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Planning for the Future of Lehigh and Northampton Counties at 615 Waterfront Drive, Suite 201, Allentown, PA 18102 ■ (610) 264-4544 ■ lvpc@lvpc.org ■ www.lvpc.org

TRANSPORTATION PLANNING COMMITTEE MEETING
Thursday, January 22, 2026, at 5:30pm
AGENDA

Roll Call

Courtesy of the Floor

1. New Staff Introductions
    a. Steven Weber, Director of Transportation Planning
    b. Beth Ritter-Guth, Director of Research & Innovation

Old Business

1. *INFORMATION ITEM:* Final Lehigh County Industrial Land Use Guide + Municipal Training (JS)
2. *UPDATE ITEM:* Trail Gap Analysis and Trail Connection Strategy Project (CM)
3. *INFORMATION ITEM:* Lehigh Valley Passenger Rail Initiative Phase 2 Funding (BB)
4. *INFORMATION ITEM:* US Route 22: Safety, Mobility and Congestion Management Plan Project Schedule (SW)
5. *INFORMATION ITEM:* 2027-2030 Transportation Improvement Program Update (SW)

New Business

1. *INFORMATION ITEM:* 2025 Transportation Improvements Accomplishments (STAFF)
2. *INFORMATION ITEM:* Safe Streets for All Grant (SS4A) (BB)

Status Reports

1. *INFORMATION ITEM:* Highway Performance Monitoring System: Monthly Traffic Report (CK)

Adjournment

Next Transportation Committee Meeting:

Virtual
Thursday, February 26, 2026, at 5:30 pm

THE MEETING CAN BE ACCESSED AT http://www.tinyurl.com/LVPC2026 OR VIA PHONE
610-477-5793 Conf ID: 947 550 319#

LEHIGH COUNTY

INDUSTRIAL LAND USE

GUIDE

DRAFT

Prepared by

LVPC

Lehigh Valley Planning Commission

This program is being funded by Lehigh County. This document serves as guidance to Lehigh County, the 62 municipalities of the Lehigh Valley, developers and community members, all of which have a vested interest in the impacts of industrial land uses on the health and well-being of the region. The LVPC is committed to supporting municipal governments and building collaboration between public and private partners to ensure the region's continued sustainability and resilience.

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Thank you to the outgoing 2025 Executive, Phillips Armstrong, and District 5 Commissioner Jeffrey Dutt for their service to the region.

2026

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Lehigh Valley Planning Commission

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Both Counties

J. William Reynolds*

Cathy Fletcher (Alt.)*

**These individuals represent the City of Bethlehem, which resides within Lehigh and Northampton counties.*

LVTS
Lehigh Valley Transportation Study

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Regional Planner for Community Engagement

Corinne Ruggiero, SEO
Environmental Planner

Jacob Weinberg
Community and Regional Planner

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INDUSTRIAL LAND USE

GUIDE

INTRODUCTION

Industrial development and rapid technology advancements are shaping Lehigh County's land use needs, forcing communities to evolve quickly to handle the emerging uses arriving at their doorstep.

However, this region has a history of adapting because industrial development has been a defining influence on Lehigh County's economy and landscape since the 1700s, when the earliest European settlers established water-powered mills for grain processing, lumber production and iron works along creeks such as the Little Lehigh, Jordan, Coplay and Saucon. The opening of the Lehigh Canal in 1829 revolutionized the local economy by allowing goods to easily move between Lehigh County and nearby regions, and local towns like Allentown grew into industrial centers.

By the late 1800s, Lehigh County and the broader Lehigh Valley had become home to a wide array of prominent industries. Iron production expanded with the advent of anthracite-fired iron furnaces, including the Allentown Iron Works on the Little Lehigh Creek, the Thomas Iron Works in what is now Hokendauqua, and the Coplay Furnace complex, several of which still stand today as historic sites. These operations helped make the region a national center for early iron manufacturing before Bethlehem Steel's rise.

The Valley also became one of the nation's premier silk manufacturing hubs in the late 1800s, driven by mills such as the Adelaide Silk Mill in Allentown, the Hemphill and Sayre silk operations in Catasauqua, and numerous smaller mills in Emmaus, Slatington, and Alburtis. At the same time, the region's cement industry began to take shape through plants near Coplay and Egypt, laying the groundwork for the Lehigh Valley's emergence as the "Cement Belt of the United States." By the late 1800s and early 1900s, Bethlehem Steel anchored a regional economy built on heavy industry, headquartered just across the county line in Bethlehem.

Industry shifted after World War II as American steel and traditional manufacturing declined, but due to the key positioning of Lehigh County relative to adjacent regions, the County emerged as a hub for logistics uses supporting the rise of global supply chains and e-commerce. This rapid shift and expansion of large-scale warehouse development created economic opportunity but also caused traffic, environmental and quality-of-life challenges for municipalities.

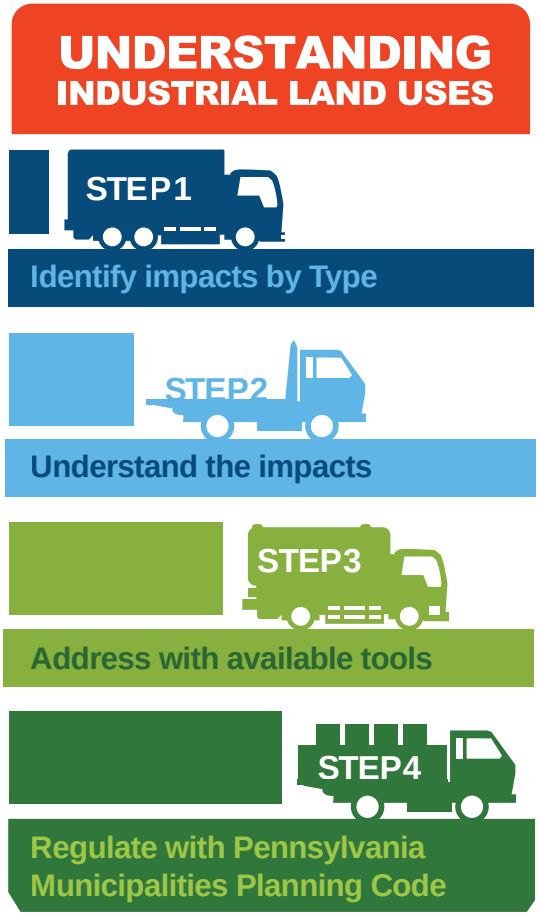
Today, industry continues to rapidly evolve, as technology-based industrial uses, advanced manufacturing, and alternative energy are expanding into the region, bringing new demands for land, transportation and utility infrastructure. Communities must prepare for a changing industrial landscape to balance community, economic and environmental priorities. The Lehigh County Industrial Land Use Guide provides the resource tools, data and best practices local governments need to manage current impacts and proactively plan.

LEHIGH COUNTY

INDUSTRIAL LAND USE GUIDE

HOW TO USE **THE GUIDE**

The Lehigh County Industrial Land Use Guide is a practical reference for planners, municipal officials and other community stakeholders to better manage industrial growth and its impacts. It serves as a policy alignment and decision-support tool that helps municipalities connect data, best practices and regulatory tools to make informed, balanced decisions about existing and emerging industrial land uses.



Municipalities can use this guide to:

- **Support Comprehensive Planning:** Align local policies and future land use maps with evolving land use trends, identify suitable areas for industrial activity, and integrate industrial corridors into long-range economic and transportation strategies.
- **Inform Zoning and Land Development Regulations:** Translate best practices into zoning districts, use standards, and subdivision and land development ordinance (SALDO) criteria that balance industrial needs with community character and environmental protection.
- **Strengthen Development Review:** Reference the guide when evaluating industrial proposals for consistency with comprehensive plans, transportation access and infrastructure capacity. The guide's recommendations can also serve as technical justification in decision-making.
- **Plan Infrastructure and Transportation Improvements:** Coordinate industrial land use planning with roadway, freight, rail and utility networks; prioritize capital projects that make appropriate sites development-ready.
- **Promote Regional Coordination:** Use the guide to collaborate with neighboring municipalities on shared issues like truck routing, stormwater or infrastructure extensions that cross boundaries.
- **Engage the Public:** Reference the guide to communicate how industrial uses are evaluated, what impacts are being mitigated, and how local and regional plans align.

Industrial development continues to fuel Lehigh County's economic and population growth. By using this guide, communities can manage that growth thoughtfully while supporting jobs and tax revenue, maintaining infrastructure efficiency, protecting environmental and community assets, and positioning themselves for future funding and investment opportunities.

LEHIGH COUNTY

INDUSTRIAL LAND USE GUIDE

MUNICIPAL ENGAGEMENT

KEY TAKEAWAYS FROM PARTICIPANTS

On October 15, 2025 from 5:30-7 pm, representatives of Lehigh County communities gathered at the LVPC Conference Center to workshop the Lehigh County Industrial Land Use Guide and discuss common challenges and opportunities. The workshop included a presentation by LVPC on project scope and initial data findings, a facilitated discussion on local industrial land use and freight concerns, priorities for planning for industrial growth, areas of traffic impacts and tools that municipalities have available to address impacts. The outcome of this engagement directly informed the development of the Guide.

Managing Traffic and Transportation Impacts Is a Universal Priority

Communities cited freight traffic, congestion, truck routing and access management as their top concerns, and emphasized that freight traffic often spills onto local roads when major corridors like Route 22 or Interstate 78 (I-78) back up, creating safety and quality-of-life challenges in boroughs and townships where roads were not designed for heavy truck volumes.

Participants expressed interest in stronger coordination on Highway Occupancy Permits (HOPs), improved truck management tools, and better access to Annual Average Daily Traffic (AADT) data, turning volumes and freight routing patterns to make informed decisions.

Infrastructure Capacity, Especially Energy, is Emerging as a Critical Limiting Factor

Participants commented on the growing need for electric capacity to support data centers, cold storage and advanced manufacturing. Several communities questioned whether local grids have the infrastructure to handle large-scale users without compromising service to existing residents and businesses.

3 Communities Need Guidance on Emerging Industrial Uses

Municipalities reported a high level of uncertainty about the unique impacts of data centers and other new industrial uses. Key themes included:

- Understanding noise, cooling systems, backup power generation and utility intensity
- Clarifying decommissioning expectations and life-cycle impacts
- Ensuring local zoning standards are consistent with state legislation

Several communities are researching emerging uses or revising ordinances, but expressed the need for consistent regional data and best practices to support their efforts.

4 Brownfield Reuse and "Best Use of Existing Space" Remain Strong Values

Many municipalities voiced a desire to direct industrial growth to brownfields, existing industrial districts, and redevelopment areas rather than greenfields.

Townships and boroughs emphasized:

- Leverage existing regional assets such as the Lehigh Valley International Airport and FedEx Ground logistics hub
- Aligning industrial development with long-term community visions, including housing and commercial growth priorities

5 Land Use Conflicts Are Becoming More Nuanced

Local leaders expressed concern that new industrial users — especially large energy-intensive ones — could crowd out desired residential or commercial development by consuming disproportionate shares of available infrastructure capacity or land supply.

Municipalities are navigating how to balance:

- The need for economic growth
- Maintaining community character
- Avoiding over-concentration of industrial uses in certain areas

6 Communities Need Practical Tools, Examples and Clear Data

Across municipalities the most requested supports from LVPC included:

- Case studies that illustrate impacts, such as utility consumption, traffic generation and project timelines
- Regional studies, guidance documents and examples from peer communities
- Support in developing or updating comprehensive plans, zoning, and Subdivision and Land Development Ordinances (SALDOs)
- Technical assistance in capital improvement planning
- Assistance in funding frequent ordinance updates, and planning and code modernization

7 Urban Communities Have Distinct Concerns

- City of Allentown representatives highlighted challenges around adapting pre-war industrial buildings for modern manufacturing and freight demands. Questions included how to incorporate modern loading, circulation and safety requirements into dense, historic settings.
- The workshop made clear that industrial land use in Lehigh County is evolving rapidly, and municipalities are eager for coordinated regional guidance. Participants are facing a mix of long-standing issues — like freight traffic and redevelopment — as well as new, complex challenges around utility capacity, digital infrastructure and emerging industrial uses.
- The feedback from this engagement directly shaped the structure of the Guide, ensuring it addresses the real-world issues communities are facing and provides the tools, insights, and resources needed to support informed, proactive planning for Lehigh County's industrial future.

LEHIGH COUNTY

INDUSTRIAL LAND USE GUIDE

INDUSTRIAL MARKET EVOLUTION
AND DEVELOPMENT TRENDS

Once known for its steel manufacturing and heavy industries like slate and cement, the Lehigh Valley has evolved into an e-commerce and logistics hub for the Northeastern United States. Situated along the I-78 and Interstate 80 (I-80) corridors, the Valley is within a day's drive of roughly one-third of the nation's population. This geographic advantage has made Lehigh County a competitive location for distribution and warehousing, supporting sustained growth in the industrial real estate market.

Warehousing and Logistics

The surge in online shopping during and after the COVID-19 Pandemic accelerated demand for large distribution facilities across the Lehigh Valley. Nearly every available building was quickly leased, and vacancy rates fell to around 3% in 2022 — an extremely low level for the market. With space scarce, rental prices more than doubled in just a few years, climbing from about $5 per square foot in 2021 to over $11 per square foot by the end of 2024.

As of mid-2025, the market has begun to stabilize. Vacancy rates have risen to about 7%, and lease rates have leveled off, signaling a transition from rapid expansion to a more sustainable balance of supply and demand. This shift reflects a healthy market adjustment rather than a broader decline.

The logistics sector is also diversifying. Subleasing activity has increased as companies reassess space commitments made during the pandemic, creating new opportunities for smaller businesses. Flex space, which can accommodate light manufacturing, assembly, storage, and administrative functions (potential call-out definition), is becoming more common.

Manufacturing

Manufacturing in Lehigh County is becoming increasingly high-tech, driven by automation, robotics and digital systems that reduce labor needs but heighten demands for skilled technicians, reliable power and broadband. These technological advancements require less space to operate, leading to a shift toward smaller facilities, typically between 20,000 and 50,000 square feet. Emerging manufacturers are producing electronics and medical devices, while reshoring trends are returning production of semiconductors, pharmaceuticals and other goods to the United States to shorten supply chains.

Together, warehousing and manufacturing trends illustrate a regional industrial market that remains active but is beginning to stabilize after a period of rapid growth.

Industrial Market Conditions

Following years of record expansion, the Lehigh Valley's industrial market is entering a period of stabilization as demand begins to balance with available supply. Net absorption — the difference between space leased and vacated — has slowed, while new construction has declined to its lowest level since 2013, with just 743,000 square feet breaking ground along the Interstate 78/ Interstate 80 corridor in early 2025, according to international real estate firm CBRE.

Both declining absorption and reduced construction reflect a market realignment after the pandemic-era surge in warehouse development. As fewer large-scale projects are proposed, the total industrial square footage added to the market each year has moderated.

Lease rates have since stabilized around $11.50, remaining among the highest along the corridor. Nationally, 2024 marked the 15th consecutive year of industrial expansion across the United States, though at its slowest pace since 2010. Within this context, the Lehigh Valley has demonstrated steady performance and resilience, maintaining near-zero changes in inventory, absorption and rent growth, even as larger metros experienced sharper swings.

Recent trade policies and executive actions have introduced some uncertainty, prompting many companies to delay expansion decisions until costs and supply chain implications become clearer. This cautious, strategic approach is visible nationwide, including in the Lehigh Valley, where developers are taking a longer-term view of new industrial investment.

Regional Development Patterns

Development patterns across the Lehigh Valley over the past decade reflect a region in transition — shifting from rapid industrial expansion toward more balanced, mixed-use growth. Between 2015 and 2022, multi-family housing approvals rose steadily, reflecting increased demand for higher-density living near employment and service centers. Public and quasi-public uses such as healthcare facilities also expanded, signaling broader investment in community infrastructure.

During the pandemic, municipalities such as Bethlehem, and the townships of Lower Macungie, South Whitehall and Whitehall experienced a temporary spike in non-residential square footage as businesses sought space outside dense urban areas. That surge has since receded, while steady growth continues in Upper Macungie Township, Allentown and Bethlehem, where strong transportation access, workforce proximity and established infrastructure continue to attract investment.

Meanwhile, warehouse and industrial development peaked during the pandemic and has since returned to pre-pandemic levels. Office and retail construction have declined since 2018, influenced by remote work, e-commerce, and automation. These changes highlight an evolving regional identity — one that increasingly emphasizes livability, resilience and sustainable economic diversity.

Importantly, the industrial surge was accompanied by parallel residential growth. Municipalities including Allentown, Bethlehem, Emmaus Borough and South Whitehall Township experienced simultaneous increases in both housing and non-residential development, underscoring the close link between industrial expansion and housing demand. As both sectors stabilize, the Lehigh Valley appears to be entering a post-boom phase defined by moderate, sustainable growth that supports long-term economic strength and regional balance.

Evolving Industrial Needs

Looking ahead, Lehigh County's industrial landscape will continue evolving as new technologies, energy systems, and logistics models reshape how and where industries operate. Traditional warehousing and manufacturing will increasingly intersect with technology-driven production — such as biofabrication, microchip manufacturing and large-scale 3D printing — that demand smaller, more specialized facilities supported by high-capacity utilities and broadband.

Digital and automated industrial operations, including data centers, cryptocurrency mining, and autonomous vehicle hubs, will expand the region's role in the national digital economy but will also heighten energy and infrastructure demands.

Simultaneously, energy generation and storage facilities from solar and battery installations to advanced grid management systems will become more common as Pennsylvania's energy market modernizes and industries seek sustainable, resilient power sources.

The freight and logistics sector is also expected to transform with the adoption of electric and autonomous trucks, increased intermodal connectivity, and the redevelopment of aging warehouse stock for more efficient operations.

Together, these shifts point toward an industrial future defined by varying footprints, higher energy intensity, greater digital integration, and closer ties between industrial land use, infrastructure and community planning. For municipalities, this means planning proactively, by updating zoning, infrastructure, and comprehensive plans to ensure that future industrial growth remains compatible with community character, resource capacity and long-term regional goals.

LEHIGH COUNTY

INDUSTRIAL LAND USE GUIDE

TOOLS FOR LOCAL GOVERNMENT

The foundation for how Pennsylvania municipalities guide growth and development is established by the Pennsylvania Municipalities Planning Code (MPC). The MPC grants local governments the authority to adopt comprehensive plans, zoning ordinances, and subdivision and land development ordinances, which together form the framework for managing land use and development.

Many municipalities in Lehigh County have adopted these planning and regulatory tools provided under the MPC, but too often these tools are developed and maintained in silos. A municipality may prepare a comprehensive plan, write a zoning ordinance, and adopt a subdivision and land development ordinance (SALDO), yet over time the connection between the three becomes blurred. Outdated zoning may not reflect the vision set forth in the comprehensive plan, and SALDO provisions may drift away from the standards needed to support zoning districts. When this happens, municipalities are left reacting to development proposals instead of proactively guiding them, particularly as new or unfamiliar industrial uses emerge.

PLANNING TOOLS WORK BEST TOGETHER

A community's comprehensive plan, zoning and SALDO are most effective when aligned—each reinforcing the others to guide industrial development from vision to site design

COMPREHENSIVE PLAN

Sets the long-term vision and identities appropriate locations for different industrial uses.

ZONING

Implements that vision through mapped districts and regulations that control where and how industrial uses occur.

SALDO

Aligns site design details with zoning standards and the broader goals of the comprehensive plan.

For industrial land uses in particular, integration is critical. Industrial facilities often come with large site footprints, significant infrastructure demands, and potential community impacts on traffic, environment, and quality of life. If zoning regulations are not aligned with SALDO standards, municipalities may miss opportunities to manage truck circulation, buffer adjacent neighborhoods, or ensure adequate utility capacity. Likewise, if zoning diverges from the comprehensive plan, municipalities may find themselves facing development in areas that conflict with community goals.

When used together intentionally, these tools allow municipalities to stay ahead of market trends, set clear expectations for developers, minimize conflicts between industrial development and surrounding land uses, ensure that industrial growth aligns with local priorities, and protect quality of life while supporting economic opportunity. The sections that follow provide guidance on how each tool can be applied to help communities make informed, forward-looking decisions about industrial land use.

Comprehensive Plans

A comprehensive plan is the highest-level policy document a municipality has under the MPC. While not regulatory on its own, it establishes the vision, goals, and framework that zoning ordinances and subdivision and land development ordinances (SALDOs) should implement.

Here is how comprehensive plans can address industrial land uses:

Identify Suitable Locations

Analyze transportation networks, utility capacity, environmental features and land availability to guide where industrial development is most appropriate. Set policies that clearly determine the outcomes of development, avoiding conflicts with residential areas, schools or sensitive natural resources. Designate industrial growth areas, and highlight opportunities for reuse or redevelopment.

Balance Land Use Priorities

Consider housing, agriculture, open space and economic development together to ensure that industrial growth is accommodated without displacing other community priorities.

Anticipate Emerging Trends

Include policies for new or evolving uses to proactively set expectations before proposals arrive.

Set Transportation and Infrastructure Policies

Identify where infrastructure upgrades may be needed; outline strategies for coordinating with utility providers and transportation agencies; include policies to elevate the quality of developments and minimize impacts (truck driver necessities, parking, etc.); reference other municipal planning documents such as Official Sewage Facilities Plans and Capital Improvements Plans.

Promote Design and Mitigation Standards

While zoning and SALDO carry the enforceable requirements, the comprehensive plan can establish policies for enhanced built environments through buffering, landscaping, sustainable building practices, renewable energy, architectural treatments and building aesthetics.

Support Regional Coordination

Align local goals with *FutureLV: The Regional Plan* to support regional coordination, as industrial markets and freight traffic cross municipal boundaries.

Zoning

Zoning is the most direct regulatory tool municipalities have to manage industrial land uses. As authorized by the MPC, zoning ordinances establish where industrial uses are permitted, the standards they must meet, and how they relate to surrounding land uses. Zoning regulations are created to implement the visions of comprehensive plans and are legally enforceable.

Here is how zoning ordinances and maps can address industrial land uses:

Differentiate Between Types of Industry

Ordinances should include clear definitions that establish separate uses based on their types and resulting impacts, including manufacturing, technology industry, warehousing and logistics.

Designate Appropriate Districts

Zoning maps identify where industrial uses can go, typically near highways, rail corridors, or other infrastructure, and away from residential neighborhoods and sensitive environmental areas.

Utilize Overlay Districts

Overlay districts apply an additional set of standards to a specified geographic area on top of the underlying zoning district. They can be used to increase flexibility and target development, for example by allowing for a wider range of permitted uses than the base zoning, or to impose additional standards that limit development, such as due to the presence of natural features.

Set Dimensional and Site Standards

Requirements for setbacks, buffering and building height reduce conflicts with adjacent uses, especially when near residential or mixed-use areas.

Require Screening and Design Features

Landscaping, berms, façade requirements and green building practices can help reduce the visual and environmental footprint of large industrial buildings.

Mitigate Operational Impacts

Performance standards address noise, lighting, emissions, truck circulation, hours of operation and other potential impacts, ensuring industrial activity does not create nuisances for neighbors.

Address Transportation and Parking

Truck routes, loading areas and parking requirements can be tailored to industrial uses, keeping heavy vehicle traffic off local streets and ensuring adequate but not excessive parking.

Encourage Redevelopment and Reuse

Flexible zoning provisions can make it easier to reuse or redevelop obsolete industrial sites and reinvest in brownfield sites to support community revitalization.

Protect Natural Resources

Overlay districts, environmental performance standards, and conservation design techniques can ensure that industrial development avoids or mitigates impacts on critical habitats, farmland or water resources.

Subdivision and Land Development Ordinances

While zoning determines where industrial uses may be located, Subdivision and Land Development Ordinances (SALDOs) establish detailed requirements for how land is divided and developed. These ordinances as authorized by the MPC allow municipalities to ensure that new industrial sites are designed safely, efficiently and in ways that minimize impacts on surrounding communities, working in tandem with zoning and comprehensive plans to create a predictable, consistent framework of plan submission and review for both municipalities and developers.

Here is how SALDOs can address industrial land uses:

Transportation and Access Management

Require traffic impact studies that are accurate for the intended use, to assess infrastructure needs and ensure safe and efficient truck circulation, including designated entrances, on-site truck parking and turning radius requirements.

Infrastructure and Utilities

Require adequate sewer, water, stormwater, and broadband capacity before approval of plans. Incorporate modern infrastructure needs, such as electric vehicle charging or redundant power for high-tech uses.

Stormwater and Environmental Management

Encourage green infrastructure approaches such as rain gardens. Protect floodplains, wetlands and steep slopes through development standards that minimize site disturbance. Require landscaping and tree plantings in parking areas and throughout sites to improve air quality and mitigate heat island effects.

Site Layout and Design Standards

Establish minimum requirements for parking, loading areas and internal circulation that reflect industrial needs without overbuilding. Require screening of loading docks, outdoor storage and mechanical equipment from public rights-of-way and adjacent residential areas. Require pedestrian and bicycle infrastructure to support workforce mobility and safety, including sidewalks, lighting, bus shelters, and safe crossings.

Worker and Driver Amenities

Encourage or require workforce amenities such as break areas, green space and driver facilities.

Regional Coordination

Incorporate external agencies including the Lehigh and Northampton Transportation Authority (LANTA) and LVPC early and often in review processes.

Emergency Services Coordination

Within plan review regulations and procedures, require early coordination with local fire, emergency medical, and police services to review site access, circulation, and any features that may affect emergency response including building layout, gate locations, hydrant access, and internal road design. This coordination ensures that sites are designed to support effective emergency access.

LEHIGH COUNTY

INDUSTRIAL LAND USE

GUIDE

STRATEGIES
FOR ADDRESSING INDUSTRIAL LAND USES

LEHIGH COUNTY
INDUSTRIAL LAND USE
GUIDE

EMERGING AND EVOLVING **INDUSTRIAL LAND USES**

Evolving and emerging industrial land uses are grouped into several categories: **Digital Infrastructure and Tech Facilities** driven by modern-day use of computers and data exchange, **Advanced Manufacturing** driven by technological advancements, **Freight, Logistics and Supply Chain** as systems increasingly incorporate automation to maximize efficiency, **Energy Generation and Storage** to power these utility-intensive land uses, and **Resource Extraction** as the industry's materials needs shift.

DIGITAL INFRASTRUCTURE AND TECH FACILITIES

Data Centers

Data centers are facilities that house physical hardware, like computer servers and telecommunications and storage systems, that enable the digital world.

When you use devices such as a smartphone or laptop, it's not the device itself that processes your requests. The device sends your request to a data center, where data is accessed, processed, and returned to your device to complete the request, typically within a fraction of a second. Hyperscale Data Centers are growing rapidly across the country in tandem with the proliferation of artificial intelligence and cloud computing.

Data centers, like all technology-based industrial facilities, must be operational 24 hours a day, seven days (24/7) a week and require uninterrupted electricity supply. The equipment produces a lot of heat, and robust cooling systems are required for proper functioning. Most of these cooling systems are water-based and may require between 20,000 gallons per day for smaller data centers to over 500,000 gallons per day for large data centers.

Cryptocurrency Mining

Cryptocurrency mining facilities operate high-powered computers that validate blockchain transactions and generate digital currency.

Unlike data centers, which process and store information for many users, cryptocurrency mines are single-purpose computing operations designed to solve complex mathematical equations. These facilities are often housed in warehouses or modular container units and rely on constant electricity supply and heavy-duty cooling systems to maintain safe operating temperatures.

Cryptocurrency mining is extremely energy-intensive and can create substantial strain on local power grids. While some operations locate near renewable energy sources, many depend on fossil-fuel-based electricity, leading to measurable air quality and climate impacts. The number of large-scale cryptocurrency mines in the United States remains relatively small but is expected to grow as digital currencies gain acceptance and the technology becomes more commercially viable.

Telecommunications Hubs

Telecommunications hubs, sometimes called network exchange points, carrier hotels, or telecom switching facilities, are specialized sites that house the equipment and infrastructure enabling digital communication networks.

These facilities connect internet service providers, mobile carriers, data centers and cloud platforms, allowing data to move efficiently across regional, national and international systems.

While data centers primarily store and process large volumes of digital information for cloud computing, telecommunications hubs focus on transmission and routing — the physical interconnection points that keep networks operational. Telecom hubs often occupy smaller buildings than data centers but require similar infrastructure, such as redundant power supply, advanced cooling and robust security systems.

Key Impacts Across Digital Infrastructure Uses

Energy Demand and Grid Reliability	High and constant electricity demand
	Potential strain on local substations and transmission networks
	Need for redundancy and emergency power
Cooling, Water Use and Heat Generation	Significant heat output from information-processing equipment
	Cooling systems that may use water, large air-handling units or mechanical chillers
	Potential opportunities for heat recovery or reuse
Noise and Environmental Factors	Persistent noise from fans, chillers, air-handling units, transformers and generators
	Air emissions from backup generators or on-site fossil-fuel power sources (more common in crypto mining)
	Stormwater impacts from large impervious surfaces and roof areas
Visual and Design Considerations	Windowless or utilitarian buildings, equipment yards, outdoor containerized units
	Need for screening, buffering and architectural standards
	Antenna structures and small-cell nodes at telecom hubs
Emergency Response and Resiliency	Hazard mitigation for electrical systems, batteries and fire suppression
	Requirements for 24/7 access and operations continuity
	Elevated risk considerations due to heat, high voltage and redundant power systems
Community Compatibility	Siting concerns near residential areas
	Public perceptions about electromagnetic frequency (telecom), fossil-fuel dependency (crypto) or noise (all uses)
Construction Traffic	Increased passenger vehicle traffic due to construction workers accessing site
	Heavy equipment traffic when building is under construction
	Truck traffic to transport data center equipment

Micro Scale
(100kw)

Local Data Processing close to source

Size Comparison
Shipping container
(Less than 5,000 sq. ft.)

Small Scale
(1mw)

Company-owned critical Data Processing

Size Comparison
1 Basketball Court
(Up to 10,000 sq. ft.)

Medium Colocation
(10mw)

Multiple Tenants Managed Services Data Processing

Size Comparison
2 Football fields
(Up to 100,000 sq. ft.)

Large Colocation
(50mw)

Multiple Tenants, Multiple Companies and network Data Processing

Size Comparison
12 Football fields
(Up to 1 Million sq. ft.)

Hyperscaler Scale
(100mw)

Capacity for Major Global Networks Data Processing (Scalable)

Size Comparison
57 Football fields
(Millions of square feet)

SIZES OF DATA CENTERS

In this daytime view of the New Albany data center campus in Central Ohio, data center Buildings 3, 2, and 1 (from left to right) are in the foreground. Photo Credit: Google Data Centers

Mitigation Strategies and Best Practices
Digital Infrastructure and Tech Facilities

Comprehensive Plans Should:

- Inventory and establish goals and policies for the protection of existing natural and historic resources
- Inventory, analyze and project existing and future community facilities and utility needs. Establish goals and policies directing digital infrastructure land uses to adequate utility capacity
- Establish goals and policies supporting the expansion of broadband and fiber internet infrastructure
- Identify the economic development potential of digital infrastructure facilities, as emerging industrial land uses with impacts that must also be mitigated if encouraged to locate in the community
- Establish policies that encourage protection of residential areas and community-centered land uses from environmental impacts of land uses adverse to public health and quality of life
- Establish sustainability goals and policies encouraging renewable or carbon-neutral energy usage
- Reference other planning documents such as Sewage Facilities Plans, Hazard Mitigation Plans, Energy Conservation Plans, Capital Improvement Plans; and/or identify creating or updating such documents as Comprehensive Plan implementation steps

Zoning Ordinance Considerations

Definitions

- Include a broad definition for “Data Centers” that encompasses all aspects of digital infrastructure land uses
- Differentiate “Data Centers” as a primary use from an accessory data center

Districts

- Direct Data Centers to appropriate areas with:
    + Compatible land uses such as technology/innovation districts, light or heavy industrial districts, business parks or highway commercial areas
    + Adequate electrical capacity
    + Public water service availability
    + Public sewer service availability
    + Access to broadband and/or fiber networks
    + Adequate transportation access for construction and emergency vehicles.

- Avoid siting in or near:
    + Areas with inadequate infrastructure, such as rural areas
    + Floodplains, wetlands and other natural constraints
    + Residential neighborhoods or community facilities
- Consider creating overlay districts to ensure adequate siting

Regulations and Performance Standards

- Permit “Data Center” as a conditional use to establish criteria and a process for additional oversight
- Specify building scale and design standards, including building height, orientation and façade treatments
- Establish adequate setbacks and buffering
- Establish standards limiting noise levels at property lines
- Establish standards limiting light levels at property lines and projected onto adjacent properties
- Specify a contextual parking requirement, such as one space per employee

Subdivision and Land Development Ordinance Considerations

Utility Capacity & Infrastructure

- Demonstrate adequate water, sewer and electric capacity, with confirmation from utility provider.

Site Design

- Require Pennsylvania-native landscaping throughout sites and within buffer areas
- Require visually aesthetic enclosures around outdoor equipment
- Require adequate site access for emergency vehicles
    + Incorporate emergency service providers in the development review process

Impact assessments should require community and environmental impact statements evaluating:

- Energy and water demand
- Emissions and air quality impacts
- Noise levels
- Emergency service requirements
- Municipal fiscal impacts

Biotechnology

Biotechnology or Biotech is a field using living organisms or systems to develop products, processes or services.

The field includes biofabrication, which can produce lab-grown meats and animal-free materials such as leather or fur, create bio-based fuels and plastics, and manufacture advanced medical products like implantable organs and 3D tissue models for drug testing. These industries collectively hold potential to transform manufacturing, energy and healthcare while addressing global challenges such as sustainability, ethical production and resource scarcity.

In Lehigh County, the region's strong healthcare sector, higher education institutions, and established manufacturing base position it well for future growth. Facilities typically resemble research laboratories or small-scale production sites and require reliable utilities, advanced ventilation, temperature control and specialized waste management systems. As the sector evolves, municipalities will need to plan for the unique spatial, environmental and regulatory requirements of this rapidly developing field.

3D and Large-Scale Printing

3D printing, also called additive manufacturing, uses computer-guided equipment to build three-dimensional objects layer by layer from digital models.

While small-scale 3D printing is already common in prototyping and component fabrication, large-scale additive manufacturing applies this technology to produce full-size building elements, bridges, vehicles, and industrial components. These operations often utilize materials such as concrete, metal, polymer or composite blends and may locate within light industrial or research and development facilities.

Unlike traditional manufacturing, which removes material from a solid block, additive processes use only what is needed, significantly reducing waste and allowing greater design flexibility. As costs decrease, large-format printers are expected to become more common in construction, infrastructure and custom manufacturing sectors, changing the spatial and infrastructure needs of industrial areas.

Microchip Manufacturing

Microchip manufacturing facilities, also known as semiconductor fabrication plants or “fabs”, produce the chips that power everything from smartphones and vehicles to medical devices and national defense systems.

The industry includes both front-end wafer fabrication, where silicon wafers are imprinted with microcircuits, and back-end assembly, testing and packaging (ATP), where chips are cut, tested and prepared for integration into finished products.

Driven by global supply chain shifts and national security priorities, the CHIPS and Science Act of 2022 has spurred new investment in domestic semiconductor production to reduce reliance on overseas manufacturing. The Lehigh Valley’s existing logistics infrastructure, workforce base and proximity to major metropolitan markets make it a competitive location for semiconductor investment — illustrated by proposals such as the Infinera packaging facility in Bethlehem.

These facilities typically require large-scale buildings, extensive water and energy resources, high-skill labor, and robust transportation networks for inbound materials and outbound products. Their complexity and scale make proactive planning essential to ensure compatibility with community goals, infrastructure capacity, and environmental standards.

Key Impacts Across Advanced Manufacturing Uses

Infrastructure & Utility Demand	High and potentially continuous electric demand
	Significant water demand, especially for bioengineering and semiconductor fabrication
	High-capacity cooling
	Potential need for substantial utility upgrades
Environmental Factors	Air emissions and ventilation needs
	Specialized waste streams
	Significant heat generation from processing equipment
	Noise from machinery, ventilation systems and freight activity
Freight, Logistics & Transportation	Frequent deliveries of specialized materials
	Passenger vehicle traffic associated with workforce shifts
	Freight traffic from shipping materials and product
Building Scale & Site Characteristics	Varying building footprints
	High-clearance interior spaces for some 3D processes
	Outdoor equipment yards and mechanical systems
Hazard Management & Emergency Response	Complex hazard profiles including biological materials, combustible powders/metal dust or hazardous chemical agents
	Heightened fire-suppression needs

Mitigation Strategies and Best Practices
Advanced Manufacturing

Comprehensive Plans Should:

- Inventory and establish goals and policies for protecting natural and historic resources that may be affected by high-intensity advanced manufacturing operations.
- Inventory, analyze and project community facility and utility needs, including water, sewer, electric, broadband, and emergency service capacity. Establish policies directing advanced manufacturing uses to areas with adequate infrastructure.
- Identify the economic development potential of advanced manufacturing, particularly sectors such as bioengineering, 3D printing, and semiconductor fabrication, while recognizing the need to mitigate their utility, environmental and freight impacts.
- Designate suitable areas for advanced manufacturing within industrial, technology, or research corridors, especially near workforce, higher education institutions transportation networks, and existing utility infrastructure.
- Support sustainability and innovation goals, including energy efficiency, renewable or low-carbon energy use, waste minimization, and opportunities for material reuse or circular manufacturing processes.
- Integrate workforce and training initiatives by referencing or coordinating with higher education, technical training centers, and industry partnerships supporting biotechnology, robotics, fabrication, and semiconductor disciplines.
- Reference related planning documents (Sewage Facilities Plans, Hazard Mitigation Plans, Energy Conservation Plans, Capital Improvement Plans, etc) and identify updates to these plans as Comprehensive Plan implementation steps.

Zoning Ordinance Considerations

Definitions

- Include clear definitions for Bioengineering/Biofabrication Facilities, Additive or 3D Manufacturing Facilities, and Microchip/Semiconductor Manufacturing Facilities to distinguish them from general manufacturing or research laboratories.
- Differentiate primary manufacturing operations from accessory research, testing, or prototyping uses.

Districts

- Direct advanced manufacturing uses to districts with:
  - + Compatible industrial, technology, innovation or business-park land uses
  - + Adequate and reliable electric capacity
  - + Adequate public water and sewer capacity (especially for biotech and semiconductor fabrication)
  - + Access to freight routes and goods-movement corridors
  - + Sufficient broadband or fiber-optic infrastructure
  - + Adequate transportation access for deliveries, workforce and emergency services
- Avoid siting in or near:
  - + Residential neighborhoods or sensitive community facilities
  - + Areas with inadequate utility infrastructure
  - + Floodplains, wetlands, and environmental constraint areas
- Consider overlay districts for advanced manufacturing clusters to standardize siting, design, and impact-mitigation requirements.

Regulations and Performance Standards

- Permit advanced manufacturing uses as conditional uses or special exceptions to establish evaluation criteria and provide additional oversight of facility intensity, environmental impacts, and freight activity.
- Specify building scale and design standards, including height, façade treatments, screening of mechanical equipment, and building orientation.
- Establish setbacks and buffering to protect adjacent uses.
- Establish noise and light standards at property lines.
- Require contextual parking requirements, scaled to workforce needs.
- Note where compliance with specialized codes is applicable, such as biosafety regulations (bioengineering), fire and ventilation codes for industrial robotics (3D printing), or cleanroom and chemical-handling standards (semiconductors).
- External agency regulation or permitting requirements can be referenced as notes on development plans.

Subdivision and Land Development Ordinance Considerations

Utility Capacity & Infrastructure

- Require applicants to demonstrate, with utility-provider confirmation:
- Adequate water capacity, critical for biotech and semiconductor fabrication
- Adequate sewer capacity for process discharge and wastewater flows
- Adequate electric capacity, with documentation of continuous power needs and redundancy
- Adequate broadband/fiber capacity for digitally intensive manufacturing
- Identification of required infrastructure upgrades, with developer responsibility where appropriate

Site Design

- Require Pennsylvania-native landscaping and buffer plantings
- Require aesthetic enclosures around outdoor equipment, mechanical systems, chemical storage areas, and utility yards
- Require adequate emergency vehicle access, including turning radii, drive aisle widths, and fire-suppression system access
    + Incorporate local emergency service providers into the review process
- Require plans showing ventilation exhaust locations, emissions-control systems, and equipment requiring special containment

Impact assessments should require community and environmental impact statements evaluating:

- Energy demand and reliability requirements
- Water demand and wastewater generation
- Emissions, chemical usage and air-quality impacts
- Noise and vibration levels
- Hazardous or specialized waste streams, such as biological, chemical, particulate
- Emergency service requirements
- Municipal fiscal impacts
- Freight and truck movement patterns, especially for semiconductor and additive manufacturing

FREIGHT, LOGISTICS AND SUPPLY CHAIN

Freight is an essential function of every economy, connecting producers, suppliers and consumers both within the region and far beyond.

The facilities that support freight movement vary widely in size and purpose, and accommodate a diverse range of activities, including manufacturing, assembly, storage, staging and distribution. Freight-based land uses in Lehigh County depend on efficient connectivity by road, rail and air, and can take many forms such as distribution centers, fulfillment centers, truck terminals, industrial or business parks and light manufacturing operations.

Many modern freight facilities are multi-tenant or multi-purpose, designed for flexibility so different users can cycle in and out as business needs evolve. This adaptability allows the regional industrial market to respond quickly to economic shifts but can also complicate local planning, as turnover in tenants may lead to changing traffic, infrastructure, and environmental impacts. Inside the walls of these facilities, operations are often highly integrated. Production, assembly, packaging and distribution may occur under one roof or across multiple buildings within the same business park. In some cases, adjacent or nearby facilities operate in synergy, forming industrial ecosystems that depend on proximity and shared infrastructure.

Municipalities are encouraged to align definitions for all freight-based land uses with the Institute of Transportation Engineers (ITE) Trip Generation Manual, provided below. The ITE is the industry standard for estimating the traffic impacts of land uses, and aligning definitions helps ensure that facilities with freight impacts are accurately assessed to address transportation infrastructure needs. Freight-Based Facilities can be generally classified into the following high-level categories:

- Manufacturing
- Warehousing (with subsets)
- Fulfillment Center
- Industrial/Business Parks
- General Light Industrial

Manufacturing

ITE Definition: “A manufacturing facility is an area where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, a manufacturing facility typically has an office and may provide space for warehouse, research, and associated functions.”

Manufacturing facilities focus on producing finished goods, often with supporting functions such as research, warehousing and office operations. While manufacturing sites generate freight movements, the majority of trips are typically employee-related. Truck volumes depend on whether raw materials are stored on-site or off-site and on the scale of distribution operations. Because operational intensity and floor area use can vary by tenant or industry, zoning and land development standards should allow flexibility to accommodate different manufacturing processes over time.

Warehousing

ITE Definition: “A warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas.”

Related uses include high-cube transload and short-term storage warehouses (Land Use 154*), high-cube fulfillment centers (155*), parcel hub warehouses (156*), and cold storage warehouses (157*).

Warehouses are primarily storage and logistics facilities that may include limited office or employee support space. Transportation impacts depend on the type of operation — short-term storage, transload, or specialized high-cube warehousing for e-commerce and parcel distribution. These facilities often generate moderate to heavy truck traffic, particularly during peak shipping hours. Rather than including blanket definitions for a “Warehouse” land use, municipalities should distinguish among these warehouse subtypes to ensure appropriate performance standards for circulation, access and buffering.

**Each number corresponds with an ITE Land Use Code*

Fulfillment Centers

ITE Definition: Fulfillment centers are categorized as sort or non-sort facilities:

- **Sort facilities** handle smaller items requiring extensive manual sorting, typically with high employee counts and greater vehicle trip generation.
- **Non-sort facilities** process larger items primarily through automated systems, resulting in fewer employees per square foot but similar freight activity.

Fulfillment centers represent the most logistics-intensive subset of warehousing, driven by e-commerce operations. These facilities often operate 24/7, generating high truck volumes and employee traffic during shift changes. Because of their size and transportation impacts, municipalities should require traffic impact studies that are accurate for the intended land use, as well as ensure truck routing is managed and that adequate infrastructure capacity is accounted for through the land development process.

Parcel Hubs/Distribution Centers

ITE Definition: A form of high-cube warehouse that serves as a regional and local freight-forwarder facility via airfreight and ground carriers.

Parcel Hubs/Distribution Centers are high intensity freight-based land uses that often have very large building footprints and generate significant peak-hour traffic.

Photo Credit: Prologis

Prologis Park 33, Lower Nazareth Township, has an automated system that demonstrates advancements in smart buildings to lower carbon footprints and make supply chain and logistics systems more sustainable.

Key Impacts Across Advanced Freight-Based Uses

Transportation & Freight Movement	High truck traffic volumes
	Increased passenger vehicle traffic during employee shift changes
	Need for safe truck routing from site to interchanges
	Need for multiple transportation modes, especially transit, to meet workforce needs
Site Circulation & Access	Tractor-trailer movements require large parking and circulation areas, truck staging, employee parking and loading docks
	Internal circulation conflicts between passenger vehicles and trucks
Infrastructure & Utility Demand	Roadway infrastructure demand, including pavement wear from heavy truck loads
	Need for adequate public utilities including electrical infrastructure to support industrial operations + Cold storage, increased automation, and autonomous vehicles all increase utility demand
Environmental Factors	Noise from trucks, loading docks and refrigeration units
	Air quality impacts from truck emissions and generators
	Light pollution from loading dock areas and security lighting
	Impervious surface coverage contributing to stormwater runoff and heat generation
Land Use Impacts	Large buildings with significant height and massing
	Tenant turnover may change impacts and operational intensity

Mitigation Strategies and Best Practices
Freight, Logistics and Supply Chain

Comprehensive Plans Should:

- Inventory and analyze existing transportation, utility and community facility capacity that support freight-based development.
- Identify appropriate areas for freight-based uses, such as industrial districts and areas with direct access to major roadways, rail or airports.
- Set goals and policies that protect residential and community-centered uses from freight-based land use impacts.
- Align future land use designations with regional freight networks, focusing on corridors with adequate capacity and multimodal goods-movement opportunities.
- Support economic resilience by recognizing the role of freight-oriented businesses, while balancing this with policies that mitigate transportation and environmental impacts.
- Incorporate sustainability goals, including reducing emissions, managing stormwater from large impervious surfaces, and encouraging renewable or energy-efficient systems.
- Reference related planning documents, such as Transportation Improvement Programs, Act 209 Traffic Impact Fee Studies, Hazard Mitigation Plans, Comprehensive Parks and Recreation Plans, and Capital Improvement Plans. Identify any necessary updates as Comprehensive Plan implementation steps.
- Promote intermunicipal coordination, especially where freight activity crosses municipal boundaries or relies on shared roadway and infrastructure systems.

Zoning Ordinance Considerations

Definitions

- Align definitions for Manufacturing, Warehousing, High-Cube Warehouses, Fulfillment Centers, Parcel Hubs, Industrial Parks, and Light Industrial Facilities with the ITE Trip Generation Manual to support accurate transportation impact evaluation.
- Differentiate primary freight-based uses from accessory functions such as small-scale storage, incidental shipping, or on-site fleet parking.

Districts

- Direct freight, logistics, and supply chain uses to zoning districts with:
  - + Adequate truck access to highways and key freight corridors
  - + Appropriate roadway capacity and turning geometry
  - + Public water and sewer availability
  - + Suitable electric and broadband infrastructure
  - + Safe multimodal access for employees and emergency services
- Avoid siting freight-intensive uses in or near:
  - + Residential neighborhoods
  - + Schools, parks, and community facilities
  - + Areas with inadequate roadway capacity or geometric constraints
  - + Environmental constraint areas, such as floodplains and wetlands
- Use overlay districts to direct high-intensity uses to strategic areas.

Regulations and Performance Standards

- Permit major freight-based uses as conditional uses to allow additional oversight of traffic, noise, lighting and environmental impacts.
- Establish building design and site-scale standards, including height, façade treatments and orientation of loading docks away from sensitive uses.
- Require adequate setbacks and buffering from adjacent properties.
- Establish and enforce noise limits at property lines, especially near residential or mixed-use districts.
- Establish lighting standards that limit glare and light spillover onto adjacent properties.
- Require adequate parking, loading and queueing spaces.
  - + Specify the inclusion of electrified tractor-trailer stalls and employee parking spaces.

Subdivision and Land Development Ordinance Considerations

Utility Capacity & Infrastructure

- Require site access via specified level of roadways with adequate capacity.
- Require applicants to demonstrate adequate public water and sewer service with confirmation from utility or infrastructure providers.

Site Design

- Require Pennsylvania-native landscaping and buffering, especially along building edges, loading areas, and property lines near non-industrial uses.
- Require visually aesthetic enclosures for loading docks, trailer parking, dumpsters, utilities, and mechanical equipment.
- Ensure safe and adequate site access for emergency vehicles, considering turning radii, drive aisle widths, and multiple access points for very large sites.
    + Incorporate emergency service providers in the development review process.
- Require on-site circulation plans that prevent on-road queueing and ensure safe separation between truck traffic and employee or visitor traffic.
- Require snow and ice removal equipment for trucks in freight-based land uses to help drivers comply with state regulations and minimize roadway hazards.

Impact assessments should require community and environmental impact statements evaluating:

- Trip generation, including truck volumes and peak-hour movements
- Traffic impacts on surrounding roadways and intersections
- Noise levels from trucking, mechanical systems and 24/7 operations
- Emissions and air-quality impacts
- Emergency service needs and response requirements
- Municipal fiscal impacts, including infrastructure maintenance
- Freight routing patterns and mitigation of cut-through traffic in residential areas

AUTONOMOUS VEHICLES AND FREIGHT-BASED LAND USES

Autonomous vehicles (AVs) are self-driving technologies that use sensors, cameras, radar, and artificial intelligence to navigate without or with limited human input.

Within the freight and logistics sector, autonomous technologies are emerging most rapidly in long-haul trucking, last-mile delivery, and yard or warehouse operations.

Freight AVs range from autonomous tractor-trailers operating on major highway corridors to automated yard tractors, forklifts, and delivery robots functioning within controlled industrial environments. Fully autonomous trucking is permitted on public roads, with the Pennsylvania Legislature signing Act 130 into law in 2022, which authorizes automated vehicles on roadways with PennDOT certification. As technology advances, logistics companies are investing heavily in AV-ready infrastructure, such as smart distribution centers, digitally connected loading areas, and logistics corridors designed for safe, efficient automation.

In the Lehigh Valley, where freight volumes are among the highest in Pennsylvania, autonomous vehicle technologies are expected to play a growing role in improving efficiency and addressing labor shortages in trucking and warehouse operations. However, these innovations will also have land use, infrastructure, and safety implications that municipalities should anticipate in local planning and regulatory frameworks.

Best Practices
Autonomous Vehicles and Freight-Based Land Uses

Comprehensive Plans Should:

- Inventory and analyze existing transportation, utility and community facility capacity that:
  - + Recognize autonomous freight technology as a long-term trend in goods movement and incorporate related infrastructure and workforce implications into transportation, land use, and economic development elements.
  - + Identify AV-ready freight corridors and industrial districts where connected infrastructure can be prioritized, particularly near interstates, intermodal facilities, and business parks.
  - + Encourage partnerships with PennDOT, LVPC, and private-sector logistics operators to coordinate pilot programs and share data on automation impacts.

Zoning Ordinance Considerations

- Define autonomous vehicle facilities (such as AV truck hubs, testing centers, or charging depots) as specific use categories within industrial or logistics districts.
- Require performance standards for noise, lighting and safety systems associated with continuous automated operations.
- Support adaptive reuse of existing freight facilities for AV staging, fleet charging and maintenance, ensuring compatibility with surrounding uses.

Subdivision and Land Development Ordinance Considerations

- Require site plans to account for automated circulation patterns, vehicle staging, and emergency access routes within industrial developments.
- Encourage the integration of smart infrastructure — including sensors, fiber optic connectivity, and electric vehicle (EV) charging stations — into new industrial park designs.
- Coordinate with PennDOT and regional planning agencies to ensure new development aligns with connected-vehicle infrastructure standards and emerging statewide AV policies.

ENERGY GENERATION, STORAGE AND MANAGEMENT

Nuclear Energy

Nuclear facilities generate electricity through controlled nuclear reactions that produce heat. Although Pennsylvania currently hosts large regional nuclear facilities, future trends may include small modular reactors (SMRs) designed to serve regional grids, or microreactors that could support large industrial or campus-style energy demands.

Impacts

- Large-scale energy generation facilities may require substantial land area and separation distances to ensure compatibility with surrounding land uses.
- Certain energy generation technologies may involve significant water use or water-related infrastructure, requiring coordination with state environmental permitting agencies.
- Transportation of specialized industrial equipment, fuel, or waste materials may present regional logistics and infrastructure considerations.
- Energy generation facilities may create visual, aesthetic, or perception-related impacts associated with industrial structures, supporting infrastructure, and access controls.

Federal Oversight and Local Land-Use Authority for Nuclear Facilities

Nuclear energy facilities are regulated exclusively by the federal government through the U.S. Nuclear Regulatory Commission (NRC) under the Atomic Energy Act. While state and local governments may not regulate nuclear facilities based on reactor safety or radiological risk, municipalities retain their traditional land-use authority over non-safety-related issues.

These include

LAND-USE	SITE ACCESS	INFRASTRUCTURE
STORMWATER	VISUAL IMPACTS	PUBLIC SERVICES

Best Practices
Energy Generation, Storage and Management

Comprehensive Plans Should:

- Identify appropriate locations for large-scale or campus-oriented energy generation facilities based on access to transmission infrastructure, transportation networks, water resources, and surrounding land-use patterns.
- Address intergovernmental coordination and emergency management communication frameworks applicable to major industrial and energy facilities, consistent with state and federal roles and responsibilities.

Zoning Ordinance Considerations

- Establish energy generation facilities, including nuclear energy generation, as permitted uses, conditional uses, or special exceptions, subject to objective zoning standards applicable to large-scale industrial or utility uses.
- Apply setbacks, buffering, and dimensional standards based on land-use compatibility, visual impacts, noise, and protection of adjacent uses, without regard to radiological or reactor safety considerations.
- Consider overlay zoning districts for large-scale energy and utility infrastructure that encompass generation, transmission, and supporting facilities.

Subdivision and Land Development Ordinance Considerations

- Require detailed site plans addressing stormwater management, grading, access, utilities, landscaping, and other customary land development considerations.
- Allow for coordination and information-sharing with emergency management agencies and infrastructure providers related to construction logistics and site access, without evaluating nuclear safety or other federally regulated matters.

Microreactor
1MW- ~20MW

Small Modular Reactor (SMR)
~20MW-300MW

Large-Scale Reactor
300MW - 1,000+MW

Graphic Credit: Stanford University, adapted from U.S. Department of Energy
**MW = Megawatt*

Solar Energy

Solar energy systems convert sunlight into electricity using photovoltaic (PV) panels or solar thermal technologies. Systems range from small rooftop installations to utility-scale solar farms spanning dozens or hundreds of acres.

Impacts

- Large ground-mounted arrays may alter rural landscapes, consume farmland and affect stormwater runoff
- Reflectivity and glare can impact nearby roads or airports

Decommissioning and recycling of panels require long-term management plans

Best Practices

Comprehensive Plans Should:

- Designate suitable areas for solar energy, prioritizing brownfields, rooftops, parking lots and other previously disturbed lands.
- Integrate solar siting goals into future land use and energy resilience planning.

Zoning Ordinance Considerations

- Define solar energy systems by types, such as accessory, community-scale and utility-scale.
- Establish performance standards for glare, screening, setbacks, fencing and pollinator-friendly groundcover.
- Consider agricultural zoning flexibility for dual-use “agrivoltaics” projects that combine farming and energy production.

Subdivision and Land Development Ordinance Considerations

- Require plans for grading, drainage and soil stabilization under arrays.
- Include decommissioning and financial assurance requirements to restore land to pre-development conditions.
- Ensure access roads and fire lanes meet emergency service needs.

Hydroelectric

Hydroelectric power uses flowing or stored water to turn turbines and produce electricity. While large dams are uncommon in Lehigh County, smaller run-of-river and micro-hydro projects may emerge on existing waterways or dam retrofits.

Impacts

- Alteration of aquatic habitats and stream flow
- Fish migration barriers and sedimentation changes
- Potential flooding, erosion, or downstream water quality effects
- Safety considerations for public recreation and access near facilities

Best Practices

Comprehensive Plans Should:

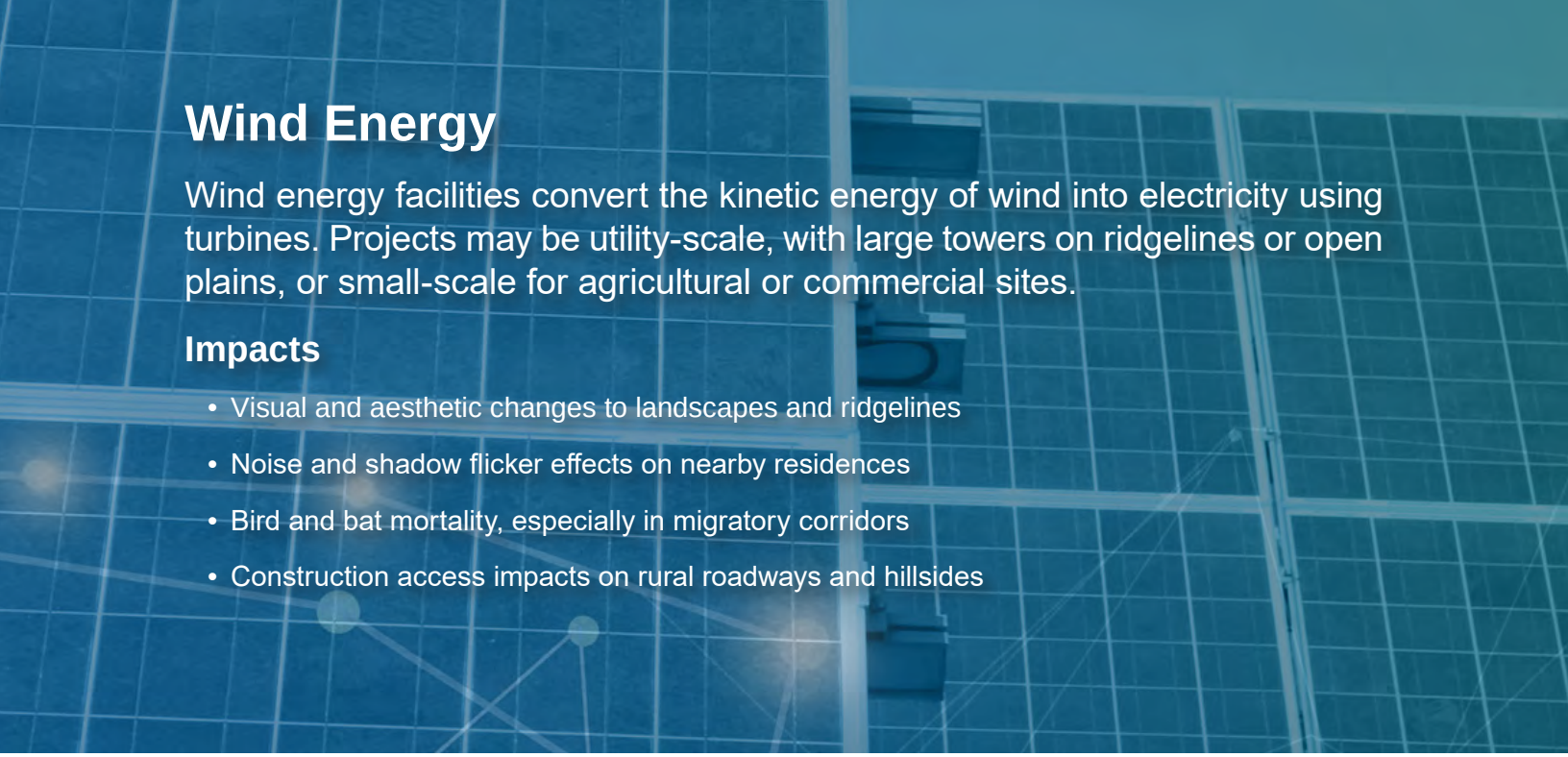
- Identify opportunities for renewable energy production using existing dams or water infrastructure.
- Incorporate watershed and ecological protection objectives in energy planning.

Zoning Ordinance Considerations

- Limit siting to areas with existing hydrologic infrastructure or previously altered waterways.
- Require coordination with the Pennsylvania Department of Environmental Protection (DEP) and U.S. Army Corps of Engineers.
- Include riparian buffer and floodplain protection requirements.

Subdivision and Land Development Ordinance Considerations

- Require hydrologic and environmental studies prior to approval.
- Evaluate impacts on public access, recreation, and streambank stabilization.
- Incorporate erosion and sedimentation control standards specific to water-based facilities.



Wind Energy

Wind energy facilities convert the kinetic energy of wind into electricity using turbines. Projects may be utility-scale, with large towers on ridgelines or open plains, or small-scale for agricultural or commercial sites.

Impacts

- Visual and aesthetic changes to landscapes and ridgelines
- Noise and shadow flicker effects on nearby residences
- Bird and bat mortality, especially in migratory corridors
- Construction access impacts on rural roadways and hillsides

Best Practices

Comprehensive Plans Should:

- Map ridgelines, open plains and other areas with sufficient wind resources while protecting scenic and environmental resources.
- Incorporate policies for renewable energy production and community benefit sharing.

Zoning Ordinance Considerations

- Define wind energy systems by scale (small, community, utility).
- Require setbacks from dwellings, property lines, and public rights-of-way based on turbine height.
- Include performance standards for noise, shadow flicker, and decommissioning.
- Require visual impact assessments and coordination with FAA and state aviation agencies for turbine height compliance.

Subdivision and Land Development Ordinance Considerations

- Require construction access and grading plans that minimize erosion on steep slopes.
- Include decommissioning and site restoration requirements with financial guarantees.
- Ensure turbine foundations and electrical systems meet local and national safety codes.

Storage of Power

Battery Energy Storage Systems (BESS) capture and hold energy for later use, improving grid reliability and supporting renewable integration. Systems may include battery storage (lithium-ion or flow batteries), thermal storage, or compressed air systems, ranging from small on-site installations to large standalone “battery farms.”

Impacts

- Fire safety and explosion risks from battery failures
- Noise and heat generation from cooling and ventilation systems
- Visual and compatibility issues in residential or mixed-use areas
- Decommissioning and disposal of batteries requiring specialized handling

Best Practices

Comprehensive Plans Should:

- Integrate microgrids into community resilience strategies for storms, grid failures, and critical facilities (e.g., hospitals, data centers).
- Plan for integration with the utility grid, broadband, and emergency management systems.

Zoning Ordinance Considerations

- Allow in industrial, commercial, institutional or mixed-use zones where more energy-consumptive land uses are located.
- Provide expedited permitting or density/intensity bonuses for renewable-powered facilities.
- Establish energy storage as a distinct use, separate from general utilities or manufacturing.
- Require compliance with National Fire Protection Association (NFPA) 855: Standard for the Installation of Stationary Energy Storage Systems.
- Include setbacks, screening and fire safety access standards.
- Consider requiring special exception review for large standalone systems to ensure compatibility.

Subdivision and Land Development Ordinance Considerations

- Require plans to show electrical connections, battery storage enclosures, emergency access, fire suppression systems and noise buffers.
- Require fire safety measures, hazardous material handling protocols and coordination with local first responders.
- Include decommissioning and recycling plans for spent batteries or equipment.

ALTERNATIVE FUELING

As the transportation and industrial sectors transition toward cleaner and more efficient technologies, alternative fueling infrastructure is becoming a critical component of local and regional energy systems.

These facilities support vehicles powered by electricity, hydrogen, and compressed natural gas (CNG), each with unique siting, safety and infrastructure needs.

For municipalities, planning for these land uses helps reduce emissions, strengthen regional competitiveness, and ensure the local road network and utility systems are ready for the next generation of freight and passenger vehicles.

Electric Vehicle Charging Stations

Electric vehicle (EV) charging stations deliver electrical power to recharge battery-electric or plug-in hybrid vehicles. Facilities range from Level 1 and Level 2 chargers in parking lots or garages to Direct Current (DC) fast-charging hubs serving fleets or highway travelers.

Impacts

- Increased electrical load on local grids and potential need for utility coordination
- Parking layout changes and accessibility requirements
- Potential site design conflicts with pedestrian or traffic circulation

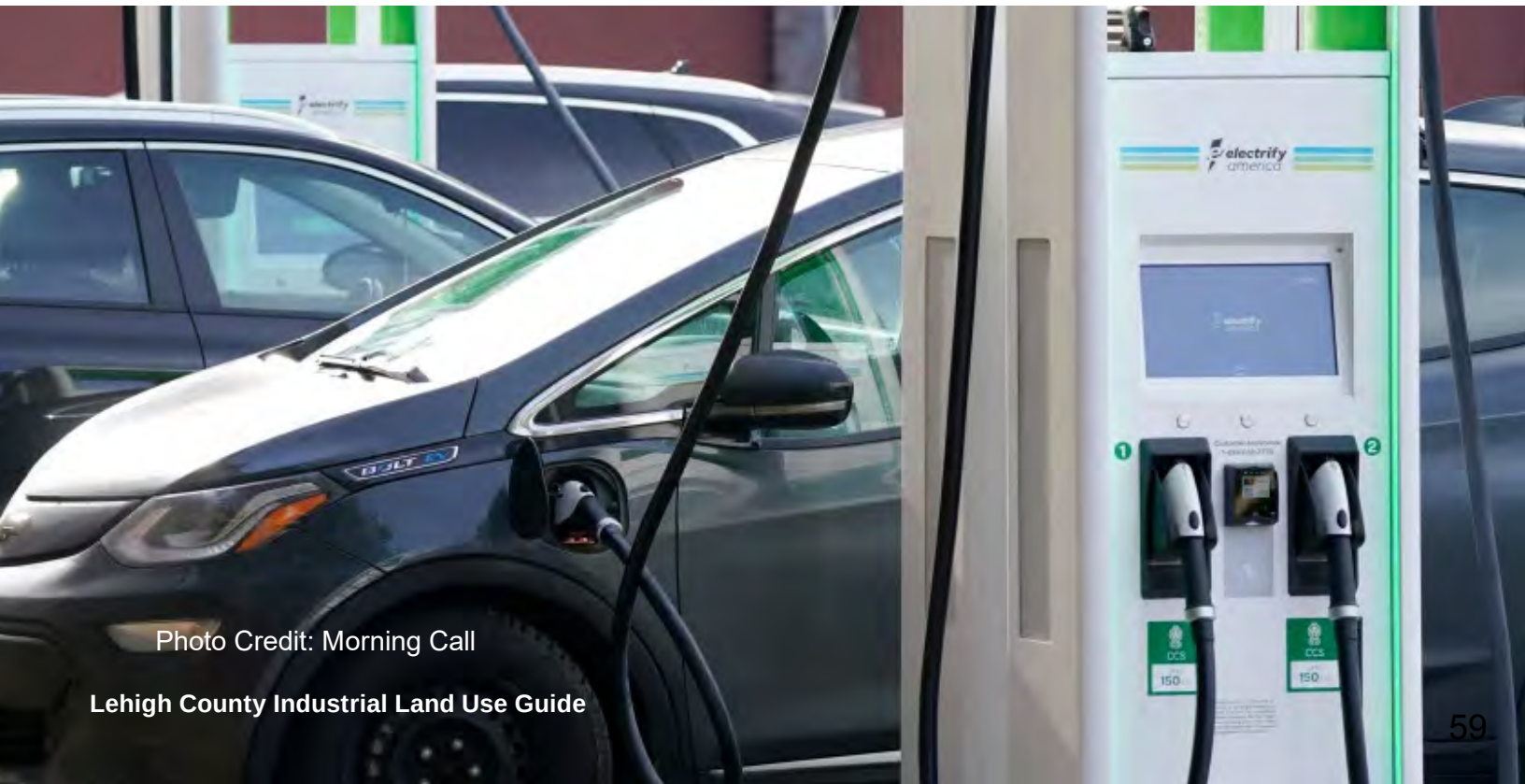


Photo Credit: Morning Call

Best Practices
Alternative Fueling

Comprehensive Plans Should:

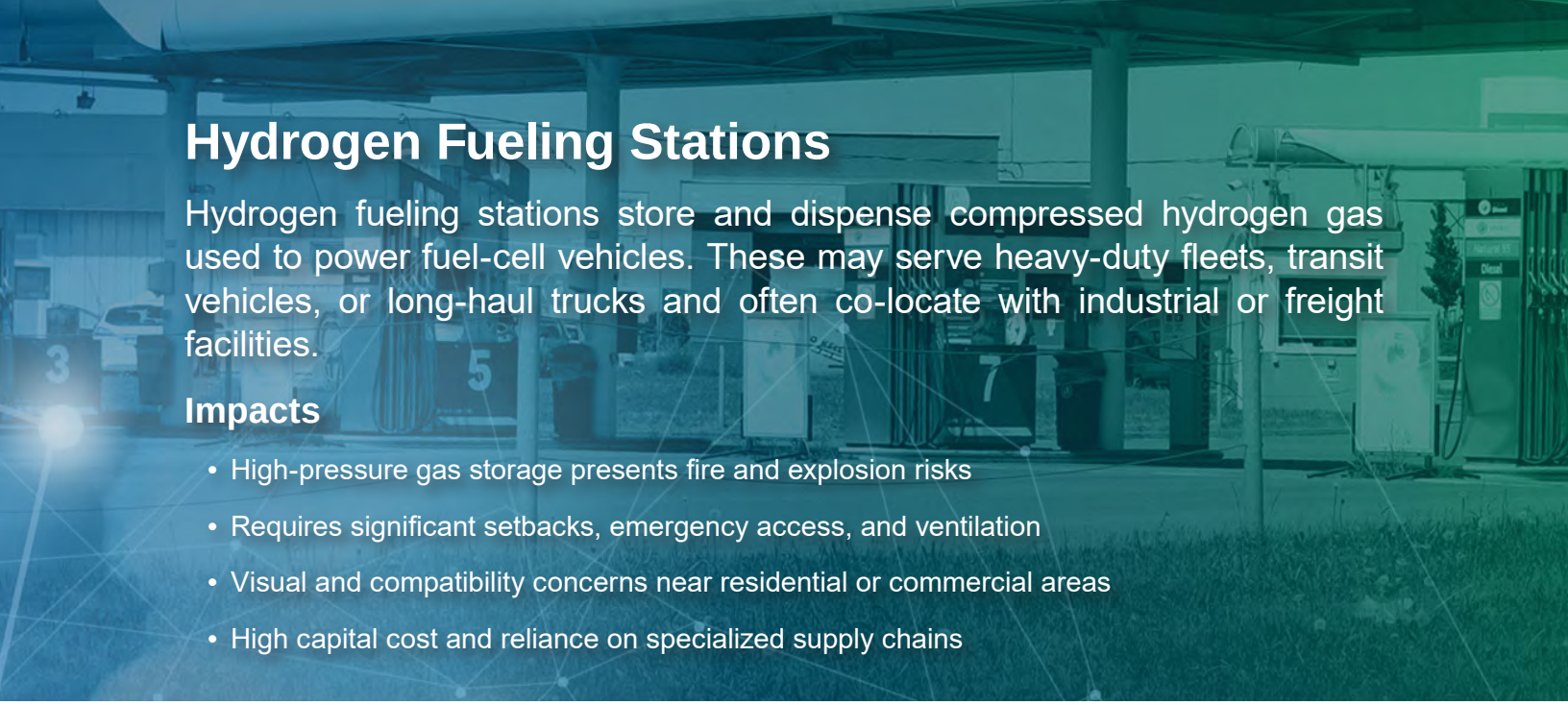
- Incorporate EV infrastructure into transportation and sustainability elements.
- Identify strategic corridors and community destinations for charging investment (downtowns, employment centers, freight routes).
- Encourage integration with renewable energy or battery-storage systems for grid resilience.

Zoning Ordinance Considerations

- Define EV charging stations as a principal or accessory use depending on scale.
- Allow Level 1 and 2 chargers by right in most zoning districts; require conditional or special exception review for large DC fast-charging plazas.
- Establish standards for signage, lighting, screening and Americans with Disabilities Act-compliant accessibility.
- Encourage shared-use parking and integration with existing commercial or public lots.

Subdivision and Land Development Ordinance Considerations

- Require site plans showing electrical connections, conduit placement and protective bollards.
- Coordinate with utility providers early in design.
- Ensure drainage, landscaping, and pedestrian circulation maintain safety and accessibility.



Hydrogen Fueling Stations

Hydrogen fueling stations store and dispense compressed hydrogen gas used to power fuel-cell vehicles. These may serve heavy-duty fleets, transit vehicles, or long-haul trucks and often co-locate with industrial or freight facilities.

Impacts

- High-pressure gas storage presents fire and explosion risks
- Requires significant setbacks, emergency access, and ventilation
- Visual and compatibility concerns near residential or commercial areas
- High capital cost and reliance on specialized supply chains

Best Practices

Comprehensive Plans Should:

- Incorporate hydrogen fueling infrastructure into transportation and sustainability elements.
- Establish policies directing hydrogen fueling to appropriate corridors, particularly near interstate interchanges or distribution centers.
- Coordinate with regional transportation and energy providers to ensure safety and supply reliability.
- Include hydrogen infrastructure in climate and clean-energy strategies.

Zoning Ordinance Considerations

- Define hydrogen fueling as a distinct use under “Alternative Fueling Facilities.”
- Limit siting to industrial, highway commercial or heavy commercial districts.
- Require compliance with National Fire Protection Association 2 (NFPA 2): Hydrogen Technologies Code and local fire-safety standards.
- Establish minimum setbacks from occupied structures and public rights-of-way.
- Require emergency access and signage consistent with hazardous-material regulations.

Subdivision and Land Development Ordinance Considerations

- Require engineered site plans detailing storage tanks, dispensing equipment, containment and ventilation.
- Coordinate review with fire marshals and emergency management officials.
- Include drainage and containment design to prevent runoff contamination.
- Require decommissioning and inspection protocols for storage vessels.

Photo Credit: Air Products

Air Products' state-of-the-art hydrogen fueling station located at its industrial gases facility in Ulsan City, South Korea, is the first station in the city built and operated by the private sector under the South Korea government's subsidy program.

Compressed Natural Gas (CNG) Fueling Stations

CNG stations store and dispense natural gas that has been compressed to less than 1% of its volume at standard atmospheric pressure. CNG is used by municipal fleets, buses and freight vehicles as a lower-emission alternative to gasoline or diesel.

Impacts

- Safety risks from pressurized gas storage and handling
- Increased truck or bus traffic at fueling depots
- Odor, noise, and visual impacts from compressors and venting equipment
- Potential conflict with adjacent sensitive land uses if not properly sited

Best Practices

Comprehensive Plans Should:

- Include policies supporting suitable corridor locations for CNG fueling, especially near transit or logistics facilities.
- Integrate CNG planning with municipal fleet-conversion or clean transportation goals.
- Encourage co-location with maintenance yards or industrial parks to reduce land-use conflicts.

Zoning Ordinance Considerations

- Define CNG fueling as a specific land use under “Alternative Fueling” or “Utility and Energy Uses.”
- Limit to highway commercial or industrial districts with adequate buffering.
- Include standards for noise, lighting, odor, and equipment screening.
- Ensure adequate distance from residential or institutional uses.

Subdivision and Land Development Ordinance Considerations

- Require detailed site plans showing compressors, storage cylinders, piping and emergency shut-off locations.
- Include ventilation and containment systems in design review.
- Coordinate with utilities for gas-line pressure requirements and emergency response planning.
- Require ongoing maintenance and inspection documentation for compliance.


MACK

Resource Extraction

While heavy industries like mining, quarrying and raw material processing have declined in many regions, demand for certain materials is surging again due to the technologies driving today's economy.

Resource extraction and material supply industries encompass the mining, quarrying, and processing of raw materials such as stone, cement, slate, and sand that form the backbone of construction and manufacturing. In the Lehigh Valley, these industries have long shaped regional identity and economic development. The Valley's abundant limestone and cement deposits supported the rise of the American cement industry in the 19th and 20th centuries, while nearby slate, iron and aggregate operations drove industrial growth that laid the foundation for today's economy.

Although large-scale extraction has declined, this sector is transforming, not disappearing. Modern operations are becoming more efficient, technology-driven, and environmentally responsible, with greater emphasis on reclamation, material recycling, and circular-economy practices. Many active quarries now integrate aggregate recycling, soil blending, or material recovery operations to reduce waste and extend the life of local resources.

At the same time, global industrial evolution is reshaping material demand. The transition to clean energy, electric vehicles, advanced manufacturing, and digital infrastructure is fueling a worldwide surge in demand for minerals such as lithium, nickel, copper, and rare earth elements. While Pennsylvania is not a major source of these critical minerals, it remains a significant supplier of construction materials and cement and participates in national supply chains that depend on stable domestic sources. As U.S. policy increasingly prioritizes domestic resource security and recycling, Pennsylvania's material-processing and reclamation industries will play a key supporting role.

Locally, this means that even as new extraction slows, municipalities may see growth in material handling, secondary processing and recycling operations that function much like traditional resource extraction uses. These activities — such as concrete and asphalt recycling, metals reclamation, or the reuse of byproducts from energy or manufacturing — represent the modern evolution of the same land use category.

Impacts

- **Environmental:** Dust, noise, vibration and water quality impacts from extraction or crushing operations. Habitat disturbance and visual impacts in rural and scenic areas.
- **Infrastructure:** Heavy truck traffic, roadway wear and safety concerns on local roads serving quarry or processing sites.
- **Land Use Compatibility:** Conflicts with nearby residential or agricultural uses due to noise, hours of operation, or aesthetics.
- **Post-Use Challenges:** Long-term management of inactive or reclaimed sites, including safety and redevelopment readiness.
- **Opportunities:** Adaptive reuse of reclaimed sites for recreation, renewable energy, stormwater management or redevelopment.

Best Practices
Resource Extraction

Comprehensive Plans Should:

- Recognize existing and historic mining, quarrying and cement production areas within the Future Land Use Map.
- Designate mineral resource overlay areas consistent with the Pennsylvania Municipalities Planning Code (§603(i)) to protect known deposits and ensure compatibility with nearby uses.
- Plan for post-extraction reuse of sites for recreation, open space, energy generation (e.g., solar installations) or redevelopment.
- Address connections between resource extraction, freight routes, and industrial supply chains to ensure safe and efficient goods movement.
- Incorporate recycling, reclamation and circular-material industries as emerging components of the regional economy.

Zoning Ordinance Considerations

- Define extraction-related uses clearly (e.g., mineral extraction, quarrying, aggregate recycling, material processing) to distinguish between traditional extraction and modern reclamation or recycling.
- Limit these uses to industrial or mineral-resource districts with adequate buffering from residential or institutional uses.
- Establish performance standards for blasting, dust, truck routing and hours of operation to minimize community impacts.
- Require landscaping, berming and visual screening to reduce aesthetic impacts.
- Support transitional and circular economy uses within existing industrial areas that handle, recycle, or repurpose materials.

Subdivision and Land Development Ordinance Considerations

- Require site and reclamation plans addressing grading, erosion control, stormwater management and future site reuse.
- Coordinate with Pennsylvania DEP permitting under the Noncoal Surface Mining Conservation and Reclamation Act and related regulations.
- Include truck circulation and access management standards to reduce conflicts with local roads.
- Require bonding or financial assurance for reclamation and long-term maintenance.
- Encourage redevelopment-ready reclamation that aligns with future land use and economic goals

Penn Slate operates an active slate mine in Washington Township just outside of Slatington Borough. Photo Credit: Penn Praxis

MANAGING INDUSTRIAL LAND USE IMPACTS

Lehigh County's industrial landscape has already been shaped by decades of growth in manufacturing, warehousing and logistics. These uses remain vital to the regional economy, but they also generate ongoing impacts on infrastructure, utilities, the environment, community character and quality of life. Municipalities can address these challenges not only when new projects are proposed but also as part of managing the day-to-day realities of existing industrial operations. The following topics outline key areas of concern and provide best practices that local governments can use to manage existing industrial land uses more effectively.

The following section outlines ways municipalities can address specific impacts.

TRANSPORTATION INFRASTRUCTURE

Roads and Bridges

Industrial development in Lehigh County depends heavily on the regional road network.

Warehousing, logistics and manufacturing generate substantial truck traffic that affects local roads and bridges, particularly near highway interchanges and industrial corridors. As freight volumes grow, municipalities must balance the economic benefits of access with the costs of maintenance, congestion and safety.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify key freight routes and roadways suitable for truck access. Discourage industrial development along local streets not built for heavy vehicles.
- **Zoning:** Require industrial sites to locate near arterial roads or highway interchanges, with clearly designated truck access points.
- **SALDO:** Mandate traffic impact studies accurate for the intended land use for new or expanded industrial projects and require developers to fund off-site roadway or intersection improvements.
    + Require on-site design that safely accommodates truck turning movements, staging and parking without impacting public roads.
    + Require snow and ice removal equipment for trucks in freight-based land uses to help drivers comply with state regulations and minimize roadway hazards.
- Implement local truck routing ordinances or signage to keep heavy vehicles on preferred corridors.
- Coordinate with PennDOT and Lehigh Valley Transportation Study (LVTS) to prioritize freight-related infrastructure investments.

Air Travel

Air travel infrastructure, especially Lehigh Valley International Airport (ABE), is an integral part of the region's freight network, supporting time-sensitive shipments and specialized cargo.

Industrial and logistics growth around the airport creates both opportunity and planning challenges, including noise exposure, airspace protection, and land use compatibility. Municipalities near flight paths or airport influence areas must balance economic development with community impacts and aviation safety.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Include airport influence areas and flight paths in land use maps to guide compatible development.
- **Zoning:** Establish airport overlay districts to limit building height, lighting and electromagnetic interference. Ensure compatible land uses near airports.
    + Encourage logistics and industrial uses that directly benefit from proximity to the airport, while maintaining appropriate buffering from residential areas.
- **SALDO:** Require Federal Aviation Administration (FAA) and airport authority coordination for developments within defined approach or transition zones.
    + Support multimodal connections between air freight facilities, roadways, and rail to reduce congestion and improve efficiency.

Cargo plane for FedEx Express in Hanover Township. Lehigh County.

Rail

Rail remains a key component of Lehigh County's industrial and freight network, connecting local industries to regional and national markets.

Industrial development near existing rail lines can improve efficiency and reduce truck dependency, but it also presents unique safety, noise and access challenges. Municipalities can play a role in protecting rail corridors, supporting rail-served development, and ensuring that rail-adjacent uses are compatible with surrounding communities.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** IIdentify and protect existing rail corridors and sidings for industrial and freight uses; encourage redevelopment of brownfield or obsolete industrial sites with rail access.
  - + Encourage rail as part of multimodal freight planning to reduce truck dependency and roadway impacts.
- **Zoning:** Create or update industrial districts that support rail-served uses, with appropriate setbacks and buffering from sensitive land uses.
  - + Promote adaptive reuse of older industrial properties near rail for modern, rail-compatible industries.
- **SALDO:** Require coordination with rail operators for developments adjacent to rail lines or crossings; ensure safe design for truck and employee access.
  - + Support grade separation projects and safety enhancements at rail crossings where feasible.

Freight trains stationed outside of an open space area in East Allen Township.

UTILITY INFRASTRUCTURE

Water

Industrial facilities can place significant demands on local water systems, whether through high-volume users like food and beverage manufacturing, cold storage, or data centers, or by expanding into areas without adequate infrastructure.

In Lehigh County, where communities rely on a mix of municipal systems, private wells, and regional authorities, these pressures can strain capacity or create costly infrastructure needs.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Map existing and planned water infrastructure to guide industrial growth to serviceable areas.
- **Zoning:** Require water-intensive uses (e.g., data centers, food processors) to locate in districts with adequate public water service.
- **SALDO:** Mandate proof of adequate water supply and capacity before plan approval, including coordination letters from water providers.
- Require developers to fund necessary extensions or upgrades to municipal water systems as opportunities present themselves, rather than shifting costs to the community.
- Incorporate water conservation and efficiency requirements into zoning performance standards, especially for high-demand uses.
- Encourage industrial users to adopt alternative water systems (graywater reuse, rainwater harvesting) to reduce reliance on potable supplies.

Sewer

Industrial growth can overwhelm existing sewer systems, especially when large-scale facilities concentrate in areas not built for high wastewater flows.

In Lehigh County, many municipalities with development areas rely on local sewer authorities with aging infrastructure that may already be near capacity. Uncoordinated expansion can lead to capacity shortfalls, costly upgrades and water quality risks, and service extensions may drive unplanned sprawl or conflict with preservation goals.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify areas with sufficient sewer capacity for industrial growth and avoid designating sewer-dependent uses in areas without planned service.
  - + Update Official Sewage Facilities Plans (Act 537).
- **Zoning:** Direct intensive industrial uses to districts with existing or expandable sewer infrastructure. Require pretreatment facilities for high-strength or specialized waste streams.
- **SALDO:** Require developers to demonstrate available sewer capacity before approval, including written confirmation from the sewer authority.
  - + Condition approvals on necessary upgrades or expansions being funded by the developer rather than the municipality or ratepayers.
  - + Establish clear standards for industrial wastewater discharge, including pretreatment requirements where needed.
  - + Coordinate land use approvals with regional sewer authorities early in the review process to avoid service conflicts or capacity shortfalls.

Stormwater

Industrial facilities create large impervious surfaces that increase stormwater runoff, flooding and pollution risks.

In Lehigh County, where stormwater management is regulated at both the local level by the municipality and at the watershed level by LVPC, many communities have older systems that weren't designed for today's scale of development combined with increasing rainfall Without proactive management, stormwater can degrade streams, overwhelm infrastructure, heighten local flood risks.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify flood-prone and environmentally sensitive areas, steering industrial development away from high-risk locations.
- **Zoning:** Require stormwater management practices that reduce peak runoff, protect water quality and encourage green infrastructure (bioswales, rain gardens, permeable pavement).
- **SALDO:** Mandate detailed stormwater management plans with development applications, ensuring compliance with state Municipal Separate Storm Sewer System regulations (MS4) and Act 167 watershed requirements.
- Require developers to establish long-term maintenance agreements for stormwater facilities, with clear responsibilities and funding mechanisms.
- Encourage retrofitting of older industrial sites with improved stormwater controls during redevelopment.
- Promote site design that minimizes impervious coverage through shared parking, reduced pavement, and compact building footprints.

Waste Disposal

Industrial uses generate solid and hazardous waste that can strain local systems if not properly managed.

High volumes of packaging, pallets, and other materials from warehouse and logistics operations can overwhelm local disposal and recycling systems, and certain manufacturing processes produce specialized wastes requiring pretreatment or off-site disposal. In Lehigh County, improper storage or disposal risks contaminating groundwater, impacting neighboring land uses, or burdening municipal services.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Establish policies for sustainable waste management, including recycling and reduction goals, that industrial land uses should support.
- **Zoning:** Require on-site waste and recycling storage areas to be screened from public view and designed to prevent nuisances.
- **SALDO:** Mandate inclusion of adequate waste handling, storage and pickup facilities in site plans, sized appropriately for the scale of industrial operations.
- Coordinate with county and regional solid waste management plans to ensure capacity and compliance with broader goals.
- Encourage or require recycling and reuse programs for common industrial materials such as pallets, cardboard and plastics.
- For specialized or hazardous waste generators, require proof of compliance with Pennsylvania DEP and federal disposal standards as part of land development approval.

Electricity

Industrial operations are among the largest consumers of electricity, and demand is growing as energy-intensive uses like data centers, cold storage, and advanced manufacturing or logistics hubs expand in Lehigh County. Reliable, resilient power is essential for these facilities, and high demand can cause service disruptions and costly upgrades if siting and use is not coordinated.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Coordinate future land use designations with areas that have sufficient electrical infrastructure or where upgrades are planned.
- **Zoning:** Require siting standards for substations and generators, including screening, setbacks and noise/emission controls.
- **SALDO:** Mandate documentation from utility providers confirming service capacity before project approval.
- Require developers to finance necessary electrical system upgrades rather than shifting costs to the municipality or ratepayers.
- Encourage or require energy-efficient building design and renewable energy integration, such as solar-ready rooftops and EV charging infrastructure.
- Coordinate with utilities and regional grid operators early in the planning process to align infrastructure planning with industrial growth.

Broadband

Modern industries depend on high-speed broadband for logistics, operations, and advanced technologies. In Lehigh County, gaps in broadband coverage or capacity can limit industrial growth, and if new land uses outpace broadband infrastructure, that may leave facilities and surrounding communities without reliable service.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify broadband access as critical infrastructure, mapping service availability and prioritizing connected areas for industrial development.
- **Zoning:** Require new data centers or high-tech facilities to demonstrate broadband redundancy and reliability as part of approval.
- **SALDO:** Mandate installation of conduit or fiber-ready infrastructure in new industrial subdivisions and developments.
- Coordinate with broadband providers early in the land development review process to ensure capacity and timely installation.
- Encourage or require “dig once” policies so that when roads or utilities are opened for construction, broadband conduit is installed concurrently.
- Partner with county and regional broadband initiatives to align industrial growth with long-term digital infrastructure investments.

EMERGENCY MANAGEMENT

Emergency Response

Industrial facilities can pose heightened risks for fire, hazardous materials and worker safety incidents. In Lehigh County, where many municipalities rely on volunteer emergency services and regional coordination, industrial land uses can stretch local response capacity. Ensuring that emergency services can access sites quickly and safely, and that facilities have appropriate safety plans in place, is essential to protecting workers and nearby residents.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Include coordination with emergency services in land use policies. Identify response time gaps and plan for mutual aid agreements.
- **Zoning:** Require safety and hazard mitigation plans for high-risk industrial uses, including materials storage, evacuation routes and suppression systems.
- **SALDO:** Mandate review of site plans by local fire and emergency services to ensure adequate access, hydrant placement, and water flow.
    + Ensure that emergency responders receive appropriate training or site orientation prior to occupancy.
- Require industrial developers to provide on-site fire protection infrastructure, such as hydrants, sprinklers, or water storage where public supply is limited.
- Coordinate with local emergency management agencies for training and response planning tailored to facility operations.
- Encourage or require developers to contribute to emergency service infrastructure or equipment needs when projects significantly increase risk exposure.

Access

Safe, efficient site access is a key factor in managing industrial land use impacts. Facilities generate frequent truck and employee traffic, and poorly designed entrances or internal circulation can create hazards for both site users and the public. In Lehigh County, industrial access design plays a critical role in maintaining safety, reducing congestion and ensuring emergency responders can reach facilities when needed.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify preferred access routes for industrial areas, linking them to major corridors while minimizing neighborhood impacts.
- **Zoning:** Require separate truck and passenger vehicle access points where feasible and set minimum driveway spacing and turning radius standards.
- **SALDO:** Mandate transportation impact studies that evaluate access design, intersection function and safety improvements. Require developer-funded mitigation.
- Require adequate turning radii, internal circulation loops and designated truck staging areas to prevent queuing on public streets.
- Coordinate access design with PennDOT and county agencies to ensure consistency with highway occupancy and freight movement standards.
- Require signage, lighting and pavement markings that clearly separate truck, employee and visitor routes within large sites.

PARKING

Visitor Parking

Visitor parking at industrial sites supports business operations, meetings and deliveries but is often overlooked during site planning. While visitor traffic is typically lower than employee or truck traffic, inadequate parking or poor placement can create safety conflicts and accessibility issues, especially when visitors must navigate active loading or truck areas.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Promote safe, accessible design for visitor parking areas as part of overall site circulation policies.
- **Zoning:** Require visitor parking to be located near primary entrances and separate from loading and truck areas.
- **SALDO:** Mandate pedestrian connections from visitor spaces to building entrances that are ADA-compliant and well-lit.
- Encourage clear signage and wayfinding to distinguish visitor parking from employee and truck areas.
- Allow reduced visitor parking requirements where demand is low or shared parking arrangements are appropriate.
- Require landscaping or green buffers to soften visual impacts along road frontages.

Employee Parking

Employee parking directly influences site design, land use efficiency and transportation patterns.

Industrial facilities often operate multiple employee shifts, leading to varying parking demands and concentrated traffic peaks during shift changes. Large parking lots can consume significant amounts of land, increase stormwater runoff and reduce space available for buildings, landscaping, or sustainable site features. At the same time, insufficient parking can affect employee accessibility and operations, especially in areas without robust transit service.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Encourage right-sizing parking to balance availability with land conservation. Promote safe and efficient site access and use of alternative transportation modes.
- **Zoning:** Establish employee parking minimums and maximums by industrial use type.
- **SALDO:** Require site plans to demonstrate safe pedestrian circulation between employee parking and building entrances. Require separation of employee parking from loading areas.
- Encourage alternative transportation options such as carpooling, public transit, biking and walking to lower parking demand.
- Support transit-oriented development and shared mobility infrastructure near industrial employment centers to reduce the need for large surface lots.

Truck Parking

Truck parking, loading and staging are among the most critical and challenging aspects of industrial site design in Lehigh County.

The region's role as a major freight and logistics hub means that industrial facilities depend on the safe and efficient movement of heavy vehicles. When on-site truck parking or loading areas are insufficient, drivers often resort to idling or parking along public roads, creating congestion, safety hazards and community concerns. Truck parking and loading facilities also consume large land areas, influencing site layout, traffic circulation, and the overall efficiency of industrial land use. Poorly planned or oversized facilities can generate noise, air pollution and visual impacts that affect nearby residents, workers and property values.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify freight infrastructure as part of goods-movement planning; map preferred industrial corridors and suitable sites for truck parking facilities that minimize neighborhood impacts.
- **Zoning:** Require industrial developments to provide dedicated on-site truck parking and staging areas separated from employee and visitor parking.
- **SALDO:** Mandate circulation plans that include designated truck entrances, queuing areas, and turning radii suited to large vehicles. Minimize community impacts by prohibiting truck parking and loading areas from facing residential districts. Require aesthetic, noise and light mitigation strategies such as downward lighting, buffering, berms and landscaping, and sound level restrictions and monitoring. Require electric plug-in infrastructure or anti-idling measures to reduce emissions at parking and loading areas.
- Support regional initiatives, such as the Eastern Pennsylvania Freight Infrastructure Plan (EPFA), which emphasize expanding overnight truck parking capacity to meet growing freight demands.

Truck parking in Upper Macungie Township.

ENVIRONMENTAL FACTORS

Noise

Noise is one of the most common community concerns associated with industrial land uses. Truck movements, loading docks, refrigeration units, cooling systems, backup generators and around-the-clock operations can create constant or intermittent noise that affects nearby residents and businesses. In Lehigh County, where industrial areas are often close to residential neighborhoods or mixed-use corridors, managing noise is essential to maintaining quality of life and community compatibility.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify noise-sensitive land uses like residential neighborhoods, schools, healthcare facilities, and high-priority natural habitats to guide industrial growth away from these areas.
- **Zoning:** Establish clear noise performance standards and maximum decibel levels at property lines. Require noise mitigation strategies such as setbacks, sound walls, or landscaped buffers between industrial and non-industrial uses.
- **SALDO:** Require proposals to submit acoustic studies and/or noise impact assessments and encourage orientation of loud equipment, loading docks, and truck parking away from nearby non-industrial uses.
    + Encourage applicants to incorporate insulated and soundproofing building materials into site design.
- Monitor and enforce noise standards.

Light

Industrial facilities require exterior lighting for safety, security and operations. Excessive or poorly directed lighting can spill into neighboring properties, disrupt wildlife habitats, and degrade nighttime visibility. In Lehigh County, industrial growth near residential and rural areas causes concern for light pollution.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Encourage dark-sky compliant lighting policies and balance safety/ operations needs with environmental quality.
- **Zoning:** Establish maximum illumination levels at property lines and require lighting standards such as height limits for lighting poles, maximum illumination levels at property lines and cutoff fixtures that direct light downward.
- **SALDO:** Require lighting plans with photometric data to evaluate impacts and compliance.

  + Incorporate landscaping or fencing to screen light from adjacent properties.

Warehouse with a loading dock in Upper Macungie Township.

Air Quality

Industrial operations can affect local and regional air quality through emissions from both stationary sources such as generators, boilers and manufacturing processes, and mobile sources like trucks, forklifts, and equipment.

The most common pollutants include volatile organic compounds (VOCs), nitrogen oxides (NOx), particulate matter (PM) such as dust, and greenhouse gases (GHGs) from fuel combustion. While modern facilities are increasingly efficient and regulated, cumulative emissions from industrial sites and freight activity can still impact public health, visibility, and environmental quality, particularly in areas with high concentrations of industrial and transportation uses.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Recognize air quality as a health and environmental priority. Specify that high-emission uses should be located away from sensitive areas. Incorporate goals to minimize emissions that reduce air quality.
- **Zoning:** Require air quality performance standards for emissions and dust control. Regulate outdoor storage, truck idling and the location of exhaust vents to minimize community exposure.
- **SALDO:** Require air quality impact assessments for large-scale or high emission uses.
    + Encourage or require installation of electric vehicle charging infrastructure to support clean fleets.
    + Encourage and/or incentivize alternative energy sources such as solar panels or green roofs to reduce energy needs for industrial buildings.

Building Form and Aesthetics

The mass, height and design of industrial buildings can have a profound impact on the visual character and identity of surrounding communities

Large-scale warehouses, logistics centers and production facilities often feature tall, box-like forms, expansive façades and wide parking areas that can dominate the landscape. When located near residential, commercial or rural areas, these visual and spatial differences can create a sense of imbalance and affect perceptions of neighborhood quality and property values. Thoughtful building design, orientation and screening can help integrate industrial development into the community form while maintaining operational efficiency and supporting high-quality economic growth.

Mitigation Strategies and Best Practices

- **Comprehensive Plans:** Identify design and aesthetic goals for industrial structures as part of broader placemaking and community character objectives. Identify gateways, corridors and transition areas where design quality and landscaping are especially important. Promote site and building design that reflect local identity.
- **Zoning:** Establish bulk, height and setback requirements appropriate to the surrounding context, ensuring smooth transitions between industrial and non-industrial areas.
- **SALDO**
  - + Require façade articulation, roofline variation and architectural detailing to reduce the monotony of large walls and enhance visual interest.
  - + Limit or screen outdoor storage, loading docks, and mechanical equipment from public view through fencing, landscaping and building placement.
  - + Require site plans to show how building orientation, service areas, and loading docks are placed to minimize visibility from public roads and neighboring properties.
  - + Encourage or require enhanced landscaping along public rights-of-way, including tree rows, berms, and pollinator-friendly vegetation to soften views and reduce environmental impacts.
  - + Promote building materials and color palettes that complement local character and minimize visual contrast with surrounding landscapes.
  - + Require pedestrian-scale design features, lighting and signage standards that contribute to safe and attractive site environments.

UNKNOWN END USERS AND SHIFTING USERS

Industrial buildings are often constructed speculatively, without a confirmed end user or tenant at the time of development approval.

These speculative projects allow for rapid occupancy once demand arises but can present challenges for municipalities when evaluating site impacts, infrastructure needs and compatibility during the review process. Because the ultimate user may have operational characteristics different from those assumed in the original design — such as higher truck volumes, longer hours of operation, or more intensive energy use — unknown or changing tenants can lead to unanticipated community or environmental impacts.

Even after occupancy, industrial buildings frequently change users or shift functions over time as markets evolve. A warehouse may become a light manufacturing facility, or an assembly operation may expand distribution activity. These shifts can significantly alter traffic patterns, utility demands and emissions, underscoring the importance of adaptable regulations and ongoing coordination between municipalities, developers and operators.

Mitigation Strategies and Best Practices
Unknown End Users and Shifting Users

- **Comprehensive Plans:** Encourage flexible land use designations that allow for the evolution of industrial and employment centers over time. Identify infrastructure corridors capable of supporting a range of industrial activities — from light manufacturing to logistics or high-tech uses — without overburdening surrounding neighborhoods.
    + Incorporate policies promoting adaptive reuse and building design flexibility to extend the life and usefulness of industrial structures as market demands change.
- **Zoning:** Define performance standards that apply regardless of tenant, focusing on measurable outcomes such as truck trips per day, noise thresholds or hours of operation.
    + Consider use classification systems that group industrial activities by intensity or impact rather than narrow use type (e.g., “low-impact manufacturing,” “high-intensity logistics”), giving flexibility to assess future users without constant ordinance amendments.
- **SALDO:** Require applicants to identify anticipated user types and conservatively estimate operational characteristics, while maintaining flexibility for future occupancy.
    + Include conditions of approval or occupancy permit triggers requiring municipal review when a new user significantly changes the operational intensity of a site.
    + Encourage property owners to maintain ongoing communication with municipalities regarding user changes to ensure continued compliance with zoning and performance standards.

ADDRESSING EXISTING LAND USE IMPACTS

While the MPC tools are targeted to regulating development proposals, there are numerous approaches municipalities can take to address the impacts already being created by existing industrial land uses:

1 Use Existing Ordinances for Operations and Maintenance

a. **Zoning Ordinance Enforcement:** Municipalities can enforce ongoing compliance with conditions of approval (e.g., landscaping, lighting, noise limits).

b. **Property Maintenance Codes:** If adopted, these codes can be used to address blight, nuisance and unsafe site conditions.

c. **Nuisance Ordinances:** Municipalities can regulate excessive noise, odor, dust or vibrations that impact nearby residents.

2 Targeted Infrastructure Partnerships

a. Work with water and sewer authorities to manage capacity and monitor impacts from high-demand users.

b. Coordinate with PennDOT and county agencies for roadway improvements near freight clusters.

c. Seek funding (PennDOT Multimodal Fund, DCED grants, federal programs) for infrastructure that mitigates existing strain.

3 Monitoring and Data Collection

a. Use traffic counts, air quality monitoring, or noise studies to document ongoing impacts. This data supports enforcement, future planning and funding applications.

b. Require periodic reporting from facilities with high truck volumes or energy/water usage, where legally feasible.

4 Community Engagement and Complaint Tracking

a. Establish hotlines or online reporting systems for residents to log issues such as truck idling, noise, litter or drainage problems.

b. Tracking complaints over time provides leverage for working with operators and shows trends that can justify ordinance updates.

5 Intergovernmental and Regional Coordination

a. Partner with adjacent municipalities to address impacts that cross borders such as truck traffic or utility demand. Enter into intergovernmental agreements to share costs and enforcement capacity, particularly for infrastructure and stormwater.

6 Incentives and Voluntary Compliance

a. Work with operators to implement best practices like truck idling limits, electric vehicle hookups or improved landscaping to reduce visual and environmental impacts. Explore recognition programs for businesses that adopt sustainability measures, such as Leadership in Energy and Environmental Design (LEED) certification, renewable energy use.

7 Amend Local Plans and Ordinances to Minimize Future Impacts

a. While ordinances typically regulate new development proposals, municipalities can update ordinances with retrofit standards that would apply if a use changes or a building redevelops. For example, requirements for stormwater upgrades or truck circulation improvements can be added into SALDOs for when expansions or major renovations are proposed.

In general, municipalities should monitor the impacts of existing development and continuously update regulations to improve performance and ensure new or future land uses align with community goals.

REUSING BROWNFIELDS AND EXISTING INDUSTRIAL SITES

Brownfields are former industrial properties where redevelopment or reuse is complicated by the presence or potential presence of hazardous pollutants or contaminants.

In Lehigh County, legacy sites such as former rail yards, manufacturing or processing facilities have the potential for reuse. Sites are often strategically located near highways and population or employment centers and redevelopment can direct growth to areas with existing infrastructure, reduce pressure on farmland and open space, and deliver jobs, tax revenue and environmental cleanup.

How Brownfield Reuse Can Address Industrial Land Uses

- **Promote Revitalization and Economic Growth:** Reuse of underutilized industrial sites brings new employers, creates long-term jobs and expands the local tax base by increasing property values and signaling that a community is "investment ready."
- **Support Environmental Cleanup and Public Health:** Remediation of contaminated sites prevents pollution, improves soil, water and air quality, and restores environmental functions to degraded lands.
- **Reduce Development Pressure on Greenfields:** Channeling redevelopment to existing industrial areas conserves farmland and open space while strengthening established urban and suburban centers.
- **Leverage Existing Infrastructure:** Brownfield redevelopment utilizes existing water, sewer, road and energy networks, reducing the cost and environmental impacts of new extensions.
- **Encourage Adaptive Reuse through Zoning:** Zoning provisions that allow flexible redevelopment options, mixed-use conversions or performance-based standards make reuse more feasible for property owners and developers.
- **Coordinate Planning and Mapping Efforts:** Maintain a community inventory of vacant and underutilized industrial parcels. Align these locations with comprehensive plan goals to target infrastructure investment and guide redevelopment priorities.
- **Coordinate with the Lehigh County Redevelopment Authority (RALC):** RALC is focused on repurposing blighted properties in Lehigh County's boroughs and townships, and partners with communities to pursue a variety of financing and incentives.
- **Address Barriers Early:** Conduct site assessments to identify contamination risks, evaluate cleanup needs and clarify liability issues. Incorporate demolition, asbestos abatement, or historic preservation costs into redevelopment planning.

The Bethlehem Steelstack, located in City of Bethlehem, is an example of how one can revitalize a brownfield.

LEHIGH COUNTY

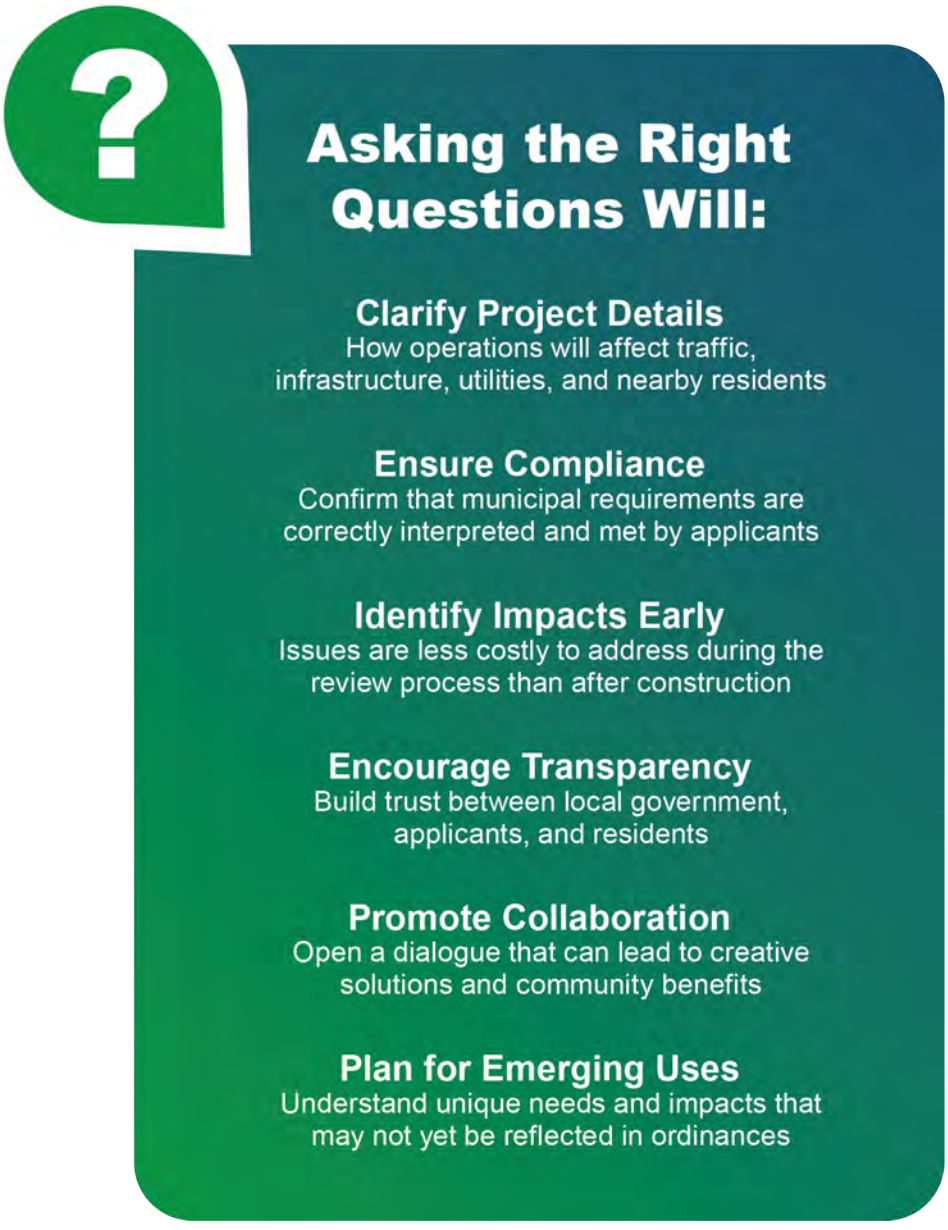
INDUSTRIAL LAND USE

GUIDE

RESOURCES

QUESTIONS TO ASK DEVELOPERS

Asking questions during the plan review process positions municipalities to be proactive rather than reactive and is one of the most important ways to ensure that industrial projects align with community goals, protect public health and safety and comply with local ordinances. Developers are experts in their own projects, but municipalities are the guardians of community interests. Without asking the right questions, local governments may miss opportunities to identify impacts, negotiate improvements or require conditions that make a development compatible with its surroundings.



Site Location and Compatibility

- Why was this site chosen for the proposed industrial use, and how does it align with the municipality's zoning and comprehensive plan?
- Is there an identified end user? If not, are there particular end users speculated?
- What adjacent land uses exist, and what potential impacts could the project have on those uses (e.g., noise, lighting, traffic, environmental)?
    + What noise levels will be generated (vehicular traffic, load/unloading, manufacturing, utility)?
    + What light will be emitted, in what directions (parking areas, building lighting/security lighting, signage lights)?
- How will the development affect nearby (not adjacent) land uses, including residential areas, schools, businesses or community facilities?

Workforce and Operations

- How many employees will work at the site, and what shifts or hours of operation are anticipated?
- What workforce amenities (sidewalks, break areas, transit connections, driver facilities) are provided to support safety and quality of life?
- Will multiple tenants occupy the building (e.g., flex space or subleases), and how will operations be coordinated to comply with zoning?

Transportation and Freight Impacts

- What is the anticipated volume of truck and passenger vehicle traffic at peak and average levels?
- What routes will trucks use to access highways, and how will you minimize impacts on local streets?
- Have traffic impact studies been conducted based on a land use accurate to the intended development, and what improvements or mitigations are proposed?
- Will on-site truck parking, loading and staging areas prevent trucks from queuing on public roads?

Utilities and Infrastructure

- What are the utility needs of the facility, such as amount of electricity usage, water consumption, wastewater disposal, etc.
- Does the site have adequate water, sewer, power and broadband capacity to support the proposed use?
- Will the project require infrastructure upgrades, and who will pay for them?
- Are backup systems, such as generators for data centers or cooling for cold storage, designed to minimize noise, emissions or neighborhood disruption?

Environmental Considerations

- How will stormwater runoff be managed, and what low-impact development or green infrastructure techniques will be used?
- Are there wetlands, floodplains or steep slopes on site, and how will they be protected?
- What measures will be taken to minimize air, noise, light, and vibration impacts?
- What steps are being taken to reduce the building's energy consumption and carbon footprint?

Site and Building Design

- How will building design and landscaping reduce visual impacts, especially for large-scale facilities?
- How will the site accommodate pedestrian and bicycle access, both within the site and connections to nearby transit or roads?
- Where will outdoor storage, loading docks, and mechanical equipment be located, and how will they be screened?

Emerging Uses and Safety

- For specialized facilities, such as data centers, battery storage, cold storage or indoor agriculture, what unique infrastructure or safety needs should the municipality be aware of?
- What emergency response coordination has been conducted with local fire, Emergency Management Services (EMS), and police departments?
- Are hazardous materials or alternative energy systems involved, and how will risks be mitigated?
- What is the size of the proposed building (height and lengths), and does the municipality have adequate equipment and training to provide emergency services?


MACK

FUNDING STRATEGIES

Addressing the impacts of industrial development and preparing for emerging industrial land uses requires not only sound planning and policy but also strategic investment. Municipalities often face financial constraints when updating land use regulations, maintaining and upgrading infrastructure, or mitigating impacts associated with industrial activity. A range of funding and financial incentive tools are available at the federal, state, regional and local levels to provide community assistance.

LVTS

Lehigh Valley Transportation Study

The Metropolitan Transportation Plan (MTP) is a multi-billion-dollar transportation investment plan that spans 25 years. The program opens every four years, and only projects that apply are eligible to be listed for funding.

Funding categories include Bridges, Road, Road Reconstruction, Modernization and Automation, Roadway Expansion, Multimodal, Planning + Research, Safe Routes to School, Rail, and Transit.

Project funding is determined by a **Project Selection Process.**

Project Selection Process
Tips for Communities/Developers Applying for Industrial Land-Use Funding

Communities/developers pursuing federal, state, or regional funding for industrial land-use projects, including manufacturing, logistics, warehousing, light industry, and emerging technology, can increase their competitiveness by following the recommendations below. This guidance applies to standalone development proposals as well as local government infrastructure improvements that support future industrial growth.

1. Align Your Project with Regional and Local Plans

Tip for Applicants: Demonstrate clear consistency with adopted plans, such as:

FutureLV: The Regional Plan

Eastern Pennsylvania Freight Alliance Freight Infrastructure Plan

Walk/Roll LV: Active Transportation Plan

Priority Climate Action Plan for Transportation Decarbonization

Your municipality's comprehensive plan, zoning ordinance, capital improvement plan or official map

Funding agencies want assurance that proposed investments support long-term regional goals and fit into an integrated land-use and transportation strategy. Projects explicitly tied to adopted plans score higher and are viewed as lower risk.

2. Understand Key Evaluation Criteria and Prepare to Address Each One

Most funding programs evaluate projects using several common criteria. Communities should tailor their applications to address:

Economic Impact

Potential for job creation and workforce development

Support for key sectors such as manufacturing, logistics, clean tech, emerging industries

Long-term effects on local tax base and economic resilience

Transportation Efficiency

Site access to interstate highways, freight corridors, rail connections, ports and airports

Reduction of bottlenecks or congestion on regional routes

Ability to improve freight mobility and reduce travel times

Land Use Compatibility

- Siting near existing industrial clusters or economic hubs
- Adequate buffering from neighborhoods, schools, parks and environmentally sensitive areas
- Alignment with zoning, future land-use maps and local development standards

Environmental Sustainability

- Brownfield remediation and adaptive reuse
- Emissions reduction, decarbonization strategies and clean-energy technologies
- Stormwater management and green infrastructure
- Minimization of impacts on wetlands, waterways and habitats

Community Impact

- Access to employment via transit, walking and biking
- Reduced impacts on overburdened or vulnerable populations
- Opportunities for upskilling, training and equity-focused benefits

Project Readiness

- Site control secured
- Engineering and design progress
- Zoning compliance
- Committed funding partners
- Public engagement completed

Tip for Applicants: Organize your narrative around these topics. Clear, structured responses make your application easier to evaluate and more competitive.

3. Build a Strong, Evidence-Based Application

Use both quantitative data (e.g., vehicle counts, freight volumes, crash patterns, job projections) and qualitative insights (e.g., community priorities, local lived experience).

Strengthen your application with:

- Geospatial analysis showing proximity to freight networks, workforce clusters or brownfields
- Cost-benefit and life-cycle analyses
- Environmental screening or preliminary engineering
- Letters of support from businesses, residents and agencies such as the LVPC
- Documentation of community outreach and stakeholder feedback

Tip for Applicants: Most programs use weighted scoring. Reviewers compare applications side-by-side, so data clarity, completeness, and consistency make a substantial difference.

4. Engage Stakeholders Early and Often

Tip for Applicants: Before submitting, coordinate with:

- Municipal leadership and planning commissions
- Industrial facility operators or developers
- PennDOT/Federal Highway Administration and Metropolitan Planning Organization staff
- Workforce development boards
- Local emergency responders
- Environmental and community organizations

Projects that demonstrate multi-sector alignment and community backing tend to score higher and move more efficiently through review.

5. Leverage Technical Assistance and Data Resources

Tip for Applicants: Use external support to collect data, document conditions and identify improvements. The PennDOT Local Technical Assistance Program (LTAP), with support from LVPC, can help municipalities by providing:

- Corridor, intersection and school zone safety reviews
- Traffic counts, speed studies and freight movement analysis
- Pavement, drainage and signage/marking assessments
- Walkability and bikeability audits
- Heavy-vehicle impact evaluations
- Analysis of land-development impacts and traffic circulation needs
- Recommendations for short-term and long-term roadway improvements
- Staff training, workshops and follow-up assistance

LTAP-supported data can significantly strengthen funding applications, demonstrating due diligence and professional validation.

6. Plan for Transparency and Public Engagement

FYI About the Process: Many funding programs require public transparency as a condition of award. Communities with existing communication channels, websites, boards and public meetings are better positioned to meet these expectations.

Tip for Applicants: Prepare to publish evaluation results and project information on your municipal website or through community outreach.

7. Stay Updated on Evolving Criteria and Regional Priorities

FYI About the Process: Criteria change as regional freight plans, climate plans, and transportation strategies evolve.

Tip for Applicants: Check program guidance every cycle. Update your data, language and design to reflect new state or federal directives.

8. Prepare Local Government Infrastructure to Support Industrial Land Uses

To increase project readiness and strengthen funding applications communities should proactively invest in infrastructure that supports industrial development.

Transportation Infrastructure

- Upgrade intersections to handle heavy trucks (signal timing, radii, geometric design)
- Improve last-mile freight connections from industrial parks to major corridors
- Replace weight-restricted bridges or culverts
- Enhance roadway pavement design for heavy-vehicle loads
- Expand or improve rail sidings, transload facilities or spur connections

Utility and Site Infrastructure

- Expand water and sewer capacity for industrial-intensive uses
- Modernize stormwater and drainage systems to manage large impervious areas
- Upgrade electrical capacity to support advanced manufacturing and clean-tech facilities
- Evaluate broadband needs for technology-driven industries

Active Transportation and Transit

- Add sidewalks, trails, bike lanes or shared-use paths connecting workers to job sites
- Coordinate with transit providers to serve industrial parks with job-access routes
- Improve pedestrian safety near industrial driveways and corridors

Environmental and Resilience Investments

- Conduct brownfield assessments and environmental due diligence
- Include green infrastructure for stormwater mitigation
- Improve tree canopy and buffer plantings around industrial edges
- Plan flood-resilient design for sites in risk-prone areas

Land Use and Policy Tools

- Update zoning to permit target industries while ensuring compatibility with neighbors
- Create overlay districts or special industrial corridors
- Adopt an official map to reserve key road, trail, or utility corridors
- Develop capital improvement plans identifying infrastructure gaps
- Use tax increment financing Local Economic Revitalization Tax Assistance (LERTA) programs, or other tools to support project feasibility

Tip for Applicants: Infrastructure investments, even preliminary ones, signal readiness to funding agencies and make your industrial project far more competitive.

This section details some assistance programs at all levels that these tips and processes can help communities utilize.

State Assistance

- Municipal Assistance Program: Offers grants for comprehensive plans, zoning and SALDO updates, and multi-municipal planning to manage industrial growth and mitigate impacts.
- Local Share Account: Funded by gaming revenues for local infrastructure improvements supporting industrial or brownfield redevelopment.
- Brownfield Cleanup and Industrial Site Reuse Program: For remediation and redevelopment of industrial or contaminated sites.
- Energy Programs (Alternative Fuels Incentive Grant, etc.): For the applicants and developers of industrial sites incorporating cleaner technologies or energy-efficient operations.
- Community Conservation Partnerships Program: Supports green buffers, trail connectivity, and open space preservation near industrial zones to mitigate environmental impacts.

Federal Assistance

- BUILD/INFRA Grants (USDOT): Large-scale, competitive grants that municipalities can pursue jointly with LVPC or counties for freight and industrial corridor improvements.
- Brownfields Assessment and Cleanup Grants (USEPA): For planning, assessment and remediation of former industrial sites.
- Climate Pollution Reduction Grants (CPRG): Can support planning for industrial decarbonization or energy transition strategies.

Local Fiscal Tools and Resources

- Transportation Impact Fees + Capital Improvement Plans
  - + Municipalities can adopt impact fee ordinances under the MPC to recover costs from industrial traffic impacts (Section 501-A).
  - + Capital Improvement Plans can strategically fund long-term infrastructure to support or mitigate industrial growth (Section 504-A).
- Tax Increment Financing (TIF) and Local Development Districts
  - + Through county or municipal authorities, TIFs can help pay for infrastructure and remediation needed for industrial redevelopment.
- Lehigh Valley Government Academy Local Technical Assistance Program (LTAP)
  - + Free training and technical assistance designed to help with roadway maintenance.
- Lehigh County Redevelopment Authority
  - + Partners with municipalities with the goal of remediating and repurposing blighted properties in Lehigh County's Boroughs and Townships.

COMPREHENSIVE PLAN BEST PRACTICES CHECKLIST

□ Identify Suitable Locations That Balance Land Use Priorities

- □ Designate industrial growth in areas with direct access to major highways, freight corridors or rail facilities to minimize truck traffic through residential neighborhoods.
- □ Preserve agricultural and environmentally sensitive lands by steering industrial development toward brownfields, underutilized sites and already serviced land.
- □ Cluster industrial uses to maximize infrastructure efficiency and reduce conflicts with other land uses.

□ Ensure Adequate Design and Compatibility

- □ Require site design standards that buffer industrial operations from adjacent residential and community uses through landscaping, setbacks, berms and architectural treatments.
- □ Encourage context-sensitive building design to minimize visual impacts of large-scale warehouses and manufacturing facilities.
- □ Promote sustainable site planning that incorporates green infrastructure, low-impact stormwater management and energy-efficient building design.

□ Set Transportation and Freight Management Policies

- □ Plan for roadway networks that separate truck traffic from local streets, schools and pedestrian areas.
- □ Coordinate with PennDOT, LANTA and regional planning partners to ensure freight movement is efficient and safe.
- □ Support the development of truck parking facilities and driver amenities in appropriate locations to reduce illegal or unsafe parking.

□ Set Infrastructure and Utilities Policies

- □ Direct new industrial development to areas with adequate sewer, water, energy and broadband capacity.
- □ Establish policies for coordinating infrastructure investment with anticipated industrial demand to prevent overextension of services.
- □ Encourage the use of renewable energy and on-site energy generation where feasible.

□ Anticipate Emerging and Evolving Uses

- □ Anticipate new industries such as data centers, cold storage, advanced manufacturing and alternative energy facilities by including them in land use planning policies.
- □ Support flexible industrial spaces that can accommodate multiple tenants or hybrid uses, while ensuring zoning and site standards address parking, noise and safety impacts.
- □ Monitor evolving technologies such as additive manufacturing, life sciences and battery storage, and update policies regularly to stay current.

□ Facilitate Economic and Workforce Development

- □ Align industrial land use planning with workforce development initiatives to ensure facilities are accessible to employees by transit, bike and pedestrian routes.
- □ Encourage industrial employers to provide amenities that support employee well-being, such as safe break areas, mobility options and sustainable workplaces.
- □ Promote redevelopment of older industrial areas to support new job growth and modern business needs.

□ Leverage Regional Coordination

- □ Coordinate industrial land use planning with neighboring municipalities to manage shared impacts of traffic, infrastructure, and environmental systems.
- □ Support consistency with *FutureLV: The Regional Plan* and county economic development goals.
- □ Partner with agencies such as Lehigh Valley Economic Development Corp. (LVEDC), PennDOT, and Pennsylvania Department of Community and Economic Development (DCED) to leverage resources for industrial site readiness and infrastructure improvements.

DEFINITIONS

These are definitions that may be necessary to craft an effective municipal ordinance.

A

Additive Manufacturing or 3D Printing Facility

A facility where the primary activity is the fabrication of objects by additive processes such as 3D printing, typically using plastics, metals, concrete, resins or composites. Operations may include design, prototyping, limited production runs, finishing, assembly and associated office or research space. Additive manufacturing may occur as a stand-alone use or as part of a larger manufacturing, research or industrial operation.

Advanced Manufacturing

High-tech production facilities using automation, robotics, 3D printing, or clean rooms for industries such as aerospace, medical devices or electronics.

Alternative Energy Generation

Facilities generating renewable energy such as solar farms, wind turbine assembly sites, hydrogen plants or biofuel refineries.

Autonomous Vehicle Support Facility

A facility or area designed to support automated or semi-automated vehicles serving freight, logistics or industrial operations, including staging areas, calibration zones, equipment storage, charging or fueling infrastructure, maintenance bays, and control rooms. This use may be accessory to a truck terminal, distribution center, warehouse, or industrial park.

B

Battery Energy Storage Facility

A facility where electrochemical energy storage systems, such as large-scale batteries or battery containers, are installed to store and discharge electricity to the grid or to serve one or more principal uses on the site. The facility may include inverters, transformers, control equipment, fire suppression systems and security fencing. This use excludes small, building-integrated storage serving a single principal use as an accessory component.

Bioengineering or Biofabrication Facility

A facility where biological materials, cells, tissues or bio-based products are engineered, produced or fabricated for commercial, medical, industrial or research purposes. Operations may include laboratory functions, controlled-environment production, quality control, warehousing of inputs and outputs, and associated office or research space. Facilities may handle biological, chemical, or hazardous materials subject to applicable biosafety and environmental regulations.

Business Park

A planned development containing one or more buildings on a common internal roadway network, designed for flexible tenant space that may include offices, light manufacturing, warehousing, research and development, laboratories and related uses. Buildings are typically one or two stories, with shared access, parking, utilities, stormwater management and landscaping.

C

Cold Storage Warehouse

A warehouse primarily devoted to the storage and handling of refrigerated or frozen goods, including food products and temperature-sensitive materials, generally consistent with the cold storage warehouse land use in the ITE Trip Generation Manual. The facility may include loading docks, limited processing or packaging areas and associated office space, and typically requires mechanical refrigeration and higher energy demand.

Cryptocurrency Mining Facility

A facility where specialized computers or servers perform cryptographic calculations to validate blockchain transactions or generate digital assets, with high ongoing electricity demand and cooling requirements. The facility may be located within a building or in modular or containerized units and may include associated office, security and electrical infrastructure.

D

Data Center

An establishment engaging in the storage, management, processing or transmission of digital data, and housing computer network equipment, systems, servers, appliances, and other associated components related to digital data operations.

Data Center Mechanical Equipment

On-site exterior machines used to sustain and/or provide energy for the operations of a Data Center.

Decibel

A unit for measuring the volume of sound using the A-weighting network on a sound level meter. Decibel may be expressed as dB, dB(A), dBA, dba, or db(A).

Distribution Center, High-Cube

A warehouse or distribution facility characterized by a large building footprint, high ceiling clearances and high-bay racking designed for the storage and distribution of goods, consistent with high-cube warehouse/distribution land use categories in the ITE Trip Generation Manual. The facility primarily handles palletized or containerized goods, with frequent truck loading and unloading and limited retail or customer activity.

E

Electric Vehicle Charging Space

An automobile parking space that includes an electrical component assembly or cluster of component assemblies (battery charging station) designed and intended to transfer Level 2 charging, as defined by the United States Department of Energy, electric energy by conductive or inductive means from the electric grid or other off-board electrical source to a battery or other energy storage device within a vehicle that operates, partially or exclusively, on electric energy. Spaces are marked to indicate that such spaces are reserved for the sole use by plug-in electric vehicles.

Electric Vehicle Supply Equipment (EVSE)

Devices that provide electric power to a vehicle to recharge the vehicle's batteries. EVSE systems include the electrical conductors, related equipment, software and communications protocols that deliver energy to the vehicle.

Energy Storage Facility

Energy storage equipment or technology that can absorb energy, storing such energy and redelivering energy after it has been stored.

A. Energy Storage, Utility Scale: One or more devices, assembled together, capable of storing energy to supply electrical energy at a future time, greater than 600kWh (kilowatt per hour) in nameplate capacity.

B. Energy Storage, Site-Specific: One or more devices, assembled together, capable of storing energy to supply electrical energy at a future time, less than or equal to 600kWh in nameplate capacity. Storage devices are an accessory use located on the property providing the energy generation source. This does not include energy storage facilities or devices associated with Solar Facility, Utility Scale.

F

Façade

The exterior wall of a building exposed to public view or a wall viewed by persons not within the building.

Flex Industrial or “Flex Space”

A building or group of buildings designed with adaptable floor plans that can accommodate a mix of uses such as light manufacturing, warehousing, research and development, small-scale assembly, laboratories and office space. Interior spaces may be reconfigured over time without substantial exterior changes. Flex space is typically located in business or industrial parks and is intended for low- to moderate-intensity industrial and commercial activity.

Fulfillment Center, High-Cube

A specialized high-cube distribution facility serving e-commerce or direct-to-customer operations, generally aligned with high-cube fulfillment center categories in the ITE Trip Generation Manual. The facility may include automated storage and retrieval systems, sorting and packaging operations and high employee densities. Fulfillment centers typically generate significant truck and delivery vehicle traffic and may operate extended or continuous hours.

G

General Industrial Use

A facility engaged in manufacturing, processing, assembly, repair, storage or similar industrial activities. General industrial uses may involve the use of machinery, handling of raw or finished materials, truck traffic and associated office or warehouse functions, but do not rise to the intensity of heavy manufacturing or hazardous industrial operations.

H

Hours of Operation

The time period during which an activity or enterprise is active, including any times during which the activity is open to customers or other members of the public, employees are present and working, deliveries are made, or equipment (other than utilities or ordinary indoor appliances) is being actively operated on the site.

I

Indoor Vertical Farming/Ag-Tech

Warehouses or controlled-environment structures used to grow crops year-round with advanced hydroponic or aeroponic systems.

Industrial Park

A planned development containing multiple industrial, manufacturing, warehousing, logistics or related facilities served by a shared internal roadway and utility network, generally consistent with the industrial park land use category in the ITE Trip Generation Manual. Uses within an industrial park may include manufacturing, distribution, research and development, support services and accessory office space.

Industrial Storage

A fixed installation where any of the following are stored, either for subsequent transshipment to a smaller fixed installation or for pick-up by truck for transport to the site where the product will be used by the consumer:

A. Oil and gas storage

B. Petroleum products

C. Natural gas

D. Coal

E. Lumber

F. Building material

G Construction equipment

H. Empty solid waste vehicles and containers

I. Building materials.

Intermodal Freight Terminal

A facility where freight is transferred between at least two modes of transportation, such as truck-to-rail or truck-to-air. The facility includes associated loading areas, container storage, staging tracks, maintenance areas and administrative offices. Intermodal terminals typically generate high truck, rail, or cargo activity and require direct access to major transportation corridors.

L

Last-Mile Distribution Centers

Logistics and warehouse facilities closer to population centers that facilitate rapid delivery of goods ordered online.

Light Industrial Facility

A free-standing building or complex used for lower-intensity industrial activities such as assembly, packaging, testing, small-scale fabrication or craft production, generally consistent with light industrial land use categories in the ITE Trip Generation Manual. These uses typically have limited heavy truck traffic, minimal outdoor storage, and lower noise and emissions than heavy manufacturing, and may be suitable at transitions between industrial and commercial or mixed-use areas.

Logistics Center

A facility or complex primarily devoted to coordinating the movement, storage and distribution of goods in the supply chain. A logistics center may include one or more warehouses, cross-dock or transload facilities, truck terminals, fleet parking and associated office or dispatch functions. The use is characterized by significant freight activity and connections to regional highway, rail or air networks.

M

Manufacturing, Heavy

A facility where raw materials or basic commodities are converted into finished products through intensive industrial processes that may involve large machinery, high energy use, outdoor storage, or more significant noise, vibration or emissions. Heavy manufacturing may include metal fabrication, chemical processing, large-scale fabrication or similar operations and typically requires greater separation from residential or sensitive uses.

Manufacturing, Light

A facility where raw materials, parts or components are assembled, processed or fabricated into finished products using relatively clean and quiet processes with limited emissions, outdoor storage or heavy truck traffic. Light manufacturing operations often occur within enclosed buildings and may include associated office, research and warehousing functions.

Microchip or Semiconductor Manufacturing Facility

A facility where semiconductor wafers, microchips, or related components are fabricated, processed, assembled, tested, or packaged. Operations may include cleanrooms, specialized equipment, and the use of chemicals, gases and ultrapure water. The facility may consist of front-end wafer fabrication, back-end assembly, test and packaging, or a combination thereof, along with support, utility and office areas.

Micro-Fulfillment Centers

Highly automated, compact warehouse facilities designed to speed up grocery and retail deliveries within urban and suburban areas.

O

Outdoor Storage Yard, Industrial

An area used for the outdoor storage of equipment, vehicles, materials or containers associated with industrial, construction, utility or logistics operations. The use may be a principal use or accessory to a permitted industrial use and typically includes fencing, screening and surfacing for vehicle and equipment maneuvering.

P

Parcel Hub Warehouse

A freight facility, generally consistent with parcel hub or parcel sorting land use categories in the ITE Trip Generation Manual, where parcel carriers receive, sort and dispatch packages for regional or local delivery. Operations may include conveyor systems, loading docks, staging areas for delivery vehicles and associated office or dispatch space, with high trip generation by trucks and smaller delivery vehicles.

R

Recycling and Materials Recovery Facility

A facility where recyclable materials such as paper, cardboard, plastics, metals, glass, or construction and demolition debris are received, sorted, processed, baled or temporarily stored for shipment to end users. The facility may include enclosed processing areas, outdoor storage of containers or baled materials and associated office space. This use does not include landfills, waste incineration or hazardous waste treatment facilities.

T

Telecommunications Hub or Network Facility

A facility where telecommunications, broadband, fiber-optic or data network equipment is housed to route, switch or process communications signals. The use may include server rooms, switching equipment, backup power systems, cooling equipment and associated office or maintenance space. It does not include broadcast towers, which may be separately regulated.

Truck Stop or Travel Plaza

A facility designed primarily to serve truck drivers and long-distance motorists, providing services such as fuel, parking, restrooms, showers, food service and limited maintenance. The facility may include convenience retail and ancillary uses and typically generates frequent truck movements and 24-hour activity.

Truck Terminal or Truck Freight Station

A facility, generally consistent with truck terminal or truck freight station land use categories in the ITE Trip Generation Manual, where freight is staged, sorted, or transferred between trucks, or between trucks and local delivery vehicles. Operations may include fleet parking, loading docks, cross-docks, dispatch offices and minor maintenance areas, and are characterized by high truck traffic and frequent vehicle movements.

U

Utility-Scale Energy Generation Facility

A facility used to generate electricity for delivery to the electric grid or to serve multiple off-site users, using renewable or non-renewable energy sources. This may include gas-fired peaker plants, solar or wind farms, combined heat and power plants or similar installations, along with associated equipment such as inverters, transformers, substations, control buildings, access drives and security fencing. Small-scale systems serving a single principal use as an accessory component are not included.

W

Warehouse, General

A facility primarily used for the storage of goods, materials or merchandise, generally consistent with general warehouse land use categories in the ITE Trip Generation Manual. The facility may include office, maintenance or limited processing areas, and is characterized by truck loading and unloading, indoor storage and minimal customer or retail activity.

Warehouse, High-Cube Storage

A warehouse facility with a large footprint and high interior clear heights designed for high-bay racking and high-density storage, consistent with high-cube storage land use categories in the ITE Trip Generation Manual. High-cube warehouses may be used for long-term storage, transload operations or as part of larger logistics or business parks.

Wholesale Trade Establishment

A facility where goods, merchandise or equipment are sold or distributed primarily to retailers, contractors or other businesses rather than to the general public. Wholesale trade establishments may include indoor storage, showrooms, loading docks and associated offices, with regular truck traffic and limited walk-in customer activity.

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NEWS RELEASE

Senator Nick Miller, Lehigh Valley Planning Commission, and Lehigh County Executive Phil Armstrong Unveil Next Steps for Passenger Rail Study

ALLENTOWN, PA – December, 18, 2025 – Senator Nick Miller (D-Lehigh/Northampton), the Lehigh Valley Planning Commission, and Lehigh County Executive Phil Armstrong hosted a press conference to announce the next phase of the Lehigh Valley Passenger Rail Transportation Study.

This next phase lays the groundwork for a future project sponsor to advance feasibility studies and alternative analyses needed to restore passenger rail service to the region. The next phase will be supported through $400,000 in funding secured by Senator Nick Miller and Executive Armstrong, with $300,000 from the Commonwealth and $100,000 from the County. Phase 2 will take 12-16 months, according to the Lehigh Valley Planning Commission.

“To keep the Lehigh Valley at the forefront of the Commonwealth, we must invest in additional modes of transit that connect people to jobs, education, and opportunity as we continue to rapidly grow,” said Senator Nick Miller. “We need a comprehensive strategy that addresses congestion, travel times, and connectivity. Restoring passenger rail is about creating opportunity and improving quality of life for future generations. This study will help ensure we grow sustainably, benefiting all residents.”

“We’re incredibly grateful for this opportunity to determine the feasibility of passenger rail, as well as a preferred route and operator,” LVPC Executive Director Becky Bradley. “This is a long process, but this step is the only path for us to move forward.”

Phil Armstrong, Lehigh County Executive, emphasized on the importance of moving forward this project with the necessary local and state funding.

“For us to meet the transportation needs of the future we must provide the funding today,” said Armstrong.

To read the full Lehigh Valley Passenger Rail Study, visit LVPC’s website for the full analysis.

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Contact: Gail Vivar, 201-870-2378

Becky A. Bradley

From: ss4a <ss4a@dot.gov>
Sent: Tuesday, December 30, 2025 11:43 AM
To: Samantha Pearson
Cc: Becky A. Bradley
Subject: SS4A FY25 Planning and Demonstration Funds Awarded: Lehigh Valley Planning Commission, PA

To Whom It May Concern from Lehigh Valley Planning Commission, SS4A ID #: SS4A_FY25_P_169

Congratulations! The project *Lehigh Valley Regional Comprehensive Safety Action Plan,* submitted in response to the Fiscal Year (FY) 2025 Safe Streets and Roads for All (SS4A) grant program Notice of Funding Opportunity (NOFO), was selected for an award of $800,000.00 in Federal funding. This includes funding for New Action Plan activities.

Key Information and Requirements: This email is not authorization to begin work, and it does not guarantee Federal funding. The United States Department of Transportation (USDOT) and Lehigh Valley Planning Commission must establish and execute a signed, mutually agreed upon grant agreement prior to the obligation of award funds. No costs incurred before USDOT signs and executes the grant agreement will be reimbursed or counted toward the 20% cost-share requirement.

Immediate Next Steps: USDOT made a public announcement related to this award on **December 23, 2025** and published a short summary of the proposal from your application on the Safe Streets and Roads for All website. This email also serves as notification of an award received in case you did not receive an email last week. If you would like to modify the information published on our website, please send an email to SS4A@dot.gov with your request.

What to Expect in the Next Few Weeks: My colleagues at the FHWA are responsible for establishing and executing a SS4A grant agreement with Lehigh Valley Planning Commission. You can expect to hear from a FHWA representative in the near future. In the meantime, **if you have questions about next steps, please send an email to SS4A.FHWA@dot.gov.**

Finally, we ask for your patience as we work diligently to execute grant agreements to support your important safety work. USDOT staff will be working with hundreds of new grant recipients to expeditiously process new grant agreements, and this will take time.

It's exciting to see so many communities on the path to improving roadway safety and the whole SS4A Program team is passionate about helping you succeed. Thank you for your commitment to roadway safety.

Best,
Loren

Loren A. Smith, Jr.
Deputy Assistant Secretary for Transportation Policy
U.S. Department of Transportation

Summary of Award Information:

Project Name: Lehigh Valley Regional Comprehensive Safety Action Plan
Applicant: Lehigh Valley Planning Commission
Unique Entity Identifier: CJC5SMKJD6C6
SS4A ID: SS4A_FY25_P_169
Grant Type: Planning and Demonstration
SS4A Grant Funding Amount: $800,000.00
Estimated Total Project Costs: $1,000,000.00
Project Description: This award will be used by Lehigh Valley Planning Commission to develop a Comprehensive Safety Action Plan for the bi-county Lehigh Valley region covering 62 municipalities, including high-injury network identification, prioritized projects, funding strategies, training, and an evaluation framework. Planned deliverables include a prioritized project list with implementation timelines, best-practice guidance, expanded technical assistance, and a dashboard to track reductions in fatalities and serious injuries.

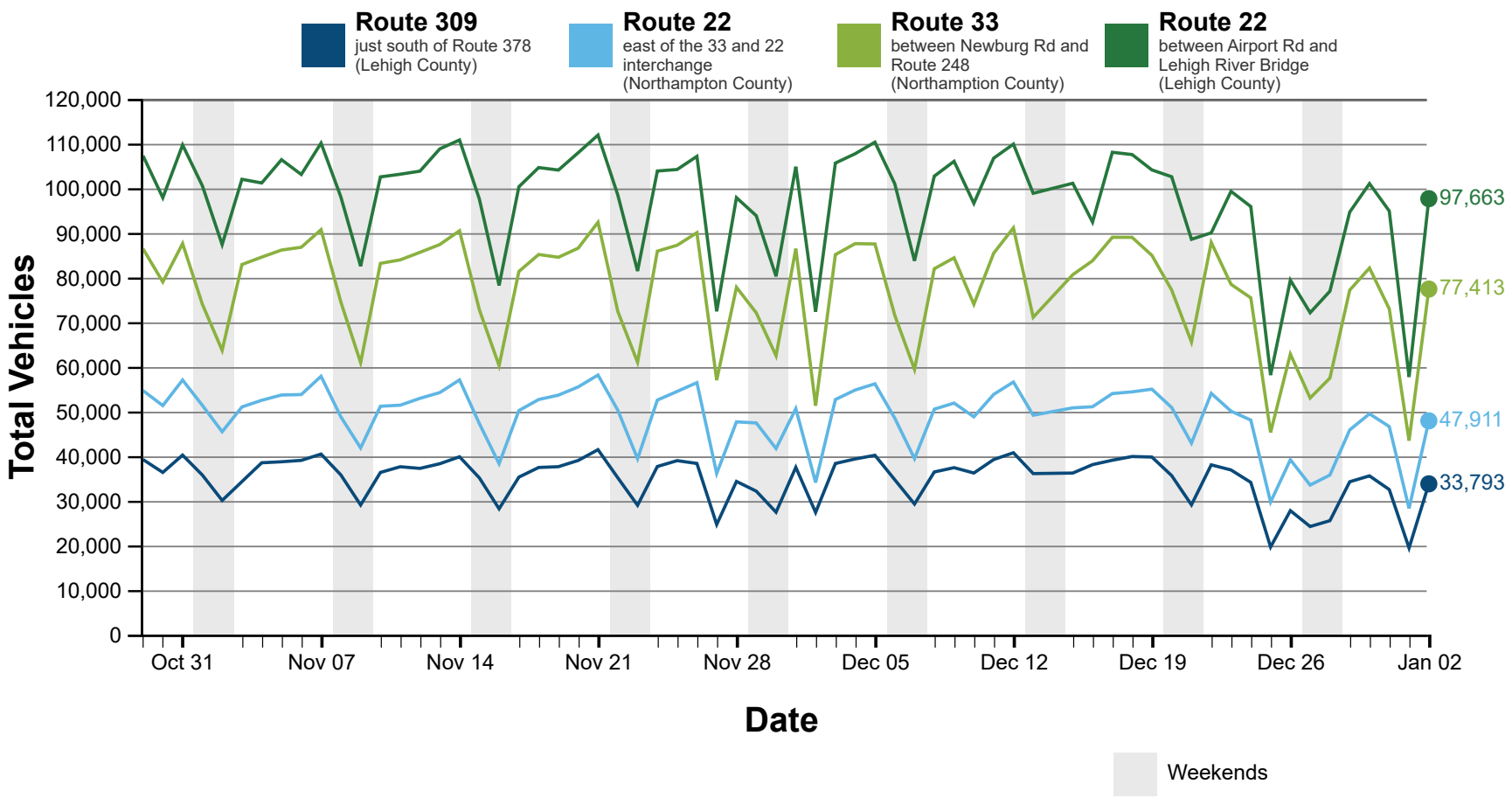
Preparing for Establishing a Grant Agreement
The terms of the grant agreement will be in accordance with the FY 2025 SS4A NOFO and applicable Federal requirements. The list below highlights key information to familiarize yourself with as the grant agreement development process begins. Note that the information below may not be applicable to all activities included in your award.

- **Scope of Activities:** Your award is for New Action Plan activities.
    - **Action Plan:** The funding awarded to develop a comprehensive safety action plan or update an existing plan to meet SS4A requirements must result in a final product that includes all Action Plan components outlined in Table 1 of the NOFO.
    - **Supplemental Planning:** The funding awarded to conduct supplemental planning must result in a final written product that connects to, supports, and enhances an Action Plan.
    - **Demonstration Activities:** The funding awarded to carry out demonstration activities that must inform an Action Plan's list of selected projects and strategies and their future implementation, and/or inform another part of the Action Plan. Demonstration activities are temporary in nature, and materials must also be temporary and/or easily reversible. Additionally, demonstration activities must measure potential benefits through data collection and evaluation as part of the grant agreement. Demonstration activities are subject to additional reviews and oversight to ensure compliance with Federal requirements, including but not limited to the National Environmental Policy Act and the

Manual on Uniform Traffic Control Devices. Demonstration activities that result in changes to the built environment will include multiple project phases, and Federal funding will be obligated for each individual phase when required conditions are met.

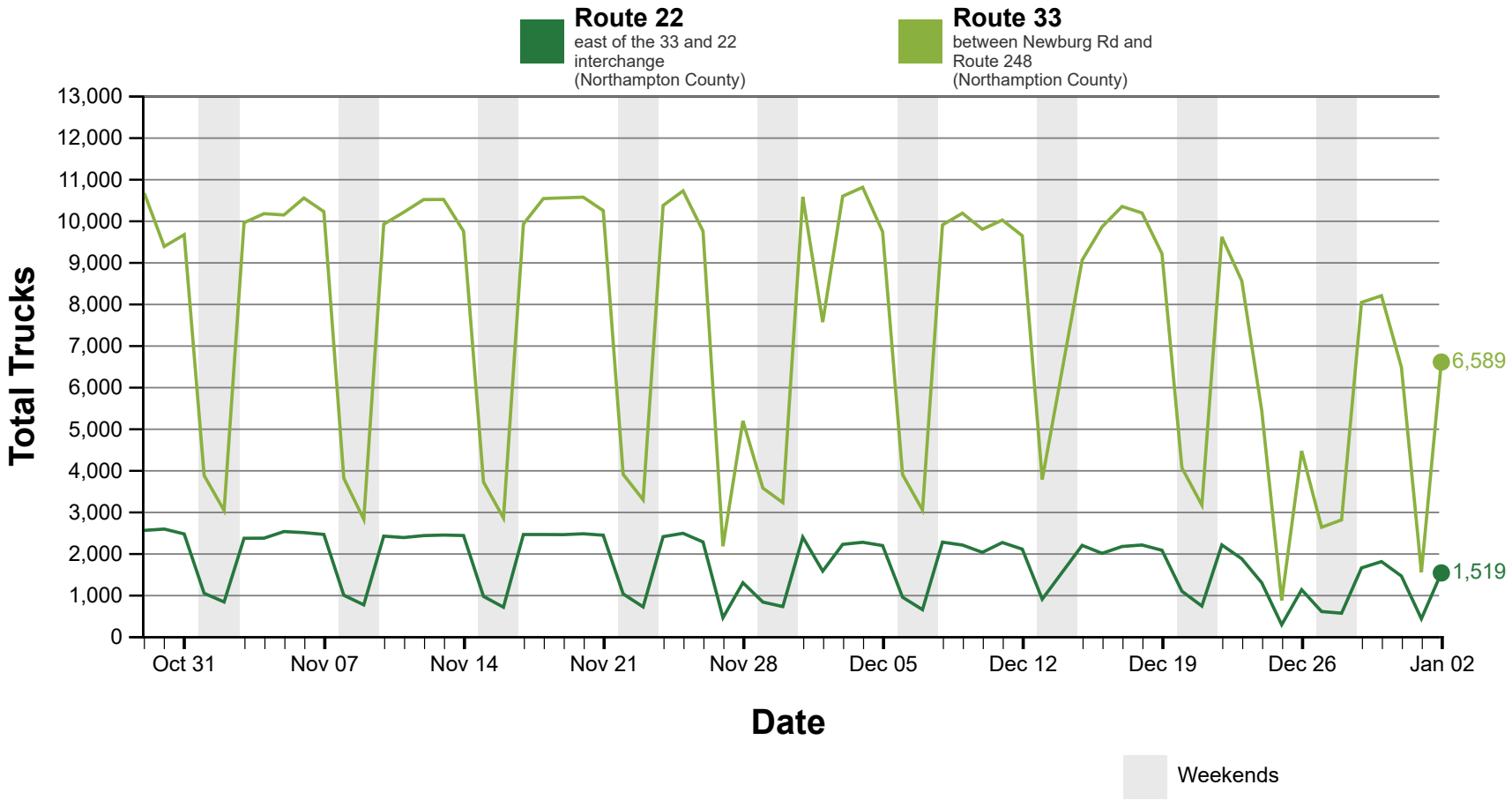
- **2 CFR part 200:** All SS4A awards will be administered pursuant to the Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards found in 2 CFR part 200 (NOFO p. 68). We encourage awardees to take FHWA's free training on these requirements, "Understanding the Uniform Guidance Requirements (2 CFR 200)," Course #231034.
- **Allowable Costs:** To be considered allowable, costs incurred must be reasonable, necessary, and allocable, as described in 2 CFR Part 200 Subpart E – Cost Principles.
- **Match and Cost Sharing:** Grant recipients are required to contribute no less than a 20% non-Federal match. For information related to match and cost-sharing in the SS4A context, please review https://www.transportation.gov/grants/ss4a/match.
- **Use of Other Federal Funds:** While SS4A grant recipients may also use other sources of Federal funding toward a SS4A project, administering a project that includes Federal funds with other requirements, such as funds under Title 23, United States Code, will result in increased complexity and such grant agreements will take longer to execute.
- **Consistency with Administration Priorities:** The selected grant may need to remove activities for consistency with Administration priorities. If the grant application included any of the following activities, they will need to be removed prior to executing a grant agreement with FHWA unless exceptions apply:
    - automated traffic enforcement (except in school zones and work zones);
    - curb extensions (except for bus or transit stops, roundabouts, school zones, on-street parking where the extension would not eliminate dedicated lanes for right turns, or curb extensions which do not reduce roadway capacity); and
    - equity analysis.
- **Maintenance Activities:** Maintenance activities for an existing roadway primarily to maintain a state of good repair are not eligible activities. Please review Section 4 for more information about "Eligible Activities and Costs." (NOFO p. 20)
- **Educational and Outreach Materials:** Any educational or outreach materials charged to the grant must align with the project goals and roadway safety. Costs of promotional items and memorabilia, including models, gifts, and souvenirs are unallowable. Costs of advertising and public relations designed solely to promote the non-Federal entity are unallowable (2 CFR 200.421).

Traffic Volumes Throughout the Lehigh Valley



**Data from Oct/29/2025 - Jan/2/2026 at daily intervals*

Truck Volumes Throughout the Lehigh Valley



**Data from Oct/29/2025 - Jan/2/2026 at daily intervals*