fails to discuss potential decreases in property values from noise, vibration, and adverse visual impacts. First, as the SCMagLev passes, it vibrates structures next to the viaducts. This shaking was felt, experienced, and reported in Rector's article.[497] Second, besides vibration of an amplitude that shakes local homes, the SCMagLev also is emitting EMF radiation from the guideways as it passes. Further, at any time there is the possibility of the SCMagLev system releasing toxins, known cancer causing compounds, and radon gas from the FA/EEs (ventilation systems) into the atmosphere and exposing people and wildlife to the emissions. These conditions compromise the quality of life for residents.

The environmental impacts discussed in this submission will further devalue property. All to build a "shiny" train system that only the wealthier among us can afford to ride. The irony is that the very owners who will see their properties devalued and potentially suffer negative health effects will likely not use the SCMagLev.

The SCMagLev tunneling in Linthicum under Camp Meade Road in Anne Arundel County could have detrimental effects on the historic Holy Cross Church, the Veterans Memorial, and the historic houses along Camp Meade Road. Many of the homes under which the tunnel will be bored were built starting in 1900 and into the 1920s, a few later into the 1950s. The foundations of these homes would originally be poured concrete, with the walls made from cinder block. Between the boring and tunnel construction process, and then with the operation of the SCMagLev, the cumulative effect of the vibrations will likely crack these 100-year-old structures and those built later, as well as topographically lower structures (therefore situating them closer to the top of the tunnel) such as the Veterans Memorial and the historic church.

[496] Ibid.
[497] Appendix - Article Reprint: Rector, Kevin "'It can be done': Futuristic Japanese maglev train could revolutionize travel from DC to Baltimore, and beyond." October 27, 2018. The Baltimore Sun.

As Amtrak is an already existing high-speed rail system and is being updated as of the writing of these comments, there is no viable research to justify bringing in a commercially unproven, high-speed ground and underground-based transportation system and risking the structural integrity of these homes and businesses. The better alternatives to the SCMagLev are discussed in Section 6 of this submission.

4. Tunnel Easement Under Property – Negotiation versus Eminent Domain

If the No Build option is not selected, one of the two routes (J or J1) that fall on either side of the BW Parkway would be selected. Property owners in the state of Maryland own their property to the core, meaning to the core of the earth. If the BWRR train tunnel passes underneath the owner's property and the ROW for the tunnel intersects any of the property lines, the BWRR or a company working for them will contact the property owner for the purpose of establishing an easement to tunnel, either by negotiation or by "taking."

The 2018 *Final Alternatives Report* provides some idea of the number of homes within the LOD, stating: [498]

Alternative J1 (West)

- Number of residential property parcels in the LOD tunnel: 1,204
- Number of residential property parcels in the LOD surface: 12
- Number of commercial property parcels in the LOD tunnel: 101
- Number of residential property parcels in the LOD surface: 21

Alternative J (East)

- Number of residential property parcels in the LOD tunnel: 1,117
- Number of residential property parcels in the LOD surface: 5
- Number of commercial property parcels in the LOD tunnel: 78
- Number of residential property parcels in the LOD surface: 20

When asked, the BWRR states they will not use eminent domain, but rather "negotiate" with property owners.[499] However, that is not a complete answer. The unaddressed other option is that the BWRR, being granted the WB&A franchise, [500] can exercise the power of eminent domain, as stated in the documents from the railroad franchise hearing, testimony, and orders conducted by the Maryland Public Service Commission (PSC) in 2015.[501]

The owner will be told that the intended tunnel intersects and crosses some portion of their property. Then, the owner will be asked for an easement that would allow the tunnel to be built

[498] SCMagLev Final Alternatives Report." November 2018. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Append_D-E-F-G_Nov2018.pdf.
[499] Appendix – Articles. Reprint: Giese, James. "Maglev Group May Prefer The Greenbelt Alignment. "December 28, 2017. Greenbelt News Review.
[500] Washington, Baltimore and Annapolis Electric Railway.
[501] Maryland Public Service Commission. Case No: 9363. "IN THE MATTER OF THE APPLICATION OF BALTIMORE WASHINGTON RAPID RAIL, LLC FOR TRANSFER OF ABANDONED RAILROAD FRANCHISE." CSNDirectJune19PubVers.pdf. Page 6.

underneath the owner's property. If agreed to, the owner would probably receive a nominal one-time payment for granting the easement to TNEM/BWRR to tunnel underneath the property. Paperwork would also have to be completed to that effect and would become a part of the property record along with filing the easement paperwork with the state of Maryland, the county and city where the owner resides, and the holder of the mortgage if the home is not paid off. The easement would then convey with any sale of the property. It would become a permanent fixture to the property.[502]

If the homeowner refuses to grant the easement, the BWRR, using the eminent domain authority conveyed with the WB&A franchise, can exercise eminent domain to take that portion of the property needed for the tunnel or take all of the property. The homeowner would be paid what would be considered fair market value and would have to vacate the property in the event all the property was taken.

When the BWRR says they will not take any "homes," they mean they will not have to take any structures *if people agree to the easement*. The property owners are left with two very unappealing choices: (1) comply or (2) lose their property. Allowing the BWRR to exercise eminent domain also establishes the acquisition of the property to be used in conflict and direct competition with existing local transportation services.

Among the many questions contained in this submission, the FRA should answer the following:

- Why should our government allow eminent domain power to be used for a private project that will undermine an existing public investment in Amtrak?

LXXIII. The DEIS is Deficient as it Fails to Compare the SCMagLev With Similar Ground-based, High-speed Systems, Existing and Planned

The DEIS all but ignores identifying and discussing the SCMagLev's benefits compared with other rail transportation systems currently in operation. With the SCMagLev plan to provide service along the Northeast Corridor, from Washington, D.C., to New York, and onto Boston, their system is in direct competition with Amtrak. For the initial segment between Washington, D.C., and Baltimore, the SCMagLev is in direct competition with Amtrak and the Maryland Area Rail Commuter (MARC) rail systems. As discussed in Section 1 - "The FRA's Statement of Purpose and Need and Its Analysis of Alternatives to the SCMagLev Project Violates NEPA," the NEPA requirements are clear, requiring that any proposed system of the size and impact the SCMagLev would bring MUST be compared with alternate and existing systems to clearly show the superiority of the proposed system warrants the economic, social, and environmental impacts on the affected communities. The FRA has so skewed the DEIS that the agency has in effect ". . . contrive[d] a purpose so slender as to define competing 'reasonable alternatives' out of consideration,"[503] which the court ruled in Simmons v Corps 120 F.3d. 664, 666 (7th Cir. 1997) an agency is not permitted to do. As the SCMagLev DEIS fails to provide this

[502] Maryland Code, Real Property § 4-105. Maryland Code, Real Property § 4-105 | FindLaw. Retrieved April 28, 2021.
[503] See "CATS-MCRT SCMagLev DEIS Comments, Concerns and Question" Section 1.

required comparison to existing and competing systems, it is seriously deficient. With these glaring deficiencies, the FRA should choose the No Build option.

There are two clearly comparable systems to the SCMagLev already in existence and operating: Amtrak (including Amtrak's Acela), and the MARC.

LXXIV. What is the SCMagLev?

The superconducting magnetic levitation or SCMagLev train is a high-speed, ground-based passenger transportation system currently being developed and tested in Japan. Its technology is based on research first conducted by James Powell and Gordon Danby at the U.S. Department of Energy's Brookhaven National Laboratory. [504] Their designs and patents include superconductive levitation, with superconductive magnets in the vehicle, electromagnetic levitation of the vehicle from the guideway, the Null Flux Loop design, and the Linear Synchronous Motor. In place of steel wheels running on steel rails, the system employs a magnetic field to levitate the train above the guideway and a magnetic alternating current manipulated frequency field, known as a linear synchronous motor, to propel the train along the guideway.

LXXV. What Value Does the SCMagLev Bring?

The increasing population, growing impacts of climate change, and need to protect green space and water from pollution drive the need for improvements in our transportation systems. As Vujan and Casello note: We are facing ". . . two serious transportation problems in urbanized regions and in major intercity corridors. First, highway and street congestion have become a chronic problem, causing longer travel times, economic inefficiencies, and deterioration of the environment and quality of life. Second, congestion problems are occurring at airports, with similar high user and social costs."[505]

While the BWRR promotion of the SCMagLev hypes it as the "best" solution for the current and future needs of commuters along the Northeast Corridor, real-world experiences with maglev compared with high-speed rail paints a different picture. As noted by Vujan and Casello, when the three (3) most important system characteristics of maglev and high-speed rail are compared side-by-side, the practical choice is in favor of high-speed rail:

(1) Developments in high-speed rail technology have reduced the advantage of maglev in higher speeds, so the differences in travel times on typical interstation spacings are minimal.
(2) High-speed rail has a large advantage over the maglev due to its compatibility with existing rail networks.

[504] Appendix – Reprint: Woomer, Dan. "SCMagLev – A Short History of MagLev Development and its Potential Future." November 8, 2017.
[505] Appendix - Reprint: Vujan, Vukan, and Casello, Jeffrey M. "An Evaluation of Maglev Technology and Its Comparison With High-Speed Rail." *Transportation Quarterly*. March 2002.

(3) High-speed rail involves a lower investment cost, while operating costs of the maglev (specifically the SCMagLev) are still uncertain, although the evidence in the Vujan and Casello report shows the operating costs for the maglev (and the SCMagLev) are higher in several areas. In one key cost area, energy consumption is estimated to be lower for high-speed rail. This is reinforced with research from Japan that found the SCMagLev can use up to *five times* the energy compared with high-speed rail.[506,507]

As U.S. and international maglev system promoters have done previously, BWRR promoters ". . . claim that their system can achieve higher speeds, have lower energy consumption and life cycle costs, attract more passengers, and produce less noise and vibration than high speed rail."[508]

The travel time difference between high-speed rail and maglev is small for short distances. While SCMagLev promoters talk about the speed of the SCMagLev, this does not necessarily translate to a faster trip. Station location(s), access to the stations, and the distance the rider is from the trip's start and ending stations play an important role in determining the total transit time to the rider's desired destination, as does the cost of a ticket.

Energy and CO_2

As noted earlier, Aoki and Nobuo reported the SCMagLev can use up to five times the energy compared with high-speed rail. The BWRR states the SCMagLev should be built because it would reduce CO_2 emission by 2 million short tons. However, no details or information to substantiate this claim have been provided. Independent analysis finds constructing the SCMagLev track between Baltimore and Washington, D.C., would likely release 0.5 to 0.9 million short tons of CO_2.[509] Further, this does not include the regional loss of CO_2 absorption with the destruction of over 200 acres of current intact greenspace and forested areas.

The DEIS states the SCMagLev operations between Baltimore and Washington, D.C., will NOT be carbon neutral. Specifically, the DEIS states that "the SCMAGLEV system and ancillary facilities will increase net transportation energy consumption by approximately 3.0 trillion Btus. For context, this would be enough energy to power around 88,900 average homes for one year."[510]

Currently, according to the Energy Information Administration's 2018 data, about 75 percent of Maryland's electricity is generated from nuclear and natural gas.[511] Generating the electricity needed to operate the SCMagLev (see the Akoi and Kawamiya report findings that indicate the SCMagLev requires five times the energy needed for other high-speed trains[512]) would increase CO_2 emission.

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[506] Aoki, Hidekazu, and Kawamiya, Nobuo. Cited in Harding, Robin. "Japan's new maglev train line runs headlong into critics." *Financial Times*. October 17, 2017. www.ft.com/content/5d4e600a-9e12-11e7-8b50-0b9f565a23e1.
[507] Aoki, Hidekazu, and Kawamiya, Nobuo. Cited in Davies, Ross. "Magnetic pull: China and Japan battle it out for maglev train supremacy." *Railway Technology*. Last Updated May 29, 2020. www.railway-technology.com/features/maglev-train/.
[508] Appendix - Reprint: Vujan, Vukan, and Casello, Jeffrey M. "An Evaluation of Maglev Technology and Its Comparison With High-Speed Rail." *Transportation Quarterly*. March 2002.
[509] Appendix - Reprint: Kelley, Owen. "Would the Proposed Baltimore-Washington Maglev Increase Greenhouse Gas Emission?" Issues Forum, Prince George's Group, Sierra Club Maryland Chapter. December 13, 2020.
[510] DEIS Chapter 4, Section 19 "Energy." Page 4.19-11.
[511] "Maryland State Profile and Energy Estimates." Energy Information Administration, U.S. Department of Energy. October 15, 2020. www.eia.gov/state/analysis.php?sid=MD.
[512] Aoki, Hidekazu, and Nobuo Kawamiya. Cited in Davies, Ross. "Magnetic pull: China and Japan battle it out for maglev train supremacy." *Railway Technology*. Last Updated May 29, 2020. www.railway-technology.com/features/maglev-train/.

The DEIS ignores the one technology that exists and is evolving to address these mounting pressures on our transportation infrastructure. This is high-speed rail, which has a proven history of efficiently moving large numbers of passengers reliably, safely, and comfortably, and at lower cost.

In a comparison of transit times between the maglev and high-speed rail, at a non-stop travel distance of 150 miles:

- At 100 mph, the travel time is 1.5 hours (both Amtrak and the MARC can travel at speeds in the 100-mph range).
- At 200 mph (the speed at which the next generation of Acela—currently in final, pre-commercial operation testing—can run), the travel time is 45 minutes.
- At 300 mph (the SCMagLev), the travel time is 30 minutes, only a 15-minute difference from running at 200 mph.

As the distances between trip starts and final destinations decrease, the travel time differences shrink considerably. Thus, on shorter distances, as between stations in the Northeast Corridor, the savings in travel time between the SCMagLev and high-speed rail are so insignificant as to not justify the high cost to build and operate anything other than high-speed rail. Again, (1) the proximity of the rider to the starting and ending stations and (2) the time and means used to access these stations contribute to the total time in transit.

Station Locations Difference
The Baltimore City train stations—Penn Station (serviced by both Amtrak and MARC) and West Baltimore and Camden Yards (serviced by the MARC)—are located near the business district. The SCMagLev station in Cherry Hill is located on the outskirts of Baltimore City, five minutes or more from the heart of the Baltimore business district.

Travel Time Difference
With the current track configuration, Amtrak's Acela runs between Baltimore's Penn Station and Washington. D.C., with a stop at the Baltimore-Washington International (BWI) Rail Station, between 33 to 38 minutes. The option to express the MARC trainsets between Union Station and BWI (23 minutes) to West Baltimore (29 minutes) and to Penn Station (39 minutes), using existing equipment and railways. With the planned upgrades to the Penn Line, these transit times will be reduced.

Ticket Cost Difference
Between Union Station and West Baltimore, the SCMagLev claims 15-minute trips at $30-$80 one-way. The MARC Express can travel the distance in 29 minutes at a significantly lower ticket price of $8.00 one way.[513]

These issues are explored more deeply in Section 4 of this commenting document.

[513] "MARC Fares." Maryland Department of Transportation - Maryland Transit Administration. https://s3.amazonaws.com/mta-website-staging/mta-website-staging/files/Fares/Penn-Line-Fare-Chart.pdf.

The DEIS is deficient as it is missing these analyses of "total transit time" and comparison with existing transportation infrastructure comparable with "total transit time." Without these data and analyses, the DEIS does not provide the information needed to make an informed decision on the cost-benefit of the SCMagLev when compared with the existing Amtrak, Amtrak Acela, or the MARC systems.

This is where real-world experience comes into the picture. As Vujan and Casello state: "Maximum operating speed is the speed for which the system has been designed for regular, daily operation under normal conditions. The entire system - its infrastructure, vehicles, controls, reliability, etc., must be designed so that this speed can be operated on a daily basis, withstanding the handling of passengers, reasonable weather variations, and operated by qualified personnel (but not an entire team of specialists supervising and intervening in every minute of system operation)."[514]

Another important point is that there can be a big difference between maximum speed and maximum *operational* speed of a system. Again, the real-world operational speed is usually lower than the experimental test and development speed, making the differences between travel speeds and travel time of the maglev versus high-speed rail even less. So, as the comparable travel times differences narrow in real-world operation, the huge cost difference to build and operate the two systems increasingly favors high-speed rail.

The SCMagLev is currently operating on a 26.6-mile test and development guideway during the day. Amtrak operates passenger rail services with over 21,000 miles of track, across 46 states, including Washington, D.C., and Canada. Amtrak also offers an array of services and serves a far broader spectrum of travelers and commuters than the SCMagLev will serve.

TNEM has stated that once the SCMagLev is built to New York, it will pull ridership from airlines; thus, according to TNEM, the SCMagLev is in competition with airlines. It is unlikely the segment under consideration between Baltimore and Washington, D.C., will pull ridership from airlines. It will most likely garner ridership from Acela. And, if built to New York, it may pull some passengers from airlines, but will continue to garner passengers from Amtrak and Amtrak's Acela. Both are ground-based transportation systems that would run parallel to each other. However, the DEIS ignores SCMagLev comparisons with existing high-speed rail systems such as Amtrak and Amtrak's Acela and, from the perspective of local transit needs, the MARC. It is precisely because the SCMagLev is a track-following, high-speed, ground-based passenger transportation system that the FRA is tasked with its review instead of the Federal Aviation Administration.

LXXVI. SCMagLev Proponents and Risk

Park noted in 2018: "SCMagLev enthusiasts have been pushing the project despite warnings of significant risks, just like the supporters of the bullet train did in Asia. For instance, the South Korean government built the Seoul-Incheon line despite consistent warnings of inadequate demand [emphasis added]. The project was politically, rather than commercially, driven: Korean officials wanted to present

[514] Appendix - Reprint: Vujan, Vukan, and Casello, Jeffrey M. "An Evaluation of Maglev Technology and Its Comparison with High-Speed Rail." *Transportation Quarterly*. March 2002.

a futuristic version of Korea to the international community as part of the 2018 Pyeongchang Winter Olympics."[515]

She goes on to say: "SCMagLev supporters in Maryland have similar non-business motives for backing the project. Baltimore has been experiencing a steady population decline over the years, and many supporters believe that connecting the city to economically vibrant D.C. could reverse that trend. This vision has blinded the advocates to serious concerns about the project."[516]

And let us not forget that the Japanese government and the Central Japan Railway Company (JRC) will stand to make significant financial gains by bringing their system to the United States. If successful, it will mean a large profit for both entities and jobs for Japan. TNEM and the BWRR have a huge financial stake in seeing the SCMagLev built and placed in operation for the benefit of TNEM's investors.

LXXVII. Amtrak, the MARC, and the VRE - A Better Alternative

Continuing to upgrade and enhance Amtrak, the MARC, and the Virginia Rail Express (VRE) systems is the far superior choice over building the SCMagLev and better for the region's rail commuting future. Amtrak and its predecessors have over 150 years of experience. As noted earlier, Amtrak operates passenger rail services with over 21,000 miles of track, covering a network of 500 destinations across 46 states (including Washington, D.C., and Canada), running more than 300 trains each day in 2019,[517,518] and carrying 32,54 million passengers.[519] Amtrak has a long history of freight, commuter, and high-speed rail experience. TNEM and the BWRR have little-to-no experience building and operating a larger, complex, ground-based transportation system.

Amtrak offers an array of services and serves a far broader spectrum of travelers and commuters than the SCMagLev will serve. Amtrak also coordinates and integrates their services with several local commuter train systems, like the MARC and VRE, as well as heavy-rail freight operators. The SCMagLev will be far less integrated into the ground-based transportation systems of the region.

The FRA has already completed a long and costly review of rail service needs in our region. The agency accepted and approved Amtrak's Environmental Impact Statement (EIS) and their Northeast Corridor (NEC) *Future Plan*.

[515] Appendix - Reprint: Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." The Maryland Public Policy Institute. December 7, 2018.
[516] Appendix - Reprint: Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." The Maryland Public Policy Institute. December 7, 2018. https://www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev.
[517] "How Much Do Amtrak Tickets Cost?" Howmuchisit.org. August 10, 2018. www.howmuchisit.org/amtrak-tickets-cost/#:~:text=Amtrak%20is%20a%20government-owned%20passenger%20rail%20corporation%20in,46%20states%20as%20well%20as%20select%20Canadian%20cities.
[518] "Amtrak Facts." Amtrak. www.amtrak.com/amtrak-facts.
[519] FY 2019 Company Profile For the Period of October 1, 2910 - September 30, 2019. Amtrak. https://media.amtrak.com/wp-content/uploads/2020/06/Amtrak-Corporate-Profile_FY2019_-FINAL-033120.pdf.

<u>During this long and costly study, building an additional rail alignment was considered, but found to be too expensive and not needed when the plans for the existing systems upgrades and enhancements were considered.</u>

The BWRR repeatedly says the existing 150-year-old rail system is obsolete. **This is not true.** If the existing rail systems are obsolete, why would FRA approve Amtrak's NEC *Future Plan*?

With the FRA's approval of Amtrak's NEC *Future Plan*, Amtrak secured a $2.5 billion loan to start the updates and enhancements. Amtrak and the MARC employ modern equipment. Both are purchasing and implementing new, proven, state-of-the-art equipment. For anyone who has commuted on Amtrak or the MARC for any length of time, they can tell you all the rails, ties, and railroad beds the MARC uses have been rebuilt. All high-speed continuous rail has been installed. The MARC trains running from Union Station to Baltimore that express to Odenton can and sometimes do run over 100 mph. The MARC is one of the fastest commuter rail systems in the world. As noted by Van Hattem: "MARC operates the fastest commuter trains in North America, using electric locomotives that race along the Penn Line at speeds of up to 125 mph – the maximum allowable track speed on the Northeast Corridor."[520] Another example of Amtrak upgrades is the new $4.7 million BWI Rail Station completed in 2020 that services both Amtrak and the MARC. The concrete structure built in the 1960s has been replaced with a new, more comfortable station, seen pictured here.

New BWI Rail Station. Photo by B. Taylor

Amtrak is currently building the next generation of Acela, capable of a speed of over 200 mph. The new Acela is being designed and built in the United States by American workers, not overseas and imported into the United States, as would be the case with the SCMagLev. In 2016, Amtrak reported it was contracting with Alstom to produce 28 state-of-the-art, fifth-generation, high-speed trainsets to replace the equipment used to provide Acela service. The new trains are scheduled to enter into service on the Northeast Corridor in 2021. The new trainsets will accommodate nearly 25 percent more customers, while continuing the spacious, high-end comfort of the current Acela service. Alstom is using parts manufactured by nearly 250 suppliers in 27 states with 95 percent of the components produced domestically. The manufacture of the trainsets will generate 1,300 new jobs in nearly 90 communities across the United States.[521]

If approved, the SCMagLev's building and operation will be in direct competition with Amtrak. Subsidies to Amtrak will likely increase. The SCMagLev, if it follows world history of such systems, will likely

[520] Appendix - Reprint: Van Hattem, Matt. "Maryland Rail Commuter (MARC) - The commuter railroad serving Baltimore and Washington, D.C." *Trains*. June 30, 2006. www.trains.com/trn/railroads/maryland-rail-commuter-marc/#:~:text=MARC%20operates%20the%20fastest%20commuter%20trains%20in%20North,EMD%2FASEA%2C%20and%20HHP-8%E2%80%99s%20built%20in%202001-2002%20by%20Bombardier-Alstom.

[521] FY 2019 Company Profile For the Period of October 1, 2910 - September 30, 2019. Amtrak. https://media.amtrak.com/wp-content/uploads/2020/06/Amtrak-Corporate-Profile_FY2019_-FINAL-033120.pdf.

require subsidies, resulting in the taxpayers footing the costs to subsidize two competing systems. Thus, the DEIS again should explain why the SCMagLev is superior to existing rail systems, but it does not.

There are additional questions that should be addressed.

- How does the SCMagLev fit in with the Biden Administration's "Made in America" directive?
- Why are we considering bringing in a train system from Japan?
- Why would we not support the system designed and built in the United States, supporting long-term American jobs, and currently in operation?
- Who pays for the security of the SCMagLev system?
- What is the level of state, city, and county resources needed to maintain the security envelope of the SCMagLev system?
- What are the costs to our residents?
- This information should be made available for public review, with sufficient time to comment, before any decision to move forward with the building of the SCMagLev is considered.

LXXVIII. Amtrak - Reality Check[522]

Financial Strength

Amtrak delivered its best operating performance in company history in FY 2019 (pre-Covid-19). It posted a Generally Accepted Accounting Principles revenue record of $3.5 billion, an increase of 3.4 percent over FY 2018. Amtrak's adjusted operating earnings (of $29.4 million) were the best to date and an 82.8 percent improvement over the prior year. Amtrak's capital investment of $1.6 billion in FY 2019 was 10.2 percent higher than in FY 2018.

Amtrak received a credit upgrade to "A" from S&P and an affirmation of an "A1" credit rating by Moody's, reflecting significantly reduced operating losses and a stronger balance sheet, with no net debt. Amtrak recovered 99.1 percent of operating costs in FY 2019 with ticket sales, payments from state partners and agencies, and other operating revenue.

> *MCRT Editor's Note:* If the SCMagLev is allowed to be built and operated, it will not only pull passengers from Amtrak, but will likely require government subsidies to cover maintenance and operating costs and loan service fees. The net effects would be (1) negatively impacting the revenue improvement efforts of Amtrak (following years of improved balance sheets), likely resulting in the need for increased subsidies, and (2) taxpayers funding one system for use by most riders and another only the more affluent can afford to ride.

Customer Service Rating

Nearly nine (9) out of ten (10) customers surveyed expressed overall satisfaction with their Amtrak experience. The company achieved a year-over-year increase in customer satisfaction scores in many categories, including clean train interiors, restroom cleanliness, and information about delays.

[522] FY 2019 Company Profile For the Period of October 1, 2910 - September 30, 2019. Amtrak. https://media.amtrak.com/wp-content/uploads/2020/06/Amtrak-Corporate-Profile_FY2019_-FINAL-033120.pdf.

Safety Updates
Amtrak was the first major U.S.-based railroad to implement a Safety Management System, a proactive approach to managing safety, resulting in improvements in a broad range of safety metrics. It also completed implementation of Positive Train Control, a safety technology designed to match train speed to track conditions for improved safety, on all Amtrak-owned and controlled track, except for less than one mile of slow-speed track in the complex Chicago terminal area.

Infrastructure Upgrades
Amtrak improved the reliability and performance of infrastructure by investing $713 million in state-of-good-repair projects, including the repair or replacement of 24,080 feet of catenary hardware, 79,985 concrete ties, 1,784 bridge ties, and 283 miles of high-speed surfacing.

Amtrak invested a record $78 million on ADA-related design and construction improvement projects at more than 40 locations, advancing efforts to make stations universally accessible.

Amtrak invested more than $110 million in technology, including an updated customer mobile app to make bookings and travel management faster and easier.

Reducing Environmental Impact
Amtrak met or exceeded all annual energy, fuel, recycling, and greenhouse gas emissions targets. Efforts such as lighting upgrades, reduced idling, and a focused recycling program helped Amtrak meet these targets and save money.

Operating and Improving
Amtrak is the only U.S. high-speed intercity passenger rail provider, operating at speeds up to 150 mph (241 kph).[523] It is the only railroad in North America to maintain right-of-way for service at speeds over 125 mph (201 kph). Its engineering forces maintain more than 350 route-miles of track for 100+ mph (160+ kph) service. Nearly half of all trains operate at top speeds of 100 mph (160 kph) or greater.

When included among ratings for U.S. airlines, Amtrak ranks seventh in domestic passengers carried. In the Northeast Corridor, Amtrak has a strong position in many markets previously dominated by air carriers. It carried more than three times as many riders between Washington, D.C., and New York City than all airlines combined. Amtrak carried more riders between New York City and Boston than all airlines combined.

The Northeast Corridor is the busiest railroad in North America, with approximately 2,200 Amtrak, commuter, and freight trains operating over some portion of the Washington-Boston route each day. 18.8 million trips were made by Amtrak customers on the corridor in FY 2019. This included all Amtrak trains that traveled over some portion of the corridor's spine (Washington-New York-Boston) and connecting corridors to Harrisburg, Pennsylvania; Springfield, Massachusetts; Albany, New York; and

[523] "FY 2018 Compony Profile" 2018. For the Period of October 1, 2017 - September 30, 2018. Amtrak. www.amtrak.com/content/dam/projects/dotcom/english/public/documents/corporate/nationalfactsheets/Amtrak-Corporate-Profile-FY2018-0919.pdf.

Richmond, Virginia. Skilled employees maintain, rebuild, and overhaul a wide variety of cars. Amtrak owns and operates 363 route-miles of the 457 route locomotives at facilities across the country. Trains regularly reach speeds of 125-150 mph (201-241 kph).

The Acela, Amtrak's premium service, is the fastest train in the Western Hemisphere, with a maximum speed of 150 mph (241 kph) on sections of its route between Boston, Massachusetts, and New Haven, Connecticut. Its top speed between New York City and Washington, D.C., is 135 mph (217 kph). During FY 2019, Amtrak launched Acela Nonstop (New York to Washington), expanded weekend Acela frequencies, and completed a $4 million refresh of train interiors on the entire Acela fleet.

The name "Acela" is a combination of the words
"acceleration" and "excellence."

More than 56.1 million passengers have traveled on the fleet of 20 Acela trainsets since revenue service began on December 11, 2000. In FY 2019, customers took nearly 3.6 million Acela trips and generated nearly $642 million in ticket revenue.

Amtrak announced in August 2016 that it had contracted with Alstom to produce 28 state-of-the-art, fifth-generation, high-speed trainsets that will replace the equipment used to provide Acela service. The new trains are scheduled to enter service on the Northeast Corridor in 2021 and each will accommodate nearly 25 percent more customers while continuing the spacious, high-end comfort of the current Acela service. And as Amtrak CEO Bill Fynn stated in his recent testimony before Congress "95% of their [Acela] components were produced in the United States by 250 suppliers in 27 states."[524] An American high-speed rail system, made in American-by-American workers, not imported from another country.

Active Amtrak-owned or -leased passenger equipment includes 20 Acela® high-speed trainsets (40 power cars and 120 passenger cars); 1,374 passenger cars, including Amfleet®, Superliner®, Viewliner®, Horizon, Talgo, and other types; 80 Auto Train® vehicle carriers; 21 non-powered control units; 230 road diesel locomotives; and 66 ACS-64 electric locomotives.

In FY 2019, Amtrak had 28 new high-speed trainsets from Alstom and 75 new Tier 4 diesel locomotives from Siemens on order. It also continued receipt of Viewliner II rail cars from CAF as part of an ongoing 130-car order and issued a request for proposal for at least 75 new intercity trainsets or rail car equivalents to replace existing Amfleet I and Talgo fleets.

Amtrak has ordered 75 new Tier 4 diesel locomotives from Siemens. Rendering courtesy of Siemens Mobility.

Amtrak improved customer experience at stations throughout the network by investing $143 million in them. Projects included installation of a state-of-the-art digital board at Gray 30th Street Station in

[524] Testimony of William J. Flynn Chief Executive Officer National Railroad Passenger Corporation Before the United States House of Representatives House Committee on Transportation & Infrastructure Subcommittee on Railroads, Pipelines, and Hazardous Materials. Page 7. https://transportation.house.gov/imo/media/doc/Flynn%20Testimony2.pdf.

Philadelphia; enhancement of Metropolitan Lounges in Washington Union Station, Boston South Station, and Gray 30th Street Station; restoration of the Great Hall at Chicago Union Station; and upgrades that ranged from new paint to seating to platforms at various locations through the Customer Now program.

Amtrak Near-Future Further Reduces the Differences between High-Cost SCMagLev and High-Speed Rail

The next generation of Acela is has arrived.


Interior of the latest generation of Acela.

"Amtrak is redefining the future of rail by investing in the customer experience on the Northeast Corridor, both in station and on board" their trains. As opposed to the dreams and claims of the SCMagLev, Amtrak plans to introduce new high-speed trainsets along the Northeast Corridor starting in 2021. These will be the next generation of Acela, built and now being assessed by American safety and performance standards. "This new service will provide customers with world-class accommodations and amenities, along with a smoother and more comfortable ride. Amtrak is also upgrading our infrastructure with significant station expansion and modernization efforts in New York and Washington, DC, and improved track capacity and ride quality along the Northeast Corridor. All of this is being done in an effort to make Amtrak the smarter way to travel."[525]

CEO Bill Flynn statement on May 6, 2021 before House Transportation and Infrastructure Committee's Subcommittee on Railroads, Pipelines and Hazardous Materials sums up the reasons to dump SCMagLev and put the resources into high-speed rail:

> the [SCMagLev] "would be environmentally disruptive, require public spending that would primarily benefit the rich and provide marginal time savings for passengers while being substantially more expensive."

Flynn continued,

> "While new technologies like maglev and hyperloop may capture the public imagination, they are not a substitute for high-speed and intercity passenger rail."

And Flynn said, as we have in this submission,

> "They [SCMagLev] would serve only a small niche of the intercity travel market at a much higher cost, both financially and environmentally."[526]

[525] "The Future of Amtrak Travel Starts Today." Amtrak. 2021. www.amtrak.com/about-amtrak/future-of-rail.html.
[526] Wilen, Holden. "Amtrak CEO bashes proposed Baltimore-Washington maglev project." Washington Business Journal. May 6, 2021. www.bizjournals.com/washington/news/2021/05/06/amtrak-ceo-bashes-maglev-project.html?s=print.

LXXIX. A Far-Lower Cost Alternative for Baltimore to Washington, D.C. - The West Baltimore MARC Express Proposal

The Baltimore-Washington Transportation Research Group (BWTRG) lays out a strong and coherent plan that makes use of **EXISTING** (emphasis added) MARC resources to start running the MARC Express trains between Baltimore and Washington, D.C. [527]

Why is the MARC Express a Far Better Idea Than the SCMagLev?

- The MARC Express takes only 14 minutes longer than the hypothetical travel time of the SCMagLev.
- The MARC Express costs tens of billions of dollars less to implement compared with building the SCMagLev.
- The MARC Express riders pay one-fourth to one-eighth less for a ticket compared with the projected ticket cost to ride the SCMagLev.
- The MARC Express runs into the heart of Baltimore City, making stops at West Baltimore and Penn Station, while the SCMagLev would be on the outskirts of Baltimore, which would increase the commute time traveling to and from its station.
- The MARC Express would bring a market-driven economic revitalization to historic environmental communities and neighborhoods.
- The MARC Express would provide a strong economic tie with Washington, D.C., by providing a major stock of affordable housing for the city's workforce that would be only 30 minutes away from the commuter train.

As noted in the report, "So it's being a part of Washington's economy that really matters. And just in the smaller region around Washington (stopping northward at the Montgomery and Prince Georges County Lines), the Metropolitan Washington Council of Governments (MWCOG) sees a huge need for housing. In a report released in September 2019, they declared that an additional 320,000 housing units are going to be needed in the Washington Metropolitan Area by 2030 - with 75% of those housing units needing to be 'near high-capacity transit' and 'affordable to low- and middle-income households.'"[528] This is an economic growth for Baltimore that the SCMagLev cannot serve.

What's the Market Driver for this Economic Growth?

West Baltimore is the quintessential inner-urban, townhouse-centric, late 19th - early 20th century environment currently sought by homebuyers all over Europe and in New York, Boston, and Washington, D.C. The problem for workers who live in Washington, D.C., however, is that their city's similar neighborhoods are so attractive to buyers that they have become unaffordable for typical low- and middle-income workers.

An attractive alternative is a train ride 30 minutes north to West Baltimore: "Rather than pay $2.5 million for a townhouse in Logan Circle in Washington, one can pay $250,000, or even $25,000 for the

[527] Sacks, Jonathan. "WEST BALTIMORE RISING: A Roadmap for Inclusive Transformational Change in One of the City's Most Challenged Yet Most Economically-Promising Neighborhood Clusters." Baltimore-Washington Transportation Research Group. October 1, 2020. https://westbaltimoreproject.org/.
[528] Ibid. Page 13.

same house in West Baltimore - or $1,000 for a shell that can be made your own. It's a kind of cheap not available anywhere else in the Washington-Baltimore Metropolitan area, certainly not for any community with similar attributes."[529]

Can the MARC Express Work? The Short Answer is Yes!
Starting from Baltimore's Penn Station, Amtrak is currently running between Baltimore and Washington, D.C., in 30 minutes, with a 2-to-3-minute stop at the BWI Rail Station. Between Baltimore and Washington, D.C., the MARC equipment is capable of running at the same speed as the Amtrak equipment. If the MARC expresses from West Baltimore, the travel time from this mixed residential and business community is shorter and the trip would take less time to complete.

The Math Works
From the West Baltimore Station to Union Station is approximately 34 miles. To travel that distance in a half-hour would require an average speed of 70 mph. This 30-minute travel time includes the time required to initially speed up leaving Penn Station, slow down for a 2-to3-minute stop at the BWI Rail Station, speed up when leaving the BWI Rail Station, and slow down to stop at Washington, D.C.'s, Union Station. To accomplish this trip in 30 minutes, the MARC trains would need to travel at approximately 85 mph on the faster sections of the trip. Reviewing the specifications for the MARC's existing equipment confirms that both the existing engines and coaches are capable of achieving and sustaining these speeds.

The MARC currently owns the trainsets and the locomotives that can be used to initiate the proposed MARC Express between Baltimore and Washington. D.C.[530]

MCRT Editor's Note: SCMagLev proponents ***falsely*** state the existing rail system is obsolete. The MARC, as well as Amtrak equipment, are modern, efficient and powerful as seen here.

The MARC's new Siemens SC-44 Chargers, eight (8) of which were delivered in 2017. They have a top speed of 125 mph and would be able to pull six or even eight coach trains on this line at the speed needed.

[529] Ibid.
[530] Ibid.

The State of Maryland purchased 54 MARC IV multi-level coaches in 2014. They have a top speed of 125 mph, and a maximum service speed of 100 mph, well more than would be needed to run the desired half-hour express trains. Some of these MARC IVs are already running on the Penn Line.

The recently refurbished MARC III multi-level coaches are rated for a maximum speed of 125 mph, with a service speed of 100 mph.

If additional equipment should be needed to initiate the Baltimore to D.C. MARC Express, there is a potential supplier of short-term leases of compatible rolling stock: Amtrak.

Leasing would allow the MARC to move forward incrementally and start off the MARC Express with a “proof-of-concept” phase, to evaluate and decide whether to maintain the operation of the MARC Express. Also, leasing from Amtrak would be possible as the MARC is a virtual railway system. The MARC does not own any of the rail lines (with one small exception). The entire line is run by Amtrak, which is paid by the State of Maryland for the use of the tracks (again, owned by Amtrak), the staffing (contracted by Amtrak), and the maintenance of some equipment. The State of Maryland owns only the MARC equipment on the Penn Line, so it would seem reasonable to begin leasing some additional equipment to evaluate the success of the MARC Express Service.

Two leasing options with Amtrak are obvious:

Amtrak has 70 Siemens-manufactured Amtrak Cities Sprinter (ACS-64) locomotives, with a top speed of 125 mph on the Northeast Corridor, and a capacity to pull up to 18 of Amtrak's coaches.

Amtrak is also in the process of replacing its current Acela fleet with all new equipment. The prior generation trainsets (locomotives and coaches) are expected to be completely retired over the next few years. Leasing these prior generation Acela trainsets is worth investigating to get the MARC Express service up and running.[531]

Is There Capacity in the Current Train Schedules? Again, the Short Answer is Yes.
The proposed MARC Express Service would run hourly on weekdays, between 6:00 a.m. and 8:00 p.m. Southbound, the trainset departs from Baltimore Penn Station on the hour, 20 minutes ahead of the Acela. Northbound, the trainset departs from Union Station five minutes after the hour, following the Acela.

The Baltimore Penn - West Baltimore - BWI - Washington Union Station Run
If the service starts at 6:00 a.m. and finishes at 8:00 p.m., it would provide 14 hours of service, with one trainset in each direction every hour and a total number of 28 runs. That is a significant increase in capacity on the Penn Line, and it is not clear whether Amtrak could or would consider allowing it. However, for the short term, a limited proof-of-concept service could be run, with a promised future expansion that would market-drive homebuyers to consider living in a reenergized West Baltimore. In the longer term, Amtrak would have time to accomplish its planned expansion of Penn Line rail capacity. Under the Biden Administration, upgrading U.S. rail passenger service is a priority. Amtrak has planned and has already accomplished upgrading capacity, systems, and services on the Penn Line section of the Northeast Corridor, as witnessed by the installation of high-speed continuous rail and the replacement of the BWI Rail Station, among other improvements.

As noted in the MARC Express proposal: "Fortunately, there's not only ample room for expansion on the Penn Line. There's an existing, imminently affordable plan for incremental expansion there - And, Amtrak already has preliminary design work completed and environmental approvals."[532]

[531] While the current Amtrak plan is to scrap the prior generation of Acela, the few of the current train sets could be used to run a proof-of-concept. The maintenance of the equipment, and acquisition of spare parts could be challenging, but the hold of a few additional train sets could provide the spare/maintenance parts during the "proof-of-concept" operating period.
[532] Ibid. Page 31.

BWI Rail Station

The BWI Rail Station is the second busiest station in Maryland (after Baltimore Penn), and the 13th-busiest in the Amtrak system.

During the short term, the MARC Express can run on the current Penn Line as currently configured. In the longer term, to accommodate the addition of 28 trainsets expressing between Baltimore, BWI Airport, and Washington, D.C., an upgrade to the Penn Line will be needed. As currently configured, three (3) tracks run through the BWI Rail Station. However, only two have access to a platform. So only two tracks are typically used for stops at BWI Airport. If there is a problem or track work is underway, the third center track is used. However, using this center track delays the loading and unloading of passengers.

Most Amtrak and MARC trains (115 out of 138) stop at the airport station. So, essentially, the current boarding platform configuration at the BWI station constrains the boarding access and operational flexibility of the Penn Line, reducing it almost exclusively to two lines for nine (9) miles of the line's length. As noted in the MARC Express proposal, "if the 3rd track at the BWI Rail Station could be brought into full use with a reconfigured platform, that could potentially increase capacity by 30% on the entire line, [allowing] another 40-50 trips a day."[533]

From an Anne Arundel County perspective, such a capacity change coupled with the proposed MARC Express Service would provide an opportunity for a significant job and economic boon in the BWI area. The potential of an hourly 24-minute express commuter service to Washington, D.C., and a 16-minute express trip to Baltimore would provide the means to increase air traveler accessibility and commuter accessibility to Washington, D.C., and Baltimore.[534] As with West Baltimore, such a short and easy trip between Washington, D.C., and BWI Airport would bring BWI into the "neighborhood" sphere of Washington, D.C. "And with that classification secured, the possibilities for transit-oriented development, and office development along the lines of Northern Virginia's great satellite cities (Courthouse, for instance), becomes not just a real possibility, but an almost irresistibly compelling prospect, since land in Maryland is cheaper, and the value proposition is therefore greater.[535]

Building the SCMagLev brings none of these benefits to Baltimore, Anne Arundel County, or Washington, D.C. However, the running of a MARC Express would bring to Baltimore and Anne Arundel County businesses, communities, and neighborhoods, as well as the Washington, D.C. workforce.

Conclusion

The better choice for Maryland is to continue to invest in Amtrak and MARC upgrades and expansion. The DEIS fails to compare the SCMagLev with the existing and planned improvements to Amtrak, Amtrak's Acela, and the MARC, a requirement of the National Environmental Policy Act process. Therefore, the DEIS is fatally flawed, and the FRA should choose the No Build option.

[533] Ibid. Page 32.
[534] Ibid. Page 37.
[535] Ibid. Page 40.

Appendices

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LXXX. Appendix: DEIS Comments Team Bios

William Boone – Retired. Has a B.A. in Environmental Geography with a minor in Urban Planning, and a M.A. in Emergency Management and Disaster Planning. He consulted with FEMA, DHS, Federal law enforcement agencies, and the U.S. Army.

Louis Cerny – has been involved with maglev proposals since the late 1980s, when he served as the executive director of the American Railway Engineering Association. He has continued to study maglev technology as a private consultant and has commented on many maglev proposals. Mr. Cerny was a voting member of FRA committees that developed safety standards for high-speed rail.

Richard Dolesh – has worked with parks, resource conservation and natural resources for nearly all of his professional life. Most of his experience in these areas has been on the Patuxent River. He is currently a Senior Policy Associate with the National Recreation and Park Association, previously was Director of Forest, Wildlife, and Heritage Service for Maryland Department of Natural Resources (DNR) and before that, was Chief of Natural and Historical Resources for Maryland National Capital Parks and Planning Commission (MNCPPC). He is the author of a number of articles in the Parks and Recreation Magazine and other publications relating to parks and conservation.

Sam Droege – grew up in Prince George's County and has worked as a biologist for the past 40 years, specializing in the survey and monitoring of plants and animals.

Ben Fischler – Archaeologist with experience preparing NEPA studies.

Maureen Fine – Bowie resident, retired from a long career in healthcare, MA Earth Literacy, Master Naturalist, Habitat Advisor Prince George's Audubon Society, environmental activist.

Kristin Fletcher – has worked in the marketing and communications in the non-profit sector since 1998 for a wide variety of organizations including public health, environmental, educational, and special needs groups.

Kyle Hart – serves as the Mid-Atlantic Field Representative for the National Parks Conservation Association (NPCA). Since graduating college in 2016, he has worked for four different environmental nonprofits in Virginia and D.C. to protect the region’s air, land, and water from harmful developments like the SCMagLev.

Pat Jackman – served as the National Equal Opportunity Program Manager and held various civil rights positions for the US Forest Service before retiring. An environmentalist and community activist, she is a co-founder and is currently treasurer of the Maryland Coalition for Responsible Transit. Pat is a resident of New Carrollton in Prince George’s County.

Stephanie Kaufman – retired in 2019 after 30 years of federal service including 10 years as the budget director of the Overseas Private Investment Corporation, 11 years at the Office of Management and

Budget, and 6 years at the U. S. Department of Transportation, where she was a founding member of the Transportation Infrastructure Finance Innovative Act (TIFIA) program office. She is currently serving as the Treasurer of the Friends of Patuxent, a non-profit organization that supports the mission and programs of the Patuxent Research Refuge and the Patuxent Wildlife Research Center.

Michael Kowalski, PhD – Retired after a long career as an Astrophysicist (federal employee) at the U.S. Naval Research Laboratory (NRL), Washington, D.C. His bibliography includes 49 publications as Principal- or Co-author in refereed scientific journals and 76 meeting presentations. He has vast experience in the analysis and scientific interpretation of ground- and space-based astronomical data, R&D of technologies for ground and space applications, and management and proposal preparation for both R&D and space-flight programs. He is a world-renowned expert in R&D of multilayer diffraction gratings and has expertise with X-ray detectors and superconducting instrumentation. He participated in seven (7) national or international orbital space-flight missions and served as Project Scientist and/or Principal Investigator on three (3) NASA sounding rocket missions. His also has extensive experience as a Contracting Officer Representative.

Rhonda Kranz – is an ecologist and independent consultant delivering strategic and tactical services to organizations that support environmental concerns. She has thirty years of experience in research, conservation, and program management.

Beth LeaMond – has a BS in Geology from the University of Cincinnati, and an MS in Environmental Science from Indiana University. Beth worked as a Hydrologist for the US Geological Survey-Water Resources Division in New York State from 1987 - 2000, and in the Water Quality Standards Program at the US EPA from 2002 - 2015.

Lawrence Liebesman – "Larry," is a nationally recognized environmental lawyer and litigator with more than 40 years of experience. His practice emphasizes wetlands, climate change, water pollution, coastal issues, environmental impact assessment and endangered species law. Larry represents a range of clients in the public, private and nonprofit sectors on a broad range of environmental issues at the federal and state levels and has testified as an expert witness in litigation and before Congress. He has negotiated Clean Water Act (CWA) and Endangered Species Act (ESA) permits and approvals for commercial, residential, public works and environmental restoration projects. Larry is involved in Chesapeake Bay cleanup issues. He advises clients on storm water issues and served on the Maryland State Water Quality Advisory Committee which provides advice to the Maryland Secretaries of Environment, Natural Resources and Agriculture on Bay water quality issues. He also served as counsel for an innovative public private partnership storm water wetland restoration project that will significantly reduce pollution impacting Bay while creating high value wetland habitat. The project received the National Wetlands Award for Landowner Stewardship from the Environmental Law Institute. Larry has also participated as amicus in landmark Clean Water Act and Endangered Species Act cases before the United States Supreme Court including the Rapanos case on the definition of Waters of the United States. Larry is a Phi Beta Kappa graduate of Rutgers University and received his law degree with honors from GW Law School. He is a member of the District of Columbia and Maryland Bars along with the bars of several federal courts including the U.S. Supreme Court.

Susan McCutchen – Retired as a senior research associate from the National Academies of Sciences, Engineering, and Medicine. She assisted in the production of more than 50 publications on policy issues, including science and technology for international development, technology transfer, aeronautics and the U.S. space program, natural disaster mitigation, U.S. education policy and science curricula, needle exchange, the scientific merit of the polygraph, human factors/engineering, research ethics, disability compensation programs, health hazard evaluation, and medical and public health preparedness for catastrophic events, including nuclear detonations. Ms. McCutchen is a community activist on many issues, including the SCMagLev.

Vicki Reynolds – Worked in government and industry as a technical training manager, system integrator, and a high school computer science teacher prior to retirement. She is a co-founder of the Maryland Coalition for Responsible Transit and is currently serving as acting director. She lives in Lanham, MD Prince George's County on the proposed J1 route of the SCMagLev.

Suzzie Schuyler – Is a retired Pet/Ct, nuclear medicine, mammographer, and radiologic technologist, having worked 38 years in conjunction with CT and MRI units. Ms. Schuyler holds a bachelor's of science degree in professional health. With her long career, she has expertise with ionizing and non-ionizing radiation and the acute precautions taken to protect employees and the public. She also taught courses in radiologic technology, which included procedural processes, safety, and radiation protection. Ms. Schuyler is an active member of community organizations, including the Linthicum-Shipley Improvement Association, where she has served as a voting Board member and held elected officer positions, including president. She has investigated the SCMagLev plans, proposals, and other information for several years, and has engaged with the Anne Arundel County Council and the Maryland state legislature, and met with Maryland Congressional leaders to express the community's opposition to building the SCMagLev.

Marcia Watson, PhD – Has a doctoral degree in biological sciences from the University of Delaware; her specialization is in environmental physiology. She served on the faculty and as an academic administrator at University of Delaware and at University of Maryland University College (now University of Maryland Global Campus). Now retired, she lives in Bowie, Prince George's County, Maryland. She is the President of the Patuxent Bird Club and serves on the Board of Directors of the Maryland Ornithological Society and also on the Board of the Friends of Patuxent Research Refuge/Patuxent Wildlife Research Center. Dr. Watson is the editor of the Birder's Guide to Maryland and D.C., a project of the Maryland Ornithological Society and formerly served on the Maryland-DC Bird Records Review Committee.

Daniel Woomer, PhD (ABD) – Is a community activist and technical expert. He retired after a long career including positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes. He is active with community organizations

including LSIA and NARFE, having served in leadership roles and elected positions. Dan's full bio can be found at: www.linkedin.com/in/daniel-e-woomer-11829613.

LXXXI. Appendix: Acronyms

- AA County – Anne Arundel County
- AACPS - Anne Arundel County Public School
- ABS – Anti-lock Braking System
- ACHP – Advisory Council on Historic Preservation
- APE – Area of Potential Effect
- BARC – Beltsville Agricultural Research Center
- BMP – Best Management Practices
- BWI – Baltimore-Washington International Airport
- BWRR – Baltimore-Washington Rapid Rail
- BWP – Baltimore-Washington Parkway (also BW Pkwy)
- BWTRG – Baltimore-Washington Transit Group.
- CAA – Common Aesthetic Area
- CAST – Chesapeake Assessment Scenario.
- CATS – Citizens Against the SCMagLev
- CEQ – Council on Environmental Quality
- CERN – European Council for Nuclear Research.
- CO_2 – Carbon Dioxide - a colorless gas with a density about 53% higher than that of dry air. Carbon dioxide molecules consist of a carbon atom covalently double bonded to two oxygen atoms.
- Corps – Army Corps of Engineers
- CPCN – Certificate of Public Convenience and Necessity
- D.C. – Washington District of Columbia
- DCDOT – District of Columbia Department of Transportation
- ^{o}C – degrees Celsius - a temperature scale originally known as the centigrade scale - the scale was named after the Swedish astronomer Anders Celsius (1701–1744), who developed a similar temperature scale. Before being renamed to honor Anders Celsius in 1948, the unit was called centigrade, from the Latin centum, which means 100, and gradus, which means steps - since 1743 the Celsius scale has been based on 0 °C for the freezing point of water and 100 °C for the boiling point of water at 1 atm pressure. Prior to 1743 the values were reversed (i.e., the boiling point was 0 degrees and the freezing point was 100 degrees). The 1743 scale reversal was proposed by Jean-Pierre Christin.
- ^{o}F – degrees Fahrenheit - is a temperature scale based on one proposed in 1724 by the physicist Daniel Gabriel Fahrenheit - the Fahrenheit scale is now usually defined by two fixed points: the temperature at which pure water ice melts is defined as 32 °F and the boiling point of water is defined to be 212 °F, both at sea level and under standard atmospheric pressure (a 180 °F separation).
- DEIS – Draft Environmental Impact Statement

- DNL – Day-Night Average Sound Level - represents the total accumulation of all sound energy, but spread out uniformly over a 24-hour period.
- DNR – Department of Natural Resources
- DOD – United States Department of Defense
- DOI - Department of Interior
- DORIS – Doppler Orbitography and Radiopositioning Integrated by Satellite
- EIS – Environmental Impact Statement
- EMF – Electromagnetic Field
- ESA – [Federal] Endangered Species Act
- ESD – Environmental Site Design
- FA/EE – Fresh Air and Emergency Egress - Surface ventilation facilities above SCMagLev tunneled sections.
- FERC – Federal Energy Regulatory Commission
- FHWA – Federal Highway Administration
- FPAB – Forest Preserve Advisory Board
- FRA – Federal Railroad Administration
- GEOS – Goddard Earth Observing System
- GGAO – Goddard Geophysical and Astronomical Observatory
- GMAO – Global Modeling and Assimilation Office
- GNSS – Global Navigation Satellite Systems
- JRC – aka JR Central - Central Japan Railway Company Design and builder of the SCMagLev and support systems.
- *He* – Helium - atomic number 2 - a colorless, odorless, tasteless, non-toxic, inert, monatomic gas, the first in the noble gas group in the periodic table, with a boiling point the lowest among all the elements.
- *LHe* – Liquid Helium
- LN_2 – Liquid Nitrogen
- LOD – Limits of Disturbance
- LOS - Level of Service
- LSIA – Linthicum-Shipley Improvement Association
- LWCF – Land and Water Conservation Fund
- MARC – Maryland Area Rail Commuter – Maryland's commuter rail system
- MCRT – Maryland Coalition for Responsible Transit email: MCRTaction@gmail.com, website: www.mcrt-action.org.
- MBTA – Migratory Bird Treaty Act.
- MDE – Maryland Department of the Environment
- mG – milliGauss - measure of magnetic field strength can be expressed in units of Tesla (T) or microtesla (μT) or Gauss (G) or milligauss (mG), where 1 G is equivalent to 10^{-4} T (or 1 mG = 0.1μT).
- MHHA – Montpelier Hills Homeowners Association
- MHRA – Montpelier Hills Recreation Association
- MHT - Maryland Historical Trust
- MJ – The joule (symbol: J) is a derived unit of energy in the International System of Units. It is equal to the energy transferred to (or work done on) an object when a force of one newton acts on that

object in the direction of the force's motion through a distance of one meter (1 newton-meter or N·m) - Megajoule (MJ) is equal to one million (10^6) joules, or approximately the kinetic energy of a one megagram (metric ton) vehicle moving at 161 km/h (100 mph).

- M-NCPPC - The Maryland-National Capital Park and Planning Commission
- MS4 – Municipal Separate Storm Sewer Permits
- MSDS – Material Data Safety Sheet
- MTA – Maryland Transit Authority
- MWCOG – Metropolitan Washington Council of Governments
- MOW – Maintenance of Way
- NABTU – North American Building Trades Union
- NASA – National Aeronautics and Space Administration
- NEC – Northeast Corridor
- NEC Future – Amtrak's FRA reviewed and approved plan to upgrade passenger rail equipment, facilities and services along the northeast corridor.
- NEPA – National Environmental Protection Act - The National Environmental Policy Act - was signed into law on January 1, 1970 and requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. The range of actions covered by NEPA is broad and includes: (1) making decisions on permit applications, (2) adopting federal land management actions, (3) constructing highways and other publicly-owned facilities.
- NHL – National Historic Landmark
- NHPA – National Historic Preservation Act
- N – Nitrogen - atomic number 7 - is the lightest member of group 15 of the periodic table, often called the pnictogens - it is a common element in the universe, estimated at about seventh in total abundance in the Milky Way and the Solar System - at standard temperature and pressure, two atoms of the element bind to form dinitrogen, a colorless and odorless diatomic gas with the formula N_2. Dinitrogen forms about 78% of Earth's atmosphere, making it the most abundant uncombined element.
- NPS – National Park Service
- NRHP – National Register of Historic Places
- NTWSSC – Nontidal Wetlands of Special State Concern
- NWRS – National Wildlife Refuge System
- NWVC – National Wildlife Visitor Center
- OSTI – Office of Scientific and Technical Information - U.S. Department of Energy www.osti.gov.
- PA – Programmatic Agreement
- pCi/L – Picocuries Per Liter - a measure used to express the results of radioactivity tests in air and water. For radon gas, one picocurie per liter is the amount of radon in the air so that 2.2 atoms of radon decay during one minute in one liter of air.[536]
- PG County – Prince George's County

[536] Picocuries - A pCi is a measure of the rate of radioactive decay of radon. One pCi is one trillionth of a Curie, 0.037 disintegrations per second, or 2.22 disintegrations per minute. Therefore, at the EPA's recommended action level of 4 pCi/L (picocuries per liter), there will be approximately 12,672 radioactive disintegrations in one liter of air during a 24-hour period. Source: https://branchinvestigations.com/avada_faq/what-is-a-picocurie-pci/. Also see the US EPA's official position at the EPA's Radon Health Risks Frequently Asked Questions. Source: www.radon.com/radon_faq/.

- PGCPS – Prince George's County Public School
- PJM – Pennsylvania-New Jersey-Maryland Interconnection
- PWRC – Patuxent Wildlife Research Center
- PRR – Patuxent Research Refuge
- RPA – Rules of Particular Applicability – U.S. Rail Safety Standards.
- ROD – Record of Decision.
- RRIF – Railroad Rehabilitation and Improvement Financing
- RSAC – Rail Safety Advisory Committee.
- RSD – Rolling Stock Depot.
- RTE species – Rare, Threatened and Endangered species.
- SCC – Social Cost of Carbon - Now set with the Biden Administration at $52/metric ton.
- SCM – Superconducting Magnetic
- SCMagLev – Superconducting Magnetic Levitation
- Short Ton – In the United States and Canada, a ton is defined to be 2,000 pounds (907.18474 kg). A short ton is equal to 2,000 pounds avoirdupois (907.19 kg). It is also a measure of gross internal capacity, equal to 100 cubic feet (2.83 cu. m). Where confusion is possible, the 2,240-pound ton is called a "Long Ton."
- SHPO – State Historic Preservation Office
- SLR – Satellite Laser Ranging
- TBM – Tunnel Boring Machine
- TCP – Traditional Cultural Properties
- TEA – Transportation Equity Act
- TFS –Transmission Feasibility Study.
- TMDL – Total Maximum Daily Load
- TMF – Train Maintenance Facility
- TNEM – The Northeast Maglev company
- TTC – Transportation Technology Center - located in Pueblo, Colorado.
- USDOE - United States Department of Energy
- USDOT – United States Department of Transportation
- USFWS – United States Fish and Wildlife Service
- USGS – United States Geologic Survey
- VLBI – Very Long Baseline Interferometry
- VMT – Vehicle Miles Travelled
- VRE – Virginia Rail Express – Virginia's commuter rail system
- WB&A - Washington, Baltimore and Annapolis Electric Railway[537]

[537] The Washington, Baltimore and Annapolis Electric Railway (WB&A) was an American railroad of central Maryland and Washington, D.C., built in the 19th and 20th century. The WB&A absorbed two older railroads, the Annapolis and Elk Ridge Railroad and the Baltimore & Annapolis Short Line, and added its own electric streetcar line between Baltimore and Washington. It was built by a group of Cleveland, Ohio, electric railway entrepreneurs to serve as a high-speed, showpiece line using the most advanced technology of the time. It served Washington, Baltimore, and Annapolis, Maryland, for 27 years before the "Great Depression" and the rise of the automobile forced an end to passenger service during the economic pressures of the 1930s "Depression" southwest to Washington from Baltimore and west from Annapolis in 1935. Only the Baltimore & Annapolis portion between the state's largest city and its state capital continued to operate electric rail cars for another two decades, replaced by a bus service during the late 1950s into 1968. Today, parts of the right-of-way are used for

- WHEJIC - White House Environmental Justice Interagency Council
- WIP – Watershed Implementation Plan
- WLA – Waster Load Allocations
- WMATA – Washington Metropolitan Area Transit Authority
- WSSC – Washington Suburban Sanitary Commission
- WQC – Water Quality Certification

LXXXII. Appendix - Reprint: Woomer, Dan. "Amtrak – the Better Alternative." CATS-MCRT White Paper. January 11, 2021

AMTRAK - the Better Alternative

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

The existing Amtrak train system, with its ongoing work to improve and enhance services and ridership experience, provides demonstrable evidence that supports the argument for its continued development. It is a far better and more cost-effective solution to address the rail transportation needs of the Northeast Corridor than the construction of the SCMagLev train system - an expensive, elite, and commercially unproven technology system that presents many unanswered safety and financial questions, as well as harmful community and environmental issues.

About Amtrak

Amtrak currently provides intercity passenger rail service with over 21,000 route-miles of track across 46 states, including the District of Columbia, and Canada. Amtrak's *Acela Express*, *Northeast Regional*, *State Supported*, and *Long-Distance* rail services between Boston, New York, Philadelphia, Baltimore, and Washington, DC, provide an expansive array of services for passengers and commuters. As the majority owner of the Northeast Corridor (NEC), Amtrak provides coordinated passenger and freight rail service planning for the NEC, as well as

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the light rail line (from Cromwell Station / north Glen Burnie going north to downtown Baltimore and further north through city to Hunt Valley in Baltimore County), rail trail for hiking - biking trails, and roads through Anne Arundel County. For additional information see: https://en.wikipedia.org/wiki/Washington,_Baltimore_and_Annapolis_Electric_Railway.

infrastructure access and operational support to eight commuter rail authorities — including the Maryland Area Regional Commuter (MARC) and the Virginia Railway Express (VRE) — and four freight rail operators. Amtrak's long experience as the U.S. high-speed operator, and the NEC end-to-end user, provides a unique, profound, and expert insight and perspective about the Baltimore-Washington passenger rail transportation network.

Questions & Concerns

Amtrak and the Federal Railroad Administration (FRA) have already analyzed the passenger rail transportation needs between Baltimore and Washington, DC, and found a new train route was not necessary.

Amtrak's *NEC Future* program has already addressed the mobility challenges of the Baltimore-Washington, DC, travel corridor with a focus on the role of passenger rail in meeting current and future challenges.[538] The FRA has already completed a lengthy and costly evaluation of future transportation needs and considered the capacity constraints of the total transportation system — including rail, highway, and air — to complete a programmatic Environmental Impact Study (EIS) of the *NEC Future* proposals and plans, and Amtrak received FRA's approval. The EIS focused on technology-neutral rail passenger technologies. Although a new alignment (route) was considered, the option of building one was ruled out as being unduly expensive and unnecessary. Instead, the preferred alternative focused on improving the existing rail alignment (route).

The framework for passenger rail investment between Baltimore and Washington, DC, is already in place.

Amtrak, the owner of the NEC between Baltimore and Washington, DC, works collaboratively with the FRA, MARC, and VRE, as well as the Northeast Corridor Commission, the states of Maryland and Virginia, Washington, DC, the Maryland Transportation Authority (MTA), the District of Columbia Department of Transportation (DCDOT), the Washington Metropolitan Area Transit Authority (WMATA), and others, to develop the *NEC Future* to address current and future needs, solve problems, prepare plans, and invest in passenger rail between Baltimore and Washington, DC.

The ability to evaluate the environmental consequences of building and operating the SCMagLev is unclear.

The SCMagLev technology proposed by BWRR is not a proven rail technology nor has it been commercially successful. Data and experience are not yet available to evaluate the potential effects of building and operating the SCMagLev train system on the local and regional economies, existing transportation systems, and the human and natural environment, as required in a Draft Environmental Impact Study (DEIS) and EIS.

Additionally, BWRR has clearly indicated this is only the first segment of an SCMagLev line they propose to extend from Baltimore to Boston and Massachusetts to the north, and from Washington, DC, to Charlotte, North Carolina, to the south. This indicates that the current SCMagLev scope provides neither true independent utility nor the full scope of the project as required for a DEIS and EIS.

Substantial investment in passenger rail transportation is already underway between Baltimore and Washington, DC.

Amtrak, Citizens Against the SCMagLev (CATS), the Maryland Coalition for Responsible Transit (MCRT), and a growing number of community organizations, environmental groups, and elected officials at the county, state,

[538] U.S. Department of Transportation and Federal Railroad Administration. *NEC Future: A Rail Invest Plan for the Northeast Corridor*. *Record of Decision*. July 2017. https://www.fra.dot.gov/necfuture/pdfs/rod/rod.pdf. Referred to throughout this white paper.

and federal levels, question the competing priorities between the Baltimore-Washington SCMagLev project and Amtrak's ongoing upgrades and enhancements.

The SCMagLev calls for construction of a separate maglev network with new guideways, stations, and maintenance facilities. To fund this massive construction, BWRR is anticipating funding from a mix of federal and private sectors.

Amtrak's *NEC Future's* EIS to renew and modernize the NEC infrastructure between Washington, DC, Baltimore, Philadelphia, New York City, and Boston was approved by the FRA. The new $4.7 million recently-renovated Baltimore-Washington Airport rail station used by both Amtrak and MARC is an example of this renewal in progress (see photos).[539, 540]

Original BWI Rail Station. Photo by Bob E.

New BWI Rail Station. Photo by B. Taylor

NEC Future has confirmed the need for passenger rail investment on the existing corridor between Baltimore and Washington, DC, including the replacement of the Baltimore and Potomac Tunnels, additional right-of-way and track segments, and modernization and expansion of the Washington Union Station. These and other crucial NEC projects are already well along in the planning process, most having completed the engineering and environmental clearance stages. Several of the upgrade projects have been completed. Over the next 5-10 years, the cost to complete them will require substantial financial commitment from the federal government, Amtrak, and others. These commitments are in direct competition with the plans of BWRR and their proposed SCMagLev train system. BWRR's anticipated January 2021 DEIS must justify the need for the SCMagLev as compared with Amtrak services, acknowledging that Amtrak is already providing passenger and commuter transportation and improving their array of services and NEC systems.

BWRR has openly and repeatedly stated and testified that further public investment has already been committed and they will pursue their efforts to secure additional public, including tax dollar, investments. However, as noted previously, major public passenger rail transportation support (tax dollars) has already been committed to Amtrak and the associated improvements and construction is underway. Public-private investment in projects noted in the *NEC Future* are also underway. To date, Amtrak has secured a $2.5 billion loan with the FRA to purchase new high-speed trains and construct the infrastructure needed to optimize high-speed rail service between Baltimore and Washington, DC.[541]

[539] E., Bob. Photo of original BWI Rail Station. May 29, 2016. foursquare.com/v/bwi-amtrakmarc-rail-station-bwi/4ac9c22bf964a5201ec020e3/photos.
[540] Taylor, Barbara H. Photos of newly renovated BWI Rail Station and rededication. *The Baltimore Sun*. December 10, 2019. www.baltimoresun.com/travel/bs-md-new-train-station-20191210-u3tc4uizfbc2zn3djp7c2rxije-photogallery.html.
[541] Clabaugh, Jeff. Amtrak's new Acela fleet is on the move (see it). January 23, 2020. https://wtop.com/business-finance/2020/01/amtraks-new-acela-fleet-is-on-the-move-see-it/.

Findings/Conclusion

Amtrak does not operate independently. It continues to work collaboratively with the FRA, NEC, MTA, MARC, VRE, DCDOT, and WMATA, as well as the states of Maryland and Virginia, Washington, DC, and others. They have jointly developed the *NEC Future*, prepared the approved Passenger Rail Corridor Investment Plan—which includes enhancement projects through 2040 and beyond—and have started implementing the planned improvements and enhancements to the Northeast Corridor rail system and service.

(2) CATS, MCRT, and Amtrak (which has a history of successful EIS preparation and approval), cannot determine the environmental impact of the SCMagLev train project because: "Data and experience are not yet available to evaluate the potential effects of maglev on the economy, transportation system, and the human and natural environment as is required in a DEIS and EIS."

(3) Amtrak's *NEC Future* has moved past the planning process, including successfully completing the environmental clearance and initial engineering stages, to beginning the actual upgrades and building phase. Financial commitments include a $2.5 billion loan to purchase high-speed trains and construct the infrastructure needed to improve high-speed train travel along the Northeast Corridor.

(4) Amtrak's *NEC Future*-related EIS was the result of a costly four-year study, to which the regional, state, and federal stakeholders have concurred and approved Amtrak's recommendations and financial plans to proceed with the enhancement of existing right-of-way, equipment, and facilities.

Continued development and support of Amtrak is a far better solution than moving forward with building the SCMagLev transportation system. Amtrak and its options provide a reliable, technically and financially-proven system at a reasonable cost for near- and long-distance rail transportation that accommodates commuters and passengers. After four years of study by the FRA, which involved the significant use of financial and human resources, and extensive engagement with stakeholders — the federal government, states, cities, the railroads, and the public — the already-completed, approved, and published *NEC Future* lays out a sound plan and investment approach to address the NEC's current and future needs. This approved plan should remain the blueprint for the future of passenger rail transportation between Baltimore and Washington, DC, as well as for the Northeast Corridor.

The competitive SCMagLev transportation system, by comparison, is inordinately expensive, commercially unproven, and potentially damaging to people, communities, and the environment. There are many unanswered safety issues, and it is very likely large government subsidies (tax dollars) will be required to build and maintain and operate the SCMagLev. SCMagLev, a transportation system for the elite and well-heeled traveler, is not justified and should not be approved.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.

(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

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(1) Campbell-Lorenc, AICP, Janet. Letter to Mr. Bradley M. Smith, Director of the Office of Freight and Multi-modalism, Maryland Department of Transportation. Amtrak, Corporate Planning. January 31, 2017.
(2) Woomer, Dan. "SCMagLev - AMTRAK Comment Submission to the Baltimore-Washington Rapid Rail Environmental Impact Study." January 5, 2018
(3) Wikipedia. "BWI Rail Station." en.wikipedia.org/wiki/BWI_Rail_Station.

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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMaglev.

LXXXIII. Appendix - Reprint: Woomer, Dan. "SCMagLev – What's the Biological and Ecological Impact? (Part 1)." CATS-MCRT White Paper. January 11, 2021

SCMagLev - What's the Biological and Ecological Impact?

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

This article explores some of the biological and ecological impacts on Maryland's and the nation's environment associated with building and operating the SCMagLev train system.

The SCMagLev proposed alignment (route) runs underground between Baltimore and Washington, except in one location. This is where the train emerges aboveground and includes two elevated guideways, as well as an aboveground industrial trainyard where the trains are cleaned, maintained, repaired, and stored. To function, this trainyard, which would cover approximately 200 acres, must be completely flat and be able to withstand the weight of thousands of tons of equipment without deforming. To understand the industrial nature of this trainyard, refer to the one built in China that is slightly smaller than the one proposed to be located on our public lands. There will be few significant differences between deployment between the two locations; while watching, the reader must ask whether this type of land use is appropriate for public refuge, research, and conservation lands.[542]

Questions & Concerns

(1) What impact would building the planned SCMagLev trainyard have on our preserved lands?

- A trainyard would normally be built in an industrial zone within a large city where power, housing, and a skilled workforce would be co-located. The trainyard would be sited in a landscape already built to accommodate and minimize the runoff, lighting, pollution, and ecological impacts such intense and industrial land use requires. Siting a trainyard in a preexisting trainyard would properly place it in a landscape that was long-ago compromised ecologically and currently dedicated to human commercial and business needs. In the same fashion, refuges and parks are dedicated to the needs of wildlife, conservation, research, and the human needs for nature, solitude, clean water, clean air, and a place to recharge our own batteries.

- However, the SCMagLev plan sites the train emerging from its underground tunnel to slice through, destroy, and disrupt the last large, ecologically intact green space left in the Prince George County region. When the SCMagLev train parasitically emerges aboveground, it would access a planned 200-acre industrial site, currently located on existing conservation lands. Building these train lines and trainyards also requires upgrading the existing small rural roads to industrial standards, as well as the creation of a new, high-powered, electrical system and associated transmission corridors. All this development would be placed into an existing, large intact landscape of protected forests, wetlands, and fields, the last such area in the region.

- To accomplish this section of the SCMagLev project, BWRR must have this protected public land transferred to their corporation and be given permission from several federal, city, state, and county agencies to build the trainyard. Agencies and municipalities unwilling to transfer this land may have their land taken by BWRR through eminent domain, a power that was granted as part

[542] Shanghai High-Speed Train Yard. www.youtube.com/watch?v=OKPqHKmpAOE&fbclid=IwAR0nDnM0VxLlfQVQUUJo0rJ-1Y7V0WBOQvuVbQVJ4ptCn6eu2I0IbwCSKsE%29%29%29.

of the train operation license of the defunct Baltimore and Annapolis Train Company that was purchased by BWRR.[543]

- The protected parklands in questions are public properties, set aside and preserved for the use of the people of the United States, the local communities, and scientific research. None of these lands have ever been transferred to private hands, and never to groups wishing to build an industrial center.

- Such a transfer of lands is problematic. It sets a precedent for future transfers to private hands of projects that could be deemed "in the public good," allowing construction such as upscale homes, shopping centers, sand and gravel operations, and parking lots, on lands that would never recover from the destruction of the natural environment. Transfers like this lean only one way, toward ecological destruction, and never toward preservation or the good of the area's environment.

(2) What are some of the permanent, unrecoverable biological damages building the SCMagLev trainyard would have?

- *The bottom line*: Building a 200-acre trainyard results in absolute, irreversible ecological damage to the land. The landscapes currently targeted for support and maintenance for the SCMagLev trains have been in forest for millennia. They contain plants, such as the White Fringed Orchid, that are globally rare. The Pitch Pine Barrens ecosystem is at its southern terminus and is also globally rare. This landscape of protected government parklands and research centers is large enough to support and retain almost all the biodiversity that was once, but is no longer, found across the Baltimore-Washington region.

- Much of that biodiversity outside this protected area has been lost, or greatly diminished, due to the combinations of housing developments, shopping malls, business centers, roadways and other built-up industrial, transportation, and recreational facilities. That altered landscape can no longer support most species that once lived and thrived in this area and, instead, is composed mostly of the weeds and nonnative species that follow development and invade the remnant natural landscapes.

- Researcher C. K. Khoury, after reviewing all the public lands in the United States, indicated that the Patuxent Research Refuge (PRR) retains the most biodiversity of the wild relatives of our crop plants, one of many examples of both how rich the biodiversity of the area remains and how important it is to keep this repository. He points out that many of these important wild native plants that could be important for our food security are now rare, un- or under-represented in genetic repositories.[544]

[543] "Eminent domain refers to the power of the government to take private property and convert it into public use. The Fifth Amendment provides that the government may only exercise this power if they provide just compensation to the property owners." See: https://www.law.cornell.edu/wex/eminent_domain.
[544] Khoury, Colin. K. "Crop wild relatives of the United States require urgent conservation action." 2020. https://www.pnas.org/content/early/2020/12/09/2007029117.

- BWRR's planned removal of the 200-acre preserve for the SCMagLev trainyard is of an intensity and magnitude that would result in the complete destruction of the existing natural preserve and the invasion and corruption of hundreds of nearby acres.

- All three of the proposed trainyards are located at the headwaters of stream systems of both the Potomac and Patuxent Rivers. These stream systems are filled with fragile springs, bogs, fens, and other wetlands. Their loss and the subsequent pollution from the runoff from these trainyards would bring large pulses of silt and industrial-related, chemical-laden water, all pushed downstream. Rain events would punish and degrade all the streams below these sites.

- The creation of these industrial sites requires the removal of all trees, plants, creatures, and topsoil on the site to level the area to accommodate these long trains. Several feet of gravel, sand, and concrete would be placed on top of this flattened landscape to stabilize the roadbed so that it would be able to handle the weight of all the trains and attendant heavy equipment. Factories would be built both to create and repair these trains. Parking lots would be created for the sites' employees. Roadways would need to be built and augmented to handle the weight of industrial vehicles and increased commuter traffic. In addition, new transmission lines and substations would need to be located to handle the high-energy needs for the site.

- The building of this trainyard in the middle of our protected public lands, as with what has occurred at other industrial sites, would create an invasion portal for non-native species—Tree of Heaven, Asian Bittersweet, Privet, Bush honeysuckle, Norway Rats, House Mice, Kudzu, and many more. These invasive plants and animals would infiltrate the surrounding parklands, seriously disrupting the native wildlife in the area, causing outright destruction of the natural hydrology of the springs, and seeping support of the rare plant and animal communities that filter and preserve our drinking water. This development would inject light, noise, vibration, and pollutants on and into our public parklands, repelling the very animals such refuges are specifically designed to protect and study.

(3) What plant and animal communities would be lost?

- The planned site for the SCMagLev trainyard is currently a large protected green space where land, plant, insect, and animal studies have been conducted by public, academic, and private researchers for over 100 years. From this century of work, a long list of species have been scientifically described for the first time and named using specimens found in this area. Literally hundreds of publications have been generated from work done on these public lands. (*Note*: Patuxent is the sole research refuge in the entire National Wildlife Refuge system and the U.S. Department of Agriculture's Beltsville Agricultural Research Center [BARC] is the largest agriculture research station in the world). This region is one of the biologically best-documented sites in the world.

    - The Patuxent Research Refuge has the largest species list of dragonflies and damselflies of any national wildlife refuge or national park in the United States—approximately 112 species. It contains more known species of bees than any other national wildlife refuge in the United States—approximately 221 species, with more new ones found each year. This refuge has

what are likely complete, or nearly so, lists of all the plants, mammals, snakes, fish, amphibians, and birds that inhabit the many types of intertwined streams, wetlands, plant communities, and rivers.

- Building the SCMagLev trainyard on the proposed site would destroy these species' habitat, effectively destroying the existing diverse nature living therein. Once built, these lands could never be recovered and the losses could never be mitigated or recreated elsewhere. These current protected areas act as a unit, a compete landscape. They function and exist in connection and relationship with each other, allowing plants and animals to migrate and reestablish populations sequentially across the region as local ecological circumstances change. Destruction of this system with the building of the SCMagLev trainyard and maintenance facilities, would kill this system. The trainyard would result in a new biological desert that would jeopardize the remaining neighboring landscape of trees, forests, and fields, and their inhabitants. When large-scale disasters, such as the inevitable hurricanes, tornadoes, floods, and fires occur, the ability of the remaining habitats to recover would be seriously compromised.

- As an analogy, if you were very wealthy and politically powerful, you could build your house from blocks of stone removed from the National Cathedral in such a way that the cathedral would be left standing. However, with the next earthquake, the cathedral would collapse because your predation of those blocks has weakened the edifice to the point of structural failure. Who would do that? Placing the SCMagLev trainyard in this protected, vulnerable, and endangered site would equally weaken it. Such wounds would ultimately cause the last forested cathedral in the region, an area held sacred to the surrounding communities, to collapse., However, unlike the National Cathedral, the area can never be rebuilt or restored.

(4) Who are the current public landowner groups and what are their lands?

- The National Park Service (NPS) owns and manages the land around the Baltimore-Washington Parkway (Parkway) in the project area. The roadway is purposely surrounded by an unbroken swath of woodlands that connect it to the PRR and BARC. The SCMagLev train lines would run parallel to the Parkway and destroy a wide path through these woods, leaving a strip of woodlands isolated between the Parkway and the train line. This would cause them to be ecologically isolated and functionally dead from the lack of connection to the contiguous PRR and BARC woodlands, and open the construction area to the invasion of weeds and non-native plants. The north- and south-bound lanes are only 40 feet wide; however, the SCMagLev line would be 130-feet wide, dwarfing the impact of the Parkway.

- The U.S. Fish and Wildlife Service owns the PRR, which would be substantially impacted by this project in several locations with the building of the trainyard. The research refuge is home to the Patuxent Wildlife Research Center. It is also home to some of the best-known and most-studied groups of animals and plants in the world. The refuge is currently an almost unbroken swath of woodlands, wetlands, headwater streams, and bottomlands bisected by both the Big and Little Patuxent Rivers.

- The BARC is the world's largest agricultural research center. It was created over 100 years ago and has housed hundreds of research scientists who have used the facility to study all aspects of agriculture. The grounds are a complex of fields, pastures, research areas, study plots, and natural areas.

- The National Aeronautics and Space Administration (NASA) Goddard Space Flight Center would be affected by this project. In the BARC-EAST proposed trainyard (primarily to be located on the PRR and BARC), some of the trainyard would directly impact NASA's optical test site. This site was chosen because the surrounding area was dark, silent, and isolated by the surrounding woodlands and fields. SCMagLev's impacts on the NASA facility would come from adding vibration, light, and sounds that are not compatible with its functioning.

- The Greenbelt Forest Preserve is 254.8 acres of forested land owned by the City of Greenbelt and protected and conserved in their existing natural state for the use and enjoyment of present and future generations. The city purchased the parcels that became the preserve in the mid-1990s and passed legislation in 2003 to designate these lands as a protected "Forest Preserve." This designation protects the land from development and retains it in a natural forested state. Several of the largest, most contiguous forested parcels, which comprise approximately 145 acres, are threatened by the proposed SCMagLev's J1 alignment (route) option. Sixty-five acres would be destroyed by that route, including 12 acres of wetlands. In addition, 6.5 of those acres are designated and protected as Wetlands of Special State Concern by the state of Maryland. The 145 acres are part of a larger unbroken patch of forest that runs from the community gardens at Gardenway to Beaverdam Road in the City of Greenbelt.

- The Forest Preserve is protected by more than municipal ownership. The Maryland-National Capital Park and Planning Commission owns a woodland covenant on one of the largest parcels, which was purchased using Maryland's Program Open Space (POS) funds.[545] Land purchased using POS funds shall be perpetually protected green space and are federally protected under the Land and Water Conservation Fund Act of 1965. The NPS owns scenic easements on 65 acres of the North Woods Tract of the preserve. These easements establish a federal interest in the green space, such that this land falls within the legal boundaries of the Parkway, although the City of Greenbelt retains ownership of the land itself. Finally, the preserve is protected under Section 4(f) of the 1966 U.S. Department of Transportation Act,[546] which prohibits the construction of transportation projects within protected green space or historical landmarks unless it is shown that no "feasible or prudent" alternative exists. And as we have identified and discussed in other articles, alternative transportation systems already exists, namely Amtrak & MARC.

- Anne Arundel County has parklands adjacent to the Parkway south of Maryland City, as well as just north of the North Tract of the refuge. The parcels along the west side of the Parkway include playfields for baseball, football, and soccer, as well as a popular dog park. The parcel

[545] See: https://dnr.maryland.gov/land/Pages/ProgramOpenSpace/home.aspx.
[546] See: https://www.environment.fhwa.dot.gov/env_topics/4f_tutorial/overview.aspx?h=e/.

north of the North Tract includes baseball playfields and floodplain wetlands, as well as the riparian forest along the Little Patuxent River.

- The District of Columbia and the federal government owns some of the land. The Oak Hill site where the proposed Route 198 trainyard would be located is an 800+-acre triangular area bounded by Maryland Route 198 on the south, the Parkway on the northwest, and Maryland Route 32 on the northeast. The Little Patuxent River traverses the site. The majority of this site is composed of an 827-acre parcel owned by the U.S. government, but it has been managed and operated by the District of Columbia since 1921, pursuant to the Federal Appropriations Act of 1923.[547] Historically, the District operated several facilities on site, including the Forest Haven Asylum, which closed in 1991; the Cedar Knoll Youth Center, which closed in 1993; and the Oak Hill Youth Center, which closed in 2009. Currently, the site houses the Maya Angelou Academy at New Beginnings and the Maryland Job Corps' Woodland Job Corps Center. The Maryland Environmental Trust, the Scenic Rivers Land Trust, and the Patuxent Tidewater Land Trust hold a conservation easement on 250 acres of the site. A great majority of the site is undeveloped. Riparian and upland forest dominate the undeveloped areas, coupled with acidic seepage swamps, wet meadows, emergent wetlands, and the river itself.

- The proposed trainyard would impact both the developed and undeveloped areas. It would require the destruction of the Woodland Job Corps Center, impact more than a dozen private landowners, and destroy parts of the historic Forest Haven Asylum. It would destroy approximately 115 acres of upland forest and 25 acres of riparian forest, as well as destroy a 2.5-acre forested, groundwater-fed wetland and a 3-acre wet meadow. The published footprint of the trainyard crosses the Little Patuxent River, which would necessitate moving the course of the river. The published footprint of the trainyard would impinge on the conservation easement by 25 acres. The footprint for Route Option J of the SCMagLev viaduct would impinge on the property on the northeast boundary. It would destroy a large beaver pond and several vernal pools with a documented presence of marbled and spotted salamanders, as well as destroy several acres of riparian wetlands.

Findings/Conclusion

There are many issues, questions, and concerns about the building and operation of the SCMagLev will have on the area ecology, environment, and people living near and alongside the guideways, or who study and make use of these forested areas. This article identifies and explores but a few.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."

[547] See: https://www.loc.gov/law/help/statutes-at-large/67th-congress/Session%204/c67s4ch148.pdf.

(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

Sources:
The principal source of information for this article is information and discussion with Sam Droege. He grew up in Prince George's County and has worked as a biologist for the past 40 years, specializing in the survey and monitoring of plants and animals.

(1) For high-quality, public domain downloadable photos of insects and other small creatures found in 2020 from the impact sites, see: www.flickr.com/photos/usgsbiml/albums/72157715288371553.
(2) For photos of the natural areas and agricultural areas that would be destroyed with the building of the SCMagLev, see: www.flickr.com/photos/189298652@N03/albums/72157715119662111.
(3) For short, low-elevation flyovers of the trainyard site at Maryland Route 198, see: www.flickr.com/photos/189298652@N03/50427339292/in/album-72157715119662111/.
(4) To watch a flight over the Patuxent refuge and the proposed SCMAGLEV trainyard site, see: https://www.flickr.com/photos/189298652@N03/50426482948/in/album-72157715119662111/
(5) To watch another flight over the Patuxent Refuge and Beltsville Agriculture Research Center and the proposed SCMagLev trainyard site, see: www.flickr.com/photos/189298652@N03/50426482948/in/album-72157715119662111/.
(6) An interactive GIS map showing locations of SCMagLev impact areas and overlays of wetlands and other features are found at:
dcgis.maps.arcgis.com/apps/webappviewer/index.html?id=ae88f4ed5cff435cb96b9990bc15e997.

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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at:
https://www.facebook.com/groups/CitizensAgainstSCMaglev.

LXXXIV. Appendix - Reprint: Woomer, Dan. "SCMagLev – What's the Biological and Ecological Impact? (Part 2)." CATS-MCRT White Paper. January 11, 2021

SCMagLev - What's the Biological and Ecological Impact? (Part 2)

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

This article takes a deeper look into the existing species and types of specimens of life that would be lost and destroyed if BWRR gains approval to build the SCMagLev train system.

Questions & Concerns

(1) What value do the Beltsville Agricultural Research Center and the Patuxent Wildlife Research Refuge bring to the state, the nation, and the world?

- The U.S. Department of Agriculture Beltsville Agricultural Research Center (BARC) and Patuxent Research Refuge (PRR) represent one of the most biologically well-studied landscapes in the world with intense research and natural history data going back over 100 years.

- Hundreds of government scientists have conducted research and continue to work in these locations, many identifying and describing new species, and most doing research related to the agriculture and natural areas retained by these properties. As part of their duties, lists of species found here were created and their status documented via physical collections. They were accessioned to the National Collection, where numerous scientific publications about them, including their biological functions and processes, were documented and monitored across the many past decades and into the present time.

- Both research centers represent the largest scientific field stations for their respective U.S. federal agencies. The region is a treasure trove of species of animals, plants, and fungi that were first described by science here, and represents one of the most important discovery locations on the North American continent and in the world.

- Building the SCMagLev as currently planned would destroy this site forever.

(2) What else could happen to the area if the SCMagLev trainyard would be built?

- If the SCMagLev train system is allowed to be built, a large block of the current preserve and refuge will be destroyed forever. Once the SCMagLev trainyard is built, there would be little that could be done to stop additional development and the loss of all remaining forested and protected land in the area.

- Research at BARC has identified over 100 species and ongoing research will undoubtedly find many more.

- The region has retained much of its original biodiversity. For example, the PRR has retained all its breeding bird species except for two—the Broad-winged Hawk and the Bachman's Sparrow. Similar results exist for all the other groups of plants, fungi, insects, and vertebrates.

- The combined protected landscapes of several government agencies have created an integrated and interconnected refuge for the region's plant, animal, fungi, and microorganisms. The extensive nature of these landscapes allows the species living in them to ebb and flow in space and time without becoming locally extinct because of small parcel sizes.

- One of the many important pieces of research in this area was conducted in the 1970s. The study looked at the impacts of forest fragmentation on woodland birds. This research was conducted by two collaborating scientists, Robert Whitcomb (BARC) and Chandler S. Robbins (PWRC). Many of the plots used in these studies are located in the SCMagLev proposed-use areas in BARC.[548]

- These past and current study sites cannot be recreated elsewhere. Once the landscape is altered with anthropogenic disturbances to the soils, and the vegetation removed and replaced with man-made structures, the land is dead for all practical purposes to scientists and to all the original plant, insect, and animal inhabitants.

- In addition to studies by employees of these agencies, the work of past researchers and the existence of ongoing study plots, taxonomic experts, and extensive documentation of the flora and fauna of the region attract other researchers from states, universities, and private groups from around the world. This research and the related economic benefits for the area would be lost.

- The long-abandoned airport area of BARC/PRR has been and is particularly important for rare birds. Over the years, sightings of nationally and regionally extremely rare species have been reported. Some of these rare birds that nest or pass through this area include the Northern Shrike, the Short-eared Owl, the Whip-poor-will, the Merlin, LeConte's Sparrow, the Sandhill Crane, and the Dickcissel. The abandoned airport still retains breeding Eastern Meadowlarks and Grasshopper Sparrows, which are almost completely absent elsewhere in the area. Raptors and

[548] R.F.Whitcomb, C.S. Robbins, J.F. Lynch, B.L. Whitcomb, M.K. Klimkiewicz, and D. Bystrak. Edited by: Robert L. Burgess and David M. Sharpe. 1981. “Effects of forest fragmentation on avifauna of the eastern deciduous forest.”

grassland species use this area heavily. This is one of the very few remaining transitional habitats; elsewhere, they have become rare or completely absent.[549]

- As cited on the Friends of Patuxent[550] and BARC[551] websites, BARC has 901 documented plant species, and PRR has 282 species of birds, 217 species of bees, and 72 species of butterflies. "Thousands of insect specimens have been collected from the combined properties of BARC and PRR," as noted by Sam Droege, an entomologist. "These specimens are published in various research papers. Several thousand, including ones I have identified, are in my database." (personal conversation with Dan Woomer, 2020)

- This area is also one of the most important places in the world where prehistoric fossil strata have been found. A rich strata of dinosaur bones and associated fossils and, perhaps even more rare, dinosaur trackways, have been and are being found here. These significant prehistoric life discoveries have been found on BARC at the Swampoodle Site. The region, known as "Dinosaur Alley," was the primary source of Maryland dinosaur bones in the nineteenth century, collected by both the Yale Peabody museum and local collectors; many of the prehistoric fossils found in this area are currently residing in the Smithsonian Institution. Other well-known prehistoric fossil locations are located at NASA Goddard and in nearby Muirkirk at the Maryland-National Capital Park and Planning Commission (M-NCPPC) Dinosaur Park, which bracket the BARC sites.[552]

- To date, 16 unique type specimens of dinosaurs and fossils have been found in this area and named from these collective sites—and more are likely to be found. The specimens identified and named include the *Glyptops caelatus*, *Rogersia angustifolia*, *Argillomys marylandensis, Goniopholis affinis, Jungermannites noterocladioides, Rogersia angustifolia, Pelletixia amelguita, Arundelemys dardeni, Arundelconodon hottoni, Tanyoscapha sigmanae, Ornithomimus affinis, Priconodon crassus, Pleurocoelus altus, Pleurocoelus nanus, Allosaurus medius*, and *Coelurus gracilis*.

- Of great importance was the type specimen of *Astrodon* Johnstoni found in the 1800s, which was named as Maryland's state dinosaur in 1998. The *Astrodon* lived in Maryland during the Early Cretaceous period, from 95 to 130 million years ago.

- It has been stated about the M-NCPPC region: "Dinosaur Park is the best place to find Cretaceous dinosaur bones in the Eastern United States, and as it happens the best place to find Cretaceous dinosaur footprints on this side of the Mississippi River."[553]

- Avocational fossil hunter Ray Stanford first started finding dinosaur tracks near College Park, Maryland, in the early 1990s. With the help of professionals and other amateurs (including

[549] Orr, Richard. Photos of the Wildlife and Animals living on and around the Old BARC Airport. www.flickr.com/photos/dragonflyhunter/albums/72157611555242488.
[550] See: http://friendsofpatuxent.org/.
[551] See: https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/.
[552] For additional information on Prince George's County Dinosaur Park, see: www.mncppc.org/3259/Dinosaur-Park, and mncppcapps.org/pgparks/dino_blog/dino_article.aspx?articleid=17.
[553] http://mncppcapps.org/pgparks/dino_blog/dino_article.aspx?articleid=17.

Dinosaur Park's own David Hacker), over 300 specimens have been recovered to date. Note that these same trackways have been found at NASA Goddard and similar rock formations occur throughout the sites currently planned to be leveled and used for the SCMagLev trainyard.

- In the forested area, studies have shown that BARC Central and East Natural areas are the southernmost points in the world of the New Jersey Pine Barrens ecotype. Note that the BARC East Farm is the land to the east of and the BARC Central Farm is the area just to the west of the Baltimore-Washington Parkway. The BARC East Farm contains the National Champion Dwarf Chinquapin Oak (*Quercus prinoides*) and the State Champion Sand Hickory (*Carya pallida*).

- Globally rare, federal- and state-protected wetlands crisscross both tracts. This landscape represents what is most likely the most silent and light-free landscape left in the Baltimore-Washington Corridor.

- As noted in a prior article, the proposed SCMagLev trainyard enveloping BARC East would be located next to NASA's Optical Test Site and other testing facilities that cannot tolerate vibration or light pollution from a SCMagLev's trainyard facility.

(3) How big is the proposed SCMagLev trainyard?

- The proposed SCMagLev trainyard is approximately 1-mile long by a quarter-mile wide. As a useful comparison, that measures:

    - about one-and-one-fifth times as big as Disneyland.
    - about six times as big as the Pentagon.
    - about 50 times as big as the Kennedy Center.
    - about 150 times as big as a football field.
    - more than three times larger than the 12, 000 parking spaces at Robert F Kennedy Stadium; the proposed area could fit up to 55,000 parking spaces.

(4) Are the losses to Maryland and the United States associated with building the SCMagLev worth it?

- No. Maryland, our nation, and the world will suffer from the loss of species, biodiversity, and access to prehistoric history in this refugia if this proposed project should be approved. Building an expensive, tax-dollar-supported, high-speed transportation system for the wealthy and well-heeled, with little to no long-term value for Anne Arundel or Prince George's counties or Maryland would be of little value, in fact, a major loss on top of the other losses described.

- We would seriously weaken the last large green space between Baltimore and Washington, DC, should the SCMagLev transportation system be built. This area is well-loved by surrounding communities, and their inhabitants would lose the cooling, carbon storage, air pollution capture, calming, and spiritual aspects of this green area space. Recreational runners, walkers, and bicyclists would lose a large part of what is a relatively safe, nature-focused public road network where they can exercise in a healthy environment. Fossil sites would be permanently destroyed

and/or rendered unavailable. The region would lose one of the last noise- and light-free environments found between Baltimore and Washington, DC.

(5) What are some of the types of specimens that have been found, identified, and studied in this area?

- Fungi include: *Arthrocristula hyphenata, Arthrocristula hyphenata, Cryptodiaporthe liquidambaris, Cryptodiaporthe liquidambaris, Discosporina carpinicola, Discosporium liquidambaris, Ditopellopsis clethrae, Endophragmiella constricta, Endophragmiella constricta, Endophragmiella constricta, Endophragmiella constricta, Hamigera insecticola, Hyalotia pistacina, Melanconiella elegans, Monilinia fructigena, Mycoleptodiscus terrestris, Myiocoprula gregaria, Ophiognomonia lenticulispora, Ophiognomonia micromegala, Ophiognomonia sassafras, Ovulinia azaleae, Pestalotia longisetula, Phomopsis oxyspora, Polyporus pseudocinnamomeus, Pseudocoprinus venustus, Sesquicillium candelabrum, Sphaceloma plantaginis, Sphaerulina rubi, Sporidesmium sclerotivorum, Trichoderma asperellum,* and *Wrightoporia cylindrospora.*

- Insects include: *Acanalonia conica, Aeolothrips annectans, Aeolothrips annectans, Andrena uvulariae, Anthrax nigripennis, Aulacus schiffi, Baldulus tripsaci, Brachythrips russelli, Brenthis selene marilandisa, Caryomyia aggregata, Caryomyia albipilosa, Cedusa gedusa, Cedusa hedusa, Ceratocapsus barbatus, Ceratocapsus decurvatus, Chrysops vitripennis, Clastoptera proteus anceps, Dolichopus flavilacertus, Forcipomyia mcateei, Hammomyia marylandica, Heterothrips azaleae, Hyalomyzus pocosinus, Hydroporus signatus youngi, Lasioglossum gotham, Madiza nigripalpis, Minettia buchanani, Myrsidea emersoni, Oxythrips divisus, Paracalocoris colon var. amiculus, Paracalocoris colon var. castus, Paracalocoris hawleyi var. fissus, Paracalocoris limbus suffusus, Paracalocoris scrupeus bidens, Phytocoris difficilis, Poanes massasoit hughi, Proctophyllodes pirangae, Prodiplosis platani, Psocus additus, Rhyacionia granti, Trichogramma marylandense, Tricyphona macateei, Typhlocyba eurydice, Typhlocyba eurydice var. discincta,* and *Typhlocyba gillettei var. casta.*

- Invertebrates include: *Babesia mephitis, Babesia procyoni, Besnoitia akodoni, Besnoitia neotomofelis, Besnoitia tarandi, Capillaria pirangae, Cladotaenia cathartis, Cryptosporidium canis, Cryptosporidium ryanae, Cryptosporidium ubiquitum, Cryptosporidium xiaoi, Cysticercus setiferous, Dicelis nira, Eimeria granulosa, Glaphyrostomum mcintoshi, Haemobartonella procyoni, Lotmaria passim, Loxogenes bicolor, Sarcocystis lindsayi, Trichuris sylvilagi, Paratylenchus marylandicus, Meloidoderita polygoni, Aorolaimus helicus, Criconema eurysoma, Criconema civellae, Heterodera weissi, Xiphinema americanum, Meloidoderita polygoni,* and *Allodiplogaster josephi.*

Findings/Conclusion

The loss of the BARC and PRR preserves for the building of the SCMagLev transportation system would be tragic and irreversible. Major research facilities of national and world importance would be destroyed. The habitat for hundreds of rare birds, insects, and fungi would be lost forever. Suffering such losses to build a redundant, high-cost, and taxpayer-supported transportation system for the elite and well-heeled that has little to no benefit for Marylanders would be unconscionable.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

Sources:
The principal source of information for this article was from correspondence and discussion with Sam Droege. He grew up in the Prince George's County and has worked as a biologist for the past 40 years, specializing in the survey and monitoring of plants and animals.

(1) For high-quality, public domain downloadable photos of insects and other small creatures found in 2020 from the impact sites, see: www.flickr.com/photos/usgsbiml/albums/72157715288371553.
(2) For photos of the natural areas and agricultures areas that would be destroyed with the building of the SCMagLev transportation system, see: www.flickr.com/photos/189298652@N03/albums/72157715119662111.
(3) To see short, low-elevation flyovers of the Maryland Route 198 trainyard site, see: www.flickr.com/photos/189298652@N03/50427339292/in/album-72157715119662111/.
(4) To watch a flight over the Patuxent Refuge and proposed SCMAGLEV trainyard site, see: https://www.flickr.com/photos/189298652@N03/50426482948/in/album-72157715119662111/
(5) To watch another flight over the Patuxent Refuge and Beltsville Agriculture Research Center and the proposed SCMagLev trainyard site, see: www.flickr.com/photos/189298652@N03/50426482948/in/album-72157715119662111/.
(6) For an interactive GIS map showing locations of SCMagLev impact areas and overlays of wetlands and other features are found, see: dcgis.maps.arcgis.com/apps/webappviewer/index.html?id=ae88f4ed5cff435cb96b9990bc15e997.
(7) R.F. Whitcomb, C.S. Robbins, J.F. Lynch, B.L. Whitcomb, M.K. Klimkiewicz, and D. Bystrak. Edited by: Robert L. Burgess and David M. Sharpe. 1981. "Effects of forest fragmentation on avifauna of the eastern deciduous forest." pubs.er.usgs.gov/publication/5210469.

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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our

communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMaglev.

LXXXV. Appendix - Reprint: Woomer, Dan. "What Impact Would the SCMagLev Have on Our Communities?" CATS-MCRT White Paper. January 11, 2021

What Impact Would the SCMagLev Have on Our Communities?

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Article Summary

BWRR's current plan is to bore a tunnel 80 to 150 feet below ground level (as measured from the top of the guideway) under more than half of any proposed route. The inside diameter of the proposed tunnel is 43 feet. The goal is to maintain at least 14 meters (about 46 feet) of soil between the top of the tunnel and the foundations of any structure being tunneled under. Most of the tunneling will take place in Anne Arundel County. The current plan is to tunnel from the Baltimore station to the Baltimore-Washington International Airport and on to southern Anne Arundel County, emerge from underground to a raised guideway through one section of Prince George's County, descend back underground through another section of Prince George's County, and continue underground into and end at the Washington DC station.

To support the underground portion of the system, BWRR intends to build surface facilities to house ventilation plants and emergency exits spaced every three (3) to four (4) miles along the tunnel segments that can be as large as 1.5 acres. Also, BWRR plans call for building power substations and other facilities above and along the route.

In this article, we identify and discuss some of the questions and concerns about the negative impact on communities through which the SCMagLev system will run, as well as the support systems and structures the it requires to be built and operated to support this expensive system.

Questions & Concerns

(1) What will be the impact of tunneling under residential and commercial structures?

- *Tunneling Depth*: Residential foundations are about 10 feet deep. The tunnel itself has an inside diameter of 43 feet; additionally, 2 feet is the estimated thickness of the tunnel walls. The estimate of the depth of the tunnel is 80 feet. The top of the tunnel would only be about 35 feet below the foundation.

- Commercial structures sometimes have foundations that are larger and deeper than those of most residential structures.

- During the tunneling for the Baltimore subway, several building foundations shifted as the tunneling progressed. It was very expensive to relevel and reinforce the shifted foundations.

    - Question - How likely is it that BWRR be willing to correct and repair foundation problems caused by the tunneling to our home and businesses?

- As stated by Cosema Crawford, PE, Senior Vice President representing Louis Berger (the engineering firm hired to study the building of a superconducting maglev train between Washington and New York), compared with the tunneling under Baltimore, the planned SCMagLev tunneling between Baltimore and BWI will be deeper underground and it will employ the latest tunneling equipment that produces less vibration. However, masonry and concrete structures (e.g., foundations and foundation walls) do not respond well to some vibrations; that is, such structures tend to crack as they do not uniformly vibrate. Cracks in foundation walls result where the vibration energy finds a weak point. Such cracks weaken the support for the structure above and lead to water infiltration. In other words, ground and/or surface water (rain and downspout runoff) seeps into the basement. Wet basements bring additional damage to the structure and anything located in the basement (such as furnaces, washers and dryers, and furniture). The increased moisture creates dangerous mold and other serious health and safety problems for people who live in single-family homes and apartment complexes, as well as for those who work or play in commercial or other types of buildings (e.g., schools, churches).

(2) What dangers do ventilation and emergency access/exit structures bring into our communities?

- BWRR planning calls for the building of ground-level ventilation structures. These structures are required for the ventilation of smoke in the event of fire and will likely also house emergency evacuation stairs. BWRR plans to build one of these surface facilities every three (3) to four (4) miles along the tunnel segments.

- At the October 17, 2017, BWRR-Maryland Transit Administration (MTA) Open House, Ms. Crawford provided the following information:

- The ventilation facilities' primary purpose is to clear smoke in case there is a fire in the tunnel. The ventilation units will force air into the tunnel on one side of the tunnel section with smoke, and the next ventilation facility will exhaust the smoke-filled air from the tunnel. In other words, one ventilation facility will pressurize the tunnel ahead of the section of the tunnel with smoke and the alternate ventilation facility will depressurize the tunnel to exhaust the smoke to the atmosphere.

- What kind of fire could occur in a SCMagLev tunnel section? If the fire resulted from a train accident or some type of electrical event, the fuel for the fire could be lubricants, plastics, and electrical wire insulation. "When plastic is burned, it releases dangerous chemicals such as hydrochloric acid, sulfur dioxide, dioxins, furans and heavy metals, as well as particulates. These emissions are known to cause respiratory ailments and stress human immune systems, and they're potentially carcinogenic." (Biemiller, quoting Noelle Eckley Selin, Massachusetts Institute of Technology, 2013).[554,555]

- Clearly, such occurrences could create potential human health impacts. These could include the possibility that toxic and cancer-causing compounds and substances could be exhausted into our communities at any time from these SCMagLev tunnel ventilation facilities. Further, the impact on the value of private properties near these facilities could be negatively affected.

  - Question - Who wants to live near a ventilation facility that will potentially spew out toxic and cancer-causing smoke at any time?

(3) Ventilation facilities collecting and releasing radioactive gas into our communities?

- The proposed tunneling route from Baltimore to BWI and onto southern Anne Arundel County, and under Prince George's County into Washington, DC, includes areas with known radon gas levels of .02 pCi/L to 4.0 pCi/L.[556,557]

- Maryland is a radon gas "hot spot." Average measurements across the state range for 0.2 pCi/l to 61 pCi/L.[558] Radon (symbol Rn, atomic weight 86) is a radioactive gas released from the normal decay of the elements uranium, thorium, and radium in rocks and soil. It is an invisible, odorless, and tasteless gas that seeps up through the ground and diffuses into the air. In a few areas, depending on local geology, radon dissolves into ground water and can be released into the air when the water is used. Radon gas usually exists at very low levels outdoors. However, in areas

[554] Biemiller, A. "Can we safely burn used plastic objects in a domestic fireplace? No, you can't. Don't even think about it…" School of Engineering, Massachusetts Institute of Technology. Posted March 12, 2013. https://engineering.mit.edu/engage/ask-an-engineer/can-we-safely-burn-used-plastic-objects-in-a-domestic-fireplace/
[555] To see the current list of known and probable cancerogenic substances from the American Cancer Society, go to: www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html.
[556] About Radon Levels in Anne Arundel County. www.county-radon.info/MD/Anne_Arundel.html - Radon levels in Anne Arundel County average 3.3 pCi/L, with a range from under 2 pCi/L to 61 pCi/L. (Note: pCi/L stands for Picocuries Per Liter.)
[557] About Radon Levels in Prince Georges County. www.county-radon.info/MD/Prince_Georges.html - Radon Levels for Prince George's County also range from 2 pCi/L to over pCi/L. (Note: pCi/L stands for Picocuries Per Liter.)
[558] Radon Levels Across Maryland. phpa.health.maryland.gov/OEHFP/EH/Pages/Radon.aspx.

without adequate ventilation, such as underground mines (or the SCMagLev tunnel?), radon can accumulate to levels that substantially increase the risk of lung cancer."[559]

- A 43-foot diameter tunnel, 80 to 150-feet below ground-level, starting in Baltimore and ending in southern Anne Arundel County will be see the collection of Radon Gas. As high-speed trains run through the tunnel, the air pressure wave at the front of the train will build, forcing air displacement to the sides and over the top of the train, and other lower air pressure areas, including ventilation shaft openings to the surface. If Radon Gas is present, this radioactive gas will be pushed out into the community through the ground-level ventilation facilities. While the level of radioactive gas will likely be low, the impact on the private property values near these facilities will be negatively affected.

    - Question - Who wants to live near a ventilation facility that will potentially spew out cancer-causing radioactive gas at unknown times and levels?

Findings/Conclusion

There are many issues, questions, and concerns about the safety of the SCMagLev operation of both passengers and people living near and alongside the guideways, as well as above the tunneled sections. This article identifies and explores only a few associated with the planned ventilation facilities releasing toxic and cancer-causing smoke and radioactive gases into our communities.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
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[559] American Cancer Society. "Radon and Cancer. Last reviewed December 6, 2011. www.cancer.gov/about-cancer/causes-prevention/risk/substances/radon/radon-fact-sheet.

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(1) American Cancer Society. "Known and Probable Human Carcinogens." Last updated: August 14, 2019. www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html.
(2) Baltimore-Washington Rapid Rail (BWRR) and Maryland Transit Administration (MTA) SCMagLev information posters displayed at Bowie State University Open House. October 14, 2017.
(3) Crawford, C.E., PE. Senior Vice President, Louis Berger (engineering firm). Discussion with Dan Woomer at the BWRR and MTA SCMagLev Open House at Arundel High School. October 16, 2017.
(4) Louis Berger. MagLev-United States http://www.louisberger.com/our-work/project/maglev-united-states.
(5) Radon. https://en.wikipedia.org/wiki/Radon.
(6) Woomer, D. "SCMagLev - Info from Today's BWRR-MTA Open House." Nextdoor Linthicum Posting. October 14, 2017.
(7) Woomer, D. "SCMagLev – Info on Ventilation Facilities." Nextdoor Linthicum Posting. October 18, 2017.
(8) Woomer, D. "SCMagLev – Info on Power Stations." Nextdoor Linthicum Posting. October 18, 2017.
(9) Woomer, D. "SCMagLev – Additional Info on Tunneling." Nextdoor Linthicum Posting. October 18, 2017.
(10) BWRR & MTA SCMagLev Info posters displayed at the Open House at Bowie State University on 10/14/2017.
(11) About Radon Levels in Anne Arundel County. www.county-radon.info/MD/Anne_Arundel.html - Radon levels in Anne Arundel County average 3.3 pCi/L, with a range from under 2 pCi/L to 61 pCi/L. pCi/L stands for Picocuries Per Liter.
(12) About Radon Levels in Prince Georges County. www.county-radon.info/MD/Prince_Georges.html - Radon Levels for Price Georges County also range from 2 pCi/L to over pCi/L. pCi/L stands for Picocuries Per Liter.
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(14) Biemiller, Amy. "Can we safely burn used plastic objects in a domestic fireplace? No, you can't. Don't even think about it…" Posted March 12, 2013. Massachusetts Institute of Technology School of Engineering. engineering.mit.edu/engage/ask-an-engineer/can-we-safely-burn-used-plastic-objects-in-a-domestic-fireplace/.

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LXXXVI. Appendix - Reprint: Woomer, Dan. "Is the SCMagLev Safe? (Part 1)." CATS-MCRT White Paper. January 11, 2021

Is the SCMagLev Safe?

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the

northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

This article identifies and discusses questions and concerns about the structural safety standards being used to assure passenger crash survivability and the impact of the SCMagLev operation on the residents living near the guideways. The trial operation of the SCMagLev on the present 26-mile test track in rural Japan, mostly in tunnels, does not fully validate its ability to function safely and reliably in day-to-day, high-frequency service in the urban and suburban environment of the Baltimore-Washington metropolitan area. The German Maglev accident of September 22, 2006, which killed 23 people after the safety of the system had been certified by the German government, should be a cautionary note as this project is considered.

Questions & Concerns

(1) How do the structural standards of the SCMagLev compare with US Railcar construction and safety standards?

- The longitudinal strength of the vehicles is an important safety consideration. No reduction should be allowed, compared with what would be required for a wheeled rail vehicle, and perhaps the strength requirements for the SCMagLev should be stricter.

Lathen - German Maglev crash. Photo DPA. 23 May 2008.

  - The SCMagLev vehicle will be confined within the sidewalls of the guideway. In any collision with another train, objects in the guideway (including maintenance or inspection vehicles), devices at the end of the line, or a damaged guideway, there is no alternative but for the SCMagLev train itself to absorb energy. Steel-wheeled trains can absorb the energy of the collision by jackknifing sideways. For the SCMagLev, the walls of the guideway would prevent jackknifing.

  - The entire impact of the incident would either be absorbed by the SCMagLev train being crushed and/or by it buckling in a vertical direction. Buckling in a vertical direction has implications of the vehicle going airborne, possibly leaving the guideway.

  - Potential accidents involving guideway switches are another reason vehicle strength should not be lowered from those of wheel-rail vehicles.

(2) What is the risk of the SCMagLev becoming airborne?

- According to the material provided at the scoping and informational meetings, there are no physical barriers in the guideway design to keep the magnetically-levitated vehicle from rising out of the guideway. With the guideway sidewalls restricting air flow, hitting an object that would wedge under the front end of the SCMagLev at high speed and lift it higher into the air could subject the underside of the vehicle to tremendous air pressure that could lift the vehicle out of the guideway, especially if the vehicle is designed with much less weight than a steel-wheeled rail vehicle.

- Are there research and safety reports on the risks of the front end of the SCMagLev accidentally being raised slightly and catching air due to malfunctions in the maglev suspension hardware?

(3) The cross-section of the guideway brings up several issues.

This issue includes:

- Snow accumulation is an issue because it cannot simply be shoved to the sides. The sides may trap objects in the guideway such as wind-blown debris. Debris larger than the space between the vehicle and the guideway would be a serious endangerment to the SCMagLev and the passengers.

- What size object can be tolerated in the guideway?

- What if a fence-jumping deer were to get trapped in the guideway just ahead of a train, with the angle of impact causing the animal to be wedged between the side of the vehicle and the guideway?

- What about a suicidal person?

- Another category of hazard is debris thrown onto the guideway, either from an overhead bridge or simply thrown in from the side of the guideway. What damage would a shopping cart cause? Or a bowling ball or an old lawn mower? Experience by both AMTRAK and MARC in the Baltimore-Washington region has shown these are not just theoretical possibilities.

- How are melting snow and stormwater mitigated as to not further pollute the adjacent community streams and waterways?

(4) Where is the research to show the SCMagLev will not cause human health issues resulting from exposure to the intense electromagnetic radiation?

- The intensity of the electromagnetic radiation emitting from the passage of the SCMagLev varies in complicated patterns not previously tested on humans over the long term. As compared with the German MagLev, the SCMagLev generates a higher level of electromagnetic radiation. BWRR indicated in its November 2018 *Final Alternatives Report* that radiation is so severe that people will not be allowed to be closer than 20 feet from the guideway when underneath it. [(4)]

(5) How limited is the forward view from the SCMagLev?

- It appears from the scoping meetings showing the design and operation of the SCMagLev that an employee will be unable to have a clear view of what is in front of the train. The safety of maintenance workers along the guideway, when handling the train in maintenance and staging yards, or in special situations (such as slow orders), would seem to be hampered without a forward view.

(6) The Federal Railroad Administration (FRA) should provide guideway safety standards for this project, including the following.

- Design tolerances for SCMagLev guideways, including speeds allowed in curves and through turnouts (based in part on the lateral forces able to be resisted), as well as safety parameters for the turnout components, including the alignment tolerances of the moving parts.

- Standards regarding the fixation of hardware on the inner vertical surfaces of the SCMagLev guideway. If such fixtures become loose, they could jam between the vehicle and the side of the guideway, with consequences that would likely compromise the integrity of the passenger compartment at high speed, or bring the train to a high G-force stop, with high-heat or even fire generated by the friction involved between the contacting components. The fixation standard issue would also involve the components of the vehicle that interact with the guideway.

(7) Is the SCMagLev leading face designed to deflect debris?

- The lower part of the front-end shape of the SCMagLev shown in the material provided at the scoping and subsequent informational meetings is not designed to deflect material. Further, its tapered, rounded design would make it more likely that debris would become wedged under or on the sides of the vehicle. As noted previously, such debris could result in a dangerous situation for the SCMagLev and its passengers.

(8) How will routine maintenance be coordinated to avoid a collision with maintenance equipment or personnel?

- Guideway maintenance activities will need to take place during operating periods. For example, what if piece of debris is reported and someone goes out to remove it? That person will need to be inside the guideway and unable to quickly step to the side.

- With larger repairs/maintenance, large equipment will be needed. Again, such equipment and operating personnel will be inside the guideway without the ability to move aside.

(9) How will the SCMagLev steer in an emergency slow-down and stop?

- At speeds of 93 miles-per-hour (150 kilometers-per-hour) or less, the SCMagLev moves along the guideway on rubber wheels. These wheels retract as speed builds [(5)]. During an emergency slow-down and stop at any point on the guideway, what is the ability of the steering (sidewall) components of the SCMagLev to keep the vehicle from contacting the sidewall if the wheels on one side accidentally come down at high speed, causing a turning moment in the vehicle?

Findings/Conclusion

There are many serious issues, questions, and concerns about the safety of the SCMagLev operation, both for the passengers and the residents living near and alongside the guideways. This article identifies and explores some of them.

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Sources
The principal source of information for this article are responses by Louis T Cerny, PE, to FRA notices, including his November 25, 2016, response to a notice in the *Federal Register*. Mr. Cerny has been involved with maglev proposals since the late 1980s, when he served as the executive director of the American Railway Engineering Association. He has continued to study maglev technology as a private consultant and has commented on many maglev proposals. Mr. Cerny was a voting member of FRA committees that developed safety standards for high-speed rail.

(1) Cerny, Louis. "Comments on Final Alternatives Report November 2018." Gmail dated December 14, 2018.
(2) Cerny, Louis. "Response to November 25, 2016 Federal Register Notice regarding Baltimore-Washington Maglev Proposal (SCMAGLEV)" December 10, 2016.
(3) Discussion with Louis Cerny on October 14, 2020.

(4) Baltimore-Washington Rapid Rail. "Interface with Other Infrastructure (Roads/Bridges/Rail Systems/Structures)." *Final Alternatives Report*, p. 42. https://www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf. November 2018.
(5) Technology. https://en.wikipedia.org/wiki/SCMagLev.
(6) Lathen German Maglev crash photo credit: news@thelocal.de. May 23, 2008. https://www.thelocal.de/20080523/12045.

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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMaglev.

LXXXVII. Appendix - Reprint: Woomer, Dan. "Is the SCMagLev Safe? (Part 2)." CATS-MCRT White Paper. January 11, 2021

Is the SCMagLev Safe? (Part 2)

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

This article identifies and discusses questions and concerns about the structural safety standards being used to assure passenger crash survivability and the impact of the SCMagLev operation on the residents living near the guideways. The trial operation of the SCMagLev train on the present 26-mile test track in rural Japan, mostly in tunnels, does not fully validate its ability to function safely and reliably in day-to-day, high-frequency service in the urban and suburban environment of the Baltimore-Washington metropolitan area. The German maglev accident of September 22, 2006, which killed 23 people after the safety of the system had been certified by the German government should be a cautionary note as this project is considered.

Questions & Concerns

(1) The Federal Railroad Administration (FRA) approval process must first consider safety before deciding whether to allow construction.

- The SCMagLev safety decisions, that is, the "Rule of Particular Applicability" (RPA),[1] should be completed by the FRA before the Final Environmental Impact Statement (FEIS) or any authorization for construction is issued. This ordering of priorities, in addition to being common sense, is supported by the U.S. Department of Transportation (USDOT) report *Pathways to the Future of Transportation* (USDOT, p.3).

  - SCMagLev safety is an important issue, as confirmed by the reporting of an accident on the German maglev at Lathen, the location of the Emsland Transrapid Test Facility, on September 22, 2006. This occurred after its safety had been approved by the German government. Twenty-three (70 percent) of the passengers riding the German maglev system at the time of the accident were killed and the rest were injured.

  - On December 15, 2016, Louis Cerny, past executive director of the American Railway Engineering Association, submitted commentary to BWRR asking a series of important safety questions. BWRR responded to Mr. Cerny on January 23, 2017. Their reply included the statement: "Issues related to safety will be addressed in the RPA process." This or similar language was the only answer to six of the critical safety questions he raised.

(2) Japanese wheel-rail history is not transferable to SCMagLev experience.

- Successful Japanese safety experience with high-speed wheel-rail trains since 1964 is no more transferable to the SCMagLev technology than was German high-speed wheel-rail (called ICE) technology to its maglev. The Japanese SCMagLev currently operates on a test track and has not yet operated in regular service. Revenue service on the planned line between Tokyo and Nagoya is not expected to begin until 2027 at the earliest, with many questions being raised in Japan about whether that date can be met.

(3) More questions about the safety issues with SCMagLev vehicles.

- Especially worrisome is the lack of information and data on the crashworthiness of the SCMagLev train and its structural ability to protect occupants of the vehicles. The existing FRA vehicle strength standards are in 49CFR, part 238. Regulation 238.703, for instance, requires a basic vehicle compressive strength. There are many additional requirements. As detailed in Mr. Cerny's comments, there are good reasons the required compressive strength for SCMagLev vehicles should be at least as high or even higher than those for Amtrak trains.

- It is a fatal safety flaw in the project if the current SCMagLev technology cannot support the vehicle weight necessary to meet existing vehicle crashworthiness and occupant protection standards. The Japanese, as the Germans before them, appear to be refusing to provide vehicle compressive strengths. It seems that the present course of action is to push for project approval before SCMagLev vehicle and passenger safety regulations are established.

- Kemp and Smith detail the arguments for the need for crashworthiness of maglev vehicles. In referring to the German "Transrapid" maglev, their report states: "The Transrapid policy is that vehicles do not need inherent crashworthiness as they will be under close computer control and thus will not crash. The Emsland accident reinforces the fact that, even if there are rigorous procedures to prevent an accident, they are never foolproof. The same is true of automatic systems." (Kemp and Smith, 2007, p. 9). The accident at Lathen would seem to blunt or even negate the argument that computer control will ensure safety.

- The SCMagLev is an extremely complex technological way of accomplishing what is achievable by the relative simplicity of steel wheels and rails.

    - Components of the SCMagLev vehicles must be kept at the unimaginably cold temperature of around 450 degrees below zero Fahrenheit. What are the safety consequences if the elements containing the supercooled liquid are ruptured in an incident?

    - The complexity of having to individually extend and retract dozens of wheels prior to and after each station when speeds drop below 93 miles per hour raises many safety issues. For example, what happens if there is a power failure of the system when the SCMagLev is travelling over 300 miles per hour? Will the train drop to the guideway prior to the wheels coming down? What happens when the SCMagLev hits the guideway at 300 miles-per-hour?

- This will be the first time the FRA is being asked to approve a passenger train operation without a human driver (engineer) on each train. What are the guidelines the FRA will implement to review and approve this driverless high-speed train?

(4) What is the electromagnetic radiation danger from the SCMagLev guideway?

- BWRR has stated that there would be a ". . . need to maintain a minimum distance of 20 feet between the magnets along the guideway and people traversing below." (BWRR, November 2018, p. 42). This is clearly a negative environmental effect on the area below elevated guideways and, therefore, needs to be discussed in the DEIS and as part of the RPA. Is the 20-feet "avoidance zone" sufficient? Note that the electromagnetic radiation levels associated with the operation of the SCMagLev train are much higher than those generated by the German Transrapid maglev.

- BWRR also explains how passengers will walk under the guideway in tunnel sections during emergency tunnel egress (BWRR, November 2018, p. 10; also see Appendix B: Figure B-3). How would the passengers be shielded from the SCMagLev's electromagnetic radiation, considering that the distance below the guideway is less than 20 feet? The same question applies to concourses under the guideway at stations (BWRR, November 2018, Appendix B: Figure B-2).

(5) The Japanese are questioning environmental (including energy consumption) and financial aspects of this technology.

- Japanese researchers Anki and Kawamiya state that the SCMagLev "constitutes not only an extraordinarily costly but also an abnormally energy-wasting project, consuming in operation between four and five times as much power as the Tokaido *shinkansen*" (or the Japanese wheel-rail high-speed train) (cited in Harding, 2017, p. 2).

- The proposed SCMagLev technology is not needed to achieve the purported goals of this project. While it is understood that this project is legislatively limited to the SCMagLev train, this does not mean the environmental effects of satisfying future traffic needs by constructing it outweigh improving existing and soon-to-be-implemented rail-wheel capabilities. Maglev and steel-wheeled systems have similar speed achievements. The record speeds attained by the Japanese SCMagLev and the French intercity high-speed rail service (TGV) are comparable, 375 miles-per-hour for the SCMagLev and 357 miles-per-hour for the TGV. At these speeds, most of the energy used is in overcoming air resistance, which is basically the same for the SCMagLev and steel-wheel systems. Restricting consideration to the SCMagLev goes against the spirit of "technology neutrality" described in *Pathways to the Future of Transportation* (USDOT, July 2020; see the introductory letter from Secretary Chao).

(6) Until it reaches a speed of 93 miles-per-hour, the SCMagLev will be a guided rubber-tire bus. This creates a "new" series of safety issues the FRA must assess.

- The FRA needs to develop safety standards to assess the safety of the SCMagLev during its "rubber-tire" operation as the train ramps up to 93 miles-per-hour and the magnetic levitation takes over. These new standards should include specific hardware specifications. The "bogies" (called "trucks" in normal railroad parlance), which are the two separate parts of each vehicle to which the wheels are attached, are extremely complex. Each of the two bogies on each car of the SCMagLev train has four wheels for support, which need to be (1) retracted after leaving each station and the train reaches the "levitation" speed of 93 miles-per-hour and (2) extended before each station is reached as the train slows down to rubber-tire speed of 93 miles-per-hour and less.

- In the event of a loss of power, the rubber wheels will automatically descend (BWRR, November 2018, p. 36). Thus, according to the report, the rubber-tired wheels must be able to safely handle supporting the vehicle at 311 miles-per-hour, as well as the near-instantaneous speed change of the rubber tire and wheel rim from zero to 311 miles-per-hour. This is a more stringent requirement than for tires during commercial aircraft landings.

(7) How will breakdowns of the SCMagLev while between stations be addressed?

- What happens when an SCMagLev train has a mechanical issue that causes it to be stopped between stations? The highly-complex nature of the bogies makes it likely such incidents would be relatively common. What procedures would be used to retrieve the stranded train? How would the safety of other trains on the line be assured while the non-maglev rescue locomotive hauls the disabled train down the guideway to the maintenance area?

(8) Work requiring presence of employees in the guideway.

- Work requiring the presence of employees in the guideway cannot realistically be confined to non-operating hours. Therefore, similar safety regulations to those applicable for all other rail workers are needed.

- Unexpected occurrences include mechanical breakdown of a train, debris blown by wind into the guideway, structural checks for safety after damage to elevated guideways, and problems with guideway switches. To avoid having to take the entire system out of service for such incidents, switches between guideways at intervals along the line are needed to allow “single-tracking,” such as is done on the Washington Metro. For example, what if there is a medical emergency aboard an SCMagLev train while it is in the BWI station? The more hours the SCMagLev system is out of service each day because maintenance is not allowed during operations, the lower its transportation value.

Findings/Conclusion

The serious issues, questions, and concerns about the SCMagLev’s impact, safety, and operation, both for the passengers and for the residents living near and alongside the guideways, continue to mount. This article identifies and explores some of them.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University’s Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

Sources
Note: The principal source of information for this article are responses by Louis T. Cerny, PE, to FRA notices, including his November 25, 2016, response to a notice in the *Federal Register*. Mr. Cerny has been involved with maglev proposals since the late 1980s, when he served as the executive director of the American Railway Engineering Association. He has continued to study maglev technology as a private consultant and has

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(1) Baltimore-Washington Rapid Rail. "Interface with Other Infrastructure (Roads/Bridges/Rail Systems/Structures)." *Final Alternatives Report*, p. 42. November 2018. https://www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf. November 2018.
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Endnotes:
(1) The "Rule of Particular Applicability" is the process the Federal Railroad Administration goes through for situations where existing safety standards for railroads need to be modified to suit a particular situation. In the case of the SCMagLev, for example, the guideway would need different detail standards than a typical steel-wheeled train's railroad track.

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LXXXVIII. Appendix - Reprint: Woomer, Dan. "AMTRAK - Next Generation Acela." CATS-MCRT White Paper. January 11, 2021

AMTRAK - Next Generation Acela

By: Dan Woomer
Edited by: Susan McCutchen January 11, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

The SCMagLev is in the imagination stage, while Amtrak is building and testing its next-generation Acela, scheduled to start operation in 2021. The new Acela trains will be faster and safer, accommodate more passengers and commuters, and provide a better travel experience. The SCMagLev, a highly-expensive, likely tax-dollar subsidized transportation system for the elite, well-heeled traveler is on BWRR's drawing board, while Amtrak's Acela has already received FRA approval to be built and will soon deploy a functional high-speed train system to enhance Amtrak's array of passenger and commuter services in the Northeast Corridor.

About Amtrak

Amtrak currently provides intercity passenger rail service with over 21,000 route-miles of track across 46 states, including the District of Columbia, and Canada. Amtrak's *Acela Express*, *Northeast Regional*, *State Supported*, and *Long-Distance* rail services between Boston, New York, Philadelphia, Baltimore, and Washington, DC, provide an expansive array of services for passengers and commuters. As the majority owner of the Northeast Corridor (NEC), Amtrak provides coordinated passenger and freight rail service planning for the NEC, as well as infrastructure access and operational support to eight commuter rail authorities — including the Maryland Area Regional Commuter (MARC) and the Virginia Railway Express (VRE) — and four freight rail operators. Amtrak's long experience as the U.S. high-speed operator, and the NEC end-to-end user, provides a unique, profound, and expert insight and perspective about the Baltimore-Washington passenger rail transportation network.

Questions & Concerns

New Acela. WTOP News. Photo Amtrak.

(1) While BWRR is still in the early stages of planning for a new train system, where is Amtrak?

- Amtrak plans to replace its popular Acela trains in 2021 with new ones that will hold more people, travel faster, and have improved safety features. The new trains will shave 15-20 minutes off the popular New York City to Washington, DC, route, which currently takes about three hours. The next-generation Acela will travel at speeds up to 160 miles-per-hour.

- While high-speed rail has struggled to take hold in the United States, Amtrak's new second-generation fast trains are pushing Amtrak toward profitability. CBS News' Kris Van Cleave got a first look at the new Acela being assembled in the United States (as opposed to in Japan for the SCMagLev). Kris Van Cleave traveled to the Hornell factory in western New York, which employs some 800 American employees, to see the new Acela being built and was favorably impressed.[560]

- The future of America's high-speed rail is starting to take shape in the same place where trains have been serviced, built, and rehabbed by American workers since the 1850s. In Mr. Van Cleave's report, he interviews Stanley Hall, a third-generation train builder, who speaks to the pride of building the next generation of Acela here in the United States: "And it's not just my father and grandfather, my brother comes in here and works. I had several cousins that worked here ... when I was first hired, my uncle helped me a lot to get my job here."[561]

- Richard Anderson, the former Delta Airlines CEO who now runs Amtrak, said the new Acela is "incredibly important" to the future of the company. "It really lays out a clear vision for what short haul, inter-city passenger rail transportation can do for this country. And, this country is going to need it in more and more corridors because millennials don't want to drive, and you cannot add enough lane miles for 100 million more people," Anderson said.[562]

- The updated Acela trains will hold about 380 people — 25 percent more passengers than the prior generation — and are designed to tilt as they take turns, allowing them to go faster. Amtrak's most lucrative corridor linking Boston, New York, and Washington, DC, will see a cut in travel time by at least 15 minutes. "We've got to position Amtrak to have a modern product that a millennial wants to get on with high-speed Wi-Fi, craft beers and reliable schedules that beat buses, cars and airplanes," said Mr. Anderson.[563]

[560] Van Cleave, Kris. "Inside Amtrak's next-generation Acela train: 'Wi-Fi, craft beers and reliable schedules." CBS News. June 11, 2019. www.cbsnews.com/news/amtrak-new-acela-trains-first-look/.
[561] Ibid.
[562] Ibid.
[563] Ibid.

- To gain the magnetic lift and speed of the SCMagLev, many of the FRA train standards for strength and crash worthiness have been “adjusted” to incorporate lighter materials. These “adjustments” have the real potential to render the SCMagLev less crashworthy, resulting in far more serious injuries if there is an accident. While BWRR claims the SCMagLev is very safe, so did the German government in certifying their maglev train; that is, until it crashed on September 22, 2006, killing 70 percent of the passengers and injuring the rest, most severely injured. This accident, as well as significant cost overruns and serious building/deployment schedule delays, forced the German government to “pull-the-plug” on their maglev plans after having invested millions and millions of taxpayer dollars into their costly, high-tech folly. (Kemp and Smith, 2007)

- The new Acela trainsets will offer passengers faster Wi-Fi, USB charging in each seat, reading lights, and winged headrests (so no one will fall asleep on your shoulder). And, unlike the airlines, Mr. Anderson promises Amtrak will not shrink your seat.[564]

- Amtrak is nearly 50 years old. The railroad predicts it is on track to break even for the first time by 2021 when the new Acela will start racing along the Northeast Corridor. Mr. Hall plans to be one of the first passengers. "It's just going to be, you know, just pride. Because I know somewhere on that train that there will be a plaque that says that this was manufactured in Hornell, New York." Mr. Hall said. An American train system, Amtrak is built and maintained by Americans, whose jobs will continue to implement, build, and maintain the upgrades, tracks, stations, facilities, and more. The Acela (and other passenger train systems, like MARC and VRE) will offer affordable travel while improving passenger comfort and safety.[565]

Interior of the new Acela. Photo by Kris Van Cleave.

- To improve their existing rail system, Amtrak continues to replace and upgrade tracks along the Northeast Corridor to accommodate the next generation of Acela trains. These new tracks have also improved the reliability and ride for the low-cost commuter MARC trains. The MARC system carries more than 8 million passengers and commuters each year, and ridership continues to grow. MARC also implemented an upgrade plan and has significantly rebuilt and improved train stations and parking facilities, as well as completed a series of upgrades to both passenger car and locomotive equipment, replacing older equipment with new, more reliable, and more comfortable trainsets.

- Amtrak currently operates 20 Acela trainsets and has ordered 28 new ones, enabling Amtrak to add more service and start reduced travel time non-stops. There is also an excellent potential that the new Acela model could work in other parts of the United States.

[564] Ibid.
[565] Ibid.

Findings/Conclusion

(1) Amtrak's *NEC Future*-related Environmental Impact Statement was the result of a costly four-year study. Regional, state, and federal stakeholders approved Amtrak's recommendations and financial plans to proceed with the enhancement of existing right-of-way, equipment, and facilities.[566]

(2) In contrast with BWRR's expensive drawing-board concept, Amtrak has moved past the planning process, successfully completing the environmental clearance and initial engineering stages, and begun to implement upgrades and start the building, and soon deployment, of the new Acela. Financial commitments, including a $2.5 billion loan from the FRA, are being used to build and deploy the next generation of high-speed trains today, and construct the infrastructure needed to improve high-speed train travel along the Northeast Corridor.[567]

Continued development and support of Amtrak is a far better solution than moving forward with building the SCMagLev transportation system. Amtrak and its options provide a reliable and technically and financially-proven system at a reasonable cost for near- and long-distance rail transportation that accommodates commuters and passengers. After four years of study by the FRA, which involved the significant use of financial and human resources, and extensive engagement with stakeholders—the federal government, states, cities, the railroads, and the public—the already-completed, approved, and published *NEC Future* lays out a sound plan and investment approach to address the NEC's current and future needs. This approved plan should remain the blueprint for the future of passenger rail transportation between Baltimore and Washington, DC, as well as for the Northeast Corridor.

The competitive SCMagLev transportation system, by comparison, is inordinately expensive, commercially unproven, and potentially damaging to communities and the environment. There are many unanswered safety issues and large government subsidies (tax dollars) will be required to build and maintain its operation. This transportation system for the elite and well-heeled traveler is not justified and should not be approved.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
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About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up

[566] U.S. Department of Transportation and Federal Railroad Administration. *NEC Future: A Rail Invest Plan for the Northeast Corridor*. *Record of Decision*. July 2017. https://www.fra.dot.gov/necfuture/pdfs/rod/rod.pdf. Referred to throughout this white paper.
[567] Ibid.

the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

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(2) Woomer, Dan. "First Look at the Next Generation of Amtrak's Acela." June 13, 2019.

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LXXXIX. Appendix - Reprint: Woomer, Dan. "SCMagLev Safety (Part 3)." CATS-MCRT White Paper. February 2, 2021

DEIS Review & Comments – SCMagLev Safety (Part 3)

By: Dan Woomer
Edited by: Susan McCutchen

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

Contrary to Federal Department of Transportation policy as stated in its *Pathways to the Future of Transportation* report,[568] which states that safety should be the ***first priority***, the SCMagLev Draft Environmental Impact Statement (DEIS) document relegates safety to a lower priority. The DEIS states that expediting the start of construction could take priority over safety.[569] In the DEIS, the U.S. Department of Transportation– Federal Railroad Administration (FRA) and Maryland Department of Transportation suggest the FRA should permit a rush to start expensive and disruptive construction before the safety of the SCMagLev system—including the trains, tracks (guideways), and bridges—has even been determined by them. This is dangerous in the extreme. Safety Rules of Particular Applicability (RPA)[570] need to be developed ***before*** FRA's Record of Decision (ROD). Further, prior to the ROD, the RPA needs to go through a process of review by an FRA-convened group of subject matter experts and representatives from affected groups. The safety of the SCMagLev needs to be assessed by American railway safety standards rather than simply accept Baltimore-Washington Rapid Rail's or the system's designer, builder, and operator's assurances.

Questions & Concerns

(1) Should SCMagLev Safety Take a "Backseat" to Construction Start-up?

- The Draft Environmental Impact Statement (DEIS), while expansive in detail, is extremely deficient when it comes to the issue of the safety of the SCMagLev train and its guideway. It would allow the start of construction before safety rules for this maglev technology are established. The DEIS states: "Construction can proceed prior to the completion of the Rule of Particular Applicability (RPA), but operation cannot commence without it."[571]

- RPAs are specialized Federal Railroad Administration (FRA) safety rules for the project. According to the SCMagLev DEIS: "Prior to operation of the SCMagLev, the project sponsor must

[5681] U.S. Department of Transportation (USDOT). *Pathways to the Future of Transportation - A Non-Traditional and Emerging Transportation - Technology (NETT) Council Guidance Document*, pp. 2 and 3. July 2020. www.transportation.gov/sites/dot.gov/files/2020-08/NETT%20Council%20Report%20Digital_Jul2020_508.pdf.

[569] USDOT – Federal Railroad Administration (FRA) and Maryland Department of Transportation (MDOT). Baltimore Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation. Text Reference: "SCMAGLEV System Safety: BWRR expects that a Rule of Particular Applicability (RPA) will be required for the operation of the system. The rulemaking process will likely proceed in parallel with the EIS process. Construction can proceed prior to completion of the RPA, but operations cannot commence without it." [emphasis added]. Appendix G7, Part 3, p. 4. February 2021. bwmaglev.info/index.php/project-documents/deis.

[570] The "Rule of Particular Applicability" is the process the FRA goes through for situations where existing safety standards for railroads need to be modified to suit a particular situation. In the case of the SCMagLev, for example, the guideway would need different detail standards than a typical steel-wheeled train's railroad track.

[571] USDOT – FRA and MDOT. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. Appendix G7, Part 3, p. 4. February 2021. *Text Reference*: "SCMAGLEV System Safety: BWRR expects that a Rule of Particular Applicability (RPA) will be required for the operation of the system. The rulemaking process will likely proceed in parallel with the EIS process. *Construction can proceed prior to completion of the RPA, but operations cannot commence without it.*" [emphasis added]. bwmaglev.info/index.php/project-documents/deis. [5] Ibid. *Text Reference*: "The Project Sponsor will provide documentation of the System Safety Program (SSP) (see Section 4.22.6, Compliance Measure #1) to FRA. The SCMAGLEV Project will import Central Japan Railway Company design safety features, safety culture, and safe operating procedures developed through decades of refinement of industry best practices. *Prior to operation of the SCMAGLEV system, the Project Sponsor must demonstrate that its proposed technology and safety program will sufficiently mitigate operational risks.*" [emphasis added]. p. 14.

demonstrate that its proposed technology and safety program will sufficiently mitigate operational risks."[5] The report also states: "The project sponsor will commit to and submit a SSP[572] to FRA for review and approval prior to operation of the SCMagLev system."[573] Note that this statement again calls for construction to proceed before a determination of safety is made by the FRA.

- The FRA, through a public comment process (preferably including a Railroad Safety Advisory Council [RSAC] with representatives of stakeholder groups), needs to develop an RPA that includes "U.S. Safety Standards" for the vehicles, guideways, and bridges, as well as for the operation and maintenance of the SCMagLev system. This must be done before construction starts in the same way as such rules exist and are applied today for steel-wheeled trains.

- The FRA RPAs (safety regulations) need to be finalized before a Record of Decision (ROD) is issued for the SCMagLev project.

- Safety of the passengers during SCMagLev operation needs to be addressed before the project is authorized. However, the DEIS indicates that construction can start before these critical safety determinations are made.

  The need for the FRA to develop the RPA and evaluate the SCMagLev by established American safety standards is particularly important because:

  - The SCMagLev has only been operated on a test track, not in regular, day-to-day, full commercial operation. The Japanese do not intend to start full commercial operation in Japan until 2027, at the earliest.

  - We have only the assurances of JP Rail—the designer, builder and operator of the SCMagLev, and the Japanese government, which has a great deal of money invested in the SCMagLev, that the extant safety standards are adequate. Remember that the German government certified its maglev was safe, and on September 22, 2006, at Lathen Germany, a train crash killed 70 percent of the passengers.[574]

  - The DEIS Compliance Measure 3 states: ". . . testing and maintenance requirements for the SCMagLev are still under development . . ."[575] These requirements must be in place, reviewed, and approved by the FRA ***before*** the construction of the SCMagLev can be allowed to begin.

[572] SSP - System Safety Plan.
[573] USDOT – FRA and MDOT. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. Chapter 4, Section 22, p. 20. February 2021. bwmaglev.info/index.php/projectdocuments/deis.
[574] To see images and read the reports of the German maglev crash site at Lathen, Germany, go to: www.google.com/search?q=lathen+train+collision&oq=lathen&aqs=chrome.1.69i57j69i59.4180j0j7&sourceid=chrome&ie=UTF-8.
[575] USDOT – FRA and MDOT. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. Chapter 4, Section 22, p. 21. February 2021. bwmaglev.info/index.php/projectdocuments/deis.

(2) How important is it that the safety of the SCMagLev is assured before construction starts?

- It is important that completed, reviewed, and FRA-approved safety regulations be in place before the start of construction because safety regulations can affect the physical designs of the vehicles, guideways, tunnels, and bridges. If the FRA waits to determine a safety rule until after construction begins, the project sponsors could refuse (or be unable) to make changes to abide by the rule. At that juncture, the FRA would be faced with the choice of altering or wasting the construction already completed or allowing a lower level of safety to be used, increasing the risk to passengers and SCMagLev personnel alike.

- Examples of the importance include the current FRA vehicle crashworthiness standards. What if the project sponsors are unwilling (or unable) to build the maglev passenger vehicles at a strength sufficient to meet the implemented U.S. standards? Would they demand using a lesser level of safety, despite the many reasons why the vehicles need to be as strong or stronger than steel-wheel rail trains (see previous MCRT-CATS position papers on SCMagLev Safety)? In the 2006 accident in Lathen, Germany, the front section of the maglev was disintegrated. Note that this accident and the German experience with maglev is not mentioned in the DEIS.

(3) What other safety aspects of the SCMagLev operation does the DEIS overlook?

- Safety of switches is never discussed in the DEIS. Standards or drawings for mechanical details of switches are not presented, although trains will be going at full speed through the straight side of some switches, such as those leading to vehicle storage and servicing (that is, the Train Maintenance Facilities [TMF]) and guideway maintenance (also known as Maintenance of Way [MOW]) facilities. A small misalignment of a switch could be deadly. RPAs for switch safety regulations need to be developed by the FRA before the ROD is issued.

- The DEIS neither discuss nor illustrates the SCMagLev's use of rubber tires up to speeds of 93 mph. The DEIS neither discusses nor illustrates the ability of the rubber tires to suddenly support the SCMagLev train at full speed (above landing speeds for commercial aircraft[576]) if a sudden power outage occurs and the magnetic levitation and propulsion terminates. RPAs are needed to set safety standards for the SCMagLev rubber tires and their operation, including in case of an emergency.

- FRA bridge standards (with possible RPA modifications) should apply to this project. Loads for which the bridges (viaducts) will be designed are not discussed. They would be dependent on the weight of the vehicles, which would in turn depend on vehicle strength and crashworthiness requirements determined by the FRA. The cross-sectional design shown in a drawing found in

[576] AircraftCompare.com. "How Fast Do Airplanes Go? (during Takeoff, Flight, Landing)." *Text References*: "Most commercial planes take off at roughly 160 to 180 MPH." "Commercial airplanes land at approximately 150 to 165 MPH . . ." www.aircraftcompare.com/blog/how-fast-do-airplanesgo/#:~:text=Big%20commercial%20airplanes%20generally%20fly,approximately%20150%20to%20165%20MPH. The Note: Aircraft Compare Editorial Team is a team of experts on diverse topics such as aircraft, travel, and aviation related gear.

Appendix G2, Part D, Drawing TY-04 of the DEIS seems to allow different deflections under the two cross-sectional vehicle loading points.

- If the project sponsor insists on keeping the tapered, rounded front nose on the vehicle where debris can wedge under and on the sides, then an enclosure of the aerial viaducts with a protective shield, such as that shown in drawing TY-04 of the DEIS,[577] should be considered a requirement for the entire above-ground section of the guideway.

  Most of the SCMagLev test and development track in Japan is in tunnels, which offers protection from the kinds of debris to which "in air" guideways could be exposed.

- The need to occasionally retrieve a train with a mechanical failure is not discussed in the DEIS. A mechanical breakdown could occur during regular operating hours, which would involve the use of non-maglev equipment on the guideway.

  Statements at many points in the DEIS indicate that MOW activity will not be permitted on the guideways during operating hours. This assertion does not reflect real-world experience with train systems. If something minor occurs that stops a train (such as an easy-to-fix malfunction in a switch), does that mean problems cannot be corrected and the system will have to shut down for the rest of the day?

(4) Should FRA safety standards be established for driverless train operation?

- Most emphatically YES. There needs to be an RPA(s) covering the integrity of the automatic (driverless) operation of the trains. This includes protection from the cyberthreats mentioned in the DEIS:[578]

  > "Cyber threats exist for railway systems. Of particular concern are computer-based train systems operations, signal and control systems, and other communications. The Project Sponsor will incorporate measures, such as installing software that monitors and protects the system from cyber threats. As planning for the SCMAGLEV Project progresses, more detailed planning to protect against cyber threats will occur."

  Again, standards developed and approved by the FRA are needed prior to the start of construction. The possibility of a cyberattack and successful "taking control" of an SCMagLev train hurtling down the guideway at over 300 miles-per-hour needs to be fully addressed. Cybersecurity walls and protection should be well established, tested, and validated to be ready for operation before construction starts.

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[577] USDOT – FRA and MDOT. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. Appendix G2, Part D, TY-04. February 2021. bwmaglev.info/index.php/projectdocuments/deis.

[578] USDOT – FRA and MDOT. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. Chapter 4, Section 22. February 2021. p. 15. bwmaglev.info/index.php/projectdocuments/deis.

(5) What does the DEIS say about protection of exposure to the electromagnetic fields radiating from the SCMagLev's powerful electromagnets?

- According to the SCMagLev project's final alternatives report, it was noted that people need to stay a minimum distance of 20 feet from the system's electromagnets;[579] however, this is not mentioned in the DEIS. It is noteworthy that the DEIS states that the electromagnetic radiation from SCMagLev may affect a list of electronics, such as limiting the range of cell phones and other communications equipment, interfere with self-driving cars, cause shocks to people, and bring on metal building corrosion.[580] The document also states that the SCMagLev electromagnetic radiation can affect heart rhythms in certain cardiac pacemakers.[581]

- If the electromagnetic radiation level's generated by the SCMagLev are safe, why is so much shielding needed at stations, as shown in the DEIS's Figure 4.18-1?[582] This implies a high-level electromagnetic field (EMF) emitting from the source.

  What is the level(s) of electromagnetic field exposure that could affect wildlife during normal operation, as well as wildlife, passengers, or bystanders if something causes a gap in the shielding?

(6) Are there misleading statements in the DEIS? Yes.

- In several places, the DEIS gives readers the impression that the SCMagLev has been in regular operation for a long period of time. For example, the DEIS states: "The SCMagLev technology has never had a collision or derailment in the 50-year history of operation in Japan."[583]

  The system in Japan is operating on a dedicated development and test track. It is not yet in full commercial operation. If built as BWRR proposes, the United States would be the first place this system would be in full day-to-day commercial operation.

- Another misleading statement can be found in the DEIS: "The Japanese SCMAGLEV technology is a more current technology, and its use has been successfully demonstrated in multiple places in the world."[18]

  Besides in Japan, on their development and test track, where is the Japanese SCMagLev operating?

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[579] USDOT – FRA and MDOT. *Final Alternatives Report*. November 2018. p. 42. https://www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_BodyAppend-A-B-C_Nov2018.pdf.
[580] USDOT – FRA and MDOT. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. Chapter 4, Section 18, Table 4.18-3, p. 9. February 2021. bwmaglev.info/index.php/project-documents/deis.
[581] Ibid. Appendix D, Section 11, p. 15.
[582] Ibid. Chapter 4, Section 18, p. 8.
[583] Ibid. Chapter 4, Section 22, p. 13. [18]
Ibid. Chapter 1, Section 2, p. 1.4.

To date, development/test runs of the present SCMagLev technology have been made only in Japan.

- The DEIS never mentions the ongoing problems in Japan in attempting to construct their first revenue service line by the planned date of 2027. Currently, it is likely the original completion date will not be met.

- In the DEIS, many statements are made to the effect that the SCMagLev train cannot derail. There are many scenarios (see previous MCRT-CATS position papers on SCMagLev safety) in which the train could be forced or rise up out of the guideway. Derailments can also occur in those instances where a switch is misaligned or the guideway is damaged by another means, - such as an errant road vehicle.

Findings/Conclusion

In general, there is little independent verification of much of the information and many of the assurances provided by the Baltimore-Washington Rapid Rail and JR Rail, the company that designed, built, and is promoting the use of the SCMagLev both in Japan and in the United States. The Federal Railroad Administration needs to develop and implement specific SCMagLev Rules of Particular Applicability prior to the start of construction so they are not forced to accept lower-level safety standards should some of the construction already have been completed when difficulties arise, or if the design of the already-purchased train sets is found not to meet U.S. safety standards.

The serious issues, questions, and concerns about the SCMagLev's impact, safety, and operation, both for the passengers and for the residents living near and alongside the guideways, continue to mount. This article identifies and explores some of them.

About the Author

Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

Sources

The principal source of information for this article are responses and discussions with Louis T Cerny, PE, to his review of BWRR's SCMagLev DEIS released January 15, 2021. Mr. Cerny has been involved with maglev proposals since the late 1980s, when he served as the executive director of the American Railway Engineering Association. He has continued to study maglev technology as a private consultant and has commented on many maglev proposals. Mr. Cerny was a voting member of FRA committees that developed safety standards for highspeed rail.

(1) *"Pathways to the Future of Transportation - A Non-Traditional and Emerging Transportation - Technology (NETT) Council Guidance Document*." U.S. Department of Transportation. July 2020. Page 2 and 3. www.transportation.gov/sites/dot.gov/files/2020-08/NETT%20Council%20Report%20Digital_Jul2020_508.pdf.

(2) "Draft Environmental Impact Statement and Draft Section 4(f) Evaluation - Baltimore-Washington Superconducting Maglev Project." January 2021. U.S. Department of Transportation Federal Railroad Administration and Maryland Department of Transportation.

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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMagLev.

XC. Appendix - Reprint: Woomer, Dan. "SCMagLev - Not the Solution." CATS-MCRT White Paper. February 6, 2021

SCMagLev - Not the Solution

By: Dan Woomer
Edited by: Susan McCutchen February 6, 2021

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

The Northeast Maglev (TNEM) ***promises*** *the SCMagLev will alleviate transportation bottlenecks between Baltimore and Washington, D.C., and revenues will sustain and pay for the system*. This and other promises were made by promoters of other expansive high-speed and maglev projects in the United States and worldwide. This position paper delves deeper into the outcomes, consequences, and unfulfilled promises experienced in other countries with moving forward and approving the building of these systems. These bring into question the actual value of building the proposed SCMagLev when there are more higher-value transportation projects in which to invest that provide a far bigger "bang for the buck" than building a train system most D.C. residents and Marylanders cannot afford to ride.

Questions & Concerns

(1) What has happened with Asia's attempts to build and operate new high-speed train systems?

Carol Park, Senior Policy Analyst for the Maryland Public Policy Institute, cites experiences in China, Taiwan, and South Korea, stating: [584]

- "In China, a bullet train crash in the city of Wenzhou in 2011 killed 40 people. The crash was blamed on poor design and mismanagement."
- "In Taiwan, the bullet train system rang up $1.5 billion in losses over seven years, requiring a $1 billion government bailout." (*Author's Note*: as of 2018)
- "In South Korea, a high-speed rail line connecting Seoul to Incheon closed in 2018 after just four years of service because 75 percent of seats were unoccupied."

(2) What happened with the train in South Korea?

- The South Korean government "built the Seoul-Incheon line despite consistent warnings of inadequate demand. The project was politically, rather than commercially, driven, in that the Korean officials wanted to present a futuristic version of Korea to the international community as part of the 2018 Pyeongchang Winter Olympics."[585] However, following the Olympics, with the system continuously operating with 75 percent of the seats empty and requiring large government subsidies to maintain operation, South Korea pulled the plug.

(3) What realities are supporters of SCMagLev ignoring and glossing over?

- Park observes: "SCMagLev supporters in Maryland have similar non-business motives for backing the project. Baltimore has been experiencing a steady population decline over the years, and many supporters believe that connecting the city to economically vibrant D.C. could reverse that trend. This vision has blinded the advocates to serious concerns about the project."[586]

- "First, though the project purports to be a private effort," Park notes, "high-speed train projects are generally magnets of questionable government subsidies,"[587] as demonstrated by California's bullet train. The Maglev website currently predicts that the project would cost $10 billion to $15 billion without cost overrun. California's bullet train, which was estimated to cost $6 billion originally, has surged to a price-tag of $10.6 billion. If we apply this rate of cost overrun to Maglev, we can realistically expect the project to cost $17.6 billion to $26.5 billion. Even at its current price tag, Maglev would still be one of the most expensive rail lines ever built on a per-

[584] Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." Originally published in the *Daily Record*. The Maryland Public Policy Institute. December 7, 2018. www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4.
[585] Ibid.
[586] Ibid.
[587] Ibid.

mile basis, at an estimated cost of $250 million per mile."[588] (*Author's Note*: $15 billion estimate in 2018 is now a $16 billion estimated cost in 2021.)

The Northeast Maglev (TNEM) CEO Wayne Rogers and other Baltimore-Washington Rapid Rail (BWRR) representatives have stated that no tax dollars will be required to build or operate the SCMagLev. However, Wayne Rogers has said: "'We can't build our infrastructure 100 percent privately,' . . ."[589]

Park writes: "The problems begin here. So far, only $5 billion has been pledged by the Bank of Japan toward construction. This means up to $10 billion more will be needed under the current price-tag, and up to $21.5 billion with the likely cost overrun."[590] Every other system around the world has experienced cost overruns. "That money will be taxpayers' dollars, a large portion of that likely having to come out of Maryland residents' pockets. Rogers did not hesitate in asking for government subsidy: 'Yes, we'll go raise private investment but it can't all be private investment. We can't rebuild our infrastructure 100 percent privately.'"[591]

Where would the needed tax dollars come from to subsidize the SCMagLev construction and operations? Most likely the tax dollars will be taken from other far-higher-priority state and national infrastructure projects, such as bridges and tunnels, and highway maintenance, repair, replacement, and enhancement, already long overdue in being addressed.

According to Park: "Unfortunately, the private sector is unlikely to invest in a project that has no evidence for profitability. After all, Maglev would target the elite business travelers and be out of reach of most residents of Maryland or D.C., due to its high-ticket prices. In addition to Amtrak, a variety of private bus companies already provide affordable trips between D.C. and Baltimore. With such narrow ridership prediction, it seems reasonable to be pessimistic about Maglev's revenue stream and profitability."[592] MARC is also a viable transportation system for travel between D.C. and Baltimore.[593]

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[588] Park, Carol. "Maglev: A high speed train to higher taxes." The Maryland Public Policy Institute. February 7, 2018. www.mdpolicy.org/policyblog/detail/maglev-a-high-speed-train-to-higher-taxes.

[589] Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." Originally published in the *Daily Record*. The Maryland Public Policy Institute. December 7, 2018. www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4.

[590] Park, Carol. "Maglev: A high speed train to higher taxes." The Maryland Public Policy Institute. February 7, 2018. www.mdpolicy.org/policyblog/detail/maglev-a-high-speed-train-to-higher-taxes.

[591] Ibid.

[592] Ibid.

[593] MARC - Maryland Area Regional Commuter train service. ". . . previously known as Maryland Rail Commuter, is a commuter rail system comprising three lines in the Baltimore–Washington metropolitan area. MARC is administered by the Maryland Transit Administration (MTA), a Maryland Department of Transportation (MDOT) agency, and is operated under contract by Bombardier Transportation Services USA Corporation (BTS) and Amtrak over tracks owned by CSX Transportation (CSXT) and Amtrak. With some equipment reaching speeds of 125 miles per hour (201 km/h) on the Penn Line, MARC is purported to be the fastest commuter railroad in the United States." en.wikipedia.org/wiki/MARC_Train.

Note: According to Maglev officials, the service would target the 'elite business travelers' and charge prices' similar to or higher "than Amtrak, which already provides regular rail service"[594] between D.C. and Baltimore, and on to New York City.

- Second, between D.C. and Baltimore, Amtrak is far into the Federal Railroad Administration's approval process of upgrading their infrastructure, equipment, and stations to support faster trains on existing rights-of-way. Continuous high-speed rails that have replaced the prior generation rails and a new Baltimore-Washington International Airport train station represent just two of the demonstrable upgrades already completed and in operation, supporting both Amtrak and MARC commuter and traveler services.

- Third, building the SCMagLev "will inevitably disrupt the communities along the line."[595] The destruction of homes and businesses during the building of the elevated portions of the line and the subsequent noise of the trains, as well as the potential of electromagnetic field exposure and dangerous emissions from the tunneled sections must be taken into consideration. The destruction of a large area of the remaining green space between Baltimore and D.C., is of grave concern. The negative environmental impacts of tunneling and handling of the soils removed to build the tunnel (some of which may still be contaminated from previous landfills[596]) and the subsequent sound and vibration to homes and buildings generated by the hurtling trains underground are concerns. The negative consequences to our residents, communities, and state far outweigh any marginal benefits of building and operating the SCMagLev would potentially bring to Maryland.

- Fourth, as Park notes: "Given the immense cost estimate of Maglev and no private partners that seem excited to step in, the Maglev project is doomed to become an expensive failure. In addition, using general taxpayers' money to build a high-speed rail system that will be mainly used by high-income residents will only exacerbate Maryland's inequality."[597]

(4) Who benefits from the SCMagLev?

- The elite traveler who can afford the high-ticket price.

- The investors who are seeking to turn a profit, especially if taxpayers' dollars subsidize the building and operation of the SCMagLev, which past international experience has shown would be highly likely.

[594] Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." Originally published in the *Daily Record*. The Maryland Public Policy Institute. December 7, 2018. www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4.
[595] Ibid.
[596] Anacostia River Park, Colmar Manor, Maryland. https://mde.state.md.us/programs/LAND/MarylandBrownfieldVCP/Documents/www.mde.state.md.us/assets/document/brownfields/anacostia.pdf.
[597] Park, Carol. "Maglev: A high speed train to higher taxes." The Maryland Public Policy Institute. February 7, 2018. www.mdpolicy.org/policyblog/detail/maglev-a-high-speed-train-to-higher-taxes.

- JP Rail, the designer, builder, and operator of the SCMagLev, and the Japanese government on interest paid to service the $5 billion loan.

- The proposed SCMagLev segment will only make three stops. The residents of Anne Arundel and Prince George's Counties are unlikely to experience any commercial or economic development in their neighborhoods, yet they will bear the brunt of the pollution, damage, and destruction SCMagLev construction and operation will bring. In short, residents along the route will pay a high price and receive little-to-no benefit from the SCMagLev.

(5) What do the supporters of the SCMagLev say about the projected ridership?

- Park states: "Supporters of the SCMagLev dismiss concerns about insufficient ridership. They argue that the success of bullet trains in Japan demonstrate these hurdles can be overcome. That's exactly what officials in China, Taiwan and South Korea thought, only to discover that the situation in Japan is unique."[598]

- She adds: "Most of Japan's 128 million inhabitants live in a few densely populated cities. Many of those residents are rich enough to afford the expensive train tickets." [599] As a culture, most Japanese are willing to overlook the negative consequences the SCMagLev has brought into their communities because of their high level of pride in their country's accomplishments.

- According to Park: "Compared to Japan, the situation is the polar opposite in Baltimore, where many of the residents who depend on public transit are low-income workers. If these residents are to commute between Baltimore and D.C., they would need an option that is affordable and easily accessible from their homes. MagLev is neither."[600] Americans are patriotic, but the national need for this technology has not been established. The city bus service links to MARC, which provides reliable and cost-effective transportation. It annually moves (Pre COVID-19) over 9 million passengers in and out of D.C.[601] There is also low-cost bus service between the two cities.

(6) How can the existing systems improve?

Park suggests: "Instead of wasting energy experimenting with dangerous projects like Maglev, Maryland government should redirect its energy to finding more efficient ways to allocate taxpayers' money to improve the safety of the existing transit system in Maryland. Making maximal use out of minimal taxpayers' dollar to improve Maryland's transit network should be the priority."[602] Focusing on maintenance and safety of the existing systems is key to preventing accidents and improving services, which is far more important than building another train system only the wealthy can afford to ride.

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[598] Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." The Maryland Public Policy Institute. December 7, 2018. www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4.
[599] Ibid.
[600] Ibid.
[601] MDOT MTA Performance Improvement - Ridership. Data through 12/31/2020. Maryland Department of Transportation - Maryland Transit Administration. www.mta.maryland.gov/performance-improvement.
[602] Park, Carol. "Maglev: A high speed train to higher taxes." The Maryland Public Policy Institute. February 7, 2018. www.mdpolicy.org/policyblog/detail/maglev-a-high-speed-train-to-higher-taxes.

Park concludes: "If Maryland wants to improve its transportation system, it should focus on ensuring that its existing projects are safe and managed properly. Whether this is done by restructuring the Maryland Transit Authority (MTA), or by privatizing some of the current MTA operations to incentivize better performance, it will not take billions of dollars to ensure Maryland residents have a reliable and integrated public transportation systems."[603]

(7) Where we agree with TNEM's CEO Wayne Rogers.

- Wayne Rogers has stated: "Infrastructure is fundamentally a government responsibility, which has failed."[604] He is right. Many governments in other countries have failed by partnering with private companies to build trains that turned out to be costly, dangerous, and increasingly reliant on government; that is, on taxpayer support. We do not need to spend tax dollars to subsidize a train system for the wealthy when there are far more important transportation projects in need of funding, projects that serve and are used regularly both by D.C. residents and Marylanders.

Findings/Conclusion

Maryland and the United States can avoid recreating the same high-speed "bottomless tax-dollar pit" by abandoning the Northeast Maglev's SCMagLev immediately, before it is too late. The funds should be used to address the many transportation priorities far worthier of attention. These systems are better integrated within our regional transportation infrastructure. Funds should be used to enhance access to the existing rail and commuter transportation systems to continue support of a broader demographic of residents and commerce. These funds should not be used to build a transportation system that only the wealthy can afford to ride. At this juncture, ". . . it is not too late for Maryland officials to stop supporting Maglev, a high-speed train to higher taxes."[605]

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMagLev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S.

[603] Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." The Maryland Public Policy Institute. December 7, 2018. www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4.
[604] Ibid.
[605] Park, Carol. "Maglev: A high speed train to higher taxes." The Maryland Public Policy Institute. February 7, 2018. www.mdpolicy.org/policyblog/detail/maglev-a-high-speed-train-to-higher-taxes.

Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

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(1) Park, Carol. "Maglev: A high speed train to higher taxes." The Maryland Public Policy Institute. February 7, 2018. www.mdpolicy.org/policyblog/detail/maglev-a-high-speed-train-to-higher-taxes.
(2) Park, Carol. "Transportation Lessons from Asia for the Northeast Maglev." The Maryland Public Policy Institute. December 7, 2018. www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4.

Maryland Public Policy Institute: "The Maryland Public Policy Institute is dedicated to advancing freedom and opportunity for every Marylander. We fulfill our mission by developing and promoting policy ideas that enable Maryland citizens and policy makers to chart a path to a freer and more prosperous future." (https://www.mdpolicy.org/about/) "The author of the original article is Carol Park, a senior policy analyst in the Center for Business and Economic Competitiveness at the Maryland Public Policy Institute. Ms. Park can be reached at cpark@mdpolicy.org." (https://www.mdpolicy.org/research/detail/lessons-from-asia-for-the-northeast-maglev?fbclid=IwAR2C1sAfojicOFJ7J6jXCqvtGmKADrtVAopQpP7XRZnc38V25p8G5wWp2s4)

(3) MARC - Maryland Area Regional Commuter train service. en.wikipedia.org/wiki/MARC_Train.
(4) MDOT MTA Performance Improvement - Ridership. Data through 12/31/2020. Maryland Department of Transportation - Maryland Transit Administration. www.mta.maryland.gov/performance-improvement.

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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMagLev.

XCI. Appendix - Reprint: Schuyler, Suzzane. "SCMagLev – Electromagnetic Fields and Our Health." CATS-MCRT White Paper. April 18, 2021

SCMagLev - Electromagnetic Fields and Our Health
By: Suzzane Schuyler
Edited by: Dan Woomer & Susan McCutchen

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Article Summary

Electromagnetic fields (EMFs) surround us. Some EMFs occur naturally and some are man-made. In this article, we provide an overview of EMFs and the increasing medical concerns of man-made EMF effects on human health. While the medical and scientific communities take the general position that the evidence is inconclusive, the effects of increased exposure to man-made EMFs on human health is a growing concern. Current research is finding connections between EMF exposure and disease. A growing body of recent studies have found that long-term exposure to man-made EMFs negatively affects human health. Considering the increasing level of electromagnetic energy to which people are exposed, concerns about the additional exposure to the high-level of electromagnetic energy generated by the SCMagLev system needed to lift and propel the train and its potential to impact our health are arising.

Introduction

Over the last century, there has been increasing exposure to higher levels of man-made sources of EMFs. Recent technological developments have made the electromagnetic environment more prominent in our lives. Present both in occupational environments and daily life, these EMF-generating technologies include, but are not limited to, industry equipment (e.g., welding machines, induction heaters), telecommunications (e.g., television, radio broadcast stations), medical diagnostic tests, and in daily life (e.g., microwaves, mobile phones and 5G, mobile phone base stations, Wi-Fi).

The adverse health effects of exposure to EMFs are a growing source of great concern within governmental and non-governmental organizations responsible for public health. Ongoing studies include an explanation of non-thermal effects of radiofrequency electromagnetic fields (RF EMFs) on human health.

Questions & Concerns

(1) What are electromagnetic radiation and electromagnetic fields?

- The U.S. Environmental Protection Agency (EPA) defines electromagnetic radiation (EMR) and EMFs:[606]

  - Electromagnetic Radiation (EMR) consists of waves of electric and magnetic energy moving together through space. An example of electromagnetic radiation is visible light. Electromagnetic radiation can range from low to high frequency, which is measured in hertz, and can range from low to high energy, which is measured in electron volts. Wavelength, another term associated with electromagnetic radiation, is the distance from the peak of one wave to the next.

  - There are two general kinds of electromagnetic radiation: ionizing radiation and non-ionizing radiation. Ionizing radiation is powerful enough to knock electrons out of their orbit around an atom. This process is called ionization and can be damaging to a body's cells. Non-ionizing radiation has enough energy to move atoms in a molecule around and cause them to vibrate, which makes the atom heat up, but not enough to remove the electrons from the atoms.

  - Electromagnetic fields (EMF) associated with electricity are a type of low frequency, non-ionizing radiation, and they can come from both natural and man-made sources. For example, lightning during a thunderstorm creates electromagnetic radiation because it creates a current between the sky and the ground. Surrounding that current is an electromagnetic field. One example is the Earth's magnetic field. We are always in the Earth's magnetic field, which is generated at the Earth's core. This magnetic field makes compasses work and is also used by pigeons and fish to navigate.

(2) What is the best way to assess the effects of EMFs on human health and why should we be concerned?

- Recent epidemiological studies provide evidence of the possible health effects of EMF exposure:

  - In 2020, research studies reported the association between maternal exposure to magnetic field non-ionizing radiation during pregnancy and the risk of Attention-Deficit/Hyperactivity Disorder (ADHD) in their offspring. The study was conducted at Kaiser Permanente Northern California with 1,482 mother-child pairs participating and EMF exposures captured during pregnancy in two studies conducted from October 1, 1996 to October 31, 1998, and from May 1, 2006 to February 29, 2012. The offspring were followed from May 1, 1997 to December 21, 2017. The main outcomes from the two studies showed physician-diagnosed ADHD and immune-related comorbidities (having multiple medical conditions) of asthma or

[606] U.S. Environmental Protection Agency. "Electromagnetic Radiation (EMR)" and "Electromagnetic Fields (EMF)." www.epa.gov/radtown/electric-and-magnetic-fields-power-lines.

atopic dermatitis up to 20 years of age in the offspring. These findings reveal probable new risk factors now prevalent in our modern-day life and should necessitate more scrutiny, possible restrictions, and at least more research on EMF.[607]

- Another study evaluated Electromagnetic Hypersensitivity Syndrome (EHS), characterized by a variety of nonspecific symptoms that can vary with individuals. The symptoms are real and vary in severity. EHS can be disabling for affected individuals. It is classified as a functional impairment in Sweden. Spain has recognized EHS as a permanent disability. (Note: The U.S. government has not recognized EHS as a disability as of this date of this article.) Below are the reported symptoms from individuals exposed to EMF:[608]

Abdominal pain	Headache	Numb limbs
Anxiety	Head pressure	Phosphenes
Appetite loss	Heart eat irregularity	Rash
Arousal decreased	Heart palpitation	Restlessness
Blood pressure increase	Hormonal disorder	Skin burning
Breathlessness	Hypersensitivity to medication	Skin redness
Chest pain	Hypersensitivity to noise	Skin tingling
Concentration difficulties	Intestinal trouble	Sleep disturbance
Crankiness	Irregular bowel movement	Stress
Daytime sleepiness	Irritation	Sweating
Digestive problems	Itching skin	Swollen eyes
Dizziness	Limb pain	Swollen joints
Dry skin	Metabolic disorder	Tachycardia
Exhaustion	Mood changes	Tenseness
Faintness	Mood depression	Tiredness
Fatigue	Muscle cramps	Toothache
Fear	Muscle pain	Trembling
Feebleness	Nausea	Unfeelingness
Feeling hot	Neck pain	Vision blurring
Forgetfulness	Neuralgia	Vomiting
Hair loss	Neurasthenia	Weariness

(3) What other medical studies have been reported to support the negative impact of EMFs on human health?

- Studies have been done worldwide on the effects of EMF exposure on human health. A key finding of these studies finds the closer the proximity to the source of the EMF, including a

[607] De-Kun L., H. Chen, J.R. Ferber, et al. "Association Between Maternal Exposure to Magnetic Field Nonionizing Radiation During Pregnancy and Risk of Attention-Deficit/Hyperactivity Disorder in Offspring in a Longitudinal Birth Cohort." *Journal of the American Medical Association*. March 24, 2020. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2763232.

[608] Leitgeb, N. Chapter 5: Electromagnetic hypersensitivity. In: *Advances in Electromagnetic Fields in Living Systems: Volume 5, Health Effects of Cell Phone Radiation*, J.C. Lin, ed. New York, New York: Springer. 2009. gnusha.org/~nmz787/biological%20radio%20research/Electromagnetic%20Hypersensitivity.pdf.

broadcast transmitter or a single phone base transmitter, the more symptoms were reported, including sleep disorders. Also, the type of EMF and its strength and duration can diminish or intensify with the variability of the RF EMFs. Some of these studies are described in the bullets below.

- As reported in 2019, the International Agency for Research on Cancer classified RF EMFs classified RF EMF as possibly carcinogenic to humans (group 2B) in May 2011.[609]

- In 2015, the Scientific Committee on Emerging and Newly Identified Health Risks reported on the effects of EMF exposure in frequencies already used by mobile telephone companies. In this report, epidemiological studies were completed on RF EMF exposure. Researchers found an increased risk of glioma (tumor in the brain or spine) and acoustic neuroma (a benign tumor that develops on the balance (vestibular) and hearing, or auditory (cochlear), nerves leading from your inner ear to the brain), in heavy users of mobile phones.[610]

- A 2017 study by Yang, et al., indicated long-term (over ten years) use (exposure) of the mobile phone increases the risk of intracranial tumors, mostly gliomas, particularly in the case of the same-side exposure. This means if the user has the phone to the right ear predominantly (not necessarily all the time), then the glioma occurs on the right side of the brain.[611] Additional 2017 research studies regarding the risk of mobile phone use and health impacts include Bortkiewicz et al., Carlberg and Hardell, Momli et al., and Prasad et al. (*See the Sources section at the end of this article for the references*.)

- In 2019, an advisory committee of the International Agency for Research on Cancer (IARC) recommended the agency reassess the cancer risks involved with RF EMFs and recommended this research should be "high priority." [612] "The group, with 29 members from 18 countries, suggests that the new evaluation take place between 2022 and 2024. In May 2011, an IARC expert committee classified RF radiation as possible human carcinogen [Group 2B]. Since then, the evidence has grown stronger."[613]

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[609] Moskowitz, J.M. Electromagnetic Radiation Safety: International Agency for Research on Cancer (WHO) Position on Radiofrequency Radiation. November 4, 2019. www.saferemr.com/2019/11/IARC-RFR-cancerrisk.html. Röösli, M. "Radiofrequency electromagnetic field exposure and non-specific symptoms of ill health: A systematic review," pp. 277-287 in *Environmental Research* 107. 2008. https://media.ellinikahoaxes.gr/uploads/2017/04/rsli2008.pdf.

[610] Scientific Committee on Emerging and Newly Identified Health Risks. "SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks), Potential health effects of exposure to electromagnetic fields (EMF)." January 27, 2015. Download available at: https://www.researchgate.net/publication/291329105_SCENIHR_Scientific_Committee_on_Emerging_and_Newly_Identified_Health_Risks_Potential_health_effects_of_exposure_to_electromagnetic_fields_EMF_27_January_2015.

[611] Yang, M., W. Guo, C. Yang, J. Tang, Q. Huang, S. Feng, A. Jiang, X. Xu, and G. Jiang. "Mobile phone use and glioma risk: A systematic review and meta-analysis." PLoS One 12, e0175136. May 4, 2017. pubmed.ncbi.nlm.nih.gov/28472042/.

[612] International Agency for Research on Cancer. In *IARC Monographs on the Identification of Carcinogenic Hazards to Humans*: Report of the Advisory Group to Recommend Priorities for the IARC Monographs during 2020-2024, pp. 148-149. https://monographs.iarc.who.int/wp-content/uploads/2019/10/IARCMonographs-AGReport-Priorities_2020-2024.pdf.

[613] Microwave News. IARC Urged to Revisit RF Risk: Animal Studies Prompt Calls to Upgrade Classification to "Probably Carcinogenic" or Higher. Last updated October 30, 2019. https://microwavenews.com/short-takes-archive/iarc-urged-reassess-rf.

(4) What other medical issues are concerned with EMF exposure and human health?

- Within the modalities of medical diagnostic testing, specifically magnetic resonance imaging (MRI), patients with cardiac pacemakers, as well as implantable cardioverter-defibrillators (ICDs), are cautioned before having an MRI. The electromagnetic field generated by the MRI can interfere with the functioning of these devices and can alter or stop the functioning of the apparatus while exposed to the electromagnetic field. The current information from the Mayo Clinic[614] and Johns Hopkins[615] states that even with the newer models of pacemakers, the MRI electromagnetic field strength should not exceed 1.5 Tesla, along with other considerations, including the type of pacemaker and manufacturer, what type of leads are being used, the duration of the scan, and the type of scan. Type of scans are functional MRI, breast MRI, magnetic resonance angiography, magnetic resonance venography, and cardiac MRI. These same criteria apply to patients with embedded ICDs. Exposure to the electromagnetic field during an MRI can heat up leads on the older models of pacemakers. If not carefully controlled, the MRI can interfere with the functioning of the embedded devices, including altering or stopping their functioning.

(5) How do EMF exposure and health issues relate to the SCMagLev?

- The same concerns of malfunctioning of cardiac pacemakers and ICDs could potentially arise with exposure to the far stronger electromagnetic field, upward of 15 Tesla in strength, needed to levitate and propel the SCMagLev. People with pacemakers and ICDs should be wary of riding the SCMagLev. The U.S. Department of Transportation (USDOT), Federal Railroad Administration (FRA), and Maryland Department of Transportation (MDOT) Draft Environmental Impact Study (DEIS), states:
    - "The electric fields associated with the SCMAGLEV may be of sufficient magnitude to impact operation of a few older-model pacemakers; in such cases, the older-model pacemakers may revert to an asynchronous pacing while in the presence of the SCMAGLEV Project. Cardiovascular specialists do not consider prolonged asynchronous pacing to be a problem. Cardiovascular specialists commonly use asynchronous pacing to check pacemaker operation; therefore, while the SCMAGLEV project's electric field may impact operation of some older-model pacemakers while in the presence of the SCMAGLEV, the result of the interference would be of short duration and not considered harmful. Pacemakers revert to their normal mode of operation once out of the immediate area of the SCMAGLEV Project."[616]

[614] "New protocols allow for MRI in selected patients with pacemakers." Mayo Clinic. September 5, 2013. https://www.mayoclinic.org/medical-professionals/cardiovascular-diseases/news/new-protocols-allow-for-mri-in-selected-pacemaker-patients/mac-20430571.
[615] "Living with a Pacemaker or Implantable Cardioverter Defibrillator ICD." Johns Hopkins Medicine. www.hopkinsmedicine.org/health/wellness-and-prevention/living-with-a-pacemaker-or-implantable-cardioverter-defibrillator-icd#:~:text=Living%20with%20a%20Pacemaker%20or%20Implantable%20Cardioverter%20Defibrillator%20ICD,-Facebook%20Twitter%20Linkedin&text=Pacemakers%20and%20ICDs%20generally%20last,normal%20life%20with%20an%20ICD.
[616] U.S. Department of Transportation (USDOT), Federal Railroad Administration (FRA), and Maryland Department of Transportation (MDOT). Chapter 4, Section 18, Table 4.18-3, p. 9. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. February 2021. bwmaglev.info/index.php/project-documents/deis.

Question: Who are these cardiovascular specialists and where are their reports?

- As stated in the DEIS: "Unlike high voltage transmission lines, EMF exposure from the SCMagLev project would not be constant. EMF exposure would only occur as the train passes by. Additionally, the exposure level would be lower than a high-voltage transmission line, as the Shinkansen website states that the train reportedly complies [*underline added*] with the International Commission on Non-Ionizing Radiation Protection standards. As previously stated, the EMF inside the train and along the tracks is approximately one third of the International Commission on Non-Ionizing Radiation Protection guidelines and is safe for persons with medical pacemakers."[617]

  Question: Note the phrase "reportedly complies." When was this research done? There are no references provided to back up these statements.

  Question: Again, who are the authors, when were this research conducted, and where are the reports?

(6) Are the EMFs generated by the SCMagLev a potential health issue?

- With the implications of current research on EMF exposure and disease and the increasing impact on human health, adding exposure to the far stronger EMFs generated by the high-powered electromagnets used to operate the SCMagLev, there is the potential for an increase in, additional, and severe health issues.

  The USDOT-FRA-MDOT *Final Alternatives Report* states: ". . . superconducting maglev (SCMAGLEV) technology, which differs from other maglev systems (such as the German Transrapid system) in that SCMAGLEV accelerates and decelerates through an electromagnetic force generated between superconducting magnets on the vehicle and reaction coils on the guideway sidewalls. The superconducting magnetism is much stronger than ordinary normal conducting electromagnets."[618]

- Depending on the proximity of the person to the guideway and the number of exposures, the symptoms, conditions, and/or diseases discussed in this article have the potential to become intensified due to the strength of the electromagnets used to levitate, propel, and brake the SCMagLev train.

  Note: The *Final Alternatives Report* states that people must maintain a distance of no less than 20 feet from the guideway because of the electromagnetic field strength.[619] DEIS Appendix D.11 indicates: "The American Conference of Governmental Industrial Hygienists also recommends

[617] Ibid. Appendix D.11-15.
[618] USDOT, FRA, and MDOT. *Final Alternatives Report*. November 2018. p. 42. www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf.
[619] Ibid. Chapter 1, page 1, footnote 1.

that workers with pacemakers should not exceed 1 Gauss (1,000 mG or 0.1 μT)."[620] Note that they refer to the safety of the workers, but what about the safety of the passengers? How is this distance going to be assured, especially if there is an emergency and passengers are exiting the train, and emergency personnel are at the scene to provide emergency services? Also, as we indicated earlier, the DEIS itself notes the detrimental effect of being in proximity to the SCMagLev if one has a cardiac pacemaker or cardioverter-defibrillator.

(7) Besides passengers and maintenance employees, should anyone else be concerned with the SCMagLev EMF exposure?

- Although the personnel representing the SCMagLev recommend that people (passengers and maintenance workers) do not get within 20 feet of the guideway during operation of the SCMagLev, there is a concern for the residents and businesses near the SCMagLev system. Besides the potential danger coming from the ventilation structures (release of toxins, cancer-causing compounds, and radioactive gas released into the atmosphere and surrounding areas; see the 2021 MCRT-CATS Report about the impact of the SCMagLev on communities[621]), the EMFs generated by the SCMagLev, in addition to the increasing amount of the man-made EMFs continuously injected into our environment, have the potential to increase the negative health consequences of those living and working in proximity to the SCMagLev system.

  While Baltimore-Washington Rapid Rail (BWRR) cites the Japanese report that states the SCMagLev's generated EMFs are safe,[622] we have not seen the research to corroborate this statement. And while the EMF emission level from the SCMagLev may be at an acceptable level, its addition to an environment increasingly saturated with man-made EMFs may well act as a multiplier of the negative human health effects already identified by ongoing international research, findings, and issued precautions.

- Many questions that have arisen require sufficient and replicated independent research to assure that exposure to the EMFs required for the SCMagLev to operate is safe. Some of are the following:

  - How will the maintenance workers for the train system who are constantly exposed be protected?
  - What kind of exposure will SCMagLev riders have and what are the long-term or cumulative health effects?
  - What is the exposure for the workers constructing the train system (over years)? What is the cumulative effect on their health? How will their safety be maintained? What happens if the system is powered-up and workers are present?

[620] USDOT, FRA, and MDOT. Appendix D.11.1.4, p. 10. *Baltimore-Washington Superconducting MAGLEV Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. February 2021. bwmaglev.info/index.php/project-documents/deis.
[621] Woomer, D. "What Impact Would the SCMagLev Have on Our Communities?" January 11, 2021. https://storage.googleapis.com/wzukusers/user-28572454/documents/b2823d429be44c7c96202d0e3e75f309/CATS-MCRT%20Rpt%20-%20SCMagLev%20Community%20Impact%20-%2020210111.pdf.
[622] JP Central. Superconducting Maglev's magnetic field has no health impact. https://scmaglev.jr-central-global.com/about/magnetic/.

- What is a safe distance from electromagnets for homes and businesses along the train's route?
- Where is the research to define and substantiate the "safe" distance?

Aside from the questions about the safety and crashworthiness of the train itself (see Part 2 of the MCRT-CATS report on SCMagLev safety[623]), statements and assessments about EMF safety from the SCMagLev builder and operator—JP Rail and BWRR, respectively—do not constitute independent, unbiased reviews. If the FRA approves building the system, BWRR, JP Rail, and the Japanese government stand to make a profit as the builders and operators. Passengers, maintenance workers, and people in proximity to the system will then become the test subjects to determine if the system has little to no effect on human health.

- Forthcoming research studies will probe further into EMF exposure and its negative effects on the human body, particularly as EMF-producing technologies continue to be developed and expand into the future. The additional electromagnetic radiation introduced with the operation of the SCMagLev could be a multiplier of the impact on human health from the increasing levels of man-made EMFs. As shown in the recent studies cited above, exposure to more EMFs will likely put more people at risk of experiencing the symptoms stated in this paper, not to mention the possibility of experiencing more intense symptoms, conditions, and disease. Furthermore, we have not yet considered the effects of continuous exposure to the SCMagLev's high-level EMF impact on the health of wildlife.

- It is anticipated that additional studies will provide stronger evidence of the correlation between our EMF-rich environment, human exposure, and human health problems. Our already non-ionized, radiation-rich environment is replete with man-made and naturally occurring EMFs. What kind of additional or increased instances of human and wildlife health issues will likely manifest with the addition of the SCMagLev's high level of EMFs?

Findings/Conclusion

This article highlights concerns about impacts on human and wildlife health from the addition of high-level electromagnet fields needed to operate the SCMagLev train system. It should give the reader pause when considering that only a small number of people will use this transportation system, one that does not provide services to our communities. The reader may ask whether, along with the destruction of irreplaceable natural research areas and lands, unanswered questions about the safety of the train system and structures, and the potential of impacts on human and wildlife health, is it worth building a transportation system only the more affluent can afford to ride?

[623] Woomer, D. "Is the Maglev Safe (Part 2)?" January 11, 2021. https://drive.google.com/file/d/1IFIOBDY7oQY7jYHqdKFrCcHupn8_srgX/view.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Suzzane Schuyler is a retired Pet/Ct, nuclear medicine, mammographer, and radiologic technologist, having worked 38 years in conjunction with CT and MRI units. Ms. Schuyler holds a bachelor's of science degree in professional health. With her long career, she has expertise with ionizing and non-ionizing radiation and the acute precautions taken to protect employees and the public. She also taught courses in radiologic technology, which included procedural processes, safety, and radiation protection. Ms. Schuyler is an active member of community organizations, including the Linthicum-Shipley Improvement Association, where she has served as a voting Board member and held elected officer positions, including president. She has investigated the SCMagLev plans, proposals, and other information for several years, and has engaged with the Anne Arundel County Council and the Maryland state legislature, and met with Maryland Congressional leaders to express the community's opposition to building the SCMagLev.

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(2) Carlberg, M. and L. Hardell. "Evaluation of mobile phone and cordless phone use and glioma risk using the Bradford Hill viewpoints from 1965 on association or causation." *BioMed Research International* 9218486. 2017. downloads.hindawi.com/journals/bmri/2017/9218486.pdf.
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Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMaglev.

XCII. Appendix - Reprint: City of Greenbelt Forest Preserve Advisory Board." Report to Council, Report # 2018-01. January 25, 2018

Forest Preserve Advisory Board: Report to Council Date: 5 January 2018
Report# 2018-01

Legal Protections against the Construction of the BWRR Superconducting Maglev within the Greenbelt Forest Preserve

The Forest Preserve Advisory Board (FPAB) recommends that the City Council submit additional information regarding legal protections of the Forest Preserve to the National Environmental Policy Act review process for Baltimore Washington Rapid Rail's (BWRR) proposed superconducting maglev (SCMaglev) routes J1 and J. The city property known as the Forest Preserve, specifically the several parcels that make up the No1ih Woods Tract and Hamilton Woods Tract,[1] is protected by laws, covenants, and easements at the municipal, county, state, and federal levels, which limit or prohibit construction within the Forest Preserve. Some of these protections also prohibit any construction outside of the Forest Preserve that would be close enough to impact the Forest Preserve's ecosystem or the public enjoyment of the Forest Preserve. FPAB recommends that the City Council submit the following comments to BWRR, Maryland Department of Transportation, and the Federal Railroad Administration as a follow-up to comments that Council has already submitted as part of the NEPA review process.

Background

The legal protections listed on the following pages expand on the items mentioned in the City Council's October 2017 letter to the Environmental Impact Study. The October 2017 letter was the City Council's immediate response to BWRR's announcement of alternatives J1 and J, the two alternatives for the SCMaglev route alignment that pass through the City of Greenbelt.

Among the two alternatives, Alternative J1 would be the more destructive to the City- owned Greenbelt Forest Preserve. First, Alternative J1 would involve the construction of a cut- and-cover tunnel through the Hamilton Woods Tract of the Forest Preserve that would destroy a wide swath of the forest. Second, Alternative JI would have a tunnel entrance close to the City's astronomical observatory. Any lighting associated with the SCMaglev project and the vibrations of the train would preclude the use of the astronomical equipment. Third, Alternative J1 would exist as an elevated viaduct along the wetlands of the Goddard Creek floodplain in the North Woods Tract. This floodplain forest is likely to be more than 100 years old, and the canopy trees are 100-120 feet tall. Alternative J1 would require that these canopy trees be cut down in a swath at least 250-feet wide to ensure clearstory for the 46-foot-wide viaduct.[2] Additionally, the passage of the 300-mph maglev trains would create a noise nuisance that would impact the public's ability to enjoy recreational visits to the Forest Preserve. The noise nuisance could extend 1,900 to 3,000 feet on either side of the elevated viaduct according to

[1] The North Woods Tract includes Parcel I. The Hamilton Woods Tract is also known as the South Woods.
[2] 46-foot width stated on a poster displayed in October 2017 at public meetings hosted by the SCMaglev Environmental Impact Study, available online at www.bwmaglev.info/index.php/october-2017-open-house-boards.

Federal Railroad Administration guidelines.[3]

In contrast to Alternative **Jl,** Alternative J would not pass through the Greenbelt Forest Preserve, but it would parallel the Forest Preserve's eastern border, passing 800 feet to the east. As currently configured, Alternative J is aboveground to the north of the Forest Preserve while remaining underground where closest to the Forest Preserve. If alternative J were to become an elevated viaduct near the Forest Preserve (rather than an underground track), then a noise nuisance would extend into the Forest Preserve, impacting the public's ability to enjoy recreational visits to the Forest Preserve.

Municipal Protection

I. The Greenbelt Forest Preserve is city-owned property. The City Council's October 2017 letter asserts the City Council's intent that these lands remain protected green space. Furthermore, Greenbelt City Code protects the Forest Preserve by stipulating that the land can only be removed from the Forest Preserve by a public referendum.[4]

County Protection

II. Prince George's County has an interest in the Greenbelt Forest Preserve remaining protected green space. In 1990 the Maryland-National Capital Park and Planning Commission (M-NCPPC), purchased a woodland covenant on Parcel 1 within the Forest Preserve.[5] Alternative **Jl** would violate this covenant by converting covenanted woodland to transportation infrastructure. The noise from the maglev train's passage would also violate the covenant by diminishing public enjoyment of the natural setting.

III. In 2017, the M-NCPPC renewed its commitment to the Greenbelt Forest Preserve when it published the *Prince George's County Resource Conservation Plan,* a document that functions as a county-wide master plan. This master plan locates the Greenbelt Forest Preserve within a M-NCPPC-designated Special Conservation Area that also includes Greenbelt National Park, the Beltsville Agricultural Research Center, and the Patuxent Wildlife Research Refuge.[6]

State Protection

4. In 1990 the City of Greenbelt used state funds from Maryland's Program Open Space (POS) to purchase Parcel 1.7 By Maryland state law, land purchased using POS funds means shall be perpetually-protected green space. Additionally, because POS also uses federal funds, this portion of the Forest Preserve is protected by federal statute, namely section 6(£)(3).

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[3] Estimate based on an elevated track, a 300-mph train speed, and either 4 or 8 train passbys per hour using the general-assessment methodology in Federal Railroad Administration, 2012, *High-speed Ground Transportation Noise and Vibration Impact Assessment,* DOT/FRA/ORD-12/15, available online at https://www.fra.dot.gov/eLib/details/L04090 .

[4] Greenbelt City *Code,* Chapter 12, Article 9, Section 12-154(c).

[5] The City of Greenbelt and MNCPPC entered into a woodland covenant after MNCPPC provided $1,250,478 of Program Open Space funds to assist the City with purchasing Parcel I (Maryland Land Records, liber 7967, folio 441-445).

[6] Map 3 in section 2 of M-NCPPC, 2017, *PG County Resource Conservation Plan, A Countywide Functional Master Plan,* pg. 32, available online at http://www.pgplanning.org/944/Publications.

of the Land and Water Conservation Fund Act of 1965.[8]

Maryland Department of Natural Resources (DNR) has designated 6.5 acres of the 12 acres of wetlands within the Greenbelt Forest Preserve as "Wetlands of Special State Concern".[9] Alternative J1 would damage this state-protected wetland within the Forest Preserve by removing a swath of canopy trees and the underlying ecosystem.

5. The Maryland Department of Natural Resources (DNR) designated the North Woods Tract of the Greenbelt Forest Preserve in 2005 as part of a hub in the state's green infrastructure. The state intends this determination to guide land-conservation efforts. The hub that contains the Greenbelt Forest Preserve is a contiguous forest that includes the Beltsville Agricultural Research Center and the Patuxent Wildlife Research Refuge. Reinforcing this designation in 2011, the Maryland DNR determined that this land is a Targeted Ecological Area, i.e., an area of "high ecological value that has been identified as a conservation priority." [10]

6. The Maryland Natural Heritage Service has provided the City of Greenbelt with a letter that states that the Maryland DNR is aware of at least one state-listed species in the Greenbelt Forest Preserve.

7. The Maryland Historic Trust has determined that NASA Goddard Space Flight Center is a historic district. This historic district abuts the Northway athletic field and the Greenbelt Forest Preserve. Alternative J tunnels under this historic district and Alternative J1 has a tunnel entrance within a few hundred feet of it.[11] In addition, there are several structures just north of the Greenbelt Forest Preserve within the Beltsville Agricultural Research Center that are listed as historical resources by the State of Maryland. The Maryland Historic Trust also recognizes the federally-designated Greenbelt National Historic Landmark, which includes the Greenbelt Forest Preserve as discussed in item #12, below. The proposed Maglev track's proximity to these historical resources may require the Maryland Historic Trust to review the impact of the proposed maglev line.

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[7] Program Open Space funds from FYl990: Maryland Land Records, liber 7967, folio 441-445.
[8] Maryland DNR, 2006, *Local Program Open Space Manual,* available online at http://dnr.maryland.gov/land/Pages/ProgramOpenSpace/Program-Open-Space-How-to-Apply.aspx.
[9] Wetland acreage measured using the Prince George's County Atlas, http://www.pgatlas.com .
'° Hubs: DNR, 2005, Maryland GIS Data Catalog, http://data.imap.maryland.gov/datasets/maryland-green-infrastructure-green-infrastructure-hubs-and-corridors. Targeted Ecological Areas: DNR, 201 I, GreenPrint Map, available online at http://geodata.md.gov/greenprint/.
" Historic significance: https://mht.maryland.gov/secure/Medusa/PDF/Prince Georges/PG;64-19.pdf. Geographic boundary: http://dnrweb.dnr.state.md.us/MERLIN/.

Federal Protection

8. An active bald-eagle nest is located near the Greenbelt Forest Preserve, which means that there are federal restrictions on construction and associated tree removal within 660 feet of the nest.[12] This nest is located on Research Road at Beaverdam Creek, near the northwest portion of the Forest Preserve.[13] Other bald-eagle nests may exist in the area, and bald eagles are known to fly over various properties adjacent to the North Woods and Hamilton Woods tracts of the Greenbelt Forest Preserve.[14] Because of the known bald eagle nest, the Maglev project may be encumbered by the Bald and Golden Eagle Protection Act. The Greenbelt Forest Preserve and surrounding forest is also an excellent habitat for the northern long-eared bat *Myotis septentrionalis* and rusty-patch bumble bee *Bombus afjinis,* both federally protected species. [15]

9. In 1972, the federal government transferred ownership of a 13.9-acre forested parcel to the City of Greenbelt under the Legacy of Parks Program.[16] This federal program assisted states and local governments with acquiring parkland, forest, and wilderness located near densely populated areas because of the societal benefit of easy access to green space.[17] The 13.9-acre parcel is part of the Greenbelt Forest Preserve. Alternative J1 would pass through this 13.9-acre parcel, negatively impacting its ecosystem and its use for outdoor recreation.

10. In 1995, the federal government purchased a scenic easement from the City of Greenbelt for Parcel **1** within the Greenbelt Forest Preserve. The City of Greenbelt sold this scenic easement in exchange for the financial assistance that the federal government provided in 1990 so that the City could purchase Parcel 1 from private developers. In addition, the federal government purchased a scenic easement in 1991 on the 13.9 acres of City-owned land in the northeast comer of the Greenbelt Forest Preserve. Both of these scenic easements prohibit construction.[18]

[12] In 2007, the U.S. Fish and Wildlife Service developed guidelines that include the 660-foot buffer based on the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Available at https://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf.

" Active nest: *Greenbelt News Review,* 21 May 2017, 21 Jan 2016, pg. 21; 21 April 2016, pg. **1;** Jamie Jorgensen and Donn Ahearn, Greenbelt Biota, 24 Jan 2017, 04 Jan 2017, 27 Nov 2016, 17 Nov 2016, 19 April 2016, https://www.facebook.com/groups/325927877605844.

[14] Eagle in flight near Hamilton Woods Tract: *Greenbelt News Review,* 21 Dec 2017, pg. 8. Eagle near North Woods Tract: Dawn LaRae-Deya, Greenbelt Biota, 20 Dec 2016.

[15] Federal and state rare, threatened, endangered (RTE) species: http://dnr.maryland.gov/wildlife /Documents/rte_Animal_List.pdf. Rusty-patch bumble bee found in Prince George's County and Northern long- eared bat found in Montgomery County: Maryland Biodiversity Project, https://www.marylandbiodiversity.com .

[16] *Greenbelt News Review,* 25 May 1972, pg. 1; 19 Oct 1972, pg. l; 1 Jan 1998, pages 1,12.

[17] Jim Byron, 14 June 2010, Legacy of Parks, available online at https://www.nixonfoundation .org/2010/06/Iegacy- of-parks/. EPA, 1973, *Legal Compilation,* pg. 3058, available online at https://nepis.epa.gov/Exe/ZyPDF.cgi/200158MI.PDF?Dockey=200158MI.PDF.

[18] 1995 easement on Parcel 1 (Maryland Land Records, liber 8015, folio 867-874). 1991 easement on the 13.9-acre parcel (liber 10,374, folio 347-359).

Both scenic easements are deeds that establish a federal interest in the green space, although the City of Greenbelt retains ownership of the land itself. Due to these easements, this land falls within the legal boundaries of the Baltimore-Washington Parkway, a unit of the National Park Service, even though the City of Greenbelt retains ownership of the land.[19] Alternative JI would violate both scenic easements.

12. The North Woods and Hamilton Woods tracts are contributing resources to the Greenbelt National Historic Landmark listed in the National Registry of Historic Places.[20] These tracts are part of the original "belt of green" surrounding the planned community that was designed, built, and administered by the federal government during the New Deal. The plan developed during the New Deal called for the belt of green to be owned by the community in perpetuity (1) to avoid encroachment by any development that would be out of character with the residential community, (2) to provide recreation, and (3) to enable residents to enjoy a beautiful, natural setting at their doorsteps.[21] The forest destruction associated with the construction of Alternative JI and the noise associated with the operation of the 300-mph train would be detrimental to the continued functioning of this resource within this National Historic Landmark.

13. Section 4(f) of the 1966 U.S. Department of Transportation Act prohibits the construction of transportation projects within protected green space or historical landmarks unless it is shown that no "feasible or prudent" alternative exists that would avoid impact to these resources and also that all possible steps will be taken to "minimize harm" if no zero-impact alternative exists.[22] This level of federal projection and review applies to the Greenbelt Forest Preserve because it is both protected green space and also part of a National Historic Landmark, as describe in detail above.

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[19] Online GIS: NPS Land Resources Division's Tract and Boundary MapServer, https://mapservices.nps.gov/arcgis/rest/services/LandResourcesDivisionTractAndBoundaryService/MapServer and http://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fmapservices.nps.gov%2Farcgis%2Frest%2Fservices%2FLandResourcesDivisionTractAndBoundaryService%2FMapServer .

[20] On 25 November l 980, the Greenbelt Historic District was added to the National Registry of Historic Places. National Historic Landmark status granted on 18 February l 997. NPS, 2017, *Spreadsheet ofNHLs,* Excel spreadsheet, national-historic-landmarks-20171201.xlsx, available online at https://www.nps.gov/nr/research/.

[21] Belt of green permanent: Resettlement Administration, 1936, *Greenbelt Towns,* pg. 9. Belt to provide recreation: Tugwell, R. G., 13 May 1936, Resettlement Administration program: Letter from the administrator of the resettlement program transmitted in response to Senate resolution No. 295, 74th Congress, 2nd session, Senate Doc. No. 213, pg. 7. Belt to prevent encroachment: Larsen, C., August 1938, Greenbelt, MD: federal planned community, *National Municipal Review,* **27,** 413-420; Fulmer, 0. K., 1941, *Greenbelt,* Am. Council on Public Affairs. Garden-city concept promotes the experience of the beauty of nature, including of forests: Howard, E., 1902, *Garden Cities a/Tomorrow,* Swan Sonnenschein & Co., pp. 17-18, 130, Fig. 2.

[22] Quotes from the Code of Federal Regulations (CFR) title 23 section 774, which codifies Section 4(f) of the 1966 Department of Transportation Act. CFR text available online at https://www.law.comell.edu/cfr/text/23/part-774.

XCIII. Appendix - Reprint: Kowalski, M. "SCMagLev DEIS Part 1 – Evaluation and Summary – NO BUILD.

SC Maglev DEIS Part 1 – Evaluation and Summary – NO BUILD

EXECUTIVE SUMMARY

The DEIS for the SC Maglev has huge omissions on every topic leading to critical and major deficiencies:

- The DEIS proposes what amounts to a segment of a much larger line, poorly concealed as a stand-alone system to improve primarily commuting and business between Washington, Baltimore, and BWI.
- The critical SC (Super Conducting) components are presented only at the top level without any detail, leaving unanswered a host of critical technology questions. This belief-based appeal to only the heritage successes of the Japanese system is an abdication of responsibility.
- The Needs analysis is largely based on traffic studies that predate COVID-19. Thus, the economics analysis is outdated. Much greater use of teleworking may eliminate a large part of the need. The traffic and economics analyses are partly based on data (Origin/Destination pairs, ridership data requests) that are not available to the public. Full disclosure is required.
- Investment in improving and modernizing current infrastructure (Amtrak, MARC) and possibly adding a 3rd lane to the Baltimore Washington Parkway would satisfy needs at much less cost.
- A proper cost analysis including debt servicing and margins has not been done. Even internal consistency in costs is lacking. Comparison to SC maglev attempts elsewhere indicate that huge cost overruns will ensue, thus requiring either a tax payer bailout or total abandonment.
- The high cost of tickets ($60 one-way between end-stations) means the SC Maglev would benefit mostly the wealthy. This project does not achieve economic equity for the community.
- Large communities in Prince George's County along the viaduct (Greater Laurel, Greater Greenbelt) will suffer tremendous adverse traffic impacts during construction, threatening gridlock. Adverse impacts on residential neighborhoods in close proximity to the viaduct will be severe, particularly in decreased property values. An analysis of South Laurel communities shows yet additional adverse impacts in traffic flow though Baltimore-Washington Parkway (BWP) interchanges, Electromagnetic Interference (EMI), noise, vibration, and aesthetics during both construction and operations. As green space is erased quality of life will degrade. The synergism of these impacts will change the nature of the communities towards urbanization. All this will happen without any benefit, as there is no station in Prince George's County.
- Safety and Security plans are underdeveloped to the point of negligence. The proponents talk about the importance of importing Japan's culture of safety but present almost nothing to indicate how that is achieved in technology, management or operations. The present security plans are more appropriate to a regular train system than a high-technology showcase. Possible terrorist activities are nearly ignored, while the SC maglev system itself exhibits a host of vulnerabilities.
- Transmission lines might not be able to supply sufficient electrical power without upgrades, leading to increased cost and schedule delays. Most importantly, the impact of the SC Maglev on grid reliability is unknown and potentially very dangerous.

- The SC maglev project will threaten the missions of both the Beltsville Agricultural Research Center (BARC) and the Patuxent Research Refuge (PRR). The areas impacted are biologically well-studied landscapes that have yielded important discoveries. There will be an irreplaceable loss of biodiversity, which cannot be recreated elsewhere. The aggregate impacts on wildlife, flora, waterways, wetlands, and farm land will be devastating and permanent.

The reviewers strongly oppose construction of the SC Maglev. While SC Maglev train technology may have some future role to play somewhere in the US, the present DEIS unequivocally shows that this is the wrong project in the wrong place and at the wrong time. No improvements or modifications to the DEIS can produce an acceptable FEIS that selects one of the 12 proposed alignment alternatives. The reviewers unequivocally endorse the NO-BUILD option.

PREFACE on the NEPA PROCESS

Fundamental questions concerning the NEPA process:

1. The DEIS was prepared by the FRA (Federal Railroad Administration) with technical assistance from MDOT (Maryland Department of Transportation, Ch.0, sec ES.1, pg ES-1) and technical input from BWRR (Baltimore-Washington Rapid Rail, LLC; sec ES.1.2, pg ES-3). Appendix A shows that the preparation team consists of individuals from FRA, MDOT, and contractors/consultants. The signing authority is FRA. Further, in sec ES.8, pg 26 the Next Step section states that after incorporating any changes caused by public comments the FRA completes a final FEIS and issues a ROD (Record Of Decision), which appears to be the critical go/no-go approval point.

To the average person there is an appearance of conflict of interest: the federal agency in charge of the EIS process also makes the decision on *whether* to build and *what* to build. The reviewers have already heard sentiments expressed by neighbors as to this being a “done deal”. The last sentence of section 1.2.3 of the DEIS is insufficient to dispel this belief and none of us are experts on NEPA.

As a retired federal employee the principal reviewer recalls strongly that it is the duty of all federal agencies and personnel *at all times* to avoid even the appearance of a conflict of interest and to embrace fairness. Thus, it is strongly recommended that the FRA make public an elaboration on section 1.2.3 concerning NEPA process and decision areas of responsibility within the FRA. This might be done easily by posting an addendum, perhaps an org-chart and short explanation on the MAGLEV website. In the interest of fairness this should be done as soon as possible while people are deciding whether it is worth their effort to comment. At last resort, such an explanation should appear in the FEIS and ROD.

2. The DEIS appears to have no explanation for the criteria used in the ROD selection, except that given by the Project Sponsor in Appendix G.11 as to their determination of a Preferred Alternative Selection. Obviously, the FRA selection will involve a complex decision matrix. Has this matrix already been determined, and if so, what weighting is put on various aspects, e.g., transportation needs vs. environmental impacts? Will this matrix be explained in the ROD?

3. Appendix A.5 lists 83 individuals from FRA, MDOT, and assorted contractors/consultants who prepared the DEIS. The preparers have impressive credentials. However, no one in this list appears to have a degree in, understanding of, or experience in SC magnet technology. Indeed, from the DEIS it is not clear that BWRR yet employs any such expert. In producing a FEIS and a ROD, it is essential that at least one expert in this field is included in the NEPA decision process. While there has not been any SC maglev in the US, there are capable experts. An internet search revealed one possibility, but no contact was made with this individual: http://www.thompsonrd.com/. Experts in arcane technology tend to be advocates, so care must be taken to ensure that the person(s) selected are neither advocates nor opponents of SC technology.

4. The DEIS has little discussion of oversight. The one exception appears to be the annual FRA audit of SSP (System Safety Plan) compliance and other possible audits. Who ensures that the proponents follow other regulations and live up to promised mitigations? Who monitors and assesses progress? Who determines if the project is getting into trouble or should be terminated? The FRA can issue RPAs or other regulatory measures, but impacts are diverse (transportation, environmental, social) and many appear to lie outside FRA's core expertise. Certainly, any of the FRA's positions/decisions would have to be issued before a Build Alternative was selected in a FEIS.

EVALUATION (AND SUMMARY) OF DETAILED COMMENTS

Document Organization: This section is an evaluation of the DEIS. Topics may include a summary of from the "SC Maglev Part 2 - Detailed Comments – NO BUILD" attachment (as indicated) or not. Items are grouped in three ranks of deficiency: Critical, Major, and Other. Critical Deficiencies deal with the entire rationale for this project and must be addressed in any FEIS. Major Deficiencies must also be addressed with sufficient detail in any FEIS. Major Deficiency topics follow topics in the DEIS, but not necessarily in the same order. Other Deficiencies are relevant and important but may require less detail to address. In all deficiency categories topics are not prioritized; each has approximately the same weight. The addition of Detailed Comments (Part 2) for some topics and not others is a function of reviewer expertise and does not indicate greater importance. All acronyms are defined in Appendix A of the DEIS. Part 2 contains a Table of Contents for both Parts 1 and 2.

I. Critical Deficiencies

A. **Independent Utility:** It is well known from the SC Maglev and TNEM (The Northeast Maglev) websites that the SC Maglev project is meant to be the first link in an eventual Washington-to-New York design. The only data presented are for a stand-alone commuter line with only three stops. Is this DEIS for only one portion of a much larger project compliant with federal law? What happens if any one of the jurisdictions in Delaware, Pennsylvania, New Jersey, and New York refuse? Without the entire run to New York, the proposed maglev is a system without rational purpose. This DEIS should be voided and replaced with a DEIS for the entire length, not just this demonstration link.

B. **Maglev Critical Components (and SUMMARY):** There is an appalling lack of detail about of the maglev critical components, notably the SC magnets, the train cars, the guideway, and the control

system. Regardless of the impressive Japanese safety record or their technical success the NEPA process cannot abdicate responsibility. The SC components appear to be taken as a given with known provenance and thus requiring no explanation. Section 3.1 appears to be only a top-level description in the technology: it utterly fails to reassure. While this is certainly a Draft EIS, the paucity of information on critical systems makes it impossible to determine their impact in multiple domains, including construction, cost, schedule, operation, economics, and safety. Hence the justification of the entire project is called into question. Whether this omission by the proponents was intentional (to defer to the FEIS) or an oversight, it does not bode well. Given the sparkling claims made about system heritage, it is indeed strange that the proponents have only a few references to the critical technology buried in Appendix D.11. Surely a wealth of technical data from the Japanese heritage test track must exist. Much more than a top-level summary should have been included in the DEIS and as a separate section and/or Appendix.

The Japanese maglev system is claimed as a proven system with a 50-year heritage; this overstates the case. Moreover, references within the DEIS to the "bullet train" heritage of safety should be qualified. Both trains are fast but it is misleading to claim heritage from one technology to another while at the same time advertising the other as transformational. Further, the current Yamanashi test track extension was completed only in 2013, and numerous technical and operational upgrades were made to predecessors in earlier years. The Yamanashi track has been semi-operational in something akin to a tourist mode. The true test of an operational intercity system will not occur until 2027, when extensions of this line are completed. Yet, the system is simultaneously advertised as both transformational and a proven technology, a logical inconsistency. In essence, the proposed SC maglev from Washington to Baltimore is no more than a Beta-test of an operational system to be built contemporaneously with the Japanese Beta-test system.

Finally, while the system is claimed to be transformational, this is only partly true. The system is unusual in that the trains are not independently propelled, but by no means unique. The SC magnet systems on the train cars and the guideway systems together comprise the "engine". It is an AC electric motor unwound into a linear geometry. Both the cars and the guideway are needed; either one alone does not work. Linear traction systems are not transformational, and the best historical example is the famous San Francisco cable car system, where the train car is pulled by a cable and has no motor. Electric street cars and buses have a motor but electrical power is delivered using overhead wires, and the Washington DC Metro is powered from a 3rd rail. The transformational part of the SC maglev is the high speed achievable through the use of superconducting magnets for propulsion and within a dedicated guideway, which is itself part of the engine. However, transformational technologies bear a greater burden of proof and validation to be acceptable for immediate public use, with both safety and a sustainable business model being prime challenges. Historical examples of disastrous transportation systems that claimed to be transformational include the Titanic, the Hindenburg, the Challenger & Columbia Space Shuttles, and the Concorde. The common element among these examples was a costly technology that benefitted primarily a wealthy clientele and it was safety that triggered their demise. (It is noteworthy that after the Challenger disaster the US government shifted the use of Shuttles away from launching commercial telecom satellites).

C. **Effects of COVID-19:** All the economic projections appear to be done using traffic studies that appear to pre-date COVID-19. The proponents acknowledge reductions experienced in mass transit systems (pgs 2-8, 2-10, 2-14), but such reductions are not mentioned in the traffic analysis, section 4.02 and its appendix. Two paragraphs in Section 4.6.3.2 (pg. 4.6-12 and -13) argue that telecommuting might make the SC maglev more attractive for commuters going into their office only a few days per week. However, higher telecommuting rates might also lower commuter ridership below the viability threshold. In sum, the sensitivity of ridership and hence economics to telework has not been adequately explored. The situation is clearly dynamic and the proponents offer no projections for the post-COVID-19 world. To be sure, it is expected that recovery from the pandemic will return the transportation and economic sectors to some normal but that normal may not be the same as pre-COVID-19. Both government and business have embraced telework at levels never before seen. Traffic studies should be repeated before an FEIS is released.
https://www.pymnts.com/travel-payments/2020/post-COVID-19-battle-for-business-travel-rages/

II. Major Deficiencies

A. **Transportation (and SUMMARY):** The traffic analysis has severe flaws. It does not list the O/D pairs used to generate ridership nor discuss how sensitive results are to input values. More fidelity should be present in the results in Tables D.2-15 and D.2-16. Nevertheless, the current results do not support the claim that the SC maglev reduces regional roadway congestion compared to the NO BUILD option. Indeed, it makes things slightly worse.

NO commuter in Greater Laurel (population 140,303) or Greater Greenbelt (population 31,777) is likely to use the maglev for daily commuting. It goes against common sense. Ground truth, based on a long history of observation, agrees well with the MWCOG and BMC models and existing analysis along the BWP. This also suggests that much cheaper alternatives (e.g., a 3rd lane on the BWP, Amtrak, MARC), refurbishment of interchanges, and diligent road maintenance can restore LOS to acceptable values without resorting to the expensive SC maglev.

Two other factors have great importance. First, the SC maglev ridership is predicted to devastate MARC and Amtrak operations, which would likely have to be scaled back thus reducing ridership options. Second, the proponents have not discussed the impacts on ridership should their future goals of northward expansion come to fruition. The proposed SC maglev designed as a Baltimore – Washington corridor commuter train could not be easily expanded to accommodate these goals without either reducing the local ridership and costly expansions with extremely adverse environmental and social consequences.

B. **Economics (and SUMMARY):** The Economics discussion suffers from severe gaps and omissions. By limiting the property value discussion and calculations to just areas surrounding stations and the TMF, the Long-Term (Recurring) Market Responses may vastly underestimate adverse impacts on all communities in between the BWI and DC stations. Extensive new calculations should be done and these should include the MOWs, Tunnel Portals, FA/EE facilities, plus all portions of the tunnels & viaduct. Moreover, a larger radius of 1.5 miles is appropriate. Similarly, the short-term costs in lost time to travelers (and residents) not associated with the project should be examined quantitatively.

The nature of the large range in predicted short-term impacts on business costs needs to be explained. The proximity of the maglev to the BWP may lead to additional automobile accidents; a quantitative analysis should be done.

Finally, the SC maglev is in direct competition to the MARC and Amtrak systems, and to a lesser extent bus transit operations and even airline flights. Building the SC maglev puts the MARC and Amtrak systems in jeopardy in the Baltimore – Washington corridor. Upgrading the MARC and Amtrak according to present NEC plans and long-term goals would solve most of the regional traffic problems at far less cost.

With an average ticket cost of $60 one way a yearly commute would cost $30,000, which is far beyond the means for the median household income in all jurisdictions in the combined Baltimore-Washington Statistical Area. Thus, the SC maglev is a project that would disproportionately benefit the wealthy. The benefits would not be equitably distributed.

The DEIS currently limits comparisons ONLY between the J- and J-1 BUILD OPTIONS and the NO BUILD option, but planned upgrades to roadways, commuter rail (MARC), intercity (Amtrak), and bus are included in the NO BUILD (Section 3.3.1, pg 3-8). A variant on the NO-BUILD option should also be investigated, namely adding a 3rd lane to the BWP in each direction. While this has not been examined it is likely a much cheaper option than the SC maglev and without the staggering adverse financial, social, and environmental consequences. In effect under the J and J-1 options, the SC maglev would already function as a 3rd lane with a sizeable "toll". A 3rd lane on BWP has been consistently rejected on the grounds that it destroys its scenic nature. However, the proposed maglev, towering over the BWP, certainly does just that.

C. **Neighborhoods: Prince George's County (and SUMMARY):** The lack of a station in Prince George's county means "no gain for much pain" during both construction and operation phases. The omission of a station in the BWRR plan is intentional and probably non-negotiable since the speed profile (Fig. A2-2, Appendix D.10, pg 10.6-29) shows the train only achieves its maximum velocity for a 25-km length starting in the tunnel south of the south portal and extending throughout the viaduct to the north portal. A station in Prince George'**s** county, especially along the viaduct, would make it impossible to achieve maximum velocity (300 mph) for any reasonable length, thus extending the travel time and defeating the fundamental purpose for building the system.

Economic impacts, particularly property value losses, are discussed in item II.B in both this document and the Part 2 document. There are other severe impacts, particularly along the viaduct. The proposed haul routes will flood all major local roads and even minor roads in Greater Laurel and Greater Greenbelt with hundreds of trucks per day. The synergism of so much construction and its associated traffic going on essentially simultaneously in years 2-4 will likely produce gridlock in many locations. Proposed mitigation measures are unlikely to be sufficient to prevent this. Businesses will suffer loss of income and both residents and travelers (especially on the BWP) will suffer significant delays making their time schedules uncertain and frustrating.

By way of an example, impacts for both alignments were examined in detail for that portion of South Laurel that lies just south of the BWP/Rt197 interchange, some 4000 residents divided into 6 communities encompassing apartments, condominiums, townhomes, and single-family homes. Weekday construction traffic is likely to effectively cut off these communities from Greater Laurel for a 34-month period, and there are numerous weekend road closures at the BWP interchanges. Maglev ramps over BWP/MD197 exit and entrance ramps will drastically reduce LOS and elevate accident rates. EMI interactions with cars has been ignored in the DEIS, but may cause failure of some car systems, such as anti-lock brakes. The very existence of the elevated viaduct will block TV antennae, cell phones, direct TV and solar panels for the nearest unlucky residents. Mitigation measures may reduce noise and vibration impacts during construction but they cannot eliminate them. The question of vibration impacts on water wells and geothermal heat pumps has been ignored. The aesthetics analysis shows the South Laurel communities will have high visual impacts and the rendering analysis is incomplete. Finally, the J alignment would require the displacement of the Snowden family cemetery, which the reviewers here find both disrespectful and obscene.

In summary, the South Laurel communities will suffer severe and unacceptable impacts in property values, traffic flow, EMI, noise, vibration, and aesthetics during construction and operations. Residents will see it, hear it, feel it, and fight its traffic problems each and every day. Quality of life will degrade. The synergism of all these impacts will change the nature of the communities, becoming more urbanized and without any benefit.

D. **Safety (and SUMMARY):** There are a host of technological safety issues left unanswered by the DEIS on essentially all critical components (SC magnets, SC coils, refrigeration systems, guideway coils, guideway design, train car design and performance, power grid interconnections). There are no results given for component and system tests done by the JRC. There is no discussion of technology compatibility with US standards. The FRA has outlined five Compliance Measures, but the proponents have supplied for this DEIS almost nothing but notional plans. The operational success of the system hangs on the ability to import and cultivate the culture of safety that exists only at the JRC. No detailed training or staffing plan was submitted for the DEIS. Finally, major gaps exist over a wide range of topics in Operations Safety particular those relating to dangerous debris on the guideway (e.g., biological, snow/ice, foreign objects launched onto the guideway), viaduct evacuation, and unanticipated events (e.g., train breakdowns).

E. **Security (and SUMMARY):** The methodology used for evaluating hazards is gravely incomplete, as the discussion neglects Low-Frequency High-Severity events, such as 9/11, the Oklahoma City bombing, the Tokyo sarin attack, and the London subway bombings. The SC Maglev has a higher probability than normal for a rail facility to be the target of a terrorist attack. The described defenses are passive and will not deter vandals, criminals, or terrorists from attacks for example on the viaduct guideway. Because passengers sit essentially inside the engine, planted bombs (timed or suicide) will produce far greater fatalities than other rail systems as critical SC subsystems are nearby, which may suffer secondary explosions. Plausible nightmare scenarios exist both for High-Value Targets (NSA, Secret Service Training Center) and Low- to Medium-Value targets (BWP traffic, homes, and buildings located above tunnels and near the viaduct). There are numerous vulnerabilities including launching of objects on the viaduct (in person or by drone), attacks on the

control center (physical or cyber), and passenger screening. The DEIS discusses none of this in any useful detail.

In conclusion, the extremely short Safety and Security sections are mere outlines, lumped together, and with few details and large gaps. This borders on negligence and suggests that neither is a high priority for the proponents.

F. **Energy (and SUMMARY):** The regional supplier PJM has sufficient generation capacity to meet the SC Maglev's requirements. However, transmission is congested in the Baltimore-Washington area and a TFS would determine what modifications to the grid might be needed. These would add cost and schedule delay to the project. Most importantly, the impact on grid reliability is unknown and potentially very dangerous. The DEIS does not discuss grid isolation to prevent damage in case a system failure on the SC Maglev dumps power back on the grid. Finally, there is no discussion of how the maglev would react to partial or complete power outages during operation.

G. **Environmental Impacts:** The SC maglev, associated facilities, and its TMF, regardless of which location is chosen, will threaten the missions of both the BARC and the PRR, both of which are premier research centers with 100-year histories. It is not just a case of acres lost to the maglev footprint, but adjacent areas will also be affected. The reviewers dispute the belief that any amount of mitigation or best practices, no matter how well intentioned or in conjunction with participating agencies, can completely eliminate severe impacts, which will be felt far downstream into the Chesapeake Bay watershed. Of particular worry are the impacts on Beaver Dam Creek, which serves as the reference stream. The areas impacted are biologically well-studied landscapes that have yielded important discoveries. They also retain their original biodiversity and contain numerous threatened species of plants, insects, and birds. There will be an irreplaceable loss of biodiversity, which cannot be recreated elsewhere. Additional adverse impacts with the loss of green space include reduction in cooling, carbon and air filtering, and eco-focused recreation. In summary, the aggregate impacts on wildlife, flora, waterways, wetlands, and farm land will be both devastating and permanent, especially for both the BARC and the PRR.

III. Other Deficiencies

A. Despite the efforts in public involvement the reviewers here were not informed of the maglev until after the scoping process had ended. The maps in section 5 show only a single public meeting in the Greater Laurel area (Figure 5.3-2, section 5.3.4, pg 5-15), where it might be expected that opposition would be strongest. Nevertheless, the discussion on pgs 5-16 to 5-18 from communities along other alignment choices indicate strong concerns on all of the topics presented here and on others. It appears that few comments were of unqualified support. The petition on the TNEM website solicits ONLY support.

B. The transfer of Federal and publicly owned land to a private firm sets a dangerous precedent with potential ramifications throughout the country. Further transfers will be that much easier to justify as other entities nibble away at what remains. Inevitably the last large green space in the Baltimore Washington corridor will be destroyed permanently.

C. **Utilities:** The single paragraph in Section 4.20.5 (pg 4.20-4) dealing with temporary utility disruptions during construction constitutes only a promise "to minimize temporary service disruptions to the greatest extent possible," and to grant "prior notification of outages to affected utility users." This is primarily an electricity issue but possibly also water service. It is also a life-threatening issue for people who may be at home but on some level of life support. (Hospitals usually have emergency generators; nursing homes might not.) In cold weather it is also an important issue for homes that depend on electric heat pumps of on electric baseboards to supply heating. (Even gas furnaces require electricity for control.) A detailed plan is lacking.

D. In Section 4.06 (pg 4.6-10), BWRR received a railroad franchise from the Maryland Public Service Commission in Nov. 2015. In Appendix G10 (pg 10), the BWRR claims: "As a franchised railroad BWRR has the power to construct power generation for its facilities pursuant to its franchise and Certificate of Public Convenience and Necessity (CPCN)". However, there is no discussion in the DEIS of either expertise or a track record at BWRR or TNEM in constructing or running a railroad, much less in state-of-the-art technology like the SC Maglev. Their websites advertise expertise only in project development, engineering, construction, and finance. Staff photos show no technical or operational personnel and none are mentioned. A single engineering contractor firm is found in the Appendices (Louis Berger, now called WSP); their relationship to the sponsor is not explained.

E. There is no management plan or organization chart for the project sponsor BWRR. The only schedule is top-level only in Appendix G7 (pg 0).

F. There is no discussion of a commitment to hire US citizens as employees or US contractors. There is no discussion of a commitment to hire small business and/or disadvantaged business contractors.

G. There is no discussion of technology proprietary to the JCR.

H. If the project collapses who pays for removal? After the 2006 Lathen disaster, the German test track was approved for removal, but some 15 years later it is still waiting, a slowly decaying eyesore. Damage to the PRR and other environmental assets will be permanent, even were the SC Maglev removed. ROM cost estimates for removal and a notional plan (schedule, materials disposal) should be provided in the DEIS and reserve funds set aside in case of project collapse.

ENDORSEMENT

The comments and opinions in these documents are endorsed by the Montpelier Woods Homeowners Association Board of Directors. These documents are submitted as a good faith response to the call for public comments on the SC Maglev DEIS 15 January 2021. Some reviewers have chosen not to reveal their identity. The reviewers are residents of Montpelier Woods, Laurel, MD.

PRINCIPAL REVIEWER CURRICULUM VITAE

- Ph.D. in Physics and Astronomy, Northwestern University 1982
- Retired 2017 from 33+ years as a federal employee (Astrophysicist) at the U.S. Naval Research Laboratory (NRL), Washington DC
- Vast experience in analysis and scientific interpretation of ground- and space-based astronomical data, R&D of technologies for ground and space applications, and management of both R&D and space-flight programs
  - 49 publications Principal- or Co-author in refereed scientific journals, 76 meeting presentations
  - Principal or Co-Investigator on 18 proposals that secured $9.4M in competed funds from internal (NRL) and external (primarily NASA) sources
  - World-renowned expert in R&D of multilayer diffraction gratings. Other areas of R&D expertise include X-ray/EUV detectors at both room and superconducting temperatures.
  - Science and/or Technical participation in national and international orbital space-flight missions: HEAO-1, HEAO-2, Spartan-1, ROSAT, ASCA, Hinode (Solar-B), USA on ARGOS
  - Rocket Scientist: 3 NASA sounding rocket missions (J-PEX)
    - 2 as Project Scientist,
    - 1 as Principal Investigator
  - Team Leader or Principal Investigator on 5 major proposals for orbital satellite missions (proposal values in the range $40M-$147M)
  - 6+ years as a Contracting Officer Representative, managing a portfolio of ~20 contracts with a total value of ~$45M

REVIEWERS

Michael P. Kowalski, Principal Reviewer
Elizabeth L. Hobbins, Co-Reviewer
Deborah O. Barrett, Co-Reviewer

XCIV. Appendix - Reprint: Kowalski, M. "SCMagLev DEIS Part 2 – Detailed Comments – NO BUILD v4.0." 2021.

SC Maglev DEIS Part 2 – Detailed Comments – NO BUILD

Table of Contents

Notes:

1. Not all sections in Part 1 have a counterpart here in Part 2.
2. All acronyms used in Parts 1 and 2 are defined in Appendix A of the DEIS.

I. Critical Deficiencies

B. Maglev Critical Components

1. Section 3.1 gives no technical information on the critical maglev system (SC magnets, train cars, control system). The MDOT project website has only a figure which identifies the SC magnet systems as critical components that operate at superconducting temperatures produced by Liquid Helium (https://www.bwmaglev.info/index.php/overview/what-is-scmaglev). Since critical components (coils) are also installed on the guideway and its engineering design is critical to operation, the guideway also is a critical component. The provenance of this system is the Yamanashi test track, but little technical information can be found on its website. A useful top-level technical summary, including photographs of SC subsystems and conceptual basic operation is given at: https://en.wikipedia.org/wiki/SCMaglev , which includes photographs of a magnetic bogie and of levitation and guidance coils. The only technical information in the DEIS is found in two recent references found in Appendix D.11 EMI (ref 24, pg 10; and

ref 30, pg 11) and the comments below assume the information in these references is valid for the DEIS proposed SCMagLev.

2. The Japanese system uses Nb/Ti superconducting magnets; Nb (niobium) and Ti (titanium) are commonly available elements with a wide variety of applications. The Nb/Ti alloy has a transition temperature to superconductivity of ~10 K, thus requiring liquid Helium (He) as a refrigerant. These magnets appear to be mounted in bogies (modules). SC magnetic bogies (and SC coils) are located only on the train and are used for propulsion and work in conjunction with propulsion coils on the guideway, the latter being powered at 8 Hz. Levitation and guidance coils within the guideway are passive and when the train exceeds 90 mph the induced magnetic forces are sufficient to both lift the train and keep it centered in the guideway. At lower speeds the train rolls on rubber wheels, which are retracted once it levitates. A location sensor allows each train to travel in its own electromagnetic bubble with no power applied to the guideway propulsion coils in locations without a train.

For an adequate review of this DEIS, an example of the some of the basic data needed was published in 1994 (https://www.osti.gov/servlets/purl/10150166) for versions of the MLU001 and MLU002, but these data are now obsolete. Some dimensions of the train cars are given in Appendix G4 (Table 4.1, pg 4).

Notwithstanding the references in Appendix D.11, many technical questions remain:

- A 16-car maglev train has 34 SC magnets and 136 SC coils. Figures are shown and data are given for the magnets.

  - It appears from the figures that each train car (including the nose cars) has an SC magnet on both sides, accounting for 32 SC magnets. What is the purpose for the other two? Where are they located?

  - What is the purpose of the SC coils, where are they located, what do they look like, and what is the relevant data?

  - How many joules of energy are stored by the current circulating in each SC magnetic and SC coil?

  - Forces data are absent.

    - § What nominal forces (newtons) are exerted by the SC elements during acceleration? At maximum speed? During deceleration?

    - § What nominal forces are exerted by guidance and levitation elements at maximum speed? During turns?

    - § What maximum forces (newtons) are exerted by the SC elements? How close is this to the design limit for the SC elements?

  - Where are the SC magnets and coils fabricated (in Japan or in the US under license)?

  - What is the expected lifetime of SC magnets and SC coils?

  - How sensitive is train operation to degradation or failure of single or multiple SC magnets and SC coils?

- How sensitive is train performance to magnet or coil replacement? What procedures are required to replace failed SC magnets and SC coils? Do replacements require precise physical alignment or magnetic field trim and/or calibration?

- Are repairs to SC magnets, SC coils, guideway coils, communication equipment, etc. all done in the TMF or are these elements returned to Japan? In either case, how many spare units of all types are kept on hand for fast replacement?

- Is any of the SC technology proprietary?

· Train car and train set data are absent.

- What is the width and weight of train cars (not given in Appendix G4)?

- What gaps exist between train cars? How do gaps affect performance? How do gaps affect train noise production?

- Describe the rubber wheel system for velocities < 90 mph (number of wheels, locations, deployment mechanism, door mechanism, deployment time, etc.). How are the train cars kept centered on the guideway when the tires are being used?

- Train weight data are absent.

  § What is total weight of a train unloaded?

  § What is the total weight of a train loaded with passengers/luggage to total capacity?

  § The kinematic performance of trains will vary with train weight. Does the system modify propulsion forces to accommodate different train weights?

- Is there any “checked luggage”? Where is it stored? What is the available volume per car?

- What are luggage weight & volume allowances, carryon and checked (if any)?

- Where are the train cars fabricated (in Japan or in the US under license)?

- Does the rolling stock arrive with SC elements already mounted or is this done in the TMF?

- Is any of the train car technology proprietary?

· Describe in detail the Inductive Power collection system used to provide on-board power in train cars for lighting, AC, electronics, etc. Is any of this technology proprietary?

· Describe in detail the communication/control system (hardware, software, operating modes, etc.) Is any of this technology proprietary, to whom, and what are the conditions under which it is being used?

· Describe the guideway propulsion coils, levitation coils, and guidance coils: materials, dimensions, weight, nominal current and current limits, etc.

- How many of each type are there along the alignments?

- Where are they fabricated (in Japan or in the US under license)?

- Are they installed in the guideway sections prior to mounting or after mounting?

- Electrical Supply

  - § Describe electrical and signal connections along the guideway?

  - § Are all cables on the inside of the guideway? If not, describe outside cables?

  - § Are coils grouped in sectors? If so, describe groupings.

  - § If one sector loses power how much time is required to switch to an alternate interconnection?

· Obviously, guideway sections will not be all identical as the guideway has to bridge rivers, ramp up and down different grades and slowly curve both to the left and to the right over the 40-mile run.

- What alignment tolerances are required on mounting guideway sections?

- What are guideway loading values?

- Figure 2 in Appendix G.7 (pg. 0) shows only the top level schedule, and item 13 shows that guideway/system installation is a long process lasting from Qtr1/Yr1through Qtr1/Yr7. Elements for both the tunnel and viaduct sections may be precast or cast on site using traditional methods; installation may involve subcontractors. Precast substructure elements will be staged at identified laydown areas. Where are guideway sections fabricated and by whom?

- Describe guideway switching mechanisms

  - § At stations

  - § At TMF entrance/exit

- The majority of Yamanashi test track heritage is within mountain tunnels affording stable climate conditions. Only about 5 km (3 miles) of the run does not have overburden (Fig. 11 in Japan Railway & Transport Review No. 68, Oct 2016), which is split into 5 main segment each about 1 km long. There are also a number of much shorter segments without overburden. Three of those km-long segments are within about 8 km of the start, where the train has not yet have achieved maximum velocity. In contrast, for example the J alignment, the single Maryland viaduct section, is much longer ~21km/13mi, and all of it is operated at maximum velocity.

  - § Climate data show that the prefecture including the Yamanashi test track has an average temperature range of 36-84 degrees F, while the average for Maryland is 23-87 degrees F. However, the standard deviation and extremes must also be considered. Have Maryland climate conditions been compared to those for the Yamanashi test track and/or the Japanese EIS for its extension? Such comparisons are necessary to determine whether required tolerances can be maintained.

  - § Long-term weathering of the guideway must also be taken into account. How often must guideway sections be replaced in the viaduct?

- Train-guideway distances are absent.

§ What is the nominal horizontal distance between train cars and the guideway?

§ What is the minimum distance between train cars and the vertical guideway wall on curves at 300 mph (give both values, if different for left-hand and right-hand curves)?

§ What is the minimum curve radius (give both values, if different for left-hand and right-hand curves)?

§ How does the applied power curves and force curves vary for left-hand and right-hand curves?

§ Is the guideway banked to accommodate turns? If so, give bank angle vs curve radius relation.

o It appears that elevation/plan drawings in Appendix C Part D do not give guideway turn radii at appropriate locations. Inspection shows that over the total distance of both alignments, northbound trains will execute at least 4 yaw maneuvers; yaw-left, yaw-right, yaw-left, and yaw-right.

o Is any of the guideway technology proprietary?

· In Appendix G.9 (Capital and Construction Costs) items 50-100 are blank. These elements book the costs of rolling stock, presumably including their SC magnet bogies. None of the sub-elements of element 10 Guideway and Track seem to book their SC magnets. Yet the grand totals (after including escalation costs) are in rough agreement with the $10-$12B total costs shown for top-level Project Construction Costs in the bottom row of Table ES4.3-2. It strains credulity to expect that the SC-maglev critical components and the rolling stock together are negligible costs. So where are the costs of these critical components booked? Are these components (in kind) part of the $5B loan from the Bank of Japan?

3. Complex refrigeration systems are needed to liquefy He at -452 deg F (4.2 K) but Figures and discussion in Section 3 do not show any such systems in the TMF. In Section 3.3.2.6 Power Facilities, it states that liquid He (hereafter LHe) “would be supplied in sealed, temperature-controlled containers that would be transported to the SCMagLev project and stored in the TMF”, but there is no other discussion of LHe in the DEIS. Nevertheless, from the Appendix D.11 references it is clear that each SC magnet bogie must have its own refrigeration system.

· A number of local commercial suppliers of LHe exist and deliveries are usually done by truck to a variety of customers (e.g., scientific use, medical MRI). Do local suppliers have sufficient capacity to provide the required LHe and still meet obligations to other customers?

· The magnet refrigeration systems have LHe storage tanks which have superinsulation and liquid Nitrogen (LN2) to prevent the rapid warming and boil-off to gas that would otherwise occur if LHe was exposed directly to room temperature. Do the SC magnets and SC coils arrive at the TMF prefilled with LHe?

· These refrigeration systems (often called cryogenic) are closed loop but must be continually supplied with electricity. Otherwise, enough heat from the outside would eventually conduct inwards to boil the LN2 and then the LHe. Re-liquefying the entire contents of a storage tank that has gone completely gaseous may not be possible (and is energy intensive) without removing the gas

to a separate facility. What is the time that a refrigeration unit can remain without power and still be able to re-liquefy whatever gas has boiled off?

· While the refrigeration systems are closed loop (sealed) systems small amounts of gas boiled off as a result of residual heat might escape the system. How often do the LHe systems have to be "topped off"?

· **Cost:** He gas is perhaps the most non-renewal of all non-renewable materials, and alternatives for achieving low temperatures are both still in development and more expensive. While He is the second most abundant element in the universe it is relatively rare on planet Earth. Even worse is that He gas is so light that when released to the atmosphere it floats to the top and eventually leaves planet Earth. Moreover, the He atom also diffuses through many materials such as the rubber/plastic of a birthday balloon. So every He birthday balloon that has ever been inflated is contributing to the irretrievable loss of He from the planet. About 10% of present He gas usage is in balloons. He gas is a by-product of natural gas mining but only a few mines produce it. The US is fortunate to have good mining capacity and to have built a strategic government reserve in the early 20th century. Unfortunately, the government reserve is being privatized, which has produced extraordinary volatility in the price of He gas. Of course LHe includes both the cost of the gas and the sizeable cost-per-unit-volume of liquefying the gas. With COVID-19 temporarily reducing the demand for birthday balloons the price of LHe has temporarily stabilized to ~$20/liter. Unless new sources external to the US can make up the difference, that price is expected to rise rapidly after the pandemic. Proven reserves suggest that the world supply of He might last from 25 to 200 years at present consumption rates, perhaps less if large SCMagLev systems become common.

  o How much LHe is used in each SC magnet and each SC coil refrigeration system?

  o How much LHe is used total by each train?

  o Given the total number of trains in use and the expected replenishment rate, how much LHe is needed yearly for operations?

· **Safety:** There are standard MSDS sheets with routine safety procedures for handling LHe and LN2 cryogens and transferring these liquids into storage tanks. However, there are at least two critical safety questions:

  o The first concerns rupture of storage tanks from, for example, physical damage caused by incidents whether accidental (e.g., train wreck) or intentional (e.g., vandalism, terrorist attack). LHe boils to gas explosively on contact with normal air temperature when storage units are ruptured. Thus, there is both a shock hazard AND an asphyxiation hazard as the He gas then displaces breathable oxygen, the extent of both hazards depending upon the amount of LHe in the system being ruptured. (Similar arguments hold for LN2 in the storage tank insulation jacket.) The DEIS Safety section (Appendix G.6, Section 4.21) require the project to identify hazards and develop safety plans. Note that LN2 is also used for cooling SCMagLev equipment in addition to SC magnet refrigeration systems (Section 4.18, Table 4.18-3, Broadband Emissions row, pg 4.18-9).

  o The second critical question involves SC magnet "quench". One reference in Appendix D.11 describes the SC magnets as "quench free", but no details are given and this claim must be verified. If SC magnets reach a temperature greater than the material (Nb/Ti) transition temperature the material instantly transitions to the normal temperature resistive state hence losing its functionality. This also releases the tremendous amount of energy stored in the current, which may be sufficient to damage or destroy the magnet and nearby equipment, perhaps including the LHe storage tanks, thus causing a secondary explosion. What guards are in

place to prevent magnet quench, especially during operation? If such an event occurs during operation at high speed what procedures does the system take to minimize effects and preserve life?

o The DEIS gives no details beyond top-level about the command/control system. This requires great elaboration in any FEIS.

· **Future Upgrades:** So-called "high temperature" superconducting materials that require refrigeration but NOT to LHe or even LN2 temperatures are in development. One favored material is $Bi_2Sr_2CaCu_2O_{8+\delta}$. There are many technical hurdles, but research continues and great strides have been made. Can the proposed SCMagLev be retrofitted in the future with high temp superconductors? If not, an uncomfortable situation could develop where the system became obsolete shortly after construction was completed.

II. Major Deficiencies

A. Transportation

1. **Traffic Analysis:** Do the MWCOG and BMC regional traffic models accurately reproduce the present traffic count rates and reliability indices? In Section D.2E.2 (Appendix D.2, pgs E-115 to -118) the Project Sponsor adapted these models for the maglev traffic analysis. To determine potential ridership, the Project Sponsor identified travel volumes between key origin/destination O/D pairs (Appendix D.2, pg B-104). The choice of (O/D) pairs might influence ridership results and a large number of pairs spanning the entire Baltimore Washington corridor is necessary to understand traffic flow sufficiently. What O/D pairs did the Project Sponsor use? The ridership results in Table D.2-2 (Appendix D.2, Section D.2A.2.1, pg A-3) are 70,069 for the Cherry Hill station choice and 77,764 for the Camden Yards station choice. These are critical values of ridership for viability and economics. What is the sensitivity of those results to the input parameters (e.g., O/D pairs, ticket cost)? This might be expressed by putting an uncertainty range on the values based on all modeled results.

2. **Ground Truth Validation:** The SCMagLev alignments are parallel to the BWP throughout the entire viaduct and much of the tunnel sections. Therefore, for commuter car traffic between Baltimore and Washington the maglev will have its greatest effect, better or worse, on this major artery. Model analysis is often validated using direct experience (ground truth) and the application of common sense. The observations and conclusions summarized below come from the principal reviewer of this document, who commuted for 32+ years (1985-2017) from South Laurel (BWP/Rt197 or BWP/PowderMill interchange) to the U.S. Naval Research Laboratory in southeast Washington DC along the BWP to the "split" and then on Kenilworth Ave (DC 295), a distance of 21 miles. Note also that this reviewer habitually listened to WTOP traffic reports every 10 minutes for the duration of the commute, which is factored into the observations:

· From the MD197 southwards the bulk of traffic is going south in the AM rush hour and north in the PM rush hour.

· Local centers of employment (e.g., Ft. Meade/NSA, NASA/Goddard) and local commuting within Prince George's and Anne Arundel counties account for a smaller but significant stream of traffic that may be opposite to the rush hour bulk directions.

· Overall there has been a steady and even increase in traffic density and decline in reliability. Commuters have shifted travel times to accommodate so that "rush hour" is longer that an hour. In 1985 the typical commute was 30 minutes going south and 35 minutes going north. In 2017 that

commute had increased about 10 minutes in both directions. (Note that about half of this commute time was on Kenilworth Ave/DC295, which itself has gone through various phases of upgrade and repair.)

· Significant traffic backups and reduced reliability are generally caused not by high traffic density alone but by accidents, which may occur more frequently with high traffic density. Accidents mostly occur at/near interchanges, where turbulence to the traffic flow is introduced by merging automobiles.

· The accident rate decreased markedly after BWP refurbishments of the Federal portion (18 miles south of MD175) were completed, the first major repair campaign to be done since the roadway was opened in 1954.

o Repair, reconstruction, or replacement of all bridges, except for the I-95 bridge over the BWP (which is owned by the State of Maryland) and the NASA exit bridge (which is owned by NASA).

o Reconfiguration or reconstruction of six interchanges (MD32, MD197, MD410, MD193, MD202/450, US/MD201) excluding the I95 and NASA interchanges.

o Repair of underlying concrete slabs/joints and recoating with asphalt, widening shoulders on both sides of travel lanes.

o While a 3rd travel lane was not added, a long northbound exit lane from Powder Mill to MD 197 was added. The exit lane is critical in drawing off significant amounts of northbound PM rush hour traffic that is headed for points in Greater Laurel.

o The work was completed over a 3 year period (1999-2002) in phases, which successfully minimized traffic flow impacts.

· Overall, the BWP refurbishments reduced accidents, particularly because of improved (longer) merge lanes. Traffic flow greatly improved to the LOS in 1985.

· Note the presence of a 3rd lane traffic lane on the state portion nearer to I695 and on southbound of MD202 to the “split” also improves traffic flow in those portions.

· The present LOS on the BWP has slipped from the level in 2002 to that shown for the PM rush hour reliability index in D.4-6 (Appendix D.4, Section D.4D.2.4.2, pg D-39), which is about the same as that just prior to the 1999-2000 refurbishments. This figure chosen for the DEIS, taken from the 2019 Maryland State Highway Mobility report, is something of a worst case. The AM case is less severe, and this report has many informative figures and tables. There are several causes for this loss in LOS, among them:

o A relatively higher accident at the Powder Mill and Route 197 interchanges, especially southbound during peak AM, primarily because of the large number of cars entering the highway from the Greater Laurel area. The Powder Mill interchange was not included in the 1997-2002 refurbishment.

o The failure to regularly maintain the BWP surface. At one point in March 2019, speed limits between MD197 and MD198 were dropped to 40 mph because a plethora of pot holes had disabled many cars. This situation persisted for several months until emergency funds could be found to resurface the road.

o Growth in traffic volume.

- The principal reviewer's experience is not unique. Along the maglev viaduct section two regional entities can be defined (data taken from https://www.unitedstateszipcodes.org/):

  - Greater Laurel, including the incorporated City of Laurel, all zip codes that touch the BWP, and/or zip codes for those regions often referred to as satellites of the City of Laurel

    - 20707, 20708, 20723, 20734, 20705, 20763, 20755

    - Population: 140,303

    - Housing units (non-rental): 54,469

  - Greater Greenbelt, including the incorporated City of Greenbelt and one other zip code north of the BWP/I95 interchange that touches the BWP

    - 20770, 20769

    - Population: 31,777

    - Housing units (non-rental): 13,557

  - A good fraction of the residents in these regions use the BWP in commuting in the AM to points southwards and entering at MD32, MD198, MD197, Powder Mill Road, and MD193. It goes against common sense to expect any of them to drive north to the maglev stations in Baltimore or at BWI to then go south to Washington DC. A similar argument holds for the reverse direction.

In summary, obvious conclusions can be drawn from these observations:

- Refurbishing BWP interchanges (and those of other north-south arteries: I95, MD29) can increase LOS.

- Adding a 3rd lane to the BWP throughout its entire length would produce a high LOS without the SCMagLev.

- All roads require regular scheduled maintenance to perform at design limits.

- Common sense arguments belie any hope that any residents of Greater Laurel or Greater Greenbelt will use the SC Maglev for daily commuting

Finally, in Section D.2A.15.2 the mitigation discussion for every single work site subsection requires regional roads to be maintained in good repair. Funding for road maintenance is traditionally done using fuel taxes on trucks, but there is no guarantee that such taxes are obligated to any project. With the SCMagLev massive construction will be going on more or less simultaneously along the whole alignment for at least 3 years. Thus, road degradation will exceed the available resources to keep impacted roads in good repair.

3. Tables D.2-15 and D.2-16 in Section D.2A.5.4 (Appendix D.2, pgs A.5-25 to -26) do not give a complete picture of the modeling results. They should both be split into two tables that show AM and PM hours that include the peak periods (rush hour). Given its proximity to the maglev it is surprising that more entries along the BWP were not included in these tables. Motorists mitigate backups by choosing suitable alternate routes which may require a decision at each and every interchange along a freeway depending on their final destination (so-called "bailout traffic"). Without higher fidelity it is

hard to obtain a complete picture. The following links along major North-South roads should be included: BWP@MD197, BWP@I95, BWP@MD410, BWP@NewYorkAve (Kenilworth-MD50 split), I95@MD32, I95@MD198, I95@MD200, MD29@MD32, MD29@MD198, MD29@ MD200. Finally, a summation row should be included at the bottom of each table.

Nevertheless, the present results in Tables D.2-15 and -16 do NOT support the claim that the SCMagLev reduces regional roadway traffic volumes in the 2045 Horizon Year compared to the NO BUILD option. Indeed, for the BWP@MD198 entry the predicted volume increases compared to the NO BUILD by 1.79% and 0.24% for the Cherry Hill and Camden station alternatives, respectively. There are few negative values in the percent change column between NO BUILD and BUILD for the Cherry Hill option, and all of the negative values for the Camden option are less than 1%. Thus, SCMagLev operations do nothing to decrease traffic congestion problem on the BWP and in fact may make matters slightly worse.

Finally, it is difficult to reconcile the results in Table 4.2-3 (Section 4.2.3.4, pg 4.2-7) for the row "Diverted from Auto" with the results in Tables D.2-15 and -16. The results in Table 4.2-3 for 2045 are 14,877,281 and 16,480,393, depending on the Baltimore station. This is a daily average of 40759 and 45152, lumping weekday and weekends together. The net daily changes in Tables D.2-15 total just a few thousand. What are the origin points of the riders who diverted to automobiles? It appears to be somewhere other than the regions reported in Tables D.2-15 and -16, which samples primarily the intercity corridor and not the Baltimore and Washington city cores.

4. The operations plan developed in Appendix G4 assumes 16-car trains (each ~1300 ft long), which is what that Station platforms can accommodate. (Note that the BWI station is somewhat shorter, which implies that passengers to/from this station will be segregated into designated cars.) The service plan in Table 5.1 of this appendix calls for 8 trains/hour during peak periods. Given dwell times for boarding at BWI and for the desired turnaround time of 20 minutes or less at the end stations, it appears that 8 trains/hour is at or near maximum capacity. (Safety margins are discussed in item II.D in this document).

- How many total trains will the proposed SCMagLev need to function at peak periods?
- What is the maximum number of trains the system can accommodate?
- How many trains can the TMF accommodate?
- How many will normally be stored in the TMF overnight?
- How many trains are stored overnight at the end stations?
- How many reserve trains/cars are kept on hand?
- Are any reserve trains kept at the end stations during daytime operations?

Summing over rows in Table D.2-1 (Appendix D.2, section D.2A.2, pg A-2) the system capacity is 67,056 passengers per day in both directions, for a total of 134,112. The forecasted ridership in Table D.2-2 is 70,069 or 77,764 depending on the Baltimore station chosen, respectively. Hence the forecasted ridership is either 52% or 57% of this capacity. Capacity can only be increased by adding cars, which may not be possible for the given station lengths or by increasing the rate of trains. If the system is eventually extended to points north (Wilmington, Philadelphia, New York City, Boston) as advertised, how much of the original designed capacity is needed to accommodate passengers boarding in Washington for these destinations? To create additional capacity trains could certainly be added during off-peak times, but the system is advertised as making regular commuting to these locations possible, so off-peak times may not be popular. However, reducing the allocation of tickets to local (Washington-Baltimore) commuters would violate the basis on which the original system

was approved. The operators would therefore have to sequester tickets for local commuters at the level prior to any line extensions, and other alternatives (MARC, Amtrak) might no longer be available. Express trains are considered in Appendix G4, but, outside of the stations, there is only a single "track" in each direction in the Baltimore-Washington corridor, so the system might not be expandable to meet the new requirements. Horizontal expansion of the alignment in both the tunnel and viaduct sections would be both prohibitively expensive and come with further adverse environmental and social impacts surpassing the original construction. Moreover, additional trains might require expansion of the TMF and/or the addition of other TMF(s) further north.

5. In Section 4.2.4.4 (pg 4.2-10) the predicted diversion of MARC ridership to the SC Maglev is 32% of the annual MARC ridership on the Penn and Camden lines. In Section 4.2.5.4 (pg 4.2-12) the predicted diversion of Amtrak ridership to the SC Maglev is 94% of Amtrak ridership at the three stations. For MARC and Amtrak these reductions may prove catastrophic. (Bus systems also suffer high losses, but can adapt more readily by changing routes.)

6. In Section D.2A.5.2 (Section D.2, pgs A.5-21 to -23) MD 197 should be included in the discussion as a major East/West Roadway. It is similar to MD 32 in its southeast to northwest orientation at its intersection with the BWP, and the BWP/alignment interchange is a major node in the proposed construction. It should also be highlighted in color in Figure D.2-7. Similarly, the Powder Mill Road/BWP is a major node in the construction, and it should be included in the discussion and highlighted in Figure D.2-7.

7. Page numbering inconsistency: Appendix D.2 pg A-8 (file page 13) turns to pg A.4-9 (file page 14), i.e., the page number has "picked up" the section number. It then goes back from A.11-41 (file page 46) to A-42 (file page 47). This annoying inconsistency occurs in other pdf files. There should be a uniform system of page numbers.

8. In Table D.2-3 (Appendix D.2, Section D.2A.2.2, pg A-3) the rightmost column values for "Changes in VMT" do NOT equal the difference (NO Build – Build) for the 2030 Year. They DO equal that difference for the 2045 Year. What is the source of this apparent error? There is a similar but small discrepancy in the rightmost column in Table D.2-4 (Appendix D.2, Section D.2A.2.3, pg A-4) for the 2045 Camden Yards option.

9. In section ES.4.3.1, (pg ES-15) the number of jobs created by SCMagLev is given as 390-440. In Appendix G15 (Table 1, pg 2) the employment range is 1,350-2,080. What is the source of this apparent discrepancy?

10. The DEIS appears to lack a weekend service plan during which commuters are presumably absent. Thus it is difficult to separate the ridership calculations into weekday and weekend.

B. Economics

1. Much of the analysis appears to depend on Ridership Data Requests with multiple reports referenced for over several years (e.g., ref 2, pg 4.6-2; refs 7, 9, pg 4.6-3; ref 31, pg 4.6-13). The DEIS and appendices do not appear to include these reports or the data, nor can they be found on the BWRR or TNEM websites. However, like the O/D pairs chosen, without their inclusion it is impossible for the public to understand the basis on which the economic arguments have been made. For such a large project as the SC Maglev full transparency should be required, and the Ridership Data Requests should be included for public comment.

2. The economics arguments seriously underestimate adverse Long-Term (Recurring) Market Responses (Appendix D.4, Section D.4D.2.5.1, pg D-58) on communities in Prince George's and Anne Arundel counties and particularly along the viaduct portion. Calculations are done only for regions around the three choices for the TMF and around the DC and Baltimore stations. The region around the BWI station is ignored because of the prevalence of airport functions. Further the impact radius chosen for calculations is only ¼ to ½ mile. Together these choices produce: (a) increases in property values around the stations, as people are willing to pay more for housing within walking distance of transit, and (b) negligible losses in property value at both BARC site TMFs and minor losses at the MD 198 TMF. Further, the discussion emphasizes effects on the tax base, mostly ignoring losses in residential property values. To obtain a true evaluation of maglev effects on residential property values, the calculations must be redone:

· MOW, Tunnel Portals, FA/EE facilities, and all portions of the tunnels and viaduct should be included.

· A radius of ¼ mile is appropriate to tunnel portions since the primary risk to residents is the effect of vibration on basements and other foundations.

· Along the viaduct that radius should be increased, as suburban residential areas have less density and generally larger properties. Real estate agents use radii up to 1 to 3 miles in calculating residential property value "comparables"; a radius of 1.5 miles is a fair compromise. It is well-known that properties near train rails are not as highly valued. While the maglev train will not have a horn, noise, vibration, and visual impacts are still present. Section 4.4.4 (pgs 4.4-4 to 4.4-15) has a long list for both J and J-1 alignments of community regions in Prince George's and Anne Arundel counties with adverse aesthetic impacts, many evaluated as M to H. These will change the nature and feel of whole communities from suburban to urban/industrial, with a consequent negative impact on property values. While only a relatively small number of residents may be displaced, ironically those who remain will be the unlucky ones because of their proximity to the maglev. Along the viaduct a radius of 1.5 miles will capture losses in entire communities including Greenbelt, Greenbriar, Applewalk, Laurelwood, Pheasant Run, Montpelier Woods, Montpelier Hills, Montpelier, Snowhill Estates, Briarwood, Maryland City, and Russett. Results from all added regions (MOWs, portals, FA/EE, tunnel & viaduct) should be included in Tables D.4-51 and D.4-52 (Appendix D.04, Section D.4D.2.5.1, pgs D-64 to D-65) and in the discussion. Moreover, results in those tables should be separated into business and residential losses. This will give a complete, accurate, and fair picture of all tax revenue and property value changes.

· Property value losses are unusual in that they are incurred as early as the date that the maglev is approved, as realtors are obligated to inform potential buyers of potential adverse impacts, which certainly applies to the maglev in Prince George's county given both its short- and long-term impacts. However, losses are not accrued until the owner sells the house. It is even possible that losses could put some property mortgages "under water". Indeed, adverse traffic consequences during the construction phases will be apparent to buyers; many will not care to wait years until construction ends and will buy elsewhere, the losses to the seller then becoming obvious. Owners who then reluctantly decide to sell-out while they can at a loss will also pay an additional penalty (as do renters) for moving expenses as well as the challenges of uprooting a family and finding suitable housing that fits their job (commute) and personal situation. Owners, who wait longer hoping for property values to recover, might not be rewarded as the nature and feel of the community has changed irretrievably. Of course, owners also pay less in property tax, but simple calculations reveal that this offset comes nowhere near compensating for the loss in home value, even after decades. Sadly, long-term owners may not even realize they have suffered a loss in property value unless they

have carefully tracked home value and tax assessments year by year. In summary, residential homeowners along the entire length of either SCMagLev alignment will likely suffer a real monetary loss from maglev proximity, and to be fair these losses should be calculated and booked against claimed benefits. Just as important, these losses are not shared evenly in their county (or city) but suffered only by those who had the great misfortune to have bought a home without foresight that its location would one day be near to a maglev.

3. Section D.4D.2 (Appendix D.4, pg D-17) discusses short term impacts on business during the construction phase. (Note that in Section 4.6.3.2, pg 4.6-20, there appears to be an omission, as there is no discussion of business impacts at the Route 197/BWP interchange, despite the nearby presence of the Crystal Plaza.)

Regarding business losses it is stated on pg D-27 that "There is limited literature and no standard methodology that focuses on quantifying the social costs associated with the impacts that results from construction" and references are cited. The results in Table D.4-6 (pgs D-17 to D-18) show a wide range of uncertainty for every choice of Build Alternative (e.g., $18.5M - $233.5M for the preferred J-03 alternative). Is this large range a result of the methodology or uncertainty in input values to the methodology? Why are these results not broken down into separate geographical areas along the alignment where local impacts can be more easily seen? More importantly, despite the extremely detailed discussions on the great value of monetized time saved by maglev users, there is only a single qualitative paragraph (Section D.4D.2.2, pg D-24) and no quantization concerning the monetized time lost during construction by travelers not associated with the project during construction (a large portion of which are likely to be nearby residents). There should be, as it is not fair to evaluate time benefits quantitatively without also evaluating time costs. Why has this been ignored?

Finally, on revenue loss for businesses (e.g., food, entertainment, etc.) during construction there are a couple of sentences that strongly contrast in attitude with the numerous mitigations promised throughout (Appendix D.4, section D.4D.2.2.1, pg D-28): "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. By contrast, professional services transactions are less likely to be tempered as people are less willing to change dentists, lawyers or hair stylists once they have found a professional with whom they are comfortable. They are more willing to accept the travel inconvenience to visit the dentist that makes them comfortable and knows them." The first sentence is Darwinian, and the second leaves affected residents with the realization of the grim choices forced upon them. Together they introduce considerable doubt about the sincerity of promises for community involvement.

4. While neither MARC nor Amtrak has made service plans to mitigate the ridership losses predicted in the Transportation analysis, it is apparent that jobs will be lost, but without specific plans these losses cannot be quantified. However, in fairness, they should also not be ignored. The DEIS should state that a yet-to-be-quantified offset of the positive jobs economic impact of 390-440 produced by the SCMagLev (Section ES.4.3.1, pg ES-15: and elsewhere). Without precise job categories it is not yet possible to determine whether workers at MARC and Amtrak can transfer their job skills to the SC Maglev. Thus, it is possible that there may be no net gain in transportation jobs produced by the maglev, even possibly a loss. Moreover, the $24.3M-$27.4M in earnings from the maglev is approximately offset by competing transportation systems losses of $23.2M-$24.8M (year 2030) as shown in Table 4.6-2 (Section 4.6.3.2, pg 4.6-1). Similar calculations might offset gains predicted for the SCMagLev in other parameters such as emissions. In effect the SCMagLev may be

approximately neutral providing no significant gain in the transportation sector other than the time saved for which SCMagLev users have paid.

5. Section D.4D.2.4.7 discusses in quantitative detail the benefits produced by reduced accident rates because of the predicted decrease in auto traffic when the maglev becomes active. It ignores the possibility that the accident rate along the BWP might actually increase as result of the maglev during both the construction and operation phases, a true irony indeed. There are certainly data which can be used to quantify the accident rate during highway construction. During operations the "startle" effect, which is caused by aerodynamic noise at portals, will be mitigated by hoods (section 4.17 pgs 4.17-11, -13, and 4.17-19). However, while there may be less noise, the close proximity of the elevated SCMagLev to the BWP will make each and every train passage visible to BWP automobiles (e.g., Appendix D.6, Section D.6.1.3.3, Figures D.6-32 and -33, pg 6-14 at BWP/PowderMill Road, and Figures D.6-38 and -39, pg 6-44 at BWP/alignment). Train passes will be comparable to landing large jet aircraft, but at much closer distances than at airports. For the J-alignment the viaduct and train passages will both cast a shadow on the BWP at times in the morning, particularly during winter months. For the J-1 alignment options, the afternoon sun will cast shadows particularly during summer months. Motorists may be distracted by train passages both by direct observation and by shadow, thus resulting in accidents. The possibility of increased accident rates on the BWP should be investigated quantitatively, as increases may reduce or completely offset claimed benefits in accidents.

6. The expected average cost of a 1-way SCMagLev ticket is given as $60 (Appendix D.4, section D.4D.2.5.4, pg D-81), which is slightly more than Acela, 4 times greater than Amtrack or auto, and nearly 8 times greater than MARC. A yearly commute (50 5-day weeks) would cost $30,000. Only wealthy people can afford such an expense and 30% of the predicted maglev non-airport ridership (Table D.4-19, Appendix D.4, section D.4D.2.4.1, pgs D-35 to D-36) is expected to be commuters. Such costs are far beyond the means of most households. In fact, no one making the median income of all the jurisdictions show in Figure D.4-3 (Appendix D.4, section D.4C.2, pg C-11) can afford to commute to work on this train.

7. What value has been assumed for the cost/liter of LHe and with what margins to accommodate market fluctuations (see item I.B.3 on this document)? Given the total amount of LHe required for system charge and for replenishment if any, what are the total costs? Values should be booked in the spreadsheets in Appendix G.9.

8. The Total Capital Cost column (rightmost) in Table D.4-8 (Appendix D.4, pgs D-21 to D-22) ranges from $13.8B to $16.2B over the 12 alignments. Projects Construction Costs in Table ES.4.3-2 (Section ES.4.3.1, pg ES-20) and on spreadsheets (including escalation) in Appendix G.9 are in the range ($10.6B to $12.4B). What is the cause for these differences?

9. The DEIS gives the total positive jobs economic impact produced by the SCMagLev as 390-440 (Section ES.4.3.1, pg ES-15). Appendix 15 (pg 1) puts the total manpower requirement as 690-750. What is the source of this apparent discrepancy?

10. Recommend that Table 4.6-2 (Section 4.6.3.2, Appendix 4.06, pgs 4.6-1 to 4.6-2) include another row at the bottom of the tab le showing Net totals (a summation) from all previous rows: Values for 2030 are $28.1M and $45.l for (J-01, J-02…) and (J-04, J-05…) alignments, respectively. Values for 2045 are $78.4M and $108.4 for (J-01, J-02…) and (J-04, J-05…) alignments, respectively.

11. Appendix G15 states that O&M cost information is proprietary, and thus the FRA has agreed to accept an O&M staffing analysis. Presumably this is temporary. Given that taxpayer funds are liable to be solicited, financial viability is a major concern and important details (such as debt service costs)

need to be disclosed before a ROD can be made. Will BWRR be required to reveal to FRA a complete detailed costing plan before a ROD?

12. Minor error in page numbering: In Section 4.06 page numbers start at 4.6-1 through 4.6-9 (pdf file pg 13) at which point the numbering system starts over again, the next page being 4.6-1 (pdf file pg 14).

C. Neighborhoods: Prince George's County

Economic impacts, particularly property value losses are discussed in item II.B in both this document and the Part 2 document. There are other severe impacts in Prince George's County, particularly in Greater Laurel and Greater Greenbelt along the viaduct. Item 1 discusses haul routes across these regions and Items 2-7 below discusses community impacts in more detail for one example, namely that portion of South Laurel that lies just south of the BWP/MD197 interchange. Similar arguments could be presented for communities just north of the intersection, such as Montpelier Hills and Montpelier, and those near the BWP/MD198 interchange, such as Maryland City and Russett.

1. **Haul Routes:** Haul Routes are needed to remove soil and other debris and for materials and precast structures (as much as 10.5 ft in width) to be transported from staging areas (e.g., Konterra) to worksites and laydown areas. The haul routes are discussed qualitatively in Section D.2A.15 (Appendix D.2, pgs A-52 to A.15-91) and mapped in Figures 17-19 and Tables 13-15 in Appendix G.7 (Section 7.4 to 7.5, pgs 24-31). They show that both Greater Laurel and Greater Greenbelt will be flooded with several hundred trucks daily traversing all or portions of every major artery including MD193, MD197, MD198, MD201, and Route 1. Even smaller roads, some single lane each direction, will be pressed into service including Powder Mill Road, Contee Road, Muirkirk Road, Odell Road, Springfield Road, Soil Conservation Road, Beaver Dam Road, and Brock Bridge Road. Some of these are inadequate in size and load bearing capability (e.g., Beaver Dam Road, Brock Bridge Road) and will have to be upgraded. In Appendix 11, the Alternatives Comparison Maxtrix (pg 10), for the sponsor's preferred alternative (J3) would require 2.25 million truck trips, an unfathomable number. As most construction is complete by the end of year 6, this would amount to 1,500 trucks per day, although during peak years 2-4 the daily rate might be much higher. Moreover, these trucks would not be spread out evenly along the alignment but concentrated along haul routes, at laydown locations, and at work sites.

Traffic control maps in Appendix G.2 Part I (TCP 13 – TCP 41) show traffic control restrictions will affect both NASA GSFC and NSA. Road closures will require long detours. Depending on the selected alignment and location of the TMF not all these roads will be used. However, most of the proposed haul routes are common to both alignment choices and any choice of the TMF. A number of mitigation measures (truck lanes, truck turning lanes, retiming signaled intersections, traffic studies, dedicated contact number) are proposed, but there is a high likelihood that extensive backups will be created daily starting with the AM rush hour as workers arrive and which, because of the truck traffic, do not dissipate during the day, thus extending to after the traditional PM rush hour. Note that many haul routes from staging to laydown areas have turns at narrow intersections, thus making the transportation process both difficult and slow. <u>In summary, the synergism produced by so much construction traffic (workers & trucks) may well produce extensive gridlock in major parts of Greater Laurel and Greater Greenbelt, thus drastically reducing quality of life for many of their combined 172,080 citizens and lasting at least 34 months.</u>

2. South Laurel communities south of the BWP/MD197 interchange

- Townhouse/Single Family: Pheasant Run (north side of MD197)
- Single Family: Montpelier Woods (north side of MD197), Snowden Pond (south side)

· Condominiums/Apartments: Applewalk, Laurelwood, The Villages at Montpelier (south side of MD197)

Other: Halltown, and approximately a dozen homes along Snowden Road and MD197 apparently unaffiliated with homeowner's associations

· Population (July 2020) (https://maryland.hometownlocator.com/maps/address/)

- 1544 north side of MD197
- 2439 south side of MD197
- Total: 3983

The DEIS has grossly underestimated construction phase impacts. While only a few homes will be displaced by eminent domain, on other topics the discussion is confined largely to the 500 ft LOD. All communities south of the BWP/MD197 interchange will be severely impacted during the construction phase.

Construction Traffic: The traffic impact on the BWP/MD197 worksite is shown in Table D.2-33 (Appendix D.2, section D.2A.15.2, pg A.15-86) A total of 51 trucks per day and 190 worker vehicles will be arriving/leaving for viaduct and electrical substation construction. This is an enormous amount of traffic concentrated in a very small region, amounting to 1 truck every 11 minutes in the unlikely event that truck arrivals were evenly space throughout the day. Workers will arrive at 7 am and the construction area will be active 7 am to 4 pm daily. Viaduct construction is scheduled to last 34 months over years 2-4 and substation construction for 24 months over years 2-6. For the J alignment there will also be a 200x90 meter laydown at the present Harley Davidson site. The laydown for the J1 alignment will be at the Suburban Airport site accessed by Brock Bridge Road. Both alignments will have a laydown at Powder Mill with 45 trucks and 90 workers arriving daily. An additional 56/44 trucks and 112/90 workers will arrive at Beaver Dam Road if either the BARC west or BARC east site is selected along with 145 trucks and 150 workers for the South Portal Construction site. Greenbelt and Soil Conservation Roads will provide access to this site.

The DEIS quotes traffic counts on MD197 of 28,700 daily but with the following description: "MD 197 is two lanes in each direction, with the two directions separated by a grass median." (Appendix D.2, section D.2A.15, pg A-56) It should be clarified that the grassy medium disappears within about 100 meters north and south of the interchange. Also, as the laydown is on the south side of MD197, vehicles must cross MD197 to bring these materials to work sites north of MD197. Moreover, for the J-alignment there are construction activities for Support Facilities SCM SVS 07 (adjacent to the northbound BWP MD197 exit lane) and SCM SVS 08 (west of southbound MD197 and between the northbound flyover exit lane and northbound BWP). Together with the laydown activities, there will be severe traffic impacts during the construction phase on the northbound MD197 exit lane from the BWP.

A traffic count of 28,700 daily for MD197 is not trivial. Moreover, MD197 narrows to a single lane each direction just south of the South Laurel Drive intersection which is well within the LOD. All six South Laurel communities listed above access the outside world only through MD197. Those on the north side have 3 minor roads accessing MD197, only one of which is signaled (Snowden Road). Those on the south side have only two access roads, also only one of which is signaled (South Laurel Drive). All but two access points to MD197 for these 6 communities are essentially within the 500 ft LOD, and the two exceptions (Basswood Drive, Snowden Pond Road) are not signaled, despite repeated appeals by residents to implement a signal. Residents leaving their homes will encounter

huge delays just getting onto MD197. These delays will introduce uncertainties in all travel, whether for commuting to work, basic trips for shopping, medical appointments, etc.

Their travel problems will not end even after escaping the local BWP/MD197 tangle for in almost all directions they will encounter additional construction traffic and activity at other construction sites and so yet more delays: at Powder Mill Road, at Brock Bridge Road (for the J-1 alignment), at Contee Road, at MD198, and construction-related congestion on the BWP in both directions. Even the only escape route to the nearest alternate grocery stores in Bowie (>6 miles distant) along MD197 will share the construction traffic up to Powder Mill Road. Weekends will not be exempt as roadblocks are scheduled to be set up on 4 weekend days, closing BOTH MD197 and the BWP at the alignment, something that was never done during the 1999-2003 refurbishment of this interchange. There are also a host of road closures scheduled at/near the BWP/Powder Mill and BWP/MD198 interchanges and other roads (Table 23, Section 6, Appendix G8, pg 35). In summary, the ~4000 residents of South Laurel will be effectively cut off from the outside world during the construction phase, some 34 months.

Finally, much of the WSSC facility at Canadian Way in South Laurel is well within the 500 ft LOD for Alignment J viaduct construction and the additional 6 meters of work area appears to extend right up to the WSSC boundary (Appendix G2, Part G, pg 22; Appendix G1, part A, pg 36); Support facility SCM SVS10 sits just west of the viaduct. Appendix G7 (Section 17.3, pg 79) states: "Discussions have been initiated with the Washington Suburban Sanitary Commission (WSSC) about the potential use of a parking lot for one of its administrative facilities as a TBM retrieval shaft and future FA/EE location. No major WSSC infrastructure is expected to be impacted." The second sentence, underlined here for emphasis, strains believability. Also, Canadian Way, which will be heavily used for access to the worksite, is the sole access for WSSC workers. There is no other discussion about the South Laurel WSSC facility in the DEIS.

3. **Traffic Impacts during Operation:** Even after construction, viaduct crossovers on the entrance/exit lanes of the BWP/MD197 interchange will continue to have great adverse impacts on car traffic flow, thus contributing to accidents on both roads and degraded LOS.

· J alignment (distances measured from Appendix G, Part A, pgs 34-35):

o The northbound BWP exit ramp at MD197 serves northbound MD197 by way of a flyover ramp and bridge over MD197 southbound. Approximately 334 meters of that is under the viaduct. Thus, the viaduct elevation at STA124+400 is planned to be ~14 meters above the flyover ramp grade and ~28 meters above southbound MD197 grade (Appendix G, Part E, PP-56). The flyover ramp is at a slight angle to the viaduct and emerges from under it for another ~222 meters (although displaced eastwards no more than 18 meters) before finally curving to the left to merge with the MD197 northbound. The merge comes right at the location where the flyover ramp again ducks under the viaduct for a distance of ~53 meters. Thus, the right-hand merge with the northbound MD197 traffic comes at highway velocity in permanent shadow from the viaduct. Under these conditions there is an extremely high probability for accidents.

o The northbound BWP also serves MD197 southbound by an additional lane that splits to the right (east). There is ~230 meters of travel under the viaduct before the additional lane curves to the right, around what is planned to be the laydown area, until it reaches a point perpendicular to MD197 at a traffic signal, allowing traffic to turn left or right. A left turn at this light allows residents of Pheasant Run to turn right on Mallard Drive to access their community. Going straight along Snowden Road allows access to Montpelier Woods. Turning right and traveling short distances allows subsequent right turns at South Laurel Drive (for Applewalk, Laurelwood,

and The Village at Montpelier), at Snowden Pond Road (for Snowden Pond), or to continue on towards Powder Mill or points further south on MD197 (Bowie).

o The entrance lane from northbound MD197 to the northbound BWP would have a similar length of 90 meters directly underneath the viaduct beginning right at the split from northbound MD197 thru traffic.

· J-1 alignment (distances measured from Appendix G, Part B, pgs 35-36):

o The southbound exit from the BWP to MD197 will go under the viaduct for a distance of ~58 meters before emerging several hundred meters before the signaled intersection with MD197, now reunified into a 2-lanes both directions.

o The loop entrance from northbound MD197 to southbound BWP will have a ~61 meter section under the viaduct.

o The viaduct is within 10 meters of the southbound BWP travel lanes for distance of ~590 meters starting just north of the MD 197 southbound exit until the viaduct crosses over southbound MD197.

o The entrance ramp to the southbound BWP from southbound MD197 is long and will be directly under the viaduct for ~459 meters.

· Common to both alignments: The long stretches of roadway in excess of 38 or even 50 meters directly underneath the viaduct do not permit the use of single hammerhead column supports for the guideway (drawings TY01 and -02, Appendix G2, Part D). Rather straddle bent mountings (TY-04) will be required. In the constricted geometry around the interchange, it is not clear whether even these mountings will fit. However, any modifications of the exit/entrance roadways to snake around viaduct mountings would defeat the careful engineering of the BWP interchange refurbishment, introduce dangerous conditions that lead to accidents, and likely result in slowing exit traffic from the BWP to the point where backups occur onto the BWP.

Analyses similar to that above for the BWP/MD 197 interchange can be done for the Powder Mill, MD198, MD 32 interchanges. The latter two along with the MD197 interchange were part of the BWP refurbishment (1999-2002) and were designed to minimize accidents and improve traffic flow. Traffic impacts might be marginally less severe for the MD32 (full cloverleaf) and MD198 (half-cloverleaf) interchanges because of the design of their on/off ramps and because the BWP crosses them at an angle closer to perpendicular.

<u>However, in summary the overall picture is that the proximity of the SCMagLev viaduct to the BWP introduces complicated challenges to motorists at the interchanges, leading to a great potential for accidents and significantly degraded LOS flow on the BWP and on all four roads that have interchanges with it (Powder Mill Road, MD197, MD198, and MD32).</u> Moreover, the viaduct mountings will essentially lock-in the proposed modified design of the interchanges, making it virtually impossible to correct any flaws or even to modify them in the future.

4. There are potential sources of EMI interference.

The first potential source of EMI interference involves cars traversing entrance/exit ramps under the viaduct (see item II.C.3 above). For the J-alignment cars on the northbound BWP flyover exit ramp to MD197 are traveling approximately 14 meters under the viaduct for a distance of 334 meters (1102 ft). If one includes all 3 segments (directly under, just east, directly under the viaduct) of that exit ramp the distance is 609 meters (2010 ft). For an exit speed of 30 mph the car transits in

25 seconds or 46 seconds for the two choices, respectively. However, an SCMagLev train of length 396 meters (1300 ft) (Appendix G4, Table 4.1, pg 4) and moving at 500 km/hour (300 mph) will completely traverse its own length over a car in ~3 seconds. Thus, traverse events where cars are under/near the viaduct for the entire duration of the train passage will be quite common especially at rush hour times.

· Any car systems that are susceptible to a magnet field varying at 8 Hz may be threatened. Note that a minimum viaduct distance of 20 ft was determined for humans, and while there is adequate discussion about interference to sensitive receivers, there is no discussion about cars.

o In Table D.11-6 (Appendix D.11, section D.11.1.5.1, pg 11) the measured field 7.5 meters from the Yamanashi train was 2680 mG. Applying the inverse square law for the 14-meter distance of the car this is reduced to 769 mG at the car, a value that is 128 times larger than that (6 mG) of the car itself (Table D.11-7). A second measurement of 200 mG in Table D.11-8 (pg 11) at 6.7 ft horizontal, 26 ft vertical distance is reduced to 81 mG at the car, still a factor of 13 greater than the car itself. While these values are comparable or less than that of the Earth's natural background field of 470 mG it is their time varying nature (8 Hz) that makes them a potential threat.

o One such car system is the Anti-lock braking system which has a magnetic Hall-effect sensor in each wheel and triggers braking at 15 Hz, close to the 2nd harmonic of 8 Hz. (Note that a Doppler shifting will increase the fundamental frequency for oncoming trains and decrease it for receding trains, but for e-m radiation the shift is infinitesimal even at the maximum train velocity, and thus can be disregarded.) Together with fields in the range 81-769 mG, there is some probability of the SCMagLev passage causing a malfunction of the anti-locking braking system. Roadways directly under the viaduct are prime areas for ice to collect in cold weather with water dripping off the viaduct, making it critical to have properly functioning anti-lock brakes. Note that the suggested use of warm water to remove snow/ice from the guideway might lead to extremely hazardous conditions on roadways beneath if the water is not properly channeled to drainage systems as part of the storm water removal process.

o For the J-1 alignment, similar arguments hold for the ~590 meter (1947 ft) stretch of the southbound BWP and for the 459 meters (1515 ft) southbound MD197 entrance ramp to the BWP (item II.C.3 above).

o There may be other car systems that are susceptible to EMI from the SCMagLev. Using data bases of materials, equipment, and designs from car manufacturers, a thorough investigation involving theory, modeling, and test should be made of all car systems operating at or near 8 Hz and its harmonics.

· In Appendix D.11.1.6.2 (Appendix D.11, pgs 14-15) the statement is made: "No impact would be expected, as the SCMAGLEV project would operate on different frequency bands. The FCC allocates different bands of the electromagnetic spectrum for different uses: cellular phones, radio control equipment and other communication devices have dedicated bands so that EMI cannot occur." While the premise is true, the conclusion (underlined here for emphasis) ignores another class of problems, namely that of line-of-sight interference.

o The elevated viaduct is a large dense structure (possibly filled with grounded rebar). It has large currents flowing for propulsion, levitation, and guidance and its coils are likely surrounded with grounds. Thus, it has the potential to block direct line-of-sight signals from TV transmission towers, cell-phone towers, and direct satellite transmission. These signals have much higher frequency than 8 Hz and thus have much lower acceptance angles for reception.

§ For the South Laurel communities listed above lines of sight from rooftop antennae to both Washington and Baltimore TV transmission towers would cross the viaduct and depending on elevation might be blocked. A sizeable number of active TV antennae have been installed in these communities as cable TV has lost its popularity, and these could be effectively blocked by the viaduct. Moreover, lines of sight to the cell phone tower in the Crystal plaza might also be blocked.

§ Homes close to the viaduct on its north side (e.g., in Montpelier Hills, Maryland City, Russet) might have blockage of direct satellite reception, as all such satellites are at relatively low altitudes in the southern sky.

§ The cell phone tower in Crystal plaza sits near a laydown area for the J-1 alignment. Would this transmitter have to be moved? If so, where would it be relocated?

o For the J-1 viaduct, homes close to the viaduct on its north side would experience a shadow from the viaduct. Any investment by homeowners in solar panel energy would be reduced in value.

· In Section D.11.1.5.3 (Appendix D.11, pg 13) the text appears to misquote reference 33 (Ohsake, H.). The text reads: "a 16-car SCMaglev train would be comprised of 34 total superconducting magnets and 136 superconducting coils. The magnets use Bi2223 superconducting wires, each with a maximum flux density of 5.2 T". The numbers of magnets and coils are taken from slides 8 and 9 of that reference, but in that case the superconducting wire is Nb/Ti, which requires LHe cooling. Bi2223 is discussed in slides 16-20 of the reference, but (a) the "wires" are actually implanted in a resin (REBCO), and (b) there is no need for LHe cooling. Since the proponents have indicated on their websites and in the DEIS of the need for LHe (Section 3.3.2.6), it is concluded here that this is a misquotation, but one however that does not affect the argument in this section as the only operative number is the maximum flux density of ~5 T. In this document it is assumed that that Nb/Ti wires and LHe cooling are being used.

5. **Noise & Vibration:** The discussion of noise and vibration in Section 4.17 and Appendix D.10 is confusing.

· Operation Phase Noise Impacts

o Background noise was measured at the locations of 20 receptor locations involving 4000 receptor sites within an 800 ft screening distance (Table D.10-6, pg 10-14)

o In the discussion in section D.10.4.2.1 and the counts in Table D.10-7 the units are not given. Are these counts/day or some other unit of time?

o It appears that the results given in Table D.10-6 are the predicted total counts (moderate/severe) summed over all receptors, thus for the alignments. If so, then the predicted counts at each receptor location should be given.

o There are 104 train passages (Table A1, pgs 10.6-27 to -28) each day in both directions for a total of 208. There are 9 receptor locations (N3-N9) in the viaduct region (disregarding N20 at the MD198 TMF), all at locations where the SCMagLev is moving at maximum speed. One would expect a total of 9x208 = 1872 counts daily (moderate+severe). Yet the totals over the alignment are in the approximate range 500-660. Is there a range of noise output for every train passage? Why this difference?

o In Appendix D.0.4.2.2 (pg 10-18): FRA predicted airborne noise up to 2,100 ft from the guideway. This impact distance is due to a combination of the aerodynamic effects of high-speed train operations, the elevated guideway and the low background noise level.", where (ref 7) "The FRA impact criteria are based on a sliding scale whereby low background noise level result in more stringent thresholds". The net effect is that most if not all in the South Laurel communities will likely be able to hear the train passages 208 times every weekday of the year (somewhat less on weekends) regardless of whether the noise levels exceed the formal definition of moderate or severe. Note that this is a periodic noise source, which is much more annoying than a random source.

o Proposed mitigation measures include track design, tunnel portal design, augmented parapet walls, and sound attenuation walls. The first three of these are probably more effective but more costly. Some of them would be difficult or impossible to implement once the line is built and in operation. The last measure, sound attenuation walls, is the most common, but would effectively destroy the scenic view which defines the BWP. Moreover, the train's minimum elevation of 10 meters over grade might render such barriers ineffective. In summary, the DEIS does not address the noise problem sufficiently.

· Construction Noise and Vibration Impacts: Sound attenuation barriers and non-impulsive equipment must be mandatory.

· Operation Phase Vibration Impacts: The analysis has important omissions.

o The Methodology is based on the FRA's *High-Speed Ground Transportation Noise and Vibration Impact Assessment* guidelines. These guidelines do not assess the sensitivity of ground water wells, sceptic systems, or geothermal heat pumps.

§ At least four properties in the Montpelier Woods community in South Laurel have geothermal heat pumps at distances in the range of 2300-2800 ft from the guideway. More are planned, and it is possible that they exist in the other South Laurel communities or elsewhere along the alignments. All implemented systems use vertical ground loops of depths in the range 300-600 ft. Geothermal heat pumps represent considerable financial investment by the property owners.

§ The extent of well usage and sceptic systems is not known to the reviewers of this document, but cannot be ruled out in South Laurel or elsewhere along the alignments.

§ It is mandatory that a survey of properties along the entire alignment be made, especially in tunnel areas to ensure that no geothermal heat pump loops or wells are destroyed.

o The analysis is based on "typical" soils (Appendix D.10.2.2.2, pg 10-12). The FRA guideline states (Ch 8, section 8.2.1, pg 8-5): "It is well known that there are situations in which ground-borne vibration propagates much more efficiently than normal. The result is unacceptable vibration levels at two to three times the normal distance. Unfortunately, the geologic conditions that promote efficient propagation have not been well documented and are not fully understood. Shallow bedrock or clay soils are often involved. One possibility is that shallow bedrock acts to keep the vibration energy near the surface. Much of the energy that would normally radiate down is directed back toward the surface by the rock layer, with the result that the ground surface vibration is higher than normal."

§ Appendix G13 gives extensive geotechnical profiles along both alignments but it is not clear how far these profiles extend in directions towards communities near the alignments.

§ Other geological data bases might be used if they cover the affected communities with sufficient spatial resolution.

o In summary, the vibration analysis should be redone for communities near the alignments assuming "efficient" soil propagation if no other data are available. Lacking guidelines, calculations should be based on first principles and/or on analogous systems. The end question is at what distance from the maglev is it safe to use wells and geothermal heat pumps?

· Operation Phase Noise-Induced Vibration Impacts: Noise-induced ground vibrations at 8 Hz may also affect car systems near and/or under the viaduct, but Doppler shifts for trains arriving and receding the moving cars must now be applied to determine the relevant harmonic frequencies. The auto's rubber tires might sufficiently attenuate such vibrations, but first principle calculations should be done using sound speeds appropriate for the soils given in Appendix G13.

6. **Aesthetics:** Aesthetic impacts were evaluated along both alignments including the entire viaduct and the TMF locations.

· Nine CAA (#5 - #13) used in Appendix D.06 to evaluate aesthetic impacts along the viaduct and the TMF locations (Figure D.6-1, section D.6.1.1.2, pg 6-7). Figures D.6-6 through D.6-14 map the locations. Regardless of the chosen alignment, Tables D.6-7 through D.6-9 show H (high) impacts for over half the locations evaluated with the remaining locations split approximately evenly between M (moderate), L (low), and RI (relatively imperceptible). The H locations are split about evenly between the alignments. As might be expected resources on the north side of the BWP show visual impacts for the J-1 alignment and resources on the south side show higher values for the J alignment.

· CAA #7 South Laurel residential areas show generally H visual impact with moderate to high sensitivity for the J alignment.

· Members of the Snowden family were early colonists of Maryland arriving in the 17th century. The family owned much of the land through which the SCMagLev would traverse, and they were friends of George & Martha Washington (who really did lodge there on trips north). Some of their iron mining operations, among the first in America, were located near where Brock Bridge Road crosses the Patuxent River. Active historic homes still dot the landscape and are on the National Register of Historic Places. These homes are operated by the M-NCPPC.

o Snow Hill manor at Contee Road and MD197 is 4000 ft from the BWP but the view is blocked by trees.

o Montpelier Mansion, located at Muirkirk road and MD197 is the historical and cultural centerpiece, with a full yearly program of events many of which are located on the east lawn towards the BWP. The mansion sits on a small hill approximately a half mile from the BWP and thus has a direct view of the SCMagLev J-1 alignment from across the Montpelier park. While this distance is formally just outside the 2,000 ft criteria, the lawn area is not. The reviewers of this document believe that the Mansion's historical significance warrants an exception and request that it be included in the noise and vibration analysis.

· In Section D.6..1.3.3 (Appendix D.06) the illustrative renderings along the viaduct are incomplete and deceptive.

o While the airplane views are useful in understanding the relationships between guideway and its facilities to the existing environment, aesthetics are evaluated on ground views. There are only three ground views along the viaduct, all of which are located from the perspective of a traveler on the BWP, not from a resident. This perspective reduces the incongruity of the maglev

by putting it in the context of another transportation artery, thus giving a favorable but unfair picture. Given the high visual impacts determined for residential neighborhoods additional renderings (before/after) are needed for both alignments:

§ J: Parking lot of New Life Christian Center (Pheasant Run) looking direct West towards MD197 flyover ramp; alternate location is parking lot of nearby 7-Eleven; a 3- or 5-photo mosaic would give a true picture of the immensity of the viaduct compared to its surroundings

§ J: Just at east edge of cul-de-sac on Pheasant Run Ct looking directly west towards MD197

§ J: northbound MD197 100 yds south of Canadian way looking toward split between northbound MD197 and northbound entrance ramp to BWP

§ J: Southern parking bay for 11742 S. Laurel Dr apartments looking WSW (260 deg east of north) towards 11746 S. Laurel Dr apartments

§ J: north side of gymnasium building belonging to Tabernacle church on S. Laurel Drive (south side of power ROW) looking WNW (280 deg east of north) towards BWP

§ J-1: Corner of Apache Tears Ct/Ispahan Loop looking ENE (20 deg north of east) towards Montpelier Hills townhomes at Ivory Fashion Ct

§ J-1: Corner of Muirkirk Rd/Hermosa Drive looking SE (120 deg east of north) towards Montpelier Hills Recreation area

o Two of the three renderings (Figure D.6-33, pg 6-41 and Figure D.6-39, pg 6-44) show the base of the mounting piers, which is open and free. Exact fencing locations are not given in the DEIS, but given safety and security concerns it is unlikely that viaduct piers such as in Figures D.6-33 and D.6-44 can remain unfenced, where any vandal is only an easy baseball throw from the viaduct. Figure D.6-33 and perhaps one more of the existing or additional renderings should show fences. Finally, fencing degrades with time and without regular trimming will become an eyesore with growth of invasive vines and weeds. Proper maintenance of fences and surrounding grounds is often reduced or eliminated when budgets become tight.

o It is disingenuous to use renderings in summer months when tree leaves partially camouflage. Deciduous trees are leafless approximately 5 months of the year, and to be fair worst case (winter months) impacts should be shown throughout. (The burden of proof should be on the proposers.)

7. Additional Community Impact: In Section 4.4.4.2 (Table 4.2-1, pg 4.4-5 and pg. 4.4-13) the J alignments would require the displacement of Snowden private cemetery within the PRR. (The word “displacement” in the DEIS is a euphemism intended to mollify.) Reburial would be done with consultation of the family and according to all applicable law. However, it is indeed sad that important historical ancestors could not be left to eternal rest in a 100x100 ft plot of earth.

D. Safety

1. Technological Safety

· Safety issues discussed in previous sections

o LHe: Item I.B.3

- SC magnet quench: Item I.B.3
- BWP throughway accidents: Item II.B.4
- BWP interchange accidents: Item II.C.3
- BWP interchanges EMI on automobiles systems: Item II.C.4
- BWP interchanges snow/ice removal: Item II.C.4
- BWP interchanges noise-induced vibration on automobile systems: Item II.C.5

· Describe results of component safety tests, including but not limited to physical tests, crash tests, theoretical modeling, standards applied, lifetime and material fatigue tests.

- SC magnets, SC coils, refrigeration system
- Guideway and coils (propulsion, levitation, guidance)
- Command/Control elements (including software)
- Train cars (normal and intermediate, car linkage); particularly important is the question of train car crumpling during back-end collisions
- Rubber wheels, mounting and retraction systems, wheel covers
- Guideway switching systems

· Describe results of system wide tests (Yamanashi test track, not predecessors unless relevant). Include results from performance, identified problems and solutions.

· Standards applied to testing and deviations from the baseline Yamanashi test track are absent.

- Describe standards of testing in Japan and compare to US standards.
- Describe any deviations in dimensions, materials, usage, values, etc., between the Japanese system (e.g., SC elements, train cars, guideway, turning radius, etc.) and those proposed for the SC Maglev.

· At 300 mph how would the train react to a bowling ball sized rock launched onto the guideway or a deer that had vaulted over the fence (even for a 10 ft fence, it has happened when a deer vaults from a slightly elevated mound)?

- On a curve during a momentary power failure could the train crash into the guideway walls, thus damaging or destroying guideway coils and SC magnet and coil systems and possibly generating secondary explosions (magnet quench, LHe storage tank rupture)?
- Could the rubber wheel systems be damaged making deployment impossible for one or more cars?
- How would train cars react if one or more wheels were damaged or did not deploy?

· At 300 mph, a train will cover 440 ft in one second. If a switch to an alternate substation takes even 100-msec the train has moved 44 ft, approximately half a train car length and has thus lost phasing with the propulsion coils.

o How much time does the switch to an alternate substation take?

o Will the train location device be able to find a train that is not where it expects it to be?

o What happens if a total grid collapse occurs?

2. Managerial Safety

· **Avoiding Hubris:** The 7 pages in the Appendix G6 Memorandum devoted to safety are little more than an outline. However, they do contain a statement (pg 4) that the reviewers here believe has no place in any safety document: "Unlike steel-on-rail systems, it is not possible for an SCMAGLEV trainset to derail due to the U-shaped design of the guideway and the stable dynamic performance created by the large magnetic forces." Admittedly it does contain an element of truth, for the maglev cannot derail because there is no rail from which to derail. However, by concluding that a derail is not possible the statement violates the culture of safety principle on which the Japanese system has been built. The statement can only be excused out of unfamiliarity.

o ALL complex technical systems have flaws, sometimes hidden, but waiting to be exploited by nature or by man, by intention (security) or by accident (safety). The more complex, the more hidden, and the likelihood of more catastrophic consequences. The "unsinkable" Titanic, the Challenger & Columbia disasters, Three-Mile Island, Chernobyl, and Fukushima are a few examples.

o It is interesting that the statement is qualified with the words "difficult for a vehicle to derail" in Section 4.22.3.2 (pg 4.22-7) and further qualified in Section 4.22.4.2 (pg 4.22-13) with an explanation that guideway walls constrain the vehicle to "prevent" derailment. The reviewers of this document dispute even that assertion, as discussed in item II.D.1 above.

· **SC Technology Heritage:** The true heritage of SC magnet technology lies not in transportation but in high-energy physics particle colliders. The levitating aspect of the SCMagLev is a new application, but the principles of propulsion and guidance of beams of subatomic particles have long been known to physicists. While dozens of small colliders exist spread across the world, the current pinnacle of success is the internationally supported CERN high-energy physics collider in Europe. This system is 27 km in circumference and contains nearly 10,000 state-of-the-art SC magnets, which are much larger than those designed for the SCMagLev. These SC magnets are maintained by an army of scientists, engineers, and technicians, who are leaders in the field of SC technology. While the SCMagLev has much more modest goals, the question of having staff members with adequate science/engineering expertise is still important

· **Importing the Culture of Safety:**

o The reviewers of this document acknowledge and salute the Japanese achievements and record of safety on SCMagLev technology.

o However, that record exists as yet only in Japan, not in the US. Importing and cultivating the expertise is not guaranteed.

o Compliance Measures #1 - #5 outline elements of a comprehensive safety program. Training is an essential part of the System Safety Program and Emergency Preparedness Plan to achieve

an adequate handoff of experience and understanding. Compliance Measure #3 - Inspection, Testing, and Maintenance, may requires a higher level of technical expertise.

§ How long is the training period? The challenges of achieving an experience level equivalent to 50 years should not be underestimated.

§ How many JRC representatives will assist in this training, testing, and commissioning?

§ How many JRC representatives will remain during operations?

§ Will JRC representatives be paid from project funds for training, testing, and commissioning?

§ Will JRC be available for consultation after operations commence?

§ The top-level schedule (Figure 2, Appendix G7, section 3.1, pg 6) show slightly less than 2 years of testing and commissioning. New trainees will not have access to a working US system for training before this time. Will US trainees go to Japan to obtain hands-on experience prior to operations?

o What staffing of US professionals with experience in SC technology is required during construction and during operation?

3. **Operational Safety:** A wide variety of issues must be addressed.

· In Appendix G, pt E, viaduct elevation plan drawing PP-55 shows change in grade from 2.43% at STA 122+800 to -0.51% at 123+800.

o A system may be safe but still provide an uncomfortable ride. What G-forces apply? Include 3-axis (pitch, yaw, roll) accelerometer spectrum.

o Are these results safe for people with medical conditions (e.g., heart problems)?

o Compare SCmaglev grades/G-forces to those in the Yamanashi test tract and its planned extensions and to other mass transportation modes (airplanes, bullet trains, commuter trains)

o Will seat belts be available for emergencies?

· There is no discussion of debris effects on the train during operations.

o Describe the aerodynamics of the nose on the end train cars. Does the nose shape produce any Bernoulli effect resulting in aerodynamic lift?

o The rounded nose does not appear to function as a “cow catcher” and might actually deflect debris downward under the train carriage. What is done to mitigate such damage?

o Deflected debris might damage train car undersides, wheels if deployed during the impact, and wheel doors when wheels are retracted (leading perhaps to non-deployment when needed).

o The intense magnetic fields will draw ferrous metal debris (e.g., metal food cans) towards the magnets toward the strong fields of the train’s SC magnets at the precise time the train is moving through the guideway. What is done to mitigate damage?

- Describe the operational sensitivity to biological debris.

  - High speed collisions with birds are likely especially given the proximity to the PRR, thus possibly causing damage to undercarriage.

  - Large amounts of autumn leaves and occasionally larger tree branches will be blown into the guideway.

  - Given the proximity of the PRR, insect collisions will be common. Most notably, Brood X of the 17-year cicada will emerge in 2021 and again in 2038. It is the largest brood in the US with densities up to 1.5 million/acre. Cicadas can easily fly to viaduct heights especially from nearby trees. Their tymbal frequency is 4.3 kHz but they are attracted to lawnmowers, weed-whackers, leaf blowers, power drills and anything else that vibrates. Thus, it is very likely that the viaduct would be covered with them in astronomical numbers, perhaps curtailing operations. They are most active during the day, and their life cycle is 4-6 weeks.

- The DEIS does not describe the snow/ice removal process in detail. Obviously snow events can occur during operations. The Northeast Maglev website suggests that hoods and a warm water sprinkler system might be used.

  - https://northeastmaglev.com/faq/#Technology

  - How does such a system drain to storm water to prevent refreezing hazards elsewhere?

  - How much power is required to deice the entire viaduct portion of the guideway?

  - How much water is used?

- Operational plans currently call for a nightly inspection, maintenance, and cleaning during 23:00-05:00.

  - The SC Maglev plan is apparently in reaction to the 2006 collision of a maglev with a maintenance vehicle in Lathen Germany. This resulted in 23 deaths and 11 injuries (10 severe). The cause was attributed to failure by the crew of the maintenance vehicle to follow proper communications protocol.

  - Despite the desire to avoid a repetition of that event, given the variety of natural (weather, biological) and manmade (material thrown onto the guideway or blown there by the wind) hazards as well as train and/or guideway breakdowns, it is certain that guideway operations will occasionally be suspended during the day for unanticipated maintenance, rescue, and/or cleaning.

  - TMF and Switching

    - Are all trains stored nightly in the TMF or are some stored at end stations after TMF processing in advance of next day operations?

    - How many trains can be stored in the TMF? How many trains can be stored nightly at end stations?

    - Are all trains processed (cleaned, inspected) every night in the TMF?

    - Describe the inspection process: train elements inspected, duty cycle, etc.

§ How many spare trains if any are present and where are they stored?

§ What is a train speed profile as it leaves a guideway for the TMF? As it enters a guideway?

§ In keeping with right hand running (Appendix G4, Table 4.1, No.5, pg 4), it appears that for all TMF choices the entrances appear to be from the northbound guideway and exits are to the southbound guideway. Is this accurate?

· Section 4. (pg 4.22-16) mentions the presence of an on-board crew

o How many individuals per train?

o What are their functions?

o Where are they located?

o Is passage between cars possible to provide first aid?

· Especially for J alignment, viaduct evacuation along the 3-mile stretch alongside the PRR from MD197 to MD198 would be difficult. First responders would need a well maintained and suitably sized access road. However, at least 15 busses would be required to evacuate a full train of 762 passengers. Building a suitable road into the PRR greatly magnifies the biological impacts. Alternately, the BWP would have to be closed for evacuation.

· Using the train speed profiles of Appendix G4, and a 20 minute turn around, a single train will complete a loop (and hence 1 train passage each direction) in 70 minutes (see also Table 3.4-5, section 3.3.2.9, pg 3-37). Thus more than 8 trains are required to maintain peak period service unless train turnaround time is kept to 15 minutes at both ends. (The minimum appears to be 10 minutes.)

o Do the end stations have sufficient room to house a spare train during peak service?

o What are the average and the minimum train-to-train distances during peak service?

o At 300 mph what is the minimum train stopping distance?

o Describe the emergency stop procedure.

o Even under computer control, there must be a margin of safety to avoid train backend collisions. This, plus passenger boarding considerations, will set the maximum hourly service rate?

§ What is this margin of safety in distance and in time?

§ What is the maximum hourly service rate?

o In the event a train becomes disabled at but makes it to an end station is the intent to add spare trains from the TMF without interrupting service?

o How are trains removed if they cannot make it on their own to an end station?

· There appears to be no discussion about the ticketing process, which may affect passenger processing and therefore system operations.

- Do riders buy a reserved ticket for a destination and a given train time or do they just buy a ticket and pick the next available train?

- In the former case, what do passengers do if their assigned departure train is unavailable because of a service disruption?

E. Security

1. The terrorism analysis in Section 4.22.3.3 (pg 4.22-7) is confined to Maryland and Washington DC for the period 2000-2017 and at the national level discusses only attacks on rail stations. They cite a low incidence level and suggest that attacks on other types of targets are more likely. These are gross oversights bordering on negligence. Low-Frequency High-Severity events (Table 4.22-1, pg 4.22-5) are the hardest to predict but are applicable to the SCMagLev. Note that attacks may be based on long-held or historic grievances. Relevant examples involving transportation infrastructure or conveyances include:

- Foreign Terrorism in the US:
  - Sept. 11, 2001
  - Mass transportation devices (aircraft) used as weapons
    - § World Trade Center
    - § Pentagon (just across the river from DC)
    - § Thwarted attempt presumed to target the US Capitol Building: had it succeeded the event would have only then been qualified for inclusion in the analysis in Section 4.22.3.3.
- Domestic terrorism in the US:
  - April 19, 1995
  - Oklahoma City
  - Truck bomb outside of Murrah Federal Building
- Domestic terrorism in Tokyo:
  - March 20, 1995
  - Sarin chemical attack
  - Coordinated attacks in the subway
- Domestic/Foreign terrorism in London:
  - July 7, 2005
  - Coordinated bombings in the subway
- Foreign terrorism in Madrid:

- March 11, 2004
- Coordinated bombings in the subway

· Greater Focus in US on Domestic Terrorism 2021

2. Previous incidents suggest a higher probability than normal for a rail facility like the SC Maglev to be a target. Possible motivating factors include:

· The SCMagLev is a US partnership with a foreign country.

· The technology may be perceived as eliminating US jobs.

· The technology is cutting edge.

· The system may be seen as a symbol, being the first of its kind in the US.

· Two High-Value targets are nearby: NSA and US Secret Service/James J. Rowley Training Center.

· Multiple Low-to-Medium Value targets are nearby: BWP traffic, homes and buildings both over the tunnel sections and near the viaduct.

3. SC Maglev Vulnerabilities

· The guideway does not physically constrain the maglev train. The train is ALREADY airborne. If for any unanticipated reason the guideway is breached or the train encounters a large heavy foreign object, a stopped train, or a ruptured (misaligned) guideway section, it will fly in whatever direction physics dictates. At 300 mph the cone of destruction will be long, and it will widen considerably as debris scatters off objects on the ground.

- SC Maglev Kinetic Energy
  - Assume: 1000 tons fully loaded train, based on approximate internet values for train cars
  - Speed: 500 km/hour
  - Kinetic Energy: 2100 MJ
- 767/200 used in the Sept. 11, 2001 attacks
  - South Tower impact Kinetic Energy: 3658 MJ
  - North Tower impact Kinetic Energy: 2540 MJ
  - http://web.mit.edu/civenv/wtc/PDFfiles/Chapter%20IV%20Aircraft%20Impact.pdf
- **Conclusion:** The SC Maglev has approximately the same Kinetic Energy as that of the aircraft that impacted the two World Trade Center buildings. Damage to objects on the ground can be expected to be comparable.

· The mostly passive defenses (fences, camera monitoring) described in Section 4.22 are more appropriate for criminal activity and vandalism than for resisting terrorists.

- Fences 10 feet in height will do nothing to deter vandals or terrorists from launching onto the viaduct guideway heavy objects that are larger than the gaps between train and guideway walls and floor.

- Commercially available drones can lift 40 lbs of debris, explosives, etc. onto the viaduct guideway

· The long viaduct makes it both hard to defend or even monitor completely. Response times to remote areas under attack will likely take much more time to arrive than for the attack to be completed. The number of security personnel (60-70) given in Appendix G15 is far too small to guard the system 24/7 effectively in addition to their other duties such as screening of passengers.

· Unlike other types of rail systems, maglev passengers essentially sit inside the engine, close to critical parts (e.g., SC magnets, SC coils), that themselves have explosive potential (item I.B.3).

· Nightmare scenarios

- While the train velocity vector normally points along the viaduct, an experienced terrorist team could blow up a viaduct mounting in advance of a train and collapse the guideway towards their target of choice. Even with power cut off, the train's momentum will do the rest according to the laws of physics.

- There is a single command/control center. Disable or destroy this center, and as many as 8 or more trains are in jeopardy.

- There are numerous communications relays any of which could be a targeted by itself or in conjunction with other attacks.

- Suicide terrorist bringing a bomb onto the train.

- Terrorist breaching TMF security and hiding a timed bomb on the train. (Note that careful screening of all personnel is necessary to prevent a terrorist from recruiting a worker or becoming a worker.)

- All of these scenarios or similar ones can be commonly found in video games, movies, and of course the internet. There is nothing unthinkable, classified, or particularly imaginative in any of them. While similar scenarios can be constructed for aircraft and normal trains, the maglev's unique status should be cause for more caution.

· For the MD198 TMF the train's velocity vector near MD198 (STA 130+000) temporarily points directly at the NSA although 2 miles distant. What is the train velocity on the exit ramp to this TMF? Are they on rubber wheels at this location?

· As described, the control/command system software will be vulnerable to cyber and other threats

- Command/control system should be isolated from internet.

- Redundancy in computer systems is critical.

- Power backup is necessary in case of local blackout.

4. It appears that TSA airport level screening will only occur at the BWI terminal. Given the probabilities (Item 2 above) and vulnerabilities (Item 3 above) it may be prudent to install TSA screening at the end stations as well. However, passengers would then incur significant time delays and this would also reintroduce the time uncertainties that the system hopes to avoid.

F. Energy

1. **Wind Power:** The BWRR has an ambitious plan to power the SC Maglev by developing, in partnership with an experienced affiliate, some 13 wind powered electric stations in western Maryland (Appendix G10). Existing transmission grids would be used to deliver power, and the total output would be 905 MW. None of these systems has been built yet. However, since they are small (70 MW) the approval process to obtain a CPCN exemption is not complex, although a public hearing is still required. The likelihood of final approval for this auxiliary wind power is not clear, but the question has little relevance as energy generation is not the driving constraint.

2. Energy Consumption

· Each train requires 35 MW during acceleration which is 0.02% of PJM generating capacity. Since 8 trains during peak periods are only 0.16%, it appears that existing generation resources are likely sufficient to meet the SG Maglev need even without resorting to additional wind power. The estimated total of 4 trillion MMBtus/year would represent an increase of 3.3-3.4 trillion MMBtu/year over existing consumption in transportation after subtracting the expected decrease in auto traffic. This is ~3% of the yearly energy requirements for the combined Baltimore Washington Area (Table 4.19-2, Section 4.19-2, pg 4.19-4), a sizeable fraction for a single user, which should therefore be viewed with concern. In times near peak loads who gets priority? Note also that if electric cars use becomes more prevalent or even dominant then the SCMagLev will be competing with electric car demands for the same resources making it certain that demand could not be met with current transmission capacity and perhaps even electrical energy generation.

· However, the critical constraint is not electricity generation, but transmission capacity, which is congested in the Baltimore-Washington area. With multiple trains needing power rapidly the SC Maglev needs are complex (Figure 4.19-5, section 4.19.3.2, pg 4.19-13) especially at peak periods (which overlap PJM peak demands from other customers. The question turns to the transmission capability for the 7 proposed substations (and another for the choice of TMF) given in Section 3.3.2.6 (pg 3-34). None of this is discussed in the DEIS.

To accommodate the SC Maglev PJM would respond to the project sponsor's application for long-term service by initiating a TFS, which might require grid system upgrades to mitigate adverse impacts on regional grid reliability. These modifications may require additional cost, responsibility and construction time. Recent events in Texas have highlighted the fundamental but perhaps little appreciated importance of grid reliability and its vulnerabilities to weather and other unanticipated events. The inherent risk that the SCMagLev poses to grid reliability is as yet unknown. It could be unacceptably large, and thus the project cannot be approved before a TFS determines impacts and solutions if any.

· What is the electrical usage during the maintenance period 23:00-05:00

- For each ancillary facility (substations, MOW, FA/EE, operations center, signals and communications)
- For train subsystem (e.g., SC magnet and SC coil refrigeration)
- For TMF activities

- For train transport to/from the TMF.

· Energy Usage on less than yearly scales

- What is the SCMagLev daily energy usage (integral under the curve of Figure 4.19-5 added to the usage during the maintenance period)?

- What is the weekly energy usage (weekends have reduced train operations)?

3. **Grid Isolation:** There is no technical detail on how the maglev electricity needs are buffered from the grid. Obviously surges to other customers must be avoided.

· If for example SC magnets quench will power be dumped back onto the grid? What level of surge suppression is needed to prevent damage to the grid and to other customers? For example, could solar panels be damaged?

· In the case of partial power outage, the system is supposed to switch to a different power substation (Table ES3.1-1, Section ES.3.1, pg ES-8). Could alternate substations handle the added power requirement, especially during peak service?

4. Apparent minor bookkeeping error: Appendix G.10 pg 5 pie chart sum is 186,788 MW installed generation capacity. Table Grand Total is 199,439.5 MW installed capacity (underlined here for emphasis. Why this discrepancy?

XCV. Appendix - Article Reprint: Davies, Ross. "Magnetic pull: China and Japan battle it out for maglev train supremacy." July 14, 2020. Railway Technology

Source: Magnetic pull: China and Japan battle it out for maglev train supremacy (railway-technology.com)
Magnetic pull: China and Japan battle it out for maglev train supremacy

By Ross Davies
14 Jul 2020 (Last Updated May 29th, 2020 12:42)

Notwithstanding the coronavirus crisis, Japan has revealed it will conduct tests of a new prototype train as part of its ambitious maglev line, while China looks set to double down on further floating projects. Elsewhere though, the maglev concept shows little sign of ever taking off.

Ever since it was launched in time for the 1964 Olympic Games in Tokyo, the Shinkansen has remained a source of national pride in Japan.

The story of the bullet train is also one of progress. When it first linked Tokyo to Osaka over half a century ago, it was at a speed of 210km/h; today, trains hurtle along at a clip of up to 320km/h, transporting over a million passengers a day.

But as the Shinkansen has developed into something of an institution – and emblem of the country's technological spirit – the next chapter of high-speed train travel in Japan has proven much harder to write. This sticking point has a name: maglev.

While Japan is already in possession of rail network based on magnetic levitation – the Linimo Line in the Aichi Prefecture, close to the city of Nagoya – it is considerably overshadowed by China's commercial maglev service, which shuttles travelers between Shanghai and Pudong International airport at 268mph (the Linimo runs at 62mph).

It has been over 17 years since the Shanghai Transrapid (its official name) commenced operations, yet it remains the world's fastest electric train. Tokyo – which first began exploring the merits of the technology in the late 1960s – is keen to steal a march on its longtime rival and unveil an even more ambitious maglev system of its own.

Japan is betting big on the Chuo Shinkansen maglev line, which will cover the 178-mile distance between Tokyo and Nagoya at speeds of 500km/h, slashing the journey time to just 40 minutes. Scheduled to open commercially in 2027, Japan's network is based around superconducting magnets that are able to levitate the train by up to 10cm with minimal friction.

"Japan's network is based around superconducting magnets that are able to levitate the train."
In 2015, a test run of the maglev train conducted by its operator Central Japan Railway Company (JR Central) saw it reach speeds of over 600km/h, shattering previous world speed records. Since then, JR Central has busied itself with constructing the line, which will predominantly run through tunnels.

The outbreak of the coronavirus pandemic, however, has brought construction work in Tokyo and Kanagawa Prefecture to a halt, after Prime Minister Shinzo Abe declared a national state of emergency in April. JR Central will be champing at the bit to get back to the ¥5.5tn ($49bn) project. It had been scheduled in May to a test a new version of the maglev train before the government issued its shutdown

More efficient: Hitachi unveils new maglev train prototype
Unveiled by Hitachi, the new LO prototype includes two end cars and an intermediate coach (the previous prototype had only one end car). According to JR Central, the latest design offers 13% less air resistance than the previous prototype, creating a significant reduction in noise and power consumption.

"The maglev constitutes not only an extraordinarily costly but also an abnormally energy-wasting project."

The operator is therefore keen to see what the new train – consisting of 12 cars and stretching a total length of 300m – can do on the Yamanashi test line as soon as possible.

This might be easier said than done. With Japan already bracing itself for a post-pandemic recession, JR Central's purse strings are likely to be tightened. Regardless of the economic disruption caused by Covid-19, there are some, however, that believe the maglev project is well in danger of losing money hand over a fist.

"The maglev constitutes not only an extraordinarily costly but also an abnormally energy-wasting project, consuming in operation between four and five times as much power as the Tokaido Shinkansen," wrote Japanese researchers Hidekazu Aoki and Nobuo Kawamiya in a 2018 paper denouncing the project.

Full speed ahead: China continues to prioritize maglev

Across the East China Sea, Beijing has plans to retain its global position as maglev's leading exponent – in addition to its ever-growing high-speed rail network. A Communist Party-approved whitepaper published in September 2019, "Outline for Building China's Strength in Transport", included an entire chapter on the development of new maglev lines between its key urban hubs.

"Tracks will be laid across the central province of Hubei in 2020 to test trains with speeds of up to 1,000km/h."

In October, Changjiang Daily, the official newspaper of Wuhan, reported that tracks would be laid across the central province of Hubei in 2020 to test trains with speeds of up to 1,000km/h, based around a high-temperature, superconducting maglev theory. China Railway Group, a state-owned company, is purported to have already carried out a feasibility study for a new maglev network extending from Guangzhou to Beijing.

While the project appears to have been temporarily put on ice due to the coronavirus pandemic, China's emergence from the crisis has seen the resumption of new infrastructure projects.

In late April, Tong Laisheng, director of CRRC's Maglev Research Institute, revealed tests had been carried out on a new version of a train on the Changsha Maglev Express Line, which links the city in Hunan with Huanghua International Airport. In a statement, Tong said the new rolling stock had successfully hit speeds of 160km/h on the 18.5km line, compared to the 100km/h capacity of the old train.

Forever an outlier: Maglev's uncertain destiny elsewhere

Outside China, Japan and South Korea – whose first Maglev line, linking Incheon International Airport to Seoul, opened in 2016 – magnetic levitation technology continues to evade mainstream consideration, in spite of its European beginnings.

"The UK holds the distinction of operating the first commercial maglev train."

The UK holds the distinction of operating the first commercial maglev train – the Birmingham Airlink shuttle that ran from 1984 to 1995. Germany looked on course to develop something similar with the Transrapid maglev monorail in Munich, until an accident in 2006 at its test facility, which killed 23, brought progress to a tragic halt.

The most common argument levelled against maglev has always been to do with money, given that projects are required to start from scratch and cannot be integrated into a standard rail infrastructure. Floating trains don't appear to generate much profit, either – a case in point, the line in Shanghai is said to lose around $85m-$100m a year, according to some reports.

As fears mount of a global recession, governments are unlikely to countenance the idea of floating trains for a long time to come, leaving China – and Japan – as maglev's only true champions.

XCVI. Appendix – Article Reprint: Park, Carol. "Maglev: A high speed train to higher taxes". February 7, 2018. The Maryland Public Policy Institute.

Source: Maglev: A high speed train to higher taxes » Policy Blog » Maryland Public Policy Institute (mdpolicy.org)

On Sunday February 4th, an Amtrak passenger train accidentally diverted to a side track and crashed in South Carolina, killing two and injuring 116 people. For Maryland, yet another Amtrak accident, the 26th major accident since 2014, is a wake-up call: Should we be drooling over the futuristic concept of Maglev, when America's existing railways are suffering from inadequate maintenance and mismanagement?

The Maglev is a superconducting "magnetic levitation" train that would connect Baltimore to Washington D.C. in 15 minutes at 311 mph. As currently envisioned, the project would be a public–private partnership, funded by a mix of public and private dollars. Earlier this month, Wayne Rogers, the CEO of Northeast Maglev, announced that construction could begin in 2020 once states involved approve the project.

The Maglev project has been backed by Gov. Larry Hogan since 2015. While Hogan's attempt to innovate Maryland's transit system deserve credit, high speed rail projects are a magnet for questionable subsidies, as demonstrated by California's bullet train. The Maglev website currently predicts that the project would cost $10 billion to $15 billion without cost overrun. California's bullet train, which was estimated to cost $6 billion originally, has surged to a price-tag of $10.6 billion. If we apply this rate of cost overrun to Maglev, we can realistically expect the project to cost $17.6 billion to $26.5 billion. Even at its current price tag, Maglev would still be one of the most expensive rail lines ever built on a per-mile basis, at an estimated cost of $250 million per mile.

The problems begin here. So far, only $5 billion has been pledged by the Bank of Japan toward construction. This means up to $10 billion more will be needed under the current price-tag, and up to $21.5 billion with the likely cost overrun. That money will be taxpayers' dollars, a large portion of that likely having to come out of Maryland residents' pockets. Rogers did not hesitate in asking for government subsidy: "Yes, we'll go raise private investment but it can't all be private investment. We can't rebuild our infrastructure 100 percent privately."

Unfortunately, the private sector is unlikely to invest in a project that has no evidence for profitability. After all, Maglev would target the elite business travelers and be out of reach of most residents of Maryland or D.C., due to its high ticket prices. In addition to Amtrak, a variety of private bus companies already provide affordable trips between D.C. and Baltimore. With such narrow ridership prediction, it seems reasonable to be pessimistic about Maglev's revenue stream and profitability.

In fact, the discussion of Maglev for Baltimore and D.C. goes back at least two decades. After a comprehensive study by the Federal Railroad Administration of the maglev technology in 2002, former Governor Robert Ehrlich opposed Maglev, saying it would be "the most technically and organizationally complex infrastructure project undertaken in Maryland in many decades." Governor Ehrlich's opposition clearly stemmed from more than just costs concerns, and it is needless to say that there were various reasons why the project failed to pass the first time.

Given the immense cost estimate of Maglev and no private partners that seem excited to step in, the Maglev project is doomed to become an expensive failure. In addition, using general taxpayers' money to build a high-speed rail system that will be mainly used by high-income residents will only exacerbate Maryland's inequality.

Instead of wasting energy experimenting with dangerous projects like Maglev, Maryland government should redirect its energy to finding more efficient ways to allocate taxpayers' money to improve the safety of the existing transit system in Maryland. Making maximal use out of minimal taxpayers' dollar to improve Maryland's transit network should be the priority. Focusing on maintenance and safety will be a key to preventing a South Carolina–type of tragedy for the Maryland residents, which is far more important than building another train.

Some of taxpayers' money has already been handed out for Maglev—the federal government issued a $27.8 million grant in 2015 for its planning. However, $27.8 million is nothing in comparison to the multi-billion-dollar figures that are currently being discussed. Luckily, it is not too late for Maryland officials to stop supporting Maglev, a high-speed train to higher taxes.

XCVII. Appendix – Article Reprint: Park, Carol. "Lessons from Asia for the Northeast Maglev." The Daily Record 7 December 2018.

Source: Lessons from Asia for the Northeast Maglev » Research » Maryland Public Policy Institute (mdpolicy.org)
Originally published in the Daily Record
Carol Park Dec 7, 2018

In China, a bullet train crash in the city of Wenzhou in 2011 killed 40 people. The crash was blamed on poor design and mismanagement.

In Taiwan, the bullet train system rang up $1.5 billion in losses over seven years, requiring a $1 billion government bailout.
In South Korea, a high speed rail line connecting Seoul to Incheon closed in 2018 after just four years of service because 77 percent of seats were unoccupied.

Across the Pacific Ocean, supporters of "Maglev" in the United States are gearing up to create an American version of the Asian rail disasters.
The Northeast Maglev is a proposed magnetic levitation train that would travel at 311 miles per hour, carrying passengers between Baltimore city and Washington in 15 minutes. The Maglev team hopes to start construction on the ostensibly private project in 2020.

Maglev enthusiasts have been pushing the project despite warnings of significant risks, just like the supporters of the bullet train did in Asia.
For instance, the South Korean government built the Seoul-Incheon line despite consistent warnings of inadequate demand. The project was politically, rather than commercially, driven: Korean officials wanted to present a futuristic version of Korea to the international community as part of the 2018 Pyeongchang Winter Olympics.

Maglev supporters in Maryland have similar non-business motives for backing the project. Baltimore has been experiencing a steady population decline over the years, and many supporters believe that connecting the city to

economically vibrant D.C. could reverse that trend. This vision has blinded the advocates to serious concerns about the project.

First, though the project purports to be a private effort, high-speed train projects are generally magnets of questionable government subsidies. “We can’t build our infrastructure 100 percent privately,” said Wayne Rogers, the CEO of Northeast Maglev. Building the Maglev line from Baltimore to D.C. is estimated to cost between $12 billion to $15 billion. So far only $5 billion in private investment has been secured for the project, so taxpayers will be on the hook to finance the rest of the project.

Second, it’s highly doubtful the Maglev will fail to attract sufficient ridership to make it economically viable. According to Maglev officials, the service would target the “elite business travelers” and charge higher prices than Amtrak, which already provides regular rail service between the two cities. Just as with the Seoul-Incheon line, there are also numerous bus companies that provide affordable trips along the Baltimore-D.C. route.

Finally, building the Northeast Maglev will inevitably disrupt the communities along the line because of noise and electromagnetic fields, not to mention the hurtling trains. As the Maglev will only make three stops, the affected residents are unlikely to experience any commercial or economic development in their neighborhood.

Supporters of Maglev dismiss these concerns. They argue that the success of bullet trains in Japan demonstrate that these hurdles can be overcome.

That’s exactly what officials in China, Taiwan and South Korea thought, only to discover that the situation in Japan is unique. Most of Japan’s 128 million inhabitants live in a few densely populated cities. Many of those residents are rich enough to afford expensive train tickets.
Compared to Japan, the situation is the polar opposite in Baltimore, where many of the residents who depend on public transit are low-income workers. If these residents are to commute between Baltimore and D.C., they would need an option that is affordable and easily accessible from their homes. Maglev is neither.

The Northeast Maglev project should be scrapped before it is too late. There are many transportation priorities that are more worthy of attention.

In early 2018, Baltimore’s Metro subway line closed for a month. According to the American Public Transportation Association, the closure was due to the Maryland Transit Administration’s lack of expertise and poor communication. Meanwhile, the D.C. Metro system is a never-ending series of service disruptions, crumbling infrastructure and safety failures.

If Maryland wants to improve its transportation system, it should focus on ensuring that its existing projects are safe and managed properly. Whether this is done by restructuring the MTA or by privatizing some of its operations to incentivize better performance, it will not take billions of dollars to ensure that Maryland residents have reliable public transportation.

According to Maglev’s Rogers, “Infrastructure is fundamentally a government responsibility, which has failed.” He is right. Many governments across the ocean have failed by partnering with private companies to build trains that turned out to be costly, dangerous, and reliant on government support. We can avoid recreating the same high-speed catastrophe in North America by abandoning the Northeast Maglev.
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XCVIII. Appendix - Article Reprint: Rector, Kevin "'It can be done': Futuristic Japanese maglev train could revolutionize travel from DC to Baltimore, and beyond." October 27, 2018. The Baltimore Sun.

Source: 'It can be done': Futuristic Japanese maglev train could revolutionize travel from DC to Baltimore, and beyond - Baltimore Sun

TSURU, YAMANASHI, JAPAN — Two hours from Tokyo's blinking neon center, the sleek white train shoots out of a mountain tunnel at nearly 311 mph —levitating about four inches above its guideway as it glides past the surrounding rice fields.

The train's long aerodynamic nose and bold blue streaks, a contrast against the forested slopes, make it seem unreal, like a prop from a space film re-purposed as a rural amusement ride. But it is in fact the world's fastest train, what Japanese Prime Minister Shinzo Abe has called "the crystallization of our most advanced technologies."

The magnetic levitation, or "maglev," train is so fast it draws exclamations from schoolchildren and retirees at a nearby exhibition center, who bemoan the blurriness of their photos. A few hundred feet down the mountain, it shakes the cinderblock walls of 91-year-old Moriyoshi Suzuki's tidy family home. On board, where the liftoff feels like that of a jet taking wing, riders gape at a speedometer as the train tears through the region's jagged topography.

"It was very comfortable," said Megumi Kawamura, who won online lottery tickets to ride the 27-mile exhibition line with her husband, Kazuki, and their 3-year old son."

It was a lot faster than I imagined," her husband said, drawing grins from officials with the Central Japan Railway Co., or JR Central, which developed the train.

The crowd-pleasing demonstration line was designed to test the technology, but also to deliver a message. The point, says Torkel Patterson, a former U.S. naval officer who serves on the railroad's board of directors, "is that this is ready for prime time. It's not just some technology that 'could be' someday." Indeed, after 50 years and billions of dollars in Japanese research and development, JR Central says its maglev train is ready for its big rollout — and not just in Japan, where the company has already begun an $80 billion project to extend the mountain test track a 272-mile commercial line from Tokyo to Osaka by 2037. [The magnetic levitation or maglev train in Japan can reach 311 mph while floating above its test track. Backers who want to build a similar line in the U.S. say it could transport travelers from Washington to Baltimore in 15 minutes, and from Washington to New York in an hour.

For nearly a decade, the company also has been working with a team of well connected U.S. partners to lay the groundwork for a second maglev line along the Northeast Corridor, perhaps some day to Boston. In its first phase,

An elevated guideway emerges from a tunnel above farmland. The maglev pushes a wave of air out of the tunnel that causes noise and vibrations, so a special hood is used to more gradually vent the air. (Kevin Rector / Baltimore Sun)

they say, it could transport travelers from Washington to Baltimore in 15 minutes, and later from Washington to New York in an hour, with stops along the way at BWI Marshall Airport and Philadelphia, among others.

It's a proposal with the potential to dramatically alter the lives of people up and down the corridor, but particularly those in post-industrial Baltimore, which has lost population for decades and struggles to hold onto an economic base beyond the universities and hospitals that anchor it. Developers and other business interests in the city eye the train as a potential shot in the arm, allowing them to someday pitch their properties as the D.C. suburbs.

Equally passionate are the train's opponents, who see it as a perk for the wealthy that would do nothing to improve the clogged highways and dysfunctional mass transit systems that most central Maryland residents rely on. Maglev is a point of disagreement between friends and neighbors, and between political candidates. Republican Gov. Larry Hogan supports exploring the idea. Ben Jealous, Hogan's Democratic challenger in the Nov. 6 election, adamantly opposes the project.

Barbara Jackson, a member of the Beacon Heights Civic Association, attends the rally at Veterans Memorial Park to oppose a maglev train in Maryland. Kim Hairston / Baltimore Sun)

As the Japanese maglev project has gotten off the ground, the U.S. proposal —long considered a half-cocked fantasy in Washington power circles and gritty Baltimore bars — has gained momentum, too. In 2015, the Obama administration provided a $28 million grant for a study of the Baltimore to Washington proposal. Hogan's administration agreed to sponsor Baltimore Washington Rapid Rail [BWRR], a U.S. company that would operate the proposed line, through the federal review process.

And the state's Public Service Commission granted BWRR rights to operate a railroad through the region using a long-dormant franchise that was abandoned in 1935 by the now-defunct Washington, Baltimore and Annapolis Electric Railroad Co.

> *MCRT Editor's Note:* With the Public Service Commission grant to BWRR to operate a railroad using a long-dormant franchise of the Washington, Baltimore and Annapolis Electric Railroad Co., came with the authorized use of eminent domain - that is the right to expropriate (take) private property for public use, with payment of compensation.

The number of potential routes for the new maglev line was narrowed to two earlier this year, and a more detailed analysis of the routes — both of which would be more than two-thirds tunnel and follow the Route 295 corridor — is due out this fall. Congress, meanwhile, is considering an additional $150 million appropriation for maglev projects, which BWRR officials say would be enough to push their proposal through engineering and possibly into construction.

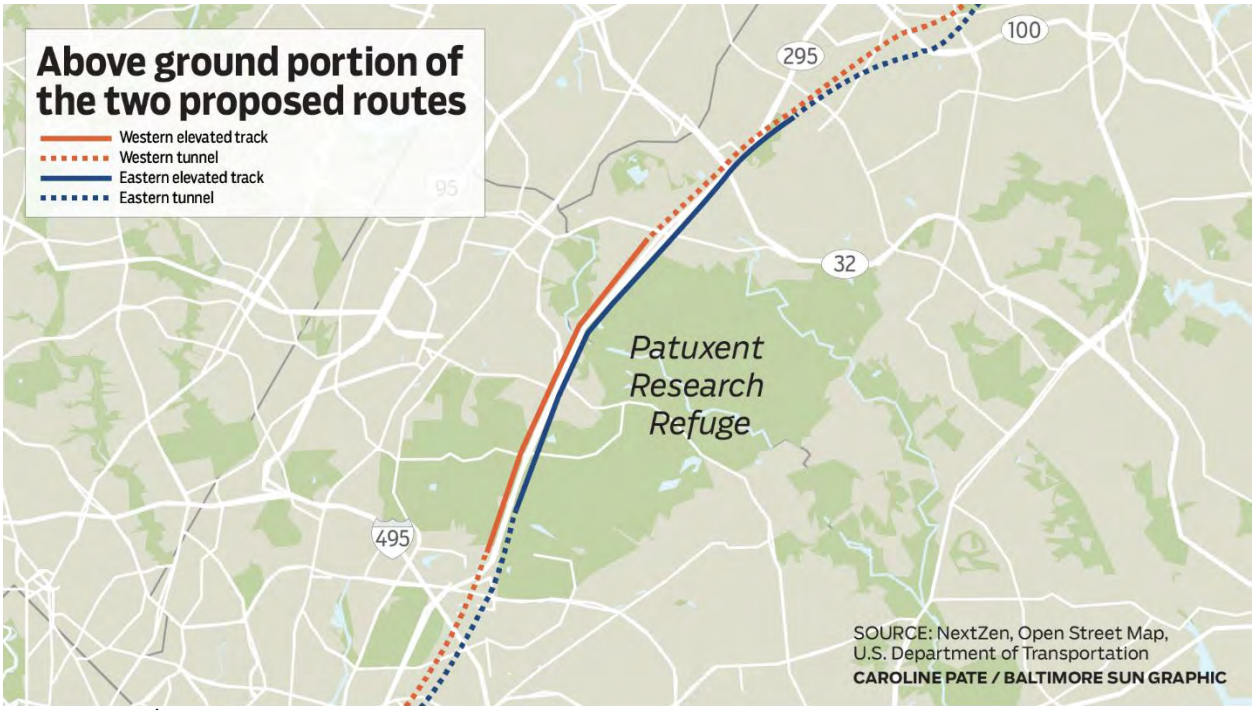
From there, it would take another $10 billion to $15 billion, by BWRR's calculations, to actually build the line from Washington to Baltimore — much of which would have to come from federal coffers, even if the project attracts massive private investment.

> *MCRT Editor's Note*: As of March 2021, the estimated cost to build the SCMagLev between Baltimore and D.C. has risen to $16 billion and as stated above "much of which would have to come from federal coffers . . ." These tax dollars would have a far higher impact by being used to rebuild, maintain and enhance current transportation systems and infrastructure, which serve a far broader spectrum of the area's population.

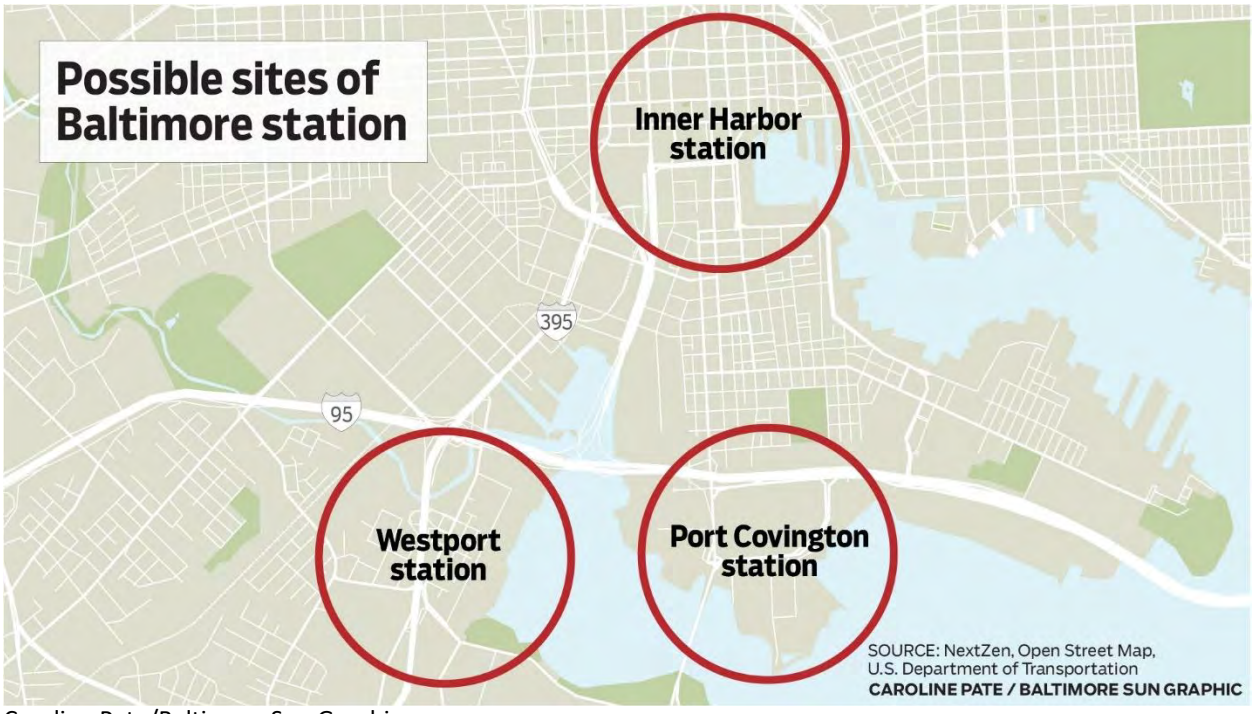
The project's Japanese backers, at JR Central and in the Japanese government, know that gives sticker shock to many U.S. officials and taxpayers. But they are highly motivated to see the U.S. project move forward, in part because it would help them realize economies of scale in the production of their own line in Japan. And it would create a more global market for the maglev expertise they've developed within their workforce.

> *MCRT Editor's Note:* "And it would create a more global market for the maglev expertise they've developed within their workforce." Also consider, construction companies selected to build the SCMagLev system will be large and have an existing, trained and experienced workforce. How does this statement and use of existing workforce personnel square with the promises by BWRR for the creation of large numbers of jobs for local labor?

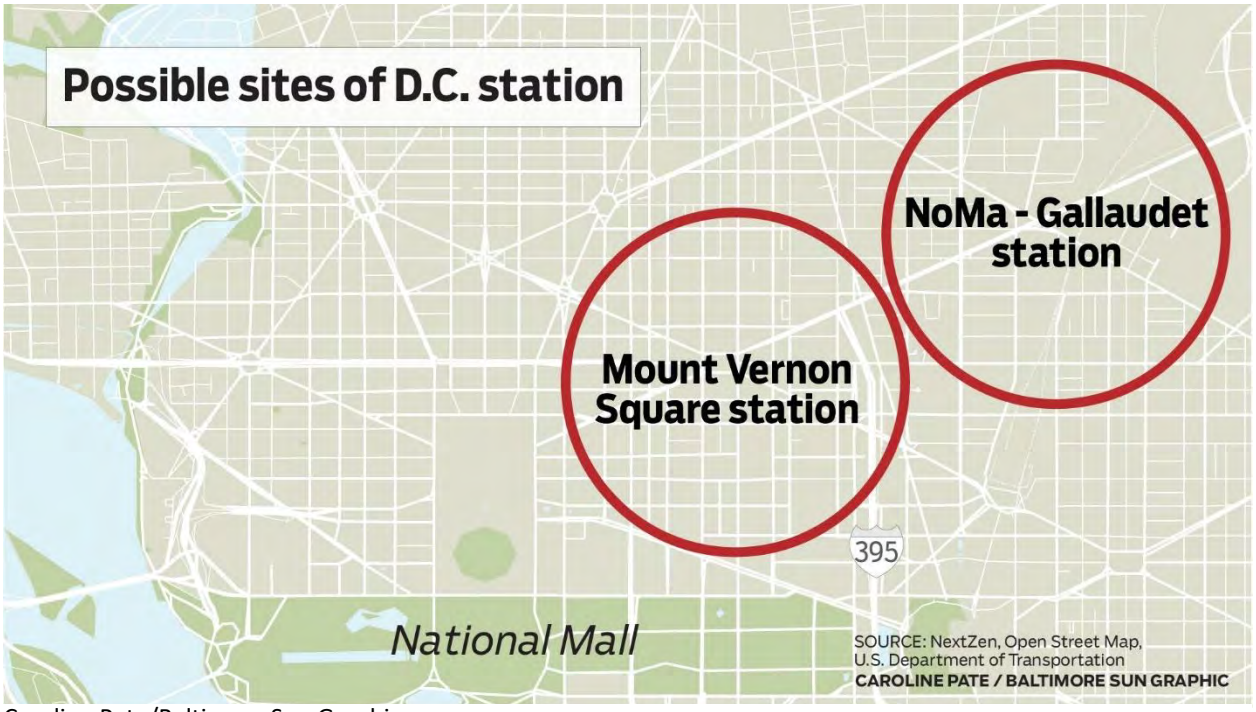
Map: Proposed routes for new maglev train
Both proposed maglev routes leave Baltimore near Westport and use tunnels for more than two-thirds of the distance to Washington. One runs along the eastern side of Baltimore-Washington Parkway, the other along the western side. The site of a station in each city is still unclear.



Caroline Pate/Baltimore Sun Graphic



Caroline Pate/Baltimore Sun Graphic



Caroline Pate/Baltimore Sun Graphic

To soften the potential financial pain, JR Central — which had more than $12 billion in operating revenues in 2017 from its existing Japanese rail business — has offered to waive licensing fees for BWRR's use of its technology. It has also promised to assist the Maryland company in securing billions of dollars in low interest Japanese loans to float as much as half the construction costs.

"We are prepared to make an all-out effort to support them from a technology point of view," said Shun-ichi Kosuge, JR Central's executive vice president.

Shun-ichi Kosuge, JR Central's executive vice president, said the Japanese railroad company is "prepared to make an all-out effort" to support the proposal to bring the company's maglev train technology to the United States. (Kevin Rector / Baltimore Sun)

With the Japanese support, a mix of additional private investments and billions in grants and loans from the U.S. government, BWRR officials say they can reach full financing. If all goes well, they say, they could start construction on the Washington-to-Baltimore leg as early as 2020 and potentially open it by 2027, the same year the first leg of the Japanese line is to open.

MCRT Editor's Note: As of March 2021, delays in the Tokyo to Nagoya extension of the SCMagLev project will push the completion date past 2027.

They contend the benefits of the rail line warrant the needed federal support.

Backers say the train would ease highway congestion, free up airspace, cutdown on lost hours and increase American productivity. They say it would revitalize post-industrial cities like Baltimore, reduce carbon emissions from cars and planes, provide a new industry for unionized labor, and make the U.S. a global leader in high-speed rail. They say construction and operation of the line would create more than 200,000 jobs.

More ominously, they argue that it is necessary to help prevent almost-certain economic stagnation between Washington and New York in coming years if nothing is done to alleviate growing congestion.

"It's a big investment. It's a lot of money. But the idea is to shrink the geography," Patterson said. "It's about transformation, not transportation."

Critics of the proposal — and there are many — say proponents vastly underestimate its many costs, and overstate its benefits. They say a maglev line will disrupt neighborhoods and communities, making them less safe and less desirable places to live. The train will blow through their towns, they say, without stopping or providing any local benefits. They fear it will fail to attract sufficient ridership, and that BWRR will have to be bailed out by taxpayers.

They argue that the massive undertaking likely would require billions more in federal backing than BWRR currently estimates. And they question the very premise of building a 40-mile train line for $15 billion — enough money to pay for thousands of miles of new highways, for example, or the entire Baltimore schools' budget for more than a decade.

> *MCRT Editor's Note:* As of March 2021, the estimated cost to build the SCMagLev has risen to $16 billion.

One citizens group launched a Change.org petition to halt the project, calling it a "boondoggle" and attracting nearly 1,800 signatures. "We don't see how the hell they're going to generate enough revenue to cover the costs," said Dan Woomer, a 66-year-old Linthicum resident and a member of the group.

“Not only is it, ‘You're going to disturb my backyard,’ but even more importantly, we feel it is a project that is not going to benefit the local community,” said Steve Skolnik, president of Greenbelt Homes, a historic cooperative in one potential path of the train.

Keisha Allen, president of the Westport Neighborhood Association in Baltimore. (Ulysses Munoz / Baltimore Sun)

“It’s scary,” said Keisha Allen, 43, president of the Westport Neighborhood Association in Baltimore, who fears being displaced by the project. “I’m waiting for the shoe to drop, that it’s going to be something bad, and that we’ll have to find an attorney — like we have the money for that.”

Officials at BWRR say they appreciate community concerns and will continue working to alleviate them as the federal review moves forward. But they also assert that their plan is financially sound, and that community disruptions will be minimal in comparison to the overall benefits to the region. They note that much of the train’s path would be 10 stories underground.

Wayne Rogers, the former Maryland Democratic Party chairman who is BWRR’s chairman and CEO, says the project’s costs are manageable with the right financing structure on the front end. He insists the company does not need — and doesn’t plan to ask for — any ongoing government subsidies to offset future operating costs, unlike existing mass transit in the region.

The U.S. would be foolish not to take advantage of five decades of Japanese development and accept JR Central’s generous help, he says — and before the Northeast stalls out. “Let’s take their train, take the advantage of all of that, lift it up, bring it into our corridor, and really transform everything,” Rogers said. “It can be done.”

3.9 inches off the ground
It’s the stuff of science fiction.

When cooled to minus 452 degrees Fahrenheit, a titanium alloy becomes a powerful super-magnet. Built into a train, such magnets interact with others in the walls of a guideway — producing forces so strong they not only

propel the train forward at record-breaking speed, but keep it perfectly centered along its track and3.9 inches off the ground.

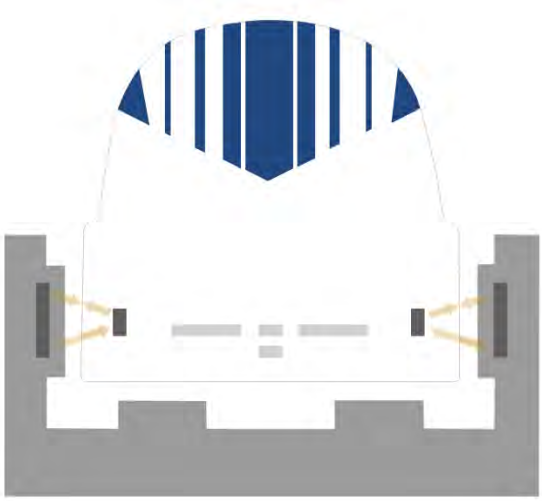
It will never derail, railroad officials say — even in the event of an earthquake, and even if power is cut to the system.

Riding the maglev doesn't diminish its otherworldliness. When the train rumbles to life, starts to move and hits about 70 mph, you can feel it suddenly lose touch with the ground as the magnets work their magic. The speed quickly doubles, then triples, then quadruples.

Meanwhile, the fastest train in the U.S. is the Acela Express, which tops out at 150 mph and runs significantly slower along much of its track due to curves, older infrastructure and other passenger and freight traffic along its shared right of way.

Graphic: How maglev works
Maglev technology uses powerful magnets to lift, center and propel the train along a guideway. The magnets — made with a titanium alloy cooled to minus 452degrees Fahrenheit — are built into the train. They interact with other magnets in the guideway walls.

Levitation



Magnetic forces between the train and the guideway keep the train centered and3.9 inches off the ground. They also propel the train forward.

The construction of a Northeast maglev train operating at 311 mph would immediately catapult the U.S. to the cutting edge of rail travel, surpassing industry leaders in Europe and China. And because the U.S. is so far behind at the moment, Rogers believes the leap would not just be monumental, but revolutionary — comparing it to villages in developing countries that never had landline phone service suddenly getting cellphones.

"We can go right from having no high-speed rail to having the fastest train in the world," he says. "We have to do something today if we want to solve not only the problems of today, but the problems of tomorrow."

Those problems are clear. The Northeast Corridor is "big and getting bigger," Rogers says, set to grow from 51 million people now to 58 million by 2040. It is already defined by congestion, with half of the worst highway bottlenecks and half of all air delays in the country, he says.

Auto, air and rail traffic in the region are projected to grow along with the population. No major projects are in the works to alleviate the associated slow downs.

> *MCRT Editor's Note:* With the approval by the FRA of Amtrak's Northeast Corridor development plan in 2017, Amtrak secured $2.7 billion in loans and has been upgrading rail, switch, stations and operating

infrastructure all along the northeast corridor, all improving speed, service and reliability. As of this date (March 2021), Amtrak has built the next generation 200 mph Acela train set, which is now being tested.

The maglev would provide immediate relief, its backers say. According to a commercial viability study conducted by BWRR, the first stretch of the line could attract more than 13 percent of the estimated 117 million trips per year currently made between Baltimore and Washington — two-thirds of which would come off area roads.

MCRT Editor's Note: This statement is highly unlikely. One - it will be unlikely people will give up their personal vehicles to travel, park and ride the SCMagLev at a cost of $40 to $80 one-way when they can drive to their place of work. Demographics of the Baltimore population do not have the income to select the option to ride the high cost SCMagLev. Three - the time savings for anyone not within a relatively short distance from one of the SCMagLev stations would be insignificant compared to the use of a personal vehicle, car/van pool, or use of existing transportation services such as the far lower cost MARC. Four - the location of the SCMagLev's Baltimore station at Cherry Hill is not comparatively or conveniently situated as are Amtrak's and MARC's Penn station, and MARC's West Baltimore and Camden Yards stations.

Rogers said fares will depend on the amount of money provided by the federal government on the front end, and on demand for the service once it begins. But he predicted they would be competitive with fares between Baltimore and Washington on Acela, which generally range between $50 and $100, depending on time and class of ticket.

The system would be capable of running trains every five minutes, carrying up to a thousand passengers per train, Rogers said. Frequent service — a proven selling point of Japan's popular Shinkansen trains — would be a top priority.

"If you have frequency, people will mode-shift," Patterson says. "The frequency of service makes people think, 'Let's just take the train.'"

MCRT Editor's Note: This statement is true only when the location of the stations in comparison to the potential rider is close and the total cost in time and money is better than using other forms of transportation. The anticipated costs of riding the SCMagLev, coupled with the station locations significantly limit the population who will make use of the high-cost SCMagLev.

A major criticism of the proposal is that it won't be affordable for everyday commuters, who rely on mass transit the most. Rogers said the company is considering a special fare for such riders, but hasn't made any decisions. He also said officials are looking for ways to work with airlines.

The two alignments shortlisted under the ongoing National Environmental Policy Act review include just one stop between Washington and Baltimore, beneath BWI Marshall Airport. The idea is that a traveler could fly into BWI, grab her bags, go down an escalator to a maglev station and be in D.C., Wilmington or Philadelphia in a matter of minutes. Airlines with gate capacity in Baltimore but not in those other cities might be interested in selling that combination of travel, Rogers says.

The Northeast, he says, with its many large cities and airports along a relatively short corridor, is "perfect for a high-speed rail solution."

'For sure I will use it'

Time is money. So Toru Hiroishi, an IT consultant in his early 40s, already relies on Japan's super-high-speed Shinkansen "bullet" trains to visit far-flung customers.

He gets from Toyko to Osaka — about 320 miles, roughly the distance from Baltimore to Providence, R.I. — in just 2 ½ hours. But the planned maglev line between the cities will cut his travel time to Osaka in half.

"For sure I will use it," Hiroishi said as he waited one evening for a Shinkansen train back to Tokyo after a meeting in Osaka. "Even if it's expensive, it's less timeconsuming, and I can use that time to meet with as many customers as possible."

In the small town of Nakatsugawa, the promise of a new maglev station is welcomed by Yuki Watanabe, a travel agent whose small office is just across the parking lot from the town's existing regional train station. Small and squat, the station sits near a dilapidated hotel that is slated for demolition. The maglev could come here within a decade as the first leg of the line is built.

Watanabe's customers are mostly locals going elsewhere for holiday. He wonders if, once the maglev is built, visitors arriving in Nakatsugawa on the new train will buy trips to the nearby towns of Magome and Tsumago, outposts along the ancient road between Tokyo and Kyoto that are now tourist attractions.

"This is a story of 10 years from now," he says, "but this is a business chance."

Up the mountain in Magome, 74-year-old shopkeeper Tomoko Watanabe wears a shirt that reads, in English, "Develop a nonchalant attitude." She, too, wonders what the maglev train will bring.

"If the visitors increase, then it will be nicer here," she said. "Even if I'm not here, it will be nicer for the next person."

It wasn't long ago that, with a downturn in the economy and in visitors, it became too difficult to pay someone to tend her shop, which she inherited from her parents. So now she stays here to do it herself, seeing her husband on the weekends when he travels from their home in Nagoya. She wonders if the train could ease that arrangement, or increase business enough to let her hire again.

Regardless of the financial impact, everyone she knows is intrigued by the faster connection with Tokyo, about 200 miles away. An 88-year-old relative told her that, if she lives to see the maglev, she has her mind set on "Ginbura," or window shopping in Tokyo's famed Ginza shopping district.

"I think everybody has dreams like that," Watanabe said.

In the U.S., the Northeast maglev proposal has won lots of similar support, including from regular commuters along the corridor, the business community, and some people who live along the proposed route.

Robert Snyder, 62, is a retired Prince George's County elementary art teacher who has lived for 30 years in the Greenbelt cooperative, 1,600 homes built during Franklin D. Roosevelt's administration. Snyder's home is close to where the western maglev alignment would pass through the community. He is a big supporter of the project, and says there are others like him whose voices are being drowned out by the project's opponents, who are louder.

He said he believes such a massive project would be in keeping with the New Deal ethos that inspired Greenbelt; help the U.S. stay competitive with countries like Japan, China and those in Europe; create good science,

technology, engineering and math jobs for the next generation; and help move the country away from diesel and other fossil fuels and toward a greener future — especially as the percentage of electricity derived from renewable energy sources like wind and solar increases.

He understands that the cooperative wants to protect its historic character, but says it shouldn't "stay in the past, like we're a living museum."

> *MCRT Editor's Note:* It is unlikely FDR would be a supporter of building a high cost, tax dollar funding transportation system for the more affluent customer who could afford the price of a ticket. FDR would be far more likely to support the enhancement of affordable existing transportation systems that serves the far broader population, so all people have access to and can make use of transportation services to better their and their family's lives.

Milena Rodban, a 32-year-old geopolitical risk consultant, lives in Brooklandville north of Baltimore and commutes to Washington a couple of times a week for work and to visit family and friends. She usually takes MARC or Amtrak trains between Penn Station and Union Station, but finds them slow and unreliable. She would love for the maglev to be built.

With reasonable fares, she said, the maglev could inspire people across the Washington area to consider living or opening businesses in cheaper Baltimore.

In Rodban's view, building the train also makes geopolitical sense, as it would benefit both the U.S. and Japan. "They've done all of the hard work in developing and testing this, and they are really the experts. This would be a big symbolic measure for us to be able to work with them."

"Whether I end up losing a house or not, I'm still excited to see this thing built."
Doug Wise, 43, owns four homes in Baltimore's Westport neighborhood

Doug Wise, 43, owns four homes — one of which he lives in — in Baltimore's Westport neighborhood, one of the locations being considered for the Baltimore maglev station. He believes that, if the project moves forward, it would benefit the area and the entire East Coast, even if it forces him and his neighbors to give up their homes through eminent domain.

"Whether I end up losing a house or not, I'm still excited to see this thing built. Because if we can get this one built, maybe we can get more built, up and down the coast," he said. "I'm interested in the technology and hope that it can do something good for the neighborhood."

Of course, not everyone supports the maglev, in Japan or in the U.S.

'A negative legacy'
All along the planned Japanese maglev route and the proposed U.S. line, residents are fighting to stop the projects or at least force concessions from the railroads — for a variety of reasons.

Yasuo Sekijima, an attorney for 738 residents suing to halt the Japanese project, says his clients believe neither the government nor JR Central has properly considered safety issues, environmental threats or the potential lack of profitability as Japan's population shrinks — from 127 million in 2015 to 88 million by 2065, according to one national projection.

Sekijima said his clients are concerned that the project's route cuts across fault lines and will be vulnerable to earthquakes. They think planned tunnels deep below the mountains will make emergency evacuations — including in the event of a terrorist attack — nearly impossible. They believe the tunnels will negatively impact ground water and endanger their drinking supply.

And they believe JR Central officials have been "hiding the truth about their plans." He hopes the lawsuit at least forces more information into the open.

Teruo Kawamura, a retired professor and the lead plaintiff in a lawsuit to halt the Japanese maglev project, said he was dismayed when he began to research the impacts of the existing Yamanashi test line on the surrounding environment. Naomi Schanen / For The Baltimore Sun)

Teruo Kawamura, the lead plaintiff, is a retired professor who taught environmental issues through literature at Keio University. One recent afternoon, he stood beneath a piece of the Yamanashi test track stretching above peach orchards, pointing to a cement channel full of rolling water. This once was a tiny dirt stream, he said, but when JR Central tunneled into the nearby mountains, it changed the way ground water moved. Suddenly, much more water was feeding into the little stream, and far less into a nearby river. JR Central had to redirect the stream to send water back to the river. He fears such changes will be repeated all along the route.

"It is highly possible that it will leave a negative legacy for future generations." he said.
Back in Nakatsugawa, a woman in her 80s, who asked not to be named for fear of making herself a target, said she has been told by JR Central and government officials that her longtime home near the existing train station is in the path of the maglev line, and will have to be demolished.

She has been told she will be compensated, but that's little consolation. Her home, where she's lived for more than 50 years, is in a central location that she likes, she said. She and her family are trying to negotiate for a new location that is equally convenient.

“We’re having to move from one of the best spots, so we’re requesting to be moved nearby.”

A woman points to an area where the maglev train is supposed to pass through the mountain town of Nakatsugawa. She has been told her longtime home will be demolished, and is hoping she will be given an equally central location to live. Kevin Rector / Baltimore Sun)

Hideki Kashida, a freelance journalist who has written two books on the maglev, said JR Central and the Japanese government have been acting as if construction is a foregone conclusion while ignoring major hurdles in its way — including the difficulty of obtaining all the land needed for construction of the line, stock yards and access roads.

Kashida says neither JR Central nor the government know where they will put all the waste soil from the tunneling, which he estimates would be enough to fill 50 stadiums. And, he said, they have failed to address community concerns about uranium deposits in areas where tunnels are to be built, which concerns people, particularly in Gifu Prefecture, where miners exposed to uranium years ago developed lung cancer.

“People don’t want this near their village,” he said.

A diverse coalition of residents who live along the U.S. route have many similar concerns.

Opponents of a proposed magnetic levitation train in Maryland say it would make their communities less safe and less desirable places to live, and worry about a range of impacts from noise to vibration to electromagnetic forces.

Dennis Brady, 64, is a Bowie resident who helped form the grassroots Citizens Against SC [Superconducting] Maglev. The Navy veteran, nuclear engineer and former Bowie city councilman says the group has members from across the region, not just along the two possible routes.

Many don't believe BWRR's claim that the train won't use state funds, or that it will only cost $10 billion to $15 billion. Residents worry about the potential use of eminent domain to take properties for access roads, maintenance facilities and ventilation shafts all along the route.

They're also concerned about the potential harm caused by vibration, noise and electromagnetic fields; the adverse impact on existing local trains that actually stop along the corridor; and problems from the tunneling, which they say could disrupt underground aquifers and expose residents to naturally occurring radon.

Skolnik, president of the Greenbelt cooperative, said his community supports mass transit over further growth of highways in the state. But they believe the maglev would serve only "a small number of rather high-end people."

A better idea, he said, "would be to spend that money to improve the Amtrak lines so that the Acela trains could actually run at the speeds they are supposed to run at."

Anay Hernandez, 29, one of about 30 people who recently protested in Bladensburg against the project, said information has not been shared well with the area's large Spanish-speaking community. Her mother, Leticia Carino, 49,fears she will lose her house if the maglev is built.

Buttons in opposition to a maglev in Maryland sit on a table during a rally at Veterans Memorial Park. Kim Hairston / Baltimore Sun)

"We didn't know anything about it until like a week ago," Hernandez said. "My mom was like, 'We have to do something. Let's go to the protest.'"

Allen, president of the Westport group, said BWRR plans that draw a big circle around her neighborhood as a possible site for a maglev station are “frightening” — especially given Baltimore’s history of black communities’ being destroyed when major infrastructure projects are built.

She said she would welcome the maglev if it were built on the vacant waterfront in Westport, didn’t displace black families and raised local home values. But she recalls family members’ being forced out of their homes when a never-finished highway was built through the middle of West Baltimore years ago.“

This crap has got to stop where [developers say], ‘We’re not going to tell you anything until we have something to offer you,’ and that’s basically a pink slip and some chump change telling us to go find somewhere else to live,” Allen said. “That’s a bad habit in Baltimore.”

‘We’ve looked at all of these things’
Officials with JR Central, BWRR and governments in both countries say many of the concerns voiced by opponents are overblown or misplaced.

Kosuge, JR Central’s vice president, said every big rail project faces local opposition, but most Japanese residents will benefit from the shorter travel times between Tokyo and Osaka. He also said JR Central is “not ignoring” those who live close to the track and have concerns. It has developed solutions around groundwater issues, noise, vibrations and electromagnetic concerns — which he said are all overstated.

Officials with JR Central note that the company has been studying the project for years alongside Japan’s central government, which has invested heavily in the railline.

> *MCRT Editor’s Note:* “. . . . has invested heavily [emphasis added] in the railline.” The Japanese government, JP Rail, and THEM have a vested interested in seeing the SCMagLev is built. If successful, all will receive substantial financial returns. But those returns may well be paid by tax payers’ dollars from many who cannot afford a ticket.

After a 3½ -year environmental study, the railroad developed measures to prevent damage to underground water systems. Its officials say they are addressing concerns about uranium deposits and waste soil, and conducting “various investigations to ensure that we are completely prepared, both in terms of our equipment and our operational systems, for all eventualities.”

An older model maglev train is seen on the experimental track in Yamanashi. Japan's state-of-the-art maglev train set a world speed record on April 21, 2015 in a test run near Mount Fuji, clocking more than 600 kilometers, or 373 mph. Toru Yamanaka/AFP/Getty Images)

Some residents near the Yamanashi test track say the company has negotiated with them in good faith to find solutions to problems.

The 91-year-old Suzuki said when the first tests began in 1997, the train caused such a massive boom each time it emerged from its tunnel that homes shook violently. He said JR Central officials listened, and made good on promises to diminish the local impact — including by developing a hood to go over the track at the tunnel exit to reduce noise and vibration.

> *MCRT Editor's Note:* ". . . . train caused such a massive boom each time it emerged from its tunnel that homes shook violently." How does this fact square with TNEM claim that because there are no steel wheel on steel train involved, the system is quite?

Now, Suzuki said, most residents in his village "are not opposing" the maglev, though they plan to continue negotiating "for the least impact possible."

Rogers said he understands that residents have lots of questions about the potential U.S. line, and said more answers will be forthcoming as the federal review process continues. But like Kosuge, he said many of their fears are misplaced.

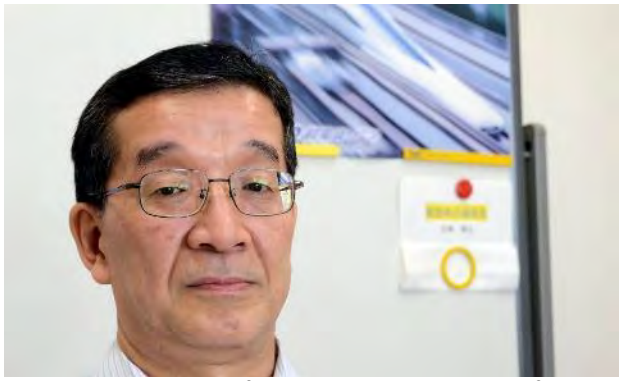
"One of the great things about taking technology that is actually in existence, and has been tested for years and years and actually has people riding on it, is we don't have to speculate about impacts," Rogers said.

"Are you going to have noise? We can actually measure the noise of a real train. Or, are you going to have vibration if you're in a tunnel? We can actually measure the vibration that's in a tunnel and come back with real numbers."

MCRT Editor's Note: If you can measure the noise, where's the analyses and report(s)?

Noise levels, vibrations, electromagnetic fields all would fall well below permitted levels, Rogers said. "We've looked at all of these things."

MCRT Editor's Note: If you can measure the noise, vibrations and electromagnetic field, where's the analyses and report(s)? What are the "Permitted" levels?



Hiroyuki Ohsaki, a professor in the department of advanced energy at the University of Tokyo.
Kevin Rector / Baltimore Sun

Rogers also says the train would have positive environmental effects by taking cars off the roads. BWRR estimates a reduction of 2 million tons of greenhouse gases. The maglev would use large amounts of electricity, but Hiroyuki Ohsaki, a professor in the department of advanced energy at the University of Tokyo, said it would be far less than airplanes would use carrying the same number of people. And Rogers says renewable energy sources — such as wind farms he's helped to develop in Western Maryland — could provide the energy needed.

MCRT Editor's Note: Constructing the SCMagLev track between Baltimore and Washington would release significant amounts of CO_2. The DEIS states the SCMagLev operations between Baltimore and Washington will be ***NOT*** be carbon neutral (see pages 4.19-7 through 4.19-15) "the SCMAGLEV system and ancillary facilities will increase net transportation energy consumption by approximately 3.0 trillion Btus. For context, this would be enough energy to power around 88,900 average homes for one year." According to Energy Information Administration's 2018 data, about 75 percent of Maryland's electricity is generated from nuclear and natural gas. Generating the electricity needed to operate the SCMagLev, which one report out of Japan says requires five-times the energy needed for other high-speed trains, would increase CO_2 emission.

In terms of the alignments, Rogers said BWRR would prefer the one along the eastern side of Route 295 because its effect on the surrounding communities would be smaller. It may not require any homes to be taken through eminent domain, the elevated portions of the track would be farther from homes, and construction would have less impact on Route 295, he said. The western alignment's impact is potentially greater and less clear, he said.

Whichever route is picked, Rogers said his company will approach any necessary home purchases "in good faith" and at "fair market value."

MCRT Editor's Note: What is the "Fair Market" value for a home or business about to be demolished? How does a "fair market" buyout help the elderly with reverse mortgages where they are using the

home's value to help support their final years? Once the reverse mortgage is paid off (as required with the sale of the home), would they have any retirement income left?

Politically speaking
In the usual ways of business and politics, proponents of a Northeast maglev have quietly been laying the groundwork for the project for a decade now.

By 2009, JR Central was eyeing the corridor as its best shot at exporting its maglev technology successfully. (The company has studied transportation corridors around the world, and determined the Northeast Corridor is currently the only one outside Japan that has a large enough ridership potential to support the maglev's high costs.)

Yoshiyuki Kasai, then chairman of the railroad and a powerful figure in Japanese business and politics, recruited Patterson, an unassuming Japan expert and former National Security Council member. Patterson had helped lead U.S. foreign policy in Asia during both Bush administrations between stints in the private sector, including with U.S. defense contractor Raytheon Co.

Once he was convinced of the merits of the idea, Patterson didn't waste much time in reaching out to Rogers, who had experience developing hydroelectric power facilities abroad and was working on building the Western Maryland wind farms as chairman of a small energy company.

Thomas V. Mike Miller, Md. Senate president, Wayne Rogers, BWRR and The Northeast Maglev CEO, Kevin Plank, Under Armour CEO and The Northeast Maglev advisory board member, and Sen. Ben Cardin attend an opening reception for The Northeast Maglev's Baltimore headquarters in 2015. Steve Ruark / Baltimore Sun)

The two knew each other from the U.S. Naval Academy in Annapolis, where they'd gone through plebe summer together in 1972. Patterson said he felt Rogers had the right combination of experience in global infrastructure development and local politics in Maryland to help get the maglev project off the ground.

Rogers began flying to Tokyo to meet with Patterson and other JR Central officials. And soon enough, they made him an offer: If he started a U.S. company to operate a maglev line in the U.S., JR Central would waive the licensing fees for its technology and help secure billions in loans — ostensibly from the government-owned Japan Bank for International Cooperation, though the bank has denied any promise of funding.

By 2010 the joint Japanese and American team now behind the maglev began dumping millions of dollars into advancing the project. Since then, the maglev has been promoted at the highest levels of government. Shinzo Abe, Japan's prime minister, who is a friend of Kasai, has been a big backer, even touting it during a meeting with President Donald Trump at the White House in February 2017.

"I'm sure you would appreciate the speed, the comfort and safety with the latest maglev technology — from Washington, D.C., to New York where Trump Tower exists, only one hour," Abe said in Japanese.

Trump was reportedly not listening to a translation and didn't understand Abe. He has not discussed the train in public.

Mike Cavanaugh, chief of the trade and economic policy unit at the U.S. Embassy in Tokyo, said the U.S. maglev project is clearly important to the Japanese, but it is still viewed by U.S. officials as a "very long-term project" in its "very early days," and with many unanswered questions, including how it would be financed and amortized over time.

Sho Ishii, director for overseas projects in the Japanese transportation ministry's railway bureau, said Japan and the U.S. "are one of the closest alliances in the world," and the Northeast maglev would be mutually beneficial.

The U.S. could massively benefit from Japan's technology and financial backing, leaping to the forefront of rail travel without having to invest in the decades of research that Japan has already done.

Ishii acknowledged that neither the central government nor the Japan Bank for International Cooperation has made specific pledges to invest in the U.S. project, but said they likely would be willing to do so if Washington signaled it wanted to build the train.

In the U.S., the maglev has held a more prominent position in trade discussions on the state level.

Maryland Governor Larry Hogan, right, and his wife Yumi took a test trip in 2015 on a maglev train that is undergoing testing by Central Japan Railway, at the Yamanashi Maglev Test Track in Tsuru, Japan. Ko Sasaki/for The Washington Post)

Hogan rode the test train in Yamanashi during his administration's first international trade mission to South Korea, China and finally Japan in 2015. On the morning he rode the train, Hogan met with Abe, who told him not to blink between tunnels, lest he miss a glimpse of massive Mount Fuji out the train's window.

He also met with JR Central officials and engineers, and said he came away impressed.

"It started to look more real, rather than some futuristic Star Trek [technology] that would never happen," Hogan said.

The following summer, in 2016, Hogan and Japan's then-ambassador to the U.S., Kenichiro Sasae, signed a joint memorandum of cooperation on economic and trade relations that listed the maglev as an area for cooperation. Still, Hogan says he has made no decisions about the future of the maglev in the state, and won't until the federal environmental review is completed.

BWRR officials say they don't need any state cash. And Hogan has said he won't pay for it.

> *MCRT Editor's Note:* If "BWRR officials say they don't need any state cash" why have BWRR and the surrogates opposed state legislation that bars the use of state taxpayer dollars to build, operate or maintain the SCMagLev?

“If we thought it was something that would benefit the state greatly, we certainly would be willing to provide rights of way and things like that,” Hogan said. “But investing billions in taxpayer dollars is not something we are willing to do.”

(He’s taken a similar stance on Elon Musk’s less-advanced “Loop” proposal to build a tunnel beneath Route 295, in which “autonomous electric skates” would travel about 150 mph between Baltimore and Washington. The Loop is not as advanced in the federal review process as the maglev proposal.)

Jealous, Hogan’s challenger in next month’s election, said he opposes the maglev project because “it’s not clear how most Marylanders could afford it” even if the federal government and BWRR could find the money to build it. Officials should instead be focused on mass transit “that will actually help the people of Maryland, at a price they can afford, get to where they need to be as efficiently as possible,” Jealous said.

“I guess I’m traditional in that way: I think mass transit should be for the masses,” he said. “This is rapid transit for the rich.”

Local politicians who represent communities along the proposed rail line are split. Baltimore Mayor Catherine Pugh and D.C. Mayor Muriel Bowser, both Democrats, have expressed cautious optimism and an open mind about the project, and the Legislative Black Caucus of Maryland supports it. But many state delegates who represent communities between the cities oppose it.

“They really don’t have the details. They don’t understand what it could do to a community,” said Del. Pam Beidle, a Linthicum Democrat. “If they start it and don’t have the money to finish it, what happens then?”

We put a man on the moon
Bradley Smith, director of the Office of Freight and Multimodalism in the Maryland Department of Transportation, said he expects a report with more details on the final two alignments, potential station locations and other facilities to be released under the federal review process this fall. A subsequent report identifying one final route, and potentially more information about estimated construction cost, ridership and fare pricing could come next year — as could a final decision from the Federal Railroad Administration as to whether the project should advance.

Rogers said he hopes a favorable FRA decision comes by 2019, so construction could begin as early as 2020. From there, “how long it’s going to take to build it really depends on the alignment selected and the construction technology, because tunneling is done in terms of feet per day,” he said. But he said BWRR thinks it could be built within a 7-year construction window.

Once the train line reaches Baltimore, he and others said, they will be eager to push on as quickly as possible to Philadelphia and then New York, which is the real prize.

“It’d be a cash cow to New York,” Patterson said.

JR Central officials, who have long been the shadow force behind the U.S. line, said they are ready to play a long game in the Northeast, just as they have in Japan.

Residents who won online lottery tickets to ride the maglev test train in Yamanashi smile as the train picks up speed. Kazuo Okamoto /For The Baltimore Sun

A screen at the front of a maglev car shows the speed the train is traveling: 500 kilometers per hour, or about 311 mph. Kazuo Okamoto /For The Baltimore Sun

"Given the magnitude of this project, it is not something that you can casually or easily decide in a few years, or in a span of 10 years," Kosuge said. "This requires long-standing efforts."

Rogers agreed. He said he knows the maglev seems fantastical, but so did plans to build the first steel-wheel railroad from Baltimore all the way to Ohio, or to buildout a massive interstate highway system across the U.S., or to land on the moon. The U.S. tradition is to pursue such futuristic projects "not because they were easy, but because they were hard," he said.

"Look at John F. Kennedy standing up and saying we're going to put a man on the moon in 10 years. And we did it! And that was at a time when we had no technology whatsoever to take a person into space," Rogers said.

"For me to say I'm going to take a train that already exists in Japan and bring it forward? I don't think it's as great a leap as some of the things that our forefathers have done."

What's next
A federal analysis of the two proposed routes is expected this fall.

Next year, a draft Environmental Impact Statement is expected to identify a preferred route. The public can comment.

By 2020, the Federal Railroad Administration is expected to issue a final report saying which line, if either, should be built.

If political leaders in Washington and Annapolis decided to back the project, its developers would have to come up with $10 billion to $15 billion to pay for it.

MCRT Editor's Note: As of March 2021, the estimated price tag has increased to $16 billion.

Reporting for this article was funded in part by a fellowship from the International Center for Journalists. Junko Takahashi, an ICFJ translator based in Tokyo, contributed to this article. krector@baltsun.com

Kevin Rector is an investigative reporter with a focus on criminal justice. He previously covered the Baltimore Police Department and city crime. Kevin joined The Baltimore Sun in 2012, is an Ellicott City native and a Terp.

Source: Rector, Kevin "'It can be done': Futuristic Japanese maglev train could revolutionize travel from DC to Baltimore, and beyond." October 27, 2018. The Baltimore Sun. www.baltimoresun.com/maryland/bs-md-japan-maglev-20180531-htmlstory.html.

XCIX. Appendix: Article Reprint: Boehm, Eric. "Proposed Baltimore-to-D.C. Maglev Train Would Cost as Much as Building 1,500 Miles of Highway." Ingram Publishing/Newscom. 18 October 2017.

Source: Proposed Baltimore-to-D.C. Maglev Train Would Cost as Much as Building 1,500 Miles of Highway – Reason.com

Proposed Baltimore-to-D.C. Maglev Train Would Cost as Much as Building 1,500 Miles of Highway
The $15 billion project would connect two cities that are only 35 miles apart. That's $420 million per mile-if it stays on-budget.

ERIC BOEHM | 10.18.2017 10:52 AM Ingram Publishing/Newscom

High-speed rail boondoggles aren't just for California anymore.

A proposal to build a high-speed maglev train between Baltimore, Maryland, and Washington, D.C., took a step toward enaction this week with the announcement of three potential routes for the rail line, *UrbanTurf* reports. The Federal Railroad Administration, the Maryland Department of Transportation, and other agencies involved in the project are planning a series of public meetings to gather citizens' input on the project.

Here's my input: I can't believe this is something that's seriously under consideration.

For now, there is no official estimate of how much the train will cost, but the website for the Baltimore-Washington Superconducting Maglev Project includes a projected cost of between $10 billion and $15 billion. Even if you give them the benefit of the doubt about the final price tag—something you probably shouldn't do, given how much other high-speed rail projects have ended up costing—that still raises some serious questions about the fiscal sanity of building this thing.

$15 billion is an amount so astronomically large that it is difficult to comprehend. So let's consider the relative costs of building this train versus, say, a new four-lane highway between D.C. and Baltimore.

The proposed maglev train doesn't have a precise route yet, but the routes under consideration are all in the neighborhood of 35 miles long. That means the maglev would cost about $420 million per mile.

According to the American Road & Transportation Builders Association, a national trade group, it costs about $10 million per mile to build a four-lane highway through a suburban or urban area, which is how most of the land between Washington and Baltimore would be classified.
Eric Boehm; Sources: baltimorewashingtonscmaglevproject.com/index.php/faqs; www.artba.org/about/faq

Here's an alternative visualization. In this graphic, we are comparing how many miles of Maglev train can be built with $15 billion versus how many miles of four-lane highway could be built with an equal amount of funding.
Eric Boehm; Sources: baltimorewashingtonscmaglevproject.com/index.php/faqs; www.artba.org/about/faq

This is insanity.

Also worth considering: Resurfacing an existing four-lane highway costs about $1.25 million per mile, meaning that the maglev's $15 billion price tag could be used instead to resurface about 12,000 miles of roadway. That's more than a third of all roads in the state of Maryland.
One more way to visualize this fiscal craziness: The WMTA, which runs buses and subways in Washington, has an expected total operating budget of $1.7 billion next year. The Maryland Transit Administration, which runs the Baltimore subway, various light-rail lines around the city, and the MARC train between Baltimore and D.C., has a total operating budget of $787 million this year.

For the cost of building this train—not operating and maintaining, but merely *building* it—you could fund both the WTMA and the MTA through 2024 without asking taxpayers or riders to pay a single dime toward either system.

That probably sounds pretty good to commuters in D.C., who have been squeezed by the WMATA with fare increases and service cuts in the past two years. A functional subway system in the nation's capital would certainly serve more people than a super-expensive train between downtown D.C and downtown Baltimore.

After all, exactly how useful would a train like this be? Most of the (admittedly horrific) traffic in the D.C. metro area is the result of commuters going back and forth between the city itself and the suburbs. Another train between D.C. and Baltimore—did I mention there already is a non-maglev train between the cities?—would be of limited utility for most residents of the greater Baltimore-D.C. metro area, even with a stop at the airport. It would likely do little to get cars off the road. Anyone needing to travel farther up the East Coast would still have to drive, or use Amtrak, or fly.

The planners behind the maglev project say this would be the first leg in a train line that would eventually connect Washington to New York City or even Boston. But those other parts of the project won't be built until the 2040s, according to the project's website (and holy moly, can you imagine how expensive the rest of the line would be?). Until then, this would be—sorry in advance, Baltimore—a train to nowhere.

Some money has already been flushed away on this idea: The federal government issued a $27.8 million grant in 2015 for the project's planning and preliminary engineering. The project is soaking taxpayers in foreign countries too, thanks to the Japanese government's decision to put up $5 billion in support. Maglev trains are already used in Japan and Japanese companies would be well positioned to bid on this project, if it gets that far.

That's a lot of money, but it's nothing compared to how much could end up being spent on this boondoggle.

This piece has been updated to correct the number of highway miles able to be built with $15 billion.

ERIC BOEHM is a reporter at *Reason*.

C. Appendix - Article Reprint: Vujan, Vukan and Casello, Jeffrey M. "An Evaluation of Maglev Technology and Its Comparison With High-Speed Rail." March 2002. Transportation Quarterly.

Source: ResearchGate

Abstract
High-speed rail (HSR) systems have a proven record of efficient services in about a dozen countries. Recently, Magnetic Levitation (Maglev) technology for high-speed ground transportation (HSGT) has been proposed for many intercity and regional lines in Germany, Japan, United States, and other countries. Maglev developers claim that their system can achieve higher speeds, have lower energy consumption and life cycle costs, attract more passengers, and produce less noise and vibration than high-speed rail. This article presents a systematic comparison of the proposed Maglev system, specifically the German Transrapid, and high-speed rail systems.

The analysis reaches the following conclusions on the three most important system characteristics.
Recent developments of HSR have reduced the advantage of Maglev in higher speeds, so that the differences in travel times on typical interstation spacings would be small.
High-speed rail has a huge advantage over Maglev due to HSR's compatibility with existing rail networks.
High-speed rail involves a lower investment cost, while operating costs on Maglev are still uncertain. Energy consumption is estimated to be lower for high-speed rail.

All other features, like riding comfort, system image, grade climbing ability, noise, etc., are not significant enough to make one mode superior to the other. Thus, the benefits of high-speed rail strongly outweigh Maglev's small travel time advantage. Based on this conclusion, the soundness and direction of US federal policy of investing in Maglev systems while neglecting high-speed rail and Amtrak is questioned.

> *MCRT Editor's Note:* ". . .the benefits of high-speed rail strongly outweigh Maglev's small travel time advantage."

Report
Any proposal for an entirely new transportation mode requires a thorough system analysis that must address, among others, the following questions:
(1) Is there a demand for the new mode?
(2) Is the proposed new mode feasible, and shown to be operationally ready for implementation?
(3) What is the current state of existing modes serving this demand?
(4) Does the proposed mode as a package of benefits and costs improve upon the current modes?

The purpose of this article is to analyze a proposed new mode of guided high-speed ground transportation (HSGT), Maglev, and evaluate its technical, economic, social and other aspects. The need for high-speed ground transportation modes is discussed in the following section. To provide the relevant background and needed understanding of issues involved in introducing a new mode of transportation, the developments in high-speed ground transportation are presented.

Two sections focus on present status of high-speed rail networks and speeds, and Maglev transportation system development. This leads to the next section with the very important

comparison of Maglev with high-speed rail systems, including technical, operational and network/system aspects of these two transportation modes. Lastly, a review of U.S. federal policy with respect to high-speed ground transportation is presented.

This article draws heavily on previous research work evaluating the proposed Baltimore—Washington Maglev System[624] presented in an unpublished report by this paper's prime author.[625] This original report led to substantial debate on the viability of Maglev systems.[626]

High-Speed Ground Transportation

The Increasing Need for HSGT

The need for high-speed ground transportation systems has greatly intensified in recent decades. All industrialized countries have faced two serious transportation problems in urbanized regions and in major intercity corridors. First, highway and street congestion have become a chronic problem, causing longer travel times, economic inefficiencies, and deterioration of the environment and quality of life. Second, congestion problems are occurring at airports, with similar high user and social costs.

Under these worsening transportation conditions, high-speed ground transportation has emerged as a vital concept. HSGT is by far the most efficient means for transporting large passenger volumes with high-speed, reliability, passenger comfort, and safety. While highway and air traffic consist of thousands of vehicles driven by individual drivers following mostly advisory traffic control devices, high-speed ground transportation is a physically guided system on fully controlled ways with fail-safe electronic signal control. This provides not only anorder of magnitude higher safety but alsoreliable operation even under capacity conditions.

While high performance and environmental compatibility are necessary features of HSGT, the high-speed is critical in determining the optimal role of this mode. Conventional railways operating with maximum speeds of 100 kilometers per hour—km/h— (in the US, with the exception of the Northeast Corridor, maximum speeds are still limited to 125 km/h only) cannot compete with freeway travel in the same corridors. Similarly, because of the speed restrictions on high-speed rail, air travel dominates on distances exceeding 300-400 km. Thus, railways were losing their market, except when highway congestion, restricted parking or other factors made travel by other modes very inconvenient.

The Importance of High-Speed and Its Optimal Values

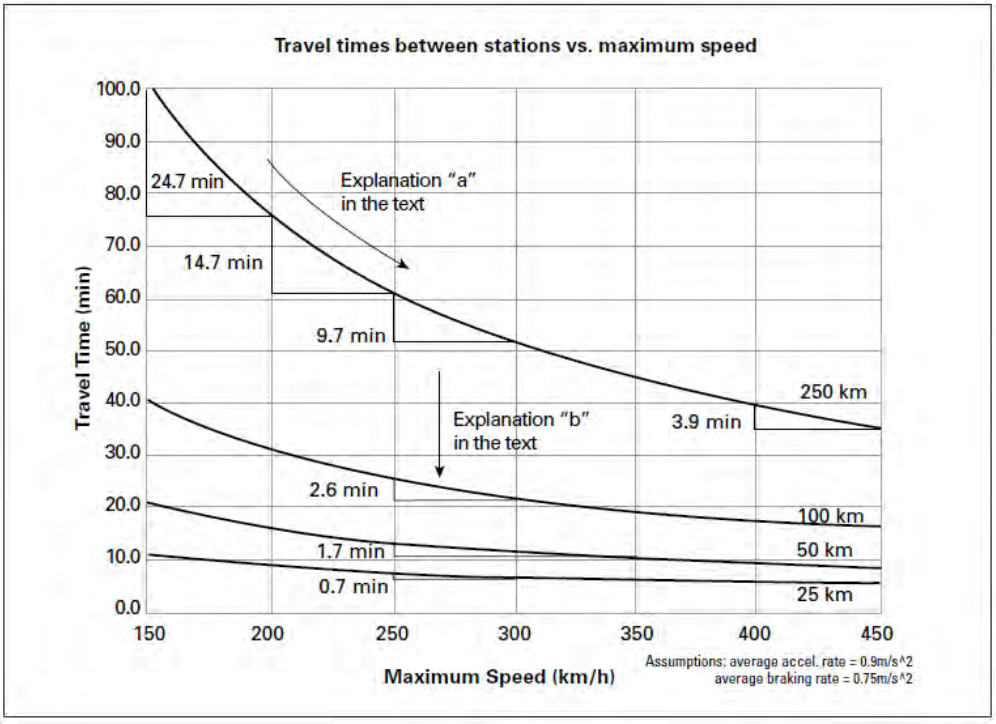
One of the goals in building HSR systems has been to increase the domain in which railway is the superior mode not only in convenience but also in speed or travel time. This goal has been successfully achieved in many locations. The introduction of the first Train a Grande Vitesse (TGV) on a new 417 km long line between Paris and Lyon in 1981, resulted in switching most of the air travel on this link to TGV.[627] Developers of the German Intercity Express (ICE) set the goal that high-speed rail should offer average travel speed twice higher than the car and half as high as air travel (including the advantage of railway in center city delivery, instead of remote airports). The introduction of an electrified line with Acela trains is expected to divert many trips between Boston and New York from air to Amtrak. Based on these advances of high-speed ground transportation in increasing its optimal domain, it is now considered the range in which it can have a dominant role is between 100 and 1,000 km, depending on the relative speed of high-speed ground transportation and its competitors in a given corridor.

[624] Maryland Transit Administration (MTA)."The Baltimore Washington Project Description," 2000.
[625] Vuchic, Vukan R. "The Maglev Transportation Systems and the Baltimore-Washington Proposed Project—An Independent Expert Review," unpublished report, January 2001.
[626] "Maglev vs. High Speed Rail: The Debate." The Urban Public Transportation Monitor, March 20, 2001.
[627] Roth, Daniel L. "The TGV System: A Technical, Commercial Financial, and Socio-Economic Renaissance of the Rail Mode." University of Pennsylvania, 1990.

Reducing travel time is critical to its success. However, the limits to which top speeds should be increased deserves careful scrutiny:

a. Increases in maximum speed have decreasing marginal gains in travel time savings. As illustrated in Figure 1, on a 250 km long interstation distance an increase in maximum speed from 150 to 200 km/h reduces travel time by 24.7 minutes; from 200 to 250 km/h saves another 14.7 minutes. A further speed increase from 250 to 300 km/h saves only 9.7 minutes. If maximum speed would be increased from 400 to 450 km/h, the gain would be only 3.9 minutes. This shows that for any given distance, the marginal value of increasing the maximum speed results in decreasing travel time savings. In other words, the speed increase from 200 to 250 km/h is much more effective than an increase (hypothetically) from 400 to 450 km/h.

Figure 1: Impact of Increases in Maximum Speed on Travel Times for Different Station-to-Station Distances



b. Travel time reductions due to higher speeds depend very much on the length of run between stations. This is also shown in Figure 1. For example, if maximum speed is increased from 250 to 300 km/h, travel time will be reduced by 9.7 minutes on a 250 km long run; the same speed increase would bring only a 2.6 minute travel time saving on a 100 km long run, and a negligible saving of 1.7 minutes on a 50 km long run. This shows that the benefits from high speeds are great on long interstation distances but very small or negligible on short distances.

c. Marginal cost of increases in maximum speed (in system design, construction, operating costs, etc.) grows more than proportionally with speed. In addition to increased precision required in guideway and vehicle design, energy consumption increases with the speed due to the exponential increase of air resistance.

To summarize, the cost-effectiveness of investments in designing higher speed systems decreases as the maximum speed grows.

These facts show that the optimal domain for high-speed ground transportation systems is on long interstation lengths, such as 100 km. On shorter distances, the gains in travel time are so small that it is difficult to justify the high investment. For example, very important and functional lines between center cities and airports (Frankfurt, Zürich, and London-Heathrow are outstanding examples) may not be candidates for HSGT (as proposed for Pittsburgh, Baltimore, Munich, and Shanghai), because they require much higher costs and bring very little additional benefit, regardless of technology.

d. It is also important to emphasize that with respect to maximum speed there are two very different concepts:
Maximum experimental speed for any transportation system technology is the speed reached under specially planned and arranged conditions, for which the guideway, power pickup, signals and vehicles are specially equipped; the test is usually done under special operational arrangements, safety precautions, etc.
Maximum operating speed is the speed for which the system has been designed for regular, daily operation under normal conditions. The entire system—its infrastructure, vehicles, controls, reliability, etc., must be designed so that this speed can be operated on a daily basis, withstanding the handling of passengers, reasonable weather variations, and operated by qualified personnel (but not an entire team of specialists supervising and intervening in every minute of system operation).

Maximum experimental speed is very important for evaluation of the system's characteristics and potential for development. However, it is the maximum operating speed that defines actual, achievable performance of the system. The difference between the two is quite large: maximum experimental speed may be as much as 50-80% greater than the maximum operating speed. Consequently, it is very important to distinguish these two speeds, and in comparing different systems, to always compare the two corresponding speeds. Comparing the maximum experimental speed of one system to the maximum operating speed of another system is false and highly misleading.

Developments 0f High-Speed Rail
A brief review of the development of the high-speed rail transportation systems, the only technology currently used for high-speed ground transportation, is given here. Through these years of extensive developments, high-speed rail has been defined as rail systems providing regular services at speeds exceeding 200 km/h.

Developments in Different Countries Since the 1960s
Japan built the first high-speed rail system, and thus initiated the concept of high-speed ground transportation, when it opened the first Shinkansen Line in the Tokaido Corridor (Tokyo-Osaka) in 1964, with cruising (operating) speed of 210 km/h. This Shinkansen Line was later extended to Fukuoka, including a tunnel between the islands of Honshu and Kyushu, with a total length of 1,079 km. The operating speeds have been raised, through improved infrastructure and rolling stock, to 240, 270 and, finally, 300 km/h. This line carries more than 400,000 passengers per day.

Progress in extending and further improving the Shinkansen is continuous. Shinkansen-type trains, which are somewhat smaller size and lower speeds, have been introduced also on some narrow-gauge lines (1.067 meters); double decker cars have been successfully introduced; new lines are being built; and speeds of 350 km/h are being designed. These lines have a reputation for high reliability, comfort and safety, and have operated for decades without a passenger fatality, despite the extremely high passenger volumes.

France opened its first TGV line between Paris and Lyon, 417 km long, in 1981. The line attracted high ridership from the beginning, including many previous car trips, newly generated trips, and the majority of airline trips on this intercity corridor. Cruising speed on this line has been 270 km/h.

In the following years, TGV Atlantique was built from Paris to the southwest, then to Lille in the north and the Channel Tunnel. Extension from Lyon to Marseilles on the Mediterranean Coast was opened in June 2001, with maximum operating speeds exceeding 330 km/h.

Germany was several years behind France in opening its first high-speed rail line in 1991, ICE, between Hannover and Würzburg with a maximum operating speed of 250 km/h. However, Germany was the leader in upgrading a number of existing rail lines to the speed of 200 km/h, at a much lower investment than new high-speed rail lines require. Although with less publicity, many lines in Germany have been operating at this speed since the 1980s.

Several new lines have been opened or are under construction in Germany, including Mannheim-Stuttgart, Frankfurt-Cologne, Berlin-Hannover, and Berlin-Hamburg.

Italy, Spain, Belgium, Sweden, The Netherlands, Taiwan, Korea, and several other countries have also been active in this field with some lines in operation in the former five countries, and some under construction in the latter two.

The United States has given much less attention to high-speed rail than most of its peers. Similar to Great Britain, the government and Congress consider minimizing operating assistance to intercity passenger railroad services (Amtrak) more important than maximum passenger attraction. The imposed requirement by Congress on Amtrak to achieve economic self-sufficiency by 2003, has forced Amtrak to introduce extremely high fares. These fares prevent attraction of many trips from highways, where no self-sufficiency requirement is imposed.

The first high-speed rail system in the United States, Acela in the Northeast Corridor, has been introduced only recently, in 2000. This progress is, however, only upgrading of an existing line, and that is happening decades after Japan, France, Germany, and other industrialized countries opened their first entirely new high-speed rail lines.

High Speed Rail technology: French TGV train, Paris-Lyon. Source: F. Dechamps.

Amtrak's Acela is the first high speed rail system introduced in the United States. Source: Amtrak.

Present Status of HSR Networks and Speeds

In summary, high-speed rail lines have been operating for 38 years with excellent efficiency and safety. Initially opened as individual lines, HSR has grown since the 1980s into networks with more than 1,000 km in Japan and a European system with integrated lines between France (with the Channel Tunnel to Great Britain), Switzerland, Germany, and Belgium. With many lines under construction, high-speed rail will in a few years also connect Sweden, Denmark, The Netherlands, Italy, and Spain. They have been remarkably successful in attracting

passengers and improving economic efficiency. Basic compatibility of all these rail systems is a fundamental feature for construction of this integrated international network of high-speed ground transportation lines.

As noted above, maximum operating speed is the most important element of high-speed rail, and its phenomenal progress in the world's most developed systems requires some elaboration. Test runs during the 1960s and 1970s gradually increased maximum experimental speeds from 250 to 350 km/h. A major breakthrough happened in Germany in 1988, when an ICE test train achieved 406 km/h. This was followed by another leap in the speed record in 1991, when on an experimental run, a TGV train established the record speed for rail systems of 515 km/h! Maximum operating speeds, achieved by hundreds of trains daily in several countries, are now in the range of 250 and 300 km/h, with the French TGV system recently achieving an average speed of 317 km/h on a 1,000 km run.

Maglev Transportation System Development
Since the 1960s, more than 100 new guided transportation systems have been proposed as concepts, and several dozen of them have been physically developed and tested. As in every research and development process, many of these concepts were unrealistic and infeasible, but a few have progressed to full development and successful implementation. Examples are the ALWEG Monorail (Seattle, Tokyo, and several other Japanese cities), Westinghouse C-100 People Mover (in many airports, Downtown Miami), MATRA's VAL system (Lille, Toulouse, Chicago O'Hare Airport), UTDC's Skytrain (Vancouver, Toronto— utilizing Linear Induction Motors— LIM, similar to Maglev systems), and several others.

Magnetic Levitation (the Maglev transportation system) is another new technology for guided transportation systems with strong public appeal because of its unique feature: the vehicles are supported as well as propelled by magnetic forces, so that there is no physical contact between wheels and guideway surfaces. A brief history of Maglev developments is presented here.

Maglev for Urban Transportation
Research and development of Maglev transportation systems started in Germany around 1970, and it produced two systems: an urban transit system, Transurban, and an intercity high-speed system, Transrapid. The Transurban system was believed to be ready for application and the government of Ontario contracted its manufacturer in 1973 to build a line in Toronto. However, after construction had started, the system faced technical problems in test operations, including difficulties with vehicles negotiating curves. The specifications of the system could not be achieved, and the project was cancelled.

> *MCRT Editor's Note:* "The specifications of the system could not be achieved, and the project was cancelled." But not until taxpayer dollars were expended and lost.

Another version of an urban transit system utilizing Maglev technology was more successful. The M-Bahn system, also developed in Germany, was built and successfully operated on two short lines, in Berlin and in the airport of Birmingham, England. Both systems were later dismantled for nontechnical reasons.

> *MCRT Editor's Note:* "Both systems were later dismantled for nontechnical reasons."
> But again, not until taxpayer dollars were expended and lost.

Intercity Maglev Developments in Germany and Japan
Transrapid development proceeded because Maglev operating features are more effective when applied to high-speed than to low- and moderate-speed transportation systems. Strongly encouraged and financially supported by the German government, Maglev has been researched and developed through a succession of models,

presently reaching the eighth generation—Transrapid 8. A full-scale, 30 km long oval test track has been built in Emsland, Germany, where thousands of train runs have been performed, proving physical feasibility of this new system. It has also reached the maximum speed of 436 km/h on a test run, and it is claimed that the limiting factor was the length of the test track. The test facility has been open to visitors for many years, with thousands of persons having ridden the Transrapid system.

During the last 20 years there have been efforts to implement the Transrapid system. Numerous proposals were made in Germany for various new intercity lines, but the most serious proposal was for a new Berlin-Hamburg line.[628,629] The alignment and station locations were selected and the design was prepared in great detail. After eight years of intensive planning, design, and discussions of impacts and costs, a final evaluation was made of the entire project, including a comparison with high-speed rail technology. The project was faced with escalating infrastructure cost estimates, increasing project complexity, decreased ridership projections, and lingering questions regarding the advantages of Maglev technology over HSR systems.[630,631] In February 2000, the decision was made to cancel the Maglev project and build the Berlin-Hamburg line with high-speed rail technology.

> *MCRT Editor's Note:* ". . . faced with escalating infrastructure cost estimates, increasing project complexity, decreased ridership projections, and lingering questions regarding the advantages of Maglev technology over HSR systems. , In February 2000, the decision was made to cancel the Maglev project and build the Berlin-Hamburg line with high-speed rail technology"
> Again, high-speed rail was found to a proven technology that would meet the need at a far lower cost.

The cancellation of the Berlin-Hamburg project raised various points and a question: this 292 km long line has a length where Maglev could fully utilize its high-speed performance, it connects the two largest German cities with intensive travel, and it can use an alignment without many obstacles. If Maglev is not feasible for that line, is there any potential for it in Germany?[632] Yet, Maglev promoters called for the allocated DM6.1B (US $3B) federal funds to be used for Transrapid demonstration projects at other locations. Among numerous proposals, two have become "finalists": a 37 km long line in Munich, from the railway station in center city to its recently opened airport, and a 78 km long "Metrorapid" line from Düsseldorf to Dortmund, serving cities in the Ruhr area. The debate about these projects includes diverse views. Promoters expect benefits for the German industry and potential for export; critics challenge the purpose of building Maglev on the lines where its high-speed capabilities bring little advantage over the parallel railway lines at an extremely high investment and uncertain operating costs.

> *MCRT Editor's Note:* ". . . critics challenge the purpose of building Maglev on the lines where its high-speed capabilities bring little advantage over the parallel railway lines at an extremely high investment and uncertain operating costs.

[628] Raschbichler, Hans Georg. "The Berlin-Hamburg Superspeed Maglev System." ETR—Eisenbahntechnische Rundschau, No. 12, 1998.
[629] Jäns, Eberhard. "The Superspeed Maglev System from the Operator's Viewpoint," ETR—Eisenbahntechnische Rundschau, No. 12, 1998.
[630] Rothengatter, Werner. "Beantwortung von Fragen des Ausschusses für Verkehr für die öffentliche Anhörung 'Magnetschwebebahn Berlin—Hamburg.'" ("Answers to Questions of the Transportation Committee for Public Hearings on the Maglev Berlin-Hamburg Project"), 1996.
[631] Hondius, Harry. "Metrorapid: Prestigeprojekt oder sinnvolle Ergaenzung des SPNV?" Der Nahverkehr 9/2001, pp. 38-42. ("Transrapid for Ruhr: A Prestige Project or Functional Completion of the Regional Transit Network?"), 2001.
[632] Ibid.

In addition to these serious technical studies and projects, there has been an intensive publicity campaign aimed at showing Transrapid applications in dozens of corridors around the world. Lists were published identifying 28 corridors in the United States alone, with a total length of 16,311 km as "candidates" for Transrapid. The potential export market was one of the arguments used intensively in Germany to secure government financing for system development and later implementation. Interestingly, a strong argument used by Maglev promoters in the US to get federal funding was that this system would have a strong export potential for US industry.

Research and development of Maglev technology in Japan dates as far back as 1962, but major efforts to develop a high-speed Maglev system began in the 1970s. The technology is somewhat different than the German Transrapid: the Japanese model utilizes superconductivity and the vehicle-guideway design is based on repulsive magnetic forces, while Transrapid uses attracting magnetic forces. The repulsive suspension technique is inefficient at low speeds, so that trains run on rubber tires up to the speed of 100 km/h before becoming magnetically levitated. This dual suspension makes vehicles more complex, but the tests of high-speed running have proven the technological feasibility of the system.[633,634] In fact, the Japanese Maglev system, now known as MLX01, holds the world record with an experimental speed of 551 km/h. In testing, two Maglev vehicles met on adjacent guideways while traveling at a relative speed of 1,003 km/h!11[635]

Extensive planning of a new Tokyo- Osaka line has been underway in recent years. However, no final decision about construction has been reached. There is presently an effort to further develop the Maglev system, including modifications to the guideway, a significant change that will require a multiyear effort of development and testing.

In conclusion, extensive developments and testing of Maglev train technology have been made in Germany and Japan for several decades. Test vehicles have carried passengers on short lines at exhibits and test tracks. Major efforts to construct a line that will utilize this technology have been made for many years at many locations, but only one line has been committed to construction: During spring 2001 Shanghai signed a contract to construct a Transrapid line from the city to the airport. In Germany and Japan there is no line in operation or under construction yet.

> *MCRT Editor's Note:* Japan went on to build a redesigned SCMagLev, which promotors want to bring to the U.S. Germany pulled the plug on their Maglev following years of significant delays and cost overruns, and following the crash in Lathan, Germany on September 22, 2006 which killed 70 percent of the passengers and injured the rest.

Comparison of Maglev With The High-Speed Rail System
Based on the analysis presented above, we can now answer three of the four questions presented in the introduction.

(1) Is there demand for Maglev?
Functionally, Maglev represents a high-speed ground transportation system, for which there is an increasing need in many major corridors, as shown above in the high-speed ground transportation section. It is likely that this need will increase in the future.

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[633] JR Central. MLX01—MagLev eXperimental 01: Technical Report, 1996.
10. "Superconducting Maglev Technology on the Threshold of the 21st Century." Technical Report, 1996.
[634] "Superconducting Maglev Technology on the Threshold of the 21st Century." Technical Report, 1996.
[635] Railway Technical Research Institute. "History of Maglev R&D." www.rtri.or.jp/re/maglev/html/english/maglev_history_E.html.

(2) Is Maglev feasible?
Maglev represents new technology: magnetic levitation and linear induction motor (LIM) propulsion. Clearly, to be deployed, a system must be physically and operationally feasible not only under controlled conditions, but also in permanent operation under "real world" conditions. This includes such external factors as public reaction, handling crowded conditions, adverse weather, incidental occurrences of technical defects, short power interruptions, etc. As explained in the above section focusing on Intercity Maglev developments in Germany and Japan, all indications are that this question can be answered positively for both systems, Transrapid and MLX01. The Maglev system can be considered to be technically and operationally feasible.

> *MCRT Editor's Note:* Here, in this report from 2006, the issues of safety, operability under "real world" conditions is noted. Today, in 2021, we are again questioning the safety and crashworthiness of the SCMagLev. FRA Rules of Particular Applicability must be established, and the SCMagLev train and associated systems must be evaluated against these U.S. standards before any consideration of building the SCMagLev moves forward.

(3) What existing modes are available for high-speed ground transportation?
High-speed rail currently serves this demand and has a proven performance record (speed, safety, efficiency, reliability, etc.), and a known cost structure.

(4) Is the proposed Maglev transportation system, as a "package" of performance, costs, positive and negative impacts and externalities, better than, or at least comparable to the existing systems which can provide the same type of service?
This question, critical in deciding which mode should be selected for given lines or intercity corridors, is evaluated in a condensed form in the following section. This comparison is extremely important, but has been given little attention or avoided in the proposals for Maglev projects.

Common Errors in Comparing Modes
It is a common phenomenon that a new transportation system, utilizing a new technology or method of operation, is presented to civic and political leaders, and the general public—citing not only innovative features but also many features not unique to that technology. Often, comparisons are presented of a new, perfectly designed system with an existing system, designed many years ago, sometimes worn out from long operation. This kind of "promotional" presentation of new modes and systems has been used for many systems, such as monorails, pneumatic tube trains, GRT (group rapid transit), OBahn, and numerous others, most of which were either physically infeasible, or inferior to existing systems.[636]

A professional review of the specific differences between the new and existing modes is often performed later, and it obtains much less publicity than the promotional or "marketing" efforts. In most cases such systematic, objective comparisons show that many of the cited "advantages" of the new system were actually not unique to the proposed system: that a newly built system with conventional technology would have many of the same features, while involving lower or no development costs, sometimes having lower operating costs, and proven maintenance procedures.

A rational, unbiased comparison of two technologies, based on a systematic evaluation of their major elements must be made. The two modes must be compared with each other as "packages" of their performance/

[636] Vuchic, Vukan R. Urban Public Transportation Systems and Technology. Prentice-Hall, 1981.

costs/impacts. This is a standard methodology for comparison of alternative proposed modes for a specific area or alignment.[637]

Comparison of HSR and Maglev Systems

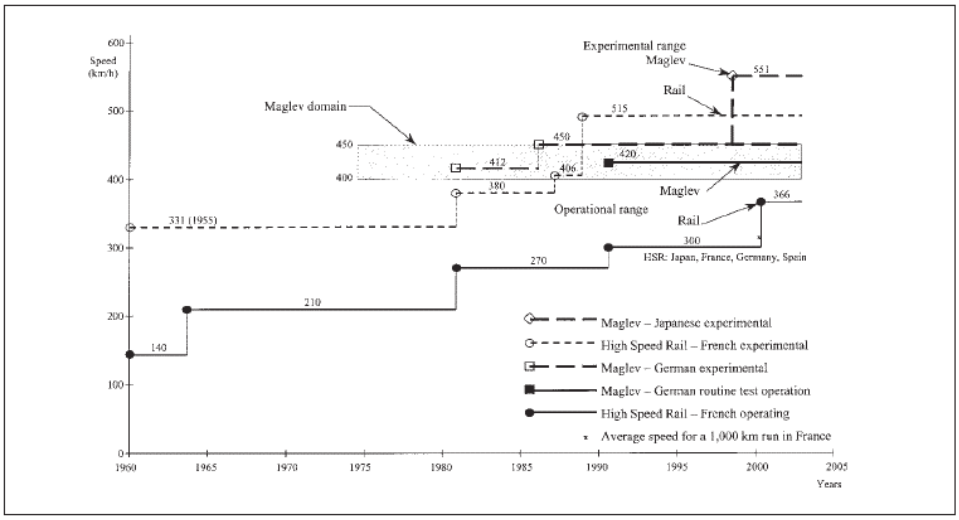
The experiences and data about the latest HSR and Maglev systems' performance, as collected from the technical literature, are used for the following summary review of the major characteristics of the two technologies.

Maximum Speeds and Travel Times

The widespread belief that Maglev would operate at much higher speeds than HSR comes from an incorrect comparison: maximum experimental speeds of Maglev systems are being compared with operating speeds of high-speed rail. As discussed above, these two speeds are drastically different, and the proper comparison can be made only between the corresponding speeds. Thus, the comparison, shown in Figure 2, is as follows.

> *MCRT Editor's Note:* The widespread belief that Maglev would operate at much higher speeds than HSR comes from an incorrect comparison [emphasis added]: maximum experimental speeds of Maglev systems are being compared with operating speeds of high-speed rail.

Figure 2: Maximum Speeds of High-Speed Ground Transportation Modes



The difference between maximum speeds of Maglev and HSR has been drastically reduced in recent years.[638] The maximum experimental speeds of the two modes are in the same range: for Maglev (Japanese), it is 551 km/h, HSR (France) has achieved 515 km/h, and German Transrapid, 450 km/h.

With respect to operating speed, hundreds of HSR trains operate daily on several lines at the speed of 300 km/h, and an average speed of 317 km/h was achieved on the new Lyon-Marseilles TGV line. Infrastructure for the Madrid-Barcelona line is being designed for maximum speeds of 350 km/h, and top speeds on TGV have now reached 366 km/h. Since there is no operating Maglev line, a regular operating speed of that system remains to be proven. It would certainly be substantially lower than the experimental speeds. Therefore, assumed operating speeds on proposed Maglev lines are hypothetical, not more realistic than assuming the same speed for a high-speed rail system.

[637] Vuchic, Vukan R. "Comparative Analysis." George E. Gray, and Lester A. Hoel, editors, Public Transportation, Chapter 10, Prentice-Hall, 1992.

[638] Eastham, Tony R. "A Re-evaluation of Maglev for High-Speed Ground Transportation." Fourth International Conference on Unconventional Electromechanical and Electrical Systems. St. Petersburg, Russia, June 21-24, 1999.

If we assume, however, that Maglev achieves in operation 420 km/h, regularly reached in Transrapid test operations, the impact of this higher speed than high-speed rail has on travel times on most interstation spacings would be small. As the diagram in Figure 1 shows, increasing the maximum speed from 350 km/h (HSR) to 420 km/h on a 100 km run results in travel time savings of approximately one (1) minute.

Initial acceleration rates of high-speed rail and Transrapid are comparable, because they are limited by passenger comfort. Transrapid has a higher acceleration rate than HSR in higher speed domains, which gives it an advantage on long interstation spacings. Yet, in most cases this results in a small percentage reduction in travel time. Maglev promoters correctly claim that Transrapid can travel faster through curves with limited radii and negotiate gradients of up to 10%, while high-speed rail is limited to 4%. The fact is, however, that most of these features are irrelevant in actual applications. Excessive guideway superelevations in curves are not acceptable for vehicles which have standing passengers, and it would be hardly practical to design a high-speed ground transportation line with 8- 10% gradient, regardless of technology. Thus, in actual design it becomes obvious that these technological maximum capabilities seldom translate into higher operating speeds. For example, simulation of the proposed Baltimore-Washington Transrapid line shows that it would have an average speed of 183 km/h. On a line with similar length, the Japanese Shinkansen travels at 209 km/h.

Consequently, Transrapid still has higher maximum speed and acceleration in highspeed ranges than high-speed rail, but its advantage in travel times over typical interstation spacings would be quite small. Even on spacings of 100 km, the difference would be about one (1) minute.

Intermodal Compatibility and Network Aspects
Maglev's switches are much more complex than rail switches. Therefore, Maglev is less capable of serving different branches or interconnected networks. The Maglev system is primarily conceived as a mode to serve long distance travel by a single shuttle-type line, rather than a connected network.

> *MCRT Editor's Note:* Maglev's switches are much more complex than rail switches. Therefore, Maglev is ***less capable of serving different branches or interconnected networks*** [emphasis added]: The Maglev system is primarily conceived as a mode to serve long distance travel by a single shuttle-type line, ***rather than a connected network*** [emphasis added].

High-speed rail, with its simple switches and extensive existing networks, is designed and operated as a transportation network, with benefits to both the operator and the passenger. With the exception of the Japanese Shinkansen lines, all other high-speed rail lines, although designed to different standards for high-speed operation, allow their trains to extend their running to existing rail facilities. This results in great benefits from lower construction costs (joint use of tracks, yards, maintenance and other facilities and entire sections of lines), shorter implementation times, fewer environmental impacts, lower external costs, and reduced local opposition to construction. While building new sections for high-speed operations, providing connections to existing lines extends the reach of the high-speed rail network, allowing high-speed trains to be routed to cities not directly on new lines. For example, ICE trains in Germany go from the new high-speed line between Hannover-Würzburg to Hamburg, Frankfurt and other cities at speeds of 200 km/h or less. Similarly, Amtrak's Acela trains could operate to Harrisburg at speeds which that line allows. This network integration ability results not only in great convenience to passengers, but also reduces the need for transfers, which can often offset the travel time gains achieved by high-speed rail.

> *MCRT Editor's Note:* . . . allow their trains to extend their running to existing rail facilities. [Resulting in] lower construction costs (joint use of tracks, yards, maintenance and other facilities and entire sections

> of lines), shorter implementation times, fewer environmental impacts, lower external costs, and reduced local opposition to construction. . . building new sections for high-speed operations, providing connections to existing lines extends the reach of the high-speed rail network, allowing high-speed trains to be routed to cities not directly on new lines.

Thus, the intermodal compatibility and network aspects of high-speed rail make it superior to the Maglev system.

Investment Costs, Operating Costs, and Energy Consumption
Guideway and station construction costs depend very much on the alignment, primarily whether the guideway is constructed at grade, aerially or in tunnel. Maglev requires entirely separate rights-of-way, special facilities that are incompatible with existing systems. This results in substantially higher investments in terminal areas, particularly in tunnels, due to its larger profile. For any given alignment, estimates in the USDOT[639] report indicate that Maglev would have somewhat (10-20%) higher costs than high-speed rail. Subsequent estimates for the seven US demonstration projects and several German proposals show a much greater cost difference, with Maglev expenditures about two times greater than those for high-speed rail. In addition, HSR can use existing tracks for some short sections, particularly in downtown areas, where construction costs are highest. Consequently, with respect to investment costs HSR is significantly superior to Maglev in the same corridor and on a comparable alignment.

> *MCRT Editor's Note:* . . . HSR can use existing tracks for some short sections, particularly in downtown areas, where construction costs are highest. Consequently, with respect to investment costs HSR is significantly superior to Maglev in the same corridor and on a comparable alignment.

Maintenance costs are sometimes claimed to be lower (or even nonexistent) for Maglev, but this seems to be an unrealistic assumption. Maglev has a significant advantage due to its lack of physical contact with the guideway, but any change in highly precise alignment would require extremely costly repairs. Moreover, very complex electronic instrumentation on the guideway and on trains requires very sophisticated maintenance. Estimated maintenance costs per kilometer figures for the seven proposed Maglev projects in the US vary among themselves by as much as a factor of 10.[640] More information on this item is needed from suitable demonstration projects to make a valid comparison of the two modes.

Maglev does not have wheel resistance as rail vehicles do, but its magnetic levitation requires continuous energy consumption, which may be greater than the energy required to overcome wheel rolling resistance.

> *MCRT Editor's Note:* One report from Japan finds the SCMagLev can use up to ***five-times*** the energy when compared to high-speed rail.

Another factor in energy consumption is the use of the linear induction motor (LIM), which uses more energy than the rotating electric motor. It has been observed that systems utilizing LIM, such as the Vancouver Skytrain and the Toronto Scarborough line, use between 20 and 30% more energy for traction than similar rail vehicles with conventional rotating electric motors (in this comparison both types of vehicles are on wheels, so that levitation has no influence on energy consumption).

> *MCRT Editor's Note:* . . . [Maglev] systems utilizing LIM, such as the Vancouver Skytrain and the Toronto Scarborough line, use between 20 and 30% more energy . . .

[639] USDOT. High-Speed Ground Transportation for America. USDOT, Federal Railroad Administration, September 1997.
[640] See as examples: USDOT, Federal Railroad Administration, "California Maglev Deployment Project, Project Description," and "Atlanta-Chattanooga Maglev Deployment Study," June 2000.

For all these reasons Transrapid is likely to have substantially higher energy consumption per square meter of vehicle floor area than the latest German high-speed rail train, ICE-3. An analysis by Hanstein[641,642] has shown that when correct comparisons between Transrapid and ICE-3 are made, i.e., consumption per square meter of car floor, the former shows higher energy consumption. Jäns[643] data confirm this. In conclusion, high-speed rail consumes less energy than Maglev per comparable unit of train capacity.

> *MCRT Editor's Note*: high-speed rail consumes less energy than Maglev per comparable unit of train capacity.

Riding Comfort
Extremely high comfort—smooth ride and low internal noise—have been amply demonstrated on most of the existing high-speed rail systems, including the Japanese Shinkansen, French TGV and German ICE systems. Visitors driven on the Transrapid and, particularly, on the Japanese test Maglev [SCMagLev] train, have often experienced considerable vibrations and noise levels. Thus, high-speed-rail still has an advantage over Maglev with respect to riding comfort.

System Image and Passenger Attraction
It is argued that a demonstration line of Transrapid is needed to test and evaluate public acceptance of this new mode, vehicle levitation and high-speed travel. Actually, the greatest innovation among these elements is high-speed travel, for which the public has already demonstrated acceptance with the introduction of Shinkansen and TGV, primarily because of large time savings. Innovative technical features, such as welded rails offering smoother ride and lower rolling resistance and high-speed rail switches, while significant for improved system performance, did not have a direct influence on passenger attraction.

> *MCRT Editor's Note:* Between Baltimore and D.C. Amtrak and MARC are already running on smother and quieter welded high-speed rail.

It is likely that the shape and levitation of Transrapid trains [and by extension SCMagLev trains] would have very good public appeal. High-speed rail systems, however, now also have a drastically different form and look than conventional railways had only 25 years ago, and new body designs are continuously being developed. It is therefore difficult to find any major difference between the appearances of the two modes. The long-term impact of these exotic features, however, is likely to be limited, as has been demonstrated by monorails. Since the demonstration projects of the 1950s and 1960s, monorails have been called the "system of the future." However, monorails are used only where exotic novelty is more important than passenger service and operating efficiency: Disney World, Las Vegas, and similar other locations. It should be noted that incompatibility of monorails with other modes is one of their major shortcomings.

It can be said that Transrapid would initially have an advantage over HSR with respect to public appeal; on the other hand, rail systems are known to draw a great public appeal with their rail technology and network operations with interline schedules, etc., which Transrapid would not have. The passenger attraction would

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[641] Hanstein, Richard. "Is There Anything Maglevs Can Do Better than Railways?" http://home.tonline.de/home/rsdhanstein/rh_2eng.htm, March 10, 1999.
[642] Wissenschaftlicher Beirat beim Bundesminister für Verkehr. "Anmerkungen zum Betreiber und Finanzierungskonzept der Magnetbahn Transrapid," Internationales Verkehrswesen 46, 1994. ("Comments about Organizational and Financing Concepts for Transrapid.")
[643] Jäns, Eberhard. "The Superspeed Maglev System from the Operator's Viewpoint," ETR—Eisenbahntechnische Rundschau, No. 12, 1998.

depend on the speed, comfort and integration with other modes, not differences in vehicle support and propulsion method.

It is not likely that either high-speed rail or Maglev would have a significant advantage over the other in system image and passenger attraction.

Impacts on Surroundings
Indications are that Maglev, not having physical contact with guideway, has lower noise[644] and vibration along the line than high-speed rail. Rail lines have an advantage in their greater ability to utilize at grade tracks in urbanized areas. In high-density areas both modes must use tunnels.

Conclusions
The preceding comparisons of Maglev and HSR systems features are summarized in Table 1. Their review shows the following differences in the three most important features:

(1) Travel time:
Maglev, despite higher top speeds and greater acceleration, has little travel time advantage in real-world applications.

(2) Intermodal compatibility:
High-speed rail has an extremely significant advantage in its compatibility with other transportation systems and with built-up areas.

(3) Cost structure:
High-speed rail is less expensive to construct, has a known operating cost level, and has an advantage in energy consumption.

The remaining features, such as riding comfort, system image, impacts on surroundings, as well as grade climbing capability, are of much lesser importance (and differences between the two systems are not major), so that they would not have a significant influence on mode selection.

The conclusion of this comparison is that the advantages of Maglev over high-speed rail are few and they are very small. They are far outweighed by the advantages of HSR, particularly in system network and compatibility characteristics and investment cost. The limitation on networking and incompatibility with other transportation systems makes Maglev extremely inconvenient for integration in intermodal systems, which actually represent the “transportation system of the future.”

> *MCRT Editor’s Note:* . . . the advantages of Maglev over high-speed rail ***are few and they are very small*** [emphasis added]. They are far outweighed by the advantages of HSR, particularly in system network and compatibility characteristics and investment cost. ***The limitation on networking and incompatibility with other transportation systems makes Maglev extremely inconvenient for integration in intermodal systems*** [emphasis added], which actually represent the “transportation system of the future.”

[644] Ibid.

Table 1: Comparison of Maglev and HSR Technologies in Critical Systems Characteristics

SYSTEM FEATURES	MAGLEV	HSR
a. Travel time factors		
• Maximum speeds	420 – 450 km/h (261 - 280 mph)	300 – 350 km/h (186 - 217 mph)
• Acceleration rates	Higher at upper speed range	
b. Intermodal compatibility		
• Network connectivity	None / single lines	Excellent / extensive networks
• Use of existing infrastructure	New and elevated guideways, tunnels and stations needed	New lines combined with existing lines and stations can be used
c. Costs		
• Investment costs[16]	$12 - 55 M / km ($19 - 88 M / mile)	$6 - 25 M / km ($10 - 40 M / mile)
• Operating and maintenance costs	Uncertain	Known
• Energy consumption[17]	Higher than HSR	
d. Additional factors		
• Riding comfort		Superior
• System image / passenger attraction	Excellent, plus initial innovation interest	Excellent / superior network accessibility
• Impacts on surroundings	Lower noise and vibration	Tracks mostly at grade

Sources: [645,646]

Consequently, there is no positive answer to the basic question: "Why build a Maglev system?" While that system has some exotic features, Maglev is not competitive with existing high-speed ground transportation systems, i.e., high-speed rail. The usually implied superiority of Maglev over high-speed rail, and its aura as a "system of the future," are based on an artificially created image of superiority in speed, lower energy consumption and better passenger attraction, none of which is supported by facts at this time.

> *MCRT Editor's Note:* . . . implied superiority of Maglev over high-speed rail, and its aura as a "system of the future," ***<u>are based on an artificially created image</u>*** [emphasis added]. of superiority in speed, lower energy consumption and better passenger attraction, none of ***<u>which is supported by facts</u>*** [emphasis added]. . .

[645] See as examples: USDOT, Federal Railroad Administration, "California Maglev Deployment Project, Project Description," and "Atlanta-Chattanooga Maglev Deployment Study," June 2000.
[646] Hanstein, Richard. "Is There Anything Maglevs Can Do Better than Railways?" http://home.tonline.de/home/rsdhanstein/rh_2eng.htm, March 10, 1999.

Comments on Federal Policy and Actions

There is a large difference between the evaluation of the technology presented above, and the results of federally conducted studies. The FRA [Federal Railroad Administration] report, High-Speed Ground Transportation for America[647], presents a conceptual comparative analysis of three possible systems for the Northeast Corridor: Accelerail (high-speed trains on upgraded railroad lines), high-speed rail with mostly new alignments, and Maglev. This analysis, reproduced here as Table 2, correctly shows that high-speed rail has an advantage over Maglev in its ability to use existing rail lines (where desirable), and that it has "service-proven technology and cost structure."

Table 2: Selected Inherent Advantages of HSGT Technological Options

	Advantages of technologies with respect to each other (+ means the technology has an apparent inherent advantage)		
Selected Characteristics	**Accelerail**	**New HSR**	**Maglev**
Trip-time and revenue performance		+	+
Initial cost	+		
Autonomy from existing railroads		+	+
Through train potential over other railroads	+	+	
Service-proven technology and cost structure	+	+	

Source: [648]

However, being politically mandated to justify Maglev as a "solution," the report deceptively compares the speeds of the two technologies. For HSR, current operational speeds are set at 200 mph, while Maglev is evaluated at 300 mph, a speed even greater than Transrapid's experimental speed. The report merely mentions in a footnote that "French National Railways have successfully tested [HSR] at speeds well in excess of 200 mph." This unrealistic speed difference leads to passenger travel times computations that give Maglev an advantage over high-speed rail. Thus, the conclusion of that report that Maglev has a higher benefit/cost ratio than HSR is based on confused concepts and incorrect assumptions.

> *MCRT Editor's Note:* . . . the report deceptively compares HSR at current ***operational*** speed of 200 mph, versus Maglev ***experimental*** speed at 300 mph.

The fact that the high-speed rail has a "service proven cost structure," while the costs of Maglev are subject to many hypothetical assumptions further undermines the report's conclusion that Maglev would have a "higher benefit-cost ratio" than high-speed rail in the Northeast Corridor. Thus, distorted facts about operating speeds and cost comparisons with drastically different reliabilities are used to satisfy the political mandate that Maglev should be proclaimed "superior" to the existing modes—Accelerail and high-speed rail.

The entire US Federal Maglev Program follows the same pattern that has taken place in Japan and in Germany in the last couple of decades: it is a program promoted by technology suppliers, rather than by transportation operating agencies or in response to public needs.[649] Actually, there is neither an interest by operators, nor is

[647] USDOT. High-Speed Ground Transportation for America. USDOT, Federal Railroad Administration, September 1997.
[648] Ibid
[649] Rothengatter, Werner. "Beantwortung von Fragen des Ausschusses für Verkehr für die öffentliche

there proof that the public would benefit more from Maglev than from other transportation systems. In spite of the claims of great significance of this system for industry, engineering research and development, as well as attraction of passengers exceeding that of any other mode, there have been few concrete proposals to finance these systems by private investors. All efforts on Maglev projects, in Japan, Germany, and the USA, are aimed at getting large amounts of public funds and only limited private participation.

> *MCRT Editor's Note:* Again, building and operating the SCMagLev will likely require large quantities of tax dollars far better used to repair, maintain and enhance existing transportation systems, which serve a far broader demographic range of people than the high-cost SCMagLev would serve.

The proposed Maglev Demonstration projects in the USA (Baltimore-Washington and Pittsburgh), in Germany (Munich and Ruhr), as well as the line under construction in Shanghai, are such short lines, that it will not be possible to test and demonstrate Maglev capabilities on them (high-speed, reliability, operating costs, and others). A longer line with considerable passenger potential which is not served by a railway at present, such as Las Vegas-Los Angeles, would be a much more appropriate demonstration project.

The strong and persistent promotion and political support for this mode can be explained by the lobbying aimed at the general public and politicians who are laymen with respect to transportation systems technology. Again, the same pattern exists in all the countries: Maglev is promoted on a political basis, while it is strongly disputed by many professionals such as engineers and economists.

Most Maglev reports, in Germany and USA, include only superficial comparisons with high-speed rail, and those comparisons are largely deceptive: Maglev is compared with existing or upgraded railroads, rather than with new high-speed rail systems which would be the closest alternative to the proposed Maglev. Further, most benefits listed in support of the Maglev, such as the need for high-capacity, high-speed systems, reduction of highway congestion, environmental benefits, and others, are actually those valid for any high-speed ground transportation: they are technology-neutral. The fact that most of these benefits could be achieved by high-speed rail also, is not mentioned.

> *MCRT Editor's Note:* ". . . . Maglev reports . . . include only superficial comparisons with high-speed rail, and those comparisons are largely deceptive: Maglev is compared with existing or upgraded railroads, rather than with new high-speed rail systems which would be the closest alternative . . . benefits listed in support of the Maglev, such as the need for high-capacity, high-speed systems, reduction of highway congestion, environmental benefits, and others, are actually those ***valid for any high-speed ground transportation***:[emphasis added] they are technology-neutral. The fact that ***most of these benefits could be achieved by high-speed rail also, is not mentioned.***" This is what The Northeast Maglev (TNEM) and the Baltimore-Washington Rapid Rail (BWRR) are doing now in promoting building the SCMagLev.

While both the German and Japanese Maglev system feasibility has been demonstrated, neither superiority nor equivalence of this technology with high-speed rail has been proven. Disadvantages of Maglev in comparison with high-speed rail strongly outweigh their advantages.

Source: Vujan, Vukan and Casello, Jeffrey M. "An Evaluation of Maglev Technology and Its Comparison With High Speed Rail." March 2002. Transportation Quarterly, Vol. 56, No. 2, Spring 2002 (33–49).

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www.researchgate.net/publication/297471032_An_Evaluation_of_Maglev_Technology_and_Its_Comparison_With_High_Speed_Rail.

CI. Appendix – Article Reprint: Giese, James. "Maglev Group May Prefer The Greenbelt Alignment." December 28, 2017. Greenbelt News Review

Source: Maglev Group May Prefer The Greenbelt Alignment | (greenbeltnewsreview.com)

Kisha Brown, community and external affairs director for Baltimore Washington Rapid Rail (BWRR), told the Prince George's County Council at a transportation briefing on October 17 that her group felt that the so-called Baltimore-Washington Parkway West maglev route would have the least impact upon Prince George's County because it is primarily underground. She also indicated to the council that the two Parkway routes, both of which run through Greenbelt in tunnels, were preferred over the Amtrak route which somewhat parallels the Amtrak railroad line through parts of Bowie.

Both Parkway routes, east and west, would tunnel 80 to 150 feet beneath homes in Greenbelt East and the Eleanor Roosevelt High School property. While the Parkway West route is proposed to emerge in the city's forest preserve from underground to a minimum of 18 feet above ground, Brown told Councilmember Todd Turner, whose district includes Greenbelt and Bowie, that the route would be totally underground in his district and planners could easily shift the emergence north into the Beltsville Agricultural Research Center.

At the beginning of the hearing, Council Chair Derrick Davis, who represents the eastern middle county in District 6, which is not directly affected by the train route proposal, noted that the council had last been given a presentation at a council retreat held in January and the SCMaglev environmental impact study review process now being conducted by the Maryland Transit Administration (MTA) had gotten way beyond "what we know." He said there was a need to catch up. He also noted that opposition to the project was high, while information about it was low.

Besides Brown, BWRR project director David Henley appeared before the council. All the councilmembers posed questions for the duo and expressed serious concerns about the project.

Brown expressed a need for ongoing public engagement, but some councilmembers criticized the MTA and other state officials for not attending the council briefing.

District 2 Councilmember Deni Taveras noted that while a part of the line would go through her Adelphi, Hyattsville district, she didn't foresee a problem because it would go underground. However, she was concerned about the high cost and possible need for federal support when there were such great needs for funding for Metro.

Turner said he was disappointed and wondered why the council had not been involved earlier when BWRR obtained a franchise from the Maryland Public Service Commission and another from Baltimore City with none being sought from Prince George's or Anne Arundel counties. (It was later noted that state law provides for only the state and Baltimore City to grant railroad franchises.)

Turner also asked if the Prince George's County Planning Department was involved. Transportation Planning Supervisor Tom Masog was at the meeting and responded that there had been limited engagement at two to three meetings last winter, plus attendance at the public meetings held. He noted that this proposal was not on the county master plan.

Turner also criticized the proposal for not benefitting the county because there were no stops proposed in the county.

It was then Brown told Turner that her group preferred a route through Greenbelt. Councilmember Mel Franklin from south county District 9 asked the BWRR representatives if they would oppose state legislation to take away the company's right to eminent domain (power to condemn land for public use). Henley told Turner that the right for eminent domain was something that came along with the franchise and the company was not interested in using it, instead acquiring property "the old-fashioned way" by negotiated purchase, if needed. But Brown responded specifically to Turner's question that BWRR would have to see the legislation proposed before commenting on it.

Expressing the belief that there were no benefits to Prince George's County, Franklin told Brown that she "has a tough one to sell." Brown responded that there was a lot of misinformation about the project and when she explains at the informational meetings what the development would do, attendees develop a new appreciation for the project. It was then she noted that the Parkway West route would have no impact because it was all underground.

Representing a district that runs south of Greenbelt from New Carrollton to College Park, District 3 Councilmember and Vice-chair Dannielle Glaros said her district would be the most affected and disagreed that building underground would result in no impact. Her constituents were asking, "Who will buy my house with a tunnel under it?" She noted the route would impact residents by vibration underground, and needed surface structures. Also, she noted that the route does not follow the Parkway from Greenbelt to Washington.

Glaros noted that the technology had been around for 40 years without a successful commercial venture and feared that newer technology would supersede it, likening it to the Concorde airplane.

District 7 Councilmember Karen Toles' district will not be directly affected, but she said she stood beside Glaros in opposition. She noted her district had five out of 15 county Metro stations and they were in need of greater funding. Also, she felt the vibrations from the Metro line near her house.

Andrea Harrison, whose District 5 extends from Bladensburg to Mitchellville, asked what tax benefits the proposed rail line would provide the county and the state. Henley said he would have to get back to her on that question.

Harrison also asked where money for the project was coming from other than the loan commitment from the Japanese bank. Henley said the Federal Railway Administration had authorization to make low-interest loans up to $30 billion of which $5 billion had been authorized. The remainder could be available to fund this project.

Councilmember Mary Lehman represents the north county including Laurel. She said she was offended by the statement that being underground would not have impact. She sought more information about how BWRR obtained the right to eminent domain.

Henley said the Maryland Public Service Commission had conducted public hearings across the state during a year-long process.

Lehman said she would seek legislation to remove that power. She also noted that the Baltimore- Washington Parkway is national parkland and that those alternate routes would also run through the Beltsville Agriculture Research Center and the Patuxent Research Refuge.

Davis closed the meeting by noting that this subject would be back for council consideration in the new year. As yet, this subject has not been placed on a county council meeting agenda for formal consideration or action.

CII. Appendix -Article Reprint: Smith, Mark. "Will Maglev be rolling soon?" November 11, 2020. The Business Monthly.

Source: [Will Maglev be rolling soon? | The Business Monthly (bizmonthly.com)]

The campaign to bring the magnetic levitation railway train, known in transportation circles as the Northeast Maglev, to the Baltimore-Washington, D.C. area, continues.

A Federal Railroad Administration and the Maryland Department of Transportation Maryland Transit Administration's Environmental Impact Study (EIS) is expected to be released Jan. 22 opening a round of commentary and debate for the $10 billion Baltimore-Washington Super Conducting (or SC) Maglev Project.

'Full Force'
According to Northeast Maglev, there are 12 different routes under consideration for the Baltimore-Washington segment, including a no build option. Other Baltimore stops could include Downtown and Cherry Hill.

While acknowledging that COVID-19 "has created unprecedented challenges that will be felt for years to come," said Chairman and CEO Wayne Rogers. "With those challenges comes an incredible opportunity to invest in bold projects that go beyond the status quo and put us on a sustainable and efficient path forward."

The Northeast Maglev is a project, said Rogers, "that will rely on proven technology to build a 311-mph superconducting maglev train that complements existing networks and re-energizes the aging Northeast corridor. As the economic ramifications live on well past the virus, the project will play a key role in helping our economy

get back on track – creating 74,000 construction jobs, 1,500 permanent jobs and providing a shot in the arm to the state's Gross Domestic Product."

It would also change the lives of millions of people in the Baltimore-Washington area "as we recapture the 102 hours per year wasted in traffic. The effort to build the project," he said, "continues full force."

As for those commuters who have sat in their cars for those 102 hours per year, "Many are returning to their daily commutes already, and when SCMAGLEV service begins from Washington, D.C., to Baltimore with a stop at BWI Thurgood Marshall Airport, our project aims to eliminate millions of automobile trips each year. That means reduced commute times and unlocked career opportunities, providing better access to jobs and to job centers."

From D.C.
As has been seen in recent months, Rogers continued, taking cars off the road "also means less toxic emissions, improved air quality and continued strides in the fight against climate change."
"For those who did drive, many never knew how much our poor infrastructure was costing us," he said. "While COVID-19 has temporarily changed the way we live and work, population in our area continues to increase and with it, demands on our infrastructure."

As for the economy, he said "We anticipate the economy will adjust and while there may be some people continuing post-pandemic to work from home, the majority will return to their jobs. Climate change is becoming an ever-present problem. We are laser-focused on the world we can create for ourselves. We want to not return to normal, but to return to better."

The word also continues in the affirmative from Jack McDougle, president and CEO of the Greater Washington Board of Trade. "We are very excited about the SCMaglev Project. In addition to allowing residents and visitors to travel between D.C. and BWI [Marshall] in just 15 minutes, we expect the project to create thousands of jobs and boost our regional Gross Domestic Product.

"The project is also the first step towards a longer-term goal of connecting D.C. and New York, with travel times estimated at under an hour," McDougle said. "The project has obvious, practical benefits for our region, but it also signals a desire to lead the world in transportation technology, which we fully endorse."

The Money
The reaction from community members and others, of course, is the opposite, with multiple concerns about the cost to build the SCMaglev, as well as ride it and the time it would take to build it, among others.

"Most of our community is opposed to it," said Dan Woomer of the Linthicum-Shipley Improvement Association. "I think you'll find that most communities are against it."
That's much to do with the economic angle. "It won't generate enough revenue to operate here because Baltimore doesn't have the economic base to support it," said Woomer. "To make money it has to go to Philadelphia and New York. Some people think Baltimore should be bypassed."

While acknowledging that the SCMaglev is an interesting technology, he said "there are rail trains in Europe that are faster. Though Maglev is three times as fast as the MARC train, it's also five times the cost; it will be $50 a trip, instead of $10 for the MARC."

No Shift
Bill Boone, a board member of Citizens Against The SCMaglev, is concerned about its financial feasibility, as well as how many people will be working from home after the pandemic dissipates.

“I think we’re still back to the basics of [Northeast Maglev] not having proven the need for or the financial feasibility of this project,” said Boone. “We’ve been asking for ridership numbers for three years. Also, bear in mind that this is not mass transit for any metro area. With one stop in each city, few people would use it. And it won’t move cars off of the local roads; upgrading infrastructure would accomplish that.”

Another observer who questions the need for the SCMaglev is Anne Arundel County Councilmember Sarah Lacey, who represents District 1. “I don’t think there has been any significant shift of public opinion in Linthicum,” she said. “The Maglev does not propose enough benefit to the community to offset the heavy burdens it would be forced to bear.
“Indeed, with the increased acceptance of telework,” she said, “one wonders why the Maglev would ever benefit enough riders to pay for itself.”

For now, the public will soon be able to comment throughout the EIS process at http://bwmaglev.info. The official Draft EIS is slated to be released to the public in winter/spring 2021.

CIII. Appendix – Article Reprint: Cox, Jeremy. “High-speed train could go through 'irreplaceable' land in Maryland”. March 2, 2021. Bay Journal.

High-speed train could go through ‘irreplaceable’ land in Maryland | Growth & Conservation | bayjournal.com

During nearly 40 years as a federal wildlife biologist at the Patuxent Research Refuge, Sam Droege has tromped across nearly every one of its 12,800 acres.

And he doesn't want to see any of them plowed under for a blazingly fast train. That is a growing possibility, though. With plans solidifying for a magnetic-levitation train between Baltimore and Washington, Droege and other conservation advocates are on alert for potential harm to the 85-year-old wildlife refuge.

"It's hard to get across how special and rare this place is," Droege said. "These places are irreplaceable. It's not something that can be moved and remade elsewhere. It would be like going to the National Mall and removing one of the museums."

The maglev train project took a key step forward in January when the Federal Railroad Administration and Maryland Department of Transportation published the preliminary findings of a federally mandated five-year, $28 million environmental and engineering study.

The draft environmental impact study outlines the project in detail: a sleek train floating on a cushion of air inside a U-shaped "guideway," with all propulsion controlled by magnets. The guideway would run through tunnels bored as deep as 320 feet beneath the surface, and along elevated sections of the route looming 150 feet overhead. The maglev train can reach speeds topping 300 mph, slashing the time of the 36-mile trip between the cities to a mere 15 minutes.

But what has caught the attention of conservationists is the possibility of a largely above- ground section of the route slicing through federal lands just outside the DC Beltway.

Two routes are under consideration. Both mostly parallel the Baltimore-Washington Parkway. The main decision boils down to selecting a more densely populated route to the west of the parkway or an eastern route that crosses into federal lands, including the fringe of the Patuxent wildlife refuge.

The new analysis calculates that the eastern route could be constructed atop as much as 24 acres of the refuge's property. A western route would leave it untouched. Both routes would bisect the Beltsville Agricultural Research Center, another federal oasis of open space, with as much as 187 acres being given over to the maglev and its supporting infrastructure.

Conservationists say that inside the refuge, the project would destroy wildlife habitat, upend wetlands and possibly require the re-routing of streams.

"I can't find words strong enough to express what I feel," said Marcia Watson, president of the Patuxent Bird Club. "It's an environmental disaster in the making. I am outraged that a private company thinks it can waltz in here and take our land."

Northeast Maglev, the company backing the project, says it will reduce travel times and ease congestion on the often-gridlocked roads connecting Washington and Baltimore. It will also be an economic boon, creating up to 195,000 jobs during construction and supporting up to 440 jobs while in operation, according to the draft study.

The environment will benefit from lower greenhouse gas emissions, a result of converting thousands of drivers into train passengers, said Wayne Rogers, the company's CEO. The region can also look forward to improved water quality, he added.

"Traffic's hurting everybody. The [Chesapeake] Bay is getting 85 million pounds of[nitrogen] pollution coming into it [from the air], and much of that is from transportation," Rogers said.

This wooded area in Maryland would be replaced by a sprawling trainyard near the border of the Patu xent Research Refuge and Beltsville Agricultu ral Research Center under one of the scenarios being considered for the construction of a high-speed magnetic- levitation train. (Sam Droege/ U.S. Geological Survey)

It is not the first time that a maglev has been proposed between Baltimore and the nation's capital. In the 2000s, the Federal Railroad Administration and Maryland Transit Administration got as far as finalizing an environmental impact study and selecting a transportation system based, at the time, on Germany's Transrapid technology. Then came a budget crunch and a legislative blockade on state spending toward the effort.

Northeast Maglev revived the idea in 2010. Gov. Larry Hogan, a Republican, began lobbying the federal government to pick up the tab for a new study. The campaign was highlighted by a 2015 trip to Japan in which Hogan rode on a maglev train at speeds exceeding 300 mph. Afterward, he pronounced it an "incredible experience."

Japan has vowed to contribute $5 billion toward construction; the bulk of the $10.6 billion to $12.9 billion total cost is expected to be privately funded.

In their new report, the Federal Railroad Administration and state transportation department opted against identifying a preferred route, saying they will consider the public's reaction to the document and other federal agency input before making a call.

Northeast Maglev officials say they favor the eastern alignment, which would impact the Patuxent refuge, because it poses fewer impacts to existing neighborhoods. The train would operate between Mount Vernon Square in Washington and the Cherry Hill neighborhood in Baltimore, with a lone stop at Baltimore-Washington International Airport. In Prince George's and Anne Arundel counties, the project has drawn protests from residents who say they will bear all the burdens of the train without any benefits because of the lack of stops.

A sprawling train-maintenance facility would be raised in the western part of the Beltsville research center, under this building scenario. That area is home to many rare plant species and one of the southernmost of gatherings of pine barrens, said Droege, who works for the U.S. Geological Survey, which has a research facility based at Patuxent. His comments about the project reflect solely his own observations, not his employer's, he said.

A spokesman for the U.S. Fish and Wildlife Service, which oversees the Patuxent refuge, said the agency will voice its opinion when it submits written comments this spring. But in a January 2017 email made public along with the environmental analysis, a Fish and Wildlife official then- stationed at Patuxent told the railroad administration that running the route through the refuge would probably be a "non-starter."

Patuxent is unique among the nation's more than 500 refuges as the only place set aside for conducting wildlife research, Watson said. "All the other refuges depend on the research done at Patuxent," she explained.

Fish and Wildlife officials likely will need to complete a "compatibility determination" before deciding whether to allow the company to build in the refuge. And stripping any land from the refuge or agricultural research center is expected to require Congressional approval before it can happen.

CIV. Appendix - Article Reprint: Ivey, Jolene & Glaros, Dannielle. “Opinion: Prince George’s County won’t stand for the maglev – another destructive project for our people.” Washington Post 23 April 2021.

Opinion | Prince George’s County won’t stand for the maglev — another destructive project for our people - The Washington Post

Opinion by Jolene Ivey and Dannielle Glaros

April 23, 2021 at 9:00 a.m. EDT

Jolene Ivey, a Democrat, represents District 5 on the Prince George’s County Council. Dannielle Glaros, a Democrat, represents District 3 on the Prince George’s County Council.

As our country confronts our historic — and current — mistreatment of Black and brown people at the hands of police and the criminal justice system, we must acknowledge and address the ways that land use, development and transportation projects have affected these exact same communities in a discriminatory way. There’s a long list of projects that have been built with wanton disregard for minority communities. Locally and across the

country, we can name highways that plowed through homes, divided communities or bypassed them altogether, cutting off their economic oxygen.

An interstate in Montgomery, Ala., originally was planned to run through the home of the Rev. Martin Luther King Jr.'s deputy, Ralph Abernathy, as well as to obliterate the two churches that helped organize the Montgomery bus boycott. Eatonville, Fla., is the nation's oldest Black township north of Orlando and has no exit or access ramp to Interstate 4. In the 1960s, Interstate 65 was run through the center of the Black middle-class community in Indianapolis.

Barbara A. Mikulski launched her political career fighting a plan to run Interstate 95 through Baltimore's Fells Point and Canton neighborhoods. Her reputation as a fighter saw her through to the U.S. Senate, and on to become one of the most revered politicians in Maryland.

Today it is the Northeast Maglev — a superconducting magnetic-levitation train, known as scmaglev or maglev — that would wreak havoc, eliminate green space, pollute our air, suffocate our businesses and siphon off significant business from MARC commuter rail and Amtrak. Prince George's County would bear the brunt of these negative impacts while realizing no balancing benefits to our community. Again, a project is planned through a majority-minority community where the land is cheap and the homes less expensive.

Just as when Mikulski fought — and stopped — the highway that would have split a community, local community leaders are fighting the maglev. The debate so far is mainly about public land. However, the Maryland Department of Transportation's draft environmental impact statement is clear who gets the benefits:

"The SCMAGLEV Project could spur development and commercial investment in neighborhoods near station locations."

However, with no station in Prince George's County, we get only the noise, pollution, disruption to businesses, homes torn down, loss of riders on Amtrak and MARC, loss of economic prosperity and more as the trains speed by us — figuratively and literally. This isn't our opinion. The statement describes what will happen in Prince George's County:

"Could change the community feel and atmosphere." "Impact community cohesion." "Increased noise." "Vibrations." "Changes to aesthetics." Sound familiar?

Northeast Maglev has mounted a campaign to smooth over community opposition, but the people are fighting back. Rep. Steny H. Hoyer (D-Md.) is listening. He has said our county council's and county executive's opposition will "weigh very heavily, not only with me, but I'm sure with [Rep. Anthony G. Brown] and with the congressional delegation."

The Purple Line, on the other hand, has gotten our full support. With 21 stations along this route, 11 in Prince George's and 10 in Montgomery County, we know that the real, lasting economic development will be transformative by spurring development and commercial investment while fulfilling the transportation needs of everyday people every day. We know that the negative impacts are also real, and the Maryland General Assembly has created a $2 million fund to start taking some of the economic sting out of it for impacted businesses. The delays from the fight between the state and the contractor have lengthened the pain that these businesses are trying to endure, and we're hopeful that construction will be fully underway again soon and that the project's benefits will quickly be realized.

The proponents of the maglev indicate they will seek federal funds and will not rule out state funds (they opposed a state bill that would limit their access to funds). One does truly wonder why this proposal is being entertained at all. Why would we support a project that could take as much as 94 percent of Amtrak and 32 percent of MARC riders between Baltimore and Washington? The maglev project's current price tag is no less than the cost of expanding regional commuter rail. Regional commuter rail expansion, as promoted by the Greater Washington Partnership, would generate the same short-term construction jobs but would provide more permanent jobs and support local economies.

Black communities matter. A transportation network that serves communities matters. It is time to shelve the maglev project.

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CVII. Appendix - Visitation Data for the Patuxent Research Refuge.

Visitation Data for Patuxent Research Refuge
Prepared by Refuge Staff from Internal Records
April 1, 2021

FY20	
IV. Visitation Totals	
A. Visitor Centers	
1. National Wildlife Visitor Center	151,583
2. North Tract Visitor Contact Station	91,039
3. Hunter Control Station	5,826
B. Total Number of Visits to the Refuge	**248,448**
FY19	
IV. Visitation Totals	
A. Visitor Centers	54,369
1. National Wildlife Visitor Center	37,300
2. North Tract Visitor Contact Station	12,504
3. Hunter Control Station	4,565
B. Total Number of Visits to the Refuge	**191,418**
FY18	
IV. Visitation Totals	
A. Visitor Centers	54,416
1. National Wildlife Visitor Center	37,281
2. North Tract Visitor Contact Station	12,200
3. Hunter Control Station	4,915
B. Total Number of Visits to the Refuge	**214,422**
FY17	
IV. Visitation Totals	
A. Visitor Centers	57,503
1. National Wildlife Visitor Center	39,813
2. North Tract Visitor Contact Station	12,233
3. Hunter Control Station	5,457
B. Total Number of Visits to the Refuge	**212,776**
FY16	
IV. Visitation Totals	
A. Visitor Centers	5,7400
1. National Wildlife Visitor Center	40,364
2. North Tract Visitor Contact Station	11,079
3. Hunter Control Station	5,957
B. Total Number of Visits to the Refuge	**211,120**

CVIII. Appendix - Affiliated Organizations Supporting this CATS-MCRT SCMagLev DEIS Comments, Concerns and Questions.

Name	Email - Website - Facebook	Contact Information
295 Coalition	www.facebook.com/events/827897241115121/	
Audubon Mid-Atlantic	david.curson@audubon.org	
Audubon Society of Central Maryland	advocacy@centralmdaudubon.org https://www.centralmdaudubon.org	
Beaverdam Creek Watershed Watch Group	tomtaylor0401@gmail.com	
Bikemore	jed@bikemore.net	
BWTRG: The Baltimore-Washington Transportation Research Group	West Baltimore Project	Jonathan Sacks - Project Lead
CATS: Citizens Against The SCMagLev – Bladensburg	https://stopthistrain.org	
CATS: Citizens Against The SCMagLev – Bowie	https://stopthistrain.org	
Defensores de la Cuenca	info@defensoresdelacuenca.org www.facebook.com/DefensoresdlC www.defensoresdelacuenca.org	(240) 415-8821
Downtown Residents Advocacy Network (Baltimore)	psturm@outlook.com,	
Eastpines Citizens' Association	info@eastpines.org www.eastpines.org	P.O. Box 322 Riverdale, MD 20737 (301) 277-0004
Friends of Quincy Run Watershed	https://friendsofquincyrun.org	
GEAC: Greenbelt East Advisory Coalition, Inc.	chair@mygeac.org www.mygeac.org	P.O. Box 2042 Greenbelt, MD 20768-2041
GDCA: Glenn Dale Citizens' Association, Inc.	www.facebook.com/Glenn-Dale-Citizens-Association-128106680573710/	P.O. Box 235 Glenn Dale, MD 20769
Greenbelt Advocates for Environmental and Social Justice		
Greenbelt Climate Action Network	http://chears.org/gcan/	Lore Rosenthal SimplicityGroupsMD@gmail.com (301) 345-2234

Name	Email - Website - Facebook	Contact Information
LSIA: Linthicum-Shipley Improvement Association	www.facebook.com/Linthicum-Shipley-Improvement-Association-187966971226498/ www.lsia.net	P.O. Box 143 Linthicum Heights, MD 21090
National Parks and Conservation Association	khart@npca.org	
Peace and Justice Coalition of Prince George's County	donna.hoffmeister@verizon.net	
Prince George's County Young Democrat	www.facebook.com/PGCYD	
Safe Skies Maryland	mark.t.southerland@gmail.com	
Washington Rowing School	cindy@washingtonrowingschool.com	
Woodlawn Community Association, Inc.		6916 Greenvale Parkway Hyattsville, MD 20784 (202) 524-8762

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CX. Appendix - Attachment: “West Baltimore Rising: A Roadmap for Inclusive Transformational Change in One of the City’s Most Challenged Yet Most Economically-Promising Neighborhood Clusters.” Baltimore-Washington Transportation Research Group. October 1, 2020.

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WEST BALTIMORE RISING:

A Roadmap for Inclusive Transformational Change in One of the City's Most Challenged Yet Most Economically-Promising Neighborhood Clusters.

Baltimore-Washington Transportation Research Group's

West Baltimore Project

October 01, 2020

West Baltimore Rising:

A Roadmap for Inclusive Transformational Change in One of the City's Most Challenged, Yet Most Economically-Promising Neighborhood Clusters

A report by the founder and lead of the Baltimore-Washington Transportation Research Group, Jonathan Sacks, with significant input from community, political and transportation leaders.

October 01, 2020

Authors' Note:

On July 27th, 2019, President Donald Trump attacked West Baltimore on Twitter, calling it among other things, "disgusting... dangerous & filthy,"[1] and saying, "No human being would want to live there."[2] When we at the Baltimore-Washington Transportation Research Group (BWTRG) read that, it floored us. How does a man who was given nearly half a billion dollars from his father in suspect tax circumstances[3], a man who lived his entire life without once knowing what it means to wake up poor and black in a country in which those two identifiers place one at a massive structural disadvantage, how does a person with an embarrassment of unearned advantages, the president nonetheless, the man charged by his oath of office with finding solutions to the problems of all his citizens, how does that person have the gall to take meanspirited potshots at people so much more disadvantaged than he – and, by the way, at Baltimore? We were angry.

And then, when we calmed down, we got to work: we're a transportation research organization after all - was there a transporation solution to this problem, or even a transportation component to the solution? Our inquiry started with a fundamental question: Why is West Baltimore still having such a rough time, decades on from the 1980's crack cocaine epidemic, when it was arguably at its low ebb? After all, nearby Washington had exploded economically in that time, and West Baltimore (Southwest Baltimore really) was the closest part of the city to that boom in the capital – as close, potentially, by public transportation, as Park Slope in Brooklyn is to Midtown Manhattan, for example. Moreover, the architecture in West Baltimore – a gem member of the North Atlantic tradition – was still largely in-tact, as were the neighborhoods and the parks, even if they were threatened by an ever-expanding inventory of vacant properties trailing bulldozers. And perhaps most importantly, in spite of all it has to recommend it – proximity, aesthetic beauty, vibrancy - it was still cheap. Boy was it cheap! It's so cheap in fact that it may be the last place left on the East Coast where folks hovering near the poverty line continue to be "priced-in" in a dynamic inner-urban environment. So what was going on, and how could transportation help? What would it take to "make it happen" - and happen inclusively, so that current residents of this jurisdiction benefit at least as much as those that will come after?

Thus began a journey for us that's lasted a year, meandered through many a meeting, roundtable, council hearing and foundation report, culminating in this roadmap. My grandfather used to say, "If you don't believe in something, you believe in nothing." Well, we at BWTRG believe in West Baltimore. We believe it will rise again. And when it does rise, it could help lift all boats in Maryland's greatest city, and even beyond. The following is the way we at BWTRG think inclusive transformational change in West Baltimore could become a reality.

Jonathan Sacks, Founder and Lead, BWTRG

Executive Summary:

In recent years in Baltimore, the call has grown louder for city leadership to establish a clear roadmap for increasing economic development and home-ownership in West Baltimore[4], one of the city's most challenged areas. This report serves as one potential roadmap for achieving transformational economic growth in that part of the city, and doing so while simultaneously ensuring that current residents participate equitably in the rising fortunes. If successful, it would represent a new model of economic growth in dense inner-core urban districts, particularly in those communities in close proximity to booming economic centers.

The three drivers of growth explored in this plan are:

1) availability of potential homeowner capital

2) unmatched attractiveness to homebuyers, and the business community that follows, stemming from affordability, proximity and aesthetics

3) two key transportation upgrades - one an infrastructure project, and the other a service upgrade made possible by the former.

Additionally, the larger context of that demand is also examined, principally the population, job and household trends in the region, and the predictive elements that follow.

For potential outcomes, the plan examines possible short-term effects not just within the city line, but also south of the city, in Anne Arundel County, specifically in and around one of the State of Maryland's most important economic engines: Baltimore-Washington International Thurgood Marshall Airport.

The magnitude and temporal windows of economic growth are also modelled, and a replicable framework is introduced for estimating those items. A granular marketing plan for the roadmap is proposed. And lastly, looking towards the medium and long-term, the roadmap contains a phasing schematic that seeks to identify opportunities for catalyzing similar economic transformation in other areas of the city beyond the three-neighborhood cluster key focus area.

ABBREVIATIONS

Key Focus Area	KFA
Maryland Area Regional Commuter	MARC
Maryland Transit Administration	MTA
Maryland Department of Transportation	MDOT
Amtrak's Northeast Corridor	NEC
Baltimore-Washington International Thurgood Marshall Airport	BWI
Baltimore-Washington Transportation Research Group	BWTRG
Sandtown-Winchester Harlem Park Neighborhoods	SWHP
Community Statistical Area (as defined by the Baltimore City Dept. of Planning)	CSA
Washington-Baltimore-Arlington Combined Statistical Area (as defined by the Census Bureau)	WBA
Baltimore Police Department	BPD
National Capital Region Transportation Planning Board	TPB
Speculator-Attractive Properties	SAP
Tenant Opportunity to Purchase Act	TOPA
Community Land Trust	CLT
Homeowner Enterprise Tax Zones	HETZ
Households	HHs

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"What we do echoes through generations."

"Show up, dive in, stay at it."

- Barak Obama

INTRODUCTION

West Baltimore is a big place with big challenges yet equally big potential. The magnitude of those challenges was brought to the attention of the world during the riots and protests that followed the death in police custody of Freddie Gray. The unrest lasted for several days, and although it was significantly less destructive than many similar events that have occurred around the country in the last few decades, the world nevertheless saw stunning images of decay. Blocks of abandoned houses flashed by on cable TV screens, and in national newspapers[5]. Naturally, many observers came to the conclusion that West Baltimore was well and truly a "lost cause"[6].

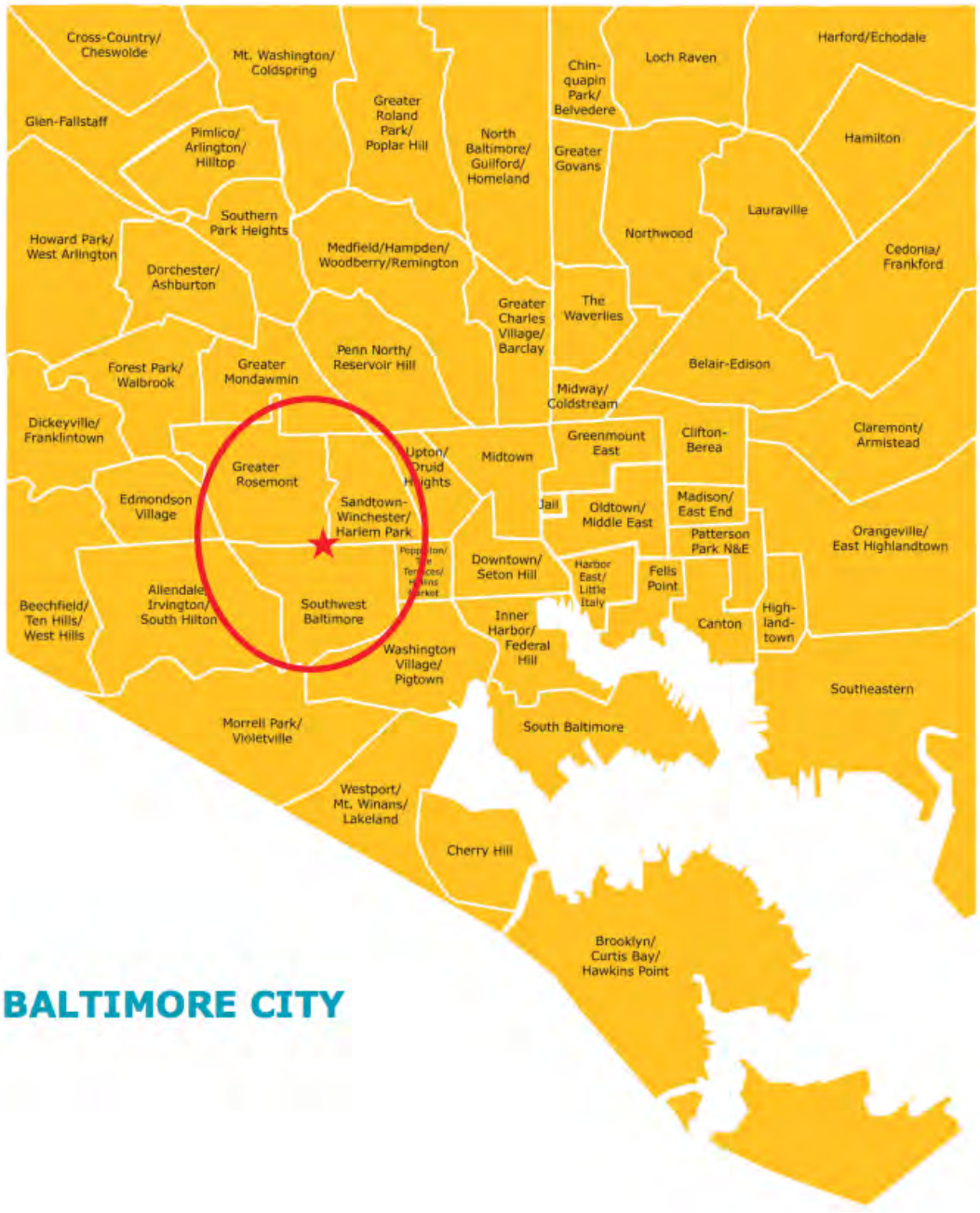
But what they didn't see during the riots was the vast economic potential of the area – and in fact it may not be well understood today, even within the walls of city government. But for anyone taking an honest look, the key ingredients for a market-driven, housing-centered revitalization are unmistakably present.

Keys to West Baltimore Revitalization

- **Proximity** – to the great economic engine of Washington, DC.
- **Accessibility** – from existing and scalable rapid transit options to create dialogue with that economic engine.
- **Affordability** – from housing as cheap as any on the East Coast.
- **Aesthetic Attractiveness** – arising from still in-tact neighborhoods filled with exemplary iterations of the great North Atlantic tradition of architecture and urban planning[7].

The catalyst needed to set revitalization in motion is one relatively minor transportation infrastructure project: the realignment of the BWI Rail Station platform. This imminently-affordable project has been on the priority list for the State of Maryland and Federal Government for decades. How could one platform realignment have such massive regional multiplier implications? That central question, and many other related ones, will be addressed in the seven sections of this roadmap.

Section One takes a brief look at the specific challenges in West Baltimore that the roadmap hopes to address in an ongoing and enduring way. It does so by focusing on a three-neighborhood-cluster Key Focus Area (KFA) surrounding the West Baltimore MARC (Maryland Area Regional Commuter) Rail Station. (See Map 1), and cataloguing the economic, public safety and budgetary implications of concentrated poverty there.



Map 1: The Key Focus Area (or KFA) showing the three neighborhood clusters examined, and their proximity to the West Baltimore MARC station, denoted by a star.

Section Two pivots to solutions and takes a hard look at the unique suite of attributes West Baltimore offers a revitalization strategy. The MARC train and its busy station situated directly in the middle of the

Key Focus Area is highlighted as a potential engine of growth. The massive positive ramifications for family health and city budgets of a turnaround are tallied in great detail, resulting, in essence, in a quantifiable "reasonable" expectation measure of short and medium-term growth.

Section Three dives into logistics and talks about infrastructure and rolling stock, cataloging what's needed on the transportation side to give this plan a foundation for success, and how - step-by-step, equipment piece by equipment piece – that foundation can be laid. Express MARC service to that West Baltimore station, coupled with the key upgrade at BWI Rail Station mentioned above, constitute the two main logistical lynchpins of this roadmap.

Section Four moves on to the equal beneficiary of this plan, the Baltimore-Washington International Thurgood Marshall Airport (BWI), and lays out how it, and the surrounding region of Anne Arundel County, would be positively and similarly affected.

Section Five describes a marketing plan that would effectively communicate the benefits of a revitalized KFA to the most important holders of capital (for the roadmap at least) - those families and individuals who may seek to relocate to West Baltimore.

Section Six looks to the medium and long-term future, and, over three phases, sketches how success in West Baltimore could be leveraged to generate a multiplier effect, not just in neighborhoods adjacent to the KFA, but across the entire city. It also turns our attention to the other bookend of the MARC Penn Line – Union Station in Washington – and briefly describes how impending development there over the next 10 or 20 years is going to provide tremendous impetus for economic growth in West Baltimore - a mere potentially 30-minutes away by commuter train.

Finally, **Section Seven** tackles the powder-keg question of gentrification and lays out goals and innovative mechanisms for ensuring existing residents participate equitably in economic development. Change is coming to this part of the city, if for no other reason than the massive development that's happening on the Washington end of the Penn Line. The challenge for Baltimore leaders today is not just how to expedite development on the Baltimore end, but also how to make it benefit everyone?

Were the roadmap laid out in this report followed, and the best-case scenario to come to fruition, West Baltimore would simply be following the lead of many high-profile success stories: New York's economy skyrocketing after its near-bankruptcy in the mid-1970s; Washington, DC springboarding off its nadir in the mid-1980s; Los Angeles recovering from the Rodney King riots in early 1990s. If you'd bought a home in any of those jurisdictions at those times, you'd likely have seen your property value appreciate a number of times over[8].

The unmistakable takeaway from those examples is that cities are back, and the model of tightly-agglomerated human dwellings that has been the central tenet of societies for millennia, is now, after one generation's flirtation with the suburbs, once again in vogue. But there are certain key ingredients that must be present. Fortunately, West Baltimore happens to have them all.

This "roadmap" will identify and explore those ingredients, and then expand its inquiry to seek insight on how to utilize the currently-existing market-based revitalization model to lift all boats, including existing residents. In that sense, Baltimore, through revitalization in its West and Southwest, has the opportunity not only to foster transformational economic development, but also to create a new, replicable model for large-scale urban renewal: one energized by powerful market forces, but guardrailed with innovative mechanisms, in place at the outset, ensuring growth is realized in a fundamentally fair way.

SECTION 1: CHALLENGES

Sandtown-Winchester Harlem Park (SWHP) - a multi-neighborhood cluster defined by the Baltimore City Department of Planning[9] as one community statistical area (CSA) - is having a rough go of it. This part of West Baltimore was once home to Thurgood Marshall, Billie Holliday and Cab Calloway[10], as well as many other African-American notables, but today, by nearly all indicators, it's in worse shape than much of the city, and in fact much, if not all, of the surrounding Baltimore-Washington Region. The poverty and homicide rates in SWHP are near-double, and more than double, respectively, that of Baltimore City overall[11]. The unemployment rate is more than seven percentage points higher than the city average[12]. And life expectancy trails the city average by more than 3 years[13] - and the national average by 10[14]. From an economic development and poverty-eradication perspective, SWHP may represent a worst–case scenario for city leaders. But even so, it's not alone in West Baltimore.

Expanding the view to encompass two adjacent CSAs (adjacent to SWHP) reveals similar indicators (See Table 1). Together, these three particular CSAs – Sandtown-Winchester Harlem Park, Southwest Baltimore and Greater Rosemont – paint a picture of stunning poverty in the heart of a modern Mid-Atlantic American city. They also constitute the Key Focus Area of this study, since they're directly adjacent to, and surrounding, the West Baltimore MARC Rail Station (Map 1), whose significance will be discussed in detail in Section 3 of this report. They're an astounding baseline for economic growth, one that is so low that, while it may be matched in its intractable poverty, it is likely not exceeded in an inner-urban setting. Governments and foundations have poured hundreds of millions of dollars into the area across decades in an attempt to lift economic boats. Those programs have had limited success in turning around any of the indicators of long-term poverty, crime and neighborhood blight[15].

But this decline didn't happen in a vacuum: these KFA-specific metrics must necessarily be viewed in the context of larger city and national trends affecting core population constituencies in West Baltimore. SWHP is 97% African-American[16] (vs 63% for Baltimore City[17] overall, and 13% of the US[18]). Structural racism and myriad adverse government policies have disadvantaged Blacks in this country for hundreds of years, and 20th century housing and employment policies in Baltimore have been no exception[19]. The result: the average white household in America is now 10 times wealthier than the average black one[20]. So not only are leaders in Baltimore faced with tackling existing poverty in West Baltimore, to do so, really, they must also wrestle with the past, and long-standing issues arising out of generational structural

inequalities. It's a big lift, but a not impossible one. And one on which this roadmap hopes to provide some guidance.

Table 1: Indicators of Poverty in West Baltimore, Specifically in the Key Focus Area

Indicator	SWHP[21]	Southwest Baltimore[22]	Greater Rosemont[23]	Baltimore City
% Families in Poverty	50.3	45.9	35.8	28.8
% Earning < $25K per year	51.3	49.8	39.6	32.2
Unemployment Rate (%)	20	20.4	17.6	13.1
% Kids in Single-Parent Households	86.8	75.4	81.6	64.8
% 8th Graders Reading Proficient	44.4	51.6	50.7	54.9
% Residents w/ Bachelor's Degree	5.5	8.6	9.4	28.7
Homicides (per 10,000 residents)	8.9	8.2	7	3.9
Life Expectancy (years)	70	68	70.6	73.6

Homeownership

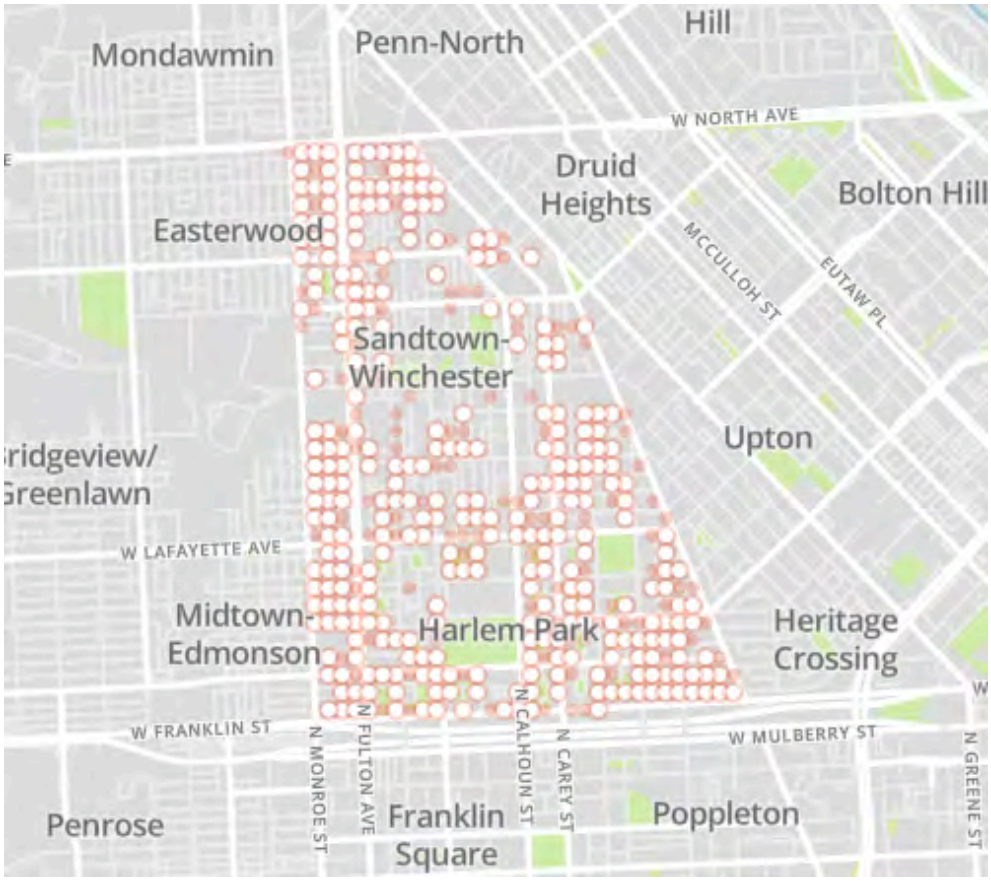
Low black property ownership is one modern-day manifestation in West Baltimore of those structural issues. Real estate is perhaps the single greatest creator of multi-generational wealth in America.[24] In 2016, family net worth for homeowners stood at $231,400 versus $5,200 for renters, according to the Federal Reserve.[25] Majority-black West Baltimore, and the city overall, lags behind the country in homeownership, despite tremendous affordability (discussed in Section 2). In Sandtown-Winchester Harlem Park, 28% of housing units are owner-occupied,[26] versus 47% for the city, and 64% nationally (2017)[27]. Black homeownership specifically is lower overall, and declining. In Baltimore, black homeownership decreased from 45% to 42% in the decade ending in 2017. On the national level, that number has dropped from half to 43%.[28]

One of the perplexing issues to contend with in a neighborhood like SWHP is that, while homeownership is low, the neighborhood is situated in a larger market that is unaffordable for half of the people who rent.[29] The Abell Foundation published a report in July 2020 examining the complex issue of barriers to homeownership in Baltimore City. Among the issues they found was a "lack of good-quality homes in

stable or improving neighborhoods that are affordable to first-time homebuyers. In less-expensive neighborhoods, it is difficult for homebuyers to compete with investors who buy homes for cash."[30] So speculators and investors are one major issue that complicates any neighborhood revitalization that hopes to include the existing residents as material and financial participants.

Vacant Properties

Another unsurprising issue, given such low economic indicators in the area, and a population that's been cut in half since 1970[31], is vacant homes and lots. They account for 35% of all properties in SWHP's 72 square blocks, just a couple of miles from the Inner Harbor[32] (See Map 2). In total, all vacant properties in Baltimore cost the city $88 million per year just to maintain, secure and caretake, so this is a massive drain on city coffers in areas that could, and should, instead be net revenue contributors.[33] There's also very real safety concerns arising from vacant buildings, when unsecured facades and walls threaten passing pedestrians,[34] and hollowed-out structures become centers of the drug trade.



Map 2: Vacant Houses in the Sandtown-Winchester Neighborhood Source: Open Baltimore

Remedies for the vacant housing problem present more seemingly insurmountable hurdles. The Baltimore Sun found that, from 2012 to 2014, the city spent some $40 million dollars in demolition funds[35] and only reduced the total number of vacant houses by 300, to 16,500. Part of that stubborn figure was increased supply from declining population, but much of it had to do with legal and regulatory hurdles in taking

control of the properties.[36] The clearances simply couldn't get done quickly enough. One conclusion that can – and has been - drawn from the decades of expenditures and a focus on demolition, is that we're not going to demolish our way out of this problem. The supply of rehabable properties with the "good bones" and aesthetics that call out for repurposing is not endless. Large-scale demolition holds the very real risk and demolishing away the heart of neighborhoods and hollowing them out beyond recognition[37], complicating immensely the goal of rebuilding a thriving community there[38]. The only other option, of course, is the admittedly more difficult one of returning these buildings and communities to greater occupancy. Again, it's a big lift, but not one that there's not a model for, and increasingly more targeted and useful federal programs seem to be in the offing[39].

In some of the biggest and most complex cities on the Atlantic and Pacific Coasts, even in what had been their most blighted areas (South Bronx, NY[40]; Southeast Washington[41], South LA), transformational change has been realized, and existing communities and housing structures – the old buildings with "good bones" – were at least part of the reason they've come back. Already, there are smaller non-profits achieving similar targeted success in West Baltimore.[42] But enduring transformational change likely will have to be market-based, however coordinated and supported by the city's government and philanthropic communities, and front-run by clever mechanisms to subvert speculators and include existing residents.

There's one additional cost too with vacants, which is often overlooked: the opportunity cost of having all of this property, all of this productive city land, not paying property taxes. If we take a theoretical value for these houses, multiply that by the actual taxes paid by property valued similarly, and then multiply it by the number of vacant structures, we can begin to estimate that opportunity cost. The median price of homes sold in the KFA in 2018 was between $35-50,000[43]. Even at the low end of the market, a $35,000 house is paying $900/year in taxes (city and state combined)[44]. There's 2100 abandoned properties in SWHP alone,[45] so for that neighborhood cluster by itself, the city and state are losing out on nearly $1.9 million dollars a year in property taxes. If one makes the same calculation for the three-cluster KFA overall (again using the most conservative number of $35k), more than $5 million[46] a year is being lost in property taxes just in these three neighborhoods, just on now-vacant properties.

Then there's income taxes missed out on, as well as sales taxes and business and real estate transaction taxes – it all rapidly adds up.

Crime

A coincident challenge faced in the KFA is crime, the inescapable bedfellow of poverty and blight. When totaled, the all-inclusive costs of crime and punishment related to the area are far more astounding than even the opportunity costs of vacant housing, and make a strong argument even stronger for a more proactive and thoughtful use of limited resources - one with a longer-focus based on a sound foundational plan.

For starters, there's the question of policing, a difficult number to tease out of the Baltimore Police Department (BPD) budget. But as just one data point to consider, Governor Hogan declared that the State of Maryland alone spent $14 million on the Freddie Gray riots. Then there's the actual crime and punishment costs. One of the worst, and most expensive crimes (on account of the time spent incarcerated) is murder. The best estimate we have for murder is that each one costs the city and state $11.8 million[47]. The costs included in this estimate are hard, measurable ones, like medical, medical-examiner, burial,

> ***"The best estimate we have for murder is that each one costs the city and state $11.8 million."***

trail and incarceration costs – all heavily studied and quantified - so one can be reasonably sure that this is a number that's not highly speculative. In fact, according to research all indications are that it's conservative. There were 14 murders in 2017 in SWHP,[48] so that's $165 million from that neighborhood cluster alone. Southwest Baltimore had 14 murders as well,[49] while Greater Rosemont had 11.[50] So for just our three-cluster KFA, that's $460 million – nearly half a billion dollars - that those 39 murders are costing the city and state over the next approximately twenty years or so.

In real numbers though, murderers are not particularly a large percentage of the inmates in jails or prisons, so we'd need to try to estimate the costs of other incarceration as well. Th Justice Policy Institute and the Prison Policy Initiative have tried to do just that for our KFA in West Baltimore. They found that, in 2015, the 1,282 inmates from our three-neighborhood KFA were costing the state $47.5 million per year. Some of that number would be included in the murder number, but as one can observe by the relative numbers of murderers to non-murderers (39 vs 1,282), not a lot of this figure is double-counting.

Table 2: Estimate of Some of the Annual Costs of Abandoned Houses and Crime in the Three-Neighborhood Clusters of the Study's Key Focus Area (in millions of dollars)

Indicator	SWHP[51]	Southwest Baltimore[52]	Greater Rosemont[53]	KFA
Abandoned Houses Lost Property Tax	1.9	2.3	1.2	5.5
Murder	165	165	130	460
Incarceration	17	15.3	15.2	47.5
			Annual Costs in the KFA:	**$513 million**

Taken in sum, these costs add up to mind-boggling expenses arising from poverty and structural racism in just three of Baltimore's 55[54] community Statistical Areas. Poverty has a cost - and it's big. City and local foundations have spent hundreds of millions over decades trying to alleviate it, with little to no success. The murder rate continues to climb,[55] and the city and state continue to be forced to outlay tremendous amounts. All of this argues for a new approach. We've tried non-profits and government programs. What's left? The market.

West Baltimore needs a demographic injection. It needs more middle-class individuals and families to move into its neighborhoods, pay taxes and contribute materially to building (and re-building) its communities.

It needs to get the economic metrics moving in the right direction. That's Social Sciences 101 after all: to break-up concentrated poverty by moderating it with higher-income demographics[56] - but it's easier said than done. West Baltimore is fortunate though - perhaps uniquely so. Our KFA has some exceptional attributes that collectively make for a tremendous opportunity to generate a turnaround. In Section 2, we'll begin to look at how to make that happen.

Section 2 – Solutions

What does it take to bring distressed neighborhoods back? Hundreds of millions of dollars in taxpayer and foundation money? Nope - that was tried in Sandtown-Winchester and it didn't achieve what city leaders had hoped[57]? What about wholesale demolition of vacant properties? Again, not the answer. In January 2016, Maryland Governor Robert Hogan pledged to spend $75 million to demolish 4000 blighted units in Baltimore, saying, "I'm a guy on a mission who wants to get things done and wants to get them done now."[58] Eighteen months later, $5 million had been spent on the effort, and only 131 houses had been demolished, a cost of $38,000 per house (not including work by city and state employees to get the permits to proceed). Demolition, like any government action involving private property in America, is fraught with legal and logistical perils, and also carries the very realistic risk of hollowing out communities beyond recognition and repair[59]. So what's left? Market-driven revitalization.

Okay... the free market, you say, how does that work in a place where homeowners don't want to live? There is no market there, right? Well, the short answer is, you've got to figure out a reason for those folks to want to live there, and then convince them of it. Sounds naively simple, but in West Baltimore, it leads to a stunning realization. What do parts of West Baltimore - in particular the Key Focus Area (KFA) of this roadmap - have going for it that the rest of the city and surrounding region does not? A suite of attributes that - together as a set - is unmatched by any other jurisdiction in the state:

1) Proximity to Washington

The West Baltimore MARC station, situated directly in the middle of our KFA, is the quickest way from Baltimore to access the booming economy of the nation's capital. Faster than a car. Eight to twelve minutes faster by train than from Station North, the rising area around Baltimore's Penn Station. Faster than any other public or private transportation, helicopters excepted. And here's the thing, as will be described later in this section, that trip could be a lot quicker - eye-poppingly quicker - and making it so would go a long way toward "figuring out a reason for folks to want to live there".

Further on the topic of Washington, it's important to note that the Baltimore City Department of Planning itself also recognizes the key role Washington's economy plays in the health of Baltimore's. In the department's latest "Key Trends" document, they state unequivocally: "The Baltimore Region's population and economic trends are better understood within the context of the larger Baltimore–Washington, DC Region, which represents the functional economic region for Baltimore."[60]

So it's being a part of Washington's economy that really matters. And just in the smaller region around Washington (stopping northward at the Montgomery and Prince Georges County Lines), the Metropolitan Washing Council of Governments (MWCOG) sees a huge need for housing. In a report released in September 2019, they declared that **an additional 320,000 housing units are going to be needed in the Washington Metropolitan Area by 2030 - with 75% of those housing units needing to be "near high-capacity transit" and "affordable to low and middle income households"**.[61] That sounds very much like a recipe for West Baltimore growth.

2. Neighborhoods and Architecture

We talked about how "cities are back" in Section 1 of this roadmap. West Baltimore is the quintessential inner-urban, townhouse-centric (in Baltimore, they're called "rowhouses), late 19th-early 20th -century environment that today commands millions to buy into all over Europe, and in New York, Boston and Washington. The problem for Washington, DC workers now, in neighborhoods that look exactly like ours in the KFA, is not blight, but rather that that city has become so attractive that it's now unaffordable, dramatically so. Which leads to the third attribute.

3. Affordability

West Baltimore is cheap - dirt cheap. Rather than pay $2.5 million for a townhouse in Logan Circle in Washington, one can pay $250,000, or even $25,000 for the same house in West Baltimore - or $1000 for a shell that can be made your own. It's a kind of cheap not available anywhere else in the Washington-Baltimore Metropolitan area, certainly not for any community with similar attributes.

So why hasn't it happened yet - why hasn't West Baltimore real estate exploded like it has in all of these other cities - and in the rest of Washington-Baltimore Metropolitan area? Two major and two minor (but still important), reasons:

Major Reasons

- **The commute is still too long** - at least 50 minutes one-way on the MARC train, and often a lot longer.[62] Just below in this section, and also in Section 3, of the roadmap, we examine how we can cut this time nearly in half, and turn this liability into a huge draw.

- **The timing hasn't been right until now** - prices have always been rising in Washington for decades, but in the last few years, Washington has crossed a threshold. Never before has unaffordability been so dramatic in virtually every neighborhood in DC that has a visual character similar to the KFA.

Lesser (but Still Important) Reasons

- **High Property Taxes** - this is an important hurdle currently because it speaks to the Affordability attribute West Baltimore enjoys. Property taxes can often end up costing homeowners in Baltimore nearly as much as one's mortgage. Although the need for such high taxes should moderate with more homeowners and their tax dollars coming in to Baltimore, and less money going out on incarceration, policing and vacant properties, nevertheless anything that can be done now to lower these rates, or creatively offer some discount incentive for newcomers, would only add to the attractiveness of the KFA.

- **Subpar Schools** - Baltimore schools need a lot of work, for sure, but the importance of this factor is more difficult to parse out, although in concert with the other issues, it clearly plays a role in dissuading homebuyers. All we can really say for sure at this point is that it's a factor of consideration to be watched, and any improvement would certainly aid the goal of economic growth in the struggling KFA areas. Fortunately however, the experience of Washington in the last few decades seems to bear out the conclusion that bad schools are not a fatal handicap to neighborhood revitalization, rather just an "add-on" in importance that grows in significance as neighborhood fortunes rise.

So... for the KFA in West Baltimore, in the simplest language possible, revitalization boils down to an equation:

Affordability + Accessibility = Transformational Change

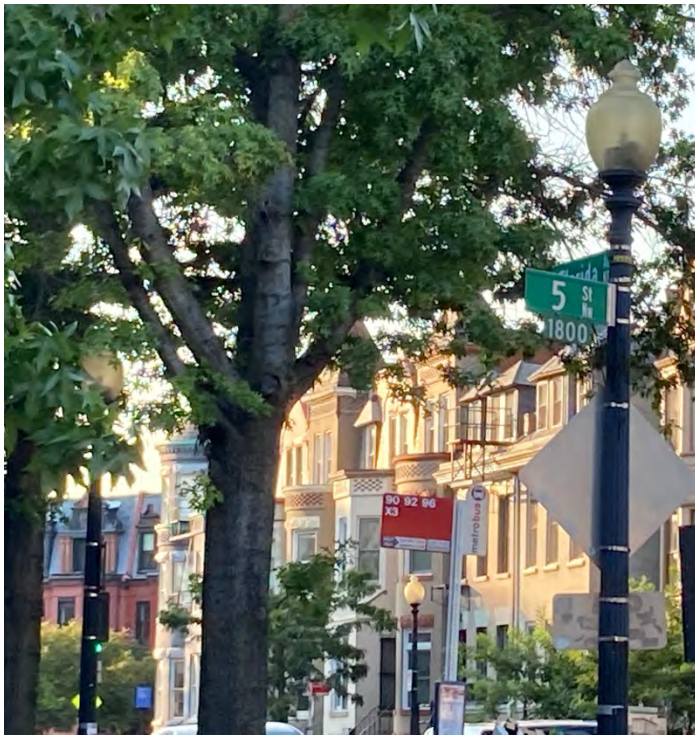
West Baltimore is already super affordable, so the critical input in that equation to address moving forward is accessibility - how do we make it irresistibly accessible to folks who want to avail themselves of that affordability by living in Baltimore, yet continuing to work in DC? We'll get to the details of that a little further on, but first let's start in order and define what each term means.

Affordability

In a free-market system like real estate in America, the notion of affordability can be a difficult one to quantify. It's deeply personal, relying on numerous other factors besides house prices - things like transportation, needs of children (childcare), work location, desires for recreation and more. Looking strictly at cost however, as a general rule, the US Department of Housing and Urban Development defines 30% of income as the threshold above which families are "cost-burdened". But even that measure can be a misleading one, particularly on the less affluent end of the income spectrum, where every penny can be critical to meeting that month's expenses.

For purposes of this roadmap, we're going to look at Relative Affordability, and consider it in the context of accessibility. We're going to assume that West Baltimore is "ultra-accessible", and then we're going to define what that means (further along in this section) and how we get there with equipment and service (in Section 3). Being "ultra-accessible" gives us the ability to really start to think of West Baltimore (and in particular the KFA) as a neighborhood *in* Washington, DC, the same way Bethesda, Chevy Chase and Silver Spring, three other Maryland jurisdictions, are really thought of as "DC neighborhoods". Or the way parts of Brooklyn 30 or 40 minutes by public transportation from Midtown are really thought of as New York (meaning Manhattan) neighborhoods. If we make this conceptual leap of accessibility for now, then we can begin to quantify West Baltimore's position of relative "ultra-affordability", and speculate on the potential impacts of a revitalization.

To simplify our comparison, we're going to focus on just one neighborhood in downtown Washington that is eerily similar to our West Baltimore KFA, both in look and in metrics. We're going to examine its experience over the last two decades, and then quantify its current relative affordability to homebuyers.



Shaw/Logan Circle

Shaw/Logan Circle (hereafter called Shaw for brevity) is a neighborhood cluster in downtown Washington, DC, roughly 10 blocks from the White House.[63] Langston Hughes wrote poetry here, Duke Ellington played piano, and African-Americans started their own bank[64], but the community struggled enormously in the decades following the 1968 riots after the murder of Dr. Martin Luther King (as many urban inner cores did). In the last two decades however, the neighborhood has been on an astounding trajectory of economic growth, with businesses large and small opening in record numbers and house values rising commensurately. Even with such incredible growth though, the neighborhood is still an excellent analogue to our less-wealthy KFA because, in addition to having similar physical attributes (a similar look), it also at one point not long ago (the year 2000) had very similar metrics to our KFA.

Poverty and violet crime were on similar levels in Shaw in 2000, as compared to the levels of today in our West Baltimore Key Focus Area - so in a sense, Shaw can be used as a model for expectations, if and when our KFA is well-and-truly brought into the DC economic orbit. True, Shaw was only roughly half black then, so the racial make-up was slightly different than the KFA, even if poverty levels materially weren't. But DC has always been a more diverse city, even when it generally was just as violent and poor as Baltimore in the 1980s, so that statistic is not surprising.

Table 3: Shaw 2000 vs West Baltimore 2015

Indicator	Shaw 2000[65]	West Baltimore 2015[66]
Violent Crime (Crimes per 1000)	16	20.5
Poverty Rate	25%	33%
% Black non-Hispanic	52%	97%

What *is* surprising is the magnitude of change that these metrics experienced in Shaw in the following 15 years after 2000. Violent crime was cut in half, as was the poverty rate (See Table 4). Average family income doubled. And property values skyrocketed. Could this be what's in store for West Baltimore in a DC-homebuyer led revitalization?

Table 4: Shaw (a neighborhood in Washington, DC) 2000-2015

Indicator[67]	2000	2015	% Change
Violent Crime (Crimes per 1000)	16	8	↓ 50%
Poverty Rate	25%	13%	↓ 50%
Average Family Income	$72,000	$137,000	↑100%
Median House Price	$113,000	$853,500	↑655%

If nothing else, these numbers are indicators of how fast inner- core urban neighborhoods that look and feel like huge swathes of West Baltimore, and find themselves within the accessible orbit of DC's booming economy, can change themselves. In Washington, it's not uncommon for residents who hadn't been in a particular neighborhood for a few years to stand gobsmacked on a corner they thought they knew, mumbling, "it happened in a blink of an eye". That, after all, is the key takeaway about the velocity of change West Baltimore can expect, if city leaders do everything right and have some measure of success. It can happen in a blink of an eye, when you're in the accessible orbit of DC's economy. So there's implications for city budgets and services, but there's also dramatic implications for the existing residents, which will be discussed in Section 6.

"It happened in a blink of an eye."

This sub-section however is about affordability, and the importance of a place like Shaw to the question of affordability in West Baltimore can be summed up in one statistic: Media House Price. We can see above, from Table 4, that the median house price of Shaw grew by 655% from 2000 to 2015. But perhaps the more useful number is where house prices in Shaw find themselves today. The average home price today for a townhome (or rowhouse, as they're called in Baltimore) with three bedrooms is: $1.351 million.[68] It's worth pausing on that number:

Average Rowhouse Price in Shaw (DC) Now: $1.351 million

Compared to our KFA in West Baltimore ($35-50,000), Shaw prices are different by several orders. Meanwhile the median household income in Washington, DC is only $82,000[69], making house prices like these beyond the pale of consideration now for huge swathes of the DC population.

As a general rule, financial planners recommend not spending more than 25% of your budget on housing (including all expenses, not just mortgage)[70] - or said another way, 4 times your household income. So even for households at what most economists consider to be the upper edge of the "middle class", earning $200,000,[71] they're not even close to being "priced in" to buy a house in a neighborhood in DC that looks like what West Baltimore could look like in a revitalization scenario. And the experience of Shaw is what's happening all over the nation's capital.

So the burden now of unaffordability for DC homebuyers is real.[72] That burden however becomes a blessing for Baltimore's city leaders, because if West Baltimore can truly be placed into the realm of consideration for DC homebuyers, the value proposition of West Baltimore's insanely cheap real estate will be too irresistible to ignore. But what does it take to do that - to insert our KFA into the conversation for DC-working homebuyers? Accessibility. We'll discuss what that means next.

Accessibility

Currently, the commute time from West Baltimore to Union Station is a minimum of 50 minutes (See Image 1), and quite often longer, whether one is travelling by MARC train or car.

Stops	Train 409	Train 511 (R)	Train 413 (R)	Train 415	Train 517 (R)	Train 419	Train 421 (R)	Train 423	Train 525 (R)	Train 427 (R)
Martin Airport MARC Sb	–	6:15AM	–	–	7:05AM	–	–	–	9:00AM	–
Penn Station MARC Sb	6:15AM	6:30AM	6:40AM	7:00AM	7:22AM	7:45AM	8:15AM	8:50AM	9:15AM	10:25AM
West Baltimore MARC Sb	6:23AM	–	6:48AM	7:08AM	7:30AM	7:53AM	8:23AM	8:58AM	9:22AM	10:32AM
Halethorpe MARC Sb	6:30AM	–	6:55AM	7:15AM	7:37AM	8:00AM	8:30AM	9:05AM	9:28AM	10:38AM
Bwi Rail Station MARC Sb	6:37AM	–	7:02AM	7:22AM	7:44AM	8:07AM	8:37AM	9:12AM	9:35AM	10:45AM
Odenton MARC Sb	6:44AM	6:49AM	7:09AM	7:29AM	7:51AM	8:14AM	8:44AM	9:19AM	9:42AM	10:52AM
Bowie State MARC Sb	–	6:56AM	7:16AM	7:36AM	R	8:21AM	8:51AM	9:26AM	9:48AM	10:58AM
Seabrook MARC Sb	–	7:02AM	7:22AM	7:42AM	R	8:27AM	8:57AM	–	9:54AM	11:04AM
New Carrollton MARC Sb	6:55AM	7:08AM	7:28AM	7:48AM	8:04AM	8:33AM	9:03AM	9:34AM	9:58AM	11:08AM
Union Station MARC Washington	7:10AM	7:24AM	7:43AM	8:02AM	8:21AM	8:47AM	9:18AM	9:51AM	10:15AM	11:25AM

Image 1: MARC Penn Line Weekday Schedule, Pre-Coronavirus

If there's one thing that the last few decades of explosive growth in the Washington-Baltimore Metro area has taught us, it's that Baltimore isn't really "close" enough to Washington to materially participate in the region's DC-driven economic revival by proximity. Baltimore has gotten poorer and more violent in the last few decades, and lost increasingly more population, while the metrics in most other places in the metro area have gone directly in the opposite direction - sometimes dramatically so (as in DC proper).

Said another way, the status quo isn't working for Baltimore, because 50 minutes to 1-hour away is not what the majority of cashed-up DC families and individual homeowners consider an acceptable commute - and certainly not to "homestead" in an area that needs revitalization. There's data for this.

The National Capital Region Transportation Planning Board (TPB) does a survey of commuters every three years and publishes the results in a report entitled, "State of the Commute"[73]. Pages 77 and 78 of the 2019 report starkly illustrate how commute satisfaction is directly tied to time spent commuting, and to proximity to public transportation. The difference in satisfaction between commuters commuting 30 minutes versus 50 minutes is nearly ½ "very satisfied" versus just 1/3 for the longer commute. This is of course intuitive and not-surprising, buy eye-opening to read nonetheless.

Table 5: Commute Satisfaction Based on Time Spent Commuting to Washington

Commute Times	Highly Satisfied	Moderately Satisfied	Unsatisfied
21-30 Minutes	42%	33%	25%
46-60 Minutes	30%	35%	35%

Note: 44% (only 2% higher than a West Baltimore express would be) is the highest commute satisfaction percentage measured of any commute in the entire survey.

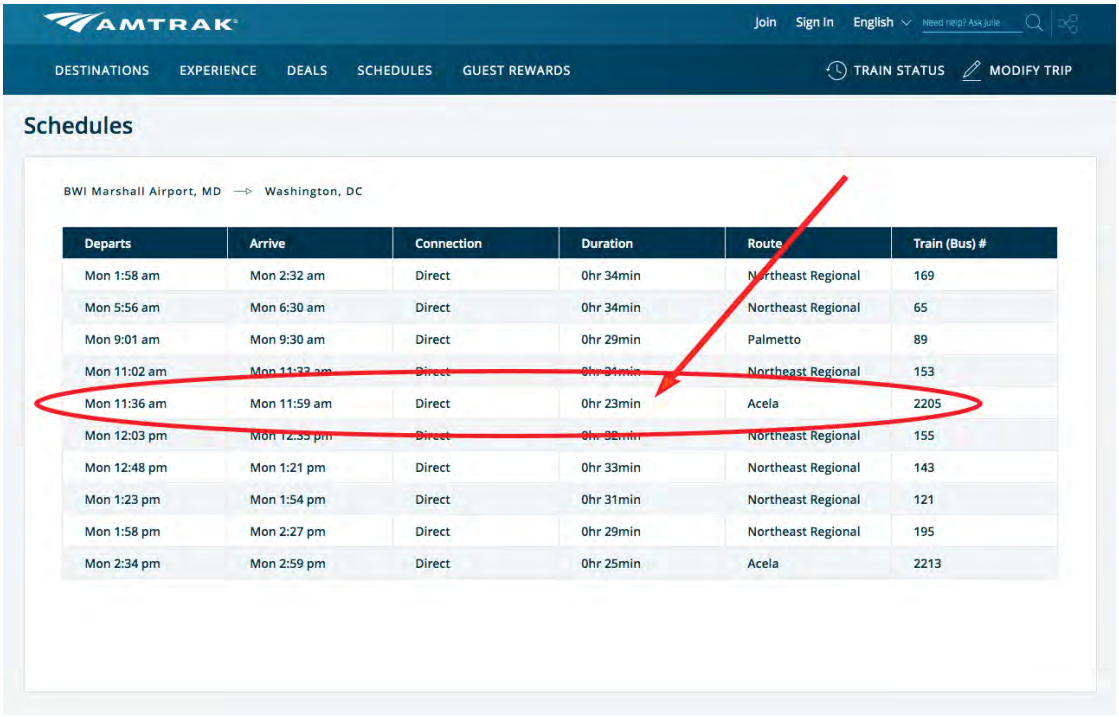
Relatedly, when it comes to commuter trains (the lynchpin of this roadmap), more than 50% of respondents who live within a half-mile of a train station reported having a "highly-satisfying" commute. The majority of our KFA is within that half-mile radius around the West Baltimore MARC station. If that excellent proximity to the station is coupled with a reliable half-hour commute, then living in West Baltimore and working around Union Station in Washington would represent a "highly-satisfying" commute for at least half of those commuters. In short, West Baltimore would reasonably be considered at that point "accessible" to the majority of DC homebuyers.

In a region where the overall commute satisfaction is about a third (p.74), that would represent a significant structural advantage in attracting middle-class families. And that's what the objective is, right? To break up poverty with an injection of folks able to pay more in taxes while utilizing less in city services requiring taxpayer outlay. At the risk of sounding simplistic...

30 Minutes is the Magic Number

But is a 30-minute MARC commute to Union Station from West Baltimore really even possible?

It is indeed. In fact, it's being done right now on the same line (the Penn Line), only it's being done by Amtrak, not MARC (See Image 2). Amtrak runs trains between Union Station and BWI in 23 mins. It takes 2-3 minutes to unload and load at the BWI Rail Station. The trip to the West Baltimore Station is another four to five minutes from BWI… Together, that puts the whole trip at 30 minutes. But Amtrak doesn't stop in West Baltimore (and by the way, it would be really expensive for commuting).



Departs	Arrive	Connection	Duration	Route	Train (Bus) #
Mon 1:58 am	Mon 2:32 am	Direct	0hr 34min	Northeast Regional	169
Mon 5:56 am	Mon 6:30 am	Direct	0hr 34min	Northeast Regional	65
Mon 9:01 am	Mon 9:30 am	Direct	0hr 29min	Palmetto	89
Mon 11:02 am	Mon 11:33 am	Direct	0hr 31min	Northeast Regional	153
Mon 11:36 am	Mon 11:59 am	Direct	0hr 23min	Acela	2205
Mon 12:03 pm	Mon 12:35 pm	Direct	0hr 32min	Northeast Regional	155
Mon 12:48 pm	Mon 1:21 pm	Direct	0hr 33min	Northeast Regional	143
Mon 1:23 pm	Mon 1:54 pm	Direct	0hr 31min	Northeast Regional	121
Mon 1:58 pm	Mon 2:27 pm	Direct	0hr 29min	Northeast Regional	195
Mon 2:34 pm	Mon 2:59 pm	Direct	0hr 25min	Acela	2213

Image 2: Amtrak Weekday Schedule Between BWI Rail Station and Union Station, Pre-Coronavirus

MARC does however stop in West Baltimore - and could safely make those same times with its existing equipment and an express schedule that stops only at BWI before finishing at Union Station. And again, it would be a much more affordable express than the inter-city focused Amtrak options.

There's a logistical puzzle however, that needs to be worked through to get to those 30-minute trips, including how to handle the need for increased capacity on the Penn Line during weekdays. After all, the issue is not just, can MARC do it, and do it affordably? The equally important component of "accessibility" is how frequent the service runs.

Running one or two "express" trains at these travel times doesn't constitute a true "express service" in the minds of DC homebuyers considering their options. To be forced to often use "non-express" trains and regularly endure 50 minutes travel times, as commuters currently do, will result in the same outcome that has been the status quo in West Baltimore for last 50 years - little to no economic development.

To be truly "accessible" to homebuyers commuting to DC, to generate buzz, to stimulate what the economist John Maynard Keynes called the "animal spirits", there's got to be a marketing hook, an eye-popping "wow" factor. And that wow factor is 30 minutes door-to-door between Union Station and West Baltimore, each-way, every-hour for the entire work day (6am - 8pm). Having that level of service allows MARC and the State of Maryland's marketing teams to persuasively claim that homebuyers can live in Baltimore and be at Union Station in the same amount of time it takes residents of Bethesda to get there on the Washington Metro system. Or Silver Spring residents to get to Farragut North on the Metro. No one would think twice about those commutes - they're considered easy and quite pleasant for a DC metro region that averages a 43-minute commute.[74] And likewise, few would consider 30-minute trips between West Baltimore and Union Station to be anything but easy.

"It's an economic play, rather than a transportation one."

It should be noted at this point, that there may be pushback against the entire notion of an express service between West Baltimore, BWI and Union Station. A key vector for that may come from constituencies at other stations on the Penn Line, wanting similar increases in their service. But it's important to remember the objective here: to capture all, or even some for now, of the economic potential in West Baltimore - easily billions worth every few years, with likely massive knock-on effects. So it's an economic play, rather than a transportation one.

If economics is the issue, one central question may be: Why not focus on Penn Station - which has some level of economic development to build on, but still needs a lot more - rather than West Baltimore, which currently has little similar growth on which to build?

Why West Baltimore Instead of Penn Station?

The simple answer is: 8 - 12 minutes.

West Baltimore is 8 - 12 minutes closer to Washington than Penn Station can ever be. When trains leave the West Baltimore Station, they enter the ancient Baltimore & Potomac Tunnel (opened in 1873[75]), and travel slowly under the city to get to Penn Station. Even in a replaced-B&P tunnel scenario[76], given current speeds and equipment on the line, the further distance, and the required stop at West Baltimore, there is no conceivable path to creating 30-minute trips to Penn Station. It's simply not possible in the foreseeable future for MARC. So the only way MARC and the State of Maryland can ever plausibly offer "regular 30-minute trips to Baltimore", is if they focus on the West Baltimore station.

And, again, let's not forget the economic side of it. West Baltimore is coming from a much lower baseline economically than Station North, the area around Penn Station. Relatedly, West Baltimore has a much higher embedded cost structure to the city and State of Maryland (from crime and vacant property), so the potential benefits financially to the various governments - through both increased revenue and savings - are likely larger by a multiple in West Baltimore. If MARC can help move the needle in West Baltimore, it will be doing so by breaking 50 years of inertia, and that alone would be nothing short of transformational in a way that Station North's relative prosperity could never experience.

"West Baltimore is 8 to 12 minutes closer to Washington than Penn Station."

By the way, while we're speaking of the area around Penn Station, it must be pointed out that, even though it won't have 30-minute trips, it's still going to be part of this service, and will still benefit

immensely. After West Baltimore, the trains will have to continue on to Penn Station to turn around, so really, Penn Station, is the other bookend for this service, not West Baltimore. It will just be approximately 40 minutes away from Union Station.

Nevertheless, regular 40-minute trips to DC could have a massive catalyzing effect in Station North as well - nearly as much as 30-minute trips in West Baltimore. In particular, the "regular" part of the service would be game-changing. Quicker trains, coming more regularly could alter perceptions dramatically about the area around Station North - for instance, about the accessibility of the exceptional university near Penn Station - Johns Hopkins. College Park (University of Maryland) to Union Station is 30 minutes on the DC metro system. Johns Hopkins could be 40 minutes to Union Station - that's pretty close to the same amount of time, and a potentially huge marketing hook for Hopkins as well.

So, the reasons to focus on West Baltimore, rather than Penn Station are:

1. **Proximity -** it's closer, and therefore quicker, to Washington than Penn Station.

2. **Upside -** there's more potential financial benefit to state and city governments, owing to West Baltimore lower economic starting point.

The housing stock and neighborhoods are pretty good too - of exactly the type that's been in tremendous demand in Washington.

But again though, nothing growth-wise is ever going to happen in West Baltimore with the status quo intact and trains stopping at a lot of stations, generating trip times approximately equivalent in time to what they currently are - at least 50 minutes, and often more. The last few decades have proved without a doubt that that's a failed strategy for realizing the true economic potential of West Baltimore - as the part of the city closest to Washington.

At the end of the day, MARC and the State of Maryland need to find a way to effectively serve the goals of all constituencies on the Penn Line - to service all the smaller stations on the Penn Line, while at the same time facilitating transportation-led transformational change in West Baltimore. Because the Penn line is MARC's main profitable line of business, and therefore all the stations are critical to the overall growth of the region. But the economic stars are uniquely in alignment right now for explosive growth in West Baltimore, and that would be a terrible opportunity to waste.

How great is that West Baltimore potential? Let's try to quantify it.

Transformational Change

We talked earlier in this section about the equation guiding revitalization in West Baltimore:

Affordability + Accessibility = Transformational change.

We know that we're in a unique period in Washington's homebuying market, where prices have risen to the point where any structure that resembles the North Atlantic-style rowhomes of the kind common in our West Baltimore KFA is effectively priced out of the range of middle-class Washingtonians without other sources of capital, or without those families severely stretching their budget - what the US Department of Housing and Urban Development calls "cost burdened".

We've also learned that it is possible to run 30-minute express trains from West Baltimore to Union Station with one stop at the BWI Rail Station, and to run them frequently enough to be called an "express service", one considered "accessible" to the Washington homebuyer market. And we're going to learn in Section 3 about the logistical steps needed to be taken for that service come to fruition.

We've examined the crushing burden of concentrated poverty in West Baltimore - on families, public safety and treasure. And we've gained some idea of the financial drains and other externalities generated by abandoned properties, which represent 35% of all properties in Sandtown-Winchester Harlem Park, one of the three neighborhood clusters in our Key Focus Area.

So we've gotten a glimpse, a few hints if you will, of how things might reasonably be expected to be different in a revitalization scenario for West Baltimore, but we haven't put it all together, and really defined what "transformational change" looks like. We're going to try to do so here.

For starters, we've got the example of Shaw in DC. In just 15 years, Shaw went from effectively where our KFA is today to a 100% increase in family income, and a 50% reduction in violent crime, with a similar decrease in poverty. So that's a data point that may represent a model.

Also during that same period, some folks made a lot of money in real estate, with prices appreciating 650% in Shaw in just 15 years. One of the key tenets of the West Baltimore Project is to figure out a way to get heavy participation in the property market by existing KFA residents early enough in the revitalization cycle so that gentrification can be a tool for lifting up families living in the KFA now. Ideas for doing that will be discussed in depth in Section 6, but the upshot is, if a high, early level of participation can be garnered, one that was planned for and actively supported by the government and others entities, it would represent an entirely new model of economic development in urban-core neighborhoods - an "organic" residents-first model.

As an aspirational vision for existing West Baltimore residents, the Shaw experience does offer compelling data points[77].

900 Block of S Streets

(1.25 miles to the White House)

A DC firefighter bought a house on this block in 1979 for $59,000. In 2005, it sold for over $1 million.[78]

900 Block of Westminster Street

(also 1.25 miles from the White House)

In 1984, a house was bought on this block by a 32-year-old man who worked for the Department of Labor. He still owns it, and it's currently appraised at $1.12 million.[79]

Leaving aside the question of gentrification for now though, what else can we say about a "transformed" West Baltimore? Well, there wouldn't be any vacant properties for one - they'd all be on the tax rolls for sure, and the ramifications of that for city budgets would be enormous. Remember, the City of Baltimore is spending $88 million dollars a year caretaking all the abandoned properties in the city. A good chunk of those are in the KFA. And the State of Maryland is spending another $75 million to knock down thousands of them. Money not spent undertaking demolition goes right to the bottom line of government budgets.

Because on the other end of the Penn Line, a half-hour away, the City of Washington is done knocking down blighted properties. Properties anywhere in the District are simply too valuable to knock down now. It's quite conceivable that West Baltimore could get to the same place in just a decade, or a decade-and-a-half, a place where we'll be regretting the loss of all those vernacular and strong-boned properties that went under the wrecking ball.

And what about crime? How would public safety and the associated expenses look? Well here, you'll remember that the costs detailed in Section 1 of crime, policing and incarceration, just from the KFA, totaled nearly half a billion dollars a year! With violent crime cut in half, and murders cut by at least that

much, and probably much closer to zero in the KFA after a decade or two, the savings to city and state budgets would easily stretch into the hundreds of millions a year.

Then moving from savings to increased tax revenue, let's look at what sums rising property taxes alone could generate. Remember from Section 1 that $5.5 million dollars a year is what would be collected on vacant properties, were they to be valued at just the low-end valuation for the three neighborhood clusters: $35,000.

Meanwhile, if all property values doubled in the three-neighborhood cluster KFA, to an average price of $75,000 (still well below the city median sales price of $155,00[80]), then the city would increase tax revenues from today by approximately $25 million per year[81], just from these three neighborhood clusters.

If the median value of the real estate in these three areas rose to equal to the current median sales price of the city overall, approximately $150,000, that would mean the city would realize an additional $80 million more per year than it's collecting from just these three neighborhood clusters.

Table 6: Expected Annual Increased Property Tax Revenue from a Modest Revitalization in the KFA

Median Price of Homes in the KFA	Annual Increased Real Estate Tax Revenue to City & State (from today)
$35,000 (including all formerly vacant properties)	+$5.5 million
$70,000 (a doubling of values)	+$25 million
$155,000 (current Baltimore median sale price)	+$80 million

For comparison's sake, it's instructive to remember, since we're talking about Washington homebuyers playing a key part in this revitalization, that $150,000 median home sale price is smaller almost by an order than the median sale price for homes with three bedrooms in DC's Shaw neighborhood. So it could reasonably be argued that $150k for a median price is entirely realistic to consider, even in a moderate revitalization scenario.

Let's total the numbers. The savings from decreased policing, incarceration and murder costs conservatively adds up to at least $150 million/year. The additional savings from decreased demolition outlays, call it $5 million/year, gets added to that total as well. And finally, increased property tax revenue from a moderate revitalization scenario would (again, conservatively) be in the range of $80 million/year.

To sum up what we've learned:

Under a moderate revitalization scenario, the net positive effect to city and state coffers would likely be in the hundreds of millions of dollars per year - from just our three KFA neighborhood clusters.

And if Washington's (or Brooklyn, NY's) experience is any guide, with all the right pieces in place, this change could happen "in the blink of an eye", as little as 10 to 15 years.

So what are those pieces that need to be put in place? We'll find out now, in Section 3.

Section 3 – Logistics:

How do we get a 30-minute MARC trip between West Baltimore and Washington's Union Station? The answer is not a $12 billion-dollar magnetic levitation train (MAGLEV).[82] Nor even billion-dollar rail upgrades. The simple fact is, a 30-minute travel time is already being run every day on the Penn Line - it's just Amtrak trains that are running it. (See Section 2, Image 2) MARC could do the exact same thing, using their existing equipment on those same existing tracks.

The details: Amtrak runs trains between Union Station and BWI in 23 mins. It takes two to three minutes more to unload and load at BWI. Then the leg to West Baltimore is another four to five minutes on the same train. Altogether, that puts the trip at 30 minutes, door-to-door. But Amtrak doesn't stop in West Baltimore (and by the way, it's really expensive for commuting). MARC does however stop at West Baltimore - and can safely make those same times with its existing equipment and an express schedule that stops only at BWI before finishing up at Union Station. And needless to say, it would be a much more affordable express than the inter-city focused Amtrak options.

Here's how it could happen with MARC. From the West Baltimore station to Union Station is approximately 34 miles.[83] Simple math tells us that to travel that distance in a half-hour would require an average speed of 70 mph. Including the time spent moving more slowly approaching and leaving BWI, and at the platform, along with other mandatory slow-down sections, the trains would need to be able to maintain a speed of at least 85 mph on the faster sections of the trip. A quick look at the spec sheets for some of MARC's existing equipment confirms both existing engines and coaches wouldn't have a problem reaching and sustaining at those speeds.

Equipment

First, there's MARC's new **Siemens SC-44 Chargers**, 8 of which were delivered in 2017. They have a top speed of 125 mph and would have no problem pulling 6 or even 8-coach trains on this line at the speed needed.[84]

Then there's the **MARC IV multi-level coaches**. The State of Maryland purchased 54 of them in 2014. They have a top speed of 125 mph[85], and a maximum service speed of 100 mph[86], well more than would be needed to run the desired half-hour express trains. Some of these MARC IVs are already running on the Penn Line.

There's also **MARC III multi-level coaches**, which were recently refurbished[87], and are likewise rated for a max speed of 125, with a service speed of 100 mph[88].

Again, MARC already owns this equipment and has run it on the Penn Line, so it's not a huge conceptual leap to consider the possibility of MARC using some of this rolling stock for an express service.[89]

However, in practice, an express service would most likely be additive to existing services, so the Maryland Transit Administration (MTA), the state agency that oversees MARC, might want to get creative in precuring additional rolling stock capacity, rather than pulling from elsewhere in their system, or outlaying vast sums initially by purchasing new equipment.

Fortunately for MARC, there's an intriguing potential supplier of short-term leases of compatible rolling stock: Amtrak. Leasing allows MARC to move incrementally, and start-off with a three-year "proof-of-concept" phase, before diving in with both feet and purchasing and/or rejiggering existing equipment.

Leasing from Amtrak also makes sense because MARC is a virtual railway system. MARC doesn't own any of the rail lines (with one small exception). The whole line is run by Amtrak, who is paid by the State of Maryland for the use of the tracks (again, owned by Amtrak), the staffing (contracted by Amtrak) and the maintenance of some equipment. The only thing the State of Maryland owns on the Penn Line is the equipment, so it wouldn't be a huge leap to begin leasing some of that as well, at least for this new express service.

Here's two intriguing options:

Amtrak completed delivery in 2016 of 70 Siemens-manufactured Amtrak Cities Sprinter (ACS-64) locomotives,[90] with a top speed of 125 mph on the Northeast Corridor (NEC), and a capacity to pull up to 18 of Amtrak's coaches.[91] Several industry insiders believe that Amtrak ordered more than was strictly required at this point, in order to secure a bulk discount on added capacity, with which it could grow in the future. Some of that capacity may be available now for a short-term (3-year) proof-of-concept lease for the new express service. Amtrak might welcome the added revenue

Amtrak is also in the process of replacing its current Acela fleet with all new equipment - both engines and coaches. The old train sets (locomotives + coaches) are expected to be completely retired by 2022[92]. It's certainly worth investigating, as a possible ultra-affordable, ultra-easy way of getting the service up and running quickly, whether two or three of these retired sets might be leasable for three years, and in good enough shape for that to make sense?

So there are lots of ways to go for equipment to run the service. And of course there's the ultimate option available as well, of jumping in with both feet and purchasing two or three train sets new - likely by piggybacking on another American jurisdiction's order, to get favorable pricing.

Now with the question of equipment out of the way, the key issue of scheduling comes to the fore.

Schedules and Timetables

Wrapped up in the puzzle of how to fit this service into existing schedules is an important strategic question: How many trains a day actually constitute a service that will be perceived as sufficiently "accessible" by potential commuters to DC? How many trains, and run at what frequency, will make folks truly consider, once and for all, West Baltimore as effectively a neighborhood *in* DC, along the lines of Bethesda or Silver Spring. In short, what level of service is required to break the current inertia, and initiate real-estate led transformational change in West Baltimore?

An informal poll of transportation experts by the Baltimore-Washington Transportation Research Group (BWTRG) seemed to settle on the idea that, to be a true service, and perceived as such, there would need to be at least **one express train run each-way (north and south), every hour, from 6am to 8pm weekdays.** Further, one of those experts looked at the current schedule and pointed out that there's actually a window in the existing timetable that would suit this service perfectly. In that window, the hourly commuter service would look like this:

Proposed Baltimore Express Service

(Hourly Weekdays 6am - 8pm)

Southbound: one train set departs Baltimore Penn on the hour, 20 mins ahead of the Acela.

Northbound: the other set departs Union Station five minutes after the hour, following the Acela.

←→

Baltimore Penn - West Baltimore - BWI - Washington Union Station

If the service started at 6am and finished at 8pm that would mean 14 hours of service, with one train set each direction every hour - so the total number of runs would be 28. That's a significant increase in capacity on the Penn Line, and one that it's not at all clear Amtrak could or would consider allowing (they own the Penn Line). Perhaps in the short term (for 3 years), a more limited proof-of-concept service could be run, with a promised expansion to come that would energize homebuyers at the prospect. But certainly, medium to long term (5 - 10 years), expansion of rail capacity of the Penn Line would have to become a priority. Amtrak has already said that the Penn Line section of the Northeast Corridor (NEC) "*operates at*

or near capacity today and is not able to reliably absorb increases in service without additional infrastructure improvements."[93]

Fortunately, there's not only ample room for expansion on the Penn Line. There's an existing, imminently affordable plan for incremental expansion there - AND it already has preliminary design work completed and environmental approvals

BWI Rail Station

The BWI Rail station is the second busiest station in Maryland (after Baltimore Penn), and the 13th busiest in the Amtrak system.[94] Created in 1980, it has a patchwork of ownership, with Amtrak owning the rails and platforms, and MTA owning the facility, station and parking garages.

Image 3: BWI Rail Station

It may not be the biggest station in the system, but a realignment of the boarding platform here is the single most important key to unlocking enough capacity to run the extra 28 MARC daily express trips (14 each way). The reason is simple. Currently, although three tracks run through the BWI Rail Station (See Image 4), only two have access to a platform. So only two tracks can be used for stops at BWI. However, most Amtrak and MARC trains (115 out of 138[95]) have to stop at the airport station[96]. So essentially, the boarding platform configuration at BWI severely constrains the capacity and operational flexibility of the entire Penn Line, reducing it almost exclusively to two lines for nine miles of the line's length - even though 3 tracks are in place and functional. If just that 3rd track at the BWI station could be brought into full use with a reconfigured platform, that could potentially increase capacity by 30%[97] on the entire line, or another 40-50 trips a day.

> ***"If just that 3rd track at BWI Station could be brought into full use, that could potentially increase capacity by 30%."***

Image 4: BWI Rail Station needed platform reconfiguration

A quick look at the station's track layout shows how this can be done reasonably and efficiently, by swapping one track and its adjacent platform (Image 4). Doing so would of course require a fair bit of demolition and reconstruction, but this option, compared to the alternative that's currently proposed and under consideration by Amtrak and the State of Maryland, is cheaper in cost by a third, and therefore much more likely to get done.

Why is the other project so expensive? Because, in addition to realigning the platform at BWI and bringing that 3rd track into use, that other project would add 9 miles of a 4th track on the Penn Line at the same time. In a perfect world, adding that 4th track project would also get done - it's definitely needed, and has been sought by Amtrak for decades.

But unfortunately, we live in a world of finite Amtrak and state budgets, and there's any number of critical NEC infrastructure projects calling out for that constrained funding. So, thinking incrementally, in the current funding environment, is prudent. Three useful tracks, while not four, is better than two, and can increase capacity commensurately (and more than enough to run a Baltimore express service). Therefore, tabling that more grandiose vision in favor of a slimmed-down - "skinny", if you will - but more doable project, is what BWTRG is advocating for.

So to recap, when we talk about work needed at and around BWI Rail Station to increase capacity on the Penn Line, there's two major issues. If both are addressed, capacity will increase on the Penn Line (and the NEC) dramatically. But if we can only afford to do one, the reconfiguration of the BWI platform would still, in and of itself, increase capacity by a significant enough amount to run a weekday Baltimore express service, with significant capacity left over to be utilized by Amtrak.

BWI Rail Station Projects Needed

1. **3rd Track -** BWI Rail Station needs a reconfigured platform, and about a mile of track adjustment around the station to bring the third track into full use.

2. **4th Track -** Nine miles of track centered around the station need a 4th track, some signal and catenary work, and the elimination and tweaking of some interlockings (track switching mechanisms).

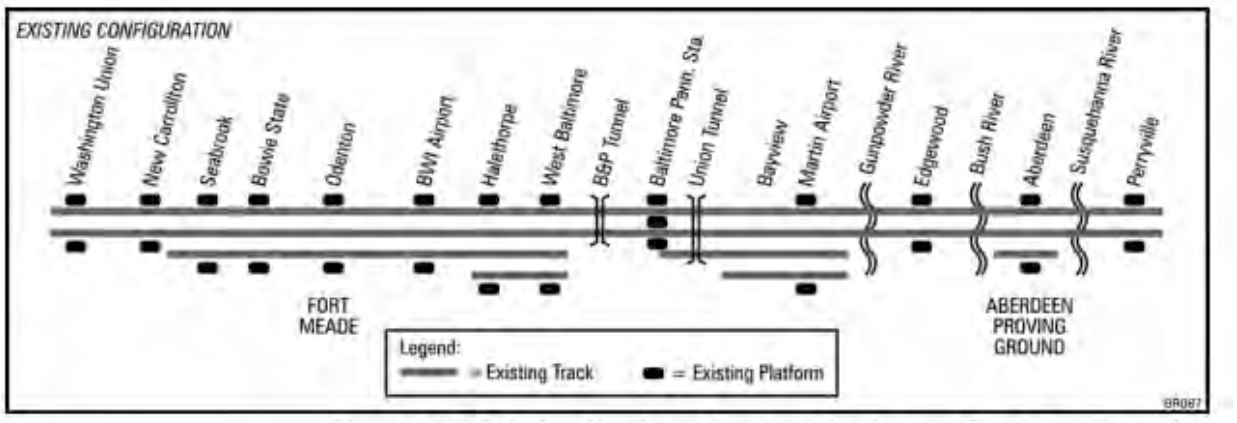
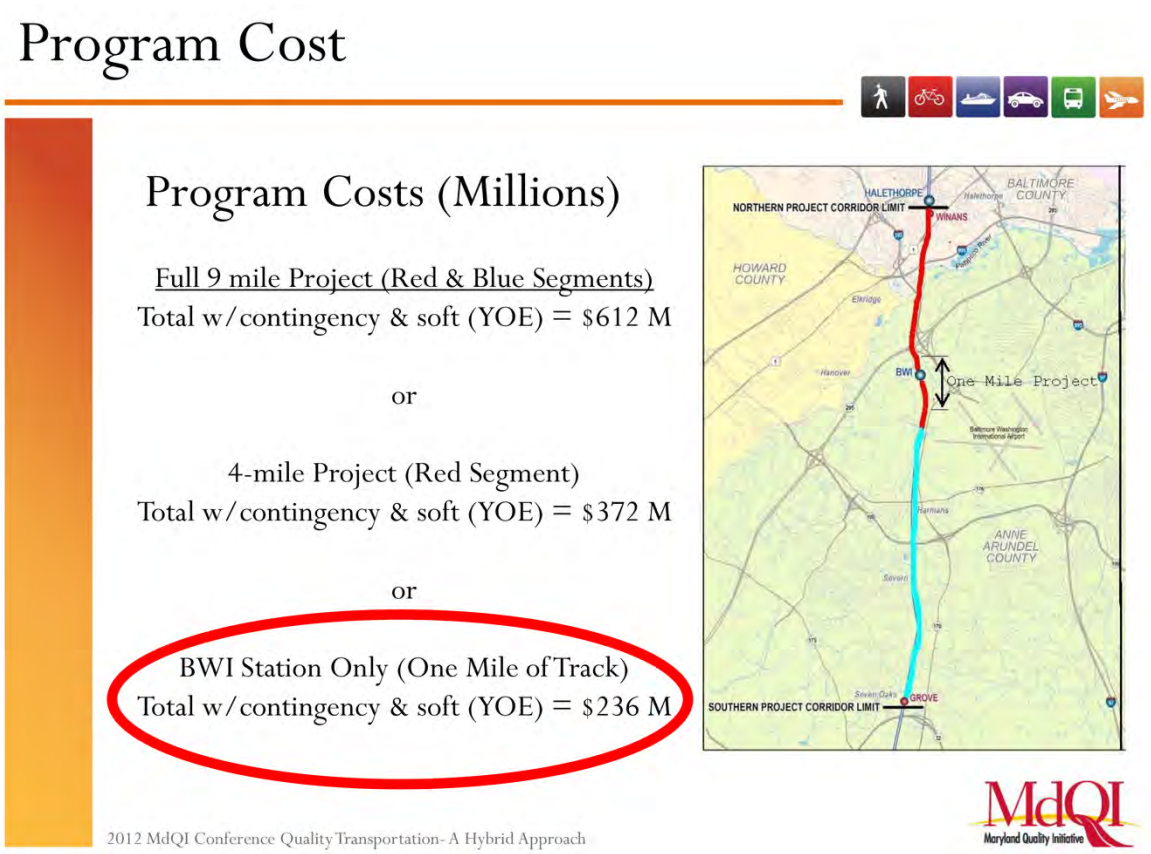


Image 5: Schematic of Existing Penn Line Rail Layout

Image 5 shows how there's three lines between the New Carrolton and West Baltimore stops, but very little of a fourth line in that interval. Again, ideally both the third and fourth track issues would be addressed concurrently and completely. But that would cost upwards of a billion dollars, some transportation experts have told BWTRG. The more affordable option is to simply address the first issue, in and around the station. What's the difference in cost? Likely around a half billion dollars[98].

This following slide from a 2012 presentation by engineers working for the state illustrates the relative costs of each option:

Image 6: Slide from a 2012 Presentation by State Project Managers



In general, that last option (circled), brings the 3rd track into full use, while the first option would bring both the 3rd and 4th track to into full productivity. (No one is considering the second option now.)

Okay, so that slide was 2012. What are the costs looking like in 2020?

We've had updated estimates come out since then, but only for the full 3rd and 4th track combined project. According to Amtrak, it looks like the price has actually gone down (!), as of July 2020, to $544 million for the full 3rd and 4th tracks.[99] If we stick with the same cost ratios (40% of the total project cost for just the 3rd track option), then we can begin to estimate the most current projected costs for just the improvements on the station platform and nearby track: $218 million.

Costs in Perspective

It's worth taking a step back here and looking at the costs of these potential station improvements in the context of the numbers we've already established in Sections 1 and 2 regarding West Baltimore.

Section 1 told us that just the annual costs of abandoned houses and crime in our three-neighborhood cluster KFA was half a billion dollars. And then section 2 showed us that the increase in annual property tax revenue the city and state could reasonably expect from a just moderate revitalization scenario in the three-neighborhood cluster KFA would be $80 million. Altogether, we estimated that the realistic financial benefit to the city of a moderate revitalization in the KFA was more than $200 million annually. Or said another way, savings in the KFA could pay for both track renovation projects on the Penn Line around BWI in just a few years. Of course, long-term, the benefits to the city and state would keep accruing and rather quickly dwarf those costs.

Table 7: Cost of BWI Rail Station Construction vs Expected Net Revenue and Savings for the City and State

Savings Annual Net Increase to City and State from a Modest Revitalization in the West Baltimore KFA	>$200 million
Cost of Construction One-Time Cost to the State for 3rd and 4th Track Projects around BWI Station	$544 million
# of Years to Recoup Costs of Construction at BWI Rail Station	**< 3**

Lastly, it's not even clear that Maryland would have to pay for all, or even a majority, of these costs for the work at and around BWI Rail Station. After all, the federal government owns the tracks and the platforms, and Amtrak uses them more than MARC (at least before an express service is initiated)[100]. And if Joe Biden wins the presidency, Amtrak will have a backer in the Oval Office like they've never had before - a passionate believer in, and longtime user of, inter-city rail.

Moreover, Amtrak is on a roll, and was set to earn a profit in 2020 for the first time[101] before Covid 19 hit. Their goal is to have operations pay for themselves, and then to use subsidies and grants to further modernize the system and catch up on maintenance. This BWI Rail Station project fits neatly into that modernization category, so it may already fit neatly into Amtrak's budget.

One thing is certain though, whether Amtrak pays for the work or not, there will be a battle for access to any increase in capacity on the Penn Line. Amtrak is not just going to give it away - they have their own designs on greatly increasing their utilization of the NEC, their key profit-generating line of business.

Securing Access

Maryland has to have an early and clear strategy to secure that access - and to bump this project up the priority list. This document - this roadmap - takes the first step by offering a legitimate, and bold, rationale for a significant capacity-increase request. But even with a clear, rational plan, Amtrak is still likely to want more from Maryland - specifically from the Maryland delegation in Congress.

To get the kind of sizeable bump in access MARC will need, Maryland's congressional lawmakers are going to have to be seen as "rainmakers" for Amtrak. If the State's congressional delegation can sit down with Amtrak's leaders before budget time, and let them know that they're going to fight on Amtrak's behalf, and then go out and execute by doing that, that would surely go a long way towards fostering the kind of goodwill that will be necessary when track allocation time comes around.

Conversely, if we wait until the money is already secured in the budget for the NEC, and then go cap in hand for time slots, that'll likely be too late. A friend in need is a friend indeed, and right now, Amtrak is still, as it's been seemingly forever, a friend in need. If Joe Biden wins the presidency however, Amtrak may have all the friend it needs in the White House. So it's better not to wait and see how this winter turns out; it's better to get started building relationships early - meaning now. Not having enough influence with Amtrak when allocation time comes around could put this whole roadmap in jeopardy. Development deferred is often development denied, and West Baltimore has been denied long enough.

Maryland has to have a concrete plan to secure access to increased capacity on the Penn Line, and it's going to have to fight hard for it. This document - this roadmap - provides a clear, logical rationale to offer Amtrak for a capacity-increase request. But Maryland legislators will also have to give Amtrak financial incentive.

Section 4 – BWI:

In the first three sections of this roadmap, we talked a lot about Washington, DC, West Baltimore and the BWI rail station. But there's two things we haven't talked at all about, and should, since the effects for them could be just as enormous: namely BWI, and the surrounding region of Anne Arundel County. The potential of an hourly 24-minute express commuter service to Union Station, and 16 minutes the other way to Baltimore, could massively increase both air traveler accessibility, and commuter accessibility to Washington.

Recall that the logistical lynchpin for this entire roadmap is a third platform at the BWI Rail Station (see Section 2). The BWI Rail Station is of course, directly adjacent to the airport itself, so as we'll see in a second, better accessibility at the station could translate into a transformation of perceptions about BWI in the DC market. And that could be critical for maintaining and growing air passenger traffic levels, as the competition heats up and greater accessibility options at DC's other airports come on-line.

But the BWI Rail Station also plays a central role in the economic life of Anne Arundel County and the surrounding region as well. Some 750,000 Amtrak riders a year (pre-coronavirus) use BWI Rail Station to board or alight from one of the 60 Amtrak trains a day. That makes it the second busiest Amtrak station in Maryland, and the 13th busiest in the entire Amtrak system[102]. Meanwhile, another 2,200 a day on average are boarding one of the 50 MARC trains that stop at the station[103]. And the MARC Growth and Investment Plan calls for a tripling of trains utilizing the station by 2035, while Amtrak predicts a 44 percent increase in trains utilizing the NEC at BWI station[104]. So it's both a critical entry point for the airport, and an essential economic link for Anne Arundel County - a link that needs infrastructure upgrades now.

All of those boarding and alightings currently happen with just two tracks in use - essentially one in each direction. What could Amtrak and MARC usage look like with the increased capacity of three (or even 4) usable platforms, and the draw of a proper 23 or 24-minute express service to and from Washington (with 14 minutes to Baltimore)? What would it mean? In two words: The World.

Let's talk about the airport first, and then we'll discuss the surrounding region.

BWI

BWI Marshall Airport, the busiest airport in the region, is located just 9 miles south of downtown Baltimore and 32 miles northeast of Washington, D.C.[105] It handles nearly 700 flights a day, and 6 million visitors a year. Nearly 13,000 jobs are directly associated with it, and the airport contributes $175 million to state and local tax coffers every year[106]. In short, it's an economic engine of the State of Maryland - and the entire region.

But it's in fierce competition with Washington, DC's two other airports, Reagan National, just across the Potomac River from The National Mall, and Dulles, further out in Northern Virginia. Reagan National is 19 minutes[107] from Union Station by Metro, the fare is only $2.65, and the train drops you directly at the station's doorstep (See Image 7). Dulles meanwhile, will also very shortly have a Washington Metro connection come on-line at its front door, when the last part of Metro's new Silver Line opens. True the trip will take longer (maybe even 45 minutes), and cost more as well (around $6-7 dollars). But travelers will be able to board a train at Metro Center and never have to get out of their seat the entire journey, until the train arrives directly at Dulles' front door. So that's the accessibility competition that BWI is facing.

Image 7: Reagan National's Metro Stop, Directly at the Airport's Front Door.

Source: Michael Barera, Wikimedia Commons

For the Maryland airport, currently the trip is around 34 minutes from Union Station[108] on MARC and costs $7[109] - which is reasonably competitive. But then you have to wait for, and ride, a shuttle bus to the airport concourse itself, which adds at least 10 minutes to the trip (and often a lot more). Riding Amtrak to BWI cuts the travel time from Union Station significantly, but adds a lot more expensive. You can pay $14 and do it in 26 minutes on Amtrak's regional trains.[110] Or you can pay $38 and do it in 21 minutes on Acela.[111] And you still have to ride the shuttle bus. Neither one of those are particularly attractive compared to the competition, OR to the prospect of a MARC train costing $7 and making the trip in 23 or 24 minutes. So even though BWI has some structural disadvantages with its airport conection, it also has a path forward to levelling the playing field vis-à-vis its competitors, with regular express MARC service. (To be fair, BWI has its own structural advantage in lower costs, which generally translate into lower fares, but again accessibility-wise, as we've talked about, it's got some catching up to do.)

So BWI needs to keep innovating to keep up with those two DC airports. For now, the shuttle bus is here to stay. (There's been very preliminary talk of a shuttle monorail.) However, there's plenty else that can be done. Maryland Governor Hogan recently launched a $600 million-dollar investment at BWI to revamp baggage handling, restrooms and restaurants. That will certainly help.[112] But perhaps the one place where BWI can really move the needle with customers deciding between the three airports in DC is travel time. If MARC could cut that 34-minute MARC travel time from Union Station to 23-minute trains every hour, that would instantly thrust BWI into the position of being one of the most convenient major

If MARC could cut the 34-minute travel time to BWI to 23-minutes, and run those trains every hour (or even half-hour), that would instantly make BWI perhaps the most convenient airport in DC.

airports anywhere in the country, and perhaps *the* most convenient airport in DC, particularly from the east side of the city, including the Capitol. It would certainly make it super-competitive with Reagan National - competitive on time, and more than competitive on price.

BWI's business is running well now (pre-coronavirus), with record levels of cargo[113] and passenger traffic[114]. But it needs to keep innovating, and this express service is the next logical innovation for that.

Anne Arundel County

Leaving aside Amtrak's 750,000 riders a year using the BWI station principally to access the airport, there would be two other major constituencies benefitting from express service: the business community around BWI, and the largely-Anne-Arundel county-based MARC commuter cohort. There's approximately 4500 MARC alightings and disembarkings every day. With the increased capacity of an additional platform, the lure of Acela-like travel times to Washington, and innovative marketing (See Section 5), there's no reason that the number of commuters using BWI couldn't grow by an order, or even several.

The business community around the airport - like the airport itself - is on a tremendous growth trajectory. On the cargo side, approximately one-third of all US consumers can be reached within one day by truck[115]. With E-commerce exploding even before the pandemic hit, the warehouse market is super-sizing. In April of 2020, Amazon paid $90 million for a 6-warehouse complex next to BWI.[116] The company has already hired 1,500 employees there, and expects to hire thousands more.

Governor Hogan:
"This is about helping people who are stuck in soul-crushing traffic every day."

A shuttle service running from BWI Rail Station, and even possibly employer-subsidized MARC tickets, is a real possibility, just on the warehouse side. But if the BWI business office community embraces robust last-mile solutions on a large scale for MARC commuters, it's not a great leap to think that one day soon, there might be just as many commuters getting off at BWI for work, as there are now, getting on to travel to their work. BWI could quickly become a commuting destination that rivals in numbers Baltimore Penn Station. That would be good for MARC revenue, good for the well-being[117] of BWI-based employees (not being stuck in "soul-crushing traffic" [Gov. Hogan][118]), and good for the environment. But, like future Amtrak growth, it would be predicated on a BWI platform reconfiguration.

Similarly, on the non-BWI-focused commuter passenger side, we know that the average commute time in DC is one of the country's longest, at 43 minutes - 26 percent longer than it was just 15 years ago, even though we're not travelling any farther distance in the aggregate[119]. And two-thirds of workers drive to work alone[120]. The more of those commuting drivers MARC can shift to rail, even for part of the weekly commute, will have a commensurate multiplier effects on reducing negative externalities - to the environment, and to the health of Marylanders.

It can't be emphasized enough how powerful a marketing message could be, that's woven around the notion of a hyper-affordable, supremely reliable, regular 23-or 24-minute express

commute from BWI to Union Station. That's a FASTER time than riding the metro from Bethesda to Union Station, FASTER than the same from College Park, FASTER than from Alexandria, and FASTER than from Falls Church. Like West Baltimore in many ways, with these kinds of commute times, and good marketing (see the next section), BWI truly becomes a neighborhood *in* the Washington Metropolitan Area. And with that classification secured, the possibilities for transit-oriented development, and office development along the lines of Northern Virginia's great satellite cities (Courthouse, for instance), becomes not just a real possibility, but an almost irresistibly compelling prospect, since land in Maryland is cheaper, and the value proposition is therefore greater[121].

Section 5 – Marketing:

So now that we've got a regular 30-minute express train service up-and-running from West Baltimore to Washington (which includes 23-minute trips to Union Station from BWI), how do you sell it?

Both numbers represent transformational trip times for their Penn Line communities, in terms of making their locations ultra-accessible to the DC job and buyer's market. But how do you shout about that accessibility from the rooftops - how do you let everyone know that West Baltimore, finally, after 50 years, is a "strong buy"? And how does one laser-target those cohorts in DC we're trying to reach, and do so with a message that resonates with them?

The answer: a mix of "old-school" analog, and "new school" data-driven digital - all with a quirky, humor-inflected, but heavily fact-infused, message. (In short, you "Baltimore" it.)

Firstly... why facts? Because they're so compelling (Those travel times! Those house prices! That architecture!). And also, because the groups we're trying to reach are so highly-educated[122] - they want facts, they like facts, they're used to incorporating facts in all of their decisions.

Second, they're also hugely environmentally-conscious[123] - and a fast-train being pulled by an electric, or super-efficient[124] diesel, is the kind green transportation that could convince them to live outside of bicycle or Metro range of their work. Not to mention the lifestyle that awaits them on their commute:

Imagine a scenario where a father or mother leaves work at 5:30 pm on a weekday, boards an express train in Union Station at 5:45. Disembarks at a stunning new West Baltimore Station (See section 6) at 6:15pm, walks less than 5 minutes to pick-up their child at Bentalou Recreation Center right next to the station, or the Mary Ann Winterling Elementary School, and then the two of them walk hand-in-hand another five minutes up Saratoga Street to their family's 3-bedroom, 2-bath 1300 sq. ft. 1924 house they bought with cash for $35,000 (and are currently planning to renovate and an extra story, effectively doubling the square footage). Arrive home time: 6:30pm - exactly one-hour after leaving work, with not a single traffic jam encountered!

And oh, by the way, as they quickly find out on the first Saturday in their new home, they happen to be living now in one of the quirkiest, hippest, coolest towns in America. Baltimore is DC's Brooklyn - and has been forever. The cool half of the regional partnership. The old saw says it all: "DC is all class and no soul; Baltimore is all soul and no class." That's been around for decades, and it's still true today.

No mortgage... a breeze of a commute... a vibrant pre-war neighborhood filled with an endless supply of gorgeous dirt-cheap North Atlantic-style rowhouses (just like DC - except for the cheap part), and a city that's loads more quirky and hip than that buttoned up town down the track - all that would undeniably have immediate appeal to homebuyers now fully and completely priced out of DC houses forever.

One place certainly to be target for advertising is public transportation in Washington, because that's where you'll catch the eco-conscious, urban-energy-loving cohort - the exact folks we'd be shooting for. So that's a good background on which to showcase some mock-up images.

To the right is what an advertisement could look like at a bus stop.

And below are mock-ups for a metro station.

Again, the facts would sell themselves.

Image 8: Mock-Up of Advertisement at DC Metrobus Stop

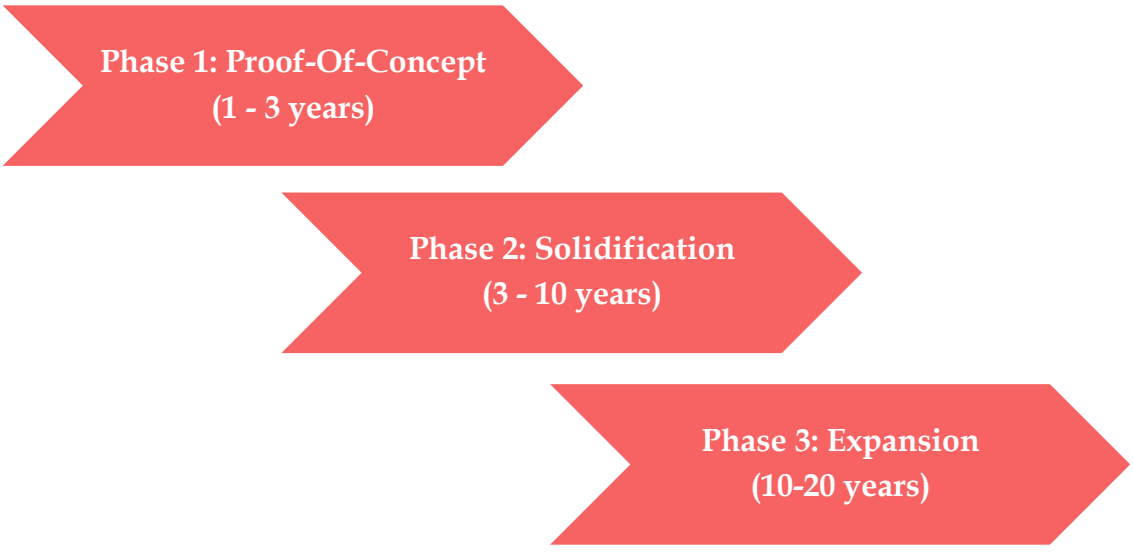
Image 9: Mock-Up of Advertisement in DC Metro

Image 10: Close-Up of Advertisement in DC Metro

Image 11: Mock-Up Advertisement Showing Three of the Key Campaign Slogans: "Baltimore is DC's Brooklyn", "Just 30 minutes away on MARC", and "This Changes Everything"

Section 6 – Phases

We've covered a lot about what can and should happen in the short-term to initiate transportation-enabled transformational change in West Baltimore (and the area around BWI Rail Station). But what is the temporal setting for the various action points? And how do they relate to the medium and long-term? What are the projects and research that naturally flow-on from the initial stages of revitalization? And where can the city and state lean-in to initial success to create a multiplier effect nearby in West Baltimore, as well as further on elsewhere in the city? We'll examine these questions and more in this section by populating a three-phase matrix that includes actions, research and other items for the short-term (1-3 years), medium-term (3-10 years) and long-term (10-20 years).



Phase 1: Proof-Of-Concept

"Lay the Groundwork, Run Initial POC Introductory Service, Start BWI Platform Construction"

Phase 1 (1 - 3 years) is obviously the most important part of the project, since there's a tremendous amount of extant inertia in West Baltimore to be overcome to get large-scale development started and homeowner buy-in initiated. So this first phase is going to have to borrow a page from military textbooks and adhere to the doctrine of "overwhelming force" to overcome this inertia. Or said a different way, it's going to have to take its cue from just down the track in Washington, where successful developments on once-forlorn H Street, or the Southwest Waterfront, were highly coordinated between the public, private and non-profit sector (mostly private-sector though), with the investments substantial and timed to coincide precisely. That level of investment and precision is what's going to be required to pull-off a revitalization of West Baltimore, and to do it in the ambitious time-frames laid out in this roadmap.

A quick note before we begin this section in earnest however: Both of those DC development areas, and many others in Washington, had their challenges with gentrification and existing residents being squeezed out. It's important to acknowledge that. But we're going to endeavor to lay out a comprehensive strategy to mitigate those effects in Section 7, so for now, in this section - Section 6 - we're just going to leave that question aside and concentrate primarily on how to get the development ball rolling in the first place. Mitigating gentrification is a super-complex puzzle, as is development, and both therefore require individual treatment - although later they should most certainly be coordinated. However, no one advocates leaving the three-neighborhood KFA as it currently is, so step one is just getting the investment ball rolling, and that means development and economic growth is job 1. That first step is what we'll concentrate on in this section.

Although Phase 1 is broadly described above partly as "Run the Trains", that brief description doesn't really do justice to the list of items that must be addressed before the trains can hit the tracks. Below are two key items for Phase 1

Access

First and foremost in Phase 1 (meaning now) is to take the steps to sort out whether the State of Maryland will even be able to secure meaningful access on the Penn Line for an express MARC service. Recall that the Penn Line is owned by Amtrak, and according to some reports by the railroad, it is already capacity-constrained. The State of Maryland would likely need to lean on its representatives at the federal level - its congresspeople - to establish a relationship with Amtrak to determine what those federal representatives could do to make the railroad more amenable to the idea of increasing capacity access for MARC. Realistically, that would mean championing, or even spear-heading, future funding in the Congress for key Amtrak projects. To the extent that they aren't already, Maryland's delegation would need to build bridges with Amtrak.

The key thing to remember about access though, is that...

Access is a two-part problem:

- **Pre-BWI Construction Access:** the first part of access is being granted the ability to run a "proof-of-concept" initial service of at least 12 express train runs (3 each-way in the morning, and 3 each-way in the afternoon) even before any increased capacity is brought on-line at BWI. That would allow the service to be marketed now to Washington homebuyers (and developers from all around the region), with the promise of even greater accessibility coming on-line after construction. The city and state wouldn't have to wait years to even think about starting revitalization in West Baltimore. And by doing so, they would circumvent the possibility of another similar pressure-release option for DC home-buyers materializing. Those buyers are seriously constrained now, and highly-receptive to adventurous ideas for homebuying. Getting a smaller, but still sufficient, amount of access would be key to capturing this moment now.

- **Post-BWI Construction Access:** the second part of access is the longer-term aspect of securing enough of the new rail capacity, post-construction on the BWI Rail Station platforms, to run a full express service of 28 train trips every weekday. In many ways, this access will be predicated on two things - first, how successful (meaning utilized) is the proof-of-concept service; and second, how "much" Maryland has done for Amtrak to motivate them to share capacity. Has Maryland chipped in significantly for the construction at BWI Rail Station? Has Maryland's congressional delegation played a key role in securing that and other funding for the railroad? Likely the answer to those two questions could determine the long-term fate of this service, and therefore of revitalization in West Baltimore.

Trains

Borrow from your own existing stock? Lease from Amtrak? Or buy outright? Where the rolling stock is the going to come from is a key part of Phase 1 as well. The options are discussed in-depth in Section 3 - Logistics.

Gentrification Mitigation Measures

These are discussed in Section 7. There are numerous steps, policies, programs and regulations that need to be ready to launch before the service does, or the hopes for revitalization could crumble under the weight of speculators and community resistance.

Development-Promoting Measures

See appendix A, where there's a list of concrete measures to be considered as augmentative to the push for revitalization. There's got to be more to offer potential homeowners and developers than just a fast train and cheap houses. There's got to be a plan as well that includes concrete measures, aspirational and otherwise, for greater growth. File this section under the heading of "overwhelming force". The more programs, ideas and plans generating excitement that can be brought to bear at the same time as train service, the greater likelihood that decades-long the inertia to development in West Baltimore will be broken.

Policing

There's got to be a forthright discussion in City Hall very early on about what is possible on the policing side of the equation. In neighborhoods as challenged as those in our KFA (see Section 1), crime and policing are going to be key variables in homebuyer decisions (and also key vectors of savings to the city and state, as discussed in sections 1 and 2). There must be a plan to be in place to address those important

and candid questions that will surely be asked. Remember, homebuyers don't have to move to West Baltimore, even with a fast train, cheap houses and great marketing. It's incumbent upon the city's representatives to do all they can to allay their fears of crime, if they want new tax dollars and neighborhood revitalization to flow into the area.

Phase 2: Solidification

"Finish BWI and Run Full Express MARC Service to Union Station. Start Planning/Building Marquis, Multi-Modal MARC Station in West Baltimore"

Phase 2 (3 - 10 years) is all about solidifying gains and ensuring momentum continues in West Baltimore. It's also, around about year 5 or so, when, with green shoots fully leafing into healthy neighborhoods in the KFA, the gaze can be turned outward toward other parts of the city. And the key vectors for that are

a) A re-imagined Red-Line **subway** that links a new marquis, multi-modal, architecturally-significant West Baltimore station with the rest of the city.

b) A "Low Line" project that seeks to address the half-century old scar on West Baltimore - the "Highway to Nowhere" section of Route 40 West. See Phase 3 of this section for more detail on the Low Line.

Full Express Service

With BWI construction completed, a third platform constructed and increased capacity access secured, a 28-daily-trip, full-express service to Union Station, originating at Penn Station, with stops only at West Baltimore and BWI, can be inaugurated.

West Baltimore Station

For any new revitalization scenario with a difficulty rating as high as this one, there's got to be eye-popping, news-article-gathering visual elements, of the kind that, in the words of economist John Maynard Keynes stir the "animal spirits". People have to get excited, and this West Baltimore MARC Station, almost as much as cheap houses and super-accessible train service, is what's going to get their attention. The station will need to be not just an inviting destination - a

Image 12: Current West Baltimore MARC Platform, with Adjacent Developable Parking Lots, and "Ice House" Development in the Background

beacon even - for weary end-of-day commuters, but also the entry point, through its multi-modality, to the city beyond.

For the local communities, there's another potential role for this station - a less visible one, but super-critical nonetheless. A building done well here - with clever, intuitive, and human-level connections to adjacent neighborhoods - has a realistic chance of beginning the process of healing the great Route 40, "Road to Nowhere" cleave that was cut through this part of the city back in the 1970s'. There's more discussion of that road just below, in the Phase 3 subsection, but on a larger level, this station, if executed well, would be the first building to span Route 40 connecting the two adjacent neighborhoods that have been split by a highway for generations. So it would be the first and best chance to demonstrate the viability of doing similar Route 40-spanning developments all along the length of the sunken part of the road to the east - to show that binding up that wound, and the neighborhood, can make good development sense, as well as righting generational wrongs.

"Getting the station right is critical. It's got to be a point of pride for the neighborhoods, a beacon for commuters, a critical point-of-entry for the city, and a key symbol of a reborn West Baltimore."

To further emphasize the potential reward, but also risks, of development here, this station would likely be the only realistic chance West Baltimore has in the foreseeable future to truly spur larger development along that highway corridor. It would likely be Baltimore's best, and perhaps one and only, shot to get the model right on Route 40. So getting the station right is absolutely critical to not just the roadmap, but really, also to large-scale development in much of West Baltimore. To succeed it's got wear many hats. It's got to be a point of pride for the surrounding neighborhoods, a warm, inviting beacon for weary commuters, a critical point of entry - through its multi-modality - for those moving on to other parts of the city, and a key symbol of a reborn West Baltimore. That's a lot to ask of a building. But this site is special.

Image 13 below shows just some of the likely-developable parcels in immediately-adjacent lots to the station.

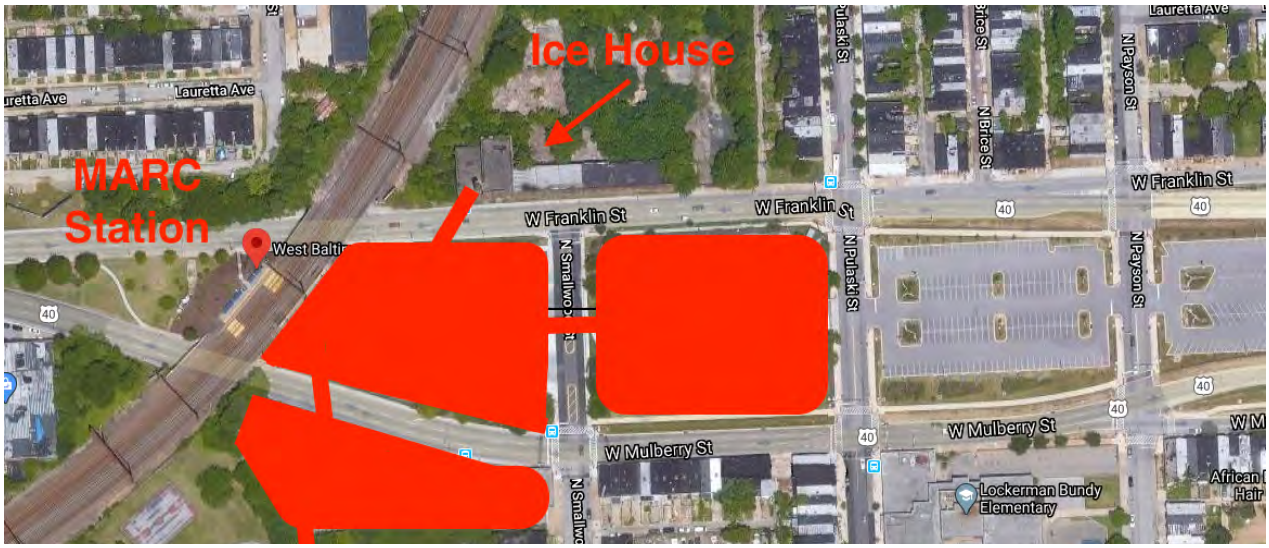


Image 13: West Baltimore Station Site, With Key Adjacent TOD Developable Land in Red

These, and many others nearby, offer the kind of open, shovel-ready terrain the biggest regional and national developers covet. The image also shows several thin arms as well, which represent locations of likely means of egress into the surrounding neighborhood, firstly by pedestrian bridge across Route 40, but then ultimately through newly-developed parcels (see Image 13) segueing into street-level entry pints into the neighborhoods. The unique potential here for developing sizeable Transit-Oriented Development (TOD), while also forging comprehensive human-level dialogue with the nearby residential streetscapes may be unique currently in Baltimore. What location has the potential for both? Maybe Penn Station - but again, that's another 10 minutes or more from Washington, so the likely demand from that highly sought-after cohort of buyers is significantly lessened. And there's no other major developable parcels at Penn Station beside the parking lot next to it.

Conversely, these parcels at the West Baltimore Station check all the boxes for large developers - accessibility through express train service, sizeable footprints with effectively no height limits or other restrictions on the mix of development, adjacent integration into 24/7 neighborhoods, and the potential for continued large-scale development down a key spine of the city (see the Phase 3 subsection). With express train service and all the other attributes recommending it, it's not hard to imagine the area around the West Baltimore station becoming one of the most highly sought-after new development areas in the entire region.

Further, on the topic of egress into the neighborhoods on the stations' flanks, take the newly-planned development at the Ice House next door to the station as an example. The front of the building can be seen in the background on Image 12, and a rendering of the back of the building after renovation is to the right, on Image 14. Through this building's second floor front could be one means of connection for the commuters to the station, across a footbridge, into the ice-house, out into their courtyard, and on into Sandtown-Winchester Harlem Park and Greater Rosemont. It would be remarkable transition from big-development to a human-level scale.

Image 14: Rendering of the Future Neighborhood Side of the Ice House Development. Courtesy of Cross Street Partners

Similarly, a footbridge to the other side of the station could lead to another development parcel, and through that development parcel to the quiet streets of Southwest Baltimore, where there's two elementary schools and a recreation center within three blocks. And again, numerous other developable parcels, large, medium and small, are available there and elsewhere, within two or three blocks of the station in all directions. Many of the structures standing on some of those parcels are reusable, desirable, early 20th-century brick warehouses and industrial buildings. There are also plenty of vacant lots on corners and in gaps between existing rows - the exact kind of parcels that developers in Washington have become experts at adeptly filling, in downtown neighborhoods like Shaw. For developers in Washington, where true large-scale and small-scale development opportunities are getting increasingly rare (and very expensive), this vast inner-urban area, with regular, 30-minute express service to and from Union Station, would present a stunning opportunity.

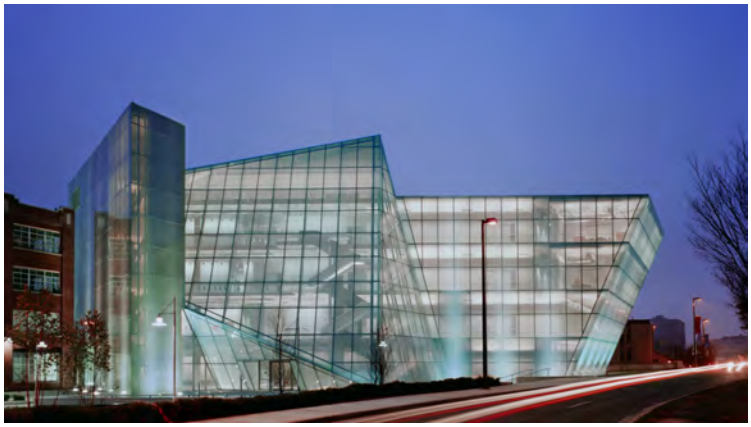


Image 15: Image of the Maryland Institute College of Art, a Potential Model for the Type of Architecture That Could Be Appropriate for the New Station

Finally, to circle back on the station itself though, as was mentioned, the architecture would have to be showpiece - a warm beacon for travelers, and also a tone-setting statement for the new direction of the neighborhood. There are numerous models in both Washington and Baltimore from which to pull ideas, but one of the best can be found just nearby on the edge of West Baltimore, at the Maryland Institute College of Art. Warm at night, modern with smoky glass in the day, spacious, inviting - this is the kind of subtle but striking building that would mesh into the existing streetscape, but make a clear statement that this part of Baltimore is heading in a different direction now. This softly-glowing structure on the horizon at the end of a long work day, would warm the hearts of train-travelers. And then, they moved through its light-filled halls into another form of transportation, or out to adjacent neighborhoods, they quickly realize that they're enjoying the kind of supremely-pleasant commuter experience sought-after the world over. Buildings can well and truly change neighborhoods, but they can also change lives.

Begin Planning Red Line Subway

As many folks have come to realize, on the 5-year anniversary of the killing of Baltimore's Red Line project by Governor Hogan[125], there was an element of truth to the positions of both sides on the issue.

On the Governor's side, there is much evidence to suggest that light rail is simply not the answer for metropolitan areas of 2 million or more people, such as Baltimore[126]. It's too slow, it has to stop for red lights and traffic, and it's not insulated from the weather, like an underground train is. It's hardly better than a bus in that sense - and much more expensive.

On the contrary, great cities like New York and London are investing heavily in underground heavy rail (2nd Avenue subway in New York[127], Cross Rail in London[128]). And even nearer to home, smaller cities are as well. Metro is set to open any day now it's new Silver Line[129].

Meanwhile, on the other side of the red line cancellation issue are constituencies that are just asking for *some* form of faster transportation than bus - anything at all - on the east-west crosstown route laid out. The rapid bus service offered by the governor, and then cut back during the COVID-19 pandemic, is not the answer to those needs either. The argument to "just do something" is a powerful one as well, since you're talking about everyday lives, and materially relieving the daily suffering of the governor's constituents.

What addresses the concerns of both sides of the issue? A marquis, multi-modal station in West Baltimore, with a new crosstown **subway** Red Line running through it - paid for, and necessitated by, an explosion of growth in the West Baltimore KFA.

The line would be accessible without ever going outside after transferring from MARC, and could quickly and efficiently wisk riders across the city to the downtown or booming east side of the Harbor. The economic and tax revenue multiplier there could be dramatic. Or it could connect a commuting rider to the northwest-bound existing subway line, or the existing central north-south light rail line. Baltimore has to think bigger than light rail, and settle for nothing less. There's one existing subway line (started, by the way, the same year as Metro's first line); it needs a perpendicular connecting line to really begin to explore its potential. A second underground line, running in a complimentary direction to the existing subway and above-ground light rail lines, could be the true fast transportation that finally knits Baltimore's disparate public transportation offerings into a coherent ecosystem.

Again, though, a true multi-modal station is the key, to facilitate the kind of easy transfer and transition that marks transit systems as truly "accessible". Again, it shouldn't go without remark that, although the station, along with the subway line, will be expensive, they'll both be huge draws for homebuyers in an express MARC scenario, and that could have massive multiplier effects, not just in West Baltimore, but, with the subway now in place, throughout the entire city. As we've seen in Sections 1 and 2, revitalization in just the KFA could easily be worth hundreds of millions of dollars a year to city and state governments, and potentially much, much more over the medium to long-term. A red-line subway could extend the potential value to governments to astronomical levels. Just look at what revitalization has done to the budgets of Washington or Brooklyn, NY since the early 1990's. A subway like this, a train station like this, are just the kinds of project that could not only stir the hearts of potential residents, but also those of politicians and government accountants.

Phase 3: Expansion

"Finish the Red Line Subway and Reimagine the Low Line"

Phase 3 (10-20 years) is all about expanding the gains beyond the three neighborhood clusters in the KFA. Again, a new Red Line subway is the main vector for that expansion. But so is something else - the intangible halo of successful development. With apologies to Frank Sinatra, if we can make it there (in West Baltimore), we can make it (development-wise) anywhere. That's the kind of can-do spirit that will pervade the entire city, if the city and state governments, following this roadmap, are able to successfully realize real, measurable, transformative change in West Baltimore.

In much the same-way Brooklyn went from thug-rap whipping boy to hipster high-priced haven in one generation, attitudes and business community investment could do a 180-degress shift here. It's not impossible to image that transportation-based transformational change in West Baltimore could be a catalyst for fundamental change in the larger Baltimore economy overall. Why couldn't West Baltimore, like Bethesda, Silver Spring, Alexandria and Arlington become one of Washington's key "satellite cities". And if there's an easy fast subway route covering the 1.5 miles to the harbor, and then on to the East, why wouldn't companies tied to Washington but seeking lower rents, locate at the harbor as well - in much the same way the Brooklyn has become an economic powerhouse that rivals, in some ways, Manhattan. To the extent that Baltimore is (DC's) Brooklyn, The rationale of successful development begetting more development nearby is fundamental. Phase 3 is all about leaning-in to that possibility.

Finish the Red Line

Phase 2 extensively discusses the Red Line. The 10-20-year window would likely be the period in which the full route would come to fruition. When it does, Baltimore's transportation system would like something like the below (see Image 16). In short, it would start to look like a real comprehensive system.

Image 16: Baltimore Regional Rail System Plan Map, Adopted March 2002. Prepared by the Maryland Dept of Transportation (MDOT)

From Highway to Low Line

We mentioned Route 40 West (aka the "Highway to Nowhere") that runs directly through the middle of West Baltimore and cleaves it in two, dramatically separating neighborhoods that were once contiguous and thriving. The highway is a product of a massive "urban renewal" / "slum clearance" / "highway building" project planned in the 1960s, and finished in the 1970s[130]. It cleaved a visual and all-too-real divide through what had been a contiguous residential neighborhood. The predictable result of the project was that blight quickly took hold, and the trajectory of the nearby streets, and even some neighborhoods, has never really recovered. Naturally, the highway is looked upon in West Baltimore with an amount of disdain equivalent to cancer. A project that seeks to better utilize that space could serve a lot of ends.

Image 17: Route 40, West Baltimore's "Highway to Nowhere"

What if this unusual sunken piece of land, right in the middle of traditional, low-level, street-gridded, neighborhoods, could be repurposed - or even partially repurposed - to generate new neighborhood-focused development. And what if that repurposing could also work to increase usable green space and knit back together the adjacent neighborhoods, in a way that feels organic and modern all at once. What if? Well... that would be an elegant solution to several vexing problems. And as would be expected in such a dynamic and imaginative city like Baltimore, some intrepid planners and visionaries are already working on it.

It's called the "Low Line" in homage to New York's wildly-successful 1.5 mile "High Line" project that also repurposed an underutilized and, in some cases abandoned, commercial transportation right-of-way through the heart of the city. The result in New York was transformational change in what had been an industrial wasteland - as well as tax revenue increases exceeding the city government's wildest dreams.

Meet the Low Line:

Image 18: The Low Line, as Envisioned by Gerald Neily and Peter Tocco.
https://baltimoreinnerspace.blogspot.com/2012/08/the-low-line.html

Acres and acres of underutilized and developable land. With the highway compressed to one side of the trench, buildings could go as high they like and still have both a front door on a quiet neighborhood street, and a back door on an even-quieter (because it's buried) semi-private park. The beauty of this existing sunken right-of-way is that there's room for everything, including a compressed-lane expressway, an urban latitudinal park, AND subway tracks. The fact that so much of the work has already been done for a subway train in West Baltimore means costs are reduced substantially. And because the subway runs directly into the multi-modal West Baltimore station, this entire discrete housing spine in West Baltimore could quite easily be populated near-entirely with priced-out, but cashed-up, Washington families and individuals.

"The best way to think about the Low Line spine of West Baltimore is as a bedroom community of Washington. It has all the ingredients."

In fact, that may be the key to thinking about this low-line for the long-term. With Union Station just 30-minutes away, maybe it's best to start thinking about the Low Line spine of West Baltimore really as a

potential bedroom community of Washington, DC. It has all the ingredients: cheap, highly-developable land, park space, quick access to Union Station, and easy public transportation (or bike or pedestrian access) to the West Baltimore station. The whole area could become "Little DC", populated with young urban professionals seeking a more-affordable, and perhaps more soulful, existence in this super-convenient neighborhood that's now - with express service - really just another community of DC. If the great expanse in West Baltimore becomes populated as a result with a diverse mix of activities (so very feasible in the gorgeous cheap buildings that abound in adjacent neighborhoods), and an economically and ethnically-diverse population (see Section 7), and can maintain that mix, the attraction of the neighborhood would truly rival that of Brooklyn to Manhattan.

And again, the anchor to the whole spine is the West Baltimore MARC station. $90 million[131] has already been earmarked for a new station after Amtrak completes a new tunnel to Penn Station. Not only will it be the key to capturing homebuyers from DC, and extending the momentum of revitalization eastward. This MARC station, multi-leveled as it will be, with pedestrian tie-ins on both the north and south side of Route 40, will also serve as a metaphorical, and actual (in parts), binding up of the great separation of historically-contiguous communities. The significance would certainly not be lost on current long-time members of the West Baltimore community.

Bookends

Finally, for this section, it's appropriate here, since we're talking about longer-term plans, to highlight what's "coming down the track", so to speak, on the other bookend of the Penn Line, in Washington. Just briefly, it's called Burnham Place, and it's a massive development that's being constructed on top of the existing rail lines leading into Union Station[132]. 1.5 million square feet of office space, 100,000 square feet of retail, more than 1,300 residential units, more than 500 hotel rooms. Why is it being constructed at such great expense on top of existing rail lines? Because there's no developable land left in Washington for this kind of large-scale project. The rail lines are all they've got. And it's not cheap, by the way, to build a platform over rail lines that will necessarily have to remain in use.

Meanwhile, just down the track, there's plenty of highly-affordable land in West Baltimore. (And plenty of residential properties.) And if it's all only 30 minutes away by regular express service, well then it's not hard to imagine that the attractiveness of all that affordable stock could easily become quite valuable very quickly. Currently, Burnham Place is on a schedule to start coming on-line in 2030. That's as good as any date to shoot for, to have not just green shoots in West Baltimore, but rather development well and truly solidified by then, and expanding steadily eastward.

In Washington, this...

Image 20: The Tracks Leading into Union Station Currently

...will become this.

What will happen in West Baltimore by that time?

Section 7 – Gentrification and Speculators

According to a 2019 report by the National Community Reinvestment Coalition, Washington, DC is the most gentrified city in the country, with 40% of its qualifying neighborhoods classified that way.[133] That's important to Baltimore, and in particular to this roadmap for growth in West Baltimore, because, in these pages, we've already dissected the experience of one DC neighborhood, Shaw, and held it up as a potential model for the kind of economic growth West Baltimore could reasonably expect to see. If we're going to hold that neighborhood up and highlight it, it's time to acknowledge that there's another side to that explosive growth: gentrification. And once we recognize there's an issue, we can begin to look at possible solutions. So that's what we'll try to do here in this section.

Relatedly, we're also going to look at perhaps the single biggest potential issue in any revitalization scenario in West Baltimore: speculators. Because really, speculation, and gentrification, are two sides of the same coin.[134] And it's been that way for a very long time.[135]

Speculators buy property for infinitesimally small sums, usually paying cash[136], and then they often do nothing with it for years, letting it and the neighborhood around it deteriorate. Finally, at the first sign of any incrementally-positive economic activity, they try to cash in, and cash in big. They often list their property for hundreds of percent more than they bought it for, with the predictable result that it doesn't find a buyer. Or if it does, that buyer is then strapped with an unreasonable and unmanageable mortgage for that property in that community.

"The single biggest potential issue in any revitalization scenario in West Baltimore: speculators."

However, even if the speculators are not unreasonable in their listing, as a practical matter, they've still taken a key amount of potential equity out of what was, before, an affordable property. To the extent that that equity increment could instead go to existing residents buying the property at that original, lower price, it could mean the difference between a community thriving, or crashing again - and existing residents benefitting if it does thrive. Homeowners with significant equity in a property have "skin in the game". That's an economic truism. And when that equity, and the mortgage, is sustainable, that community's foundation becomes stronger.

Conversely, a series of unsustainable transactions, or even unrealized transactions with property continuing to lay fallow, almost inevitably results in a crash, as we saw in 2008 nationally, and as has been seen in West Baltimore over several economic cycles.

Returning to gentrification though, functionally, at the end of the day, it doesn't matter whether there's a crash or not; either way, the existing residents lose. Either the state of the community gets worse on the aggregate over time and they're stuck there, or it gets better, and they're eventually priced-out. So the key for city leaders is to figure out a way to put a thumb on the scale to help existing residents over speculators (and yes, even new residents), getting as many of those existing residents into homes they own before the speculators snap them up for cash. Policies like that would be good for people who need help. They would be good for growing sustainable communities. And as we've discussed in Sections 1 and 2, they would be extremely lucrative for city and state tax coffers.

So how do we do it? Well... very carefully, step-by-step.

There's two central aspects to preserving deeply-affordable housing in an area about to be revitalized:

1) **Identification -** You got to figure out, before the speculators, where and when economic growth is going to happen (in our West Baltimore KFA case, it'll be when express MARC service has been approved).

2) **Early Acquisition -** Then, before that growth gets started, you've got to quietly secure as many of those "speculator-attractive properties" (SAPs) in homeowner, city, foundation or community land trust hands as possible, so that they can held be held on to, and later be sold, rented or owner-occupied in an orderly fashion, as deeply-affordable housing for qualified existing residents.

We mentioned New York City's wildly-successful High Line park project in the last section. Robert Hammond, the co-founder[137] of that "out-of-the-box" elevated park - which is expected to contribute over a $1 billion[138] to the city to the city in economic output, and probably a lot more - has said a number of times how he wishes they had concentrated more on gentrification ahead of time. He told Reuters, for instance, "*Once you create the value, it's too late to capture it.... You need to capture value for other things you care about, and maybe for the people who aren't necessarily going to benefit in the neighborhood from the increase in value.*"[139]

So the roadmap suggests doing the following in this order:

Identify Target KFA → **Assemble Legislative Tools and Property Portfolios** → **Announce Express Train Service**

To be sure, it's a delicate undertaking, to pull-off this kind of property accumulation and favorable legislation on the quiet. But it's one that's done every day in the financial markets, sometimes on vast scales. And with the right team in place, there's no reason it couldn't be done in West Baltimore.

Another selling point in all this, in this case for foundations, is that, even though they may have to acquire property for a duration of time, they don't have to "lose" money nominally on the land banking. In a sense, they'll be just renting out their capital. That's because, as we've discussed, most houses are already deeply-affordable. Foundations just need to hold them and sell them near the same price they bought them for, to maintain affordability in the face of a speculation wave that is sure to follow an announcement of express train service. And so, in that sense, and in some ways, this is a force-multiplying model for foundations, more so than that of simply granting money to non-profits, and therefore by definition sending it out the door for good. Not to denigrate the non-profit granting model in any way, but under this scenario, foundations will get the money back in the end, so they'll be able to use it twice to further their mission. It'll be double-bang for the mission buck.

By the way, why use foundations as an acquisitional and transitional structure in the first place? Because they've got available cash of course. But also because they're able to work discreetly and efficiently through the private sector, without tipping-off speculators. The city would have a much harder time doing that without showing its hand. Although, that said, the city would also have to work hard to preserve diversity and deep-affordability on the land it owns (principally vacants), or can acquire through eminent domain (mostly more vacant property).

We're going to dive-in deep next on assembling land portfolios, and then look at the kinds of numbers we could target. After that, we'll look at local and state legislation that could help. We'll take stock of a piece of federal legislation working its way through Congress now, that could be a game-changer for vacant house rehabilitation. And then we'll finish up with a brief discussion of the other key challenge to getting homes into economically disadvantaged hands: the banking and mortgage side of the puzzle. Excellent work has been, and continues to be, done at the local level in both the fields - banking and housing legislation that seeks to increase low-income homeownership. We'll point to some of that as well.

The Numbers

When we talk about assembling portfolios of affordable houses for sale or rent, or helping current homeowners stay in their property long-term in a revitalization scenario, two central questions really have to be answered before we move forward. These questions will help us define our quantitative goals:

1. How many houses do we need to get into owner-occupied hands with sustainable mortgages to give sustained growth in the community a fighting chance?

2. How many rental units (or renters converted to homeowners) do we need facilitate to complement existing homeowners and create an "equitable" spreading of the benefits of revitalization?

In short, what numbers represent an equitable outcome?

A qualifier before we proceed: these numbers are always going to be, at best, educated guesses. Moreover, the overall amount of houses that end up land-banked or controlled by one of the above entities is also going to necessarily be dictated by the amount of funds available. What propriety ultimately

requires is simply that we give it an honest try - we make a reasonable plan and try our best to execute it. Just trying to do *something* to address gentrification will put this large-scale, market-driven economic revitalization on a completely different footing than virtually anything of this magnitude that has come before it.

> ***"Just trying to do <u>something</u> to address gentrification will put this large-scale, market-driven economic revitalization on a completely different footing than that of virtually any that has come before it."***

Anthony Williams, the great mayor and rescuer of city finances in Washington, always recognized there were limits to what a city government could do for its people, saying, "There's only so much you as a city can do to solve all the world's problems."[140] He did a lot in the end. But arguably, Baltimore's leaders may be in a position today to do a great deal more than him on gentrification. After all, they're sitting on a goldmine of acres and acres of deeply-affordable houses in neighborhoods surrounding what will be a highly-accessible commuting hub, with express train service. There may not be any place like it on the East Coast, with such an attractive suite of assets to recommend it - and its available to be land banked now. It won't be forever however.

So, again, how much is enough? Let's start with how many properties, households and housing units currently exist in the KFA, and in what form.

Table 8: Key Focus Area Quantitative Matrix

Indicator (2018)	SWHP[141]	Greater Rosemount[142]	Southwest Baltimore[143]	KFA
Current Number of Residential Properties	6,037	7,110	8,233	21,380
Number of Current Households	4,528	5,863	5,798	16,189
% of Housing Units Currently Owner-Occupied	28%	42%	23%	31%
% Properties Currently Vacant	35%	19%	30%	28%
% Vacant Properties Currently Owned by City	18%	6%	10%	11%

Table 8 is, of course, statistics describing <u>before</u> revitalization (i.e. now). As the starting point to approach our target numbers, we look at how many currently existing households could be potentially displaced.

That number for the entire KFA is around 16,000 households, if every single household were to be displaced (owners and renters). That of course would be the worst-case scenario.

Then we observe that roughly a third (7,125) of the currently existing 21,380 residential properties are vacant already. That means that all 16,000 households have to be in just 14,255 residential properties - meaning, quite a few of the current households (~ 2000) have to be in multi-family structures. And that's good, because in many ways, protecting and preserving affordable ownership and rentals in multi-family structures can be easier than in individual houses, since many of the costs are spread over multiple households (like the same roof or same heating and hot water systems).

We know, also, that owners live in roughly 30% of all housing units. So that's another key data point because, in general, when focusing on mitigating gentrification, it's tremendously easier to keep folks in a home they already own, rather than getting them into one they don't yet own. The primary tool to maintain that owner-occupied residency in the face of dramatically-rising property values is through a mechanism for significantly moderating real estate tax increases for previously-existing homeowners. In short, it would be a sort of homestead reduction for homeowners who were residents before a certain date - an "economic diversity", or "diversity conservation" governor on annual property taxes.

"The primary tool to maintain affordability in owner-occupied residential units in the face of dramatically-rising property values is through a mechanism for moderating real estate tax increases for previously-existing homeowners."

Moreover, it should be in place for 20 years, because 20 years is generally seen as the length of one generation - which is what is mostly considered fair, in that you protect the existing homeowner from being squeezed out by gentrification, but not their kids. Twenty years is also quite a substantial amount of time to accumulate equity without being squeezed out. And it's also a point when a number of homeowners will transition to special real estate tax treatments for elderly owners. And finally, at the 20-year mark, there's a good chance, at least if Shaw's experience is any guide, that many of the owners will have already sold out by then, cashing in the equity so to speak, and moving to cheaper housing elsewhere. The remaining owners by that point will, without a doubt in a revitalization scenario, be able to rent part or all of their property and cover their monthly note. So, for a number of reasons, 20 years seems reasonable. Of course, if needed, the 20-year limit can always be revisited, or even set at 30 years, if that's what's determined to be the best course. So that's the "owner-occupied" piece of the puzzle.

"The strategy to keep residents currently renting in the KFA is either: a) transition as many of them as possible to owners; or b) preserve affordable multi-family rental structures in land trusts, or other self-governing and/or partial-equity structures."

Then we're left with the rental population and trying to preserve in the KFA an "equitable" number of this group. Renters are certainly the harder residents to maintain in a revitalization scenario, because they have the lowest savings, lowest equity and they're usually in more of a state of transition than home-owners. The strategy to keep renters in the KFA is either a) transition as many of them as possible to owners; or b) preserve affordable multi-family rental structures in land trusts, or other self-governing and/or partial-equity structures, with as many of these structures as possible out of government control - in other words, self-governing, allowing, like foundations, for the government money to be used more than once. Again, though, there's a seemingly endless amount of different legal structures that could be used for initiating the purchase of multi-family structures - we'll focus on just a few later in this section.

Eyeballing the figures in Table 8, and retrofitting the most ambitious numbers one can, keeping in mind that we're hoping to find ourselves in a rapidly-appreciating revitalization scenario, the following seems reasonable:

Table 9: Anti-Gentrification Quantitative Targets

	Target Percentage for Preservation	Percentage of Total Housing Stock	Actual Number of Housing Units
Currently Owner-Occupied Housing Units	100%	30%	4,857
Currently Rental-Occupied Housing Units	30%	10%	1,619

To be clear, together, those numbers mean that the goal is to preserve occupation of 40% of existing housing units - as either owner-occupied, or deeply-affordable in perpetuity - for the folks who are living in the KFA now. That 40% number would be unprecedented.

The goal is to preserve 40% of existing housing units for the folks living in the KFA now. That number would be unprecedented.

Of course, the hope is that that percentage of existing housing units versus total housing will rapidly decrease with revitalization, since there will (hopefully) be a lot building of new structures, and coming on-line of renovated ones. It's not only okay, that percentage falling, it's a very good thing. If there's been success already in preserving 40% of the folks that were there before large-scale building in the KFA was undertaken, and provisions have been made for them to be able to stay in the KFA long-term, then that's a great result.

That 40% figure also seems to be about the right number, if we survey research and experience on the question of concentrated poverty thresholds. According to the DC Policy Center, "*Demographers generally term a neighborhood with a poverty rate of 20 percent or more as a 'poverty neighborhood' and classify a neighborhood with a poverty rate of 40 percent or more as a 'high poverty neighborhood.*"[144]

"That 40% figure seems to be about the right number, if we survey research and experience on the question of concentrated poverty thresholds."

Since a number of the homeowners we'd be seeking to preserve in their homes are already above that "poverty" threshold, as well as some of the rental households as well, we would probably, even with our ambitious gentrification mitigation goals, still be below that high poverty neighborhood threshold of 40% poverty - even at the beginning. Maybe not far below it, but probably below it.

And then, after new wealthier families move in, the hope is that the mix of poverty will decline dramatically, to somewhere around a more sustainable 15-18% of the total population. That seems to be just the right mix to sustain a multi-income-level diverse community, which study after study has shown to be the best environment for lifting families out of poverty.

Sticking with DC, if one surveys the wealthier neighborhoods (nearly all of DC west of the river now), one observes that the poverty rate is closer to 10% than 20% in these neighborhoods. And near-universally, observers agree that it would be helpful to have more of the city's impoverished citizens living in these wealthier communities west of the river - that those neighborhoods could easily absorb more. So ending up around the 10% poverty levels is too low, but above 20% poverty levels gets you us into the "poverty neighborhood" category, and is therefore probably too high. The sweet spot is between 15-18% - that's well more than "too little", and enough below "too much".

So, starting out in West Baltimore with "under 40%" preservation of existing households, understanding that not all of them are going to be in the "poverty" demographic (although many will); and then recognizing that the poverty proportion is going to drop dramatically with substantial new construction (or renovation) in the neighborhoods, seems like a reasonable approach. Especially because, with so much land owned by the city already, enough of it can be set aside for later iterations of re-balancing the income demographic, were that to be necessary.

Finally, the 40% number seems to make sense from another perspective as well - that of the absolute number of folks in Baltimore living below the poverty threshold as a percentage of Baltimore's target population in the future. Warning, more math here...

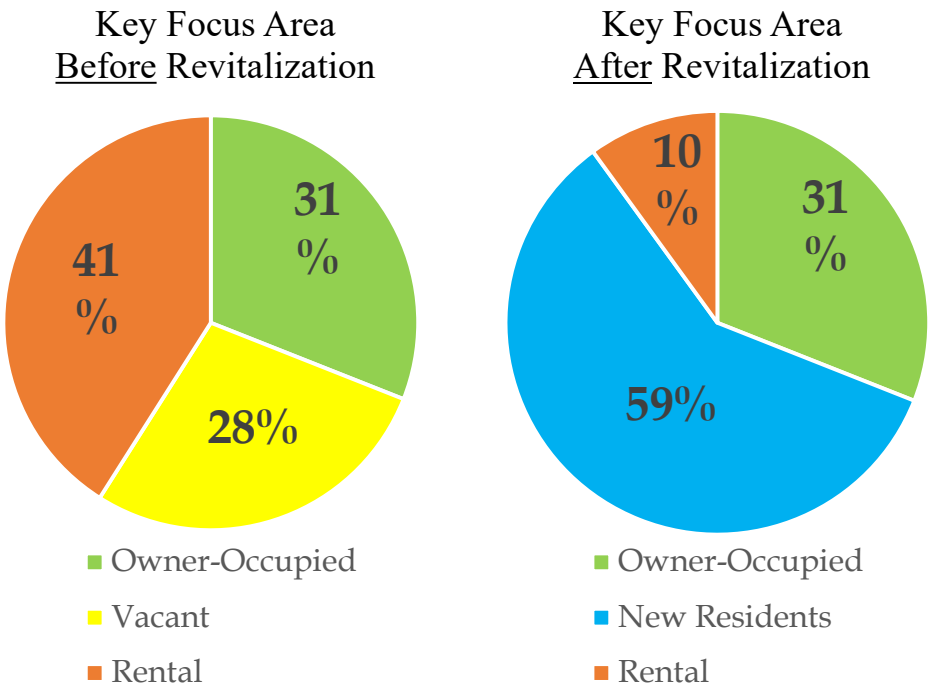
For a target population, one has to look to the past, as well as the future. In 1950, Baltimore's population approached 1 million people, but it's now dropped to just below 600,000[145]. In a high-growth scenario, what kind of population influx could Baltimore reasonably expect? Some of that at least will depend on

the capacity of express trains to move commuters, and move them quickly, to Washington. But assuming that capacity is deep, where could Baltimore get to, in terms of population?

Census Bureau figures report that the Washington-Baltimore-Arlington Combined Statistical Area (CSA) is growing its population at a rate over the last 10 years of around 1%.[146] If growth continues at that rate, that means, by 2040, the CSA population could grow by approximately another 2 million people. Could Baltimore capture 20% of that population growth in that time? That would be a huge turn of events. But maybe, as Brooklyn did vis-à-vis Manhattan, it could get real momentum up and capture 10 percent of it, or 200,000 people in the next 20 years? City leaders in Washington are fond of declaring that 1,000 people a month are moving into their city. That's significantly more than 200,000 over 20 years. So, although the 200K is an ambitious figure, it doesn't seem to be out of the realm of consideration in a revitalization scenario of the kind we're aiming to engender. If Baltimore shoots for 200,000 extra folks living in its borders by 2040, that would put Baltimore's population at around 800,000 - still far below 1950, but significantly higher than today.

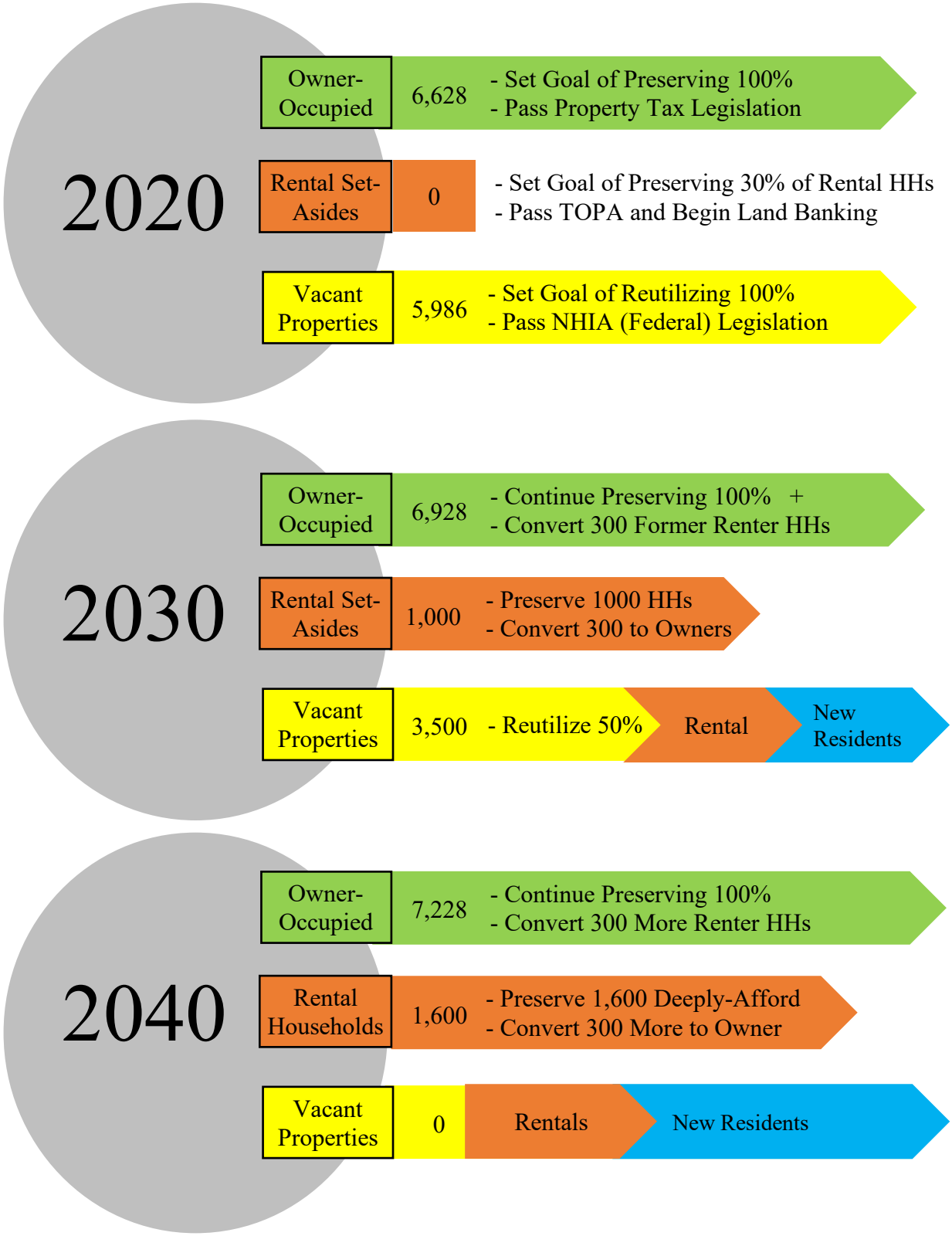
Moreover, the Census Bureau says that there are 130,000 people living below the poverty line in Baltimore currently.[147] If that number remain static, then that means in 2040, we'd be right in the middle of our target preservation range of 15-18% of grandfathered homeowners and deeply-affordable rentals. (130,000 is 16% of 800,000.) If population only grows by 100,000 in Baltimore in the next 20 years, and that poverty level remains the same, then we'd still be in our target range - just at the very top of it. (130,000 is 18% of 700,000.) So that's another data look that seems to indicate we're on the right track.

Again though, ultimately these targets are educated guesses. Repeating the mantras, "Just do something.," and "Have a reasonable plan.," the results over time could look like the following. We start with what the before and after pictures, and then game out how we get there.



(Note: "New Residents" includes rental and owner-occ)

Progression of Existing Residents in the KFA (2020 - 2040)



Setting Mitigation into Motion

As was mentioned earlier, a number of legal and legislative tools are available to help us move toward these target numbers.

For homeowners, the principal tool will be special provisions in the property tax code to grandfather in existing residents, as "diversity conservation" measures. Or to conceptualize it another way, as Homeowner Enterprise Tax Zones (HETZ). Enterprise tax zones have been used for decades as a tool to lure businesses to locate in underperforming areas. Baltimore is quite familiar with their use, as well as its top-down approach to growing wealth that has been only moderately successful in that regard. This would, on the contrary, be a bottom-up approach.

We know that most individual household wealth creation happens primarily through homeownership in America.[148] This HETZ would leverage that powerful tool to preserve diversity and lift residents' boats in the KFA. There's no reason why every pre-revitalization owner-occupied structure couldn't be helped with this targeted real estate tax break, so that's what's we've done: attempt to preserve 100% of all owner-occupied units (which is 30% of all housing units in the KFA), in the hope that they'll all remain for decades as part of the newly-revitalizing community

Meanwhile, for renters, we've got that "1,600 housing units" number to shoot for. While it sounds sizeable, and it is, it's important to remember that we're not shooting for 1,600 individual structures, but rather 1,600 household units, residing in either freestanding houses or multi-family structures. Some preserved units would be in conversions of existing structures into deeply-affordable apartments, while others could be units, or even whole houses in renovated vacant properties. And still a third type could be in new construction. All we're targeting is the number; we're agnostic about what kinds of structures get us to that total.

The key of course for preserving deeply-affordable rentals is the purchase and transition of the property to its final holding vehicle. It is here that the city, with the assist of foundations, will play a key role. Those two entities will have to work together to identify and secure enough properties to get us to the KFA. After individual structures and capacity possibilities are evaluated, a plan will have to be made and executed. Some of these rentals may even already be in some sort of protected status, either with the city or otherwise, which would of course be great. And not all of them need to be developed right away. But such land and property that is required at least needs to be secured and set aside. There's plenty of time to build in the future, but (hopefully) not a lot of time to gather property - we say "hopefully" because the hope is we'll be in a rapidly revitalizing scenario stemming from the announcement of express train service from West Baltimore.

Table 10: Key Tools To Reach Target Gentrification Mitigation Goals

Housing Type	Target	Key Tools
Owner-Occupied Household Units	Preserve 100% of Owner-Occupiers Pre-Revitalization	Property Tax Grandfathering, Banking, Mortgage Reform, Education
Rental Household Units	Preserve 10% of All Properties Pre-Revitalization for Deeply-Affordable Rentals	Existing City Land Holdings (incl Vacants), Foundations, TOPA Legislation, CLTs

One key tool for converting renters into owners in Washington is TOPA, or the Tenant Opportunity to Purchase Act, and we'll take a look at how that could help in the KFA. Just after that we'll look at Community Land Trusts as a potential holding vehicle for deeply-affordable rental properties. We'll follow that with some key Congressional legislation to watch, and finish with a look at mortgages, banking and education.

TOPA

As part of the Rental Housing Conversion and Sale Act of 1980, Washington provided two mechanisms to help tenants use the condominium conversion process to gain leverage toward homeownership. One part of the bill forces landlords to get 50% of tenants in the building to agree, in a city-administered election, to allow the rental building to convert to condominiums. A second part of the bill, The Tenant Opportunity to Purchase Act (TOPA)[149] gives tenant associations the right to band their individual units together and claim a collective right-of-first-refusal to purchase. The Act also provides for tenants to assign their rights to third parties, which means the tenants can work collectively with an outside developer to purchase and renovate the building. Together, these three rights, along with rent control laws, provide powerful incentives for building owners to work with tenants to find a way to facilitate their purchase of the building.[150] TOPA laws have been transformational in the lives of thousands of less-affluent residents in Washington, allowing them to stay in their own homes, and even, in many cases, participate financially in the explosive growth of their city.[151]

"TOPA laws have been transformational in the lives of thousands of less-affluent residents in Washington, allowing them to stay in their own homes, and even, in many cases, participate financially in the explosive growth of their city."

But TOPA laws have not just facilitated ownership - they've also allowed untold number of long-time tenants to remain in the building indefinitely. Tenants can use the provision to assign their rights to bargain with developers to keep rents low, or take a buyout, or even allow developers to sell some of the units, or raise the rents to market in those vacant or bought-out units. There's no one single form of deal that emerges from TOPA transactions. Rather there's just a suite of rights that put tenants on an equal negotiating platform.[152]

The City of Baltimore currently has a condo conversion right-of-first-refusal law for single-family homes, but nothing like the powerful series of rights that have been given to DC renters, and nothing for multi-family structures. One of the single biggest moves the city could make in the face of coming gentrification-inducing development in the KFA would be to strengthen those TOPA-like laws to more-closely align with those of Washington.

Community Land Trusts

One other ownership-facilitating structure that also can be used to provision for affordable rents is already gaining some traction in Baltimore:[153]community land trusts (or CLTs). (By the way, it's also taking off in Washington.[154]) First created and utilized in the 1960s,[155] community land trusts can work in many

ways, but in general they would have the overarching principal, at least in cities, of keeping housing affordable for the less-affluent. One way they do that is by separating out the ownership of the land and structure built on it. That way the CLT can work to keep the building structure from appreciating too quickly, either by instituting covenants on the sale or rental, or some other mechanism. CLTs also commonly own multi-family structures, and assist their tenants in self-governing in those buildings. And that would seem to be highly-plausible way for ownership of structures originally purchased by the city or foundations to ultimately end up.

Another way CLTs work is to set up structures where there's fractional ownership, similar to condominiums or cooperatives, except that there's typically covenants in place that govern the sale of individual units in that structure, and how much can be charged for those sales - so that works to keep prices down as well. They can form agreements with private developers on CLT land and institute covenants that way. That can acquire land outright and develop it themselves. There are simply an infinite number of ways for CLTs to try to accomplish their mission.

One thing to note about CLTs, particularly as it pertains to one type of property. BWTRG does not believe that restrictions on the growth in value of individual houses are beneficial. In fact, in terms of the goals of the roadmap, we would argue they are counter-beneficial. As we discussed, in America a key tool - perhaps THE key tool for individual households - in building wealth is home appreciation. Growing that wealth for existing homeowners, as well as for new homeowners and converted renters, is a key tenet of this roadmap. So to recommend that that growth would be capped in a CLT structure for individual houses is not something for which we see a strong benefit.

However, BWTRG thinks that CLT's can be an extremely advantageous legal structure in which to hold rental buildings. The buildings never have to be sold, the real estate taxes on them can be kept lower than market, since CLTs can arguably be structured as a charitable benefit-generating legal entity eligible for favorable tax treatment. In many ways, structured like that, they'd be almost akin to a conservation easement in a rural setting. They'd be a kind of *diversity conservation* easement. And there's a mechanism for community, or self-governance as well, so there can be capacity-building component too.

One concern that CLT's help to address is that government-owned affordable housing sometimes gets a bad reputation. For anyone who knew the high-rise "projects" in Baltimore of the 1970s and 80s, the memories of them are likely not fond either on the tenant, government manager, or neighbor side. So CLT's help to address that public housing concern by taking the ownership out of the government realm, and putting in mostly into the community itself, in these various ownership structures, but with some overall guidance from the experts at the CLT.

Of course, foundations and charitable organizations can also hold property, and do so usually in a tax-advantaged structure - and those are all also vehicles worth exploring. But again, to maximize foundation dollars, as well as community input and governance, it's probably better to ultimately move those multi-family rental structures into some sort of self-governing, semi-autonomous structure. CLTs are one of those. The KFA will need all of the above - foundations, charitable organizations, and government dollars, to help facilitate these transactions, at least initially. But ultimately, in a revitalization scenario, those entities should be able to exit the deal expeditiously, with ownership secured and affordable housing locked-down in the community for the long-term.

Congressional Legislation

If TOPA is one piece of legislation to campaign for on the local government level, the Neighborhood Homes Investment Act is the bill to champion in the Congress. Co-introduced by Maryland Senator Ben Cardin, the bi-partisan-backed bill seeks to close the financing gap between what it costs to fix vacant houses, versus what the houses will be worth when they're sold.[156] Tax credits will be offered for the gap. Tax credit incentives are a simple model that is already widely-used in Baltimore and other cities for things like restoration of historic structures, and energy-saving measures. To have a tax credit specifically targeted at rehabilitating vacant and blighted structures could be massive, if it's generous enough.

> ***"To have a tax credit specifically targeted at rehabilitating vacant and blighted structures could be massive, if it's generous enough."***

Recall that vacant homes account for 35% of all structures in Sandtown-Winchester Harlem Park. More than 7,000 of the 21,000 residential structures in the KFA alone are vacant. Without a tool to make their renovation financially feasible, it's hard to see how to deal with the problem. But with this tool making renovations suddenly financially possible, it's equally hard to see how that avenue of making money won't be made us of. Supporters estimate that every $1 billion set aside at the federal level for these tax credits will lead to over $4 billion in development activity, as well as 25,000 homes rehabilitated or rebuilt, and more than 33,000 jobs in construction and construction-related activities.[157] In an express MARC train scenario, undoubtedly, West Baltimore will be contributing substantially to these totals. It could be a game-changer for the vacant house problem in the KFA (and the rest of Baltimore), by making it profitable to renovate vacant houses, even in a price-constrained environment.

Creating Owners from Renters

According to Baltimore's Department of Housing and Community Development, 50 percent of renters in Baltimore - more than 50,000 households - are paying more than 30% of their income on housing. We discussed earlier in this document how that's a common measure of being "housing cost burdened".[158] Meanwhile, a third of all renters in Baltimore live in either subsidized affordable housing, or have a Section 8 housing choice voucher.[159] Baltimore has more than 42,000 publicly-supported rental units - that's among the highest in the nation.[160] When you throw in the statistic of 16-20,000 vacant homes in the city, and then add the figure discussed earlier in the roadmap, that the state has allocated $75 million for demolition of those vacant houses, with the best evidence showing they're costing as much as $35,000 a house to demolish,[161] the only takeaway one can gather from all of these stats is that Baltimore (and the State of Maryland as it pertains to the city) currently has a dysfunctional housing policy. What are the larger objectives? Where is the free market in all of this? And how is the city (and state) helping their least advantaged citizens access that free market?

> ***"Baltimore has a dysfunctional housing policy. What are the larger objectives? Where is the free market in all of it? And how is the city (and state) helping their least-advantaged citizens access that free market?"***

The number one goal has to be to move as many of those renters as possible into ownership. Homeownership is difficult to get started in, tough for individual homeowners to maintain, but nevertheless tremendously uplifting for both individuals and their community. Huge parts of the federal tax code are set up to intentionally advantage the homeowner over the renter, with things like mortgage interest deductions and capital gains tax exclusions. Homeownership, for better or worse, is how the game is played in this country. Baltimore City has a wealth of deeply-affordable land and housing that just happens to be in what are now-considered "bad neighborhoods". But if there's one lesson that Washington can teach us, tit's that here are no bad neighborhoods. There are just neighborhoods without enough owner-occupied housing. It's a lot like the Social Sciences 101 dictum of "breaking up poverty"; well, the same goes for housing - you need to reach a certain threshold of homeownership on a block, or in a community or neighborhood. That's the fastest way to overcoming blight - not bulldozers.[162]

Consequently, homeownership should be the primary goal of Baltimore City's housing policies, and every program, to the extent possible, should be working towards it - whether that's full ownership of a single-family structure, or partial ownership of a multi-family building or land trust. Even the tiniest fractional amount of ownership is super important in an environment of rising rents, land costs and real estate values. If one is participating in that rise, wealth is being generating, and boats are being lifted. Renting accomplishes none of that, so subsidized rental units should not be the end-goal, only the means to the end.

So how do you get started turning renters into homeowners? That's a big question with lots of potential answers, but fortunately, the Abell Foundation has done some of the hard yards for us, by commissioning a comprehensive report on it, focusing specifically on Baltimore City. The July, 2020 report is entitled "*Overcoming Barriers to Homeownership in Baltimore City*."[163] In the report, authors Sally Scott of University of Maryland, Baltimore County and Seema Iyer of the University of Baltimore, took stock of the city's latest "*Framework for Community Development*"[164] and found much to add to the city's discussion. There's a tremendous amount in the Abell report that we won't restate here, but some of the key larger takeaways are that the city needs a "comprehensive strategy around affordable housing, homeownership and economic inclusion," along with "education, counseling and incentives," as well as programs to "preserve existing homeownership".

"Around the West Baltimore MARC Station, the city has a test-case to work with that's positively-skewed toward success, in the event express train service to Union Station becomes a reality."

We at BWTRG agree wholeheartedly in those findings and would add that, in the KFA around the West Baltimore MARC Station, the city really has a test-case to work with that's positively-skewed toward success, in the event express train service to Union Station becomes a reality. Viewed in light of the other temporal markers discussed in this roadmap, the Abell Foundation report couldn't have been more-timely, and parties interested in diving deeper into the questions of encouraging and facilitating homeownership in Baltimore are referred to that report. There's much to work with in there, as we tackle the task of mitigating coming gentrification in West Baltimore.

Conclusion

Ten to twenty years into the running of an express MARC service to Union Station, the hope, and really the expectation, is that around 60% or more of all housing units would be occupied by new residents, with many of those new units being new construction, or restoration of now-vacant properties sold in a "Dollar House" program. Remember, the KFA currently has a vacant property burden totaling 30% of its entire housing stock. A "60% new residents" number would necessarily mean that a great deal of new construction would be built on a lot of that vacant land, or be created by restoring some of those vacant properties.

Either outcome would be an extremely positive turn of events for the community overall, for the 40% of existing residents still living in the community, and for city and state budgets. If that 60% of new residents were to grow even faster to a much larger share, that would be even better. Keep in mind, the ultimate goal for stasis in the KFA, is to settle out at a poverty level around 15-18%. That means, even at more than 60% new residents, there's likely still a long way to go to get that poverty level down to where it needs to be.

And let's not forget, when it comes to mitigating gentrification, there are so many economically-challenged areas in West Baltimore, many of them directly adjacent to KFA, that there are seemingly endless opportunities to expand deeply-affordable housing if our calculations are wrong and more is needed to supplement that of a rapidly-gentrifying KFA. In fact, that economic pressure, is the very thing we're trying to engender with this roadmap, so that would be a good problem to have. Without it, without any sort of growth, no one is going to care a lick about gentrification in West Baltimore.

So gentrification is not, in and of itself, a dirty word - it just signifies a community that's experiencing economic growth and changing demographics. In that NCRC report cited at the very beginning of this section, there was a recounting of a conversation that the writer had in Baltimore with one of NCRC's members who was, as the report described it, living in an impoverished and high-crime neighborhood. Pointedly, the member told the writer: "*When can we get some of that (gentrification) in my community?*"[165] There's a high likelihood that that same sentiment would be echoed, not just in the KFA, but throughout West Baltimore.

Where gentrification takes a wrong turn though, is when leaders can see it coming, and still make no provision for a substantial portion of existing residents to remain and be lifted economically by the rising tide. In that sense, the City of Baltimore may right now be the luckiest city in America. It's sitting on a goldmine of acres and acres of deeply-affordable housing units in neighborhoods surrounding what could quite easily become a critical commuting hub to one of the country's highest performing economic centers. West Baltimore has still got time to make a plan to ignite transformational growth and mitigate gentrification issues. But it's not going to have that time forever.

"The City of Baltimore may right now be the luckiest city in America. It's sitting on a goldmine of acres and acres of deeply-affordable housing units in neighborhoods surrounding what could quite easily become a critical commuting hub to one of the country's highest performing economic centers."

It should also be mentioned, by the way, that fighting gentrification doesn't necessarily mean just maintaining families strictly below the poverty line in the neighborhood. It means, rather, maintaining

existing residents in a sizeable percentage - home-owners as well as renters, and folks above the poverty line as well as below. In the KFA, at the numbers we're suggesting above, that would ensure a number equal to 40% of existing residents - some poor, some not-so-poor, but none rich, and nearly all African-American - would be woven deeply into the neighborhood fabric for decades, and possible forever. Now that's how you make gentrification work for everyone.

Appendix A

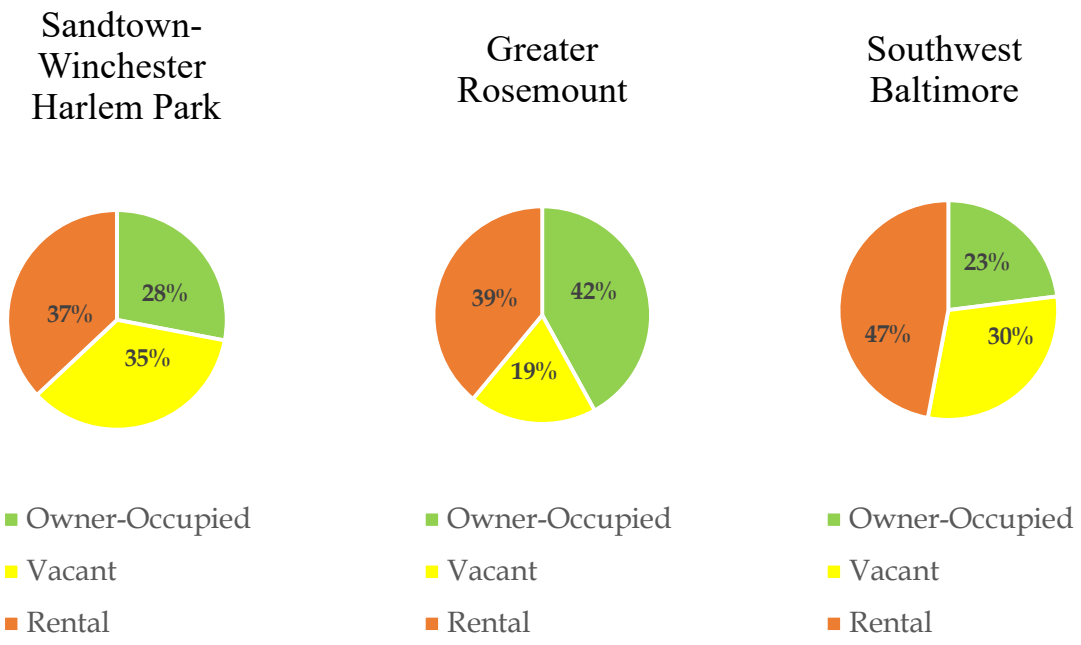
"*West Baltimore Roadmap*" Project Phase Matrix	*Tasking*
Development and Planning *(Current - 1 year)*	Align federal, state and local political leaders, as well as BWI leadership team
	Colloquy Amtrak and State of Maryland: 1) Nail down BWI capital infrastructure cost share percentages 2) Finalize BWI 3rd track engineering plan timetable 3) Finalize buy/lease/borrow decision for train sets 4) Finalize Proof-of-Concept service timetables
	Huddle with MD congressional delegation - emphasize need for: 1) Funds for BWI platform realignment in in federal infrastructure bill 2) Reaching agreement with Amtrak for capacity sharing 3) Passing Neighborhood Homes Investment Act
	At municipal level, set in motion key gentrification mitigation measures, incl: 1) Huddle with HCD and BNIA, and then ground truth, KFA neighborhoods to census, catalog the state of repair, and then outcome-forecast every property 2) Undertake land-banking process - acquisitions, tax sales, surrenders 3) Pass key legislation incl TOPA, "Diversity Conservation" property tax increase caps for KFA - yr0, and "Dollar-House" legislation. 4) Put in place infrastructure for larger-scale Community Land Trust participation, preferably through knowledge sharing with experienced partners in Washington, all in an effort to scale-up local CLT capacities
	Finalize "*30 Minutes*" and "*Baltimore is Brooklyn*" marketing campaigns (in concert with MARC and MDOT.
	Huddle with Baltimore Police to initiate planning for key focus areas (KFAs)
	Huddle with foundations to discuss affordable housing and management, land banking, workforce programs and other synergies.
	Huddle with West Baltimore community leaders - pre-announce/soft roll-out WBP plan, including gentrification mitigation/diversity conservation measures
	Huddle with developers - large and small. Gauge interest and requirements. Emphasize local components - partnerships, hiring, capital and community benefit value-adding.
	Discuss development-friendlier government steps, including overall targeted property-tax level reductions.
	Huddle with Johns Hopkins AI Data team to set baselines
	Huddle with Hopkins and MICA to gauge interest in property for satellite campus

	Investigate business partnerships for key KFA public schools
	Huddle with D. Simon to spitball soundstage and film studio property possibilities
	Huddle with Casey Trees to plan and set in motion comprehensive revitalization of tree cover initiative
	Huddle with U of Maryland to inaugurate long-term study of tree cover/health and well-being correlations
	Conduct comprehensive “before” visual recording project (with MICA?)
	Inaugurate City Fair reboot at Harlem Square Park
Phase 1 *(1-3 years)*	Take ownership or lease possession of 2 (or 3) trainsets
	Complete first tier anti-gentrification measures
	Complete first tier development-friendly measures
	Implement “Dollar House” program
	Showpiece public announcement & media pitch
	Launch marketing campaigns
	Begin running POC 12 branded "*Baltimore Bullet*" trains each workday: 6 total in the am (3 trains each way) 6 total in the pm (3 trains each way)
	Initiate policing plan for KFAA
	Launch tree cover initiative
	Start BWI Rail Station platform construction project
	Hard market both West Baltimore and *Bullet* to Washington and Baltimore target homebuyer audiences
	Finalize property tax reduction for KFA - yr0 (and others?)
	Hard sell transit-oriented development (TOD) of W. Baltimore and BWI stations
	Continue hard sell individual school partnerships
	Ongoing data, visualization and research projects
	Propose new multimodal, multi-story, architecturally-significant "Gateway" MARC station building at W. Baltimore
	Check-in on status of B&P tunnel and coordinate new "Gateway" station planning
Phase 2 *(3-10 years)*	Complete BWI Rail Station platform construction
	Begin running full express service - 28 branded "*Baltimore Bullet*" trains each workday: 14 southbound, according to plan times 14 northbound, according to plan times
	Complete second tier anti-gentrification measures

	Complete second tier development-friendly measures
	Solidify neighborhood stabilization gains through innovative community and school programming, policing and property tax reductions
	Expand marketing focus to include broader swaths of blighted W. Baltimore neighborhoods (Leakin/Gwynns Falls Park?)
	Expand tree cover initiative
	Hard sell Low Line opportunities
	Advocate for full completion of Penn Line 4th track projects
	Initiate hard planning for new larger-scale transit-oriented development projects in W. Baltimore and at BWI
	Begin (and finish) work on new multi-modal W. Baltimore "Gateway" MARC station, coordinated with B&P Tunnel rebuild
	Advocate, and initiate planning, for east-west subway Red Line
	Begin TODs at West Baltimore station
	Ongoing data, visualization and research projects
Phase 3 *(10-20 years)*	Complete and open new West Baltimore "Gateway" MARC station
	TOD build-outs completed at West Baltimore station
	Complete third, and final, tier (and plan for ongoing) Anti-Gentrification Measures
	Complete third, and final, tier (and plan for ongoing) Development-Friendly Measures
	Begin (and complete during Phase 3) Low Line reconfiguration, build-outs and park land
	Use TOD delta income to help complete Penn Line 4th track projects?
	Expand branded "Baltimore Bullet" train service to 30-minute headways
	Begin construction (and complete during Phase 3) Baltimore Red Line subway
	Ongoing school partnerships
	Complete (and plan for ongoing) tree cover maintenance and augmentation
	Complete data, visualization and research projects

Appendix B

Table 11: Housing Distribution Before Revitalization in the Individual Neighborhood Clusters



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More from the article: “Featherstone has no regrets, because "you could stay until you're 80 and get $2 million, but then you take it to the grave." As a third-generation Washingtonian, he said, he knows neighborhoods change. Georgetown once had a large black population. Whites lived in Anacostia.”

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"So there was a lot of capital dumped into so-called red areas, but in ways that was about harvesting the highest returns on rental investment," he said.

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