



**TIER 3 – AIR QUALITY
TECHNICAL MEMORANDUM**

**Prepared for:
Southeastern Pennsylvania Transportation Authority (SEPTA)**



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Executive Summary

ES-1 Purpose

The purpose of this report is to document potential air quality effects associated with the construction and operation of the SEPTA King of Prussia Rail Project (the Project), along with potential minimization and mitigation measures, if necessary. The air quality evaluation includes an assessment of the region's attainment status, existing conditions, and potential effects of the Action and No Action Alternatives.

ES-2 Methodology

An air quality assessment was prepared in accordance with the National Environmental Policy Act (NEPA) and Federal Transit Administration (FTA) air quality conformity guidance established per the requirements of the Clean Air Act.

ES-3 Environmental Consequences

The potential effects to air quality resulting from the Action and No Action Alternatives were evaluated in three ways: change in vehicle miles traveled (VMT), change in travel delay on roadways and change in greenhouse gas emissions:

- **Conformity Determination:** To conform to air quality goals established by the Pennsylvania State Implementation Plan for air quality, the Project must originate from a conforming Transportation Improvement Program (TIP). The Project is not listed in the most recent 2015-2018 TIP. However, the Project is listed in the funded portion of the Delaware Valley Regional Planning Commission's (DVRPC) *Connections 2040* (regional long-range plan), which means that the Project was included in the air quality conformity modeling that was performed during the PA Act 89 Transportation Funding Plan updates to the long-range plan. SEPTA anticipates that the alternative SEPTA selects and adopts through the DEIS process will be included in a future revision of the TIP and a regional conformity demonstration will be completed by DVRPC at that time.

The Project must also demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) on a project level. According to United States Environmental Protection Agency (EPA) guidance, the Project is not of local air quality concern because it is not expected to cause or contribute to violations of the NAAQS. However, project level air quality modeling analysis of roadway intersections potentially affected by the Project will be performed after a locally preferred alternative is selected and will be presented in the FEIS.

- **Change in VMT:** Compared with each Action Alternative, forecasted weekday daily roadway vehicle miles traveled (VMT) would be higher in the No Action Alternative, resulting in higher levels of vehicular emissions. However, this potential negative effect may be mitigated by reduction in overall vehicular emissions because of federal and state implemented emissions control measures in the future.

Each Action Alternative would result in a net reduction of VMT by 2040 compared to the No Action Alternative. Due to the VMT reduction and progressive federal and state measures to control vehicular emissions, it is anticipated that no significant adverse air quality impacts would occur under each Action Alternative.

- Change in travel delay on roadways: Roadway operational analysis of the No Action Alternative indicates degradation of operations will occur by 2040 because of growth in traffic volumes. Longer roadway travel delays will increase vehicle emissions, potentially degrading air quality. SEPTA minimized the potential for each Action Alternative to affect roadway operational impacts by elevating the rail guideway over study area roadways. Near station areas and park-and-ride facilities, most roadway intersections would operate the same or better with the intersection optimization proposed by SEPTA. In these cases, vehicular emissions would not increase and no worsening of air quality conditions would occur.
- **Mobile source air toxics (MSATS):** The CAA lists 187 air toxics, of which 93 pollutants have been identified as mobile source air toxics (MSATs) by the EPA. The Federal Highway Administration's Interim Guidance on air toxics analysis specifically exempts projects with no meaningful impacts on traffic volumes or vehicle mix. The Project is determined to achieve exemption under this guidance because, as described in the *KOP Tier 3 Transportation Technical Memorandum*, the overall traffic mix and volume around the intersections the Project would affect would remain essentially the same and the number of diesel vehicles traveling through the affected intersections would not change because of the Project. Therefore, none of the Action Alternatives would cause an increase in MSAT impacts. The No Action Alternative potentially would increase MSAT impacts because, as demonstrated in the traffic analysis for 2040 without the Project, traffic volumes and congestion at Project study area intersections will increase.
- **Change in greenhouse gas emissions:** Greenhouse gases such as carbon dioxide (CO₂) are emitted in motor vehicle exhaust and other sources and have contributed to climate change and global warming. The No Action Alternative would not reduce regional production of greenhouse gases or their criteria pollutants, and would not reduce automobile use, miles traveled or time spent in roadway congestion. Forecasted future traffic analysis indicates growth in congestion in the No Action Alternative, likely causing greenhouse gas emissions and their criteria pollutants to increase over time in the region. Each Action Alternative would provide a benefit by reducing energy use in the region and reducing automobile use, thereby resulting in fewer miles traveled and less time spent in roadway congestion. This energy benefit correlates to a reduction in emissions of greenhouse gases and their criteria pollutants in the region over time with each Action Alternative.

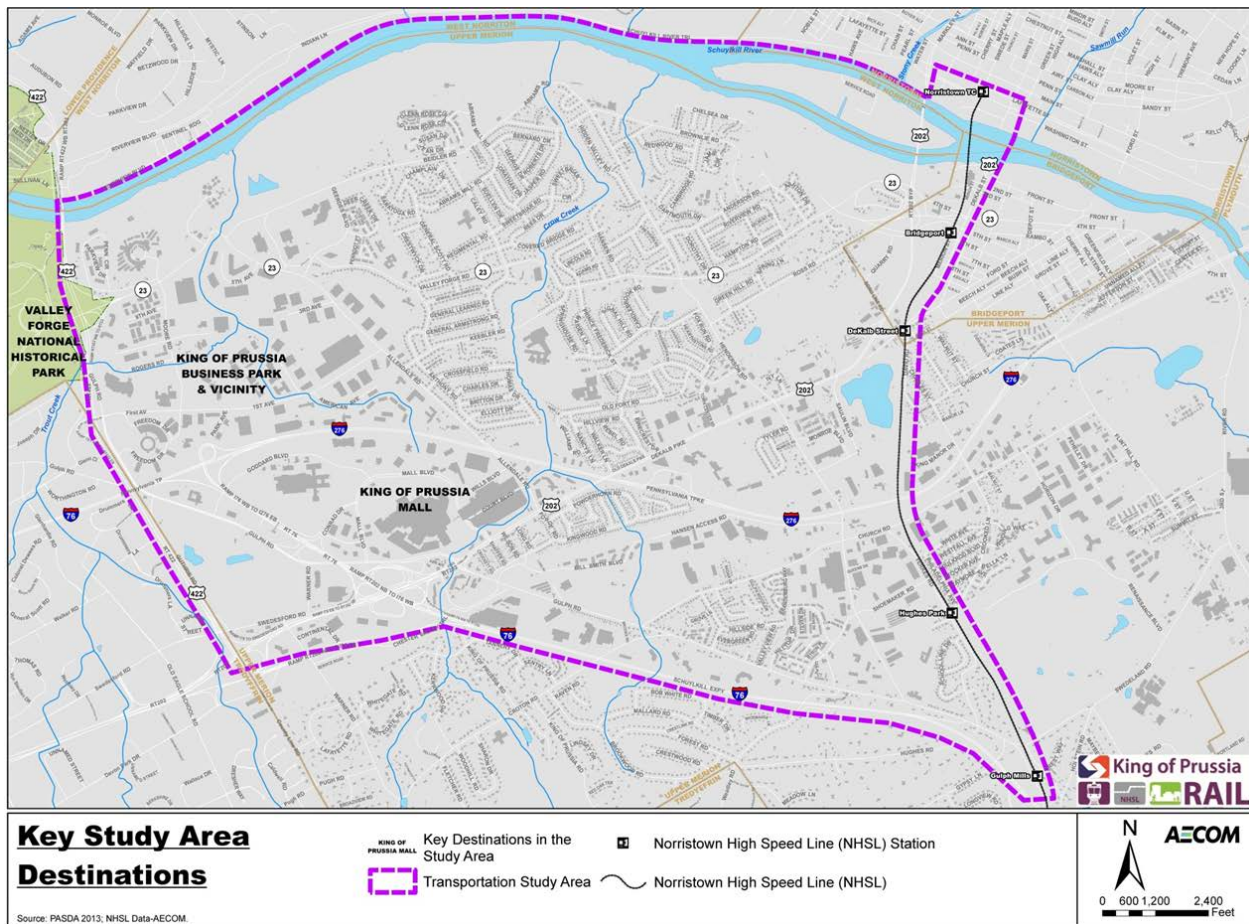
ES-4 Minimization and Mitigation

SEPTA will assess the potential for a Project air quality effect during the FEIS when the design of station areas and park-and-ride facilities is refined for the selected LPA. SEPTA's construction plan would include an air quality management component. Strategies SEPTA would consider including in the plan are construction vehicle emissions and dust controls.

1.0 Introduction

The Federal Transit Administration (FTA), in cooperation with the Southeastern Pennsylvania Transportation Authority (SEPTA), prepared a Draft Environmental Impact Statement (DEIS), under the National Environmental Policy Act of 1969 (NEPA), that examines and evaluates a proposed extension of the existing Norristown High Speed Line (NHSL) to the King of Prussia Mall and other destinations in the King of Prussia-Valley Forge area of Upper Merion Township, Montgomery County, PA, known in this report as the transportation study area (Figure 1-0.1).

Figure 1-0.1: The Project’s Transportation Study Area



An air quality assessment was conducted in accordance with the FTA/Federal Highway Administration (FHWA) Environmental Impact and Related Procedures (23 C.F.R 771) and the Transportation Conformity Rule (TCR) established by the Clean Air Act Amendments. The TCR contains detailed transportation “conformity” requirements for the purpose of ensuring that federally-funded transit and highway projects conform to the applicable air quality State Implementation Plan (SIP). The SIP documents the measures to be taken in a specific nonattainment area in order to attain the national ambient air quality standards. The conformity requirements apply only in nonattainment and maintenance areas.

1.1 Purpose of Report

The purpose of the technical report is to describe potential air quality effects associated with the Project in the transportation study area including proposed minimization and mitigation measures, if necessary.

1.2 Project Overview

SEPTA's alternatives development and evaluation process is grounded in the Project purpose and need. The purpose of the Project is to provide faster, more reliable public transit service to the KOP area in a manner that:

- Offers improved transit connections to the area from communities along the existing Norristown High Speed Line, Norristown, and Philadelphia;
- Improves connectivity between defined key destinations within the King of Prussia area; and
- Better serves existing transit riders and accommodates new transit patrons.

It represents a new way to serve a growing transit market, by providing direct rail transit service to this area, attracting additional transit riders, helping to reduce the rate of growth in traffic congestion, and linking Philadelphia, Norristown, and Upper Darby and existing communities along the NHSL to key destinations in the transportation study area.

2.0 Project Description

This technical memorandum examines five Action Alternatives and the No Action Alternative described in the following subsections.

2.1 No Action Alternative

The No Action Alternative assumes no improvements to the transportation system in the transportation study area other than those contained in the financially constrained element of Connections 2040 Plan for Greater Philadelphia, the long-range transportation plan of the Delaware Valley Regional Planning Commission (DVRPC), the Metropolitan Planning Organization (MPO) for the Philadelphia metropolitan area. Table 2-1.1 lists the committed No Action Alternative projects within the transportation study area.

Table 2-1.1: Committed Projects in the No Action Alternative

Project	Type	Description
New US Route 422 Bridge crossing over Schuylkill River	Highway	New 4-lane bridge westbound; replace bridge eastbound.
Widen US Route 422 from US Route 202 to PA 363	Highway	Widen this 2-mile segment from 4 lanes to 6.
Full interchange at US Route 422 and PA 363	Highway	Complete to a full interchange, with movements in both directions.
PA Turnpike widening from Morgantown exit to Valley Forge	Highway	Widen to 6 lanes throughout.
Lafayette Street extension and new Turnpike exit in Norristown	Highway	Construction of extension underway. Construction on Turnpike exit could start in 2018.
1 st Avenue Streetscape and Multi-use Trail (known also as the 1 st Avenue Road Diet project)	Highway	Funded through statewide TAP program. Road Diet, streetscaping and multi-use trail along the length of 1 st Avenue to enhance multi-modal access.
Relocate PA 23/Valley Forge Road intersection with North Gulph Road	Highway	Move roadway 300 feet east of current entrance with Valley Forge National Historical Park to improve operations and reduce traffic impacts at the entrance to the Park, and create a new Gateway entrance.
Widen Henderson Road and South Gulph Road	Highway	Widen South Gulph Road from Crooked Lane to I-76 intersection at Gulph Mills and widen Henderson Road from South Gulph Road to Shoemaker Road.
Chester Valley Trail Extension	Multimodal	Extend the Chester Valley Trail to connect with the Schuylkill River Trail in Norristown, a 2.5 mile extension.

Source: DVRPC, *Connections 2040 Plan for Greater Philadelphia*.

The committed projects consist primarily of planned capacity and operational improvements to regional and local study area roadways, particularly US Route 422 and the Pennsylvania Turnpike. All but one roadway project, 1st Avenue “road diet,” operates at the periphery of the transportation study area. Montgomery County’s Chester Valley Trail Extension is also within the study area. In addition to these committed projects, the No Action Alternative consists of highway and transit networks, transit service levels, traffic volumes, and forecasted demographics for the horizon year 2040.

2.2 Action Alternatives

Figures 2-2.1 through 2-2.5 illustrate the Action Alternatives:

- **PECO-1st Ave.:** The PECO-1st Ave. Action Alternative would use a portion of the PECO electric utility corridor as its trunk, passing in front of (to the south of) the King of Prussia Mall, turning north to use a portion of the Norfolk Southern Railroad (NS) Industrial Track before turning west along 1st Avenue as its branch and ending near the intersection of 1st Avenue and N. Gulph Road in the vicinity of the Valley Forge Casino Resort (VFCR).
- **PECO/TP-1st Ave.:** The PECO/TP-1st Ave. Action Alternative would use portions of the PECO electric utility corridor and PA Turnpike as its trunk, passing behind (to the north of) the King of Prussia Mall, turning north to use a portion of the NS Industrial Track before turning west along 1st Avenue as its branch and ending near the intersection of 1st Avenue and N. Gulph Road in the vicinity of the VFCR.
- **PECO/TP-N. Gulph:** The PECO/TP-N. Gulph Action Alternative would use portions of the PECO electric utility corridor and PA Turnpike as its trunk, passing behind (to the north of) the King of Prussia Mall, turning south to connect to N. Gulph Road before turning west along the N. Gulph Road as its branch and ending near the intersection of 1st Avenue and N. Gulph Road in the vicinity of the VFCR.
- **US 202-1st Ave.:** The US 202-1st Ave. Action Alternative would use portions of the US Route 202 corridor and the PA Turnpike right-of-way as its trunk, passing behind (to the north of) the King of Prussia Mall, turning north to use a portion of the NS Industrial Track before turning west along 1st Avenue as its branch and ending near the intersection of 1st Avenue and N. Gulph Road in the vicinity of the VFCR.
- **US 202-N. Gulph:** The US 202-N. Gulph Action Alternative would use portions of the US Route 202 corridor as its trunk, passing behind (to the north of) the King of Prussia Mall, turning south to connect to N. Gulph Road before turning west along the N. Gulph Road as its branch and ending near the intersection of 1st Avenue and N. Gulph Road in the vicinity of the VFCR.

As part of each Action Alternative, two tracks would be provided on primarily elevated guideway. However, a short at-grade section would be provided at the turnouts to/from the existing NHSL. In the PECO and PECO/TP Trunks, the tracks would also be at grade on a hilltop area within the PECO corridor a short distance west of Henderson Road.

The Action Alternatives include five to seven proposed station areas: Henderson Road, the Court, Mall Boulevard North, Plaza, 1st Avenue East, and the terminal stations at either 1st & Moore or Convention Center. The Henderson Road and 1st & Moore stations would include

park-and-ride facilities; proposed as a surface lot at the Henderson Road station and a multi-story garage structure at 1st & Moore.

As the elevated guideway approaches the western terminal stations (1st & Moore or Convention Center), the two-track guideway structure would widen from approximately 34 feet to a three-track cross-section approximately 50 feet wide. In the widened area, the third track would provide SEPTA with the necessary capacity for efficient train operations at the terminal station and along the alignment in those areas.

Figure 2-2.1: PECO – 1st Ave. Action Alternative

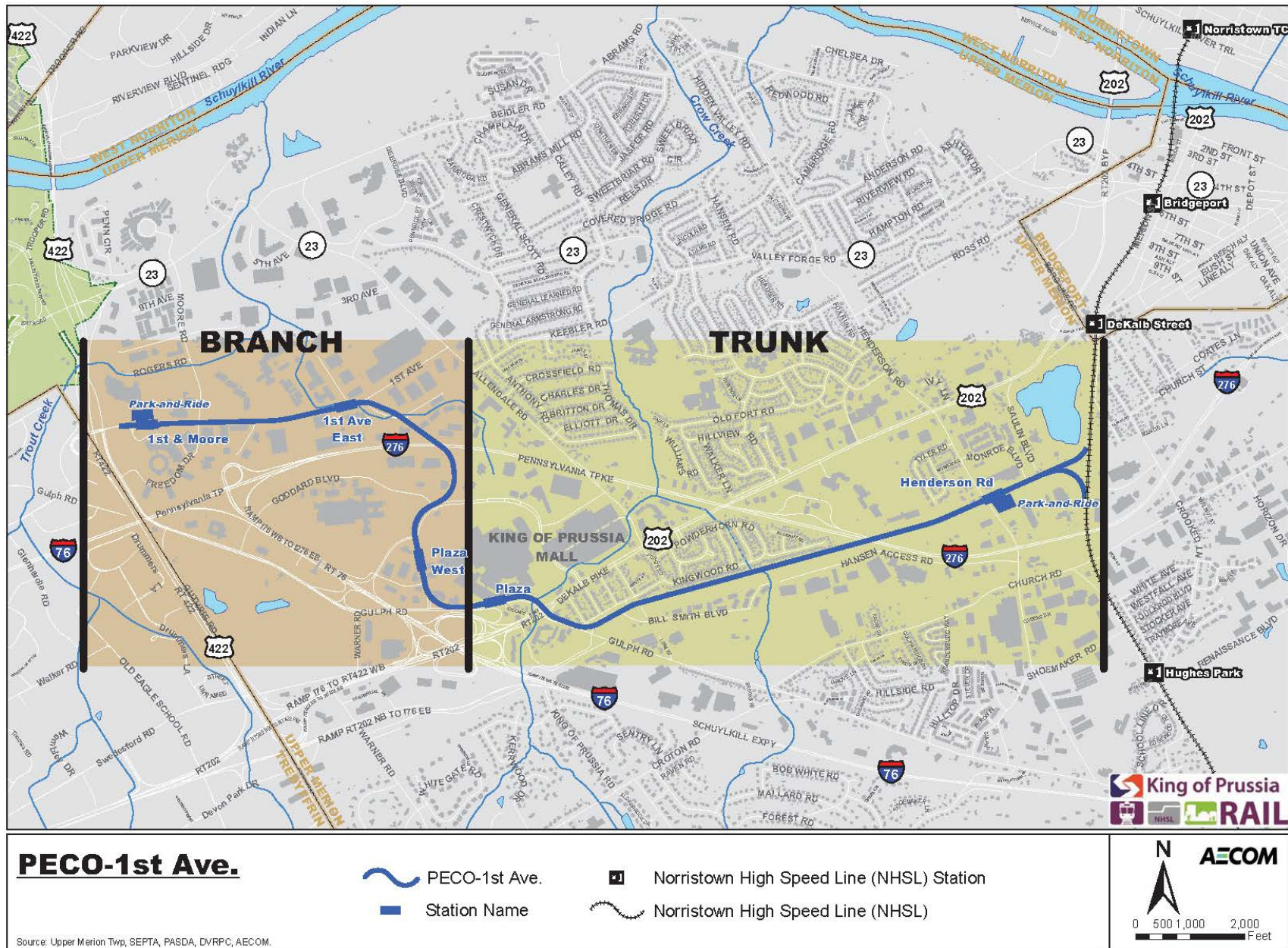


Figure 2.2-2: PECO/TP- 1st Ave. Action Alternative

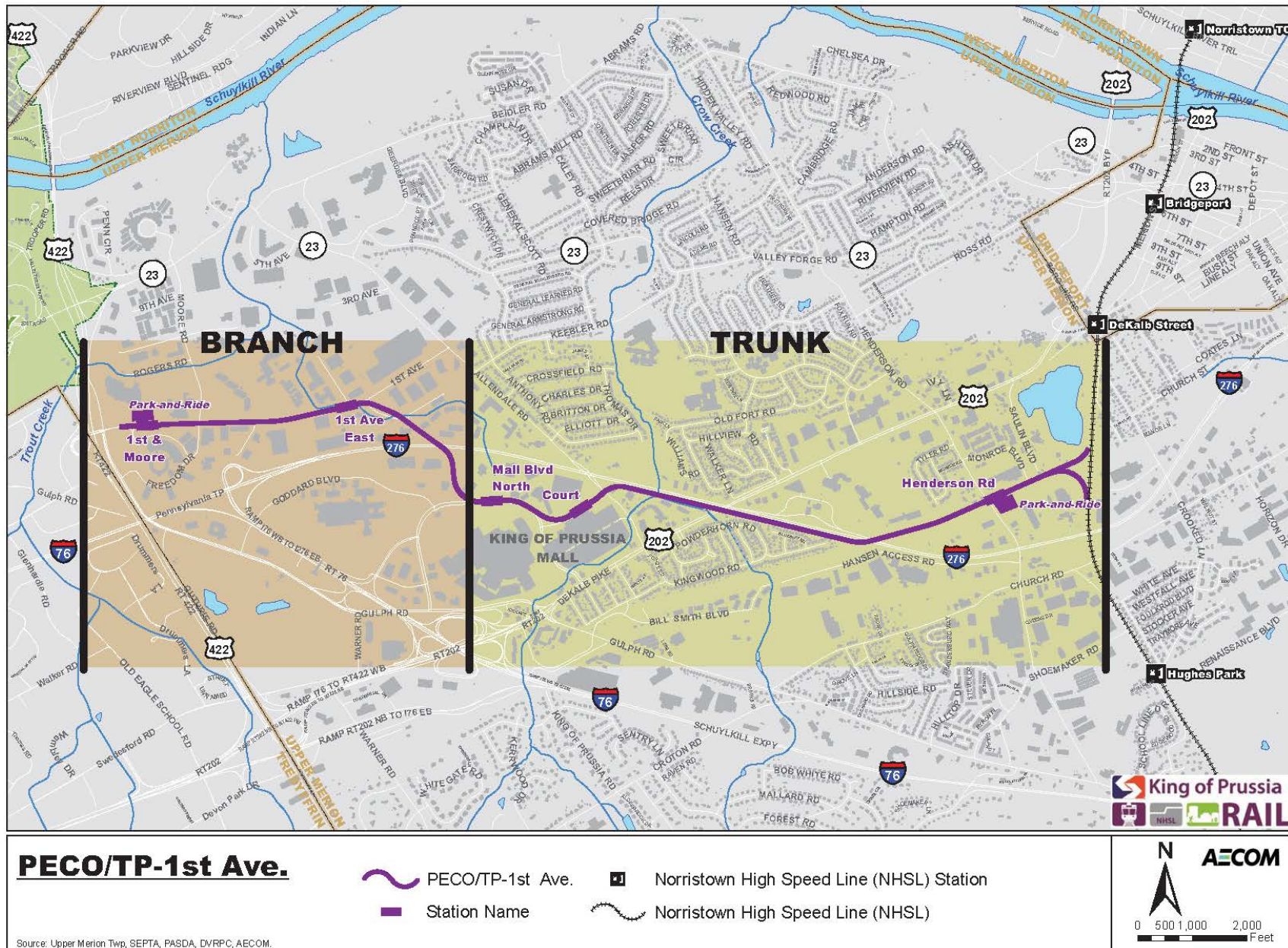
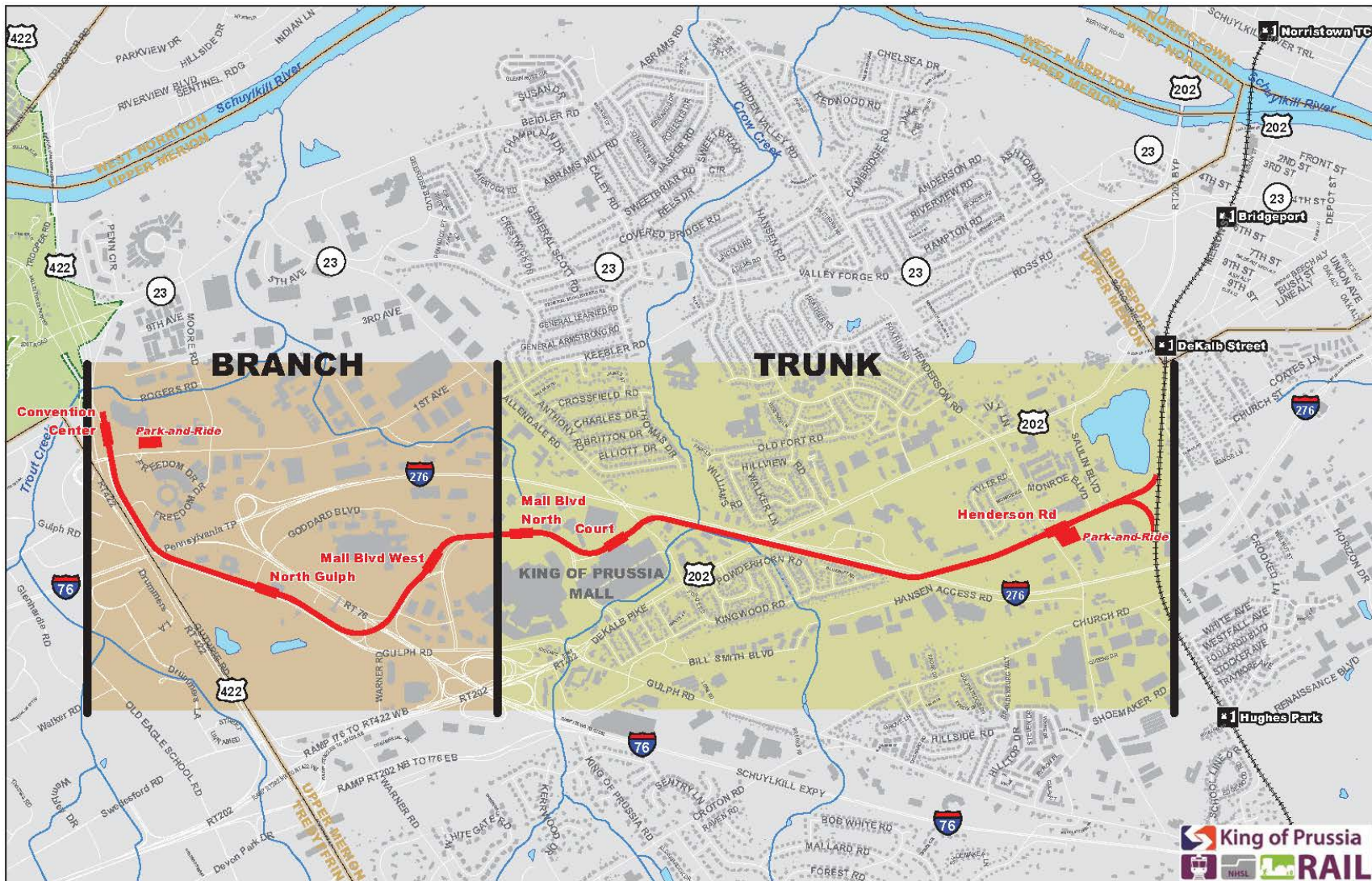


Figure 2-2.3: PECO/TP - N. Gulph Action Alternative



PECO/TP-N. Gulph

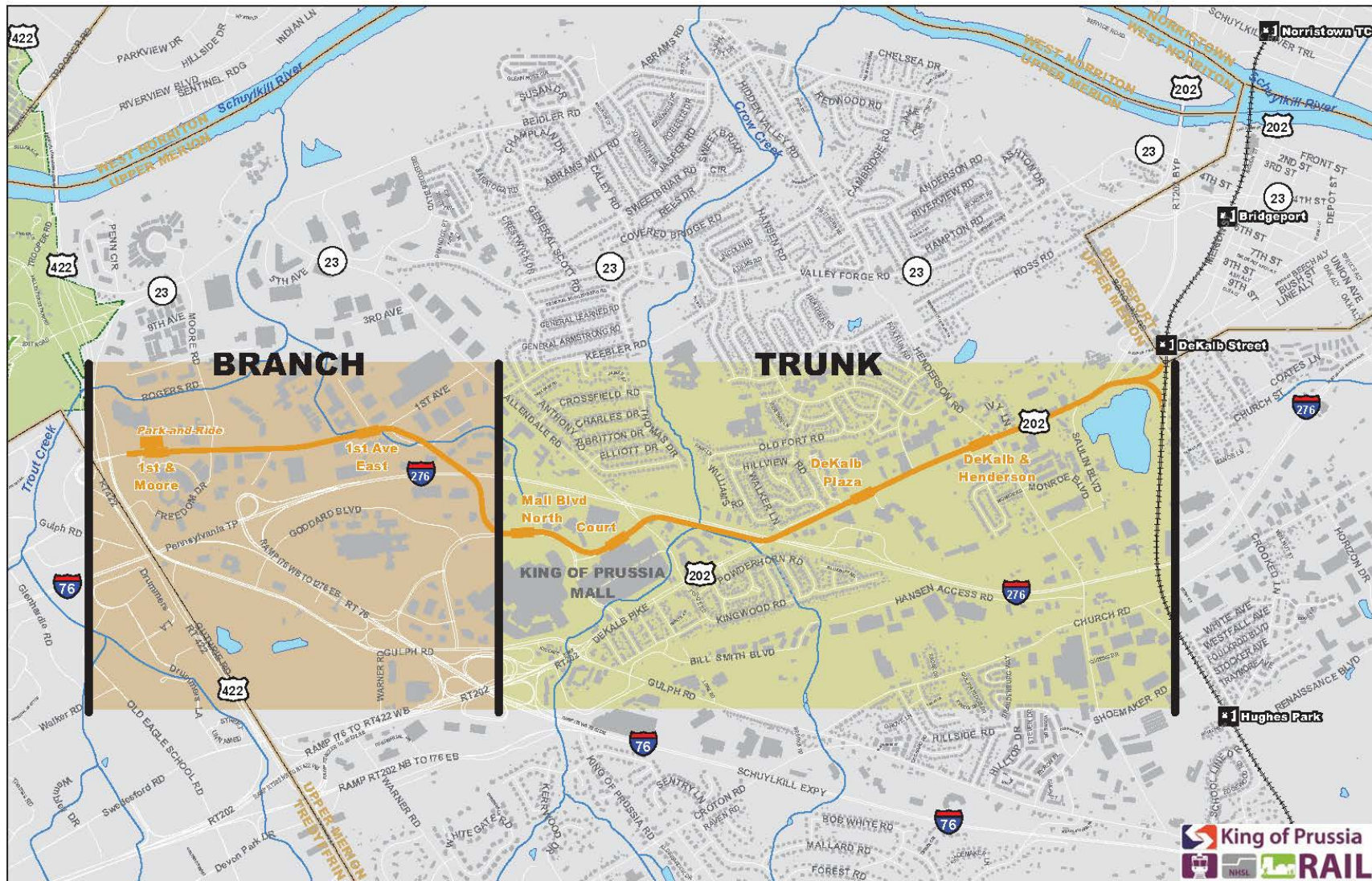
~ PECO/TP-N. Gulph
■ Station Name

Norristown High Speed Line (NHSL) Station
~ Norristown High Speed Line (NHSL)

Source: Upper Merion Twp, SEPTA, PASDA, DVRPC, AECOM.

AECOM
 0 500 1,000 2,000 Feet

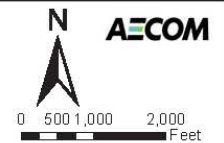
Figure 2.2-4: US 202 – 1st Ave. Action Alternative



US 202-1st Ave.

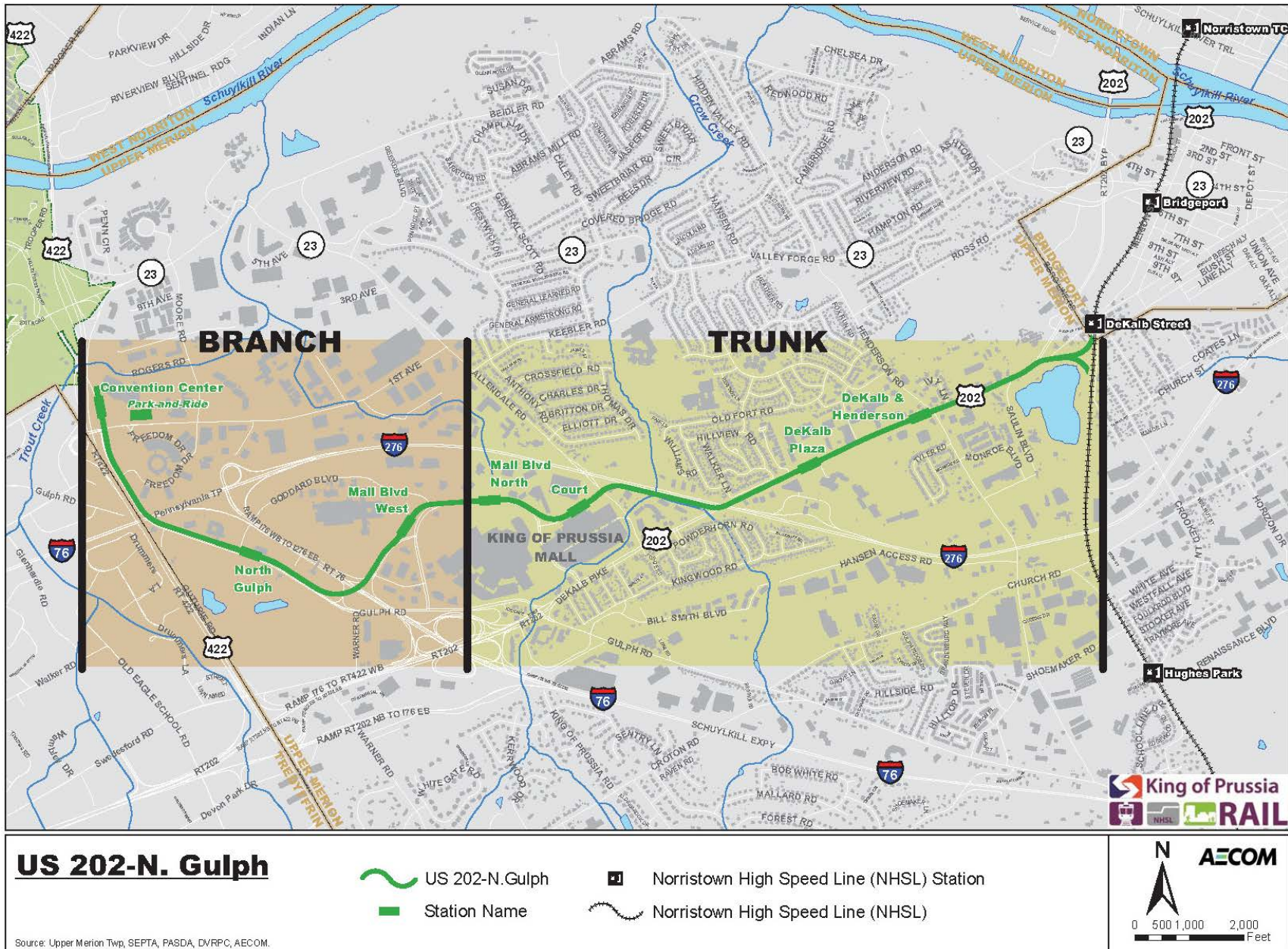
US 202-1st Ave.
 Station Name

Norristown High Speed Line (NHSL) Station
 Norristown High Speed Line (NHSL)





Source: Upper Merion Twp, SEPTA, PASDA, DVRPC, AECOM

Figure 2-2.5: US 202 – N. Gulph Action Alternative



US 202-N. Gulph

-  US 202-N.Gulph
-  Station Name

-  Norristown High Speed Line (NHSL) Station
-  Norristown High Speed Line (NHSL)

King of Prussia RAIL

AECOM

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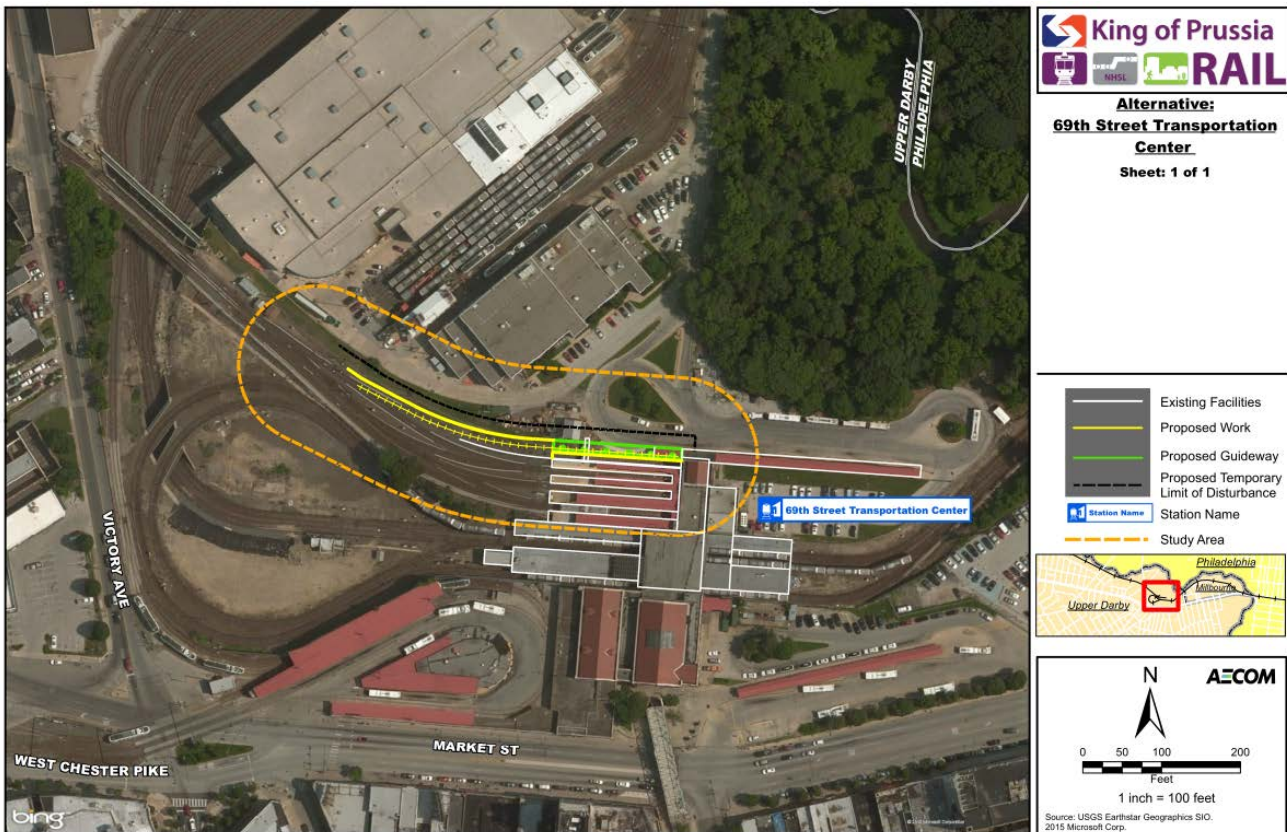
0 500 1,000 2,000 Feet

Source: Upper Merion Twp, SEPTA, PASDA, DVRPC, AECOM.

Extending NHSL service into King of Prussia would require SEPTA to add one new station track at SEPTA's 69th Street Transportation Center in Upper Darby Township, Delaware County (Figure 2-2.6). The new track would be aligned along the north side of the existing NHSL tracks, terminating at the existing building along the north side of a modified northern platform. The ballast embankment supporting the existing NHSL tracks would be widened to the north to accommodate the new track. Adjacent to the widened northern platform, the new track would be supported on an elevated guideway structure. The purpose of using structure rather than continuing the embankment up to the building is to avoid impacting the existing bus stop and turnaround area underneath and adjacent to the new track.

The northern platform would be widened to serve the new track. As with the existing NHSL service, the new track and widened platform would be designed to enable level passenger boarding. The existing windbreak wall along the northern edge of the existing platform would be removed and rebuilt along the northern edge of the proposed guideway structure. Elements to be removed include a short section of existing turnout track along the proposed alignment, as well as an existing stairway used by passengers exiting from the north platform and by SEPTA personnel. The existing track embankment retaining wall would be relocated to the north edge of the new embankment and the existing track turnout would be replaced. Other portions of the 69th Street Transportation Center would not be affected nor changed by the proposed Project.

Figure 2-2.6: 69th Street Transportation Center Modifications



3.0 Regulatory Framework

As discussed in Section 1.0, the operational impacts were evaluated using the guidelines set forth by the FTA/FHWA Environmental Impact and Related Procedures (23 C.F.R 771) and the Transportation Conformity Rule established by the Clean Air Act Amendments.

3.1 Air Pollutants Relevant to the Project

"Air pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. Regulations for air pollutant emissions exist to protect human health, welfare, and the environment.

The United States Environmental Protection Agency (EPA) develops and enforces the regulations related to air quality. In 1970, the federal Clean Air Act established the National Ambient Air Quality Standards (NAAQS) to protect the public health. Six criteria air pollutants have been identified by the EPA as being of concern nationwide: carbon monoxide, sulfur oxides (sulfur dioxide), nitrogen oxides (nitrogen dioxide), ozone, particulate matter with a size of 10 micrometers or less, particulate matter with a size of 2.5 micrometers or less, and lead. The sources of these pollutants, their effects on human health, and their concentrations in the atmosphere vary considerably.

Ozone (O₃) is a strong oxidizer and pulmonary irritant that affects respiratory functions, respiratory mucous membranes, and other lung tissues. Exposure to ozone can impair the ability to perform physical exercise. It can result in symptoms such as tightness in the chest, coughing, and wheezing and can ultimately result in asthma, bronchitis, and emphysema. Motor vehicles do not emit ozone directly. Instead, emissions of volatile organic compounds (VOC) and nitrogen oxides (NO_x), which are the precursor pollutants to ozone formation, react in the presence of sunlight to form ozone in the atmosphere. These reactions occur over periods of time that can last from hours to days while mixing with other gases in the atmosphere and transporting downwind.

Nitrogen dioxide (NO₂) is one of a group of highly reactive gases known as "oxides of nitrogen" or "nitrogen oxides (NO_x)". These gases form when fuel is burned at high temperatures. NO₂ forms quickly from motor vehicle emissions and stationary sources. NO₂ is a brownish gas, which is a strong oxidizing agent that reacts in the air to form corrosive nitric acid and toxic organic nitrate. NO₂ plays a major role in the atmospheric reactions that produce ground-level ozone. NO₂ can irritate the lungs and it can also lower resistance to respiratory infections such as influenza. The frequent exposure to NO₂ at higher levels can cause acute respiratory illnesses in children.

Carbon monoxide (CO) is a colorless, odorless, gaseous product of incomplete combustion. CO is absorbed by the lungs; it reacts with hemoglobin to reduce the oxygen-carrying capacity of the blood. At low concentrations, CO has been shown to aggravate symptoms of cardiovascular disease. It can cause headaches and nausea, as well as comas and death if sustained at high concentration levels. CO concentrations are not related to ozone levels. CO

concentrations tend to be the highest in localized areas due to local traffic congestion, since motor vehicles are a major source of CO emissions.

Particulate matter (PM₁₀ and PM_{2.5}) is made up of small solid particles and liquid droplets. PM₁₀ refers to particulate matter with an aerodynamic diameter of 10 microns and smaller. PM_{2.5} refers to particulate matter with an aerodynamic diameter of 2.5 microns and smaller. Particulates enter the body via the respiratory system. Particulates over 10 microns in size captured in the nose and throat are readily expelled from the body. Particles that are smaller than 10 microns, especially those that are smaller than 2.5 microns, can reach the air ducts (bronchi) and the air sacs (alveoli) in the lungs. Particulates, especially PM_{2.5}, are associated with increased incidences of respiratory diseases such as asthma, bronchitis, emphysema, cardiopulmonary disease, and cancer. The majority of PM emissions from mobile sources are attributed to diesel vehicles.

Sulfur dioxide (SO₂) is a gas formed during the combustion of fuels containing sulfur compounds. It can cause irritation and inflammation of tissues that it comes into contact with. Inhalation can cause irritation of mucous membranes, resulting in bronchial damage; it can exacerbate pre-existing respiratory diseases such as asthma, bronchitis, and emphysema. Exposure to SO₂ can also cause damage to vegetation, corrosion to metallic materials, and soiling of clothing and buildings. Due to the implementation of EPA's Ultra-Low Sulfur Diesel Fuel Requirements in 2006, SO₂ is not expected to be a concern as a result of the Project.

Lead (Pb) is no longer considered to be a pollutant of concern for transportation projects. The major source of lead emissions in the atmosphere had been from motor vehicles burning gasoline with lead-containing additives. However, lead emissions have nearly been eliminated with the conversion to unleaded gasoline nationwide.

In addition to the above criteria air pollutants, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), and stationary sources (e.g., dry cleaners, factories, or refineries). The CAA identifies 187 hazardous air pollutants (HAPs) among which 93 HAPs have been identified as mobile source air toxics (MSATs), of which seven are priority MSATs. These priority MSATs are benzene, formaldehyde, naphthalene, diesel particulate matter/diesel exhaust gases, acrolein, 1, 3-butadiene, and polycyclic organic matter (POM). Currently, there are no established ambient air quality standards for MSATs and, as a result, an assessment will not be conducted.

3.2 Regulatory Setting

The EPA, under the requirements of the amended 1970 CAA (amendment of 1977 and 1990), has established primary and secondary NAAQS¹ for the six criteria pollutants discussed in

¹ The EPA develops and enforces the regulations related to air quality. In 1970, the federal Clean Air Act established the NAAQS to protect the public health. Six criteria air pollutants have been identified by the EPA as being of concern nationwide: carbon monoxide, sulfur oxides (sulfur dioxide), nitrogen oxides (nitrogen dioxide), ozone, particulate matter with a size of 10 micrometers or less, particulate matter with a size of 2.5 micrometers or less, and lead. In addition to the above criteria air pollutants, the EPA also regulates air toxics. Currently, neither the Transportation Conformity Rule nor the NEPA regulations require analysis of mobile source air toxics. As a result, an assessment of mobile source air toxics will not be conducted.

Section 3.1. Pennsylvania DEP has also adopted all of the NAAQS standards. Table 3-2.1 lists the applicable National and Pennsylvania Ambient Air Quality Standards.

Table 3-2.1: National and Pennsylvania Ambient Air Quality Standards

Pollutant	Standard Type	Averaging Period	Standard Value
Carbon Monoxide (CO)	Primary	8-Hour average	9 ppm (10 mg/m ³)
	Primary	1-Hour average	35 ppm (40 mg/m ³)
Nitrogen Dioxide (NO ₂)	Primary and Secondary	Annual arithmetic mean	53 ppb
	Primary	1-Hour average	100 ppb
Ozone (O ₃)	Primary and Secondary	8-Hour average	0.070 ppm
Sulfur Dioxide (SO ₂)	Secondary	3-Hour average	0.5 ppm (1300 µg/m ³)
	Primary	1-Hour Average	75 ppb (0.075 ppm)
Particulate Matter (PM ₁₀)	Primary and Secondary	24-Hour average	150 µg/m ³
Particulate Matter (PM _{2.5})	Primary	Annual arithmetic mean	12 µg/m ³
	Secondary	Annual arithmetic mean	15 µg/m ³
	Primary	24-Hour average	35 µg/m ³
Lead (Pb)	Primary and Secondary	3-month rolling average	0.15 µg/m ³

Source: 40 CFR 50, National Primary and Secondary Ambient Air Quality Standards.

Areas where ambient concentrations of a criteria pollutant are below the corresponding NAAQS are designated as being in "attainment". Areas where the criteria pollutant level exceeds the NAAQS are designated as being in "nonattainment." A maintenance area is one that has been re-designated from nonattainment status with an approved maintenance plan under Section 175 of the CAA. Where insufficient data exist to determine the attainment status of an area, that area is designated either unclassifiable or in attainment. Ozone nonattainment areas are categorized as *marginal*, *moderate*, *serious*, *severe*, or *extreme*. CO and PM₁₀ nonattainment areas are categorized as *moderate* or *serious*.

The proposed action would take place in Montgomery County, Pennsylvania, which is currently designated as:

- A *marginal* nonattainment area for O₃.
- A maintenance area for PM_{2.5}.
- An attainment area for all other criteria pollutants.

The Project would use electric-powered vehicles, and as such would not be a project of concern for air quality. However, because of the County's status as marginal nonattainment for O₃, TCR compliance is applicable to the Project.

The CAA, as amended in 1990, mandates that states with nonattainment areas must adopt State Implementation Plans (SIPs) that target the elimination or reduction of the severity as well as the number of violations of the NAAQS. SIPs set forth policies to expeditiously achieve and

maintain attainment of the NAAQS. SIPs also establish Motor Vehicle Emission Budgets (MVEBs) for mobile source emissions used in determining transportation conformity in the respective nonattainment areas. After a nonattainment area meets the NAAQS, the State can request from the EPA a re-designation of the county/area from nonattainment to attainment. The maintenance plan describes the actions that will be taken for a period of 10 years to ensure that the area will meet the NAAQS after the re-designation.

3.3 Transportation Conformity Rule

Section 176(c) of the Clean Air Act (CAA), as well as the transportation planning provisions of 23 USC § 135 and 49 USC § 5304, require that transportation activities that receive federal funding or approval to be consistent with (“conform to”) the air quality goals established by a state air quality implementation plan (SIP). Conformity with the SIP means that transportation activities will not cause new air quality violations, worsen existing violations or delay timely attainment of the NAAQS. The U.S. Environmental Protection Agency (EPA) adopted regulations at 40 CFR 51.390 and Part 93 (referred to as the Transportation Conformity Rule or TCR) to implement the requirements of Section 176(c) of the CAA. The TCR requirements apply to transportation plans, transportation improvement programs (TIPs), and transportation projects approved, funded or implemented by the FTA. Additionally, the TCR requirements apply in nonattainment and maintenance areas for transportation-related criteria pollutants. Transportation conformity is not required in attainment areas.

The Pennsylvania Department of Environmental Protection (DEP) is responsible for developing and updating the SIP for the metropolitan Philadelphia nonattainment or maintenance region, including Montgomery County where the Project would be located.

DVRPC, the designated MPO for the Delaware Valley, is responsible for developing a Transportation Improvement Program (TIP) that conforms to the SIP in order to address mobile source emissions within the region, which includes Montgomery County. The TIP outlines the staged development with priority projects selected for programming in the first year of the five-year program. There are two levels of transportation conformity:

- **Regional conformity:** Demonstration of regional transportation conformity is through the development of TIPs, which is the responsibility of the metropolitan planning organization (MPO). For the greater Philadelphia region/Delaware Valley (including Montgomery County), the DVRPC is the designated MPO. The current applicable transportation plan and TIP are known as the *2040 Comprehensive Regional Plan* (CRP) and the fiscal year (FY) 2017-2020 TIP, respectively. DVRPC is responsible for demonstrating that the transportation plan and TIP conform to the SIP. The proposed Project is currently included within the conforming 2040 CRP. The proposed Project is not currently included within the FY 2015-2018 TIP. However, the Project is listed in the funded portion of the DVRPC’s *Connections 2040 Long-Range Plan*, which means that it was included (as item 2035M) in the air quality conformity modeling that was performed during the PA Act 89 Transportation Funding Plan updates to the long-range plan (DVRPC, 2016 *Transportation Conformity Demonstration*). SEPTA anticipates that the alternative that SEPTA selects and adopts through the DEIS process will be included within a future revision of the TIP and a regional conformity demonstration will be completed by DVRPC at that time.

- Project-level conformity: For specific transportation projects, the conformity determination must show that the individual project is included in the TIP in order to be consistent with the SIP conformity determination (i.e., to be exempt from a regional emissions analysis and to be in compliance with the NAAQS on a local level). Potential localized emission impacts should be addressed through a hot spot analysis for localized nonattainment or maintenance pollutants (such as PM_{2.5}) to demonstrate that such emissions would be in compliance with the NAAQS.

4.0 Methodology

The methodology used to assess the air quality effects from the Action Alternatives is described in the following subsection.

4.1 Screening Assessment

The potential effects to air quality resulting from the Project were evaluated in three ways:

- Change in VMT - The likely change in transportation study area VMT for each Action Alternative compared to the No Action Alternative was determined by examining DVRPC's modeling data. For example, if the change in VMT shows a reduction between the No Action and the Action Alternatives, then it can be deduced that the overall project-level emissions also would be reduced as a result of the proposed Project.
- Change in travel delay on roadways - Delay is the additional travel time due to the presence of a traffic control device and conflicting traffic. Level of service (LOS) is a conversion of delay in seconds to a qualitative letter-grade system measuring operational performance. Six LOS levels are used ranging from A to F, with A being the best, B through D being generally acceptable, and E to F being poor. This assessment qualitatively compared LOS between the Action and No Action Alternatives. Level of service-based air quality modeling analysis of roadway intersections potentially affected by the Project will be performed after a locally preferred alternative is selected and will be presented in the FEIS.

Additionally, a PM_{2.5} and PM₁₀ impact analysis was performed based on the guideline and procedures outlined by the EPA in Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas (EPA 2015). To meet statutory requirements, the Transportation Conformity Rule (TCR) requires PM hot-spot analyses to be performed for projects of air quality concern located in PM_{2.5} or PM₁₀ nonattainment or maintenance areas. Montgomery County is in a maintenance area for PM_{2.5} and a partial maintenance area for PM₁₀. Consistent with the guideline, forecasted traffic conditions in the study area were evaluated to determine whether the Project is a project with air quality concern that requires a hot-spot analysis for PM_{2.5} and PM₁₀.

The EPA's final rule defines projects of air quality concern that require a PM_{2.5} or PM₁₀ hot-spot analysis in 40 CFR 93.123(b)(1) as:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
- Projects affecting intersections that are at Level of Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level of Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{2.5} or PM₁₀ applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

Typical sample projects of air quality concern defined by 40 CFR 93.123(b)(1)(i), (iii) and (iv) include:

- A project on a new highway or expressway which serves a significant volume of diesel truck traffic, such as facilities with greater than a 125,000 annual average daily traffic (AADT) and eight percent or more of such AADT is diesel truck traffic.
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal.
- Expansion of an existing highway or other facility which affects a congested intersection (operated at LOS D, E, or F) which has a significant increase in the number of diesel trucks.
- Similar highway projects which involve a significant increase in the number of diesel transit busses and/or diesel trucks.
- A major new bus or intermodal terminal considered to be a "regionally significant project" under 40 CFR 93.1019.
- An existing bus or intermodal terminal which has a large vehicle fleet where the number of diesel buses increases by 50% or more, as measured by bus arrivals.

Under each Action Alternative, and as described in Chapter 3, the overall traffic mix and volume around the affected intersections would remain essentially the same. The number of diesel vehicles traveling through these intersections would not change because of the Project. Moreover, the Project does not fall into any of the above-listed project categories with potential for air quality concern. Therefore, the Project is not a project of air quality concerns (POAQC) warranting a hot-spot analysis.

- Change in greenhouse gas emissions - Greenhouse gases such as carbon dioxide (CO₂) are emitted in motor vehicle exhaust and have contributed to climate change and global warming. The transportation sector is a substantial part of the climate change mitigation challenge, accounting for approximately 28% of all annual greenhouse gas emissions in the United States. FTA has responded to the need to reduce greenhouse gas emissions by creating new funding programs to purchase low-carbon emitting vehicles, conducted research on strategies to reduce transit emissions, and developed the Transit Greenhouse Gas Emissions Estimator, a tool that allows agencies to estimate the partial lifecycle greenhouse gas emissions generated from the construction, operations, and maintenance phases of projects. Use of this tool is not mandatory and is not warranted for projects that would have the overall beneficial effect of reducing emissions when considering all Project phases. The evaluation in this section uses the energy assessment described below to determine the warrant for quantifying emissions using FTA's Estimator. Energy use is one of the most common measures of a Project's impact on greenhouse gas emissions.

This evaluation examined the effect of vehicle miles traveled (VMT) each year on fuel consumption. In the document *Connecting KOP* (2015), the Economy League of Greater Philadelphia (ELGP) calculated cost savings for fuel using VMT estimates generated by the Delaware Valley Regional Planning Commission (DVRPC).

5.0 Affected Environment

The existing condition is described in the following subsections.

5.1 Existing Pollutant Concentrations

The existing air quality in the transportation study area is indicated by the current attainment status of the county where the Project is located. The Project corridor is located in Montgomery County, Pennsylvania, currently classified as:

- A nonattainment area for the ozone standard.
- A maintenance area for the PM_{2.5} standards.
- An attainment area for the standards of other criteria pollutants.

Measured ambient criteria pollutant concentrations at the closest monitoring stations are summarized in Table 5-1.1. The monitored levels in the past show no exceedances of the NAAQS for all criteria pollutants, with the exception of ozone for which the Project area was designated as a nonattainment area.

Table 5-1.1: Monitored Pollutant Concentrations (2012-2014)

Pollutant	Location	Units	Averaging Period	Concentration			NAAQS
				2012	2013	2014	
CO	1501 E. Lycoming Ave., Philadelphia	ppm	1-hour	2.7	2.4	2	35
			8-hour	1.9	1.7	1.6	9
SO ₂	State Armory - 1046 Belvoir Rd, Norristown	ppb	1-hour	8	8	5	75
			3-year average	7.0			
PM ₁₀	3000 Lewis St. (Near Bath St.), Philadelphia	µg/m ³	24-hour	67	65	63	150
			3-year average	65.0			
PM _{2.5}	State Armory - 1046 Belvoir Rd, Norristown	µg/m ³	24-hour	23	28	25	35
			3-year average	25.3			
			Annual	9.9	10.1	9	15
			3-year average	9.7			
NO ₂	1501 E. Lycoming Ave., Philadelphia	ppb	1-hour	56	52	59	100
			3-year average	55.7			
			Annual	17.91	16.29	17.45	53
			3-year average	17.2			
Ozone	1501 E. Lycoming Ave., Philadelphia	ppm	8-Hour	0.075	0.069	0.072	0.07
			3-year average	0.072			

Source: EPA Air Data, http://www.epa.gov/airdata/ad_rep_mon.html

6.0 Environmental Consequences

This section includes a discussion of the potential operational impacts of the Project, as well as an assessment of temporary construction impacts.

6.1 No Action Alternative

For the purposes of evaluating project-level potential changes in study area emissions under the Action and No Action Alternatives, the weekday daily VMT predicted for on-road vehicle traffic was used as a measuring metric. The weekday peak hour VMT under the No Action Alternative is predicted and summarized in Table 6-1.1. Compared with the Action Alternatives, forecasted VMT would be higher in the No Action Alternative, suggesting potential for higher levels of vehicular emissions. However, this potential negative effect may be mitigated by reduction in overall vehicular emissions because of federal and state implemented emissions control measures in the future.

Table 6-1.1 lists the committed roadway projects within the transportation study area, which are presumed to be implemented by 2040. Some projects, such as the addition of travel lanes on US Route 422, will increase roadway capacity. Others, such as the proposed Lafayette Street extension and new Turnpike exit in Norristown, will address specific access needs. While these projects will help address some transportation study area roadway deficiencies, congestion and travel delays will remain due to expected increase in traffic volumes. As shown in Table 6-1.1, the capacity analysis of key transportation study area intersections indicates that levels of service at these intersections will be degraded as delays increase by 2040 in the No Action Alternative. Where intersection operations are degraded, vehicular emissions could negatively affect air quality.

Table 6-1.1: 2040 Intersection LOS/Delay, No Action Alternative

Intersection		Intersection Control	AM Peak Hour		PM Peak Hour	
			LOS	Delay (sec)	LOS	Delay (sec)
1	N. Gulph Rd/1st Ave	Signalized	D	49.6	D	45.8
2	1st Ave/Moore Rd	Signalized	D	36.9	F	95.0
3	Henderson Rd/Saulin Blvd	Signalized	D	49.9	D	39.1
4	Henderson Rd/Monroe Blvd	Signalized	A	9.2	F	335.1
5	US 202/Saulin Blvd	Signalized	B	13.0	D	50.0
6	Henderson Rd/Church Rd	Signalized	E	61.6	F	95.8
7	US 202/Henderson Rd	Signalized	F	166.7	F	294.2

Source: Malick & Scherer, PC and AECOM, 2017. *KOP Tier 3 Transportation Technical Memorandum*

The No Action Alternative would not reduce regional production of greenhouse gases or their criteria pollutants as it would not provide a regional energy benefit: no reduction in automobile use, miles traveled or time spent in roadway congestion. Forecasted future traffic analysis indicates growth in congestion, likely causing greenhouse gas emissions and their criteria pollutants to increase over time in the region.

6.2 Action Alternatives

Conformity Determination - Since the Project is located in an ozone nonattainment and PM_{2.5} maintenance area, according to the TCR, the Project must originate from a conforming TIP and the Project must demonstrate its compliance of the NAAQS on a project level.

The Project is not listed in the most recent 2015-2018 TIP. However it is listed in the regional long range transportation plan (i.e., *2040 Comprehensive Regional Plan*). Therefore, after a preferred alternative is selected, the preferred alternative would need to be included in the future TIP designed to ensure the implementation of the goals and objectives identified in the long range transportation plan on a regional level.

According to EPA PM guidance, the Project is not of air quality concern for PM_{2.5}. As such, the Project is not expected to cause or contribute to violations of the PM_{2.5} NAAQS. Therefore, each Action Alternative complies with the conformity requirements on both regional and local levels for ozone and PM_{2.5}.

Change in VMT - For purposes of providing an alternative comparison of the potential for emissions to change as a result of the Project, regional VMT was selected as an indicator of potential change in mesoscale emissions under each Action Alternative. The weekday peak hour VMT under the Action Alternatives is predicted and summarized in Table 6-2.1. Each Action Alternative would reduce the amount of time transit riders and automobile drivers spend traveling. The amounts of VMT reduction by 2040 were calculated for the weekday peak hour using DVRPC modeling data. As shown in Table 6.2-1, each Action Alternative would result in a net reduction of on-road peak hour VMT and automobile emissions compared to the No Action Alternative. The reduction would be due to travelers changing mode from automobile to Project service. Due to the peak hour VMT reduction, each Action Alternative would have a positive air quality benefit.

Table 6-2.1: Peak Hour Vehicle Miles Traveled, No Action and Action Alternatives

Proposed Alternative	Weekday Peak Hour VMT			
	No Action Alternative 2040	Proposed Alternative 2040	Change in VMT	Percentage Change
PECO-1 st Ave.	1,575,560	1,568,409	-7,150	-0.45%
PECO/TP-1 st Ave.		1,569,076	-6,484	-0.41%
PECO/TP-N. Gulph		1,568,262	-7,298	-0.46%
US 202-1 st Ave.		1,568,394	-7,166	-0.45%
US 202-N. Gulph		1,567,614	-7,945	-0.50%

Source: VMT data from DVRPC, 2015, Tier 3 model runs.

Change in roadway levels of service (LOS) – SEPTA minimized the potential for each Action Alternative to affect roadway LOS and air quality by elevating the rail guideway over study area

roadways. However, each Action Alternative would have station areas and park-and-ride facilities that would attract traffic, including buses and motor vehicles dropping off and picking up Project riders as well as riders parking vehicles at the park-and-ride facilities. To accommodate the new traffic, and as reported in the *KOP Rail Tier 3 – Transportation Technical Memorandum* (February 2017), SEPTA developed and evaluated conceptual designs for traffic circulation in the vicinity of station areas and park-and-ride facilities. In its assessment, SEPTA determined that Project-related traffic in the vicinity of proposed park-and-ride facilities would warrant specific improvements to key intersections (Table 6-2.2), involving specific signal timing and geometrical improvements. In these cases, vehicular emissions would not increase and no worsening of air quality conditions would occur because of the Project.

Table 6-2.2: 2040 Intersection LOS/Delay, Action Alternatives

Location		AM	PM	Action Alternative				
Int.	St.	AM LOS/Delay	PM LOS/Delay	PECO-1 st Ave.	PECO/TP-1 st Ave.	PECO/TP-N. Gulph	US 202-1 st Ave.	US 202-N. Gulph
1	1st/N. Gulph	B/18.1	D/50.6	✓	✓	✓	✓	✓
2	1st/Moore	C/26.4	C/28.5	✓	✓	✓	✓	✓
3	Henderson/Saulin	D/36.5	D/51.4	✓	✓	✓	NA	NA
4	Henderson/Monroe	B/11.1	F/90.7	✓	✓	✓	NA	NA
5	US 202/Saulin	B/14.7	E/70.5	✓	✓	✓	✓	✓
6	Henderson/Church	E/60.4	F/92.8	✓	✓	✓	NA	NA
7	US 202/Henderson	F/155.0	F/257.6	✓	✓	✓	✓	✓

Source: Malick & Scherer, PC and AECOM, 2017. *KOP Tier 3 – Transportation Technical Memorandum*

Where poor intersection LOS remains, congestion and travel delays would be experienced. A comparison of effects among the alternatives indicates that the PECO and PECO/TP Action Alternatives would affect the same intersections to a similar extent. In contrast, the US 202 Action Alternatives would affect fewer intersections because a park-and-ride facility is not proposed in the eastern portion of the transportation study area. These findings indicate the potential for an air quality effect at the impacted intersections if vehicular emissions increase.

Change in greenhouse gas emissions - Each Action Alternative would provide a benefit by reducing energy use in the region by 14.6 to 18.4 million miles traveled annually as reported by ELGP in *Connecting KOP*. Each Action Alternative would reduce annual bus VMT by 57,000 to 128,000 miles; the recommended LPA would reduce bus VMT by 86,000 miles per year. The proposed transit vehicles in each Action Alternative would be electrically-powered as is the case with the existing NHSL. An increase in the number of transit vehicles and increase in the miles of the transit service as a result of any Action Alternative would increase the electrical demand compared to the existing NHSL demand. However, the energy saved by reducing VMT would be much greater on a per rider basis than the increased electrical use. Reduced automobile

use, fewer miles traveled and less time spent in roadway congestion are key factors in this finding. This energy benefit correlates to a reduction in emissions of greenhouse gases.

Each Action Alternative would have the overall beneficial effect of reducing greenhouse gas emissions after considering the combined potential impacts of construction, operation and maintenance phases of the Project. Despite the potential for a temporary increase in localized emissions during construction as described in Section 6.3 below, the reduction in operating emissions in the region due to the Project would result in a net benefit. As a result, calculating Project emissions using FTA's Transit Greenhouse Gas Emissions Estimator is not warranted.

6.3 Construction-Related Impacts

Project activities during construction would include demolishing existing structures within the permanent and temporary Project rights-of-way, earth-moving (on-site as well as hauling to and from the work area), and installing the elements of the Project. These activities would occur within the LOD and, in the case of haul routes, along the roadways to be designated as such. Each Action Alternative has the potential to cause short-term impacts to air quality from these activities in the areas where the activities occur. Potential air quality impacts from construction of each Action Alternative would be temporary and could include the following impacts:

- Localized increases in emissions concentrations from construction equipment, particularly diesel-powered equipment. Effects could occur in the areas of work activities, access points, and haul routes.
- Increases in motor vehicle emissions associated with potential disruption of traffic operations during construction. Effects could occur if temporary lane closures and detours cause congestion and travel delays.

Localized dust and airborne particulate matter generated by temporarily exposed soils, earth-moving activities, and equipment operating in unpaved areas. Effects could occur in the area of work activities and access points.

7.0 Minimization and Mitigation

The potential air quality control measures recommended to minimize or mitigate the predicted future impacts are described in the following subsections.

7.1 Long-Term Operational

Level of service-based air quality modeling analysis of roadway intersections potentially affected by the Project will be performed after a locally preferred alternative is selected and will be presented in the FEIS.

7.2 Short-Term Construction

SEPTA's construction plan, described in Section 2.8, would include an air quality management component. Strategies SEPTA would consider including in the plan are: minimizing construction equipment emissions by proper engine maintenance and code enforcement; dust control measures, such as application of water and calcium chloride to haul roads; providing and using truck wheel wash stands where vehicles enter public/paved streets; minimizing exposure of erosion prone areas; stabilizing exposed soils with grass, geotextile fabric, ground cover, or other finished surface in connection with construction activities; and covering or shielding stockpiled materials from the wind. Air quality control measures and BMPs for the Project would be confirmed during later stages of design when the details of project construction activities have been developed and finalized as part of construction bid contracts.

APPENDIX A

Acronyms

Acronyms

AA	Alternatives Analysis
ASTM	American Society of Testing and Materials
BEA	Bureau of Economic Analysis
BID	Business Improvement District
BLS	Bureau of Labor Statistics
BLVD	Boulevard
CBD	Central Business District
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHOP	Children's Specialized Hospital
CN	Canadian National Railway
CSX	CSX Railroad
DEIS	Draft Environmental Impact Statement
dB	decibels, linear or unweighted
dBA	A-weighted decibels
DVRPC	Delaware Valley Regional Planning Commission
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESRI	Ecological Systems Research Institute
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Administration
GIS	Geographic Information Systems
ips	inches per second
KOP	King of Prussia
Ldn	Average Day-Night Noise Level
Leq	Average Hourly Equivalent Noise Level
Lmax	Maximum Noise Levels
LEP	Limited English Proficient
LPST	Leaking Petroleum Storage Tanks
LWCF	Land and Water Conservation Fund
MBTA	Migratory Bird Treaty Act
MCMC	Michigan City Municipal Coach
MED	Metra Electric District
μips	micro inch per second
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standards

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHSL	Norristown High Speed Line
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NS	Norfolk Southern Railroad
NTD	National Transit Database
NTHP	National Trust for Historic Preservation
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O&M	Operating and Maintenance
OCS	Overhead Contact System
PADEP	Pennsylvania Department of Environmental Protection
PHMC	Pennsylvania Historical and Museum Commission
PST	Petroleum Storage Tanks
PPV	Peak Particle Velocity
RMS	Root Mean Squared
ROW	Right-of-way
SCC	Standard Cost Categories
SEL	Sound Exposure Level
SEPTA	Southeastern Pennsylvania Transportation Authority
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
TOD	Transit Oriented Development
TP	Pennsylvania Turnpike
USACE	United States Army Corps of Engineers
U.S.C	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Services
USGS	United States Geological Survey
VFNHP	Valley Forge National Historical Park
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled