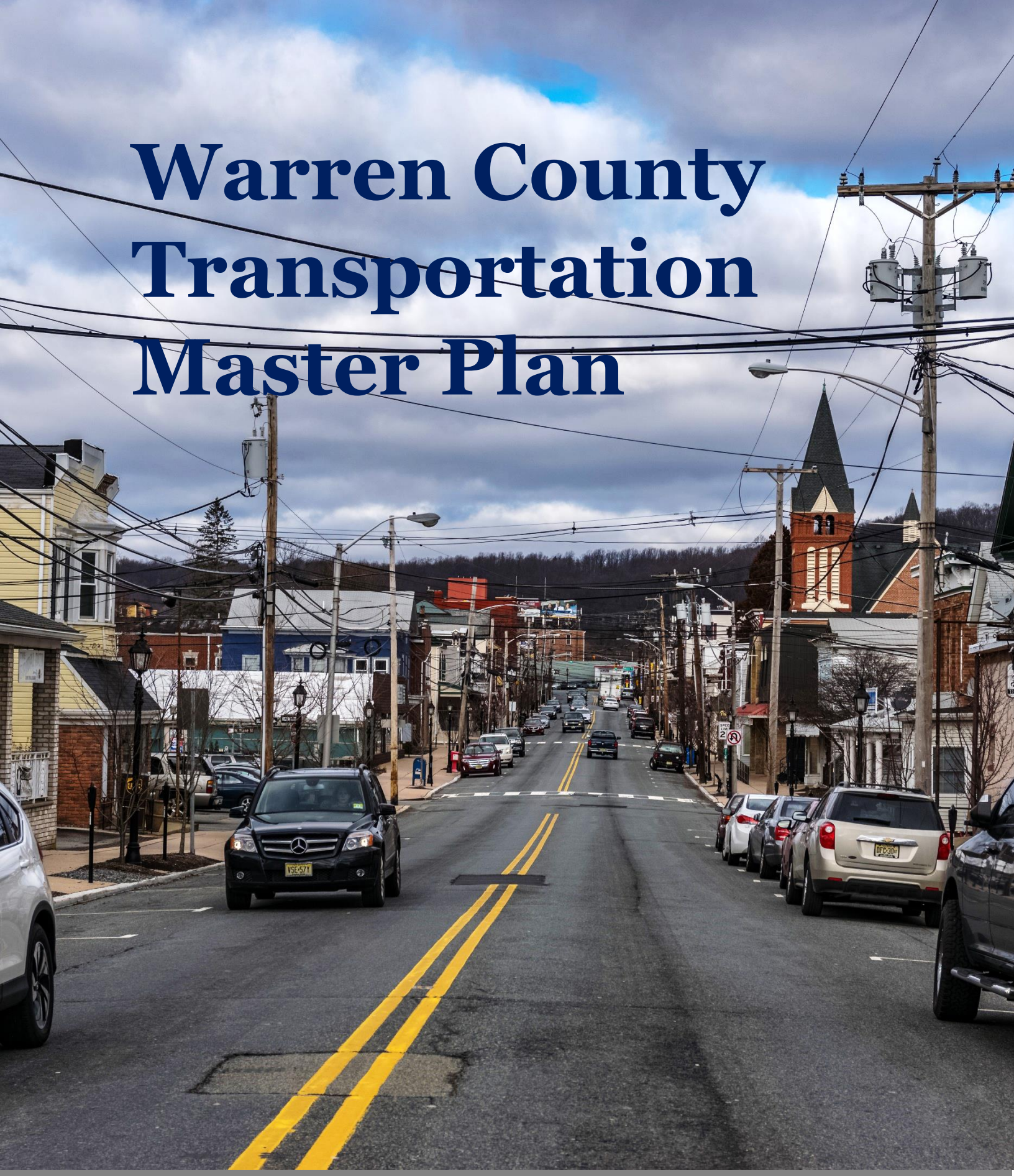
Warren County Transportation Master Plan



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Disclaimer

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Abstract

The Warren County Transportation Plan helps provide a vision for the County's future. The Plan was completed by reviewing previous studies and recommendations, analyzing existing conditions, and conducting a scenario planning process utilizing population, employment, and industrial land use development projects. The scenario planning process evaluated several future development patterns for the County, leading to the development of infrastructure and policy recommendations.

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Acknowledgments

2021

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Warren County Municipalities

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Alpha Borough

Belvidere Town

Blairstown Township

Franklin Township

Frelinghuysen Township

Greenwich Township

Hackettstown

Hardwick Township

Harmony Township

Hope Township

Independence Township

Knowlton Township

Liberty Township

Lopatcong Township

Mansfield Township

Oxford Township

Phillipsburg Town

Pohatcong Township

Washington Borough

Washington Township

White Township

Executive Summary

The Warren County Transportation Plan forges a vision for the County's transportation network through 2045. The plan identifies areas of concern and provides recommendations and a phased implementation plan to address transportation needs, overcome challenges, and leverage opportunities across a broad range of projects, policies, and strategies. This study utilized a scenario planning process projecting the impact of alternative future development patterns on the County's roadway network. Several development options were evaluated, including targeting residential development into existing centers to maximize non-motorized transportation trips and mitigate future traffic congestion. The traffic impacts of such development could be mitigated by the targeted widening of portions of CR 519, CR 620 and CR 646 in addition to the expansion of shuttle services to connect Belvidere, Phillipsburg, Alpha, and Washington Borough with growing employment centers. Additional original and adapted transportation recommendations were made to help guide the County's future including addressing safety concerns at priority intersections, adopting a Complete Streets policy, and implementing a network of on-road and off-road bicycle facilities.

This transportation plan represents an official update to the County's 1982 Transportation Plan and 2018 Transportation Technical Study. A thorough review of existing conditions was conducted including inventorying and evaluating the County's roadways, traffic volumes, safety data, public transit services, airports, freight infrastructure and cycling/biking (the two terms are used interchangeably throughout this document) and walking conditions. Dozens of previous studies were reviewed and summarized. Public outreach and stakeholder engagement were conducted throughout the study through a website, virtual public meetings and focus groups, and the use of a Steering Advisory Committee that guided the process.

Spurred by analysis and results of the 2020 *Warren County Light Industrial Site Assessment*, a detailed analysis of traffic and volume data was utilized to develop and refine several scenarios projected to the year 2045, incorporating potential light industrial sites. The scenario planning process revealed the opportunity for alternative development patterns including focusing growth in more developed centers and the need for multimodal corridor and intersection measures to mitigate the impact of expected light industrial development on the roadway network.

After reviewing existing conditions, previous studies, and the traffic and land use modeling scenarios, recommendations were developed addressing needs concerning roadways and bridges, walking, biking and trails, public transportation, goods movement, and gateways. Additionally, several policy recommendations, including opportunities for further study and funding, are provided to help facilitate the implementation of infrastructure improvements. With these data sources and recommendations, Warren County is well positioned to consider future land use, transportation, and infrastructure decisions and pursue funding for implementation and further studies.

1.Introduction

This long-range transportation plan will forge a vision for the future of the County's transportation network through 2045. The plan identifies areas of concern and provides recommendations and a phased implementation plan to address transportation needs, overcome challenges, and leverage opportunities across a broad range of projects, policies, and strategies. In partnership with the North Jersey Transportation Planning Authority (NJTPA), this document investigates existing conditions, projected conditions through 2045, and engineering, enforcement, policy, and coordination recommendations featuring a cohesive implementation strategy. This document represents a substantial update from the County's previous transportation plan released in 1982, recognizing the changing trends and issues impacting people living and working in Warren County.

CR 624 (Belvidere Avenue), Oxford Township

Previous Studies

Since the 1982 Plan, several transportation and land use documents have been completed, reflecting the continuation and introduction of transportation issues affecting Warren County. A thorough review of relevant previous studies is provided in Technical Memo 2.1 in Appendix B with several key studies listed in the following pages.

A comprehensive list of previous studies reviewed is shown in Table 1 with the Summarized column indicating inclusion on the following pages. Most were published since the 2018 Transportation Technical Study; earlier studies were reviewed as part of the 2018 documentation. The studies summarized on the following pages are those that focused on Warren County as a whole rather than individual communities or corridors. As part of the previous study review process, recommendations from each of these studies and its implementation status were compiled to be provided to the County for future use.

Table 1: Studies Reviewed

Title	Year	Lead Jurisdiction	Summarized
Warren County Transportation Plan	1982	County	X
Liberty Township Master Plan	2003	Municipality	
Warren County Smart Growth Plan-Transportation Technical Study	2004	County	X
Knowlton Township Master Plan Reexamination Report	2009	Municipality	
Washington Borough Downtown Redevelopment Plan	2009	Municipality	
Phillipsburg Walkable Community Workshop Report	2010	MPO	
Morris/Warren County Rail Corridor Study	2013	MPO	
Phillipsburg Master Plan Reexamination Report	2013	Municipality	
New Jersey Statewide Freight Plan	2017	NJDOT	
Plan 2045: Connecting North Jersey	2017	MPO	X
Hackettstown Master Plan Reexamination Report	2018	Municipality	
Mansfield Township Master Plan Reexamination Report	2018	Municipality	
Morris Canal Greenway Corridor Study	2018	MPO	
Warren County Transportation Technical Study Update	2018	County	X
Freight Rail Industrial Opportunities Corridors Program	2019	MPO	
Oxford Township Active Transportation Plan	2019	Municipality	
White Township Proposed Master Plan Amendment	2019	Municipality	
Warren County Light Industrial Site Assessment	2020	County	X
2040 Freight Industry Level Forecasts	2020	MPO	

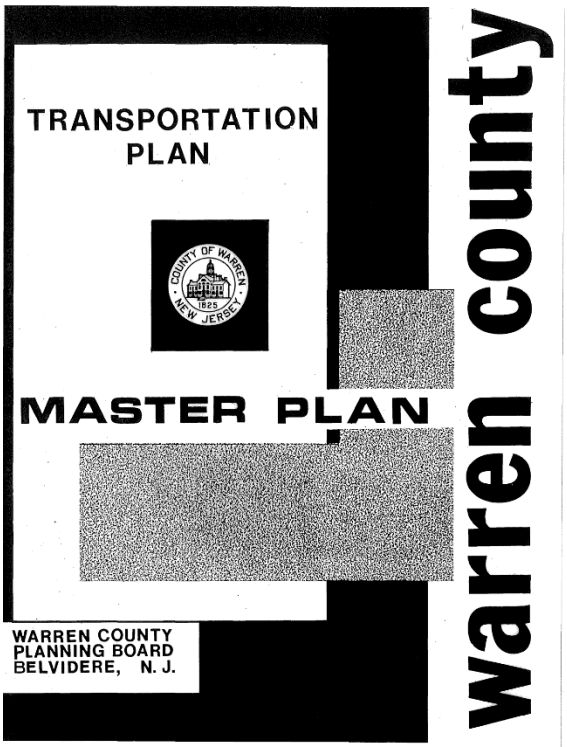
Warren County Transportation Plan (1982)

The 1982 Warren County Transportation Plan provided an orderly and timely plan for coordinated development of different transportation modes and identified deficiencies in existing modes. Through the plan, the County Planning Board adopted the following 11 high-level goals and objectives (each with several sub-goals) for maintaining existing infrastructure and expanding network opportunities where feasible. Each of these goals has influenced the subsequently undertaken studies.

- Promote and maintain a highway system which provides for efficient movement of people and goods within and through the County
- Upgrade and maintain the traffic safety characteristics of the County Road System
- Encourage the use of Federal and State funding for all major roadway improvements
- Coordinate improvements to existing facilities
- Include environmental concerns in the transportation planning process
- Monitor growth and development patterns and adjust the transportation plan as required to accommodate unanticipated changes
- Continue to update and add to the Warren County Highway Inventory
- Maintain present level of service
- Improve commuter rail and bus service
- Expand the availability and type of transportation systems for all residents
- Increase public participation in the overall transportation planning process for the County by creating a County Transportation Committee

Warren County Smart Growth Plan-Transportation Technical Study (2004)

The 2004 Warren County Transportation Technical Study provided a key step in the development of the Warren County Smart Growth Plan. This study developed a land use and transportation model to test the impacts of land use decisions on the roadway network and predict future traffic levels. Existing zoning was compared with a centers-based land use scenario in which development was focused in three regional centers, and 22 local centers. The model determined a 35 percent reduction in vehicle miles traveled in the centers-based approach compared to future no-build conditions. Recommendations to preserve the transportation network's capacity and efficiency include restoring or extending passenger rail service along three corridors in the County, assessing fees related to the burden of future development on the transportation system, and improving site design and access management.



1982 Transportation Plan

Plan 2045: Connecting North Jersey (2017)

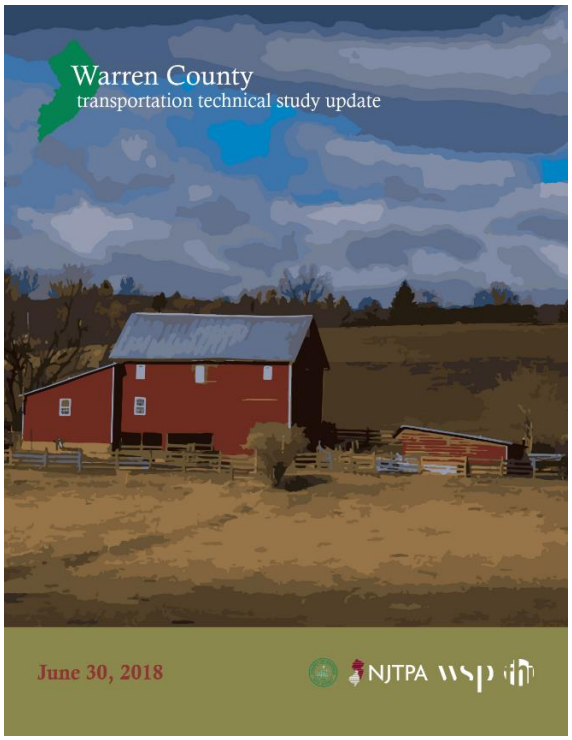
NJTPA's Long Range Transportation Plan *Plan 2045: Connecting North Jersey*, completed in 2017, aims to lay out a plan for transportation infrastructure improvements for the next 25+ years. Goals of the plan's initiatives include:

- Protect and improve natural ecosystems, the built environment and quality of life
- Provide affordable, accessible and dynamic transportation systems responsive to all current and future travelers
- Retain and increase economic activity and competitiveness
- Enhance system coordination, efficiency, overall safety and connectivity for people and goods across all modes of travel
- Maintain a safe, secure and reliable transportation system in a state of good repair
- Create great places through select transportation investments supporting the coordination of land use with transportation systems
- Improve overall system safety, reducing serious injuries and fatalities for all travelers on all modes

Demographic, transportation, and technology trends impacting the NJTPA region were identified. Specific trends most affecting Warren County include an aging population, long commute times, and limited bus and rail service. After reviewing these trends, the plan details a performance-based funding scenario and a set of nine Regional Capital Investment Strategy principles to guide project funding going forward. These principles include moving freight more efficiently, supporting walking and biking, managing crash incidents and applying transportation technology. Twenty-nine near and mid-term road, highway, and transit projects within Warren County are also included in the Project Index.

Warren County Transportation Technical Study Update (2018)

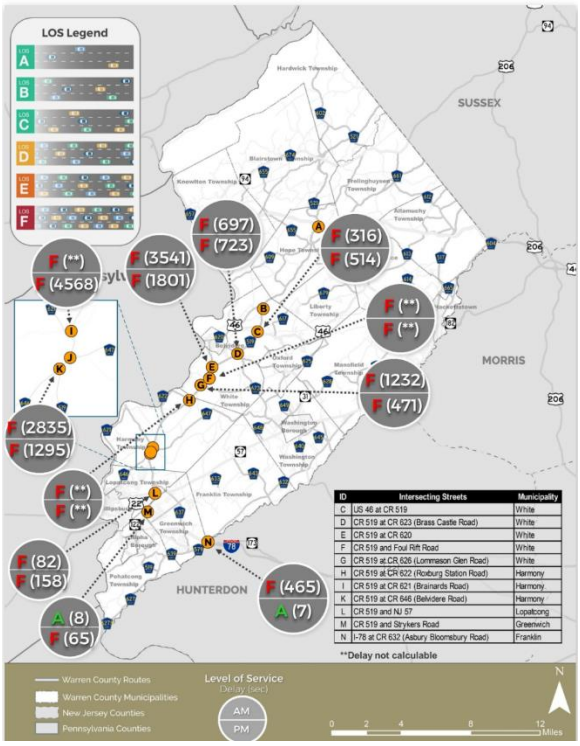
The 2018 Warren County Transportation Technical Study represents the first phase of updating the 2004 transportation plan element of Warren County's Master Plan. This phase involved gathering data, defining methodologies, evaluating existing conditions, and establishing goals and priorities. A review of transportation and demographic trends found a significant increase in the non-white, Hispanic, and foreign-born communities, and a need for more robust, accessible, and affordable mobility options. The study concludes with the recommendation of three alternative future scenarios for testing using NJTPA's travel demand model and comparing it to baseline conditions using a 2045 build year in a subsequent study phase. The future alternative scenarios form the basis of the scenario analysis in the Warren County Transportation Plan.



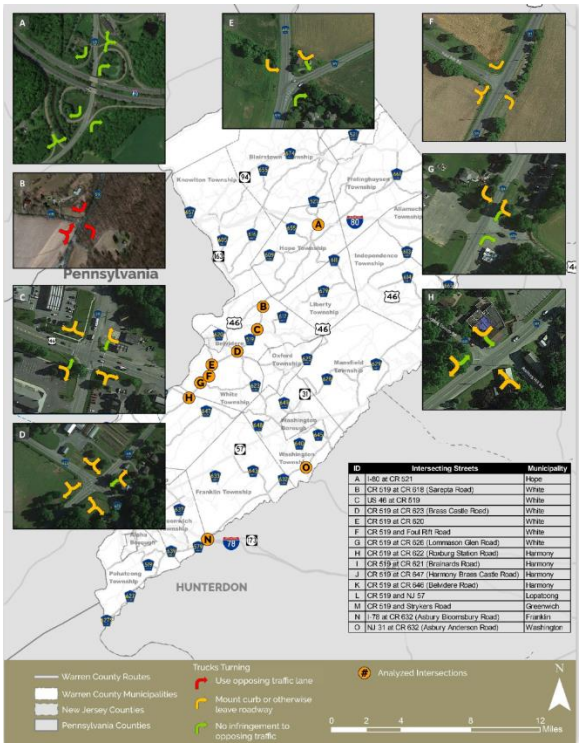
2018 Transportation Technical Study Update

Warren County Light Industrial Site Assessment (2020)

The recently completed *Warren County Light Industrial Site Assessment* was completed in 2020 to understand the potential long-term impact of warehousing and distribution development in the County. Based on the location of existing clusters of parcels zoned for industrial uses, 15 sites were selected for analysis. The 2045 No-Build and Build condition traffic volumes were extrapolated from existing volumes to determine the impact of industrial development on the roadway network and at select intersections. Under build conditions, nearly every intersection analyzed was projected to operate with a Level of Service F. Potential measures necessary to mitigate the impacted intersections were identified, including restriping of lanes at intersections to facilitate turns, installing traffic signals, and pushing back stop bars. To maintain an acceptable level of service under the analyzed build-out condition, the study found that CR 519 would also need to be widened to two lanes in each direction. Several transportation demand management approaches were also identified to mitigate traffic impacts, including staggering worker shifts at industrial sites and increasing the use of freight rail for goods movement where possible to reduce roadway freight volumes.



Build 2045 Intersection Level of Service from 2020 Light Industrial Site Assessment



Turning Radii Assessment from 2020 Light Industrial Site Assessment

Demographic Trends

From reviewing existing conditions and data, several trends are prominent in Warren County. These trends have been identified in previous regional, county and municipal plans and help recognize the changing nature of the County's transportation needs, land use, and people. The following introduces each of these trends, which have been considered throughout the study and were influential in formulating recommendations.

Warren County continues to be a mainly rural county with several low-to-mid density towns and boroughs located throughout. Most residents rely on single-occupant motor vehicles for mobility with minimal County shuttle service available and only one NJ TRANSIT train station (Hackettstown). Despite the high automobile use, a portion of residents throughout the County rely on public transit due to affordability issues, mobility constraints or personal preference. The densely populated communities (greater than 1,000 residents per square mile) of Phillipsburg, Washington Borough, Hackettstown, Belvidere, Alpha and Lopatcong are home to 40 percent of the County's population.

NJ 57 (East Washington Avenue), Washington Borough

As presented in the 2018 Transportation Technical Study, the demographic projections developed for the 2004 Warren County Strategic Growth Plan anticipated a continuation of the county's historic population growth rate of approximately 1 percent per year and forecast that Warren County would maintain this robust population growth rate through at least 2030. Based on official U.S. Census data, from 1830 to 2000 the Warren County population grew at an average rate of 1.01 percent per year.

The resulting land use and traffic forecasts based on this historic annual average growth rate included significant levels of new development, population, and employment growth over the Plan's 25-year time frame, and the travel demand models developed using these forecasts projected a severe worsening in traffic congestion and mobility. This finding led to the recommendation of a comprehensive centers-based program of smart growth land use strategies and transportation demand measures to mitigate the projected worsening of traffic congestion, based on the anticipated continuation of the 1.01 percent per year historic population growth rate.

What happened instead was a significant and unanticipated slowing of population growth in the mid-2000s followed by a small decline in total county population, which has persisted through to the current 2020 U.S. Census estimates.

Therefore, in contrast to 2005 Strategic Growth Plan projections, the post-2005 U.S. Census and approved NJTPA projections present a remarkably different and much more restrained assessment of current and future growth in Warren County.

According to these more recent data and projections, Warren County population actually grew at a much slower rate — from 102,437 in 2000 to 108,692 in 2010 (about 6.1 percent overall, or about 0.59 percent per year) — and the current 2020 U.S. Census estimate is 107,099, a small decrease of 1.5 percent compared to 2010), or about -0.15 percent per year for the decade.

So, compared to the 1.01 percent per year historic population growth rate, the 2000-2020 period experienced an annual growth rate of just 0.22 percent per year. **Error! Reference source not found.** provides decennial population counts for each municipality.

Suburban Street in Warren County

At the same time, the county, surrounding region, and nation have experienced an increased demand for freight due to greater availability and affordability of goods, as well as increases in online shopping in recent years that was accelerated by social distancing measures during the COVID-19 pandemic, a topic elaborated upon later in this document. The presence of Interstates 78 and 80 represent key regional linkages for freight within the county, increasing demand for distribution, warehousing and other freight-generating sites, as identified in the 2020 Warren County Light Industrial Site Assessment.

Since completion of the Transportation Technical Study, an unanticipated series of light industry development projects have been proposed in Warren County (including conventional warehousing and e-commerce uses of various sizes and types), with several currently advancing through review with municipal land use boards. These contrasting trends of a much lower population growth rate and a much higher than anticipated growth in employment frame the development and assessment of the scenario planning process for the Warren County Transportation Plan (WCTP). If approved, these new light industry projects could have a significant impact on Warren County's future and how it should prepare though specific planning and policy initiatives, and transportation improvements. Thoughtful consideration should be given to where this growth should be located, and if there is adequate infrastructure in place to support it.

Equity Assessment

Several socioeconomic and demographic indicators were reviewed at the census tract level within Warren County as part of an equity assessment to ensure all people are treated fairly and are meaningfully involved in the transportation planning process, and the development and implementation of a project regardless of race, color, origin, or income. Concern that a minority and/or low-income population might disproportionately bear potential adverse environmental or health impacts from a project led to the issuance of Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 makes environmental justice a core mission of projects funded by Federal agencies. This Executive Order builds on and expands Title VI, (42 U.S.C. § 2000d et seq.), that was enacted as part of the landmark Civil Rights Act of 1964. It prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance.

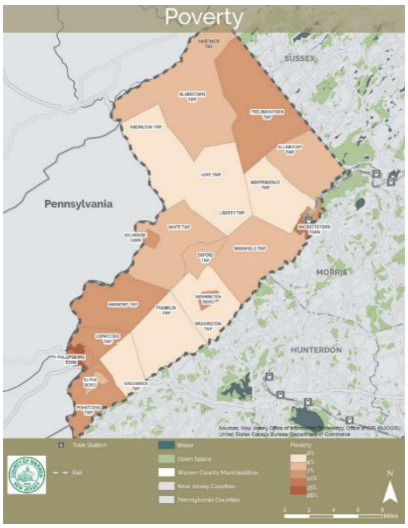
For the WCTP, the equity assessment focused on the following indicators:

1. Poverty
2. Racial Minorities
3. Limited English Proficiency
4. National Origin
5. Auto Accessibility
6. Disabilities
7. Age

Several of these variables were also reviewed for Warren County's 2018 Transportation Technical Study. Where applicable, comparisons to the data were made. Data for the 2018 study was gathered from the Environmental Protection Agency's Environmental Justice (EJ) Screening tool, whereas more recent data was gathered directly from the U.S. Census. The identification of vulnerable populations has assisted with the public outreach process in assuring all communities are heard.

Warren County has a significantly lower portion of the population living in poverty, being a racial minority, having limited English proficiency, having been born outside of the United States, and lacking automobile access than state and national figures, and a similar rate of residents with disabilities, according to Census data. Despite these lower comparative rates of vulnerable populations, significant proportions of vulnerable populations were mainly found in Hackettstown and Phillipsburg.

A more detailed analysis of each of the equity indicators is provided in Technical Memo 2.2 in Appendix B.



Map of poverty by Census Tract from Technical Memo 2.2

Other Issues

COVID-19

The development of this Transportation Master Plan update was undertaken during the COVID-19 pandemic. During the final months of the document's writing, several vaccines were available and a large portion of New Jersey residents were eligible to receive them. Despite rapid progress in vaccine development, the operation of the transportation network remains and may remain altered compared to pre-COVID levels. In addition to impacting how public outreach was conducted during the document's development, the pandemic will likely have lasting changes to transportation patterns and land use. There is an endless array of possible changes but some of the most feasible changes impacting issues pertinent to this Transportation Master Plan include:

- decreased demand for daily in-person commuting
- changes to the way public transit is funded and/or operated
- increased interest in living in rural areas (such as Warren County)
- increased importance on public spaces and walking and biking to access such spaces
- increased demand for next day shipping of goods to residences and a consequential decreased demand for brick and mortar stores

Telecommuting increased during the pandemic and is expected to continue, following an already existing trend for office workers. This would impact traffic flows and volumes while decreasing congestion. This may be offset by the expected growth in warehousing and logistics in the County, as those jobs generally require employees in person at each site.

I-80 Curve and Rockfall Mitigation Project

The site with the most comments received from the project's interactive mapping site concerned the curve of Interstate 80 in Knowlton and Hardwick Township near the exit for Dunnfield Creek, the Appalachian Trail, and Kittatinny Point Visitor Center. The comments generally concerned the high traffic volumes and speeds, particularly of trucks, navigating around the "s-curve" as well as opposition to proposals to blast the rock and install fencing and a retaining wall up to 60 feet high against the adjacent rockface. In addition to how the project would compromise the scenic beauty of this national landmark, the traffic congestion on the highway and caused by detouring traffic through the villages of Columbia, NJ, Portland, Pa, and Delaware Water Gap, Pa that could result during construction and the extremely high costs are the prime concerns.

A problem statement concerning the location was submitted to the New Jersey Department of Transportation (NJDOT) in December 2020, specifically citing issues with the "s-curve" and on- and off-ramps that are inadequate for the amount of traffic. A 2011 NJDOT study, the *I-80 Rockfall Mitigation Concept Development Report,* identified deficiencies in the roadway's curve radius, shoulder width and stopping sight distance resulting in increased risks of rear-end, fixed object and sideswipe crashes, increased possibilities for disabled vehicles to hinder traffic flow and obstructing the passage of emergency responders. Additionally, the seven on- and off-ramps from I-80 in this area do not meet current standards for acceleration and deceleration lanes. Resolutions from the following municipalities in New Jersey and Pennsylvania have been passed in support of resolving these issues:

- Hardwick Township (NJ)
- Knowlton Township (NJ)
- Delaware Water Gap Borough (PA)
- Lower Mount Bethel Township (PA)
- Pen Argyl Borough (PA)
- Plainfield Township (PA)
- Portland Borough (PA)
- Upper Mount Bethel Township (PA)

Additionally, the Warren County Board of County Commissioners passed a resolution encouraging study and resolution of the issue.

Graphic from NJDOT Problem Statement Identifying Design Deficiencies

Graphic from NJDOT Problem Statement Identifying Substandard Ramps

Autonomous Vehicles

Autonomous vehicles (AVs) have become a popular discussion topic in the urban planning, transportation, and technology worlds. The potential impacts of widespread AV use and government and private sector responses are nearly limitless. While there have been great strides in AVs over the past decade, going forward, AVs are expected to first rollout on high-speed, limited-access roadways such as interstate highways. Roadways with less consistent cross-sections, hilly terrain and more prevalent visual intrusions (such as nearby buildings, bus stops, etc.) are not expected to accommodate frequent AV usage for several decades. Additionally, areas with less precipitation – particularly lack of snow – are more likely to be early adopters of AVs due to the difficulty AV technology has in reacting to inclement weather. Taking all this into consideration, AVs are unlikely to have a significant impact on traffic circulation or land development in Warren County over the next 10 years. The first use of AVs in Warren County is likely to occur on one of the two interstates crossing the County. Nevertheless, it is helpful to be aware of how AVs may function in the future.

All modern automobiles operate with some level of autonomy such as cruise control, steering assistance, and in some cars, the ability to self-park. Similar to the rollout of these features over recent decades, the features of AVs are likely to occur gradually. These are described using five levels of automation, with Level 1 providing driver assistance through cruise control and Level 5 requiring zero human intervention. Vehicles with steering assistance fall into Level 2, while Level 3 is when the vehicle can perform most driving tasks without human involvement.

Potential impacts of widespread AV usage include a sharp reduction in traffic fatalities, greater demand for drop-off/pick-up areas, and less demand for public transportation. Traffic fatalities would decrease due to the numerous safety automated safety precautions included in AVs. Public transportation demand could decrease due to the relative ease and affordability of AV's and ability to multi-task while traveling. The need for residential parking garages and on-street parking may also be reduced, depending on the ownership mix that accompanies AVs (which is yet to be determined but could range from mostly privately owned to predominately shared ride services). A system primarily composed of shared ride services could result in the ability for AV's to be more efficiently used, traveling to pick-up other passengers rather than stay parked in a lot/garage for extended periods of time. The ease of commuting by AV may also encourage longer commutes.

While AVs are not expected to have a dramatic impact on Warren County for several decades, it is helpful to recognize and be cognizant of the broader trends in technology, which will eventually impact the County, as part of supporting this plan's goal to "monitor and incorporate technological trends and innovations in transportation projects and strategies."

Planning Process

Public engagement is essential for assuring all voices are heard and that recommendations meet the needs of stakeholders. Public engagement for the Warren County Transportation Plan took a variety of forms to allow for maximum involvement throughout the process for a variety of stakeholder groups. Additionally, throughout the process, it was important to maintain engagement with traditionally underserved communities, including minority, low-income, and limited English proficiency populations. Publicity materials were translated into Spanish to promote accessibility and comply with the Americans with Disabilities Act and federal Limited English Proficiency guidelines.

The Warren County Transportation Plan team also maintained a contact list including, but not limited to, government agencies and organizations, local elected officials, neighborhood groups, interested individuals, civic organizations, private transportation providers, environmental justice organizations, and community service groups. The contact list was employed to notify interested stakeholders about opportunities to get involved in the WCTP.

Due to the uncertainty surrounding the COVID-19 pandemic and social distancing policies, public outreach was mainly conducted online.

The study's overall public involvement process aimed to respond to three goals:

- **Engage people in every way possible.** Warren County residents are most likely to support a plan they helped shape from the start. Stakeholders in Warren County had various opportunities to provide their input and work with the WCTP team to develop a plan with relevant and attainable goals per the study's scope.
- **Seeing is believing.** The public outreach approach offered many opportunities for input from, and dialogue with, the community. The Plan team actively listened to comments, suggestions, and feedback to ensure all stakeholders had a voice.
- **Reach as much of the community as possible.** By interacting with countywide interest groups, the team was able to reach as many stakeholders as possible and incorporate their comments and suggestions into the final plan recommendations.

Methods and Tools

The Plan team implemented a comprehensive public engagement program in the development of the WCTP. Complete materials, including presentations, meeting notes, website text, and outreach results are provided in Appendix C. Outreach techniques and methods used include:

Website

The team launched an interactive website (WCTransportationPlan.com) as a conduit for dissemination and gathering information during the Plan's development. The website provided the following information:

- Home page with a video overview of the planning process
- Listening session information with access to event information
- Interactive exercises page with active links to the WikiMap and pre-recorded interactive video presentation
- Library page with access to related outreach materials and resources from previous studies
- Contact information for WCTP staff, which allowed visitors to submit inquiries about the plan via email comment form and telephone

Steering Advisory Committee (SAC)

The SAC provided invaluable guidance for the overall direction and development of the Plan. Warren County identified SAC members including a mix of local, state, and regional stakeholders as well as community and advocacy groups. Three virtual SAC meetings were held in June and December of 2020, and April 2021. The SAC provided input through the plan development by identifying key areas of concern and commenting on Plan recommendations.

Virtual Focus Groups

Three focus groups were conducted during June and July 2020. The focus groups were conducted via a virtual platform allowing participants to use video. Each focus group was concentrated on a specific topic: freight, public transit, and cyclists/pedestrians. Warren County staff selected participants who represented a diverse group of stakeholders including operators, residents, people with disabilities, non-profit organizations, and County and municipal staff and representatives.

Municipal Meeting

A meeting was held in August 2020 to introduce municipal officials to the transportation plan process and obtained initial feedback about areas of concern, and where improvements are needed, for roads, public transportation, and cyclists and pedestrians. The municipal group identified 10 intersections and corridors with safety and congestion concerns.

WikiMap

An interactive mapping tool, using a website called WikiMap, was used to gather feedback on transportation areas of concern within Warren County from June 22 through August 31, 2020. Participants were able to add place-based comments onto the map as well as reply to other users' comments. Participants could zoom in and out of the map to place points or lines to identify specific transportation concerns and opportunities within Warren County. This interactive exercise was designed to engage diverse groups of people throughout the County. More than 360 comments were collected from the WikiMap. More detailed WikiMap data and results can be found in Technical Memo 2.3 in Appendix B.

Pre-recorded Virtual Public Workshops

The team held a pre-recorded interactive virtual workshop from February 17 to March 19, 2021. An on-demand video presentation was developed to allow stakeholders to participate at their own pace at any time of day. This interactive meeting consisted of a 20-minute narrated presentation. The

presentation paused at several points and launched interactive activities prompting participants to share comments and provide input on what was viewed and encouraged them to visit the project's website. More than 60 people participated in the interactive exercises.

Listening Session

Following the virtual workshop, a one-hour listening session was held on March 9, 2021 to allow the public to interact with the Plan team. The team provided a short presentation based on the pre-recorded presentation on the study's website. The purpose of this presentation served as a refresher for participants who had seen the pre-recorded presentation. After the presentation concluded, the team answered questions and listened to comments provided by attendees. Stakeholders could attend via phone or computer.

Outreach to Community-Based Partner Organizations

The Plan team collaborated with community-based partner organizations in the County. Warren County identified organizations dedicated to community interaction and cooperation such as non-government organizations, community organizations, and economic development corporations. These groups were engaged by phone and email to let them know that the transportation plan was underway and encourage them to explain to members the importance of getting involved in the planning process. Community leaders can serve as trusted advocates to ensure members have a voice in the process. Follow-up outreach to these organizations informed them of upcoming listening sessions and provided publicity for those events.

Publicity Materials

The following tools were used to raise awareness about the Plan with the public:

- Advertisements in local newspaper
- Press releases
- Social media through established Warren County channels
- Email e-blast announcements in coordination with other transportation-focused agencies
- A three-minute introductory video explaining the study's planning process

2. Goals and Visioning Process

The Warren County Transportation Plan identifies recommendations and a phased implementation plan to address transportation needs in an equitable manner, overcoming challenges and barriers to advancement, and leveraging opportunities across a broad range of projects, policies, and strategies.

Transportation-related decision making for Warren County is guided by a series of goals and a vision statement.

The goals and vision were developed through a collaborative process that included the SAC, Warren County Planning and Engineering Departments, the NJTPA, and both public engagement and stakeholder outreach efforts. Guidance from this collaborative engagement process noted that the goals and vision should be:

- Unique to transportation
- Reflect both current and historic priorities and needs
- Emphasize preservation of Warren County's rural and scenic qualities
- Incorporate emerging issues, technologies, and challenges
- Use a multimodal approach to mobility and accessibility, and
- Prioritize equity, safety, resilience, and access to opportunity

Development and formulation of the goals and vision also drew upon several local and countywide plans and studies including:

- Warren County Master Plan (1982)
- Strategic Growth Plan (2005)
- Several iterations of the Transportation Technical Study (2004, 2007, and 2018)
- Review of the 22 municipal master plans and circulation elements

U.S. 46 (Main Street), Hackettstown

Goals

Guidance from the engagement process and previous studies resulted in the development of the following goals:

1. Provide transportation infrastructure that is consistent with Warren County's rural character
2. Focus growth and infrastructure in existing centers
3. Minimize and mitigate environmental and stormwater impacts of transportation infrastructure
4. Maintain and improve the existing transportation system
5. Provide multimodal transportation choices that improve safety, mobility, and equity
6. Improve the resiliency of Warren County's transportation infrastructure
7. Improve access to education and employment opportunities
8. Promote cooperation and participation to advance mutual interests
9. Encourage state enabling legislation to provide municipalities and counties more authority over the impacts of traffic on their roadways from new development
10. Monitor and incorporate technological trends and innovations in transportation projects and strategies

Vision Statement

Feedback through the engagement process, review of previous studies and development of the plan's goal resulted in the following vision statement:

Warren County is noted for its scenic rural landscapes, prized farmlands, natural and historic assets, and desirable quality of life. The Warren County Transportations Plan is a collaborative and cooperative effort to preserve and enhance these qualities and provide multimodal transportation choices that improve safety and mobility, and create a more equitable, sustainable, and resilient future.

Based on this process, and in addition to development of the goals and vision, it is recommended that each of the municipal master plans and circulation elements should be refreshed in a similar manner to reflect both current and historic priorities; prepare for emerging trends, needs, and priorities; and develop local transportation networks that are comprehensive, multimodal, safe, and equitable.

More detailed information about the Goals and Vision Statement is provided in Technical Memo 1 in the Appendix B.

Oxford Central School, Oxford Township

3. Existing Conditions

A variety of data sources were gathered, reviewed, and analyzed for inclusion in the Warren County Transportation Plan. These sources provide an understanding of the overall transportation and demographic conditions of the county as well as important distinctions between communities. Together, with the results of the public outreach process, these data sources help identify key focus areas to develop recommendations. More detailed data methodology and results for each of the following existing conditions sections is provided in Technical Memo 2.4 in Appendix B.

U.S. 46, Hackettstown

Roadway Network

Functional Classification

The Federal Highway Administration (FHWA) categorizes all roadways by functional classification. Functional classification is the systematic organization of highways and roadways into classes or groups based upon their intended service function with roadways such as interstate highways serving a different function than local residential streets. Efficient and safe operation of the roadway network requires a complete hierarchy of roads be present to serve all circulation needs in a diversity of land use contexts.

A variety of roadway levels are represented in Warren County. Interstates 78 and 80 allow high-speed, high-volume thru movement to reach higher density metropolitan destinations. Principal arterials such as NJ 57 and NJ 31 provide access between distant towns within the County including Phillipsburg, Washington Borough, and Hackettstown, and beyond while connecting local retail and commercial centers. Minor arterials such as CR 519, and U.S. 46 east of NJ 31 also provide access to regional centers such as Hackettstown and Phillipsburg, connecting to principal arterials and interstates. Major and minor collectors constituting most of the County roadway system provide additional access between the higher functional classification roadways and smaller residential neighborhoods. Table 2 provides a list of county and state routes based on their functional classification. In addition to these routes, many roadways under local jurisdictions fall into these classifications. Several county routes fall under multiple functional classifications, based on the nature and use of the roadway segment. The functional classification for all roadways within the County is mapped in Figure 1.

U.S. 46 (Main Street)., Hackettstown

Functional Class	Description
Interstate	Interstates were designed and constructed with mobility and long-distance travel in mind. The Interstate System provides a superior network of limited access, divided highways offering high levels of mobility while linking the major urban areas of the United States.
Other Freeway/Expressway	Other Freeways/Expressways look similar to Interstates. Travel lanes are usually separated by some type of physical barrier, and their access and egress points are limited to on and off-ramps or a very limited number of at-grade intersections. These roadways are designed and constructed to maximize their mobility function, and abutting land uses are not directly served by them.
Other Principal Arterial	Other Principal Arterials serve major centers of metropolitan areas, providing a high degree of mobility and can also provide mobility through rural areas. Abutting land uses can be served directly.
Minor Arterial	Minor Arterials provide service for trips of moderate length, serve geographic areas that are smaller than their higher Arterial counterparts and offer connectivity to the higher Arterial system. In rural arterials Minor Arterials are typically designed to provide relatively high overall travel speeds, with minimum interference to through movement.
Major Collector	Collectors serve a critical role in the roadway network by gathering traffic from Local Roads and funneling them to the Arterial network. In rural areas, Collectors generally serve primarily intra-country travel and constitute those routes on which predominant travel distances are shorter than on Arterial routes. Consequently, more moderate speeds can be posted.
Minor Collector	
Local Roads	Local roads account for the largest percentage of all roadways in terms of mileage. They are not intended for use in long distance travel, except at the origin or destination of the trip, due to their provision of direct access to abutting land. They are often designed to discourage through traffic.

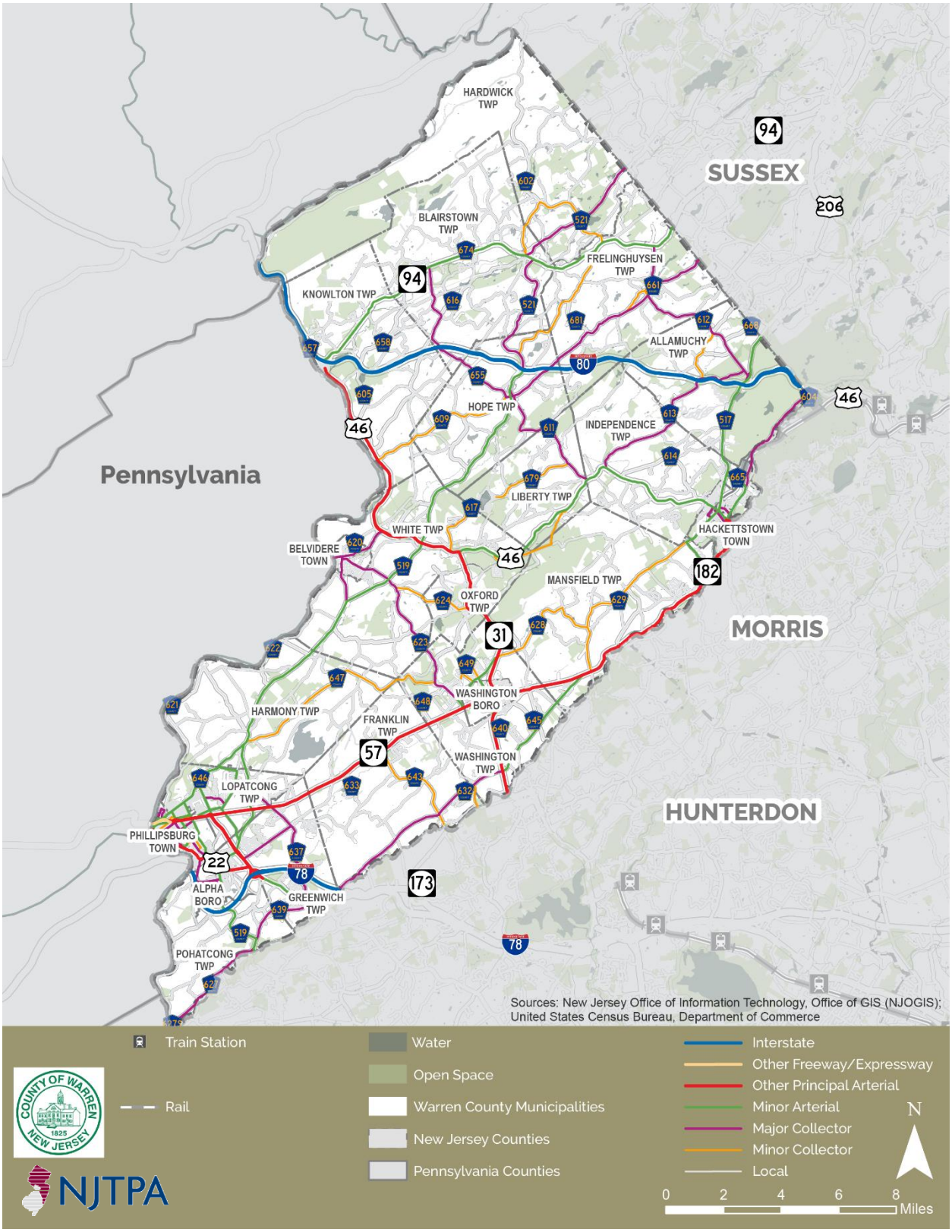
Source: Adapted from Planning Process information from the Federal Highway Administration

CR 519 approaching the village of Hope

Table 2: Functional Classification Designations

Interstates			
Interstate 78		Interstate 80	
Other Freeways/Expressways			
U.S. 22 (west of North Hillcrest Boulevard westbound, west of Morris Street eastbound)			
Other Principal Arterials			
U.S. 22 (east of Warren Street in Phillipsburg to I-78)	U.S. 46 (west of NJ 31)	NJ 31	NJ 57
NJ 122	NJ 182		
Minor Arterial			
U.S. 173 (east of I-78)	U.S. 46 (east of NJ 31)	NJ 94	CR 517
CR 519 (south of CR 521)	CR 521 (south of I-80)	CR 604 (south of CR 665)	CR 623 (small portion north of NJ 57)
CR 628 (west of NJ 31)	CR 632 (east of NJ 31)	CR 646	CR 665
Major Collector			
CR 519 (north of 521)	CR 521 (north of I-80)	CR 601	CR 604 (north of CR 665)
CR 609 (small portion)	CR 611	CR 612 (most)	CR 613
CR 620	CR 621 (only in Phillipsburg)	CR 623 (most)	CR 627
CR 632 (west of NJ 31)	CR 637	CR 638	CR 639
CR 641	CR 642	CR 655	CR 661
CR 667			
Minor Collector			
CR 602	CR 608	CR 609 (most)	CR 612 (small portion in Johnsonburg)
CR 615	CR 617	CR 624	CR 625 (portion)
CR 628 (east of NJ 31)	CR 629	CR 643	CR 647
CR 649	CR 659	CR 679	
Local Roads			
All other roads			

Figure 1: Functional Classifications



Speed Limits

An efficient and effective roadway network provides a variety of road types with varying speed limits to ensure the safe movement of vehicles through and within the County.

Similar to functional classification, a variety of speed limits regulate roadways in Warren County. Interstates and roadways with minimal curves cater to higher speed traffic (> 50 mph) while much of the county roadways allow travel speeds of 35-50 mph, traveling through rural areas with curvy and hilly terrain.

Local roadways providing direct access to residential uses tend to have lower speed limits (<35 mph).

Table 4 and Table 5 list the range of speed limits on state and county-maintained roadways in Warren County, respectively. Figure 2 maps speed limits along county and state routes. Where applicable in the tables, a range of speed limits is provided where the speed limit along a route varies.

Table 3: Speed Limits

Interstate Routes	U.S. Routes	State Routes
I-78: 65 mph	U.S. 22: 25-50 mph	NJ 31: 35-50 mph
I-80: 50-65 mph	U.S. 46: 35-50 mph	NJ 57: 25-50 mph
		NJ 94: 35-50 mph
		NJ 122: 25-50 mph
		NJ 163: 25 mph
		NJ 173: 40-50 mph
		NJ 182: 40 mph

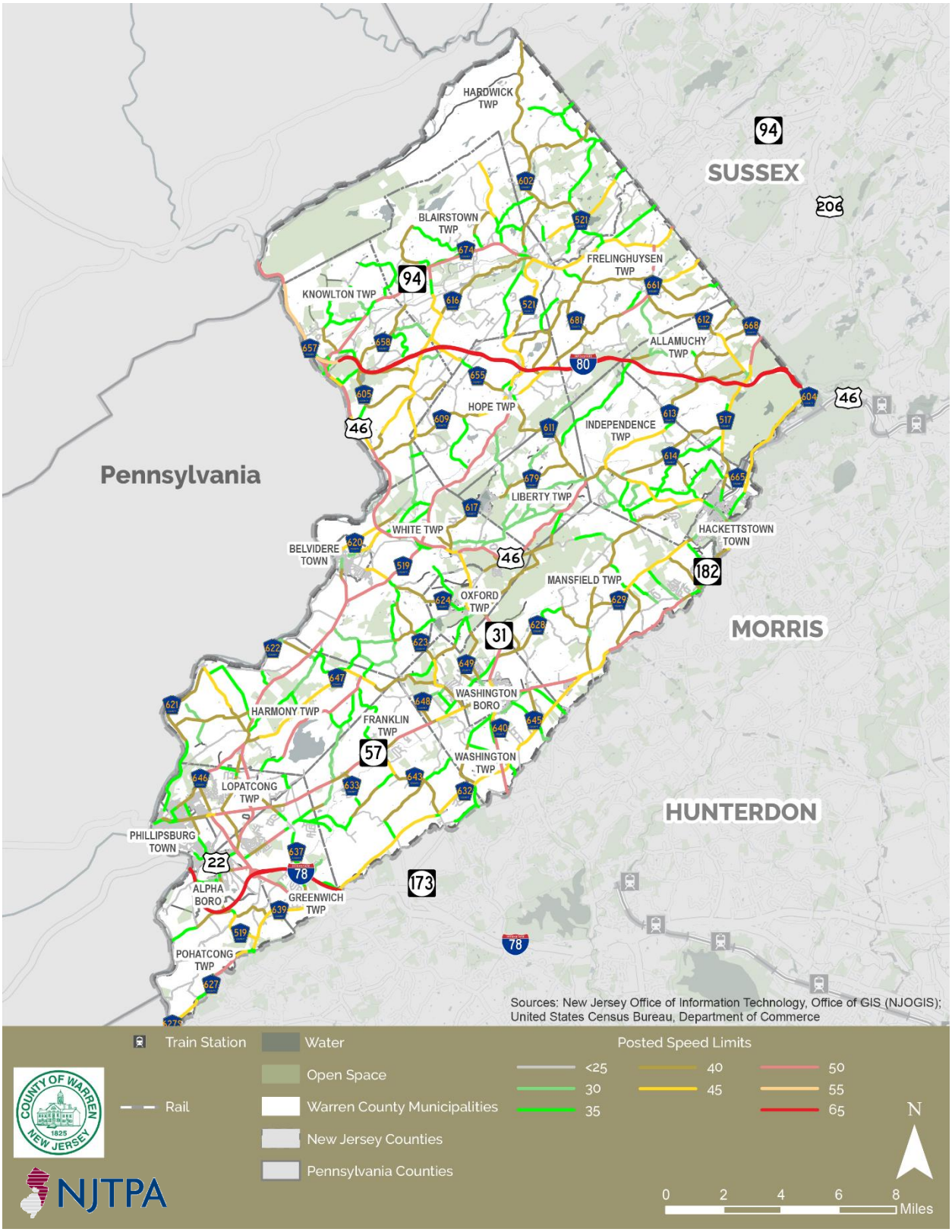
NJ 57, Mansfield Township

Table 4: Speed Limits on County Routes

CR 517: 25-50 mph	**CR 614**: 30-40 mph	**CR 628:** 35-40 mph	**CR 643:** 25-45 mph	**CR 658:** 40 mph
CR 519: 25-50 mph	**CR 615:** 40 mph	**CR 629:** 30-45 mph	**CR 644:** 30 mph	**CR 659:** 35-40 mph
CR 521: 25-45 mph	**CR 616:** 40-45 mph	**CR 630:** 30-35 mph	**CR 645:** 30-35 mph	**CR 661:** 25-50 mph
CR 601: 20 mph	**CR 617:** 40 mph	**CR 631:** 25 mph	**CR 646:** 40-50 mph	**CR 665:** 45 mph
CR 602: 25-40 mph	**CR 618:** 35 mph	**CR 632:** 35-45 mph	**CR 647:** 40-45 mph	**CR 667:** 30 mph
CR 604: 25-45 mph	**CR 619:** 35 mph	**CR 633:** 40-45 mph	**CR 648:** 30-40 mph	**CR 668:** 40 mph
CR 605: 25-40 mph	**CR 620:** 25-50 mph	**CR 635:** 35-40 mph	**CR 649:** 30-40 mph	**CR 669:** 40 mph
CR 607: 30 mph	**CR 621:** 25-45 mph	**CR 636:** 40 mph	**CR 650:** 40 mph	**CR 671:** 35 mph
CR 608: 40 mph	**CR 622:** 25-40 mph	**CR 637:** 25-40 mph	**CR 651:** 40 mph	**CR 672:** 35 mph
CR 609: 25-45 mph	**CR 623:** 35-45 mph	**CR 638:** 25-40 mph	**CR 652:** 40 mph	**CR 673:** 35 mph
CR 610: 35 mph	**CR 624:** 30-40 mph	**CR 639:** 45 mph	**CR 653:** 35 mph	**CR 674:** 35 mph
CR 611: 25-40 mph	**CR 625:** 30-40 mph	**CR 640:** 35 mph	**CR 654:** 25 mph	**CR 676:** 25 mph
CR 612: 25-45 mph	**CR 626:** 30-40 mph	**CR 641:** 35 mph	**CR 655:** 35-50 mph	**CR 678:** 25 mph
CR 613: 35-45 mph	**CR 627:** 35-50 mph	**CR 642:** 30-35 mph	**CR 656:** 25-30 mph	**CR 679:** 40 mph

Janes Chapel Road, Mansfield Township

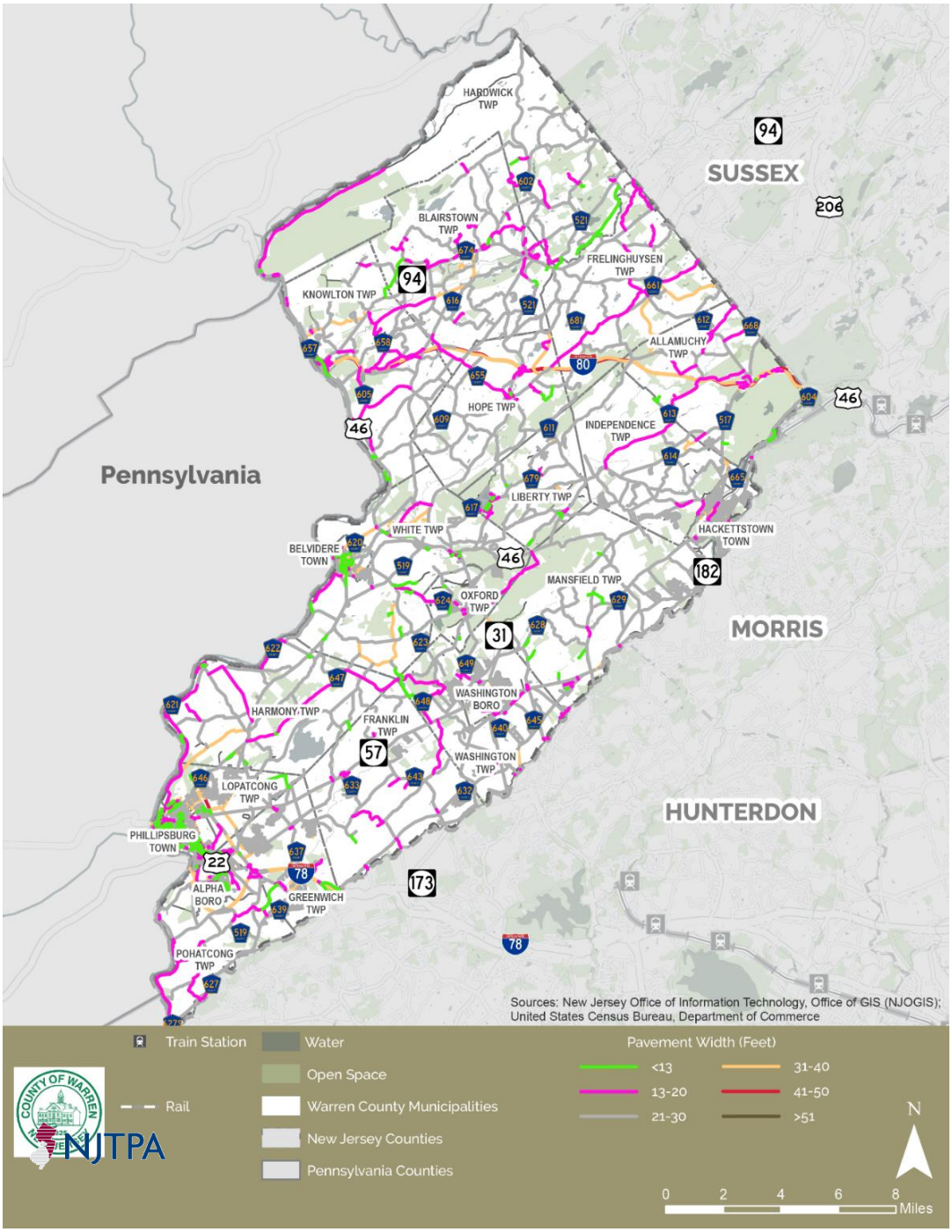
Figure 2: Speed Limits



Pavement Width

Most roadways in the County, including the majority of county routes have a pavement width of 21-30 feet, sufficient for one travel lane in each direction with no on-street parking. Roadways with a pavement width above 40 feet include U.S. 46, NJ 31, NJ 57 and short segments of several municipal roadways. Additionally, many municipal roadways have a pavement width of less than 20 feet. Figure 3 maps the pavement widths of all roads in the County.

Figure 3: Pavement Width



Roadway Jurisdiction

Public roadways are under the jurisdiction of either the state, county, or municipality. Jurisdiction entails which agency is responsible for maintaining and improving the roadway. Warren County's 1982 Transportation Plan made several recommended changes to roadway jurisdiction, many of which have been implemented. Additionally, several roadway jurisdiction changes were undertaken that were not part of the 1982 Transportation Plan. All roadways added to the County roadway network were previously under municipal jurisdiction, and all roadways removed from the County roadway network reverted to the jurisdiction of the municipality. There has been no change to the state roadway network in Warren County.

Additions to the county roadway network (and their extents) from the 1982 plan include the following:

- CR 665 (Bilby Road): CR 517 to CR 604 in Hackettstown
- CR 679: Lakeside Drive North to CR 611 in Liberty
- CR 659: CR 602 to CR 521 in Hardwick
- CR 521: NJ 94 in Blairstown to Hardwick border
- CR 661 (Dark Moon Road): CR 661 in Frelinghuysen to Sussex County border
- CR 519 (Johnsonburg Bypass): CR 661 to CR 661 in Frelinghuysen
- CR 602 (Franklin Grove Road): from Millbrook Flatbrook Road to Newman Road in Hardwick
- CR 632: NJ 57 in Mansfield to CR 651 in Washington Township
- CR 629: CR 652 to CR 628 in Mansfield
- CR 621: North Main Street in Phillipsburg to Lopatcong border
- CR 628: CR 623 to CR 649 in Washington Township and Washington Borough

Roadways removed from the county roadway network from the 1982 plan recommendations include the following:

- CR 606 (River Road): Old Mine Road from I-80 to Delaware River National Recreation Area, formerly Pahaquarry Township merged into Hardwick Township
- CR 621 Spur: Railroad Avenue to CR 621 in Harmony
- Roaring Rock Road: west of CR 623 in Washington Township
- Old Belvidere Road: from CR 646 to CR 646 in Harmony
- Belview Road: CR 519 in Lopatcong to Strykers Road in Harmony
- Penwell Road: NJ 57 in Mansfield to Hunterdon County border
- Mellicks Woods Road: CR 519 to CR 519 in Pohatcong
- CR 677 (Morris Street): Raymond Street to U.S. 22 in Phillipsburg
- Bridge Street: CR 660 to NJ 94 in Blairstown
- CR 661: CR 519 to CR 519 in Frelinghuysen

Additions and deletions to the county roadway network from the 1982 Transportation Plan are mapped in

Figure 4.

Additions to the county roadway network not recommended in the 1982 Transportation Plan but occurring since then include the following:

- CR 658 (Polkville Road): CR 658 (Vail Road) in Knowlton to CR 655 (Mount Hermon Road) in Blairstown
- CR 683 (Ryan Road and Cat Swamp Road): CR 614 Petersburg Road in Independence to Allamuchy border
- CR 680 (Mt. Pisgah Road): Jensen Drive to the County landfill

Roadways removed from the county roadway network not recommended in the 1982 Transportation Plan include the following:

- CR 601 (Blair Place): CR 660 (Main Street) to CR 602 (Bridge Street) in Blairstown
- CR 665 (Bilby Road): CR 517 to Independence/Hackettstown border

A list of roadways remaining to be exchanged is shown in Table 5.

In addition to these changes made since the previous County transportation plan, the existing jurisdiction of roadways in the county were reviewed. Most (63 percent) roadway mileage falls under municipal jurisdiction though county, state and interstate roadways cater to far higher traffic volumes. Except for small pockets of the County with little to no development and large open areas (including Hardwick, Blairstown, and Franklin), the County is well-served by county roadways. Existing roadway jurisdiction is mapped in Figure 5.

Table 5: County Roadway Network Outstanding Changes

Road Name	Municipality	Length to be Added (miles)	Length to be Deleted (miles)
Cat Swamp Rd	Allamuchy	1.20	
Old Hackettstown Rd (CR 653)	Allamuchy		0.37
Ervey Rd (CR 669)	Allamuchy		1.25
Cemetery Rd	Allamuchy		1.05
High St	Alpha		0.85
Edge Hill Rd (CR 607)	Blairstown		0.75
Old Route 94 Alignment Loops	Blairstown		2.65
Edison Rd (CR 633)	Franklin		0.94
New Village-Stewartsville Rd (CR 638)	Greenwich		0.40
Greenwich Church Rd	Greenwich		0.40
Hutchinson Rd (CR 622)	Harmony		1.50
Swayzes Mill Rd (CR 610)	Hope		2.20
Old Route 517 Alignment Loop	Independence		0.20
Simpson Rd	Knowlton		0.80
Decator Green, Green & Columbia Sts	Knowlton		0.49
Tunnel Hill Rd (CR 650)	Mansfield		1.50
Mine Hill Rd	Oxford/Washington Twp	1.10	
Bowerstown Rd (CR 632)	Washington Twp		0.45
Plane Hill Rd	Washington Twp		0.45
Little Philadelphia Rd (CR 648)	Washington Twp		1.90
South Lincoln Ave	Washington Twp		0.62
Broad St	Washington Twp		0.13
Washburn Ave (CR 630)	Washington Twp		1.50
Changewater Rd (CR 645)	Washington Twp		1.70
Bryant Rd	Washington Twp		0.65
Mountain Lake Rd	White	0.75	
Foul Rift Rd	White	0.85	
North Beaver Dr (CR 618)	White		2.00
Old Route 519 Alignment Loop (two segments)	White		0.10 (each of the segments)

Figure 4: Roadway Jurisdiction Changes

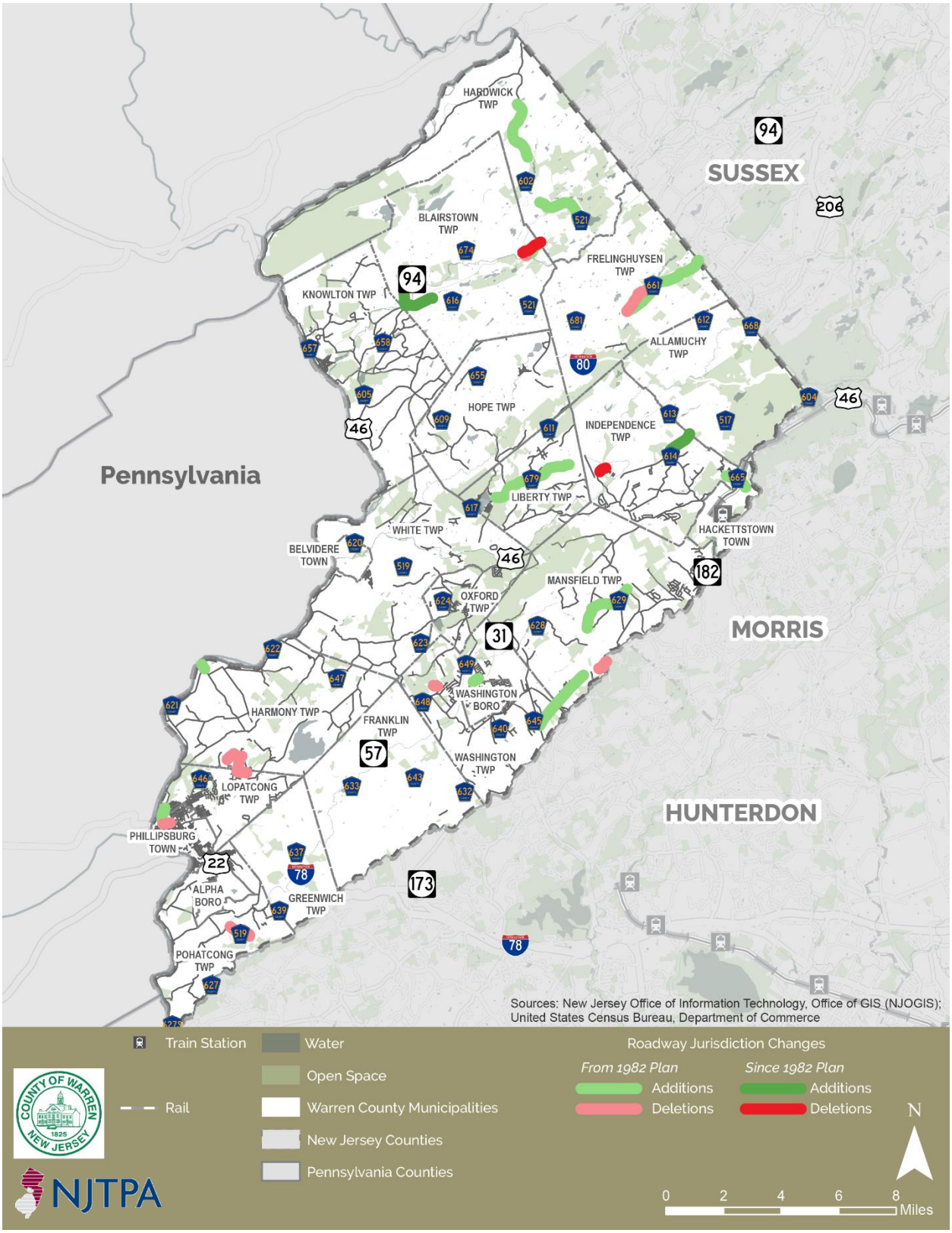
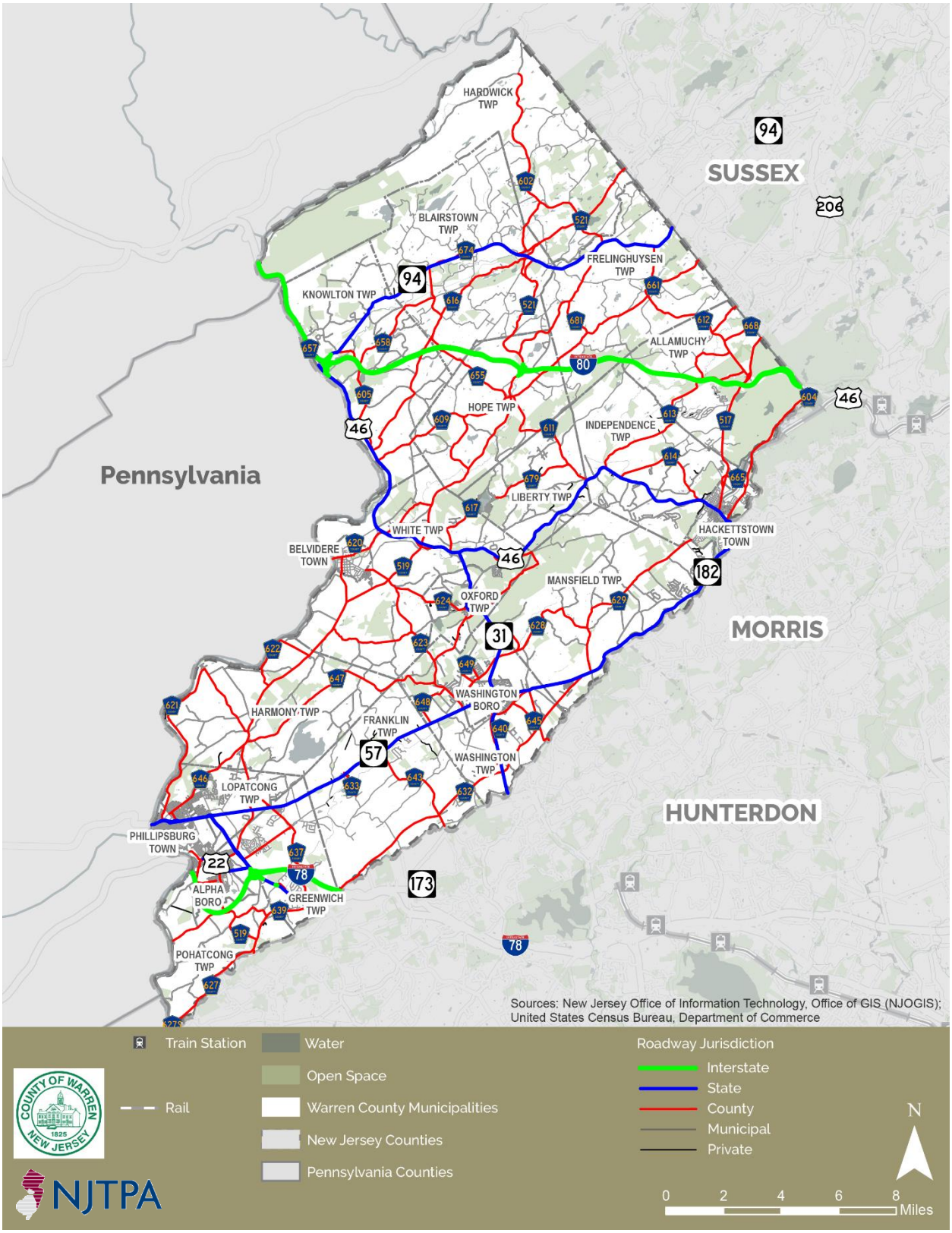


Figure 5: Roadway Jurisdiction



Traffic Volumes

Traffic counts on Warren County roadways conducted between 2016 and 2020 were obtained from NJDOT's Traffic Monitoring System. Data for each count site included average annual daily traffic volume (AADT) for all vehicles, and separate truck volumes.

Traffic counts are highest on interstate roadways, with the highest being 105,000 AADT on Interstate 78, followed by 60,000 on Interstate 80. U.S. 22 and NJ 31 each have an AADT above 30,000. Several county roadways have an AADT above 10,000. Most traffic counts were conducted on higher-volume roadways and in the more developed areas of Hackettstown, Washington Borough, Phillipsburg, and Alpha.

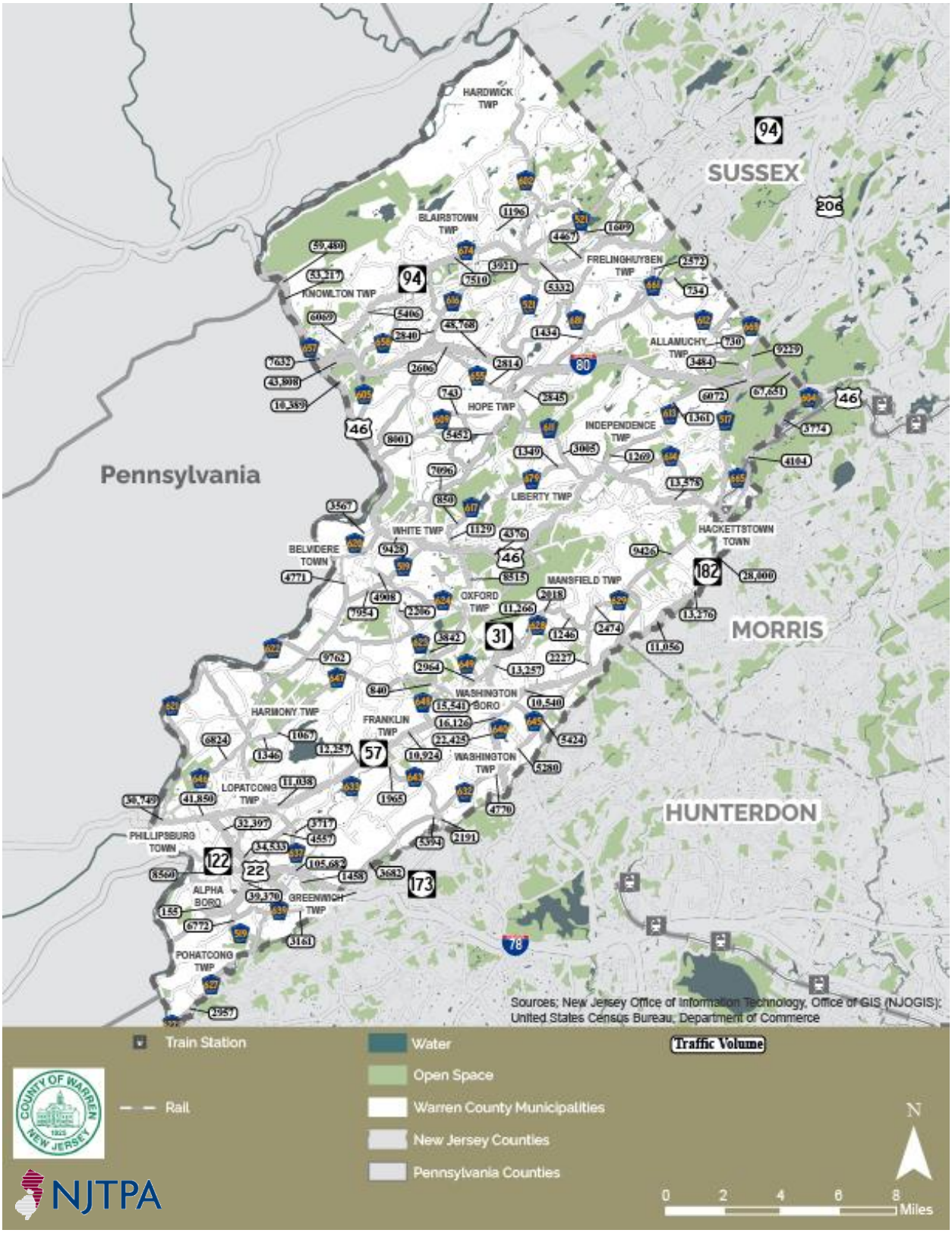
Table 6 presents the list of corridors where AADT is greater than 10,000. Where multiple counts were taken along a corridor, the upper and lower AADT limits are shown. Ranges can widely vary due to the differing context along a corridor. Volumes are also mapped in Figure 6. Where multiple counts were taken at a location, only the most recent AADT is shown.

Table 6: Traffic Volumes

Roadway	AADT
I-78	106,000
I-80	40,000-60,000
U.S. 22	30,000-43,000
NJ 182	16,000-28,000
CR 517	13,000-18,000
NJ 173	13,000
NJ 31	11,000-24,000
NJ 57	10,000-16,000
U.S. 46	10,000-14,000
CR 519	11,000-13,000
CR 638	11,000-13,000
NJ 122	11,000-12,000

U.S. 22, Phillipsburg

Figure 6: Traffic Volumes



Average Annual Daily Traffic Volumes from NJDOT Safety Voyager tool, 2016-2018

Height and Weight Restrictions

Numerous bridges and roadways in Warren County have weight or height restrictions precluding use by trucks exceeding given limits, making travel through the County and between major roadways more difficult.

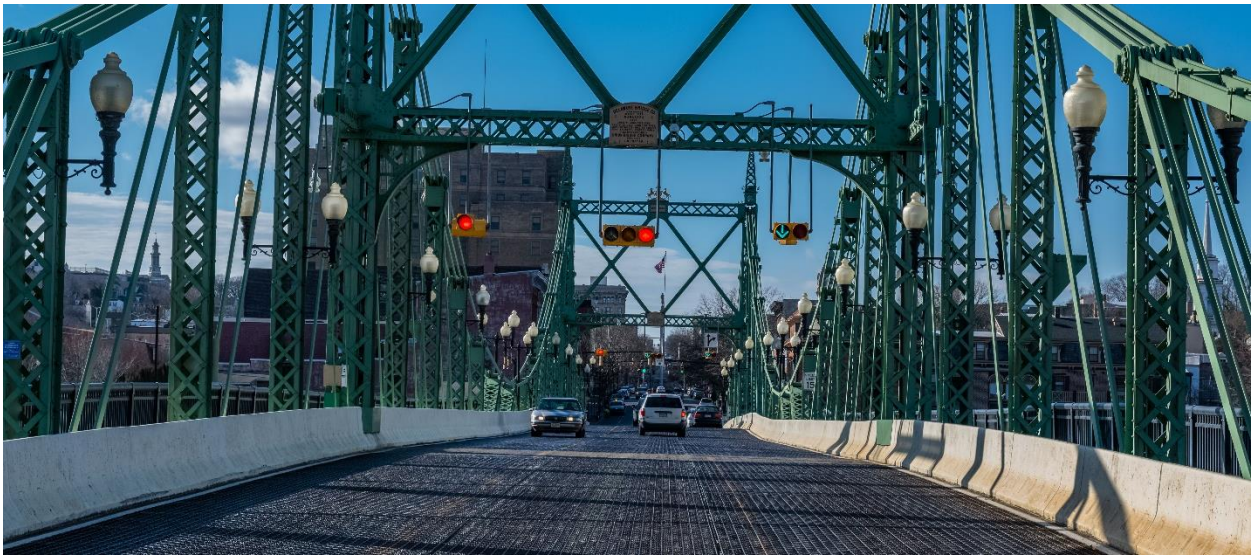
While necessary for physical and safety reasons, height and weight restrictions can have negative impacts. Restrictions can limit transportation accessibility for local businesses, impact local economic viability, increase vehicle miles traveled, and divert traffic through residential neighborhoods. Eleven county routes have height restrictions and seven county routes have weight restrictions.

County roads with height and weight restrictions tend to be around the periphery of Warren County. In Pohatcong, CR 636 and CR 639 have height restrictions of 11'3", and 13'6", respectively. Additionally, CR 519 in Alpha has a 13'9" height restriction and a 10'6" height restriction in Lopatcong. These restrictions present fewer opportunities for trucks entering from the southeast. In the north, there are height restrictions along CR 658 in Knowlton, and CR 616 and CR 655 in Blairstown. Near the Delaware River, there are two height restrictions on CR 622 in Harmony, west of CR 519. To the north of this location, CR 620 Spur A in Belvidere has a 13-foot-9-inch height restriction.

Most weight-restricted county roadways are in the southern portion of the County. CR 519 in Pohatcong has a 4-ton limit and in Greenwich, an 8-ton limit. CR 637 in Lopatcong and Greenwich has a 10-ton limit. CR 646 in Phillipsburg, Lopatcong, and Harmony has a 4-ton limit. CR 620 has an 8-ton limit in White and Belvidere, and the short extent of CR 519 in Pohatcong has a 4-ton limit.

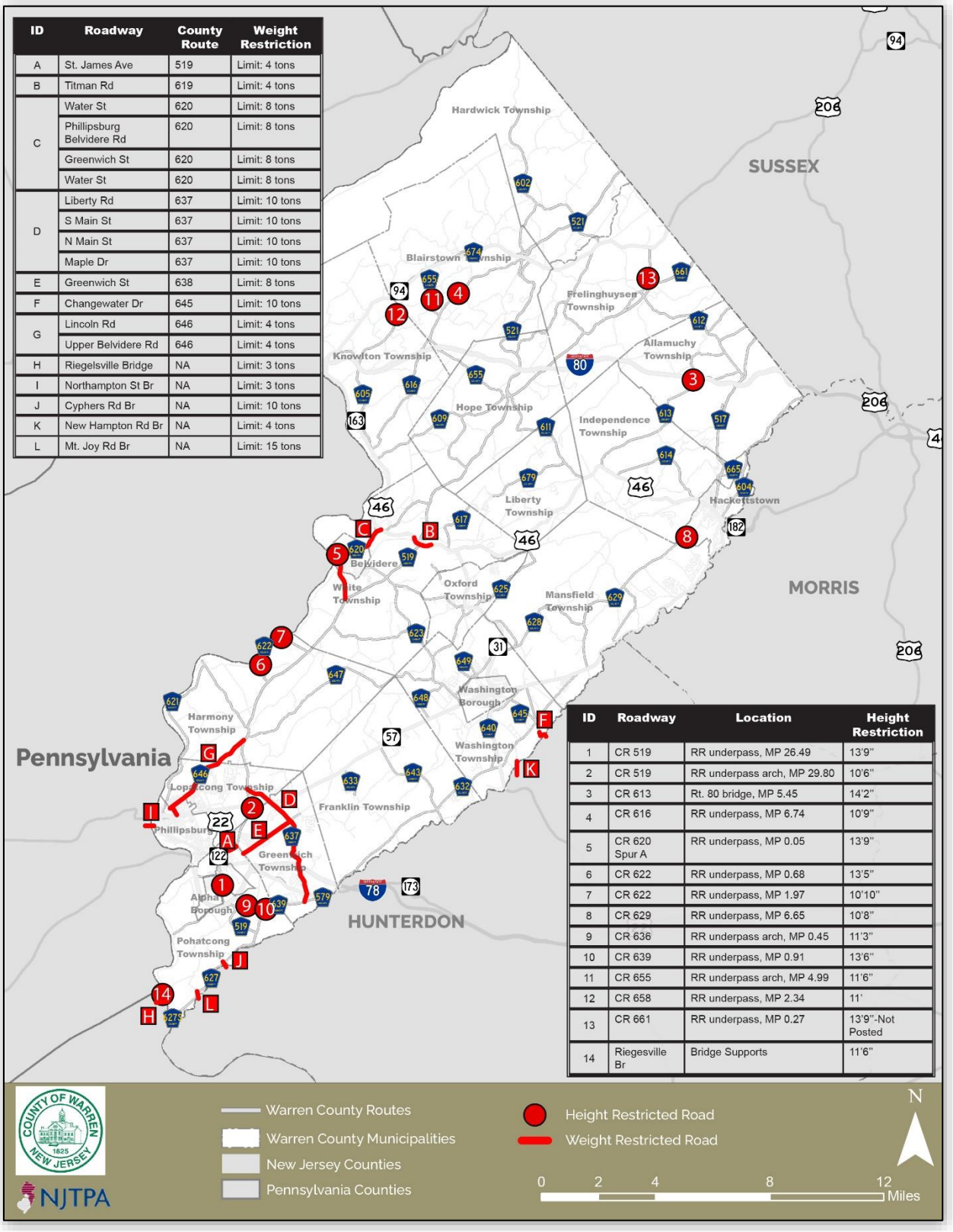
Additionally, at the request of Hope Township, the County conducted an engineering analysis of CR 519/CR 521 between the intersection of CR 519/U.S. 46 and CR 521/I-80 to impose a 13-ton directional weight limit. As an alternate route, vehicles over 13 tons would be directed to use U.S. 46 between CR 519 in White Township and the I-80 interchange in Knowlton Township. The request for the weight restriction is pending with the New Jersey Department of Transportation.

The location and a listing of height and weight restricted-county routes are presented in Figure 7.



Northampton Street Bridge (3-ton limit), Phillipsburg

Figure 7: Height and Weight Restrictions



Maintenance and Capital Improvement Plan

The County reconstructs surface treated pavements (such as oil and chip roads) every 3 to 4 years and resurfaces bituminous concrete surfaced roadways every 12-15 years, as outlined in the 1982 Transportation Plan.

The Warren County Engineering Department has designated standard cross-sections for each roadway classification category. These standards are used in implementing the county subdivision and site plan regulations as well as general implementation of the Circulation Plan. Since the county's 1982 Transportation Plan, county roadway cross-sections have been updated. Standard cross-sections from 1982 and the present for various roadway types are shown in Figure 8 through 12 The 1982 and updated minor arterial cross-sections are displayed first, followed by the 1982 collector cross-section and updated major and minor collector cross-sections.

In 2021, the county budgeted funds to resurface 16 miles of roadway. Bridge and culvert improvements are planned and will be undertaken as funding and permitting become available. Nearly $8,000,000 is presently budgeted for road and bridge improvements and maintenance, a majority of which is funded through the State Transportation Trust Fund.

CR 519, Hope Township

Figure 8: Minor Arterial Cross-Section (1982 Plan)

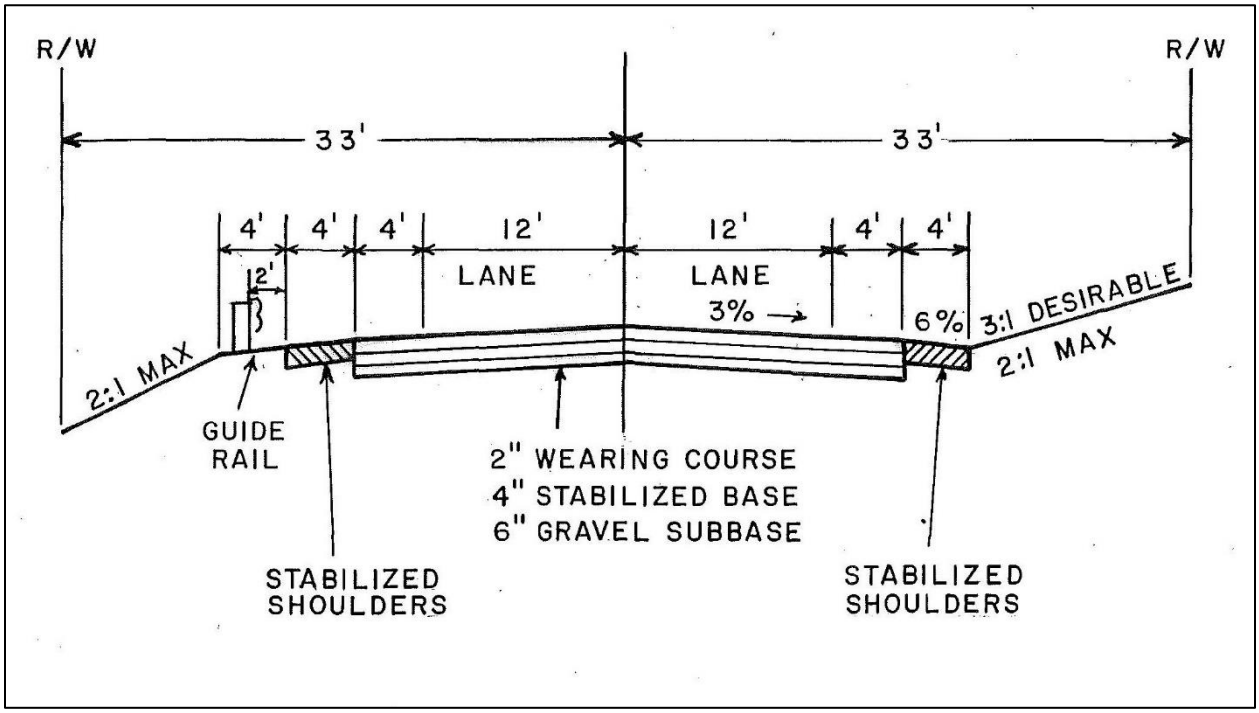


Figure 9: Minor Arterial Cross-Section (Updated)

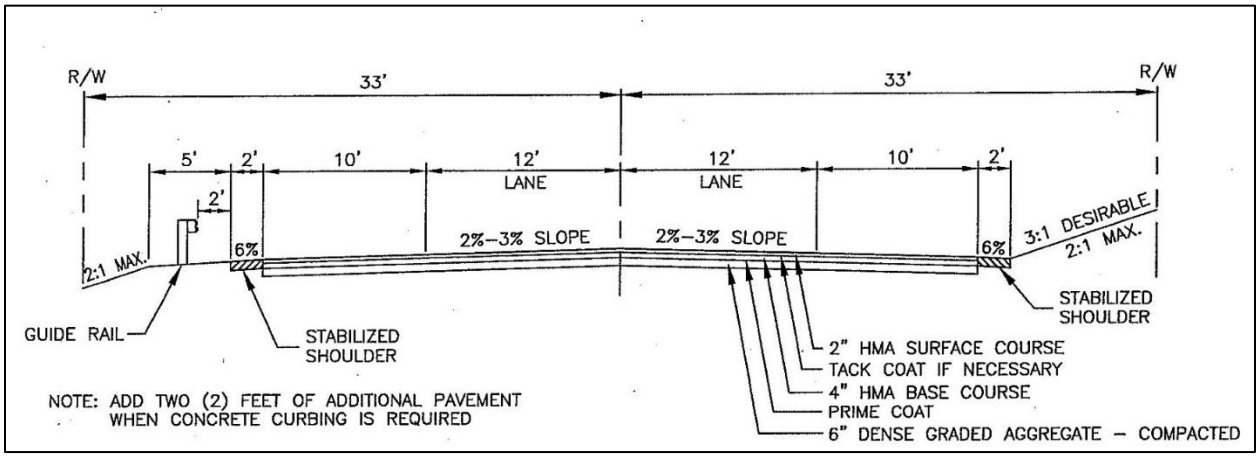
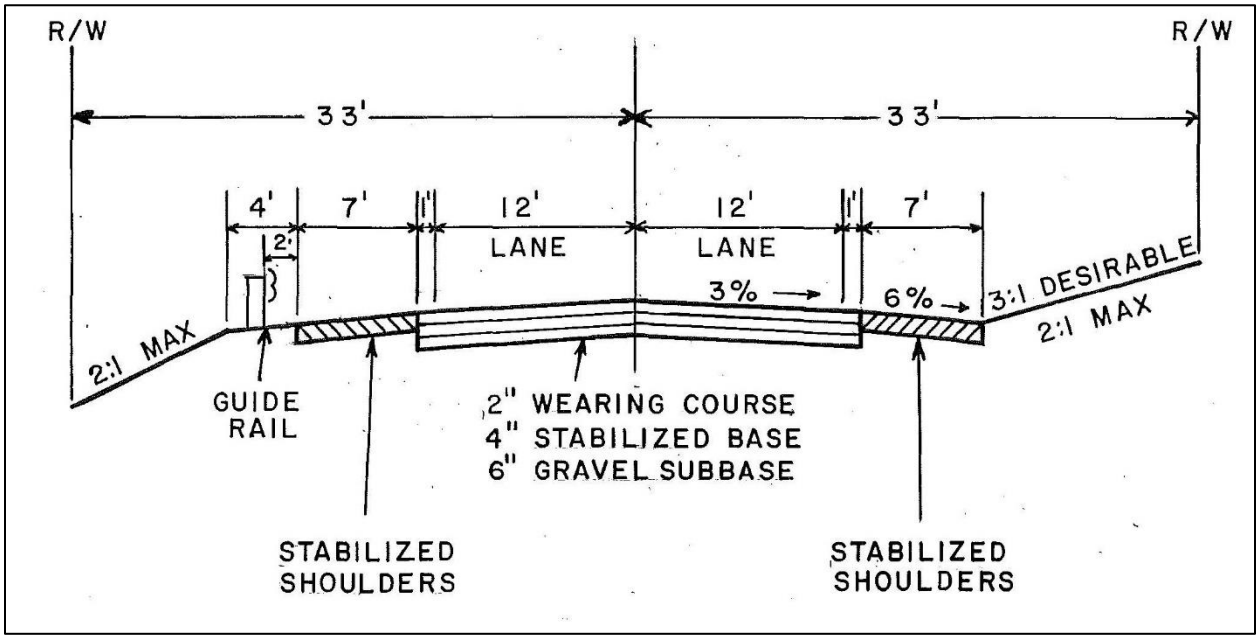


Figure 10: Major and Minor Collector Cross-Section (1982 Plan)



Washington Avenue, Oxford Township

Figure 11: Major Collector Cross-Section (Updated)

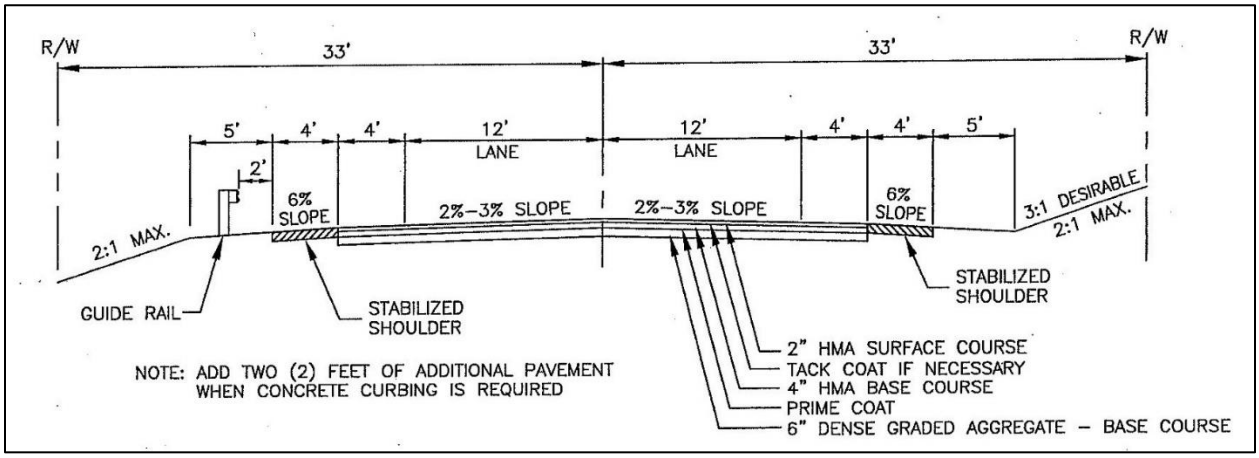
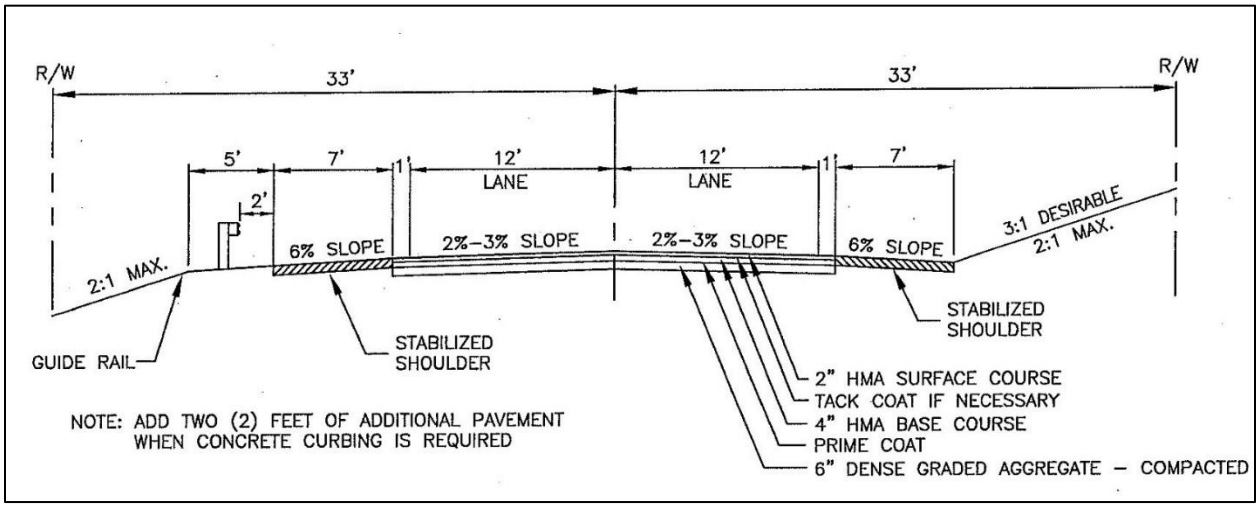


Figure 12: Minor Collector Cross-Section (Updated)



CR 624, Oxford Township

As illustrated in the figures above, the following changes were made between cross-sections in the 1982 plan and current county guidance.

Minor Arterial

- 2-foot stabilized shoulders instead of 4 feet
- 10-foot separation between travel lane and stabilized shoulder instead of 4 feet
- 3-foot provided to the outside of the guide rail instead of 2 feet
- 2-3 percent slope of roadway instead of 3 percent

Major Collector

- 4-foot stabilized shoulders instead of 7 feet
- 4-foot separation between travel lane and stabilized shoulder instead of 1 foot
- 3-foot provided to the outside of the guide rail instead of 2 feet
- 2-3 percent slope of roadway instead of 3 percent

Minor Collector

- 3-foot provided to the outside of the guide rail instead of 2 feet
- 2-3 percent slope of roadway instead of 3 percent

Each of the updated cross-sections provide adequate space for dedicated on-road bicycle facilities to be accommodated.

CR 631 (Washington Avenue), Oxford Township

Crashes

Crash records from 2016-2018 (the most recent available at the time the study commenced) were collected and mapped for all roads in Warren County. Particular attention was paid to crashes on county roadways. Crash hotspots were identified at locations with a high number of crashes. Intersections and corridor segments with the most crashes tended to be on state and U.S. roadways, which fall under NJDOT jurisdiction. Eight county roadway crash hotspots were identified, each with between 21 and 92 crashes. While including at least one county roadway, each of these hotspots tended to be located near the intersection with a state, U.S., or interstate road. Throughout the County, crashes mainly occur on higher-speed and higher-volume roadways.

The location of crash hotspots on county roadways and number of crashes in each hotspot are mapped in

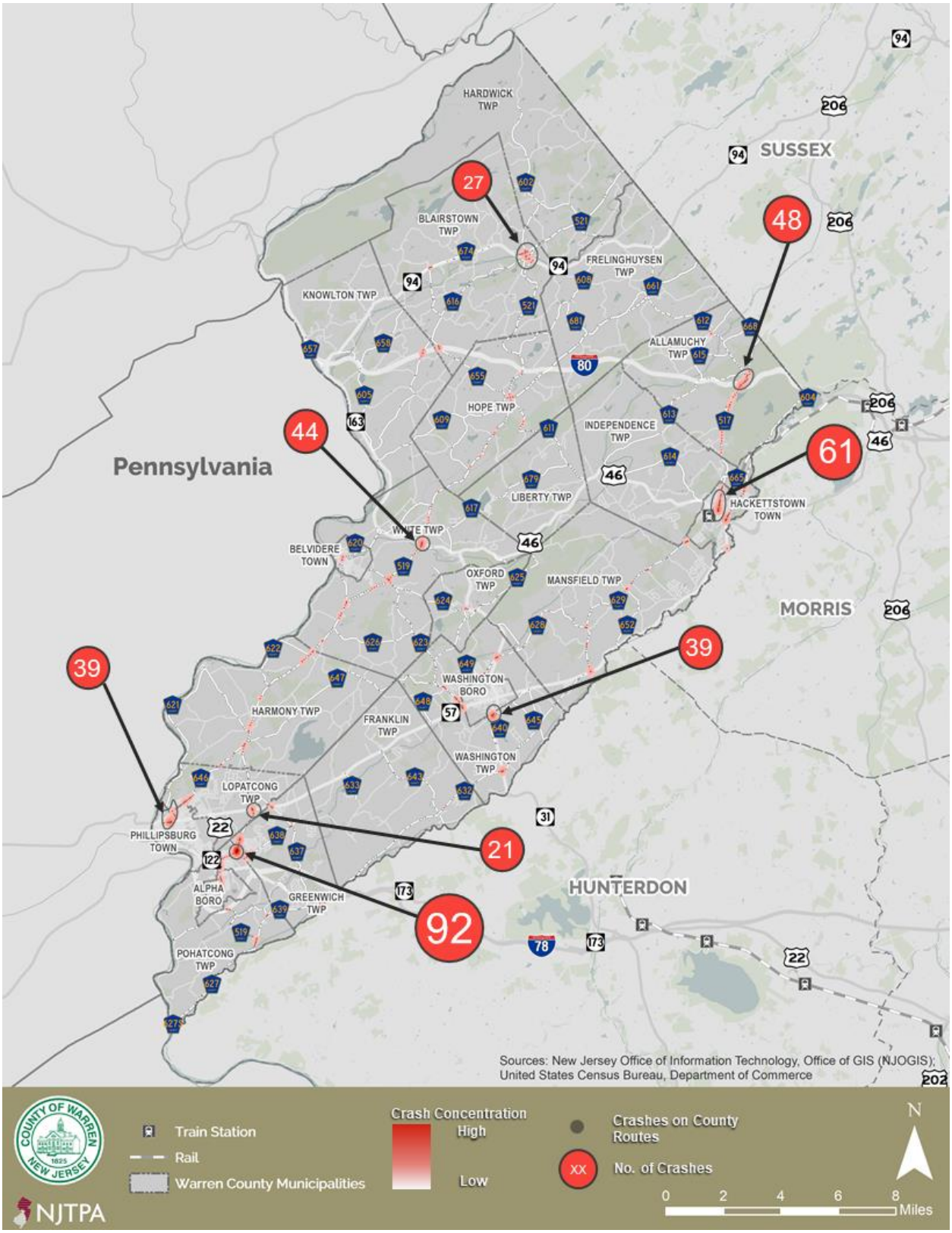
Figure 13. Overrepresented crash types (compared to statewide averages on county roads) are shown in Table 7.

A more detailed analysis of crash characteristics in the county is provided in Technical Memo 2.4 in Appendix B.

Table 7: Crash Hotspots

Crash Hotspot	Number of Crashes	Municipalities	Overrepresented Crash Types (observes vs. statewide avg)
US 22/CR 519	92	Pohatcong/Greenwich	Rear End (55% vs. 48%) Backing (4% vs. 1 %)
US 46/CR 517	61	Hackettstown	Right Angle (16% vs. 10%) Fixed Object (23% vs. 19%) Backing (4% vs. 1%) Pedestrian (3% vs. 1%)
U-80/CR 517	48	Allamuchy	Left/U-Turns (8% vs. 2%) Head-On (4% vs. 2%) Overturned (2% vs. 1%) Backing (6% vs. 1 %) Animal (6% vs. 4%) Pedestrian (4% vs. 1%)
US 46/CR 519	44	White	Right Angle (34% vs. 10%)
US 22/CR 646/Morris St	39	Phillipsburg	Rear End (59% vs. 48%) Fixed Object (13% vs. 9%) Parked Vehicle (10% vs. 1%) Backing (3% vs. 1%)
CR 630/CR 640	39	Washington Twp	Rear End (59% vs. 48%) Fixed Object (13% vs. 9%) Head-On (5% vs. 2%) Overturned (3% vs. 1%)
NJ 94/CR 521/CR 602/CR 616/CR 607	27	Blairstown	Fixed Object (11% vs. 9%) Struck Parked Vehicle (26% vs. 1%) Left/U-turns (4% vs. 2%) Head-On (4% vs. 2%) Backing (19% vs. 1%)
NJ 57/CR 519	21	Lopatcong	Left/U-turns (14% vs. 2%) Right Angle (14% vs. 10%)

Figure 13: Crashes Hotspots on County Roadways



Biking, Walking and Trails

Biking and walking are integral parts of Warren County's transportation network, providing an alternative means to single-occupant motor vehicle use, and essential to mobility for the region's vulnerable populations. Biking and walking are also an important part of the county's attractiveness to visitors because of its scenic and rural character. The county's trail network provides recreation and scenic views, contributing greatly to the county's tourism industry. An inventory of bicycle compatibility and trails were conducted as part of this study as well as a review of crashes in the county involving cyclists and pedestrians.

Bicycle Compatibility Analysis

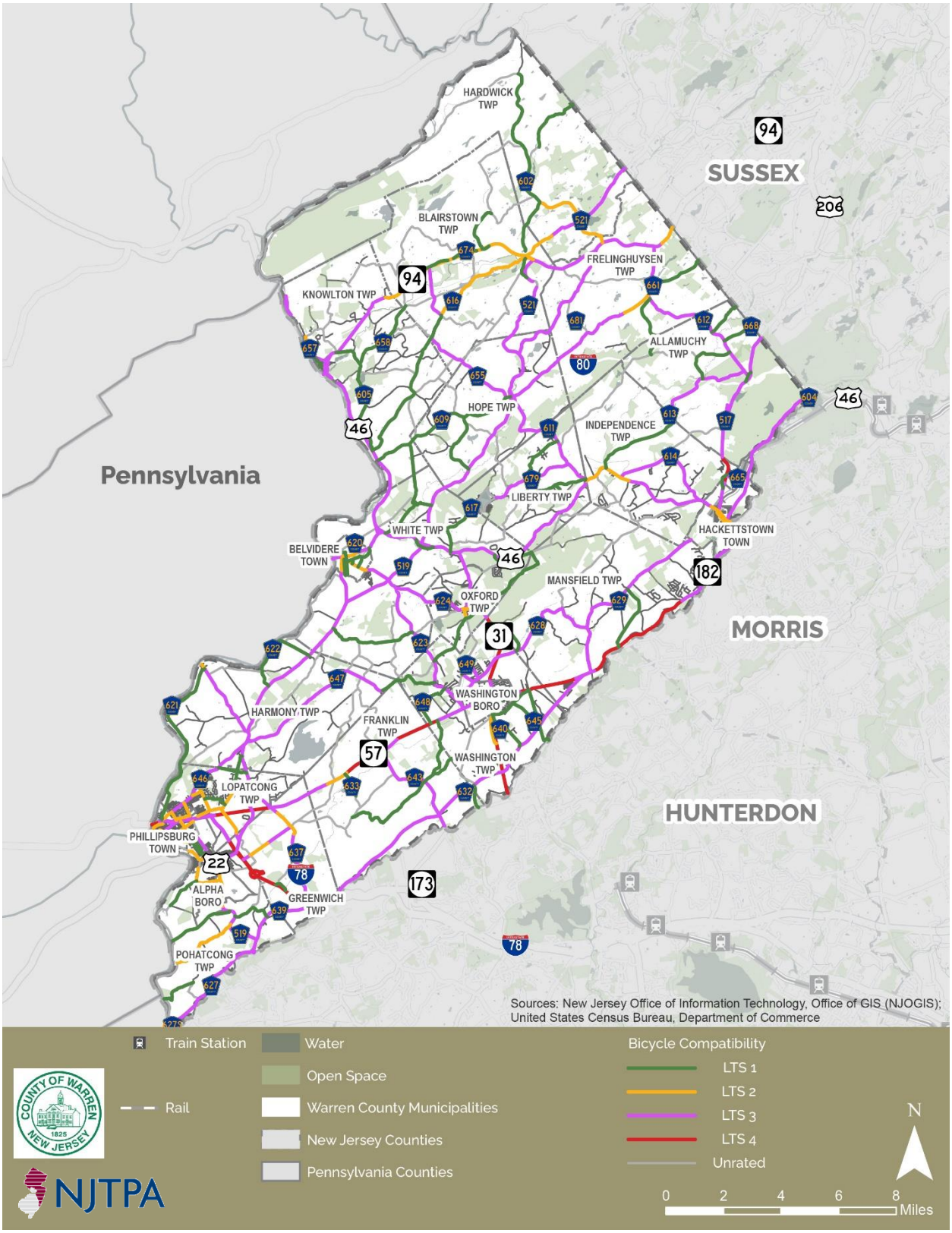
Prior to the development of this Warren County Transportation Plan, the County completed a bicycle compatibility analysis of all county roadways based on bicycle level of traffic stress (LTS). LTS measures a cyclist's expected comfort of a given roadway based on roadway conditions including volume, speed, and shoulder width. Based on an analysis of the criteria, the LTS for a given roadway segment is classified into one of four categories, with LTS 1 indicating comfort for most users (including children and the elderly) and LTS 4 indicating comfort for only the most experienced riders. The bicycle compatibility analysis indicates expected comfort on the existing roadway, or the compatibility of biking. It does not indicate the most advantageous places to install dedicated cycling facilities.

Most municipal roads were categorized as LTS 1 with the majority of county roadways designated LTS 3, indicating a need for physical improvements to enhance cyclist safety. Figure 14 maps bicycle compatibility for all roadways in the county.

A more complete explanation and review of bicycle compatibility analysis is presented in Technical Memo 2.

U.S. 46, Hackettstown

Figure 14: Bicycle Compatibility Analysis



Bicycle and Pedestrian Safety

Though a safety analysis of crash incidents on county roadways was conducted to identify crash hotspots, a thorough analysis of bicycle and pedestrian crashes was not conducted as part of this Transportation Plan. Despite this, a review of the location of bicycle and pedestrian crashes in the county reveal that two-thirds of crashes (59 of 89) involving cyclists or pedestrians occurred in one of three municipalities: Phillipsburg, Hackettstown and Washington Borough. These three municipalities account for only 2.4 percent of the county's area but an overwhelming number of bicycle and pedestrian crashes. Most of these crashes occurred on state or municipally maintained roadways.

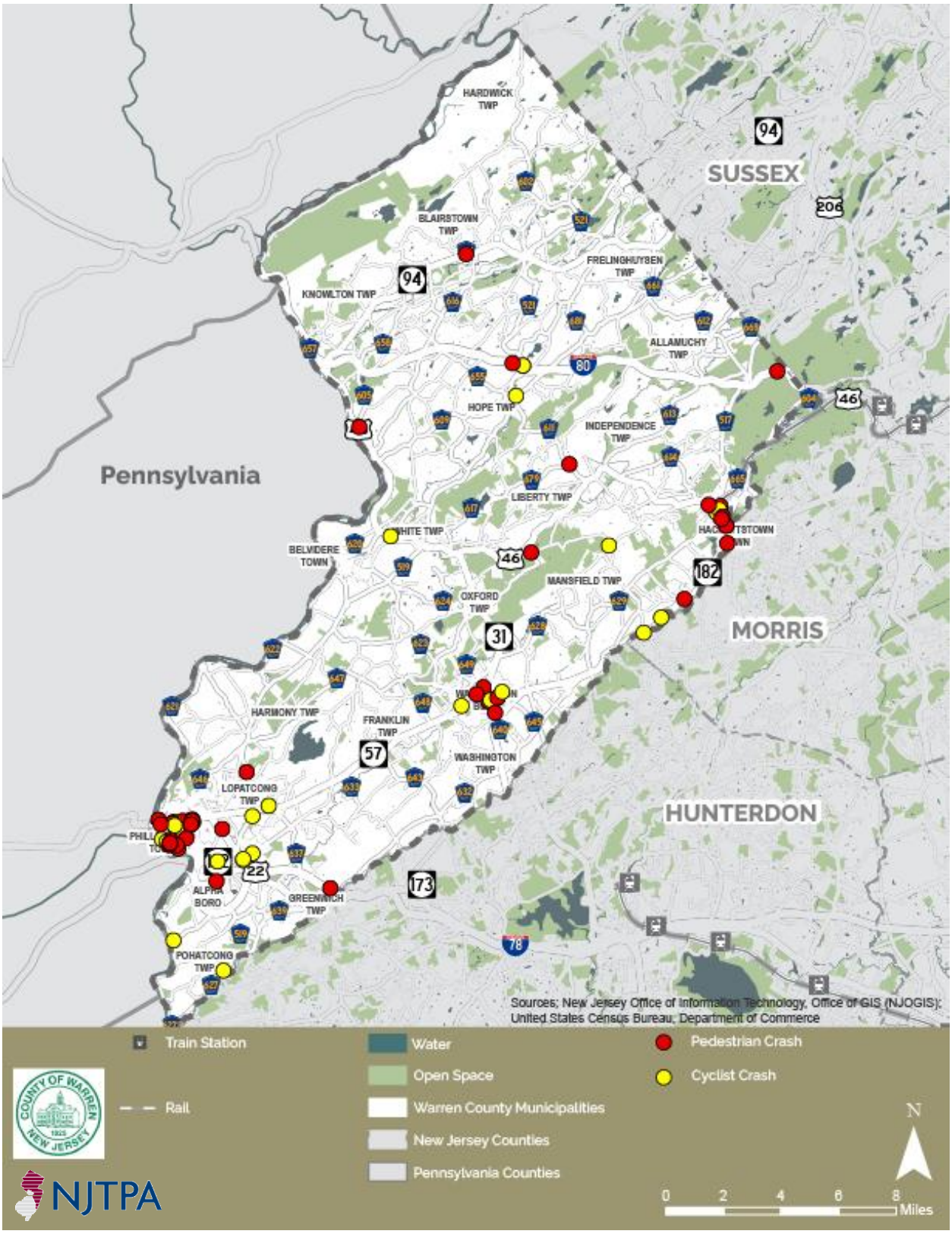
The following trends were found in the bicycle and pedestrian crash data. All comparisons with countywide crashes refer to crashes of all types (not only bicycle and pedestrian crashes) on the entire roadway network (local, county and state roadways):

- Crashes were more likely to occur from mid-afternoon to early evening with more than one quarter of crashes occurring between 2pm and 5pm
- Crashes were evenly distributed between those at intersections and those between intersections, this compares to 81 percent of crashes of all types countywide occurring between intersections
- Crashes were more likely to occur on municipal roads (44 percent) compared to only 24 percent of all crashes countywide
- Crashes were equally likely to occur during daylight (63 percent) as crashes countywide (66 percent)
- Crashes were more likely to occur during clear weather conditions (87percent) than crashes countywide (75 percent)
- Crashes were far more likely to occur on roadways with a posted speed limit of 25 mph (56 percent) than crashes countywide (21 percent

A map presenting bicycle and pedestrian crashes is shown in Figure 15.

NJ 57, Washington Borough

Figure 15: Bicycle and Pedestrian Crash Incidents



Regional Trail Network

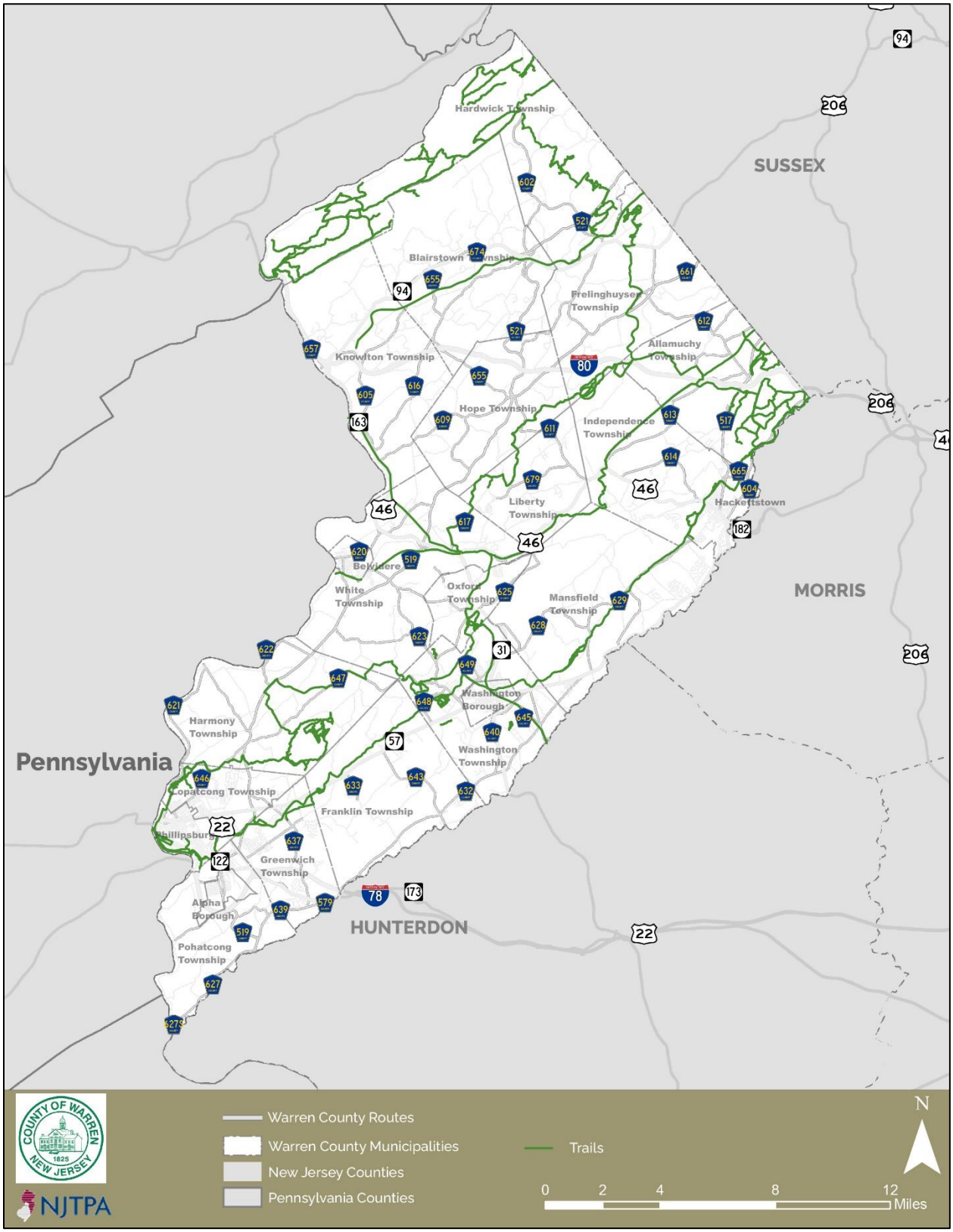
The county provides a vast network of regional and local trails. Table 8 provides a list of the 180 miles of trails in the county, indicating segments that are part of a regional trail system. Several of the larger regional trail corridors/networks are discussed below.

Figure 16 maps the location of major trails in the county. In addition to providing a means of transportation, exercise and recreation, the trail system strongly contributes to tourism in the county.

Table 8: Trails

Trail Name	Part of Regional Trail	Length Miles
Allamuchy Mountain State Park Trails	Warren-Highlands/Morris Canal	23.02
Appalachian Trail	Appalachian Trail	14.56
Bread Lock Park Trails	Morris Canal	2.10
Florence Kuipers Park Trails	Morris Canal	2.43
Jenny Jump Trails	Warren Highlands	13.64
Lehigh Hudson Trail	LH Trail/Pequest Valley	10.80
Merrill Creek Trails	Warren Highlands	12.60
Marble Hill Trails	Warren Highlands	4.86
Mt. Rascal Trail	Morris Canal	1.04
Delaware Water Gap National Recreation Area and Worthington State Forest Trails	Appalachian Trail	40.29
Paulinskill Valley Trail	Liberty Water Gap/911 Trail	12.70
Phillipsburg Riverfront Heritage Trail	Morris Canal	6.91
Port Murray Preserve Trail	Morris Canal	1.75
Port Warren Trail	Morris Canal	1.06
Ridge and Valley Trails	Ridge and Valley Trails	18.37
Washington Township Park Trails	Morris Canal	6.95
East Oxford Mountain Trail	Warren Highlands	0.56
West Oxford Trails	Warren Highlands	2.77
White Lake Trail	Ridge and Valley Trails	4.06
Total Trail System		180.56

Figure 16: Major Trails



Appalachian Trail
The Appalachian Trail is a more than 2,180-mile-long public footpath between Maine and Georgia traversing the scenic, wooded, pastoral, wild, and culturally resonant lands of the Appalachian Mountains. The trail skirts the northern part of Warren County within Worthington State Forest.

Morris Canal Greenway
The Morris Canal Greenway is envisioned as a 111-mile continuous east-west pedestrian and bicycle trail connecting six counties in northern New Jersey. Once completed, it will extend from the Delaware River in Phillipsburg to the Hudson River in Jersey City.

The acquisition of the historic Morris Canal has been a high priority of the county for years. The Morris Canal was listed on the National and State Registers for Historic Places in 1974. The Morris Canal Greenway Trail uses a mix of public open spaces/parks and public roadways as the route in several areas, providing the needed connections between Morris Canal sites. The total existing length of the Morris Canal Greenway in Warren County is 36 miles.

The Morris Canal Greenway is comprised of the following local trail systems:

- Bread Lock Park Trails, Franklin (2.1 miles)
- Florence Kuipers Park Trails, Hackettstown (2.4 miles)
- Mt. Rascal Trail, Independence (1.0 mile)
- Riverfront Heritage Trail, Phillipsburg (6.9 miles)
- Port Murray Preserve Trail, Mansfield (1.8 miles)
- Port Warren Trail, Greenwich/Lopatcong (1.0 mile)
- Meadowbreeze Park, Washington Twp (7 miles)

In 2012, the NJTPA published a 25-year Action Plan that described specific strategies, recommendations and projects intended to guide the next 25 years of development for the Morris Canal Greenway. It prioritized specific items based on the feasibility, costs and public support. The action in the study examined ways to provide safe pedestrian and bicycle access along the canal greenway while promoting historic awareness. In 2018, NJTPA released the *Morris Canal Greenway Corridor Study* as an implementation-focused plan to develop the full canal corridor as a greenway while preserving the area's historic, recreational, and scenic resources, and leveraging the greenway to enhance local communities. The study developed both short- and long-term trail alignments while aiming to maximize the use of off-road trails. Several trail typologies were developed based on immediate surroundings and land uses.

Warren Highlands Trail
The Warren Highlands Trail is a spur of the main Highlands Trail extending over 150 miles from Storm King Mountain on the Hudson River in NY south to Riegelsville, NJ on the Delaware River. One section of the main trail is in Warren County and traverses Allamuchy Mountain and Stephens State Parks. The Warren Highlands Trail spur travels 52.4 miles from the Delaware River in Phillipsburg to the Morris Canal Greenway Trail in Allamuchy. The trail travels through t Phillipsburg, Lopatcong, Harmony, Washington Township, Oxford, White, Hope, Liberty, Frelinghuysen, Independence, and Allamuchy. The trail passes through 22,700 acres of preserved natural area including Merrill Creek Reservoir, Jenny Jump Mountain, Pequest River Wildlife Management Area, and Allamuchy Mountain State Park and travels near several historic sites including Shippen Manor, Van Nest Hoff Vannatta Farmstead, and Rutherfurd Hall. The Warren-Highlands Trail connects with the main trail in Allamuchy Mountain State Park.

Local trail systems along the Warren Highlands Trail include:

- Allamuchy Mountain State Park Trails (23 miles)

- Jenny Jump Trails (13.6 miles)
- Pequest River WMA Trails
- Merrill Creek Trails (12.6 miles)
- Marble Hill Trails (4.9 miles)
- East and West Oxford Mountain Trails (3.3 miles)

Trail in Oxford

Public Transportation

Public transportation options in Warren County include a county shuttle system and one NJ TRANSIT train station.

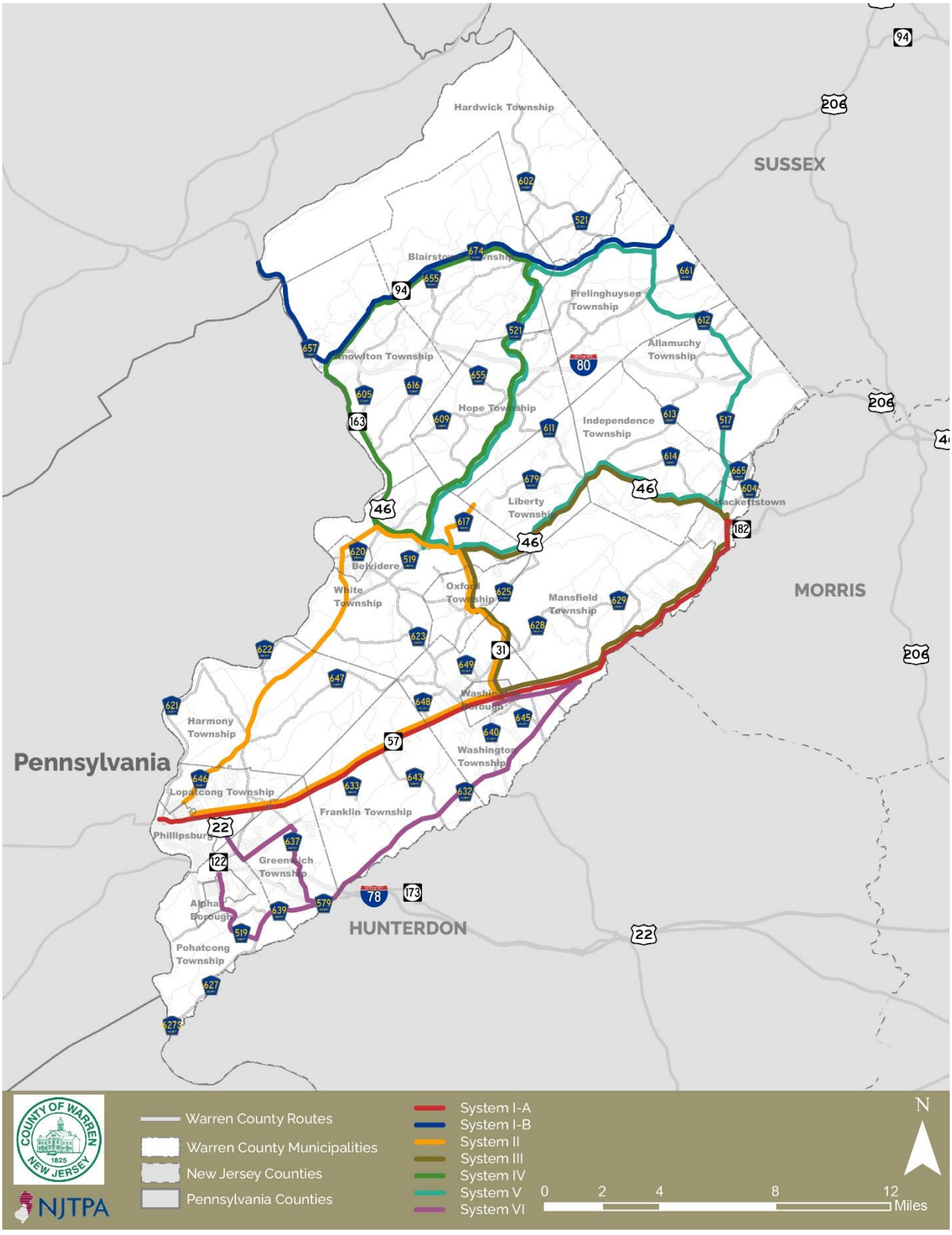
Bus/Shuttle

Easton Coach Company operates existing bus service along NJ 57 as the Route 57 Shuttle with two routes in the county. Each route terminates at Abilities of Northwest Jersey in Washington Township, with one route operating from Phillipsburg and the other from Hackettstown. Service mainly operates on an hourly basis during weekdays. Additionally, from June 2016 to December 2018, the 31Ride Shuttle operated from Oxford to the Clinton (Hunterdon County) Park & Ride.

The 1982 Warren County Transportation Plan proposed a series of transit service initiatives to address inter- and intra-county travel needs and offer modal opportunities other than single occupant vehicles. The intra-county system envisioned a series of five bus loops, each operating two days per week to cumulatively provide coverage to a broad area of the county (see Figure 17). At the time of the plan's development, much of the service was expected to remain a long-term initiative, with immediate implementation infeasible at the time due to low population density and lack of available funding. Existing NJ 57 shuttle service operates as one of the five desired routes. The other routes were each intended to serve a specific part of the county (southern, northwestern, etc.) including various interchange points, allowing for transfers when service schedules aligned. Implementation of the larger system remains infeasible due to low population density and lack of funding.

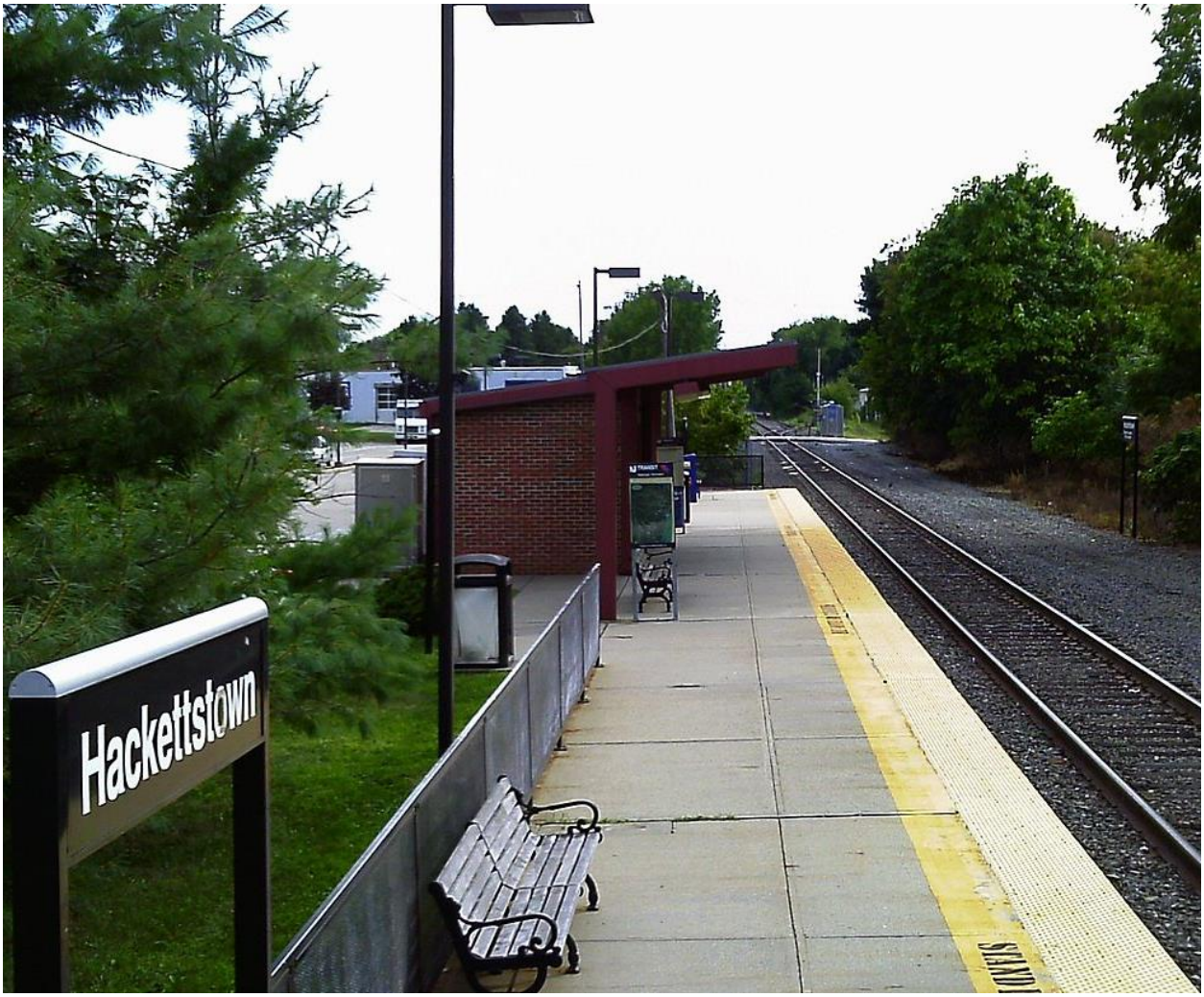
Warren County Transportation Shuttle

Figure 17: 1982 Shuttle Service Recommendations



Passenger Rail

The county's only NJ TRANSIT rail station is in Hackettstown, south of U.S. 46 on Stiger Street. This station is the western terminus of NJ TRANSIT's Morristown Line (a branch of the Morris & Essex Line) and Montclair-Boonton Line. The current schedule operates seven trains to/from Hackettstown each day. Passengers traveling to/from Penn Station in New York City must transfer at either Dover or Newark Broad Street.



Hackettstown Train Station (source: Wikipedia)

Airports

The two public-use airports in the county are Hackettstown Airport and Blairstown Airport, both primarily used for recreational purposes. The 1982 Transportation Plan stressed the need to keep these airports operational and functional, a desire that remains in place.

The New Jersey Department of Transportation's 2007 State Airport System Plan identified Hackettstown Airport as a Core Candidate Airport, housing approximately 90 percent of the system's aircraft and essential to the future aviation system in New Jersey. If improved, Core Candidate airports could provide needed landside storage capacity and reduce capacity constraints at core airports.

Hackettstown Airport provides aviation services such as fuel, hangars, tie downs and flight instruction.

The NJDOT's 2007 State Airport System Plan identified Blairstown Airport as a Core General Service Airport, intended to support smaller corporate aircraft, such as twin-engine aircrafts, and the operation of general aviation aircraft for business and pleasure. General Service airports provide most of the system's operational and storage capacity for single and multi-engine piston aircraft. Blairstown Airport provides flight training, and rental and scenic air tours.

Hackettstown Airport (Source: hackettstownairport.com)

Freight/Goods Movement

Trucks

Warren County provides access to high volumes of truck traffic on its network of county, state and interstate routes. The plethora of county routes provide connections to major roadways and local access to industrial, warehousing, commercial, and manufacturing establishments located throughout the county. Routes under State jurisdiction, including NJ 31, NJ 57, U.S. 22, and U.S. 46, provide freight access across the county and larger region. Annual truck ton flows along Interstates 78 and 80 are among the highest in the state. These corridors serve truck traffic both stopping in and passing through Warren County to reach transportation assets and distribution centers in North Jersey, eastern Pennsylvania and beyond. Together, this network of roadways is essential to the continuation of efficiently moving goods throughout the region. Public outreach and discussions with County staff and stakeholders revealed an acute lack of overnight truck parking along the major highway corridors in northern New Jersey, leading to freight haulers to sometimes park overnight in unsafe conditions.

The 2020 *Warren County Light Industrial Site Assessment* introduced earlier in this report aimed to understand the potential long-term impact of warehousing and distribution development in the county. A build-out analysis led to the development of mitigation measures recommended to maintain an efficient level of service, as well as improve safety.

Truck Routes

Truck routes are identified as New Jersey Access Network, National Highway System (NHS), or Trucks Not Permitted. These routes are consistent with NJDOT's Truck Network Map, which identifies the New Jersey Access Network (N.J. Admin Code § 16:32-1.1), a series of routes where double-trailer truck combinations or 102-inch wide trucks are permitted, the NHS (23 U.S. Code § 103), the Federally designated system of major intra- and interstate roadways, and New Jersey's Blue Routes, a series of roadways where trucks are permitted only when making local deliveries (defined in N.J. Admin Code § 16:32).

Both Interstates 78 and 80 are part of the NHS. The New Jersey Access Network includes U.S. 22, U.S. 46, NJ 31, NJ 57, NJ 94 and NJ 122. Trucks are prohibited from NJ 173 in Greenwich Township, CR 521 (north of NJ 94), CR 519 (north of central Frelinghuysen), and CR 519 (south of Alpha Borough).

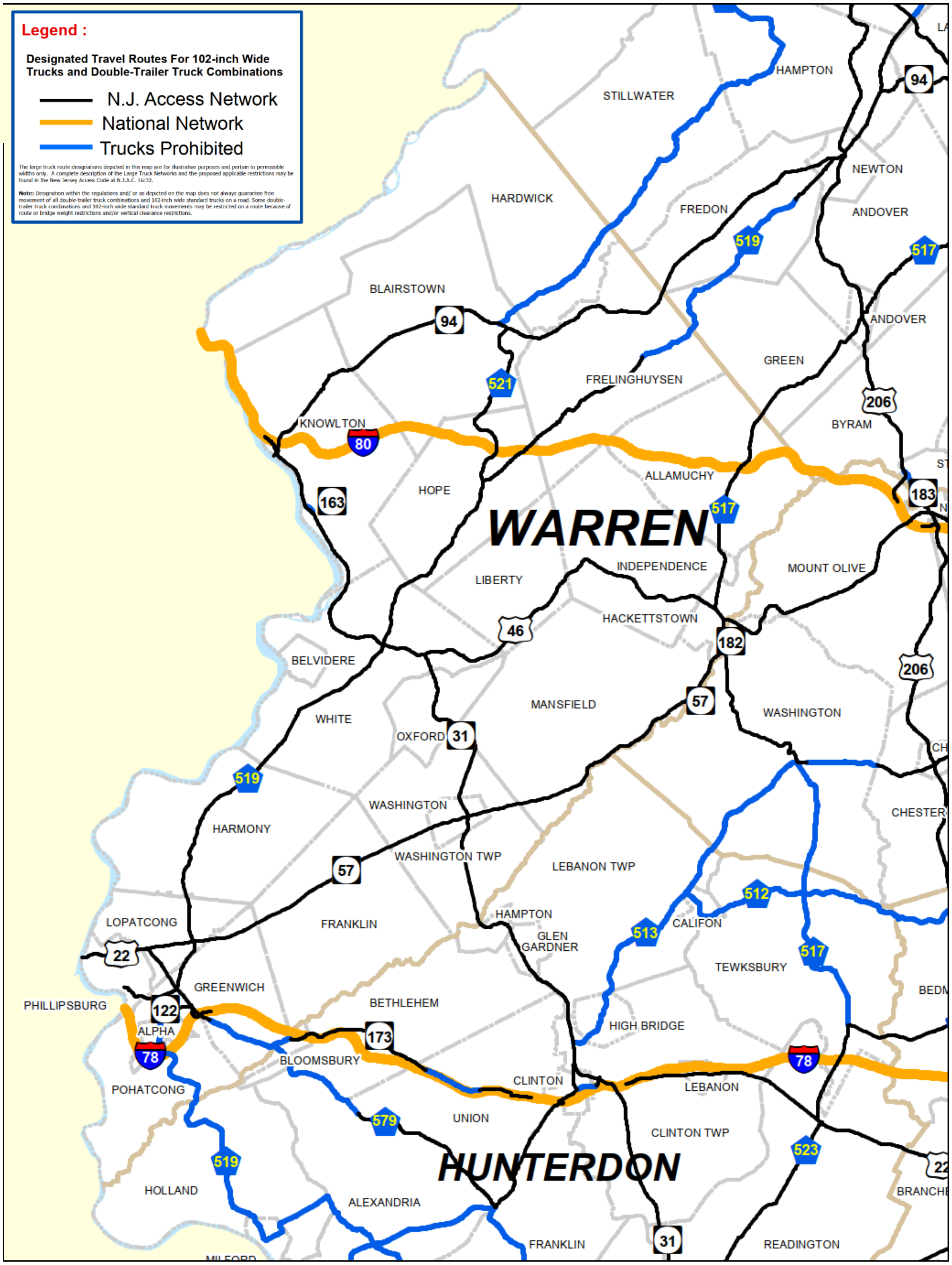
Truck routes in Warren County and surrounding counties are mapped in

Trucks on I-80

Figure 18.

Trucks on I-80

Figure 18: Truck Routes


Legend :
Designated Travel Routes For 102-inch Wide Trucks and Double-Trailer Truck Combinations
N.J. Access Network
National Network
Trucks Prohibited
The large truck route designations depicted in this map are for illustrative purposes and pertain to permissible widths only. A complete description of the Large Truck Networks and the proposed applicable restrictions may be found in the New Jersey Access Code at N.J.A.C. 16:32.
Note: Designation within the regulations and/ or as depicted on the map does not always guarantee free movement of all double-trailer truck combinations and 102-inch wide standard trucks on a road. Some double-trailer truck combinations and 102-inch wide standard truck movements may be restricted on a route because of route or bridge weight restrictions and/or vertical clearance restrictions.
WARREN
HUNTERDON
HAMPTON
STILLWATER
NEWTON
ANDOVER
HARDWICK
FREDON
BLAIRSTOWN
ANDOVER
GREEN
FRELINGHUYSEN
BYRAM
KNOWLTON
ALLAMUCHY
HOPE
INDEPENDENCE
MOUNT OLIVE
LIBERTY
HACKETTSTOWN
BELVIDERE
MANSFIELD
WASHINGTON
WHITE
OXFORD
CHESTER
WASHINGTON
HARMONY
WASHINGTON TWP
LEBANON TWP
HAMPTON
GLEN GARDNER
CALIFON
LOPATCONG
FRANKLIN
TEWKSBURY
GREENWICH
PHILLIPSBURG
ALPHA
BETHLEHEM
HIGH BRIDGE
BLOOMSBURY
CLINTON
LEBANON
POHATCONG
UNION
CLINTON TWP
HOLLAND
ALEXANDRIA
FRANKLIN
READINGTON
94
519
517
206
521
80
183
163
517
46
182
206
57
31
519
57
512
513
517
22
122
173
78
78
579
519
523
31

Freight Rail

Three freight railways provide service in Warren County. This infrastructure is essential to the continued efficient movement of goods throughout the county and beyond. Several projects are underway to improve freight rail movement within the county.

Norfolk Southern operates two lines entering the county in Phillipsburg. Norfolk Southern's principal line extends from Allentown to North Jersey and the Lehigh Line extends from Somerset County, NJ to eastern Pennsylvania. Thirty trains per day use this line, which passes through Alpha before crossing south into Hunterdon County. This line does not serve any local Warren County customers. Norfolk Southern's Portland Secondary line passes through Phillipsburg and runs north along the Delaware River to Brainards where it crosses to Martin's Creek, PA.

The Dover and Delaware River Railroad is a short line railroad operating between Phillipsburg and Hackettstown. The railroad is leasing the Washington Secondary line from Norfolk Southern. Short line railroads include small to mid-sized rail companies operating over a relatively short distance as compared to regional or national rail lines, such as Norfolk Southern. The line connects to Norfolk Southern's Lehigh Line and runs northeast past the Bridgeport 78 Industrial Park to Washington, Port Murray, Rockport and Hackettstown. This railroad has trackage rights beyond Hackettstown over NJ TRANSIT as far as Newark. The route serves local customers in Morris, Passaic and Warren Counties.

The Belvidere & Delaware River Railway is a short line railroad affiliated with the Dover and Delaware River Railroad. The railway connects with Norfolk Southern's Lehigh Line in Phillipsburg and runs south along the Delaware River passing into Hunterdon County at Riegelsville. The railway serves Builder's First Source and Baer Aggregates in Warren County. In addition to freight use, the railway is a partner with the New York Susquehanna and Western Railway Technical and Historic Society in providing tourist passenger train service to 75,000 visitors in Phillipsburg annually.

All rail lines in Warren County are cleared for Plate F railcars and can accommodate railcars up to 286,000 pounds (286K), which is the industry standard, except for east of Hackettstown on the Washington Secondary. To improve the suitability of rail service in Warren County, a study was conducted to explore improvements to the Hackettstown drainage bridge, which cannot accommodate the 286K rail cars. The drain runs under the railroad track at Third Avenue and Moore Street in Hackettstown and is essential to allow stormwater to flow underneath the track. The study recommended replacing the slab with precast slab panels. The Norfolk Southern Lehigh Line is cleared for double-stack intermodal trains.

Scenic Byways and Points of Interest

Warren County possesses a network of scenic and cultural corridors and points of interest. In addition to the county's vast trails network elaborated upon on page 4, a network of scenic byways and cultural and historical points of interest contribute to tourism in Warren County. The trail network provides scenic views traversing mountaintops and mountainsides, inactive railroad and river corridors, lakesides, and the historic Morris Canal. Additionally, several corridors present scenic byways for cyclists and motorists to view the county's beautiful natural landscapes.

CR 632 (Asbury Anderson Road), Port Murray, Mansfield Township

Scenic Byways

The NJDOT has designated eight scenic byways throughout the state. These byways "highlight transportation corridors that have outstanding scenic, natural, recreational, cultural, historic or archaeological significance…represent[ing] the uniqueness and diversity of the state," according to NJDOT.

The Warren Heritage Scenic Byway travels 19 miles along NJ 57 between Greenwich Township and Hackettstown. The route follows a trail first established by the Lenni Lenape Indians to connect camp sites and villages with hunting and fishing grounds. The route was subsequently used by Europeans as they arrived on horseback and in wagons to settle in the region. The route is locally known for its scenic Highlands setting, rolling fertile valleys and streamside views traversing the region's distinctive mountains ridges, and three stream watersheds. The byway also provides views of the historic Morris Canal, designated a Historic Civil Engineering Landmark.

Warren Heritage Scenic Byway Corridor Management Plan (2011)

The 2011 *Warren Heritage Scenic Byway Corridor Management Plan* described the special qualities of the Route 57 Scenic Byway. The byway runs through Greenwich Township, Franklin Township, Washington Borough, Washington Township, and Mansfield Township to Hackettstown. Lopatcong Township was included in the study but the Township declined to officially designate its section of the highway as a scenic byway. This plan outlines strategies for preservation, enhancement, and interpretation of the corridor's unique resources, and sets forth a vision for the future of the byway along with practical steps to better publicize its special features to visitors. The Corridor Management Plan was developed through a collaborative working group representing local officials, County agencies, NJDOT, civic groups, and non-profit organizations with an interest in the area's heritage.

This plan identified goals and strategies for preserving and enhancing the corridor's unique qualities, improving access and transportation, developing a sign program, interpreting byway resources, and encouraging tourism. These actions will require coordination among a variety of organizations over a period of several years. An institutional survey was conducted for the plan which identified initiatives and resources for implementation.

Since the plan was completed, the County has worked with NJDOT to create a scenic byway logo and branding and coordinated tourism promotion with wayfinding efforts. A Warren Heritage Scenic Byway Committee composed of municipal, county, state, and non-profit representatives was formed. The committee's efforts thus far have included extending the scenic byway north into Waterloo Village in Sussex County and south to Union Square in Phillipsburg. Additionally, NJDOT has developed and implemented a process for monitoring compliance with outdoor advertising strategies along the corridor.

Ongoing work includes supporting efforts to preserve, protect, and link Morris Canal sites, and support preservation efforts by local historical societies. The county also continues to support local farming and farmland/open space preservation, initiatives to protect environmental quality, and implementation of the Musconetcong River Management Plan.

Points of Interest

Warren County is home to an array of state and federally recognized historic properties and districts — 29 individually recognized properties and 1601 properties that are part of 22 historic districts. Each of these sites represent a tourist attraction and many provide pedestrian or cycling connections with scenic trails. Notable points of interest and historic sites include:

- Morris Canal, including Port Warren (Inclined Plane 9 west), Bread Lock Park (Lock 7), Saxton Falls, Allamuchy Mountain State Park
- Oxford Industrial Historic District including Shippen Manor and Oxford Furnace
- Old Mine Road Historic District
- Blair Presbyterian Academy
- Asbury Historic District
- Delaware River Water Gap/Mount Tammany, Delaware River Water Gap National Recreational Area
- White Lake
- Centenary University
- Merrill Creek Reservoir
- Van Nest Farmstead
- Belvidere Historic District
- Great Meadows
- Hackettstown Business District
- Warren County Farmers Fair and Fairgrounds

Warren County is home to several breweries and wineries that act as points of interest, drawing visitors from outside the county. Breweries include brewpubs, restaurants serving beer made on-site with their meals. State legislation in 2012 enhanced the ability for microbreweries to operate in the state, allowing locations brewing less than six million barrels per year to sell beer by the glass in taprooms, or in cans, growlers and keys to-go. Brewpubs can also sell to liquor stores and other restaurants. Warren County's rural landscape also caters to wineries. These businesses tend to utilize locally-grown resources with some offering tours and catering to all-day or multi-day tourist trips.

Shippen Manor, Oxford Township

4. Scenario Planning

Scenario Planning Overview

A scenario planning exercise was conducted to help understand and prepare for anticipated changes and growth, using a comprehensive community-based planning process to gather and evaluate comments and concerns from the wide variety of Warren County stakeholders. Scenario planning is an analytical tool that can help decision makers and stakeholders understand and prepare for what lies ahead. Scenario-based methodologies provide a platform for evaluating a range of potential outcomes, visions and investment scenarios by testing a mix of infrastructure, demographic, land use and/or policy changes.

This process actively involves the public, the business community, and elected officials on a broad scale, educating them about growth trends and trade-offs, and incorporating their values and feedback into future planning initiatives.

This type of inclusive collaborative process is essential to identifying the issues, interests, needs, and priorities unique to those who live, work, and conduct business in Warren County, and helps shape its future.

The scenario planning exercise draws upon the existing conditions analysis, assessment of trends and changes, and collaboration with stakeholders. This scenario planning exercise evaluated several development patterns to determine how each impacts the roadway network. Based on the modeling scenarios, the county, stakeholders and local businesses can contribute to actions to mitigate projected negative traffic impacts. Although the county does not have control over many aspects of land use development, there are steps the county and its municipalities can take to shape how communities develop and grow.

Beyond what is included in the following pages, more detailed modeling and analysis information is provided in Technical Memo 3 in Appendix B.

Planning Tool Refinement

To better evaluate the impacts of proposed light industry development in Warren County, modifications were made to the base traffic analysis zone system and the highway network. These changes were made primarily to include the 15 additional TAZ zones, each representing the location of the proposed industrial sites as discussed below. One of the 14 sites was determined to be unbuildable and thus removed from consideration and further analysis.

Figure 19 maps the location of the 14 potential light industrial sites. Table 9 presents a list of the 14 sites, their municipality, zoning district, and total lot area.

Figure 19: Identified Industrial Sites and NJRTM-E Traffic Analysis Zones

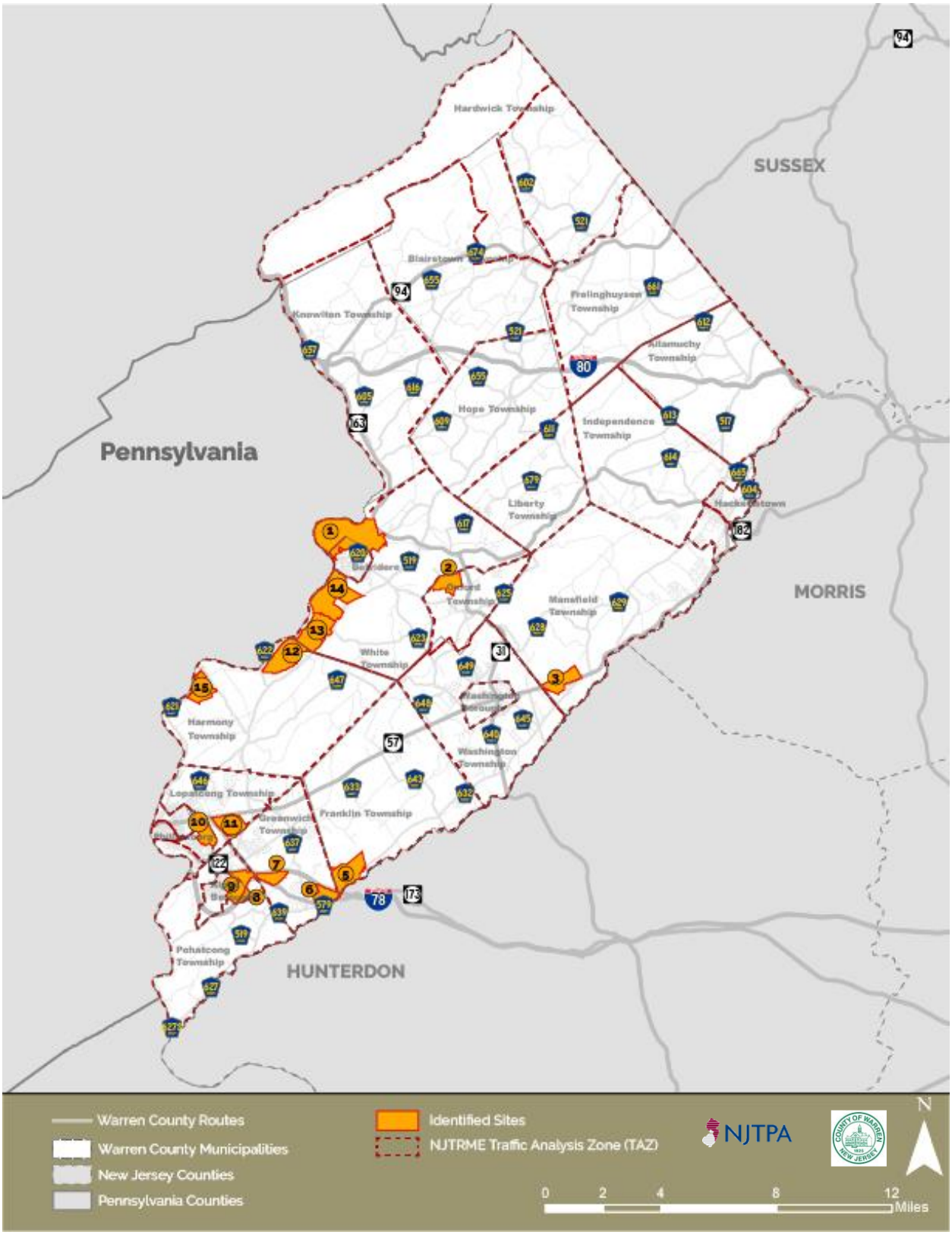


Table 9: Identified Light Industrial Sites

Site ID	Municipality	Zoning	Total Area (Acres)	Potential (1,000 Sq. Ft.)	Modeled (1,000 Sq. Ft.)
1	Belvidere	LM - Light Manufacturing	283.2	8,174	500
	White	I - Industrial	1260.7		
2	Oxford	I - Industrial	49.0	1,332	100
	Oxford	I - Industrial, O & LI - Office and Light Industrial	66.6		
	Oxford	I - Industrial, LI - Light Industrial	186.2		
3	Mansfield	I - Industrial	356.0	962	100
4	Franklin	I - Industrial	141.3	968	0
5	Franklin	I - Industrial, IP-A - Industrial Park	89.8	3,413	1,700
	Franklin	I - Industrial, IP-A - Industrial Park	444.7		
6	Greenwich	ROM - Research, Office & Manufacturing	246.9	980	1,000
7	Greenwich	RO - Research, Office	199.7	658	650
8	Alpha	I - Industrial	71.6	694	175
9	Pohatcong	I - Industrial	146.0	1,123	1,863
	Alpha	I - Industrial	239.0		
10	Phillipsburg	I - Industrial, Phillipsburg Commerce Park Redevelopment Area	384.6	5,672	4,300
11	Lopatcong	ROM -Research, Office & Manufacturing	376.2	1,648	1,100
12	Harmony	I - Industrial	623.9	5,066	500
13	White	LDI -Low Density Industrial	622.8	4,877	2,600
14	White	I - Industrial	943.3	5,750	575
15	Harmony	I - Industrial	369.0	4,073	400
TOTAL			6817.3	37,216	15,063

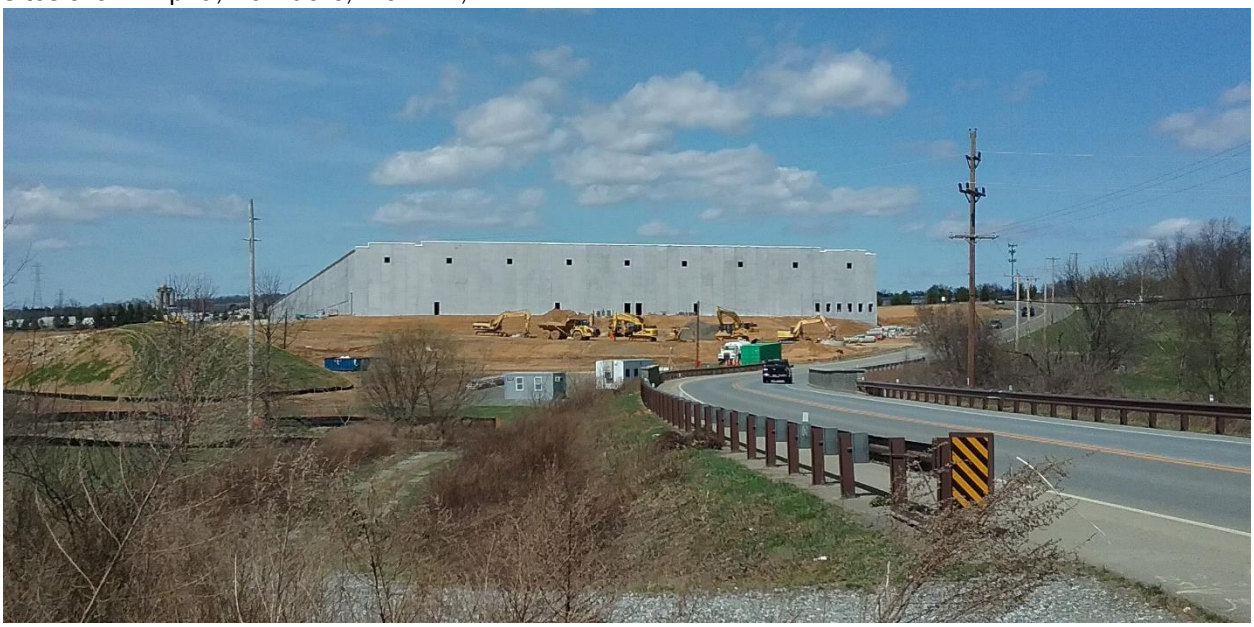
Source: Warren County

Scenario Alternatives

Based on the data review, demographic assumptions and evaluation of light industrial sites detailed in the *Warren County Light Industrial Site Assessment*, several scenario alternatives were developed. If developed, these potential light industrial sites could have a significant impact on Warren County's future and the WCTP scenario planning process sought to describe and understand what may happen, the potential impacts and benefits, and how Warren County can prepare through specific planning and policy initiatives, and multimodal transportation improvements.

Warren County's location in the region and proximity to Interstates 78 and 80 position the county as a desirable center for warehouse development and the related need for freight and goods movement by truck. According to the *Warren County Light Industrial Site Assessment*, 14 sites with the potential for industrial development were identified, with the potential for over 4,000 acres and over 45 million square feet of gross floor area. These sites are in Alpha, Belvidere, Franklin, Greenwich, Harmony, Lopatcong, Mansfield, Oxford, Phillipsburg, Pohatcong, and White.

Based on zoning, site constraints, accessibility, proximity to regional interstate highways, and other factors including those sites already formally proposed or under construction, about one-third of this total was projected for the purposes of the WCTP and scenario planning process, for a total of 15.563 million square feet. Site 4 was determined to be not viable, leaving the remaining 14 eligible light industrial sites, with most at a much lower scale of buildout than the initially estimated full potential. The WCTP scenario planning process is therefore based on an assumption of 15.563 million square feet of light industrial development compared to the initial estimate for 45 million square feet included in the *Warren County Light Industrial Site Assessment*. Table 10 presents the list of sites with developable area, gross floor area and number of anticipated on-site jobs.



Development on Strykers Road, Lopatcong

Table 10: 2045 Employment Estimates per Site

Site ID	Total Area (Acres)	Developable Area (Acres)	Potential Gross Floor Area (1,000 SQFT)	Modeled Gross Floor Area (1,000 SQFT)	Employment (# of jobs)*
1	1,543.9	809.2	8,175	500	4,088
2	301.7	152.9	1,332	100	666
3	356.0	88.3	962	100	481
4	141.3	88.9	968	0	484
5	534.5	313.4	3,413	1,700	1,707
6	246.9	149.9	980	1,000	490
7	199.7	151.2	658	650	329
8	71.6	53.1	694	175	347
9	385.0	143.8	1,123	1,863	562
10	384.6	325.5	5,672	4,300	2,836
11	376.2	189.2	1,648	1,100	824
12	623.9	387.7	5,066	500	2,533
13	622.8	559.8	4,877	2,600	2,439
14	943.3	660.0	5,750	575	2,875
15	369.0	311.7	4,073	400	2,037

*based on 2,000 square feet per employee

For the purposes of the scenario planning, new light industrial jobs are anticipated to be filled by three population groups:

- Existing residents, which would not add new population or households to Warren County
- Residents from neighboring counties and regions including Pennsylvania's Lehigh Valley, which would not add new population or households to Warren County
- New resident (and households) moving to Warren County to fill newly generated jobs

This study assumes a 50-50 split, with half of the jobs being filled by existing residents and the other half by new residents (and households) moving to Warren County.

The NJTPA projections for employment, population, and households for 2045 indicate that Warren County features a slightly smaller household size (2.41 per household in Warren County versus 2.66 for the NJTPA region) and generates fewer new jobs per resident (0.34 jobs per resident versus 0.46) than the NJTPA region as a whole.

The National Association for Industrial and Office Parks (NAIOP) and Institute of Traffic Engineers (ITE) include trip generation estimates based on industry experience with recent and historical development projects and actual counts of new jobs and trips generated. The potential Warren County development sites listed in Table 10 are anticipated to include a mix of conventional warehousing and e-commerce fulfillment centers.

In consultation with the NJTPA and Warren County, a mix of 60 percent conventional, 40 percent fulfillment was agreed to; based on this development mix and NAIOP and ITE trip generation data, an estimate of one new job per 2,220 square feet was used. Based on these data and estimates, the projected 15.563 million square feet of new light industrial development is anticipated to

generate 7,010 new jobs, 8,716 new residents, and 3,616 new households in Warren County through 2045. Fulfillment industrial sites include those receiving, packaging and shipping goods but do not manufacture goods on-site.

Furthermore, the Centers-Based and Warren County Blend scenarios were also modeled under additional build conditions, elaborated upon toward the end of this chapter.

The following sections provide the assumptions, performance measure results and conclusions for each of the scenarios.

A summary of the results of each of the scenarios is shown in Table 11.

Table 11: Scenario Results

Population	Households	Employment	Auto Daily Person Trips (includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles Traveled (VMT	Vehicle Hours of Travel (VHT)
2020 Existing								
110,763	44,426	37,163	7,201,511	910.37	22.04	9.48	3,883,819	100,627
2045 Baseline								
120,404	49,949	41,461	7,201,511	980.86	21.65	9.21	4,485,471	116,736
2045 Logistics Hub								
126,881	52,636	46,670	7,241,178	983.00	21.73	9.23	4,445,990	119,488
2045 Centers-Based								
126,881	52,636	46,670	7,463,225	1,002.78	21.81	9.27	4,585,634	122,109
2045 Warren County Blend								
126,881	52,636	46,670	7,377,829	1,030.93	21.83	9.29	4,515,147	120,681
2045 Centers Build								
126,881	52,636	46,670	7,266,212	1,189,79	21.3	9.26	4,456,043	118,960
2045 Warren County Blend Build								
126,881	52,636	46,670	7,162,883	1,226.62	21.35	9.32	4,379,859	117,796

NJ 57, Washington Borough

Baseline Scenarios

2020 Existing Baseline Scenario

Scenario planning for the WCTP begins with the 2020 Existing Scenario which represents the reference point for comparison with all future scenario alternatives. The analysis looks at what happens to travel conditions as population grows and new jobs are created. It will also consider whether traffic congestion spreads to new corridors and intersections and what mix of improvement projects is recommended to maintain system performance through the year 2045. The 2020 Existing Scenario includes 44,426 households, 110,763 people and 37,163 jobs.

2045 Baseline Scenario

The 2045 Baseline Scenario represents one reference point for comparison with all future scenario alternatives, indicating what would happen to travel conditions in the region if no new plans, policies, programs, or projects are introduced beyond what has already been approved and adopted within the 2045 timeframe.

The 2045 Baseline scenario is based on the following assumptions:

- Current trend line of population growth and development patterns for Warren County and the NJTPA region
- NJTPA demographic projections for population, households, and employment
- Includes only the approved NJTPA Transportation Improvement Program (TIP) and Plan 2045 roadway and transit improvements (see Table 12)
- Includes the three new light industrial projects under construction and/or approved within the 2045 timeframe (Alpha Industrial Ave/Edge Rd; Phillipsburg I-78 Logistics Park; Lopatcong-Strykers Road)
- These new jobs are allocated to the municipalities where the three proposed Baseline light industrial sites are located, and the new population and households are allocated proportionately to each Warren County municipality, based on their current share of the overall county population

Based on these data and estimates, the Warren County Baseline Scenario projects 3.99 million square feet of new light industrial development with 1,801 new jobs, 2,239 new residents, and 929 new households. These are part of the projected 120,404 population, 49.949 households and 41,461 jobs.

Table 12: Programmed NJTPA TIP and LRP Projects

Project Name	Project Type
Route 31, Bridge over Furnace Brook	Bridge Replacement
Route 31, Franklin Road (CR 634) to Route 46	Resurfacing
Route 46, Route 80 to Walnut Road	Pavement Reconstruction
Route 57, Bridge over Branch Lopatcong Creek	Bridge Replacement
Route 57 & CR 519	Intersection Improvement
Route 78, Route 22 to Drift Road/Dale Road	Intelligent Transportation Systems
Route 80, WB Rockfall Mitigation	Stabilize Rock Outcrop
Route 94, Bridge over Jacksonburg Creek	Bridge Replacement

2045 Baseline vs. 2020 Existing Performance

The travel demand model performance measures for the 2045 Baseline reflect additional travel demand and traffic congestion commensurate with the projected increase in demographic inputs (population, households, and employment) based on the NJTPA demographic projections and the three light industrial projects currently under construction, yielding an 8.7 percent increase in population, 12.4 percent increase in households, and 11.6 percent increase in employment compared with 2020 demographics.

Compared to the 2020 Existing Scenario, the 2045 Baseline experiences small decreases in average speed and average trip length; increases of 15.5 percent and 18.2 percent in total vehicle miles traveled (VMT) and total vehicle hours traveled (VHT); with VMT and VHT per capita projected to increase moderately by 6.2 percent and 8.8 percent, respectively.

Data points for the two scenarios are shown in Table 13.

Table 13: 2020 Existing vs. 2045 Baseline

Population	Auto Daily Person Trips (Includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Avg. Trip Length (miles)	Vehicle Miles of Travel (VMT)	VMT per Capita	Vehicle Hours of Travel (VHT)	VHT per Capita
2020 Existing								
110,763	7,201,511	910.4	22.0	9.5	3,883,819	35.1	100,627	0.91
2045 Baseline								
120,404	7,300,406	979.4	21.7	9.2	4,485,471	37.3	118,906	0.99
% Change								
8.7%	1.4%	7.6%	-1.4%	-2.4%	15.5%	6.2%	18.2%	8.7%

The NJTPA travel demand models also forecast an increasing impact to Warren County's state, county, and local roadways through 2045. The share of VMT on freeways and expressways drops by a small amount from 59 percent in 2020 Existing to 58 percent for 2045 Baseline, the beginnings of a shift in travel from higher to lower functional classification roadways. A similar pattern of diversion in travel and congestion has also been observed in regional and countywide planning studies for other NJTPA counties. As demand and congestion on higher functional classification roadways grow, some travel migrates down to lower functional classification roadways, as travelers seek less congested travel routes, which could impact smaller towns and communities.

Overall, the 2045 Baseline forecasts that Warren County residents and workers will be traveling more miles and more hours, taking longer trips at slightly lower speeds, and traveling more on lower functional classification roadways than they do today. Data points for the two scenarios by roadway classification are shown in Table 14.

Table 14: 2020 Existing vs. 2045 Baseline by Roadway Classification

Vehicle Miles of Travel (VMT)	VMT per Capita	Freeways + Expressways	% of Total	Principal Arterials	% of Total	Major Arterials	% of Total	Minor Arterials / Collectors / Locals	% of Total
2020 Existing									
3,883,819	35.1	2,275,242	59%	673,925	17%	390,093	10%	544,558	14%
2045 Baseline									
4,485,471	37.3	2,614,286	58%	798,312	18%	444,380	10%	628,493	14%
% Change									
15.5%	6.2%	14.9%		18.5%		13.9%		15.4%	

The data shows that the potential benefits of newly projected reduced population growth rate and resulting changes in travel are counterbalanced by the higher than anticipated growth in employment. These trends have similar consequences for travel demand and congestion, projecting a smaller increase in congestion than forecast by the 2018 Transportation Technical Study.

Washington Boro

2045 Logistics Hub Scenario

The Logistics Hub Scenario assumes the projection of the 14 eligible sites from the emerging trend of light industry development proposed in areas of Warren County with available land and or/compatible zoning, compared to the three sites for the 2045 Baseline, as documented in Table 13 above. The Logistics Hub Scenario balances the benefits of opportunity — new jobs and economic development — with the traffic and congestions impacts of more workers, large trucks and delivery vehicles on the county's transportation network.

The 2045 Logistics Hub Scenario is derived from similar assumptions as the 2045 Baseline but includes all 14 of the potential sites. This scenario assumes:

- Current trend line of growth and development patterns for both Warren County and the overall NJTPA region
- NJTPA demographic projections for population, households, and employment
- Includes only transit and road improvements in the NJTPA TIP and Plan 2045
- Includes the 14 potential light industrial sites
- Similar to the Baseline, these new jobs are allocated to the municipalities where the proposed light industry sites are located, and the new population and households are allocated proportionately to each Warren County municipality, based on their current share of the overall County population.

Based on these data and estimates, the Warren County Logistics Hub Scenario projects 15.563 million square feet of new light industrial development with 7,010 new jobs, 8,716 new residents, and 3,616 new households

2045 Logistics-Hub Performance

The travel demand model performance measures for the 2045 Logistics Hub reflect additional travel demand and traffic congestion commensurate with the projected increase in demographic inputs (population, households, and employment). Based on the NJTPA demographic projections and the 14 light industrial projects projected to be built within the 2045 timeframe, this yields a 14.6 percent increase in population, 18.5 percent increase in households, and 25.6 percent increase in employment compared to 2020.

The 2045 Logistics Hub experiences similar changes in performance as the 2045 Baseline Scenario when compared to 2020: small decreases in average speed and average trip length (-1.4 percent and -2.6 percent, respectively); increases of 14.5 percent and 18.7 percent in total VMT and total VHT; with per capita almost unchanged (-0.1 Percent decrease), and a moderate increase in VHT per capita (3.7 percent).

Data points for the 2045 Logistics Hub and 2045 Baseline scenarios are shown in Table 15.

Table 15: 2045 Logistics-Hub vs. 2045 Baseline

Population	Auto Daily Person Trips (Includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles of Travel (VMT)	VMT per Capita	Vehicle Hours of Travel (VHT)	VHT per Capita
2045 Baseline								
120,404	7,300,406	979.4	21.7	9.2	4,485,471	37.3	118,906	0.99
2045 Logistics-Hub								
126,881	7,241,178	983.0	21.7	9.2	4,445,990	35.0	119,488	0.94
% Change vs 2045 Baseline								
5.4%	0.8%	0.4%	0.0%	-0.1%	-0.9%	-5.9%	0.5%	-4.6%
% Change vs 2020 Existing								
14.6%	0.6%	8.0%	-1.4%	-2.6%	14.5%	-0.1%	18.7%	3.7%

The NJTPA travel demand models for the Logistics Hub forecast a more substantial impact than the Baseline to Warren County's state, county, and local roadways through 2045. The share of VMT on freeways and expressways drops from 58.6 percent in 2020 Existing to 58.1 percent for 2045 Baseline to 56.3 percent for 2045 Logistics Hub, a more than 2 percent change. As demand and congestion on higher functional classification roadways grow, increasing levels of travel are forecast to migrate down to lower functional classification roadways, as travelers seek less congested travel routes, which could impact Warren County's smaller towns and communities. The additional demand created by the 14 light industrial sites for the Logistics Hub and the associated population growth have a much greater net effect than the three sites used in the 2045 Baseline. Local communities would see increased traffic and a measurable share of travel would shift to the lower classification roadways.

Data points for the 2045 Logistics Hub scenario by roadway classification are shown in Table 16.

Front Street, Belvidere Town

Table 16: 2045 Logistics-Hub by Roadway Classification

Vehicle Miles of Travel (VMT)	VMT per Capita	Freeways + Expressways	% of Total	Principal Arterials	% of Total	Major Arterials	% of Total	Minor Arterials / Collectors / Locals	% of Total
2045 Baseline									
4,485,471	37.3	2,614,286	58%	798.312	18%	444,380	10%	628,493	14%
2045 Logistics Hub									
4,445,990	35.0	2,501,305	56%	805,980	18%	461,457	10%	677,249	15%
% Change vs Baseline									
-0.9%	-5.9%	-4.3%		-1.0%		3.8%		7.8%	

Overall, the 2045 Logistics Hub forecasts that Warren County residents and workers will be traveling more miles and more hours at lower speeds and traveling significantly more on lower functional classification roadways than they do today.

Any potential benefits of the newly projected reduced population growth rate are forecast to be overtaken by the higher than anticipated employment growth, creating new population and households, and causing measurable impacts regarding travel demand, congestion, and travel burden on lower functional classification roadways by 2045.

Garret Wall, Belvidere Town

2045 Centers-Based Scenario

The Centers-Based Scenario examines the potential of targeting new population and households to existing centers rather than continuing patterns of decentralization across lower density areas — such as farmlands or other undeveloped lands — lacking adequate infrastructure.

The Centers-Based Scenario is derived from similar assumptions as the Logistics Hub, and also includes the 14 potential light industrial sites. This scenario assumes:

- Current trend line of growth and development patterns for both Warren County and the overall NJTPA region
- NJTPA demographic projections for population, households, and employment
- Includes only the road and transit improvements in the NJTPA TIP and Plan 2045
- Includes the 14 potential light industrial sites
- In contrast to the Baseline and Logistics Hub, however, these new jobs are allocated to the municipalities with the greatest potential to benefit from sustainable smart growth development and housing principles, rather than on a proportional basis. These include Belvidere, White Township, Greenwich, Washington Township, Washington Borough, Phillipsburg, Hackettstown, Lopatcong, Pohatcong, Alpha Borough, Oxford Borough

Based on these data and estimates, the Warren County Centers-Based scenario includes the same projected totals as the Logistics Hub: 15.563 million square feet of new light industrial development, 7,010 new jobs, 8,716 new residents, and 3,616 new households.

This scenario also recognizes that many of the new jobs created by light industrial development are lower- or moderate-wage jobs, and therefore most likely to attract workers from a relatively short commute area, as opposed to higher paying jobs which may be more likely to attract longer-commuting workers.

Rather than the proportional allocation pattern of the Baseline and Logistics Hub scenarios, new population and households are instead allocated primarily to municipalities with:

- Existing centers or walkable downtowns
- Potential to reduce new vehicular travel and use multimodal networks
- Attract employees from a relatively nearby commute area, with proximity to one or more of the proposed 14 light industrial sites

Easton-Phillipsburg Toll Bridge

2045 Centers-Based Performance

Similar to the 2045 Logistics Hub, the travel demand model performance measures for the Centers-Based Scenario reflect additional travel demand commensurate with the projected increase in demographic inputs (population, households, and employment). Based on the NJTPA demographic projections and 14 light industrial projects, this scenario yields a 14.6 percent increase in population, 18.5 percent increase in households, and 25.6 percent increase in employment compared to 2020.

However, in contrast to the 2045 Logistics Hub performance, the Centers-Based Scenario demonstrates the benefits of smart growth land use strategies through targeting new population and households to existing centers rather than continued decentralization across lower density areas. Changes in performance include higher average speeds and more non-motorized trips than Logistics Hub.

Data points for the 2045 Centers-Based and 2045 Baseline scenarios are shown in Table 17.

Table 17: 2045 Centers-Based vs. 2045 Baseline

Population	Auto Daily Person Trips (Includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles of Travel (VMT)	VMT per Capita	Vehicle Hours of Travel (VHT)	VHT per Capita
2045 Baseline								
120,404	7,300,406	979.4	21.7	9.2	4,485,471	37.3	118,906	0.99
2045 Centers-Based								
126,881	7,463,225	1,002.8	21.8	9.3	4,585,634	36.1	122,109	0.96
% Change vs 2045 Baseline								
5.4%	2.2%	2.4%	0.4%	0.2%	2.2%	-3.0%	2.7%	-2.5%
% Change vs 2045 Baseline								
14.6%	3.6%	10.2%	-1.0%	-2.2%	18.1%	3.1%	21.3%	5.9%

The NJTPA travel demand models for the Centers-Based Scenario also project significantly less impact to Warren County's state, county, and local roadways than the Logistics Hub, cutting in half the shift in VMT from freeways and expressways to lower functional classification arterials, collectors, and local streets. Much less VMT is forecast to migrate down to lower functional classification roadways, due to the benefits of targeted population growth being located closer to new employment opportunities.

Data points for the 2045 Centers-Based Scenario by roadway classification are shown in Table 18.

Table 18: 2045 Centers-Based by Roadway Classification

Vehicle Miles of Travel (VMT)	VMT per Capita	Freeways + Expressways	% of Total	Principal Arterials	% of Total	Major Arterials	% of Total	Minor Arterials / Collectors / Locals	% of Total
2045 Baseline									
4,485,471	37.3	2,614,286	58%	798,312	18%	444,380	10%	628,943	14%
2045 Centers-Based									
4,585,634	36.1	2,624,144	57%	822,415	18%	460,861	10%	678,214	15%
% Change vs Baseline									
2.2%	-3.0%	0.4%		3.0%		3.7%		7.9%	

Although the newly projected reduced population growth rate is forecast to be overtaken by the higher than anticipated growth in employment, concentrating population growth in more densely populated centers can help mitigated increases in congestion and shifts to lower functional classification roadways.

Farm and Hill Landscape in Warren County

2045 Warren County Blend Scenario

The Blend Scenario combines the most beneficial elements of the Logistics Hub and the Centers-Based scenarios. It includes the anticipated growth in Warren County's light industrial sector and targets the associated growth in population and households to just six municipalities (compared to the 11 in Centers-Based) that are both closer to these new jobs and that afford the greatest potential to benefit from center-based development and multimodal travel networks, providing an opportunity to mitigate new travel demand and congestion.

- The 2045 Blend Scenario's more targeted approach assumes: Current trend line of growth and development patterns for both Warren County and the overall NJTPA region
- NJTPA demographic projections for population, households, and employment
- Includes only road and transit improvements included in the NJTPA TIP and Plan 2045
- Includes the 14 proposed light industry projects
- Targets the new population and households generated by light industrial sector growth to the six most viable centers-based municipalities: Belvidere, White Township, Pohatcong, Alpha Borough, Washington Borough, and Phillipsburg

2045 Warren County Blend Performance

Similar to the 2045 Logistics Hub and Centers-Based scenarios, the travel demand model performance measures for the 2045 Warren County Blend reflect additional travel demand commensurate with the projected increase in demographic inputs (population, households, and employment) based on the NJTPA demographic projections and the 14 light industrial sites. This yields a 14.6 percent increase in population, 18.5 percent increase in households, and 25.6 percent increase in employment compared to 2020.

The Blend realizes some but not all the potential benefits of smart growth land use strategies through targeting new population and households to existing centers rather than continued decentralization across lower density areas. The Blend recoups some of the degradation in performance experienced from 2020 to 2045 due to new population, household, and employment growth, and features the best overall 2045 performance for average speed. The Blend also generates fewer daily auto person trips and more non-motorized trips than the Centers-Based.

Data points for the 2045 Blend and 2045 Baseline scenarios are shown in Table 19.

Table 19: 2045 Blend vs. 2045 Baseline

Population	Auto Daily Person Trips (Includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles of Travel (VMT)	VMT per Capita	Vehicle Hours of Travel (VHT)	VHT per Capita
2045 Baseline								
120,404	7,300,406	979.4	21.7	9.2	4,485,471	37.3	118.906	0.99
2045 Blend								
126,881	7,377,829	1,030.93	21.8	9.3	4,515,147	35.6	120.681	0.95
% Change vs Baseline								
5.4%	1.1%	5.3%	0.5%	0.5%	0.7%	-4.5%	1.5%	-3.7%
% Change vs Baseline								
14.6%	2.4%	13.2%	-0.9%	-2.0%	16.3%	1.5%	19.9%	4.7%

However, the benefit to lower functional classification roadways in Warren County is not as fully realized as the Centers-Based Scenario, with some degradation to the lower classification roadways.

Additional land use, multimodal, and transit enhancement would be required to fully realize the benefits of the Blend Scenario. In the absence of these, travel demand models indicate that the Centers-Based, with a more diverse targeting of new population and households across a greater number of existing centers, yields better performance and recoups more of the degradation in performance over the 25-year analysis timeframe than any of the other 2045 scenario alternatives.

A similar pattern of growing travel demand and congestion was observed in long range planning studies in other New Jersey counties, which demonstrated that increased density alone could not adequately realize the desired benefits of reduced trip-making, congestion mitigation, travel mode shifts, and reduced VMT impact to lower-classification roadways. Rather density changes and centers-based development patterns must be paired with enhanced mode choice and improved multimodal networks to achieve long term benefits and mitigate costly roadway widenings, new bridges, and large-scale construction projects.

Data points for the 2045 Blend Scenario by roadway classification are shown in Table 20.

Table 20: 2045 Blend vs. 2045 Baseline by Roadway Classification

Vehicle Miles of Travel (VMT)	VMT per Capita	Freeways + Expressways	% of Total	Principal Arterials	% of Total	Major Arterials	% of Total	Minor Arterials / Collectors / Locals	% of Total
2045 Baseline									
4,485,471	37.3	2,614,286	58%	798,312	18%	444,380	10%	628,493	14%
2045 Blend									
4,515,147	35.6	2,542,615	56%	823,774	18%	465,023	10%	683,735	15%
% Change vs Baseline									
0.7%	1.5%	-2.7%		3.2%		4.6%		8.8%	

Build Scenarios

Two additional 2045 scenarios were developed to test the potential for highway and multimodal improvement projects and evaluate their ability to mitigate the degradation in performance experienced under the 2045 scenario alternatives. These include:

- Centers-Based: Build Version, and
- Warren County Blend: Build Version

These scenarios assume the completion of several transportation improvement projects, also included in the previously discussed Logistics, Centers-Based and Blended scenarios. These proposed projects were developed based on a combination of factors, including:

- Consensus Goals and Vision (Tech Memo 1)
- Multimodal system performance assessment (Tech Memo 2)
- Comments, concerns, and suggestions from the WCTP community engagement and outreach
- Previous plans and studies
- *Warren County Light Industrial Site Assessment*
- Collaboration with Warren County and Steering Committee

Based on these variables, as well as the results from the 2045 scenarios, two further substantial potential improvements were incorporated into the model (detailed below) to determine their impact on the larger transportation network:

- Widening of Belvidere Road from two to four lanes
- Implementation of a shuttle/jitney service via CR 519 and CR 632

The route for the potential shuttle/jitney service was selected with the aim of connecting existing population centers with anticipated light industrial sites. NJRTM-E data indicate a worsening of congestion on three segments of Belvidere Road; all located adjacent to several of the new light industrial sites. In the model, Belvidere Road was widened along three contiguous segments:

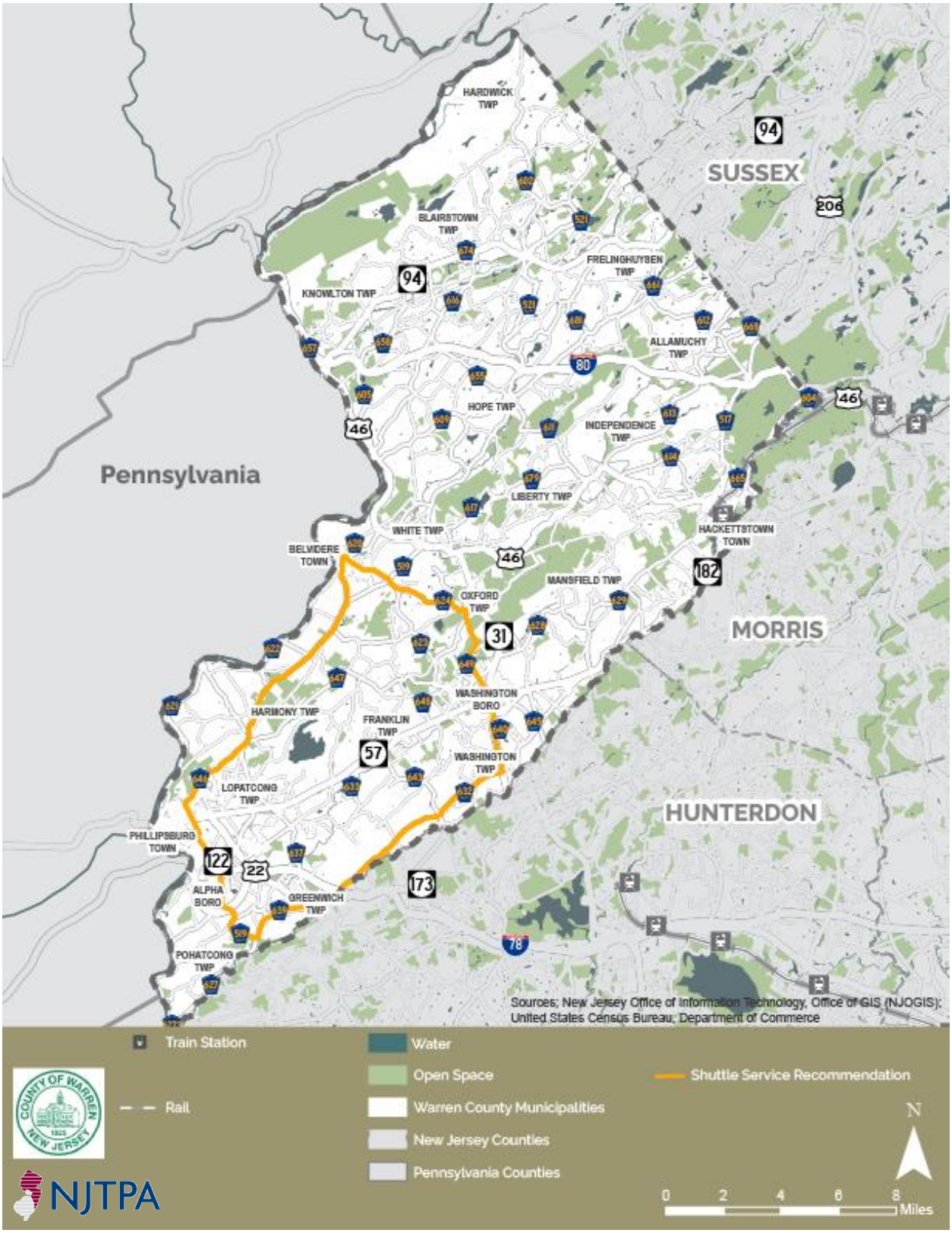
- CR 646 Belvidere Rd – Roseberry Street, Phillipsburg to CR 519
- CR 519 Belvidere Rd – CR 646 Belvidere Rd to CR 620
- CR 620 Belvidere Rd – CR 519 to Belvidere municipal boundary/Greenwich Street

Results from the 2045 Centers-Based and Blend scenarios indicate that a more extensive local and regional bus/transit system might be necessary to realize the full benefits of smart growth land use strategies. Although the new population is targeted to centers and municipalities with new light industrial employment, these new employment generators are still dispersed from the population centers and therefore diminish some of the potential trip reduction and congestion mitigation benefits. Rather than being located adjacent to new population or within walking distance, new sites are located along state and county roadways and thus generate more VMT on these roadways.

Two new improvements in transit service were developed to be further studied, as depicted in Figure 20:

- Belvidere to Alpha via CR 519
- Phillipsburg–Pohatcong–Alpha to Washington/Oxford via CR 632

Figure 20: Build Condition Transit Service



2045 Centers-Based Build Scenario

The Centers-Based Build scenario is derived from the same assumptions as the non-build 2045 Centers-Based scenario by targeting new population and households to existing centers rather than continued patterns of decentralization across lower density areas. It is designed to evaluate the potential benefits of targeted highway and transit improvements. Assumptions include:

- Current trend line of growth and development patterns
- NJTPA demographic projections for population, households, and employment
- Includes only road and transit improvements included in the TIP and Plan 2045
- Includes the 14 potential light industrial sites
- The new jobs are allocated to 11 municipalities with the greatest potential to benefit from sustainable smart growth development and housing principles, rather than on a proportional basis. These include Belvidere, White Township, Greenwich, Washington Township, Washington Borough, Phillipsburg, Hackettstown, Lopatcong, Pohatcong, Alpha Borough, Oxford Township

In addition to these, the Centers-Based Build includes the three proposed highway improvements and two transit service improvements.

2045 Centers-Based Build Performance

The Centers-Based Build Scenario yields improved performance compared to the (non-build) Centers-Based Scenario, including:

- Significant increase in non-motorized trips
- Fewer auto-person trips
- Less VMT and VHT
- Substantially lower shift of VMT from freeways and expressways to arterials, collectors, and local streets than Logistics Hub

Centers-Based Build improves access and utility of multimodal trips choices, resulting in a similar VMT along minor arterials, collectors and local roads as the non-build Centers-Based Scenario while facilitating a higher number of non-auto trips (see Table 21 and Table 22).

Table 21 - 2045 Baseline versus 2045 Centers-Based Build

Population	Auto Daily Person Trips (Includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles of Travel (VMT)	VMT per Capita	Vehicle Hours of Travel (VHT)	VHT per Capita
2045 Baseline								
120,404	7,300,406	979.41	21.73	9.25	4,485,471	37.25	118,906	0.99
2045 Centers-Based Build								
126,881	7,266,212	1,189.78	21.32	9.26	4,456,043	35.12	118,960	0.94
Percent Change vs Baseline								
5.4%	-0.5%	21.5%	-1.9%	0.1%	-0.7%	-5.7%	0.0%	-5.1%

Table 22 - 2045 Baseline vs 2045 Centers-Based Build VMT

Vehicle Miles of Travel (VMT)	VMT per Capita	Freeways + Expressways	% of Total	Principal Arterials	% of Total	Major Arterials	% of Total	Minor Arterials / Collectors / Locals	% of Total
2045 Baseline									
4,485,471	0.99	2,614,286	58%	798,312	18%	444,380	10%	628,493	14%
2045 Centers-Based Build									
4,456,043	0.94	2,494,750	56%	812,868	18%	470,436	11%	677,989	15%
Percent Change vs Baseline									
-0.7%	-5.1%	-4.6%		1.8%		5.9%		7.9%	

2045 Warren County Blend Build Scenario

The Warren County Blend Build Scenario is also derived from the same assumptions as the 2045 Blend by targeting new population and households to just six existing centers rather than continued patterns of decentralization across lower density areas and is designed to evaluate the potential benefits of targeted highway and transit improvements. Assumptions include:

- Current trend line of growth and development patterns
- NJTPA demographic projections for population, households, and employment
- Includes only road and transit improvements in the NJTPA TIP and Plan 2045
- Includes the 14 potential light industrial sites
- The new jobs are allocated to 11 municipalities with the greatest potential to benefit from sustainable smart growth development and housing principles, rather than on a proportional basis. These include Belvidere, White Township, Greenwich, Washington Township, Washington Borough, Phillipsburg, Hackettstown, Lopatcong, Pohatcong, Alpha Borough, Oxford Township

In addition to these, the Centers-Based Build scenario includes the three proposed highway improvements and two transit service improvements.

2045 Blend: Build Performance

The Blend Build Scenario yields the best overall performance of any 2045 scenario:

- Lowest auto person trips
- Highest non-motorized trips
- Lowest VMT and VHT
- Lowest VMT and VHT per-capita

Blend Build realizes the potential of smart growth strategies by showing that density alone is not enough, but rather must be paired with targeting new population to existing centers that are proximate to new jobs, coupled with enhanced mode choice and improved multimodal networks (see Table 23 and Table 24). Trips can only shift to alternate travel modes if adequate multimodal networks and service capacity are a viable and accessible option. The Blend Build scenario indicates that investments in improved walk-bike-transit networks and connectivity that connect people to jobs can help to mitigate future congestion and traffic impacts to Warren County communities.

Table 23 - 2045 Baseline versus 2045 Blend Build

Population	Auto Daily Person Trips (Includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles of Travel (VMT)	VMT per Capita	Vehicle Hours of Travel (VHT)	VHT per Capita
2045 Baseline								
120,404	7,300,406	979.41	21.73	9.25	4,485,471	37.25	118,906	0.99
2045 Blend Build								
126,881	7,162,883	1,226.62	21.35	9.32	4,379,859	34.52	117.796	0.93
Percent Change vs Baseline								
5.4%	-1.9%	25.2%	-1.8%	0.8%	-2.4%	-7.3%	-0.9%	-6.0%

Table 24 - 2045 Baseline vs 2045 Blend Build VMT

Vehicle Miles of Travel (VMT)	VMT per Capita	Freeways + Expressways	% of Total	Principal Arterials	% of Total	Major Arterials	% of Total	Minor Arterials / Collectors / Locals	% of Total
2045 Baseline									
4,485,471	0.99	2,614,286	58%	798,312	18%	444,380	10%	628,493	14%
2045 Blend Build									
4,379,859	0.93	2,413,673	56%	808,771	18%	474,311	10%	683,105	15%
Percent Change vs Baseline									
-0.66%	-5.06%	-7.7%		1.3%		6.7%		8.7%	

Warren County Blend Build also provides implications for municipal zoning, land use, and affordable housing. Municipalities may welcome the new jobs but must also recognize the traffic impacts they can bring and evaluate the extent to which light industrial zoning is used. They must also recognize that the siting of affordable housing is a critical factor in mobility and access to work opportunities. Affordable housing should have access to adequate multimodal transportation options and networks.

Sycamore Landing, Phillipsburg

Scenario Modeling Conclusion

The results of the scenario planning exercise present Warren County with several development options. Under the 2045 Baseline Scenario, without any change in trends, county residents and workers will be traveling more miles and hours, taking longer trips at slightly lower speeds and traveling more on lower functional classification roadways than today.

Each of the other future scenarios lead to the following changes compared to the Baseline:

- 2045 Logistics Hub – more auto trips at similar speeds and distances, with more vehicle hours of travel
- 2045 Centers-Based – more auto trips at slightly higher speeds, slightly longer trips, significant increases in VMT, VHT, and non-motorized trips
- 2045 Blend – significant increase in auto trips, speed, trip length, non-motorized trips and VHT, with a slight increase in VMT
- 2045 Centers-Based Build – significantly more non-motorized trips, and slightly more auto trips at lower speeds with similar trip lengths, VMT and VHT
- 2045 Blend Build – significantly more non-motorized trips, and slightly fewer auto trips at lower speeds with longer trips, and minimal change in VMT and VHT

It's important to also compare the 2045 scenarios because other than the 2045 Baseline, they include the 14 logistics sites. The 2045 Logistics Hub scenario represents the likely direction of growth in the county based on current zoning and land uses. When compared against one another, the subsequent scenarios show the following changes:

- 2045 Centers-Based – increased speed, VMT and VHT; more non-motorized trips as compared to 2045 Logistics Hub
- 2045 Blend – increased speed, VMT and VHT but at a lower level than Centers-Based; more non-motorized trips than Logistics or Centers-Based; more person-trips than logistics but fewer than Centers-Based. This falls short of potential benefits of smart growth and centers-based development patterns because it does not improve the multi-modal network and people lack bus/transit options and would have to drive to new jobs
- 2045 Centers-Based Build – significant increase in non-motorized trips, decrease in person trips, VMT and VHT compared to the 2045 Centers-Based Scenario. Compared to 2045 Logistics Hub, there are improvements in non-motorized trips and VHT, but increased VMT, person trips, and slower travel speeds.
- 2045 Blend Build – results in fewer person trips, more non-motorized trips, and lower VMT and VHT than any other scenario. Speeds are slightly lower and trip length is slightly higher, but overall it shows the best performance of any 2045 scenario.

With significant employment growth expected and slow but steady population growth, it is anticipated that the county will cater to more trips. The 2045 Blend Build scenario most successfully minimizes the negative impacts of these additional trips by catering to fewer auto daily person trips and more non-motorized trips than all other scenarios. This scenario also results in only minimal changes to speed (-1.4%), trip length (+1.1%), VMT (+2.4%), and VHT (+0.9%) compared to the 2045 baseline. This centers-based scenario also supports the Vision laid out on page 3 "supporting multimodal transportation choices" by encouraging development in established centers while preserving the "scenic rural landscapes, prized farmlands, natural and historic assets, and desirable quality of life."

The scenario planning results indicate that density alone will not achieve desired improvement in performance and congestion. Enhanced mode choice, improved multimodal networks, and targeting new population to existing centers close to new jobs are needed for the best performance outcome.

A summary of the scenario results is shown in Table 25.

In addition to systemwide conclusions, some corridor-specific conclusions can be drawn concerning where congestion is expected to improve or worsen. Due to the gradual change in population and employment spread throughout the County, traffic impacts are expected to also occur gradually though certain corridor segments are anticipated to face worse conditions than others. Corridors expected to experience worsened congestion during any of the scenarios are listed in Table 26.

Rural Landscape in Warren County

Table 25: Scenario Summary Results

Population	Households	Employment	Auto Daily Person Trips (includes Trucks)	Non-Motorized Trips	Average Speed (mph)	Average Trip Length (miles)	Vehicle Miles Traveled (VMT)	Vehicle Hours of Travel (VHT)
2020 Existing								
110,763	44,426	37,163	7,201,511	910.37	22.04	9.48	3,883,819	100,627
2045 Baseline								
120,404	49,949	41,461	7,201,511	980.86	21.65	9.21	4,485,471	116,736
2045 Logistics Hub								
126,881	52,636	46,670	7,241,178	983.00	21.73	9.23	4,445,990	119,488
2045 Centers-Based								
126,881	52,636	46,670	7,463,225	1,002.78	21.81	9.27	4,585,634	122,109
2045 Warren County Blend								
126,881	52,636	46,670	7,377,829	1,030.93	21.83	9.29	4,515,147	120,681
2045 Centers Build								
126,881	52,636	46,670	7,266,212	1,189,79	21.30	9.26	4,456,043	118,960
2045 Warren County Blend Build								
126,881	52,636	46,670	7,162,883	1,226.62	21.35	9.32	4,379,859	117,796

Table 26: Roadways with Worsening Congestion

Corridor	Segment	Direction	Scenario	Period
CR 519	I-80 to CR 609/High St (Hope Twp.) to	SB	2045 Baseline	AM/PM
CR 623	NJ 57 to CR 519	NB	2045 Baseline	AM
CR 646	US 22 to Uniontown Rd/CR 519	NB	2045 Baseline	AM
CR 519	CR 610/Swayze Mill Rd to CR 623/Brass Castle Rd	SB	2045 Baseline	PM
CR 623	CR 624/Hazen Oxford to CR 519	NB	2045 Baseline	PM
CR 623	NJ 57 to Buckhorn Dr	NB	2045 Baseline	PM
CR 646	Red School Ln to US 22	SB	2045 Baseline	PM
US 22	NJ 57/US 22 to CR 646/Lincoln Rd	WB	2045 Baseline	PM
NJ 57	NJ 31 to US 22	WB	2045 Baseline	PM
NJ 122	Center St to US 22	WB	2045 Baseline	PM
CR 517	Bilby Rd to Bald Eagle Rd	NB	2045 Baseline	PM
CR 519	US 46 to CR 609/ High St	NB	2045 Centers	AM
CR 623	Buckhorn Rd to CR 626/Summerfield Rd	SB	2045 Centers	AM
CR 623	CR 647/ Harmony Brass Castle Rd to NJ 57	SB	2045 Centers	AM
CR 623	CR 626/Summerfield Rd CR 647/Harmony Brass Castle Rd	SB	2045 Centers Build	AM
NJ 122	CR 519 to US 22	WB	2045 Centers Build	PM
CR 623	5th St (Belvidere) to CR 519	SB	2045 Blend	AM
CR 623	CR 626/Summerfield Rd to Harmony Brass Castle Rd	SB	2045 Blend	AM
CR 519	CR 610/Swayze Mill Rd to US 46	SB	2045 Blend Build	PM

5. Recommendations

The following recommendations stem from the review of previous studies, existing conditions analysis and the scenario modeling exercise. These recommendations should be considered in tandem with the many other recommendations proposed in earlier studies. An implementation matrix of this Plan's recommendations is provided in Appendix A while a summary of previous recommendations is provided in Technical Memo 2.1 of Appendix B.

Pequest Wildlife Management Area Trail, Oxford Township

Roadway and Bridges

Recommendations from Recent Studies

Warren County's network of roadways and bridges are essential to safely and efficiently move people and goods. In addition to analysis conducted as part of this Plan, several roadway recommendations were proposed in the 2020 *Warren County Light Industrial Site Assessment*. The following safety improvements were recommended based on crash data. These recommendations should continue to be studied and pursued.

U.S. 22 Phillipsburg

- Consider consolidating driveways

U.S. 46/NJ 182/CR 517/CR 604

- Consider realigning U.S. 46 westbound approach closer to perpendicular and curbing the reclaimed area

U.S. 22/CR 638/CR 519

- Consider extending acceleration lanes and adjusting signal timing

U.S. 22/CR 646

- Consider improving signage from U.S. 22 to signify the transition into a residential neighborhood and tightening the curve from U.S. 22 westbound on CR 646 northbound
- Public and stakeholder feedback indicated a need to study the interchange of I-78/U.S. 22/NJ 173

Further priority intersections were listed in the Warren County Transportation Technical Study based on congestion, pavement, bridge, and crash data. Priority intersections at county roadways included but are not limited to:

- U.S. 22 at CR 638 in Greenwich
- U.S. 22 at CR 519 in Pohatcong/Greenwich
- NJ 57 at CR 629 in Mansfield
- U.S. 46 at CR 519 in White

Additionally, the safety analysis conducted as part of this study and provided in Technical Memo 2.4 of Appendix B should be used to assist with targeting additional intersection and corridor improvements. The details of crash incidents, including their type (sideswipe, rear-end, etc.), time of day, and proximal lighting conditions can assist in developing proper recommendations.

Bridge Maintenance

The 2018 *Warren County Transportation Technical Study* identified 24 structurally deficient and 58 functionally obsolete bridges on state, county and municipal roadways. Each of these structures should be studied for maintenance improvements, rehabilitation, or replacement, as necessary. The 24 structurally deficient bridges are listed on pages 19-20 of Technical Memo 3.2 of the 2018 Warren County Transportation Technical Study. Most of these structures carry a relatively low volume of traffic and carry a combination of U.S, state, county and municipal roadways.

Height and Weight Restricted Structures

There are 11 height-restricted structures and seven weight-restricted structures on county roads. These restrictions can limit transportation accessibility for local businesses, impact local economic viability, increase VMT, and divert traffic through residential neighborhoods. Removing height restrictions along railways can be costly and difficult. Therefore, it may be prudent to remedy weight-restricted roadways first. Though further analysis could reveal engineering and structural constraint and variables for prioritizing these improvements, an initial list of priority height and weight restrictions is provided in Table 27. These sites were selected based on proximity to light industrial sites selected as part of the *Warren County Light Industrial Site Assessment* and detailed in Technical Memo 3. All height and weight restricted structures on county roadways are mapped and listed in Figure 7.

Table 27: Priority Height and Weight Restrictions

Restriction Type	Roadway	Municipality	Restriction	Location
Height	CR 519	Alpha	13'9''	RR underpass, MP 26.49
Height	CR 519	Lopatcong	10'0''	RR underpass arch, MP 29.80
Height	CR 622	Harmony	13'5''	RR underpass, MP 0.68
Height	CR 622	Harmony	10'10''	RR underpass, MP 1.97
Height	CR 636	Pohatcong	11'3''	RR underpass arch, MP 0.45
Height	CR 639	Pohatcong	13'6''	RR underpass, MP 0.91
Weight	CR 519	Pohatcong	4 tons	
Weight	CR 637	Lopatcong/Greenwich	10 tons	
Weight	CR 638	Greenwich	8-10 tons	
Weight	CR 646	Greenwich/ Phillipsburg/ Lopatcong	4 tons	

Truck Stuck in CR 519 Tunnel

Interstate 80

Biking, Walking, and Trails

Walking and biking infrastructure represent vital pieces of Warren County's transportation system. Sidewalks are necessary elements in the county's more densely settled areas and provide a safe refuge for travel. The county's network of trails offers a recreational opportunity to view Warren County's scenic landscape from a variety of angles. Some cyclists also ride comfortably along roadways though dedicated facilities for cyclists would entice more users. In addition to trails infrastructure catering to recreational users, improved bicycle and pedestrian infrastructure in the county's more densely settled centers will help support the conclusion of the scenario modeling exercise to target growth in these centers while allowing for the continued preservation of the county's scenic and rural landscapes. Efforts at improving conditions for cyclists and pedestrians in the county can take many forms, as described below.

Targeted speed reductions would also provide benefits to Warren County's multimodal travelers and vulnerable populations by lowering speeds to be better compatible with local context. The tool USLimits2 (an approved FHWA Safety countermeasure) has proven effective in helping New Jersey municipalities and counties achieve targeted and strategic speed limits reductions.

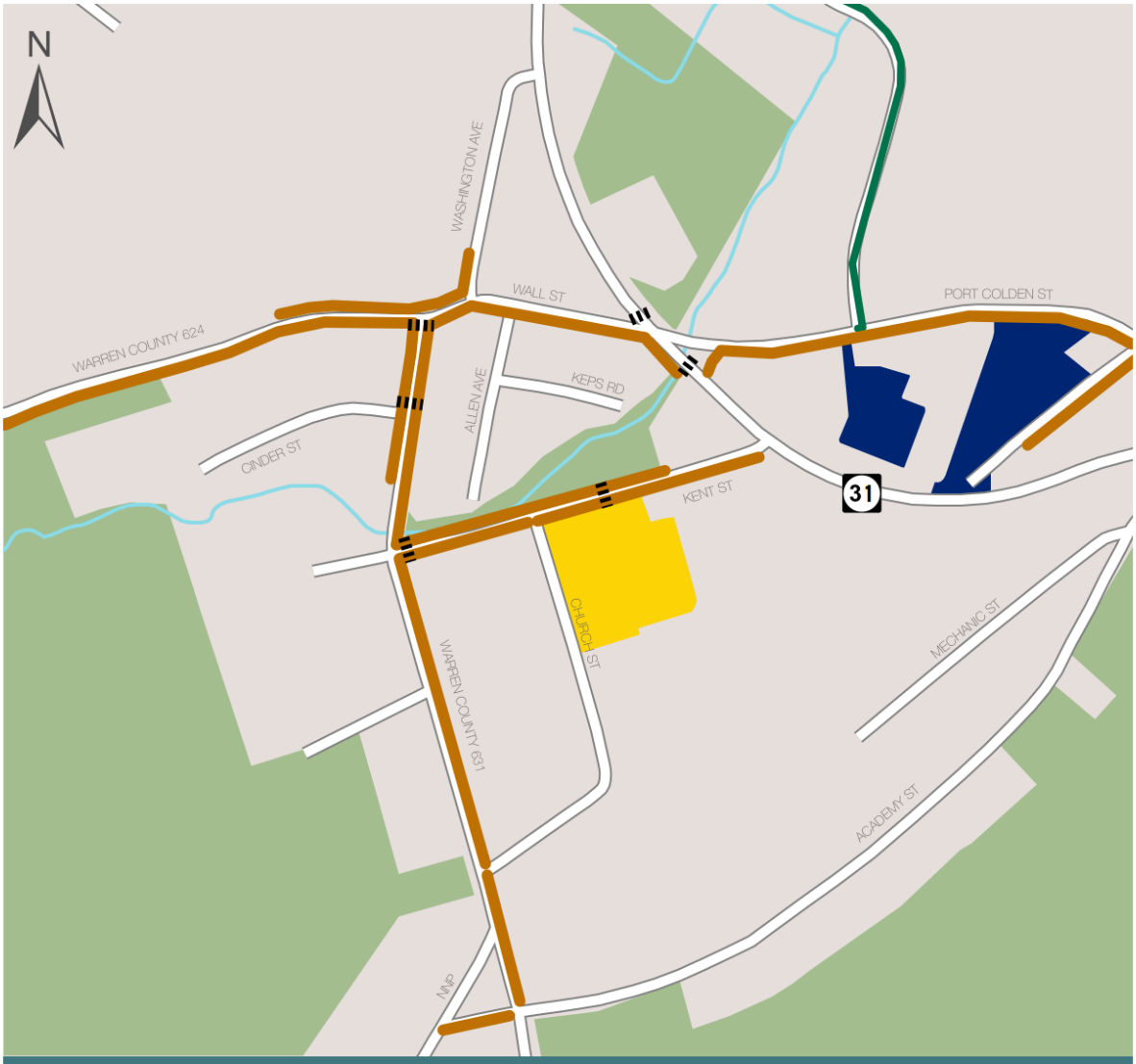
Sidewalks

Properly constructed and maintained sidewalks promote walking and provide accommodations for those with mobility impairments or who are unable, or uninterested in driving. In a rural setting such as Warren County, sidewalks are not warranted on every roadway. They should be constructed in the more densely populated portions of the county, near public transit stops/stations, between existing sidewalks to fill gaps, and near particular points of interest that tend to facilitate walking (schools, parks, houses of worship, government facilities, certain retail locations, etc.) Improved sidewalk infrastructure can promote development, improve quality of life and enhance tourism in such centers.

A county-wide inventory of walking accommodations is recommended. This can include sidewalks, crosswalks, and ADA-accessible curb ramps and consider pedestrian crash characteristics. Warren County should conduct a study for its own roadways as well as provide resources and collaboration for municipalities to do the same.

Community walkability workshops and Road Safety Audits are also recommended for site-specific reviews of walkability conditions including sidewalks, crosswalks, traffic signal timing, and location-specific walking impediments. Senior mobility workshops can provide a similar benefit in areas with many seniors. As noted in the Previous Studies review in Technical Memo 2.1 of Appendix B, Phillipsburg conducted a walkable community workshop in 2010 for the intersection of Roseberry Street and U.S. 22. As a result, ADA compliant crosswalks and new signal heads were installed and retimed to allow pedestrians to cross the highway safely. In addition to developing potential solutions to walkability issues, these focused workshops help stakeholders consider walkability in their day-to-day lives and instill an interest in walkability that is beneficial for future studies and projects. Figure 21 provides an example of a sidewalk and crosswalk inventory map completed as part of the 2019 Oxford Township Active Transportation Plan.

Figure 21: Oxford Township Sidewalk and Crosswalk Inventory



MAP 9: EXISTING PEDESTRIAN NETWORK

Portions of several intersections in Oxford have existing crosswalks. In some instances, these crosswalks are faded and difficult for motorists to see. A significant piece of the recommendations detailed in Chapter 5 involve upgrading and installing new high visibility crosswalks to better connect destinations.

Legend

- Crosswalk
- Trail
- Sidewalk
- School
- Municipal Building
- Open Space

Miles
0 0.15 0.3

21 Oxford Township Active Transportation Plan

Safety Analysis

As detailed in the Bicycle and Pedestrian Safety section of this document on page 3, 89 bicycle and pedestrian crashes occurred in the county from 2016 to 2018 with nearly two-thirds of these occurring in Phillipsburg, Hackettstown or Washington Borough. The county should encourage and collaborate with these three municipalities to address safety concerns for cyclists and pedestrians. Additionally, the bicycle and pedestrian safety analysis trends listed on page 3 indicate the need for complete streets and traffic calming measures to slow traffic on municipal roadways with a 25-mph speed limit to ensure motorists are traveling at a safe speed in the county's more densely developed communities. A walkable community workshop, Road Safety Audit, or similar intervention would be helpful for addressing these concerns. Warren County should collaborate with local and regional organizations, including TransOptions to educate particularly vulnerable populations, such as school-age children, about how to walk, bike and cross streets safely.

Scenic Byways, Trails and Points of Interest

The broad array of scenic byways, trails and points of interest necessitate further study and analysis to determine how Warren County can continue to provide connections to and benefit from these sites. Several findings from Warren County's 2018 Transportation Technical Study can work in tandem with such efforts, including the "County-wide need for traffic calming and gateways to preserve traditional villages, small town quality of life, and safety" and the associated theme of "balancing the strongly-expressed interest in preservation vs. the need for, and impact of, future growth and development." Further study should inventory and analyze the location and characteristics of scenic byways, trails and points of interest, including agritourism sites, which will better allow the county to develop a comprehensive and concerted effort to present these cultural and tourism assets to residents and visitors. Such a study should also make recommendations for additional biking, walking and recreational infrastructure.

Complete Streets

Warren County should develop and adopt a Complete Streets policy. As defined by the National Complete Streets Coalition, Complete Streets:

> "Are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street."

NJDOT adopted its nationally recognized Complete Streets policy in 2009 with the purpose of "[providing] safe access for all users by designing an operating a comprehensive, integrated, connected multi-modal network of transportation options." A critical component in the design of a Complete Street is that its accommodations be provided with the same level of detail and attention that has been historically afforded to the movement of automobiles. Though not included in either of these definitions, the needs of freight vehicles should be also considered as part of Complete Streets. In 2019, NJDOT published *Complete Streets for All: Model Complete Streets Policy and Guide* which is a one-stop resource to implement Complete Streets. A complete list of county and municipal Complete Streets policies in New Jersey can be found through the New Jersey Bicycle & Pedestrian Resource Center here: http://njbikeped.org/complete-streets-2/

Though one may think a Complete Streets policy is not necessary for a rural county, such a policy can be tailored to Warren County's needs and specify in what locations and what kind of roadways Complete Streets measures (sidewalks, bike-compatible shoulders,

dedicated bike facilities, etc.) are required. The county should also work with NJDOT to encourage and provide resources for municipalities to adopt their own Complete Streets policies. Several of the more densely populated communities would also benefit from developing a bicycle and pedestrian master plan, particularly Phillipsburg, Hackettstown, and Washington Borough. As noted earlier in the Equity Assessment and detailed in full in Technical Memo 2.2, these communities are also home to more historically disadvantaged and vulnerable populations that rely on this infrastructure. The development of Complete Streets policies and infrastructure such as traffic calming elements, supports the conclusion of the scenario modeling exercise to target development in established centers.

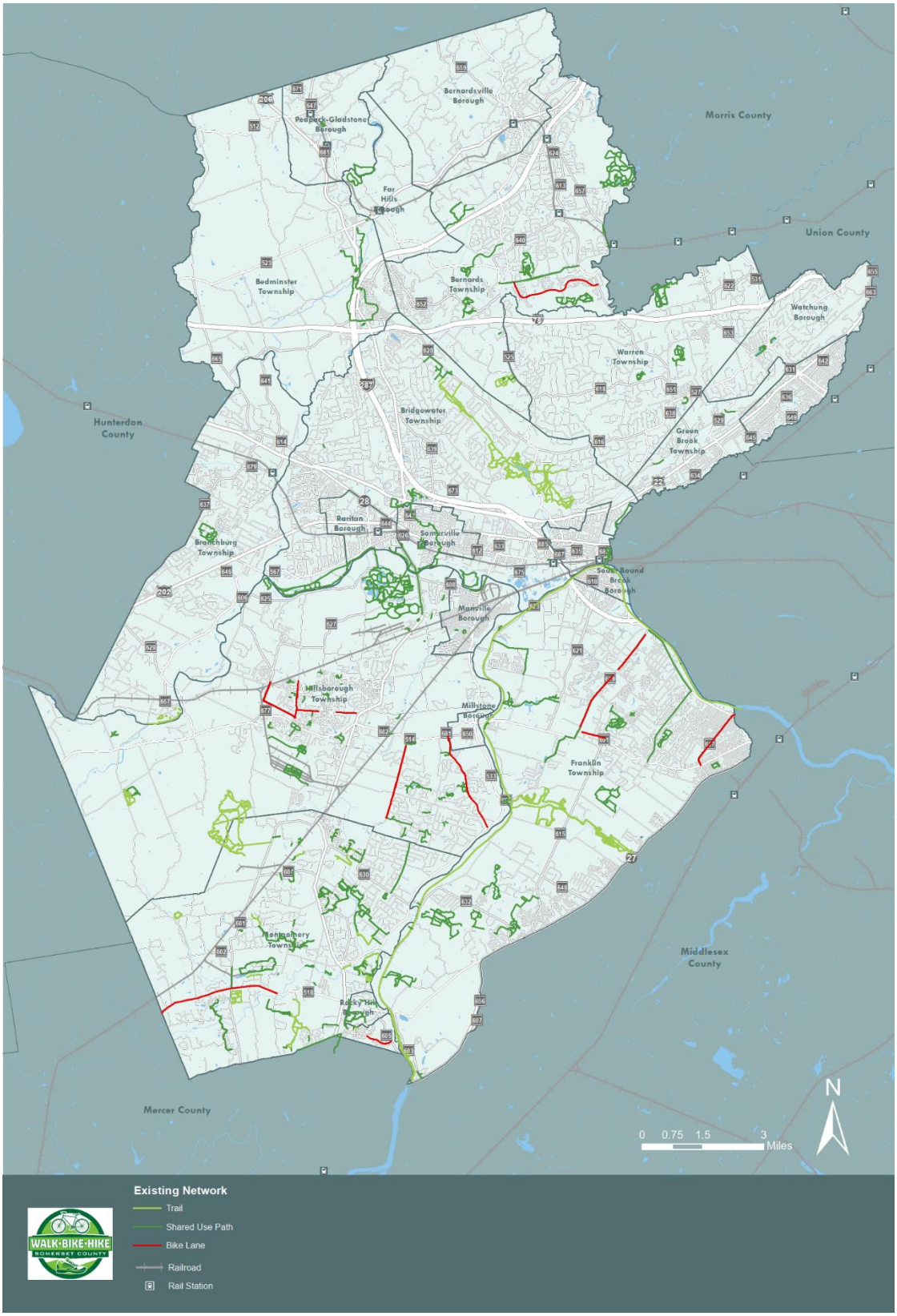
The county should consider completing a comprehensive trails/pedestrian plan (similar to those conducted in Somerset County and for the Greater Mercer Transportation Management Association) that develops a cohesive guide and map to maximize the public's awareness and understanding of its vast trail system. A sample map of Somerset County's biking and trail network is shown in Figure 22. It would also be beneficial for such a study to inventory pedestrian facilities (sidewalks, crosswalks, ADA-accessible curb ramps), review pedestrian crashes, and formulate recommendations for improving walking conditions in the county's town centers, a means of establishing gateways into communities.

In addition, there should be a county-wide study of biking and walking mobility and safety. Several municipalities, including those with significant vulnerable populations such as Phillipsburg, Hackettstown, and Washington Borough, would also benefit from master plans for biking and walking.

Northampton Street Bridge

Pedestrian Crossing in Washington Borough

Figure 22: Existing Biking and Trail Network from Somerset County WalkBikeHike Plan



Bicycle Facilities

Warren County completed a bicycle compatibility analysis of all county roadways. The bicycle compatibility analysis indicates expected comfort of biking on a given roadway and is calculated based on a variety of variables including speed limit, traffic volumes, and pavement width. Using these same variables, and the bicycle compatibility analysis scores, the project team developed a set of bike facility recommendations for county roadways. Though a variety of bicycle facility types exist and are used throughout New Jersey, only those types recommended on the county's existing roadway network are detailed below. Additionally, changes to vehicular speeds and volumes that may result from the actions taken in response to scenario planning may increase opportunities for bicycle facility recommendations.

Many Warren County roadways were found to be too narrow to accommodate dedicated bicycle facilities, and many roads also lack adequate sidewalks. Sidepaths may be particularly useful and warrant further study along busy county roads due to the narrow width and high prevailing travel speeds. Design standards for county and municipal roads should be updated to better accommodate safe biking and walking throughout Warren County. Regardless of whether road standards are updated, the implementing agency or jurisdiction faces no legal liability concerns as long as bike facilities are properly designed and maintained. Proper bicycle facility design guidance can be found on page 89-107 of NJDOT's Complete Streets Design Guide.

Sample locations are provided for each of the pertinent facility types other than sidepaths. These recommended bike facilities are intended to introduce biking infrastructure to many places in the county and form the foundation for further study and improvements. As noted earlier, a more thorough countywide trails and biking plan is recommended to further evaluate these recommendations.

Oxford Bikeway in Oxford Township

Four types of facilities are recommended as most applicable Warren County; sidepaths, bicycle boulevards, shared-lane markings, and bike lanes.

Sidepaths

A sidepath is a path next to the road, generally separated by a buffer and wider than a sidewalk, that is designated for bicycle or pedestrian use. They function similarly to a multi-use path or paved trail though trails are often found in recreation areas and multi-use paths need not be immediately adjacent to a roadway. Sidepaths are intended to minimize conflicts between all users and provide access to destinations (commuting or recreation). Along high-speed, high-volume roads, sidepaths may be more desirable than sidewalks or bike lanes. Sidepaths provide dedicated opportunities for those who wish to ride a bicycle or walk and may increase the use of non-motorized modes. Sidepaths can be one-way or two-way; the selection of the appropriate configuration requires an assessment of many factors including safety, connectivity, available right of way, and intersection navigation. Sidepaths should be signed to discourage or prevent unauthorized motorized access.

Due to limited width along existing cross-sections of county roadways, no sidepaths are recommended under current conditions though sidepaths should be considered under all roadway widenings including recommended widenings of CR 519 and CR 620 detailed beginning on page 45.

CR 638 Sidepath, Greenwich Township

Bicycle Boulevard

Bicycle boulevards, also referred to as neighborhood greenways or quiet streets, are traffic calmed streets that prioritize bicycle travel, creating a more comfortable bicycling environment. While bicyclists share the street with motor vehicles, the low-speed and low-volume character of a bicycle boulevard creates a low-stress facility for bicyclists of all ages and abilities.

Many neighborhood residential streets provide the basic components of a bicycle boulevard. These streets can be enhanced to create a bicycle boulevard through a variety of design treatments deterring high vehicle speeds and discouraging through-trips by motor vehicles. Many of these treatments benefit not only bicyclists but by creating a safe and quiet environment, benefit pedestrians and motorists.

Where constraints prevent bicycle improvements on arterial roadways, utilizing parallel neighborhood streets as bicycle boulevards provide convenient, attractive alternative routes for cyclists.

Key elements of a bicycle boulevard include:

Reduced Speed Limits: the preferred speed limit of a bicycle boulevard is 20 mph, five miles per hour slower than typical residential streets

Signage and Markings: pavement markings and wayfinding signage highlight the corridor as a priority route for bicyclists and the intention for the roadway as a shared, slow street

Speed Management: traffic calming elements appropriate for the context, such as curb extensions, speed cushions, chicanes or mini-roundabouts, should be used to reinforce the low speed limit and discourage cut-through traffic

Access Management: depending on the context, elements such as diverters or medians can be used to deter or prevent vehicular through-traffic, while still accommodating local access and prioritizing bicycle through-trips

Intersection Crossings: appropriate intersection treatments, particularly at crossings with major streets, are crucial to minimize bicyclist delay and ensure a safe, comfortable street for bicyclists of all ages and abilities

Bike boulevards are recommended for further study for portions of several corridors including CR 519 in Greenwich, CR 620 in Belvidere, CR 631 in Oxford, and CR 642 in Alpha.

Bicycle Boulevard in Ocean City, NJ

Shared Lane Markings

On roadways that cannot accommodate dedicated bicycle facilities, shared-lane markings may be used to indicate a shared environment for bicycles and automobiles. Shared lane markings can provide several benefits:

- Assert the legitimacy of bicyclists on the roadway
- Provide directional and wayfinding guidance
- Direct bicyclists to ride in the most appropriate location on the roadway
- Provide motorists with visual cues to anticipate the presence of bicyclists

Shared lane markings can be used to provide connections to major destinations where there is limited cartway width or other constraints limiting implementation of other bicycle facilities.

Shared lane markings are typically applied on streets with a speed limit of 25 mph or less.

The markings typically consist of a bicycle and chevron symbol, with or without a green background. Shared lane markings should also be paired with traffic calming treatments to reinforce the low speed limit and support a more comfortable environment conducive to sharing the roadway with multiple types of road users. Shared lane marking treatments can include “Share the Road” signage as is currently implemented along Southtown Road in Frelinghuysen Township.

To increase the visibility and effectiveness of the marking, the marking can be applied on a green background. This “enhanced” or “green back” shared lane marking is particularly useful on streets with higher traffic volumes and more activity, which benefit from improved visibility.

Shared lane markings are recommended for low speed sections of roadways throughout the county including CR 602 in Hardwick, CR 616 in Blairstown, CR 609 in Hope, CR 625 in Oxford, CR 621 in Harmony and CR 626 in White, among other locations.

Shared-Lane Markings in Princeton, NJ

Bike Lane

Standard or conventional bicycle lanes provide an exclusive space for bicyclists through the use of pavement markings and signage. They enable bicyclists to ride at their preferred speed, free from interference from motorists, and help facilitate predictable behavior and interaction between bicyclists and motorists. Bicyclists may leave the bicycle lane to pass other bicyclists, make turns, or avoid obstacles and conflicts. Motorists may pass through the bicycle lane to access parking or make other turning movements, but they cannot stand or park in the lane. Standard bike lanes provide dedicated space for cyclists, but no vertical or horizontal separation from moving traffic.

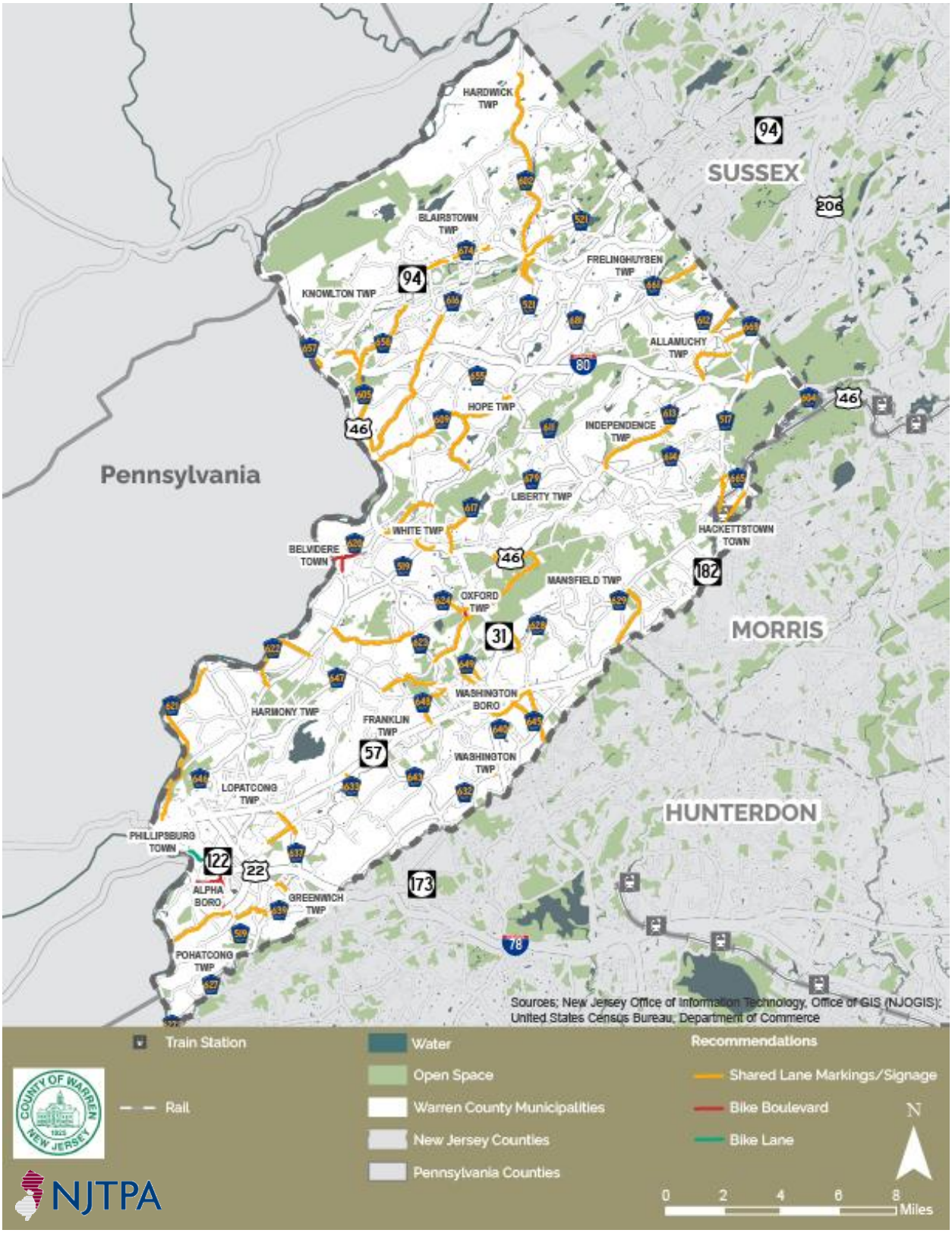
For example, based on factors such as local context, roadway width, speed, traffic volume and network connectivity, a bike lane is recommended for CR 678 in Phillipsburg. The existing network of county roadways is limited in bike compatibility due to width constraints, but if changes to cross sections occur in the future, a bike network can be expanded to other roads.

Recommendations Summary

These recommended bicycle facilities are intended to serve as a basis for future bike infrastructure in the county. A more through planning, traffic and engineering analysis is required before these facilities are implemented. Recommended bicycle facilities are mapped in Figure 23.

Bike Lane in Asbury Park, NJ

Figure 23: Recommended Bicycle Facilities



Public Transportation

The full 1982 transit plan from the County's transportation plan published in the same year did not achieve the funding or institutional support necessary for implementation; however, its intent to move people within and outside the county should not be discounted. New technologies and methods of service delivery offer opportunities to explore mobility solutions that may rely on fixed route bus service. Another reason to enhance public transportation is to attempt to reduce greenhouse gas emissions from single-occupant vehicles.

Although overall performance and service levels for Warren County transit have declined in recent years (Table 28), a fresh look at opportunities to modernize and revisit key corridors and the 1982 plan are warranted.

Table 28 - Recent Transit Ridership

Year	Route 57 Shuttle	31Ride Shuttle
2016	115,800	1,102
2017	121,638	1,833
2018	107,446	1,948
2019	94,263	No service
2020 (Jan-Mar) pre-COVID	18,989	No service
2020 (Apr-Sept) COVID	11,643	No service

The following elements should be included in considering public transit improvements:

- Build on successful elements of the Route 57 Shuttle
- Create user-friendly services, with consistent and clearly communicated routes/schedules
- Explore opportunities to enhance demand-response services and seek integration with public transit (funding sources must be considered)
- Provide regular (at least every hour, ideally every half hour) service throughout the day to maximize use of service. Rural shuttle services are often focused on facilitating travel during peak commute times or to make connections to more intensive transit uses (higher-capacity buses or trains) but such methods limit the ability for people to take advantage of and trust the service.

Several public transit related recommendations were made in the 2018 Warren County Transportation Plan including:

- Improving access to key destinations such as Warren County Community College, schools and vocational high schools, Veterans Affairs New Jersey Health Care System, hospitals, grocery stores, and employment centers
- Include extended and non-peak transit service for shift work, evenings, and weekends
- Provide information on transit service and schedules in various languages, as needed by county residents
- Mitigate capacity limitations at the Clinton Park & Ride

Additional recommendations were included in the plan and previous proposed in a 2004 study, including:

- Restoring passenger rail service in northern Warren County along the Lackawanna Cut-off
- Implementing passenger rail service between Hackettstown and Phillipsburg along the Washington Secondary
- Extending passenger rail service to Phillipsburg along the Raritan Valley rail line from High Bridge (Hunterdon County)

Warren County should complete a detailed examination based on the public transit improvements included in the 2045 build

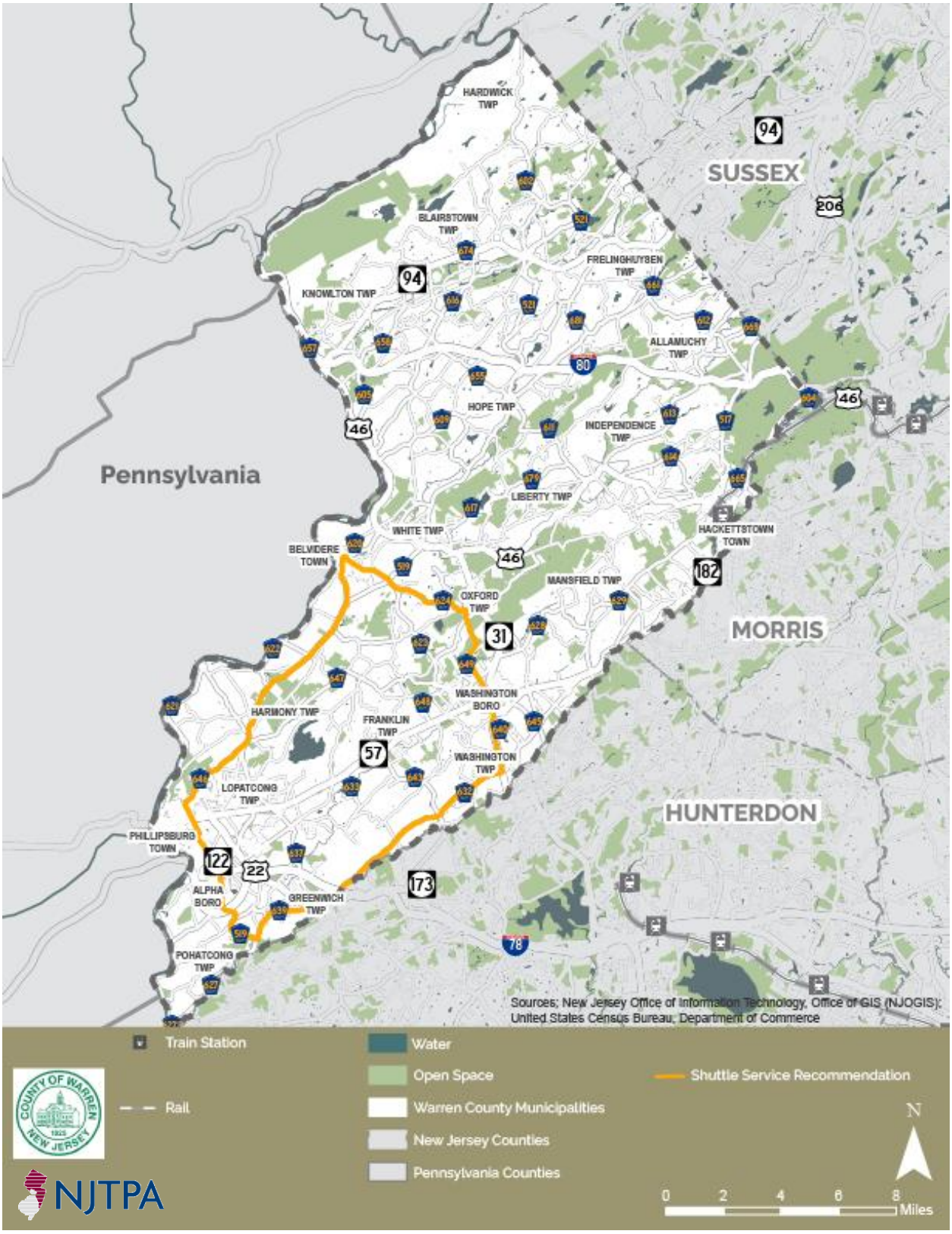
scenarios elaborated upon in Technical Memo 3 of Appendix B to potentially provide new service along CR 519 and CR 632, connecting the expected future employment centers with the regional centers of Alpha, Belvidere, Oxford and Washington Borough, as well as possible service to Easton, PA, with social, economic and geographic ties to Phillipsburg. Such improvements would help facilitate centers-based growth as elaborated upon in the scenario modeling exercise. The extension of public transit routes would likely increase maintenance costs and lengthen routes (thus increasing total route travel time. These issues must be considered in tandem with broadening the feasibility and appeal of public transit in the county, and the ability to connect destinations. A graphic illustrating the potential routes is shown in

Warren County Shuttle in Phillipsburg

Figure 24. Additional analysis is required to finalize a route. Upon further review, other alignments, including those traveling along interstate highways, may be preferable. Consideration should be given to the need to connect the existing and growing centers with future light industrial sites.

Warren County Shuttle in Phillipsburg

Figure 24: Potential Public Transit Improvements


HARDWICK TWP
SUSSEX
BLAIRSTOWN TWP
FRELINGHUYSEN TWP
KNOWLTON TWP
ALLAMUCHY TWP
HOPE TWP
INDEPENDENCE TWP
Pennsylvania
LIBERTY TWP
WHITE TWP
HACKETTSTOWN TOWN
BELVIDERE TOWN
MANSFIELD TWP
OXFORD TWP
MORRIS
WASHINGTON BORO
HARMONY TWP
FRANKLIN TWP
WASHINGTON TWP
LOPATCONG TWP
HUNTERDON
PHILLIPSBURG TOWN
ALPHA BORO
GREENWICH TWP
POHATCONG TWP
94
206
80
46
31
182
57
122
22
173
78
Sources: New Jersey Office of Information Technology, Office of GIS (NJOGIS); United States Census Bureau, Department of Commerce
Train Station
Rail
Water
Open Space
Warren County Municipalities
New Jersey Counties
Pennsylvania Counties
Shuttle Service Recommendation
N
0 2 4 6 8
Miles
NJTPA

Goods Movement

Freight is becoming an increasingly important part of our daily lives, as demand for next-day and home deliveries increases. With this demand comes higher truck volumes on local and county roadways, many of which were not designed with trucks in mind. Warren County is particularly impacted by this trend as it experiences not only increased demand for local shipments but also greater demand for warehousing sites necessary to meet consumers' needs. The 2020 *Warren County Light Industrial Site Assessment identified* 14 sites encompassing more than 4,000 acres, which could potentially be developed for industrial uses such as warehousing or e-commerce. If developed, these sites would generate a significant amount of traffic from both trucks and automobiles, as increased employment and goods movement would be generated to and from these sites. A capacity analysis was conducted as part of the *Warren County Light Industrial Site Assessment* under existing 2020, no-build 2045 and build 2045 conditions. No-build 2045 conditions assumed the 14 identified sites would not be built and all trends in the county would continue at their current rate. The build 2045 scenario assumes all 14 sites were built-out. This traffic model was run using NJTPA's NJRTM-E model scenario, also used in the Warren County Transportation Plan modeling exercises. To accommodate the expected increase in traffic that would result from the development of the 14 industrial sites and provide an acceptable level of service, a combination of improvements including additional turning lanes and intersection alignments, traffic signal timing adjustments, and travel demand management strategies were explored. The potential increase in cars and trucks can be better accommodated at intersections through a variety of potential improvements ranging from low cost solutions such as optimizing stop bars to higher cost investments such as roadway widening. Other physical improvements to mitigate roadway impacts, such as roundabouts, should be explored in the future as sites are developed. For all mitigation treatments (corridor, intersection and others), close and early coordination with the site developer is recommended to ensure the most appropriate mitigation strategies based on anticipated site uses and associated traffic levels. Workforce access, as part of a larger Transportation Demand Management (TDM) strategy, elaborated upon below, is also an important consideration early in the development process. Several of the light industry sites were identified as requiring mitigation strategies, as detailed below.

Corridor Treatments

As studied under the build scenarios detailed in Technical Memo 3, CR 519's existing one lane of traffic in either direction is not expected to be sufficient to handle future traffic demands under the 2045 build conditions. A more thorough analysis of potentially widening the corridor to two travel lanes in either direction from CR 646/Uniontown Road in Harmony Township to CR 620 in Belvidere is recommended. Dependent on further study, intersection treatments may also be beneficial in addition to or in lieu of a corridor widening. Intersection treatments can be implemented at what are expected to be the busiest intersections to reduce bottlenecks by expanding approaches to include dedicated turning lanes. Other site-specific improvements can include a short passing lane or truck climbing lane along a hill. Additionally, any study of the CR 519 corridor should consider the need for bicycle and pedestrian improvements and connectivity. Traveling north-south through the entirety of Warren County, CR 519 also continues south into Hunterdon County and north into Sussex County for a total of 89 miles, New Jersey's longest county route. This length presents an opportunity to improve biking and walking connections between

these counties and communities. Depending on specific site conditions, available right-of-way and topography, a sidepath along the corridor may be feasible.

Additionally, it is recommended to widen a segment of CR 620 between Belvidere and CR 519 from one to two lanes in both directions to accommodate the anticipated auto traffic expected to be generated due to site developments. This widening should be carried through each intersection along the corridor. Such roadway widening should consider the need for bicycle and pedestrian improvements and connectivity.

Phased or partial implementation is recommended for roadway widenings and intersection improvements as light industrial sites and other proposed developments that would contribute to the volume of traffic are approved and constructed. When possible, the municipalities and county should require that developers contribute a fair share towards needed improvements directly related to site development.

Intersection Treatments

While this study suggests widening two corridors, treatments at specific intersections can result in similarly beneficial impacts to traffic by targeting the locations expected to present the worst traffic conditions. Intersection treatments can include marking a new turn lane, signalizing a stop-controlled intersection, optimizing signal timing, or altering the location of stop bars to better allow turning movements by oversized vehicles.

The following treatments are recommended for the respective intersections. More detailed analysis and graphics of each of the recommendations can be found in the *Warren County Light Industrial Site Assessment*.

- U.S. 46/CR 519
    - Optimize signal timing
    - Pull back stop bars
    - Widen approaches to add turn lanes
- CR 519/CR 623
    - Signalize intersection
    - Widen all approaches to add turn lanes
- CR 519/CR 620
    - Signalize the intersection
    - Widen all approaches to add turn lanes
- CR 519/Foul Rift Road
    - Signalize intersection
    - Widen approaches to add turn lanes
    - Consider adjusting turning radii to accommodate trucks
- CR 519/CR 626
    - Signalize intersection
    - Widen all approaches to add turn lanes
- CR 519/CR 622 (Roxburg Station Road)
    - Signalize intersection
    - Widen all approaches to add turn lanes
    - Consider adjusting turning radii to accommodate trucks
- CR 519/CR 621 (Brainards Road)
    - Signalize intersection
    - Widen all approaches to add turn lanes
    - Pull back stop bars
- CR 519/CR 647
    - Widen approaches to add turn lanes
- CR 519/CR 646
    - Signalize intersection
    - Widen all approaches to add turn lanes
    - Pull back stop bars
- CR 519/NJ 57
    - Widen all approaches to add turn lanes
- CR 519/Strykers Road

  - Signalize intersection
- I-78/CR 632
  - Signalize intersection
  - Consider adjusting turning radii to accommodate trucks
- NJ 31/CR 632
  - Pull back stop bars

Truck Parking

An important piece of the infrastructure necessary for freight movement is a place for trucks to park overnight, while staging as they wait for a pick up/delivery appointment, outwait inclement weather conditions, or rest after exhausting their maximum allowable driving time. The public outreach process and discussions with County and municipal staff revealed a long-term concern for increased truck parking. Presently, trucks often park on the side of roadways not intended for such use. Warren County should work with the NJTPA, and NJDOT as they conduct a study specific to the need for truck parking, preferably for the two most widely used truck routes in the county, Interstates 78 and 80. These studies would ideally include cooperation with the other counties home to these interstates including Hunterdon, Somerset, Union, Essex and Hudson counties for Interstate 78 and Sussex, Morris, Essex, Passaic and Bergen counties for Interstate 80. More complete truck parking infrastructure and facilities may not be necessary in Warren County itself, but additional infrastructure should be investigated along with adjacent counties. Based on the anticipated increase in freight-focused warehousing and light industrial use, the County can also work with developers of large industrial parcels to provide truck parking and amenities on-site or find adequate space nearby to assure sufficient parking is available for truck drivers while mitigating any negative impacts of truck parking on local residents.

Transportation Demand Management (TDM) Strategies

The *Warren County Light Industrial Site Assessmen*t proposed an array of freight-focused TDM recommendations. TDM provides solutions focusing on creating a more efficient transportation network through targeted policies and strategies focused on demand. These strategies are optimal in locations where existing constraints limit physical improvements or where funding for capital improvements is not available or feasible. Strategies include promoting non-peak trips and creating a county-wide freight transportation advisory group. The *Warren County Light Industrial Site Assessment* provides a detailed assessment and recommendations for future industrial developments. While the *Warren County Light Industrial Site Assessment* framed TDM in terms of freight, these strategies can be used for mitigating other congestion sources as well.

Trucks Parked at Truck Stop on U.S. 46

Gateways

The county and its municipalities should conduct a study of incorporating gateway treatments for several communities, including, but not limited to, Belvidere, Hackettstown, Oxford, and Washington Borough. As detailed on page 114 of the NJDOT *Complete Streets Design Guide*, gateway treatments incorporate visual cues to alert users of a change in street typology or context. Such treatments are particularly helpful on higher-speed county or state roadways that enter a more densely populated area. Gateway treatments can also help a location serve as a de facto entrance to a downtown, historic district or public square. By alerting users of the change in character and context of the roadway, gateway treatments are intended to trigger and enforce a change in user behavior, such as for drivers to reduce speed or be aware of a higher level of pedestrian and bicyclist activity. Gateway treatments can also facilitate tourism, place-making and improve an area's economic vitality.

There are a variety of potential gateway treatments, many of which overlap with general Complete Streets tools. Specific improvements should be based on local context, but treatments can include:

- Specialty light fixtures
- Signing and striping
- Pavement texture treatments and transverse rumble strips
- Public art installations
- Radar speed signs to highlight a change in speed limit
- Raised crosswalks or intersections
- Wayfinding kiosks, signage or map displays
- High-visibility crosswalk striping or a unique crosswalk striping design distinctive of the district or neighborhood
- Curb extensions to narrow the intersection

Gateway treatments are currently used to a limited extent along the Warren Heritage Scenic Byway (NJ 57) incorporating signage and shoulder treatments when entering the villages of Broadway and New Village. Gateway treatments can help instill a sense of place, supporting placemaking and downtown development, as well as encouraging growth in such gateway communities, as elaborated upon in the earlier scenario modeling exercise.

Source; Goole Maps, Existing Gateway Elements in New Village, Franklin Township, NJ

Policy Recommendations

One purpose of this update to Warren County's Transportation Plan is to direct how resources and attention should be allocated going forward. Several transportation issues in the county warrant further study, review, analysis, and consideration including those detailed below. These recommendations are intended to complement recommendations made in previous plans, including the 2018 Transportation Technical Study and 1982 Transportation Plan.

Agricultural Land in Warren County

Land Use & Zoning Updates

The scenario planning exercise and resultant recommendations made in this document assume land uses will remain the same, other than the specified light industrial sites. Other changes made to municipal land use and zoning regulations have the potential to mitigate traffic impacts from those discussed in the scenario planning, and thus potentially require fewer mitigations. The results of the scenario planning exercise should be shared with municipalities and considered in the context of land use and zoning updates. As per the modeling results, the county and municipalities should continue focusing growth through land use and zoning updates in the county's existing centers, helping maintain the rural character of other communities. Municipalities should work with the county and consider future land use and traffic scenario planning to best determine necessary traffic measures to ensure an efficient roadway network.

Complete Streets

Future planning should encourage the use of all modes through supportive non-motorized policies and studies to include:

- County Complete Street Policy
- Update county and municipal roadway design standards to accommodate safe biking and walking
- Countywide walk, bike, hike study

Climate Resiliency

Expected light industrial development and any corresponding residential development will have an impact on the county's environmental integrity, including runoff and stormwater issues. This is in addition to larger climate trends bringing about more extreme weather conditions. While these changes will not occur overnight, Warren County should be aware of these ongoing concerns when planning for and implementing transportation improvements. Climate change hazards can also impact the proper functioning of the county's transportation assets, including roadways, public transit and airports. The county should consider "weather hardening" the most critical assets, such as bridges. Additionally, resiliency and stormwater measures should be utilized in municipal zoning codes, assuring that new developments and construction consider stormwater and resiliency needs. This is particularly important for parcels that are critical for development in these communities, including those to be used for affordable housing.

Several resources are available to become more aware of and incorporate climate change issues into the planning process including:

- The State of New Jersey Hazard Mitigation Plan (2014)
- NJTPA's Plan 2045 (2017)
- New Jersey Draft Climate Change Resilience Strategy (2021)
- New Jersey Climate Change Trends and Projections Summary (2013)
- NJDOT's Complete & Green Streets For All Model Complete Streets Policy & Guide (2019)

Though Warren County is not as prone to some of same climate hazards as other New Jersey communities (flooding along the Shore), the county is not immune to climate issues. Warren County should consider resiliency and stormwater issues when planning for transportation. The county is currently revising its hazard mitigation plan. The recommendations developed in the hazard mitigation plan and should work in tandem with this Warren County Transportation Plan, and future revisions of each should consider the other.

Stakeholder Coordination

Future planning development should actively engage stakeholders. Depending on the location, scale and type of project, stakeholders can include residents,

individuals employed in Warren County, tourists/visitors, freight carriers, or those merely traveling through Warren County to reach their destinations. If social distancing restrictions continue to be mandated or recommended, innovative public outreach techniques should be utilized to encourage on-line and virtual participation. Particular attention should be paid to those stakeholders identified in the Equity Assessment/Environmental Justice analysis as these communities have been traditionally and historically underrepresented in planning matters and may have more difficulty having their voices heard. Though updated demographic and equity data will be made available each year through the United States Census, the equity assessment conducted as part of this study and included in Technical Memo 2.2 of Appendix B should serve as a resource for the county to target stakeholder input from these historically under presented communities. Accommodations should also be considered for these communities, including where, when and how public meetings are conducted.

Funding and Support

Warren County and its municipalities should work with the NJTPA, as appropriate, to receive planning support through NJTPA's Complete Streets Technical Assistance program. The NJTPA connects approximately ten communities each year with Sustainable Jersey and the Alan M. Voorhees Transportation Center to assist with Complete Streets training, program marketing, public education, technical assistance, and assistance with applying for grants. Eligible projects include walkable community workshops, bicycle corridor and network plans, demonstration project guidance and conceptual renderings. Additional funding opportunities for regional and subregional studies recommended earlier in this document may also be available from NJTPA.

NJDOT's Local Aid Resource Center helps connect counties and municipalities with consultants to provide guidance in grant applications, project planning, and project delivery. Guidance for both federal funding and state funding is available, including municipal aid, transit village, bikeways and walkways, local bridges and local freight impact funds, Safe Routes to School, and other transportation funding sources.

Interstate 80

6. Appendices

Appendix A: Implementation Matrix

Appendix B: Technical Memos

Technical Memo 1 – Vision and Goals

Technical Memo 2.1 – Previous Studies

Technical Memo 2.2 – Equity Assessment

Technical Memo 2.3 – WikiMap Assessment

Technical Memo 2.4 – Data Assessment

Technical Memo 3 – Model and Analysis

Technical Memo 4 - Recommendations

Appendix C: Public Outreach Materials

Appendix A: Implementation Matrix

The below implementation matrix (Table 29) is intended to help Warren County prioritize and track improvements. The following table includes only those improvements recommended in this 2021 Warren County Transportation Plan, both initially recommended here as well as those recommended in previous studies and reiterated here. Additional recommendations incorporated in this document include those originally proposed in the 2018 Warren County Transportation Plan Technical Transportation Study and the 2020 *Warren County Light Industrial Site Assessment*. Hundreds more recommendations have been proposed in the many studies conducted over the preceding decades throughout the county and are summarized and listed in Technical Memo 2.4 of Appendix B. For each recommendation listed in (Table 29), information is provided for the general type, lead agency, and general cost estimate (on a scale of $ to $$$, with $$$ being the most expensive). These are intended to be rough cost estimates with $ projects costing less than $500,000, $$ projects costing less than $5,000,000 and $$$ projects costing more than $5,000,000. The "type" of improvement is intended to provide broad categorization of the recommendations though there can be substantial overlap between these types (for example, freight and roadway).

Rural Area in Oxford Township

Table 29: Implementation Matrix

Improvement	Type	Lead Agency	Cost
U.S. 22 Phillipsburg - Consolidate driveways	Roadway and Bridges	NJDOT	$$
U.S. 46/NJ 182/CR 517/CR 604 – Realign U.S. 46 westbound approach closer to perpendicular and curbing the reclaimed area	Roadway and Bridges	NJDOT	$$
U.S. 22/CR 638/CR 519 – Extend acceleration lanes and adjusting signal timing	Roadway and Bridges	NJDOT	$
U.S. 22/CR 646 – Improve signage from U.S. 22 to signify the transition into a residential neighborhood and tightening the curve from U.S. 22 westbound on CR 646 northbound	Roadway and Bridges	NJDOT	$
U.S. 22/CR 638 – Intersection safety improvements	Roadway and Bridges	NJDOT	$$
U.S. 22/CR 519 – Intersection safety improvements	Roadway and Bridges	NJDOT	$$
NJ 57/CR 629 – Intersection safety improvements	Roadway and Bridges	NJDOT	$$
U.S. 46/CR 519 – Intersection safety improvements	Roadway and Bridges	NJDOT	$$
I-78/U.S. 22/NJ 173 – intersection improvements	Roadways and Bridges	NJDOT	$$
Investigate feasibility of removing height restrictions from bridges	Roadway and Bridges	County, NJTPA	$$$
Study feasibility of maintenance improvements, rehabilitation or replacement of the structurally deficient and functionally obsolete bridges in the County	Roadway and Bridges	County, NJTPA	$$$
Conduct county-wide sidewalk inventory	Walking, Biking and Trails	County, NJTPA	$
Provide resources for municipalities to conduct community walkability workshops and/or senior mobility workshops	Walking, Biking and Trails	County, NJTPA	$
Encourage and collaborate with municipalities to address safety concerns, particularly bike/ped crashes in Phillipsburg, Hackettstown and Washington Borough	Walking, Biking and Trails	County, Municipalities	$

Conduct a study to inventory and analyze the location and characteristics of scenic byways, trails and points of interest, including agritourism sites; making biking, walking and recreational infrastructure recommendations	Walking, Biking and Trails	County, NJTPA	$
Adopt a County-wide Complete Streets Policy	Walking, Biking and Trails	County	$
Encourage and provide resources for municipalities to adopt their own Complete Streets policies	Walking, Biking and Trails	County, Municipalities, NJTPA	$
Encourage and provide resources for municipalities to develop bicycle and pedestrian master plans, particularly Phillipsburg, Hackettstown and Washington Borough including working with NJTPA, as appropriate, to receive planning support through Complete Streets Technical Assistance Program	Walking, Biking and Trails	County, Municipalities, NJTPA	$
Conduct comprehensive trails/pedestrian plan	Walking, Biking and Trails	County, NJTPA	$
Utilize the bicycle compatibility recommendations included in the Bicycle Facilities section beginning on page 3	Walking, Biking and Trails	County	$$
Investigate improving public transit access to key destinations such as Warren County Community College, schools and vocational high schools, Veterans Affairs New Jersey Health Care System, hospitals, grocery stores, and employment centers	Public Transportation	County, NJTPA	$$
Investigate offering extended and non-peak transit service for shift work, evenings and weekends	Public Transportation	County	$$
Work with NJ TRANSIT to provide information on transit service and schedules in various languages, as needed by County residents	Public Transportation	County	$$
Warren County should work with Hunterdon County and NJ TRANSIT to identify ways to mitigate capacity limitations at the Clinton Park & Ride	Public Transportation	County	$$
Investigate feasibility of restoring passenger rail service in northern part of County along the Lackawanna Cut-off	Public Transportation	NJ TRANSIT	$$$
Investigate feasibility of implementing passenger rail service between Hackettstown and Phillipsburg along the Washington Secondary	Public Transportation	NJ TRANSIT	$$$
Investigate feasibility of restoring passenger rail service to Phillipsburg along the Raritan Valley rail line from High Bridge (Hunterdon County)	Public Transportation	NJ TRANSIT	$$$
Consider providing shuttle service along CR 519 and CR 632, connecting Alpha, Belvidere, Oxford and Washington Borough. Provide at least hourly and on weekends to maximize use of service	Public Transportation	County	$$$

Conduct analysis of potentially widening CR 519 to two travel lanes in either direction and/or implementing intersection capacity improvements; also consider biking and walking infrastructure along corridor	Goods Movement	County	$$$
Conduct analysis of widening segment of CR 620 between Belvidere and CR 519 from one to two travel lanes in either direction to accommodate the anticipated auto traffic expected to be generated due to site developments	Goods Movement	County	$$$
U.S. 46/CR 519 – optimize signal timing, pull back stop bars and widen approaches to add turn lanes	Goods Movement	NJDOT	$$
CR 519/CR 623 – signalize intersection and widen all approaches to add turn lanes	Goods Movement	County	$$
CR 519/CR 620 – signalize intersection and widen all approaches to add turn lanes	Goods Movement	County	$$
CR 519/Foul Rift Road – signalize intersection, widen approaches to add turn lanes and consider adjusting turning radii to accommodate trucks	Goods Movement	County	$$
CR 519/CR 626 – signalize intersection and widen all approaches to add turn lanes	Goods Movement	County	$$
CR 519/CR 622 (Roxburg Station Road) – signalize intersection, widen all approaches to add turn lanes and consider adjusting turning radii to accommodate trucks	Goods Movement	County	$$
CR 519/CR 621 (Brainards Road) – signalize intersection, widen all approaches to add turn lanes and pull back stop bars	Goods Movement	County	$$
CR 519/CR 647 – widen all approaches to add turn lanes	Goods Movement	County	$$
CR 519/CR 646 – signalize intersection, widen all approaches to add turn lanes and pull back stop bars	Goods Movement	County	$$
CR 519/NJ 57 – widen all approaches to add turn lanes	Goods Movement	County	$$
CR 519/Strykers Road – signalize intersection	Goods Movement	County	$
I-78/CR 632 – signalize intersection and consider adjusting turning radii to accommodate trucks	Goods Movement	NJDOT	$$
NJ 31/CR 632 – pull back stop bars	Goods Movement	NJDOT	$
Conduct study specific to the need for truck parking, particularly for I-78 and I-80; consider cooperation and collaboration with other New Jersey counties with these routes	Goods Movement	County, NJDOT, NJTPA	$
Consider use of Transportation Demand Management strategies	Goods Movement	County, NJTPA	$

Pursue gateway treatments into Belvidere, Hackettstown, Oxford and Washington Borough	Gateway	County, Municipalities	$$
Make any necessary and/or desirable changes to municipal land use and zoning updates to mitigate negative impact of future development	Policy	Municipalities, County	$
Implement “weather hardening” at the most critical transportation assets, such as bridges	Policy	County	$$$
Utilize resiliency and stormwater measures in municipal zoning codes, assuring that new developments and construction consider stormwater and resiliency needs	Policy	County	$
Consider developing a County Hazard Mitigation Plan	Policy	County	$