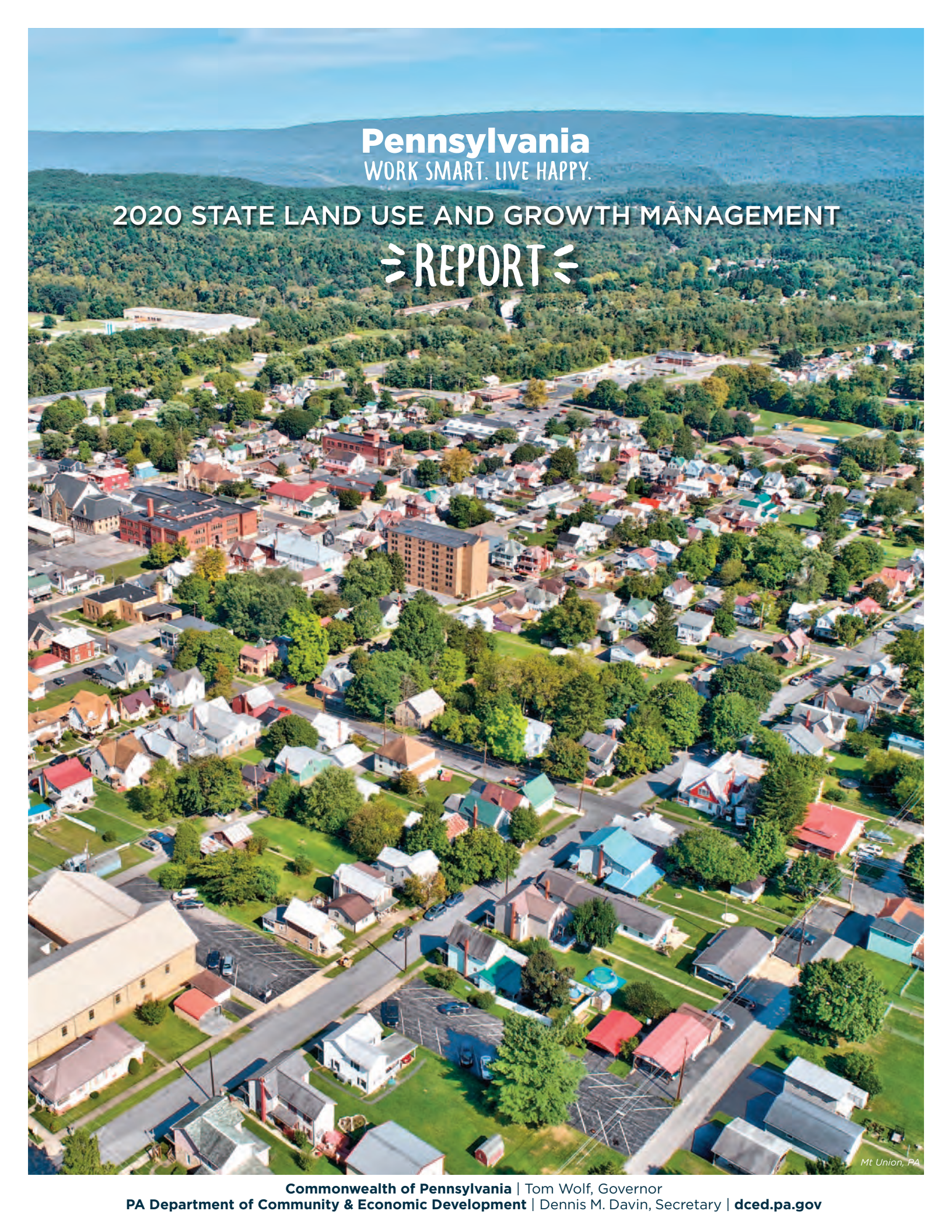




Pennsylvania
WORK SMART. LIVE HAPPY.

2020 STATE LAND USE AND GROWTH MANAGEMENT
REPORT

Mt Union, PA



Harrisburg, PA

The *2020 State Land Use and Growth Management Report* contains data about land use and development in Pennsylvania from 2015 through 2020. Prepared by the Governor's Center for Local Government Services in compliance with the Municipalities Planning Code, the Report was written with contributions from various state agencies, the Pennsylvania State Planning Board, and numerous county planning agencies. It should be used as a framework for measuring the impact of implemented policies, as well as to inform future decision-making at all levels of government in Pennsylvania.

During the last *State Land Use and Growth Management Report (2015)*, our nation was focused on rebounding from the Great Recession of 2008. Since then, we have witnessed Pennsylvania's resilient communities implement policies to mitigate blight, prevent foreclosures, promote fiscal health, and foster sustainable growth. The commonwealth has also renewed significant investments in various programs such as the Neighborhood Assistance Program, Keystone Communities Program, and the Strategic Management Planning Program to help preserve the character, diversity, viability, and appeal of our municipalities. New options for expansion were explored in both the energy and the technology sectors and opportunity zones were identified and targeted for business attraction, site selection, and tourism.

At the local level, regional strategies for growth and development have been encouraged and embraced. Our municipalities have collaborated with neighbors and partners to enact new economic strategies, comprehensive plans, and zoning ordinances. Some established historic preservation initiatives while others have experimented with land banks for the very first time.

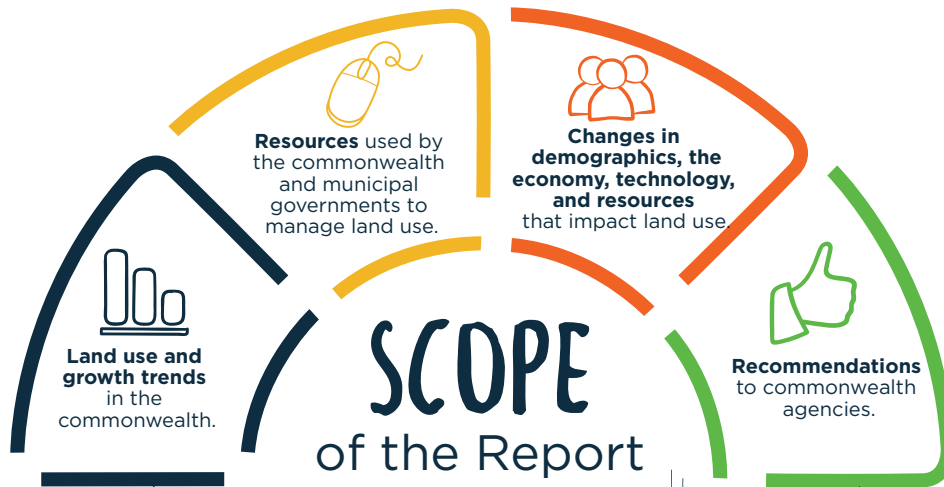
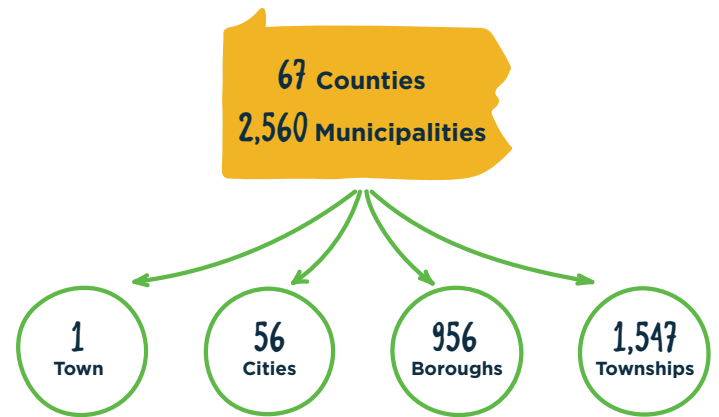
As new land use challenges emerge, Pennsylvania continues to place greater emphasis on sustainable growth, conservation, and development. We recognized the importance of environmental justice and equity in land use, as we welcomed new residents into our fastest growing counties. And even now, as we grapple with public health and economic outcomes related to COVID-19, we are expecting and preparing for land use adaptation again, specifically in the areas of economic development, housing, technology and transportation infrastructure, recreation, and tourism. With so much to consider, it is our intention that this Report be used regularly as we collectively work together to determine the next steps of land use planning and policy in Pennsylvania.

C. Kim Bracey
Executive Director
Governor's Center for Local Government Services

The Governor's Center for Local Government Services, a division of the Pennsylvania Department of Community and Economic Development, is required to produce a land use and growth management report once every five years (Municipalities Planning Code, Section 107). Previous iterations of the report were released in 2005, 2010, and 2015. This document is the *2020 State Land Use and Growth Management Report*.

The *2020 State Land Use and Growth Management Report* is a five-year collection of data points and related policy recommendations regarding land use and growth trends and their impacts on the Pennsylvania landscape. This Report is intended to inform executive branch policies and programs but may be equally useful for state legislators, local governments, and professional planners.

The Commonwealth of Pennsylvania is formed of 67 counties and 2,560 individual municipalities. The Pennsylvania General Assembly bestows each county and municipality in the commonwealth with the statutory authority to use planning and zoning to regulate land use and development. Federal, state, and local planning and zoning decisions are all contributing factors in economic trends and environmental sustainability. The data collected in this Report should provide a framework for measuring the impacts of implemented land use policies, as well as inform future decision-making at all levels of government in Pennsylvania.



STATE LAND USE AND GROWTH MANAGEMENT REPORT

"A comprehensive land use and growth management report to be prepared by the Center for Local Government Services and which shall contain information, data, and conclusions regarding growth and development patterns in this commonwealth and which will offer recommendations to the commonwealth agencies for coordination of executive action, regulation, and programs."

- Pennsylvania Municipalities Planning Code, Section 107

The 2020 Report was prepared by Planning staff of the Governor's Center for Local Government Services within the PA Department of Community and Economic Development. Significant contributors include the Pennsylvania Departments of Conservation and Natural Resources (DCNR), Environmental Protection (DEP), and Transportation (PennDOT), and the Pennsylvania Historical and Museum Commission (PHMC). Each contributing state agency collected and analyzed data from a variety of sources to inform the Report's policy recommendations.

A primary data source for the Report is the most recent U.S. Geological Survey (USGS) National Land Cover Data. This dataset was formulated in 2016 but was only released as recently as 2019. Special thanks to Craig Ebersole, Geologic Scientist, in DCNR's Office of Conservation & Technical Services, Bureau of Geological Survey for conducting a detailed analysis of the USGS National Land Cover data, as well as providing mapping services.

The Pennsylvania State Planning Board, comprised of officials from all levels of government, as well as citizen gubernatorial appointees such as non-governmental planning professionals, provided valuable input and review for the Report over the course of three work sessions. Their contribution adds a vital industry perspective to this Report.

Another significant method of data collection for the Report included a survey of Pennsylvania's County Planning Directors. This survey captured qualitative observations about land use and development trends on the local level.



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TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

3 PART 1 LAND COVER DATA

- 4 Understanding our Landscape
-

7 PART 2 COMPREHENSIVE PLANNING AND LAND USE ORDINANCES

- 8 Comprehensive Planning
 - 8 Zoning
 - 9 Municipal Zoning
 - 10 Subdivision and Land
Development Ordinances
-

13 PART 3 DEMOGRAPHICS, HOUSING AND ECONOMIC DEVELOPMENT IN PENNSYLVANIA

- 14 Population Data
- 15 Regional Population Changes
- 16 Live, Work and How Pennsylvanian's
Get Between Them
- 20 Housing
- 22 Blight
- 22 Home Values
- 23 Business Site Selection and Clustering
- 24 High-Volume Occupancy Permits (HOP)
- 24 Broadband Infrastructure
- 26 Municipal Fiscal Health

7 PART 4 TRANSPORTATION

- 31 Traffic Congestion
 - 32 Multimodal Trends
 - 34 Electric Vehicles
 - 35 Automated Vehicles
-

37 PART 5 SUSTAINABILITY AND LAND USE

- 38 Brownfield Redevelopment
 - 41 Solar
 - 42 Riparian Buffer Space
 - 43 Carbon Sequestering
 - 43 Climate Mitigation
 - 44 Landfills
 - 45 Abandoned Mines and Wells
 - 46 Weather Vulnerability
 - 48 Water Space and Water Quality
-

51 PART 6 NATURAL AND CULTURAL RESOURCES

- 52 Historic Preservation
 - 54 Farmland
 - 57 Forests
 - 58 Green Gentrification
 - 59 Recreation/Trail Space
 - 60 Wrap-Up
-

62 APPENDIX I

EXECUTIVE SUMMARY

The *2020 State Land Use and Growth Management Report* is a five-year collection of data points and related policy recommendations regarding land use and growth trends and their impacts on the Pennsylvania landscape. This Report was produced by the Pennsylvania Department of Community and Economic Development (DCED), in compliance with the Municipalities Planning Code (MPC), and is intended to inform executive branch policies and programs. The Report may be equally useful for state legislators, local governments, and professional planners.

The Pennsylvania Department of Conservation and Natural Resources' (DCNR) 2019 analysis of U.S. Geologic Survey's (USGS) National Land Cover Database is the primary source for the State Land Use and Growth Management Report. Data was also collected from Pennsylvania's county planning agencies, the U.S. Census, and other research.

According to the most recent release of USGS data, Pennsylvania was home to 3,539,254 acres of developed land out of a total of 28,991,450 acres. There were net increases in wetland space and in cultivated crop acreage but there were net decreases in pasture lands and forest acreage.¹

Pennsylvania's land use controls include comprehensive planning and zoning measures facilitated by county and municipal governments. A recent survey of Pennsylvania's county planning agencies, conducted by DCED, found that a total of 46 out of Pennsylvania's 67 counties were in compliance with the MPC's comprehensive plan 10-year update requirements for counties at the close of 2019.² At this point in time, only 13 counties have enacted county zoning ordinances to implement those comprehensive plans. And a total of 137 municipalities have elected to adopt a county zoning ordinance rather than create their own.³ Out of PA's 2,560 municipalities, 1,740 of them (67.9 percent) operate under zoning regulations, either by a municipal ordinance or coverage under a county ordinance. The number of municipalities with zoning increased by only one in the last five years.⁴ Additionally, there are 2,416 municipalities (94.3 percent of all PA municipalities) with a Subdivision and Land Development Ordinance (SALDO) in place to regulate lot development.⁵ The Commonwealth should continue to support municipalities in exploring the benefits of adopting regional zoning ordinances.

In a state with such diverse rural and urban characteristics, land use decisions have a significant impact on the concentration of population, availability of workforce, industry sectors, housing stock, environment, and transportation infrastructure. The DCED survey of county planning directors included an open-ended question about observed land use trends. Common responses in the fast-growing Southeast region of Pennsylvania were related to managing economic development through a variety of different land use tools (such as growth boundaries and preservation), a lack of affordable housing, and increases in both multifamily and single family residential units. Elsewhere, a variety of topics of regional importance were identified, but unrelated to affordable housing and the management of economic growth. This indicates a dichotomy in policy needs for growth and land use in Pennsylvania over the next five years.⁶

Sources

- 1 U.S. Geologic Survey National Landcover Database (2019)
- 2 Survey of Pennsylvania's county planning agencies, PA Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 3 Survey of Pennsylvania's county planning agencies, PA Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 4 Survey of Pennsylvania's county planning agencies, PA Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 5 Survey of Pennsylvania's county planning agencies, PA Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 6 Survey of Pennsylvania's county planning agencies, PA Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 7 Survey of Pennsylvania's county planning agencies, PA Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 8 U.S. Census Housing Estimates (2018).
- 9 "PA's Comprehensive Freight Movement Plan," Pennsylvania Department of Transportation, (2016).
- 10 "PA's Long-range Transportation Plan," Pennsylvania Department of Transportation, (2016).
- 11 Pennsylvania Department of Transportation, (2019).
- 12 Pennsylvania Department of Environmental Protection, (2019).
- 13 The Pennsylvania Department of Environmental Protection, (2019).
- 14 The Pennsylvania Department of Conservation and Natural Resources, (2020).
- 15 <http://pawasteindustries.org/waste-industry/waste-facts/>
- 16 The Pennsylvania Historical and Museum Commission, (2020).
- 17 https://outdoorindustry.org/wp-content/uploads/2017/07/OIA_RecEcoState_PA.pdf
- 18 https://www.agriculture.pa.gov/Documents/PennsylvaniaAgriculture_EconomicImpactFutureTrends.pdf
- 19 U.S. Census of Agriculture, (2017).



Delaware Water Gap, PA

The *2020 Land Use and Growth Management Report* also includes findings in the areas of housing, transportation, environment, and other important topics such as agriculture and historic preservation.

HOUSING POLICY HIGHLIGHTS

- Lack of affordable housing continues to be a challenge in faster-growing regions such as Southeast Pennsylvania.⁷
- Age of housing stock is a prevalent problem for Pennsylvania, with a significant portion of housing infrastructure being 70 or more years old.⁸

TRANSPORTATION POLICY HIGHLIGHTS

- Increasing demand for overnight shipping has driven the construction of distribution warehouses on farmland in rural areas proximate to major metropolitan consumer centers.⁹
- Traffic volumes on both urban and rural interstates has increased but congestion on all other arterials and roadways has been declining steadily since 2011.¹⁰
- Based on the current number of registered Electric Vehicles, existing infrastructure for charging is not adequate to meet forecasted demands.¹¹

ENVIRONMENTAL POLICY HIGHLIGHTS

- With increased intergovernmental coordination, Brownfield Redevelopment will continue to be a strong land use strategy.¹²
- Climate mitigation strategies are imperative to face the outcomes of development-driven increases in greenhouse gas emissions and extreme weather events.^{13 14}
- An estimated nine million tons of garbage is deposited into Pennsylvania's 29 square miles of permitted and non-permitted landfills every year.¹⁵

NATURAL AND CULTURAL RESOURCES HIGHLIGHTS

- Historic Preservation Tax Credit rehabilitation projects generate significant Federal, state, and local tax revenue, jobs, and other spinoff effects including housing creation and the catalyzing of revitalization in adjacent areas.¹⁶
- Outdoor recreation generates \$29.1 billion in consumer spending annually, \$1.9 billion in state and local tax revenue, and directly supports over 251,000 jobs. Space dedicated to these activities is integral to the Pennsylvania economy.¹⁷
- Pennsylvania's diverse food and agriculture sector accounts for a significant portion of the state's economy, with a \$135.7 billion annual economic impact. Agriculture supports 1 out of every 10 jobs in the Commonwealth.¹⁸
- The number of farms and the acreage of farms has continued to decrease over the last decade while the percentage of farms that are harvested croplands increased by three percent.¹⁹





LAND COVER DATA

Land Cover Data is key to visualizing opportunities for growth and conservation across the commonwealth.

Pennsylvania's diverse landscape is ideal for a variety of industries, recreational pursuits, and lifestyles.

UNDERSTANDING OUR LANDSCAPE

The Pennsylvania Department of Conservation and Natural Resources' (DCNR) 2019 analysis of the U.S. Geologic Survey's (USGS) National Land Cover Database is the primary source for the State Land Use and Growth Management Report. The database is derived from Landsat satellite imagery. The most recent Landsat imagery available was collected in 2016 and released by USGS in 2019.

Pennsylvania's developed land acreage was most recently recorded at 3,539,254 acres according to USGS.¹ In 2011, Pennsylvania had 3,506,662 developed acres out of a total 28,991,450 acres, or 12%. There were net increases in wetlands and cultivated crop acreage but there were net decreases in pasture lands and forest acreage.²

Figure 1: Pennsylvania Statewide Landcover by Category

Land Cover	2011 Area (acres)	2016 Area (acres)	Change 2011-16 (acres)	Change (Percentage)
Open Water	340,987	335,704	-5,283	-1.55%
Developed, Open	2,008,518	2,011,408	2,890	0.14%
Developed, Low	909,343	919,835	10,492	1.15%
Developed, Med	412,995	426,255	13,260	3.21%
Developed, High	175,806	181,756	5,950	3.38%
Barren Land	131,306	130,937	-368	-0.28%
Deciduous Forest	13,292,546	13,274,108	-18,438	-0.14%
Evergreen Forest	549,267	547,708	-1,560	-0.28%
Mixed Forest	3,837,731	3,848,209	10,478	0.27%
Shrub/Scrub	276,878	305,664	28,786	10.40%
Grassland/Herbaceous	264,442	220,449	-43,993	-16.64%
Pasture/Hay	3,777,359	3,711,784	-65,575	-1.74%
Cultivated Crops	2,515,110	2,572,239	57,129	2.27%
Woody Wetlands	434,552	437,909	3,358	0.77%
Emergent Herbaceous Wetlands	64,610	67,485	2,876	4.45%
Total	28,991,450	28,991,450		

Source: Pennsylvania Department of Conservation and Natural Resources, (2019)

*See Appendix I for detailed description for 2011 area data correction.

Sources

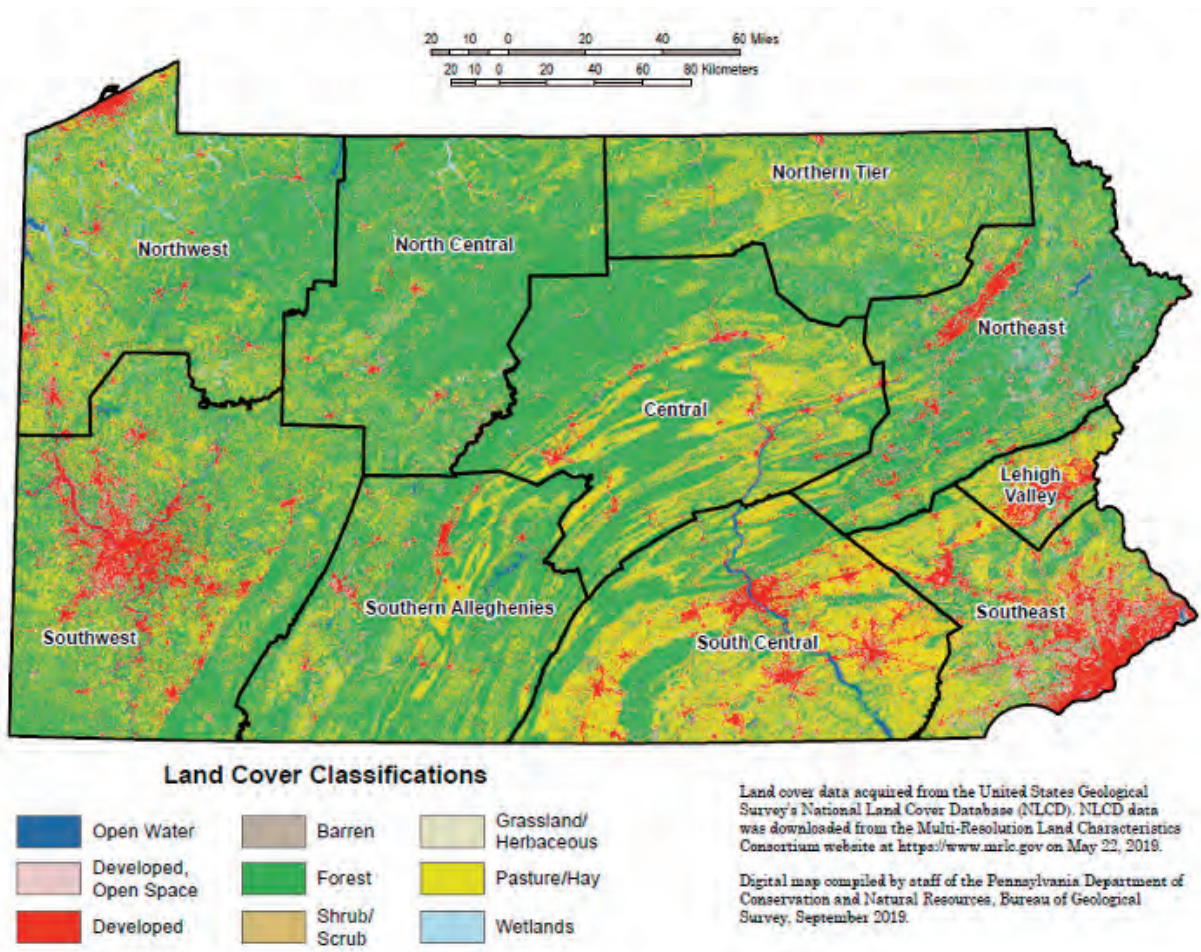
1 U.S. Geologic Survey National Landcover Database (2019)

2 U.S. Geologic Survey National Landcover Database (2019)



Allegheny National Forest

Figure 2: Pennsylvania 2016 Land Cover Composite Map



Source: Pennsylvania Department of Conservation and Natural Resources, (2019)
 *See Appendix I for detailed description for 2011 area data correction.



Souderton, PA



COMPREHENSIVE PLANNING AND LAND USE ORDINANCES

Comprehensive Planning and Land Use Ordinances are important tools in establishing the character and potential for Pennsylvania's communities. This section examines the trends on statewide implementation of these tools.

Good planning is essential to community vitality.



Allentown, PA

“Zoning ordinances should reflect the policy goals of the statement of community development objectives...and give consideration to the character of the municipality, the needs of the citizens and the suitability and special nature of particular parts of the municipality.”

– MPC Article VI, 603 (a)

COMPREHENSIVE PLANNING

Comprehensive Planning is a vital and effective tool when completed in coordination with a zoning ordinance and other land use regulation tools. The Municipalities Planning Code (MPC) requires all Pennsylvania counties to prepare and update a comprehensive plan every ten years at minimum.¹ A 2019 survey of Pennsylvania’s county planning agencies, conducted by the Department of Community and Economic Development, found that a total of 46 out of Pennsylvania’s 67 counties were in compliance with the MPC’s comprehensive plan update requirements at the close of 2019.²

ZONING

The MPC establishes both county and municipal powers in setting ordinances for land use and the implementation of comprehensive plans. It is important to note that the power of a county to enact a zoning ordinance is limited in application to land not subject to an existing municipal zoning ordinance.³ Therefore, any enacted municipal zoning ordinance supersedes an existing county zoning ordinance. As of 2020, 13 counties have enacted zoning ordinances and a total of 137 municipalities have elected to adopt a county zoning ordinance rather than create their own.⁴

MUNICIPAL ZONING

The MPC states that municipal zoning ordinances should be reflective of local policy goals, citizens' needs, and the character of the community.⁵ It should promote, protect, and facilitate space for various public services as enumerated in MPC Section 604, and it should encourage the preservation of prime agricultural land and natural and historic resources.⁶

Currently 1,740 out of PA's 2,560 municipalities (67.9%) operate under zoning regulations, either by a municipal ordinance or coverage under a county ordinance. The number of municipalities with zoning increased by only one in the last five years.⁷ A change in percentage is negated because PA has less municipalities in (2020) than it did in 2015 as a result of a 2016 municipal merger of Tulpehocken Township and Strausstown Borough in Berks County.

It is important to note that any PA municipality enacting a zoning ordinance must provide a space for all reasonable and lawful land uses and no areas may be left un-zoned.⁸ Under a multi-municipal zoning ordinance, two or more contiguous municipalities enact a shared zoning ordinance and negotiate on the location of land uses within the multi-municipal boundary. When this happens, the MPC requirement to allow for all land uses is satisfied when just one participating municipality accommodates a possible land use.⁹ Also, contiguous municipalities which participated in a joint comprehensive planning process were able to opt for individual administration of the zoning ordinance while still sharing land uses. This is achieved through enactment of a shared land use agreement. For these reasons, the use of multi-municipal zoning ordinances and multi-municipal comprehensive plans have increased in popularity over the last five years. The Commonwealth should continue to support municipalities in exploring the benefits of adopting regional zoning ordinances.



Harrisburg, PA

Figure 3: Municipal Zoning in PA as of 2019

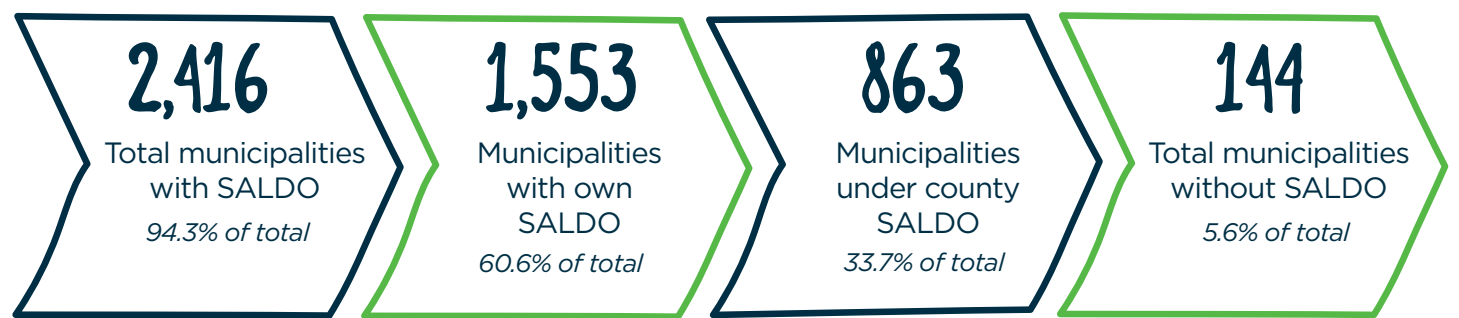


Source: DCED Survey of County Planning Agencies (2019)

SUBDIVISION AND LAND DEVELOPMENT ORDINANCES

Currently there are 2,416 municipalities (94.3% of all PA municipalities) with a Subdivision and Land Development Ordinance (SALDO) in place to regulate lot development. These regulations are enacted by a municipal ordinance or by adoption of a county ordinance. The number of municipalities with SALDO regulations increased by one in the last five years. However, the number of municipalities with locally enacted SALDO decreased by 17. The number of municipalities which adopted a County SALDO increased by 18. The number of municipalities operating without a SALDO is 144.¹⁰

Figure 4: Subdivision and Land Development Ordinances (SALDO) in PA as of 2019



Source: DCED Survey of County Planning Agencies (2019)



Red Lion, PA



Reading, PA

Sources

- 1 *Municipalities Planning Code Act of 1968, P.L. 805, No. 247, Article III, § 301 (c).*
- 2 *Survey of Pennsylvania's county planning agencies, Pennsylvania Department of Community and Economic Development, Governor's Center for Local Government Services (2019).*
- 3 *Municipalities Planning Code Act of 1968, P.L. 805, No. 247, Article VI, § 602.*
- 4 *Survey of Pennsylvania's county planning agencies, Pennsylvania Department of Community and Economic Development, Governor's Center for Local Government Services (2019).*
- 5 *Municipalities Planning Code Act of 1968, P.L. 805, No. 247, Article VI, § 603 (a).*
- 6 *Municipalities Planning Code Act of 1968, P.L. 805, No. 247, Article VI, § 105.*
- 7 *Survey of Pennsylvania's county planning agencies, Pennsylvania Department of Community and Economic Development, Governor's Center for Local Government Services (2019).*
- 8 *National Land & Investment Co. v. Easttown Twp. Board of Adjustment, PA Supreme Court (1965).*
- 9 *Municipalities Planning Code Act of 1968, P.L. 805, No. 247, Article VI, § 1103 (a)(4).*
- 10 *Survey of Pennsylvania's county planning agencies, Pennsylvania Department of Community and Economic Development, Governor's Center for Local Government Services (2019).*

Bistro 614

Jan Ray

WEST
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SHOOT

Back Dog
614 Pen
Apart

610-47



DEMOGRAPHICS, HOUSING, AND ECONOMIC DEVELOPMENT IN PENNSYLVANIA

Land Use Planning sets the stage for economic development and growth when it embraces the unique experiences and diverse needs of Pennsylvanians.

The connection between our diverse community assets and resilient industries is at the heart of Pennsylvania's economy.

POPULATION DATA

In a state as diverse as Pennsylvania, population trends have a significant impact on land use, such as the concentration of industry sectors, the size of legislative districts, housing stock, transportation infrastructure, and the need for certain types of social services.

According to U.S. Census Bureau estimates, since 2010, it is likely that Pennsylvania's overall population may increase by 1% or less, while the US population increases by approximately 5-7%. Statistics also show that Pennsylvania is getting older and more diverse.¹ In 2018, PA's population was estimated to be 12,807,060, which accounted for a 0.8% growth from 2010. In contrast, the U.S. population grew at 6% over the same time to 327,167,439. PA's 12.8 million accounts for 3.9% of the U.S. population.

PA Population (2018)

12,807,060

0.8% Growth since 2010

3.9% SHARE OF U.S. POPULATION

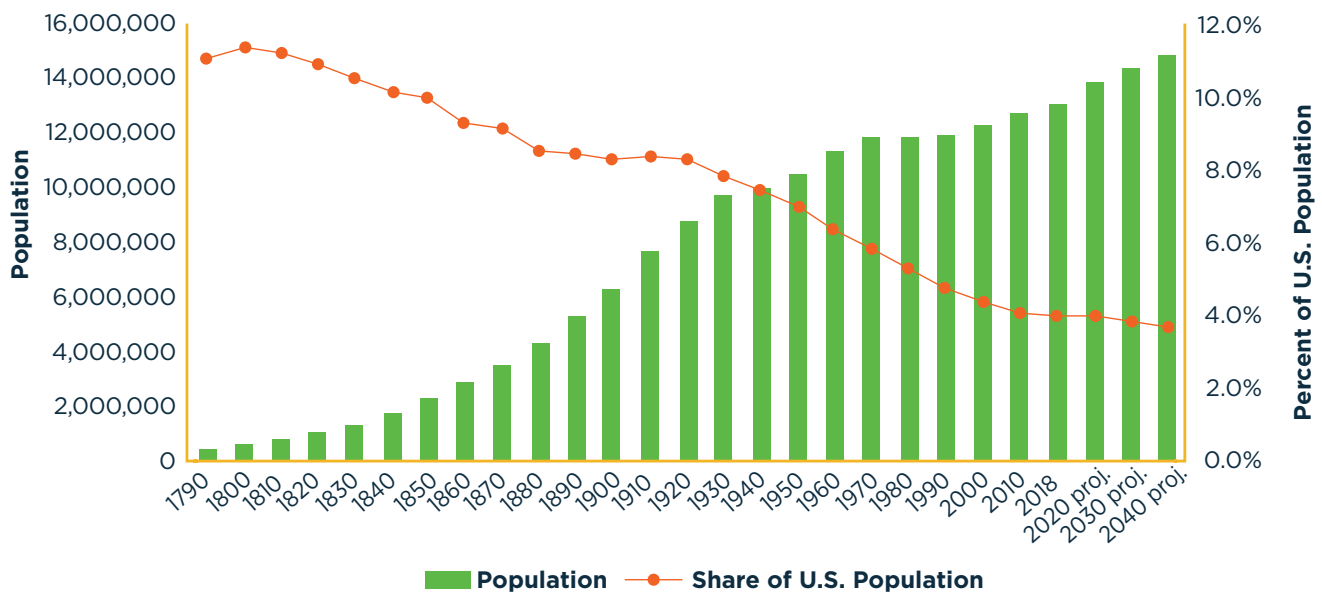
U.S. Population (2018)

327,167,439

6.0% Growth since 2010

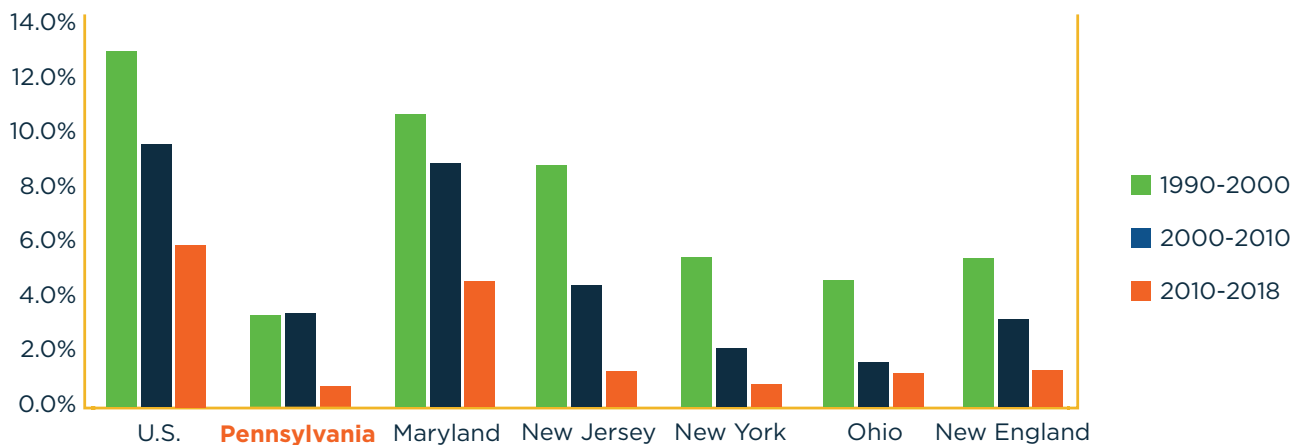
Source: U.S. Census Bureau estimates (2018)

Figure 5: Pennsylvania Population Share of U.S. Population, 1790-2040



Source: U.S. Census Bureau

Figure 6: Population Growth Rates PA, U.S. and Nearby States



Source: U.S. Census Bureau



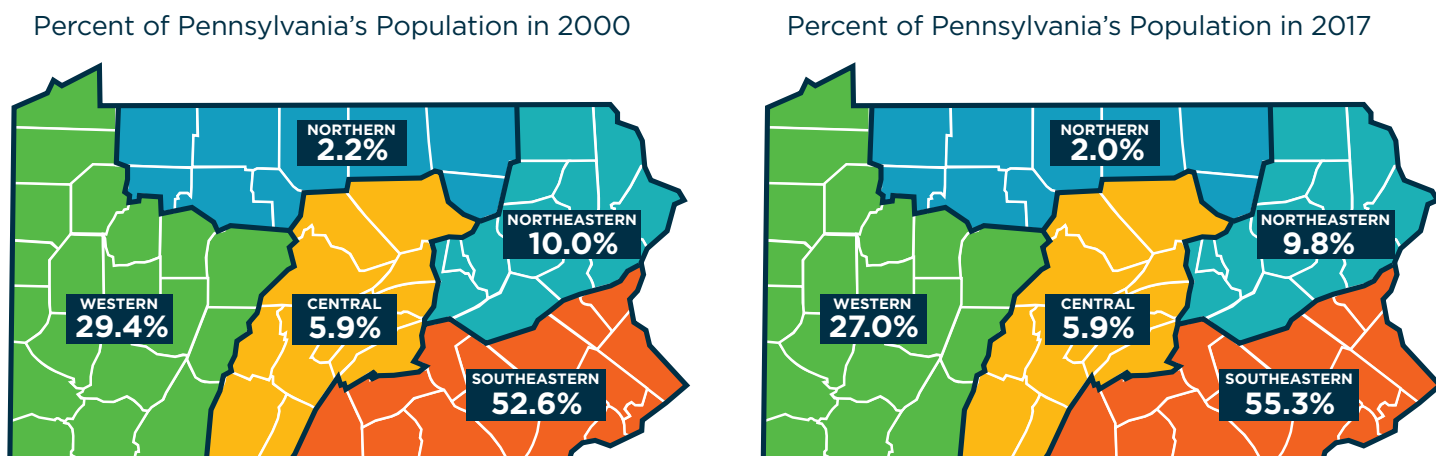
REGIONAL POPULATION CHANGES

The 2019 DCED survey of county planning directors included an open-ended question about observed land use trends. The Commonwealth is geographically diverse, however, common responses in the were related to managing economic development through a variety of different land use tools (such as growth boundaries and preservation), a lack of affordable housing, and increases in both multifamily and single family residential units. Specifically, a variety of topics of regional importance were mentioned, but unrelated to affordable housing and the management of economic growth. These survey results were mirrored in academic research.²

A report released in 2018 titled *"Pennsylvania Population on the Move: 2000-17"* by Penn State's Center for Economic and Community Development suggested the divergence of Pennsylvania's population into two broad categories: the Southeast region and the rest of PA. The Southeast was largely characterized by population growth and its "competitive position" in the global economy while the rest of PA was characterized with mostly varying degrees of population decline. Notably, the report showed Pennsylvania's population from 2000-2017 shifting Southeast, increasing from 52.6% of PA's population in 2000 to 55.3% in 2017. This corresponded with the greatest declines being in Western Pennsylvania as its population declined from 29.4% in 2000 to 27% in 2017 of Pennsylvania's population.³

Now considering the effects of the ongoing COVID-19 Global Pandemic, how these trends will manifest themselves in population and land use is yet to be seen. At the time of this Report, there is insufficient data available to show how the pandemic will play a role in reshaping land use and population trends on a regional basis in Pennsylvania. However, shifting to and the popularity of telework will certainly be an indicator of land use changes in the future.

Figure 7: Pennsylvania on the Move



Source: *Pennsylvania Population on the Move* (2018)



Pittsburgh, PA

LIVE, WORK AND HOW PENNSYLVANIAN'S GET BETWEEN THEM

Figure 8 shows the percentage of Pennsylvanians that work in the Commonwealth vs. out-of-state, and the percentage of residents that live and work within the same county. This information tells us which areas of the state provide more economic opportunities for residents. Where residents live and work directly relates to their commuting habits, preferred modes of transportation to work, and the average commute time to work. Figure 10 compares the preferred modes of commuting to work for Pennsylvania as a whole, and the Philadelphia and Pittsburgh regions. The majority of Pennsylvania residents drive to work alone. Philadelphia has the largest percentage of people who use public transportation, and Pittsburgh has the largest percentage of people who walk to work. Figure 11 shows the average amount of time people in Pennsylvania spend commuting to work and compares it against the national average. Since 2000, the average commute time in Pennsylvania has been higher than the national average.



Figure 8: Pennsylvanians' Work Locations (2008-2012)



Source: U.S. Census Bureau, 2009-13 American Community Survey

Figure 9: Pennsylvania Top 10 Counties

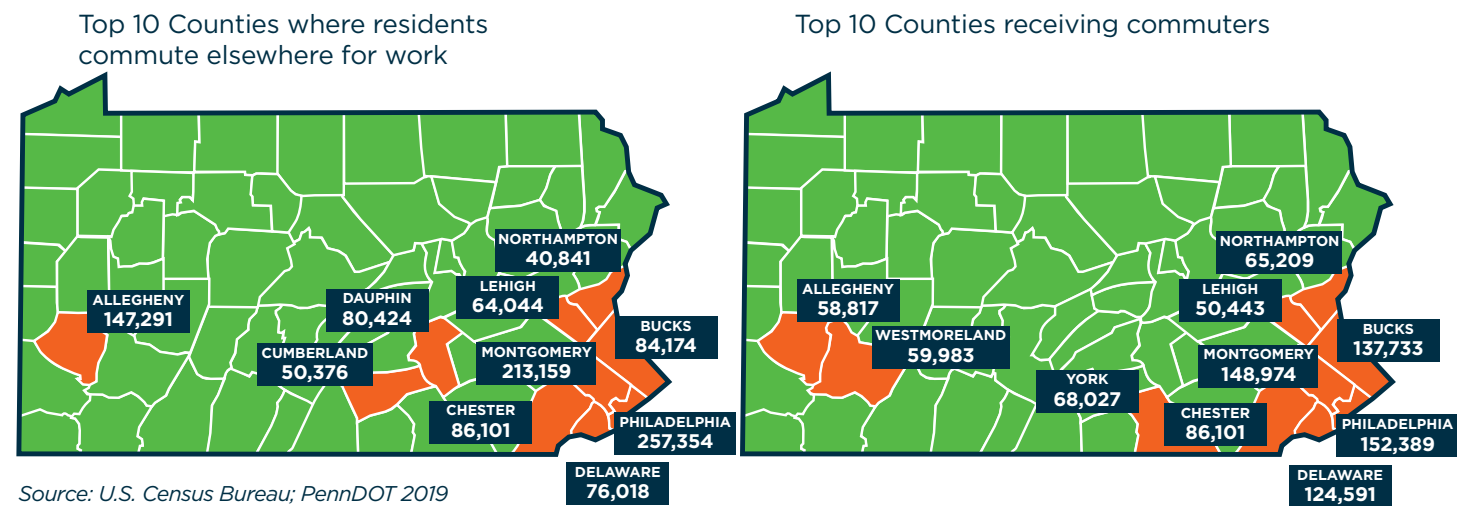
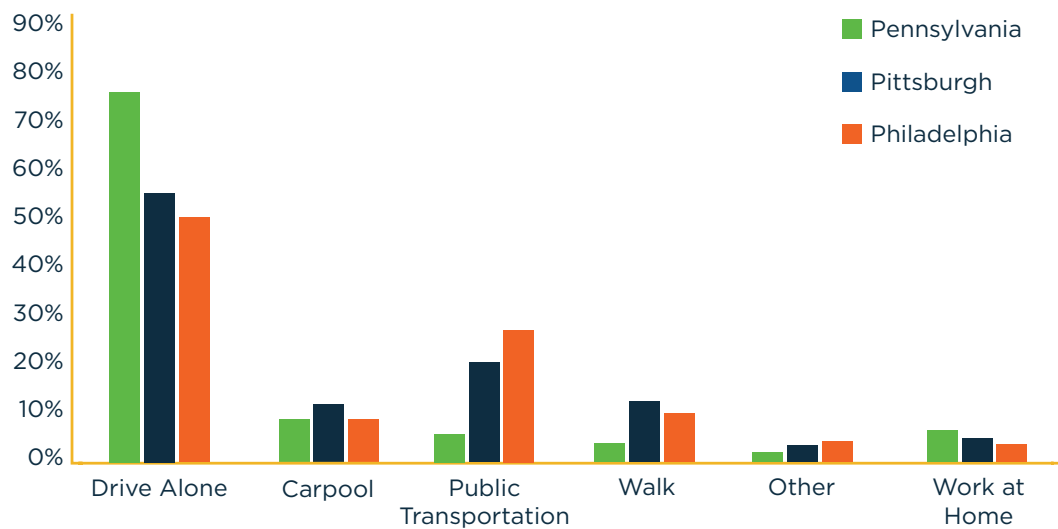
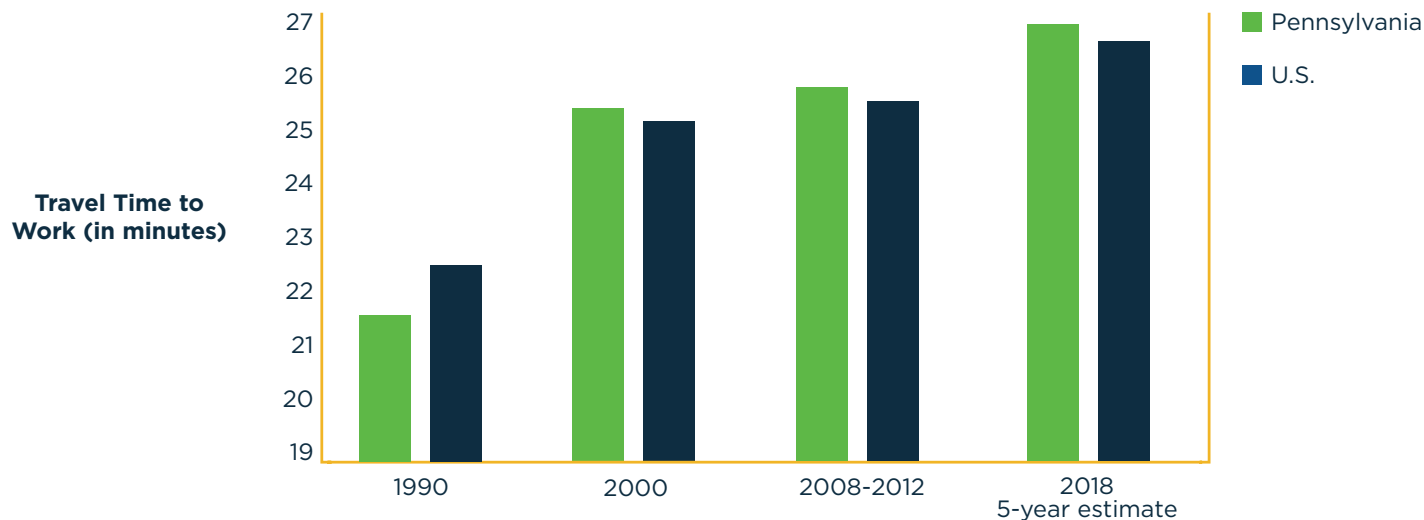


Figure 10: Mode of Commuting to Work
Pennsylvania, Pittsburgh and Philadelphia (2009-2013)



Source: American Community Survey, 2009-2013

Figure 11: Travel Time to Work
Pennsylvania and the U.S. (1990, 2000, 2008-2012)

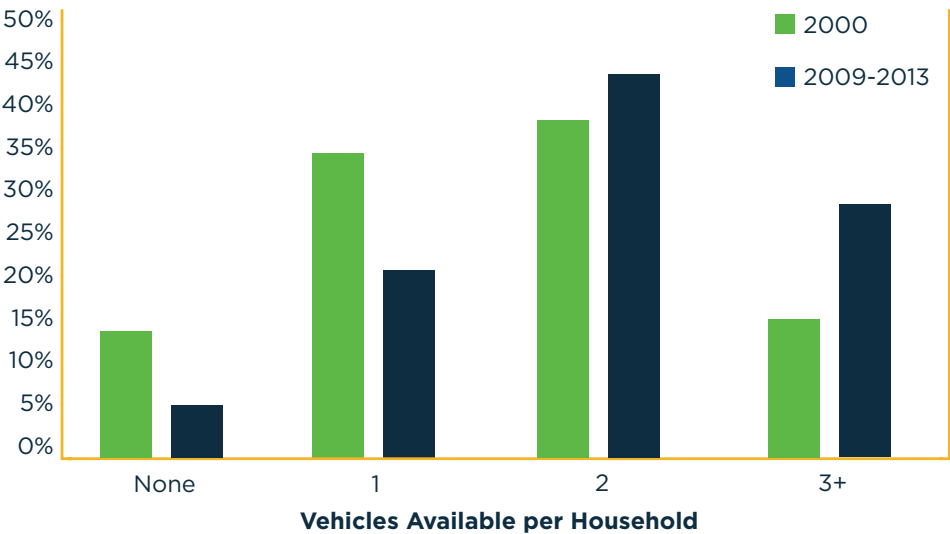


Commuter data, when paired with housing, is revealing of economic development prospects. There are 35 fixed route transportation systems. During the 2017-2018 fiscal year 420 million trips were taken on fixed route transit and nearly 7 million trips were taken on our demand response (paratransit) service.⁴

While historic trends are often used in anticipating future real estate activity, mitigation efforts related to the COVID-19 pandemic of 2020 have given rise to changes that could disrupt operational norms for years to come. The Brookings Institution estimates that up to half of American workers were working from home at the height of the pandemic, and as a result there may be a more permanent shift toward teleworking.⁵ Cushman & Wakefield suggests that the “new normal” will no longer be a single location, but an ecosystem of locations and experiences, with current footprint sizes remaining steady, balancing social distancing’s relaxing of space density with less office space headcount.⁶

Currently, every county in Pennsylvania has some form of shared ride and public transportation. Public transportation investments generate more than \$10 billion in economic activity per year. Research found that 11% of Pennsylvania households have no access to a personal vehicle, making public transportation and ride sharing critical services.⁷

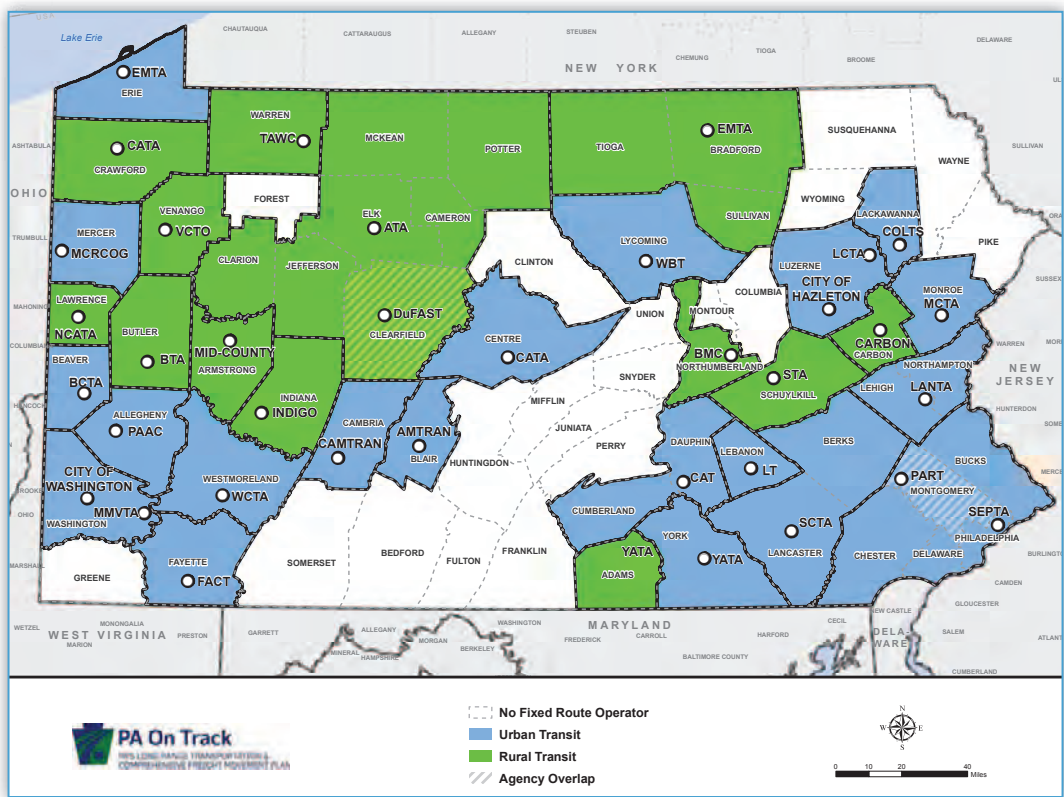
Figure 12: Pennsylvania Vehicles Available per Household (2000, 2009-2013)



Source: U.S. Census; American Community Survey, 2009-2013

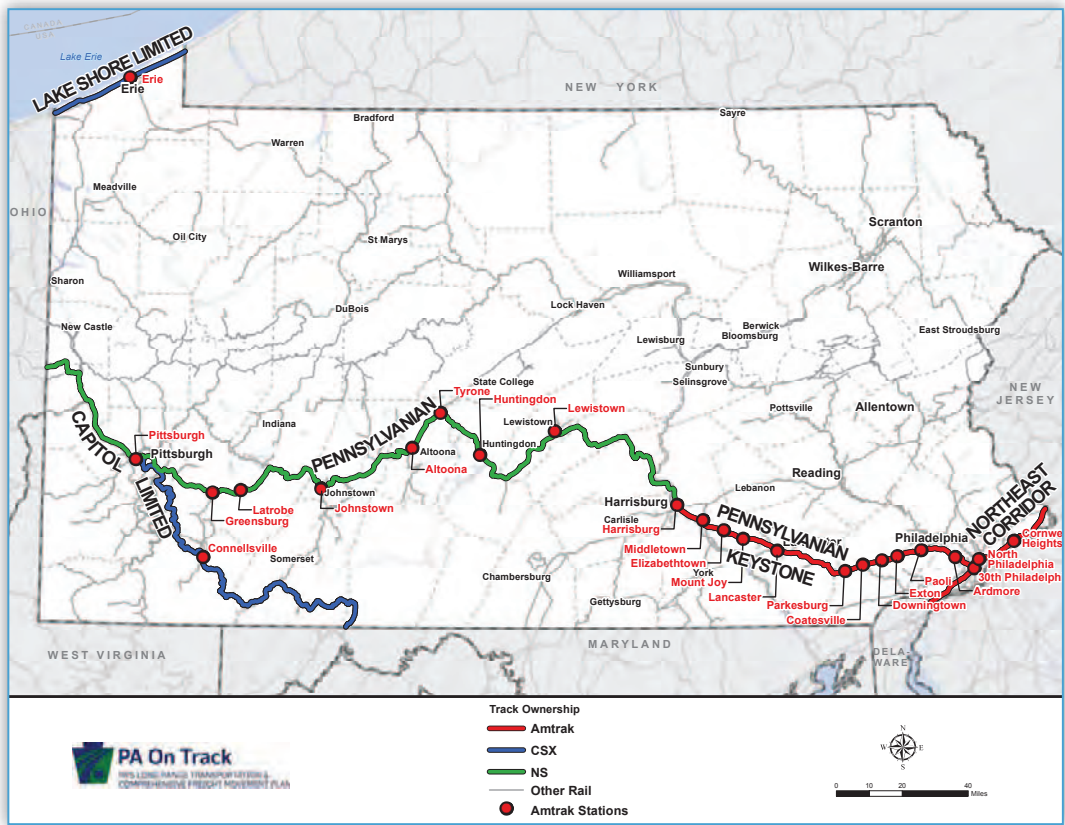


Figure 13: Travel Transit Systems



Source: Pennsylvania Department of Transportation

Figure 14: Amtrak Routes in Pennsylvania



Source: Pennsylvania Department of Transportation



Pittsburgh, PA

HOUSING

According to U.S. Census 2018 estimates, compared to the U.S., PA has:

- Similar rates of occupied and vacant housing.
- A significantly higher percentage of 1-Unit Attached structures such as townhomes.
- Less Multifamily Housing units.
- Double the percentage of housing stock built in 1949 or prior.
- A higher percentage of owner-occupied homes.
- A lower median home value and a lower average rent.⁸



The majority of Pennsylvania's housing units are single-unit, detached structures, over 57% of all housing units. The second largest group of housing units are single-unit attached structures (18% of all units). Most of all housing units are owner-occupied, with 69% of all housing units. This represents a decrease in homeownership that could be attributed to stricter mortgage lending and lack of available resources for first-time buyers for down payments.⁹ The Pennsylvania Housing Availability and Affordability study notes that this shift is pushing up rents in multifamily buildings and in homes for rent by increasing market demand.¹⁰

Pennsylvania's housing stock is one of age with 3.9M units (70%) built prior to 1980. Many of these homes are well maintained and add character to the communities they are located with their period style and special architectural detail, but many fall into disrepair due to the aging owner, loss of income, absentee landlord or abandonment.¹¹

Pennsylvania also has also seen an increase in the number of vacant housing units 642,205 and a large number of owner-occupied (22.6%) and renter-occupied housing units (45.6% according the HUD CHAS Data) with more than one housing condition impacting the household. Housing conditions include: 1) housing unit lacks complete kitchen facilities; 2) housing unit lacks complete plumbing facilities; 3) household is overcrowded; and 4) household is cost burdened. These factors combined with an aging housing stock impact the overall quality and affordability of homes to Pennsylvanians.¹²

Figure 15: Housing Profiles

Housing Profile 2018	United States (2018)	US %	Pennsylvania (2018)	PA %	Pennsylvania (2013)	Net Difference in # of units 2013-2018	PA % Change 2013-2018
Total Housing Units	138,539,906	...	5,713,136	...	5,565,653	+147,483	...
Occupied Housing Units	121,520,180	87.7%	5,070,931	88.8%	4,958,427	+112,504	+0.2%
Vacant Housing Units	17,019,726	12.3%	642,205	11.2%	607,226	+34,979	-0.3%

Units in Structure, 2018

Units in Structure, 2018	United States	US %	Pennsylvania	PA %
1-Unit, Detached	85,012,921	61.4%	3,253,824	57.0%
1-Unit Attached	8,104,981	5.9%	1,062,639	18.6%
2 Units	4,923,261	3.6%	247,288	4.3%
3 or 4 Units	5,993,272	4.3%	234,854	4.1%
5 to 9 Units	6,554,010	4.7%	183,108	3.2%
10 to 19 Units	6,180,952	4.5%	146,766	2.6%
20 or more Units	13,134,966	9.5%	362,435	6.3%
Mobile Homes	8,503,364	6.1%	220,642	3.8%
Boat, RV, Van, etc.	132,179	0.1%	1,580	0.0%

Year Structure Built

Year Structure Built	United States	US %	Pennsylvania	PA %
2014 or Later	4,785,640	3.5%	101,852	1.8%
2010-2013	3,715,688	2.7%	92,658	1.6%
2000-2009	18,731,885	13.5%	447,739	7.8%
1990-1999	19,140,568	13.8%	540,662	9.5%
1980-1989	18,520,320	13.4%	552,334	9.7%
1970-1979	20,991,871	15.2%	733,495	12.8%
1960-1969	14,574,442	10.5%	568,773	10.0%
1950-1959	14,111,092	10.2%	765,516	13.4%
1940-1949	6,679,375	4.8%	409,940	7.2%
1939 or Earlier	17,289,025	12.5%	1,500,167	26.3%

Housing Tenure, 2018

Housing Tenure, 2018	United States	US %	Pennsylvania	PA %
Owner-Occupied	77,708,394	63.9%	3,478,645	68.6%
Renter-Occupied	43,811,786	36.1%	1,592,286	31.4%
Median Rooms per Unit	5.5	...	6	...
Median Value 2018	\$229,700	...	\$186,000	...
Median Rent 2018	\$1,058	...	\$927	...

Source: U.S. Census Bureau, 2018

Public bodies may establish Land Banks to promote the redevelopment of certain vacant, abandoned, and tax-delinquent properties that otherwise pose local health and safety concerns and generate minimal to no tax revenue. The Land Bank Act authorizes local governing bodies to establish a Land Bank through ordinance, which may then acquire and direct the redevelopment of local property to the benefit of the community. In Pennsylvania, Land Banks are renewing brownfields and blighted properties to create more affordable housing stock.

BLIGHT

Municipalities across the commonwealth continue to face challenges associated with residential and commercial blight. These vacant and deteriorating properties not only act as an eyesore or possible health risk for the community, but may also result in a negative economic impact. Not only do cases of blight influence the property values in the area, but many of these abandoned properties are also found to be tax delinquent.

In order to combat the negative ramifications of blighted properties, some county and municipal governments have explored the adoption of land banks. Following Pennsylvania's Act 153 of 2012, a total of 20 land bank ordinances have been passed. As an additional option, communities have also been authorized to designate existing redevelopment authorities to act as land bank, utilizing Act 33 of 2018. Since 2018, five redevelopment authorities have been designated as land banks. Between 2015 and 2020, a total of 18 land banks, including designated redevelopment authorities, have been authorized across the commonwealth.¹³ The use of land bank ordinances, along with the establishment of blight demolition funds, provides county and city governments some additional mechanism to address the burdens of blighted, tax delinquent properties.

HOME VALUES

The median home value in Pennsylvania was \$186,000 in 2018¹⁴ and \$195,810 at the close of 2019.¹⁵

Home values rose 4% during 2019 and, prior to the COVID-19 Pandemic, were expected to rise another 4% by 2021. Zillow described Pennsylvania's market temperature, or "Buyer-Seller Index," as "Very Hot." This rating is based on list price versus sale price ratios, the percentage of listings with price cuts prior to sale, and the number of days homes are listed on the market. The median price of all Pennsylvania homes listed for sale in 2019 was \$210,000 but the median price of homes actually sold was \$175,300.¹⁶

Two of every 10,000 homes in Pennsylvania are foreclosed, a rate which is double the national average.¹⁷

The median home value in Philadelphia is \$15,000 higher than the median home value in Pittsburgh. The median home value in Philadelphia is \$73,100 higher than in nearby Reading, and \$58,700 higher than the median home values in Erie and Scranton.¹⁸

Figure 16: PA Home Inventory and Sales

Name	Median ZHVI	Name	Median ZHVI	Name	Median ZHVI
West Chester	\$389,900	Pittsburgh	\$122,600	Erie	\$78,600
Bethlehem	\$154,800	Lancaster Township	\$118,700	Scranton	\$78,300
Philadelphia	\$137,300	Allentown	\$114,100	Reading	\$64,200

Source: www.Zillow.com/pa/home-values/ (2020)

BUSINESS SITE SELECTION AND CLUSTERING

Positioned in the heart of the nation's Northeast Corridor, Pennsylvania offers easy access to some of the most densely populated markets in the United States and Canada. The state's I-81 & I-78 Corridor is among the top industrial markets in the United States with over 300 million square-feet of inventory at the end of 2019, and an estimated 16.3 million square-feet under construction. An estimated 93% of new industrial construction is warehouse/distribution space. Due to expected demand for immediate occupancy, approximately 75% of new inventory is spec construction.¹⁹



The industrial market in Southeast Pennsylvania (Philadelphia, Bucks, Montgomery, Chester, and Delaware counties) comprises more than 84 million square-feet of inventory, with five million square-feet under construction at the end of 2019. The Southeast Pennsylvania office market comprises 134 million square feet with more than one million square feet under construction at the end of 2019.²⁰

The industrial market in Southwest Pennsylvania (Pittsburgh and Allegheny, Butler, Beaver, Armstrong, Westmoreland, Fayette, and Washington counties) comprises nearly 170 million square-feet of inventory, with 1.4 million square-feet under construction at the end of 2019. The Southwest Pennsylvania office market comprises more than 92 million square feet with more than 1.8 million square feet under construction at the end of 2019.²¹

An estimated 20% of industrial inventory in the Pittsburgh market is high tech and flex properties, with a trend toward hybrid “tech flex” properties. This trend is reflected in a three-mile stretch of Pittsburgh’s Strip District known as “Robotics Row,” where a growing number of artificial intelligence and robotics companies have reclaimed and transformed former industrial and shipping facilities along the riverfront into creative work spaces that will attract top talent and spur innovation.²²

Over the past five years, more than 85% of DCED’s site selection inquiries were focused on the central and eastern portions of the state, and half of all inquiries were seeking to lease or purchase an existing facility. Most of the inquiries (75%) were for manufacturing and food processing operations, while 12 percent were for warehouse distribution space. For these uses, proximity to major highway corridors was often among the top selection criteria. Manufacturers interested in land purchase or build-to-suit options indicated the need for an average of 150 acres, and those interested in purchasing or leasing an existing facility indicated a need for 280-290K square-feet. Warehouse distribution inquiries were seeking an average of around 110 acres, with an average need for more than 660K square-feet.²³

In late 2017, Amazon.com, Inc. issued a nation-wide request for proposals for an 8 million square-foot second headquarters, expected to employ an estimated 50,000 employees. Sites in Philadelphia and Pittsburgh were among 20 sites short-listed by Amazon for the development. While sites in northern Virginia and New York were ultimately selected for the development, the selection of the two Pennsylvania sites to Amazon’s short-list confirmed the state’s attractiveness for a large company headquarters and could be an indicator of things to come.²⁴

While historic trends are often used in anticipating future real estate activity, mitigation efforts related to the COVID-19 pandemic of 2020 have given rise to changes that could disrupt operational norms for years to come. The Brookings Institution estimates that up to half of American workers were working from home at the height of the pandemic, and as a result there may be a more permanent shift toward teleworking.²⁵ Cushman & Wakefield suggests that the “new normal” will no longer be a single location, but an ecosystem of locations and experiences, with current footprint sizes remaining steady, balancing social distancing’s relaxing of space density with less office space headcount.²⁶

HIGH-VOLUME OCCUPANCY PERMITS (HOP)

The map below displays all the commercial driveway and local road HOPs issued by PennDOT since 2015. Local road permits represent access intended to serve more than three properties (e.g. residential development) or to act as a connecting link between two or more roadways.

The number of commercial driveway and local road HOPs issued in a given year is directly related to the level of development activity occurring in a geographic region.²⁷

BROADBAND INFRASTRUCTURE

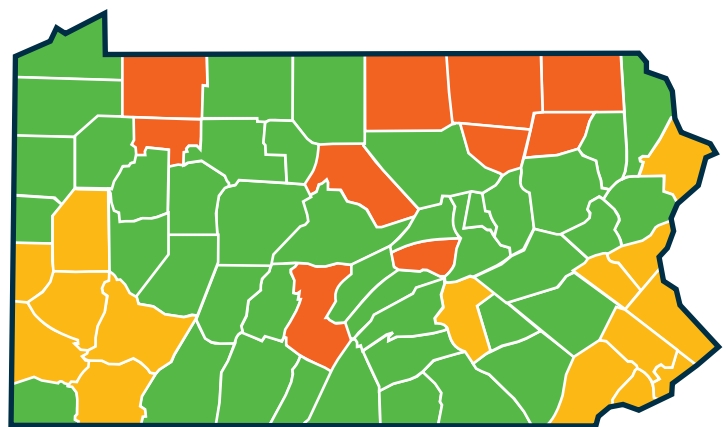
In today's interconnected world, the economy and society are heavily reliant on technology. Access to broadband will continue to become a major factor in how people throughout the Commonwealth choose where and how they live, work and play.

Broadband service is delivered through a variety of mediums that include cable, fiber optics, satellites or wireless with internet speeds as defined by the Federal Communications Commission (FCC) of 25Mbps download and 3Mbps upload.²⁸ According to the FCC's *Household Broadband Guide*, this speed of 25/3 allows for three separate home users or devices to engage in basic functions such as email, video streaming, online gaming, or telecommuting functions.²⁹

Unfortunately, there is a great disparity in rural and urban broadband access amongst Pennsylvanians. A 2019 report by The Center for Rural Pennsylvania³⁰ highlighted this digital divide, finding that:

1. The FCC's official broadband maps from December 2017 (updated May 2019) show 100% availability across all of Pennsylvania of broadband speeds that exceed 25 Mbps;
2. The research team collected more than 11 million speed tests from across Pennsylvania in 2018 and found that median speeds across most areas of the state did not meet the FCC's criteria to qualify as a broadband connection;
3. At the county level, the 2018 data documented that there were 0 (zero) counties in Pennsylvania where at least 50% of the populace received "broadband" connectivity, as defined by the FCC;
4. Connectivity speeds were substantially slower in rural counties (as defined by the Center for Rural Pennsylvania) than in urban counties; and
5. By combining 2018 data with a historical archive of an additional 15 million tests from Pennsylvania residents, the research team identified that, since 2014, the discrepancy between ISPs' self-reported broadband availability in the FCC's broadband maps and the speed test results collected via the M-Lab platform has grown substantially in rural areas, but not in urban areas; this may indicate systematic and growing overstatement of broadband service availability in rural communities.³¹

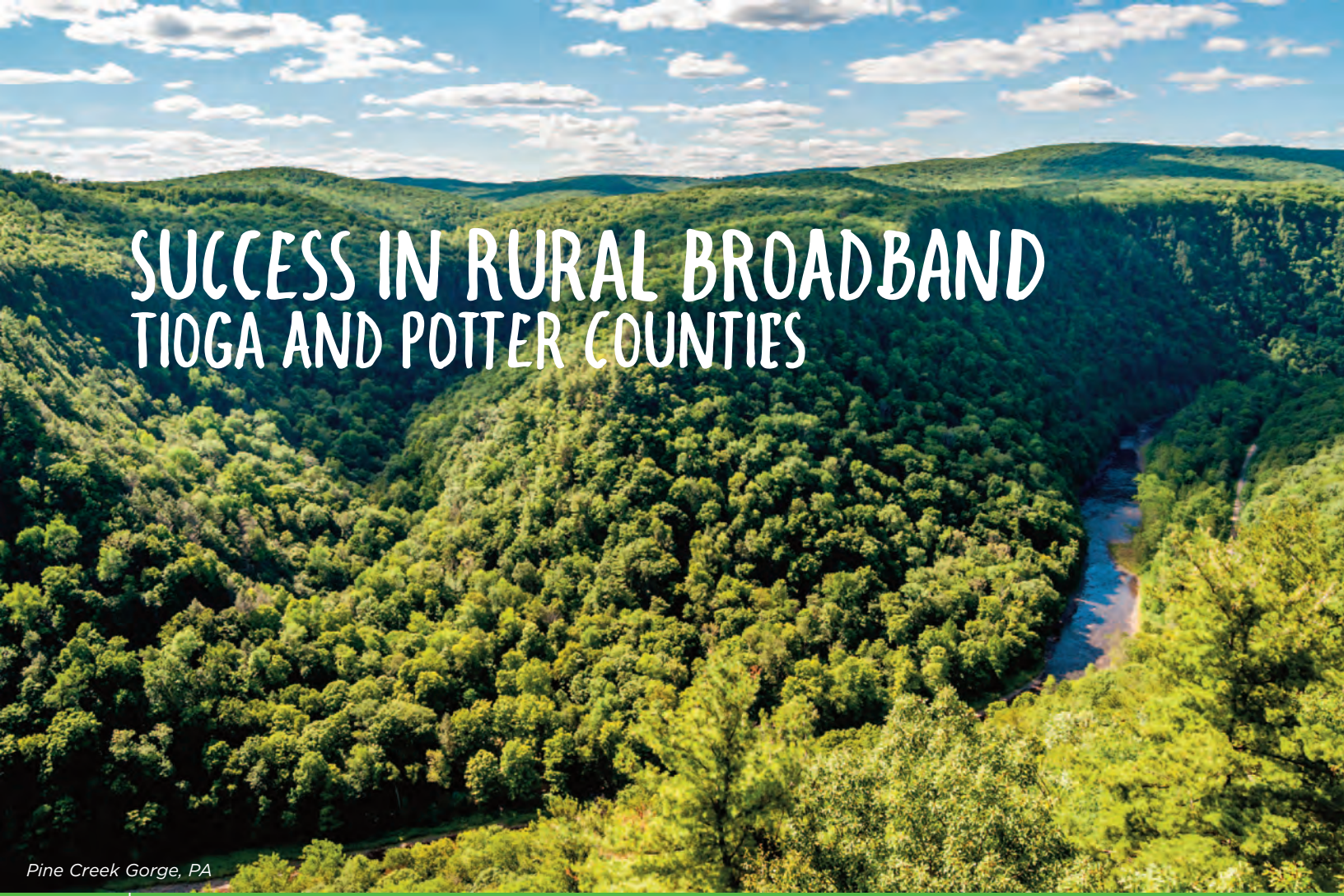
Figure 17: Download Speed by County



■ From 0.2 up to <4 Mbps ■ From >4 up to <10 Mbps
■ 10 Mbps and higher

Measured NDT speed tests through 2018 - median speeds of 25Mbps - speed broadband were not available in any county in Pennsylvania.

A lack of connectivity results in significant economic consequences. Those on the wrong side of the digital divide have limited access to job search capabilities, lack the opportunity to develop competency for employment, and forego the business development opportunities which would allow entrepreneurs the opportunity to participate in the global marketplace beyond their physical location.³² Lack of field communication abilities and data infrastructure will impact the ability for those communities to deploy emerging technologies, such as connected vehicles, automated vehicles and smart intersection applications. Improving broadband allows for these improved efficiencies, but also improve safety of Pennsylvanians.



SUCCESS IN RURAL BROADBAND TIOGA AND POTTER COUNTIES

Pine Creek Gorge, PA

Tioga and Potter Counties are experiencing great success in enhancing broadband accessibility and capability throughout the region. In the Tioga and Potter County areas, the Tri-County Rural Electric Cooperative and its high-speed internet subsidiary, Tri-Co Connections, have already secured enough funds to build out its roughly 5,000 square-mile broadband service area. This feat was accomplished through a variety of funding sources, including the Redevelopment Assistance Capital Program, the FCC Connect America Fund, the Pennsylvania Broadband Initiatives Program, and the Appalachian Regional Commission.

Successful acquisition of funds and deployment of service throughout the Tioga-Potter area have occurred through strong partnerships between local, state and federal stakeholders in combination with an innovative use of Geographic Information Systems (GIS). By combining a variety of publicly available GIS datasets and allowing individual internet users to map their speed relative to their location, Tioga County GIS can provide a hard contrast to the FCC broadband maps which, as referenced in the Center for Rural PA broadband report above, show indications of “systematic and growing overstatement of broadband service availability in rural communities.” This quality control is vital to indicating otherwise unrecognized need to available funding sources as well as providing the information necessary for internet service providers such as Tri-Co Connections to most efficiently expand and enhance their networks.³³

Case Study Source: Tioga County Commissioner Coolidge and Tioga County GIS Director Scott R. Zubek

MUNICIPAL FISCAL HEALTH

Economic development strategies are directly tied to municipal fiscal health. At the close of 2019, there were 16 municipalities enrolled in the Commonwealth's Act 47 Program for fiscally distressed communities and 89 municipalities enrolled in the Commonwealth's fiscal distress prevention program, the Strategic Management Planning Program (previously known as the Early Intervention Program). Following the COVID-19 Pandemic, a direct impact to local government revenue streams is widely anticipated, highlighting the need for additional support and cost-saving strategies at the county and municipal levels.³⁴



York County, PA



Millersburg, PA



Philadelphia, PA

Sources

- 1 U.S. Census Bureau, 2018.
- 2 Survey of Pennsylvania's county planning agencies, Pennsylvania Department of Community and Economic Development, Governor's Center for Local Government Services (2019).
- 3 "Pennsylvania Population on the Move: 2000-17," Penn State College of Agricultural Sciences, (2019).
- 4 "PA's Long Range Transportation and Comprehensive Freight Movement Plans," Pennsylvania Department of Transportation, (2016).
- 5 "Telecommuting will likely continue long after the pandemic," Brookings Institution Up Front, <https://www.brookings.edu/blog/up-front/2020/04/06/telecommuting-will-likely-continue-long-after-the-pandemic/> (2020).
- 6 "The Future of Workplace," Cushman & Wakefield Insights, <https://www.cushmanwakefield.com/en/insights/covid-19/the-future-of-workplace>, (2020).
- 7 Ibid.
- 8 U.S. Census Bureau, 2018.
- 9 Pennsylvania Department of Community and Economic Development 2020 Consolidated Plan. <https://dced.pa.gov/download/final-2019-2023%20Consolidated%20Plan%20&%202019%20Annual%20Action%20Plan/?wpdmdl=89693>
- 10 Pennsylvania Housing Finance Agency, Housing Availability Study. https://www.phfa.org/forms/housing_study/2020/pennsylvania-comprehensive-housing-study-full-report.pdf
- 11 Pennsylvania Department of Community and Economic Development 2020 Consolidated Plan. <https://dced.pa.gov/download/final-2019-2023%20Consolidated%20Plan%20&%202019%20Annual%20Action%20Plan/?wpdmdl=89693>
- 12 Pennsylvania Department of Community and Economic Development 2020 Consolidated Plan. <https://dced.pa.gov/download/final-2019-2023%20Consolidated%20Plan%20&%202019%20Annual%20Action%20Plan/?wpdmdl=89693>
- 13 Housing Alliance of Pennsylvania, <http://www.pablightlibrary.com/pennsylvania-land-bank-ordinances> (2019).
- 14 U.S. Census Bureau, 2018.
- 15 Zillow Home Values, <http://www.zillow.com/pa/home-values> (2020).
- 16 Ibid.
- 17 Ibid.
- 18 Ibid.
- 19 Pennsylvania Department of Community and Economic Development, Governor's Action Team, site selection database (2020).
- 20 Ibid.
- 21 Ibid.
- 22 Ibid.
- 23 Ibid.
- 24 Ibid.
- 25 "Telecommuting will likely continue long after the pandemic," Brookings Institution Up Front, <https://www.brookings.edu/blog/up-front/2020/04/06/telecommuting-will-likely-continue-long-after-the-pandemic/> (2020).
- 26 "The Future of Workplace," Cushman & Wakefield Insights, <https://www.cushmanwakefield.com/en/insights/covid-19/the-future-of-workplace>, (2020).
- 27 Pennsylvania Department of Transportation, (2019).
- 28 Federal Communications Commission, (2020).
- 29 Federal Communications Commission Household Broadband Guide, <https://www.fcc.gov/consumers/guides/household-broadband-guide> (2020).
- 30 "Broadband Availability and Access in Rural Pennsylvania," The Center for Rural Pennsylvania, (2019).
- 31 Ibid.
- 32 <https://www.stlouisfed.org/open-vault/2018/november/impact-of-digital-divide>
- 33 County of Tioga, Tioga County Commissioner Coolidge and Tioga County GIS Director Scott R. Zubeck, (2020).
- 34 Pennsylvania Department of Community and Economic Development, Governor's Center for Local Government Services (2020).





TRANSPORTATION

Our transportation systems lay the framework for determining where we live, work, and play. Land use decisions often center around our existing infrastructure and transportation options.

Transportation system enhancements and new technologies continue to connect us and bring us closer together.

≡ PENNSYLVANIA ≡

IS HOME TO



39,787

linear state-owned roadways

25,000

state-owned bridges
(greater than 8 feet in length)

77,988

linear miles of
locally-owned roadways

10,700

locally-owned bridges

12

roadway tunnels

over 5,600

miles of freight rail track

7

major airports

125

public-use airports

53

transit agencies

2,440

miles of BicyclePA routes¹

3,700

miles of designated bicycle trails¹

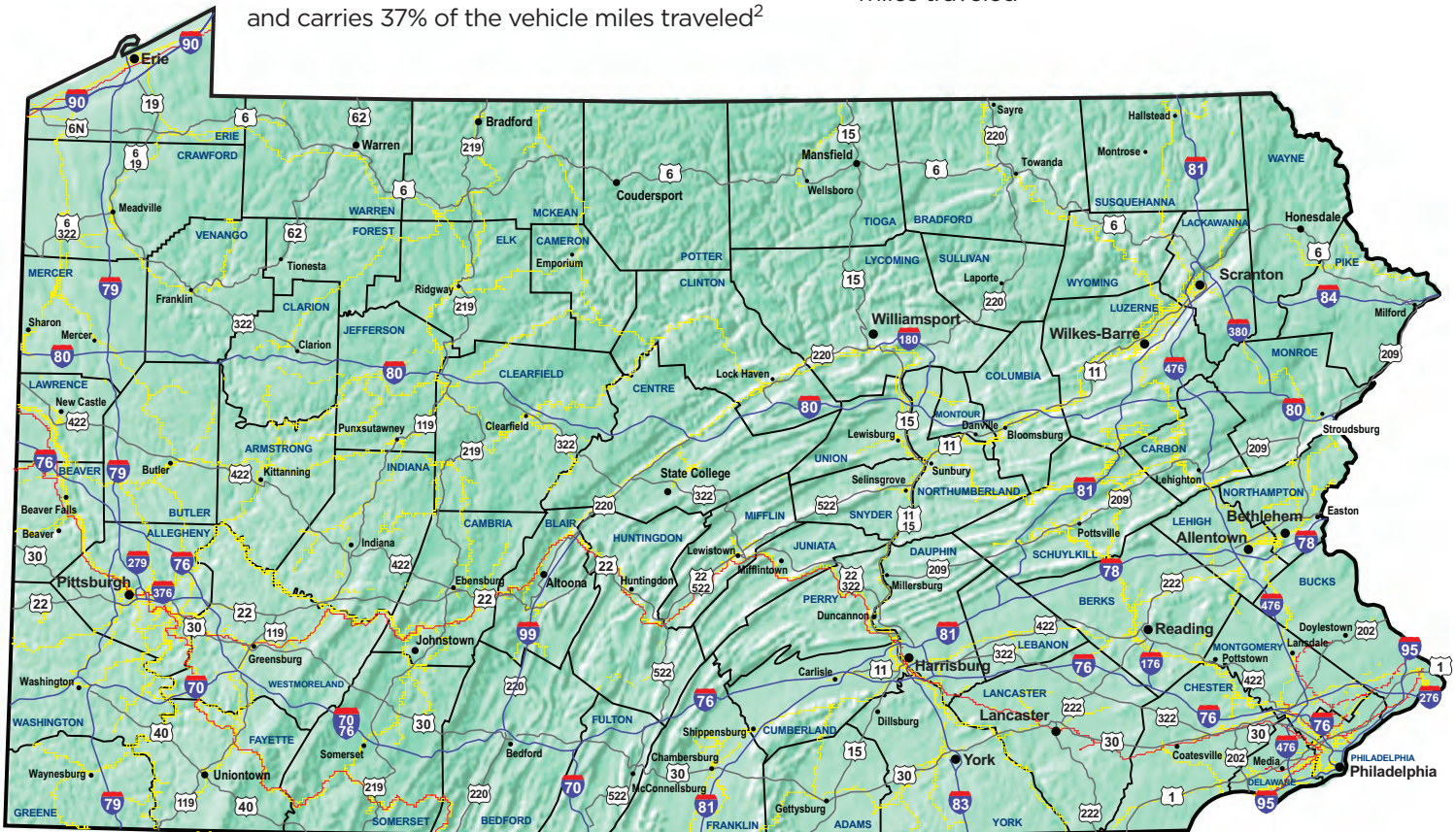
HIGHWAYS

The National Highway System (NHS) in Pennsylvania, excluding Interstate, includes:

- 7,151 segment miles
- 4,971 bridges
- 16% of the total state-owned miles and carries 37% of the vehicle miles traveled²

INTERSTATE SYSTEM

- 21 interstates = 2,743 segment miles
- 2,209 PennDOT bridges
- Our interstate makes up 6% of the total state-owned miles, and 27% of the vehicle miles traveled³



Source: PA Department of Transportation (2016)



New Oxford, PA

TRAFFIC CONGESTION

Pennsylvania collects approximately 10,000 traffic counts per year from 43,700 miles of state and local roads. For the purpose of data analysis, the Pennsylvania Department of Transportation categorizes findings into ten different "Traffic Pattern Groups" (TPGs) based on classification, geographic area, and urban/rural characteristics.⁴

Traffic Volumes on both urban and rural interstates (TPGs 1 and 2) have increased each year since 2009, with rural interstates experiencing the largest growth in traffic volume.⁵

**Figure 18: Traffic Pattern Group (TPG)
Percent Growth (2009-2018)**

TPG	08-17 (2009)	09-17 (2010)	10-17 (2011)	11-17 (2012)	12-17 (2013)	13-17 (2014)	14-17 (2015)	15-17 (2016)	16-17 (2017)	17-18 (2018)
TPG 1 - Urban - Interstate	1.7%	0.7%	0.7%	1.4%	2.3%	3.4%	3.3%	2.8%	2.0%	1.1%
TPG 2 - Rural - Interstate	16.7%	14.2%	12.4%	10.5%	8.2%	5.8%	4.6%	3.2%	2.2%	1.1%
TPG 3 - Urban - Other Principal Arterials	-5.7%	-5.9%	-6.1%	-5.6%	-4.6%	-3.6%	-3.0%	-2.2%	-1.5%	-0.8%
TPG 4 - Rural - Other Principal Arterials	-30%	-3.4%	-3.7%	-3.4%	-3.1%	-2.6%	-2.1%	-1.6%	-1.1%	-0.6%
TPG 5 - Urban - Minor Arterials, Collectors, Local Roads	-5.7%	-5.9%	-6.1%	-5.6%	-4.6%	-3.6%	-3.0%	-2.2%	-1.5%	-0.8%
TPG 6 - North Rural - Minor Arterials	-3.0%	-3.4%	-3.7%	-3.4%	-3.1%	-2.6%	-2.1%	-1.6%	-1.1%	-0.6%
TPG 7 - Central Rural - Minor Arterials	-3.0%	-3.4%	-3.7%	-3.4%	-3.1%	-2.6%	-2.1%	-1.6%	-1.1%	-0.6%
TPG 8 - North Rural - Collectors & Local Roads	-3.0%	-3.4%	-3.7%	-3.4%	-3.1%	-2.6%	-2.1%	-1.6%	-1.1%	-0.6%
TPG 9 - Cenral Rural - Collectors & Local Roads	-3.0%	-3.4%	-3.7%	-3.4%	-3.1%	-2.6%	-2.1%	-1.6%	-1.1%	-0.6%
TPG 10 - Special Recreational	-3.0%	-3.4%	-3.7%	-3.4%	-3.1%	-2.6%	-2.1%	-1.6%	-1.1%	-0.6%

Source: PA Department of Transportation (2016)



MULTIMODAL TRENDS

Bicycle and Pedestrian

Bicycle and pedestrian facilities represent critical infrastructure for both accessibility and mobility. Walking and bicycling currently constitute 4.3 percent of all the state's journey to work trips, representing nearly a quarter of a million Pennsylvania workers. Additionally, these facilities provide important "quality of life" elements to the Commonwealth's transportation system, connecting people to their neighbors and their community, all while promoting health and wellness as well as contributing greatly to local and regional economies. With over 3,700 miles of designated bicycle trails in the state, and a growing network of on-street infrastructure, walking and bicycling are critical pieces of the transportation network.⁶

Freight

Pennsylvania's multimodal transportation system carries approximately \$1.6 trillion of goods each year. It carries 7.5% of the goods and materials produced, used, or exported by the entire country. Trucks transport the largest share of Pennsylvania freight by weight and value, followed by rail. By 2040, trucks are projected to transport an even larger share of the tonnage and value of Pennsylvania's freight.⁷

A primary challenge of the freight industry is maintaining economic development and competitiveness while also minimizing impacts on local land use and congestion. Due to the growth of direct-to-consumer online shopping in recent years, traditional shopping malls, commercial strip malls, and stand-alone retail buildings are increasingly vacant and unable to find businesses to fill the space. Simultaneously, increasing demand for overnight shipping, leading to increased delivery trucks on local roads, has driven the construction of distribution warehouses on farmland in rural areas proximate to major metropolitan consumer centers.⁸

Freight planning on a regional level provides communities with the opportunity to inventory and assess how multimodal freight movement is occurring within its region and to prioritize policies, multimodal infrastructure projects, land uses, and other initiatives that will support the community's vision for freight. Working together to establish a long-term vision for the community, future development, and preserving infrastructure can help enhance a region's economic competitiveness and provide an improved quality of life for its residents.

Pennsylvania's rail freight system is comprised of over 5,600 miles of track operated by more than 60 railroads (three Class I railroads, three Class II railroads, and 57 Class III railroads, and switching or terminal railroads).⁹



Port of Philadelphia, PA

Truck Parking

Increased freight movement correlates to increased demand for truck parking along our interstates and state highways. There are approximately 11,500 truck parking spaces available at private truck stops, PennDOT rest areas and welcome centers, and PA Turnpike service plazas. During the peak truck parking hour (3:00 a.m. to 4:00 a.m.) more than 13,000 trucks require parking accommodations. The overall demand for truck parking is expected to grow by almost 50 percent by 2030, requiring an estimated 4,400 additional truck parking spaces.¹⁰

In the summer of 2018, the state held the Eastern Freight Summit which helped to elevate the conversation about PA's truck parking situation and generate ideas to address the issue. In early 2019, PennDOT's Public-Private Partnership (P3) office launched an RFI to gather information on addressing truck parking within the realm of P3.

Airports

There are 125 public-use aviation facilities in Pennsylvania, which accommodate close to 5,000 based aircraft and handle over 2 million general aviation aircraft takeoffs and landings annually. There are currently 15 commercial airports in the state.¹¹

Ports

There are three major ports in Pennsylvania. Collectively, these facilities comprise an important component of the commonwealth's freight system and play an especially important role in providing cost-effective global market access.

The Port of Philadelphia is located along the Delaware River in the Philadelphia-Camden-Wilmington Metropolitan Area and offers access to the Atlantic Ocean and international shipping via the Delaware River. The top commodity moved through the Port is crude petroleum. The port ranks 25th nationally in tonnage and 6th on the east coast.

The Port of Pittsburgh is located within the Greater Pittsburgh Region and offers access to three major rivers in southwestern Pennsylvania: the Allegheny, Monongahela, and Ohio Rivers. The primary commodity moved through the port is coal and lignate. It is the 5th busiest inland port in the country.

The Port of Erie, located along Lake Erie, offers access to the Great Lakes and the Saint Lawrence Seaway. The top commodity consists of aggregates, primarily construction and road salt materials. The Port of Erie handles approximately 700,000 tons of freight per year.¹²



Kinzua Bridge State Park, PA

ELECTRIC VEHICLES

The popularity of Electric Vehicles (EVs) is rising because they offer a host of social, economic, and environmental benefits. This growth of EV sales indicates foreseeable impacts to Pennsylvania's transportation system, directing decision-makers to reconsider how they plan for roads, fuel stations, charging locations, and other road-side infrastructure.¹³

In 2017, Pennsylvania was ranked 24th nationally for total number of EV sales.¹⁴ To prepare for automobile modernization, both private and public entities will need to equip roadways with the enough EV charging infrastructure to support the growing number of EV travelers. Pennsylvania's major metropolitan areas contribute a higher percentage of the total EV registrations than other parts of the state.

Pennsylvania has over 570 publicly listed Electric Vehicle Supply Equipment (EVSE) -or charging stations, and 1,330 total plugs, most of which are "Level 2" chargers.¹⁵ It is critical that the statewide supply of EV charging stations be enough to meet the demand. When comparing the total number of registered EVs to the availability of EV charging infrastructure, there is a considerable gap in charging station accessibility.

The U.S. Department of Energy studied the availability of charging stations required to accommodate the projected market share of EVs by the year 2030. This analysis concluded that Pennsylvania would need 13,600 Level 2 workplace chargers and 9,200 Level 2 public chargers to support the projected market growth.¹⁶ Pennsylvania's current EV infrastructure only supports 8% of this estimated need.¹⁷

In 2015, transportation accounted for 20 percent of Pennsylvania's net GHG emissions, 63 and 26 percent of which were generated by gasoline and diesel-powered vehicles, respectively. While the transportation sector has decreased its total GHG emissions over time, it remains one of the top three contributors of GHGs in Pennsylvania.¹⁸ According to Pennsylvania's EV Roadmap, "By 2023, each mile driven by an EV passenger car compared to a gasoline-powered vehicle would emit 50 percent less greenhouse gases based on the anticipated regional electricity mix."¹⁹ The expanding EV market will be a contributing factor for Pennsylvania meeting its statewide goal to reduce greenhouse gas emissions by 26 percent by 2025 and 80% by 2050.

AUTOMATED VEHICLES

Autonomous vehicle implementation is just one of many trends likely to affect future transportation demands and costs, and therefore planning decisions. Pennsylvania's transition into today's advanced economy has led us to become an industry leader of autonomous vehicle investment, research, and testing. As self-driving cars become more prevalent, transportation infrastructure will need to incorporate such technologies like on-road sensors, software and control algorithms, and interconnectivity between intersections and other vehicles. Aside from connectivity, infrastructure will play a roll in the deployment of AVs in terms of things like pavement markings and paved roads. Every AV being tested has a cellular modem broadcasting information back to the HQ. Fiber is needed for both connectivity and cellular coverage is pivotal to AV deployment.

Older infrastructure that is not in good repair will not lend itself to assisting the deployment of AVs. As a result, rural communities will not get the safety benefits of these technologies. Even today with ADAS systems (e.g., lane keep technology and emergency breaking), have issues in rural environments.

Pennsylvania will have to consider investing in resources to address the incorporation of these new intersections, traffic signals and signs, roadway markings, and roadway obstructions. Not only will there be a need for more connected and spacious intersections, there will also be a need for spatial equity as alternative forms of transportation such as shared electric scooters become more trendy and accessible.

In Pennsylvania's rural areas, AV technology could significantly improve mobility options and quality of life for many rural Pennsylvanians, particularly the elderly and individuals with limited mobility. Though it is likely that most AVs will have some sort of electric powertrain qualities, not all AVs will be electric. There is a variety of expected uses for this technology and 100% electric cars will not always be the best design for AVs. AV technology is expected to continue to grow at a fast rate and will only continue to put a burden on current planning activities.²⁰

AV testing is occurring and/or the testers have stated that they expect it to occur in 56 of our 67 counties. Approximately 40% of our counties have 2 or more testers. However there is a risk of increased congestion due to the adoption of automated vehicles. Studies by HERE and University of Adelaide have concluded that over the next 30 years, during the transition period between driver operated vehicles and automated vehicles, congestion may likely drastically increase. Included in these analyses is an assumption of an increase in vehicle miles driven spurred by the decrease in the physical costs of driving. However, increased use of shared automated vehicles and the shift to full automation are expected to increase the efficiency of use of roadway space. A concerted effort through education, policies, and incentives will be necessary to combat congestion and land use issues during the transition period.

Sources

- 1 "PA's Long-range Transportation Plan," Pennsylvania Department of Transportation, (2016).
- 2 *Ibid.*
- 3 *Ibid.*
- 4 *Ibid.*
- 5 *Ibid.*
- 6 *Ibid.*
- 7 "PA's Comprehensive Freight Movement Plan," Pennsylvania Department of Transportations, (2016).
- 8 *Ibid.*
- 9 *Ibid.*
- 10 "Regional Freight Plan Guidance," Pennsylvania Department of Transportation, (2019).
- 11 Pennsylvania Department of Transportation, (2019).
- 12 Pennsylvania Department of Transportation, *State Rail Plan*. <http://www.planthekeystone.com/Pages/PA-State-Rail-Plan.aspx>
- 13 *Ibid.*
- 14 *Ibid.*
- 15 *Alternative Fuels Data Center*, (2020).
- 16 *U.S. Department of Energy*, (2019).
- 17 Cooper, A., Schefter, K. (2017, June). *Plug-in Electric Vehicle Sales Forecast Through 2025 and the Charging Infrastructure Required*. Retrieved from [http://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20PEV%20Sales%20and%20Infrastructure%20thru%202025_FINAL%20\(2\).pdf](http://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20PEV%20Sales%20and%20Infrastructure%20thru%202025_FINAL%20(2).pdf)
- 18 *Pennsylvania Department of Environmental Protection*, (2019).
- 19 *Pennsylvania's Electric Vehicle Roadmap*, Pennsylvania Department of Environmental Protection (2019).
- 20 *Local Government Autonomous Vehicle Subcommittee*, (2020).



Pittsburgh, PA



SUSTAINABILITY AND LAND USE

Pennsylvania's natural resources, green spaces, and sustainability practices are vital to our land use and growth management. Proper resource management ensures that the Pennsylvania landscape will be beautiful, vibrant, and healthy for years to come.

Sustainability in land use planning is integral to conservation and growth management.



Williamsport, PA

BENEFITS OF REDEVELOPING BROWNFIELDS

- ✓ Recycles existing infrastructure
- ✓ Facilitates job growth
- ✓ Increase tax base
- ✓ Improves blighted areas
- ✓ Decreases urban sprawl
- ✓ Protects humans and the environment

BROWNFIELD REDEVELOPMENT

A brownfield is land property that has the presence of one or many hazardous substances, pollutants, or contaminants. Historically, these properties formerly housed commercial or industrial activities, ranging in size from small, abandoned gas stations to large refineries, manufacturing warehouses, and industrial sites where chemicals were regularly used or stored. Regulators collect soil, surface water, and groundwater samples and submit them to a laboratory for analysis to determine the presence of harmful contamination. The remediation of brownfields requires collaboration between local, state, and federal governments and, sometimes, potential responsible parties who are liable for the contamination.¹ Pennsylvania's voluntary cleanup program, known as Act 2 of 1995, oversees the reclamation process to ensure that the land is free of harmful substances.

Brownfield redevelopment addresses items frequently discussed in this and in other reports including growing population in cities, aging infrastructure, and the change in industries dominant in Pennsylvania.

In Pennsylvania, a piece of land is not categorized as a "brownfield" until after its environmental media has been sampled and tested positive for certain contamination. There are of thousands of vacant, former commercial or industrial properties in Pennsylvania that would likely be labeled as a brownfield if sampled. For example, its estimated that the City of Philadelphia alone contained an estimated 13 sites per square mile.²

Records of known brownfield properties are typically maintained by individual county governments. For example, Washington County runs a brownfields program that readily provides comprehensive data for nearly 100 brownfield properties.

Improved communication between state agencies and local Redevelopment Authorities would increase the likelihood that developers would select former brownfield sites for projects rather than pristine, untouched land. The Department of

BROWNFIELDS INVENTORY

The Pennsylvania Department of Environmental Protection's Land Recycling Program maintains a database that tracks the number of ongoing and completed voluntary cleanups.

To date, **7,104** brownfield redevelopment projects under Act 2 have been **completed**:

- North West383
- North Central945
- North East1,330
- South West567
- South Central1,486
- South East2,393

To date, **1,562** brownfield redevelopment projects under Act 2 are **in progress**:

- North West111
- North Central115
- North East118
- South West112
- South Central234
- South East87

Community and Economic Development's interactive Keystone Opportunity Zones map illustrates land parcels with certain tax benefits, including former brownfield sites. Increased communication between Pennsylvania's state agencies would likely increase the listed number of reclaimed brownfield sites and promote more development. Visit dc.ed.pa.gov/koz to view the interactive map.

Brownfield Redevelopment Funding

Public-private investments for the redevelopment of blighted properties improve community aesthetics, increase tax roll revenue, eliminate public hazards, and protect the environment. Pennsylvania's portfolio includes assistance opportunities to those seeking various types of redevelopment support. Interested parties can reference the Department of Environmental Protection's [Brownfield Redevelopment Guide](#) for step-by-step information.

- **Pennsylvania Land Recycling Program**

DEP's Land Recycling Program encourages the voluntary cleanup and reuse of contaminated commercial and industrial sites. This program's foundation is built on the need to eliminate common barriers to redevelopment. This program eliminates these barriers by: establishing standards to provide certainty and to protect humans and the environment; addressing liability protection; standardizing consistent reporting requirements; and awarding grants and low-interest loans for assessment.

- **Land Banks**

Redevelopment Authorities have the same powers allotted to Land Banks, allowing them to acquire tax delinquent properties at a judicial sale without competitive bidding, to discharge tax liens on those properties, and to share up to 50% of the real property taxes for five years after transference of authority-owned property. It would also eliminate the need to form an entirely new entity in these municipalities; which can be redundant and cost-prohibitive given the lack of resources and funding for these initiatives.

- **Industrial Sites Reuse Program**

The Departments of Environmental Protection and Community and Economic Development provide funding for the Industrial Sites Reuses Program. Eligible applicants can apply for grants and low-interest loans for environmental assessments and land remediation.

- **Keystone Opportunity Zones**

Community partners may apply for incentives to transform undeveloped property in Keystone Opportunity Zones (KOZs). The KOZs include listed former brownfield properties. DCED's KOZs unite state and local leaders, community organizations, developers, business development authorities, and school districts together to apply for additional incentives to transform undeveloped property.



Nanticoke, PA

BROWNFIELD TO PLAYFIELDS PROJECTS LIST

- ✓ **Kaier's Playground**
Mahanoy City Borough, Schuylkill County
- ✓ **Fairground Avenue Linear Park**
Carlisle Borough, Cumberland County
- ✓ **Ira Reynolds Riverfront Park**
Susquehanna Depot Borough, Susquehanna County
- ✓ **Susquehanna River Walk Extension**
Williamsport City, Lycoming County
- ✓ **Lower Broadway Recreation Complex**
Nanticoke City, Luzerne County
- ✓ **Waterfront Park**
Charleroi Borough, Washington County
- ✓ **Elrama Neighborhood Park**
Union Township, Washington County
- ✓ **Washington County Redevelopment Authority**
- ✓ **Pittsburgh Brownfield Redevelopment Map**



Canton Township, PA

SOLAR

The U.S. Bureau of Labor Statistics projects that the solar equipment installer profession will be the fastest growing job in the United States between 2016 and 2026.³ This growth is expected to increase solar installation jobs by more than 100% through 2026. Comparatively, the average growth rate for all occupations is seven percent. Since 2010 solar job growth has grown by 168 percent, from just over 93,000 to more than 250,000 jobs in all 50 states in 2017.⁴

There are over 500 solar companies in Pennsylvania (122 manufacturers, 311 installers/developers, 130 solar supporting indirect).⁵ In 2018 Pennsylvania ranked 17th nationwide with 4,219 workers employed in the solar industry.⁶ A significant portion of this industry's growth is due to the affordability of solar technology, which has dropped in price 34% within the last five years.⁷ As technology and equipment prices continue to become more affordable, the total statewide solar investment, which has reached over \$1.68 billion, will continue to grow.⁸

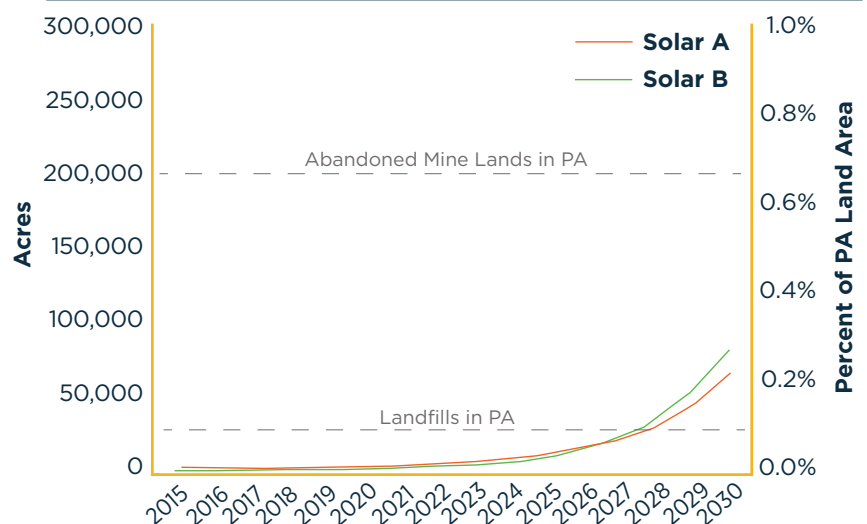
The Pennsylvania Department of Environmental Protection's Pennsylvania's Solar Future Plan identified the quantity of land that would be required to install enough solar to equal 10% of our electricity consumption. Based on conservative estimates, it is estimated that it would take approximately 124 square miles, equal to 0.3% (3/10ths of 1%) of Pennsylvania's total land.⁹ When compared to other land uses, like abandoned mine lands or landfills, it is in line with or significantly less. Estimating that grid scale solar would use 8 acres per MW, grid scale solar would use between 89 square miles (56,800 acres) and 124 square miles (79,200 acres).¹⁰ In addition, 10 percent of residential, and 50 percent of commercial systems are assumed to be on the ground, contributing to land use. Rooftop systems are not included in the land use numbers.

Some observers cite the space requirements of solar as a reason for it not to play a major energy supply role. Although sunshine is one of the least dense forms of energy, and siting space might be a limiting factor in cities attempting to become energy self-sufficient, Pennsylvania has more than enough space for solar. Installing solar panels on right-of-way (ROW) and property is an emerging strategy to generate renewable energy while reducing emissions using green energy. Other state DOT's have successfully contracted with vendors to install renewable energy along ROW. There is generally little up-front cost to the DOT and then the state purchases the renewable electricity at a price that is often less than market average.

Results indicate that solar land use in the 10% scenarios represents a negligible fraction (<3/10ths of 1%) of Pennsylvania's total land area for 46,055 sq. miles. The availability of land for siting solar does not mean that thoughtful land use planning, solar system siting and permitting are not important, but the analysis indicated the availability of sufficient land to meet the 10% target is not a binding constraint. While solar often is considered a commercial or industrial land use, solar installations do not require the same level of supporting infrastructure that other commercial uses might require.

There are opportunities to site solar development in ways that are complementary to the working land scape and rural economy, such as using solar on buffer zones, disturbed lands, and in conjunction with grazing or pollinator friendly perennials. For agricultural land, it is recommended that land owners prioritize siting solar panels on buildings whenever possible and to consider soil productivity when determining locations for potential solar fields. American Farmland Trust New England has developed Solar Siting Guidelines for Farmland which recommend prioritizing solar development on brownfields and rooftops, as well as building mounted and solar canopies. AFT also recommends dual-use projects to allow continued agricultural activity whenever possible. The American Solar Grazing Association has developed a Solar & Multiuse Farming fact sheet on co-locating utility-scale solar with livestock and pollinators. Pennsylvania's nation-leading farmland preservation program offers an interesting model through the soil productivity index, which allows the program to prioritize the most productive land for preservation. Using a similar model when considering where to site potential solar fields would minimize disruption to the most productive agricultural lands. Additional recommendations would be to amend Act 43 to allow limited and strategic solar development on buildings or marginal lands for use outside of the farm's personal energy costs is also recommended.

Figure 19: PA Solar Future



Source: Pennsylvania Department of Environmental Protection, 2020



Susquehanna River
Southern Lancaster County, PA

RIPARIAN BUFFER SPACE

Riparian forest buffers are the trees, shrubs, and grasses planted or growing along streams and rivers.¹¹ Forest buffers filter pollutants and sediments, reduce erosion, cool streams and moderate temperature swings, provide habitat, and store water and reduce flooding.¹² Ultimately, they are critical for maintaining and improving the health of our water.

Riparian forest loss is caused by development of land for residential, commercial, industrial, or agricultural uses. The U.S. Forest Service estimates that over one-third of the rivers and streams have had their riparian buffers degraded or altered.¹³ A water quality report issued by Pennsylvania Department of Environmental Protection in 2018 found that as many as 40% of Pennsylvania's streams and rivers are impaired for various reasons.¹⁴ There are 85,000 miles of streams and rivers in Pennsylvania and they connect over 700,000 acres of lakes, bays, and wetlands;^{15 16} for example, the Susquehanna River connects to the Chesapeake Bay. Half of the land area from Pennsylvania drains into the Chesapeake Bay; the U.S. Environmental Protection Agency (EPA) requires Pennsylvania, specifically the Commonwealth's 43 counties within the Chesapeake Bay watershed, to reduce the amount of nitrogen, phosphorus, and sediment that eventually make their way into the bay. A study of 16 streams in eastern Pennsylvania found that, "in the case of nitrogen pollution, 200–800 times more nitrogen reached streams in the non-forested segments than reached the stream in the forested segments."¹⁷ Forest buffer restoration is a critical—and cost-effective—way to clean up the Chesapeake Bay.¹⁸

Forest buffers also provide food, shelter, and important travel corridors for wildlife. The shade they provide over streams and rivers helps cool water temperatures, increase oxygen, and provide habitat and food for fish and other aquatic life. Riparian buffers also act as core habitat for many semi-aquatic species such as turtles, minks, frogs, and salamanders. The wider the buffer, the greater the number and diversity of species.¹⁹

The DCNR Riparian Forest Buffer Program has specialists who can offer technical assistance; the program also offers financial assistance to property owners looking to plant a forest buffer.²⁰

CARBON SEQUESTERING

The concentration of carbon dioxide in Earth's atmosphere is currently at nearly 412 parts per million (ppm) and rising. This represents a 47% increase since the beginning of the Industrial Ages, and 11% of that increase was seen in the last 20 years.²¹ Of the carbon dioxide emitted from human activities in a year, about half is removed from the atmosphere by natural processes within a century but ~20% continues to circulate and to affect atmospheric concentrations for thousands of years.²²

Geologic and biological carbon sequestration capture carbon dioxide in the atmosphere and store it for generations. Geologic carbon sequestration is the "process of storing carbon dioxide in underground geologic formations."²³ The Pennsylvania Department of Conservation and Natural Resource's (DCNR) Bureau of Geological Survey has been at the forefront of researching geologic formations suitable for carbon storage. They have determined that Pennsylvania has significant and varied geologic resources, mostly associated with depleted and depleting oil and gas reservoirs, that could be used to store carbon dioxide. Multiple geologic intervals, found at various depths and locations across western and north-central Pennsylvania, could potentially store ~2.4 billions metric tons of carbon dioxide. That is equivalent to greenhouse gas emissions from 510,476,074 passenger vehicles driven for one year. Biological carbon sequestration is the storage of atmospheric carbon in vegetation, soils, wood products, and aquatic environments.²⁴

DCNR's forested land holdings, conservation work and investments—including through land conservation and riparian buffer plantings—supports biological carbon sequestration. Trees and forests naturally store carbon through photosynthesis; Pennsylvania forests store about 1.2 billion metric tons of carbon and sequester about 7 million metric tons of carbon from the atmosphere annually. Trees planted in developed areas through DCNR's TreeVitalize program have helped remove ~12,700 metric tons.²⁵ Planting trees can make significant contributions to sequester carbon from the atmosphere at a low cost.²⁶ Conversely, when deforestation occurs as a result of development, carbon is released into the atmosphere.

According to the National Environmental Trust, Pennsylvania emits 1% of the entire planet's human-caused global warming gases and ranks third among all states in global warming emissions. Responsible and meaningful action by Pennsylvanian communities should be taken to reduce global warming pollution.²⁷ Carbon sequestration is also an opportunity for the agriculture industry and these benefits should be further explored.

CLIMATE MITIGATION

Climate mitigation is an approach to climate change that involves reducing and stabilizing levels of heat-trapping greenhouse gases (e.g., carbon dioxide and methane) in the atmosphere.²⁸ Reducing the sources of these gases or enhancing "sinks" that accumulate and store these gases are both mitigation techniques.²⁹

Companies, government agencies, and individuals are acting to mitigate their impact. For example, DCNR has committed to reducing and preventing emissions of greenhouse gases through investments in renewable energy, electric vehicles, and energy efficiency.³⁰

DCNR's goals are to derive 50% of its electricity from renewable sources by 2022 and convert 25% of its passenger vehicles to either electric vehicles (EVs) or plug-in electric vehicles (PHEVs) by 2025. Sixteen solar arrays, producing 365kW of power, have been installed across DCNR facilities to-date. By 2021, DCNR aims to have 39 solar arrays installed, nine net-zero parks and 13 net-zero facilities. Of DCNR's 359 passenger vehicles, 24 are EVs and PHEVs. Twenty-five electrical charging stations have been installed across DCNR facilities; 43 will be installed by the end of 2021.³¹

DCNR's 2.2 million acres of state forest act a significant, natural carbon sink. In addition to replanting state forest lands, DCNR's TreeVitalize Riparian Forest Buffer Program can create new sinks through forest regeneration.³⁴

IN 2015, TRANSPORTATION ACCOUNTED FOR 20% OF PENNSYLVANIA'S NET GHG EMISSIONS

63% and 26% of which were generated by gasoline and diesel-powered vehicles, respectively.

While the transportation sector has decreased its total GHG emissions over time, it remains one of the top three contributors of GHGs in Pennsylvania.³²

According to *Pennsylvania's EV Roadmap*, "By 2023, each mile driven by an EV passenger car compared to a gasoline-powered vehicle would emit 50% less greenhouse gases based on the anticipated regional electricity mix."³³

LANDFILLS

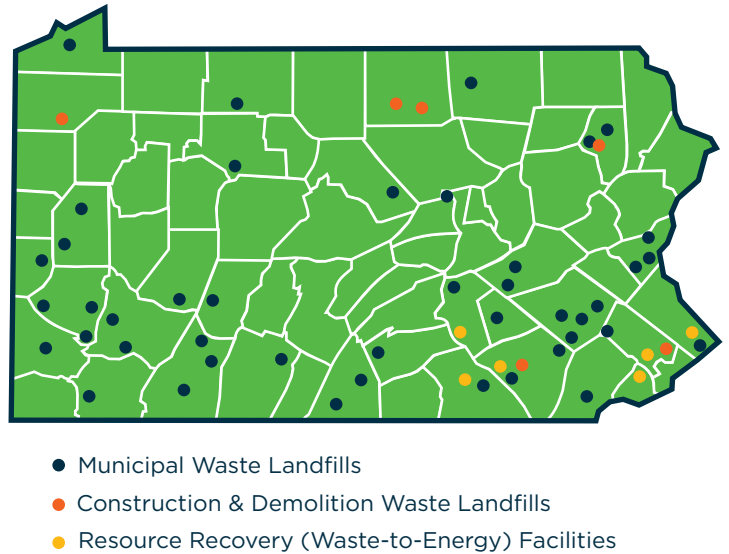
Landfills are carefully designed structures that can be built into or on top of the ground to store a variety of waste. Pennsylvania is home to 43 active municipal solid waste landfills and three active residual waste landfills.³⁵

More landfills are categorized as inactive, abandoned, reclaimed, out of business, and illegally unpermitted. Together, these landfills account for a minimum of 18,600 acres (29 square miles) of land. The Pennsylvania Waste Industries Association estimates that nearly 9 million tons of garbage are disposed of into Pennsylvania's landfills every year.³⁶

The Department of Environmental Protection maintains information about permitted activities. Since 2014 municipal, asbestos, residual, construction, and WTE ash residue wastes have all increased in Pennsylvania landfills.³⁷ However, there are programs dedicated to managing recyclable products to reduce waste and prolong landfill capacity.

As a result of the 1988 Municipal Waste Planning Recycling and Waste Reduction Act, 90 percent of Pennsylvanians now have access to recycling programs. This act also requires each county to submit waste management plans to State regulators to better plan for long-term disposal options. Collectively, each county's planning efforts were responsible for the 7.8 million tons of resources recycled in 2015 and 2016.³⁸ However, not every community in Pennsylvania is required to offer a recycling program; Only municipalities with a population of 5,000 or 300 residents per square mile must offer curbside recycling.

Figure 20: Landfills in Pennsylvania



Source: Pennsylvania Department of Environmental Protection, 2020

TOP TEN MATERIALS DISCARDED INTO RESIDENTIAL TRASH

food waste	– 12.2%
non-recyclable paper	– 10.1%
corrugated cardboard	– 5.3%
newspaper	– 5.2%
yard waste	– 1%
mixed paper	– 4.8%
film plastic	– 4.7%
C&D (construction and demolition)	– 4.5%
textiles	– 4.4%
unpainted wood	– 3.6%



BENEFITS OF RECYCLING

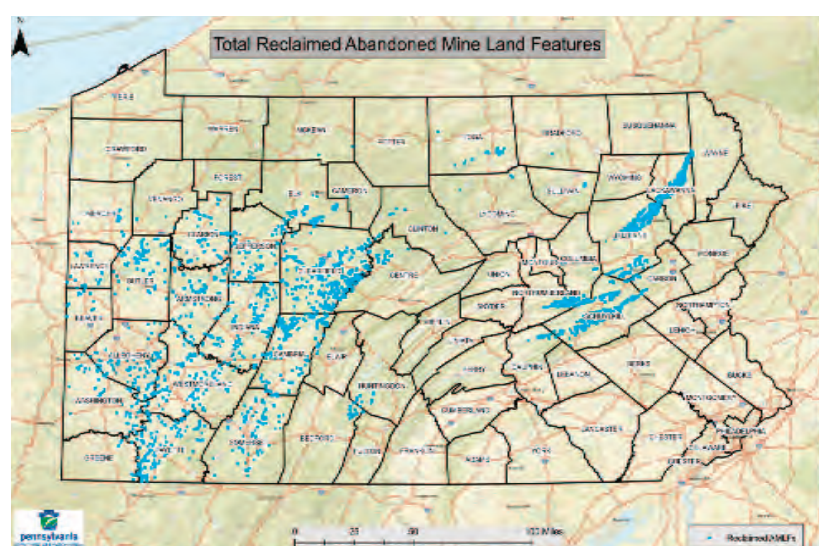
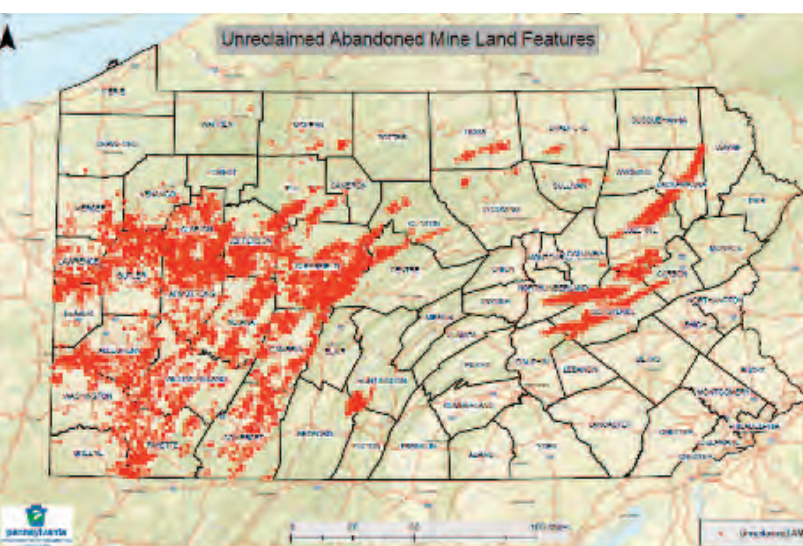
- ✓ Cutting greenhouse gas emissions (10.2 million tons of carbon dioxide in 2016).
- ✓ Supporting 66,000 jobs and over 100,000 indirect jobs in Pennsylvania.
- ✓ Creating over \$40 billion in annual economic stimulation.
- ✓ Prolonging the life of forests and other carbon sinks.



*Abandoned Coal Mining Site
Western PA*

ABANDONED MINES AND WELLS

Pennsylvania's mountainsides are reminders of the rock that fueled America's industrial revolution. Prior to 1977, mining operators were not required to repair the land they mined. This created a host of detrimental hazards including, mine subsidence, mine fires, acid mine drainage, and unmanaged coal waste piles. While over 35,893 acres (56 square miles) have been reclaimed to date, there are still 175,487 acres (274 square miles) of land that require reclamation and hazard mitigation.³⁹





Wilkes Barre, PA

WEATHER VULNERABILITY

In Pennsylvania, flooding is an increasing problem for both public and private property. The four-year period between July 2015 – June 2019 were the wettest on record in Pennsylvania, with a total rainfall of more than 198 inches. The increasing frequency of extreme weather events across the Commonwealth jeopardizes the integrity of transportation infrastructure, increases the cost of recovery and maintenance, and poses a risk to the safety and mobility of citizens.

More than 450 locations and 3,096 miles of roadways in Pennsylvania have been identified as being vulnerable to flooding. Land and rock slides, high winds, and tornados have also become more prevalent in the Commonwealth. In the 3-month period from July through September 2018 more than \$113.5 million dollars in damages at 2,419 locations across PA.⁴⁰

An increasing amount of space statewide has been designated floodplain during recent FEMA Flood Map updates. Additionally, the Commonwealth executed a number of buyouts and residential structure elevations in order to mitigate the damage of flood waters to residential homes.⁴¹

Event Date	Estimated Damages to Non-Federal Aid Routes (FEMA)	Non-Federal Aid Damaged Locations (FEMA)	Estimated Damages to Federal Aid Routes (FHWA)	Federal Aid Damaged Locations (FHWA)	Total Estimated County Damages	Total Damaged Locations
July 22-26, 2018	\$5,593,351	369	\$6,191,524	325	\$11,784,874	694
August 1-4, 2018	\$1,411,384	72	\$758,682	49	\$2,170,066	121
August 7-8, 2018	\$2,922,872	11	\$201,130	5	\$3,124,002	16
August 10-14, 2018	\$39,764,050	738	\$22,691,245	467	\$62,455,295	1,205
August 31, 2018	\$9,701,604	55	\$4,516,309	28	\$14,217,913	83
September 9-11, 2018	\$6,235,933	134	\$12,617,494	126	\$18,853,427	260
September 17, 2018	\$348,682	28	\$828,666	12	\$1,177,348	40
Overall Totals	\$65,977,876	1,407	\$47,805,050	1,012	\$113,782,926	2,419



FLOOD VULNERABILITY OF HISTORIC PLACES

Harrisburg, PA

Many of Pennsylvania's older and established communities are located along rivers and streams that now pose an existential threat to those communities' survival. Likewise, land adjacent to watercourses is generally considered highly sensitive for both native American and historic period archaeological resources. As flood events created by storms and climate change increase in frequency, so too does the need to adapt cultural resources to these threats. The PA State Historic Preservation Office has been working with PEMA, FEMA, and a number of regional and county planning agencies since 2013 on survey and planning efforts in flood vulnerable communities to identify and implement adaptation and resilience strategies. Understanding the presence and significance of cultural resources in floodplains is relevant to land use because of the frequent use of federal and state funding for recovery and mitigation, which requires consideration of the effects of these activities on cultural resources under Section 106 or State History Code review. These processes are intended to encourage sensitive adaptation of historic resources to flood vulnerability where possible, or compensatory mitigation if the resources are adversely impacted by the flood mitigation activities.⁴²



Dingmans Falls
Pike County, PA

Pennsylvania is home to over 85,000 miles of streams and rivers and 700,000 acres of lakes, bays, and wetlands.⁴³

WATER SPACE AND WATER QUALITY

The quality of the water we drink and recreate in is dependent on the health of the environment. Forests and natural lands impact the quantity, quality, and filtration costs associated with a community's water supply. Trees and forests collect and filter rainfall and release it slowly into streams and rivers.⁴⁴

When forests and natural lands are developed, the quantity (volume) of surface water runoff increases and moves with higher velocity as it sweeps across impervious surfaces (e.g., asphalt roads, compacted turf) instead of being absorbed into the ground. As water moves across our roads, lawns and farm fields, it picks up pollutants such as heavy metals and fertilizer, affecting the quality (pollutant levels) of the water. "According to the U.S. EPA, the leading cause of water quality degradation is nonpoint source pollutions- over 60% of pollution in the U.S. waterways comes from runoff from lawns, farms, cities, and highways, as well as leachate from rural septic systems and landfills."⁴⁵ Communities can reduce runoff quantity, protect water quality, and conserve water by developing compactly, preserving ecologically critical open space, and using green infrastructure such as rain gardens and street trees.⁴⁶

Forest cover has been directly linked to drinking water treatment costs; the more forest cover, the lower the cost to treat that water.⁴⁷ According to a study by American Water Works Association and Trust for Public Land, every 10% increase in forest cover in the source area reduces treatment and chemical costs by about 20%.⁴⁸ Water quality and water access for recreational use can also be protected through land conservation; communities that invest in land protection as a way to protect their drinking water, they are investing in the long-term health and quality of life of their citizens.⁴⁹

Sources

- 1 Pennsylvania Department of Environmental Protection, (2020).
- 2 <https://philadelphiaencyclopedia.org/archive/brownfields-redevelopment/>
- 3 <https://www.thesolarfoundation.org/national>.
- 4 <http://www.seia.org/research-resources/national-solar-database>
- 5 <http://www.thesolarfoundation.org/solar-jobs-census/states/>
- 6 <https://www.seia.org/states-map>
- 7 Ibid.
- 8 Pennsylvania Department of Environmental Protection Solar Future Plan
- 9 Sean Ong et al., "Land-Use Requirements for Solar Power Plants in the United States" (National Renewable Energy Laboratory, June 2013),
- 10 <http://www.nrel.gov/docs/fy13osti/56290.pdf>.
- 11 <https://www.dcnr.pa.gov/Conservation/Water/RiparianBuffers/Pages/default.aspx>
- 12 <https://conservationtools.org/guides/131-the-science-behind-the-need-for-riparian-buffer-protection>
- 13 Ibid.
- 14 https://www.depgis.state.pa.us/2018_integrated_report/index.html
- 15 <https://www.dcnr.pa.gov/Conservation/Water/RiparianBuffers/Pages/default.aspx>
- 16 https://www.depgis.state.pa.us/2018_integrated_report/index.html
- 17 Chesapeake Bay Foundation (n.d). Forested Buffers: The Key to Clean Streams. Annapolis, MD: Chesapeake Bay Foundation. 499.
- 18 https://www.chesapeakebay.net/issues/forest_buffers
- 19 <https://conservationtools.org/guides/131-the-science-behind-the-need-for-riparian-buffer-protection>
- 20 <https://www.dcnr.pa.gov/Conservation/Water/RiparianBuffers/Pages/default.aspx>
- 21 <https://climate.nasa.gov/news/2915/the-atmosphere-getting-a-handle-on-carbon-dioxide/>
- 22 <https://nca2014.globalchange.gov/report/response-strategies/mitigation>
- 23 https://www.usgs.gov/faqs/which-area-best-geologic-carbon-sequestration?qt-news_science_products=0#qt-news_science_products
- 24 https://www.usgs.gov/faqs/what-s-difference-between-geologic-and-biologic-carbon-sequestration?qt-news_science_products=0#qt-news_science_products
- 25 <https://www.opentreemap.org/patreemap/map/?z=7/40.996/-77.651>
- 26 <https://www.britannica.com/technology/carbon-sequestration>
- 27 http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20033316.pdf
- 28 <https://climate.nasa.gov/solutions/adaptation-mitigation/>
- 29 Ibid.
- 30 Pennsylvania Department of Conservation and Natural Resources, (2020).
- 31 Ibid.
- 32 <https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/climatechange/PublishingImages/Pages/CCAC/Inventory%20-%202018%20write%20-up.pdf>
- 33 <http://files.dep.state.pa.us/Energy/OfficeofPollutionPrevention/StateEnergyProgram/PAEVRoadmap.pdf>
- 34 Pennsylvania Department of Conservation and Natural Resources, (2020).
- 35 Pennsylvania Department of Conservation and Natural Resources, (2020).
- 36 <http://pawasteindustries.org/waste-industry/waste-facts/>
- 37 http://www.depgreenport.state.pa.us/powerbiproxy/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information
- 38 <https://www.dep.pa.gov/Business/Land/Waste/Recycling/Pages/default.aspx>
- 39 Pennsylvania Department of Environmental Protection, (2020).
- 40 Extreme Weather Vulnerability Study, Pennsylvania Department of Transportation, (2017).
- 41 Pennsylvania Emergency Management Agency, (2019).
- 42 Pennsylvania Historical and Museum Commission, (2020).
- 43 Pennsylvania Department of Environmental Protection, (2020).
- 44 <https://www.americanforests.org/blog/the-important-relationship-between-forests-and-water/>
- 45 https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs039/gtr_srs039-part_1.pdf
- 46 <https://www.epa.gov/smartgrowth/smart-growth-and-water>
- 47 <https://www.americanforests.org/blog/the-important-relationship-between-forests-and-water/>
- 48 https://www.tpl.org/sites/default/files/cloud.tpl.org/pubs/water-protecting_the_source_final.pdf
- 49 Ibid.





NATURAL AND CULTURAL RESOURCES

Pennsylvania's vast natural and cultural resources are the foundation for our robust history and community character. These assets must be preserved through thoughtful land use planning.

Farmland, forests, outdoor recreation, and historic landmarks are all essential to Pennsylvania's economy and our way of life.



Gettysburg National Park, PA



106
MUNICIPALITIES
have Historic
District Acts.

Source: Center for Rural PA (2017)
and PHMC (2020)

HISTORIC PRESERVATION

Local preservation ordinances, whether they apply to districts or individual resources, are important aspects of a community's land use and growth management program. Many ordinances regulate the demolition of existing buildings as well as the size, scale, and design of new buildings. Local governments also use zoning ordinances to incentivize rehabilitation through expanded uses, parking relief, setback relief, and impervious cover relief for locally-designated buildings.¹

National Register of Historic Places

Listing in or eligibility for the National Register of Historic Places impacts land use and growth management in direct and indirect ways. Direct impacts include eligibility for Federal and State Rehabilitation Tax Credits, Keystone Historic Preservation Grants, and relief or alternate compliance opportunities for building codes, floodplains, and accessibility. Federal and State agencies are also obligated to consider the effects of their funding, licenses, permits, and direct activities on NR listed and eligible resources (both above ground and archaeological resources), with directives to avoid, minimize, or mitigate adverse effects. Indirect effects of NR listing include heightened local awareness and appreciation for historic places and local incentives for preservation.

Figure 21: Pennsylvania Properties Listed in the National Register of Historic Places as of September 2020

Individual buildings, structures, objects and sites	2,799
Districts*	654

**Districts contain multiple resources, ranging from 2 or 3 to several thousand properties each.*

Source: Pennsylvania State Historic Preservation Office



Bellefonte, PA

Financial Incentives for Historic Preservation

Financial incentive programs for historic preservation impact land use and growth management by motivating property owners to rehabilitate existing buildings and offsetting the costs of rehabilitation as compared to new construction. Federal and State Historic Tax Credit programs provide direct incentives to owners of income-producing properties for rehabilitating National Register listed buildings into retail, office, industrial, and other commercial uses, including rental housing. Tax credits are frequently used to facilitate rehabilitation of vacant, blighted, or underutilized buildings, often in prominent locations within communities. Rehabilitation projects generate significant Federal, state, and local tax revenue, jobs, and other spinoff effects including housing creation and catalyzation of revitalization in adjacent areas.

Figure 22: Historic Preservation Tax Credit Data

PA State Historic Tax Credits	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Total Applicants	36	29	23	21	73	42	56
Number Projects Approved	15	15	16	15	24	28	22
Total Requests Credits	\$15.0	\$13.0	\$9.1	\$9.4	\$17.9	\$8.8	\$21.4
Available and Approved Credits	\$3.0	\$3.0	\$3.0	\$3.0	\$3.0	\$3.0	\$5.0
Total Unfunded Credits Requested	\$12.0	\$10.0	\$6.0	\$6.4	\$14.9	\$5.8	\$16.4
Total Estimated Project Costs	\$856.0	\$856.0	\$704.7	\$746.3	\$903.1	\$482.6	\$591.4
Total Approved Project Costs	\$500.6	\$323.7	\$290.1	\$299.4	\$244.5	\$116.6	\$289.0
Average Approved Project Cost	\$33.4	\$21.6	\$18.1	\$14.3	\$10.2	\$4.2	\$13.1
Federal Historic Tax Credits	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Number Approved	30	35	31	25	39	41	68
QRE at Completion*	\$249.5	\$430.	\$249.5	\$172.7	\$330.9	\$420.0	\$584.0
Average QRE	\$8.3	\$12.3	\$8.0	\$6.9	\$8.5	\$10.2	\$8.6

Source: Pennsylvania DCED as compiled by the Pennsylvania State Historic Preservation Office

*Qualified Rehabilitation Expenditures (QRE) are the total eligible costs that are used to determine the value of the tax credit.



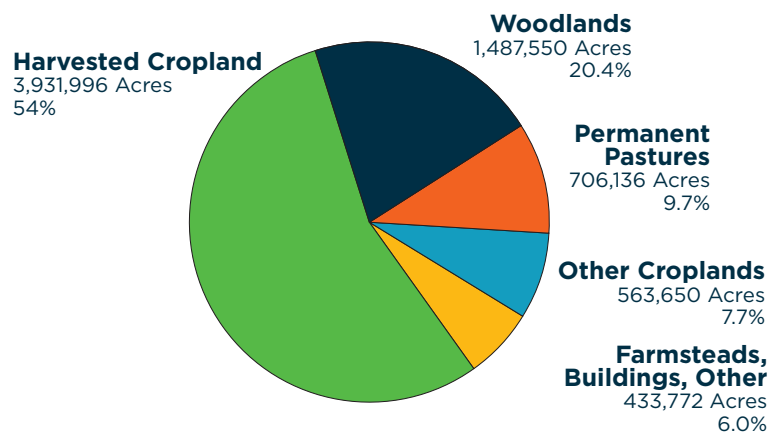
53,157
FARMS IN PA

7,278,668
ACRES OF FARM LAND

FARMLAND

The most recent data on farms in Pennsylvania comes from the U.S. Census of Agriculture's 2017 database. The number of farms and the acreage of farms has continued to decrease over the last decade. In 2017, there were 53,157 farms in PA and 7,278,668 acres of farm land. The percentage of farms that are harvested croplands increased by 3% over a 5-year period while the percentages of woodland acres, permanent pasture acres, other cropland acres, and farm building acres all decreased slightly.²

Figure 23: PA Land Use on Farms



Source: U.S. Census of Agriculture, 2017

Case Study: The Economic Impact of Pennsylvania's Agriculture Industry and the PA Farm Bill

In 2018, the Pennsylvania Department of Agriculture and the Team Pennsylvania Foundation released a comprehensive economic impact analysis and strategic recommendations for Pennsylvania's agriculture industry. The report was a result of a public-private partnership that brought leaders from varied industry segments throughout the commonwealth to form an Agricultural Advisory Board that worked together to develop a shared vision and strategic priorities for Pennsylvania's agriculture industry. The report provides a detailed look at the direct and indirect impact of agriculture on Pennsylvania's economy. Agriculture and its associated industries provide a \$135.7 billion annual economic impact, representing close to 18% of Pennsylvania's gross state product. It employs and supports nearly 580,000 people paying wages of \$27 billion. Agriculture supports 1 out of every 10 jobs in Pennsylvania and for each dollar of direct output, another \$0.62 is generated in economic impact. The report includes deep dives into leading industries in Pennsylvania, such as livestock (poultry, equine, dairy, sheep/lamb/goat, beef, and pork), fruits and vegetables, food processing, hardwoods, and nursery and landscaping. The report also includes a SWOT analysis, overview of drivers and trends that included industry listening sessions, and a set of six strategic recommendations.

1. Capitalize on branding and marketing opportunities;
2. Expand on agricultural infrastructure, such as processing and manufacturing capacity;
3. Continue improving regulatory processes and the business climate;
4. Broaden workforce development and education opportunities;
5. Make additional investments in infrastructure systems like transportation and broadband;
6. Diversify products to strengthen markets and build resiliency.



The report solidified the importance of Pennsylvania’s agriculture industry, its national leadership in food and agriculture, and showed that it is in the commonwealth’s interest to ensure the industry remains a vibrant part of the state’s economy. In August 2018, Governor Tom Wolf announced a six-point plan for Pennsylvania agriculture based on the strategic recommendations and in February 2019, he unveiled a proposal for the first-ever Pennsylvania Farm Bill with unprecedented funding and programmatic investments in agriculture based on the six-point plan and strategic recommendations. The Pennsylvania Farm Bill proposal created a historic amount of bipartisan legislative and stakeholder support for agriculture initiatives and gained national attention in the ag industry as Pennsylvania is the first, and so far, the only state to have created a state-level farm bill.

In June 2019, Governor Tom Wolf signed the first-ever Pennsylvania Farm Bill, with \$23 million in bold, aggressive, and necessary investments to grow opportunities and resources, remove barriers to entry, and inspire future generations of leaders within agriculture. The PA Farm Bill provides support for the agriculture industry in six areas:

Resources for Agricultural Business Development and Succession Planning

- Created the Agriculture Business Development Center, a one-stop-shop to support business planning, marketing, diversification, and transition planning services to Pennsylvania farmers.
- The Farm Vitality Planning Grant, funded at \$1 million and administered through the Agriculture Business Development Center, funds professional services to those planning for the future of a farm. It may be used for writing a business plan, transitioning farm ownership, expansion or diversification of production. Solid planning keeps farms in operation. The program received 159 applications and passed grants on to 133 eligible applicants.

New Market Opportunities, Investments in Organic

- The Specialty Crop Block Grant program, funded at \$500,000, invests in Pennsylvania’s priority crops: hardwoods, hemp, honey and hops; and rye/wheat/barley for malting, brewing, and distilling. The program funded 13 projects.
- Bolstered enrollment in the Homegrown by Heroes Program by providing an additional \$1 million to the PA Preferred program. This marketing tool communicates to the public that a product was grown in Pennsylvania by a veteran-owned business.

- Another \$1.6 million in funding went to support PA Preferred and the creation of the PA Preferred Organic Initiative, including hiring an organic specialist to guide the growth of the organic sector
- Improved urban agriculture infrastructure with \$500,000 in the Urban Agricultural Infrastructure Grant Program. It funded 28 projects.

Building a Strong Agricultural Workforce, Educating and Launching New Farmers

- A new Realty Transfer Tax Exemption for the transfer of preserved farmland to a qualified beginning farmer has certified 13 qualified beginner farmers for easier land transfers.
- The PA Farm to School Grant Program was funded at \$500,000 to increase nutrition and agriculture education opportunities for pre-kindergarten through fifth grade. The program received 60 applications and was able to fund 45 projects with available funds.
- The Agriculture and Youth Development Grant Program to invest in workforce development initiatives for agriculture and youth organizations such as FFA and 4-H. Also funded at \$500,000, the program received 71 applications and was able to approve 53 projects.

Removed Regulatory Burdens, Strengthen Ag Business Climate in PA

- The allowable width for use of implements of agriculture husbandry was expanded from 16 feet to 18 feet
- Conservation and preservation was strengthened by allocating \$13 million to the Resource Enhancement and Protection (REAP) program which invites farmers, landowners, and businesses to earn tax credits for implementing best management practices to enhance farm production and protect natural resources. The project cap was increased from \$150,000 to \$250,000 per operation in a 7-year time-frame. \$3 million in new tax credits were made available, and well over 300 applications showed interest in the REAP program in 2019.
- The Agriculture Linked Investment Program provides \$500,000 in low-interest loans for conservation practices.
- The Conservation Excellence Grant Program has \$2.5 million to fund best management practices in priority areas of the Chesapeake Bay Watershed. This funding has been sent to the Lancaster and York county conservation districts.

Increased Processing Capabilities

- The Pennsylvania Dairy Investment Program was funded at \$5 million to support innovation, value-added processing, marketing, and organic transitions in the dairy industry. Grants were awarded to 46 projects for dairy marketing, research and development of new dairy products, value added processing, on-farm single producer projects, and to cooperative, processing plant, or multi-producer projects.
- The Small Meat Processor Grant Program incentivized access to meat processing inspections and equipment for small farmers or butchers by reimbursing costs for federal compliance to access new markets. The program was funded at \$500,000 and supported 15 projects. There is still a need for more funding in this program, as there were 24 applications for nearly \$1 million in requests and continues to be strong interest in expanding small meat processing capacity statewide.
- The Center for Poultry and Livestock Excellence was created to support livestock viability. The Center has approved \$340,000 in grants for projects to improve on-farm biosecurity practices, support animal health and disease prevention, and to strengthen the swine, poultry, and small ruminant sectors.

Protection for Pennsylvania Agriculture Infrastructure

- Funded at \$4 million, Pennsylvania will continue the fight against the invasive Spotted Lanternfly by creating the Pennsylvania Rapid Response Disaster Readiness Account to provide a quick response to the next agricultural disaster, whether animal health, plant health, or foodborne illness.

Finally, a Beginning Farmer Tax Credit Program was also created in 2019 to provide tax credits to owners of agricultural assets who sell or rent agricultural assets to beginning farmers. The tax credits are equal to 5% of the lesser of the sale price or the fair market value of the agricultural asset (up to \$32,000), or 10% of the gross rental income of the first, second, and third year of the rental agreement, up to a maximum of \$7,000 per year. \$5 million was made available for the first year, and \$6 million in subsequent years.

The PA Farm Bill shows the value of a comprehensive industry analysis and strategic recommendations that can be translated into strategic legislative, policy, and budgetary investments. In the first round of grants, almost every program was oversubscribed. Continued investments in agriculture and policies to support the industry are critical at all levels of government and the private sector. In particular, the conservation funding in the PA Farm Bill is a down payment on the funding needed to achieve the agriculture industry's required reductions for compliance with the Chesapeake Bay Watershed Implementation Plan (WIP 3). A recent study and comparative analysis by the Environmental Defense Fund (EDF) studied four Pennsylvania dairy farms to determine how their conservation practices impacted their budgets. The study found that conservation can improve the financial health of dairy farms to make them more resilient, especially during a lean agricultural economy. This report, as well as EDF's overview of Innovative State-Led Efforts to Finance Agricultural Conservation, which highlighted Pennsylvania's REAP program, encourages increased support for conservation through cost share programs, tax credits, and low-interest loans.

FORESTS

Seventy percent of Pennsylvania's 16.8 million acres of forest land is privately held by more than 730,000 individuals.³ The future of privately held forests are greatly endangered by parcelization, which complicates conservation. The Pennsylvania Department of Conservation and Natural Resources (DCNR) holds and manages 2.2 million acres (~13%) of the commonwealth's forest land.⁴ The remaining forest land is owned by the forest products industry, federal, or local government. Forests exist in many forms—large or extensive tracts predominated by trees as forests, farm woodlots, urban street trees, and forested buffers along streams—and whether publicly or privately owned, forests and trees provide many essential economic, environmental, health, and recreational benefits. Indirect and direct benefits forests provide include clean air and water, wildlife habitat, wood products, aesthetic views, carbon sequestration, and recreation.

Conserving wooded tracts of land, including forest remnants remaining in developed areas, enables communities to retain these many benefits. Communities, eager for growth, often overlook the importance of forests, which can result in a reduction of their size or impairment to their health, resiliency, and economic value.⁵ According to a study by the American Farmland Trust, forestland yields an average of \$3 in taxes for every \$1 required governmental services while residential land costs \$1.11 in services for every \$1 collected in tax revenues.⁶

Today, forests face increasing challenges and threats from many factors including fragmentation, invasive insects and diseases, development pressures, and climate change. Sustainable forest management—an intentional practice that includes, but is not limited to, selective harvesting accompanied by replanting—can help minimize threats and increase the vitality, long-term health, and recreational use of forests. DCNR's sustainable-management forestry practices balance creating wildlife habitat, enhancing forest health and diversity, and providing a steady flow of wood products to the economy.⁷ The DCNR Bureau of Forestry sustainably harvests about 15,000 acres across the state forest annually. State forests are also open to hunting and include over 120 wildlife food plots. In 2016, hunting in forests generated \$73,294,000 in state and local taxes and supported about 13,500 jobs in Pennsylvania.⁸

Pennsylvania is the largest producer of hardwoods in the country and is responsible for 10% of the total hardwood output in the U.S.⁹ Revenue from the Pennsylvania forests product industry exceed \$5.5 billion dollars annually.¹⁰



Mount Penn, Reading, PA



Philadelphia's Callowhill Neighborhood, PA
Photo credit: Thom Carroll / PhillyVoice

GREEN GENTRIFICATION

As the country's demographics continue to shift to a more urbanized population and urbanism movements gain footholds, gentrification has become a hot topic amongst urban residents, planners, and policy makers. The role of trees and green space are vital to improving air quality but can also be a factor in raising land values, and subsequently rental prices and taxes, putting long-term residents at risk of displacement. Research has shown that the so-called "back-to-the-city" movement is spurred by more proximity to workplaces, but also a desire to have immediacy to urban amenities, parks included.¹¹

In terms of gentrification, not all parks are equal, however. Greenway parks have been found to increase the chances an area will gentrify by 200% within half a mile. Park proximity to downtown cores is another factor which increases the chances of gentrification by 90%. For every mile away from a downtown core that chance decreases by 20%.¹²

This is not to say that building parks is the wrong approach but implementing these projects requires strategies to ensure that they do not negatively impact communities, especially communities that are already at risk of displacement. Parks Related Anti-Displacement Strategies (PRADS) have been employed on various park projects throughout the United States, including the Rail Park in Philadelphia's Callowhill neighborhood, to ensure harmonious coexistence in changing neighborhoods. These strategies include multidisciplinary outreach efforts which engage with housing trusts, land banks, and venture capital entities, as well as ensuring that funders require or incentivize anti-displacement strategies for grant recipients in park development.¹³

Multidisciplinary approaches include strategies for business retention and creation such as small business disruption funds and first source hiring ordinances, and importantly, housing. Rent control and right to council ordinances have seen success for rental populations, while property tax freezes and down payment assistance programs have been employed to promote home ownership for lower resourced populations.¹⁴

Park and trail development must engage in the whole of the community while understanding historical context of neighborhoods. This development must include the community in planning, but also ensure the engagement of old and new residents. The most successful park development will be ones that are seen as spaces for everyone and not only the well most well-resourced.



York Rail Trail, PA

RECREATION/TRAIL SPACE

Pennsylvania's outdoor recreation industry is the fifth-largest in the nation. It attracts millions of visitors annually and is vital to the commonwealth's economy, employment, and tax generation. In Pennsylvania, outdoor recreation generates \$29.1 billion in consumer spending annually, \$1.9 billion in state and local tax revenue, and directly supports over 251,000 jobs.¹⁵

Land and water are interdependent: conserving both helps establish vibrant outdoor recreation destinations while maintaining the scenic beauty of the state.¹⁶ Conserved natural places and access to outdoor recreation increases the quality of life for Pennsylvania residents and enhances the visitors experience. Living close to parks and other recreation facilities is consistently related to higher physical activity levels for both adults¹⁷ and youth.¹⁸

Investing in parks and open space is a proven economic development tool that can help communities attract businesses and a contributing tax base.¹⁹ In southeastern Pennsylvania, protected open space adds \$16.3 billion to the value of homes and generates \$240 million in additional annual property and transfer tax revenues.²⁰ Studies have found that every \$1 invested in land conservation returns \$7 in natural goods and services to the Pennsylvania economy.²¹ Although open space and natural lands may generate less revenue than residential, commercial, or industrial property, they require less public infrastructure and fewer community services. A study from 25 states show that, on average, the median cost per dollar of revenue raised to provide public services for commercial and industrial lands was \$0.30, for working and open space lands was \$0.37, and for residential lands was \$1.16.²² Similar to how home values in densely developed areas increase with proximity to open space and natural lands, proximity to preserved farmland in rural and suburban areas also positively impact real estate values. A study done in Maryland found people were willing to pay \$3,307 more for a house near permanently preserved open space rather than pastureland that could be developed at some point in the future.²³ The loss of open space is a threat to this economic advantage²⁴ as well as water quality. [Pennsylvania's State Comprehensive Outdoor Recreation Plan](#) includes detailed strategies and recommendations for recreation land use.



Jim Thorpe, PA

WRAP-UP

Why is land so important? Land is the “Keystone” of economic and community development. Federal, state, local public as well as a variety of private resources are spent to manage and protect land as well as to develop and create opportunities for Pennsylvania’s residents to thrive economically. Pennsylvania is an agricultural state and Pennsylvania also leads the nation in preserved farmland. While we can help to fight food insecurity through our robust agricultural production, there are also other implications that need attention, as outlined throughout this report. Land, and ultimately the use of that land, ties directly to quality of life. Pennsylvania’s natural resources are the heart of the Commonwealth. Protecting these resources are vital to continued prosperity of Pennsylvania’s residents. The Commonwealth, local governments and businesses need to think critically about how they utilize land moving forward. For example, when utilizing prime agricultural land for development, parties involved should understand the ability of potential workforce to get to these locations prior to development, rather than after development.

The COVID-19 pandemic has also changed current and prospective business land use needs. Agencies need to consider these changes in teleworking and telecommuting, as well as continued coordination, in development of policies that impact land use. Agencies need to examine PA’s strengths and adapt policies based on these shifting working environments. This report details the current use of land in Pennsylvania and is released in five year increments to provide updated snapshots of this data. The information contained within the report can and should be used by government officials at all levels to make informed decisions related to policies and programs that directly, and indirectly, impact Pennsylvania’s use of one of our most valuable resources.

Sources

- 1 Pennsylvania Historic and Museum Commission
- 2 U.S. Census of Agriculture, (2017).
- 3 Forestry with Confidence: A Guide for Woodland Owners. Penn State Extension, (2012).
- 4 Pennsylvania Department of Conservation and Natural Resources, <https://www.dcnr.pa.gov/about/Pages/Forestry.aspx>, (2020).
- 5 Pennsylvania Department of Conservation and Natural Resources, http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_007864.pdf, (2020).
- 6 https://www.agriculture.pa.gov/Business_Industry/HardwoodDevelopmentCouncil/Documents/EE0249%20Timber%20Harvesting_Final.pdf
- 7 Pennsylvania Department of Conservation and Natural Resources, <https://www.dcnr.pa.gov/about/Pages/Forestry.aspx>, (2020).
- 8 <https://www.pennlive.com/life-and-culture/erry-2018/12/2734469fdc9092/what-are-hunting-fishing-and-o.html>
- 9 <http://paforestproducts.org/quickfacts.cfm>
- 10 Pennsylvania Department of Conservation and Natural Resources, <https://www.dcnr.pa.gov/about/Pages/Forestry.aspx>, (2020).
- 11 <https://www.bloomberg.com/news/articles/2019-10-10/why-greenway-parks-cause-greater-gentrification#:~:text=While%20green%20spaces%20are%20often,much%20greater%20role%20than%20others.&text=There%20is%20no%20hotter%20hot%2Dbutton%20issue%20among%20urbanists%20than%20gentrification>.
- 12 Rigolon, A., & Németh, J. (2020). Green gentrification or 'just green enough': Do park location, size and function affect whether a place gentrifies or not? *Urban Studies*, 57(2), 402–420.
- 13 <https://www.ioes.ucla.edu/wp-content/uploads/Parks-Related-Anti-Displacement-Strategies-report-with-appendix.pdf>
- 14 <https://rhls.org/wp-content/uploads/First-Source-Hiring-Overview-RHLS.pdf>
- 15 https://outdoorindustry.org/wp-content/uploads/2017/07/OIA_RecEcoState_PA.pdf
- 16 https://conservationtools-production.s3.amazonaws.com/library_item_files/1210/1105/benefits-pa-keystone-roi-report.pdf?AWSAccessKeyId=AKIAIQFJLILYGVD4AMQ&Expires=1583273935&Signature=GZfZNY6WCt98oApLmABGUfPG2qk%3D
- 17 Humpel N, Owen N, Leslie E. "Environmental Factors Associated with Adults' Participation in Physical Activity: A Review." *American Journal of Preventive Medicine*, 22(3): 188-199, April 2002.
- 18 Sallis J and Kerr J. "Physical Activity and the Built Environment." *President's Council on Physical Fitness and Sports Research Digest*, 7(4): 1-8, December 2006.
- 19 https://activelivingresearch.org/sites/activelivingresearch.org/files/Synthesis_Shoup-Ewing_March2010_0.pdf
- 20 https://conservationtools-production.s3.amazonaws.com/library_item_files/1210/1105/benefits-pa-keystone-roi-report.pdf?AWSAccessKeyId=AKIAIQFJLILYGVD4AMQ&Expires=1583273935&Signature=GZfZNY6WCt98oApLmABGUfPG2qk%3D P6
- 21 https://conservationtools.org/library_items/1210-Pennsylvania-s-Return-on-Investment-in-the-Keystone-Recreation-Park-and-Conservation-Fund
- 22 https://conservationtools-production.s3.amazonaws.com/library_item_files/352/1464/Cost_of_Community_Services_Studies_AFT_FIC_201609.pdf?AWSAccessKeyId=AKIAIQFJLILYGVD4AMQ&Expires=1584991556&Signature=zQCu76GHjlaNE7svaUErVSfOF3k%3D
- 23 https://activelivingresearch.org/sites/activelivingresearch.org/files/Synthesis_Shoup-Ewing_March2010_0.pdf P6
- 24 https://conservationtools-production.s3.amazonaws.com/library_item_files/1210/1105/benefits-pa-keystone-roi-report.pdf?AWSAccessKeyId=AKIAIQFJLILYGVD4AMQ&Expires=1583273935&Signature=GZfZNY6WCt98oApLmABGUfPG2qk%3D

The 2011-16 Land Cover Change project was completed for the PA Department of Community and Economic Development (DCED) in support of the *2020 State Land Use and Growth Management Report*. The data analysis was completed by Craig Ebersole, PA Department of Conservation and Natural Resources, Bureau of Geological Survey in August-September 2019. Mr. Ebersole can be contacted via phone, 717-702-2023, or email, caebersol@pa.gov.

Contents included in the project file:

- LandCover_1116.xlsx – spreadsheet containing report-ready data charts and tables, and land cover change matrices for DCED Partnership for Regional Economic Performance (PREP) regions.
- Readme_LandCover_1116.pdf – Readme file (this document) for the 2011-16 Land Cover Change project.
- LandCover_16_Map_Landscape.pdf – landscape-oriented, letter-sized map of 2016 Pennsylvania Land Cover.
- LandCover_16_Map_Portrait.pdf – portrait-oriented, letter-sized map of 2016 Pennsylvania Land Cover.
- Yang_2018.pdf – detailed explanation of National Land Cover Database data processing methods.

ACQUISITION AND USE OF DATA COMPILED FOR THE DCED 2020 STATE LAND USE GROWTH MANAGEMENT REPORT

- 1) The data presented in the accompanying spreadsheet is derived from land cover data from the National Land Cover Database (NLCD). The NLCD is produced by the United States Geological Survey (USGS) in partnership with other federal agency members of the Multi-Resolution Land Characteristics (MRLC) consortium. The NLCD Geographic Information System datasets used in this analysis are the NLCD 2016 Land Cover (CONUS) and NLCD 2011 Land Cover (CONUS) rasters, available from the MRLC website. The NLCD raster data is compiled from Landsat imagery and geospatial ancillary datasets at a 30-meter resolution.
 - a. [MRLC Website](#)
 - b. **Preferred citation (for both 2011 and 2016 NLCD data):** Yang, L., Jin, S., Danielson, P., Homer, C., Gass, L., Case, A., Costello, C., Dewitz, J., Fry, J., Funk, M., Grannemann, B., Rigge, M. and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies, *ISPRS Journal of Photogrammetry and Remote Sensing*, vol 146, p. 108-123.
- 2) Users of the data need to be aware since the reporting period for the *2015 State Land Use Growth Management Report* (2015 Report), the USGS developed a new data processing method to create a new generation of NLCD products under the umbrella name, “NLCD 2016.” The new data processing method used to generate the 2016 land cover data was retroactively applied to all previous years of NLCD Continental U.S. (CONUS) data. Consequently, the 2011 data used to complete this 2011-2016 land cover change analysis are not the same as the 2011 data used in the 2006-2011 study, despite being provided by the same organization. Additionally, according to the MRLC website, the products of NLCD 2016, “are not directly comparable to previous products.” Therefore, the results of this study cannot be compared to previous results. Furthermore, the NLCD data used in the 2015 Report is no longer available from the MRLC. Additional information about the new processing method can be found in the “Yang_2018” PDF included in the project zip file.
- 3) The *NLCD 2016 Land Cover (CONUS)* and *NLCD 2011 Land Cover (CONUS)* data rasters were downloaded from the above referenced website and individually imported into ArcMap 10.4.1 in their original projection (Albers Conical Equal Area). Each raster was clipped to a 10-mile buffered Pennsylvania outline with the Clip tool.
- 4) The buffered Pennsylvania rasters were reprojected into DCNR’s NAD 1983 Lambert Conformal Conic coordinate system.
- 5) The buffered Pennsylvania rasters were clipped to a polygon of Pennsylvania’s boundary. The buffering polygon was created by dissolving the Pennsylvania Department of Transportation’s “PaMunicipalities2019_05” shapefile provided to Pennsylvania Spatial Data Access (PASDA).
- 6) Rasters for each of the ten DCED PREP regions were clipped from both the 2011 and 2016 statewide rasters. The polygons for the prep regions were created by dissolving the “PaMunicipalities2019_05” shapefile by county code and then merging counties into each PREP region.

- 7) The PREP region rasters for both years were converted to polygons using the Raster to Polygon tool, while retaining the “Value” attribute field, which corresponds to an NLCD Land Cover Classification.
- 8) For each PREP region, the 2011 and 2016 land cover polygons were intersected so that each polygon cell contained a land cover classification value for 2011 and 2016. A field (Area_acres) was added to the attribute table of each region’s intersected polygon feature class. The “Calculate Geometry” tool was used on this field to calculate the area in acres for each feature in the feature class.
- 9) Each region’s intersected land cover attribute table was exported from ArcMap into Microsoft Excel .xlsx spreadsheets. For each region a change matrix was generated by creating a pivot table using the fields for 2016 cover, 2011 cover, and Area (acres). The matrices are organized with 2016 land cover data in columns and 2011 land cover in rows.
- 10) A collection of report-ready tables, charts, and change matrices are included in the **LandCover_1116**. All land cover area data is presented in acres. The “Report Tables” page contains statewide data tables and bar graphs structured as their 2006-11 counterparts were in the 2015 Report. The information on this page is a compilation of the regional data also presented in the spreadsheet. Each region has a page that includes a change matrix and several pie and bar graphs to visualize the land cover changes.
 - a. Please note: Land cover data is presented in some diagrams in a generalized or composite format. In these charts similar NLCD land cover classifications are aggregated into a single classification. The aggregated classifications are: “Developed” consisting of Low, Medium, and High Developed classifications; “Forest” consisting of Deciduous Forest, Evergreen Forest, and Mixed Forest classifications; “Agriculture” consisting of Pasture/Hay and Cultivated Crops; and, “Wetlands” consisting of Woody Wetlands and Emergent Herbaceous Wetlands.
- 11) How to read the change matrices:
 - a. The change matrix is a spreadsheet that quantifies the amount of change that occurs between two dates of land cover (i.e. 2011 and 2016). The change matrix spreadsheets are structured with the 2016 land cover classifications organized into columns and the 2011 land cover classifications organized into rows.

Figure 24: Example Region (acres)

2016 - TO class								
2011 - FROM class	Land Cover Classifications	Open Water	Developed, Med	Deciduous Forest	Pasture/ Hay	Total Losses (acres)	Total Area (acres)	Total Area %
	Open Water	500	0	70	10	80	580	2.5
	Developed, Med	0	2,000	0	0	0	2,000	8.7
	Deciduous Forest	150	50	12,200	400	600	12,600	55.1
	Pasture/Hay	15	120	550	7,000	685	7,685	33.6
	Total Gains (acres)	165	170	620	410	1,365		
	Total Area (acres)	665	2,170	12,620	7,410		22,865	
	Total Area %	2.9	9.5	55.2	32.4			100

Table 1: Land cover change matrix example. This table can be used to determine how land use changed among categories between 2011 (rows) and 2016 (columns). Reading across the rows and down the columns provides detailed information about changes between specific land cover classifications. For example, reading across the Deciduous Forest row indicates 50 acres of forest converted to Medium Developed; interpreted another way, Deciduous Forest lost 50 acres to Medium Developed. Reading down the Deciduous Forest column indicates 550 acres of Pasture/Hay converted to Deciduous Forest; interpreted another way, Deciduous Forest gained 550 acres from Pasture/Hay. The colored cells indicate the area of no land cover change.

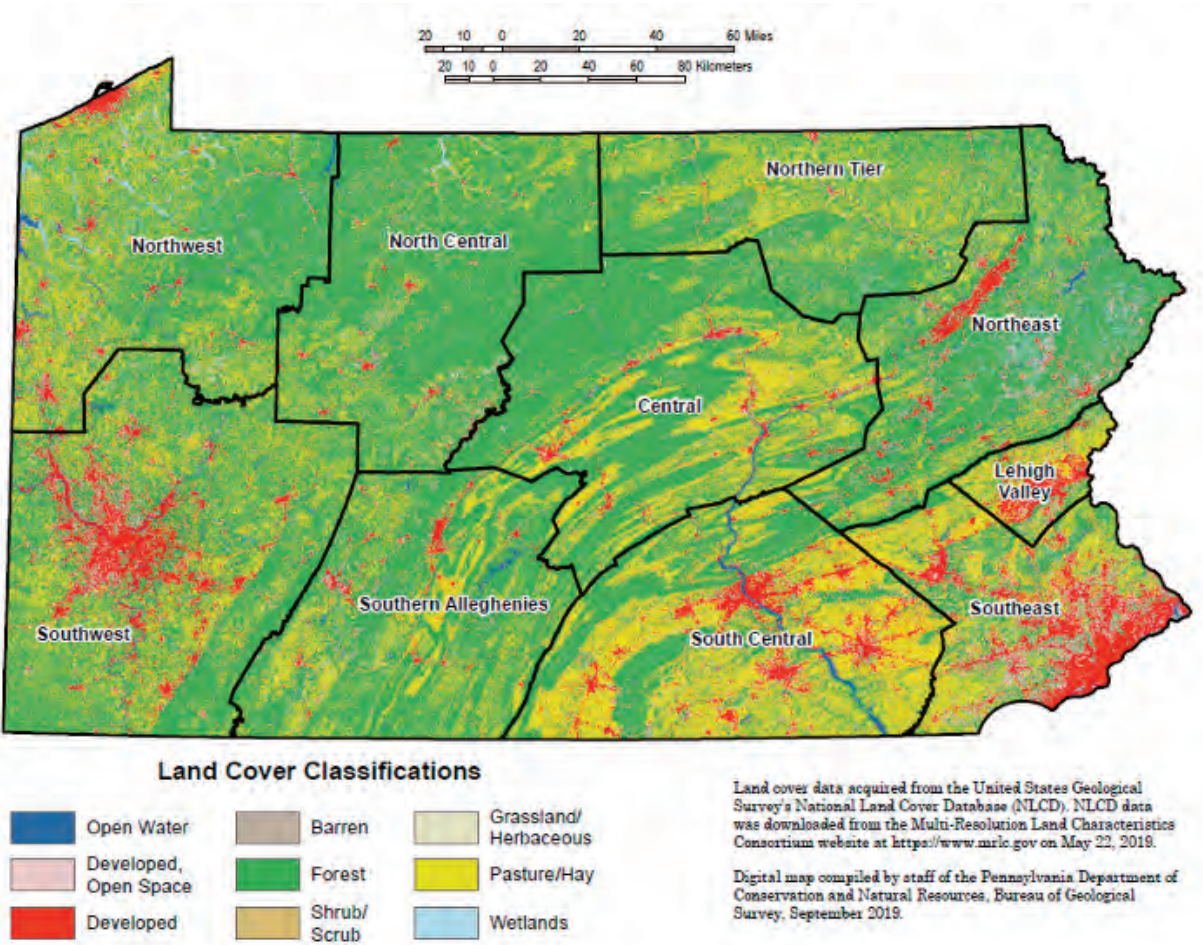
Furthermore, reading across the Deciduous Forest row indicates there were a total of 12,600 acres of Deciduous Forest in 2011. Reading down the Deciduous Forest column indicates there were a total of 12,620 acres of Deciduous Forest in 2016. The net change of Deciduous Forest can be found by subtracting the 2011 area (12,600) from the 2016 area (12,620) for a total increase of 20 acres between 2011 and 2016.

Figure 25: Classification Description

Class / Value	Classification Description
WATER	
11	Open Water — areas of open water, generally with less than 25% cover of vegetation or soil.
DEVELOPED	
21	Developed, Open Space — areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	Developed, Low Intensity — areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
23	Developed, Medium Intensity — areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
24	Developed High Intensity — highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
BARREN	
31	Barren Land (Rock/Sand/Clay) — areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
FOREST	
41	Deciduous Forest — areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
42	Evergreen Forest — areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	Mixed Forest — areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
SHRUBLAND	
52	Shrub/Scrub — areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
HERBACEOUS	
71	Grassland/Herbaceous — areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
PLANTED / CULTIVATED	
81	Pasture/Hay — areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
82	Cultivated Crops — areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
WETLANDS	
90	Woody Wetlands — areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
95	Emergent Herbaceous Wetlands — Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Figure 2: Pennsylvania 2016 Land Cover Composite Map

Figure 2 Map is from page 5 for reference.



Source: Pennsylvania Department of Conservation and Natural Resources, (2019)

*See Appendix I for detailed description for 2011 area data correction.



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