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TRANSPORTATION PLANNING COMMITTEE MEETING
Thursday, March 28, 2024, at 5:30 pm
AGENDA

THE MEETING CAN BE ACCESSED AT https://tinyurl.com/LVPC2024 OR VIA PHONE 610-477-5793 Conf ID: 928 251 831#.

Roll Call

Courtesy of the Floor

Old Business:

1. *INFORMATION ITEM:* Priority Climate Action Plan (BB)
   - www.tinyurl.com/2024LVPCAP
2. *INFORMATION ITEM:* Priority Climate Action Plan Implementation Grant (BB)
3. *INFORMATION ITEM:* Lehigh Valley Passenger Rail Analysis (BB)
4. *INFORMATION ITEM:* Monthly Status Reports:
   - PennDOT District 5-0 Bridge Project Status Report (BD)
   - Traffic Monitoring Report (BH)
   - Eastern Pennsylvania Freight Alliance Freight Infrastructure Plan (BD)

New Business:

None

Adjournment

Next Transportation Committee Meeting:
April 25th, 2024, at 5:30 pm

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

LEHIGH VALLEY

PRIORITY CLIMATE ACTION PLAN

Transportation Decarbonization

February 2024

Disclaimer: This project has been funded wholly or in part by the United States Environmental Protection Agency (EPA) under assistance agreement 95318301 to the Lehigh Valley Planning Commission. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend use of commercial products mentioned in this document.

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Lehigh Valley Transportation Study

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Thank you to the outgoing 2023 Lehigh Valley Planning Commissioners: Geoff Brace, Kathy Rader, Joyce Moore, Jamie Johnson, Dan Engle, William McGee, Taiba Sultana and Tara Zrinski. The Region is grateful for your service.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

TABLE OF CONTENTS

PRIORITY CLIMATE ACTION PLAN FOR TRANSPORTATION DECARBONIZATION

More detailed information about the LIDAC census tracts are found separately, on our website: www.lvpc.org.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Executive Summary

Climate change is often referred to on a global level because it is a threat to the health of our planet, but it also poses a significant threat to our region, which is evident every day. The region is experiencing more extreme weather events, and with two major rivers and an extensive stream network, it is now even more vulnerable to flooding. At the same time, the beauty and high quality of life here makes it attractive to more people and businesses, making it one of Pennsylvania's fastest growing regions. The dilemma is more people and businesses typically result in more carbon emissions.

This Priority Climate Action Plan (PCAP) is focused on a specific sector of regional importance and has been prepared by the Lehigh Valley Planning Commission (LVPC) in accordance with the US Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant (CPRG) program guidance. It includes a list of near-term, high priority strategies to mitigate the impacts of climate change, even as we grow, by reducing greenhouse gas (GHG) emissions from one of the Allentown-Bethlehem-Easton Metropolitan Statistical Area (MSA) top sources — the transportation sector. The MSA includes Lehigh, Northampton and Carbon counties in Pennsylvania and Warren County in New Jersey. Lehigh and Northampton counties are the geographic focus of the Lehigh Valley Planning Commission (LVPC) and the Lehigh Valley Transportation Study (LVTS), which is the designated regional Metropolitan Planning Organization (MPO) specifically for the Lehigh Valley.

The transportation sector was selected as the focus for this PCAP, as it was determined to be one of the largest sources of GHG emissions in the region. It is also the area where we can have the greatest impact because it gives us access to billions of dollars of state and federal decarbonization funding streams, many of them created through the Infrastructure Investment and Jobs Act and the Inflation Reduction Act.

The PCAP includes several required elements including a comprehensive GHG inventory, specific GHG reduction goals,or measures, and associated projections of GHG emission reductions, a low-income and disadvantaged communities benefit analysis and a review of the authority to implement the proposed goals.

"The transportation sector was selected as the focus for this PCAP, as it was determined to be one of the largest sources of GHG emissions in the region."

At the heart of this PCAP are its proposed GHG reduction goals. Organized under a series of themes, the goals, include:

Theme 1

Integration of Land Use Planning and Transportation

- Implement *Walk/RollLV: Active Transportation Plan*.
- Increase transit ridership.

Theme 2

Transition to Clean (Low-Carbon) or Zero-Emissions Fuels

- Supporting deployment of alternative fuel vehicles (AFVs) of all types.
- Increase alternative fueling infrastructure and stations.

Theme 3

Green Infrastructure

- Reimagine and retrofit major transportation corridors with green infrastructure.

Theme 4

Transportation Systems Management and Operations

- Plan and implement Intelligent Transportation Systems (ITS) technologies.

Potential GHG emission reductions resulting from the goals outlined in this plan are estimated at 321,000 metric tons of CO_2e annually by 2050, a reduction from 2021 transportation sector emissions by nearly 12%. These goals, coupled with improvements in clean fuel technologies and other climate sector emission reduction goals will benefit our communities, our environment and our economy. Considering that the Lehigh Valley's population is projected to grow by 14.4%, job growth by 19% and Vehicle Miles Traveled (VMT) by 23% during this time, the actual reduction in emissions is much more significant as this occurs even with continued regional population and job growth. Each of the six goals are equally important, due to their community, economic and social benefits beyond the emissions reductions.

These goals were selected for their direct impact on reducing emissions and their additional benefits to the communities. Analyzing these benefits can reveal broader improvements in areas such as air quality, public health and economic growth, making the case for decarbonization even stronger.

An essential aspect of this PCAP is the low-income and disadvantaged communities (LIDAC) benefits analysis. This analysis is reflected in each of the individual GHG goals and more broadly in the context of transportation emissions reductions across the region. The LVPC Equity Analysis has been included and referenced in this document along with Justice40 goals. Equitable access to clean transportation and the benefits of improved air quality are key considerations.

The PCAP also includes a review of the authority to implement each goal, ensuring legal and administrative feasibility.

With the completion of the PCAP, the LVPC will then develop a Comprehensive Climate Action Plan (CCAP), which covers all major emission sectors within the region. Following adoption of the CCAP, the LVPC will monitor progress on the plan goals, which is the third phase of the EPA CPRG program.

The commitment to transportation decarbonization, through this PCAP, reflects a forward-thinking approach to climate action, balancing environmental imperatives with social equity and economic viability.

Potential GHG emission reductions resulting from the goals outlined in this plan are estimated at 321,000 metric tons of CO2e annually by 2050, a reduction from 2021 transportation sector emissions by nearly 12%.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Introduction

Climate Pollution Reduction Grant Overview

The 2022 Inflation Reduction Act authorized the United States Environmental Protection Agency (EPA) to allocate funding to states, local governments, tribes and territories under the Climate Pollution Reduction Grant (CPRG) program to develop and implement climate action plans to reduce greenhouse gas emissions and other harmful air pollutants. Many of the largest metropolitan areas in the US received funding from the CPRG program, including the Allentown-Bethlehem-Easton Metropolitan Statistical Area, for which the Lehigh Valley Planning Commission (LVPC) is the lead organization and official planning commission of Lehigh and Northampton counties. This planning grant provides $1 million over a four-year period for the LVPC to use for climate action planning.

The CPRG program consists of three phases: Priority Climate Action Plan (PCAP), Comprehensive Climate Action Plan (CCAP) and Plan Progress and Monitoring. This plan is the deliverable for the PCAP, which is focused on an emissions sector of highest priority. With the completion of the PCAP, the LVPC will then develop a Comprehensive Climate Action Plan, which covers all major emission sectors within the region. Following adoption of the CCAP, the LVPC will monitor progress on the plan strategies, which is the third phase of the program. In addition to the planning grant funds allocated to the metropolitan areas, the CPRG program also offers approximately $4.6 billion in competitive implementation grants. Completion of the PCAP opens access to apply for this larger pool of funding.

With the completion of the PCAP, the LVPC will then develop a Comprehensive Climate Action Plan, which covers all major emission sectors within the region.

Priority Climate Action Plan Overview

A Priority Climate Action Plan (PCAP) is a strategic and comprehensive approach designed to address climate change effectively within a specific community, organization or region.

The LVPC, recognizing the critical role of transportation in regional greenhouse gas emissions, has identified transportation decarbonization as the focus of its Priority Climate Action Plan. This strategic approach is designed to effectively address climate change, focusing on reducing emissions from one of the most significant emission sources: the transportation sector.

Central to the PCAP is a comprehensive greenhouse gas (GHG) inventory, which provides a detailed baseline of current emissions, with a particular emphasis on transportation sources, such as vehicles, public transit and freight. This inventory is crucial as it sets the stage for targeted interventions. GHG emission projections are also valuable, offering insights into potential future emission trends and the impacts of various decarbonization strategies.

At the heart of the PCAP are GHG reduction goals. These include strategies such as promoting the use of alternative fuel vehicles and enhancing cycling and pedestrian infrastructure. These goals are selected not only for their direct impact on reducing emissions but also for their additional benefits. Analyzing these benefits can reveal broader improvements in areas such as air quality, public health and economic growth, making the case for decarbonization even stronger.

An essential aspect of the PCAP is the low-income and disadvantaged communities (LIDAC) benefits analysis. This analysis ensures that low-income and disadvantaged communities are not only protected from potential negative impacts of climate policies but also benefit from the policies. Equitable access to clean transportation and the benefits of improved air quality are key considerations.

The PCAP includes a review of the authority to implement each goal, ensuring legal and administrative feasibility. In addition, exploring the availability of other funding sources can provide a more robust and sustainable approach to implementing the plan. Finally, the region's next steps will include the development of a Comprehensive Climate Action Plan (CCAP) and a monitoring process to measure the success of the CCAP.

“This analysis ensures that low-income and disadvantaged communities are not only protected from potential negative impacts of climate policies but also benefit from the policies.”

Scope of the Priority Climate Action Plan

This PCAP is focused specifically on the transportation sector of the defined Allentown-Bethlehem-Easton Metropolitan Statistical Area (MSA). The MSA includes Lehigh, Northampton and Carbon counties in Pennsylvania and Warren County in New Jersey. Lehigh and Northampton counties are the geographic focus of the LVPC and the Lehigh Valley Transportation Study (LVTS), which is the designated regional Metropolitan Planning Organization (MPO) specifically for the Lehigh Valley. Carbon County is part of the Northeastern Pennsylvania Alliance (NEPA) MPO, while Warren County is part of the North Jersey Transportation Planning Authority (NJTPA). For this PCAP, the term "Lehigh Valley" refers to Lehigh and Northampton counties, while the term "region" refers to the broader MSA (including Carbon and Warren counties).

The focus of the PCAP on the transportation sector was determined through an evaluation of multiple factors. One is that transportation is a major source of greenhouse gas emissions in the Lehigh Valley. Two interstate highways, I-78 and I-476, run through the Lehigh Valley, along with other heavily traveled highways, such as Route 22, Route 33, Route 309, Route 378 and other appropriate major corridors, which account for a significant portion of the region's vehicle travel and emissions. The LVPC's comprehensive *Lehigh Valley Greenhouse Gas Assessment*, completed in 2022, found the transportation sector to be the second largest greenhouse gas source, as it was responsible for approximately 26% of all greenhouse gas emissions in the Lehigh Valley in 2019.

In addition, the Lehigh Valley is experiencing a period of great growth in both population and employment. From 2010 to 2020, the Lehigh Valley's population increased from 647,949 to 687,508, and by 2050, it is projected to increase by nearly 100,000 to 786,751, which is roughly equivalent to adding an additional City of Bethlehem and City of Easton to the Lehigh Valley. Employment opportunities are contributing to this rise, as job growth is forecast to increase by 19.1% by 2050. A large portion of this job growth is in the transportation and warehousing industries. From 2016 through 2023, more than 30 million square feet of warehouse and distribution space was approved in the Lehigh Valley. The movement of goods and the associated employment opportunities in these industries are factors in the rise in vehicle miles traveled (VMT) and current level of transportation greenhouse gas emissions in the Lehigh Valley. Overall, increases in population and economic activity generate more vehicle traffic. Vehicle miles traveled in the Lehigh Valley increased from 13,772,215 miles per day to 14,823,542 miles per day in 2019. In 2020, daily VMT dipped because of the COVID-19 pandemic, but it is now back to pre-pandemic levels and is forecast to increase by 23.2% by 2050. This increasing transportation demand necessitates proactive planning to ensure a sustainable future for the Lehigh Valley transportation network.

Carbon County is situated in northeastern Pennsylvania and encompasses a mix of rural and urbanized areas that offer its residents a combination of natural surroundings and access to amenities. Based on 2020 US Census data, Carbon County has a population of 64,749 people. Overall, Carbon County has experienced slow, stable population growth between 2010 and 2020, and this trend is likely to continue. Two interstate highways, I-80 and I-476, run through Carbon County along with US 209 and Route 248. The presence of I-80 in Carbon County supports freight transportation as it connects major areas to the Port of New York and New Jersey, which can increase freight movement and emissions in the county. And as a gateway to the Pocono Mountains, the county experiences significant tourism, resulting in increased travel and transportation emissions.

Warren County is primarily a rural county in New Jersey with several low- and mid-density towns and boroughs. According to the *Warren County Transportation Master Plan* (2021), demographic projections developed for their Strategic Growth Plan (2004) anticipated the county's historic population growth rate of approximately 1% per year would continue through the year 2030. Land use and traffic forecasts based on this growth rate indicated there would be significant development, population and employment growth, resulting in increased

traffic congestion and mobility. Instead, Warren County experienced an unexpected slowing of their population growth in the mid-2000s, which was then followed by a decline in population, a trend which continued through 2020. The resulting growth rate from 2000-2020 was 0.22% per year. In contrast, employment growth in Warren County increased due to the high demand for freight and the presence of Interstates 78 and 80, which provide regional linkages for freight in the county. Overall, the increase in demand for freight and employment growth can cause an increase in congestion and transportation emissions in Warren County.

Targeting transportation as the priority focus area enables a wider variety of decarbonization funding opportunities. The PCAP creates avenues to receive funding from not only the CPRG program but also Carbon Reduction Plan (CRP) funds, Congestion Mitigation and Air Quality (CMAQ) funds, Transportation Alternatives Set-Aside (TASA) funds, Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation (PROTECT) formula funds, and other federal and state transportation funding sources. Considering the current investments, it becomes apparent how important this time is for climate and transportation planning. The region has an opportunity to plan for and implement impactful strategies utilizing this Priority Climate Action Plan.

Climate change also poses specific challenges to transportation that may continue to worsen. Flooding events are anticipated to occur more frequently, which are hazardous to bridges, pavement and other elements of transportation infrastructure. Another threat is increasing temperature, which puts greater stress on road surfaces. According to the Federal Highway Administration (FHWA), more frequent freeze-thaw cycles weaken pavement, and extreme heat can cause substantial structural damage to roadways. Climate-related hazards can disrupt the region's transportation network by causing unsafe travel conditions and delays, transit service interruptions, costly infrastructure repairs and economic losses.

Climate action planning will not just reduce the negative effects from climate-related hazards but also provides many benefits to the region. Electric and alternative fuel vehicle adoption will not only reduce greenhouse gas emissions but reduce associated air pollutants, such as particulate matter, ozone and sulfur dioxide, resulting in cleaner and healthier air for all. Improving active transportation and transit accessibility will reduce private vehicle emissions, making it easier for people of all income levels and physical abilities to move around and live in their communities. Installing green infrastructure along road rights-of-way will sequester carbon, purify the air, reduce stormwater runoff volume and velocity, provide pollinator habitats, mitigate heat island effects and beautify the built environment. These are just a few examples of the many possible benefits to the region through the actions proposed in this plan.

Due to the increased usage of the region's transportation network, the growing threat of climate change to the communities, environment and infrastructure, the unprecedented funding opportunities for transportation decarbonization and the host of potential benefits possible to the region, it is clear that transportation decarbonization should be the focus for this PCAP.

> **This analysis ensures that low-income and disadvantaged communities are not only protected from potential negative impacts of climate policies but also benefit from the policies.**

Approach to Developing the Priority Climate Action Plan

The LVPC has a long history of planning for and promoting the protection of the natural environment. The LVPC's sister organization, the Lehigh Valley Transportation Study (LVTS), for decades has focused on reducing transportation-related emissions, protecting endangered species, floodplains and other environmental assets, as a means for improving safety. Lehigh and Northampton counties, along with the LVPC and LVTS, took a leadership role in preparing for climate change in 2014 to develop the *Climate + Energy Element*. The *Climate + Energy Element* provides an overview of climate change and energy use and reports on the potential impacts on Pennsylvania's water resources, aquatic ecosystems, forests, agriculture, human health and economy. The policies and actions in the *Climate + Energy Element* became the climate change foundation for *FutureLV: The Regional Plan*, Lehigh and Northampton counties' *Livable Landscapes Plans* and *Walk/Roll LV: Active Transportation Plan*.

Through these plans, the LVPC supports and reinforces the importance of environmental and climate resiliency throughout Lehigh and Northampton counties. Climate action is a continuous thread through the foundational plans of the LVPC, LVTS, and Lehigh and Northampton counties. The LVPC's approach to developing this PCAP builds from these foundational plans, which contain over 520 climate action policies.

Plans of Significance Referred To In The PCAP

2014

Climate + Energy Element

The LVPC's *Climate + Energy Element* provides an overview of climate change and energy use and reports on the potential impacts on Pennsylvania's water resources, aquatic ecosystems, forests, agriculture, human health and economy.

2016

Livable Landscapes: An Open Space Plan for Northampton County

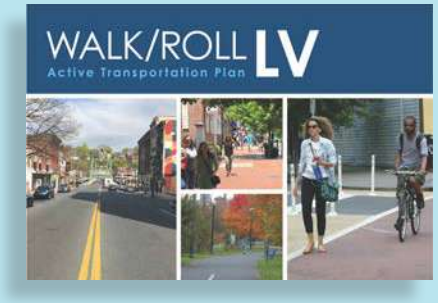
Livable Landscapes: An Open Space Plan for Northampton County was developed as a guide for the conservation, restoration and enhancement of Northampton County's open space resources. The plan contains a framework that broadly builds climate action throughout its many goals, policies and actions.

2018

Livable Landscapes: A Park, Recreation, Open Space, Agricultural and Historic Lands Plan for Lehigh County

Livable Landscapes: A Park, Recreation, Open Space, Agricultural and Historic Lands Plan for Lehigh County was created to guide the conservation, restoration and enhancement of Lehigh County's open space and cultural resources and to create linkages between these resources.

2020



Walk/Roll LV: Active Transportation Plan

Walk/Roll LV: Active Transportation Plan works in partnership within the broader structure of the Long-Range Transportation Plan in coordinating public transit, trail, sidewalk, bikeway and roadway systems to create a seamless regional transportation network that is safe and convenient.

2023

FutureLV: The Regional Plan

FutureLV: The Regional Plan combines the state-mandated regional comprehensive plan with the federally mandated Long-Range Transportation Plan (LRTP), setting the vision and direction to carry the Lehigh Valley to 2050. This plan provides a blueprint for managing future growth, making the most of the region's assets, and promoting a region where everyone has access to health, opportunity and a livable neighborhood. It also represents the investment strategy for the region's transportation infrastructure to meet current and future needs, manage transportation-related emissions, improve transportation infrastructure resiliency and create options for non-automobile trips.

Local Climate Plans + Programs

The Pennsylvania Department of Environmental Protection's Local Climate Action Program (LCAP) provides technical assistance to local governments that wish to reduce greenhouse gas emissions and address climate change. Assistance is provided for the preparation of greenhouse gas inventories and local climate action plans.

Within the Lehigh Valley, several municipalities have entered the program, including the cities of Allentown and Easton and the townships of Lower Macungie and Palmer. Easton completed a greenhouse gas inventory and prepared a municipal climate action plan in 2021. Allentown and Lower Macungie have completed greenhouse gas inventories, with the next step to prepare climate action plans. Palmer Township recently entered the program. In addition to the municipalities involved in the LCAP, the City of Bethlehem completed its own greenhouse gas inventory and climate action plan in 2021. Colleges and universities in the Lehigh Valley have also entered the program, providing college students the opportunity to collaborate with local governments to develop a greenhouse gas inventory and climate action plan. These colleges and universities included Muhlenberg College, which entered the program in 2020 and Moravian University, which entered the program in 2021. Municipal climate action planning efforts build upon and complement this Priority Climate Action Plan through specific mitigation and resiliency strategies and implementation plans for their communities.

State Climate Plans + Programs

Development of this Priority Climate Action Plan aligns with and incorporates related plans from state agencies. The Pennsylvania Department of Transportation's (PennDOT) Carbon Reduction Strategy aims to provide funding for projects that reduce transportation emissions, along with project identification, policy guidance and funding information. Development of the strategy was done in coordination with Pennsylvania MPO's, including the Lehigh Valley Transportation Study and Northeastern Pennsylvania Alliance.

The 2021 *Pennsylvania Climate Action Plan* serves as a guide for policy development, priority setting and actions to be taken to meet Pennsylvania's greenhouse gas reduction goals and adapt to climate change. This plan covers all emissions sectors, including transportation. Four transportation-specific greenhouse gas reduction strategies are stated in the plan:

- Increase fuel efficiency of all light-duty vehicles and reduce vehicle miles traveled for single-occupancy vehicles.
- Implement the multi-state medium- and heavy-duty zero-emission vehicle memorandum of understanding, of which the Commonwealth is a signatory.
- Increase adoption of light-duty electric vehicles (EV).
- Implement a low-carbon fuels standard.

Increasing vehicle efficiency, reducing vehicle miles traveled and EV adoption are all important aspects of this PCAP, which is fortified by regional and state coordination.

According to the *Pennsylvania Climate Impacts Assessment 2021*, climate change poses a growing threat to nearly every aspect of life in the Commonwealth, and the impacts are expected to increase in severity unless actions are taken. While global average temperature is expected to rise at least 1.5°C (2.7°F) in the coming two decades, warming in Pennsylvania and the Lehigh Valley is expected to increase by 5.9°F by 2050, according to the Pennsylvania Assessment. These changes in our climate will have widespread impacts across the Lehigh Valley and the region.

To quantify the Commonwealth's greenhouse gas emissions in 2019, the Pennsylvania Department of Environmental Protection (PA DEP) created the 2022 *Pennsylvania Greenhouse Gas Inventory Report*. In the report, emission sources were split into sectors. These sectors, from largest to smallest, are industrial, electricity production, transportation, residential, commercial, agriculture and waste management. From the report, the Lehigh Valley accounted for 3.7% of Pennsylvania's greenhouse gas (GHG) emissions. This comparison with state-level data provides a perspective on the region's relative contribution to statewide environmental impacts.

The PA DEP report, along with the greenhouse gas inventory update for the Lehigh Valley described in Section 2 of this PCAP, provides a clear understanding of greenhouse gas emission sources so that planning efforts can be coordinated to improve local environmental conditions.

Public Engagement

The LVPC established public working groups in 2018 after an extensive Equity and Access to Opportunity Analysis, supporting the update of *FutureLV: The Regional Plan*. The resulting WorkshopLV groups are subject area, open task forces on a variety of issues from the environment to freight and housing to multimodal transportation. Any person participating becomes a decision-maker, resulting in an inclusionary process. As a result, WorkshopLV meetings and outreach provided better access to equity and environmental justice communities in the Lehigh Valley.

Throughout the development of this Priority Climate Action Plan, LVPC staff have utilized the WorkshopLV format to receive input and feedback from residents and stakeholders of the Lehigh Valley to gauge the priorities of the region in terms of reducing transportation emissions. These workshops have provided a forum to share PCAP information and receive input and ideas directly from participants. Invitations to the workshops were sent to municipal officials, municipal environmental advisory councils, LVPC and LVTS members, active transportation advocacy groups, Greater Lehigh Valley Chamber of Commerce, non-profit groups, church groups, colleges/universities, commercial and industrial real estate interests, freight industry groups, freight operators, water and sewer authorities, manufacturers and citizens, among many others. The workshops were also promoted on the LVPC website, as well as on our social media platforms.

Three virtual sessions of the LVPC's first workshop were held in September 2023, where participants were introduced to the CPRG program and the PCAP and provided opportunities for input on the PCAP direction. During the virtual presentations, attendees participated in an online poll exercise to indicate their priority policy areas. To create more meaningful participant engagement, an in-person workshop was conducted in October 2023. This workshop provided additional background on the CPRG program as well as existing LVPC plans and initiatives that support this work. An interactive activity was conducted where participants were asked to indicate the existing LVPC transportation goals and policies that were important to them now and those that would be important in the future. This activity helped build a deeper understanding of priorities and fostered a lengthy, constructive dialogue for the rest of the meeting. In November 2023, the LVPC hosted another workshop in collaboration with members of the Lehigh and Northampton Transportation Authority (LANTA), who presented their Enhanced Bus Service Study and their planned Bus Rapid Transit progression, demonstrating the important role transit has in decarbonizing the Lehigh Valley's transportation sector. This again created a constructive, engaging conversation with participants.

The LVPC hosted its third in-person WorkshopLV in December 2023 to review PCAP policies and strategies and receive additional input. In January 2024, the LVPC hosted an in-person WorkshopLV meeting to present a draft of the emission reduction goals required for this plan and to receive additional feedback from workshop participants on their thoughts or suggestions for these goals. An additional workshop was held in February 2024 to share the final PCAP document with participants.

Throughout the public engagement process, the LVPC received impactful feedback from workshop participants who provided ideas to help in the selection of climate reduction goals included in this PCAP. Some issues and concerns raised by workshop participants included:

- Creating greater bicycle network connectivity, infrastructure and parking.
- Widening and shading sidewalks.
- Enhancing multimodal access to green spaces.
- Planning for future forces such as e-bikes and alternative fueled vehicles.
- Connecting corridors and population centers with transit and active transportation.
- Providing accessibility to electric vehicles for low-income and disadvantaged communities.
- Developing strategies to increase transit ridership.

WorkshopLV attendees and interactive activity results can be found in Appendix A.

In addition to the WorkshopLV outreach described above, virtual public meetings of the LVPC and LVTS committees were held monthly beginning in September 2023 that included presentations on the CPRG program and PCAP as well as draft policies and strategies.

The LVPC also organizes and manages the biannual meetings of the Lehigh Valley General Assembly, which includes all 62 local governments, 17 school districts, Lehigh and Northampton counties, state and federal elected representatives and senators and is designed to coordinate and collaborate across political boundaries. An overview of the CPRG program and PCAP were presented at the General Assembly virtual meeting held in November 2023, which was also open to the public.

All work of the CPRG effort will be housed online as part of the LVPC website and include a comprehensive data repository, with online mapping and monitoring components.

163 People
from across the Lehigh Valley attended the workshops

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Priority Climate Action Plan Elements

Lehigh Valley Greenhouse Gas Inventory

The LVPC prepared the *Lehigh Valley Greenhouse Gas Assessment* in 2022. The assessment's geographic focus was on the Lehigh Valley, accounting for all major sources of greenhouse gas (GHG) emissions. The inventory, which utilized 2019 as its baseline year, includes emissions generated within the boundaries of Lehigh and Northampton counties and those resulting from electricity used within this area, regardless of where the electricity is generated.

This comprehensive inventory described emissions data across the following key sectors, each contributing significantly to the overall environmental footprint of the Lehigh Valley:

Industrial Electricity and Natural Gas

GHG emissions from a wide range of industrial activities and their energy usage patterns.

Commercial Energy

GHG emissions arising from energy utilized in commercial buildings and services. This involves understanding the energy demands of the commercial sector, including offices, retail spaces and other service-oriented establishments.

Transportation and Mobile Sources

GHG emissions from various forms of transportation, including cars, trucks, public transit and other mobile sources.

Solid Waste

The management of solid waste and its associated emissions, particularly landfill gas emissions.

Residential Energy

GHG emissions derived from household energy use, including residential energy consumption patterns, providing insights into possible areas for emission reduction in domestic settings.

Water and Wastewater

GHG emissions related to water treatment processes and wastewater management. This includes emissions from water treatment plants and the processing of wastewater, both of which are essential components of the Lehigh Valley's infrastructure emissions.

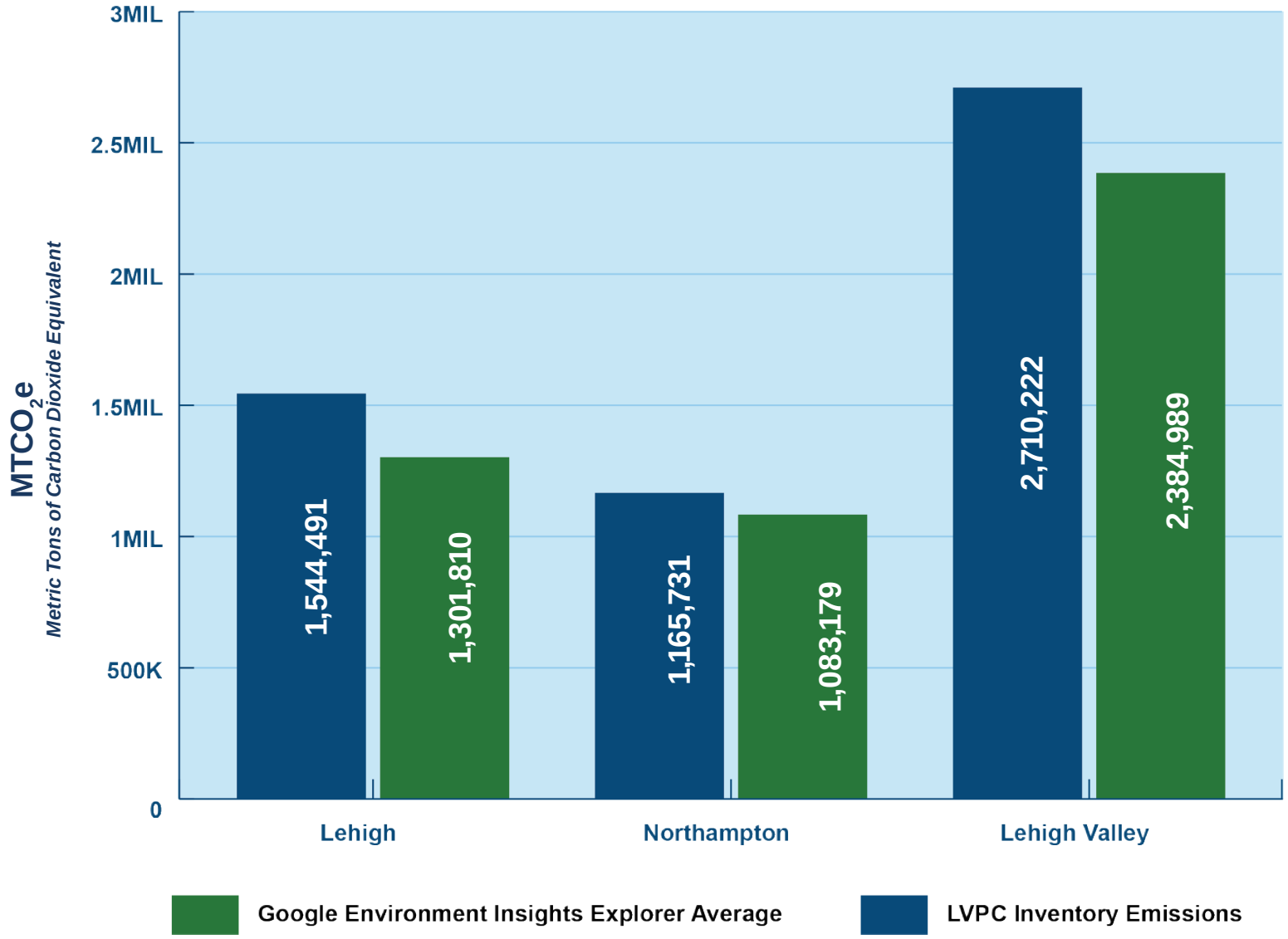
Since the focus of this PCAP is on transportation, only the Transportation and Mobile Sources sector emission estimates were updated from the 2022 report. The base year for the updated estimate is 2021 and includes business-as-usual forecasts through 2050.

For the greenhouse gas inventory update, transportation emission estimates for the Lehigh Valley were calculated using the US Environmental Protection Agency's (EPA) MOVES 3.1 program. The program's assumptions and emission constants are supported by PennDOT, which utilizes the MOVES program to calculate the Lehigh Valley's transportation air quality performance metrics. Three greenhouse gases are included in the inventory: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). This inventory represents emissions in "carbon dioxide equivalent" (CO_2e) values. A carbon dioxide equivalent is a measure that converts the concentration or amounts of other gases within the atmosphere to the equivalent amount of carbon dioxide with the same global warming potential.

The data review process was a critical component of the greenhouse gas inventory update, ensuring the accuracy and relevance of the information to the local context of Lehigh and Northampton counties. This included comparing different data sets to ensure consistency and reliability. For instance, the updated transportation emissions data calculated from the EPA's MOVES 3.1 program was cross verified with data from Google Environmental Insights Explorer (EIE), which compiles user data from various apps like Google Maps. Such comparisons allow for a more nuanced understanding of emissions, considering factors like vehicle miles traveled broken down by vehicle types based on fuel use.

A carbon dioxide equivalent is a measure that converts the concentration or amounts of other gases within the atmosphere to the equivalent amount of carbon dioxide with the same global warming potential.

Transportation Greenhouse Gas Emissions

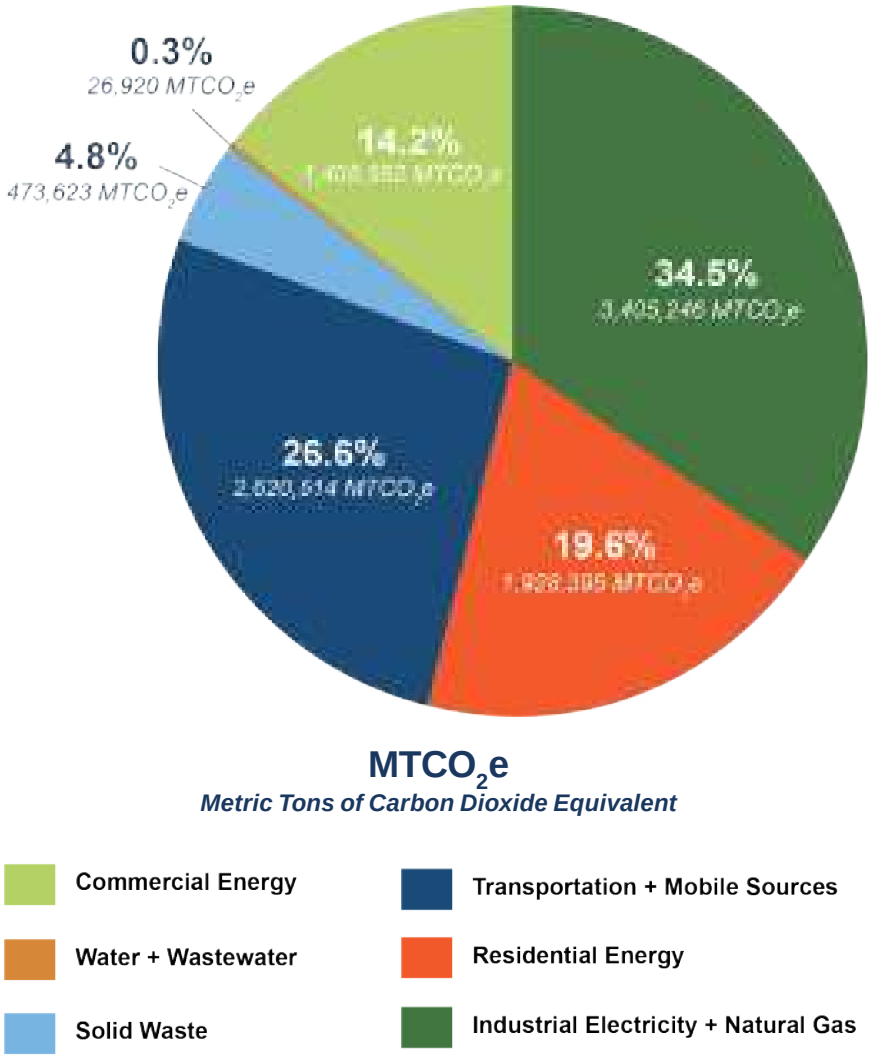


While the Industrial Electricity and Natural Gas sector emerged as the largest contributor to the Lehigh Valley's emissions in 2019, accounting for a substantial 34.5%, the Transportation and Mobile Sources sector followed closely behind at 26.6%.

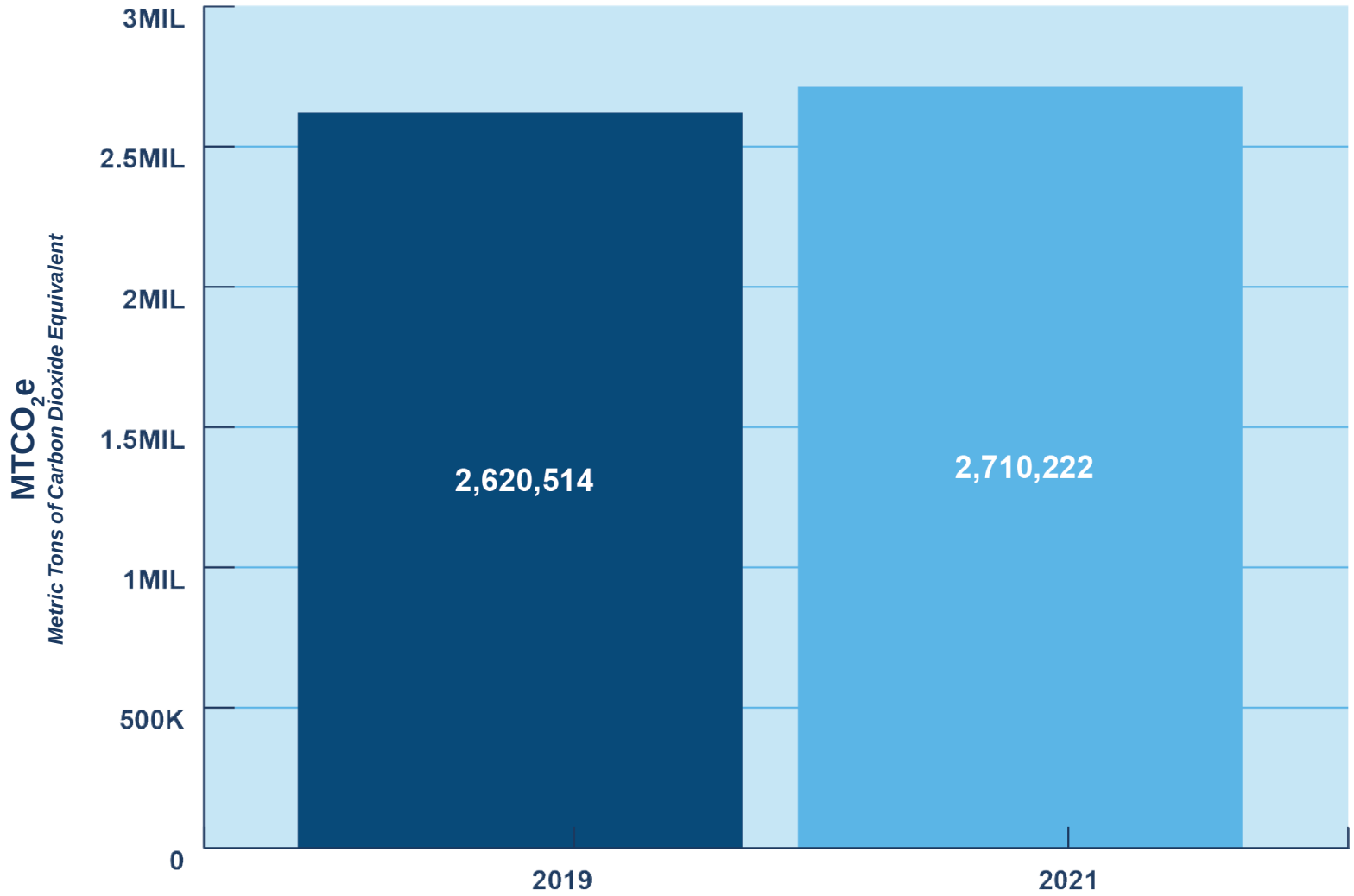
With the greenhouse gas update completed as part of this PCAP, transportation emissions in the Lehigh Valley increased slightly from 2019 to 2021, which can be attributed to population and economic growth, along with a rebound from the dip in transportation activity during the beginning of the COVID-19 pandemic.

Most vehicles on Lehigh Valley roads are passenger vehicles, such as cars

2019 Greenhouse Gas Emissions by Sector



Total Transportation Sector Greenhouse Gas Emissions

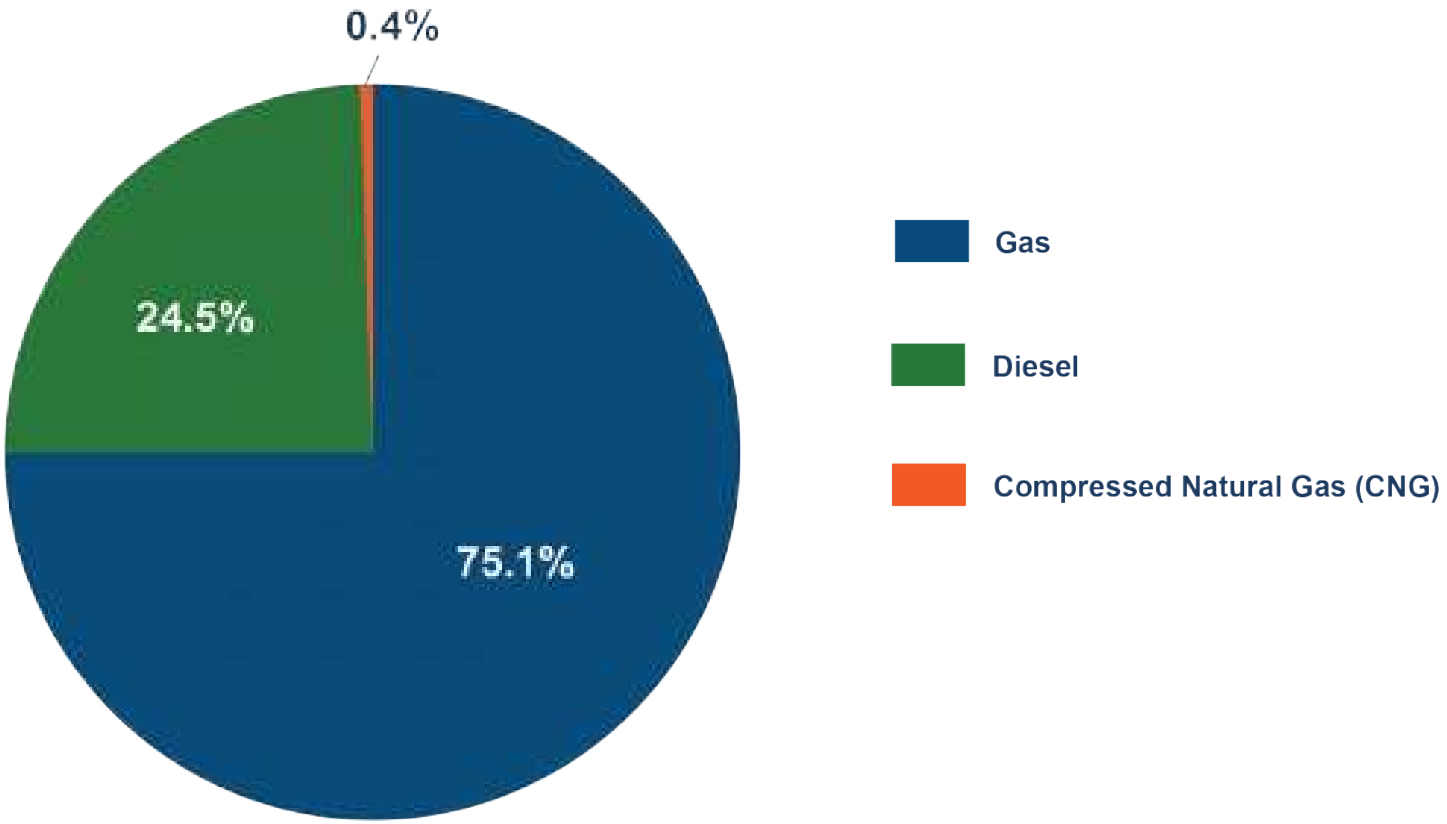


Due to increasing fuel efficiencies and adoption of alternative fuel vehicles, transportation emissions are forecast to drop in the near term. However, emissions are projected to begin increasing again near mid-century, as an increasing number of vehicles on the roads and vehicle miles traveled outweigh efficiency increases.

Total Estimated Greenhouse Gas Emissions
Transportation Sector
2021-2050

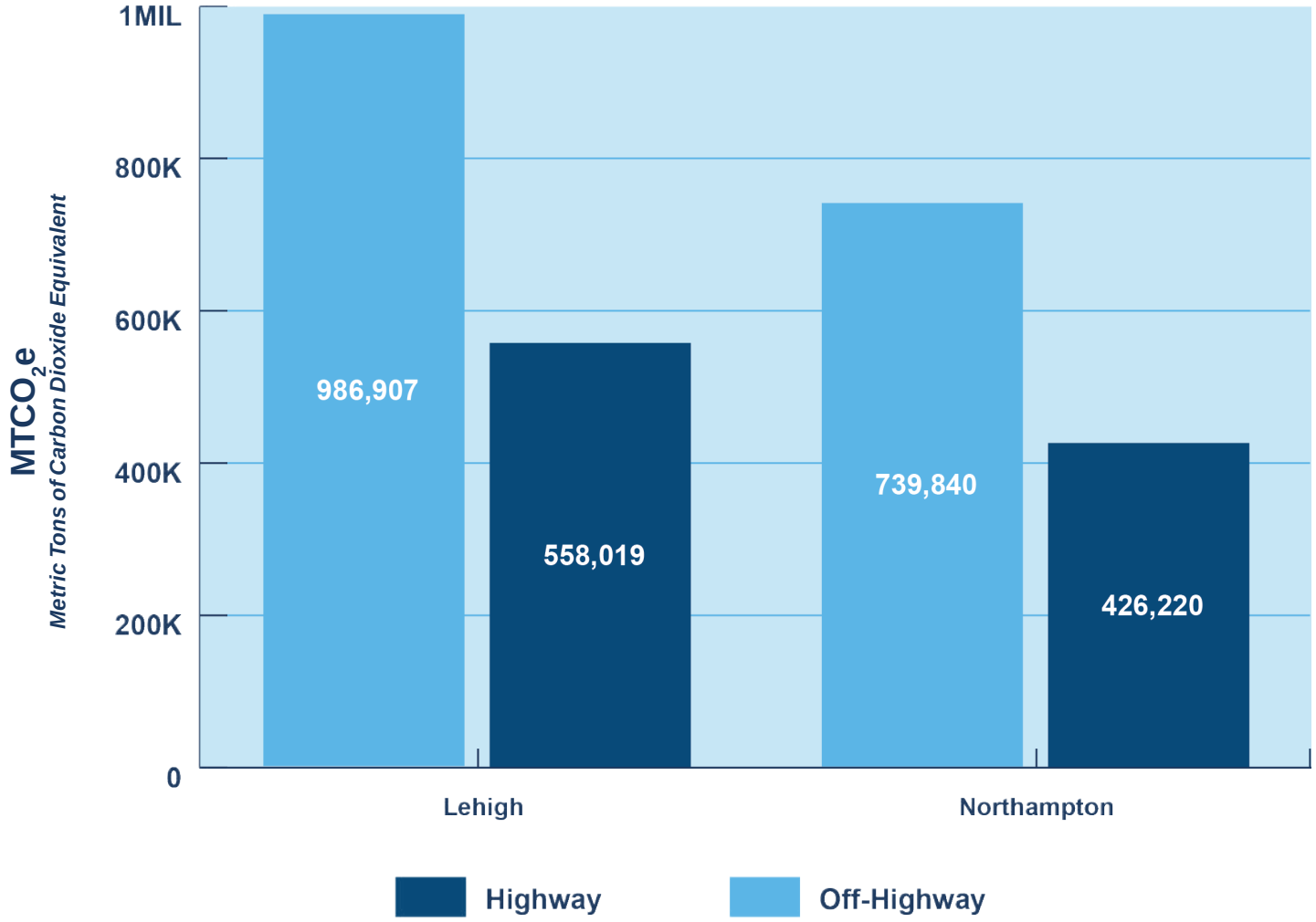
Over three-fourths of transportation emissions are from gasoline combustion, mostly from personal passenger vehicles. The remaining quarter is mostly diesel combustion emissions, such as from tractor-trailers and trucks, and compressed natural gas used primarily in the Lehigh and Northampton Transportation Authority (LANTA) bus fleet, which represents a very small portion of overall emissions.

Greenhouse Gas Emissions by Fuel Type



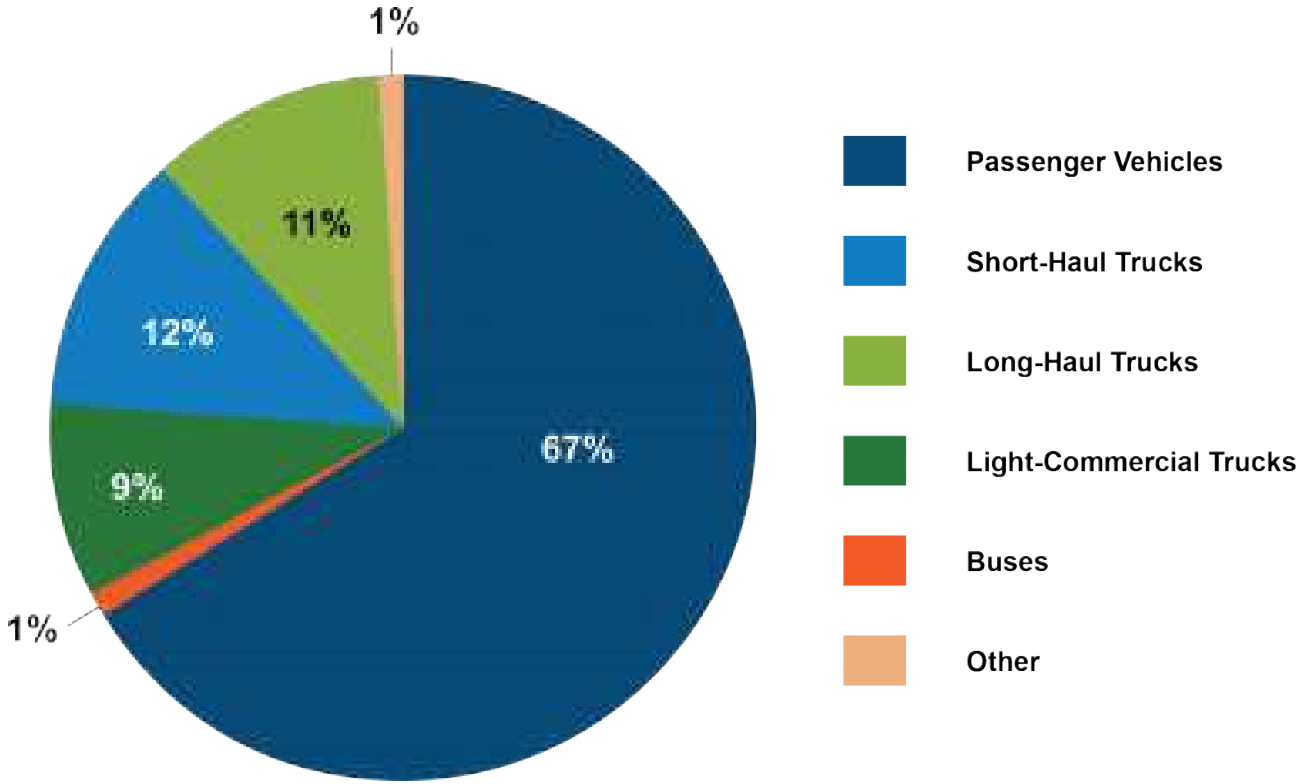
Lehigh County's transportation network emits more greenhouse gases than Northampton County's, which is likely due to a higher number of residents, jobs and vehicle miles traveled. When adjusted for population, both counties have similar rates of transportation emissions.

Vehicle Emissions in Lehigh and Northampton Counties



and passenger trucks, and are responsible for approximately two-thirds of the transportation emissions. Light-commercial trucks, such as delivery vans, account for 9% of emissions. Short-haul and long-haul trucks mainly consist of tractor-trailers and single-unit trucks, and they represent approximately 23% of transportation emissions, with short-haul and long-haul trips being roughly equal in terms of emissions.

Percent of Emissions by Vehicle Type



$MTCO_2e$

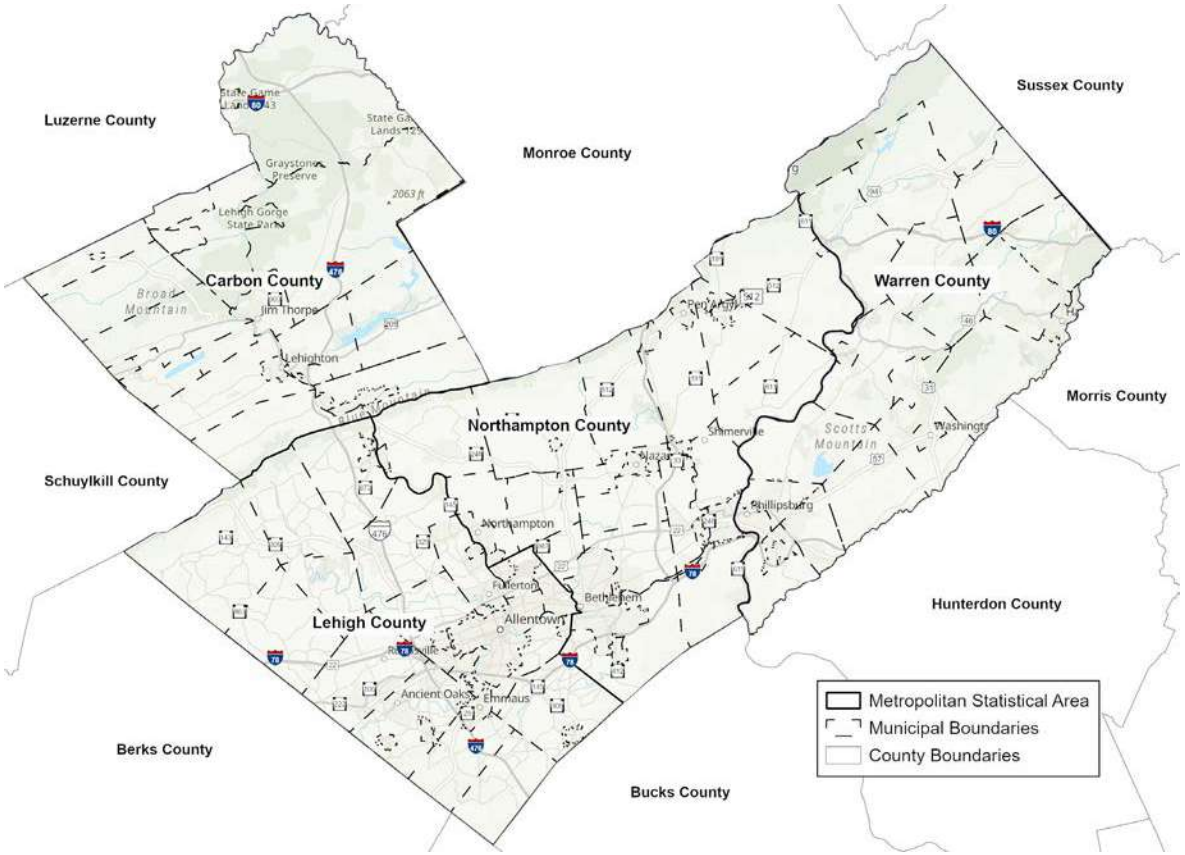
Metric Tons of Carbon Dioxide Equivalent

Metropolitan Statistical Area Greenhouse Gas Inventory

This section presents the greenhouse gas (GHG) emissions data from the transportation sector across all four counties included in the Allentown-Bethlehem-Easton Metropolitan Statistical Area (MSA): Lehigh, Northampton, Carbon and Warren. This data is included to provide a regional perspective and to compare the detailed analysis conducted specifically for the Lehigh Valley geography within the MSA described in the previous section.

Methodology

The MSA GHG transportation sector emissions are estimated using the 2020 National Emissions Inventory (NEI). NEI data from 2020 is used to display emissions on the MSA level, rather than the data from the Lehigh Valley 2021 inventory through MOVES, because the NEI provides the most recent estimate of emissions for all four counties in the MSA. The NEI is compiled by the EPA and houses comprehensive data of air pollutants, including transportation source emissions. In this plan, on-road mobile sources are considered transportation emissions.

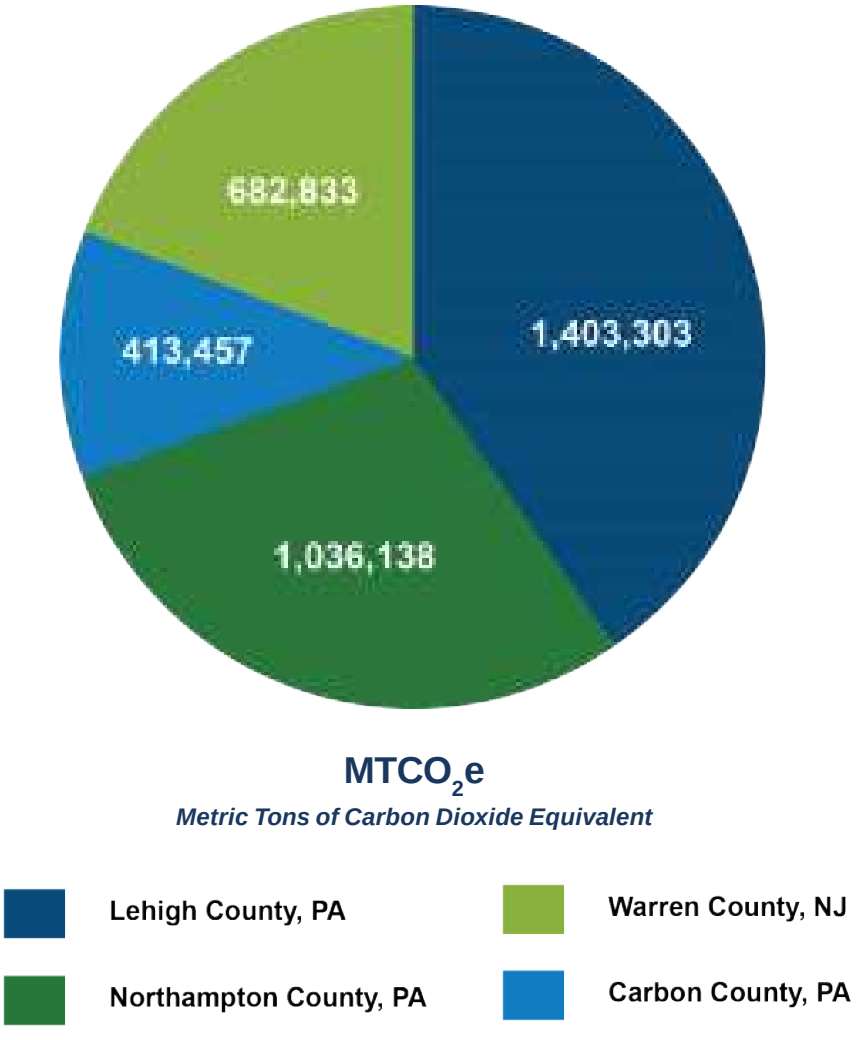


Emissions Data Overview

While the impacts from COVID-19 affected the transportation sector acutely in 2020, the NEI still provides representative data and fascinating insight regarding the status of emissions in the region. Remaining consistent with the 2021 Lehigh Valley inventory, Lehigh County produced the most transportation emissions in the region in 2020, followed by Northampton County. The Lehigh Valley accounts for approximately 69% of the MSA's transportation emissions. Warren County produced the third most emissions, although significantly less than Lehigh and Northampton, and Carbon emitted the least. The concentration of emissions in Lehigh and Northampton counties is largely due to their higher populations and greater economic activity. When examining emissions on a per capita basis, the trend reverses, and Carbon and Warren counties emit roughly double the transportation emissions per capita of Lehigh and Northampton counties. This is a function of these counties being less densely populated, which makes them more dependent on vehicle travel.

The data across all four counties underscores the urgent need for a comprehensive approach to reduce transportation-related emissions. The diverse set of goals set forth in this plan are essential for achieving the goals of transportation decarbonization and are vital for the overall success of climate action planning in the region. The transition to environmentally friendly transportation is not just beneficial for reducing emissions but also for improving air quality and public health.

Transportation Sector Greenhouse Gas Emissions for the Metropolitan Statistical Area



Greenhouse Gas Reduction Goals

Six priority greenhouse gas (GHG) reduction goals specifically tailored for transportation decarbonization are identified. These goals are designed to achieve significant GHG reductions, while aligning with adopted regional planning goals, strategies and actions, including benefits to low-income and disadvantaged communities (LIDAC), improving air quality, encouraging quality sustainable design and construction, and other co-benefits. Estimated GHG emission reductions are included with each goal. Corresponding methodology and supporting data are included in Appendix B.

1.	Implement *Walk/RollLV: Active Transportation Plan*.
2.	Increase transit ridership.
3.	Supporting deployment of alternative fuel vehicles (AFVs) of all types.
4.	Increase alternative fueling infrastructure and stations.
5.	Reimagine and retrofit major transportation corridors with green infrastructure.
6.	Plan and implement Intelligent Transportation Systems (ITS) technologies.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Integration of Land Use Planning and Transportation

GOAL 1

Implement *Walk/RollLV: Active Transportation Plan*

Incorporating planning for transit, bicycle and pedestrian networks within local and regional comprehensive plans can encourage development patterns that support multimodal transportation networks, complete streets and reduced trip lengths, preservation of open space and agricultural land, and provide convenient trail networks. Through supportive land use-transportation decisions, the ability for residents to choose non-automobile travel modes for their trips reduces the amount of greenhouse gas emissions from vehicles.

Target

Miles of priority bicycle corridors to add:

- 25% complete by 2030
- 50% complete by 2050

Priority sidewalk gaps to be fully completed by 2050.

GHG Reduction Estimates

2030 | 1,149 Metric Tons CO_2e

2050 | 1,200 Metric Tons CO_2e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- **Increased mobility and accessibility to areas of the region that traditionally were only accessible via motorized transportation modes**
- **Connections to employment opportunities and educational and cultural resources**
- **Lower-cost travel options**
- **Health-supportive travel options**
- **Extension of the region's transit system, another low-cost travel mode**
- **Increased improvements to air quality and health outcomes**

Direct Benefits

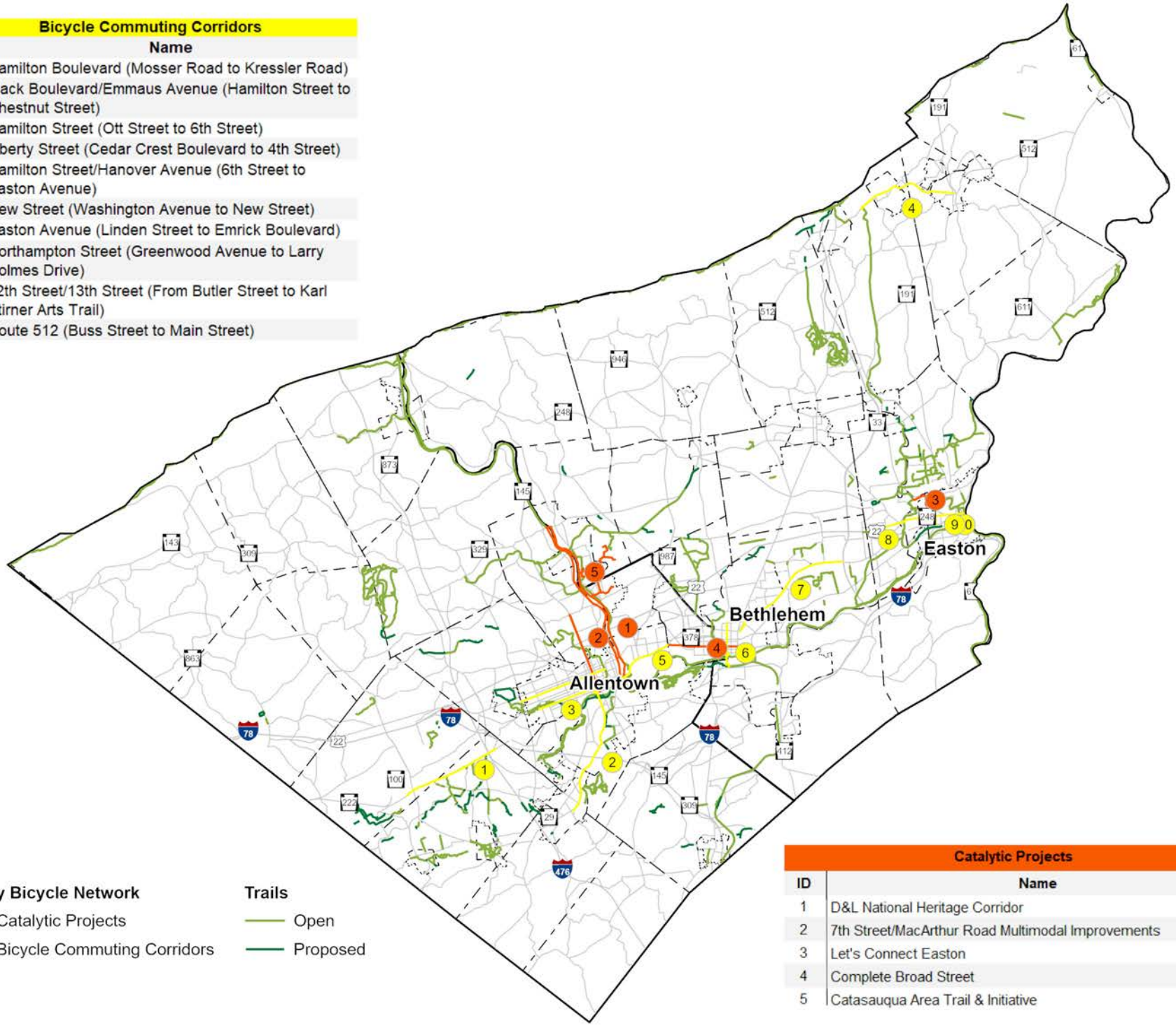
Infrastructure investments within LIDAC neighborhoods.

Indirect Benefits

External infrastructure investments connect LIDAC neighborhoods to other places.

Policies to increase alternative transportation and walkability would particularly benefit the MSA's low-income and disadvantaged communities located in areas with some of the region's lowest National Walkability Index scores, including Lower Nazareth to the east and south of Nazareth Borough; Forks Township east of Sullivan Trail; southern Bushkill Township adjacent to Nazareth Borough, and in Carbon County, northwest of Jim Thorpe and east of Palmerton.

Bicycle Commuting Corridors	
ID	Name
1	Hamilton Boulevard (Mosser Road to Kressler Road)
2	Mack Boulevard/Emmaus Avenue (Hamilton Street to Chestnut Street)
3	Hamilton Street (Ott Street to 6th Street)
4	Liberty Street (Cedar Crest Boulevard to 4th Street)
5	Hamilton Street/Hanover Avenue (6th Street to Easton Avenue)
6	New Street (Washington Avenue to New Street)
7	Easton Avenue (Linden Street to Emrick Boulevard)
8	Northampton Street (Greenwood Avenue to Larry Holmes Drive)
9	12th Street/13th Street (From Butler Street to Karl Stirner Arts Trail)
10	Route 512 (Buss Street to Main Street)



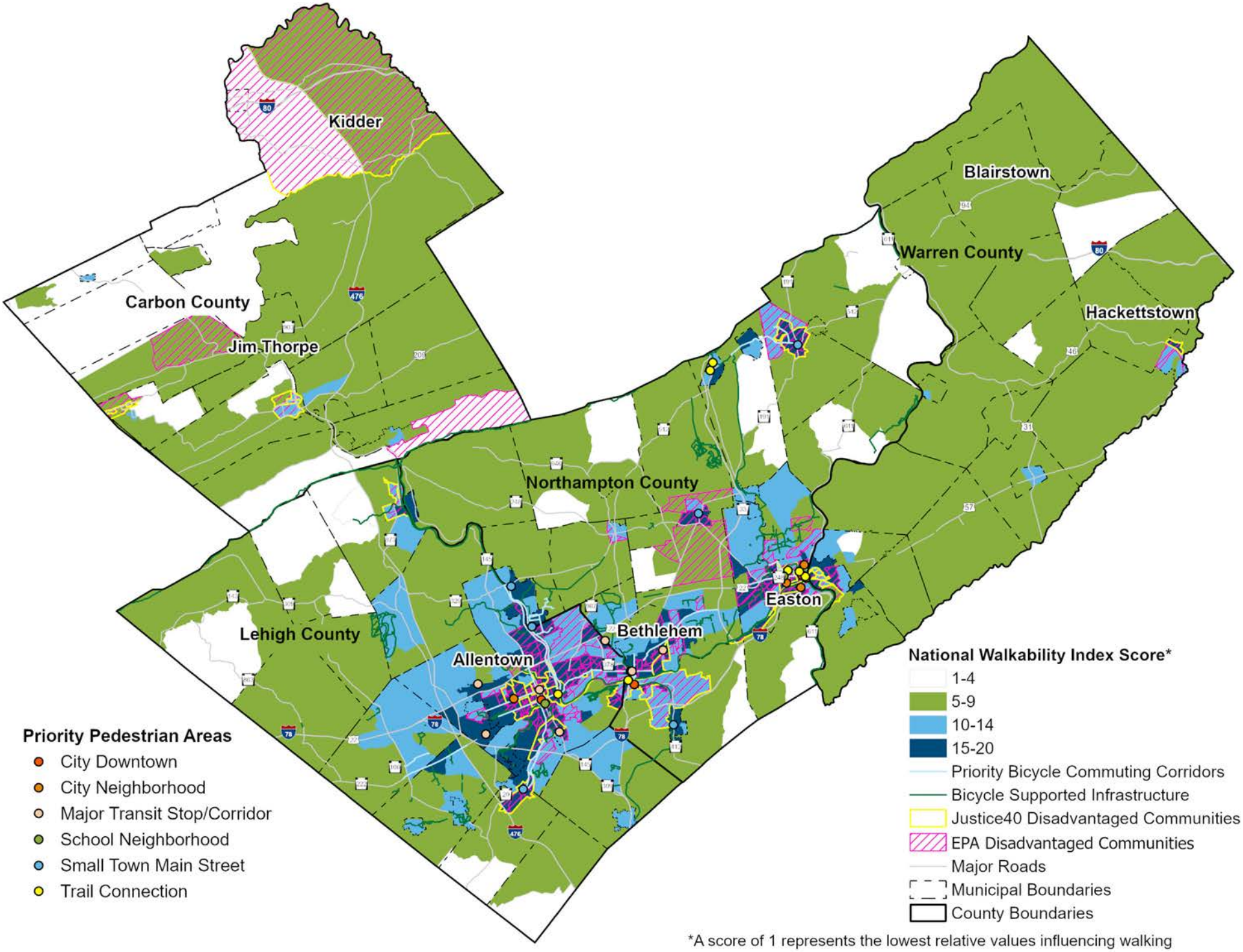
Priority Bicycle Network

- Catalytic Projects
- Bicycle Commuting Corridors

Trails

- Open
- Proposed

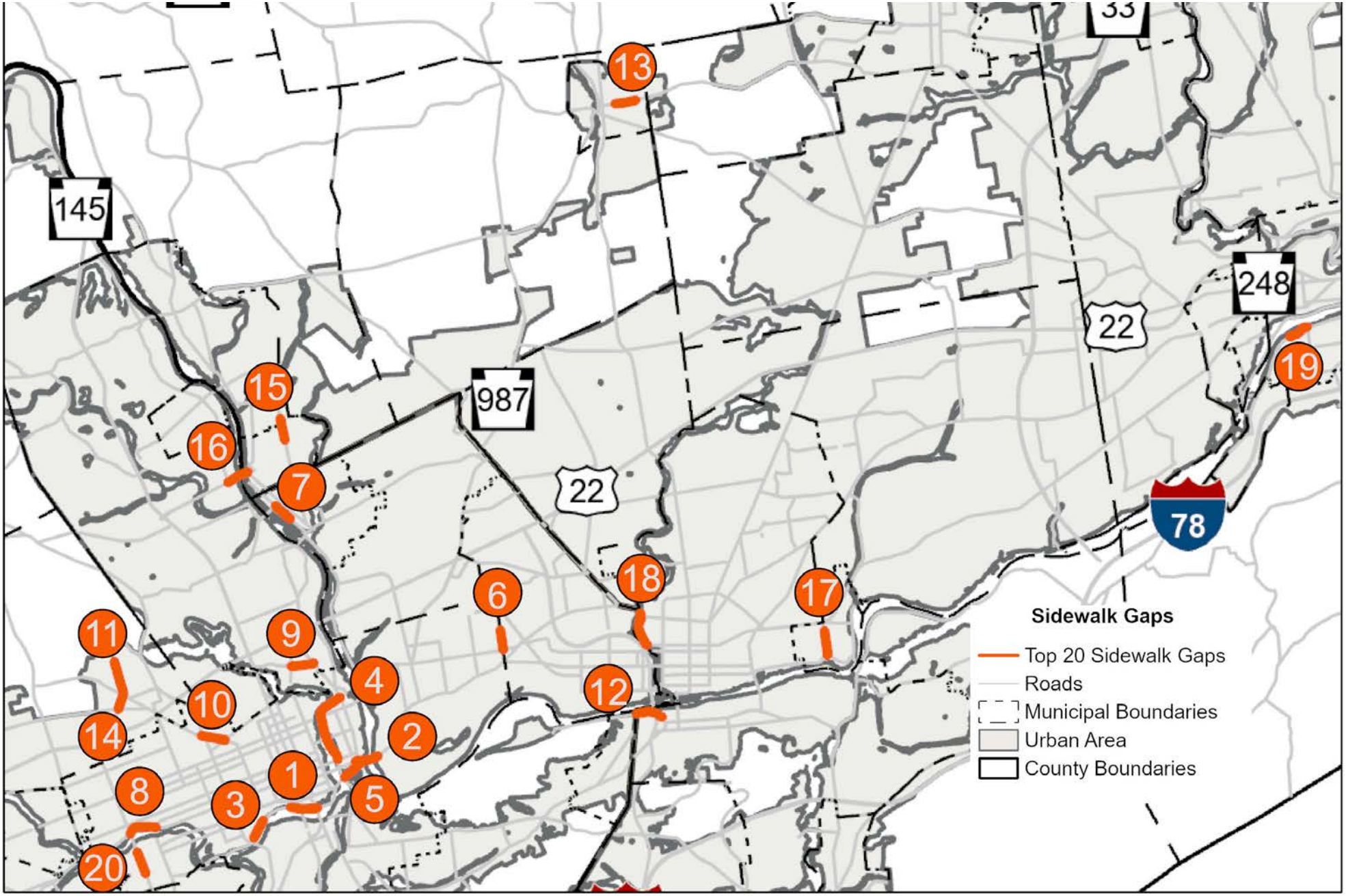
Catalytic Projects	
ID	Name
1	D&L National Heritage Corridor
2	7th Street/MacArthur Road Multimodal Improvements
3	Let's Connect Easton
4	Complete Broad Street
5	Catasauqua Area Trail & Initiative


Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Bethlehem
Lehigh County
Allentown
Priority Pedestrian Areas
City Downtown
City Neighborhood
Major Transit Stop/Corridor
School Neighborhood
Small Town Main Street
Trail Connection
National Walkability Index Score*
1-4
5-9
10-14
15-20
Priority Bicycle Commuting Corridors
Bicycle Supported Infrastructure
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries
*A score of 1 represents the lowest relative values influencing walking

Goal 1: Implement *Walk/RollLV: Active Transportation Plan*

Implementing Agencies	Municipalities, Pennsylvania Department of Transportation, Lehigh County, Northampton County, LVPC/LVTS.
Authority to Implement	Municipalities have the authority to implement bicycle and pedestrian projects within their jurisdiction, which supports this goal. LVTS can allocate funding from various federal and state sources for projects that improve pedestrian and bicycle accessibility, and state Departments of Transportation (DOTs) and municipalities have final approval authority. For example, in 2024 and 2025, the LVTS, in coordination with PennDOT and USDOT, will develop a prioritization and selection process for the allocation of Transportation Alternatives Set-Aside (TASA) and Carbon Reduction funds, which are two major sources of funding for implementation of multimodal projects. Project location and selection can be assisted by active transportation and long-range transportation planning documents, which identify priority locations and corridors.
Milestones	Funding mechanism established for completion of priority bicycle network, pedestrian paths and related safety and accessibility projects. Completion of gap analysis to assist in prioritizing funding. Future development of a micromobility plan addressing bike/scooter share program business plan.
Implementation Schedule	5-10 years
Geographic Location	Identified Priority Bicycle Commuting Corridors and Catalytic Projects per *Walk/RollLV* and Priority Sidewalk Gaps per *Walk/RollLV*.

Funding Sources	USDOT: Congestion Mitigation and Air Quality Improvement Program, Safe Streets for All, Surface Transportation Block Grant; US EPA: Climate Pollution Reduction Grant Implementation Grants; PA DCNR: Community Conservation Partnerships Program; PA DCED: Greenways, Trails, and Recreation Program; PennDOT: Transportation Alternatives Set-Aside, Carbon Reduction, Connects Program; Lehigh Valley Greenways Mini Grants, local government budgets, LVTS, private foundations.
Metrics	Increased bicycle and pedestrian traffic, increased use of electric assist bicycles, reduced vehicle usage, miles of trail constructed, number of trail and sidewalk gaps closed, number of active transportation/accessibility projects completed from the Long-Range Transportation Plan (LRTP)/ Transportation Improvement Program (TIP).
Related LVPC Plan Goals	***FutureLV: The Regional Plan*** ▸ Efficient and Coordinated Development Pattern ▸ Connected Mixed-Transportation Region ▸ Safe, Healthy, Inclusive and Livable Communities
	Walk/RollLV: Active Transportation Plan ▸ Safety and Accessibility ▸ Convenience and Connectivity ▸ Seamless Multimodal Integration ▸ Regional Coordination ▸ Equity
	Climate + Energy Element ▸ To encourage alternatives to automobile use, both motorized and non-motorized.


145
987
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3
5
20
Sidewalk Gaps
Top 20 Sidewalk Gaps
Roads
Municipal Boundaries
Urban Area
County Boundaries

Priority Sidewalk Gaps

Rank	Street Name	# of Sides	Length in Feet
1	Martin Luther King Jr. Drive (West)	1	1,851
2	Hamilton Street	1	1,618
3	Martin Luther King Jr. Drive (East)	1	1,343
4	American Parkway	2	5,130
5	West Union Street	2	1,814
6	Club Avenue	1	1,350
7	Front Street	1	1,331
8	Parkway Boulevard	2	1,999
9	Fairmont Avenue	2	1,551
10	Roth Avenue	1	1,642
11	Whitehall Avenue	1	1,641
12	Riverside Drive	2	1,861
13	Bath Pike	2	1,411
14	Whitehall Avenue	2	1,726
15	Howertown Road	1	1,502
16	Lehigh Street	1	1,542
17	Cambria Street	2	1,659
18	Mauch Chunk Road	2	1,386
19	Canal Street	1	1,386
20	South Ott Street	1	1,547

Part of what makes the region and Lehigh Valley so great is their diverse landscapes. There are populous, dense and historic cities and boroughs along with large areas of natural and agricultural lands. This diversity supports a variety of transportation modes. The density and form of many urban areas is conducive to increasing active transportation. The LVPC has identified ten bicycle commuting corridors and five catalytic corridors within the Lehigh Valley in *Walk/RollLV*. These are areas where there is a high transportation demand, and active transportation infrastructure improvements would be highly beneficial. In fact, the Broad Street catalytic corridor in Bethlehem has been selected as a recipient of national Safe Streets for All funding for multimodal infrastructure improvements along the corridor. The need for a safe and accessible active transportation network is a priority in the Lehigh Valley, including efforts such as the AARP/United Way of Greater Lehigh Valley/ LVPC Walk Audit program.

In addition, there are many active transportation projects identified in the *FutureLV LRTP* project list and are in popular demand for funding. The region is also connected by a robust trail network that people can use to commute and visit natural areas. The Delaware & Lehigh National Heritage Trail is an extensive trail that connects Allentown, Bethlehem and Easton and runs through Lehighton, Jim Thorpe and the Lehigh Gorge in Carbon County. There are also many trails in Warren County, such as the Morris Canal Greenway and Paulinskill Valley Trail. Further connecting and improving the region's active transportation network will encourage people to walk, bike or roll rather than using motorized vehicles.

GOAL 2

Increasing transit ridership above current levels in the Lehigh Valley

Target	20% increase in transit passenger trips per capita by 2030 (9.0 transit passenger trips per capita) and a 40% increase in transit passenger trips per capita by 2050 (10.5 transit passenger trips per capita).
GHG Reduction Estimates	**2030 |** 1,833 Metric Tons CO_2e **2050 |** 3,720 Metric Tons CO_2e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- **Increased accessibility to desired travel destinations, such as educational and employment opportunities and essential services**
- **Improved viability of transit as an alternative transportation mode by reducing barriers, such as availability of transit stops, shelters from the elements and reducing time burdens because of bus frequency or trip travel times**
- **Increased travel options for low-income individuals who do not have access to a vehicle (zero-vehicle households)**
- **Increased use of public transportation can reduce traffic congestion, lowering emissions and improving air quality**

Direct Benefits

Public transportation infrastructure investments in LIDAC neighborhoods improve usability of transit and reduce barriers to accessing areas where communities need to travel.

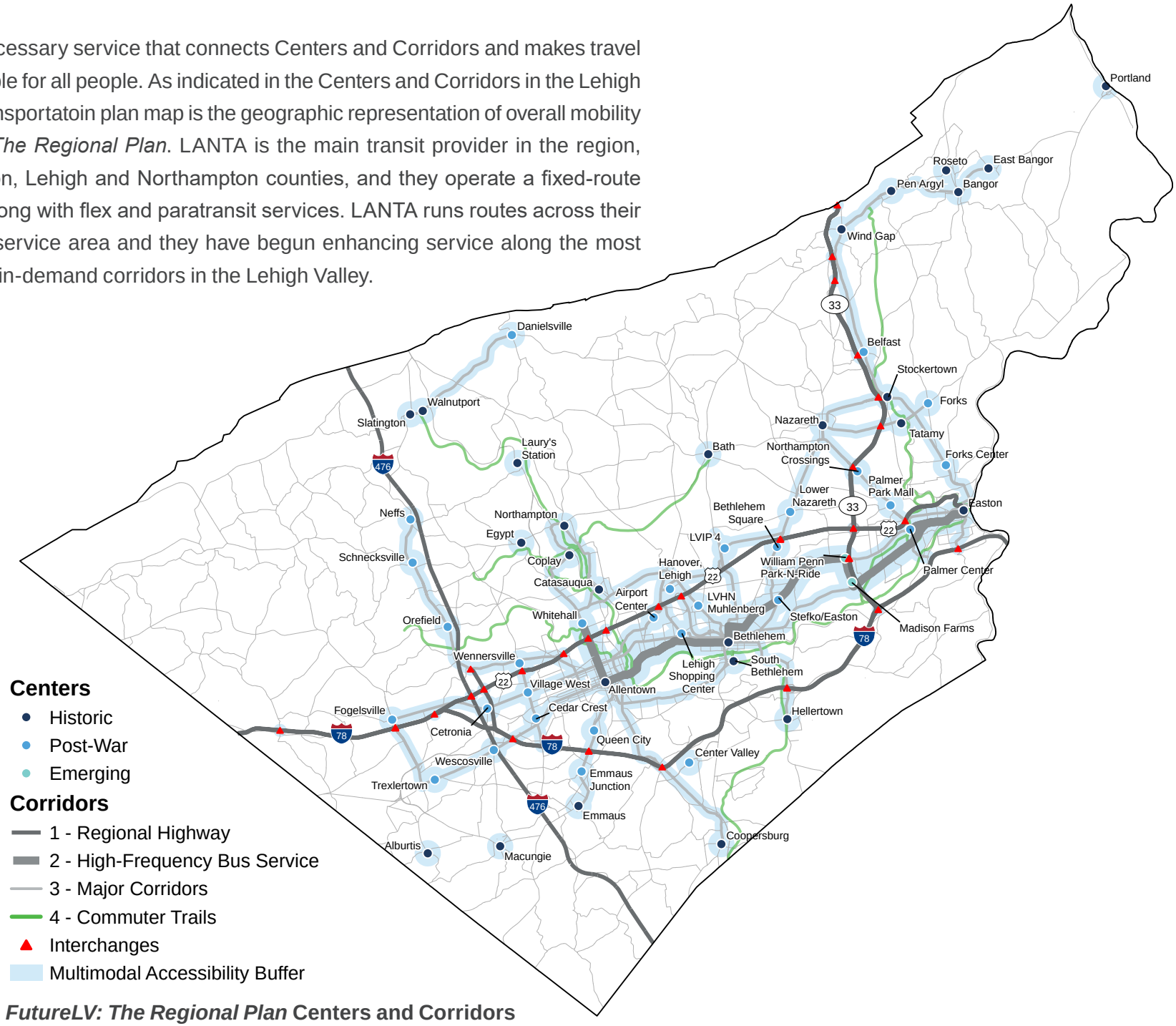
Indirect Benefits

External infrastructure investments, such as at destination locations, support LIDAC use and accessibility to those locations.

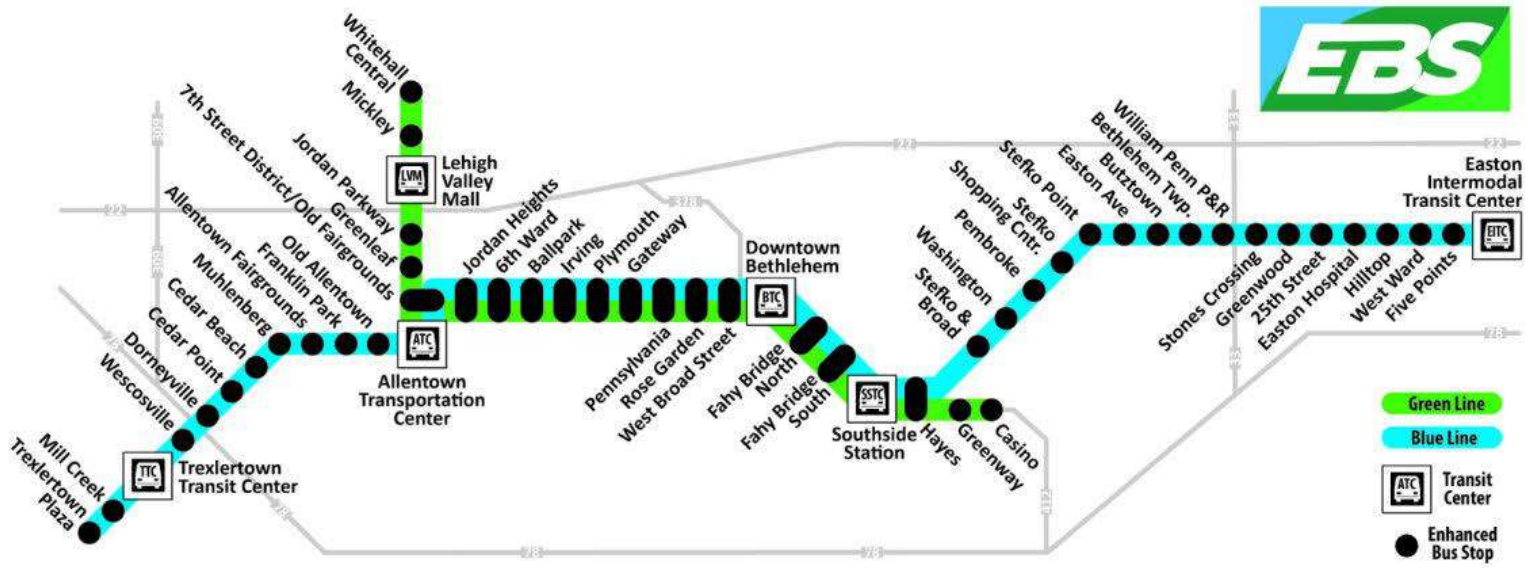
Example: Well-designed bus shelters in shopping centers that may not be within LIDAC neighborhoods but are frequented by LIDAC as high employment centers.

LANTA provides transit service within nearly all the Lehigh Valley's identified low-income and disadvantaged communities. The southwestern portion of Bath Borough is the most notable area of the region, with identified low-income and disadvantaged communities that do not have any transit service available, and no service is provided in the vicinity. Areas of Forks Township just north of the City of Easton are not served directly by transit but have transit service available nearby along Sullivan Trail. In Carbon County, low-income and disadvantaged communities northwest of Jim Thorpe and east of Palmerton also have transit service available nearby but are not served directly by transit. Transit investments would be particularly beneficial to these communities.

Transit is a necessary service that connects Centers and Corridors and makes travel more accessible for all people. As indicated in the Centers and Corridors in the Lehigh Valley, this transportatoin plan map is the geographic representation of overall mobility in *FutureLV: The Regional Plan*. LANTA is the main transit provider in the region, serving Carbon, Lehigh and Northampton counties, and they operate a fixed-route bus service along with flex and paratransit services. LANTA runs routes across their three-county service area and they have begun enhancing service along the most populous and in-demand corridors in the Lehigh Valley.



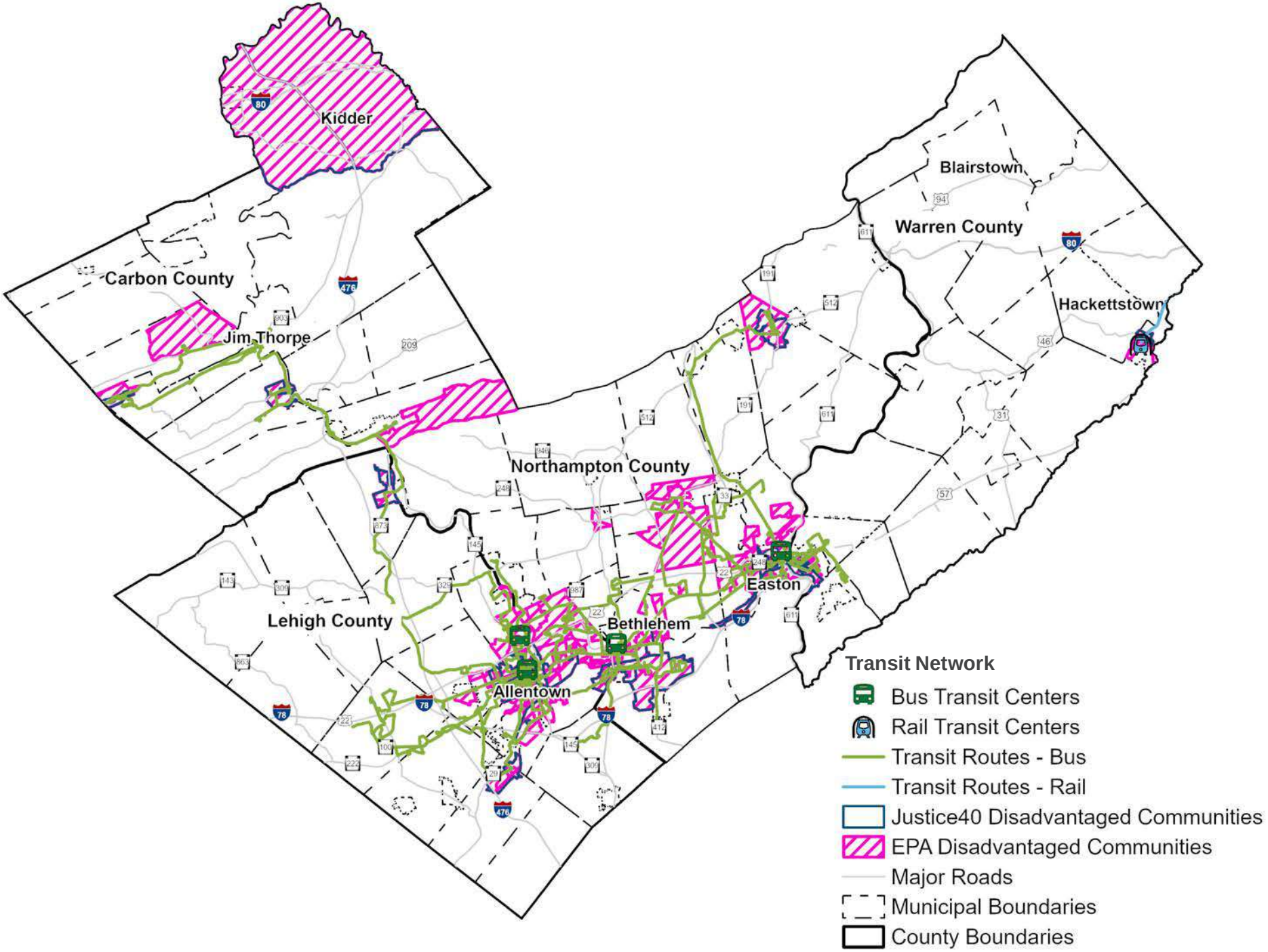
***FutureLV: The Regional Plan* Centers and Corridors Transportation Plan**



Enhanced Bus Service (EBS) is LANTA's branding for its bus rapid transit (BRT) operations. BRT is a more robust version of traditional bus service, as it includes elements of light rail, such as dedicated station and ticketing infrastructure, higher frequencies and limited stop or express service, while maintaining the flexibility and cost efficiencies of buses. Currently, LANTA is in the early phases of their EBS BRT plan and operates two EBS routes with limited stop service and minimal on-street infrastructure.

LANTA is in the process of upgrading bus station infrastructure, and as EBS progresses, LANTA aims to improve bus frequency, expand the route network and coordinate with PennDOT and municipalities to install bus-specific infrastructure to speed up service. Bus service improvements will not only benefit current riders but also attract new riders, which will take vehicles off the road and reduce emissions. In addition, bus service promotes the revitalization of the Lehigh Valley's urban core and encourages economic activity along route corridors.

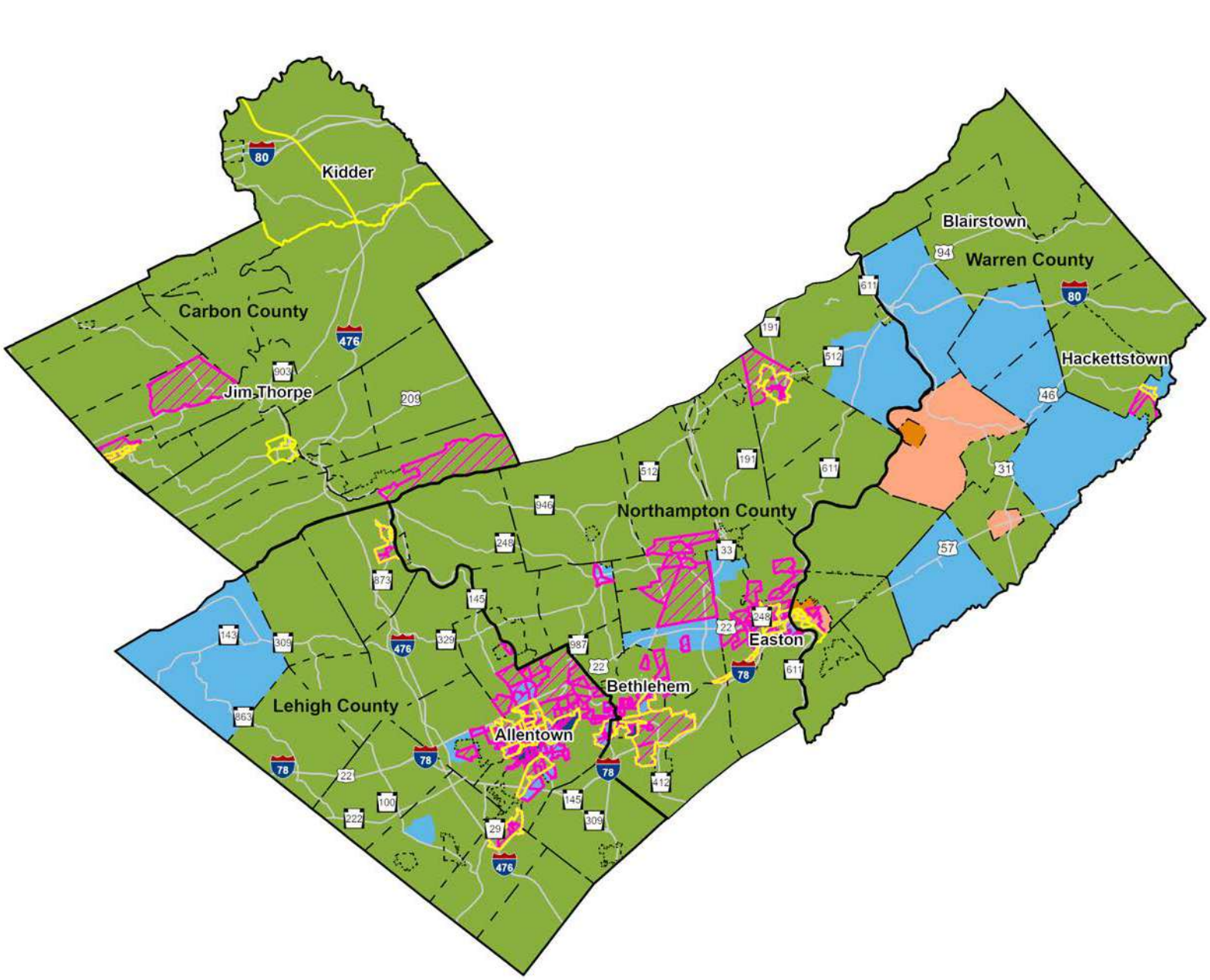
Warren County does not receive service from LANTA; however, riders can transfer from LANTA to NJ Transit buses at the Easton Transportation Center. NJ Transit provides transit service in Warren County, along with the Warren County Transportation system, which operates shuttle bus routes within the county. Along with buses, Warren County has a passenger rail station in Hackettstown, which receives regional rail service to and from Newark/New York City, operated by NJ Transit. The Lehigh Valley does not currently receive passenger rail service; however, studies are underway to determine its feasibility.

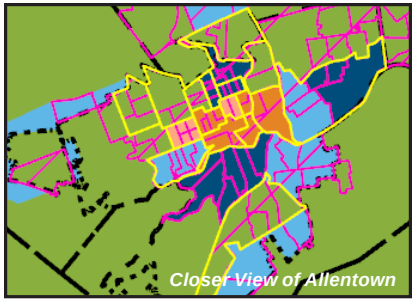

Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Lehigh County
Bethlehem
Easton
Allentown
Transit Network
Bus Transit Centers
Rail Transit Centers
Transit Routes - Bus
Transit Routes - Rail
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries

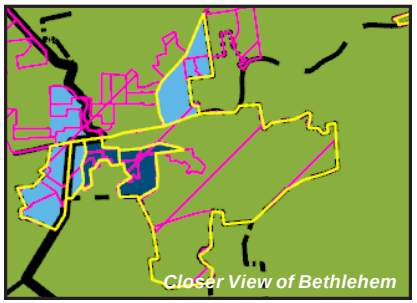
It is critical for transit service to not only be available to low-income and disadvantaged communities but also provide access to key destinations, such as educational institutions, healthcare and job centers with frequent, consistent and predictable service throughout the day and night. Transit availability is also critical in areas with a high concentration of households that do not have access to any vehicles (zero-vehicle households). The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent. In a car-centric society, not having access to a vehicle can limit access to critical needs, including employment, educational opportunities, healthcare, daycare and grocery stores. It can also substantially increase the burden of time required to move between locations. About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households. Those households are primarily concentrated in core urban areas where there are more mode options available (Allentown, Bethlehem and Easton cities), but zero-vehicle households also expand beyond city boundaries into suburban and rural townships and boroughs where alternative modes are more limited, if available at all.

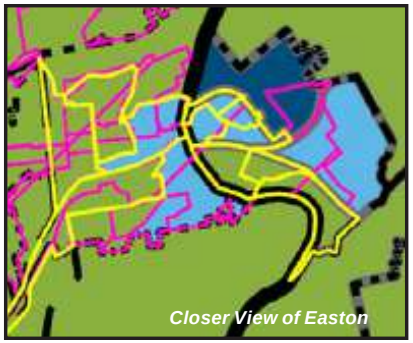
A lack of vehicle availability disproportionately affects low-income and disadvantaged communities and communities of color. In the Lehigh Valley, people of color and the Hispanic or Latinx population are much more likely to live in areas where a high concentration of households do not have access to a vehicle: 28.8% of people of color and 34.7% of people identifying as Hispanic or Latinx, compared to 3.7% of people identifying as White Alone. Additionally, a person who is Black, Indigenous or a person of color is nearly three times more likely to commute to work via alternative transportation modes, including public transportation, walking, biking, rideshare or some other means (9.1% people of color compared to 3.6% of White, Non-Hispanic) (US Census Bureau American Community Survey, 2017-2021 5-Year Estimates).

The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent.









Percent of Zero-Vehicle Households

- 0.00% - 5.00%
- 5.01% -10.00%
- 10.01% - 15.00%
- 15.01% - 20.00%
- 20.01% - 27.50%
- Justice40 Disadvantaged Communities
- EPA Disadvantaged Communities
- Major Roads
- Municipal Boundaries
- County Boundaries

Goal 2: Increasing transit ridership above current levels in the Lehigh Valley

Implementing Agencies	LANTA, LVPC/LVTS, municipalities.
Authority to Implement	LANTA has the authority to expand its service. Funds to do so can come from its budget, funding from federal programs, or action by the state legislature. LVTS can also allocate certain funding to transit agencies from federal programs. Further, LVTS and municipalities can encourage transit ridership by investing in multimodal accessibility projects that enhance connectivity to transit stops, and the LVPC and municipalities can support transit-friendly land development and redevelopment.
Milestones	Completion of LANTA's Enhanced Bus Service Plan's six phases, completion of bus infrastructure upgrades, implementation of expanded routes, progress towards passenger rail.
Implementation Schedule	3-12 years, as resources are available.
Geographic Location	LANtaBus service areas, regional metropolitan areas.
Funding Sources	USDOT: Carbon Reduction Program, Congestion Mitigation and Air Quality Improvement Program, Surface Transportation Block Grant; US EPA: Climate Pollution Reduction Grant Implementation Grants; Federal Transit Administration (FTA) grants; public-private partnerships.
Metrics	Ridership numbers, frequency of service, expansion of current routes/number of new routes, number of new vehicles in fleet.

Related LVPC Plan Goals	***FutureLV: The Regional Plan*** ▸ Efficient and Coordinated Development Pattern ▸ Connected Mixed-Transportation Region ▸ Safe, Healthy, Inclusive and Livable Communities
	Walk/RollLV: Active Transportation Plan ▸ Safety and Accessibility ▸ Convenience and Connectivity ▸ Seamless Multimodal Integration ▸ Regional Coordination ▸ Equity
	Climate + Energy Element ▸ To encourage alternatives to automobile use, both motorized and non-motorized.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Transition to Clean Low-Carbon/Zero-Emissions Fuels


MACARTHUR
ICE CREAM
NACHOS
SMOOTHIES

GOAL 3

Supporting deployment of alternative fuel vehicles (AFVs) of all types

Increased investment in low-carbon fuel and vehicle technologies is a critical component of transportation decarbonization. Transitioning to clean and sustainable fuel options/ vehicles, such as electric vehicles, fuel cell electric vehicles (powered by hydrogen generated from low-carbon sources) and biomass fueled vehicles, is expected to drive the majority of emissions reductions in the United States (US Department of Energy, 2023).

These innovations need to be paired with supporting alternative fueling infrastructure that is readily available and accessible to all users. Rapid adoption of these practices may be constrained due to the need to increase generation of power within the existing power distribution network, including substations and utility lines, to meet increased use of alternative fuel vehicles. In addition, there are major limitations currently in battery technologies.

Target	Increase share of alternative fueled vehicle (AFV) registration to 9% by 2030 and 21% by 2050 consistent with projections in PennDOT's EV Mobility Plan.
GHG Reduction Estimates	**2030 |** 285,957 Metric Tons CO_2e **2050 |** 297,013 Metric Tons CO_2e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- **Increased availability of alternative fuel vehicles**
- **Reduced asthma rates due to improved air quality**

Direct Benefits

Increasing the prevalence of AFVs also increases their availability and can reduce the upfront cost to obtain them; reduced emissions improve air quality and support better health outcomes for low-income and disadvantaged communities.

Indirect Benefits

The proliferation of AFVs reduces transportation emissions and improves air quality overall, thus improving health outcomes for low-income and disadvantaged communities.

The Transportation and Mobile Sources sector is one of the Lehigh Valley's largest contributors to greenhouse gas emissions, most of which is generated by on-road gasoline vehicle travel. Air quality impacts resulting from vehicle emissions are exacerbated in low-income and disadvantaged communities, where 12% of people of color and 14.7% of those who identify as Hispanic or Latinx suffer from asthma, compared to 1.5% of people identifying as White Alone. Efforts to reduce transportation emissions and investments in alternative transportation options help to improve adverse health impacts tied to poor air quality.

Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of Particulate Matter 2.5 (PM 2.5) and Ozone nationwide: In Center City Allentown along North 7th Street and to the west and east, southwest of Route 22 and Cedar Crest Boulevard, east side Allentown south of Hanover Avenue and between the Lehigh River and Susquehanna Street; in the City of Bethlehem west of Stefko Boulevard and north of the Lehigh River, north of Fahy Bridge and east of Old York Road, and in Southside Bethlehem along 4th Street and Hayes Street; and in Fountain Hill Borough north of Broadway to the west.

In addition to areas of the Lehigh Valley, where high rates of PM 2.5 and Ozone overlap, the City of Easton north of Lehigh Drive is between the 90th and 95th percentile nationwide for Ozone.

Measures taken to increase deployment of AFVs would improve air quality and greatly benefit the low-income and disadvantaged communities mentioned above, as well as low-income and disadvantaged communities in Carbon and Warren counties that have high degrees of exposure to PM 2.5 and Ozone.

Goal 3: Supporting deployment of alternative fuel vehicles (AFVs) of all types

Implementing Agencies	Vehicle manufacturers, businesses/organizations, state legislative bodies and associated regulatory agencies, transit authorities, local governments, power and fuel generation and distribution companies.
Authority to Implement	The LVPC/LVTS and other planning organizations and MPOs can coordinate with state and federal agencies to support programs that make AFVs more accessible and attainable for all. Many strategies to reduce the cost burden of AFVs require the authority of federal or state legislation, such as the federal EV tax credit, however, car manufacturers can also provide consumers with cash back programs to incentivize sales. Organizations such as transit authorities, school districts, municipalities and private companies can increase adoption of AFVs by switching their fleets to these vehicles.
Milestones	EV or AFV sales milestones relating to fleet transition.
Implementation Schedule	Ongoing with annual targets, gradual increase in AFV percentages over 5-10 years.
Geographic Location	Metropolitan Statistical Area
Funding Sources	USDOT: Carbon Reduction Program; US EPA: Climate Pollution Reduction Grant Implementation Grants, Clean School Bus Program; Federal EV Tax Credit; public-private partnerships, private initiatives.
Metrics	Number of AFVs sold/registrations from base year, percent increase in alternative fueled government fleet vehicles and percent of commercial light- and heavy- duty trucks transitioned to hybrid and/or fossil free fuels.

Related LVPC Plan Goals	***FutureLV: The Regional Plan*** ▸ Protected and Vibrant Environment ▸ Connected Mixed-Transportation Region
	Walk/RollLV: Active Transportation Plan ▸ Air Quality and Climate
	Climate + Energy Element ▸ To encourage alternatives to automobile use, both motorized and non-motorized.

Adoption targets included in this plan are based on the trajectory from the 2022 *Pennsylvania State Plan for Electric Vehicle Mobility*. The adoption rate for alternative fueled vehicles can vary widely based on federal policy setting mileage standards and providing tax incentives for purchasers. PennDOT data indicates AFVs comprised 1.88% of total vehicles registered in 2022 in the Lehigh Valley.

Long-haul trucking, which greatly affects the Lehigh Valley and is one of its biggest environmental challenges, will need to transition to hybrid or other fueling mechanisms to operate in a greener way. Air Products (one of the Fortune 500 companies in the Lehigh Valley) is developing technology with Mack Trucks to address this need.

> **The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent.**

GOAL 4

Increase alternative fueling infrastructure and stations

Innovations in the development of clean or zero-emissions fuel technology need to be paired with continuing federal and state support for the development of alternative fueling infrastructure and deployment. As more vehicles transition to these low-carbon alternatives, supporting fueling/recharging infrastructure must similarly be scaled up to match the demand and be widely accessible and convenient to users.

Target	Increase alternative fueling infrastructure by 25% by 2030 and 40% by 2050 over 2022 baseline in line with PennDOT goals.
GHG Reduction Estimates	**2030 |** 5,644 Metric Tons CO_2e **2050 |** 13,791 Metric Tons CO_2e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- **Increased availability of alternative fuel vehicles**
- **Reduced asthma rates due to improved air quality**

Direct Benefits

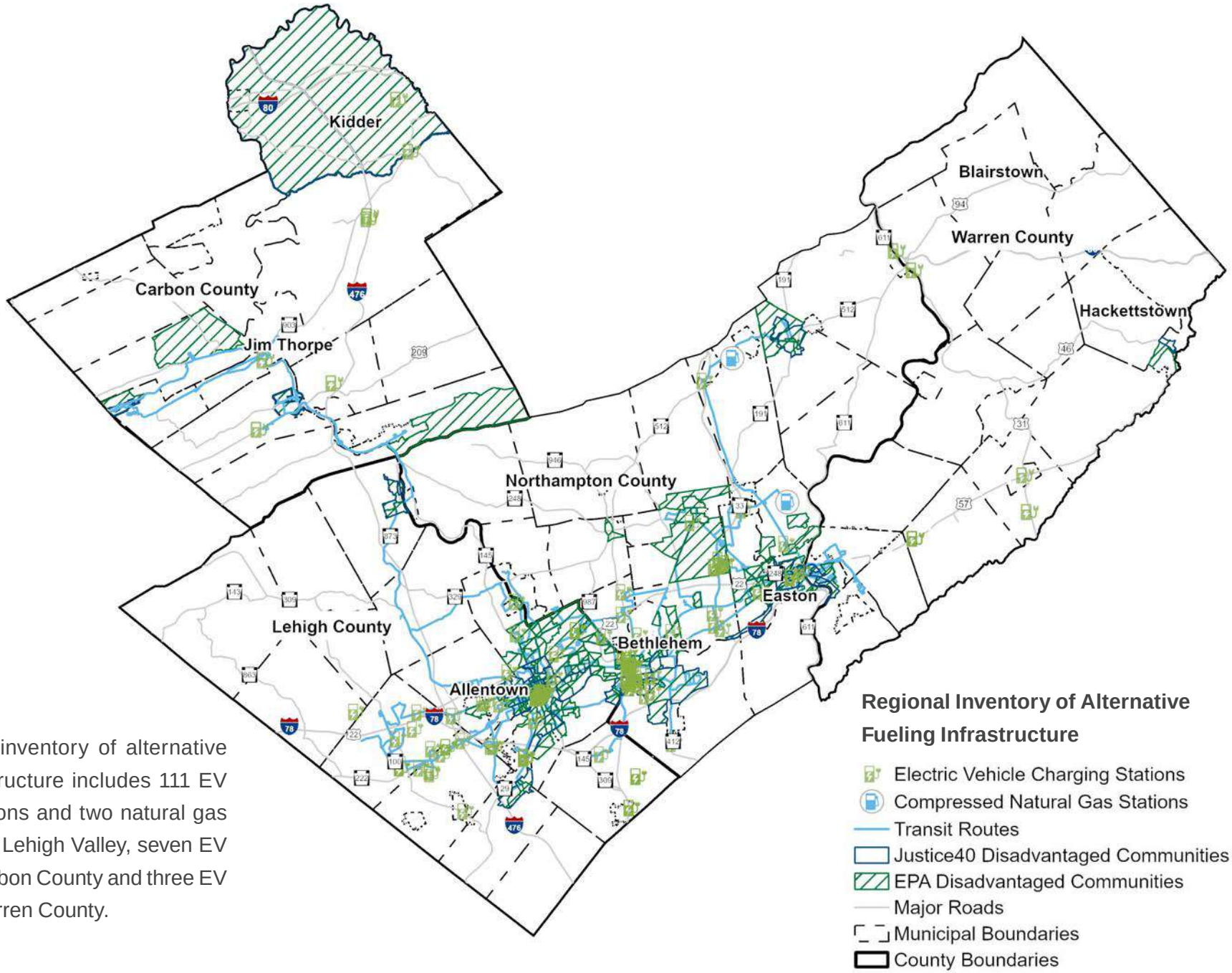
Developing AFV infrastructure in LIDAC neighborhoods reduces barriers to AFV ownership.

Indirect Benefits

The proliferation of AFVs reduces transportation emissions and improves air quality, thus improving health outcomes for low-income and disadvantaged communities.

Clean or zero-emissions fueling infrastructure is a key component to supporting AFVs, sharing the same benefits of increasing the deployment of AFVs. The lack of fueling infrastructure is often a significant impediment to AFV ownership, and increasing available infrastructure in LIDAC neighborhoods reduces barriers to obtaining AFVs. Additionally, providing fueling infrastructure within LIDAC neighborhoods makes AFV ownership more cost-effective by eliminating the need to travel further out of one's way for fueling.

While clean or zero-emissions fueling infrastructure is largely available within the Lehigh Valley's identified low-income and disadvantaged communities, LIDAC neighborhoods outside of the Lehigh Valley's core in particular can benefit from direct alternative fuel infrastructure investments: Slatington Borough, Bangor Borough, Roseto Borough and northernmost Washington Township in Northampton County, the southwestern portion of Bath Borough, Emmaus Borough and the western and southern areas of Southside Bethlehem. Each of the LIDAC neighborhoods in Carbon County lack zero-emissions fueling infrastructure and would benefit from investments, including northwest of Jim Thorpe, Lansford and Lehighton and east of Palmerton. In Warren County, Phillipsburg and Hackettstown also can benefit from direct alternative fuel infrastructure investments.



The regional inventory of alternative fueling infrastructure includes 111 EV charging stations and two natural gas stations in the Lehigh Valley, seven EV stations in Carbon County and three EV stations in Warren County.

Goal 4: Increase alternative fueling infrastructure and stations

Implementing Agencies	Vehicle manufacturers, businesses/organizations, federal and state legislative bodies and associated regulatory agencies, transit authorities, MPOs, local governments, power and fuel generation and distribution companies.
Authority to Implement	The LVPC/LVTS and other MPOs and planning organizations can use multiple methods to help expand the region's charging network. Planning organizations can recommend alternative fueling infrastructure to be included when applicable in land development reviews. Local governments can require alternative fueling infrastructure in land development projects via specific standards/criteria within zoning or subdivision and land development regulations. Another method is to allocate funding for alternative fuel infrastructure projects, as MPOs select projects for certain federal funding programs. Extensive collaboration is needed to implement this goal because many alternative fueling stations are constructed by private companies, and utility companies will also need to upgrade grid infrastructure to continually allow for greater fueling capacity.
Milestones	Enhancements to modernize the existing power grid to accommodate new fueling infrastructure. Funding and regulatory support to advance battery and engine design technologies, especially for heavy-duty and long-haul trucks. Funding for and development and construction of new charging/fueling infrastructure for a variety of fueling options, accessible broadly to all communities.
Implementation Schedule	Ongoing and alignment with technological advancements and projected vehicle conversion rates, with annual targets.
Geographic Location	Metropolitan Statistical Area

Funding Sources	USDOT: National Electric Vehicle Infrastructure Program, Congestion Mitigation and Air Quality Improvement Program, Carbon Reduction Program; US EPA: Climate Pollution Reduction Grant Implementation Grants; private investment, state funds, federal incentives, potential public-private partnerships.
Metrics	Number of new charging/alternative fueling stations added, including in LIDAC communities.
Related LVPC Plan Goals	***FutureLV: The Regional Plan*** ▸ Protected and Vibrant Environment ▸ Connected Mixed-Transportation Region
	Walk/RollLV: Active Transportation Plan ▸ Air Quality and Climate
	Climate + Energy Element ▸ To encourage alternatives to automobile use, both motorized and non-motorized.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Green Infrastructure

GOAL 5

Reimagine and retrofit major transportation corridors with green infrastructure

Green infrastructure refers to the interconnected network of open spaces and natural areas, often used to manage stormwater, improve water quality and reduce hazard impacts to public health and safety. Examples include urban forests, parks, green roofs, natural drainage systems and low impact development. When communities utilize and enhance their natural environmental assets as an integral part of their infrastructure, they can reduce their impact on climate change and increase their ability to adapt to changes that may occur.

Traditional methods have focused on enhancing fuel efficiency and transitioning to electric vehicles. However, these approaches, while critical, tackle only a part of the problem. The LVPC recognizes the necessity for a more comprehensive strategy, one that includes carbon sequestration as a key component in transportation decarbonization. This innovative approach aims to capture and store atmospheric CO_2, thereby reducing the overall carbon footprint of the transportation network.

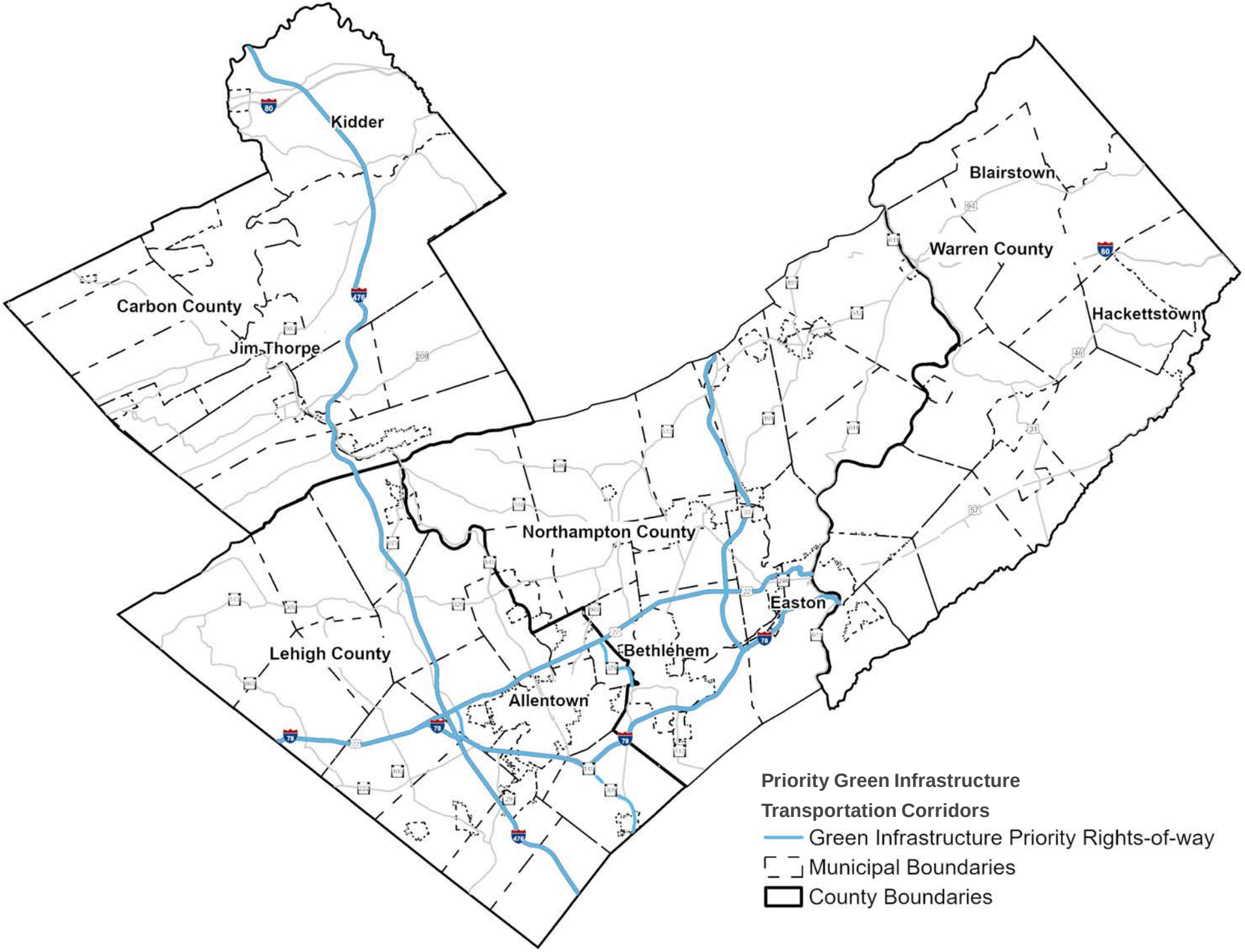
Integrating carbon sequestration into transportation infrastructure signifies a revolutionary step in environmental management. It involves capturing atmospheric CO_2 and storing it in a manner that prevents it from contributing to global warming. This can be achieved through various methods, such as using carbon-absorbing materials in road construction, urban greening along transportation corridors and integrating biochar in landscaping. By implementing these techniques, the LVPC aims to create a transportation network that facilitates movement and actively contributes to the reduction of greenhouse gases.

Target

This goal includes phasing, starting with landscaping retrofits of approximately 462 acres along Route 22 and expanding to other major corridors, with the goal to increase landscaped-based solutions along all corridors by at least 50% by 2050.

Estimate of GHG Emissions Reductions from Landscaping Enhancements

Regional Corridors	Estimated ROW Available for Greening in Acres*	Potential 2030 GHG Reductions ($MTCO_2e$ per year)**	2050 ($MTCO_2e$)
Route 22	462	388.08	388.08
Route 33	599	Future Phase	503.16
Interstate 78	1,065	Future Phase	894.60
Interstate 476	619	Future Phase	519.96
Route 309	108.44	Future Phase	91.09
Route 378	79.91	Future Phase	67.12
Total	2,933.35	388.08	2,464.01


Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Bethlehem
Lehigh County
Allentown
Priority Green Infrastructure
Transportation Corridors
Green Infrastructure Priority Rights-of-way
Municipal Boundaries
County Boundaries

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- **Enhanced resiliency of low-income and disadvantaged communities vulnerable to the impacts of climate change.**
- **Reduced heat island effects.**
- **Reduced impacts resulting from extreme weather events, such as flooding.**
- **Increased carbon sequestering improves air quality and reduces adverse health outcomes.**
- **Increased presence of natural areas improves aesthetics of an area and supports mental health.**

Direct Benefits

Improvements within LIDAC neighborhoods increase climate resiliency for LIDAC properties, preventing property damage or loss during extreme weather events.

Indirect Benefits

Investments outside of LIDAC neighborhoods that target flood sources can prevent property damage or loss within LIDAC neighborhoods.

Within the Lehigh Valley, many low-income and disadvantaged communities are concentrated in more developed areas with a high proportion of grayscape, such as in cities and boroughs. In particular, Center City Allentown and Southside Bethlehem are at the 90th percentile nationwide for share of land area covered by impervious surface.

LIDAC neighborhoods in urban areas are susceptible to extreme heat and urban island effects as temperatures rise, and heat islands are made worse by vehicle exhaust in areas with a high proximity to traffic. Converting impervious areas to natural spaces and reducing traffic in developed areas can significantly improve temperature conditions for low-income and disadvantaged communities, while also helping with other climate change impacts, such as flooding and air quality. While Carbon and Warren counties do not have any areas at or above the 90th percentile nationwide for share of land area covered by impervious surface, benefits identified above would also serve low-income and disadvantaged communities in Carbon and Warren that are in more developed areas with a high proportion of grayscape.

Goal 5: Reimagine and retrofit major transportation corridors with green infrastructure

Implementing Agencies	PennDOT, Pennsylvania Turnpike Commission, LVPC/LVTS, municipalities
Authority to Implement	Municipalities can require green infrastructure/carbon sequestration measures be prioritized in land development projects via specific standards/criteria within zoning, subdivision and stormwater regulations. The LVPC, through its stormwater ordinance regulatory oversight power, can assure consistency with adopted stormwater provisions. The LVTS can allocate funding from various sources towards green infrastructure projects on state and locally owned roads. However, state agencies and municipalities have final approval authority over these projects. Additionally, the Pennsylvania Turnpike Commission has authority over green infrastructure efforts on the Pennsylvania Turnpike.
Milestones	**Phase I: Assessment, Planning and Grant Application (Months 1-2)** ▸ Environmental impact assessments and strategic planning. ▸ Preparation and submission of the EPA grant application. **Phase II: Pilot Implementation (Months 7-18)** ▸ Implementation of carbon sequestration techniques. ▸ Monitoring and evaluation of pilot projects. **Phase III: Full-Scale Implementation (Months 19-36)** ▸ Expansion of successful techniques along the routes. ▸ Continued community engagement and educational initiatives. **Phase IV: Ongoing Monitoring and Adaptation (Months 37-onwards)** ▸ Long-term monitoring and strategy refinement.

Implementation Schedule	3-5 years for Phase I, 2029-2032 for Phase II, 2033-2036 for Phase III and 2036 and beyond for Phase IV.
Geographic Location	Route 22 initially, followed by Route 33, I-78, I-476, Route 378 and 309.
Funding Sources	USDOT: Carbon Reduction Program; US EPA: Climate Pollution Reduction Grant Implementation Grants; LVTS, municipalities.
Metrics	Lawn and impervious areas converted to forested areas or meadows, number, size and type of trees planted, number of nature-based stormwater control measures constructed, volume of stormwater managed via nature-based systems.
Related LVPC Plan Goals	***FutureLV: The Regional Plan*** ▸ Protected and Vibrant Environment
	Climate + Energy Element ▸ To promote energy efficiency and natural resources conservation within existing and new buildings and land development.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Transportation Systems Management and Operations

GOAL 6

Plan and implement Intelligent Transportation Systems (ITS) technologies.

The integration of Transportation Systems Management and Operations (TSMO) strategies into the Priority Climate Action Plan represents a forward-thinking approach to decarbonization and efficient resource utilization. By focusing on reducing congestion, particularly on regional highways and major corridors as outlined in the Long-Range Transportation Plan (LRTP), these strategies are key in creating a more sustainable transportation network.

The *FutureLV* initiative serves as a cornerstone in this endeavor, merging strategic planning and transportation mapping into a cohesive blueprint for the future. This plan emphasizes not just the movement of people and goods, but also the environmental implications of transportation. Prioritizing TSMO strategies achieves a dual objective: enhancing the efficiency of the transportation system while simultaneously reducing vehicle miles traveled (VMT).

Reducing congestion is a critical component of this strategy. Congestion leads to increased emissions due to idling and stop-and-go traffic and contributes to time loss and decreased economic efficiency. By implementing TSMO strategies, such as optimizing traffic signal timings, managing road space and promoting real-time traffic information systems, the region can significantly reduce congestion. These goals not only make transportation more efficient but also contribute to lowering greenhouse gas emissions.

For this goal, TSMO strategies are prioritized for regional highways and major corridors as outlined in the *FutureLV: The Regional Plan*. This includes, but is not limited to, 207 miles of regional highways and 188 miles of major corridors in the Lehigh Valley, which includes congested corridors.

Target

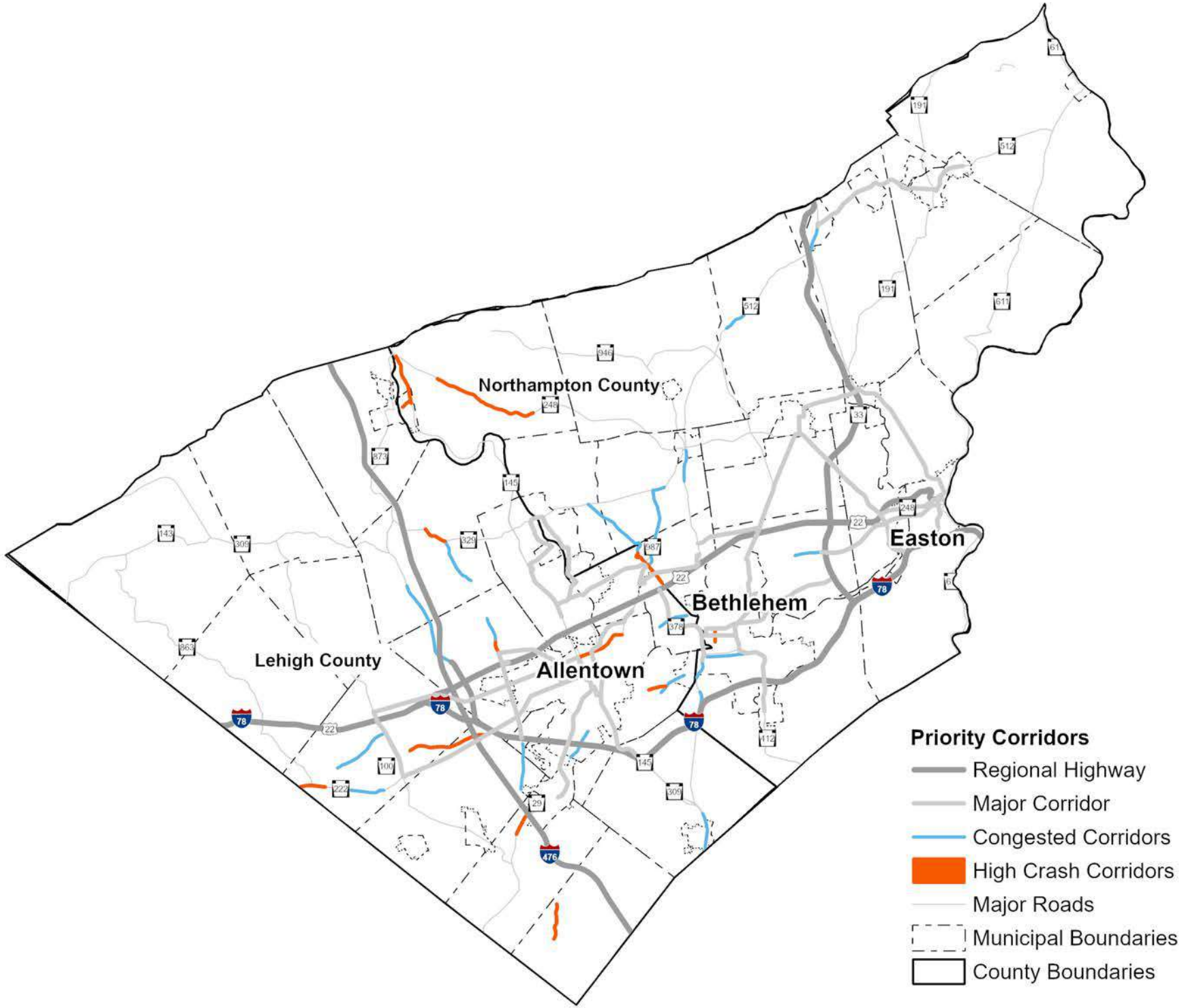
By 2030, Transportation Systems Management and Operations (TSMO) strategies are projected to be fully integrated along all regional roadways experiencing major congestion. These goals include adaptive signal control, real-time traffic monitoring and dynamic lane usage to enhance flow. Additionally, ramp metering, incident management systems and integrated corridor management will be utilized to optimize roadway capacity and reduce bottlenecks, significantly improving travel times and reducing emissions due to stop-and-go traffic.

GHG Reduction Estimates

2030 | 2,527 Metric Tons CO_2e

2050 | 2,010 Metric Tons CO_2e*

**TSMO and some other strategies may have less benefit in future years because the cars will be cleaner.*


Northampton County
Lehigh County
Allentown
Bethlehem
Easton
Priority Corridors
Regional Highway
Major Corridor
Congested Corridors
High Crash Corridors
Major Roads
Municipal Boundaries
County Boundaries

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- **Improved air quality**
- **Reduced noise pollution**
- **Improved traffic safety**

Direct Benefits

Efforts directed to reduce traffic within LIDAC neighborhoods improve air quality and reduce adverse health outcomes, such as asthma, reduce the health impacts of noise pollution and increase traffic safety.

Indirect Benefits

Traffic reduction outside of LIDAC neighborhoods improves air quality overall.

Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of traffic proximity: In the City of Allentown, Center City, East Allentown, north of Susquehanna Street and southeast of Route 22 and Cedar Crest Boulevard; in Whitehall Township southeast of Route 22 and MacArthur Road; in the City of Bethlehem, northwest and southwest of Route 22 and Schoenersville Road, South Bethlehem along Bethlehem's Main Street and east of Stefko Boulevard; southwest Bath Borough; and in the City of Easton along Larry Holmes Drive and Lehigh Drive and along Northampton Street at Wood Avenue; in Warren County, southern and southwestern Hackettstown and the eastern and southern areas of Phillipsburg. It is of note that high traffic proximity is located at the four Route 22 interchanges centrally located in the Lehigh Valley: the 15th Street interchange, Cedar Crest interchange, 7th Street/MacArthur Road interchange and Route 378 interchange.

Goal 6: Plan and implement Intelligent Transportation Systems (ITS) technologies.

Implementing Agencies	PennDOT, LVTS, municipalities. The implementing agencies for TSMO initiatives typically include state departments of transportation (like PennDOT and NJDOT), metropolitan planning organizations (like LVTS, NEPA and NJTPA) and municipalities. These agencies work collaboratively to plan, fund and execute transportation projects aimed at enhancing traffic flow and safety, reducing congestion and improving overall transportation infrastructure efficiency. The successful implementation of TSMO goals may involve engagement with the community, coordination with emergency services and partnerships with private sector stakeholders to leverage the latest technologies and practices in traffic management.
Authority to Implement	For the Lehigh Valley's specific TSMO projects, agencies include USDOT, PennDOT, LVTS and municipalities: ▸ **USDOT** can establish nationwide or statewide TSMO strategies and provide funding and policy guidance for state, regional and local implementation. ▸ **PennDOT** has the authority to implement TSMO projects on state roadways. They are responsible for statewide transportation planning, funding allocation and adherence to federal and state transportation regulations. ▸ **LVTS**, as the MPO for the Lehigh Valley, has the authority to conduct regional transportation planning and to prioritize projects for funding from both state and federal sources. ▸ **Municipalities** have the authority to implement TSMO goals on local roadways. This includes adopting traffic ordinances, approving the installation of traffic control devices and enhancing local road infrastructure.

Milestones	**Phase I** ▸ Project approval and funding allocation, technology acquisition and deployment, operational launch of Phase I, data collection and analysis, community engagement and feedback. **Phase II Expansion** ▸ Advanced technology integration, performance review, reporting and documentation, sustainable practices integration, continuous improvement.
Implementation Schedule	2-4 years for Phase I and 2029-2032 for Phase II. There are currently five TSMO projects in the Lehigh Valley TIP falling within the Phase I and II timelines.
Geographic Location	TSMO projects will be distributed along regional highways and key corridors as delineated in the *FutureLV* Centers + Corridors Transportation Plan Map, targeting areas with the highest congestion and potential for emission reductions.
Funding Sources	**Federal Funding:** EPA Climate Pollution Reduction Grants, USDOT CMAQ Program, Federal Transit Administration, Surface Transportation Block Grant Program. **State Funding:** PennDOT's Statewide TSMO Funding, Automated Red Light Enforcement Funding, Multimodal Transportation Fund, Green Light-Go Program, Act 89 Transportation Plan, State Transportation Innovation Council Incentive Program, Bond Financed Programs, Pennsylvania Infrastructure Bank. **Local Funding:** Local government budgets, regional transportation authorities, public-private partnerships, private sector investment. **Innovative Financing Tools:** Transportation Infrastructure Finance and Innovation Act Loans.

Metrics	Percentage reduction in peak hour traffic congestion and associated greenhouse gas emissions, improvement in traffic safety and operational efficiency, adoption rates of ITS and utilization of optimized infrastructure, ratio of cost savings to investment and public satisfaction with transportation improvements.
Related LVPC Plan Goals	***FutureLV: The Regional Plan*** ▸ Connected Mixed-Transportation Region ▸ Safe, Healthy, Inclusive and Livable Communities
	Walk/RollLV: Active Transportation Plan ▸ Air Quality and Climate ▸ Emerging Technologies

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Low-Income and Disadvantaged Communities Benefits Analysis

Historical inequities and policies related to transportation infrastructure, environmental justice and climate change over our nation's history have disproportionately affected low-income populations and communities of color.

Policy decisions such as freeway construction, suburbanization and transit underinvestment have resulted in negative consequences for these communities. Efforts to combat climate change today can also unintentionally become inequitable or exclusionary for several reasons that are often tied to historical and systemic factors. The LVPC and LVTS aim to understand and address historical inequities as a crucial foundation for developing comprehensive and equitable strategies that mitigate the impacts of climate change, while ensuring that vulnerable populations are not further marginalized or disproportionately burdened by environmental challenges. Addressing these issues requires a conscious effort to incorporate principles of environmental justice into climate policies, ensuring that strategies are inclusive, considerate of historical disparities and actively work to avoid perpetuating or exacerbating existing racial and economic inequalities.

Proximity to Polluting Industries

Historically, industrial facilities and hazardous waste sites have been disproportionately located in or near low-income neighborhoods and communities of color. This practice, known as environmental racism, exposes these populations to higher levels of pollution and environmental hazards, contributing to adverse health effects and reduced quality of life.

Communities that have historically faced environmental racism, such as the siting of polluting industries in their neighborhoods, may be skeptical of new environmental initiatives. If past injustices are not acknowledged and addressed, these communities may resist or be excluded from climate change solutions.

Redlining and Segregation

Redlining policies in the United States systematically denied financial services to residents of certain neighborhoods, often based on racial and socioeconomic factors. This resulted in the concentration of environmental hazards in marginalized communities, as these areas were denied the resources for infrastructure development and were left vulnerable to the impacts of climate change.

Lack of Access to Green Spaces

Low-income communities and neighborhoods with predominantly non-white populations often lack access to green spaces and urban parks. This lack of green infrastructure contributes to the urban heat island effect, leading to higher temperatures and increased vulnerability to heat-related illnesses.

Displacement Risk

Climate change-related events, such as sea-level rise, extreme weather events and wildfires, can lead to displacement and migration. Low-income communities often lack financial and social resources and face challenges in relocating, which can exacerbate social inequalities.

Climate resilience goals, such as infrastructure improvements and green initiatives, can also inadvertently result in displacement. As neighborhoods become more resilient to climate change, property values may rise and lead to the displacement of existing low-income residents, many of whom are part of marginalized racial or ethnic groups.

Economic Disparities in Access to Green Technologies

The transition to green technologies and sustainable practices may create economic barriers. For example, electric vehicles and solar panels can be expensive, making them less accessible to low-income individuals. Without targeted policies to address affordability and accessibility, the benefits of clean technology may not be equitably distributed.

Health Disparities

Exposure to environmental pollutants and climate-related health risks, such as heatwaves and air pollution, has historically been higher in low-income communities and communities of color. This exposure contributes to health disparities, including higher rates of respiratory diseases, cardiovascular problems and other adverse health outcomes.

Inequitable Access to Climate Information

Vulnerable communities may lack access to timely and relevant information about climate change and its impacts. This information gap can hinder their ability to prepare for and respond to climate-related challenges, exacerbating existing disparities in resilience and adaptability.

Unequal Distribution of Environmental Benefits and Burdens

Climate mitigation and adaptation strategies may inadvertently result in an unequal distribution of benefits and burdens. For example, policies promoting the use of renewable energy sources might disproportionately benefit wealthier communities, while low-income communities, often communities of color, may bear the brunt of the impacts of pollution and environmental degradation.

Lack of Representation in Decision-Making

Historically, communities of color and low-income populations have been underrepresented in decision-making processes, including those related to environmental policies. A lack of representation results in policies that may not adequately consider or address the specific needs and concerns of these communities, perpetuating existing social and environmental injustices.

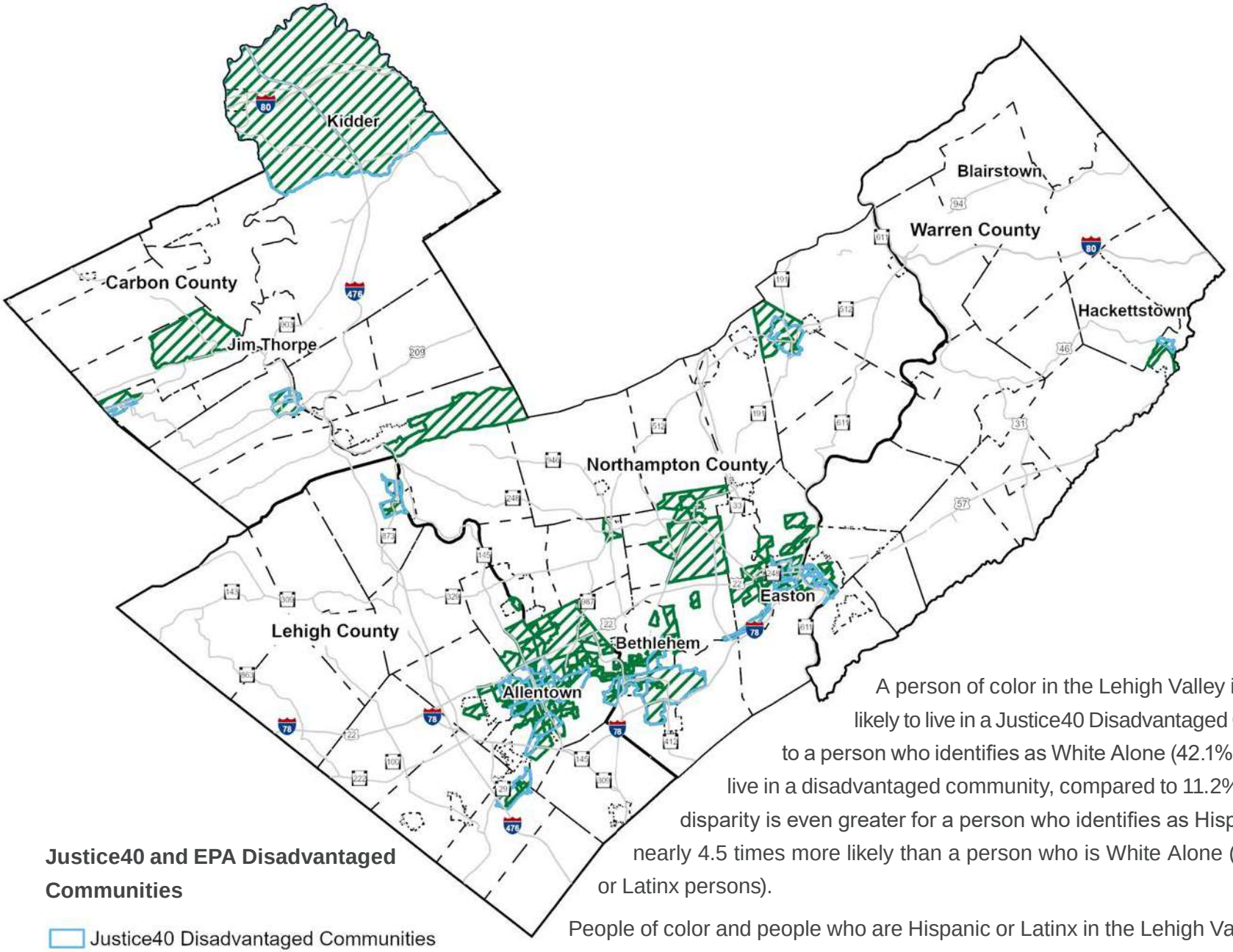
Environmental Justice and Low-Income and Disadvantaged Communities

> **The US Environmental Protection Agency's definition of environmental justice contains two conditions:**
>
> 1. Meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.
> 2. No group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.

This plan abides by the Justice40 directive set by the Biden Administration. It aims to address historical underinvestment in disadvantaged communities, which are greatly impacted by pollution, climate change and other environmental hazards. Through the Justice40 directive, at least 40% of benefits from government plans and programs, such as this PCAP, will go towards disadvantaged communities. Federal and state funding programs referenced in this plan, such as CRP, CMAQ and PROTECT, all follow Justice40 guidance as well. The LVPC has developed a regional equity analysis based upon Justice40 guidance, which informed the 2023 update of the *FutureLV: The Regional Plan*. This analysis helps identify areas where LRTP projects will provide especially impactful benefits, allowing for identification of transportation decarbonization projects that will benefit traditionally underserved communities.

This analysis defines low-income and disadvantaged communities (LIDAC) as any community identified as disadvantaged by the Climate and Economic Justice Screening Tool (Justice40 Disadvantaged) or any Census ID that is identified as disadvantaged by the EPA using the Environmental Justice Screening and Mapping Tool (EPA Disadvantaged).

Thirty-one of the Lehigh Valley's 144 Census IDs meet the Justice40 threshold that identifies disadvantaged communities, as well as nine Census IDs in Carbon County and eight Census IDs in Warren County. Additionally, the Lehigh Valley has 479 Census IDs that meet the EPA threshold for disadvantaged, with seven Census IDs in Carbon County and five Census IDs in Warren County meeting that threshold.



Justice40 and EPA Disadvantaged Communities

- Justice40 Disadvantaged Communities
- EPA Disadvantaged Communities
- Major Roads
- Municipal Boundaries
- County Boundaries

A person of color in the Lehigh Valley is nearly four times as likely to live in a Justice40 Disadvantaged Community compared to a person who identifies as White Alone (42.1% of all persons of color live in a disadvantaged community, compared to 11.2% of White Alone). The disparity is even greater for a person who identifies as Hispanic or Latinx, who is nearly 4.5 times more likely than a person who is White Alone (49.9% of all Hispanic or Latinx persons).

People of color and people who are Hispanic or Latinx in the Lehigh Valley are also six times more likely to have low median household incomes (22.7% of people of color and 27.5% of people who are Hispanic or Latinx, compared to 4% of people identifying as White Alone).

LVPC Equity Analysis

Equity is integral to the daily functions of the LVPC, recognizing that an equitable region is vital to the success and sustainability of the Lehigh Valley as a whole. Equity is a core element of the LVPC's mission and serves as the foundation of *FutureLV: The Regional Plan*. The LVPC and LVTS have maintained and continually updated a Lehigh Valley-wide Equity Analysis for several years that identifies existing disparities in access to opportunities and provides a platform that elevates informed discussions about equity. Since its inception, the Lehigh Valley Equity Analysis has been an accessible online tool used and referenced by many public, private and non-profit partners.

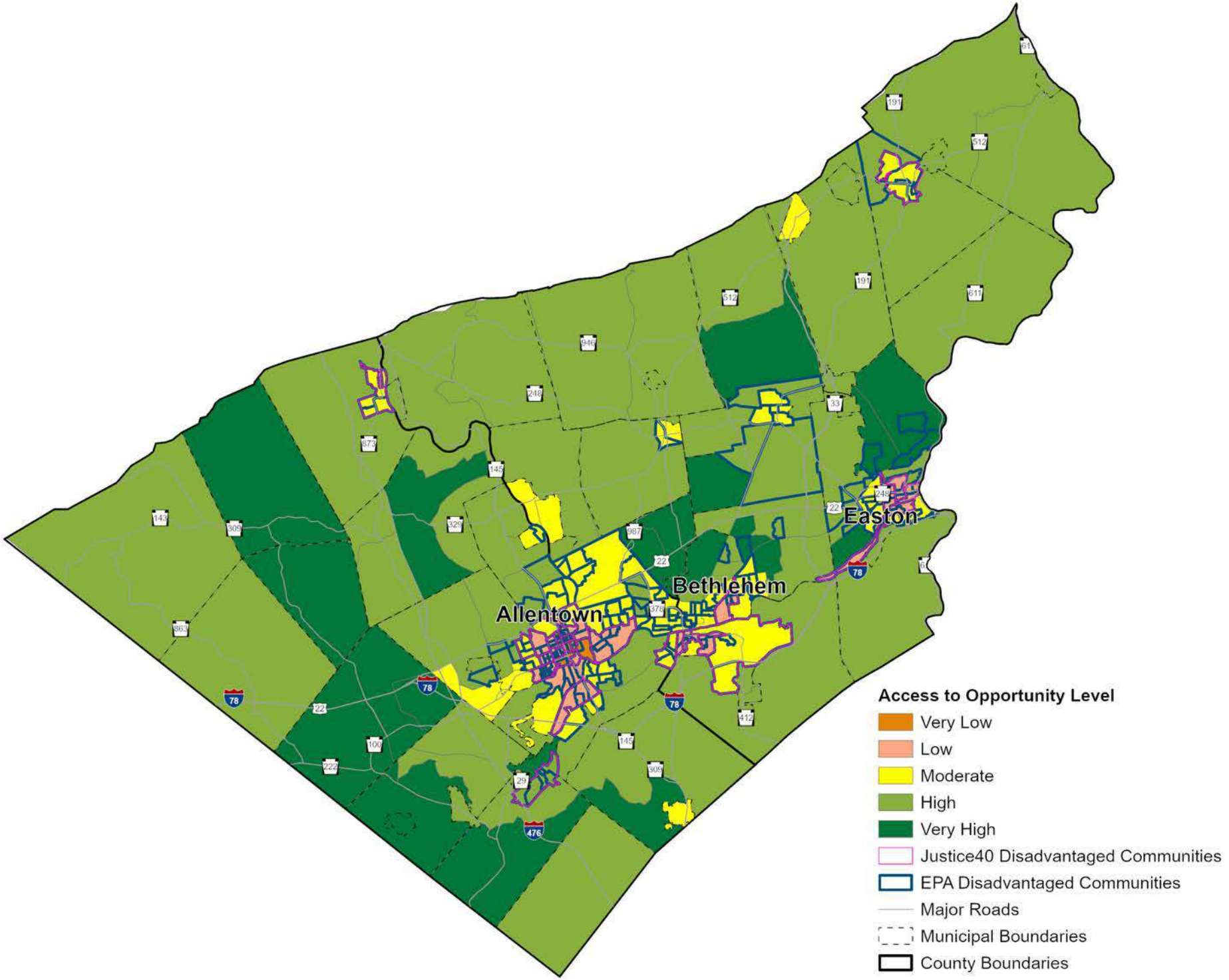
The LVPC Equity Analysis was developed using datasets obtained through the Climate and Economic Justice Screening Tool (CEJST), identifying Justice40 Disadvantaged Communities, with the addition of datapoints representing homeownership rate, zero-vehicle households and broadband access. The similarities in datasets used results in similar results between the LVPC Equity Analysis and Justice40 and EPA Disadvantaged Communities; however, where Justice40 identifies disadvantaged communities on a national level, the LVPC Equity Analysis quantifies equity between communities in the Lehigh Valley, providing a regional context in an accessible tool that supports local initiatives.

A primary function of the LVPC Equity Analysis is to identify disparities affecting disadvantaged populations that are geographically dispersed, including those with low incomes, people of color and additional populations including seniors and single parents.

The LVPC Equity Analysis is used in combination with additional map layers, such as population demographics, public infrastructure and transit service, to analyze factors with equity conditions as a primary consideration. Population demographics, such as age and race, are overlayed on the map to identify what populations have the greatest and least access to opportunity.

Justice40 Disadvantaged Communities can also be overlayed when developing and selecting projects to pay special attention to any positive and negative impacts projects will have on disadvantaged populations, and to actively include their voices in meaningful public participation processes.

Equity in the Lehigh Valley
is achieved when race and ethnicity can no longer be used to predict life outcomes.


Easton
Bethlehem
Allentown
Access to Opportunity Level
Very Low
Low
Moderate
High
Very High
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries

Benefits Analysis

Low-income and disadvantaged communities stand to benefit from efforts to reduce GHG emissions if historical inequities and the results of disproportionate impacts are considered to ensure that vulnerable populations are not further marginalized or burdened by environmental challenges.

The following LIDAC benefits analysis evaluates the benefits provided to low-income and disadvantaged communities by reducing transportation and air quality impacts, increasing mobility for zero-vehicle households, increasing transit ridership, commuting and walkability, and reducing impacts due to traffic proximity, as well as additional environmental benefits that mitigate climate change impacts through transportation decarbonization.

The LIDAC analysis is supported by data from the Justice40 Initiative, the EPA's Environmental Justice Screening and Mapping Tool (EJScreen), and the LVPC's Equity and Opportunity Analysis.

Justice40 is a federal initiative that seeks to address systemic inequitable historic policies and underinvestment in disadvantaged communities. US DOT defines a disadvantaged community as 'a group of individuals living in geographic proximity to one another or sharing common conditions or group experiences that experience cumulative burden across economic, social, and environmental factors.' Through EJScreen, the EPA provides an online analysis of disadvantaged communities that includes both environmental and socioeconomic data indicators at a range of geographic levels. The EPA provides this data to be more transparent about what the EPA considers and evaluates environmental justice as well as to support a wide range of research and policy goals and assist users in making informed decisions about pursuing environmental justice. Within the MSA, 231,489 people live within a Justice40 or EPA Disadvantaged community, accounting for 27% of the population.

The LVPC has maintained and continually updated a Lehigh Valley-wide Equity and Access to Opportunity Analysis for several years that identifies existing disparities in access to opportunities and provides a platform that elevates informed discussions about equity. Since its inception, the Lehigh Valley Equity Analysis has been an accessible online tool used and referenced by many public, private and nonprofit partners. The Lehigh Valley Equity Analysis now includes 32 datasets, which support and expand on the Justice40 and EJScreen datasets.

Together, these analyses accomplish a deeper understanding of the impacts and benefits of the goals outlined in the PCAP on LIDAC populations in the MSA.

Transportation and Air Quality Impacts (PM 2.5 and Ozone)

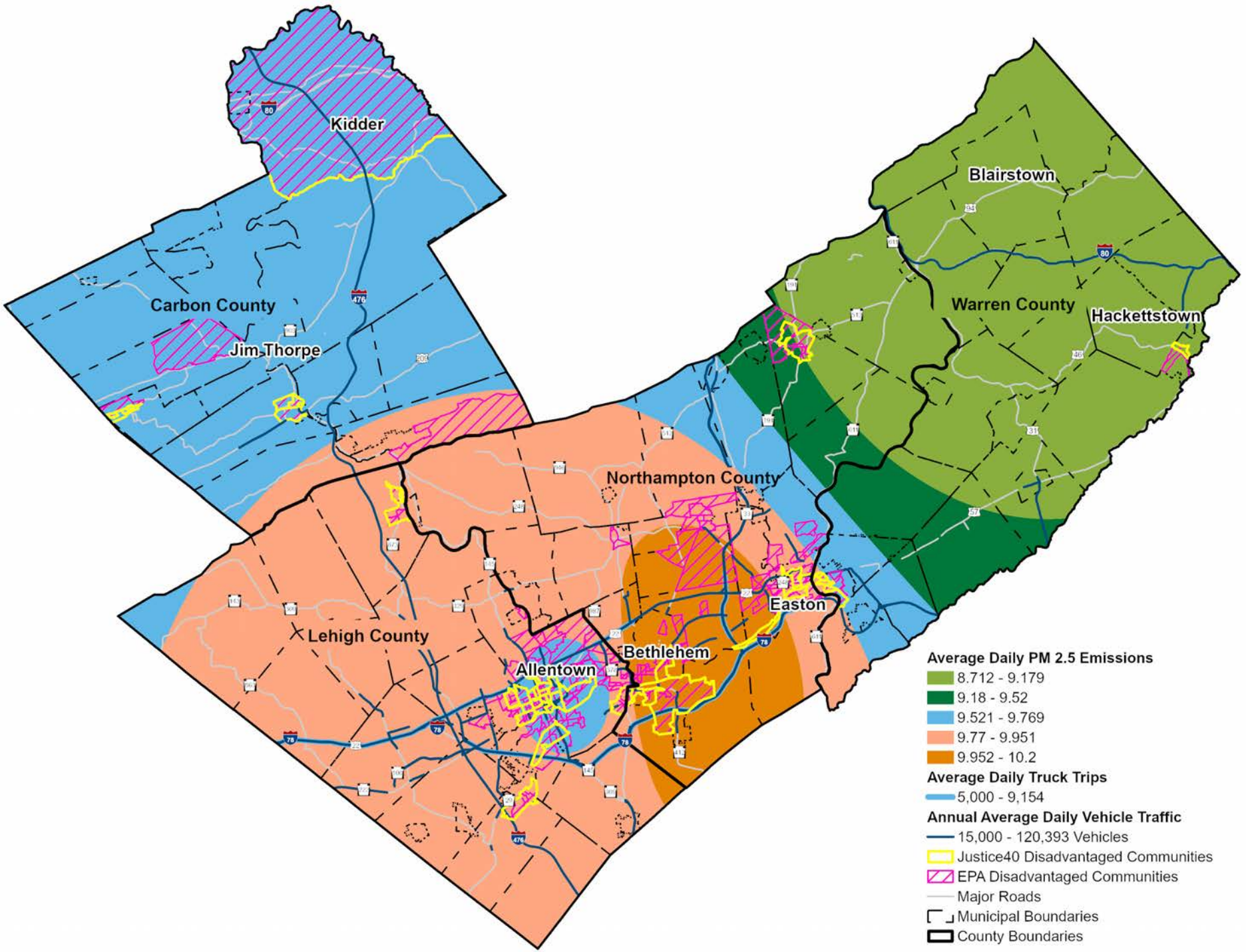
The Transportation and Mobile Sources sector is one of the Lehigh Valley's largest contributors to greenhouse gas emissions, most of which is generated by on-road gasoline vehicle travel. Air quality impacts resulting from vehicle emissions are exacerbated in low-income and disadvantaged communities, where 12% of people of color and 14.7% of those who identify as Hispanic or Latinx suffer from asthma, compared to 1.5% of people identifying as White Alone. Efforts to reduce transportation emissions and investments in alternative transportation options would help to improve adverse health impacts tied to poor air quality.

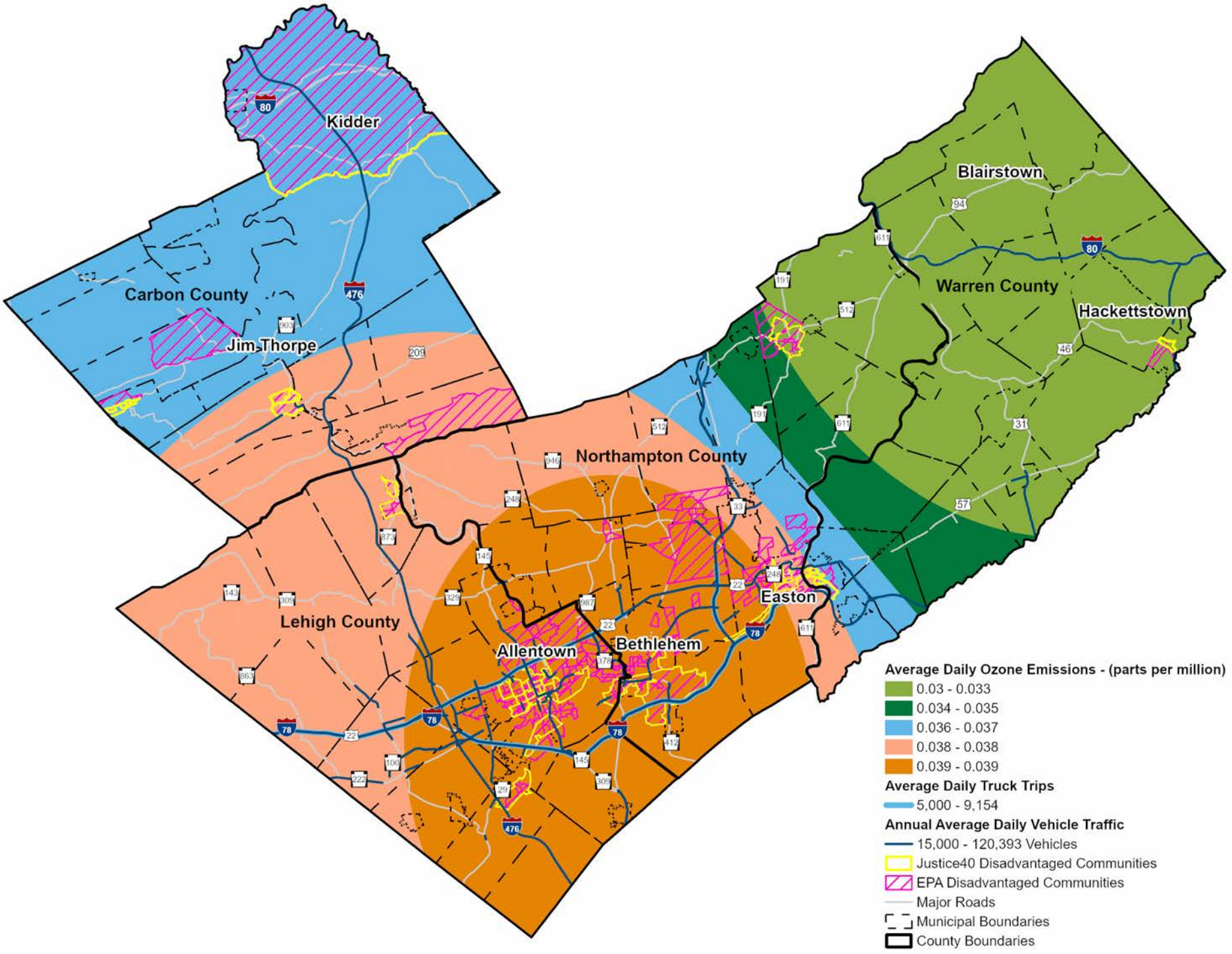
Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of Particulate Matter 2.5 (PM 2.5) and Ozone nationwide: In Center City Allentown along North 7th Street and to the west and east, southwest of Route 22 and Cedar Crest Boulevard, east side Allentown south of Hanover Avenue and between the Lehigh River and Susquehanna Street; in the City of Bethlehem west of Stefko Boulevard and north of the Lehigh River, north of Fahy Bridge and east of Old York Road, and in Southside Bethlehem along 4th Street and Hayes Street; and in Fountain Hill Borough north of Broadway to the west.

In addition to areas of the Lehigh Valley where high rates of PM 2.5 and Ozone overlap, the City of Easton north of Lehigh Drive is between the 90th and 95th percentile nationwide for Ozone. No areas within Carbon County or Warren County are at or above the 90th percentile nationwide for PM 2.5 or Ozone.

Investing in alternative transportation options also provides additional health benefits to low-income and disadvantaged communities by increasing options for active transportation, which supports positive health outcomes. In the Lehigh Valley, 7.5% of people of color and 9.5% of people who identify as Hispanic or Latinx have diabetes, compared to 0.9% of people identifying as White Alone, and 2.9% of people of color and 3.7% of those who are Hispanic or Latinx suffer from heart disease, compared to 0.5% of people identifying as White Alone. Diabetes and heart disease are two health conditions that can be prevented through increased activity.

> **"Air quality impacts resulting from vehicle emissions are exacerbated in low-income and disadvantaged communities."**


Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Lehigh County
Bethlehem
Allentown
Average Daily PM 2.5 Emissions
8.712 - 9.179
9.18 - 9.52
9.521 - 9.769
9.77 - 9.951
9.952 - 10.2
Average Daily Truck Trips
5,000 - 9,154
Annual Average Daily Vehicle Traffic
15,000 - 120,393 Vehicles
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries


Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Lehigh County
Allentown
Bethlehem
Average Daily Ozone Emissions - (parts per million)
0.03 - 0.033
0.034 - 0.035
0.036 - 0.037
0.038 - 0.038
0.039 - 0.039
Average Daily Truck Trips
5,000 - 9,154
Annual Average Daily Vehicle Traffic
15,000 - 120,393 Vehicles
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries

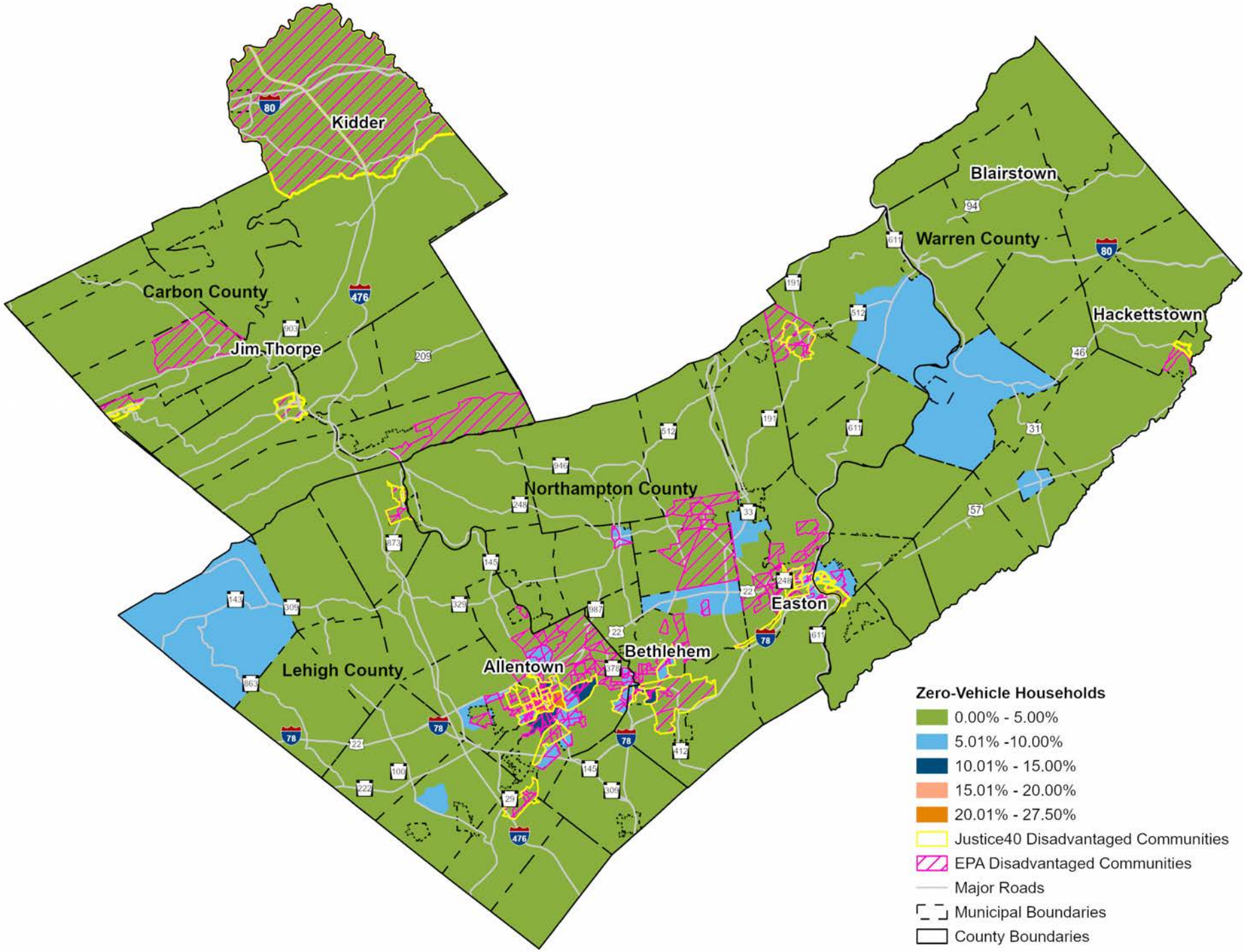
Zero-Vehicle Households

Zero-vehicle households are households that indicate they do not have any motorized vehicles. The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent. For some, not owning a vehicle represents a lifestyle choice, while for others, the process of obtaining a vehicle is cost-prohibitive, and long-term vehicle maintenance is a substantial economic investment. Understanding which households in the region do not have access to a vehicle, and where they are located, is critical when identifying areas to direct transportation infrastructure investments. Alternative transportation infrastructure investments, such as sidewalks, bike lanes, trails and transit service, can help eliminate the need for personal vehicles and directly benefit zero-vehicle households.

In a car-centric society, not having access to a vehicle can limit access to critical needs, including employment, educational opportunities, healthcare, daycare and grocery stores. It can also substantially increase the burden of time required to move between locations. About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households. Those households are primarily concentrated in core urban areas where there are more mode options available (Allentown, Bethlehem and Easton cities), but zero-vehicle households also expand beyond city boundaries into suburban and rural townships and boroughs where alternative modes, such as transit, are more limited, if available at all.

Disparities in mode choice are also present for geographically dispersed populations. In the Lehigh Valley, people of color and the Hispanic or Latinx population are much more likely to live in areas where a high concentration of households do not have access to a vehicle: 28.8% of people of color and 34.7% of people identifying as Hispanic or Latinx, compared to 3.7% of people identifying as White Alone. Additionally, a person who is Black, Indigenous or a person of color is nearly three times more likely to commute to work via alternative transportation modes, including public transportation, walking, biking, rideshare or some other means (9.1% people of color compared to 3.6% of White, Non-Hispanic). Benefits to low-income and disadvantaged communities can be quantified by tracking the increase in number of locations accessible via alternative transportation modes available in LIDAC neighborhoods and areas with zero-vehicle households.

> **About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households.**

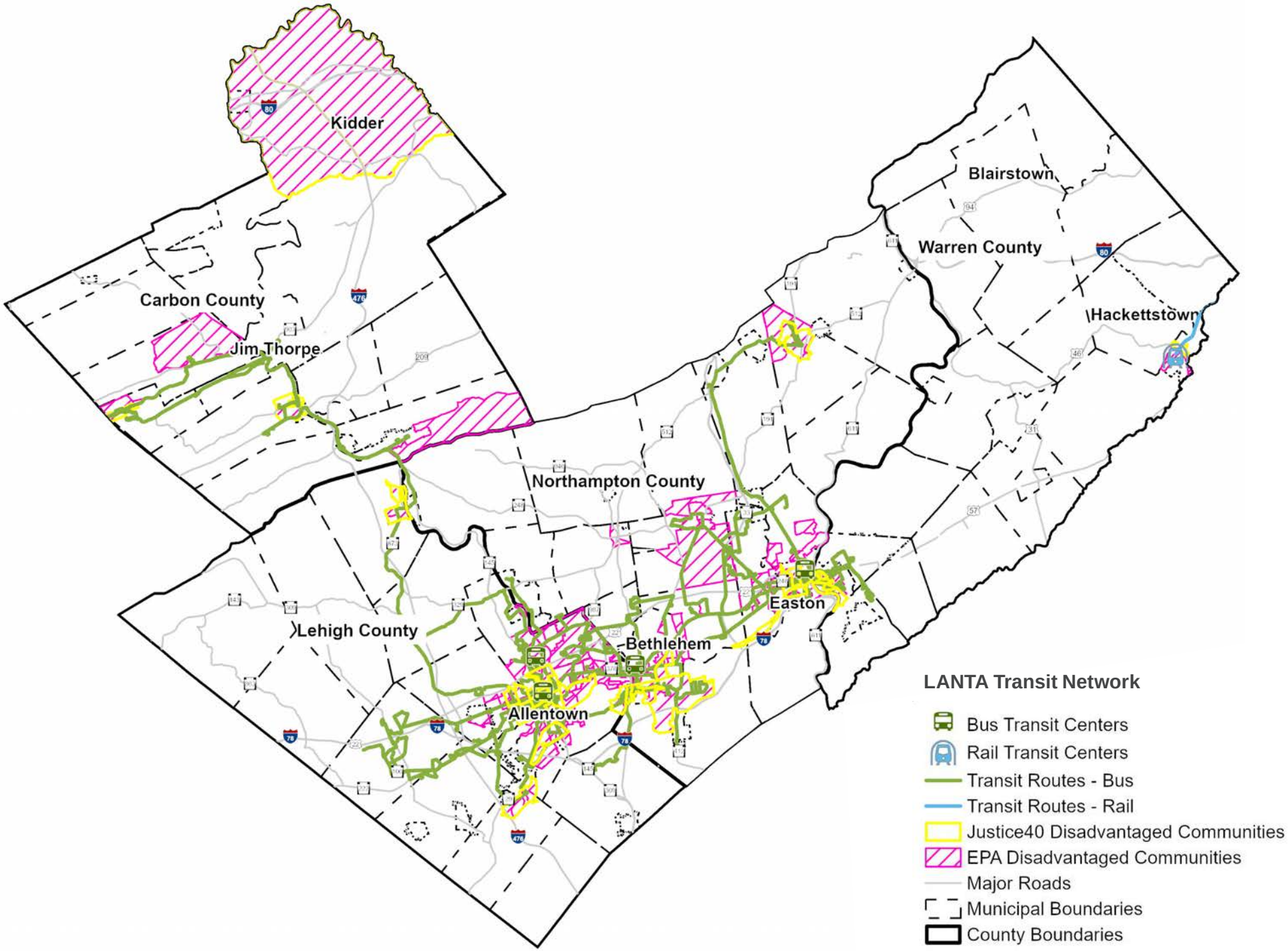

Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Bethlehem
Allentown
Lehigh County
Zero-Vehicle Households
0.00% - 5.00%
5.01% -10.00%
10.01% - 15.00%
15.01% - 20.00%
20.01% - 27.50%
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries

Transit Ridership and Commuting

The Lehigh and Northampton Transportation Authority (LANTA) provides transit service within nearly all the Lehigh Valley's identified low-income and disadvantaged communities. The southwestern portion of Bath Borough is the most notable area of the region, with identified low-income and disadvantaged communities, that does not have transit service available, and no service is provided in the vicinity. Areas of Forks Township, just north of the City of Easton, are not served directly by transit but have transit service available nearby along Sullivan Trail. In Carbon County, low-income and disadvantaged communities northwest of Jim Thorpe and east of Palmerton also have transit service available nearby but are not served directly by transit. In Warren County, low-income and disadvantaged communities in Phillipsburg and Hackettstown are both served directly by transit.

It is critical for transit service to not only be available to low-income and disadvantaged communities, but also provide access to key destinations, such as educational institutions, healthcare and job centers with frequent, consistent and predictable service throughout the day and night. Benefits specific to low-income and disadvantaged communities can be quantified by tracking the increase in transit ridership, the increase in number of locations accessible via transit from LIDAC neighborhoods, the decrease in length of time for transit trips between LIDAC neighborhoods and key destinations, and the increase in frequency of service availability.

> **About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households.**


Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Lehigh County
Bethlehem
Allentown
LANTA Transit Network
Bus Transit Centers
Rail Transit Centers
Transit Routes - Bus
Transit Routes - Rail
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries

Walkability

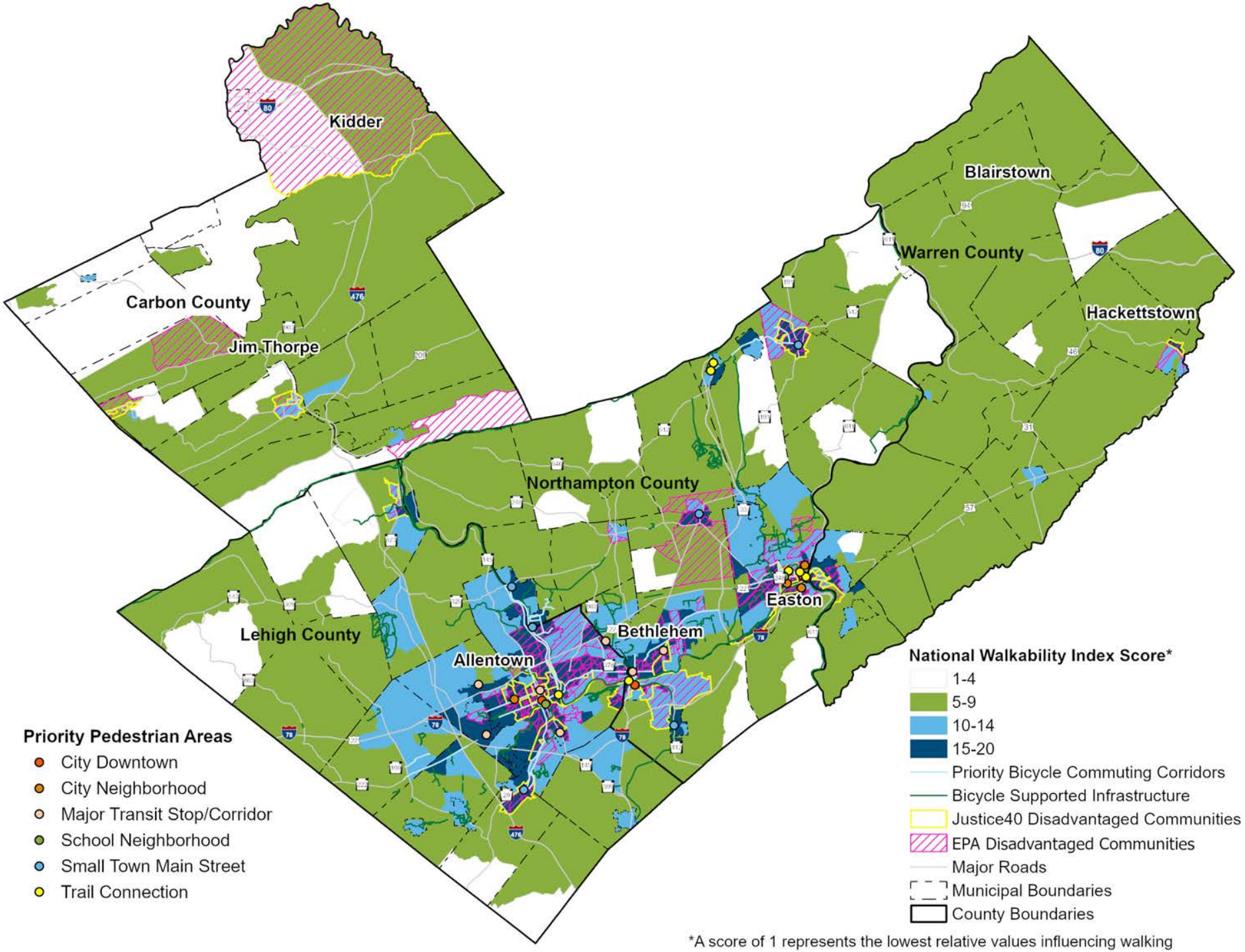
Policies to increase alternative transportation and walkability would particularly benefit the Lehigh Valley's low-income and disadvantaged communities that are located in areas with some of the region's lowest National Walkability Index scores:

- Lower Nazareth to the east and south of Nazareth Borough
- Forks Township east of Sullivan Trail
- Southern Bushkill Township adjacent to Nazareth Borough
- Northwest of Jim Thorpe and east of Palmerton, in Carbon County.

There are several other areas of the region where alternative transportation infrastructure can further improve walkability to serve low-income and disadvantaged communities (Score of 10-14):

- Northern and western areas of Slatington Borough
- Southwestern Bath Borough
- Northern Nazareth Borough
- Southern Forks Township adjacent to the City of Easton; areas of northern and southeastern Easton, West Easton Borough and Wilson Borough
- Hanover Township, Lehigh County
- Areas in the cities of Bethlehem and Allentown
- Phillipsburg and Hackettstown in Warren County

Benefits specific to low-income and disadvantaged communities can be quantified by tracking the increase in the National Walkability Index Score for LIDAC neighborhoods and areas frequented by low-income and disadvantaged communities.

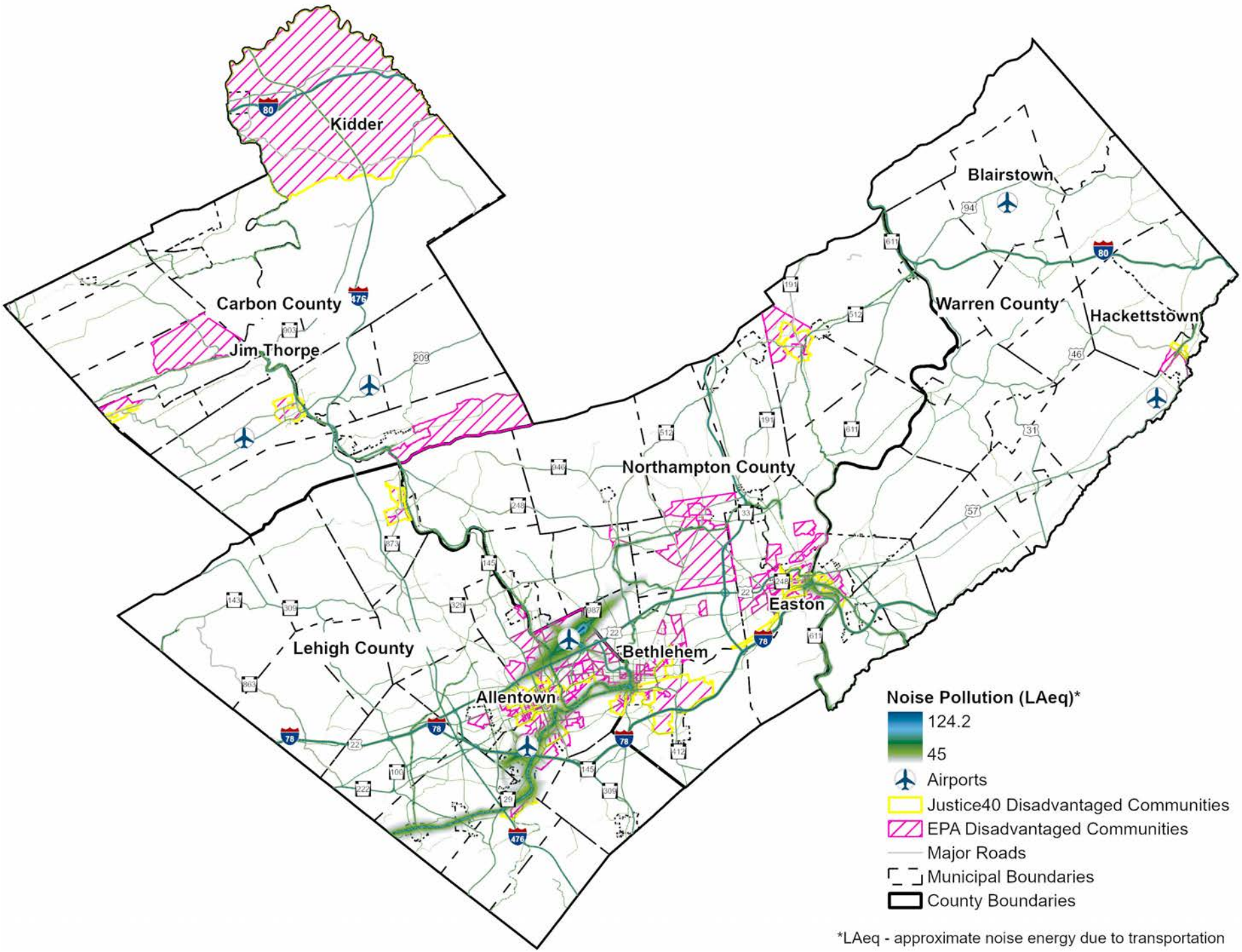

Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Bethlehem
Lehigh County
Allentown
Priority Pedestrian Areas
City Downtown
City Neighborhood
Major Transit Stop/Corridor
School Neighborhood
Small Town Main Street
Trail Connection
National Walkability Index Score*
1-4
5-9
10-14
15-20
Priority Bicycle Commuting Corridors
Bicycle Supported Infrastructure
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries
*A score of 1 represents the lowest relative values influencing walking

Traffic Proximity

Areas with high rates of traffic proximity should be targeted for efforts to reduce traffic. Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of traffic proximity: In the City of Allentown, Center City, East Allentown, north of Susquehanna Street and southeast of Route 22 and Cedar Crest Boulevard; in Whitehall Township southeast of Route 22 and MacArthur Road; in the City of Bethlehem, northwest and southwest of Route 22 and Schoenersville Road, Southside Bethlehem, along Bethlehem's Main Street and east of Stefko Boulevard; southwest Bath Borough; in the City of Easton along Larry Holmes Drive and Lehigh Drive and along Northampton Street at Wood Avenue; in Warren County, southern and southwestern Hackettstown and the eastern and southern areas of Phillipsburg. No areas of Carbon County are in the 90th percentile or above for traffic proximity.

The following map indicates the level of noise pollution generated by traffic in relation to low-income and disadvantaged communities.

It is of note that high traffic proximity is located at the four Route 22 interchanges centrally located in the Lehigh Valley: the 15th Street interchange, Cedar Crest interchange, 7th Street/ MacArthur Road interchange and Route 378 interchange. Benefits to low-income and disadvantaged communities can by quantified by tracing the reduction in traffic proximity within and near LIDAC neighborhoods.


Kidder
Carbon County
Jim Thorpe
Blairstown
Warren County
Hackettstown
Northampton County
Easton
Bethlehem
Lehigh County
Allentown
Noise Pollution (LAeq)*
124.2
45
Airports
Justice40 Disadvantaged Communities
EPA Disadvantaged Communities
Major Roads
Municipal Boundaries
County Boundaries
*LAeq - approximate noise energy due to transportation

Climate Mitigation Benefits

Transportation emissions contribute to climate change and indirectly contribute to other environmental risks resulting from increasing global temperatures and extreme weather events. Reducing transportation emissions supports the reduction of other climate change impacts on low-income and disadvantaged communities, such as the risk of flooding and associated property loss or damage, and heat island effects, where areas with a high rate of impervious cover and a low rate of green space experience hotter temperatures than surrounding areas.

Low-income and disadvantaged communities are particularly vulnerable to:

Extreme weather events

- Low-income and disadvantaged communities located in proximity to streams and water bodies are prone to flood hazard, especially in the event of extreme rainfall.
- Low-income and disadvantaged communities often lack financial means or social capital to address property damage in the event of extreme weather events and are at greater risk of displacement.

Extreme heat and urban heat island effects

- Many low-income and disadvantaged populations are concentrated in urban areas with a high proportion of grayscape.

The LVPC and LVTS have identified the following climate mitigation benefits that will reduce the overall risk of adverse climate impacts on low-income and disadvantaged communities (LIDAC):

Equitable Access to Public Transportation

Investing in affordable and efficient public transportation options benefits low-income individuals who may rely on public transit for their daily commute. Well-planned public transportation systems can reduce traffic congestion, lower emissions and improve air quality in marginalized communities.

Direct Benefit: Infrastructure investments in LIDAC neighborhoods.

Indirect Benefits: External infrastructure investments supporting LIDAC use in other areas and connecting LIDAC neighborhoods to other places.

Example: Well-designed bus shelters in shopping centers that may not be within LIDAC neighborhoods but are frequented by LIDAC at high employment centers.

Access to Active (Alternative) Transportation

Developing infrastructure for active transportation opportunities, such as trails and sidewalks, provides travel options that are lower cost and health-supportive for low-income individuals. Investing in active transportation helps connect communities to employment opportunities and educational and cultural resources and can serve as an extension of the region's transit system.

Direct Benefit: Infrastructure investments in LIDAC neighborhoods.

Indirect Benefit: External infrastructure investments connecting LIDAC neighborhoods to other places.

Public Health Benefits

Greenhouse gas reduction goals often lead to improved air and water quality. This has direct public health benefits, as cleaner environments can reduce the incidence of respiratory diseases and other health issues that disproportionately affect low-income and disadvantaged populations.

Direct Benefit: Cleaner air and water improves health outcomes and reduces the rate of adverse health conditions (asthma, diabetes, heart disease).

Green Job Creation

Implementing renewable energy projects, energy efficiency initiatives and sustainable infrastructure can generate employment opportunities. By focusing on training and hiring from within local communities, especially in areas with lower incomes and higher unemployment rates, these initiatives can directly benefit low-income populations.

Direct Benefit: Providing increased job opportunities specifically for LIDAC attainability.

Affordable and Clean Energy Access

Policies that promote the use of clean and renewable energy sources can help reduce energy costs for households. Targeted programs, such as subsidies and incentives, can make clean energy technologies more affordable and accessible to low-income communities, improving energy efficiency and reducing reliance on fossil fuels.

Direct Benefit: Reduced energy costs and reduced barriers to obtaining green energy.

Climate Resilient Infrastructure

Designing and implementing climate-resilient infrastructure projects, such as flood barriers, green spaces and improved water management, can enhance the resilience of vulnerable communities to the impacts of climate change. Measures that prioritize areas susceptible to climate-related hazards with populations historically facing environmental injustices will reduce disparate impacts resulting from extreme weather events.

Direct Benefit: Improved climate resiliency for LIDAC properties, preventing property damage or loss during extreme weather events.

Indirect Benefit: Investments outside of LIDAC neighborhoods targeting possible flood sources can prevent property damage or loss.

Equitable Access to Climate Information

Ensuring that communities have access to timely and relevant information about climate change impacts and adaptation strategies is crucial. This can empower residents to make informed decisions and participate in local climate planning efforts.

Direct Benefit: Providing necessary information that supports critical decision making.

Inclusive Decision-Making Processes

Actively involving representatives from low-income communities and communities of color in decision-making processes related to climate policies ensures that diverse perspectives are considered, and solutions are tailored to the specific needs of these communities.

Direct Benefit: LIDAC participation supports diverse perspectives and specific solutions to community needs.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Review of Authority to Implement Reduction Measures

In the context of transportation decarbonization, a comprehensive review of the authority to implement proposed greenhouse gas reduction goals is crucial for effective action.

The legal and regulatory framework provides the basis for implementing transportation decarbonization strategies. This includes laws and regulations related to vehicle emissions, fuel standards and transportation funding. Ensuring that these legal frameworks are robust and forward-looking is essential for enabling effective decarbonization efforts. This section provides a general overview of various organizations and agencies with implementation authority related to goals included in this plan. Specific references are included with each goal described in Greenhouse Gas Reduction Goals.

The organizations listed below have specific legal authority via federal, state or municipal code to set policy, allocate funding, regulate land use and/or enforce regulations. Effective implementation of these strategies is essential for transitioning to a more sustainable transportation system, which is a key component in the fight against climate change.

Implementing transportation decarbonization strategies involves navigating various challenges, including coordinating among different levels of government, securing adequate funding and overcoming political and institutional barriers. However, there are significant opportunities to leverage new technologies, foster public-private partnerships and engage communities in the transition to sustainable transportation.

A thorough review of the authority to implement transportation decarbonization strategies reveals a complex web of stakeholders, each with unique roles and responsibilities. Effective collaboration and coordination among these stakeholders are crucial for achieving the shared goal of a sustainable and low-carbon transportation future. By understanding the specific powers and capacities of each entity, strategies can be more effectively designed and implemented, paving the way for a more environmentally friendly and sustainable transportation system.

“There are significant opportunities to leverage new technologies, foster public-private partnerships and engage communities in the transition to sustainable transportation.”

Federal Government

At the federal level, agencies such as the USDOT and EPA possess significant authority to set nationwide policies and regulations that guide transportation decarbonization. This includes setting emission standards for vehicles, providing funding for sustainable transportation projects, and supporting research and development in green technologies. The Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) also play crucial roles in funding and overseeing transportation projects that contribute to decarbonization.

State Government

State governments, in this case Pennsylvania and New Jersey, through agencies such as environmental agencies and state DOTs, have the authority to implement state-level policies and programs that align with federal guidelines. This includes developing state infrastructure plans, regulating vehicle emissions and providing incentives for EV adoption. States can also establish partnerships with private companies and local governments to accelerate the transition to sustainable transportation.

Local Government

Local governments, including municipal and county governments and authorities, have varying control over local transportation planning and infrastructure. Local governments are enabled to regulate land use via zoning and subdivision ordinances that encourage sustainable urban development patterns and promote pedestrian and bicycle-friendly policies. Municipalities, counties and transit authorities can determine levels of investment in transit infrastructure, alternative fueled vehicles and systems. Local governments also play a key role in facilitating community engagement and ensuring that decarbonization initiatives meet the specific needs of their communities.

Metropolitan Planning Organizations (MPOs)

MPOs, including LVTS, NEPA and NJTPA, play a pivotal role in regional transportation planning. They are responsible for developing long-range transportation plans and short-term improvement programs, such as the Transportation Improvement Program, that integrate sustainability and decarbonization objectives. MPOs also coordinate funding and project implementation among various stakeholders, ensuring alignment with regional and national transportation goals.

Private Sector

Private sector entities, particularly companies involved in the automotive, public transit and energy industries, are essential in driving innovation and investment in decarbonization technologies. Private companies can develop and commercialize clean transportation technologies, such as electric vehicles and hydrogen fuel cells. They can also partner with government entities to deploy these technologies and operate sustainable transportation services.

Lehigh Valley Planning Commission / Lehigh Valley Transportation Study

Other Funding Sources

The success of transportation decarbonization initiatives in the region hinges significantly on the adept management of funding and resource allocation.

This process involves not just securing adequate funding but also ensuring that these resources are directed efficiently towards projects that offer the highest impact in terms of carbon reduction, sustainability and equity.

This section includes a general overview of funding sources for transportation decarbonization efforts. Specific funding sources are included with each goal described in Greenhouse Gas Reduction Goals.

Securing Funding

A key strategy in funding transportation decarbonization projects involves tapping into a variety of sources.

- Grants, whether federal, state or from non-governmental organizations, are a primary source. These grants often target specific areas, such as emission reduction, sustainable transportation or innovation in transit systems.
- Public-private partnerships (PPPs) leverage the strengths of both sectors — the efficiency and innovation of the private sector combined with the public sector's regulatory support and broad perspective. PPPs can be particularly effective in large-scale infrastructure projects or in areas where new technology is being implemented.
- Governmental budgets, both at the state and local levels, are also crucial. Allocating funds from these budgets requires advocacy and lobbying to ensure transportation decarbonization is prioritized within the broader context of government spending.

Allocating Resources Efficiently and Equitably

- Efficient allocation of resources necessitates a strategic approach. Priority should be given to projects that promise the most significant impact in terms of carbon reduction. This involves a thorough analysis of potential projects based on criteria such as emission reduction potential, cost-effectiveness, feasibility and long-term sustainability.
- Resource allocation priorities must include evaluation of community impact to ensure that benefits are available and accessible to low-income and disadvantaged communities (LIDAC). It also involves a balancing act between investing in proven technologies and innovative solutions. While established methods provide a certain level of security in terms of outcomes, innovation is crucial for long-term advancements in decarbonization.

Monitoring and Evaluation

- Equally important is the establishment of a robust monitoring and evaluation system. This ensures that the allocated resources are being used effectively and that the projects are on track to meet their decarbonization goals.

Stakeholder Involvement

- Engaging stakeholders in the funding and resource allocation process also adds value. It ensures transparency and builds trust among the public and private entities involved. Stakeholder feedback can also provide insights into how resources can be best utilized to meet the community's needs.

Transportation Decarbonization Funding Opportunities

Funding Name	Organization	Description
Climate Pollution Reduction Grant (CPRG) Implementation Grants	US Environmental Protection Agency	The CPRG program provides discretionary funding for implementable and ambitious projects that will achieve substantial greenhouse gas and hazardous air pollutant emission reductions and achieve substantial community benefits.
Transit Planning 4 All Grant (T4All)	Community Transportation Association of America	T4All is an inclusive and coordinated transportation planning project that has funded a series of pilot projects across the nation, each seeking to increase inclusion in transportation planning and services for people with disabilities and older adults.
National Volunteer Transportation Center Grant	Community Transportation Association of America	The purpose of the Center is to promote and support the concept and practice of volunteer transportation, which includes volunteer driver programs, shared vehicle utilization and ride sharing initiatives.
National Center for Mobility Management Grant	Community Transportation Association of America	The Center's primary activities support mobility management professionals, Federal Transit Administration (FTA) grantees and partners in adopting proven, sustainable and replicable strategies that achieve its mission.
The National Center for Applied Transit Technology Grant	Community Transportation Association of America	The grant provides technical assistance regarding emerging transportation technologies for states and localities across the US. The Center will develop learning and planning resources for rural, small-urban and tribal transportation providers and communities, as well as provide community and state-specific technical assistance.

Funding Name	Organization	Description
Alternative Fuels Incentive Grants (AFIG)	Pennsylvania Department of Environmental Protection	AFIG has approximately $5 million in funding available annually to school districts, municipalities, non-profit organizations and businesses in Pennsylvania that want to transition to cleaner fuel transportation. Supported alternative fuels include electricity, compressed natural gas, liquefied natural gas, propane, hydrogen, hythane, biodiesel, ethanol, methanol and other advanced biofuels.
DCNR Trail Grants	Pennsylvania Department of Conservation and Natural Resources (DCNR)	DCNR's Bureau of Recreation and Conservation provides grants to support the enhancement and expansion of non-motorized and motorized trails.
Surface Transportation Block Grant Program (STP) and Surface Transportation – Urban (STU) (formerly Transportation Alternatives Program (TAP) and Transportation Alternatives – Urban (ATU))	US Department of Transportation	The Surface Transportation Program provides flexible funding for states and localities for projects to preserve and improve the conditions and performance on any federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.
Transportation Alternatives Set-Aside Program (TASA)	Pennsylvania Department of Transportation	TASA provides funding for transportation alternatives, including pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation, community improvement activities, environmental mitigation, trails that serve a transportation purpose and safe routes to school projects.

Funding Name	Organization	Description
Infrastructure and Facilities Improvement Program (IFIP)	Pennsylvania Department of Revenue	The IFIP provides multi-year grants that will be used to service debt that was incurred to pay the costs of certain infrastructure and facilities improvement projects that enhance the economic development of Pennsylvania.
Greenways, Trails and Recreation Programs (GTRP)	Pennsylvania Department of Community and Economic Development	Since 2012, GTRP established the Marcellus Legacy Fund that allocates funds to the Commonwealth Financing Authority for planning, acquisition, development, rehabilitation and repair of greenways, recreational trails, open space, parks and beautification projects.
Congestion Mitigation and Air Quality Program (CMAQ)	US Department of Transportation	Introduced in 1991, CMAQ funds transportation projects that reduce vehicle idling and improve air quality without adding new highway capacity.
Advanced Transportation Technology & Innovation (ATTAIN)	US Department of Transportation	ATTAIN is a grant by the USDOT that deploys advanced technologies to address safety, mobility, sustainability, economic vitality and air quality through advanced technologies that maximize efficiencies.
National Highway Performance Program (NHPP)	US Department of Transportation	NHPP is funding to support the National Highway System. It can be used for the construction of bridges, tunnels, highways, bicycle and pedestrian facilities, and ITS Intelligent Transportation Systems (ITS) improvements.
Carbon Reduction Program (CRP)	US Department of Transportation	CRP funds projects designed to reduce transportation emissions. These funds can be “flexed” to fund transit projects.
National Electric Vehicle Infrastructure (NEVI) Program	US Department of Transportation	NEVI funds projects for fast-charging stations along identified national Alternative Fuel Corridors (AFCs). After these corridors are sufficiently built out, the program will then focus on projects on any publicly accessible road.

Funding Name	Organization	Description
Lehigh Valley Greenways (LVG) Mini Grant Program	Lehigh Valley Greenways	LVG mini grants provide funding to plan for and/or implement projects that protect and promote the natural resources of the Lehigh Valley, such as projects that improve bicycle/pedestrian connections and enhance trail access.
Clean School Bus (CSB) Program	US Environmental Protection Agency	The CSB Program provides rebates, grant funding, technical assistance, workforce development and educational materials to help replace existing school buses with zero-emission and low-emission models.
Promoting Resilient Operations for Transformative, Efficient, and Cost Saving Transportation (PROTECT) Discretionary Grant Program	US Department of Transportation	PROTECT provides funding for planning and implementation of projects that help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding, extreme weather events and other natural disasters.

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Further Engagement + Coordination

The LVPC will build and expand upon its technical GHG emissions data and public engagement approaches included in the PCAP to develop its Comprehensive Climate Action Plan (CCAP). The LVPC will continue to build upon initial outreach conducted as part of the PCAP to entities within Carbon County, Pennsylvania and Warren County, New Jersey to seek information and insight on the development and analysis of GHG emission reduction goals across all sectors in the MSA region.

Enhancing Public Engagement

Public engagement is a vital component for planning and developing the CCAP. Every person, regardless of race, religious creed, ethnicity, gender, sexuality, disability status or socio-economic status should have the opportunity to participate in the climate action planning process. Providing full disclosure of plans and programs during the development phase involves the general public and ensures that the plans and programs are influenced by public feedback. The access to these documents and plans during and after the adoption process is critical to facilitate public comment.

> **Public engagement is a vital component for planning and developing the CCAP.**

For the CCAP, the LVPC will continue to follow and strengthen the Public Participation Plan practices of the LVPC/LVTS, including but not limited to:

1. All workshop meetings are open to the public.
2. All workshops are advertised in a local newspaper of general circulation covering the study area at least five business days before the meeting. All workshops are also advertised on social media and the LVPC website.
3. Physical copies of plans and programs available for review must be available for the duration of the public comment period at the following locations:
    a. Allentown Public Library
    b. Bethlehem Area Public Library
    c. Easton Area Public Library
    d. LANTA Office
    e. LVPC Office
    f. PennDOT District 5-0 Office
4. All physical copies of documents available for public review must include a public notice to summarize the document and provide details about the public comment period for the document.
5. When plans and program documents become publicly accessible, memorandums are sent to municipalities, tribal contacts, community-based organizations and individuals who have requested notification. These memorandums include information on where the documents can be reviewed, both physically and digitally, when and where public meeting(s) will be held and how comments can be made.
6. Staff strives to maintain relationships with partners and stakeholders and members of the public to facilitate meaningful engagement between the MPO and the community.
7. Public notices are sent to various media outlets to further promote public participation in the planning process. Printed media (general newspapers, community newspapers, magazines) audiovisual media (television news, radio news, television community bulletin boards), website (LVPC website), mass email marketing tools and social media (Facebook, X, Instagram, LinkedIn) should be utilized. When applicable, Spanish language media outlets must be included in this notice.

8. The LVPC will convert plans and programs into alternative formats, such as large font or Braille, when requested. Web-based materials will also include accessibility features, including captions and alternative text, when available.
9. Visioning techniques, such as maps and slideshows, are utilized to share information regarding plans and programs with the public.
10. In-person meetings are held in locations accessible by public transportation and in a facility that can accommodate wheelchair users.
11. Agendas and other meeting materials are available to participants as printed handouts and/or projected images. These materials will also be posted to the LVPC website.
12. For virtual meetings, a live meeting link will be created and shared publicly for the meeting. At the time of adoption, the LVPC uses Microsoft Teams as a virtual meeting platform.
13. Participants are notified of the closed-captioning function of the virtual meeting platform.
14. Agendas and other meeting materials are shared through screen-share and linked in the chat function of the virtual meeting platform. These materials are posted to the LVPC website.

The LVPC will continue to utilize the Lehigh Valley Equity Analysis to determine areas of low-income and disadvantaged populations. It is expected that WorkshopLV meetings will be held in these communities. In addition, the LVPC will leverage its relationship with WDIY National Public Radio and monthly Plan Lehigh Valley radio program and Morning Call newspaper Business Cycle column to engage the community broadly. The LVPC intends to work with the Spanish-language radio station MEGA 101.7FM, the Chamber of Commerce's African American, Hispanic and LGBTQ + Committees, Lehigh Valley Center for Independent Living, Lehigh Valley Conference of Churches, as well as the United Way's Age-Friendly Lehigh Valley Committee to engage often underrepresented groups in the development and implementation of the CCAP. The all-government General Assembly infrastructure will help support the dissemination of information and invitations to various in-person and online engagements to the broader public. The General Assembly is an excellent avenue to reach out to rural and isolated individuals and groups that would not otherwise be reachable. Utilizing the municipal and state legislative offices connected to this engagement platform is critical outside of the region's urbanized areas.

It is of note that the LVPC's equity commitment is extending to its offices as the LVPC will be relocating to a Justice40 data-identified neighborhood in Allentown in March 2024. Also, the LVPC specifically employs a Regional Planner for Community Engagement, who has training and experience working in underserved communities. Materials and support are available for visually and auditorily impaired persons and in alternate languages as part of the LVPC's adopted Public Participation Plan. All engagement is required by the adopted policies of the LVPC to occur with equity and health as foundations and early information gathering, later policy and implementation development will be required to meet these standards. Low-income and disadvantaged communities' engagement and needs will be included from the beginning of the effort and throughout implementation.

"The General Assembly is an excellent avenue to reach out to rural and isolated individuals."

CCAP Interagency and Intergovernmental Coordination

As previously noted, the LVPC is a representative government for the 62 municipalities and two counties comprising the Lehigh Valley. The LVPC is responsible for all coordination and collaborations on environmental, housing, economic, land use, farmland and open space preservation, parks and recreation, public facilities and utilities, water, sewer and transportation issues for the bi-county area under a series of state and federal statutes. As such, the LVPC and its sister entity, the Lehigh Valley Transportation Study (LVTS), bring together governmental entities, authorities, boards, commissions, non-profits and for-profit entities in the interests of the public health, safety and general welfare of the Lehigh Valley.

Current relationships and partnerships with the Workforce Board Lehigh Valley, Greater Lehigh Valley Chamber of Commerce Energy and Environment Committee, Wildlands Conservancy, Pennsylvania Department of Environmental Protection, Pennsylvania Department of Transportation, United Way of the Greater Lehigh Valley, Nurture Nature Center, City Mayor's Coalition, Municipal Environmental Advisory Council Network, Lehigh Valley Partnership and many others will support the development and implementation of the CCAP. It is of note that the United Way will be a key partner in the engagement of equity communities. This work will happen through standing committees within partner organizations and through the WorkshopLV public engagement working groups. All materials will be housed on the website of the LVPC, a public website; hard copy and translation services will be available upon request, at a minimum as well.

Central to the CCAP will be the identification and prioritization of quantifiable GHG reduction goals and associated emission reduction targets. A workforce planning analysis and benefits analysis, with prioritization of low-income and disadvantaged communities, will be completed. These tasks will support the development of the Comprehensive Climate Action Plan.

Once drafted, the plan will be vetted and refined through the public participation process. An implementation structure will be developed that will identify resources, including the intersection of funding sources, to support long-term, committed climate action.

Following completion of the CCAP in summer 2025, the LVPC will begin monitoring progress on the plan strategies, which is the third phase of the EPA CPRG program.

Overall, it is the intent of this effort to support the creation of a 'green ribbon team' from among the various WorkshopLV, LVPC, General Assembly and LVTS participants and to develop a permanent infrastructure to further climate action past the CPRG effort.

Conclusion

Once the priority climate action plan is completed, the implementation grant applications for the $4.6 billion pool of funding will be due April 1, 2024. LVPC will then work on the regional comprehensive climate action plan (CCAP), covering all emission sectors.

The regionwide comprehensive climate action plan will be adopted on or before June 2025. This plan will include a monitoring period for policy measures, which will last through 2027. Concurrent with this plan is the updated long range transportation plan, which allocates funding, from now through 2050, for specific transportation projects that will reduce emissions. The opportunity to coordinate climate action through various related programs like these is unprecedented, and jump starts progress towards a low carbon future.

Potential GHG emission reductions resulting from the goals outlined in this plan are estimated at over 321,000 metric tons of CO2e annually by 2050, a reduction from 2021 transportation sector emissions by nearly 12%. These goals, coupled with improvements in clean fuel technologies and other climate sector emission reduction goals will benefit our communities, our environment, and our economy. Considering that the Lehigh Valley's population is projected to grow by 14%, job growth by 19% and Vehicle Miles Traveled by 23% during this time, the actual reduction in emissions is much more significant as these occur even with continued regional population and job growth.

The Lehigh Valley and its broader region continue to attract new businesses, families, and tourists due to its centrally convenient location between two major metropolitan areas, affordability, diverse institutions, and unique and abundant natural resources. With this popularity comes responsibility to manage growth and protect, preserve, and steward its environmental heritage for its current and future population. The PCAP is the first step in a longer-term commitment for the region to ensure a healthy, robust, and sustainable future.

321,000 $MTCO_2e$
Potential Greenhouse Gas Reductions, resulting from the goals outlined in this plan

Climate Pollution Reduction Grant (CPRG) Timeline

List of Acronyms

AFV – Alternative Fuel Vehicle

CCAP – Comprehensive Climate Action Plan

CH4 – Methane

CMAQ – Congestion Mitigation and Air Quality

CO_2 – Carbon Dioxide

CO_2e – Carbon Dioxide Equivalent

CPRG – Climate Pollution Reduction Grant

CRP – Carbon Reduction Plan

DOT – Department of Transportation

EPA – US Environmental Protection Agency

EV – Electric Vehicle

GHG – Greenhouse Gas

LANTA – Lehigh and Northampton Transportation Authority

LCAP – Local Climate Action Program

LIDAC – Low-Income and Disadvantaged Communities

LRTP – Long-Range Transportation Plan

LVPC – Lehigh Valley Planning Commission

LVTS – Lehigh Valley Transportation Study

MPO – Metropolitan Planning Organization

MSA – Metropolitan Statistical Area

N_2O – Nitrous Oxide

NEPA -Northeast Pennsylvania Alliance

NJTPA – North Jersey Transportation Planning Authority

PCAP – Priority Climate Action Plan

PA DCED – Pennsylvania Department of Community and Economic Development

PA DCNR – Pennsylvania Department of Conservation and Natural Resources

PA DEP – Pennsylvania Department of Environmental Protection

PennDOT – Pennsylvania Department of Transportation

PM 2.5 – Particulate Matter 2.5

PROTECT – Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation

TASA – Transportation Alternatives Set-Aside

TIP – Transportation Improvement Program

TSMO – Transportation Systems Management and Operations

US DOT – US Department of Transportation

VMT – Vehicle Miles Traveled

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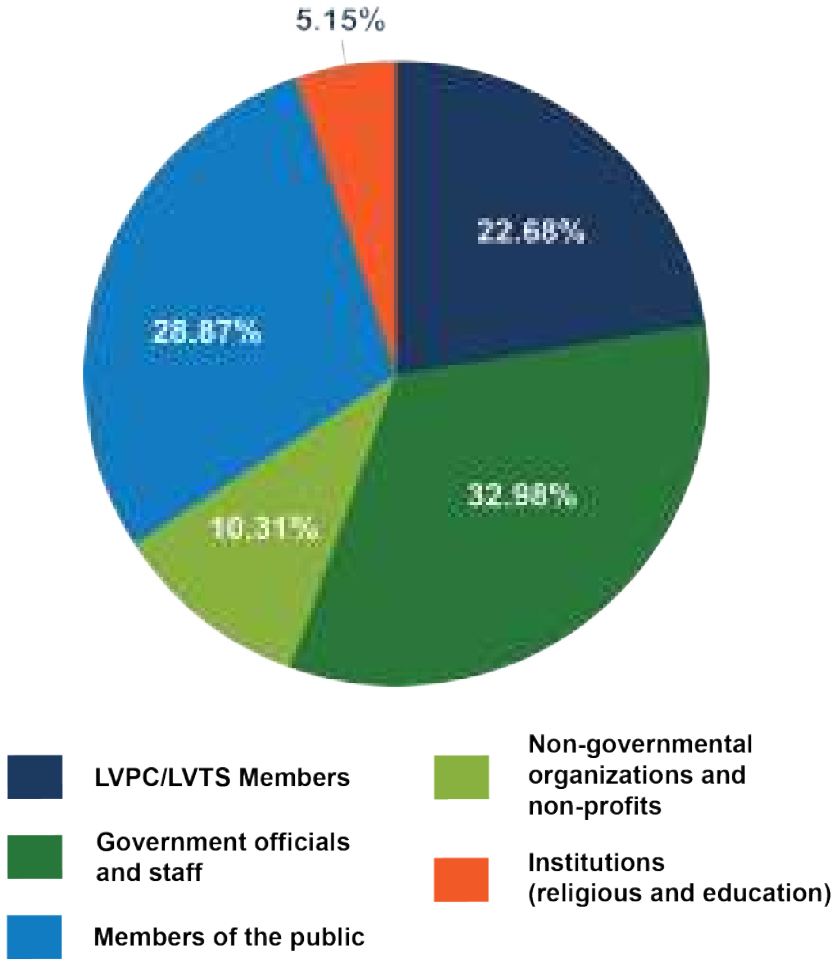
Appendices

Appendix A: WorkshopLV Attendees and Interactive Activity Results

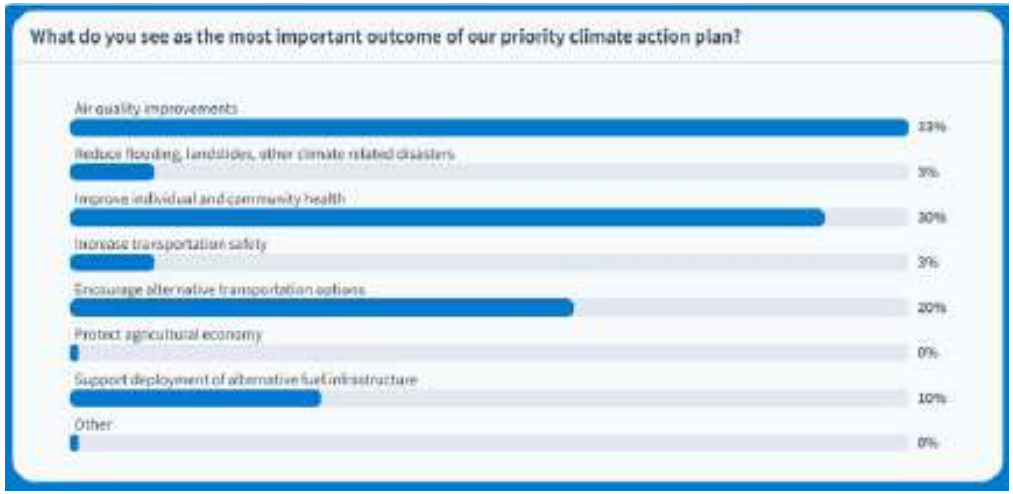
Attendance for the WorkshopLV Environment/ Transportation meetings for the Priority Climate Action Plan averaged about 28 participants per meeting. In total, 92 people attended the in-person workshops, and 47 people attended the virtual workshops. The attendees that participated in the workshops ranged from municipal officials, municipal environmental advisory councils, LVPC and LVTS members, active transportation advocacy groups, environment education and sustainability advocacy groups, Greater Lehigh Valley Chamber of Commerce, non-profit groups, commercial and industrial real estate interests, freight industry groups, freight operators, water and sewer authorities, manufacturers and engineers, students and staff from local colleges/universities, representatives from Senator Nick Miller's office and US Representative Susan Wild's office, as well as members of the public who have an interest in climate action work.

All participants during the public engagement process contributed to the vision and focus for this PCAP, helping make the plan more meaningful and robust.



INTERACTIVE WORKSHOP ACTIVITIES

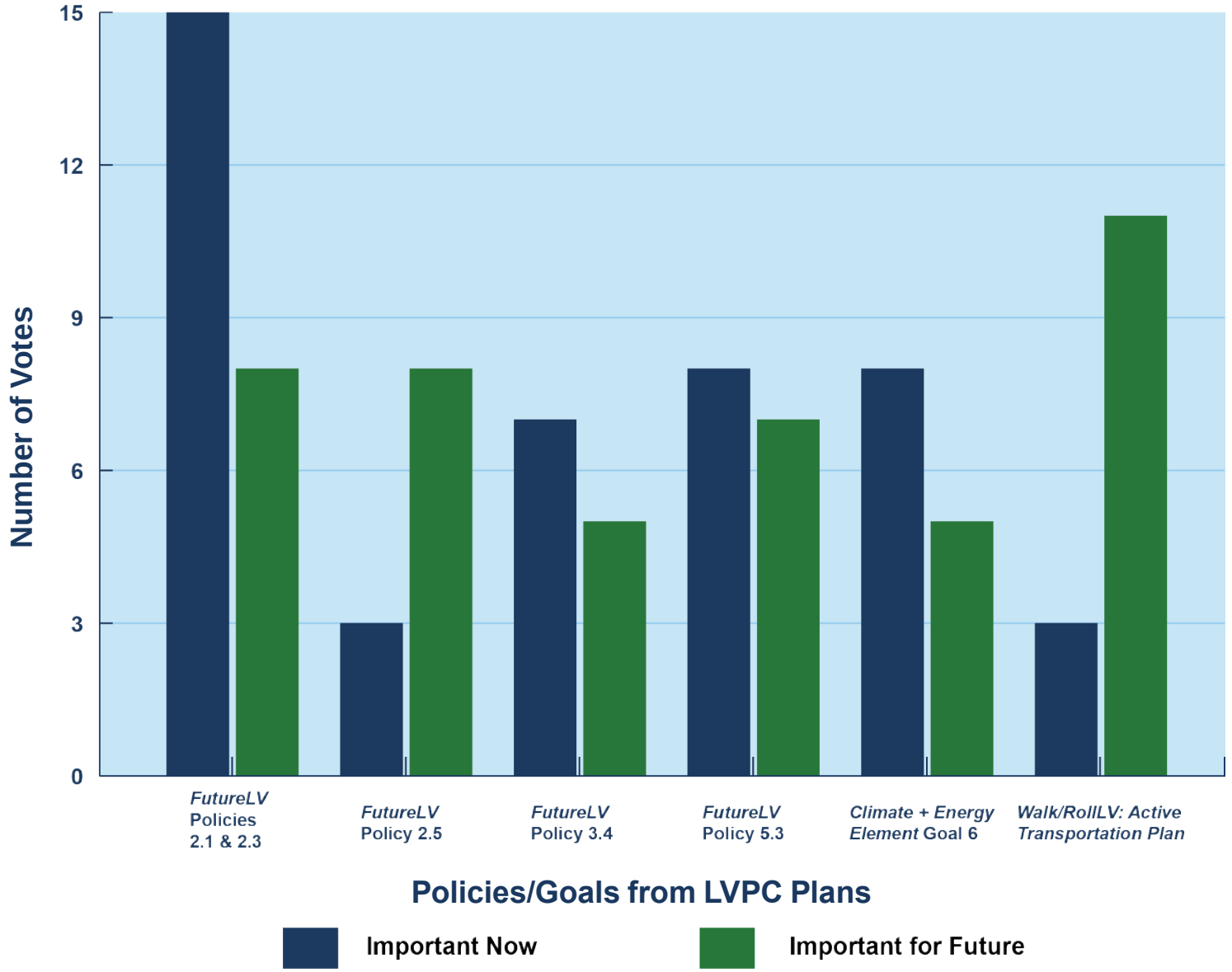
Poll Everywhere question given to participants to answer during the September 2023 Workshop series to gain a general idea of participants' priorities for the PCAP. Results from the October 18, 2023 interactive activity where participants voted on the LVPC/LVTS adopted policy they felt was important now (blue) and the policy they felt was important for the future (green).



KEY FOR ACTIVITY GRAPH

FutureLV **Policy 2.1**	Develop a mixed-transportation network to support a more compact development pattern, optimize roadway capacity and encourage alternative travel options.
FutureLV **Policy 2.3**	Encourage enhanced transit connections to improve mobility and job access.
FutureLV **Policy 2.5**	Support the expansion of technology, communications and utilities to reduce travel demands, optimize traffic flow and prepare for the next generation of jobs.
FutureLV **Policy 3.4**	Reduce climate change impacts through mitigation and adaptation.
FutureLV **Policy 5.3**	Create community spaces that promote physical and mental health.
Climate + Energy Element **Goal 6**	To reduce Lehigh Valley greenhouse gas emissions from residences, government operations and businesses.

WorkshopLV Environment/Transportation Interactive Activity Results



Appendix B:
GHG Reduction Estimates by Measure: Methodology Notes

1. **Implement *Walk/RollLV: Active Transportation Plan*.** Miles of priority corridors to add: 25% complete by 2030 and 50% complete by 2050. GHG figures include improvements to address priority sidewalk gaps in the Lehigh Valley. The total gap mileage was assumed to be constructed by 2050.

- **Impact on GHG (Bicycle Corridors):**
  - **2030:** -1,099 Metric Tons of Carbon Dioxide Equivalent (CO_2e)
  - **2050:** -1,114 Metric Tons CO_2e
- **Impact on GHG (Sidewalk Gaps):**
  - **2030:** -50 Metric Tons CO_2e
  - **2050:** -86 Metric Tons CO_2e
- **Methodology Notes: Bicycle Corridors**
  - Evaluated proposed bike and walk infrastructure corridors provided in the LVPC *Walk/RollLV: Active Transportation Plan* and identified all proposed corridors and identified mileage of new multi-use path and bike lanes.
  - Used Geographic Information System (GIS) analysis to assemble data on activity centers (banks, churches, hospitals, shopping areas, schools, etc.) within ½ mile of the proposed corridors.
  - A separate GIS analysis was performed to identify the presence of colleges and universities within two miles of the proposed corridors.
  - Annual Average Daily Traffic (AADT) for streets adjacent or parallel to the proposed corridor was also collected from the Pennsylvania Road Management System traffic data.
  - For this analysis, it is assumed all proposed corridors will be constructed. If only a percentage of infrastructure is expected by 2030 or 2050, then those shares can be provided to the full emission credit above.
  - Entered the assembled data in Maryland's Bicycle/Pedestrian Network Improvement Air Quality tool to obtain vehicle trip and Vehicle Miles Traveled (VMT) reductions due to proposed corridors.
  - The vehicle trip and VMT reduction was then used in PAQONE7 tool to obtain GHG emission benefits.
- **Methodology Notes: Sidewalk Gap Analysis**
  - Evaluated LVPC's sidewalk gap analysis, which identified 6.87 miles of priority sidewalk infrastructure needed in the Lehigh Valley.
  - Entered new infrastructure mileage into the Georgetown Climate Center TEA-CART tool to obtain GHG emission benefits. The tool has been acquired by PennDOT for their climate action planning.

2. **Increasing transit ridership.** Increase transit ridership target levels to 9.0 rides per capita by 2030 and 10.5 rides per capita by 2050 from base of 7.5 rides per capita.

- **Impact on GHG:**
  - **2030:** -1,833 Metric Tons CO_2e
  - **2050:** -3,720 Metric Tons CO_2e
- **Methodology Notes:**
  - LVPC acquired unlinked passenger trips from the Lehigh and Northampton Transportation Authority (LANTA). For 2023, the total annual passenger trips were 3,911,164.
  - Assumed targeted passenger trips for future years would be proportional to the targeted increase identified by LANTA for passenger trips per capita. This was calculated to be a 20% increase by 2030 and a 40% increase by 2050.
  - Applied % target increase to 2023 passenger trips. The total targeted increase in ridership is +782,233 riders by 2030 and +1,564,466 riders by 2050 over 2023 levels.
  - Extracted additional parameters from the Georgetown Climate Center Transportation Evaluation and Carbon Reduction Tool (TEA-CART) tool being used by PennDOT for GHG evaluations and FHWA parameters for national performance measures:
    - Assumed that 80% of ridership increase would draw from those that drove before (commuter bus default from TEA-CART).
    - Average work trip length by auto (12.7 miles).
    - Average vehicle occupancy for Federal Highway Administration reliability national performance measure = 1.7 person/vehicle. (avo_factors.pdf (dot.gov))
  - Calculated annual VMT reduction related to transit ridership increases as:
    - **2030:** 782,233 x 0.80 / 1.7 x 12.7mi = - 4,674,993 vehicle miles
    - **2050:** 1,564,466 x 0.80 / 1.7 x 12.7mi = - 9,349,985 vehicles miles
  - Ran PennDOT's PAQONE7 emission software for the Lehigh Valley to apply MOVES emission rates to the VMT and trip reductions estimated. PAQONE is used by PennDOT for air quality evaluations related to the Congestion Mitigation and Air Quality (CMAQ) funding program. It includes rates for CO_2e.

3. **Supporting deployment of alternative fuel vehicles (AFVs) of all types.** Increase share of alternative vehicles in region to 9% of total fleet in 2030 and 21% of total fleet in 2050 consistent with projections in PennDOT's Electric Vehicle (EV) Mobility Plan.

- **Impact on GHG:**
  - **2030:** -285,957 Metric Tons CO_2e
  - **2050:** -297,013 Metric Tons CO_2e
- **Methodology Notes:**
  - Utilized the Georgetown Climate Center tool TEA-CART to estimate the impacts of EV adoption in the region. TEA-CART has been obtained by PennDOT to support their statewide GHG evaluations.
  - Entered the % of EVs of the total fleet for each model year from 2022 to 2050. Adjusted the default TEA-CART percentages, which were based on the 2023 Annual Energy Outlook (AEO) prepared by the Energy Information Administration (EIA). Adjusted to match alternative fuel vehicle targets in 2030 (9%) and 2050 (21%) per information in PennDOT's EV Mobility Plan.
  - Compared benefits of EV adoption to a base scenario assuming no EV growth from 2022 onward.
  - Utilized assumptions on Vehicle Miles of Travel (VMT) from the Highway Performance Monitoring System (HPMS) for Lehigh, Northampton, Carbon and Warren (NJ) counties. Assumed growth consistent with that provided in the Lehigh Valley Regional Travel Demand Model.

4. **Increase alternative fueling infrastructure and stations.**

- **Impact on GHG:**
  - **2030:** -5,644 Metric Tons CO_2e
  - **2050:** -13,791 Metric Tons CO_2e
- **Methodology Notes:**
  - This strategy may overlap with the EV adoption benefit measure.
  - Estimated needed chargers in the region to meet the EV adoption targets presented in the previous measure. Utilized the US Department of Energy EV-PRO Lite tool (LINK to EVI-PRO Lite Tool).
  - Entered into EV-PRO Lite Tool the 2030 and 2050 EV projections as far as number of vehicles in region:
    - For 2030: Department of Motor Vehicles (DMV) 2022 Total Registrations for region x 9% EV Fleet

    - For 2050: DMV 2022 Total Registrations for region x 21% EV Fleet
    - 2022 Vehicle Registrations = 269,161 (Northampton) + 303,927 (Lehigh) + 62,180 (Carbon) + 98,079 (Warren) = 733,347 vehicles
    - Assume registrations consistent in future years.
    - Estimated EV Fleet for 2030 = 733,347 x 9% = 66,001
    - Estimated EV Fleet for 2050 = 733,347 x 21% = 154,002
- EV-PRO export needed number of chargers:
    - **2030**
        - Single-Family Charging Ports: 55,324
        - Shared Private Charging Ports: 1,254
        - Public Level 2 Charging Ports: 1,723
        - Public DC Fast Charging Ports: 95

        2050
        - Single-Family Charging Ports: 122,226
        - Shared Private Charging Ports: 2,744
        - Public Level 2 Charging Ports: 3,625
        - Public DC Fast Charging Ports: 186
- From Department of Energy Alternative Fuel Data Center, used the number of public charging stations and ports currently in region:
    - DCFC Stations = 13; Assumed Port count = 61
    - Level 2 Stations = 110; Assumed Port count = 235
- Calculated Needed number of ports to meet needs from EV-PRO tool:
    - 2030 Level2 Needs: 1,723 – 235 = 1,488 ports
    - 2030 DCFC Needs: 95 – 61 = 34 ports
    - 2050 Level2 Needs: 3,625 – 235 = 3,390 ports (Note this overlaps with 2030 needs)
    - 2050 DCFC Needs: 186 – 61 = 125 ports (Note this overlaps 2030 needs)
- Used the Georgetown Climate Center TEA-CART Tool to estimate GHG impacts of new EV charging infrastructure. This tool is available through PennDOT. The tool bases emission benefits on the number of new ports by type.

5. **Reimagine and retrofit major transportation corridors with green infrastructure.** This goal includes phasing, starting with landscaping retrofits of approximately 462 acres along Route 22 rights-of-way (ROW) and expanding to other major corridors.

- **Methodology Notes:**
  - Conducted literature review of carbon sequestration due to forest cover. Extracted conversion factor for carbon sequestered in one year by one acre of average forest: https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references
  - Conversion factor = -0.84 metric tons CO_2/acre/year sequestered annually by one acre of average forest cover.
  - Assumed right-of-way (ROW) acres were to be entirely forested; Calculation: 2,745 acres x 0.84 metric tons CO_2e/acre/year.
  - These results can be factored for additional corridors or other area planting.
- **Low-Carbon Construction Materials Impact on GHG:**
  - **2030:** -1,165 Metric Tons CO_2e
  - **2050:** -1,165 Metric Tons CO_2e
- **Methodology Notes:**
  - Examined Environmental Product Declaration (EPD) limits for different construction materials as required by the Inflation Reduction Act (IRA): Interim IRA LEC Material Requirements — used in Pilot May 2023 05162023.pdf (gsa.gov).
  - Chose asphalt as an example and noted a 25% benefit between the highest level EPDs and average reported EPDs for that material. Assumed that a 25% reduction in GHG emissions is reasonable through the application of low-carbon materials through transportation construction.
  - Identified 64 centerline miles of Transportation Improvement Program projects in the Lehigh Valley. Assumed for this estimate that all projects include reconstruction. Assumed four lane miles of construction for each centerline mile.
  - Entered construction assumptions into FHWA's Infrastructure Carbon Estimation (ICE) tool: Carbon Estimator – Tools – Energy – Sustainability – Environment – FHWA (dot.gov)
  - Extracted annualized GHG Metric Tons CO_2e related to construction activities (4,660 Metric Tons CO_2e). Assumed this measure could reduce that value by 25% through the use of low-carbon materials.

6. **Plan and implement Intelligent Transportation Systems (ITS) technologies.** Assume Transportation Systems Management Operation (TSMO) goals implemented along regional highways and major corridors adopted in the *FutureLV: The Regional Plan*.

- **Impact on GHG:**
  - **2030:** -2,527 Metric Tons CO_2e
  - **2050:** -2,010 Metric Tons CO_2e
- **Methodology Notes:**
  - LVPC acquired annual delay by causal category from PennDOT based on reported INRIX travel time data for 2019. Delay was collected for key corridors in the Lehigh Valley.
  - Conducted a literature review of anticipated benefits of TSMO and Intelligent Transportation Systems (ITS). Referenced research from: https://www.hsdl.org/?view&did=452716 which indicated up to a 40% reduction in incident delay for incident response strategies.
  - Assumed a tiered benefit of TSMO strategies by causal factors (40% for incident causes, 30% for work zones and signals, and 20% for recurrent congestion).
  - Applied benefits to the 2019 reported annual delay totals for the Lehigh Valley.
  - Assumed delay is primarily idling delay. Applied 2030 and 2050 idling emission rates based on the EPA MOVES model.

Appendix C: Data Sources

Map	Dataset	Source	Year
Air Quality Measure	Air Quality	https://www.epa.gov/outdoor-air-quality-data/download-daily-data	2023
Ozone Emissions	Ozone Emissions	https://www.epa.gov/outdoor-air-quality-data/download-daily-data	2023
PM 2.5 Emissions	PM 2.5 Emissions	https://www.epa.gov/outdoor-air-quality-data/download-daily-data	2023
Noise Pollution	Noise Pollution	https://www.bts.gov/geospatial/national-transportation-noise-map	2020
ALL	Justice40	https://ejscreen.epa.gov/mapper/	2023
ALL	EPA Disadvantaged	https://ejscreen.epa.gov/mapper/	2023
Alternative Fuels	EV Charging Stations	https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC	2023
Alternative Fuels	CNG Stations	https://afdc.energy.gov/	2023
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	AADT PA	https://data-pennshare.opendata.arcgis.com/datasets/a17c20bf71dd40fea24363bb9f0ae0e4_0/explore?showTable=true	2023
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	AADT NJ	https://njogis-newjersey.opendata.arcgis.com/maps/47a9e9abd50b4f7bbc56db38a373cc43	2023
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	ADDT PA	https://data-pennshare.opendata.arcgis.com/datasets/a17c20bf71dd40fea24363bb9f0ae0e4_0/explore?showTable=true	2023

Map	Dataset	Source	Year
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	ADDT NJ	https://njogis-newjersey.opendata.arcgis.com/maps/47a9e9abd50b4f7bbc56db38a373cc43	2023
Freight and Logistics	IFF - Pipeline	https://geodata.bts.gov/datasets/94402ee-698ba4fdebab2b12921dfcf34_0/about	2023
Freight and Logistics	IFF - Air to Truck	https://data-usdot.opendata.arcgis.com/datasets/77a8680802624fd7aa038d52727770ba	2023
Freight and Logistics	IFF - Rail	https://geodata.bts.gov/datasets/usdot::intermodal-freight-facilities-rail-tofc-cofc/about	2023
Freight and Logistics	National Highway Freight Network	https://data-usdot.opendata.arcgis.com/datasets/usdot::national-highway-planning-network/explore?location=40.728110%2C-75.077016%2C12.00&showTable=true	2023
Alternative Transportation	Walkability	https://catalog.data.gov/dataset/walkability-index1	2 3 - Feb
Alternative Transportation	State Bike Routes PA	https://www.penndot.pa.gov/TravelInPA/active-transportation/Pages/Pennsylvania-Bicycle-Routes.aspx	2023
Alternative Transportation	State Bike Routes NJ	https://gisdata-njdep.opendata.arcgis.com/datasets/statewide-trails-in-new-jersey/explore	2023
Adults with Asthma	Asthma	https://ejscreen.epa.gov/mapper/	2023

Map	Dataset	Source	Year
Adults with Heart Disease	Heart Disease	https://ejscreen.epa.gov/mapper/	2023
Alternative Transportation, Alternative Fuels	Transit Routes PA	https://www.arcgis.com/home/item.html?id=f7649f55048e4835873fc81684db9757	2023
Alternative Transportation, Alternative Fuels	Transit Routes NJ	https://njogis-newjersey.opendata.arcgis.com/search?groupIds=60a4f9a1342f4f7a94ac986e8dd14892	2023
Alternative Transportation	Transit Centers PA	https://www.arcgis.com/home/item.html?id=f7649f55048e4835873fc81684db9757	2023
Alternative Transportation	Transit Centers NJ	https://njogis-newjersey.opendata.arcgis.com/search?groupIds=60a4f9a1342f4f7a94ac986e8dd14892	2023
Noise Pollution	Airports	https://hub.arcgis.com/datasets/esri-de-content::world-airports/explore	2023
Right of Way	Study Area - Right of Way	https://data-pennshare.opendata.arcgis.com/datasets/a934887d51e647d295806cc2d9c02097_0/explore	2021
High Crash Corridor	High Crash Corridor	https://data-pennshare.opendata.arcgis.com/datasets/a934887d51e647d295806cc2d9c02097_0/explore	
High Crash Corridor	Corridors - Regional, Major, Congested	https://data-pennshare.opendata.arcgis.com/datasets/a934887d51e647d295806cc2d9c02097_0/explore	2021

Map	Dataset	Source	Year
Land Use	Northampton and Lehigh LVPC Land Use	https://www.northamptoncounty.org/gis https://www.lehighcounty.org/departments/gis	2021
Land Use	Warren County Land Use	https://njogis-newjersey.opendata.arcgis.com/datasets/2deaaa3cadd94166bdbff92a44ade284_5/explore	2020
Alternative Transportation	Bicycle Commuting Corridors	https://www.traillink.com/state/pa-trails/ https://lvgreenways.org/partner-reporting/miles-of-trail-opened-report/	
Alternative Transportation	Bicycle Supported Infrastructure	https://www.traillink.com/state/pa-trails/ https://lvgreenways.org/partner-reporting/miles-of-trail-opened-report/	
PennDOT Driver and Vehicle Services - Annual Report of Registrations		https://www.dmv.pa.gov/VEHICLE-SERVICES/Title-Registration/pages/annual-report-of-registrations-.aspx	2023

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Lehigh Valley Planning Commission
LVTS
Lehigh Valley Transportation Study

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Lehigh Valley Passenger Rail Feasibility Analysis

E04113 WO 14

Final Report

March 2024

Credit: GMF Journal, 2016

Prepared for:

pennsylvania
DEPARTMENT OF TRANSPORTATION

Prepared by:

wsp

Table of Contents

List of Figures

List of Tables

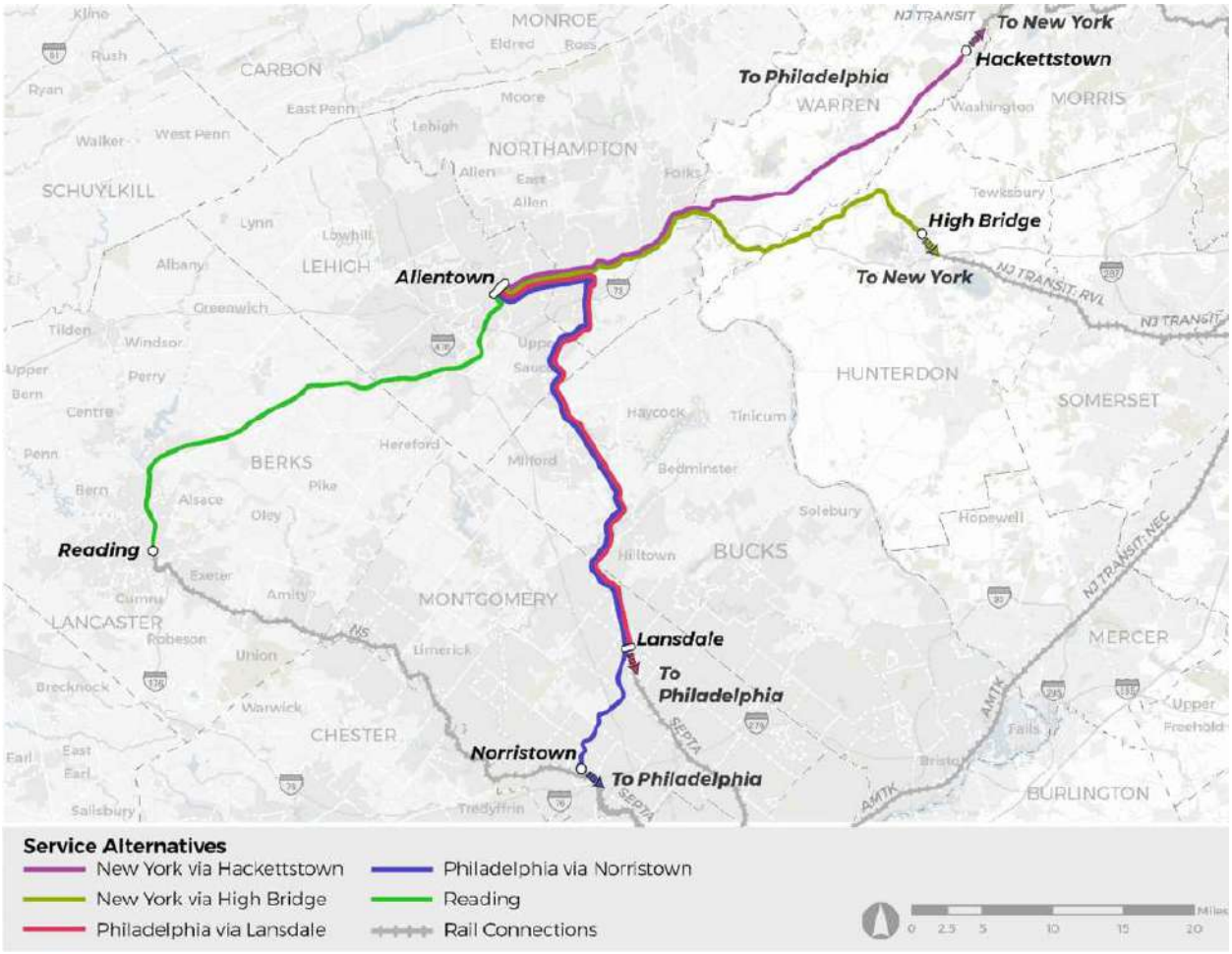
Executive Summary

Since 1979, when passenger train service was last operated to the Lehigh Valley, there has been public and private interest in the potential restoration of passenger train services. This interest has grown over time, with multiple studies examining the potential for service along specific corridors previously linking the Lehigh Valley to New York and Philadelphia. These efforts were largely isolated to individual rail lines or corridors, however recent population and economic growth has spurred interest in new passenger rail transportation services to the Lehigh Valley as a whole. To date, no effort has broadly examined the potential for restoration of passenger rail services across former corridors between the Lehigh Valley and New York, Philadelphia, and Reading, all of which are nearby cities with current or planned intercity passenger rail services.

By providing an initial inquiry into these corridors, this study provides a framework for a future passenger rail project sponsor to advance the feasibility studies and alternatives analyses that would be required to restore service. In doing so, this study provided analysis of twelve former rail corridors, examining modern land use development along the corridors, environmental considerations, current rail operations (where extant), engineering constraints, and high-level capital costs.

Of the twelve former corridors examined, five consolidated corridors stand out as the most likely candidates for passenger rail restoration. These are the existing corridors which are mostly comprised of active rail lines and provide the most direct connections to existing or planned passenger rail services. These include:

- Allentown to New York via Hackettstown
    - Utilizing the Norfolk Southern Railway to Phillipsburg and Dover & Delaware River Railroad to connect with the NJ TRANSIT Morris & Essex Line in Hackettstown.
- Allentown to New York via High Bridge
    - Utilizing the Norfolk Southern Railway to connect with the NJ TRANSIT Raritan Valley Line in High Bridge
- Allentown to Philadelphia via Lansdale
    - Utilizing the Norfolk Southern Railway to Bethlehem, Lehigh Valley Rail Management within Bethlehem, Saucon Rail Trail (SEPTA) to Coopersburg, Upper Bucks Rail Trail (SEPTA) to Quakertown, East Penn Railroad (SEPTA) to Telford, and Pennsylvania Northeastern Railroad (SEPTA) to connect with the SEPTA Lansdale Doylestown Line in Lansdale
- Allentown to Philadelphia via Norristown
    - Utilizing the Norfolk Southern Railway to Bethlehem, Lehigh Valley Rail Management within Bethlehem, Saucon Rail Trail (SEPTA) to Coopersburg, Upper Bucks Rail Trail (SEPTA) to Quakertown, East Penn Railroad (SEPTA) to Telford, Pennsylvania Northeastern Railroad (SEPTA) to Lansdale, and CSX/Norfolk Southern (SEPTA) to connect with the SEPTA Norristown Line in Norristown
- Allentown to Reading
    - Utilizing the Norfolk Southern Railway to connect with the planned Schuylkill River Passenger Rail Authority service between Reading and Philadelphia



For these five major candidate corridors, conceptual operating plans, operating cost estimates, and high-level demand analyses are presented within the report. These concepts were developed independently by the study team, and did not include consultation with NJ TRANSIT, SEPTA, Amtrak, Norfolk Southern, CSX, and/or any other impacted rail carriers. A summary of the advantages and concerns of each of the corridors, as well as high-level cost estimates, is shown in the table on the following page.

Service Alternative	Advantages	Concerns	Estimated Trip Duration	Estimated Capital Costs[1]	Estimated Annual Operating Costs[2]
Allentown to New York via Hackettstown	• Entirely utilizes active rail corridors. • Class 1 freight rail infrastructure is in place over Norfolk Southern segment, albeit with passenger service upgrades needed. • Minimizes need to operate over Norfolk Southern by utilizing Dover & Delaware River Railroad, a short-line railroad which may be amenable to passenger service upgrades.	• Operations over Norfolk Southern may impact the freight rail supply chain to the Lehigh Valley and Port of New York and New Jersey. • Hackettstown routing to New York is less direct than High Bridge Routing • Operations must use NJT and Amtrak lines east of Hackettstown. Surplus capacity on these lines is unknown. • Bi-state cooperation on New Jersey portion of route adds complexity.	2:30	$474.9M Rolling Stock: $145.0M	$23.6 – $28.8M/year
Allentown to New York via High Bridge	• Most direct route to New York City from Allentown. • Class 1 freight rail infrastructure is largely in place, albeit with passenger service upgrades needed.	• Operations over Norfolk Southern may impact the freight rail supply chain to the Lehigh Valley and Port of New York and New Jersey. • Operations must use active NJ TRANSIT, Conrail (freight), and Amtrak lines east of High Bridge. Surplus capacity on these lines is unknown. • Bi-state cooperation on New Jersey portion of route adds complexity.	2:20	$469.9M Rolling Stock: $145.0M	$16.5 – $20.1M/year
Allentown to Philadelphia via Lansdale	• Most direct route to Philadelphia, utilizing (mostly) in-service rail corridors.	• Almost 12 miles of this route has had the track removed and been converted to public rail trails. • Operations over Norfolk Southern may impact the freight rail supply chain to the Lehigh Valley and Port of New York and New Jersey. • Optimal routing through Bethlehem is unclear. • Operations over SEPTA south of Lansdale will directly conflict with dense commuter rail operations. • SEPTA may not permit dual-mode diesel/electric locomotives through the Center City, Philadelphia tunnel.	1:46	$635.8M Rolling Stock: $102.0M	$5.1 – $10.2M/year
Allentown to Philadelphia via Norristown	• Can provide a diesel-only route to 30th Street Station in Philadelphia.	• Almost 12 miles of this route has had the track removed and been converted to public rail trails. • Operations over Norfolk Southern may impact the freight rail supply chain to the Lehigh Valley and Port of New York and New Jersey. • Optimal routing through Bethlehem is unclear. • Operations over the SEPTA Norristown Line will directly conflict with dense commuter rail operations.	1:52	$739.0M Rolling Stock: $102.0M	$5.5 – $10.8M/year
Allentown to Reading	• Lowest anticipated operating costs of all rail alternatives • Class 1 freight rail infrastructure is largely in place, albeit with passenger service upgrades needed.	• Operations over Norfolk Southern may impact the freight rail supply chain to the Lehigh Valley and Port of New York and New Jersey. • Future proposed passenger rail connections to Philadelphia are proposed by the Schuylkill River Passenger Rail Authority, but not yet certain. • Downtown Reading may not have the same travel demand characteristics of New York and Philadelphia.	0:46	$450.3M Rolling Stock: $102.0M	$2.2 – $4.3M/year

[1] Planning-level, order-of-magnitude capital estimates developed to allow for a comparative assessment of the infrastructure needs and estimate rolling stock procurement costs. New track alignment, earthwork, flyovers, and stations were based on new track mileage from each of the corridors that composed each service Alternative, and major bridge structures and flyovers were based on whether or not these items would be needed on the specific segments that each service alternative used. One rail maintenance facility was assumed to be part of every service alternative. A rough estimate of additional ROW acquisition costs was noted separately but is not included in the capital cost totals. Items not considered in cost estimates include financing, utility relocation, and environmental mitigation. Capital cost methodology is discussed further in Chapter 6 or this report and in the *Infrastructure and Capital Costs Technical Memorandum*.

[2] Operating cost estimates are based on hypothetical service plans developed solely to identify approximate run times and potential service levels (trains per day) to allow for a high-level order-of-magnitude estimate of annual operating costs for these service options. Operating cost estimates only include train-related expenses; they do not include the ongoing costs of operating and maintaining stations. No effort has been made to determine if this assumption is acceptable to NJ TRANSIT, SEPTA, Amtrak, or any other passenger service provider or with any freight carrier. Likewise, no effort was made to integrate these service schedules into existing patterns of service. Capital cost methodology is discussed further in Chapter 6 or this report and in the *Infrastructure and Capital Costs Technical Memorandum*.

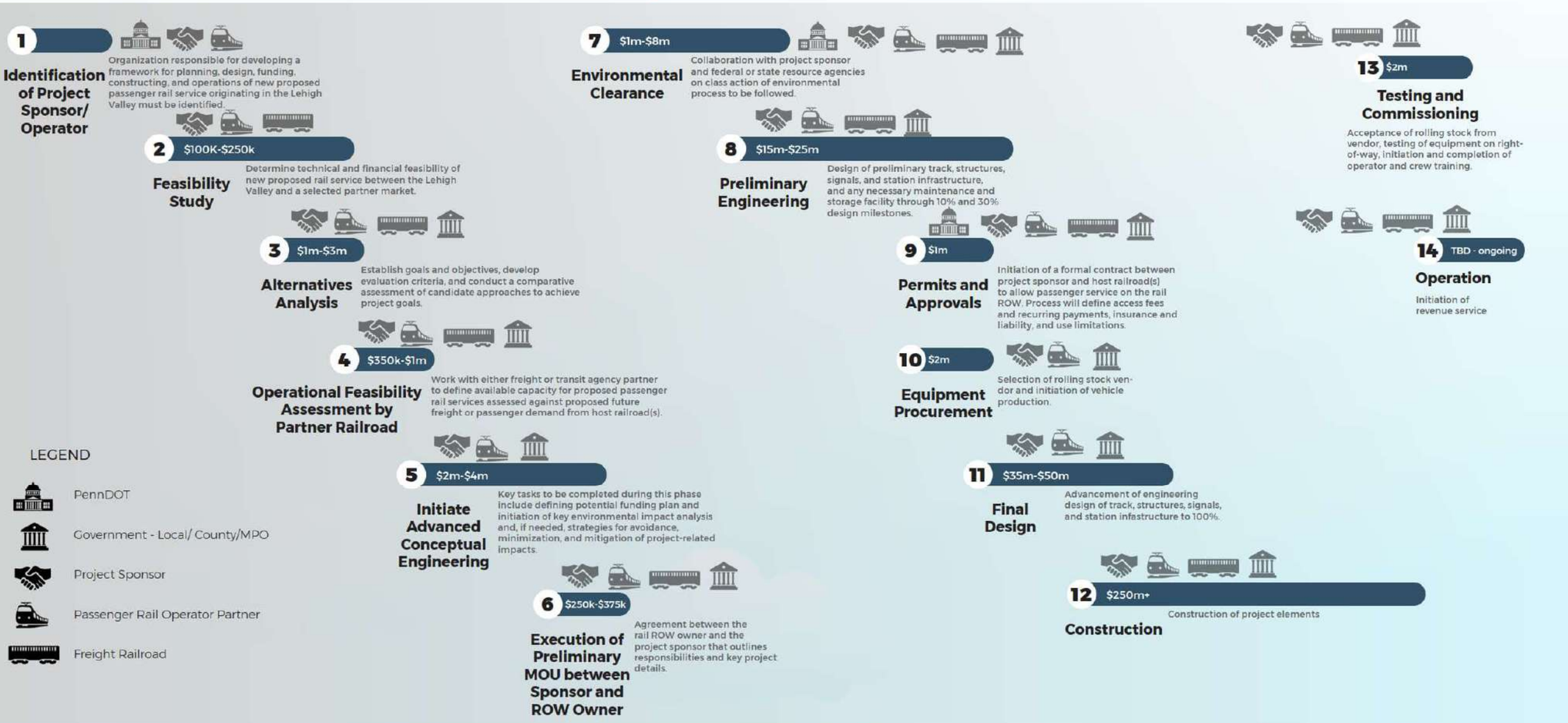
Development of any of the Lehigh Valley passenger rail corridors will require a future project sponsor to lead the project process and overcome significant challenges during the initial years of the project development lifecycle. These challenges include:

1. Missing or re-developed sections of former rail lines – Of all former passenger rail corridors between Allentown and Philadelphia/New York, not a single one remains intact in its entirety. Every corridor has had portions of the rail line removed and abandoned, with the formerly active railroad property sold and repurposed. Common uses of the former lines include rail trails, parks, roadway alignments, commercial development, and private property. For new passenger services to be established where these conditions exist, property will need to be acquired.
2. Operational conflicts with freight railroads – Any future passenger service to the Lehigh Valley will need to share corridors with active privately-owned freight railroads. The Lehigh Valley is a critical freight rail access point to the New York City metropolitan area and is itself a major freight rail logistics center. Any future passenger service will require significant capital investment on freight railroad properties to ensure that critical freight rail services can continue unimpeded by passenger trains, which have dramatically different operational characteristics and needs.
3. Operational conflicts with existing passenger railroads – With the exception of the potential Reading service, routes from the Lehigh Valley to New York and Philadelphia require operations over NJ TRANSIT, SEPTA, Amtrak, or a combination thereof. These are well-established commuter and intercity rail operations with a high train density during peak rush hour periods. Existing operations may limit capacity for a new Lehigh Valley service, and agreements would need to be reached with these existing rail operators to permit the new service.
4. Missing facilities – Although there was historically passenger service to the Lehigh Valley, few of the former stations exist and those that do would certainly not comply with modern standards. It can be safely assumed that all stations would be required to be constructed new. Additionally, an equipment maintenance facility would likely need to be constructed in the Allentown area to support the new service.
5. Cost and Funding – Estimated capital costs for the new service range from $450 million to $739 million, and estimated annual operating costs range from $2 million to $29 million. This report outlines many potential sources of funding for capital investments, however operating costs will require a permanent subsidy, the source(s) of which will need to be determined.

To assist in guiding the development process should a project sponsor be identified, this study also provides a typical project development lifecycle (shown on the following page) which can inform the project sponsor on the steps, roles, and responsibilities required to realize passenger service within an approximately 10- to 12-year timeline.

Lehigh Valley Rail Study

Project Lifecycle 10 to 12 Years



1. Introduction

The *Lehigh Valley Passenger Rail Feasibility Analysis* investigates and defines the critical path necessary for restoring passenger rail service to Pennsylvania's Lehigh Valley, with connections to existing or planned rail services in the Newark/New York, Philadelphia, and Reading market areas. This document (including appendices) summarizes the various efforts to date to restore rail service, identifies the key infrastructure and institutional challenges, estimates costs, defines the necessary approvals and operational requirements, and highlights key steps for both a technical and non-technical audience.

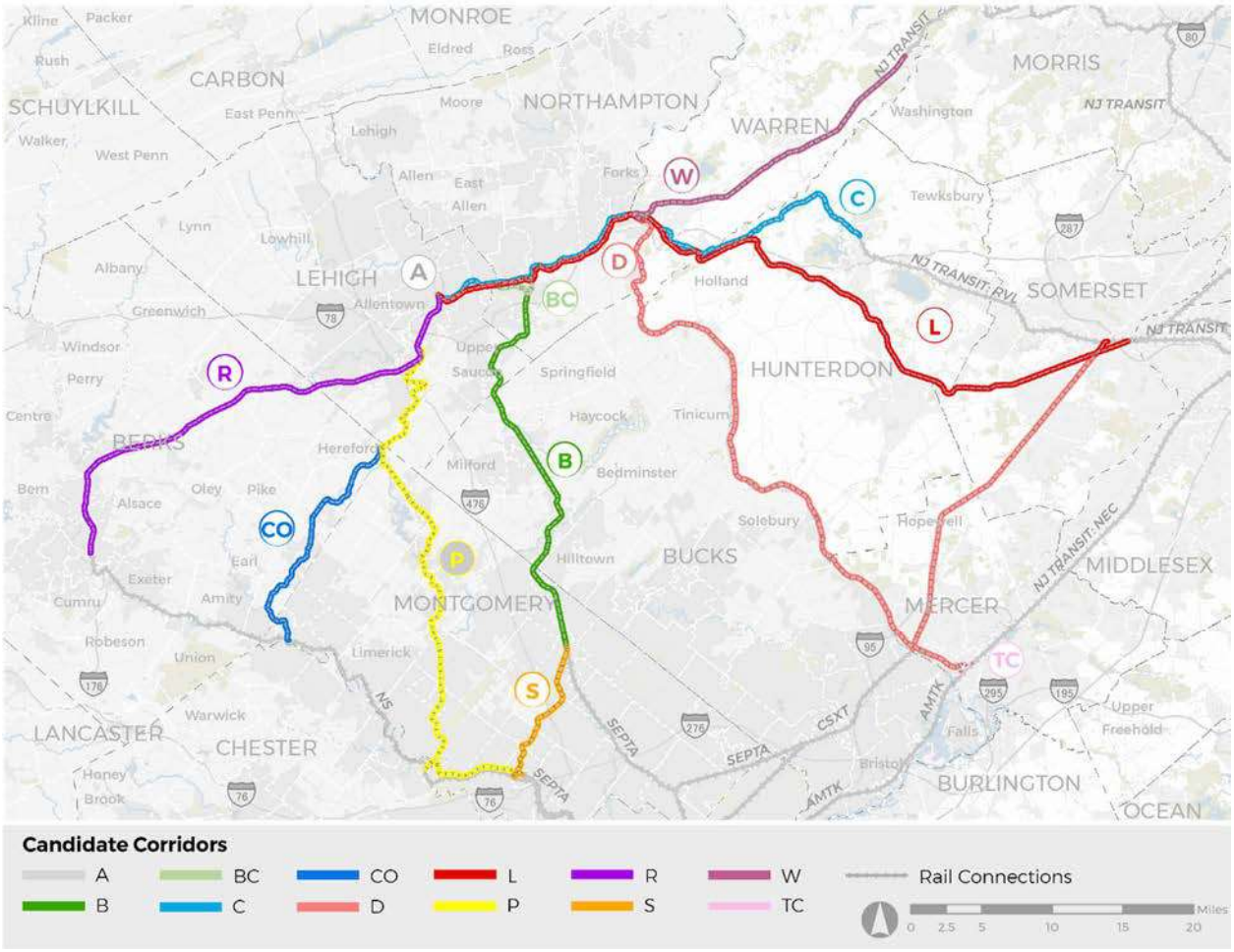
Chapter 2 – Previous Rail Studies summarizes the numerous previous rail service studies investigating options for improved transit between the Lehigh Valley and the three market areas. These studies were published subsequent to the termination of Lehigh Valley passenger rail service in 1979, which had operated since the mid-1850s. The documents were prepared by county, regional, and state entities in Pennsylvania and New Jersey, using different approaches and various assumptions, to restoring passenger rail service. The studies identified numerous challenges, including transit underserving suburban areas, potentially high capital costs, low anticipated farebox recovery, the presence of environmental constraints, and conflicts with existing SEPTA passenger rail service. Additional details are provided in the *Previous Rail Service Studies Technical Memorandum.*

Chapter 3 – Service Corridors introduces the 12 identified corridors which historically supported passenger rail service to the three market areas. There were four overall corridors analyzed between the Lehigh Valley and New York market area, four corridors analyzed between the Lehigh Valley and Philadelphia market area, one corridor analyzed between the Lehigh Valley and Reading market area, and an additional three "connector" corridors analyzed which facilitate train movements between other corridors. These corridors, shown in Figure 1, were further divided into 99 segments for deeper analysis. Because most of the former corridors are no longer completely intact, this segmentation allows for portions of former corridors to be combined for realistic modern routings.

While 12 corridors are examined as part of this effort, the corridors have widely varying degrees of viability for future passenger service. A deep analysis of corridors and segments is presented here to fully consider all potential passenger train routings and to help a future project sponsor understand the granular challenges and opportunities along each corridor. Additional detail can be found in the *Service Alternatives Technical Memorandum.*

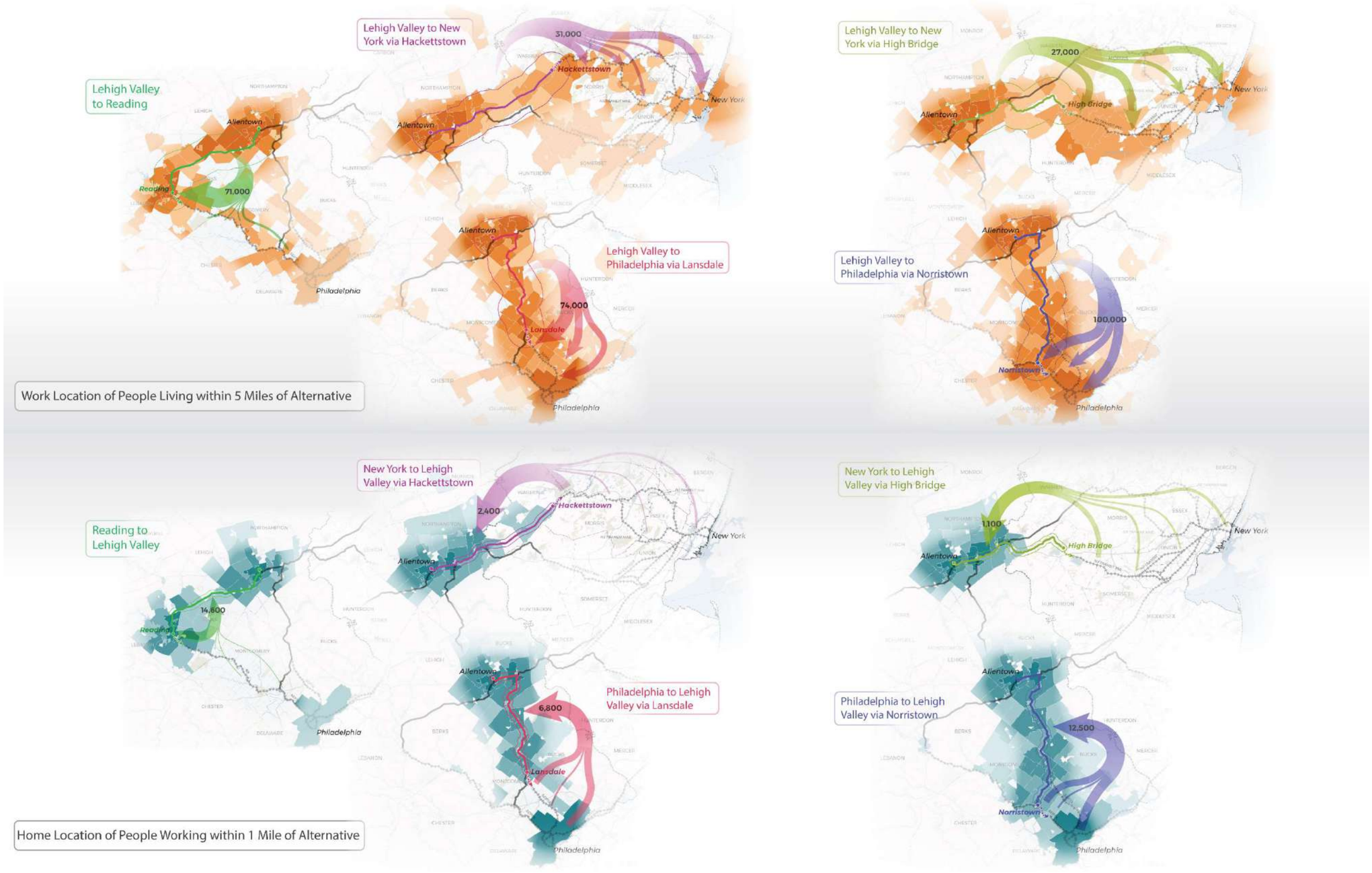
Chapter 4 – Environmental Screening discusses environmental constraints along the 12 identified corridors. Constraints were identified through a combination of geographic information system (GIS) analysis and desktop research. The environmental screening represents the first step in identifying potential constraints. Constraints include parks, wetlands, preserved areas, historic districts, and flood zones, among others. Additional flagged constraints identified via desktop research include the need for new bridges, operational conflicts with freight rail, and missing sections of right-of-way. The *Environmental Screening Technical Memorandum* provides additional detail on environmental constraints, including the 12 corridors and 99 segments displayed across 34 maps.

Figure 1. Lehigh Valley Passenger Rail Feasibility Analysis Candidate Corridors



Chapter 5 – Service Alternatives and Demand Analysis summarizes five service alternatives developed from segments of the 12 corridors. Two alternatives connect the Lehigh Valley to the New York market area, two connect to the Philadelphia market area, and one connects to the Reading market area. These alternatives combine segments of various corridors to provide feasible potential routes between the Lehigh Valley and the three market areas. Environmental constraints, operational considerations, and a qualitative consideration of ridership demand informed the selection of alternatives. In addition to detailing the five corridors, this chapter includes a demand analysis using U.S. Census data to review existing demographics and commuting data between the Lehigh Valley and three market areas along the five alternative routes. This analysis is not intended to provide ridership estimates, but rather to demonstrate that there is existing potential demand for renewed passenger rail service from the Lehigh Valley (Figure 2), although the portion of travelers who would choose to take the train instead of driving is uncertain and dependent on many variables. Additional detail can be found in the *Service Alternatives Technical Memorandum.*

Figure 2. Demand Analysis Mapping



Chapter 6 – Costs provides planning-level conceptual cost estimates for each of the 12 corridors and 5 service alternatives. Cost estimates considered geographic and topographical constraints, required infrastructure upgrades and modifications, station facilities, rolling stock, and maintenance and layover facilities. A rough estimate of additional ROW acquisition costs was noted separately but is not included in the capital cost totals. Items not considered in cost estimates include financing, utility relocation, and environmental mitigation. A high-level operating plan and range of costs, subject to project operators, are also provided for each service alternative under this chapter.

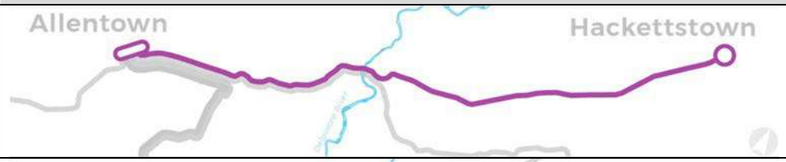
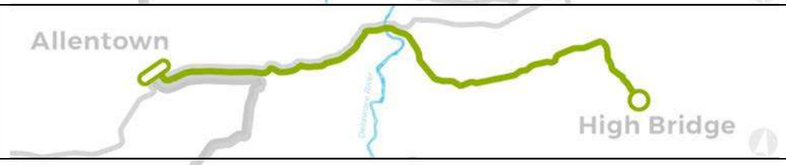
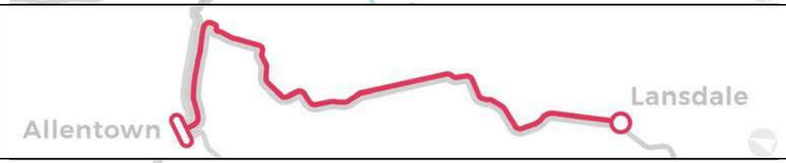
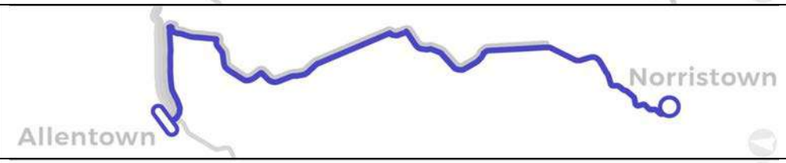
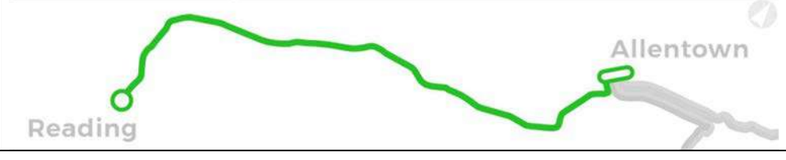
The *Infrastructure and Capital Costs Technical Memorandum* provides detailed breakdowns of the cost estimates for each corridor, including the methodology for estimating unit costs.

Chapter 7 – Operations, Approvals, and Funding discusses the key requirements to restore passenger rail operations between the Lehigh Valley and the three market areas. The conditions under which services could be provided are described, including a general legal framework governing agreement between freight railroads and a passenger service sponsor. Additionally, potential federal, state, and local funding sources that could support restoring passenger rail service are identified and briefly described. The funding and financing portion of the chapter discusses potential capital, operations, and maintenance funding sources from federal, state, and regional programs, as well as potential local tax and fee opportunities. Additional details about operations, approvals, and funding can be found in the *Operations, Approvals, and Funding Technical Memorandum*.

Together, this final report and its appendices lay the foundation for a future project sponsor to restore passenger rail service to the Lehigh Valley. A critical next step is identifying a project sponsor. This entity will be the organization responsible for developing a framework for planning, designing, funding, constructing, and operating the new passenger rail service.

The analysis conducted as part of this *Lehigh Valley Passenger Rail Feasibility Analysis* will be essential to informing potential project sponsors of the opportunities and challenges associated with this effort. If passenger rail is pursued, a project sponsor will need to be identified, and subsequent steps include conducting a detailed feasibility study and alternatives analysis and assessing the operational feasibility of partner railroads. This analysis occurs early in the process; operation of passenger rail service in the Lehigh Valley can be reasonably expected to take at least another 10 years; however, this study and subsequent elements will help guide a project sponsor and support the desired outcome for the Lehigh Valley.

Table 1. Service Alternatives Summary

Market Area Served	Alignment	Estimated Costs (in million $)			Environmental Constraints	Flagged Constraints	Travel Time
		Capital	Rolling Stock	Operation (Yearly)			
To New York via Hackettstown		$474,909,110	$145,018,585	$23,564,400 – $28,776,600	• Historic properties and preserved farmlands are located along the route	Operations over freight lines	2 hours, 30 mins
To New York via High Bridge		$469,923,680	$145,018,585	$16,471,500 – $20,114,800	• Historic properties and preserved farmlands are located along the route • Contaminated site along route	Operations over freight lines	2 hours, 20 mins
To Philadelphia via Lansdale		$635,811,084	$102,016,680	$5,132,200 – $10,186,900	• Historic properties are located along the route	Operations over freight lines, Portions of route have been converted to rail-trail	1 hour, 46 mins
To Philadelphia via Norristown		$739,026,613	$102,016,680	$5,451,200 – $10,820,000	• Historic properties are located along the route • Contaminated site along route	Operations over freight lines, Portions of route have been converted to rail-trail	1 hour, 52 mins
To Reading		$450,325,639	$102,016,680	$2,174,700 – $4,316,500	• Historic properties and preserved farmlands are located along the route • Potential reconstruction of a creek crossing	Operations over freight lines	46 mins

2. Previous Rail Service Studies

The project team reviewed previous service studies as part of the *Lehigh Valley Passenger Rail Feasibility Analysis*. These studies explore the restoration of passenger rail service in Pennsylvania's Lehigh Valley, and all have been conducted since 1979, when passenger rail service to the Lehigh Valley was terminated after operating since the mid-1850s. The studies are summarized below, with additional detail provided in the *Previous Rail Service Studies Technical Memorandum*, which is included as an appendix to this final report. The technical memorandum provides the agency, date, estimated costs, study summary, and relevant issues to consider for each reviewed document. The summaries report key findings and facts, including ridership estimates, capital cost estimates, and operating plans, where applicable.

Studies concerning restoring passenger rail service to the Lehigh Valley from New York and Philadelphia are listed in *Table 2* and summarized below.

Table 2. Reviewed Studies (as of February 2023)

Study Name	Study Publisher	Publication Date	Service Area
I-78 Corridor Transit Study	North Jersey Transportation Planning Authority	2007	New York
Central New Jersey/Raritan Valley Transit Study – Pennsylvania Component	Northampton County, Lehigh County, Lehigh Valley Economic Development Corporation	2010	New York
Central New Jersey/Raritan Valley Transit Study – New Jersey Component	NJ TRANSIT	2011	New York
Raritan Valley Line Capacity Expansion Study Final Report	NJ TRANSIT	2013	New York
Raritan Valley Line One-Seat Ride Service to Manhattan Study Report	NJ TRANSIT	2020	New York
Quakertown-Stony Creek Rail Restoration Study	Bucks County Planning Commission	2000	Philadelphia
Quakertown Stony Creek Passenger Rail Restoration Business Plan	Bucks County Transportation Management Association	2006	Philadelphia
Quakertown Rail Restoration Travel Forecasts Study Technical Memorandum	Delaware Valley Regional Planning Commission	2008	Philadelphia

Service to the New York/New Jersey Urban Core

Three interconnected studies were conducted concerning transit service on the Interstate 78 (I-78) corridor west of the Bridgewater area as far west as the Lehigh Valley. The studies explored how regional transit service could be expanded and improved to facilitate transit trips to the urban core and reduce intra-suburban regional vehicle trips. These studies generally explored commuter rail and

commuter bus alternatives. Two additional studies investigated improving capacity and providing a full-time one-seat ride along the Raritan Valley Line into New York City.

I-78 Corridor Transit Study (2007)

The I-78 Corridor Transit Study evaluated potential improvements to enhance transit service on the I-78 corridor between Bridgewater, New Jersey, and the Lehigh Valley, including evaluating existing transit services, facilities, and future traffic conditions. The study focused on express bus patterns and new park-and-ride facilities along the corridor and largely deferred decisions about rail expansion to the subsequent NJ TRANSIT-led study. The study endorsed a commuter bus service with 20-minute peak headways originating at the William Penn Park & Ride west of Easton, with service to Bridgewater making intermediate stops. The study acknowledged that transit underserves the suburban region within the study area, as well as Lehigh County.

Central New Jersey/Raritan Valley Transit Study – Pennsylvania Component (2010)

The Central New Jersey/Raritan Valley Transit Study – Pennsylvania Component assumed an NJ TRANSIT Raritan Valley Line extension to Phillipsburg and explored transit options to connect to the rail corridor. The study identified three alignments for a Raritan Valley Line rail extension into the Lehigh Valley but ultimately shortlisted only the southern alignment using the existing Norfolk Southern Lehigh Line tracks. The study also considered a commuter bus service offering direct, non-stop, peak-hour service from park & rides in Allentown, Bethlehem, and Easton to New York City. Reviewed rail service was expected to garner 800 daily riders with a 155-minute ride between Allentown and New York City, while reviewed bus service was expected to garner 600 daily riders with a 129-minute ride between Allentown and New York City.

Central New Jersey/Raritan Valley Transit Study – New Jersey Component (2011)

The Central New Jersey/Raritan Valley Transit Study – New Jersey Component reviewed a series of regional transit improvements along the Raritan Valley Line/I-78 corridor between Bridgewater and Phillipsburg. The study considered new express bus services, extensions of the Raritan Valley Line and Morris & Essex commuter rail lines, construction of park & rides to complement commuter rail and new express bus services, and improvements to existing rail stations. The study ultimately envisioned a hybrid commuter bus/rail hybrid service for the Raritan Valley oriented toward serving the urban core around New York City as a primary destination and the Bridgewater area as a secondary destination. Assuming a Raritan Valley Line extension to Phillipsburg, full construction of proposed park & rides, and completion of proposed upgrades to rail stations, the extension was expected to serve up to 1,475 daily riders. The study assumed that more train slots would be available on the Raritan Valley Line and at New York Penn Station due to the construction of the ARC (Access to the Region's Core) tunnel. While other capacity improvements are now in progress, the assumptions used in this study for train slots and service patterns may no longer be applicable.

Raritan Valley Line Capacity Expansion Study Final Report (2013)

The Raritan Valley Line Capacity Expansion Study Final Report investigated several capacity enhancement options along the central segment of the Raritan Valley Line between Cranford (Union County) and Raritan (Somerset County). The purpose of the study was to begin outlining a framework for additional analysis to firmly establish a future Raritan Valley Line infrastructure improvement plan.

The study reviewed four capacity enhancement scenarios. The analysis assumed all Raritan Valley Line trains would terminate at Newark Penn Station and concluded that increasing train lengths could accommodate much of the line's forecasted growth.

Raritan Valley Line One-Seat Ride Service to Manhattan Study Report (2020)

The Raritan Valley Line One-Seat Ride Service to Manhattan Study Report reviewed the feasibility of providing a one-seat ride during peak and off-peak hours on weekdays and weekends along the Raritan Valley Line to Penn Station New York. The study reviewed two short-term scenarios, two medium-term scenarios, and one long-term scenario and determined that any scenario reducing service along the Northeast Corridor or North Jersey Coast Line routes would negatively affect customers, reducing ridership and carrying capacity and leading to additional overcrowding at Newark Penn Station and Secaucus Junction. The study determined that full-time direct rail service to New York Penn Station would be best achieved by expanding trans-Hudson and Penn Station infrastructure capacity, such as that included in the Gateway Program.

Service to Philadelphia

Three studies reviewed the feasibility, considerations, and demand for restoring passenger rail service to the Quakertown-Stony Creek rail corridor between Quakertown and Norristown. Each study also reviewed the feasibility of extending this service along other rail lines into Center City, Philadelphia. These three studies can be seen as operating along a single continuum, proposing adjustments from the previous study's recommendation in an effort to advance passenger rail along the corridor. No known recent studies investigated restoring transit service directly between Philadelphia and the Lehigh Valley.

Quakertown-Stony Creek Rail Restoration Study (2000)

The Quakertown-Stony Creek Rail Restoration Study investigated linking the Upper Bucks and North Penn communities with the employment centers of King of Prussia and Center City, Philadelphia, through restored passenger rail service along SEPTA's Bethlehem and Stony Creek branches. Three broad preliminary alternatives were developed. A key element of developing alternatives was maximizing the use of existing or immediately pending rail facilities. Criteria for selecting a lead alternative included infrastructure and vehicle capital costs, annual operating costs, and patronage affinity scores for accessing Philadelphia and King of Prussia. Under the selected lead alternative, new diesel train service would operate via Amtrak's Northeast Corridor to the lower level of the 30th Street Station. Service would operate non-stop between Norristown and 30th Street Philadelphia. The corridor would serve 22 stations (11 new), 11 daily round trips, and serve up to 7,000 daily riders.

Quakertown Stony Creek Passenger Rail Restoration Business Plan (2006)

The Quakertown Stony Creek Passenger Rail Restoration Business Plan documented the project background, reviewed requirements for the Bucks County Transportation Management Association as a potential federal grant recipient, and outlined an action plan and next steps. This plan proposed advancing passenger rail service in three successive stages. This approach would significantly reduce the expense and complexity of initial service startup. Ultimately, 21 round trips would be offered on weekdays and 17 on weekends. Phase 1 was estimated to have between 1,200 and 2,000 weekday trips.

Quakertown Rail Restoration Travel Forecasts Study Technical Memorandum (2008)

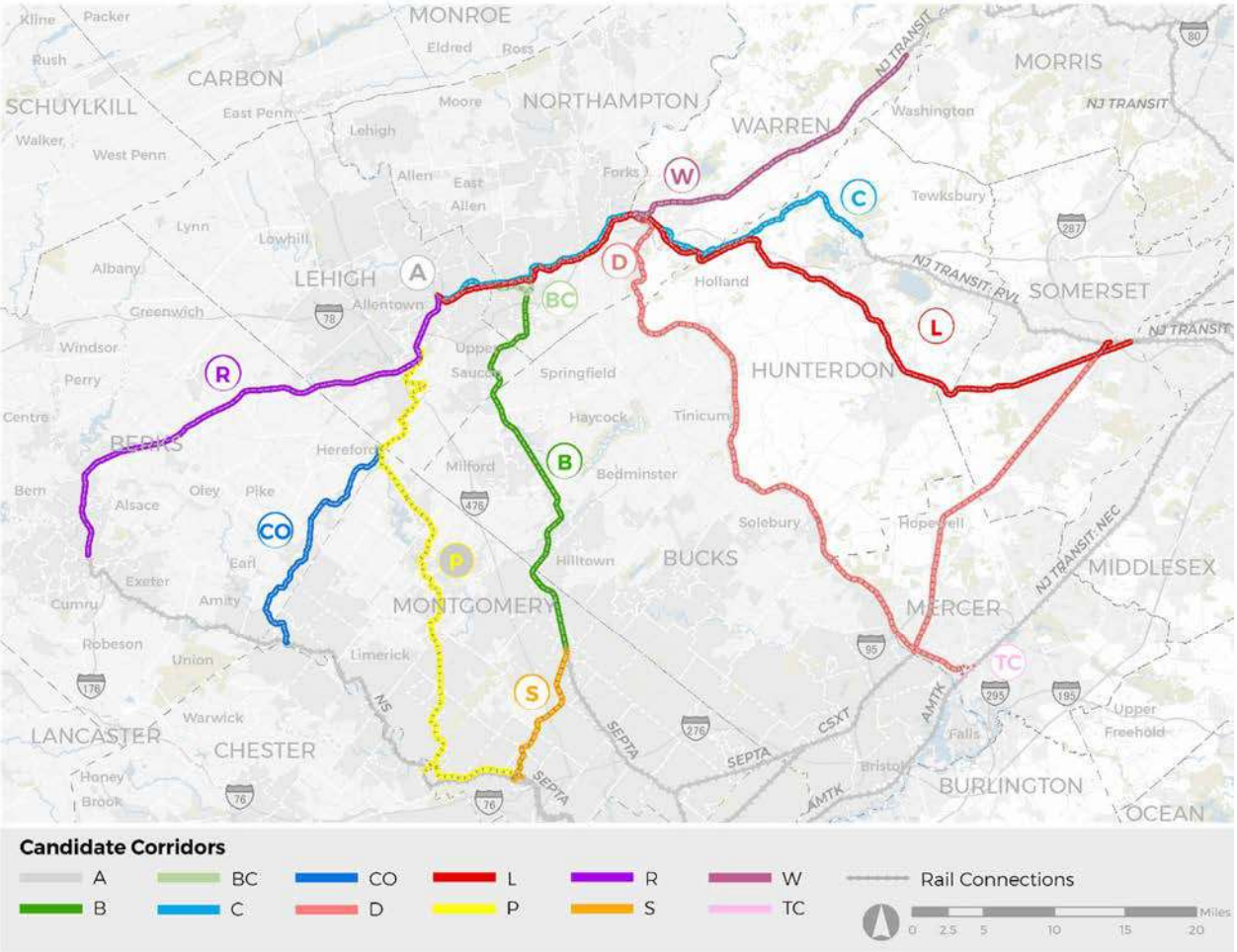
The Quakertown Rail Restoration Travel Forecasts Study Technical Memorandum focused on projecting travel demand for the portion of the study corridor between Lansdale and Bethlehem/Allentown. The model incorporated expected residential and employment change in each study area municipality. The study area population was expected to grow by 31.9% from 2005 to 2030. Four alternatives were developed. The Shuttle alternative was expected to result in more than 8,000 new daily train trips, while the Regional Rail alternative resulted in 11,000 new daily train trips.

3. Service Corridors

The project team developed several service corridors for the three market areas of Newark/New York, Philadelphia, and Reading. Twelve corridors were ultimately identified and reviewed, offering several options for routes to the market areas. The 12 corridors were further divided into 99 segments based on right-of-way (ROW) conditions, existing rail usage characteristics, and junctions with other corridors. Each corridor extends to the location of an existing (or, in the case of Reading, planned) rail service. Connections are available at these locations to SEPTA Regional Rail, NJ TRANSIT commuter rail, or planned Amtrak intercity rail service. No assumptions were made about potential operators.

This section summarizes the corridor identification methodology and each corridor. Additional details are found in the *Service Alternative Technical Memorandum*. The 12 corridors are shown in *Figure 3*.

Figure 3 Candidate Corridors



Methodology

The identified routes largely consist of existing or former railroad ROWs and, in some cases, include limited sections of greenfield alignment that connect rail segments. More capital-intensive ROWs that might predominantly follow highway alignments or use significant greenfield alignments were excluded from this initial feasibility analysis.

The inventory of ROWs consists of 12 corridors. These corridors were identified as physically continuous ROWs that, combined with other corridors, connect the Lehigh Valley to reasonable hand-off locations with existing passenger rail providers, including NJ TRANSIT and SEPTA, or to the proposed future passenger rail project presently being evaluated by the Schuylkill River Passenger Rail Authority. Three corridors are collections of smaller branches that provide alternatives for a precise station location or junction within a city.

Segmentation

Each corridor was subdivided into segments. The segments and their breakpoints were distinguished based on the following:

- ROW condition – this includes active, lightly used, inactive, abandoned, and repurposed conditions
- Existing rail usage characteristics – which considers the existence and nature of existing freight rail service
- Junctions with diverging corridors or other segments

Organizing the ROWs into corridors and subdividing them into segments permits a granular analysis of the ROWs and creates a comprehensive picture of the operational issues a particular passenger rail service sponsor in the region may face.

Corridor Summaries

The following sections summarize the conditions of the identified service alternatives.

Newark/New York Service Area

Corridor W

Corridor W is made up of a shortline railroad serving industries in northern New Jersey that connects them to the interchange with Norfolk Southern in Phillipsburg. Present freight volumes on this corridor are relatively low but subject to change. While Norfolk Southern trackage would need to be used beyond Phillipsburg into the Lehigh Valley, present freight rail traffic volumes suggest that Corridor W offers minimal conflicts between passenger and freight operations.

Corridor W comprises Federal Railroad Administration (FRA) Class I tracks, confining trains to speeds of 10 miles per hour (mph). The use of this line would require a total reconstruction of the ROW to make it suitable for passenger rail operations and a new signaling system to accommodate that operation.

Corridor W would require substantial capital work but offers a low freight traffic alternative to accessing the Lehigh Valley from Newark/New York. However, passenger rail services would need to use Corridor C or Corridor L west of Phillipsburg to access Corridor W.

Corridor C

Corridor C starts as an abandoned railroad ROW in Allentown, crossing the Lehigh River on a single-track bridge. The corridor passes Allentown Yard, which poses operational challenges for passenger rail service because while yard rules that limit train speeds do not apply here, freight trains entering, leaving, or being assembled can foul the main line and interfere with passenger rail operations. The entire portion of Corridor C between Allentown and Bethlehem is characterized by slow 20 mph freight movements and heavy freight traffic in a constrained area. Physical constraints between the cliffs and the Lehigh River also present a constructability challenge for any new tracks dedicated to passenger use. Most of the ROW between Bethlehem and Easton is abandoned or inactive, with one segment repurposed as a rail trail. The corridor continues into New Jersey, where a significant portion is abandoned. Two new bridges need to be constructed: one over 3rd Avenue and another over I-78, both in Alpha. The corridor is inactive between Bloomsbury and High Bridge. At Pine Hollow Road in Bloomsbury, Corridor C connects to Corridor L. Currently, trains are restricted to 10 mph along this segment. Restoring this segment to operating condition for passenger rail requires reconstruction of the tracks and a new signaling system. Use of this segment would result in a passenger-exclusive ROW and permit access to the Raritan Valley Line at High Bridge.

Making use of Corridor C generally minimizes interaction with freight railroad traffic and maximizes opportunities for passenger rail exclusive ROWs, but it also requires costly rehabilitation and reconstruction in many cases. Corridor C within the Lehigh Valley may also have greater impacts on recreational sites and residential communities than other corridors.

Corridor L

Corridor L begins in Allentown and continues east as a lightly used industrial track that requires total reconstruction for passenger service. In Bethlehem, the corridor is heavily used for freight; it functions as an important conduit for freight traffic moving between the West Coast, Midwest, and New York area. The ROW can accommodate an additional track. An existing interchange yard in Bethlehem results in slow freight trains entering and exiting the yard. Passenger rail operations might also necessitate the use of tracks within the yard, further complicating both freight and rail operations. Between Bethlehem and Easton, an additional track for passenger service and signaling upgrades is necessary to comfortably accommodate both passenger and freight services.

Corridor L crosses the Delaware River along an abandoned railroad bridge. South of Bloomsbury, the Lehigh Line continues as a single-tracked main line with passing sidings interspersed throughout the corridor to Port Reading Junction near Manville. Near Flemington, underused or abandoned rail ROWs parallel Corridor L for nearly 10 miles. This ROW provides an opportunity to create an exclusive ROW for passenger services for at least some distance along the corridor. East of Manville, Corridor L splits into several approaches to join with the Raritan Valley Line. Segment L12b offers a direct connection to the Raritan Valley Line but requires a significant reconstruction of the ROW and of the existing bridge over the Raritan River; it also requires accommodating space for industrial usage along the segment.

Corridor L offers a highly viable ROW for passenger rail service in the Lehigh Valley and New Jersey west of Bloomsbury, but it also offers challenges associated with existing freight rail mainline traffic. Corridor L may also require capital investment to make the ROW suitable for passenger use and to minimize conflict with freight rail traffic.

Corridor D

Corridor D begins as an abandoned ROW in Phillipsburg, integrated into the surrounding Delaware River Park. The corridor becomes active to the south, limited to speeds of 10 mph. Using this branch requires significant reconstruction of the ROW and new signaling, and existing curvature is likely to limit overall speeds on this route. Existing freight traffic is light, but regular passenger excursion trains run on weekends.

Between Milford and Trenton, the ROW is largely occupied by the Delaware & River Canal Trail. ROW width here is highly restricted, which precludes the inclusion of both a railroad ROW and a rail trail. In Ewing, the corridor meets the CSX Trenton Subdivision. Connecting the two requires a new ramp. The corridor then continues south into the densely developed city of Trenton, with multiple potential connections to the Trenton Transit Center, with connecting service to Amtrak, NJ TRANSIT's Northeast Corridor service, SEPTA Regional Rail's Trenton Line, and NJ TRANSIT's River Line.

Corridor D offers access to the Lehigh Valley and Trenton, which other corridors cannot access. It also offers access to various population centers along the Delaware River. Corridor D has the opportunity to indirectly serve both the Newark/New York and Philadelphia markets via connections to the Northeast Corridor in Trenton. However, Corridor D also substantially impacts recreational trails and lands along the Delaware River. The demand for Lehigh Valley-Trenton services is likely substantially lower than services toward Newark/New York and Philadelphia. Passenger rail services using the CSX Trenton Subdivision to access Newark/New York or Philadelphia also add considerable mileage to either of these destinations over other corridors.

Philadelphia Service Area

Corridor B

Corridor B consists of the former Reading Railroad Bethlehem Branch between Bethlehem and Lansdale. Corridor B was historically the primary rail corridor between the Lehigh Valley and Philadelphia. Today, SEPTA owns almost the entire corridor. The corridor is a formerly double-tracked, relatively direct route with a wide ROW that allows for multiple uses. Corridor B on its northern half is inactive, but on its southern half, it serves as a branch line for local freight service. At its southern end in Lansdale, Corridor B connects to the SEPTA Doylestown Line and Corridor S for additional connections to Philadelphia. Also in Lansdale, local shortline railroads that operate on Corridor B interchange with CSX via the Stony Creek Branch. At the northern end of the corridor, connections to Corridors L and C are available through a collection of branches described in Corridor BC.

Various portions of the corridor operate as the Upper Bucks and Saucon rail trails, which are owned by SEPTA and leased to local municipalities. Between Shelly and Lansdale, two tracks are present, but one is generally used for storage. Use of this line requires the total reconstruction of the ROW and a new signaling system to make it suitable for passenger rail operations.

Corridor B offers a straightforward route from the Lehigh Valley to Philadelphia with a comparatively straight ROW. Connections with the SEPTA Doylestown Line enable service to minimize interfacing with heavy freight traffic south of Bethlehem. Using Corridor B also minimizes the capital cost of rail corridor acquisition and construction needed to reach Philadelphia from the Lehigh Valley relative to other corridors that connect directly to Philadelphia.

Corridor S

Corridor S begins on SEPTA's Doylestown Line at the Lansdale station, where Corridor B ends and merges with the Doylestown Line. All services using the Stony Creek Branch need to follow the Doylestown Line for at least a quarter mile to meet Corridor B. This sharing of tracks creates potential scheduling conflicts between crossing trains. An additional track can be constructed to the west to allow Lehigh Valley trains connecting from Corridor B to the Stony Creek branch to bypass tracks currently used by SEPTA trains. Such construction requires the reconstruction of a platform at Lansdale station and the relocation of grade crossing infrastructure and approximately 400 feet of a bike trail.

New passenger rail service would have to contend for slots where the corridor meets SEPTA's Norristown Line. SEPTA operations in Norristown are slow and carry the risk of scheduling conflicts between the Lehigh Valley and Manayunk/Norristown Line services.

The advantage to Corridor S over continuing services down the Doylestown Line to Philadelphia is that Corridor S permits access to 30th Street Station without passing through SEPTA's City Center Tunnel and without the use of active mainline freight rail ROW in Philadelphia. Avoiding use of the City Center Tunnel permits diesel operation of the Lehigh Valley passenger rail service. This comes at the tradeoff of having to invest in 15 miles of capital improvements to the Stony Creek Branch. Additionally, Corridor S has historically been a lower speed, branch line alignment, and geometry may not permit higher passenger speeds along this route.

Corridor P

Between Emmaus and Pennsburg, Corridor P remains intact as a shortline railroad operated by the East Penn Railroad. The railroad is limited to speeds of 10 mph, and the ROW has exceptionally sharp curves. Using this branch requires significant reconstruction of the ROW and new signaling. However, even with significant infrastructure improvements, passenger rail services would likely be confined to low speeds because of the curvature of the ROW. Between Pennsburg and Arcola, the Perkiomen Trail occupies significant portions of the ROW. Elsewhere, parcels have been sold to private owners and developed. Between Arcola and Oaks, the ROW is abandoned and largely consumed by new development and other infrastructure. An alternative branch avoiding the use of Norfolk Southern's ROW is an abandoned railroad ROW that passes through the Greater Philadelphia Expo Center and follows the Schuylkill River Trail to Norristown, where it connects with the SEPTA network. Using the Expo Center site requires the taking of portions of the parking lot and realignment of an access road.

The Perkiomen Branch offers an alternative to get to Philadelphia but leans heavily on acquiring property currently repurposed for other uses. The use of Corridor P also likely requires sharing tracks with Norfolk Southern freight trains at either end of the corridor.

Corridor CO

Corridor CO is composed of a shortline railroad, an abandoned railroad ROW, and a greenfield ROW through Berks County. The first section of Corridor CO branches off from Corridor P in a greenfield route. This section between Zionsville and Barto has never had a railroad ROW and has no existing grade to follow. Construction of the ROW requires the taking of property currently held by private owners. The second section of Corridor CO is an abandoned railroad ROW between Barto and Boyertown. While the ROW is mostly intact, a few key locations have been developed. Most of the corridor between Barto and Bechtelsville is privately owned. The final section of Corridor CO is composed of the Colebrookdale Railroad. Berks County Redevelopment Authority owns the property itself, but Colebrookdale Railroad operates the line. Colebrookdale Railroad offers shortline freight services and excursion passenger services. Railroad operations here are confined to speeds of 10 mph.

Corridor CO offers a ROW with less impact on trails and existing properties than Corridor P but requires the acquisition of approximately 9 miles of greenfield property between Zionsville and Barto to make this route viable. Any passenger rail service using Corridor CO would also experience scheduling conflicts with freight traffic on the Norfolk Southern Reading Line and Harrisburg Line.

Reading Service Area

Corridor R

Corridor R largely consists of the Norfolk Southern Reading Line, which forms part of the core freight rail line between Norfolk Southern's network to the west and the Lehigh Valley and New York City areas to the east. The corridor is double-tracked, which provides operational flexibility but may also limit the ability to build a new dedicated passenger rail track. Freight movements through and around Reading are frequent and slow, potentially leading to greater conflicts for passenger rail movements than would be typical on a mainline track. The corridor extends to Franklin Street in Reading, where the Berks Area Regional Transportation Authority Transportation Center and the former Reading Railroad station are located, presenting a potential meeting point with the Schuylkill River Passenger Rail Authority with further connections to Philadelphia.

Connector Corridors

Corridor A

Connected Corridor A is a pair of segments that act as station leads between Corridors C and L to two potential station sites in Allentown. The selection of station and Connector Corridor A segment is immaterial to the planning of the overall Lehigh Valley passenger rail service. Both stations are close to downtown and Allentown's new Waterfront district and are located on a street with several bus routes. The stations differ in their topography, existing station infrastructure, and vacancy of surrounding parcels.

Corridor BC

Connector Corridor BC represents the collection of three possible ROWs between the northern end of Corridor B and connections to Corridor L and C in Bethlehem. Historically, Corridor B was connected to Corridor L at the former Bethlehem Union Station site along a ROW that is now the South Bethlehem Greenway. Traversing this corridor requires sharing significant sections of track that are heavily used for

assembling and maneuvering trains bound for a forge and an intermodal yard. This Lehigh Valley Rail Management area is also envisioned as an "inland port" that would become a major generator for freight rail traffic. Heavy freight rail traffic volumes as envisioned would impose constraints on passenger rail and freight rail operations passing through the area.

Corridor TC

Connector Corridor TC represents the collection of three possible approaches from the southern end of Corridor D to the Trenton Transit Center. The available options differ in their need for at-grade crossings of the Northeast Corridor and additional infrastructure required to cross existing highways.

Additional Considerations

The fundamental considerations in corridor selection for Lehigh Valley passenger rail services are minimizing conflict between freight and passenger rail operations and using corridors that require less construction capital.

Newark/New York Service Area

For corridors oriented toward Newark/New York, minimizing conflict between freight and passenger rail operations is the greatest challenge. All possible routes, no matter which corridors and segments they use, must share the rail ROW with the Norfolk Southern Lehigh Line at some point to reach Allentown from the east.

Three possible strategies exist for passenger rail service to share the rail ROW with mainline freight traffic on the Lehigh Line. Passenger and freight rail services can share the same existing tracks, passenger and freight rail services can share the same tracks but with additional capacity in the form of extra tracks added, or passenger and freight rail services can exist in the same rail ROW but with tracks dedicated to either passenger rail or freight rail services. The third option provides the greatest degree of flexibility in operations for both parties, given the differing nature of operations, but it limits the growth potential for both services.

An additional consideration is that any Bethlehem station located on Corridor L would likely be located on the south side of the corridor, requiring passengers to cross over the freight track to access the station. This area is further complicated by the fact that Lehigh Valley Rail Management, a heavily trafficked shortline industrial switching operation in Bethlehem, has its interchange yard with Norfolk Southern in south Bethlehem. Passenger rail service would need to cross over the dedicated Lehigh Line freight rail tracks and all interchange tracks from Lehigh Valley Rail Management. Depending on the location of crossovers and station site, passengers would need to cross from five to eight tracks. An additional consideration is that all approaches from Corridor B also approach Corridor L from the south, further suggesting the need to locate a station on the south side of the corridor if Corridor B were used for Philadelphia-bound services. Potential efforts to mitigate these conflicts prompt other conflicts between passenger and freight rail infrastructure or complications between station siting and the existing street grid.

If passenger rail service were to follow Corridor C in the Lehigh Valley instead of Corridor L, interacting with freight rail services is avoided until Bethlehem, where the rail ROW would be shared. To avoid

sharing tracks in Norfolk Southern's Allentown Yard requires a new elevated structure and the construction of a new bridge over the Lehigh River.

Because of the positioning of freight rail infrastructure, it is physically impossible for a completely dedicated passenger rail service track to exist between Newark/New York and Allentown that does not intersect freight main lines at-grade. Such dedicated tracks require flyovers, elevated tracks, and other capital-intensive infrastructure to separate the services completely. For full Newark/New York-Allentown service, dedicated passenger rail service tracks must either compromise on having conflicts with freight rail traffic or invest in capital-intensive infrastructure. Whether full-grade separation is preferable, it depends on local operational factors, including the frequency of freight and passenger rail services and the ability to schedule and dispatch around conflict points.

Philadelphia Service Area

Philadelphia-bound corridors are less affected by the interaction with freight rail services than Newark/New York-bound services. However, all Philadelphia-bound corridors require some degree of new construction or reconstruction to make routes viable.

Both Corridors B and P have critical stretches that are abandoned or inactive. However, the nature of these abandoned/inactive stretches on the two corridors is dramatically different. The inactive portion of Corridor B largely remains intact as a leased rail trail. Corridor B is a mix of rail trails, developed parcels, and abandoned ROWs that no longer form a continuous corridor. All three Philadelphia-bound corridors require some form of takings or adjustments to existing recreational trails, but the degree of impact varies between corridors.

Access to Allentown is more favorable for routes following Corridor P and Corridor CO compared to Corridor B, which has no viable connection to Corridor L. These two corridors merge into Corridor R and the Norfolk Southern Reading Line. While the ability to access a mainline freight track is unknown, it does not require the same amount of capital work or risk to passenger and freight rail operations that some of the Corridor BC branches do.

Corridors R, P, and CO all make use of existing freight rail mainlines, including the Norfolk Southern Reading Line and Harrisburg Line. The Reading Line is largely double-tracked, which mitigates some of the capacity concerns of Corridor L, but it may also preclude a dedicated passenger rail service track. On the Harrisburg Line, where Corridors CO and P connect, the Schuylkill River Passenger Rail Authority is examining concepts for service and ROW improvements to accommodate passenger rail service. The viability of Lehigh Valley passenger rail services using the Harrisburg Line partially depends on the solutions that the Schuylkill River Passenger Rail Authority identifies. Philadelphia-bound services via Corridor R rely entirely on mainline freight rail services.

One variable to consider with routes using Corridor B is whether the use of Corridor S or the SEPTA Doylestown Line is preferable for accessing Philadelphia. The Doylestown/Main Line, as currently configured, necessitates traversing the SEPTA Center City Tunnel to access 30th Street Station, which cannot accommodate diesel locomotives. A direct connection could be built from the SEPTA Main Line to the Northeast Corridor at North Philadelphia, but this likely requires an at-grade junction, which could foul the busy Main Line and Norristown Line.

Bethlehem

Only Corridor C and Corridor L are available for passenger rail services to travel through the Lehigh Valley. All services headed to Bethlehem at some point must interact with or be built over the freight tracks of the Lehigh Line to reach Allentown. However, if the passenger rail services were to terminate in Bethlehem instead of Allentown, it is possible to avoid crossing over or conflicting with the Lehigh Line.

A number of slow-moving trains pass through and are stored at the Lehigh Valley Rail Management yard, southeast of the Wind Creek Casino. The open area to the east of the casino offers an opportunity as a Bethlehem station site. Locating a terminal here has the advantage of having Philadelphia service via Corridor B avoid interacting with the Lehigh Line rail ROW.

4. Environmental Screening

Environmental constraints along the 12 identified rail corridors were reviewed as part of this analysis and are summarized below. Additional detail can be found in the *Environmental Documentation Technical Memorandum*. The technical memorandum briefly summarizes the location of each corridor, including connecting services. Constraint data were provided as maps and in an Excel spreadsheet.

Methodology

The project team conducted a desktop environmental screening that analyzed environmental constraints at both the corridor (12 corridors) and segment (99 segments) levels and created buffers for each environmental constraint. The indicators listed in *Table 3* were gathered and reviewed. Buffers were used for each variable to better understand the presence and potential for constraints.

Table 3. Environmental Documentation Data Sources

Indicator	Source		Buffer
	New Jersey	Pennsylvania	
Parks and Open Space	• New Jersey Geographic Information Network (NJGIN) state, local and nonprofit open space layer	• Pennsylvania Spatial Data Access (PASDA), federal, state, and local parks and open space	0.25 mile
Conservation and Preservation Areas	• NJ Highlands Council area boundary	• PASDA Highlands regional study area boundary	0.25 mile
Wetlands	• NJGIN priority wetlands • U.S. Fish & Wildlife Service wetlands data	• PASDA national wetlands inventory for Pennsylvania	500 feet
Coastal Environments	• NJGIN priority wetlands	• PASDA national wetlands inventory for Pennsylvania	500 feet
Agricultural Districts and Farmlands	• NJGIN preserved farmland • NJDEP Land Use/Land Cover	• PASDA conserved land and farmland preservation easements • PASDA croplands	0.25 mile
Historic Districts	• NJGIN historic districts	• PA-Share historic district data	0.25 mile
Federal Emergency Management Agency (FEMA) Flood Hazard Areas	• FEMA National Flood Hazard Layer Database		500 feet
Known Contaminated Sites	• NJGIN known contaminated site list • EPA Superfund site boundaries	• PASDA land recycling cleanup locations • EPA Superfund site boundaries	500 feet

Additionally, based on desktop research and knowledge of site conditions, the project team flagged the anticipated interference of the following variables along the respective rail corridors. This analysis

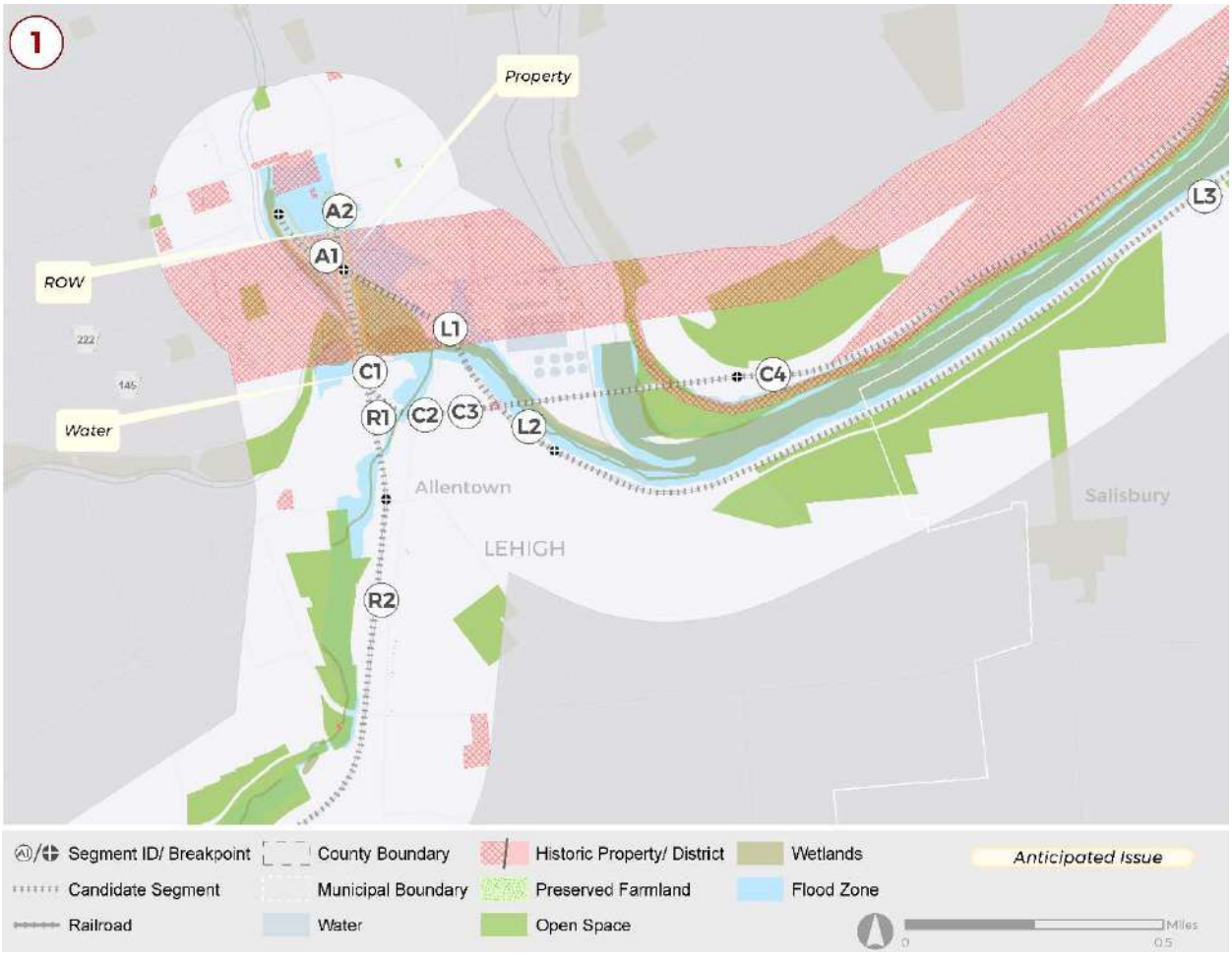
provides a more detailed review of constraints specifically affecting the rail corridor (without using a buffer) than the GIS-based analysis.

- Bridge – requires construction of new bridge at a high capital cost
- Contaminated Site – proximal to a contaminated site
- Operational Conflict – conflict between passenger and freight rail
- Park – conflict with parkland, including trails
- Parking – conflict with existing parking lot
- Property – conflict with existing building
- ROW – requires additional ROW
- Water – conflict with body of water

Results

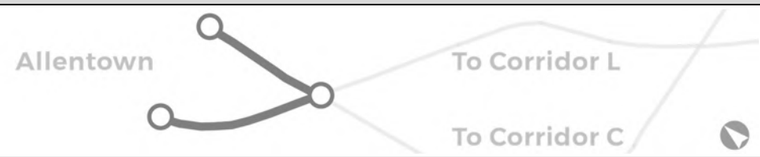
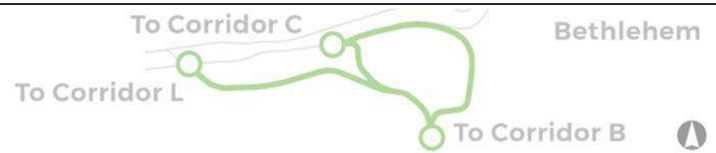
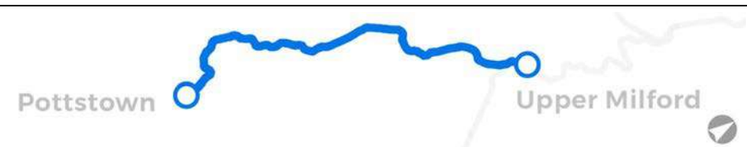
In the *Environmental Screening Technical Memo*, 34 maps are provided, covering the entire 99 segments. These maps highlight the presence of the above-identified environmental constraint categories. As an example, one of these 34 maps is shown below in *Figure 4*.

Figure 4. Example of Zoomed-in Environmental Constraint Map



The presence of the constraints and flagged variables listed above are summarized in *Table 4* below. The green, orange, and red boxes indicate the extent of the constraint for each corridor. The precise presence of each constraint category differs between constraints, but green indicates a general absence of a constraint, orange indicates a notable presence of a constraint, and red indicates a significant presence of a constraint.

Table 4. Environmental Screening Summary by Corridor

Market Area Served	Corridor				Constraints						Flagged Environmental Constraints
	ID	Alignment	Water	Parks	Property	Contaminated Sites	Bridges	Parking	Rail ROW	Operational Conflicts	
Connector	A				●				●		• Property: Alignment for old CNJ Allentown station site (A1) • Rail ROW: Alignment for old LVRR Allentown station site (A2)
Philadelphia	B			●							• Parks: Site of Bethlehem Greenway rail trail (B1); site of Saucon Rail Trail and Upper Bucks Rail Trail (B3-B7)
Connector	BC			●	●					●	• Parks: Site of Bethlehem Greenway rail trail (BC3.2, BC3.3) • Property: Requires new steep ramp and potential Casino property impacts (BC1.3) • Operational Conflicts: Conflict with frequently used industrial switching operation (BC2.2)
Newark/ New York	C		●	●	●	●	●			●	• Water: Potential reconstruction of creek crossing required (C1) • Parks: In parkland and overlaps with Delaware & Lehigh Trail (C7, C8, C9) • Property: Requires new steep ramp and potential Casino property impacts; section used for private driveway (C6) • Contaminated Sites: Contaminated site in area (C6, C14) • Bridges: Requires new bridge over I-78 (C13) • Operational Conflicts: Shared use with main line freight rail; slow-speed yard-related traffic (C3, C4, C5b, C11, C12)
Philadelphia	CO				●						• Property: Requires takings of multiple residential, commercial, industrial, and farm properties (CO1, CO2, CO3); requires taking of Walmart parking lot and realignment of road CO3)
Newark/ New York & Philadelphia	D			●	●					●	• Parks: Requires use of parkland (D1); site of Delaware & Raritan Canal Trail and rail trail in Trenton (D3, D6, D7) • Property: Requires aerial structure to connect ramp to West Trenton Line; requires taking of residential property (D8b) • Operational Conflicts: Shared use with main line freight rail (D10)

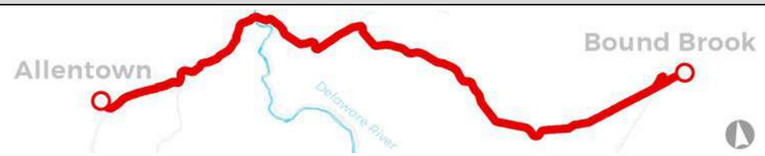
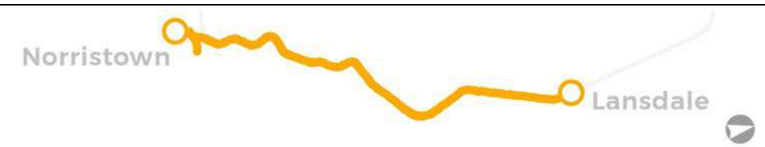
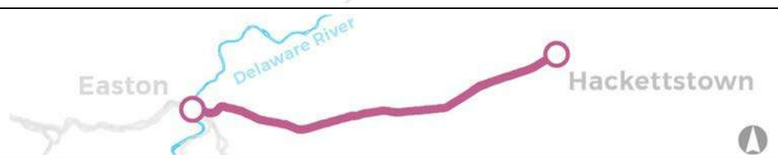
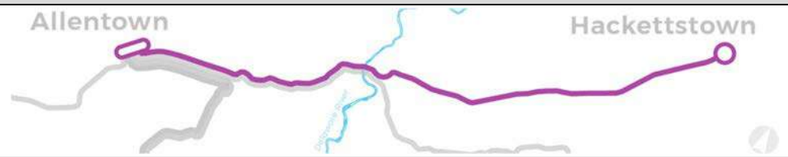
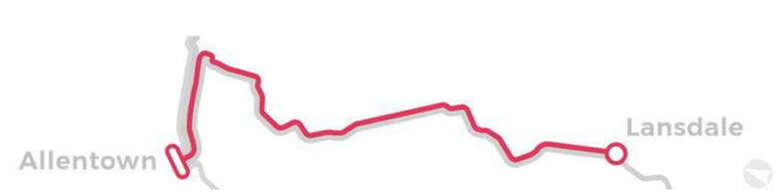
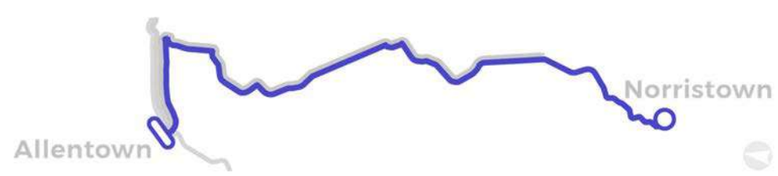
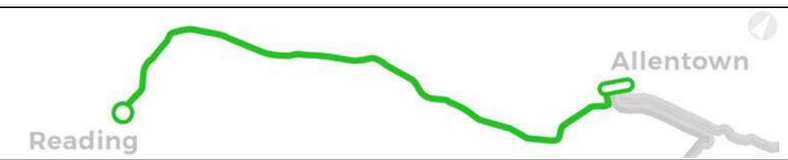
Market Area Served	Corridor				Constraints						Flagged Environmental Constraints
	ID	Alignment	Water	Parks	Property	Contaminated Sites	Bridges	Parking	Rail ROW	Operational Conflicts	
Philadelphia	L									●	• Operational Conflicts: Shared use with main line freight rail (L10-L13); used for storage of cars and heavy industrial operations (L12b)
Philadelphia	P			●	●			●			• Parks: Site of Perkiomen Trail (P3); site of Schuylkill River Trail (P7) • Property: Likely requires taking of major office development and residential properties, as well as new tunnel under freeway and relocation of local road (P4, P6) • Parking: Requires removal of SEPTA parking lot (P8)
Reading	R										
Philadelphia	S					●					• Contaminated Site: Contaminated site in area (S2)
Connector	TC			●	●	●					• Parks: Rail trail impacts (TC2.1, TC2.2) • Property: Requires significant reduction of parking; new bridge of Trenton Freeway required (TC1.1) • Contaminated Sites: Contaminated site in area (TC2.3)
Newark/ New York	W										

Table 5. Environmental Screening Summary by Service Alternative

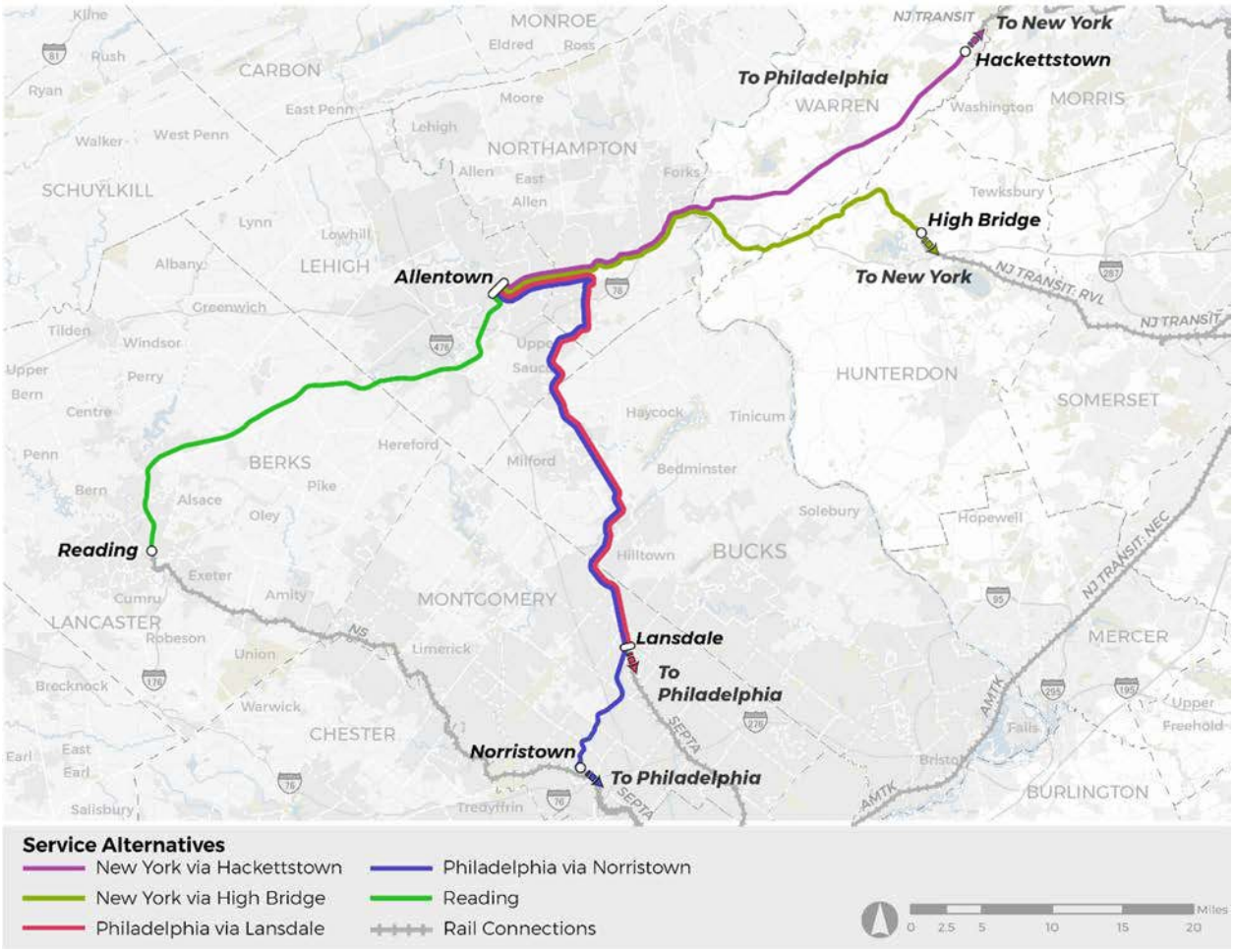
Market Area Served	Corridor			Constraints						Flagged Environmental Constraints
	Alignment	Water	Parks	Property	Contaminated Sites	Bridges	Parking	Rail ROW	Operational Conflicts	
To New York via Hackettstown								●	●	• Rail ROW: Alignment for old LVRR Allentown station site (A2) • Operational Conflicts: Shared use with main line freight rail (L10-L13, C11); used for storage of cars and heavy industrial operations (L12b)
To New York via High Bridge					●	●		●	●	• Contaminated Sites: Contaminated site in area (C14) • Bridges: Requires new bridge over I-78 (C13) • Rail ROW: Alignment for old LVRR Allentown station site (A2) • Operational Conflicts: Shared use with main line freight rail (L10-L13, C11-C12); used for storage of cars and heavy industrial operations (L12b)
To Philadelphia via Lansdale			●					●	●	• Parks: Site of Bethlehem Greenway rail trail (B1); site of Saucon Rail Trail and Upper Bucks Rail Trail (B3-B7) • Rail ROW: Alignment for old LVRR Allentown station site (A2) • Operational Conflicts: Shared use with main line freight rail (L10-L13); used for storage of cars and heavy industrial operations (L12b); conflict with frequently used industrial switching operation (BC2.2)
To Philadephia via Norristown			●		●			●	●	• Parks: Site of Bethlehem Greenway rail trail (B1); site of Saucon Rail Trail and Upper Bucks Rail Trail (B3-B7) • Contaminated Site: Contaminated site in area (S2) • Rail ROW: Alignment for old LVRR Allentown station site (A2) • Operational Conflicts: Shared use with main line freight rail (L10-L13); used for storage of cars and heavy industrial operations (L12b); conflict with frequently used industrial switching operation (BC2.2)
To Reading		●						●		• Water: Potential reconstruction of creek crossing required (C1) • Rail ROW: Alignment for old LVRR Allentown station site (A2)

5. Service Alternatives and Demand Analysis

Service Alternatives

Segments from the various corridors have been combined to form service alternatives between the Lehigh Valley and each of the market pairs. These service alternatives represent the actual route that a potential passenger rail service could follow between the Lehigh Valley and the three market areas. The project team identified five service alternatives from the network of evaluated corridors. Two of these service alternatives serve the Lehigh Valley to the Newark/New York market, two alternatives serve the Lehigh Valley to the Philadelphia market, and one alternative serves the Lehigh Valley to the Reading market. Figure 5 shows the five alternatives between the Lehigh Valley and the three market areas.

Figure 5. Service Alternatives



Lehigh Valley to Newark/New York

Within the Lehigh Valley, Corridor L is more feasible than Corridor C. Corridor C affects recreational land and nearby residential areas. Corridor L, while dominated by heavy freight rail traffic, is a pre-existing and active rail ROW and has space for additional tracks along the length of the corridor.

Hackettstown Alternative

Within the Lehigh Valley, the Hackettstown Alternative follows Corridor L to Easton, crosses the Delaware River on Segment C11, and stays on the Norfolk Southern Lehigh Line. At Phillipsburg, the alternative follows Corridor W to Hackettstown, where service then follows NJ TRANSIT's Morris & Essex Lines to Newark/New York. The Hackettstown Alternative has an expected travel time of 2 hours and 2 minutes from Allentown to New York Penn Station.

This alternative shares the ROW with the Norfolk Southern Reading Line and Lehigh Line between Allentown and Phillipsburg. This section sees heavy main line freight traffic with diverging tracks and yards that complicate the construction and operation of passenger rail infrastructure. However, the ROW generally has room for additional track infrastructure, and the use of an existing, active rail ROW avoids complications with acquiring private property or recreational lands. East of Phillipsburg, the rail ROW leverages underused freight rail corridors and existing NJ TRANSIT passenger rail corridors to access Newark/New York, which avoids using main line freight rail ROWs east of Phillipsburg.

High Bridge Alternative

Within the Lehigh Valley, the High Bridge Alternative follows Corridor L to Easton and stays on the Norfolk Southern Lehigh Line across the Delaware River and through to Bloomsbury on a mix of Corridor C and Corridor L segments. At Bloomsbury, the alternative follows Segment C14 to High Bridge, where it continues to Newark/New York via the NJ TRANSIT Raritan Valley Line. The High Bridge Alternative has an expected travel time of 1 hour and 49 minutes from Allentown to New York Penn Station.

The High Bridge Alternative shares the ROW with the Norfolk Southern Reading Line and Lehigh Line between Allentown and Bloomsbury. This section sees heavy main line freight traffic with diverging tracks and yards that complicate the construction and operation of passenger rail infrastructure. However, the ROW generally has room for additional track infrastructure, and the use of an existing, active ROW avoids complications with acquisition of private property or recreational lands. East of Bloomsbury, the ROW leverages underused freight rail corridors and existing NJ TRANSIT passenger rail corridors to access Newark/New York, which avoids using main line freight rail ROWs east of Bloomsbury. The High Bridge Alternative uses 7.4 miles more of Norfolk Southern's Lehigh Line than the Hackettstown Alternative but with the benefit of faster running times.

Lehigh Valley to Philadelphia

While Corridors B, S, P, and CO all provide potential routes for service alternatives to Philadelphia, Corridors P and CO pose substantial problems with acquiring privately owned land for rail ROW. Both alternatives use Corridor B to reach Philadelphia.

Lansdale Alternative

Between Allentown and Bethlehem, the Lansdale Alternative follows Corridor L. At Bethlehem, the alternative uses the existing Lehigh Valley Rail Management ROW (Segments BC2.2 and BC2.1) to reach the Saucon Creek crossing. The Lansdale Alternative then uses Corridor B to Lansdale, where passenger rail service joins the SEPTA Main Line to the Center City Philadelphia and 30th Street Station. The alternative has an expected travel time of 1 hour and 44 minutes from Allentown to Philadelphia's 30th Street Station.

The Lansdale Alternative shares the ROW with the Norfolk Southern Reading Line between Allentown and Bethlehem. The shared segments with Lehigh Valley Rail Management experience heavy freight rail traffic with trains moving in and out of the yards to the interchange point with Norfolk Southern. Operational or infrastructure strategies will need to be devised to avoid delays to freight and passenger rail services. On Corridor B north of Shelly, existing SEPTA-owned rail ROW is leased to local governments to maintain a mixed-use trail. Strategies for sharing or replacing the rail trails need to be carefully considered and sensitive to local communities. The alternative is predicated on using the SEPTA Main Line between Lansdale and Center City. The Center City Tunnel does not permit diesel operation, and it is unknown if SEPTA would permit dual-mode locomotives to operate. Therefore, the ability to use the Lansdale Alternative depends on trainsets used for this service to not be diesel-powered.

Norristown Alternative

Between Allentown and Bethlehem, the Norristown Alternative follows Corridor L. At Bethlehem, the Lansdale Alternative uses the existing Lehigh Valley Rail Management ROW (Segments BC2.2 and BC2.1) to reach the Saucon Creek crossing. The Norristown Alternative uses Corridor B to Lansdale. At Lansdale, this alternative follows Corridor S to SEPTA's Norristown Transportation Center, where passenger rail service joins the SEPTA Norristown Line to a connection to the Northeast Corridor near North Philadelphia Station and follows the Northeast Corridor to 30th Street Station. The Norristown Alternative has an expected travel time of 1 hour and 52 minutes from Allentown to Philadelphia's 30th Street Station.

Like the Lansdale Alternative, the Norristown Alternative shares ROW with the Norfolk Southern Reading Line between Allentown and Bethlehem. The shared segments with Lehigh Valley Rail Management experience heavy freight rail traffic with trains moving in and out of the yards to the interchange point with Norfolk Southern. Operational or infrastructure strategies will need to be devised to avoid delays to freight and passenger rail services. On Corridor B north of Shelly, existing SEPTA-owned rail ROW is leased to local governments to maintain a mixed-use trail. Strategies for sharing or replacing the rail trails need to be carefully considered and sensitive to local communities. Unlike the Lansdale Alternative, the Norristown Alternative uses Corridor S as far as Norristown, which necessitates greater capital investment and longer travel times. The Norristown Alternative, however, allows for the use of diesel-powered trainsets.

Lehigh Valley to Reading

Reading Alternative

Only one viable service alternative was created for Allentown to Reading service. The Reading Alternative uses Segment C1 to Auburn Street and Corridor R the rest of the way to downtown Reading.

This alternative has an expected travel time of 46 minutes. The Reading Alternative uses the Norfolk Southern Reading Line, the only direct rail ROW between Allentown and Reading. The Reading Line is mostly double-tracked, but freight rail volumes are high.

Demand Analysis

This section summarizes the demand analysis that used U.S. Census data to review existing demographics and commuting data between the Lehigh Valley and the three market areas along the five alternative routes. This analysis is not intended to provide ridership estimates, but it does show existing potential demand for renewed passenger rail service from the Lehigh Valley. Additional detail can be found in the *Service Alternatives Technical Memorandum*.

The demand analysis primarily used data from the U.S. Census 2019 OntheMap tool, which provides home and employment data for mapping and analysis. The data used was collected prior to the Covid-19 pandemic, at a time when typical weekday commutes involved daily round trips between home and work. It is unknown as of the writing of this report if and when commuting patterns will return to pre-Covid levels and frequencies or if they will remain more hybrid in nature, with many weekday employees continuing to work partially, primarily, or entirely from home.

The analysis focused on the five alternatives that connect the Lehigh Valley with existing or planned rail connections and the commuting characteristics along these existing and planned connections. Analyzing commuting along these connected corridors provides insights into the potential demand for transit service between the Lehigh Valley and the market areas, with the important caveat that proximity to a corridor alone does not mean an individual will choose to ride the train. Other factors like convenience of the rail service – and the cost, convenience, and reliability of the competing drive – influence modal decision-making.

Data were mainly gathered for the following two variables:

- Home location of people working within 1 mile of the corridor
- Work location of people living within 5 miles of the corridor

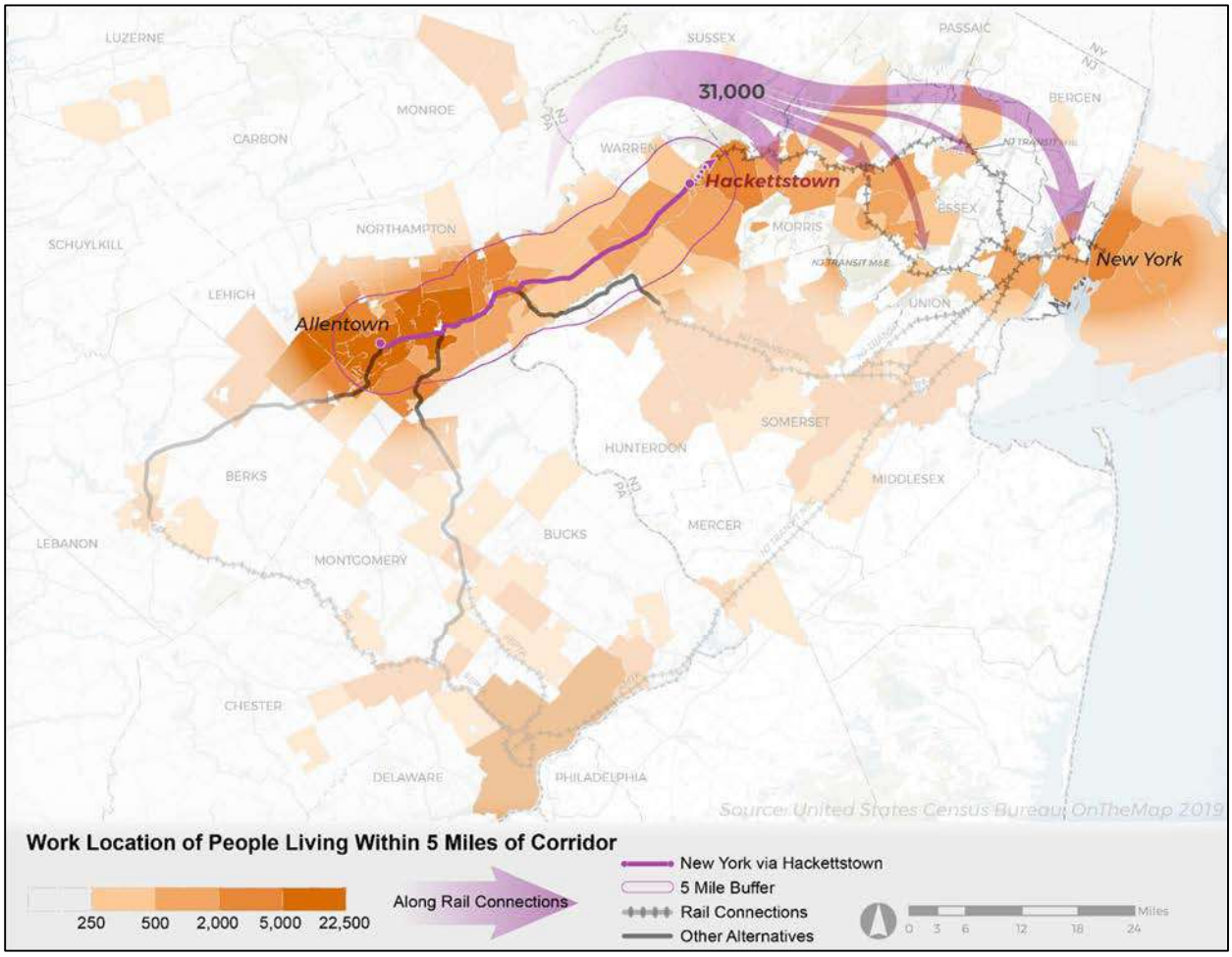
A distance of 1 mile was used for employment proximity because of the typically lower demand and ability for people to travel an additional distance from departing the train to their work destination. Five miles was used for home locations because people are typically more willing to drive a farther distance to start their trip by train.

The following maps (*Figures 7 through 11*) show the work location of Lehigh Valley residents living within 5 miles of the corridor for each alternative. Data are shown at the municipal geographic level. The large arrow and corresponding number on each map indicate the number of people commuting daily from within 5 miles of the planned corridor to municipalities within 1 mile of the connecting corridor (extending to New York, Philadelphia, or Reading, as applicable). Each map is followed by a brief description of the commuting patterns displayed on the map.

As further detailed in the *Service Alternatives Technical Memorandum*, far more people presently commute from the Lehigh Valley toward New York/Newark, Philadelphia, and Reading than commute from these areas to the Lehigh Valley. Renewed passenger rail service in the Lehigh Valley would

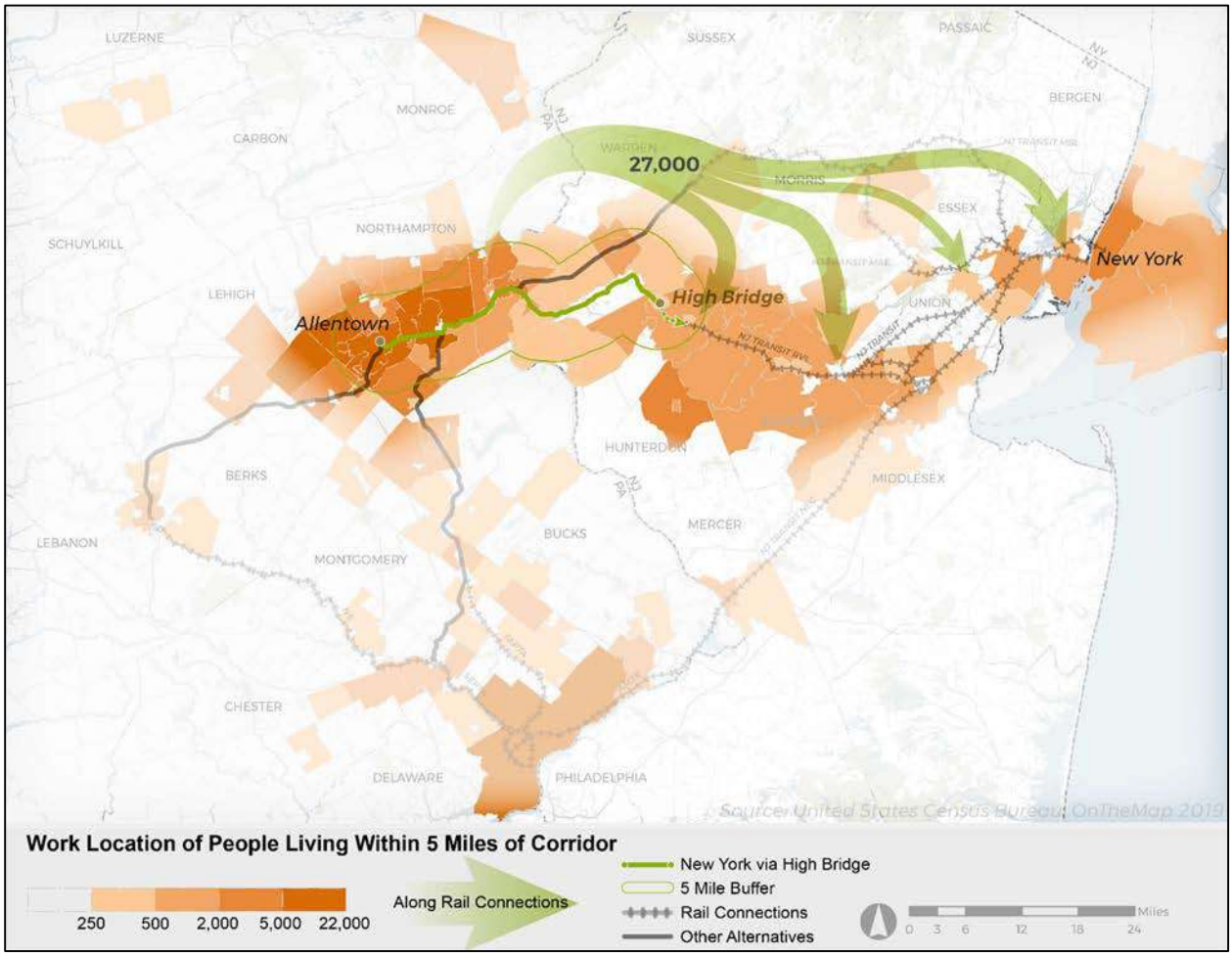
provide transit access for those already commuting toward these market areas and provide opportunities for commuting into the Lehigh Valley.

Figure 6. Hackettstown Alternative – Work Locations



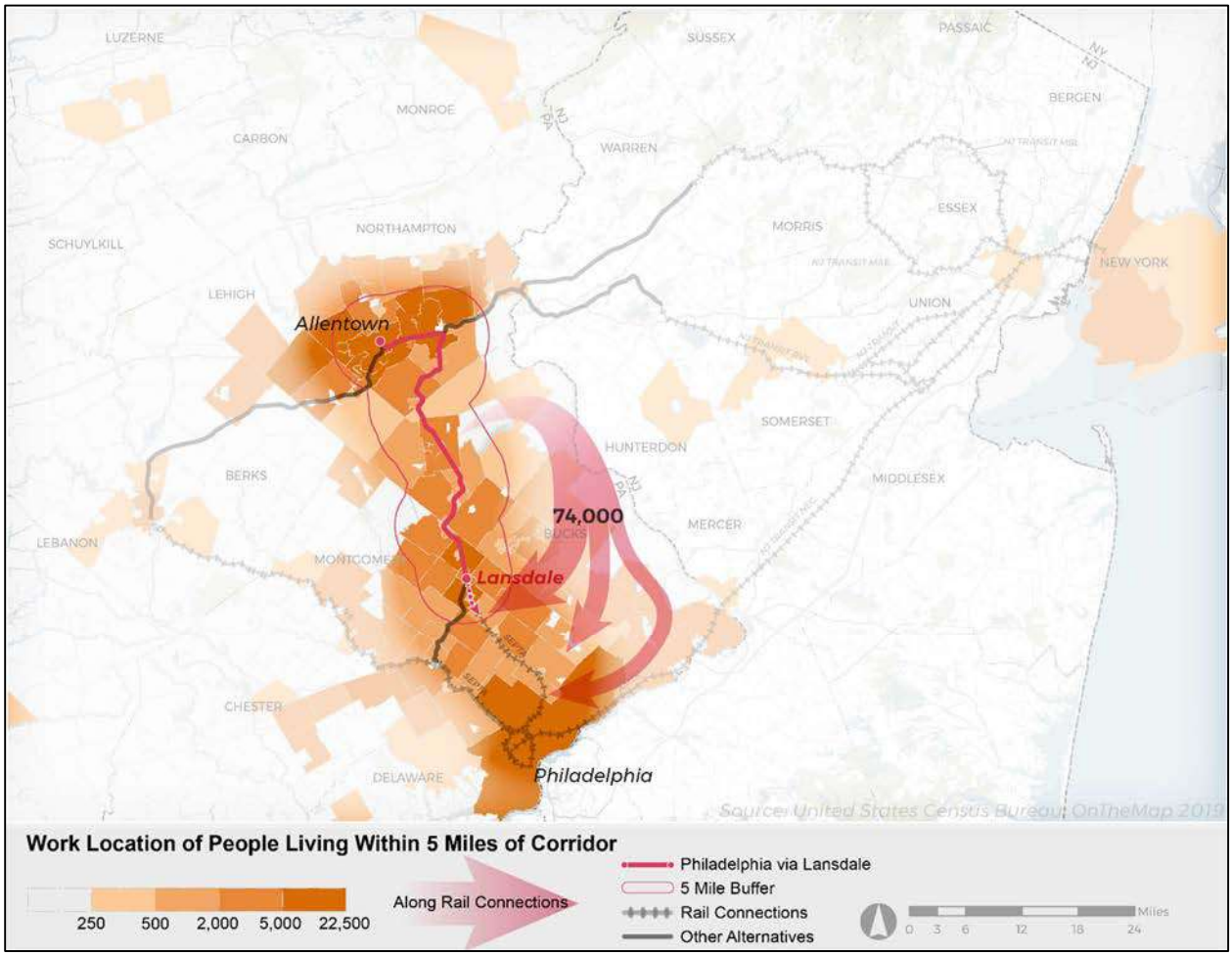
More than 30,000 people commute to work from the Lehigh Valley east to the New York/Newark area, including to communities along NJ TRANSIT's Morris & Essex Line and Montclair-Boonton Line. In addition to commuting from the Lehigh Valley to New York and Newark, many people also commute to Hackettstown.

Figure 7. High Bridge Alternative – Work Locations



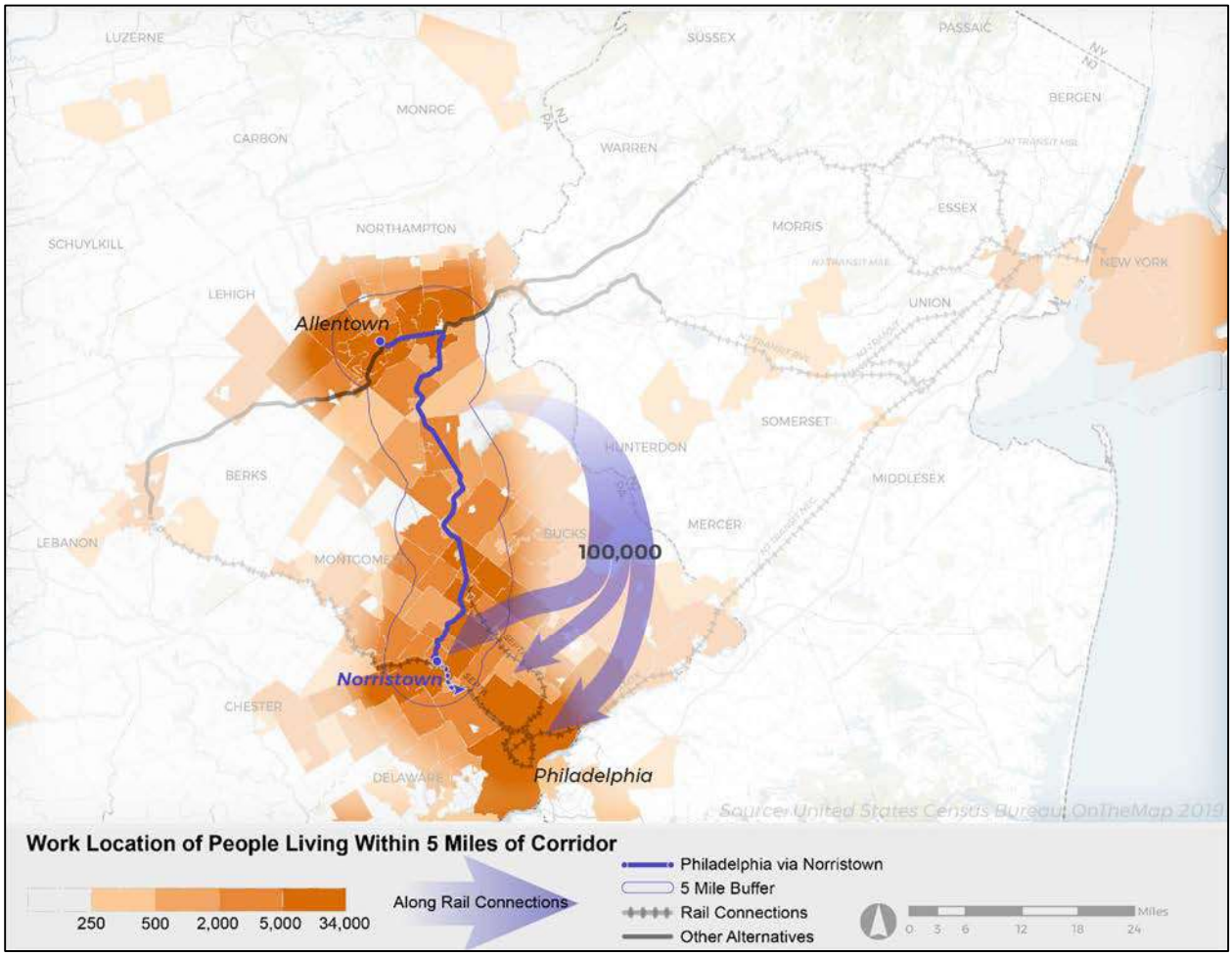
More than 35,000 people commute to work from the Lehigh Valley east to the New York/Newark area, including to communities along NJ TRANSIT's Raritan Valley Line. In addition to commuting from the Lehigh Valley to New York and Newark, many people also commute to Raritan Township in Hunterdon County.

Figure 8. Lansdale Alternative – Work Locations



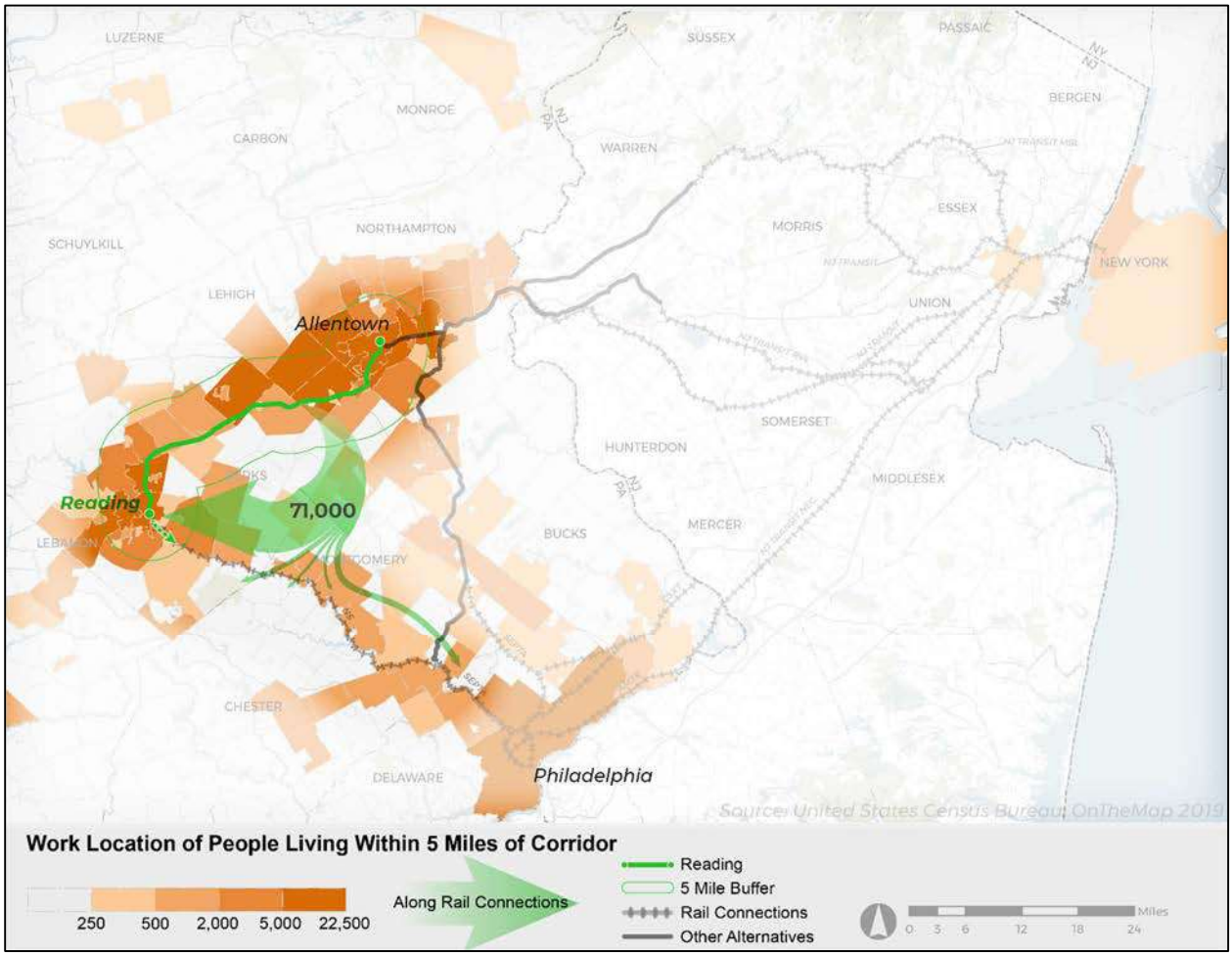
More than 74,000 people commute to work from the Lehigh Valley south to the Philadelphia area, including to communities along SEPTA's Lansdale/Doylestown Line. In addition to commuting from the Lehigh Valley to Philadelphia, many people also commute to Lansdale.

Figure 9. Norristown Alternative – Work Locations



More than 100,000 people commute to work from the Lehigh Valley south to the Philadelphia area, including to communities along SEPTA's Manayunk/Norristown Line and Norristown High Speed Line. In addition to commuting from the Lehigh Valley to New York and Newark, many people also commute to Norristown and King of Prussia.

Figure 10. Reading Alternative – Work Locations



More than 70,000 people commute to work from the Lehigh Valley southwest to the Reading and Philadelphia areas, including to communities along the planned rail route between Reading and Philadelphia. In addition to commuting from the Lehigh Valley to Reading and Philadelphia, many people also commute to the communities surrounding Reading.

6. Cost

Capital Cost

The project team developed planning-level capital cost estimates to compare the infrastructure needs and rolling stock procurement costs for the service alternatives. These order-of-magnitude capital costs are preliminary and were developed without detailed engineering analysis. These planning-level costs are being provided as a starting point for discussion of the service alternatives and will require more thorough study to serve as a guide for future investment.

The cost estimates considered the following variables:

- Constraints and limitations from freight activity, such as steep grades, sharp curves, and freight yard conflicts
- Necessary infrastructure upgrades or modifications to implement the potential service plans such as sidings, additional track, catenary, signals, and positive train control
- Constraints associated with reactivating or building tracks adjacent to existing rail trail facilities
- Station facilities (does not include any potential acquisition costs for station or parking needs)
- Identification of rolling stock
- Identification of maintenance and layover facilities

All infrastructure and rolling stocks are scaled to assume train service that operates three round trips per day. Capital costs were estimated based on the Passenger Rail Investment and Improvement Act (PRIIA) Section 209 cost methodology.

Methodology

This section presents capital costs for both the five potential service alternatives, as well as for each individual corridor segment that comprise those service alternatives. Costs for each line item were first calculated for each corridor. Then an estimated cost for each of the five service alternatives was derived from the corridor costs based on mileage of each corridor used as well as the locations of certain high-cost infrastructure pieces. These cost estimates all assume train service that operates three round trips per day.

Each of the candidate corridors was assumed to require 1 mile of new track construction for each mile of corridor. This assumption was made to account for single-track ROWs on passenger-only segments or freight branch lines and for an exclusive passenger rail track on segments that share the rail ROW with Class I freight railroad mainlines. A mile-long sample section was used for each corridor to estimate the quantity of structural items.

The following items were NOT included in the cost estimates:

- Financing
- Hazardous material handling
- Utility relocation

- Environmental mitigation
- Third-party mitigation
- Freight rail access fees

A unit price based on 2023 dollars was established for each of the items and multiplied by the quantity for each corridor. The sum of these figures resulted in the total direct cost for each corridor. The following additional contingency costs were added to this direct cost:

1. 30% of direct cost added for mobilization
2. 6.625% of direct cost added for taxes
3. 30% of direct cost added for general conditions
4. 20% of direct cost added for contractor's overhead and profit
5. 15% of direct cost added for subcontractor's overhead and profit
6. 10% of direct cost added for bond and insurance costs
7. 10% of direct cost added for environmental and permitting costs
8. 30% of direct costs added for an engineering contingency allowance, and includes:
    a. Design costs
    b. Construction management
    c. Program management
    d. Direct agency involvement

Because this study was conducted very early in the project development process prior to the identification of a potential project sponsor, the study did not involve discussions with freight rail roads or transit agencies about the potential for future Lehigh Valley passenger service or the costs associated with that service. Likewise, costs for freight rail access fees were not considered part of this effort since freight railroads or transit agencies involved may ultimately require different or additional capital improvements, which would impact the estimated capital costs.

After costs were established for each corridor segment using the methodology described above, the capital cost of each of the five service alternative alternatives was derived from the costs of the corridors comprising that alternative. For retaining walls, minor bridge structures, and minor culverts, service alternative line-item quantities were generally based on the percentage of mileage of a corridor that a service alternative used, multiplied by the quantity of that item from the corresponding corridor. The quantities calculated from each corridor were then summed up. Track alignment, earthwork, tunnels, flyovers, and stations were based on total service alternative mileage. Major bridge structures, tunnels, and flyovers were based on whether or not these items would be needed on the specific segments that each service alternative used. One rail maintenance facility was assumed to be part of each service alternative.

Service Alternative Capital Cost Summary

Table 6 provides an overview of the planning-level capital costs and track length for each of the service alternatives.

Table 6: Planning Level Capital Costs for the Service Alternatives

Service Alternative	Total Length (mi)	Estimated Capital Cost ($)	Rolling Stock Cost ($)
Newark/New Jersey Alt via Hackettstown	51.98	$474,909,110	$145,018,585
Newark/New Jersey Alt via High Bridge	47.19	$469,923,680	$145,018,585
Philadelphia Alt via Lansdale/Main Line	48.79	$635,811,084	$102,016,680
Philadelphia Alt via Norristown	63.21	$739,026,613	$102,016,680
Reading Alt	46.46	$450,325,639	$102,016,680

Note: Capital costs are assumed to be within ±20% of the estimated total capital costs. In addition to the capital costs shown in the table, approximately $0.5M-$1M in ROW costs is anticipated, depending on the service alternative.

Corridor Capital Cost Summary

Table 7 provides an overview of the planning-level capital costs and track length for each candidate corridor. Corridors C, D, L, P, and R are each estimated to exceed a capital cost of $1 billion because of the need for construction of new track. The table also presents the cost per mile.

Table 7. Planning-Level Capital Costs for the Candidate Corridors

Corridor	Total Length (mi)	Estimated Capital Cost ($)	Cost Per Mile ($)
Corridor A	0.40	$7,356,192	$18,390,479
Corridor B	38.82	$443,204,435	$11,416,910
Corridor BC	7.22	$49,279,230	$6,825,378
Corridor C	47.30	$665,252,290	$14,064,530
Corridor CO	25.01	$384,984,808	$15,393,235
Corridor D	98.35	$1,499,561,403	$15,247,193
Corridor L	80.09	$719,215,361	$8,980,089
Corridor P	59.71	$1,097,245,417	$18,376,242
Corridor R	46.00	$338,311,169	$7,354,591
Corridor S	15.07	$147,290,149	$9,773,733
Corridor TC	3.34	$198,509,269	$59,433,913
Corridor W	30.82	$219,990,035	$7,137,899

Note: Capital costs are assumed to be within ±20% of the estimated total capital costs.

Additional details for the estimated costs for the 12 candidate corridors are provided in the *Infrastructure and Capital Costs Technical Memorandum*, which is included as an appendix to this document.

Operating Plans and Cost Estimates

Operating Plan Methodology

The project team created draft service schedules for service from the Lehigh Valley to the target destinations to develop order-of-magnitude estimates of operating costs. These service plans assume the use of three equipment sets to provide service each day for each line. Each plan was developed using estimates of run time based on distance and average operating speeds for typical commuter rail operations. Average speeds were used to calculate run times because the study of these line segments is not at the level where engineering work has progressed to the point that would produce a speed profile for each route.

Along with the use of average operating speeds, allowances were added for a limited number of intermediate station stops. In scenarios where trains are expected to operate over existing NJ TRANSIT or SEPTA territory, trip times were estimated using existing service schedules, with the assumption that these trains would be something of a hybrid service—between a commuter rail and intercity rail service—with fewer stops than most express trips operating on the lines today. At this point, no effort has been made to determine if this assumption is acceptable to NJ TRANSIT or SEPTA. Also, at this level of planning, with no known start date for a potential start of service, no effort was made to integrate these service schedules into existing patterns of service.

The purpose of developing these draft service plans is simply to identify approximate run times and potential service levels (trains per day) to allow for a high-level order-of-magnitude estimate of annual operating costs for these service options.

New York/Newark Alternative via Hackettstown

A draft service plan was created for service to the Newark/New York area using the Lehigh Line, Short Line Railroad segment and the NJ TRANSIT Morristown Line via Hackettstown. For a trip from Allentown to Penn Station, New York, trip times were estimated at 2 hours 30 minutes. Three stops were assumed in Pennsylvania. In New Jersey, approximately five fewer intermediate stops then are typical for semi-express schedules on the Morristown Line were assumed. As noted earlier, it is not known if this number of stops would be acceptable to the various parties that would be involved with this service. The daily equipment cycles for the three trainsets allowed time for refueling between each round trip, based on the characteristics of existing, in-service, dual-mode (electric and diesel) locomotives. For cost-estimating purposes, the draft service plan assumed:

- 3 round trips or 6 trains per day
- A service pattern for the day with a morning round trip, midday round trip and evening round trip
- The same service level 7 days per week

New York/Newark Alternative via High Bridge

A draft service plan was created for service to the Newark/New York area using the Lehigh Line, portions of the currently inactive NJ TRANSIT Raritan Valley Line, and the NJ TRANSIT active section of the Raritan Valley Line. For a trip from Allentown to Penn Station, New York, trip times were estimated at 2 hours and 20 minutes. Three stops in Pennsylvania and up to five intermediate stops in New Jersey were included. As noted earlier, it is not known at this time if these stops would be acceptable to the various parties that would be involved with this service. The daily equipment cycles for the three trainsets allowed time for refueling between each round trip, based on the characteristics of existing, in-service, dual-mode (electric and diesel) locomotives. For cost-estimating purposes, the draft service plan assumed:

- 3 round trips or 6 trains per day
- A service pattern for the day with a morning round trip, midday round trip and evening round trip
- Allentown to the final daily arrival in Allentown)
- The same service level 7 days per week

Philadelphia Corridor Alternative via Lansdale

A draft service plan was created for service from Allentown to Philadelphia (30th Street Station) using the SEPTA Line between Lansdale, Pennsylvania, and Philadelphia with trip times of 1 hour and 46 minutes. Trip time on the Lansdale Line portion of the route was estimated by using current trip times for the Fort Washington Express trains that currently operate on the line, assuming these trains making three or four fewer stops between Lansdale and the Jefferson stop (formerly Market East Station). Again, there is no concurrence from SEPTA for this type of stopping pattern or assumed train slotting on the line. Like the New Jersey route, the equipment cycles allowed time for fueling in Allentown between each round trip. For cost-estimating purposes, the draft service plan assumed:

- 3 round trips or 6 trains per day
- A service pattern for the day with a morning round trip, midday round trip and evening round trip
- The same service level 7 days per week

Philadelphia Corridor Alternative via Norristown

A draft service plan was also created for service from Allentown to Philadelphia (30th Street Station) using the SEPTA Line between Norristown, Pennsylvania, and Philadelphia, with an estimated trip time of 1 hour and 52 minutes. Trip time on the Norristown Line portion of the route was estimated by using current trip times for trains that currently operate on the line, with those trains making three or four fewer stops between Norristown and the Jefferson Station (formerly Market East). Again, there is no concurrence from SEPTA for this type of stopping pattern or assumed train slotting on the line. Like the New Jersey route, the equipment cycles allowed time for fueling in Allentown between each round trip. For cost-estimating purposes, the draft service plan assumed:

- 3 round trips or 6 trains per day

- A service pattern for the day with a morning round trip, midday round trip and evening round trip
- The same service level 7 days per week

Reading Alternative

A draft service plan was also created for service from Allentown to Reading with trip times of 46 minutes between the two. These trip times assumed three intermediate station stops. Like the other routes, the equipment cycles allowed time for fueling in Allentown between each round trip. For cost-estimating purposes, the draft service plan assumed:

- 3 round trips or 6 trains per day
- A service pattern for the day with a morning round trip, midday round trip and evening round trip
- The same service level 7 days per week

Order-of-Magnitude Operating Cost Estimate Methodology

The study team used National Transit Database average cost per revenue vehicle hour data for diesel service as well as average cost per hour for the appropriate regional provider (NJ TRANSIT or SEPTA) to develop a range of cost estimates for the services studied. These estimates were developed to represent an "**order-of-magnitude**" estimate of operating costs. Operating cost estimates only include train-related expenses; they do not include the ongoing costs of operating and maintaining stations.

An existing operating railroad normally builds cost estimates from known data sources, such as labor rates, fuel costs, maintenance history, and other similar sources. The project team is familiar with these costs but not to the level of detail needed to generate operating cost estimates at this time. Because these data sources were not available for this level of study and this early in the process of study, the project team used available averages to estimate costs. Each average cost factor is result of the buildup of known costs for an operating railroad.

The basic formulas for the development of costs are:

- Rate per vehicle * number of vehicles per train * revenue hours per trip*trains per day = daily cost
- Daily cost * # of days of operation per year = annual cost

The cost factors or rate per vehicle revenue hour are shown in Table 8.

Table 8. Average Cost Factors or Rate Per Vehicle Revenue Hour

Average Cost per Vehicle Revenue Hour		
Operator	**Cost/Revenue Hour**	**Data Source**
National Diesel Services	$562	FTA National Transit Database (NTD)
NJ TRANSIT	$538	FTA NTD
SEPTA	$331	2019 Data

Average Cost per Vehicle Revenue Hour		
Operator	**Cost/Revenue Hour**	**Data Source**
Amtrak State-Supported Services	$657	FTA NTD

The cost estimates considered the ownership of line segments that could be used to provide the service, where applicable. The cost factors for SEPTA and NJ TRANSIT, where these service providers' rail lines might become part of the service route, were used for one of the estimates for that route. The project team also considered the average cost per revenue hour for Amtrak state-supported service to recognize the possibility that Amtrak could be the service provider.

Operating cost estimates were developed for the full length of proposed service. Where the potential for sharing those costs with a non-Pennsylvania entity exists, the project team used current examples for cost sharing as models to estimate a potential break-out of cost by the parties involved. An example of this situation might be the operation of a train from Pennsylvania to the New York City region, where part of the route operates over NJ TRANSIT territory and provides service to NJ TRANSIT rail stations. The potential exists for cost sharing with NJ TRANSIT over that NJ TRANSIT territory.

The cost-sharing approach was based, to a degree, on the current operating agreement between NJ TRANSIT and Metro North for the operation of trains from Orange County, New York, and Rockland County, New York, to and from Hoboken Terminal in New Jersey. In this arrangment, Metro North is 100% responsible for the cost of operation in New York State and shares the cost of operation for those specific trains over NJ TRANSIT territory. The costs are split based on the percentage of New York State riders and percentage of New Jersey riders on the service, while operating through New Jersey.

Where SEPTA and/or NJ TRANSIT own a line segment, that railroad's cost averages per revenue service hour per car were used for the estimate of operating costs along with a separate estimate using the national diesel cost factor developed from NTD reporting. Nationally, many service providers operate service over rail lines owned by other entities, so use of the national rate helps cover the cost structure for operations over the freight and commuter lines in question.

It should be noted that the SEPTA average cost per revenue hour is signifcantly lower than other rates. While pay scales differ by operator and given the fact that SEPTA's current operation does not involve the use of diesel trains (which may affect the cost structure), it is also possible that the SEPTA average cost factor is related to direct operating costs and does not include some overhead costs that would be expected with the operation of these services.

These estimates are for annual operating costs and do not include capital costs or access fees that might be required above and beyond the annual operating fees or costs.

The cost factors were applied as follows.

NJ TRANSIT/New York Options

New York/Newark Alternatives via Hackettstown and High Bridge

To develop a range of costs:

- The first estimate used the national diesel rate per revenue hour using the general formulas shown above for the entire route.
- The second estimate used the NJ TRANSIT rate per revenue hour using the general formulas above for the entire route.
- The project team developed an estimated sharing of cost split over NJ TRANSIT's existing active lines. Note that the project team cannot state with any assurance that NJ TRANSIT or the State of New Jersey will participate in funding the service, if a decision is made to move forward with this option.
- The final result is an estimate of the potential range of costs for the operation of the service over the NJ TRANSIT lines used in Alternatives 1 and 2.

Note: The number of vehicles assumed matched the six-car trainsets that NJ TRANSIT operates on the Raritan Valley Line and eight-car trainsets that NJ TRANSIT operates on the Morristown Line.

A separate estimate was developed using the Amtrak state-supported rate per revenue hour, with the costs split by mileage and by state, using the general formulas above and the Amtrak average rate per vehicle revenue hour.

SEPTA Options

Philadelphia via Lansdale and Norristown Corridors

To develop a range of costs:

- The first estimate was developed using the national diesel rate per revenue hour using the general formulas noted above for the entire route.
- The second estimate was developed using the SEPTA rate per revenue hour using the general formulas noted above, for the entire route.

Note: The number of vehicles used in the calculation matched the four-car trainsets often operated by SEPTA on the Lansdale Doylestown and Norristown Lines.

An estimate assuming Amtrak as the operator was also developed for each scenario using the average cost per revenue hour for state-supported services.

This combination of estimates provides a range of potential order-of-magnitude costs based on recent experience in the region and across the country for the various options under consideration.

Method Validation

The project team evaluated this cost-estimating concept based on a recent study for NJ TRANSIT. In that study, NJ TRANSIT budgeting staff provided feedback on operating costs for the various scenarios studied. The use of the proposed approach resulted in similar order-of-magnitude results when compared to the cost estimates from NJ TRANSIT. NJ TRANSIT did not provide the details behind those estimates, so the project team cannot state with certainty the various cost factors that NJ TRANSIT used; however, this information is sufficient for this level of planning.

Order-of-Magnitude Operating Cost Estimates

The project team created order-of-magnitude cost estimates for five route/service options: two Lehigh Valley to New York area routes, two Lehigh Valley to Philadelphia options, and the Allentown to Reading service option. The draft service plans for these options are described in the previous section of this document. As a reminder, the service plans used to develop these estimates have not yet been coordinated with existing service on the rail lines assumed for operation of the service and have not been discussed with the operators of those lines.

New York/Newark Corridor Alternative via Hackettstown - Lehigh Line, Raritan Valley Line and NEC - Allentown to New York, Penn Station

Key factors for this set of estimates are described below. Table 9 provides the estimates.

- 6 trains per day
- 8 cars per train
- 2 hours and 30-minute service time per train
- The same service level assumed 7 days per week

Table 9. Estimates for the New York/Newark Corridor Alternative via Hackettstown

Cost Factor Used	Per Day Cost Estimate (Dollars in Thousands)	Annual Operating Cost Estimate (Dollars in Thousands)
NJ TRANSIT	$64.6	$23,564.4
National Diesel	$67.4	$24,615.6
Amtrak State-Supported	$78.8	$28,776.6

Because this route would operate in New Jersey, New York, and Pennsylvania and because NJ TRANSIT is a potential operator of the service, the project team developed potential cost-sharing estimates for the portion of the route where NJ TRANSIT service currently operates. The cost sharing was modeled on the current operating agreement between NJ TRANSIT and Metro North for the operation of trains to and from New York State communities in New Jersey and operated by NJ TRANSIT. Because the split of ridership between states for the line segment within New Jersey is a critical factor in determining the potential cost-sharing split, the project team assumed an equal (50/50) share for this exercise (Table 10).

Table 10. Potential for Cost Share Based on 50%/50% Ridership Split with NJ TRANSIT

Cost Factor Used	Potential NJ TRANSIT Share Based on 50/50 Split of Ridership on NJ TRANSIT Territory (Dollars in Thousands)	Potential Pennsylvania Share Based on 50/50 Split of Ridership on NJ TRANSIT Territory (Dollars in Thousands)
NJ TRANSIT	$6,833.7	$16,730.7
National Diesel	$7,138.5	$17,477.1
Amtrak State-Supported	$8,345.2	$20,431.4

New York/Newark Corridor Alternative via High Bridge - Lehigh Line, Raritan Valley Line and NEC - Allentown to New York, Penn Station

The key factors for this set of estimates are provided below. Table 11 provides the estimates.

- 6 trains per day
- 6 cars per train
- 2 hours and 20 minutes of service time per train
- The same service level assumed 7 days per week

Table 11. Estimates for the New York/Newark Corridor Alternative via High Bridge

Cost Factor Used	Per Day Cost Estimate (Dollars in Thousands)	Annual Operating Cost Estimate (Dollars in Thousands)
NJ TRANSIT	$45.1	$16,471.5
National Diesel	$47.1	$17,206.3
Amtrak State-Supported	$55.1	$20,114.8

Because this route would operate in New Jersey and New York as well as Pennsylvania and because NJ TRANSIT is a potential operator of the service, the project team developed potential cost-sharing estimates for the portion of the route where NJ TRANSIT service currently operates. The cost-sharing was modeled on the current operating agreement between NJ TRANSIT and Metro North for the operation of trains to and from New York State communities that operate through New Jersey by NJ TRANSIT. The split of ridership between states for the line segment within New Jersey is a critical factor in determining the potential cost-sharing split; the project team assumed an equal 50/50 share for this exercise, as shown in Table 12.

Table 12. Potential for Cost Share Based on 50%/50% Ridership Split with NJ TRANSIT

Cost Factor Used	Potential NJ TRANSIT Share Based on 50/50 Split of Ridership on NJ TRANSIT Territory (Dollars in Thousands)	Potential Pennsylvania Share Based on 50/50 Split of Ridership on NJ TRANSIT Territory (Dollars in Thousands)
NJ TRANSIT	$4,964.4	$11,777.1
National Diesel	$4,903.8	$12,302.5
Amtrak State-Supported	$5,732.7	$14,382.1

Philadelphia Alternative 1 Corridor - Allentown to Philadelphia – Via the SEPTA Lansdale Line

Key factors for this set of estimates are described below. Table 13 provides the estimates.

- 6 trains per day
- 4 cars per train
- 1 hour and 46 minutes of service time per train
- The same service level assumed 7 days per week

Table 13. Estimates for the Philadelphia Alternative via Lansdale

Cost Factor Used	Per Day Cost Estimate (Dollars in Thousands)	Annual Operating Cost Estimate (Dollars in Thousands)
SEPTA	$14.1	$5,132.2
National Diesel	$23.9	$8,713.9
Amtrak State-Supported	$27.9	$10,186.9

The estimates above provide a range of potential service costs for this option. There is some concern regarding the comparability of the SEPTA figures with the other two calculations. Both the national diesel rate and the Amtrak state-supported rate come from NTD statistics. The SEPTA rate comes from SEPTA data and may not include the same overhead information or other costs that are factored into the NTD data. It should also be noted that SEPTA service is completely electrified, while the other rates are predominately based on diesel operations, which could also account for some of the differences in the rates.

Philadelphia Alternative via Norristown Corridor

Key factors for this set of estimates are described below. Table 14 provides the estimates.

- 6 trains per day
- 4 cars per train
- 1 hour and 52 minutes of service time per train
- The same service level assumed 7 days per week

Table 14. Estimates for the Philadelphia Alternative via the Norristown Corridor

Cost Factor Used	Per Day Cost Estimate (Dollars in Thousands)	Annual Operating Cost Estimate (Dollars in Thousands)
SEPTA	$14.9	$5,451.2
National Diesel	$25.4	$9,255.5
Amtrak State-Supported	$29.6	$10,820.0

Reading Alternative

Key factors for this set of estimates are described below. Table 15provides the estimates.

- 6 trains per day
- 4 cars per train
- 46 minutes of service time per train
- The same service level assumed 7 days per week

Table 15. Estimates for the Reading Alternative

Cost Factor Used	Per Day Cost Estimate (Dollars in Thousands)	Annual Operating Cost Estimate (Dollars in Thousands)
SEPTA	$6.0	$2,174.7
National Diesel	$10.1	$3,692.3
Amtrak State-Supported	$11.8	$4,316.5

7. Operations, Approvals, and Funding

The review of operations, approvals, and funding covers the key requirements necessary to begin passenger rail operations between the Lehigh Valley and the three partner market areas of Newark/New York, Philadelphia, and Reading. Detailed analysis is provided in the *Operations, Approvals, and Funding Technical Memorandum*.

This section also describes the conditions under which services could be provided, including a general legal framework governing agreement between freight railroads and a passenger service sponsor, the studies required by the various railroads prior to service initiation, potential financial mechanisms to allow for the service, as well as a general discussion of the process of allocated or shared costs. Additionally, potential federal, state, and local funding sources that could support restoring passenger rail service are identified.

Rail service between the Lehigh Valley and the partner markets is predicated on two key determinations:

- Concurrence is required between the owner/controller of a corridor to permit passenger rail service within its ROW. This concurrence must be legally formalized.
- A project sponsor must be identified that has developed a model for operations. A project sponsor would serve as the contracting entity to any rail segment owner(s) and would ultimately oversee the planning, design, construction, and operations of the proposed service.

The project sponsor would be responsible for acquiring new ROW on corridors where active rail ROW is not currently in use or available for new or additional passenger rail operations. The project sponsor also would need to acquire property on the rail ROW, lease it from public or private owners, establish any easements, or otherwise initiate an agreement for the use of the rail ROW.

The restoration of passenger rail service originating in the Lehigh Valley assumes the following activities:

1. Agreement with freight rail operators to permit passenger rail service or acquisition of the rail ROW.
2. Acquisition or agreement to use ROW not currently used for rail services.
3. The identification of an operator to plan, operate, maintain, and financially support the service.
4. Infrastructure program to ensure the development of the support facilities necessary to enable service, such as stations, platforms, and parking; track, turnouts, switches, and other necessary rail work; grade crossing upgrades and signal systems, including Positive Train Control systems; and maintenance and storage facilities.
5. Operations funding program to address labor, insurance, staffing, and internal and external coordination.

For any potential service alternative between the Lehigh Valley and the New York City region, restoration of passenger service would also require an agreement or working partnership with NJ TRANSIT or the State of New Jersey.

Agreement with Freight Railroads and Corridor Owners

As part of the Class I freight railroad's consideration of passenger rail services along its ROW, Class I freight railroads typically undertake evaluations to determine the impact of the proposed passenger rail services on system capacity, network infrastructure, dispatching, liability and indemnification, compensation, and consistency with business plans, among other topics. While each railroad's due diligence varies, studies often focus on four areas:

1. **Capacity and Service Planning** – evaluating the impact of proposed passenger rail service on capacity of freight rail network and consistency with growth and business plans.
2. **Infrastructure Needs and Integration with Existing Rail Facilities** – identifying the infrastructure necessary to support passenger rail service.
3. **Environmental Reviews** – evaluating the current environmental conditions along the freight railroad ROW in advance of a public environmental process that would be undertaken by the proposed operator in coordination with the FRA.
4. **Access, Operations, Indemnification/Liability, and Compensation Agreements** – developing multiple contractual agreements between the freight railroads and the operator of the Lehigh Valley passenger rail service.

Additional agreements with shortline freight railroad operators may be necessary; however, entering into any operating arrangement with a shortline operator may be easier than equivalent arrangements with a Class I freight railroad, as the shortline railroads typically would directly benefit from improvements made to enable passenger rail service with little impact to their own scheduling. Shortline railroads' lower traffic volumes mean they are not incentivized to invest track and capacity improvements based on their traffic alone, but they would benefit from improvements made by others nonetheless and may therefore be more eager to enter into these agreements.

Some segments make use of rail ROW already owned or operated on by existing passenger rail operators such as SEPTA or NJ TRANSIT. In some cases, these agencies may own the tracks but have agreements with another agency to run passenger rail services on them. Arrangements for using these tracks will depend on negotiation and planning between the agencies and may include scheduling arrangements to permit both rail operators to maintain service on the shared track.

Some segments of corridors are owned by either private owners or public agencies for purposes other than rail transportation. For acquiring ROW from private owners, the most common means of acquisition are through a negotiated purpose or eminent domain by agencies and authorities with the ability to do so. Public agencies have repurposed many of the former rail ROWs included as candidate segments in the study for recreational purposes, either in the form of multi-use trails or as part of parks. Making shared use of these segments for recreational purposes will require careful negotiation and planning with the agencies operating these facilities.

Mechanisms

Commuter rail systems have started or continued operations on current and former ROW and/or tracks under agreements with freight railroads throughout the United States. Each Class I freight railroad

entered such agreements with commuter rail system owners and/or operators. These agreements generally take one of the following forms:

- Buy – the commuter rail operator acquires the ROW from the freight railroad. Such agreements may encompass a clause by which the freight railroad pays access fees to continue operating slots on the ROW.
- Lease – the commuter rail operator leases the ROW from a freight railroad. The lease can consist of an annual fee, which can be considered an operating expense.
- Pay access fees – similar to a lease, the commuter rail operator pays access fees to a freight railroad for use of the ROW. Access fees can be based on specific metrics.

Example metrics and examples of transportation providers making financial contributions to freight operators to gain access to freight-owned ROW are provided in the *Operations, Approvals, and Funding Technical Memorandum*.

Capital Funding and Financing Sources

Federal

The Bipartisan Infrastructure Law, passed by Congress in November 2021, provides $102 billion in funding directed to passenger and freight rail between fiscal year 2022 and fiscal year 2026. For most programs, the federal share may not exceed 80% of total project costs. Restoring passenger rail funding to the Lehigh Valley may be eligible for the following funding programs:

- Corridor Identification and Development Program – provides discretionary funding to project sponsors for the planning and development of intercity passenger rail service. Has broad eligibility of project sponsors and is particularly applicable to any potential Lehigh Valley-originating project.
- New Starts – supports projects with costs greater than $300 million or projects seeking more than $100 million in federal grants. Projects must either be new fixed-guideway investments or an extension of an existing fixed-guideway system. Eligible activities include design and construction of new fixed guideways or extensions to fixed guideways.
- Small Starts – supports projects with capital costs less than $300 million and seeking less than $100 million in Section 5309 Capital Investment Grant program funds. Projects must be new fixed-guideway projects, extensions to existing fixed-guideway systems, or corridor-based bus rapid transit projects. Eligible activities include design and construction.
- Federal-State Partnership for Intercity Passenger Rail Grant Program – provides discretionary funding for projects that expand or establish new intercity rail service, including privately operated intercity passenger rail service.
- National Infrastructure Project Assistance (Mega) Program – provides discretionary federal funding for large, complex projects that create regional or national economic benefits. Intercity passenger rail is an eligible category.

- Rebuilding American Infrastructure with Sustainability and Equity (RAISE) – provides discretionary federal funding for multimodal, multijurisdictional projects with a broader list of potentially eligible applicants compared to most federal programs. Rail projects are identified as an eligible funding category.
- Interstate Rail Compacts Grant Program – includes promotion of intercity passenger rail services as an identified category, though only existing entities established by member states are eligible.
- Consolidated Rail Infrastructure and Safety Improvements Program (CRISI) – provides discretionary capital funding for intercity rail or commuter rail projects that typically seek to reduce congestion, deploy new technologies, and link rail transit to other modes.

State and Regional

State and regional funds are available to support the planning and design of passenger rail service terminating in the Lehigh Valley, although the funding they provide is relatively small compared to the federal funding programs described above. The project sponsor would almost assuredly need to attain funding from multiple sources to plan, design, permit, and construct a passenger rail project into the Lehigh Valley. The following state and regional funding sources are available:

- PennDOT Multimodal Transportation Fund – reimburses up to $3 million to project sponsors for eligible activities and requires a local match of at least 30% of the award.
- Department of Community and Economic Development Multimodal Transportation Fund – provides grant funding to projects and sponsors similar to the PennDOT Multimodal Transportation Fund, including intercity bus and rail programs.
- Transportation and Community Development Initiative (TCDI) – provides funding, within Philadelphia, and Bucks, Montgomery, Delaware, and Chester Counties in Pennsylvania and Mercer County in New Jersey; the program is managed by the Delaware Valley Regional Planning Commission.

Operations and Maintenance Funding and Financing Sources

Federal funding options are more limited for operations and maintenance support than for capital support.

- Section 5307 (Urbanized Area Formula Funding program) – makes federal resources available to urbanized areas and to governors for transit capital and operating assistance.
- Section 5337 (Good Repair Grants Program) – provides capital assistance for maintenance, replacement, and rehabilitation projects of high-intensity fixed-guideway and bus systems to help transit agencies maintain assets in a state of good repair.

Recent initiatives to permit selected counties the authority to levy and collect taxes through a county or municipal ordinance were introduced in the Pennsylvania House of Representatives in June 2023 as HB1307. Should this legislation pass, another potential source of regional funding for transit services will be available. As written, this legislation would apply to Bucks, Chester, Delaware, Lancaster, Montgomery, and Philadelphia counties; it would not apply to Berks, Lehigh, or Northampton counties.

Local taxes and fees could be used to cover a share of the project's recurring operations and maintenance costs. Potential sources of local funding used to fund similar rail projects throughout the country include property taxes, income taxes, utility taxes, license fees, and others. Across the United States, there are numerous examples of local taxes and fees used to defray the operations and maintenance costs of transit service beyond fares, including municipal contributions, student activity fees, advertising, and station concessions. The project sponsor would need to work with local municipalities and other organizations that would benefit from the restoration of rail services between the Lehigh Valley and partner markets to determine whether local funding sources could be available. It must be noted that local funding sources at the scale envisioned for the passenger rail project originating in the Lehigh Valley likely represent a small portion of the transportation funding needed to operate the proposed system.

As noted in Chapter 6, there is also the potential for operating cost sharing with NJ TRANSIT if a route were to operate over NJ TRANSIT territory and provide service to NJ TRANSIT rail stations. A similar arrangement currently exists between NJ TRANSIT and Metro North for the operation of trains between Orange and Rockland counties in New York and Hoboken Terminal in New Jersey. In this arrangement, Metro North is 100% responsible for the cost of operation in New York State and shares the cost of operation for those specific trains over NJ TRANSIT territory. The costs are split based on the percentage of New York State riders and percentage of New Jersey riders on the service while operating through New Jersey. Note that the project team cannot state with any assurance that NJ TRANSIT or the State of New Jersey would participate in funding the service, if a decision were to be made to move forward with an option that operates in NJ TRANSIT territory.

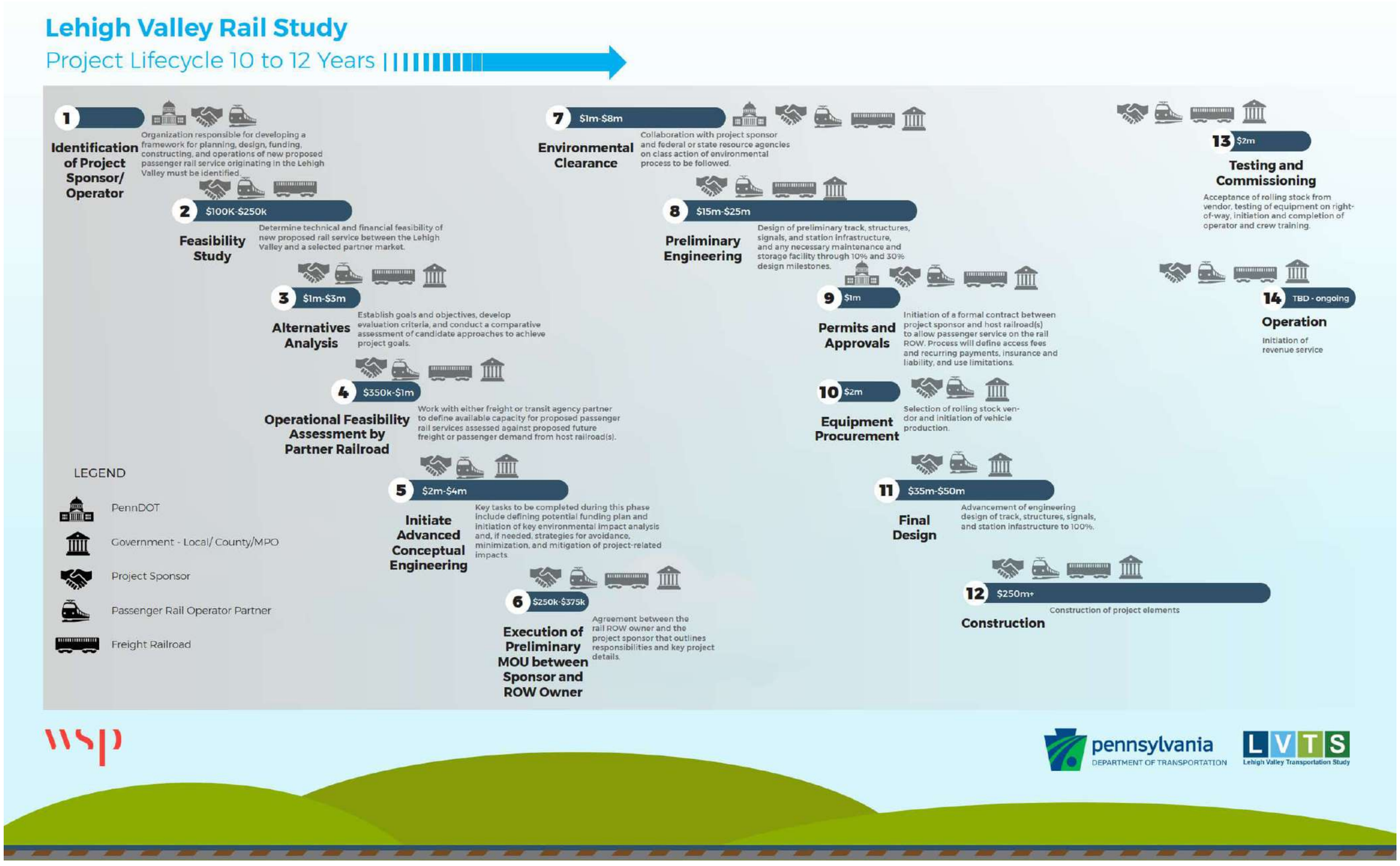
Additionally, partnerships or agreements with private stakeholders could provide limited funding to support rail operations along the candidate corridors.

8. Conclusion

Together, this final report and its appendices lay the foundation for future study phases aimed at restoring passenger rail service to the Lehigh Valley. Should the region decide to pursue reestablishing Lehigh Valley passenger rail service, a critical next step is identifying a project sponsor (*Figure 11*). This entity will be the organization responsible for developing a framework for planning, designing, funding, constructing, and operating the new passenger rail service. Figure 11 provides a high-level timeline for the project lifecycle, including planning-level cost estimates for each phase.

The analysis conducted as part of the *Lehigh Valley Passenger Rail Feasibility Analysis* will be essential to informing potential project sponsors of the opportunities and challenges associated with this effort. Once a project sponsor is identified, subsequent steps include conducting a feasibility study, developing an alternatives analysis, and assessing the operational feasibility of partner railroads. This analysis is occurring early in the process, and the operation of passenger rail service in the Lehigh Valley is dependent on a complex series of next steps. However, this study and subsequent elements will help guide the direction of the project and support the desired outcome for the Lehigh Valley.

Figure 11. Project Development Process



Lehigh Valley Rail Study

Project Lifecycle 10 to 12 Years

1 **Identification of Project Sponsor/ Operator**

Organization responsible for developing a framework for planning, design, funding, constructing, and operations of new proposed passenger rail service originating in the Lehigh Valley must be identified.

2 $100K-$250k

Feasibility Study

Determine technical and financial feasibility of new proposed rail service between the Lehigh Valley and a selected partner market.

3 $1m-$3m

Alternatives Analysis

Establish goals and objectives, develop evaluation criteria, and conduct a comparative assessment of candidate approaches to achieve project goals.

4 $350k-$1m

Operational Feasibility Assessment by Partner Railroad

Work with either freight or transit agency partner to define available capacity for proposed passenger rail services assessed against proposed future freight or passenger demand from host railroad(s).

5 $2m-$4m

Initiate Advanced Conceptual Engineering

Key tasks to be completed during this phase include defining potential funding plan and initiation of key environmental impact analysis and, if needed, strategies for avoidance, minimization, and mitigation of project-related impacts.

6 $250k-$375k

Execution of Preliminary MOU between Sponsor and ROW Owner

Agreement between the rail ROW owner and the project sponsor that outlines responsibilities and key project details.

7 $1m-$8m

Environmental Clearance

Collaboration with project sponsor and federal or state resource agencies on class action of environmental process to be followed.

8 $15m-$25m

Preliminary Engineering

Design of preliminary track, structures, signals, and station infrastructure, and any necessary maintenance and storage facility through 10% and 30% design milestones.

9 $1m

Permits and Approvals

Initiation of a formal contract between project sponsor and host railroad(s) to allow passenger service on the rail ROW. Process will define access fees and recurring payments, insurance and liability, and use limitations.

10 $2m

Equipment Procurement

Selection of rolling stock vendor and initiation of vehicle production.

11 $35m-$50m

Final Design

Advancement of engineering design of track, structures, signals, and station infastructure to 100%.

12 $250m+

Construction

Construction of project elements

13 $2m

Testing and Commissioning

Acceptance of rolling stock from vendor, testing of equipment on right-of-way, initiation and completion of operator and crew training.

14 TBD - ongoing

Operation

Initiation of revenue service

LEGEND

- PennDOT
- Government - Local/ County/MPO
- Project Sponsor
- Passenger Rail Operator Partner
- Freight Railroad

LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING MARCH 20, 2024

SR 145 over Jordan Creek Bridge Replacement (C-C. Frey)
City of Allentown and Whitehall Township, Lehigh County
MPMS 110076 – est. let April 1, 2026

- Coordination continuing with LANta regarding their bus stops and Enhanced Bus Service (EBS) project
- Coordination initiated with the municipalities regarding the Jordan Creek Greenway Trail but on hold until temporary impacts fully established for stream rehabilitation work
- Design team continuing to work on Preliminary TCP submission, including operational analysis of adjacent intersections during each stage
- Field meeting held with PADEP and PAFBC to discuss stream rehabilitation measures to be installed in conjunction with the bridge replacement and their limits. Design team conducting H&H analysis on up to 4 scenarios. Final TS&L and geotechnical investigations on hold until preferred alternative established with PADEP and PAFBC
- Currently, all preliminary engineering plans and reporting are scoped to be included with US 22 Widening in anticipation of the projects being packaged together for construction, which is no longer feasible with the US 22 breakout project delivery approach. Supplement needed to establish scope for a free-standing project

SR 378 Hill to Hill Bridge Rehabilitation over Lehigh River (C-B. Teles)
City of Bethlehem, Lehigh and Northampton Counties
MPMS 93630 – est. let July 24, 2025

- ROW progressing
- Lighting progressing
- Coordination with Norfolk Southern continues
- Preparing package for PUC field meeting
- Utility meeting held January 26, 2024, other coordination continues
- Boring Contract #1 ongoing under the bridge, boring Contract #2 award progressing
- Traffic Coordination continues for staging, signals and pedestrian crossings
- Additional traffic data collection initiated
- Permit related activities continue, pre-application Meeting with agencies held February 12, 2024
- Stormwater Management activities progressing
- Let date changed from February 27, 2025 to allow time for ROW and permitting

SR 873 over Lehigh River – Gap Bridge Repairs (C-J. Crawford)
Washington Township, Lehigh County and Lehigh Township, Northampton County
MPMS 107552 – est. let July 11, 2024

- Norfolk Southern Railroad 90% plans review received January 17, 2024, 100% plans submitted February 24, 2024
- Latest bridge inspection completed January 16, 2024 – final structure plans being updated to incorporate
- Final ROW negotiations ongoing, all property owners have settled except Norfolk Southern
- GP-11 Permit submitted to DEP December 4, 2023, technical review due March 13, 2024
- Constructability and final plans check review completed December 14, 2023 – final PS&E being prepared

Lower South Main St (SR 1015) over Martins Creek (C-M. Mignella)
Washington Township, Northampton County
MPMS 85930 – actual let November 2, 2023

- Awarded to Grace Industries, Inc. on November 15, 2023
- Notice to Proceed issued on December 18, 2023
- Anticipated completion is November 4, 2024

LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING MARCH 20, 2024

Fifth Street (SR 1029) Bridge Replacement (C-C. Frey)
Whitehall Township, Lehigh County
MPMS 94873 – est. let April 1, 2027

- Phase I ESAs approved May 7, 2023; phase II/III ESAs will be completed in Final Design
- Design team and DUA have determined the Northampton Borough Municipal Authority (NBMA) waterline will need to be relocated due to proximity to the proposed Fifth Street Bridge abutment foundations, coordination with NBMA to be initiated in May 2024
- Virtual public plans display on PennDOT's website tentatively scheduled for May 2024
- TS&L approved on January 24, 2024
- Supplement needed to implement FHWA-mandated environmental justice population communication strategies and expanded environmental clearance documentation needs due to the number of proposed relocations

Lower Saucon Road (SR 2001) over E Branch of Saucon Creek (C-J. Crawford)
Lower Saucon Township, Northampton County
MPMS 119940 – est let December 10, 2026

- NTP issued for PE on September 15, 2023
- Survey and wetland studies are completed

Church Road (SR 1016) over Trib to Little Bushkill Creek (C-E. Berg)
Plainfield Township, Northampton County
MPMS 12106 – est let June 10, 2027

- NTP issued for PE on September 19, 2023
- NOITE letters sent November 8, 2023
- Field Survey completed January 22, 2024

Raubsville Road (SR 2006) over Freys Run (M. Patel)
Williams Township, Northampton County
MPMS 109914– est. let September 26, 2024

- Permit application pending DEP Technical review since 8-21-2023 due to District Permit review Priorities/ DEP workload issue
- Final Structure Plan designer addressing District comments
- Utility coordination, designer need supplement to complete ongoing utility task
- Final ROW plan approved on June 5, 2023, ROW acquisition on schedule

Fish Hatchery Road (SR 2010) over Little Lehigh Creek (C-M. McGuire)
City of Allentown, Lehigh County
MPMS 119933 – est let July 29, 2027

- NTP issued for PE on September 11, 2023
- Survey and wetland studies are completed
- Lead based paint inspection completed (no lead based paint)

Powder Valley Road (SR 2025) over Indian Creek (C-J. Crawford)
Upper Milford Township, Lehigh County
MPMS 109237 – est. let March 13, 2025

- Meeting held with DEP February 6, 2024, DEP is reviewing 2D H&H results
- TS&L and subsequent preliminary engineering submissions to be submitted after meetings

LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING MARCH 20, 2024

Hecktown Road (SR 2027) Bridge over Route 22 (C-R. Himmelwright)
Bethlehem Township, Northampton County
MPMS 89614 – est. let August 21, 2025

- Final E&S Plans approved January 29, 2024
- Final SPM Plans approved February 5, 2024
- Right of Way acquisition in progress
- Final MPT Plans in progress
- Let date changed from August 22, 2024 due to geotechnical issues uncovered by structure borings

Farmersville Road (SR 2029) Bridge over Route 22 (C-M. McGuire)
Bethlehem Township, Northampton County
MPMS 71707 – est. let August 22, 2024

- Right of Way acquisition is in progress
- Utility re-designs in progress
- Structure Foundation Report in progress
- Final MPT and Signing and Pavement Markings in progress
- Final Erosion and Sediment Pollution Control plans completed

Limeport Pike (SR 2029) over Hosensack Creek (C-M. Fallon)
Lower Milford Township, Lehigh County
MPMS 119936 – est let April 22, 2027

- NTP issued for PE on September 8, 2023
- Survey and wetland studies are completed

Newburg Road (SR 3020) over Trib Monocacy Creek (C-E. Berg)
Lower and Upper Nazareth Townships, Northampton County
MPMS 85940 – actual let October 5, 2023

- Awarded to Richard E. Pearson Construction Co., Inc. on October 19, 2023
- NTP issued November 14, 2023
- Anticipated completion date December 31, 2024

Meadows Road (SR 7210) Bridge (C-M. McGuire)
Lower Saucon Township, Northampton County
MPMS 12286 – actual let February 29, 2024

- GP-11 permit issued on January 23, 2024
- Final Structure Plans approved on January 21, 2024
- Project advertised for construction on January 30, 2024
- Project let on February 29, 2024 to the low bidder of Kinsley Construction, Inc.

LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING MARCH 20, 2024

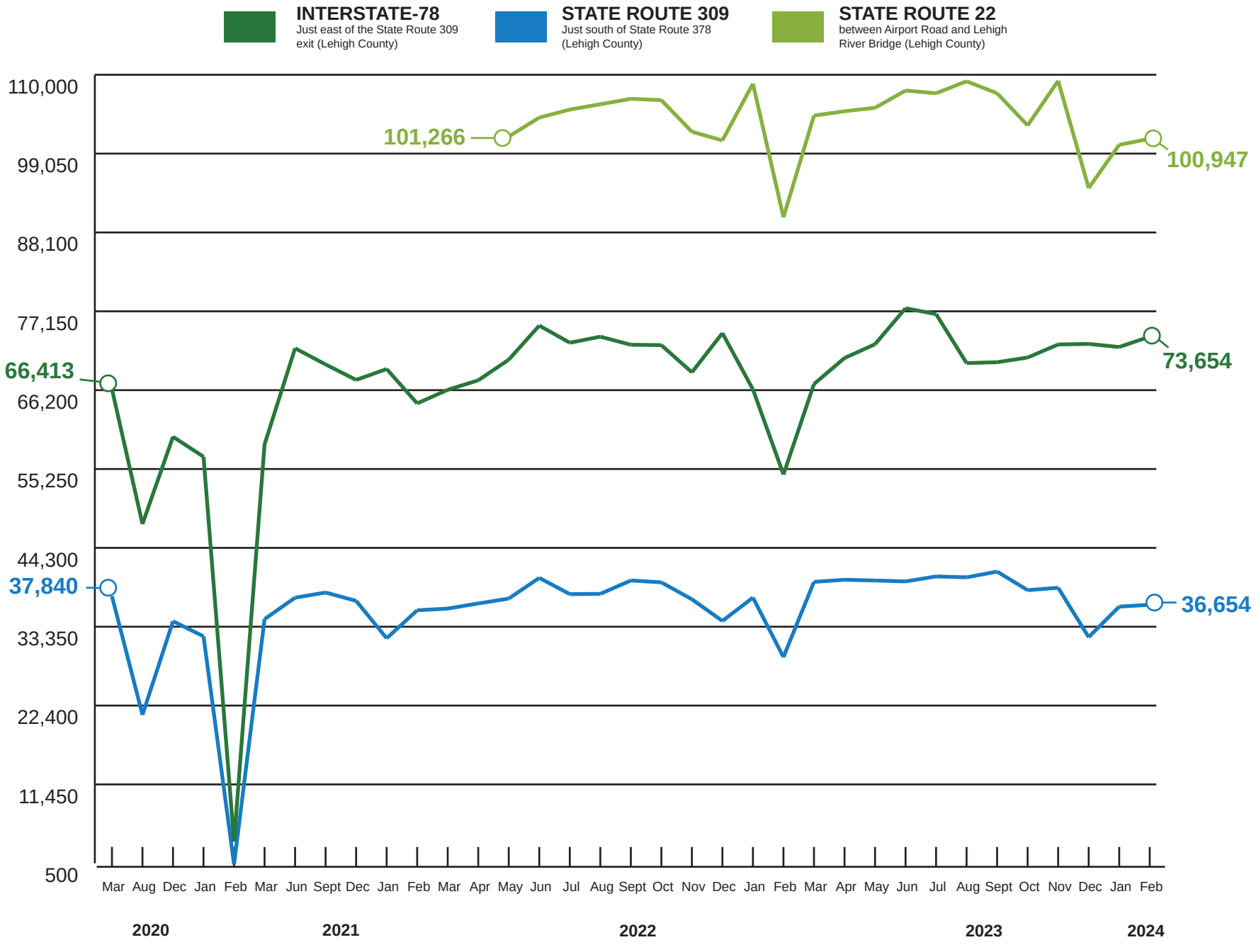
South Walnut Street (SR 7408) Bridge over Trout Creek (C-J. Besz)
Slatington Borough, Lehigh County
MPMS 94680 – est. let December 12, 2024

- ROW acquisition continues
- The Pre-Final MPT was submitted, reviewed, and returned as REVISE AND RESUBMIT; revisions are ongoing
- The Structure Foundation Report was submitted, returned as REVISE AND RESUBMIT; revisions are ongoing
- Development of the Final Structure Plans continues
- Development of the Highway Lighting Plans is ongoing
- Development of the Pavement Marking & Signing Plan is ongoing
- Utility coordination continues
- Drainage design continues
- The Joint Permit Application was submitted to PADEP on November 9, 2023, and is under review; it was deemed administratively complete on February 6, 2024
- Preparation of the Erosion and Sediment Control Plan is ongoing
- Section 106 Consulting Party coordination for development of mitigation measures continues

LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING MARCH 20, 2024

ACRONYM REFERENCE	
ACM/LBP	ASBESTOS CONTAINING MATERIAL / LEAD BASED PAINT
ACOE	ARMY CORPS OF ENGINEERS
ADA	AMERICAN WITH DISABILITIES ACT
BRPA	BRIDGE AND ROADWAY PROGRAMMATIC AGREEMENT
CBR	CONSTANT BIT RATE
CE	CATEGORICAL EXCLUSION
CEE	CATEGORICAL EXCLUSION EVALUATION
CO	CENTRAL OFFICE
CRP	CULTURAL RESOUCES PROFESSIONAL
DCNR	DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DEP	DEPARTMENT OF ENVIRONMENTAL PROTECTION
DFV	DESIGN FIELD VIEW
DO	DISTRICT OFFICE
E&S	EROSION AND SEDIMENTATION
ESA	ENVIRONMENTAL SITE ASSESSMENT
FD	FINAL DESIGN
FHWA	FEDERAL HIGHWAY ADMINISTRATION
GP	GENERAL PERMIT
H&H	HYDROLOGIC AND HYDRAULIC
HOP	HIGHWAY OCCUPANCY PERMIT
HRSF	HISTORIC RESOURCE SURVEY FORM
JD	JURISDICTIONAL DETERMINATION
JPA	JOINT PERMIT AGREEMENT
L&G	LINE AND GRADE
LCCD	LEHIGH COUNTY CONSERVATION DISTRICT
LGTS	LINE, GRADE AND TYPICAL SECTION
MPT	MAINTENANCE AND PROTECTION OF TRAFFIC
NOITE	NOTICE OF INTENT TO ENTER
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NTP	NOTICE TO PROCEED
PHMC	PA HISTORICAL AND MUSEUM COMMISSION
PNDI	PENNSYLVANIA NATURAL DIVERSITY INVENTORY
POA	POINT OF ACCESS
PS&E	PLANS, SPECIFICATIONS AND ESTIMATE
ROW	RIGHT OF WAY
RSGER	RECONNAISSANCE SOILS AND GEOLOGICAL ENGINEERING REPORT
SEPS	SUBSURFACE EXPLORATION PLANNING SUBMISSION
SFV	SCOPE AND FIELD VIEW
SHPO	STATE HISTORIC PRESERVATION OFFICE
SPMP	SIGNING AND PAVEMENT MARKING PLAN
SUE	SUBSURFACE UTILITY ENGINEERING
T&E	THREATENED AND ENDANGERED SPECIES COORDINATION
TCP	TRAFFIC CONTROL PLAN
TIF	TECHNICALLY INFEASIBILITY FORM
TS&L	TYPE, SIZE AND LOCATION
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE

TOTAL VEHICLE TRAFFIC



TOTAL TRUCK TRAFFIC

Planning for the Future of Lehigh and Northampton Counties at 961 Marcon Blvd., Ste 310, Allentown, PA 18109 ■ (610) 264-4544 ■ lvpc@lvpc.org ■ www.lvpc.org

March 2024 Traffic Monitoring Report Memorandum

To: Lehigh Valley Planning Commission
Lehigh Valley Transportation Study

From: Brian Hite, Transportation Planner

The Lehigh Valley Planning Commission (LVPC) staff conducts approximately 100 traffic counts per year under contract with the Pennsylvania Department of Transportation. Additionally, PennDOT has installed and maintains several continuous traffic monitoring stations across the Lehigh Valley that are permanent at their location and collect data 24 hours a day all year long.

Since the beginning of the COVID-19 pandemic, in March of 2020, the LVPC staff has been reporting on a monthly basis the fluctuations in traffic volumes as a result of the pandemic and in the past year the recovery back to the “new normal” of traffic volumes at our continuous counters.

The attached graphic illustrates the last Tuesday of the month traffic volumes for overall vehicles as well as a graphic the shows the larger vehicles classified as “trucks”. Because automatic vehicle traffic counters have difficulty distinguishing from large pickup trucks and SUVs, these two types of vehicles may be combined into the passenger vehicle category depending on the characteristics. We generally distinguish between passenger vehicles and commercial vehicles by identifying vehicles over 1 ton in license registration as commercial.

In February 2024 there were three continuous traffic counters in operation providing the following data:

- Route 22 between Airport Road and the Lehigh River Bridge in Hanover Township
  - 100,947 vehicles with 13,253 of those being trucks
- Interstate 78 between Route 309 and the Lehigh and Northampton County boundary line in Upper Saucon Township and Lower Saucon township
  - 73,654 vehicles with 22,213 of those being trucks
- Route 309 just North of Coopersburg and South of East Passer Road in Upper Saucon Township
  - 36,654 vehicles (*this location is unable to identify types of vehicles*)

The following two continuous counters are currently out of service for maintenance repairs or due to construction of the roadway:

- Route 33 South of Route 248 and North of Newburg Road in Lower Nazareth Township
- Interstate 78 between Route 33 and Morgan Hill Road, the last exit in Pennsylvania East bound in Williams Township

For the March 2024 Traffic Monitoring Report, the LVPC staff is also providing traffic count data recorded in 2023 at select regional traffic count locations of short-term durations utilizing mobile traffic counters conducted by the LVPC staff in coordination with PennDOT, contracted PennDOT vendors. Also included is data provided by the Delaware River Joint Toll Bridge Commission (DRJTBC) and the Pennsylvania Turnpike Commission.

There are different data collection methods and reporting timeframes for data by the various agencies, such of the Pennsylvania Turnpike providing data on a monthly basis, DRJTBC provides yearly data and PennDOT with the LVPC staff providing average annual daily traffic data.

Average Annual Daily Traffic by the LVPC / PennDOT:

- Interstate 78 between Adams Road at Route 100 in Upper Macungie Township
  - 52,361 total vehicles per day (32,753 cars – 19,608 trucks)
- Interstate 78 between Route 22 and Route 309 in Upper Macungie Township
  - 39,528 total vehicles per day (26,653 cars – 12,875 trucks)
- Interstate 78 between Route 412 and Route 33 in Lower Saucon Township
  - 68,815 total vehicles per day (51,246 cars – 17,569 trucks)
- Route 33 between the Tatamy exit and Route 191 in Stockertown Borough
  - 80,583 total vehicles per day (71,168 cars – 9,415 trucks)
- Route 378 between 8th Avenue and Schoenersville Road in Bethlehem City
  - 45,081 total vehicles per day (42,991 cars – 2,090 trucks)
- Route 222 between Krocks Road and Interstate 78 in Lower Macungie Township
  - 50,767 total vehicles per day (47, 405 cars – 6,362 trucks)

2023 Overall Yearly Traffic by the DRJTBC:

- Interstate 78 Bridge over the Delaware River in Williams Township
  - 11,010,667 total vehicles (7,771,357 cars – 3,239,310 trucks)
- Route 22 Easton – Phillipsburg Bridge in Easton City
  - 5,390,745 total vehicles (5,027,583 cars – 363,162 trucks)
- Northampton Street “Free Bridge” in Easton City
  - 4,998,463 total vehicles *(this location is unable to identify types of vehicles)*
- Route 611 Portland – Columbia Bridge in Portland Borough
  - 1,348,390 total vehicles (1,248.836 cars – 135,554 trucks)

December 2023 overall traffic by the Pennsylvania Turnpike Commission:

- Interstate 476 (Pennsylvania Turnpike Northeast Extension) in South Whitehall Township
  - Exiting Interstate 476 to Route 22
    - Ø 548,883 total vehicles (423,734 cars – 125,149 trucks)
  - Entering Interstate 476 from Route 22 and Tilghman Street
    - Ø 560,586 total vehicles (429,241 cars – 125,149 trucks)