Appendix C – Air Quality Report

DRAFT, PRE-DECISIONAL, DELIBERATIVE

MEMORANDUM

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Date: **DRAFT July 17, 2020**

To: CSX, FRA

From: RK&K

Re: CSX Howard Street Tunnel Project – Air Quality

The Howard Street Tunnel (HST) Project (Project) proposes improvements to address clearance restrictions along CSX's I-95 Rail Corridor between Baltimore, MD and Philadelphia, PA. This portion of railway is the last major intermodal rail-freight corridor on the CSX network unable to provide modern double-stack service due to various height-clearance obstructions located in Maryland, Delaware and Pennsylvania. Additionally, the Project will improve the network's reliability, add resiliency, and will reduce the cost of existing rail service between Baltimore and Philadelphia. The project will provide benefit to the Port of Baltimore as an improved option for global shippers to reach key inland markets. This memorandum presents the finding associated with our air quality assessment for these proposed improvements.

1. Regulatory Context and Purpose

The purpose of this air quality technical memorandum is to provide an overview of the air quality conditions in which the proposed Project is located, including conformance with ambient air quality standards (AAQS). This memorandum defines the air quality and greenhouse gas (GHG) resources pertinent to the Project, and provides the regulatory context, methodology, and affected environment. For the Build and No-Build Alternatives, this analysis assesses the potential short-term and long-term impacts on air quality and GHG emissions. This analysis also discusses proposed measures to reduce potential adverse impacts of the Project.

1.1. Applicable Regulations

The Federal Clean Air Act (CAA) is the overarching statute regulating air quality in the United States. Among other things, it requires the U.S. Environmental Protection Agency (EPA) to set the National Ambient Air Quality Standards (NAAQS), designate areas that are not in attainment of the NAAQS, and subsequently approve state plans for achieving those standards. The CAA Amendments of 1990 and the Final Transportation Conformity Rule [40 CFR Parts 51 and 93] direct the EPA to implement environmental policies and regulations that ensure acceptable levels of air quality. In addition to the CAA, other major regulations within the Project area that apply to the potential air quality impacts of transportation projects include:

- The General Conformity Rule, 40 CFR Part 93 Subpart B;
- General Emissions Standards, Prohibitions, and Restrictions - Particulate Matter, Code of Maryland Regulations (COMAR) 26.11.06.03;
- Pennsylvania Air Pollution Control Act, 25 Pa. Code Article III. Air Resources;
- Delaware Department of Natural Resources and Environmental Control (DNREC), Conformity of General Federal Actions to the State Implementation Plans, Title 7, Section 1100, Code 1135.

1.2. Regulatory Agencies

The management of air quality conditions in Maryland, Delaware, and Pennsylvania is the responsibility of federal, state, regional, and local governmental air quality regulatory agencies.

Federal Agencies

Under the Federal CAA, the USEPA establishes the guiding principles and policies for protecting air quality conditions throughout the nation. The USEPA's primary responsibilities in this area include promulgating the NAAQS and approving State Implementation Plans (SIPs), plans that demonstrate compliance with the NAAQS. The CAA requires states to develop, update and maintain SIPs that define attainment timeframes or milestones, area-wide emissions inventories and budgets and control and mitigation strategies that are to be employed.

The Federal Railroad Administration (FRA) is the primary agency involved in, and responsible for, ensuring that air quality impacts associated with proposed railroad projects adhere to the reporting and disclosure requirements of the National Environmental Policy Act (NEPA) as well as the General Conformity rule of the CAA.

Metropolitan Planning Organizations

As Federally-designated Metropolitan Planning Organizations (MPO), the organizations identified below are required by law to demonstrate that the Long Range Transportation Plan (LRTP) and Transportation Improvement Plan (TIP) conform to the transportation emission budgets set forth in the SIP for each state. If emissions generated from the projects included in the TIP and LRTP are equal to or less than the emission budgets in the SIPs, then conformity is demonstrated.

Maryland Agencies

The Maryland Department of the Environment (MDE) is the primary authority for ensuring that federal (and state) air quality regulations are met in Maryland. MDE is responsible for air quality monitoring throughout the state as well as the development and implementation of the SIP. The permitting of stationary emission sources, the regulation of mobile source emissions, and air programs related to criteria pollutants are also under the jurisdiction of MDE.

Baltimore City is part of the Baltimore Regional Transportation Board (BRTB). The BRTB is the federally-designated MPO for the Baltimore region. The BRTB along with the Baltimore Metropolitan Council (BMC), assists the MDE with SIP development and compliance with Transportation Conformity regulations as they pertain to air quality. The Maryland Department of Transportation (MDOT) is involved in air quality management of Maryland's surface transportation facilities by means of coordination with the BMC and Federal Highway Administration (FHWA) in the development of TIP, the LRTP, and adherence to the Transportation Conformity rules.

Delaware Agencies

The Department of Natural Resources and Environmental Control (DNREC) is the primary authority for ensuring that federal (and state) air quality regulations are met in Delaware. DNREC is responsible for air quality monitoring throughout the state as well as the development and implementation of the SIP. The permitting of stationary emission sources, the regulation of mobile source emissions, and air programs related to criteria pollutants are also under the jurisdiction of DNREC.

The Wilmington Area Planning Council (WILMAPCO) is the MPO for New Castle County, Delaware and Cecil County, Maryland. It is designated by the governors of both states to plan for, coordinate, and program the many transportation investments in the region. Under federal law and regulation, all plans and programs that involve federal funds or are of regional significance must be reviewed and approved through WILMAPCO.

WILMAPCO is responsible for developing a TIP and a LRTP in cooperation with the MDOT, the Delaware Department of Transportation (DelDOT) and affected transit operators. In accordance with federal planning requirements, a collaborative process has been developed wherein state, county and local governments and transportation providers are partners in the planning and programming process.

Pennsylvania Agencies

The Pennsylvania Department of Environmental Protection (PADEP) is the primary authority for ensuring that federal (and state) air quality regulations are met in Pennsylvania. PADEP is responsible for air quality monitoring throughout the state as well as the development and implementation of the SIP. The permitting of stationary emission sources, the regulation of mobile source emissions, and air programs related to criteria pollutants are also under the jurisdiction of PADEP.

The Delaware Valley Regional Planning Commission (DVRPC) is the MPO for the greater Philadelphia region that serves Delaware and Philadelphia Counties. DVRPC is the agency responsible for demonstrating that the transportation investments, strategies, and programs included in the Long-Range Plan (Plan) and TIPs are consistent with air quality goals established in Pennsylvania and New Jersey SIPs for achieving the NAAQS. Conformity demonstrations show that emissions from projects in transportation plans and programs do not exceed the SIP targets ("budgets") for emissions from mobile sources.

1.3. National Ambient Air Quality Standards

Pursuant to the requirements of the CAA, the USEPA establishes, enforces, and periodically reviews the NAAQS. The NAAQS are set to safeguard public health and environmental welfare against the detrimental impacts of outdoor air pollution and are defined as primary and/or secondary standards. Primary NAAQS are health-based standards geared toward protecting sensitive or at-risk portions of the population such as asthmatics, children, and the elderly. Secondary NAAQS are welfare oriented and are designed to prevent decreased visibility and damage to animals, vegetation, and physical structures. NAAQS have been established for six common air pollutants, referred to as criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter (PM), and sulfur dioxide (SO_2). PM includes particulate matter with a diameter of 10 microns or less (PM10) and a diameter of 2.5 microns or less (PM2.5). Nitrogen oxides (NOx) and volatile organic compound (VOC) emissions are precursors to ozone formation. The NAAQS are summarized in **Table 1**.

Table 1: National Ambient Air Quality Standards (NAAQS)

Pollutant		Primary/ Secondary	Averaging Time	Level
Carbon Monoxide (CO)[a]		Primary	8-hour	9 ppm
			1-hour	35 ppm
Lead (Pb)[b]		Primary and Secondary	Rolling 3 month average	0.15 µg/m^3
Nitrogen Dioxide (NO_2)[c]		Primary	1-hour	100 ppb
		Primary and Secondary	Annual	53 ppb[d]
Ozone (O_3)[e]		Primary and Secondary	8-hour	0.070 ppm[f]
Particulate Matter	$PM_{2.5}$[g]	Primary	Annual	12 µg/m^3
		Secondary	Annual	15 µg/m^3
		Primary and Secondary	24-hour	35 µg/m^3
	PM_{10}[h]	Primary and Secondary	24-hour	150 µg/m^3
Sulfur Dioxide (SO_2)[i]		Primary	1-hour	75 ppb[j]
		Secondary	3-hour	0.5 ppm

Source: USEPA, National Ambient Air Quality Standards (NAAQS), 2020, http://www.epa.gov/air/criteria.html.
Notes: ppb = parts per billion, ppm = parts per million, and µg/m^3 = micrograms per cubic meter of air.
[a] CO 1-hour and 8-hour standard not to be exceeded more than once per year.
[b] Lead rolling three month average standard not to be exceeded. Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
[c] NO_2 1-hour standard represents the 98th percentile of 1-hour daily maximum concentrations, averaged over three years.
[d] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is presented for the purpose of clearer comparison to the 1-hour standard.
[e] Ozone 8-hour standard represents the annual fourth-highest daily maximum 8-hr concentration, averaged over three years.
[f] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
[g] $PM_{2.5}$ annual standards represent annual mean, averaged over three years. $PM_{2.5}$ 24-hour standard represents 98th percentile, averaged over three years.
[h] PM_{10} 24-hour standard not to be exceeded more than once per year on average over three years.
[i] SO_2 1-hour standard represents 99th percentile of 1-hour daily maximum concentrations, averaged over three years. SO_2 3-hour standard not to be exceeded more than once per year.
[j] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)).

1.4. Attainment Status

The USEPA designates areas as either meeting (attainment) or not meeting (nonattainment) the NAAQS. An area with measured pollutant concentrations which are lower than the NAAQS is designated as an attainment area, and an area with pollutant concentrations that exceed the NAAQS is designated as a nonattainment area. Once a nonattainment area meets the NAAQS and the additional re-designation requirements in the CAA, the USEPA will designate the area as a maintenance area. Ozone nonattainment areas are further classified as extreme, severe, moderate, or marginal. An area is designated as unclassifiable when there is a lack of sufficient data to form the basis of an attainment status determination. The EPA's area designations are shown in **Table 2**.

Table 2: Attainment Classifications and Definitions

Classification	Definition
Attainment	Area is in compliance with the NAAQS
Unclassified	Area has insufficient data to make determination and is treated as being in attainment.
Maintenance	Area once classified as nonattainment but has since demonstrated attainment of the NAAQS.
Nonattainment	Area is not in compliance with the NAAQ

Note: Ozone thresholds are for locations inside an Ozone Transport Region (OTR).
Source: USEPA, De-Minimis Levels, h*ttp://www.epa.gov/oar/genconform/deminimis.html*.

The CAA requires states to develop a general plan to attain and/or maintain the primary and secondary NAAQS in all areas of the country and to develop a specific plan to attain the standards for each area designated nonattainment for a NAAQS.

Baltimore City, Maryland

Baltimore City is presently designated by the USEPA as a marginal nonattainment area for the 8-hour Ozone, and a maintenance area for PM2.5. The HST, Mount Royal Track Lowering, MTA Bridge Lowering, North Avenue Bridge Modification, Sisson Street Track Lowering, Huntington Avenue Track Lowering, Charles Street Track Lowering, St. Paul / Calvert Street Track Lowering, Guilford Avenue Bridge Replacement, Barclay Street Track Lowering, Greenmount Avenue Track Lowering, and Harford Road Bridge Replacement are all located within Baltimore City. A portion of the project area in Baltimore City falls within a maintenance area for CO, which is the Regional Planning District Number 118.

New Castle County, Delaware

New Castle County, DE is presently designated by the USEPA as marginal nonattainment area for 8-hour Ozone, and a maintenance area for PM2.5. The 4th Street Track Lowering and Lancaster Avenue Track Lowering are located within New Castle County, DE.

Delaware County, Pennsylvania

Delaware County, PA is presently designated by the USEPA as marginal nonattainment area for 8-hour Ozone, and a maintenance area for PM2.5. The Boone Tunnel, Clifton Avenue Track Lowering, Crum Lynne Road Track Lowering, and Chichester Avenue Track Lowering are all located within Delaware County, PA.

Philadelphia County, Pennsylvania

Philadelphia County, PA is presently designated by the USEPA as marginal nonattainment area for 8-hour Ozone, and a maintenance area for PM2.5. The 61st Street Track Lowering, Woodlawn Avenue Track Lowering, Cemetery Avenue Track Lowering, 65th Street Track Lowering, 68th Street Track Lowering, Interlocking Location North of Woodland Avenue, and new interlocking location east of Lindbergh Boulevard are all located within Philadelphia County, PA.

1.5. Conformity

The CAA requires that a SIP be prepared for each nonattainment area and a maintenance plan be prepared for each former nonattainment area that subsequently demonstrated compliance with the standards. The

SIP includes the state's air quality control plans and rules that are approved by EPA. Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP. The state and USEPAs' goals are to eliminate or reduce the severity and number of violations of the NAAQS and to achieve expeditious attainment of these standards. The Clean Air Act defines conformity as:

> A. Conformity to an implementations plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and
>
> B. that such activities will not:
> (i) cause or contribute to any new violation of any NAAQS in any area;
> (ii) increase the frequency or severity of any existing violation of any NAAQS in any area;
> (iii) or delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

See 42 USC 7506(c)(1)(A), (B).

The General Conformity (GC) Rule, 40 CFR Part 93 Subpart B, prohibits federal agencies (such as FRA) from permitting or funding projects that do not conform to an applicable SIP. The GC Rule applies only to areas that are in nonattainment or within a maintenance status. Under the GC Rule, project-related emissions of the applicable nonattainment/maintenance pollutants are compared to de-minimis level thresholds. If the emissions exceed the thresholds, a formal Conformity Determination is required to demonstrate that the action conforms to the applicable SIP. Conversely, if project-related emissions are below the de-minimis levels the Project is assumed to conform to the SIP. The proposed Project is funded by, and would require approval by, the FRA and it is located in a nonattainment/maintenance area; therefore, the General Conformity requirements of the CAA are applicable.

For the Project area, the applicable de-minimis emission thresholds are presented in Table 3. Ammonia and VOC are not included for PM2.5 because they are not considered to be significant overall contributors to PM2.5 overall air quality issues. SO2 and NOX are included because they are considered to be significant overall contributors to PM2.5 air quality issues. VOC and NOX are included because they are ozone precursors.

Table 3: General Conformity *De-Minimis* Thresholds

Pollutant	Primary/ Secondary (tons per year)
Ozone (NO_x)	100
Ozone (VOC)	50
$PM_{2.5}$ (Direct Emissions)	100
$PM_{2.5}$ (SO_2)	100
$PM_{2.5}$ (NO_x)	100
Carbon Monoxide	100

Note: Ozone thresholds are for locations inside an Ozone Transport Region (OTR).
Source: USEPA, De-Minimis Levels, h*ttp://www.epa.gov/oar/genconform/deminimis.html*.

A conformity determination under the GC Rule may be required if the federal agency determines that the action will occur in a nonattainment or maintenance area. The determination would be required if the action is not included in the federal agency's "presumed to conform" list; if the emissions from the proposed action are not within the approved emissions budget for an applicable facility; and if the total direct and indirect emissions of a pollutant (or its precursors) are at or above the de minimis levels established in the GC Rule regulations (75 FR 17255).

GC Rule criteria are listed in 40 CFR 93.158. An action will be required to conform to the applicable SIP if, for each pollutant that exceeds the de minimis emissions threshold provided in 40 CFR 93.153(b) or otherwise requires a conformity determination due to the total of direct and indirect emissions from the action, the action meets the requirements of 40 CFR 93.158(c).

The CAA Transportation Conformity Rule functions similarly to the General Conformity Rule. The Transportation Conformity Rule restricts federal funding to highway or transportation projects that do not conform to an applicable SIP. The responsibility of transportation conformity determination is vested in the FHWA and Federal Transit Administration (FTA). The proposed Project is not subject to the Transportation Conformity Rule because it is not an FHWA/FTA project (i.e., will not receive funding assistance and approval from Federal-Aid Highway program and will not require FHWA or FTA approval for any aspect of the Project).

1.6. Air Pollutants for Analysis

1.6.1. Criteria and Toxic Air Pollutants

This section examines the impact of criteria and toxic air pollutants at both the local and regional levels. Pollutants that can be traced principally to motor vehicles, construction equipment and diesel locomotives are relevant to the evaluation of the project's impacts. These pollutants include CO, HC, NOx, O_3, SO_2, PM10, PM2.5 and MSAT. Transportation sources account for a small percentage of regional emissions of Pb; thus, a detailed analysis is not required. The Project's direct and indirect impacts on air quality are considered, including post-construction operations mobile sources and construction emissions.

Regional effects on air quality were evaluated based on both the direct and indirect emissions from operation of the Project. The proposed improvements have the potential to affect regional air quality by direct emissions. Railroad activity releases emissions, primarily from diesel combustion during train operations. Emissions of NOx and primary PM2.5 from diesel combustion contribute to ambient concentrations of ozone and PM2.5, pollutants for which many states have NAAQS nonattainment areas. A localized adverse effect occurs if the alternative causes a localized air emission increase that has the potential to cause violation of the NAAQS, or causes or contributes to a substantial air toxic emission increase that exposes sensitive populations to a high level of air toxic concentrations. The local emissions assessment for the Project was qualitative and considered the comparison of operational emissions from the Build Alternative to the No-Build Alternative, as described below. Emissions from diesel engine locomotives were compared using existing and predicted train schedules provided by CSX. It should be noted that any discussion regarding the impact of CO emissions is only pertinent to the portion of the project in Baltimore City, as it is the only region of the project area that in not in attainment for that pollutant.

Diesel combustion also releases air toxins and GHGs, pollutants for which many states have established reduction programs. Existing and Proposed condition emissions from diesel engine locomotives were

compared using the existing and predicted train schedule provided by CSX. The proposed Project will also affect indirect emissions through several modes of transportation. These modes primarily include the travel of freight along the I-95 corridor by on-road vehicles and by rail.

The qualitative Mobile Source Air Toxics (MSAT) assessment followed the FHWA guidelines on air toxics, the *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*.[1] Technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to estimate accurately the health impacts of MSATs at the project level, it is possible to assess qualitatively the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences in MSAT emissions, if any, from the alternatives.

The qualitative assessment presented below is derived in part from a study conducted by the FHWA titled, *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives.*[2] FHWA's interim guidance groups projects into the following categories: Exempt Projects and Projects with No Meaningful Potential MSAT Effects; Projects with Low Potential MSAT Effects; and, Projects with Higher Potential MSAT Effects.

The Build Alternative is not predicted to significantly change the roadway vehicle miles traveled (VMT) of traffic local to the project sites as compared to the No-Build Alternative. However, it is predicted that the Build Alternative will decrease roadway vehicle miles travel (VMT), particularly trucks, on a regional scale, when compared to the No-Build Alternative. Furthermore, the Build Alternative is not predicted to increase the number of diesel train engines; as determined by CSX and represented below in Table 5. As such, based on the recommended tiering approach detailed in the FHWA methodology, the operational impacts of the project falls within the Tier 1 category as a project with no meaningful potential MSAT effects.

The assessment of construction air quality impacts includes a comparative qualitative analysis, drawing data from the qualitative analysis of the *Virginia Avenue Tunnel Reconstruction Project*.[3] The *Virginia Avenue Tunnel Reconstruction Project* was selected as an example because of its similarity to the HST Project in regional and local air environment, non-attainment status, and the nature of construction and operational condition resultant of the proposed improvements. Construction effects on air quality are generally short term and are due to the emissions from construction equipment and fugitive dust from ground-level disturbances. The potential construction impacts on air quality are evaluated based on the intensity of the construction activities and duration of the construction of the Project and corresponding alternatives. A comparative analysis determined the peak year of construction, defined as the year in which the largest amount of pollutant emissions occurs. The study then compares the emissions inventory

[1] Biondi, Emily. *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA*. Federal Highway Administration. October 18, 2016.

[2] Claggett, Michael. *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives.* August 22,2016 https://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/methodology/msatemissions.pdf

[3] Parsons Brinckerhoff Quade and Douglas, Inc., *Virginia Avenue Tunnel Reconstruction Project, Air Quality Technical Report*, April 2014.

of the peak year of construction to the de minimis thresholds to evaluate whether a General Conformity determination is necessary.

1.6.2. Greenhouse Gas Emissions

The state of dispersion science and health effects of GHG emissions have not sufficiently advanced to accurately consider the microscale level of mobile sources. For this reason, this analysis only considered GHG emissions on a regional scale. For the consideration of this Project, GHG emissions are a result of fossil fuel combustion in vehicles and diesel trains. Any potential change in GHG emissions from implementation of the project is calculated from the same sources and categories that are identified in the analysis of local operational emissions. See Section **2.2.4, Localized Impacts**.

2. Affected Environment

This section summarizes the existing air quality and GHG emissions conditions within the Local and Regional Study Areas.

2.1. Study Area

The mesoscale or regional study area for air quality impacts is composed of the regional air basins that the project corridor would go through. Air quality in nearby air basins could also be affected by changes in travel patterns, VMTs, and regional pollutant transport resulting from the build condition, but likely at a much lower level than in the project corridor. For this analysis, potential effects on regional air quality are evaluated for the air basins (i.e., regions) that physically contain the project area. The origination point of the proposed project in the south is Baltimore City at the location of the HST, and a termination point in the north at the region of Philadelphia. Major metropolitan areas are typically the main source of air emissions due to large human populations and numbers of vehicles on the roadways, and more industry. The proposed Project travels through the major metropolitan areas of Baltimore City, Wilmington, and approaches the most southern portion of Philadelphia.

The microscale or local study area for air quality impacts considers the air quality in close proximity to each project site. The pollutants for analysis at the local scale are CO and PM. Both CO and PM can have localized impacts on air quality, which contribute to the nonattainment or maintenance designation for the region. For this analysis, the entire project area is in attainment for PM and Baltimore City is the only region that in not in attainment for CO; therefore, only Baltimore City is evaluated for potential effects on local air quality from CO as a pollutant from the operational condition of the Project. PM is evaluated for potential effects on local air quality during construction, due to the potential for fugitive dust emissions.

2.1.1. Ambient Air Quality

Ambient air is the outdoor atmosphere to which the general public has access. The CAA requires the USEPA to set the NAAQS on pollutants considered potentially harmful to public health and the environment at ambient concentrations, including seven principal (criteria) pollutants: CO, NO_2, O_3, PM2.5, PM10, SO_2, and Pb. Ambient air monitoring is the systematic, long-term assessment of pollutant levels by measuring the quantity and types of pollutants in the surrounding outdoor air.

Table 4 presents the background concentrations of pollutants for the Regional Study Area based on air quality monitoring from 2017 to 2019. The values describe the air quality status of a given location relative to the NAAQS. These values provide a way to designate and classify nonattainment areas and to assess progress towards meeting the NAAQS. The monitoring locations are representative of Project sites in Baltimore City and are a conservative representation of the Project corridor as a whole.

The representative regional background concentrations show that all pollutant concentrations are below their respective NAAQS criteria, with the exception of ozone.

Table 4: Regional Background Air Quality Concentrations

Pollutant	Averaging Period	Background Concentration	Monitoring Location	NAAQS
CO (ppm)	8-hour	2	Essex, MD	9
	1-hour	2.7	Essex, MD	35
Pb (μ/m^3)	3-month	0.025	Wilmington, DE	0.15
NO2 (ppb)	1-hour	47.8	Old Town, MD	100
	Annual	15.65	Old Town, MD	53
O3 (ppm)	8-hour	**0.076**	Furley, MD	0.070
PM2.5 (μ/m^3)	Annual	8.76	Old Town, MD	12
	24-hour	19.66	Old Town, MD	35
PM10 (μ/m^3)	24-hour	53	Old Town, MD	150
SO2 (ppb)	1-hour	12.01	Essex, MD	75

Source: US Environmental Protection Agency. Air Quality System Data Mart [internet database] available via https://www.epa.gov/airdata. Accessed June 23, 2020.
Note: (ppm) – parts per million; (ppb) parts per billion; (μ/m^3) micrograms per meter cubed

2.2. Operational Impacts - Post Construction Phase - Permanent or Long-Term Effects

This section discusses the permanent or long-term effects following the construction of the Build and No-Build Alternatives on air quality and GHG emissions within the Local and Regional Study Areas.

2.2.1. No-Build Alternative

The No-Build Alternative would involve no action to create a double-stack rail network to and from the Port of Baltimore and along CSX's I-95 Rail Corridor. The existing single-stack capable Railway Section would remain operational without improving the capacity constraint in the national freight rail network. The No-Build Alternative would entail continued use with no significant improvements to the existing HST and I-95 rail corridor. Routine maintenance of the tunnel and corridor would continue. The tunnel's basic geometry and structure would not be improved; the existing tunnel and tracks would be left in place. This alternative would not modernize the rail system or bring it into a "state of good repair," but would rather maintain the existing service and ongoing maintenance as currently practiced with minimal disruption.

Under the No-Build Alternative, the Project would not occur, and interstate highway traffic I-95 corridor would presumably continue to increase based on population growth. Existing air quality, compared to the

future predicted air quality without the project, would be affected by two key factors: regional growth and air quality regulatory actions. Regional growth, such as increased residential development and density, along with additional industry, results in more and greater sources of air emissions. These increases in air emissions are offset by transportation projects which generally reduce traffic congestion, thus minimizing local effects for emissions, as well as vehicle regulatory programs that control the level of emissions from on-road and non-road vehicles.

2.2.2. Build Alternative

The Build Alternative analyzes the air quality conditions that result from the proposed tunnel modifications at the HST and Boone Tunnel; bridge modifications at North Avenue, Guilford Avenue, and Harford Road; track lowering at Mount Royal Avenue, MTA Bridge, Sisson Street, Huntington Avenue, Charles Street, St Paul /Calvert Street, Barclay Street, Greenmount Avenue, 4th Street, Lancaster Avenue, Chichester Avenue, Crum Lynne Road, Clifton Avenue, 68th Street, 65th Street, Cemetery Avenue, Woodland Avenue, 61st Street; and interlocking modification north of Woodland Avenue.

2.2.3. Regional Assessment

Operation of the Build Alternative would generally result in a long-term net benefit to air quality by reducing emissions of criteria pollutants and air toxics. Several factors would contribute to the potential long-term effect on air quality. These include the forecasted train volume of the rail system and the subsequent vehicle emission change due to the shift of freight travel mode from on-road vehicles to trains. Long-term regional effects of the Build Alternative were evaluated based on the total direct and indirect emissions associated with the Project operation.

Direct emissions of the Project relate to the change in locomotive volume from the existing to Build condition of the Project. The existing operation of the rail corridor, including train characteristics and averaged daily locomotive frequency, was provided by CSX. These volumes are presented below in **Table 5**. CSX reports that the existing operational condition will remain unchanged between the Build and No-Build Alternatives and that the proposed improvement of the HST Project would not cause and increase in traffic. As such, the Build Alternative would not cause or contribute to any new violation of any NAAQS or increase the frequency or severity of any existing violation of any NAAQS in the region, and does not require a General Conformity determination.

Table 5: Existing and Future Predicted Train Volumes

Direction	Existing			Future Predicted		
	Total Traffic Per Day	Typical Train Make Up		Total Traffic Per Day	Typical Train Make Up	
		Locomotives	Cars		Locomotives	Cars
Northbound	9.2	3	65.5	9.2	3	65.5
Southbound	9.5	3	65.5	9.5	3	65.5

Source: CSX, Dir Performance Measurements

The Project is not expected to increase regional VMT or VHT. The indirect emission levels that would result from the Build Alternative are not predicted to have any negative impact on regional air quality or GHG. As such, the operational phase of the project is not predicted to increase GHG emissions.

Evidence of the benefit of the Project on regional air quality is supported by a Benefit-Cost Analysis (BCA) conducted for the Infra Grant Application of the Project, and research provided by the Association of American Railroads (AAR). AAR research has reported that

> privately owned freight railroads are the most sustainable way to move freight over land. Moving freight by rail instead of truck lowers greenhouse gas emissions by up to 75%, on average. USEPA data show freight railroads account for only 0.6% of total U.S. greenhouse gas emissions and only 2.0% of the transportation-related sources, while accounting for over one third of intercity freight ton-miles.[4]
>
> By moving more freight without increasing fuel use, redesigned railcars have made freight rail a sustainable and economically viable mode of transportation in comparison to freight traveling on-road. A single freight train can take several hundred trucks off the nation's highways, moving just 5% of freight from truck to rail would result in nine million fewer tons of greenhouse gas emissions.[5]

Transporting freight by railroad, especially in a double-stacked intermodal container configuration, produces significantly fewer emissions than if the same quantity of freight were moved by truck, and double-stacking reduces the number of trains (and locomotives) used to transport the expected growth in East Coast freight traffic. The BCA of the Project determined that the environmental benefit of the project is driven by three values – avoided rail ton mileage (from Port shifts), created rail ton-mileage (from truck to rail diversion), and avoided truck VMT (from truck to rail diversion). All three effects would reduce the amount of fuel consumed for the purpose of moving freight along the I-95 corridor by up to 50%.[6]

2.2.4. Localized Impacts

The Project and the operational condition of the Build Alternative will not cause any additional increase in local concentrations of air pollutants over the No-Build Alternative given that the volume of locomotives will remain unchanged on the Corridor (see **Table 5**). The distance between emissions sources and receptors will remain unchanged since it is primarily only the vertical alignment of the railway that is shifting. Based on the volumes provided in **Table 5**, the amount of locomotive air pollutant emissions that would be dispersed to a local receptor along the railroad on an hourly, daily, or annual basis is anticipated to be negligible and the condition of air quality will remain unchanged between the Build and No-Build Atternative.

According to General Conformity Rule standards, project-related emissions of the applicable nonattainment/maintenance pollutants are compared to de-minimis level thresholds, and if project-related emissions are below the de minimis levels the project is assumed to conform. Although the

[4] Association of American Railroads., *AAR Sustainability Fact Sheet 2019*
https://www.aar.org/wp-content/uploads/2019/02/AAR-Sustainability-Fact-Sheet-2019.pdf

[5] Association of American Railroads., *Freight Rail and The Greening of America*
https://www.aar.org/article/freight-rail-greening-america/

[6] WSP, Inc., *State of Maryland 2019 Infra Grant Application Howard Street Tunnel and Port of Baltimore Double-Stack Clearance Program Benefits-Cost Analysis (BCA) Summary,* March 2019

operational condition of the Build Alternative would not result in any additional increased locomotive volume, quantitative analysis conducted for the B&P Tunnel Project showed that the doubling bi-directional frequency of locomotives would only result in very minor increases of criteria air pollutants. Additionally, the worst-case net increase of those emissions were less than 10% of the de minimis thresholds. Comparatively, the HST project and the associated improvements would be significantly less impactful than the improvements of the B&P Tunnel project.[7] Furthermore, improvements to the track's vertical profile and interlocking location along the corridor would reduce slow down areas which would be expected to result in a reduction of locomotive emissions. As such, the operation of the Build Alternative would not cause major adverse impact locally and does not require a General Conformity determination.

2.3. Construction Phase - Temporary Effects

This section discusses the direct and indirect temporary impacts of the Build Alternative during construction, based on the conceptual engineering design.

2.3.1. Build Alternative

The Build Alternative would have minor temporary adverse direct impacts on local and regional emissions based on the short duration of pollutant exposure associated with the temporary nature of the Project's construction activities. The Project would result in temporary effects on air quality and GHG emissions due to the various emission sources associated with construction. Pollutant emissions during construction would occur from emissions from on-site diesel equipment, increased truck traffic to and from the construction site, and fugitive dust as a result of vehicle travel on paved/unpaved roadways and wind erosion from active storage piles.

The Build Alternative consists of improvements that would remove all obstructions restricting passage of modern double-stack intermodal trains, allowing for a 21-foot clearance along the noted stretch of the corridor between Baltimore and Philadelphia, PA. In general, the physical obstructions generally consist of a bridge or tunnel for which CSX has developed a tailored approach to achieve clearance. At bridge obstructions, four conventional methods, or a combination thereof, were considered for increasing the vertical clearance: (1) lower tracks beneath the bridge; (2) modify the bridge; (3) raise the existing bridge; or (4) remove and replace the bridge. For tunnel obstructions, three conventional methods, or a combination thereof, were considered to increase vertical clearance: (1) lower tracks within the tunnel; (2) modify the arch and/or invert within the tunnel, or (3) open cutting and reconstructing the tunnel.

The general rationale for selecting a specific option or combination of options described above included the following:

1. At bridge and tunnel locations where there are no utilities or other obstacles present, track lowering was selected.
2. At bridge locations only - where utilities or other obstacles are present, a combination of track lowering and bridge modification or replacement would be undertaken.

[7] U.S. Department of Transportation Federal Railroad Administration, *B&P Tunnel Project Air Quality Technical Report,* August 2015

3. At tunnel locations only - where utilities or other obstacles are present, a combination of track lowering, arch and/or invert modification may be used to achieve clearance.

Construction among the entire Project would last approximately 4 years, and each construction location would have its own shorter timeframe. The preliminary estimated construction schedule and general construction type are included in **Table 6**.

Table 6: Construction Type and Preliminary Schedule

Location	Schedule		Improvement Type
	Start Date	End Date	
North of Woodland Avenue (Current Interlock)	03/2021	08/2021	Interlocking Modification
North of Woodland Avenue (Proposed Interlock)	03/2021	08/2021	Interlocking Modification
61st Street	10/2021	2023	Track Lowering
Woodland Avenue	10/2021	2023	Track Lowering
Cemetery Avenue	10/2021	2023	Track Lowering
65th Street	10/2021	2023	Track Lowering
68th Street	10/2021	2023	Track Lowering
Boone Tunnel	01/2022	07/2023	Tunnel Modification
Clifton Avenue	05/2021	11/2021	Track Lowering
Crum Lynne Road	11/2021	05/2022	Track Lowering
Chichester Avenue	05/2022	11/2022	Track Lowering
Lancaster Avenue	11/2022	05/2023	Track Lowering
4th Street	11/2022	05/2023	Track Lowering
Harford Road	06/2022	07/2024	Bridge Modification
Greenmount Avenue	11/2021	11/2022	Track Lowering
Barclay Street	11/2021	11/2022	Track Lowering
Guilford Avenue	11/2021	11/2022	Bridge Modification
St Paul / Calvert Street	11/2021	11/2022	Track Lowering
Charles Street	11/2021	11/2022	Track Lowering
Huntington Avenue	11/2021	11/2022	Track Lowering
Sisson Street	11/2021	11/2022	Track Lowering
North Avenue	07/2022	07/2024	Bridge Modification
MTA Bridge	07/2022	07/2024	Track Lowering
Mount Royal	07/2022	07/2024	Track Lowering
Howard Street Tunnel	07/2022	07/2024	Tunnel Modification

As a whole, the construction required to allow for the additional clearance along the Project corridor would be relatively unimpactful. The majority of construction activity that has potential to cause impact would result from the excavation, demolition and grading of the existing track alignment. These activities have the potential to generate fugitive dust, and the heavy machinery used may generate emissions from combustion. The vast majority of emissions generated by the construction of the Project would be directly proportional to the amount of earth and material moved. Preliminary designs of the track lowering, bridge modification and tunnel modification show that the amount of earth and material moved for the Project would be very small in comparison to other clearance increasing projects. In many cases and locations along the corridor where track lowering and tunnel modification would be taking place, vertical clearance is already very near the required 21 feet, and therefore only a minor amount of excavation is needed.

Furthermore, the proposed construction of the HST Project compared to the quantitative analysis of construction emissions for the Virginia Avenue Tunnel Reconstruction Project shows that the extent and duration of construction of the HST project would be exceedingly less to the extent that quantitative analysis is not required. For the Virginia Avenue Project, the total annual emission from construction equipment and construction related activities of the most impactful alternative, in terms of emissions ton per year, was more than ten times lower than the general conformity de minimis thresholds. That alternative included a complete rebuild and temporary runaround track.[8] This alternative also would entail the largest amount of volume to be excavated (e.g., underground, in addition to cut and cut-and-cover at each portal), thus requiring more material handling as well as haul truck trips to and from staging areas.

A side-by-side comparison of construction operation, travel of truck and machinery, quantity of earth moving and demolition activities, and construction schedule, between the analysis of the Virginia Avenue Tunnel Reconstruction Project and the construction plans of the HST Project, show that the construction air quality footprint of the HST Project is significantly lower. In addition to the reduced volumes of vehicles and quantities of earth moving for the HST Project, it is expected that the level of emissions on a per vehicle mile traveled basis or during idling, would be significantly lower for the HST Project given the construction timeframe of 2021 through 2024. Since the Virginia Avenue Tunnel Reconstruction Project was constructed from 2013 through 2017, the emissions from on-road motor vehicles and heavy-duty diesel vehicles have been significantly reduced through EPA regulatory actions and from more efficient and lower-emitting engines associated with a newer fleet of vehicles. Thus, while the expected level of vehicle miles traveled and earth moving activities is expected to be lower for the HST Project, it is also expected that the level of emissions from those activities would be lower for the HST Project given the 8 years that have elapsed since the Virginia Avenue Tunnel Project began construction. Also, note that a general conformity applicability assessment is conducted on a regional and calendar year basis. Provided the lengthy construction schedule and geographical distribution of construction over multiple air quality control regions for the HST Project, the total calendar year construction emissions in a single calendar year for an air quality control region would be expected to be much lower for the HST Project compared to the Virginia Avenue Tunnel Project.

Based on comparisons provided in **Table 5** and the conclusions of the Virginia Avenue Tunnel Reconstruction Project, general conformity applicability analysis and the additional reasons stated above, it can be confidently concluded that construction phase emissions are not predicted to exceed the GC Rule's de minimis emission thresholds for the HST Project. As such, air quality impacts from construction of the Build Alternative would not be subject to a conformity determination. Construction phase impacts are not predicted to exceed a NAAQS at adjacent to the project area. The construction of the Build Alternative would not cause major adverse impacts and would not require a General Conformity determination.

2.3.2. Minimization Strategies

Although the Build Alternative would not cause any major adverse impacts during construction, compliance with all applicable laws and regulations would reduce pollutant emissions from construction activity. In order to mitigate these emissions, construction activities would be performed in accordance

[8] Parsons Brinckerhoff Quade and Douglas, Inc., *Virginia Avenue Tunnel Reconstruction Project, Air Quality Technical Report*, April 2014

with construction level best management practices (BMPs). Strategies that should be considered during construction could include:

- apply water suppression at least twice a day to all active construction areas to minimize dust;
- tarp all trucks hauling soil, sand, and other loose materials or require that all trucks maintain at least two feet of freeboard;
- pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites;
- use water sweepers to sweep all paved access roads, parking areas and staging areas at construction sites daily, use water sweepers to sweep all streets daily if visible soil material is carried onto adjacent public streets;
- hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more);
- enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.);
- limit traffic speeds on unpaved roads to 15 miles per hour;
- introduce appropriate erosion control measures to reduce silt runoff to public roadways;
- replant vegetation as quickly as possible to minimize erosion in disturbed areas;
- use alternative fuels for construction equipment;
- when feasible, minimize equipment idling time, and maintain properly tuned equipment.

3. Conclusion

The proposed project will not cause any impact as result of operational emissions, due mainly to no projected increase in diesel freight train operations. Regionally, the existing operational condition will remain unchanged between the Build and No-Build Alternatives and that the proposed improvement of the HST Project would not cause and increase in rail traffic. Additionally, transporting freight by railroad, especially in a double-stacked intermodal container configuration, produces significantly fewer emissions than if that same quantity of freight were moved by truck, and double-stacking would potentially reduce the number of trains (and locomotives) used to transport the expected growth in East Coast freight traffic. As such, the operational phase of the project is not predicted to have any negative impact on regional air quality, or cause or contribute to any new violation of any NAAQS or increase the frequency or severity of any existing violation of any NAAQS or GHGs in the region. The Project and is not predicted to exceed the GC Rule's de minimis emission thresholds.

Locally, the operation of the Build Alternative would not cause major adverse impact or increase the frequency or severity of any existing violation of any NAAQS in any area, since the operational condition of the corridor is to remain unchanged between the Build and No-Build alternatives.

The emissions from construction activity would be expected to be minimal in any one area, and would not be expected to substantially affect ambient air quality, assuming application of BMPs. By comparison of the HST project to the Virginia Avenue Tunnel Project, it can be confidently concluded that construction phase emissions of the Project are not predicted to exceed the GC Rule's de minimis emission thresholds.