2023

Master Plan Element Section IX

Conservation Plan Element

Adopted November 8, 2023

Township of West Windsor | Mercer County, New Jersey

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Conservation Plan Element of the Master Plan

Township of West Windsor
Mercer County, New Jersey

Prepared for the Township of West Windsor
Planning Board

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The Planning Board thanks the members of the West Windsor Environmental Commission for their contributions to this element and for their continued service to our community

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Table of Acronyms

Acronym	Meaning
AQI	Air Quality Index
ANJEC	Association of New Jersey Environmental Commissions
BMP	Best Management Practices
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act CERCLA
CDC	Center for Disease Control
CFL	Compact Fluorescent Light
CO	Carbon Monoxide
CRTK	Community Right to Know
dBA	Decibel
DRCC	Delaware and Raritan Canal Commission
DFE	Design Flood Elevation
EPA	Environmental Protection Agency
ERI	Environmental Resource Inventory
FEMA	Federal Emergency Management Agency
FW	Freshwater
GIS	Geographic Information System
HUC	Hydrologic Units
KCS	Known Contaminated Sites
LOI	Letter of Interpretation
LU/LC	Land Use/Land Cover
MCIA	Mercer County Improvement Authority
MCSCD	Mercer County Soil Conservation District
MLUL	Municipal Land Use Law
MG/MC	Milligrams Per Cubic Meter
NJAC	New Jersey Administrative Code
NAAQS	National Ambient Air Quality Standards
NHD	National Hydrology Dataset
NJAC	New Jersey Annotated Code
NJDEP	New Jersey Department of Environmental Protection
NJGS	New Jersey Geological Survey
NJSA	New Jersey Statutes Annotated
NO2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NRCS	Natural Resource Conservation Service
NWI	National Wetlands Inventory
O3	Ozone
Pb	Lead
pCi/1	Picocuries Per Liter
PI	Site Remediation Program Interest Number
PM	Particulate Matter
PPB	Parts Per Billion
PPM	Parts Per Million
PPT	Parts Per Thousand
PSI	Pollutant Standards Index
RAP	Remedial Action Permit
REM	Remediation
SARA	Superfund Amendments and Reauthorization Act
SO2	Sulfur Dioxide
UG/M3	Micrograms per Cubic Meter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tanks
WBP	Watershed-Based Plans
WMA	Watershed Management Area

Section 1:
Introduction and Overview

The following section introduces the 2023 Township of West Windsor Conservation Plan Element of the Master Plan.

1.1: Introduction to the Plan

Conservation is essential for maintaining the well-being of a community.

The conservation of natural resources is directly linked to the promotion of the public health, safety, and general welfare. The benefits of conservation are numerous. For example, the proper management of the natural landscape serves to expand and sustain the diversity of local habitat while also promoting a desirable community aesthetic. Conservation also assists with flood control, water quality improvement, oxygen replacement and pollution dilution, soil erosion control, micro-climactic benefits, windbreak, and provides increased opportunities for passive recreation. Inappropriate land development can result in adverse impacts upon natural areas, greatly diminishing these benefits. Therefore, the conservation and cultivation of natural resources is a quintessential component in contributing toward the creation and maintenance of a desirable quality of life.

Similarly, the preservation and restoration of historic resources, including farmland preservation, offers significant benefits to the community. Historic resources provide a foundational knowledge which helps a community better understand itself and the lands in which it lives, thereby contributing to a sense of local pride. This knowledge can also assist with present and future decision-making process concerning community growth. Historic and farmland resources also offer opportunities for recreation and education. Farm preservation can establish a desirable pastoral aesthetic and can preserve a historic way of life which is characteristic of the community.

Accordingly, the following 2023 Conservation Plan Element of the Master Plan is designed to promote the preservation, conservation, restoration, cultivation, and appropriate utilization of the Township's natural and historic resources as a benefit to the community. It contains information regarding the current status of West Windsor's various natural resources and conservation related issues. This information relies upon the work of the Township Environmental Commission.

Due to the broad nature of conservation issues, this 2023 Conservation Plan Element also includes information relevant to farmland protection and open space preservation. Both farmland preservation and open space preservation are addressed in separate elements of the master plan. Accordingly, the 2023 Conservation Plan should be reviewed in conjunction with the 2023 Farmland Preservation Plan and the 2018 Open Space and Recreation Plan.

It should be noted that this 2023 Conservation Plan Element builds upon a vast amount of work already completed by the Township and the Environmental Commission. In 2022, the Township was just one of thirty-six municipalities to have Silver Certification from Sustainable Jersey, a network and movement of municipalities, schools, and school districts "working collectively to bring about a sustainable New Jersey."[1] To achieve such a certification, West Windsor was tasked to develop a green team, complete certain priority actions, and amass a total of at least three hundred and fifty points from sustainable actions

[1] https://www.sustainablejersey.com/about/

(the Township in fact amassed three hundred and ninety such points). The Township has been Silver Certified since 2013.

In addition, the Township is also a member of the Mercer County Sustainability Coalition, which is an "alliance of the green teams and sustainability organizations of Mercer County designed to promote a regional and collaborative approach to sustainability initiatives."[2] In April 2022, the Township participated in the Coalition's "Greening Together" program, which is a week-long environmental celebration featuring webinars and activities. Furthermore, the Township also consults with Rutgers University's Master Gardeners of Mercer County program, which is designed to "educate the community on research-based horticulture and gardening practices through a network of trained volunteers directed and supported by Rutgers University faculty and staff."[3]

Moreover, the Environmental Commission has a longstanding relationship with the Association of New Jersey Environmental Commissions (ANJEC), a nonprofit organization whose mission is to "promote local action to protect and restore New Jersey's natural resources and to ensure healthy communities for today and the future."[4] ANJEC provides a series of lectures, webinars, and other educational offerings which keep the Environmental Commission up-to-date on the latest environmental, scientific, and technological news which, in turn, allows the Environmental Commission to keep the Township Council informed on important and evolving environmental matters. The Environmental Commission also works with local schools as well as with local girl and boy scout troops on community environmental projects. A member of the Environmental Commission also participates in the environmental stewardship program conducted through Rutgers University. Finally, a member of the Environmental Commission also sits on the Planning Board.

The 2023 Conservation Plan Element of the Master Plan is divided into the following sections.

- Section 1: Introduction and Overview

  The remainder of this introductory section discusses what a master plan is, as well as the statutory requirements for master plans and conservation plan elements in particular.

- Section 2: Goal and Policies

  Next, Section 2 outlines the goal and policies of the Township of West Windsor as they relate to conservation.

- Section 3: Summary of Local Conservation Activities

  Section 3 provides a background on the Township's conservation activities.

- Section 4: Existing Conditions

  Section 4 provides a snapshot of the Township's existing conditions, including its setting, context, geology, topography, and climate.

[2] https://mercersustainabilitycoalition.org/about-2/
[3] https://mgofmc.org/
[4] https://anjec.org/who-we-are/

- Section 5: Air Quality

  Section 5 discusses the air quality of the community.

- Section 6: Hydrology

  Section 6 discusses hydrological issues, including groundwater and surface water.

- Section 7: Soils

  Section 7 discusses the soils of West Windsor. The Township's physiographic regions, soil types, erosion hazards, surface runoff, and farmland soils are analyzed.

- Section 8: Vegetation and Wildlife Habitats

  Section 8 discusses vegetation and wildlife habitats.

- Section 9: Greenbelt Plan

  Section 9 discusses the Township's Greenbelt Plan.

- Section 10: Wetlands

  Section 10 provides an overview of the Township's wetlands, including their definitions, identifying factors, and classifications.

- Section 11: Land Use/Land Cover

  Land use and land cover data from the New Jersey Department of Environmental Protection (NJDEP) is discussed in Section 11.

- Section 12: Cultural Sites

  Section 12 identifies the various cultural sites of the community.

- Section 13: Waste Management/Recycling

  Section 13 provides an overview of waste management and recycling.

- Section 14: Regional Relationships

  Section 14 analyzes the regional relationships of the Township, including its relationship to the State Development and Redevelopment Plan (SDRP), Mercer County Master Plan, Delaware and Raritan Canal Commission (DRCC), and watershed planning associations.

- Section 15: Other Conservation Issues

  Section 15 discusses other conservation issues of the Township which are largely related to contamination and environmental reporting.

- Section 16: Recommendations

  Finally, Section 16 offers recommendations relating to open space, the Township Greenbelt, development standards, and site planning.

1.2: Overview of a Master Plan

The Municipal Land Use Law (MLUL), which serves as the guiding legal document for planning and zoning throughout the State of New Jersey, identifies a master plan as:

> *"…a composite of one or more written or graphic proposals for the development of the municipality as set forth in and adopted pursuant to section 19 of P.L. 1975, c.291 (C.40:55D-28)."*

In other words, a master plan is a comprehensive, long-term strategic document which is intended to guide the growth and development of a community. It is a roadmap, one which identifies where a municipality presently is and where it wishes to be in the future. A master plan develops the general parameters around which development is to occur and, specifically, where different types of development should occur. By doing so, a master plan links a municipality's land use vision to its existing and proposed zoning regulations.

Master plans therefore provide municipalities with the legal basis to control development through the adoption of land use ordinances which are designed to implement its goals, policies, and recommendations. As per the MLUL, a Planning Board must reexamine its master plan at least once every ten years in order to ensure it is timely and effective.

As established by NJSA 40:55D-28 of the MLUL, the planning board is the designated entity responsible for the preparation and adoption of a master plan. A master plan must be adopted at a public hearing after proper public notice, thus ensuring that the community has an opportunity to contribute, ask questions, and offer recommendations.

The MLUL further identifies the mandatory contents of a master plan, which include:

- A statement of objectives, principles, assumptions, policies, and standards upon which the constituent proposals for the physical, economic, and social development of the municipality are based;
- A land use plan;
- A recycling plan, and;
- A housing plan.

In addition, the MLUL identifies a number of other optional plan elements which may be incorporated into a comprehensive master plan.

The following table identifies the elements incorporated into the Township of West Windsor Master Plan as of the date of the adoption of this Conservation Plan. These plans are all publicly available on the Township of West Windsor website.[5] It also lists additional optional elements of a master plan identified by the MLUL which the Township has not adopted.

Section	Element	Status	Date	MLUL
I	Introduction	Adopted	2002	Optional
II	Goals/Policies Summary	Adopted	2002	Required
III	Land Use Plan	Adopted	February 12, 2020	Required
IV	Housing Element & Fair Share Plan	Adopted	February 27, 2019	Required
V	Circulation Plan	Adopted	December 15, 2021	Optional
VI	Utilities Plan	Adopted	December 15, 2021	Optional
VII	Community Facilities	Adopted	October 26, 2022	Optional
VIII	Open Space and Recreation Plan	Adopted	November 28, 2018	Optional
IX	Conservation Plan	Adopted	November 8, 2023	Optional
X	Farmland Preservation Plan	Adopted	March 1, 2023	Optional
XI	Relationship to Other Plans	Adopted	February 12, 2020	Required
XII	Stormwater Management Plan	Adopted	March 2005	Optional
XIII	Sustainability Plan	Adopted	October 14, 2009	Optional
XIV	Historic Preservation	Adopted	August 16, 2023	Optional
---	Economic Plan	Not Adopted as of the date of this Element	---	Optional
---	Development Transfer Plan	Not Adopted as of the date of this Element	---	Optional
---	Educational Facilities Plan	Not Adopted as of the date of this Element	---	Optional
---	Public Access Plan	Not Adopted as of the date of this Element	---	Optional

1.3: Conservation Plan Element Requirements

The MLUL at NJSA 40:55D-28.b(8) identifies the requirements of a conservation plan element. It establishes that a such an element shall include information:

> *"providing for the preservation, conservation, and utilization of natural resources, including, to the extent appropriate, energy, open space, water supply, forests, soil, marshes, wetlands, harbors, rivers and other waters, fisheries, endangered or threatened species wildlife and other resources, and which systemically analyzes the impact of each other component and element of the master plan on the present and future preservation, conservation and utilization of those resources."*

[5] https://westwindsornj.org/master-plan

1.4: Climate Change

One of the overarching considerations of this Conservation Plan Element of the Master Plan is climate change.

In 2020, the New Jersey Department of Environmental Protection released its *Scientific Report on Climate Change*.[6] The report is intended to synthesize the latest and most reliable scientific information on the current and predicted future impacts on climate change. By doing so, it is the aim of the report to inform state and local decision-makers as they continue to understand and respond to the wide-ranging impacts of climate change. These impacts include, but are not limited to, the following:

Temperatures	Weather	Water	Air Quality
New Jersey's average temperature has increased 3.5 degrees since 1895. Heatwaves are expected to impact larger areas with more frequency and longer duration by 2050.	Annual precipitation is expected to increase by 4% to 11% by 2050. Extreme weather events are expected to increase by 71% over the next 50 years. Droughts may occur more frequently.	The ocean is 30% more acidic since the Industrial Revolution due to increased levels carbon dioxide. By 2050, there is a 50% chance that sea-level rise will meet or exceed 1.4 feet. Surface and groundwater quality will be impaired as increased nutrients and contaminants enter waters.	Air quality will be impacted due to changes in meteorological conditions often referred to as the ozone-climate penalty, which is the "deterioration of air quality due to a warming climate."

These global impacts will, in turn, have local impacts on the West Windsor community. At particular risk are socially vulnerable populations, including children, the elderly, those with respiratory and cardiovascular illnesses, and the economically disadvantaged. Ecosystems and wildlife are also continually threatened by climate change; rapidly changing natural environments threaten native species while increasing the likelihood of invasive species. Climate change also threatens infrastructure essential to the public health, including agriculture, food production, and water supply and treatment facilities.

[6] https://www.nj.gov/dep/climatechange/pdf/scientific-report-on-climate-change-at-a-glance.pdf

While the answer to combatting climate change ultimately relies upon a global response, there nevertheless remain numerous local measures to help mitigate its impact. Some of these measures include the following.[7]

The State of New Jersey has also taken steps to combat the effects of climate change. On February 15, 2023, Governor Murphy adopted two executive orders intended to serve as part of the foundation for a cleaner, greener, and more resilient New Jersey.

- **Executive Order 315** establishes an accelerated target of one hundred percent clean energy by 2035 (as opposed to the previous target of 2050), which is defined as one hundred percent of the electricity sold in the State coming from clean sources of electricity.[8] For reference, the 2019 New Jersey Energy Master Plan defines "100% clean energy" as "100% carbon-neutral electricity generation and maximum transition to electrification of the transportation and building sectors by 2050, with the goal of meeting or exceeding the 80x50 Global Warming Response Act."[9] Thus, examples of clean energy pursuant to this definition include, but are not limited to, solar, wind, and nuclear energy.
- **Executive Order 316** establishes a target to install zero-carbon-emission space heating and cooling systems in four hundred thousand homes and twenty thousand commercial properties, as well as a target to make ten percent of all low-to-moderate income properties electrification-ready by 2030.[10]

[7] https://www.state.nj.us/transportation/eng/completestreets/pdf/NJCS_DesignGuide.pdf
[8] https://nj.gov/infobank/eo/056murphy/pdf/EO-315.pdf
[9] http://d31hzlhk6di2h5.cloudfront.net/20200127/84/84/03/b2/2293766d081ff4a3cd8e60aa/NJBPU_EMP.pdf
[10] https://nj.gov/infobank/eo/056murphy/pdf/EO-316.pdf

Section 2:
Goal and Policies

The following section outlines the goal and policies of the Township of West Windsor as they relate to conservation.

2.1: Goal and Policies

The overarching purpose of this 2023 Conservation Plan Element of the Master Plan is to protect the environmental resources of the Township while simultaneously accommodating growth and development. It is recognized that environmental protection, social cohesion, and economic vitality are not mutually exclusive. The information contained in this 2023 Conservation Plan distinguishes between those portions that are highly sensitive to disturbance or disruption and those areas where development is less likely to degrade the environment. When coupled with socioeconomic data, this information provides a foundation for sustainable land use decisions throughout the community.

Accordingly, the following goal and policies are hereby established for the Township of West Windsor as they relate to conservation. 10omp goal and its associated policies are equally applicable to the Open Space and Recreation Plan Element and the Sustainability Plan Element.

Goal:

To preserve and maintain the ecological, social, historic, visual, agricultural, and scenic resources of the Township, preserve the environment, and avoid or minimize detrimental impacts of land development upon natural, social, and historic resources to enhance the overall quality of life for Township residents.

Policy 1: Identify and protect ecological, historic, visual, agricultural and scenic resources through the use of creative land development techniques (i.e. clustering, lot averaging, flexible implementation of setbacks and buffers) and other methods as may be found effective and practical.

Policy 2: Continue to use the local open space tax to preserve environmentally sensitive areas, agricultural lands, parkland, Greenbelt, historic resources, and other conservation areas. In addition, pursue other State and County funding mechanisms and methods of acquisition and/or preservation as are available and practical (i.e., conservation easements, private donations).

Policy 3: Encourage the continued protection of the continuous Township-wide Greenbelt, including its existing and proposed areas. The Greenbelt shall incorporate natural areas, stream corridors, environmentally sensitive areas, and areas of scenic beauty in order to connect various parts of the Township through a unique open space network and to sustain and enhance the natural character of the community and quality of life for all West Windsor residents. The Township should continue to support and increase awareness of the Greenbelt and the Greenbelt Plan as well as their importance to the community.

Policy 4: Where possible, incorporate the Township Greenbelt Plan with State, County, and adjacent Community Greenbelt networks.

Policy 5: Where possible, link small or isolated environmentally sensitive or open space areas with those on adjoining tracts and, where practical, through to the established or proposed Greenbelt network.

Policy 6: Proactively protect, sustain, and expand the community forest, including street trees, park landscape, and natural areas wherever they occur.

Policy 7: To the extent possible, encourage existing agricultural areas to remain. Where possible, employ agricultural districting, land and/or development rights acquisition, and other methods to preserve agriculture, particularly in the southern portion of the Township where active agriculture is most viable. Employ specific farmland preservation planning to achieve this goal.

Policy 8: Active participation in farmland preservation programs should be fostered to retain existing farmland and create viable farm enclaves.

Policy 9: Maintain design and siting standards to protect the Township's historic and rural character throughout the Township, and particularly in the Township's original villages and centers and along those roadways where natural vegetation, farmland, or open space remain. These historic features and rural farmland areas should be preserved wherever possible, as they establish the pastoral open character of much of the Township and represent the community's heritage.

Policy 10: Encourage conservation of individual archaeological and historical landmarks wherever they occur, including clusters of locally significant historic sites and areas predominantly found in the crossroad villages of Edinburg, Dutch Neck, Port Mercer, and Penns Neck.

Policy 11: Continue to work with State and County organizations to promote environmental protection, open space, and farmland preservation. In addition, the Township should foster a working relationship with private and non-profit conservation groups (Friends of West Windsor Open Space, greenways, and/or watershed groups, etc.) to consolidate and coordinate conservation efforts.

Policy 12: Support and promote actions that preserve and improve the quality of both surface water bodies and groundwater resources and sustain air quality while reducing impacts upon the climate.

Policy 13: Recognize the critical need for climate science to inform land use planning, particularly in consideration of the impacts of climate change both locally and throughout the region.

Policy 14: Develop strategies to address the increasing threats of invasive species, including public education and outreach.

Policy 15: Monitor, manage, and maintain rain gardens and other similar stormwater management facilities to ensure that they retain their intended function and to limit the introduction of invasive exotic plant species.

Section 3: Summary of Local Conservation Activities

Section 3 provides a background on the Township's conservation activities.

3.1: Summary

Over the past several decades, West Windsor has benefited from progressive and productive actions in the arena of environmental conservation. The Township Environmental Commission, Planning Board, Zoning Board of Adjustment, Shade Tree Commission, the Agricultural Advisory Committee, and Mayor and Council as well as the Township's staff and consultants have all contributed to these conservation efforts. Furthermore, efforts provided by State and County agency programs as well as several non-profit organizations have also presented substantial opportunities and contributions. Through this collaborative work, several significant programs have been developed. These are summarized below.

3.2: Greenbelt

West Windsor established its Township Greenbelt Plan in 1977. The Greenbelt Plan establishes linear belts of conservation lands along stream corridors to preserve and sustain wildlife habitat, wetlands, floodplains, and native vegetation. This 1977 plan was developed by the Environmental Commission and has been updated several times since its initial adoption. The latest amendment to the Township Greenbelt Plan was in 1999. Much of the Greenbelt has been preserved as part of the extensive areas of open space set aside by deed or purchase of conservation easements or ownership by the Township. See Map 11 in Appendix B.

3.3: Environmental Resource Inventory

The Environmental Commission prepared a Natural Resource Inventory which was initially adopted in 1979. This document was the first comprehensive inventory of West Windsor's environmental landscape. It was later revised in 1991 and 2003, and was most recently revised in 2006. The mapping and descriptions offered with this element now serve as the Environmental Resource Inventory (ERI) for the community.

3.4: Water Quality Monitoring

For a period of time, the Township operated a sampling program to monitor surface water quality throughout the municipality. The information from this monitoring program was utilized to identify trends and significant changes in water quality. It included pollutants such as total coliform, fecal coliform, biochemical oxygen demand, chemical oxygen demand, total suspended solids, pH, and total phosphorus. The Environmental Commission administered this program before ultimately deciding to discontinue it, as it had become redundant relative to other programs conducted by the United States Geological Survey (USGS), the New Jersey Department of Environmental Protection (NJDEP), and local watershed association programs. Additional information on water quality monitoring testing times and results can be obtained utilizing the NJDEP's NJ-GeoWeb online mapping resource.

Section 4:
Existing Conditions

Section 4 provides a snapshot of the Township's existing conditions, including its setting, context, geology, topography, and climate.

4.1: Township Setting

The Township of West Windsor is located along the easterly border of Mercer County, immediately adjacent to its border with Middlesex County. It is bounded by the Municipality of Princeton and the Township of Plainsboro to the north, the Township of East Windsor to the east, the Township of Robbinsville and the Township of Hamilton to the south, and the Township of Lawrence to the west. As per the US Census Bureau, the Township has a total area of 26.27 square miles, which includes 25.56 square miles of land area and 0.71 square mile of water. It is the third largest municipality in Mercer County.

When looking at the regional highway system, the Township is nearly equidistant from New York City and Philadelphia. This centralized location along the greater transportation system between two large cities makes West Windsor a prime location for residential and commercial land development. This is evident in the Township's recent rate of growth. Between 1990 and 2021, the United States Census Bureau and the American Community Survey (ACS) estimates that approximately 5,200 dwelling units were constructed in West Windsor. Nevertheless, the Township has endeavored to create a sustainable, livable community by preserving over 8,300 acres of open space, which represents nearly one-half of its land area.

4.2: Base Map

The base map used in the Conservation Element and Environmental Resource Inventory (ERI) relies upon the most updated Geographic Information Systems (GIS) parcel data maintained by the Township. Utilizing data from the National Hydrology Dataset (NHD) from the United States Geological Survey (USGS), the base map also identifies surface water located within the Township, such as Lake Mercer, Grovers Mill Pond, Millstone River, Delaware & Raritan Canal and Duck Pond Run.

An ERI is "a compilation of text, tables, maps and other visual information about the natural resource characteristics and environmentally significant features of an area."

- https://anjec.org/

In order to facilitate the effectiveness of the Conservation Element and ERI for the Township Government and its constituents, the Environmental Commission proposes that an electronic version of the base map be made available upon the request of any interested party. Such availability could facilitate the submission of electronic site-specific information to the Township from developers, state government, and environmental groups, thus improving the exchange of information and enhancing planning activities.

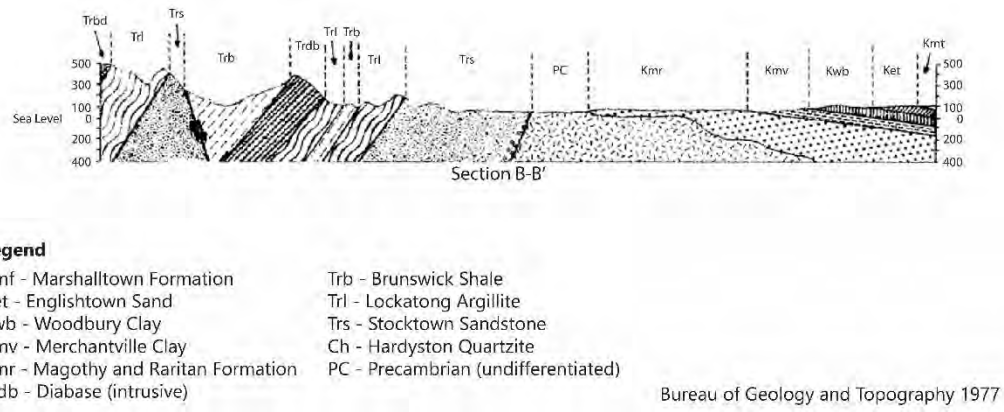
4.3: Geology

Map 02 in the Appendix of this 2023 Conservation Plan illustrates the five basic geologic formations found in the Township.

The definitive authority for New Jersey bedrock geology is the current edition of the state geological map[11] which includes not only primary bedrock formations, but also pertinent cross-sections which reflect the structural geology for the subsurface. The information contained herein is primarily based upon this information.

The Township is located on the boundary of two physiographic provinces which reflect the bedrock geology in the subsurface. This was also shown in simplified form by Widmer in 1977, including a useful east-west cross section (B-B').[12, 13] This natural feature is related to the topographic Fall Line of the eastern United States and is also reflected in various cultural features, including prehistoric and historic trails, the route of principal railroad lines, and the position of the US Route 1 corridor. This interpretation of the basic structure and stratigraphy (i.e. the branch of geology concerned with the order and relative position of strata and their relationship to the geological time scale) has long been known and is basically described the same way in older[14] and more recent[15] publications.

Figure 1: Geologic Cross-Sections of Mercer County[16]



[11] Dalton, R. F., Monteverde, D. H, Sugarman, P. J, and Volkert, R. A., 2014. Bedrock Geological Map of New Jersey. New Jersey Department of Environmental Protection, New Jersey Geological Survey.
[12] Widmer, K. 1965. Geology of the Ground Water Resources of Mercer County. New Jersey Geological Survey.
[13] Widmer, K. 1977. Geology of Mercer County in Brief. New Jersey Geological Survey.
[14] Lewis, J. V. and Kummel, H. B., 1910-1912. Geologic Map of New Jersey: N. J. Department of Conservation and Development, Atlas Sheet 40, revised 1931 by H. B. Kummel and 1950 by M. E. Johnson. Scale 1:250,000.
[15] Owens, J. P., Sugarman, P. J., Sohl, N. F., Parker, R. A., Houghton, H. F., Volkert, R. A., Drake, A. A., and Orndorff, R. C.; 1998. Bedrock Geologic Map of Central and Southern New Jersey. United States Geological Survey Miscellaneous Investigations series. Map I-2540-B, 8 cross sections. Scale 1: 100,000.
[16] https://www.state.nj.us/dep/njgs/enviroed/county-series/Mercer_County.pdf

The northwesterly portion of the Township, including Penns Neck, belongs to the Piedmont Province which is underlain by rocks of the Triassic age, the Stockton Formation. It is strongly considered arkosic (feldspar-rich) sandstone, and the thickness exceeds one thousand meters (3,280 feet). It is notable for being the prime source of the brownstones of commerce. The regional dip (slope) of these rocks is toward the northwest. The age of the rocks is approximately 200 million years.

The southeasterly portion of the Township belongs to the Inner Coastal Province which is underlain by rocks of the Cretaceous age, mapped as three sequential formations. These are (lower to upper) the Potomac, Magothy, and Merchantville Formations. The regional dip of these formations is southeasterly. They are relatively fine grained unconsolidated sediments, such as sands and clays. The Magothy Formation is up to eighty meters thick and consists of quartz sands, which are fine to course-grained. The Potomac and Magothy units (which are also associated with the Raritan Formation in Middlesex County) are especially notable as aquifers and groundwater recharge strata[17] and underlie a substantial portion of the Township. The Merchantville Formation is up to twenty meters (sixty-five feet) thick in Mercer County. Much of it is bedded with clay and silt, with some glauconitic sands. It has less porosity and permeability than the other two formations, but it underlies only a small portion of West Windsor. The age of the Cretaceous sequence is approximately seventy to ninety million years.

As the Piedmont formations and the overlapping Inner Coast Plain formations meet at opposite dip directions, the bedrock along the intersection features rocks of extremely great age near its surface. This formation is a metamorphose crystalline unit generally known as the Wissahickon Schist (or Mica-Gneiss), with several additional metamorphic lithologies now recognized and mapped (metabasalt and gneiss/granofels/migmatite). It is the primary rock beneath the City of Trenton but is rarely exposed elsewhere, as it is generally located at a considerable depth in the subsurface. However, it has been mapped (although not necessarily visible) at the surface in West Windsor along the principal railroad right-of-way (See Map 02 in Appendix B). Such "basement rock" units are believed to be of Precambrian to Cambrian age, approximately 600 million years old or more.

Overlying much of the Township at the surface are various Quaternary sediments of the last one million years (Pleistocene to Holocene and Recent). These unconsolidated sediments[18] include the fertile alluvial soils which provided the notable agricultural heritage of West Windsor Township.

[17] Gill, H. E. and Farlekas, G. M. 1976. Geohydrologic Maps of the Potomac-Raritan-Magothy Aquifer System in the New Jersey Coastal Plain. United States Geological Survey Hydrologic Atlas 557.
[18] Newell, W. L., Powars, D. S., Owens, J. P., Stanford, S. D., and Stone, B. D.; 2000. Surficial Geologic Map of Central and Southern New Jersey. United States Geological Survey IMAP-2540-D.

4.4: Topography

Topographic maps are utilized to show the elevation or height of land surfaces above sea level. Contour lines are plotted to join locations of equivalent elevations. As shown on Map 03 in Appendix B, the topography of the Township is relatively flat with elevations generally ranging between sixty and one hundred feet above sea level (with one small portion of the Township nearing one hundred and twenty feet above sea level). More detailed topographic maps are available from the United States Geological Survey website[19], wherein stream valleys and ridge lines may be more easily identified.

Topographic maps also help identify sloped areas. Slope is defined as the vertical change in elevation for a horizontal distance and is typically expressed as a percentage. Slope is an important factor in considering land use. For example, slopes of less than ten percent (one foot of vertical rise for every ten feet of horizontal distance) may be suitable for most uses, although drainage problems may arise where a slope is less than two percent. Slope values between ten and fifteen percent, on the other hand, may impose some limitations on land use and development. Sites with such slopes may require more complex earthwork or grading, or the special design of septic systems. Furthermore, slopes of these categories may make certain agricultural practices infeasible. Slopes exceeding fifteen percent pose a potentially significant constraint on land use and development. Extensive grading is typically required for more residential and industrial development occurring within this slope category, and the operation of heavy earth-moving equipment is more hazardous. The clearing of steeply sloped sites can also cause erosion and sedimentation problems if runoff is not strictly controlled. Furthermore, the use of septic systems is difficult; nevertheless, steep slopes can accommodate lower density, large lot, single-family development if construction is sensitively planned.

While they exist, steep slopes are not common throughout the Township. Most steeply sloped areas in West Windsor typically occur along streams and within wooded areas. They also generally coincide with the Greenbelt and wildlife habitats, thus providing aesthetic benefits. These attributes, as well as the associated constraints on development, must be considered when planning for the use of such areas.

[19] https://www.usgs.gov/faqs/how-do-i-find-download-or-order-topographic-maps

4.5: Climate

The climate in West Windsor is based upon prevailing air currents, fluctuations in temperature, seasonal precipitation, and topographical protection from wind. Climate data can be obtained from the Office of New Jersey State Climatology at Rutgers University in New Brunswick, New Jersey. A website[20] managed by that office provides data which is collected from various monitoring station throughout the state.[21]

Prevailing Air Currents

The average wind speed and direction at the surface of the earth most commonly define prevailing air currents. Wind speed and direction data (referenced in degrees) in Mercer County are collected at the Trenton Mercer Airport by the National Oceanic and Atmospheric Administration (NOAA)[22]. In 2022, Mercer County had an average wind speed of 7.4 miles per hour. The lowest monthly average wind speed was 3.5 miles per hour, while the highest monthly average wind speed was 14.4 miles per hour. Sustained wind directions fluctuated between 020 degrees and 360 degrees.

Maximum/Minimum Fluctuations in Temperature

Fluctuations in temperature are listed according to daily maximum and minimum, seasonal average, and record high and low. Values are means in degrees Fahrenheit.

Table 1: Maximum/Minimum Fluctuations in Temperature (Mercer County, 2022)[23]

	Winter	Spring	Summer	Fall
Monthly Maximum Average	40.6	61.6	83.3	65.4
Monthly Minimum Average	23.0	39.1	61.1	44.0
Monthly Average	31.8	50.3	72.2	54.7
Monthly Record High	56.8	79.7	91.7	83.6
Monthly Record Low	5.9	21.5	52.3	26.8

Source: Rutgers University (Note: Data collected from 1895 to 2022)

[20] https://climate.rutgers.edu/stateclim/
[21] https://njweather.org/maps/station-locations
[22] https://www.ncei.noaa.gov/cdo-web/
[23] http://climate.rutgers.edu/stateclim_v1/nclimdiv/index.php?stn=NJ021&elem=maxt

Seasonal Precipitation

The following two figures measure the average seasonal precipitations experienced throughout Mercer County and the New Brunswick recording stations over the past thirty years, respectively. Seasonal precipitation is typically measured in inches and is divided into two groups: water equivalent and snow/ice pellets. As shown, average yearly precipitations have trended upwards, while yearly snowfall cumulations have trended downwards.

Figure 2: Mercer County Average Yearly Precipitation (inches)[24]

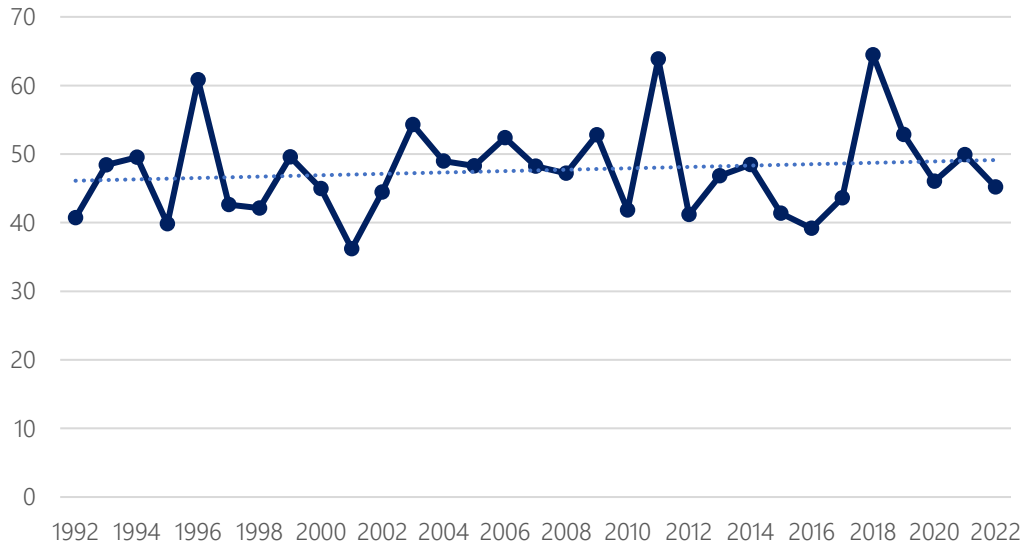
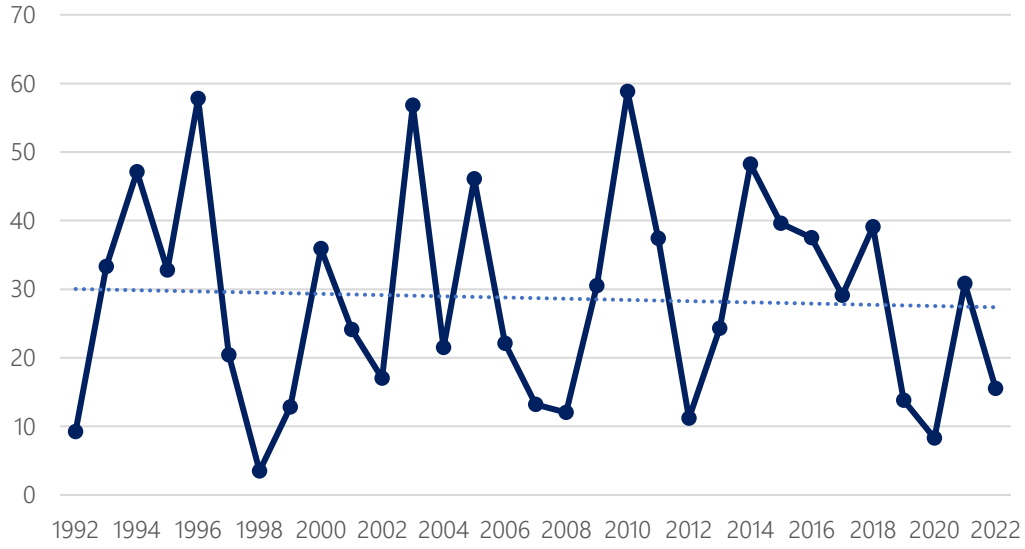
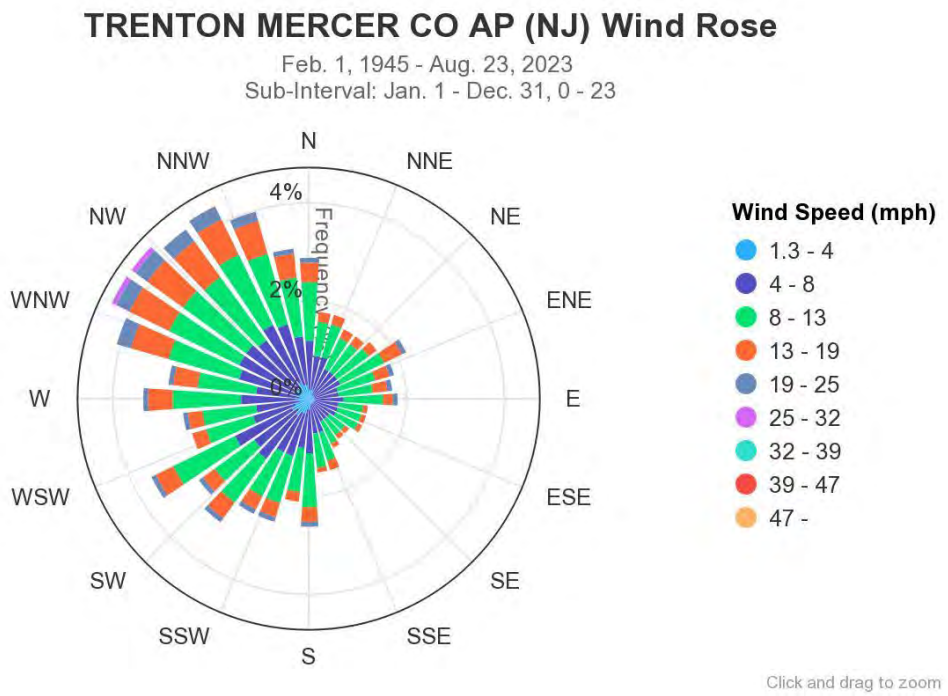


Figure 3: New Brunswick Average Yearly Snowfall (inches)[25]



[24] http://climate.rutgers.edu/stateclim_v1/nclimdiv/index.php?stn=NJ021&elem=pcpn
[25] New Brunswick utilized because up-to-date Trenton data not available: http://climate.rutgers.edu/stateclim_v1/monthlydata/index.php?stn=286055&elem=snow

Wind Rose



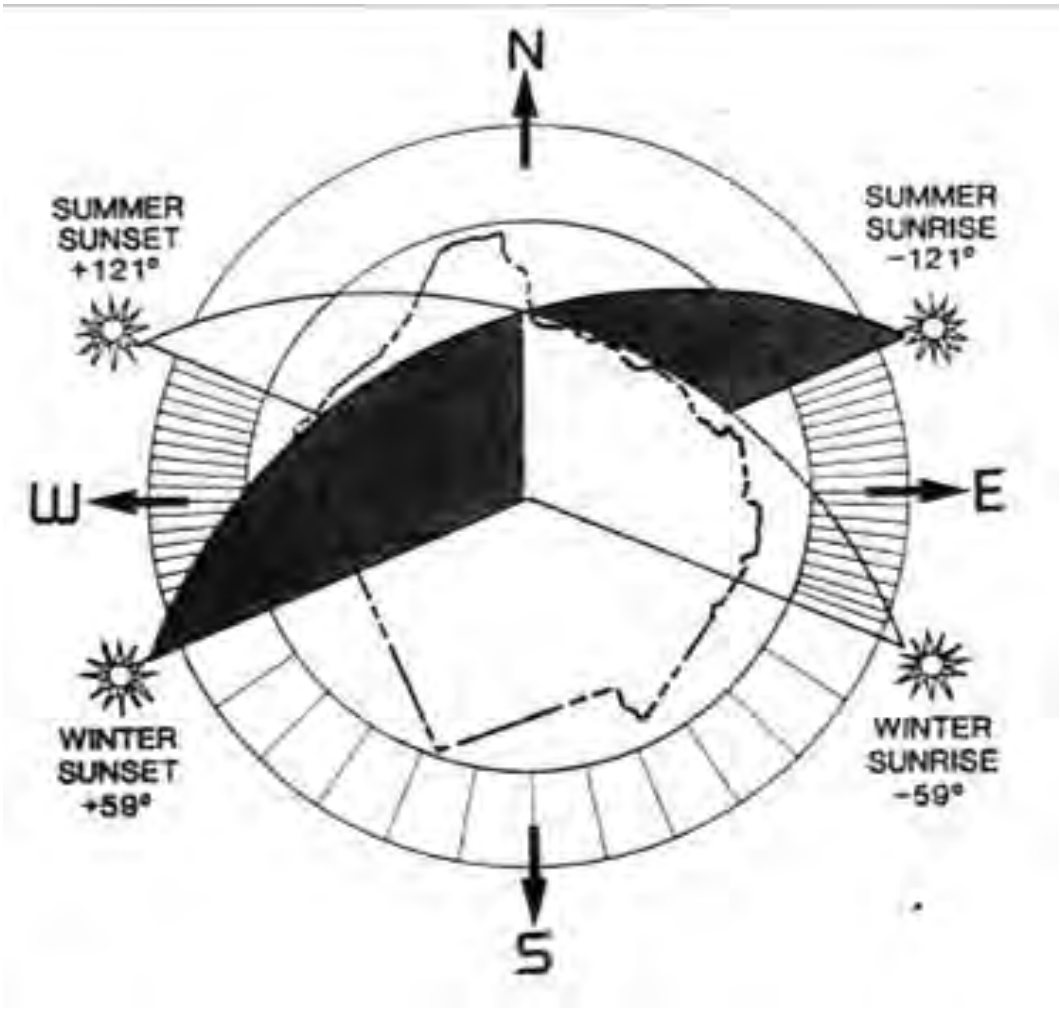
[26]

A wind rose diagram is a geographical representation which depicts the distribution of wind direction and speed at a location over a certain period of time. Wind rose diagrams are one of the most common ways to display wind data, as they can quickly indicate dominant wind directions as well as the directions of the strongest wind speeds. The length of each bar represents the percentage of time the window blows from that direction. The bars on a wind rose diagram also identify the wind speed ranges associated with each direction.

Wind roses can be utilized for developing energy conservation measures in site planning. However, topographical protection for wind is essentially a non-factor for the Township, as its elevations generally fluctuate between sixty and one hundred feet. Low-lying areas, such as wetlands, tend to be fog-bound depending on the weather conditions at any given time.

[26] Climate Monitoring | National Centers for Environmental Information (NCEI) (noaa.gov)

Sun Arc



The sun arc describes the sun's changes in position both seasonally and throughout daylight hours. Sun arc diagrams are tools utilized in solar access planning in order to determine the appropriate placement of solar collectors in relation to nearby trees, structures, and other obstructions.

A sun arc diagram can illustrate the position of the sun from: (1) east to west (azimuth), and; (2) height above the horizon (altitude). Altitude is measured in degrees from zero to ninety, with zero being sunrise/sunset and ninety signifying that the sun is directly overhead (noon). Solar azimuth is measured in the number of degrees from true south, with a negative value to the east and a positive value to the west. Solar angles (azimuth and altitude) determine the area of the sky that a solar collection system must "see" to perform effectively. This area is known as the "skyspace". The skyspace should be clear of shading from trees and other sun blocking structures. In the northern hemisphere, usable skyspace is between an azimuth of plus forty-five to minus forty-five. The altitudes of the sun on December 21 and June 21 determine the upper and lower boundaries of the skyspace. In most cases, the lowest altitude reached by the sun on December 21 produces the longest shadows of the year and determines the minimum distance between the passive or active solar collection system and adjacent buildings or obstructions.

Section 5:
Air Quality

Section 5 discusses the air quality of the community.

5.1: Overview

The following section discusses the air quality considerations of the Township. These includes air quality standards, air monitoring sites and statistics, descriptor ratings, sources of air pollution, and radon.

5.2: Air Quality Standards

Air quality is guided by the Clean Air Act of 1970, which was last amended in 1990. The Clean Air Act requires the United States Environmental Protection Agency (USEPA or EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Two types of standards have been established:

- Primary standards, which set public health limits to protect the health of "sensitive" populations including those with asthma, children, and the elderly, and;
- Secondary standards, which set limits to protect the public welfare, including protection against decreased visibility as well as damage to animals, crops, vegetations, and building.

The USEPA has set NAAQS for six principal "criteria" pollutants that are listed in Table 2.[27] Since the adoption of the previous Conservation Plan Element of the Master Plan, two landmark Supreme Court decisions ultimately ruled that carbon dioxide and greenhouse gases were air pollutants under the Clean Air Act and could be regulated by the EPA, but that the EPA cannot put state-level caps on carbon emissions.

Units for measurement for these standards are in parts per million (ppm) by volume, parts per billion (ppb), milligrams per cubic meter of air (mg/mc), and micrograms per cubic meter of air (ug/m^3).

[27] https://www.epa.gov/criteria-air-pollutants/naaqs-table

Table 2: Air Quality Standards

Pollutant	Standard		Averaging Time	Level	Form
Carbon Monoxide	Primary		8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead	Primary and Secondary		Rolling 3 month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide	Primary		1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary		1 year	53 ppb	Annual mean
Ozone	Primary and Secondary		8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Pollution	$PM_{2.5}$	Primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide	Primary		1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary		3 hours	0.5 ppm	Not to be exceeded more than once per year
https://www.epa.gov/criteria-air-pollutants/naaqs-table					

5.3: Air Monitoring Sites and Statistics

A daily air quality summary known as the Air Quality Index (AQI)[28] is prepared by the New Jersey Department of Environmental Protection (NJDEP). These state-wide summaries are divided into nine regions, in which various pollutants are measured. Each pollutant is given a daily AQI rating based upon the concentrations recorded for the previous day. The daily numerical AQI rating for a region is equal to the highest rating achieved by any pollutant within that region. A Pollutant Standards Index (PSI) rating of one hundred or greater indicates that at least one pollutant in the recording region has reached and/or exceeded a primary ambient air quality standard. AQI numerical ratings are described in Table 3.

Table 3: Air Quality Index (AQI)

AQI Level of Health Concern	Rating	Description
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects.

Source: 2021 New Jersey Air Quality Report from NJDEP

The Central New Jersey Recording Region, which includes West Windsor, measures pollutants at monitoring sites in Cattus Island, Colliers Mill, Monmouth University, Toms River, Trenton, Rider University, Rutgers University, and Washington Crossing. A comparison of AQI ratings (2021 annual summary) between the Central New Jersey Recording Region and Statewide recordings in number of days is shown in Table 4. Note that these numbers may be skewed lower than typically reported due to decreased automobile traffic resulting from the COVID-19 pandemic. An update of this data should be sought by the reader if this information is needed for any type of specific analysis or reporting, such as for the submittal of an Environmental Impact Assessment or Statement.

[28] https://www.airnow.gov/state/?name=new-jersey

Additional information on pollutants may be found in the 2021 Air Quality Report by the NJDEP Bureau of Air Monitoring. A website, http://www.state.nj.us/dep/airmon, may also be accessed for current air quality levels.

Table 4: Descriptor Ratings

	Good	Moderate	Approaching Unhealthy	Unhealthy
Central	355	10	0	0
Statewide	350	15	0	0

Source: 2021 New Jersey Air Quality Index Exceedance Days, prepared by NJDEP (updated March 23, 2022)

5.4: Sources of Air Pollution

The prior Conservation Plan Element identified three specific static sources of air pollution identified in the Township. The first source was the persistent utilization of agricultural biocides by the West Windsor farming community which, despite stringent State and Federal regulations, still was a significant source of air pollution. The second static source was the Township's compost station, which contributed to intermittent odor and air pollution. The third source was an incinerator located at the former BASF (also known as the Howard Hughes tract, now identified as the American Properties and/or the Bridgepoint 8 site) facility located on Clarksville Road.

In the years following the adoption of the Prior Conservation Plan element, the aforementioned compost facility was removed; the area in which it was located was capped and is currently the site of the Vaughn Lot which is managed by the West Windsor Parking Authority. Today, West Windsor now takes its compost to the Hamilton Ecological Facility in the Township of Hamilton. Furthermore, the incinerator located at the former BASF has since been removed.

Vehicular air pollution in the Township is primarily generated along the US Route 1 corridor. Increased traffic along this north/south corridor, particularly during rush hour periods, generates significant air pollution from both gasoline and diesel powered vehicles. The prevailing westerly wind direction likely presents this source as the most significant regular air pollution concern for the majority of the Township. The prior Conservation Plan had projected that the proposed Millstone Bypass would improve the flow of traffic with fewer emissions from stopped and/or slowed traffic. However, after receiving significant opposition by Princeton Township and Princeton Borough (since merged into the Municipality of Princeton) as well as several environmental groups, the State ultimately decided to abandon this project.[29] The Township's 2021 Circulation Plan Element of the Master Plan now recommends a new grade-separated connection across US Route 1 in order to provide more local east-west circulation. However, there is no timeline for this project.

[29] https://www.communitynews.org/princetoninfo/business/fastlane/life-in-the-fast-lane-millstone-bypass/article_e37767ba-9209-53ea-8814-8388a23cbe54.html

Two evolving issues may impact vehicular air pollution over the next several years. The first is increases in ecommerce, the reshoring of manufacturing, and increased consumer expectations regarding expedited delivery schedules. It is not clear how this change in retail sales will translate in terms of vehicular emissions (type of vehicle and miles traveled). A review of air quality monitoring data as well as traffic studies or statistics over the next few years, as the retail market resets and adjusts, will be necessary to determine if any and to what degree any changes in vehicular traffic result in changes in air quality.

Conservation of the Township Greenbelt, mature woodland, and natural areas should be fostered to help counter or dilute any potential degradation of air quality. Expansion of the community forest via expanded preservation of natural lands as well as the expansion of new woodland and trees in association with land development should be promoted.

Furthermore, New Jersey Assembly Bill A3352 was signed into law on November 8, 2021, which requires certain newly constructed warehouses to be solar-ready buildings. Specifically, any new warehouse building greater than 100,000 square feet in size must reserve at least forty percent of its roof area for the future installation of a photovoltaic or solar thermal system. This type of energy production should help reduce fossil fuel energy production and the potential for air pollution from these sources.

The second such issue is the increasing market for electric vehicles, which have the potential to reduce carbon pollution from transportation and thereby improve air quality. In a study conducted by the Electric Power Research Institute (EPRI) and the Natural Resource Defense Council (NRDC), electric vehicles were found to have the potential to reduce both annual greenhouse gas emissions and carbon pollution.[30] In 2012, only three hundred and thirty-eight electric vehicles were registered in the State of New Jersey. By 2022, this number has increased to over eighty thousand.[31] As of 2021, Mercer County had 3,934 registered vehicles, which represents the fourth highest county number.

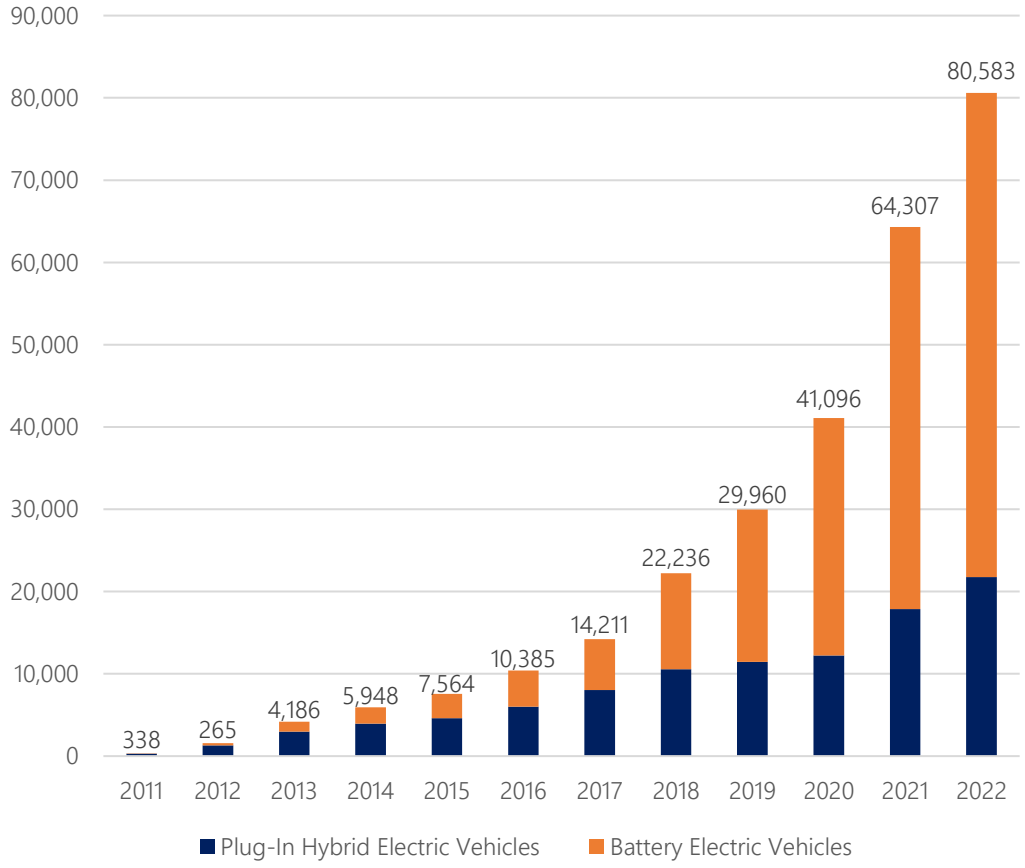
The utilization of electric vehicles, inclusive of the utilization of electric tractor-trailer vehicles, may also prove to be an effective means to offset the potential negative environmental air quality impacts. West Windsor Township has promoted, encouraged, and supported the transition to electric vehicles at community events (demonstration) and during the review of land development projects (installation of EV charging stations).

Nationally, the federal government has announced a goal to build a "national network of 500,000 electric vehicle chargers along America's highways…and have electric vehicles make up at least 50% of new car sales by 2030."[32]

[30] https://www.nrdc.org/experts/luke-tonachel/study-electric-vehicles-can-dramatically-reduce-carbon-pollution
[31] https://nj.gov/dep/drivegreen/dg-electric-vehicles-basics.html
[32] https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/

New Jersey's anti-idling regulations further assist in mitigating air pollution. Generally, these regulations limit idling times for vehicles not in motion – including diesel and gas-powered vehicles – to no more than three consecutive minutes. Idling laws are enforced by the NJDEP, the EPA, local health departments, and local police departments.

Figure 4: New Jersey Electric Vehicles, 2011-2022



Source: NJDEP Air Quality, Energy & Sustainability

Another potential mitigating factor in air pollution has resulted from the loss of agricultural land. The National Institute of Feed and Agriculture (within the United States Department of Agriculture) notes that air pollution from agriculture includes emissions from tractors and farm vehicles as well as pollution from animal-raising operations. At the time the Township adopted its prior Conservation Plan Element of the Master Plan in 2002, West Windsor contained approximately 3,520 acres of agricultural land. As noted in the 2023 Farmland Preservation Plan Element of the Master Plan[33], West Windsor presently has approximately 2,840 acres of farmland, representing a decrease of approximately 680 acres or 19.3%.

[33] https://www.westwindsornj.org/images/MasterPlan/Section%2010/Section%2010.pdf

5.5: Radon

Radon, which is a naturally occurring radioactive gas which enters homes and buildings through cracks and other openings in foundations, is a well-documented carcinogen which causes an estimated twenty thousand[34] lung cancer deaths each year. Radon gas concentrations of four picocuries per liter (pCi/1) or more in the lowest livable level of any dwelling represents a significant risk for developing lung cancer. Serious steps to reduce radon levels should be taken to markedly reduce this risk. The NJDEP recommends radon testing as part of any real estate transaction.

The NJDEP has developed a Tier System that classifies municipalities as having high, moderate, or low potential for indoor radon problems. This system is based on the percentage of homes with radon concentrations greater than or equal to four (pCi/1).

As per a 2015 assessment by the NJDEP[35], approximately seventeen percent of tested dwellings in West Windsor (846 of 5,033) measured greater than four pCi/1. Thus, the Township is considered to be a Tier 2 municipality. Additional information on radon, such as health risks, testing, and mitigation options (including listings of New Jersey certified measurement and mitigation businesses), may be obtained from the NJDEP Radon information telephone line at 1-800-648-0394. A website is also available at https://nj.gov/dep/rpp/radon/.

Table 5: Radon Tiers

Tier	Description
Tier 1	High Potential: at least twenty-five homes tested with twenty-five percent or more having radon concentrations greater than or equal to four pCi/1
Tier 2	Moderate Potential: at least twenty-five homes tested with five to twenty-four percent radon concentrations greater than or equal to four pCi/1
Tier 3	Low Potential: at least twenty-five homes tested with less than five percent having radon concentrations greater than or equal to four pCi/1

Source: NJDEP

[34] https://www.cancer.org/healthy/cancer-causes/radiation-exposure/radon.html#:~:text=Scientists%20estimate%20that%20about%2020%2C000,develop%20in%20people%20who%20smoke.
[35] https://www.nj.gov/dep/rpp/radon/download/rtar2015.pdf

Section 6: Hydrology

Section 6 discusses hydrological issues, including groundwater and surface water.

6.1: Overview

The following section discusses the hydrology of the Township, including groundwater and surface water.

6.2: Groundwater

Aquifer Characteristics

An aquifer is a body of geologic material which can supply useful quantities of groundwater to natural springs and wells. An aquifer is recharged when rainwater seeps down through the soil. There are several natural processes which determine how much rainwater may actually reach and replenish an aquifer instead of being evaporated, consumed by plants and animals, or simply running off the ground surface and into surface water systems.

The protection of both surface water and groundwater is essential for maintaining the quality and availability of clean drinking water. Approximately fifty percent of the water utilized in the United States on a daily basis is from groundwater; thus, it is important to identify those parts of the state where groundwater is most likely to be replenished to protect them from land use practices which will decrease the quality and availability of clean water.[36]

Well locations and average well yield figures provide an indication of the distribution and quantity of groundwater available in the Township. Four of the five geologic formations underlying West Windsor are important aquifers. The Merchantville Clay formation is not classified as an aquifer because day beds are too compacted and have too low a permeability to yield much groundwater. The Wissahickon Schist and Stockton Sandstone formations are adequate aquifers. Although they are consolidated rock formations, the upper zone close to the soil is fragmented or weathered, creating water-bearing areas. Water is also contained in fissures running through the solid bedrock. The yield of these aquifers is adequate for residential and some industrial use. The Pleistocene deposits consist of sedimentary layers of varying grain size; yields of wells tapping these deposits depend on the composition of the specific layers penetrated. The Magothy-Raritan formation is an excellent aquifer composed of alternating sands and clays. It is, in fact, the most important aquifer of the Inner Coastal Plain of New Jersey. Because so many users to the east and south of West Windsor Township depend on this aquifer, it is a resource of greater than local concern.

In areas such as West Windsor where groundwater is a major source of water supply, knowledge of aquifers' locations and characteristics is a valuable planning tool. Knowledge of the locations of the most reliable aquifers and their relative depths is a significant advantage when large water yields are necessary.

[36] https://www.usgs.gov/news/featured-story/quality-nations-groundwater-progress-national-survey

The NJDEP has taken several steps over the past few years to further regulate stormwater management. These steps largely focus on emphasizing nonstructural strategies, including: utilizing low impact development principles; collecting, infiltrating, and where possible reusing stormwater near its source; capturing runoff from small storm events in vegetated systems to protect water quality and to promote recharge; and minimizing and disconnecting impervious surfaces. New regulations also require the use of green infrastructure best management practices to satisfy recharge, quantity, and quality stormwater requirements. Examples of green infrastructure include, but are not limited to, bioretention systems, cisterns, drywells, green roofs, and pervious paver systems.

Furthermore, pursuant to NJDEP requirements, the Township adopted a new ordinance (Ordinance 2023-03) which establishes minimum recharge requirements for all development located in any flood hazard area. The Township is also preparing a new Stormwater Management Plan Element of its Master Plan.

Aquifer Recharge Potential

Those portions of the Township where aquifers are exposed or covered only by Pleistocene deposits are areas of potential recharge. Groundwater supplies are fed by rainfall and streams running over the outcrop area. The most effective and valuable recharge areas, therefore, are those with the most permeable soils. Soils are usually two to five feet thick, consisting of layers or horizons of unconsolidated material. The recharge potential of a given soil type depends upon the permeability of its least pervious horizon.

Assessing aquifer recharge potential requires a knowledge of both geology and soil characteristics to distinguish between those areas of high recharge where surface water and precipitation easily penetrate to the groundwater supply, and other areas of low recharge with low permeability rates and minimal groundwater storage. The most important recharge areas are those having soil percolation rates greater than 6.3 inches/hour. This means that water poured onto the soil will percolate more than 6.3 inches in one hour.

The Magothy-Raritan formation is the aquifer of regional importance. Water recharge in West Windsor outcrops affects users to the southeast in Monmouth County. The Stockton Sandstone and Wissahickon Schist formations are locally important aquifers. Because of its low permeability, the Merchantville Clay formation has no significant aquifer recharge potential. In the upper Pleistocene formation, recharge areas are as variable as the nature of the deposits themselves. these recharge areas were not mapped so recharge for more important, deeper aquifers could be shown.

The New Jersey Geological Survey (NJGS) developed a method for mapping aquifer recharge areas. The method uses rainfall data from climate-monitoring stations, maps showing how the land surface is currently used (e.g. residential, agricultural, commercial, wooded and pavement), what kind of soils occur at the earth's surface, and the extent of wetlands (streams, rivers, lakes, marshes, and bogs). These data are combined using scientific methods to determine how much ground water is available in any particular area for recharge to the local aquifer. How much of this water will actually make it into the

aquifer is also predicted based on how much water can usually be pumped from water wells drilled into the aquifer.

The West Windsor Environmental Commission strongly recommends that the newly developed NJGS method for mapping recharge areas be applied to lands within the Township as soon as practically possible.

If groundwater withdrawal is to continue at its present rate or increased, adequate recharge of important aquifers must be maintained. The Township should avoid extensive development over recharge areas which would reduce the quantity of percolation reaching the aquifer. A developer contemplating the use of a land parcel should consider placing homes, parking lots, and other impervious surfaces over areas with low recharge potential and keeping high recharge potential areas in open space.

Furthermore, there is a direct connection between groundwater levels and surface water conditions. If aquifer recharge is significantly lessened, stream flow may be reduced, small streams may dry up, and well yields decrease. Since the Magothy-Raritan formation extends under Raritan Bay, continued pumping of the aquifer at reduced recharge rates could induce saltwater intrusion into the eastern portions of the state and contaminate the well water with salt. Aquifers may be contaminated by poorly planned or maintained landfills and septic systems located over recharge areas. The high permeability of soil is the outstanding feature of a prime recharge area, but rapid percolation through these soils may not allow sufficient purification of effluent or leachate.

Contamination of the Magothy-Raritan aquifer may not be apparent for many years, as the water travels very slowly within the formation. It is estimated that water entering the Magothy-Raritan aquifer in West Windsor Township will be drawn from wells in Freehold approximately one hundred years later.

There is presently an active permit for well water for agricultural uses at Grover Farm, which is owned by the Township. However, well water is typically only utilized for specialty crops.

Depth to Seasonally High Water Table

One of the most valuable pieces of information about a site is its depth to the water table. The water table is the top of a layer of soil saturated by groundwater and its depth is measured from the surface of the soil. Water table groundwater is not the same as water held in aquifers, which are geologic formations. The water table is often "perched" above an aquifer. However, the water table is also an important ecological resource and constraint on development. The water table is replenished by percolation from rainfall, irrigation and septic tank drainage fields. The depth of the water table varies according to rainfall, topography and soil permeability. The force of gravity causes groundwater near hill crests to flow slowly toward surface water bodies, where the groundwater is discharged to the stream or pond.

The water in the saturated zone of the soil is an essential environmental resource. It is the source of water which maintains vegetative growth. It also serves to recharge deeper

underlying aquifers. Groundwater replenishes surface water resources and provides the major source of stream flow during dry periods.

At the same time, however, the depth of the water table may present a severe constraint to development. The New Jersey State Standards for the Construction of Individual Subsurface Sewage Disposal Systems require a minimum depth to water table of four feet from the bottom of the disposal trench or bed for the installation of septic tanks and tile fields. This is a minimum depth to water table of six feet from the ground surface. Degradation of the water table not only impacts overall ground-water quality, but may eventually pollute surface water supplies as well. Cellar or basement installation is infeasible if the depth to the water table is less than five or six feet. Although artificial drainage may be used to lower a seasonally high water table, an estimation of the potential effectiveness of such systems requires that features unique to each site be evaluated.

6.3: Surface Water

Watersheds

A watershed is a geographic area within which water, sediments, and dissolved materials drain to a receiving surface waterbody such as a river, lake, or stream. Watershed management, therefore, is the process of managing all of the water and water-related resources within the entire area of a watershed, as opposed to on a site-specific basis. The State of New Jersey is divided into twenty Watershed Management Areas (WMAs). The Township is divided between WMA 10 (the Millstone Watershed Management Area) and WMA 11 (the Central Delaware Watershed Management Area). The former WMA drains north toward New York City, while the latter drains south toward Philadelphia. Each WMA is divided into several subwatersheds.

The following table identifies the watersheds and subwatersheds of importance to West Windsor. Note that a Hydrological Unit Code (HUC) is a hierarchical land area classification system created by the United States Geological Survey (USGS) that is based on surface hydrological features in a standard, uniform geographical framework.

Table 6: Watersheds and Subwatersheds of Importance

WMA	Subwatershed
10	Bear Brook (above Trenton Road): HUC 02030105100120
	Bear Brook (below Trenton Road): HUC 02030105100130
	Duck Pond Run: HUC 02030105090080)
	Millstone River (Rt. 1 to Cranbury Brook): HUC 02030105100140
	Millstone River (Cranbury Brook to Rocky Brook): HUC 02030105100060
11	Assunpink Creek (Shipetaukin to Trenton Road): HUC 02040105230050
	Assunpink Creek (Trenton Road to New Sharon Bridge): HUC 02040105230040
	Miry Run (Assunpink Creek): HUC 02040105240030
	Shipetaukin Creek: HUC 02040105230060

Streams, Rivers, and Lakes

There are eight waterways in the Township: the Millstone River; Duck Pond Run; Assunpink Creek; Bridegroom Run; Canoe Brook; Big Bear Brook; Little Bear Brook; and the Delaware Raritan Canal. In addition, the Township contains several significant waterbodies including, but not limited to, Mercer Lake in Mercer County Park, Grovers Mill Pond, and Windsor Pond

Some streams in West Windsor are first order streams, or unbranched tributaries to larger streams. First order streams experience very low flows during dry periods, making them extremely vulnerable to degradation. Pollution of these streams has far-reaching impacts on the water quality of water bodies downstream. Little Bear Brook, Canoe Brook, and portions of Duck Pond Run are first order streams in West Windsor Township.

Throughout the Township, as land coverage changes from pervious states to impervious states, less rainwater soaks into the ground. As a result of this change in rainwater hydrodynamics, pollutants washed from parking lots, streets, and fertilized lawns at a scouring force end up in streams. The turbulent stream flows cause stream bank erosion, the evidence of which is the visual appearance of vertical or caved in banks. Furthermore, stream channels become filled with silt and sedimentation, thus impacting the biological life in the stream and surrounding environment.

Mercer Lake and its immediate surrounding environs are located within the Mercer County Park System, which is under the jurisdiction of Mercer County. Nevertheless, upstream conditions which are outside of the County's jurisdiction and within the jurisdiction of West Windsor impact the health of this lake and its downstream environment. Therefore, the Township should implement best management practices in agriculture, land development, lawn care, landscape planting, street sweeping, and stormwater management to reduce non-point source pollution into the lake.

The prior 2002 Conservation Plan noted that for several years, Grovers Mill Pond had experienced excessive eutrophication (the excessive growth of biota and the reduction of oxygen concentration in the pond). Eutrophication negatively impacts a lake's plant and fish life and makes it unpleasant to view. Since that time, this issue was resolved by dredging and restoring the pond between 2008 and 2009.

Flood Hazard Areas

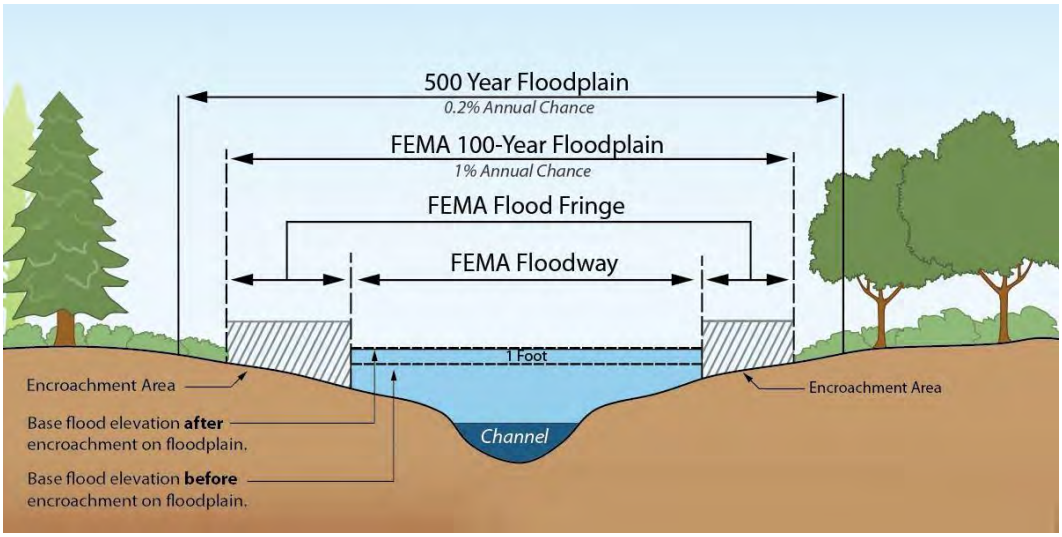
Floodplains are generally characterized as areas of land susceptible to being inundated by floodwaters from any source, including coast areas impacted by storm surge, land along rivers and bayous that is flooded when a waterway rises out of its bank, or low-lying land which fills with water when it rains. Map 05 in Appendix B identifies the floodplains of West Windsor as delineated by the Federal Emergency Management Agency (FEMA) as part of its National Flood Insurance Program. These include floodways, the 100-year floodplain, and the 500-year floodplain.

- The floodway is defined by FEMA as "the channel of a river or other watercourse and the adjacent land area that is reserved from encroachment in order to discharge the base flood without cumulatively increasing the water-surface elevation by more than a designated height."[37] Floodways are areas of high flood intensity where water flows the fastest and the deepest.
- The 100-year floodplain, also known as the 1 percent floodplain, is land that is covered in water during a flood event that has a one percent chance of being equaled or exceeded each year. It is a common misconception that the 100-year floodplain only becomes inundated once every hundred years. On the contrary, the 100-year floodplain has a one percent chance of being flooded in every given year. Statistically, the 100-year floodplain therefore has a twenty-six percent chance of occurring during a thirty-year period.[38]
- The 500-year floodplain, also known as the 0.2 percent floodplain, is land that is covered in water during a flood event that has a 0.2 percent chance of being equaled or exceeded each year. Similar to the 100-year floodplain, it is a common misconception that the 500-year floodplain only happens once every five hundred years. Rather, the 500-year floodplain has a 0.2% chance of occurring every single year. Statistically, the 500-year floodplain therefore has a six percent chance of occurring during a thirty-year period.[39]

It should also be noted that even properties located outside of these floodplains are not immune to flood risks.

[37] https://www.fema.gov/sites/default/files/documents/fema_floodway-analysis-and-mapping.pdf
[38] https://capitol.texas.gov/tlodocs/85R/handouts/C2102018020609151/54cc9851-0127-49ff-a78c-4d64a2e22c50.PDF
[39] https://capitol.texas.gov/tlodocs/85R/handouts/C2102018020609151/54cc9851-0127-49ff-a78c-4d64a2e22c50.PDF

Figure 5: Floodplain Map



Source: City of Little Rock (https://www.littlerock.gov/city-administration/city-departments/public-works/civil-engineering/)

Floodplains are also areas of substantial ecological value. The sediments deposited in the floodplain by slow-moving floodwaters increase the fertility of the land. Where floodplains are undeveloped, natural shrub and lowland forest vegetation provide excellent habitat for wildlife. Proximity to nearby water sources further heightens the floodplains' value to wildlife, and overhanging vegetation offers shade and refuge for stream organisms and maintains natural stream temperatures. Vegetated floodplains can also filter out non-point source pollutants before they enter streams, thus providing a natural mechanism for water quality benefits. Floodplains are also excellent locations for water-related recreation sites and nature study. Since standing floodwaters are steadily absorbed by floodplain soils, groundwater supplies are maintained and flood peaks downstream are reduced.

Although floodplains are typically attractive sites for development due to their flat terrain and proximity to water, development within them will inevitably result in significant flood-related damages and even danger to lives. Any building, structure, or paved surface in a floodplain prevents absorption and obstructs flood flows, thereby eliminating valuable groundwater recharge sites and increasing flood peaks.

Proper floodplain planning is therefore essential to reduce the potential damages associated with their development and to ensure the perpetuation of the important ecological functions of floodplains. Uses which are not significantly harmed by periodic flooding, such as agriculture, recreation, and nature study, should be encouraged. If building must occur, structures should be flood-proofed.

In May of 2023, the Township adopted new floodplain management regulations the purpose of which is to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific flood hazard areas. They provide minimum requirements for development located in flood hazard areas as established by FEMA's Flood Insurance Rate Map.

The NJDEP adopted its new Inland Flood Protection Rule which became effective on July 17, 2023. The Inland Flood Protection Rule updates the state's flood hazard and stormwater regulations by replacing prior precipitation estimates with new estimates which account for observed and predicted rainfall. As noted by the NJDEP[40], there are five key points of the Inland Flood Protection Rule: a new Design Flood Elevation (DFE) which raises fluvial (non-tidal) flood elevation mapped by the NJDEP by two feet; the use of future projected precipitation is required when calculating flood elevations; NJDEP Flood Hazard Area permits are to conform to NJ Uniform Construction Code standards and meet or exceed minimum FEMA National Flood Insurance Program requirements; stormwater Best Management Practices (BMPs) are required to be designed to manage runoff for current and future storms; and the use of Rational or Modified Rational methods for stormwater calculations have been removed. Applications which have been deemed accepted/completed by the Land Use Office and/or approved by the Planning Board prior to July 17, 2023 are not required by law to abide by the new Flood Protection Rule.

Riparian Zones

In addition to flood hazard areas, the State of New Jersey also regulates riparian zones. A riparian zone is a protective buffer located around surface waters including streams, lakes, and rivers. Depending on how they are classified, a riparian area may extend fifty feet, one hundred and fifty feet, or three hundred feet along either side of a waterway. Nearly every waterway which collects runoff from at least fifty acres of land possesses a riparian zone. Furthermore, any naturally occurring stream which has a discernible channel possesses a riparian zone. In the Township, the majority of riparian zones are encompassed by the Township Greenbelt and either have been or are proposed for conservation.

Disturbance to riparian zones is regulated by the NJDEP, as these areas provide essential ecological benefits. Vegetation which grows along the banks and in the riparian zone of a waterway is essential for maintaining bank stability and water quality. Disturbance of this vegetation has the potential to destabilize a waterway's banks, thereby leading to increased erosion and sedimentation which in turn increases the intensity and frequency of flooding. Furthermore, the loss of vegetation near a waterway reduces the filtration of stormwater runoff while also subjecting surface waters to increased sun exposure. In turn, this leads to increased water temperatures and decreased oxygen levels, thereby threatening the health and habitat of fish and wildlife.

[40] https://dep.nj.gov/inland-flood-protection-rule/

Raingardens

West Windsor's Environmental Commission has recently supported the development of several rain gardens on Township property. Rain gardens are shallow depressions, typically planted with native plants, which capture runoff and promote infiltration into the ground. The soil naturally removes pollutants from the runoff during infiltration. Rain gardens are typically placed at locations where surface runoff water originates, such as a drainage pipe from a roof gutter or the downhill edge of parking lot. Rain gardens capture and infiltrate runoff water before it reaches storm sewers or waterways.

Current stormwater regulations, required for all significant land development and redevelopment, encourage the implementation of rain gardens and similar stormwater management techniques that promote infiltration of rainwater that flows from impervious surfaces. The monitoring, management, and maintenance of these areas to retain their intended functions and to limit the introduction of invasive exotic plant species will be an objective that requires greater levels of attention as more of these features are constructed.

Section 7: Soils

Section 7 discusses the soils of West Windsor. The Township's physiographic regions, soil types, erosion hazards, surface runoff, and farmland soils are analyzed.

7.1: Overview

The following section discusses the soils of the Township. Information regarding physiographic regions, soil types, erosion hazard, surface runoff, and farmland is provided.

7.2: Physiographic Regions

The State of New Jersey is divided into four geomorphic regions which are based on a northeast to southwest trend in geological formations as well as by the characteristics of underlying rocks (Wolfe, 1977). These regions are known as the Valley and Ridge, Highlands, Piedmont Lowlands, and Coastal Plain Regions. The Township is located in two of these regions; specifically, the Piedmont Region and the Coastal Plain Region. As shown on Map 06 in Appendix A, the Piedmont Region is predominantly located in the northwesterly portion of the Township while the Coastal Plain Region is predominantly located in the southeasterly portion of the Township.

The Piedmont Region is predominantly a low rolling plain divided by a series of higher ridges. It is mainly underlain by slightly folded and faulted sedimentary rocks of the Triassic and Jurassic age (140 to 240 million years old) and igneous rocks of the Jurassic age. Rocks in this region consist of soft red shales with areas of sandstone, siltstone, resistant argillites and volcanic rocks.[41]

The Coastal Plains Region, which is the largest physiographic region in the state, is characterized by gently southeastwardly dipping consolidated clays, marls, silts, and sands with interglacial gravel caps on hills and watershed divides (Wolfe, 1977).

7.3: Soil Types

One of the most important tools in land use planning is an accurate map of soil types. The structure and composition of each particular soil type in a community determines its fertility and suitability for various types of land development.

Soil lies in a very thin layer above bedrock and extends approximately to the depth of plant roots. It is composed of both inorganic and organic materials. The primary inorganic constituent is extensively weather parent rock, otherwise known as bedrock. Soils which overlie the same types of bedrock have similar characteristics because of their common origin. The organic component of soil is derived from decayed plants and animal materials.

One important feature of soil is its texture, which is determined by the relative proportions of sand, silt, and gravel. The permeability of soil is directly related to its texture. Soils also vary in their structure, as individual grains can cohere to form block, granular, or flaky pieces of soil. Soil structure also affects percolation, ease of cultivation, and susceptibility to

[41] https://www.nj.gov/dep/njgs/enviroed/infocirc/provinces.pdf

erosion. As a result of leaching, all soils in West Windsor are naturally strongly acidic or extremely acidic.

Table 7 identifies the soil types mapped and identified by the Natural Resource Conservation Service (NRCS), an agency of the United States Department of Agriculture. The Soil Survey provided by the NRCS lists all of the features of each soil type which are useful in determining its suitability for development. Altogether, there are forty-two different soil types existing in West Windsor. The locations of these are identified in Map 7 in Appendix A. Those maps delineate soils based upon their drainage classifications.

Table 7: Soil Types

Map Unit Name	Symbol	Drainage Classification	Depth to Water Table	Runoff Class	Septic Rating	% of Township
Aura sandy loam, moderately firm, 2 to 5 percent slopes	AugmB	Well-Drained	More than 80 Inches	Low	Very Limited	0.28%
Aura sandy loam, moderately firm, 5 to 10 percent slopes	AugmC	Well-Drained	More than 80 Inches	Low	Very Limited	0.13%
Birdsboro sandy subsoil variant soils, 2 to 6 percent slopes	BHSGB	Well-Drained	More than 80 Inches	Very Low	Very Limited	1.31%
Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	BoyAt	Poorly Drained	0-12 Inches	Negligible	Very Limited	0.10%
Downer fine sandy loam, gravelly clay loam substratum, 0 to 5 percent slopes	DohgB	Well-Drained	48-122 Inches	Very Low	Very Limited	0.69%
Elkton silt loam, 0 to 2 percent slopes	EkbA	Poorly Drained	0-12 Inches	Very High	Very Limited	0.94%
Evesboro loamy sand, 0 to 5 percent slopes	EvgB	Excessively Drained	48-122 Inches	Negligible	Very Limited	4.29%
Fallsington sandy loams, 0 to 2 percent slopes, northern coastal plain	FamA	Poorly Drained	0-10 Inches	---	Very Limited	2.22%
Fort Mott loamy sand, 0 to 5 percent slopes	FodB	Well-Drained	More than 80 Inches	Very Low	Very Limited	2.18%
Fort Mott loamy sand, 5 to 10 percent slopes	FodC	Well-Drained	48-122 Inches	Low	Very Limited	0.50%
Galestown loamy sand, 0 to 5 percent slopes	GadB	Somewhat Excessively Drained	More than 80 Inches	Very Low	Very Limited	2.66%
Galestown sandy loam, 0 to 5 percent slopes	GafB	Somewhat Excessively Drained	More than 80 Inches	Very Low	Very Limited	2.73%
Galloway variant soils, 0 to 5 percent slopes	GASB	Moderately Well-Drained	18-24 Inches	Very Low	Very Limited	3.56%
Glassboro and Woodstown sandy loams, 0 to 5 percent slopes	GKAWOB	Somewhat Poorly Drained	6-18 Inches	Very High	Very Limited	5.79%

Map Unit Name	Symbol	Drainage Classification	Depth to Water Table	Runoff Class	Septic Rating	% of Township
Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded	HcuAt	Poorly Drained	0-6 Inches	Negligible	Very Limited	4.19%
Lansdale sandy loam, 2 to 6 percent slopes	LbhB	Well-Drained	More than 80 Inches	Low	Very Limited	0.33%
Lansdale channery loam, 6 to 12 percent slopes, eroded	LbnC2	Well-Drained	More than 80 Inches	Medium	Very limited	0.36%
Lansdale channery loam, 12 to 18 percent slopes, eroded	LbnD2	Well-Drained	More than 80 Inches	Medium	Very Limited	0.10%
Lehigh silt loam, 2 to 6 percent slopes, eroded	LenB	Somewhat Poorly Drained	12-30 Inches	Medium	Very Limited	0.23%
Manahawkin muck, 0 to 2 percent slopes, frequently flooded	MakAt	Very Poorly Drained	0-6 Inches	Negligible	Very Limited	1.42%
Marsh, fresh water, 0 to 2 percent slopes, frequently flooded	MbaAt	---	---	---	Not rated	0.47%
Matapeake loam, 0 to 2 percent slopes	MbpA	Well-Drained	More than 80 Inches	Low	Very Limited	6.56%
Matapeake loam, 2 to 5 percent slopes	MbpB	Well-Drained	More than 80 Inches	Low	Very Limited	4.14%
Matapeake loam, 5 to 10 percent slopes, eroded	MbpC2	Well-Drained	48-122 Inches	Medium	Very Limited	0.17%
Mattapex and Bertie loams, 0 to 5 percent slopes	MBYB	Moderately Well-Drained	18-42 Inches	Very High	Very Limited	6.36%
Othello silt loams, 0 to 2 percent slopes, northern coastal plain	OthA	Poorly Drained	10-20 Inches	Very Low	Very Limited	6.98%
Pits, sand and gravel	PHG	---	---	---	Not rated	0.03%
Plummer sandy loam, 0 to 2 percent slopes	PmmA	Poorly Drained	0-12 Inches	Very High	Very Limited	1.39%
Plummer sandy loam, very wet, 0 to 2 percent slopes	PmmwA	Very Poorly Drained	0-6 Inches	Very High	Very Limited	0.19%
Portsmouth variant silt loam, 0 to 2 percent slopes	PortA	Very Poorly Drained	0-12 Inches	Very High	Very Limited	1.94%
Readington and Abbottstown silt loams, 0 to 2 percent slopes	REFA	Moderately Well-Drained	18-36 Inches	Medium	Very Limited	0.04%
Rowland silt loam, 0 to 2 percent slopes, frequently flooded	RorAt	Moderately Well-Drained	12-36 Inches	Negligible	Very Limited	0.00%
Sandy and silty land, strongly sloping	SaaD	Excessively Drained	48-118 Inches	Low	Very Limited	0.42%
Sandy and silty land, steep	SaaE	Excessively Drained	48-118 Inches	Medium	Very Limited	0.21%

Map Unit Name	Symbol	Drainage Classification	Depth to Water Table	Runoff Class	Septic Rating	% of Township
Sassafras sandy loam, 0 to 2 percent slopes, Northern Coastal Plain	SacA	Well-Drained	More than 80 Inches	---	Very Limited	3.54%
Sassafras sandy loam, 2 to 5 percent slopes, Northern Coastal Plain	SacB	Well-Drained	More than 80 Inches	---	Very Limited	11.76%
Sassafras sandy loam, 5 to 10 percent slopes, Northern Coastal Plain	SacC	Well-Drained	More than 80 Inches	---	Very Limited	12.49%
Sassafras gravelly sandy loam, 2 to 5 percent slopes	SadB	Well-Drained	More than 80 Inches	Low	Very Limited	2.67%
Sassafras sandy clay loam, 5 to 10 percent slopes, severely eroded	SagC3	Well-Drained	More than 80 Inches	Medium	Very Limited	0.58%
Sassafras-Woodstown sandy loams, 2 to 5 percent slopes	SaoB	Well-Drained	More than 80 Inches	Low	Very Limited	1.45%
Udorthents, gravelly substratum, 0 to 8 percent slopes	UdgB	Well-Drained	More than 80 Inches	Very Low	Very Limited	0.92%
Woodstown-Fallsington sandy loams, 0 to 5 percent slopes	WomfB	Moderately Well-Drained	18-42 Inches	Very Low	Very Limited	1.20%
Water	WATER	---	---	---	Not Rated	2.50%
Total						100.00%

7.4: Erosion Hazard

Erosion is a naturally occurring process involving the detachment and movement of soil particles by water, wind, and gravitational forces. Soil textures and structures determine how easily soil may be displaced. In addition to soil type, other factors which determine the potential severity of erosion for any particular site include:

- Intensity of wind or rainfall;
- Slope, and;
- Type and density of vegetative cover.

The natural erosion process which occurs at a gradual pace is often accelerated by human interference. Indeed, development may alter slope and vegetation with harmful consequences. One such consequence is the loss of productive topsoil. In addition, soil sedimentation on land or waterbodies downslope of the eroding site smothers vegetation and can change the stream or lake profile. Increased turbidity from washed-off soil disrupts aquatic life and stream productivity.

Strict control of disturbed and exposed soil through appropriate erosion control measures and proper stabilization must be implemented and monitored as any type of land development occurs. The Township is under the jurisdiction of the Mercer County Soil Conservation District (MCSCD) and thus relies upon the services offered by MCSCD to regulate and enforce erosion control and stabilization measures associated with significant land development projects. Smaller projects should also be careful to adhere to similar measures in order to protect the valuable soil and watercourse resources throughout West Windsor.

7.5: Surface Runoff

Runoff is equal to total precipitation minus the amount of moisture which infiltrates the soil and/or evaporates. The quantity of runoff from a site can be calculated from the amount of rainfall, the type of land use or natural cover, and the hydrological group of the soil.

The rate of runoff is also dependent on the slope of a site. Soil types are assigned to various hydrologic groups according to the rate of infiltration of water into the bare soil after prolonged wetting. These hydrologic groups can be summarized into four categories.

- Soils with a low runoff potential have a high rate of infiltration and are deep and well-drained.
- Those classified as having a moderate runoff potential inhabit a moderate rate of infiltration as well as moderate depth and drainage.
- Soils with a moderately high runoff potential have a slow infiltration rate. They may be finely textured and have a high water table or impermeable layer underneath.
- High runoff potential soils have a very slow infiltration rate. This may be due to high clay composition, a shallow impermeable layer, or a permanently high water table. If the water table is the primary cause of high runoff potential, artificial drainage improvements may shift the soil to a hydrologic group with a lower potential for runoff.

Knowledge of the hydrologic groups to which soils of a particular site are assigned can provide better guidance to land use decisions. Development which alters vegetative cover over soils with high runoff potential will increase runoff which, in turn, may result in several negative repercussions including increased flash flooding, degradation of surface water quality, and reduced percolation to groundwater supplies. These negative repercussions can be alleviated by minimizing disturbances of natural cover and by reducing the uses of impervious surfaces. The installation of swales, retention ponds, and porous pavement helps retain excess runoff on site, thus allowing gradual percolation.

As noted elsewhere in this plan, both the NJDEP and the Township have adopted additional regulations which require minimum recharge requirements for all development located in any flood hazard area. The NJDEP has also adopted new stormwater regulations which, in part, emphasize nonstructural strategies and green infrastructure to address runoff and recharge requirements.

7.6: Farmland

As discussed in greater detail in the Township's Farmland Preservation Plan Element[42] of the Master Plan, the Township is endowed with extensive areas of prime agricultural lands which are suitable for permanent cultivation. As per the Natural Resources Conservation Service (NRCS), prime farmland is:

> *"land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. Prime Farmlands are not excessively erodible or saturated with water for a long period of time, and they do not flood frequently or are protected from flooding."*

These attributes also make prime farmland soils highly suitable for urban development. Furthermore, escalating land prices and taxes, loss of support services, stricter environmental regulations, and urban sprawl continue to put greater economic pressure on farmers, often resulting in increased pressures to sell farmland for development. As a result, the state continues to lose its prime agricultural soils.

The retention of prime agricultural soils offers several benefits. These soils represent a non-renewable resource which is irretrievable once they are irrevocably transformed by intensive development. Retaining farmland also serves to boost local food production, thus reducing reliance on other markets. The use of prime farmland for agriculture also requires less energy input than the use of marginally productive land. Other values of prime agricultural land include their role in aquifer recharge, the importance of cropland as habitat and feeding grounds for wildlife, and the open space benefits offered by farmland.

The perpetuation of land for agricultural production has been a longstanding important priority for the Township. For additional information on the local, county, and state efforts to promote farmland, see the Township's Farmland Preservation Plan.

[42] https://www.westwindsornj.org/images/MasterPlan/Section%2010/Section%2010.pdf

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Section 8: Vegetation and Wildlife Habitats

Section 8 discusses vegetation and wildlife habitats.

8.1: Vegetation and Wildlife

There is a great diversity of vegetation and wildlife in West Windsor. Since each animal species differs in its requirements for food and shelter, areas with diverse vegetation and wildlife habitat can therefore support a wide variety of wildlife species. Diverse ecosystems are typically more resilient to nearby environmental disturbance than are ecosystems characterized by a few dominant species. Preserving and restoring a wide spectrum of vegetation types helps ensure the perpetuation and sustainability of native wildlife species.

Extensive areas of natural vegetation also contribute to the general environmental quality of the entire Township. Lush vegetation and dense root structures conserve soil by slowing runoff and erosion. Leafy vegetation and aquatic plants extract and utilize common air and water pollutants. Large stands of mature woodland help moderate the local climate by breaking the force of winds and trapping heat reradiated from the earth's surface at night. The scenic value of naturally diverse vegetation also makes the Township an aesthetically pleasing place to live.

Eight categories of vegetation have been identified in the Township. The herbaceous freshwater marsh is one of the most valuable yet least appreciated kinds of vegetation. Marshes support a great variety of wildlife and are among the most productive ecosystems in the world. They improve water quality by filtering suspended solids and utilizing nutrients to support plant growth. The spongy organic base, called peat, upon which marsh vegetation grows, is highly absorbent. Marshes play an important role in reducing flood peaks and recharging groundwater supplies. Lowland shrub vegetation provides dense cover for wildlife on flood plains.

The lowland forests are composed of species tolerant of moist conditions. Two types of lowland forest have been identified in the Township, dominated by Red Maple and Sweetgum species, respectively. The greatest number of wildlife species in the Township has been identified in the lowland forest, the majority of which are bird species. The upland forests are located on well- drained soils. One type of upland forest is dominated by oaks and beech, and the other is composed of mixed species, with none more prevalent than the others.

The category of open land represents cultivated and fallow fields. Some abandoned fields are in various stages of succession, which involves a natural transition from field to forest. Fields are an important habitat for many birds and rodents as well as a feeding area for forest dwellers. Sod farms are a man-made category of vegetation, as is suburban land. The latter consists of developed areas around Post Corner, Edinburg, Grover's Mill, Princeton Junction and Penn's Neck. Fewer wildlife species are found on suburban land because of the lack of underbrush and the proximity to humans. The final category is bare land. These are areas that have been cleared or paved, have no vegetation, and have little wildlife value. It is important to maintain a variety of vegetation for aesthetic, educational and ecological reasons. Some kinds of vegetation, however, are more valuable than others due to their role in protecting other environmental resources and their wildlife habitat potential. Sensitive planning should encourage the development of the least useful areas. For example, flood

plains, on which some of the most valuable vegetation is found, are already protected by ordinance. Woodlands and other important areas could be incorporated into planned residential developments as open space or zoned for low-density residential use. The Township's Greenbelt Plan is a significant step towards the protection and wise use of the most valuable vegetation and wildlife habitats.

8.2: Invasive Species

The continued introduction and spread of exotic and highly invasive plant, insect, and wildlife species has become one of the most significant changes occurring with vegetation and wildlife resources in the past few decades.

By way of background, an invasive species is an organism which causes ecological or economic harm in a new environment where it is not native.[43] As noted by the United States Forest Service, invasive species have two main characteristics: they are non-native (exotic/alien) to the ecosystem that they occupy, and their existence in that ecosystem causes or is likely to cause harm to the economy, environment, or even human health. If unattended, invasive species can threaten "native species, biodiversity, ecosystem services, recreation, water resources, agricultural and forest production, cultural resources, economies and property values, public safety, and infrastructure."[44]

Invasive species can take several forms, including plants, animals, algae, fungus, or disease-causing microorganisms. In the Township, the proliferation of *Pyrus calleryana*, *Callery Pear trees*, *Agrilus planipennis*, Emerald Ash Borer, and *Lycorma delicatula* (the Spotted Lanternfly) have received the greatest attention. Nevertheless, several other species have also disrupted the natural regeneration of native species and altered the natural native ecosystem.

Climate change has exacerbated the issue of invasive species, as it continues to have the potential to alter the mix of indigenous species which flourish in the area. For example, due to changing climates, the Oak/Beech forest may shift toward an Oak/Hickory forest which is typically more prevalent in regions south of central New Jersey. Accordingly, species which find this area as the southern edges of their range will likely migrate to the north. Landscape and ecological restoration projects must take these changes into account.

[43] https://oceanservice.noaa.gov/facts/invasive.html
[44] https://www.fs.usda.gov/managing-land/invasive-species

Efforts to counter the impacts of invasive species and climate change have included, but have not been limited to, rain gardens, pollinator gardens, and bird/bee/bat houses. Scout groups and volunteers have generally pioneered these projects. In addition, recent updates to stormwater management regulations which emphasize the infiltration of rainfall and the natural filtration of runoff by soil and vegetation have and will continue to expand the introduction of rain garden-type landscapes. An emphasis on planting vegetation which is beneficial to wildlife, indigenous to the area and ecosystem, and not invasive to natural areas must be both promoted and regulated.

Further efforts should focus on public education on invasive species. The United States Forest Service offers the following tips to help prevent invasive species.[45]

At Home

Avoid planting invasive ornamental plants on your property. Use native alternatives for ornamental plantings.

Learn how to control invasive plants around your property and what tools to use to properly remove them.

Report invasive species infestations to your local, county, state, or federal government agency.

Do not dump aquariums or houseplants into the environment (such lakes, streams, rivers, ponds, or other natural areas).

Contact your local National Forest or Grassland, state or county government officials to learn about invasive species in your area.

While Traveling

Make sure to clean your clothes, boat, animals, and gear off after recreating to prevent the spread of invasive species to other areas.

Do not collect invasive plants, their seeds, or reproductive bodies.

Do not carry firewood for long distances. Burn it where you buy it.

Properly dispose of live bait in the trash, not into the environment.

Use only invasive-free (weed-free) forage/hay when feeding livestock on National Forests.

[45] https://www.fs.usda.gov/managing-land/invasive-species

8.3: Pollinators

"Pollinators" refers to the insects, birds, bats, and other animals that carry pollen from the male to the female parts of flowers for reproduction by the more than 240,000 species of the world's flowering plants. Pollinators are essential to agriculture because they pollinate most of the fruit, vegetable, seed, and other crops consumed by humans. There is widespread scientific evidence and agreement that pollinator populations are in decline because of human activities.[46] These activities include eliminating pollinators' habitat and food sources, application of some types of pesticides, and the introduction of invasive plant and insect species.

The following are simple examples which illustrate how the Township and its citizens can help protect pollinators.

- A field or meadow of native wildflowers which is turned into a grass lawn eliminates habitat and food sources for pollinators. Returning some of West Windsor's public grass lawns and residential lawns into native wildflower meadows and native plant gardens (sometimes referenced as "rewilding") will help protect pollinators.
- Invasive plant species are often successful in replacing native plants because invasive plants are not as susceptible to native pests and diseases. Pollinators often cannot survive in an ecosystem overrun with invasive plant species. Reducing invasive plants in West Windsor's public and residential properties, and nurturing native plants, will help protect pollinators.
- Many pesticides, including insecticides, fungicides, and herbicides, can harm pollinators.[47] As per the practice of integrated pest management, a pesticide is often not required or should only be used as a last resort. Educating homeowners on appropriate pest management practices can reduce the unnecessary use (and often overuse) of pesticides.

For additional information, tips, and webinars on providing a more sustainable lawn, visit Jersey-Friendly Yards.[48]

The Township along with West Windsor's Environmental Commission continue to promote policies to protect pollinators:

- Pollinator gardens and rain garden with pollinator-friendly native plants have been created on several Township properties under the Commission's encouragement. These gardens include signage that leads to information for residents to produce such gardens on their properties.

[46] https://nap.nationalacademies.org/catalog/11761/status-of-pollinators-in-north-america
[47] xerces.org/pesticides/risks-pesticides-pollinators
[48] https://www.jerseyyards.org/

- The Commission is planning to convert appropriate sections of Township parks into native plant meadows to protect pollinators. These meadows will include signage that provides information for residents to replace some of their grass lawns with native meadows.
- Signage on gardens and meadows can include references to Mercer County's Master Gardeners Helpline (609-989-6853), which is available five days a week to answer questions about pests, integrated pest management, and pesticides.

Section 9: Greenbelt Plan

The following section discusses the Township's Greenbelt Plan.

9.1: Greenbelt Plan

The West Windsor Township Greenbelt is a wide, largely uninterrupted expanse of woodland, meadows, and agricultural fields which straddles the major stream corridors of the Township. Presently, the Township Greenbelt totals over two thousand acres of preserved land as well as approximately 1,575 acres of proposed land for preservation.

The Township Greenbelt offers tremendous value for the protection of West Windsor's natural environment, foremost among which is its protection of water resources. Water-oriented greenbelts provide a vegetative buffer which filters out non-point source pollutants such as fertilizers and sediments before they reach the stream. Forest litter and soil humus also perform important stormwater management functions by reducing runoff and controlling erosion. Tree roots help maintain soil porosity and soil structure. Forests also serve to improve air quality by absorbing air pollutants. Large woodland areas also moderate local weather extremes by providing wind buffers and natural cooling to nearby residences.

Furthermore, the Township Greenbelt is also important for the preservation of indigenous vegetation and wildlife in the Township. Large expanses of undisturbed woodland provide stable habit for many species of birds and mammals. The Greenbelt also provides long contiguous corridors which permit normal wildlife home range movement. Woodlands with a substantial continuous size must be maintained to allow predominate canopy trees to regenerate and sustain their species.

Woodlands also provide nutrients to the ecosystem through the decomposition of leaf litter and other organic matter which support the bottom of the major food chain. Forest detritus (i.e., dead particular organic material) is an important source of nutrients for aquatic organisms. The shading effect of the forest canopy is also important in moderating the temperature of streams, thereby protecting aquatic life from extremes in temperature.

The Township's Greenbelt Plan defines the Greenbelt area to include the maximum extent of the 100-year floodplain, wetlands and associated wetland buffers, and all significant forests. A minimum band of four hundred feet (measured as two hundred feet from either edge of a stream) is established for the majority of the Greenbelt to achieve the desired environmental benefits and sustainability of habitat. To maintain the important natural functions described herein, the Greenbelt Plan calls for this corridor to remain in its natural state. Developments adjacent to the Greenbelt are requested to incorporate the Greenbelt in their open space planning for passive recreation and for stormwater management uses. Extremely limited recreation amenities (typically in the form of trails) or land development infrastructure (such as sanitary sewers) are occasionally permitted in some Greenbelt areas. The vast majority of the Township Greenbelt is intended to remain set aside for the preservation of native flora and fauna.

See Map 11 in Appendix B.

The establishment and maintenance of the Greenbelt in West Windsor has been a long-ranging effort backed by the Township's elected leaders, staff, and local community, and has also been supported by both small- and large-scale developers in the area. The benefits of the Greenbelt are far-reaching and contributes to the pastoral character and identity of West Windsor. The Township Greenbelt also helps sustain the high quality natural resources of the area for future generations to enjoy.

The most recent version of the Greenbelt Plan is incorporated into the Environmental Resource Inventory (ERI) and into this Conservation Plan Element by reference and is available to the public at the Municipal Building during normal business hours. Recently, the West Windsor Township Environmental Commissions has concluded that the Greenbelt Plan should be a "living" document, in as much that it should be updated, enhanced and revised to reflect both the advancement in environmental goals desired by the Township government or the residents.

Additional revisions to the Greenbelt Plan may be required now that the NJDEP has adopted its Inland Flood Protection. As discussed in Section 6.3 of this plan, the Inland Flood Protection Rule became effective on July 17, 2023. It updates the state's flood hazard and stormwater regulations by replacing prior precipitation estimates with new estimates which account for observed and predicted rainfall. These new regulations will require additional study to determine whether revisions to the Greenbelt Plan may be warranted.

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Section 10: Wetlands

Section 10 provides an overview of the Township's wetlands, including their definitions, identifying factors, and classifications.

10.1: Definitions

Previously misunderstood as wastelands or otherwise mischaracterized as swamps and bogs, wetlands have been recognized in recent years for their vital ecological and socioeconomic contributions. The benefits of wetlands are wide-ranging and include:

- The protection of drinking water by filtering out chemicals, pollutants, and sediments that would otherwise clog and contaminate our waters;
- The collection of heavy rains and snow melts, providing natural flood control;
- The drawdown of stored flood waters during droughts;
- Critical habitats for a major portion of the State's fish and wildlife, including endangered, commercial and recreational species, and;
- High quality open space for recreation and tourism.

The United States Fish and Wildlife Services, Office of Biological Services provides an inventory of the wetlands of the United States. Specifically, the National Wetlands Inventory (NWI) provides a wetland database in both map and geodatabase format for the entirety of the country. The NWI provides detailed information to the public on the abundance, characteristics, and distribution of American wetland and deepwater habitats, as well as changes in those habitats through time.[49] The NWI's Wetlands Mapping tool serves as an important starting point for wetland investigations for all levels of government.

The US Fish and Wildlife Service officially adopted the "Classification of Wetlands and deepwater Habitats of the United States" (Cowardin et al. 1979) to delineate and classify wetlands. Known as the Cowardin System, it is a hierarchical system which is structured around a combination of ecological, hydrological, and substrate characteristics. It consists of five systems:

- **The Marine System**, which consists of the open ocean overlying the continental shelf and its associated high-energy coastline.
- **The Estuarine System**, which consists of deepwater tidal habitats and adjacent tidal wetlands which are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.
- **The Riverine System**, which includes all wetlands and deepwater habitats contained within a channel with two exceptions: wetlands dominated by trees, shrubs, persistent emergent, emergent mosses, or lichens; and habitats with water containing ocean derived salts of 0.5 parts per thousand (ppt) or greater.

[49] https://www.fws.gov/program/national-wetlands-inventory/what-we-do

- **The Lacustrine System**, which includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergent, emergent mosses or lichens with thirty percent or greater areal coverage; and (3) total area of at least twenty acres.
- **The Palustrine System**, which includes all nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to the ocean-derived salts is below 0.5 ppt.

From those five major hierarchies, the Cowardin System offers further subsystem, class, and subclass categories. The classification system also contains provisions to apply modifiers to describe the amount of flooding (water regime), water chemistry, soil type, and development actions (i.e. dredging, draining, etc.).

10.2: Identifying Factors

Typically, the first step in identifying the potential location of wetlands is to consult the NJDEP's Bureau of Geographic Information System's (GIS's) GeoWeb resource. This online mapping resource provides guidance on where wetlands may be found in New Jersey; nevertheless, they are not exact delineations. An official determination can only be offered from the New Jersey Department of Environmental Protection in the form of a "Letter of Interpretation" (LOI) which verifies the presence and associated boundaries of wetlands and their transition areas on any given site.

The designation of freshwater wetlands is based upon a three-parameter approach (hydrology, soils, and vegetation) which is enumerated in the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands."[50] The three-parameter approach is a methodology for determining, in a consistent and repeatable manner, the presence of wetlands and the boundaries of wetlands. It requires careful consideration of factors such as vegetative species composition, saturated soil conditions, depth to seasonal high water table, and the presence or absences of hydrological indicators.

[50] Document Display | NEPIS | US EPA

10.3: Wetland Classifications

All wetlands in the Township are considered freshwater wetlands, which are divided among three different types of systems: riverine, palustrine and lacustrine systems. Furthermore, in New Jersey, wetlands are generally characterized into three types of resource values:

- **Exceptional resource value wetlands**, which is any wetland that: discharges into freshwater-1 (FW-1) or FW-2 trout production waters or their tributaries; is a present habitat for threatened or endangered species, or; is a documented habitat for threatened or endangered species, and which remains suitable breeding, resting, or feeding by these species during the normal period these species would use that habitat. Exceptional value wetlands typically have a protective buffer of one hundred and fifty feet.
- **Intermediate resource value wetlands**, which are defined as any wetland that is not an exceptional or ordinary resource value wetland. Intermediate value wetlands typically have a protective buffer of fifty feet.
- **Ordinary resource value wetlands**, which are defined as any wetland which does not meet the definition of an exceptional resource value wetland and: is an isolated wetland that is smaller than 5,000 square feet and has at least fifty percent of its area devoted to lawns, landscaping, impervious surfaces, active railroad rights-of-way, and graveled or stoned parking/storage areas and roads; a drainage ditch; a swale, or; a detention facility created by humans in an upland area. Ordinary resource value wetlands typically do not have a protective buffer.

Preliminary and non-official mapping of potential wetland delineations can be found from the Wetlands Mapper[51] managed by US Fish and Wildlife Service as well as the NJ-GeoWeb[52] service managed by the NJDEP. Non-official wetland mapping can also be found in Map 8 in Appendix B.

[51] https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper
[52] https://www.nj.gov/dep/gis/geowebsplash.htm

Section 11:
Land Use/Land Cover

The following section discusses land use and land cover data from the New Jersey Department of Environmental Protection.

11.1: Land Use/Land Cover

Beginning in 1986, the NJDEP began a detailed study of the status and trends in land use and land cover (LU/LC) utilizing orthophotography and photointerpretation. Updates to this data have been completed utilizing newer orthophotography from 1995, 2002, 2007, 2012, and 2015. Data is mapped to a one-acre minimum mapping unit and most recently utilized one-foot resolution digital imagery.

LU/LC data relies upon the Anderson Classification System[53] which establishes six general land use categories. These are summarized as follows:

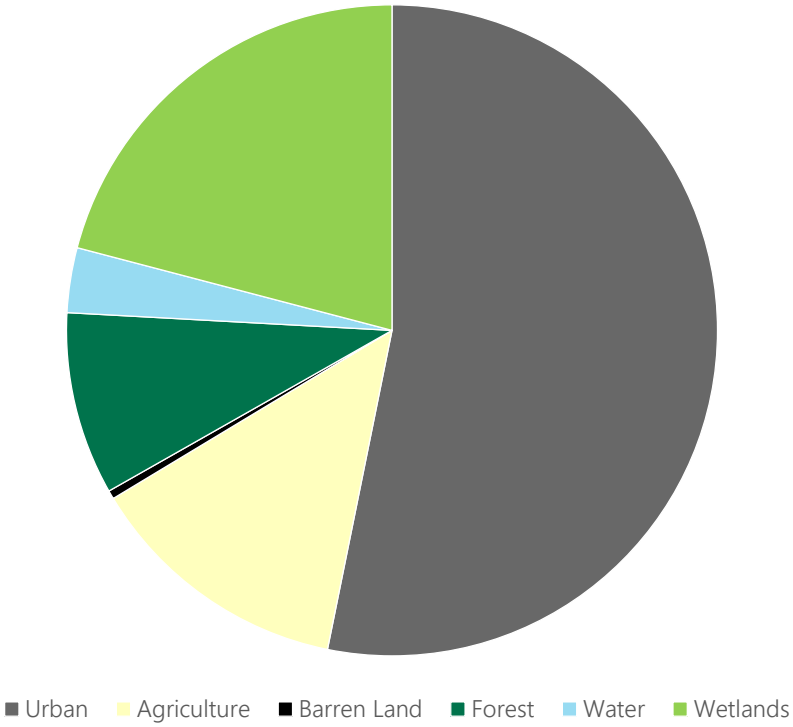
- **Urban**. The urban (or built-up) category is characterized by intensive land use where the landscape has been altered by human activities. Although structures are usually present, this category is not restricted to traditional urban areas. This category also takes precedence over other categories when criteria for more than one category. Hence, properties which may be reserved as open space can often times fall into the urban category.
- **Agricultural**. The agricultural land use category includes all lands primarily used for the production of food and fiber and some of the structures associated with this production.
- **Forest**. The forest land use category includes any lands covered by woody vegetation other than wetlands. These areas are capable of production timber and other wood products, as well as supporting many kinds of outdoor recreation.
- **Water**. The water land use category includes all areas within the landmass of New Jersey which are periodically water covered. These includes streams and canals, natural and artificial lakes, bays, and estuaries. It does not include areas in an obvious state of flood nor water and sewage treatment facilities.
- **Wetlands**. The wetlands land use category includes those areas which are inundated or saturated by surface or ground waters at a frequency and duration sufficient to support vegetation adopted for life in saturated soil conditions. This category includes naturally vegetated swamps, marshes, bogs, and savannas which are normally associated with topographically low elevation but may be located at any elevation where water perches over an aquiclude (a geological formation which is impermeable to the flow of water).
- **Barren Lands**. Barren lands are characterized by thin soil, sand, or rocks and a lack of vegetative cover in non-urban setting. Vegetation, if present, is widely spaced.

53 https://www.state.nj.us/dep/gis/digidownload/metadata/lulc02/codelist2002.html#:~:text=The%20Anderson%20et%20al.,and%20Level%20IV%2C%20most%20detailed.

As noted by the NJDEP, the LU/LC dataset is designed to provide information for regulators, planners, and others interested in LU/LC changes, as well as to allow them to quantify those changes over time utilizing geographic information systems (GIS). The NJDEP further notes that the use of this dataset provides a means of monitoring "the health of the citizens and ecosystems of New Jersey."[54] The LU/LC dataset also provides estimates regarding impervious surfaces which are delineated as percentages broken down into five percent increments.

The following figure and table provides a breakdown of the overall types of LU/LC in West Windsor, which include: urban; agriculture; barren land; forest; water; and wetlands. More detailed LU/LC information can be found on the NJDEP's NJ-Geoweb online mapping resource.[55]

Figure 6: LU/LC Summary

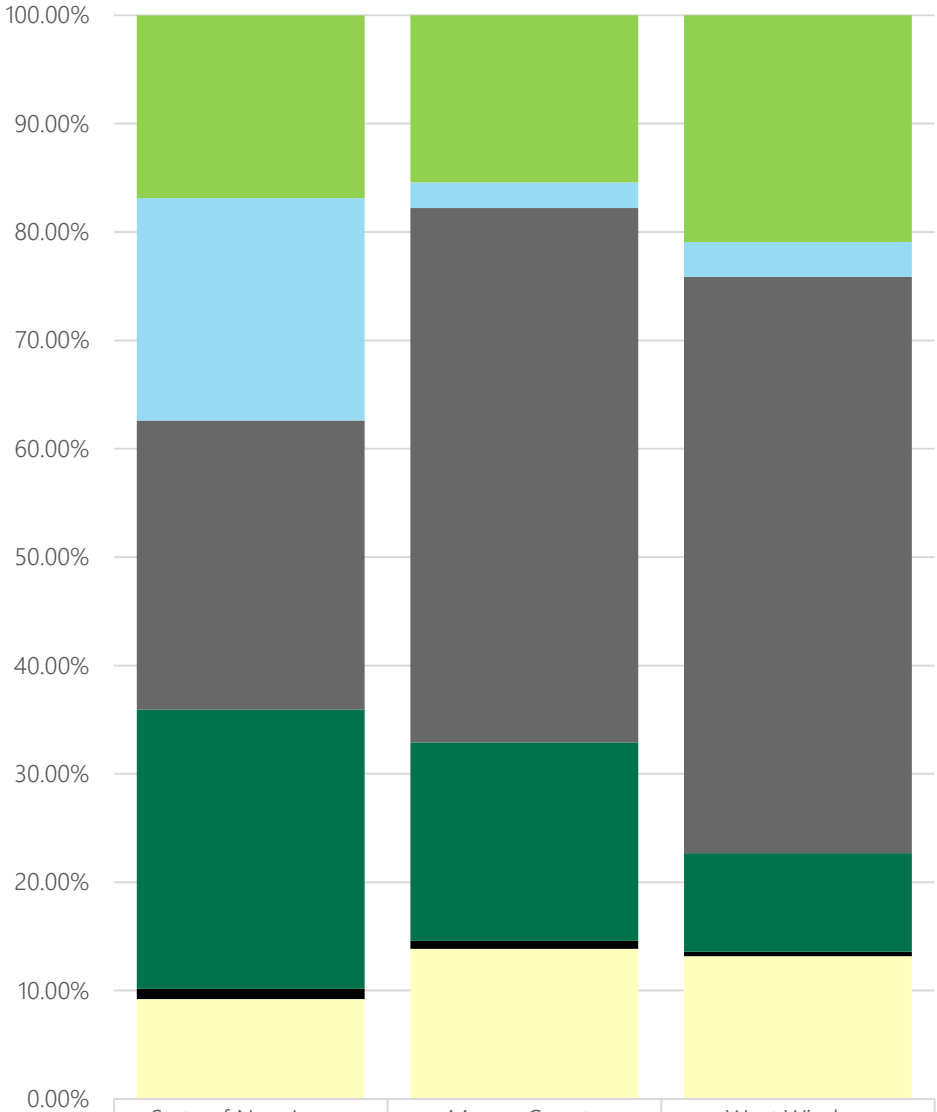


	Acres	Percent
Urban	8,934	53.2%
Agriculture	2,215	13.2%
Barren Land	71	0.4%
Forest	1,526	9.1%
Water	541	3.2%
Wetlands	3,513	20.9%
Total	16,800	100.0%

[54] https://gisdata-njdep.opendata.arcgis.com/documents/6f76b90deda34cc98aec255e2defdb45/about
[55] https://www.nj.gov/dep/gis/geowebsplash.htm

The following figure compares the LU/LC characteristics of the Township with those of Mercer County and the State of New Jersey as a whole. As shown, the Township's LU/LC make-up is relatively commensurate to that of the County's.

Figure 7: State, County, and Township LU/LC Comparison



	State of New Jersey	Mercer County	West Windsor
Wetlands	16.87%	15.43%	20.91%
Water	20.51%	2.37%	3.22%
Urban	26.66%	49.31%	53.18%
Forest	25.80%	18.30%	9.09%
Barren Land	0.92%	0.74%	0.42%
Agriculture	9.23%	13.85%	13.18%

Section 12: Cultural Sites

The following section identifies the various cultural sites of the community.

12.1: Overview

Prior to the arrival of European colonizers, the lands which would eventually become West Windsor were largely occupied by the Lëni Lënape. At the time of its initial corporation in 1797, the Township was a sparsely populated rural community predominantly comprised of Dutch and British settlers. By the mid-nineteenth century when its current borders were officially established, the Township was comprised of nine distinct hamlets as well as approximately 1,600 residents. Today, nearly one hundred and seventy-five years later, West Windsor has grown into a bustling, robust, and diverse community with a population quickly approaching thirty thousand residents.

Over the course of those many centuries, the Township has accrued a rich assortment of archeological and historical sites. An summary of those sites is provided herein. For more information, see the Township's Historic Preservation Plan Element of the Master Plan.

12.2: Archeological Sites

As noted by the New Jersey Historic Preservation Office (SHPO), archeology is "the study of past ways of life through analysis of surviving physical remains."[56] Archeology is comprised of equal parts theory and methods. Theories typically revolve around society and culture, and how the remains of past human behavior are structured in or on the ground (or sometimes in the water), and how those remains can be interpreted. Methods "are the means by which those remains may be identified, recovered, and analyzed to extract information and interpret it."[57]

There are three general types of archeological sites in New Jersey:

- **Prehistoric Native American Sites**. Prehistoric Native American sites include residential settlements, cemeteries, mortuary sites, trails, stone quarries, fish weirs (structures placed in waters to direct the passage of fish), shell middens (collections of domestic waste which may include animal bone, human excrement, botanical material, etc.), and other special purpose locations.
- **Historic Archeological Sites**. Historical archaeological sites occur in conjunction with historic districts, buildings, and structures. They may also include areas in which buildings and structures were never located, such as battlefields. Cemeteries, canals, bridges, dams, early roadways, and other engineering features may also be archeological sites.
- **Underwater Archeological Sites**. Underwater archaeological sites are found in navigable portions of rivers, bays, and particularly off of the Atlantic coastline.

[56] https://www.nj.gov/dep/hpo/1identify/survarkeo.htm
[57] https://www.nj.gov/dep/hpo/1identify/survarkeo.htm

In order to prevent and discourage public contamination, the exact locations of archaeological sites are not disclosed by the State of New Jersey. Rather, the state provides a victor grid of approximately one-half mile cells indicating the presence of archeological districts or sites.

While there are is no evidence of a major Native American settlement in West Windsor, many temporary camps were likely constructed during hunting and fishing activities. Thus, it is essential that in addition to preserving the most promising known sites for excavation, care should also be taken in any below-ground construction activity to avoid inadvertently and irrevocably destroying a new archeological site. If evidence of prehistoric occupation is found, the New Jersey Department of Environmental Protection (NJDEP) should be notified immediately.

12.3: Historical Sites

The following historic sites of West Windsor. Where possible, historical sites are organized by the historic hamlet in which they are located.

Hamlet/Area	ID	Site	Location	Status
Clarksville	1	Doherty Family Farm House	Clarksville Road	Demolished
	2	Weber's Kennels Buildings	3440 US Route 1	Existing
Dutch Neck	3	Dutch Neck Presbyterian Church	154 South Mill Road	Existing
	4	Dutch Neck Inn (Widow Bergen's Tavern)	212-214 South Mill Road	Existing
	5	General Store and Post Office	420 Village Road East	Existing
	6	Dutch Neck Schoolhouse	516 Village Road West	Existing
	7	Dutch Neck School	392 Village Road West	Existing
	8	Dutch Neck Chapel	505 Village Road West	Existing
	9	Slayback-Reed Homestead	540-542 Village Road West	Existing
	10	Reed-Moomaw House	530 Village Road West	Partially Demolished
	11	Ayers-Smallbone House	528 Village Road West	Existing
	12	Dorothy Mather House	514 Village Road West	Existing
	13	Gilham House	510 Village Road West	Existing
	14	Copeland-Sailey House	508 Village Road West	Existing
	15	Rogers-Forman-Walton House	509 Village Road West	Existing
	16	216-218 South Mill Road	216-218 South Mill Road	Existing
	17	Bowers-Hawk House	210 South Mill Road	Existing
	18	Walton House	146 South Mill Road	Existing
	19	Mather House	142 South Mill Road	Existing
	20	Groendyke-Hann-Mihan House	140 South Mill Road	Existing
	21	Fred Robins House	136 South Mill Road	Existing
	22	Rose Conover House	134 South Mill Road	Existing
	23	Perrine-Wyckoff-Holman Residence	131 South Mill Road	Existing
	24	Hooper-Updike House	418 Village Road East	Existing
	25	Post-Long House	416 Village Road East	Existing
	26	Williamson-Conover House	414 Village Road East	Existing
	27	Denison-Mackenzie-Dey House	412 Village Road East	Existing
	28	Robbins-Wyckoff House	408 Village Road East	Existing
	29	Hutchinson-Roszel-Kaplan Farm	401 Village Road East	Existing
	30	David Bergen House	409 Village Road East	Existing
	31	Mount-Reynolds House	411 Village Road East	Existing
	32	Hiram Cook House	413 Village Road East	Existing
	33	Cook-Tindall House	415 Village Road East	Existing
	34	Fred Cook House	419 Village Road East	Existing
	35	Hutchinson-Terhune House	557 Village Road West	Existing
	36	William Walton House	574 Village Road West	Existing
	37	The Manse	138 South Mill Road	Existing
Edinburg	38	Beckett-Carson House	1694 Old Trenton Road	Existing
	39	John and Anna Tindall House	1712 Old Trenton Road	Existing
	40	George and Gertrude Tindall House	1714 Old Trenton Road	Existing
	41	Hart-Carson House	1337 Old Trenton Road	Existing
	42	General Store and Post Office	1720-22 Old Trenton Road	Existing
	43	Rachel Conover House	1726 Old Trenton Road	Existing
	44	Forman-Conover-Tayler House	1309 Windsor Road	Existing
	45	Edinburg Hotel	1719 Old Trenton Road	Existing
	46	Sailey-Tantum House	1721 Old Trenton Road	Existing
	47	Ivans-Mill-Mount House	1727 Old Trenton Road	Existing

Hamlet/Area	ID	Site	Location	Status
	48	1312 Windsor Road	1312 Windsor Road	Existing
	49	Joseph Mount House	1309 Windsor Road	Existing
Grovers Mill[1]	50	Grovers Mill	164 Cranbury Road	Existing
	51	Millwright's House (Ladyfair)	429 Clarksville Road	Existing
	52	Brain House	160 Cranbury Road	Existing
	53	Saltzman House	152 Cranbury Road	Existing
	54	Old Snedeker Place	148 Cranbury Road	Existing
	55	123 Cranbury Road	123 Cranbury Road	Existing
	56	Grover Mill Co. Barn	163 Cranbury Road	Existing
	57	The Millwright's House	175 Cranbury Road	Existing
	58	Vannest-Slayback House	22 Millstone Road	Existing
	59	Wiley Farm	249 Cranbury Road	Existing
Penns Neck	60	Penns Neck Baptist Church[1, 2]	261 Washington Road	Existing
	61	Penns Neck Cemetery[1]	Washington Road	Existing
	62	Baptist Church Parsonage, Red Lion Inn	261 Washington Road	Existing
	63	Penns Neck Schoolhouse	3637 US Route 1	Demolished
	64	249 Washington Road	249 Washington Road	Existing
	65	245 Washington Road	245 Washington Road	Existing
	66	241 Washington Road	241 Washington Road	Existing
	67	237 Washington Road	237 Washington Road	Existing
	68	229 Washington Road	229 Washington Road	Existing
	69	198 Washington Road	198 Washington Road	Existing
	70	182 Washington Road	182 Washington Road	Existing
	71	Jerab's Market	175 Washington Road	Existing
	72	14 Morning Sun Road	14 Morning Sun road	Existing
	73	169 Washington Road	169 Washington Road	Existing
	74	167 Washington Road	167 Washington Road	Existing
	75	165 Washington Road	165 Washington Road	Existing
	76	124 Washington Road	124 Washington Road	Existing
	77	RCA/Sarnoff/SRI International[1]	201 Washington Road	Existing
Port Mercer[1]	78	Crater House	4261-4263 Quakerbridge Road	Existing
	79	Port Mercer Inn	4271 Quakerbridge Road	Existing
	80	4273 Quakerbridge Road	4273 Quakerbridge Road	Existing
	81	4275 Quakerbridge Road	4275 Quakerbridge Road	Existing
Princeton Basin	82	Berrien House	8-10 Canal Road	Existing
	83	Ed Ryan House	14 Canal Road	Existing
Princeton Junction	84	Conrad Shafer's Service Station	37 Station Drive	Existing
	85	Hey General Store	31 Station Drive	Existing
	86	Hey Warehouse	33 Station Drive	Existing
	87	Jacob Wyckoff Feed Mill	37 Station Drive	Existing
	88	Nassau Interlocking Tower	Station Drive	Existing
	89	Dey Barn	61 Princeton Hightstown Road	Existing
	90	1 Penn Lyle Road	1 Penn Lyle Road	Existing
	91	13 Penn Lyle Road	13 Penn Lyle Road	Existing
	92	332 Clarksville Road	332 Clarksville Road	Existing
	93	325 Clarksville Road	325 Clarksville Road	Existing
	94	315 Clarksville Road	315 Clarksville Road	Existing
	95	377 North Post Road	377 North Post Road	Existing
	96	Kiernan House	397 North Post Road	Existing
	97	408 North Post Road	408 North Post Road	Existing
	98	918 Alexander Road	918 Alexander Road	Existing
	99	928 Alexander Road	928 Alexander Road	Existing
	100	930 Alexander Road	930 Alexander Road	Existing
	101	John Forbes Nash House	932 Alexander Road	Existing

Hamlet/Area	ID	Site	Location	Status
	102	986 Alexander Road	986 Alexander Road	Existing
	103	992 Alexander Road	992 Alexander Road	Existing
	104	97 Harris Road	97 Harris Road	Existing
	105	110 Harris Road	110 Harris Road	Existing
	106	Princeton Junction Schoolhouse	50 Southfield Road	Existing
	107	Historic Berrien City	Berrien City	Existing
Scudders Mills	108	John Applegate House	43 Lower Harrison Street	Existing
	109	Robert D. Thompson House	47 Lower Harrison Street	Existing
	110	Isiah Jemison House	51 Lower Harrison Street	Existing
	111	Edward S. Patterson House	65 Lower Harrison Street	Existing
VanHiseville	112	VanHiseville Store/Post Office	255 Hendrickson Drive	Existing
	113	Hendrickson House	219 Hendrickson Drive	Existing
	114	Mundy House	3 South Mill Road	Existing
	115	Wright-Chamberlin House	6 North Mill Road	Existing
	116	Cox Farm/Raggedy Ann Publishing Site	10 North Mill Road	Existing
Other Sites	117	Delaware and Raritan Canal[1, 2]	Northerly portion of Township	Existing
	118	Route of Washington's March	Quakerbridge Road	Existing
	119	Washington Road Elm Allee[1, 2]	Washington Road	Existing
	120	536 Alexander Road	536 Alexander Road	Existing
	121	51 Cranbury Road	51 Cranbury Road	Existing
	122	Clifford Carling House	72 Cranbury Road	Existing
	123	85 Cranbury Road	85 Cranbury Road	Existing
	124	420 Clarksville Road	122 Clarksville Road	Existing
	125	198 Cranbury Road	198 Cranbury Road	Existing
	126	The Mulvey Farm	304 Cranbury Road	Existing
	127	315 Cranbury Road	315 Cranbury Road	Existing
	128	420 Cranbury Road	420 Cranbury Road	Existing
	129	434 Cranbury Road	434 Cranbury Road	Existing
	130	457 Cranbury Road	457 Cranbury Road	Existing
	131	474 Cranbury Road[1]	474 Cranbury Road	Existing
	132	3 Compton Lane	3 Compton Lane	Existing
	133	The Reed Farm	106-108 Rabbit Hill Road	Existing
	134	103 Rabbit Hill Road	103 Rabbit Hill Road	Existing
	135	101 Rabbit Hill Road	101 Rabbit Hill Road	Existing
	136	175 Southfield Road	175 Southfield Road	Existing
	137	221 Southfield Road	221 Southfield Road	Existing
	138	364 Princeton Hightstown Road	364 Princeton Hightstown Road	Existing
	139	372 Princeton Hightstown Road	372 Princeton Hightstown Road	Existing
	140	2044 Old Trenton Road	2044 Old Trenton Road	Existing
	141	105 Southfield Road	105 Southfield Road	Existing
	142	Cranbury Golf Club	49 Southfield Road	Existing
	143	The Fisher House	1953 Old Trenton Road	Existing
	144	The Jewell Farmstead	1912 Old Trenton Road	Existing
	145	Armstrong House	7 Finch Court	Existing
	146	231 Village Road East	231 Village Road East	Existing
	147	180 South Lane	180 South Lane	Existing
	148	1777 Old Trenton Road	1777 Old Trenton Road	Existing
	149	1262 Windsor Road	1262 Windsor Road	Existing
	150	1255 Windsor Road	1255 Windsor Road	Existing
	151	1234 Windsor Road	1234 Windsor Road	Existing
	152	1235 Windsor Road	1235 Windsor Road	Existing
	153	Windsor Farm and Market	1202 Windsor Road	Demolished
	154	1209 Windsor Road	1209 Windsor Road	Existing

Hamlet/Area	ID	Site	Location	Status
	155	1203 Windsor Road	1203 Windsor Road	Existing
	156	1640 Old Trenton Road	1640 Old Trenton Road	Existing
	157	1638 Old Trenton Road	1638 Old Trenton Road	Existing
	158	1645 Old Trenton Road	1645 Old Trenton Road	Existing
	159	1611 Old Trenton Road	1611 Old Trenton Road	Existing
	160	39 Cubberly Road	39 Cubberly Road	Existing
	161	1393 Old Trenton Road	1393 Old Trenton Road	Existing
	162	Isaac Hutchsin House	66 Line Road	Existing
	163	1201 Old Trenton Road	1201 Old Trenton Road	Existing
	164	364 South Post Road	364 South Post Road	Existing
	165	372 South Post Road	372 South Post Road	Existing
	166	Jon Rogers House[1, 2]	Mercer County Park	Existing
	167	Appelget Farm	135 Conover Road	Existing
	168	Hooper House	1439 Edinburg Road	Existing
	169	8 Orly Court	8 Orly Court	To be demolished
	170	The Rue Farmstead/Old Post Farm	11 South Post Road	Existing
	171	Couwenhoven-Post-Everett Farm	18 North Post Road	Existing
	172	38 South Mill Road	38 South Mill Road	Existing
	173	55 Penn Lyle Road	55 Penn Lyle Road	Existing
	174	157 North Post Road	157 North Post Road	Existing
	175	163 Clarksville Road	163 Clarksville Road	Existing
	176	The Cella and Faccini Family Farms	551, 553, 554 Meadow road	Existing
	177	758 Village Road West	758 Village Road West	Existing
	178	762 Village Road West	762 Village Road West	Existing
	179	The Robbins House	774 Village Road West	Existing
	1780	786 Village Road West	786 Village Road West	Existing
	181	4095 Quakerbridge Road	4095 Quakerbridge Road	Existing
	182	The Schenck Farmstead	50 and 58 Southfield Road	Existing
	183	Glen Acres	Glenview Drive	Existing
	184	Penns Neck Schoolhouse	Alexander Road/US Route 1	Demolished
	185	Finn M. W. Caspersen Rowing Center	Mercer Lake	Existing
	186	Van Nest Park War of the Worlds Memorial	Van Next Park	Existing

[1] *SHPO Opinion;*
[2] *National Register*

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Section 13: Waste Management and Recycling

The following section provides an overview of waste management and recycling.

13.1: Trash

The Township of West Windsor contracts for the removal of normal trash collection (including but not limited to household garbage, grass, empty latex paint cans, bulk items) for all residential properties with a private company. More detailed information concerning specific requirements and schedules of the present contractor is available on the Township's website[58].

Additional information regarding waste management and recycling can be found in the Utilities Plan Element of the Master Plan, which can be found on the Township's website by clicking here. (https://www.westwindsornj.org/master-plan)

Businesses typically contract for the recycling and disposal of solid waste with private companies separate from the Township system. All business properties are required to address the anticipated production of solid waste and provide a plan and area for the storage and disposal of these materials as part of the site plan review process at the Township Planning or Zoning Board.

13.2: Recycling

The Mercer County Improvement Authority (MCIA) handles the majority of recycling in West Windsor Township. As detailed by the MCIA's website, the following materials are recycled. These recyclable materials are picked up at residential curbs, usually on every other Thursday.

- Mixed paper, office paper, and window envelopes.
- Corrugated cardboard (flattened and/or cut into manageable bundles).
- Telephone books and soft cover books.
- Hard cover books with the hard cover removed.
- Glass food and beverage jars and bottles (all colors).
- Aluminum and metal beverage containers.
- Pet food cans.
- Milk jugs and plastic beverage bottles.
- Detergent and shampoo containers.
- Juice boxes and juice/beverage cartons.
- Plastics with #1 and #2 symbols.

Household hazardous waste can be disposed of through the MCIA's three specially held events throughout the year. Collection of hazardous waste and electronics recycling is held at the Dempster Fire School in Lawrence Township. At these special collection recycling events, Township citizens can drop off residential hazardous wastes. Acceptable materials include aerosol cans, used motor oil, propane/gas tanks, pesticides and herbicides, car

[58] https://www.westwindsornj.org/departments/trash-collection#:~:text=Garbage%20collection%20for%20the%20town,townships%20winter%20and%20summer%20schedule.

batteries, paint thinner, oil based paint, stains and varnishes, gasoline, anti-freeze, driveway sealer, insect repellents, mercury, and fluorescent and compact fluorescent light (CFL) bulbs. The County also has prepared a "Beyond the Bucket" pamphlet for other recycling opportunities.[59]

In addition to the above, the Township Public Works Facility is a recycling facility which accepts recyclable materials.

13.3: Wastewater Disposal

Wastewater generated within the Township is either conveyed through the sewer collection system to a wastewater treatment plant in Princeton for treatment and final disposal or it is treated and released on site via a septic system. The management of such wastes is planned under the Mercer County Water Management Plan, of which more information can be found at the County's website.[60] Most of the Township's wastewater is conveyed to and treated at the Stony Brook Regional Sewerage Authority, River Road Facility. There is an area in the Township, however, that is serviced by the Hamilton Township Water Pollution Control Plant. That area includes the Mercer County Park within the Township on the south side of the Assunpink Creek. In addition, the Bridgepoint 8 Site (formerly known as the Atlantic Realty Site, the Howard Hughes Site, and the American Cyanamid Site) was previously approved to treat the wastewater from its own facilities at an onsite plant. The future development of this site will require connection to the public sewer system through the Duck Pond Run (south branch) Interceptor line.

There are also areas within the Township that are served by individual septic tanks. The location, design, construction, operation, and maintenance of these on-site disposal systems is regulated by the Board of Health and by the NJDEP. However, there have been cases of septic systems failing. Improper maintenance and operation have the potential to pollute groundwater and/or surface water. The Environmental Commission encourages the Township to take a proactive position with respect to septic systems by reducing the chances of failure in the first place. Therefore, owners of individual septic tanks are encouraged to contact the NJDEP's Division of Water Quality to obtain the manual that identifies proper operation and maintenance of such systems. If, in the future, septic systems continue to fail, the Environmental Commission recommends the Township consider adopting ordinances which require certain preventative actions on the part of the septic system owners.

[59] https://www.mercercounty.org/home/showdocument?id=16224
[60] https://www.mercercounty.org/departments/planning/plans-and-reports/wastewater-management-plan

13.4: Noise Factors

Noise is considered by both the State of New Jersey and the Township of West Windsor as any sound that exceeds the provisions outlined in both the State Noise Control Standards and the Township's Noise Ordinance.

By way of background, noise is measured in decibels using approved sound level meters set at the A weighting, a level which mimics human hearing characteristics. The state noise control statutes require that all noise meters be calibrated on a yearly basis. Table 8 provides a list of common activities and their associated noise level readings taken at given distances, as identified by the Center for Disease Control (CDC).[61] Sound source levels were abstracted from the Noise Navigator™ Sound Level Database from the University of Michigan. Additional information on those sounds, as well as at what distance those sounds were measured, can be found in that database.[62]

Noise standards in both the state and local noise ordinances limit noise levels measured on residential properties to 65 decibels (dBA) between the hours of 7:00 am and 10:00 pm and 50 dBA between the hours of 10:00 pm and 7:00 am. Noise levels measured at commercial facilities, public service facilities, non-residential properties and community service facilities cannot exceed 65 dBA twenty-four hours a day. In addition, impulse noise levels, or those noises with duration of less than one second, are limited to 80 dBA between 7:00 am and 10:00 pm. Between 10:00 pm and 7:00 am, impulsive sound which occurs less than four times in any hour shall not equal or exceed 80 decibels. However, impulsive sound which repeats four or more times in any hour shall be measured as continuous sound.

Areas within the Township which are sensitive to elevated noise levels include all residential areas, parks and recreational fields and schools. These areas are protected from elevated noise levels by both state and local noise regulations. Sources of noise that may impact the sensitive areas within the Township include railroads, traffic corridors, and industrial operations. Proper zoning within the Township can reduce most noise impacts by maintaining separation between sensitive areas and the sources of noise. In addition, proposed development within the Township is often evaluated for noise related impacts to the surrounding environment. Mitigating measures can and should be imposed if impacts may occur.

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61 https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html#:~:text=Common%20Sources%20of%20Noise%20and%20Decibel%20Levels&text=A%20whisper%20is%20about%2030,immediate%20harm%20to%20your%20ears.

62 https://multimedia.3m.com/mws/media/888553O/noise-navigator-sound-level-hearing-protection-database.pdf

Table 8: Decibels of Common Activities

Sound Source	Decibel Level (dBA)	Typical Response (after routine or repeated exposure)
Softest sound that can be heard	0	Sounds at these dB levels typically don't cause any hearing damage.
Normal breathing	10	
Ticking watch	20	
Soft whisper	30	
Refrigerator hum	40	
Normal conversation, air condition	60	
Washing machine, dishwasher	70	You may feel annoyed
City traffic (inside a car)	80-85	You may feel very annoyed
Gas-powered lawnmowers and leaf blowers	80-85	Damage to hearing possible after two hours of exposure
Motorcycle	95	Damage to hearing possible after approx. fifty minutes of exposure.
Approaching subway train, car horn at 16 feet, sporting events	100	Hearing loss possible after fifteen minutes
Maximum level for personal listening devices; loud radio, stereo, or television; loud entertainment venues	105-110	Hearing loss possible in less than five minutes
Shouting or barking in the ear	110	Hearing loss possible in less than two minutes
Standing beside or near sirens	120	Pain and ear injury
Firecrackers	140-150	

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Section 14: Regional Relationships

The following section analyzes the regional relationships of the Township, including its relationship to the State Development and Redevelopment Plan (SDRP), Mercer County Master Plan, Delaware and Raritan Canal Commission (DRCC), and various watershed planning associations.

14.1: Overview

Environmental information and issues identified by state, regional, and county entities have the potential to influence local level decisions. Thus, the following section analyzes the regional relationships of the Township, including its relationship to the State Development and Redevelopment Plan (SDRP), Mercer County Master Plan, Delaware and Raritan Canal Commission (DRCC), and various watershed planning associations.

14.2: State Development and Redevelopment Plan (SDRP)

Recognizing that the state must plan for its future to preserve and maintain its social, cultural, economic and natural assets, the New Jersey Legislature adopted the State Planning Act (NJSA 52:18A-196 et seq) in order to better:

> *"…conserve [the State's] natural resources, revitalize its Urban Centers, protect the quality of its environment, and provide needed housing and adequate public services at a reasonable cost while promoting beneficial economic growth, development and renewal…"*

In an effort to realize these goals, New Jersey adopted the State Development and Redevelopment Plan (SDRP)[63] in 1992 with the aim of providing a blueprint for future development and redevelopment on an integrated and coordinated statewide basis. Ultimately, the main objective of the SDRP is two-fold:

- To guide future development, redevelopment and economic growth in areas that already contain (or are anticipated to contain) the public services, facilities and infrastructure necessary for such growth, and;
- To discourage development where it may impair, encroach, or destroy the State's natural features and environmental assets.

The SDRP seeks to curb development in rural areas and other relatively undeveloped areas of the State and encourage growth in New Jersey's predeveloped corridors, including along transportation corridors as well as in older cities, suburbs with adequate infrastructure, and concentrated rural centers. While it does not take power away from planning and zoning at the municipal level, the SDRP is used as a general guide for a variety of decisions made by the state in addressing local matters.

To organize its general statewide policies and objectives, the SDRP divides the state into several different "Planning Areas," each with its own specific set of policy objectives that are tailored to each area's unique qualities and conditions. The overarching goal of these Planning Areas is to implement land use policies on the local level that will be consistent with state-wide policies.

[63] https://nj.gov/state/planning/state-plan.shtml

The Township's comprehensive planning documents and its Environmental Resource Inventory (ERI) should continue to reflect the issues discussed by the SDRP, including: conservation of the State's natural resources and systems; protection of the environment; prevention and clean-up of pollutants, and; preservation and enhancement of areas with historic, cultural, scenic, open space and recreational value.

14.3: Mercer County Master Plan

At the time of the adoption of this element, Mercer County does not have its own Environmental Resource Inventory. If an ERI is developed on a countywide basis, this Environmental Plan Element and the Township ERI will need to be reexamined to determine their consistency with it.

14.4: Delaware and Raritan Canal Commission (DRCC)

Pursuant to the Delaware and Raritan Canal State Park Law of 1974, N.J.S.A. 13:13A-1 et seq., the Delaware and Raritan Canal Commission (DRCC) was created to prepare and adopt a master plan for the physical development of the Delaware and Raritan Canal State Park.

The DRCC establishes zones to help review projects which may impact the Delaware and Raritan Canal State Park. Within the Township, Zone A consists of those areas that are within one thousand feet on either side of the canal. Zone B consists of those areas within the Township that are within the watershed of the Canal.

Projects within these areas are subject to review by the DRCC, the goal of which is to determine how they will impact:

- Storm drainage and water quality;
- Visual and natural quality, including historic assets;
- Stream corridors, and;
- Traffic.

Detailed information on the DRCC can be found in New Jersey Annotated Code (NJAC) 7:45, Subchapters 1 through 9.[64]

[64] https://www.nj.gov/dep/drcc/pdf/drcc_regs.pdf

14.5: Watershed Planning Associations

Watershed management is the process of managing all of the water and water-related resources within the entirety of a watershed, as opposed to managing these assets on a site-specific basis. As discussed in Section 6, a watershed is a geographic area within which water, sediments, and dissolved materials drain to a receiving surface waterbody such as a river, lake, or stream. New Jersey has developed seventeen Watershed Restoration and Protection Plans, also known as Watershed-Based Plans (WBPs), which focus on reducing nonpoint sources (NPS) of water pollution.

In addition, there are two nonprofit organizations which partake in watershed management. These include the New Jersey Water Supply Authority[65] and the Watershed Institute (formerly known as the Stony Brook-Millstone Watershed Association)[66].

[65] https://www.njwsa.org/
[66] https://thewatershed.org/

Section 15:
Other Conservation Issues

The following section discusses other conservation issues of the Township which are largely related to contamination and environmental reporting.

15.1: Superfund

In response to the possible dangers of uncontrolled and abandoned contaminated sites throughout the country, the United States Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) – otherwise known as the Superfund – in 1980. In 1986, CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA).

Both CERCLA and SARA require that a National Priorities List (NPL) of sites be maintained and revised annually for sites throughout the United States. As of February 2022, the NPL identifies one hundred and fifteen existing Superfund sites in New Jersey, as well as one proposed site and thirty-six deleted sites. There are no existing, proposed, or deleted sites in West Windsor.

15.2: Known Contaminated Sites (KCS)

Known Contaminated Sites (KCS) are those sites and properties within the state where contamination of soil or groundwater has been confirmed at levels equal to or greater than applicable standards. The list of KCS may include sites where remediation is either currently under way, required but not yet initiated, or has been completed and addressed via an institutional control.

In years past, the NJDEP released physical reports of its KCS. Today, this information is provided digitally so that it may be updated on a daily basis. This information can be found on the NJDEP's GeoWeb[67] mapping resource as well as via Data Miner[68]. Those KCS in the Township are identified in the following table. The locations of these KCS are also identified in the Appendix in Map 10. For additional information on each site's individual contaminants as well as their remediation methods, readers may visit the Data Miner website.

Table 9: Known Contaminated Sites (KCS)

Map ID	Site ID	PI Number	Facility Name	Address	Status
1	6171	8696	3713 RT 1 PRINCETON LLC	3713 BRUNSWICK PK	Active - RAP
2	6172	533392	WINDSOR GREEN DRY CLEANERS	3495 RT 1 S	Active
3	6173	14879	SUNOCO 80000227	56 HIGHTSTOWN RD	Active - RAP
4	6174	7605	PRINCETON JUNCTION SHELL	74 PRINCETON HIGHTSTOWN RDS	Active

[67] https://www.nj.gov/dep/gis/geowebsplash.htm
[68] https://njems.nj.gov/DataMiner/Search/SearchByCategory?isExternal=y&getCategory=y&catName=Site+Remediation

Map ID	Site ID	PI Number	Facility Name	Address	Status
5	6176	27075	TRI STATE PETRO INC WEST WINDSOR	401 RT 571 W & SOUTHFIELD RD	Active
6	6177	7927	G&B PRINCETON JUNCTION	78 PRINCETON HIGHTSTOWN RD	Active - RAP
7	6178	13912	LEES CLEANERS	64 PRINCETON HIGHTSTOWN RD	Active
8	6180	22661	EMR PHOTOELECTRIC	20 WALLACE RD	Active
9	6186	6737	CUMBERLAND GULF 126342	3717 BRUNSWICK PK	Active
10	6187	10289	56206 PRINCETON FUELS	264 WASHINGTON RD	Active
11	6191	26063	PRINCETON POLYCHROME PRESS INC	861 ALEXANDER RD	Active
12	15881	20434	AMERICAN CYANAMID COMPANY WEST WINDSOR	QUAKERBRIDGE RD	Active - RAP
13	13793	8514	DAVID SARNOFF RESEARCH CENTER	201 WASHINGTON RD	Active
14	15322	14871	SUNOCO 80000113	3729 US 1 & HARRISON ST	Active - RAP
15	15384	802578	JEM CLEANERS	33 PRINCETON HIGHTSTOWN RD	Active
16	18406	440145	BRISTOL MYERS SQUIBB CO	100 NASSAU PARK BLVD	Active
17	66370	G000005115	MILLSTONE ROAD & NEW GROVERS MILL ROAD	MILLSTONE & NEW GROVERS MILL RDS	Active
18	51346	16766	THOMPSON REALTY PRINCETON SUCCESSOR MERGER TH	50 PRINCETON HIGHTSTOWN RD	Active
19	48885	21457	PRINCETON MOTOR LODGE	3520 RT 1 & MEADOW RD	Active - RAP
20	50498	13153	WEST WINDSOR GARAGE	HIGHTSTOWN RD & WALLACE RD	Active

Map ID	Site ID	PI Number	Facility Name	Address	Status
21	58022	33880	WHEELER WAY	1 WHEELER WAY	Active
22	27419	10903	GETTY SERVICE STATION 95315	39 AND 41 HIGHTSTOWN RD	Active - RAP
23	57322	32366	RM SQUARE LLC	ALEXANDER RD & RTE 1	Active - RAP
24	67154	G000011100	WEST WINDSOR SANITARY LANDFILL	877 ALEXANDER RD	Active
25	55276	25615	ABANDONED GAS STATION	RTE 1 N & MEADOW RD	Active - Post Rem
26	56548	31323	131 SOUTH MILL RD	131 S MILL RD	Active
27	185995	932031	2044 OLD TRENTON ROAD	2044 Old Trenton Road	Active
28	202082	33881	MERCER CNTY PARK WORKSHOP	OLD TRENTON RD	Active
29	399789	500128	SOUTH POST ROAD GROUNDWATER CONTAM	S POST RD	Active
30	170972	461218	CARNEGIE CENTER WEST BUILDING 701	3635 BRUNSWICK PK	Active - RAP
31	92237	283646	WWM PROPERTIES	350 358 PRINCETON HIGHTSTOWN RD	Active - RAP
32	623893	801977	47 PRINCETON-HIGHTSTOWN ROAD	47 Princeton-Hightstown Road	Active
33	121671	26399	THE SHOPS AT WINDSOR GREEN/WINDSOR ARCO	3477 BRUNSWICK PK	Active - RAP
34	150250	254163	BLUE ROSE CORP	119 PENN LYLE RD	Active
35	700062	989543	WEST WINDSOR PROPERTY		Active
36	*	G000009362	GRESS AND MILES ORGAN COMPANY	20 WASHINGTON RD	Active

RAP: Remedial Action Permit: A Soil Remedial Action Permit is required whenever a remedial action includes leaving soil contamination in place at concentrations in excess of the unrestricted use Soil Remediation Standards N.J.A.C. 7:26D.

PI: Site Remediation Program Interest Number

REM: Remediation

** Identified on Site Remediation Program Preferred ID Sites List*

15.3: Industrial Site Recovery Act (ISRA)

As a result of growing concerns that the discharge of toxic chemicals dating back to the days of early industrialization has left a legacy of contaminated industrial properties, the State adopted the Industrial Site Recover Act (ISRA) in 1993. As set forth in NJAC 7:26B, ISRA regulations set forth the procedures by which owners and operators of "industrial establishments" investigate the environmental conditions of their facilities before they sell, close, or transfer operations. Industrial establishments are specifically defined as those facilities involved in the "generation, manufacture, refining, transportation, treatment, storage, handling, or disposal of hazardous substances or wastes" on-site, above-grade, or below-grade. As a precondition of the sale, transfer, or closure of industrial establishments, the ISRA requires the owner or operator of the industrial establishment to investigate the site and remediate any discharges of hazardous substances to protect the public health, safety and environment. It is the goal of the NJDEP to ensure that industrial establishments have been remediated to an acceptable condition upon sale, transfer, or closure without jeopardizing the time needed to finalize real estate and business transactions.

Subsequently in the late 1990s, the Brownfield and Contaminated Sites Remediation Act was signed which added new provisions to New Jersey's overall environmental cleanup regulatory system. The purpose of the Act is to advance the reuse of brownfields as part of a comprehensive program for urban redevelopment.

A brownfield is defined under New Jersey state law as "any former or current commercial or industrial site that is currently vacant or underutilized and on which there has been, or is suspected to have been, a discharge of a contaminant."

Under the Open Public Records Act under NJSA 47:1A-1, the NJDEP makes all of its ISRA case files available for public inspection. This listing is not presently readily available through online resources. However, interested parties may contact the NJDEP directly for information in specific ISRA case locations. The NJDEP ISRA website is https://www.nj.gov/dep/srp/isra/.

15.4: Community Right to Know

The federal and state Community Right to Know (CRTK) laws are similar in nature, as both include requirements for reporting on the storage, use, and releases of hazardous substances into the environment. CRTK laws require employers of any facility whose business activities, according to certain criteria developed by the NJDEP, complete and return an annual survey which inventories the environmental substances which are stored, produced, or used at that facility.

Common substances often associated with business activities may pose a hazard to human health and the environment. Therefore, inventory reporting is not just limited to businesses engaged in heavy chemical use. The information collected by these surveys is available to the public and emergency personnel. It is also used to supplement other regulatory programs within the state to facilitate the proper planning for emergency responses.

Table 10 identifies sites within West Windsor which received a survey reporting package. The following is noted regarding response status:

- Reported Above Threshold: This facility reported that they produce, store or use Environmental Hazardous Substances above the thresholds as defined in the New Jersey CRTK Regulations.
- Reported Below Threshold: This facility reported that they produce, store or use Environmental Hazardous Substances below the thresholds as defined in the New Jersey CRTK Regulations.
- Non-User. This facility reported that they do not produce, store or use Environmental Hazardous Substances in any quantity as defined in the New Jersey CTRK Regulations.
- No Survey Received: No Community Right to Know survey was received as of the date of this Conservation Plan Element of the Master Plan.

Table 10: New Jersey CRTK Public Access System Facility List

Facility ID	Facility Name	Address	Reporting Status ***
73937	ABI INVESTMENT GROUP LLC	408 VILLAGE RD E	(No Survey Received)
73309200000	SCHLUMBERGER[1]	20 WALLACE RD	Reported Above Threshold
58530700001	SUNOCO #80000227	56 PRINCETON HIGHTSTOWN RD	Reported Above Threshold
46902	AMTRAK	27 WALLACE RD	EPCRA Only
74858	APHELION PHARMA LLC	186 PRINCETON HIGHTSTOWN RD BLD#3	Non-User
83990300000	PETROLEUM MARKETING GROUP INC.	RT 571 & ALEXANDER RD (HIGHTSTOWN RD)	Reported Below Threshold
73733	BOWFUL TECHNOLOGY CORP	6 STUART LN E	(No Survey Received)

Facility ID	Facility Name	Address	Reporting Status ***
195116000 19	E R SQUIBB & SONS LLC	100 NASSAU PK BLVD	Reported Above Threshold
36743	G&B BUSINESS ASSOCIATES INC.	78 RT 571 PRINCETON-HIGHTSTOWN RD	Reported Above Threshold
6184440 0000	HOLMAN GO	3466 RT 1 N	Reported Above Threshold
73740	HOLMAN GO, LLC	3466 RT 1	(No Survey Received)
3066000 88	LUKOIL #57729	3513 RT 1 & FARBER RD	Reported Above Threshold
8714370 0000	TRI STATE PETRO INC	401 PRINCETON HIGHTSTOWN RD	(No Survey Received)
2443042 33	VERIZON NEW JERSEY, INC. (NJ53981)	138 WASHINGTON RD	Reported Above Threshold
46100	LOWE'S HOME CENTERS, LLC (1185)	3504 BRUNSWICK PK	EPCRA Only
38445	THE HOME DEPOT STORE #0921	701 NASSAU PARK BLVD	EPCRA Only
1604260 0022	NEW JERSEY AMERICAN WATER	BRUNTSFIELD DR	Non-User
5852113 08	PUBLIC SERVICE ELECTRIC & GAS CO	ROUTE 1 AND EDEN WAY	Reported Above Threshold

[1] *As of 6/21/23, this facility has been closed.*

In addition to chemical inventory reporting, owners and operators of manufacturing and select non-manufacturing companies (the latter of which have the equivalent of ten or more full-time employees and manufacture, import, process, or otherwise use toxic chemicals in quantities which exceed specified thresholds) are required to annually report their releases of these chemicals for the previous year. Additional information can be found at the Department of Environmental Protection's Compliance and Enforcement website.[69]

[69] https://www.nj.gov/dep/enforcement/opppc/rpprindex.html

15.5: Underground Storage Tanks (UST)

As defined by NJAC 7:14B, an underground storage tank (UST) is:

> *"…any one or combination of tanks as set forth in N.J.A.C. 7:14B-1.4, including appurtenant pipes, lines, fixtures, and other related equipment, used to contain an accumulation of hazardous substances, the volume of which, including the volume of the appurtenant pipes, lines, fixtures, and other related equipment, is 10 percent or more beneath the surface of the ground."*

The NJDEP's online DataMiner[70] resource maintains a list of regulated UST facilities throughout the state, as well as a list of regulated USTs which presently have an active cleanup. The following table identifies those regulated USTs which presently have a cleanup underway in the Township.

Table 11: UST Active Remediations in West Windsor

PI Number	Activity Number (CF)	PI Name	Street Address
006737	LSR110001	CUMBERLAND GULF 126342	3717 BRUNSWICK PK
007605	LSR110001	PRINCETON JUNCTION SHELL	74 PRINCETON HIGHTSTOWN RDS
007605	LSR180001	PRINCETON JUNCTION SHELL	74 PRINCETON HIGHTSTOWN RDS
010289	LSR120001	56206 PRINCETON FUELS	264 WASHINGTON RD
010289	LSR170001	56206 PRINCETON FUELS	264 WASHINGTON RD
013153	LSR130001	WEST WINDSOR GARAGE	HIGHTSTOWN RD & WALLACE RD
013912	LSR110001	LEES CLEANERS	64 PRINCETON HIGHTSTOWN RD
016766	LSR220001	THOMPSON REALTY PRINCETON SUCCESSOR MERGER TH	50 PRINCETON-HIGHSTOWN RD
020434	LSR220001	AMERICAN CYANAMID COMPANY WEST WINDSOR	QUAKERBRIDGE RD
022396	LSR140001	ORR'S GROVER MILL AUTO REPAIR & TOWING	249 CRANBURY RD
027075	LSR120001	TRI STATE PETRO INC WEST WINDSOR	401 RT 571 W & SOUTHFIELD RD
031323	LSR100001	131 SOUTH MILL RD	131 S MILL RD
033880	LSR120001	WHEELER WAY	1 WHEELER WAY
033881	LSR120001	MERCER CNTY PARK WORKSHOP	OLD TRENTON RD
771985	LSR180001	PRINCETON AIR	39 EVERETT DR

[70] https://njems.nj.gov/DataMiner/Search/SearchByCategory?isExternal=y&getCategory=y&catName=Site+Remediation

Section 16: Recommendations

The following section offers recommendations relating to open space, the Township Greenbelt, development standards, and site planning.

16.1: Overview

The following recommendations are offered to advance the Township's overarching goal of protecting the environmental resources of the Township while simultaneously accommodating growth and development.

16.2: Open Space Recommendations

The following recommendations relating to open space are offered:

- ☐ Proactively pursue acquisition of open space within the Greenbelt or areas appropriate for park land or historic preservation utilizing the Municipal Open Space Tax.
- ☐ Pursue State, County, Private and Non-Profit funding to augment municipal funding for open space acquisition including but not limited to: State Green Acres Program; Green Trusts; Mercer County Trust Fund Tax Acquisitions; and the State Farmland Preservation Program.
- ☐ Implement the action plan of Community Forestry Management Plan, and Tree Canopy Goal (Shade Tree Committee).
- ☐ Active participation in farmland preservation programs should be fostered to retain existing farmland and create viable farm enclaves.
- ☐ A minimum 400' wide corridor should be preserved along all stream corridors. Acquisition of property or conservation easements should be pursued to achieve a continuous corridor (Greenbelt) along all streams.
- ☐ Encourage acquisition of open space by private donations.

16.3: Greenbelt

The following recommendations regarding the Township Greenbelt are offered:

- ☐ Greenbelt lands should continue to be depicted and reviewed with all site plan and subdivision applications to enable the municipality to conserve these lands in conjunction with prudent land development.
- ☐ Review the Greenbelt Plan relative to Township Open Space goals and amend the plan to include additional lands that are best suited to natural preservation. (Environmental Commission).
- ☐ Review the new NJDEP Inland Flood Protection Rule to determine whether modifications should be made to the Township Greenbelt Plan.
- ☐ Simplify and standardize Township Greenbelt mapping and terminology.
- ☐ Promote respect and knowledge of the Greenbelt and its importance to the community.

16.4: Development Standards

The following recommendations regarding development standards are offered:

- ☐ Creative land development techniques (i.e. clustering, lot averaging, purchase or transfer of development rights, flexible implementation of setbacks and buffers) should be considered for lands that include critical environmental, historic or farm resources.
- ☐ Design standards (M.I.C., maximum improvement coverage, and F.A.R. floor area ratio) should be carefully examined for zones that include lands with valuable environmental, historic, and farmland resources.
- ☐ The design of roads, drives and parking areas should be carefully planned and examined to avoid excessive coverage, which can adversely modify the quantity, rate and quality of ground and surface water replenishment, but provide adequate circulation to avoid excessive noise and air pollution.
- ☐ Site design techniques that result in reduced impervious surface cover and stormwater runoff should be fostered. Reduced road and drive widths, and efficient parking lot design and allocation should be encouraged with all public and private development. Common driveways and shared parking should be required where possible and practical. Current ordinance standards should be reviewed to determine if decreased coverage requirements can be established.

16.5: Site Planning and Management

The following recommendations are offered regarding site planning.

- ☐ All NJDEP and DRCC stream corridor buffers should be strictly enforced in the review of development applications.
- ☐ Carefully consider the impacts of recreational development relative to natural ecosystems and the sustainability of these areas.
- ☐ Design and construct all recreation development according to all required environmental regulations and practices appropriate to preserve environmentally sensitive areas and maintain or enhance environmental quality.
- ☐ Minimize the clearing of sustainable woodland and trees for recreation development by situating facilities in open areas.
- ☐ Encourage the implementation of natural vegetative stormwater infiltration techniques over mechanical, sand, or other structural elements.
- ☐ Encourage the utilization of indigenous landscape planting species while strictly avoiding introduction or proliferation of exotic species that exhibit invasive tendencies.
- ☐ Prepare a new Stormwater Management Plan Element of the Master Plan as well as a Stormwater Mitigation Plan to handle off-site improvements to counterbalance future waiver or variance requests from the Township's stormwater regulations.
- ☐ Develop a program to monitor the management and maintenance of rain gardens and bio-infiltration stormwater management features.
- ☐ Encourage new development to be compliant with and promote Executive Order 315 and Executive Order 316 which respectively establish statewide targets regarding clean energy as well as carbon-emission space/cooling systems and electrification.
- ☐ Prepare an updated Environmental Impact Statement (EIS) for the Township's application materials.

16.6: Municipal Actions

The following recommendations are offered regarding municipal actions.

- ☐ Develop and implement strategies that reduce municipal fleet emissions and provide sustainable transportation options for municipal employees, including the utilization of electric vehicles.
- ☐ Continue to encourage green building policies as well as the installation of rain gardens and pollinators in appropriate sites.

Appendix A: Exhibits

Exhibit 01: Geologic Cross-Sections of Mercer County

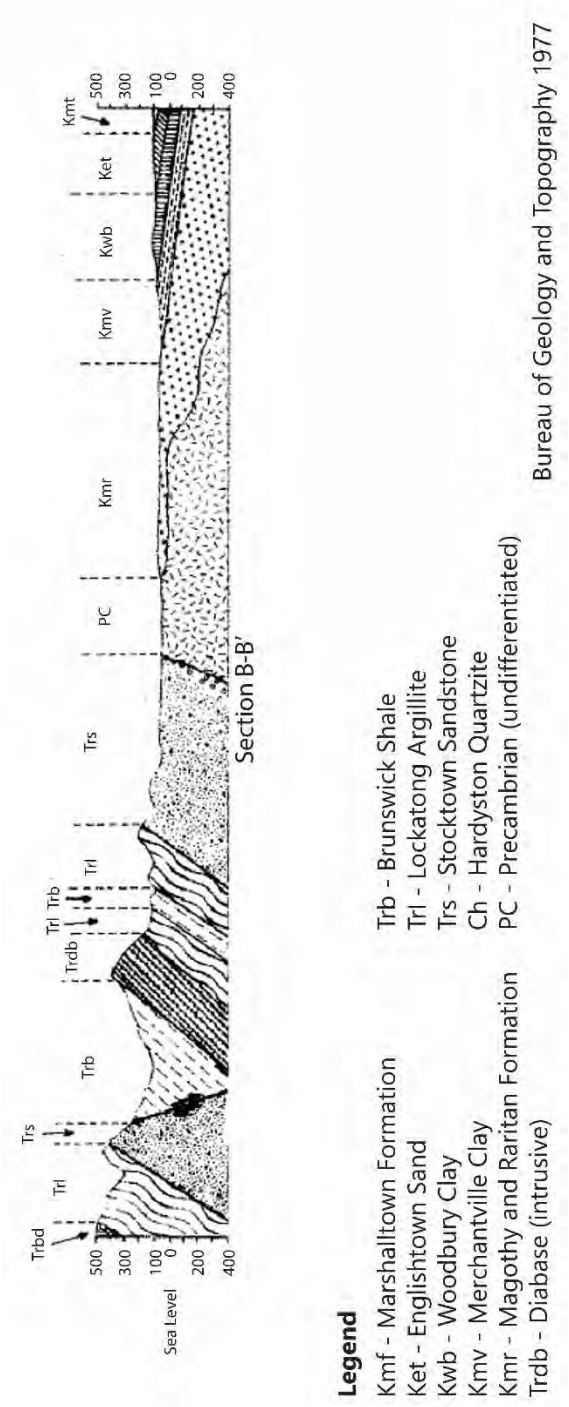


Exhibit 02: Wind Rose

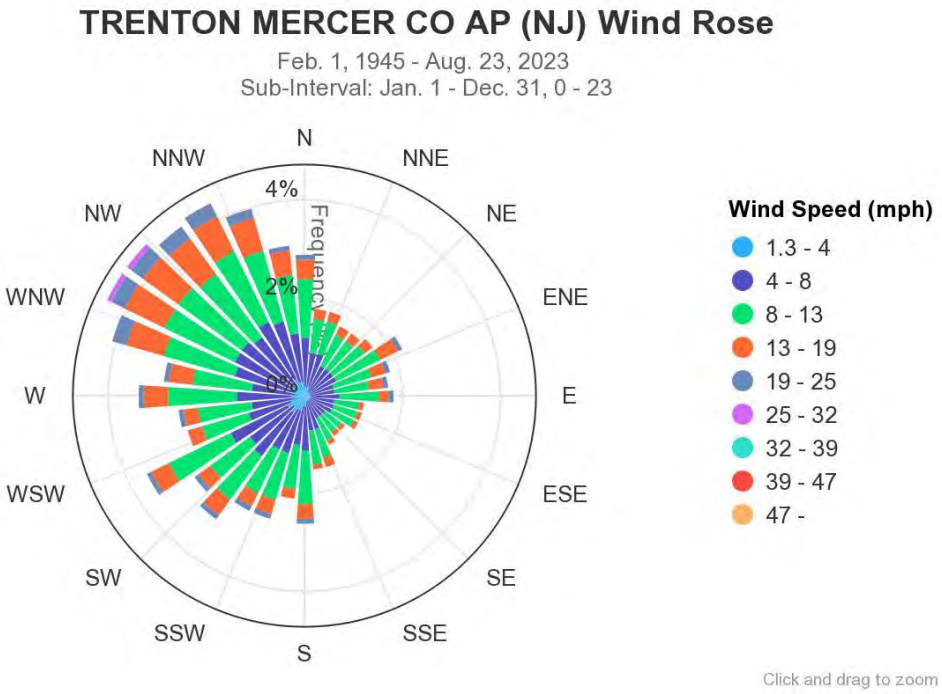


Exhibit 03: Sun Arc

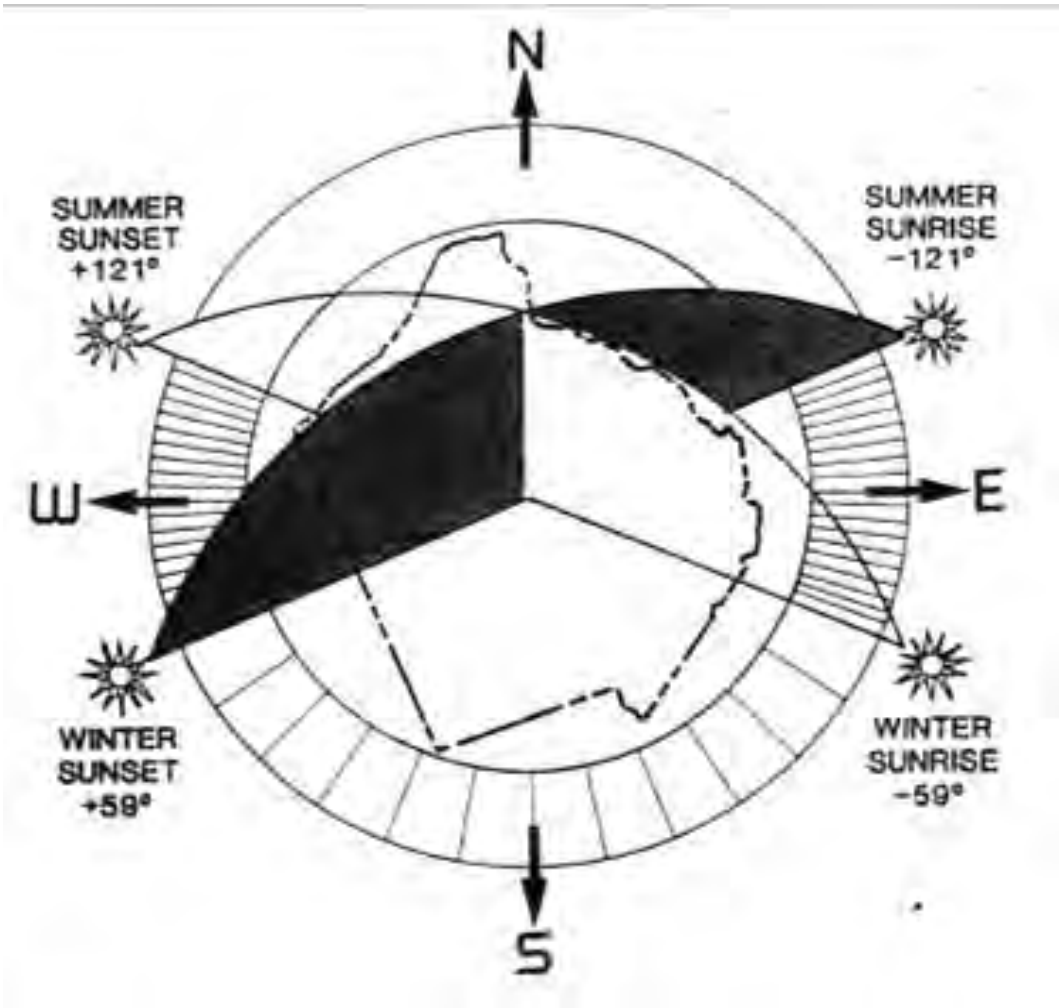
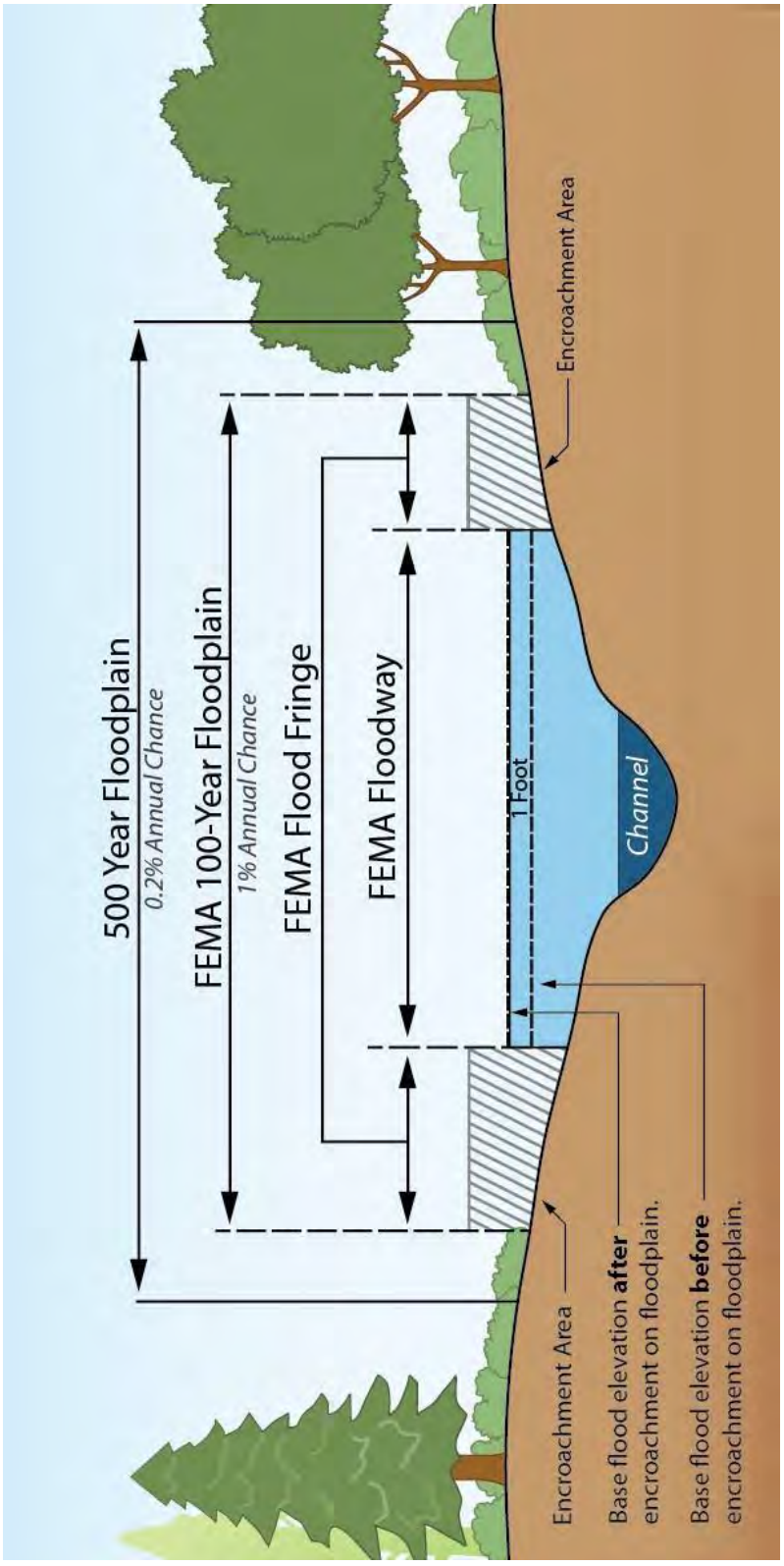
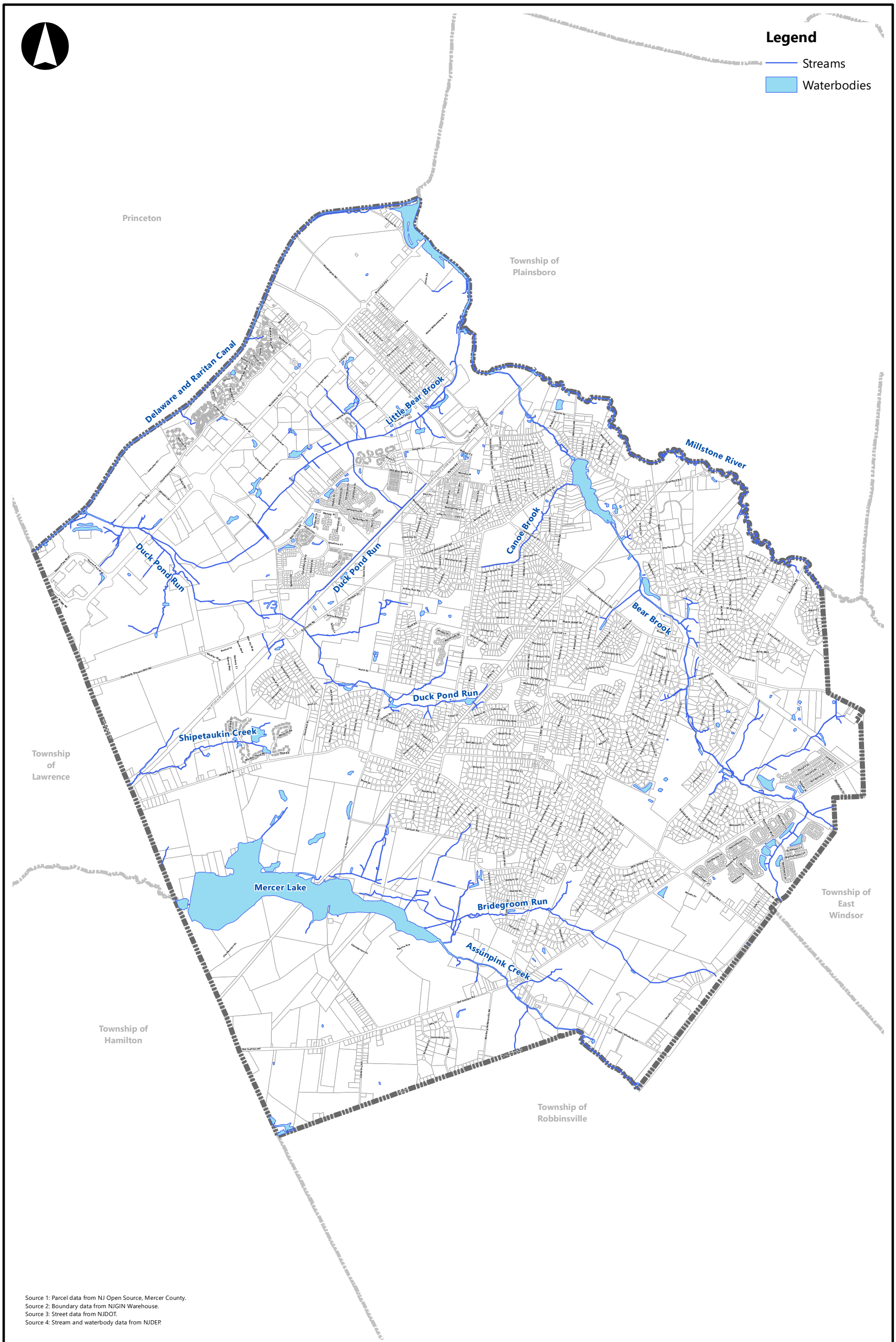


Exhibit 04: Flood Plain Map



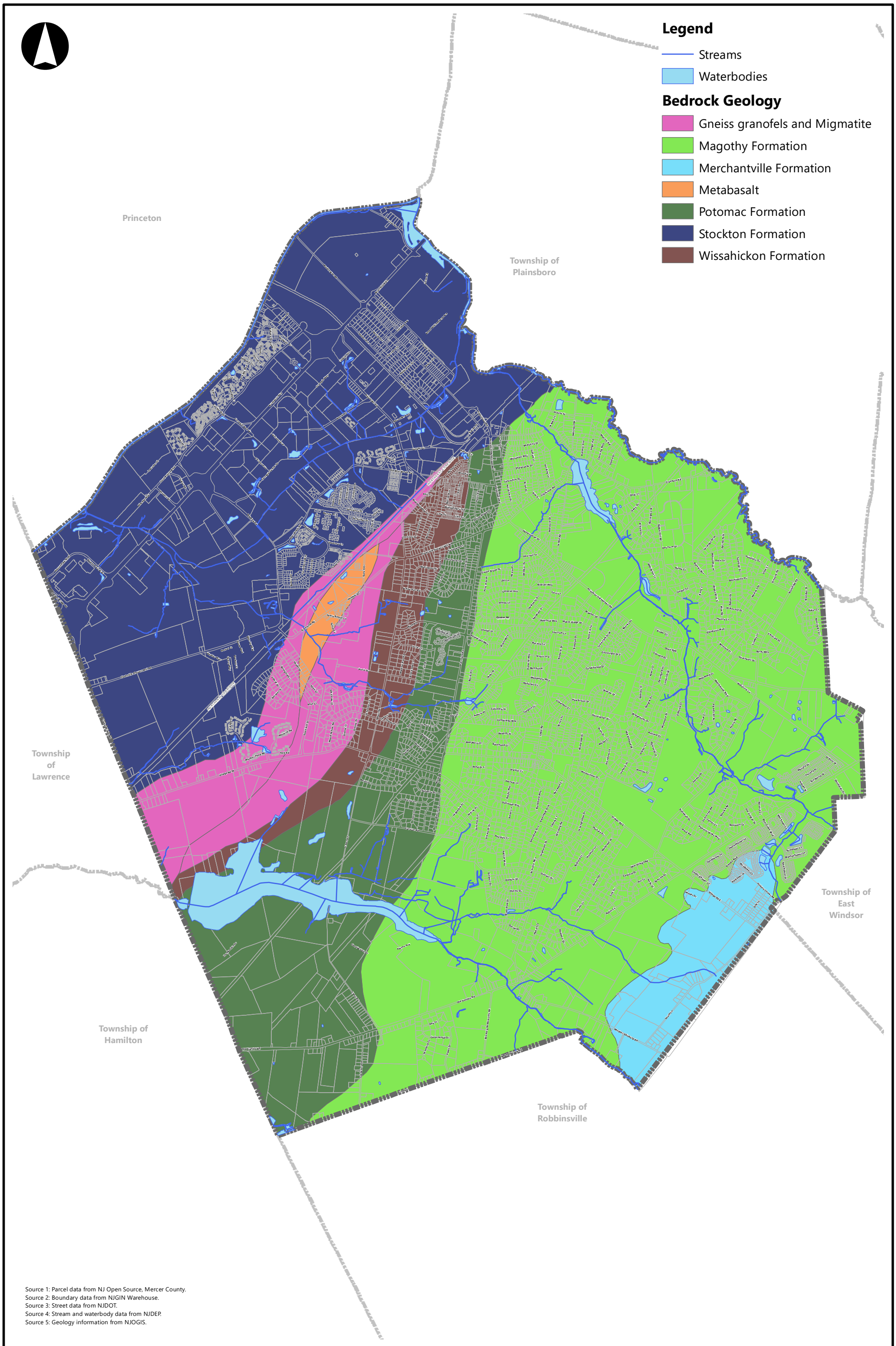
Appendix B: Mapping

Map 1	Base Map
Map 2	Geology and Aquifer Characteristics
Map 3	Topography
Map 4	Watershed Management Areas
Map 5	Flood Hazard Areas
Map 6	Physiographic Regions
Map 7	Soils Map
Map 8	Land Use/Land Cover
Map 9	Delaware and Raritan Commission Zones
Map 10	Known Contaminated Sites
Map 11	Greenbelt Map



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Stream and waterbody data from NJDEP.

Project Title: Map 01: Base Map	Project No. 3442.22	Date 11.09.23	Drawn By DN
Burgis Associates, Inc. Community Planning | Land Development and Design | Landscape Architecture 25 Westwood Avenue p: 201.666.1811 Westwood, New Jersey 07675 f: 201.666.2599	Project Title: 2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	Scale 1 " = 3,500 '	Dwg. No. map 01



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Stream and waterbody data from NJDEP.
Source 5: Geology information from NJOGIS.

Project Title:
Map 02: Geology and Aquifer Characteristics

Project No.	Date	Drawn By
3442.22	02.06.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
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Project Title
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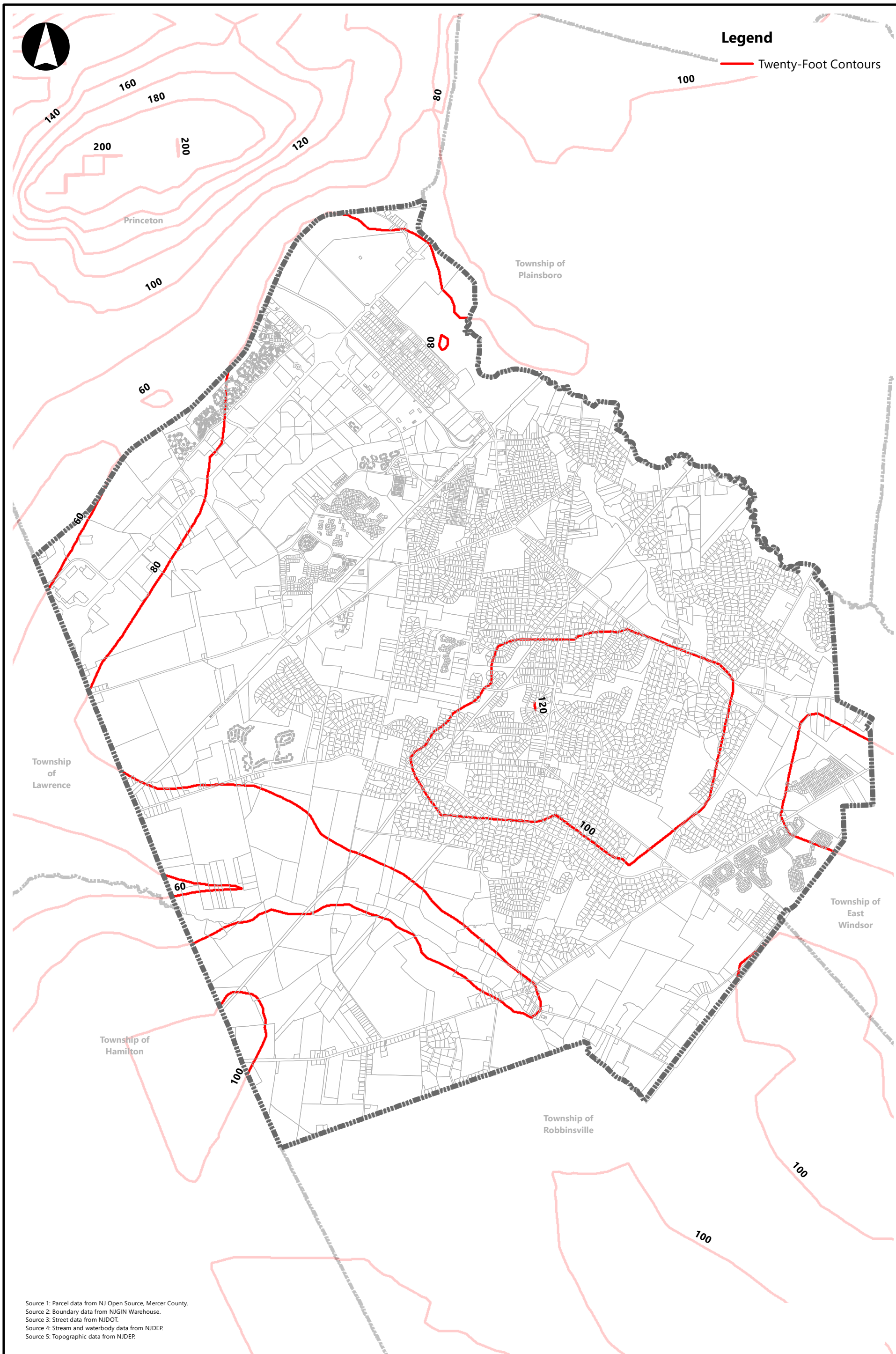
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 3,500 '	map 02



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Stream and waterbody data from NJDEP.
Source 5: Topographic data from NJDEP.

Project Title:
Map 03: Topography

Project No.	Date	Drawn By
3442.22	02.06.23	DN

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COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
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Westwood, New Jersey 07675
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Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale: 1 " = 3,500 '
Dwg. No.: map 03

Watershed Management Areas

- WMA 10: Millstone
- WMA 11: Central Delaware

Princeton

Township of Plainsboro

Township of Lawrence

Township of East Windsor

Township of Hamilton

Township of Robbinsville

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Stream and waterbody data from NJDEP.
Source 5: Topographic data from NJDEP.

Project Title:
Map 04: Watershed Management Areas

Project No.	Date	Drawn By
3442.22	02.06.23	DN

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COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
Westwood, New Jersey 07675
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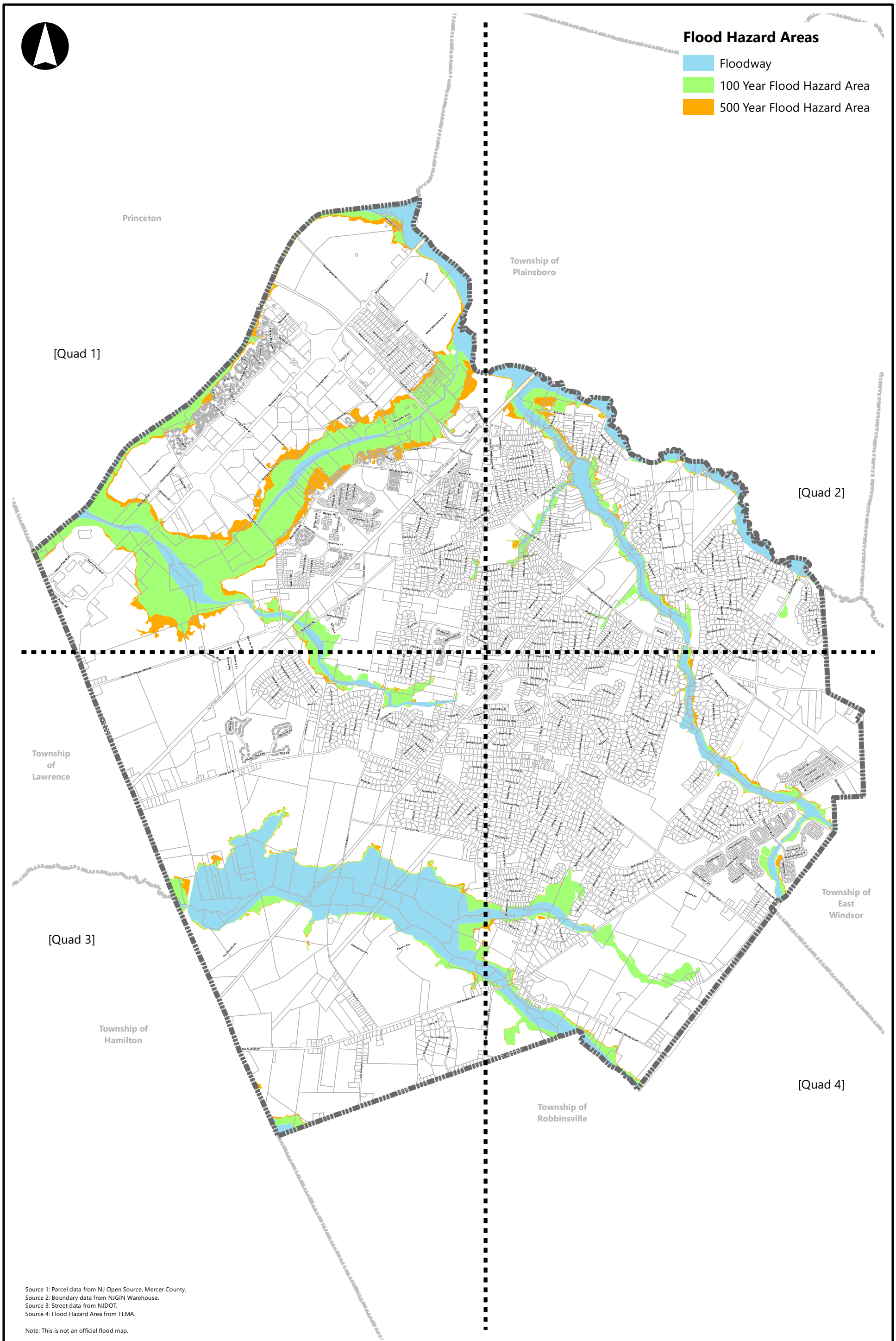
Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 3,500 '	map 04



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Flood Hazard Area from FEMA.

Note: This is not an official flood map.

Project Title:
Map 05: Flood Hazard Areas

Project No.	Date	Drawn By
3442.22	02.06.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
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Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

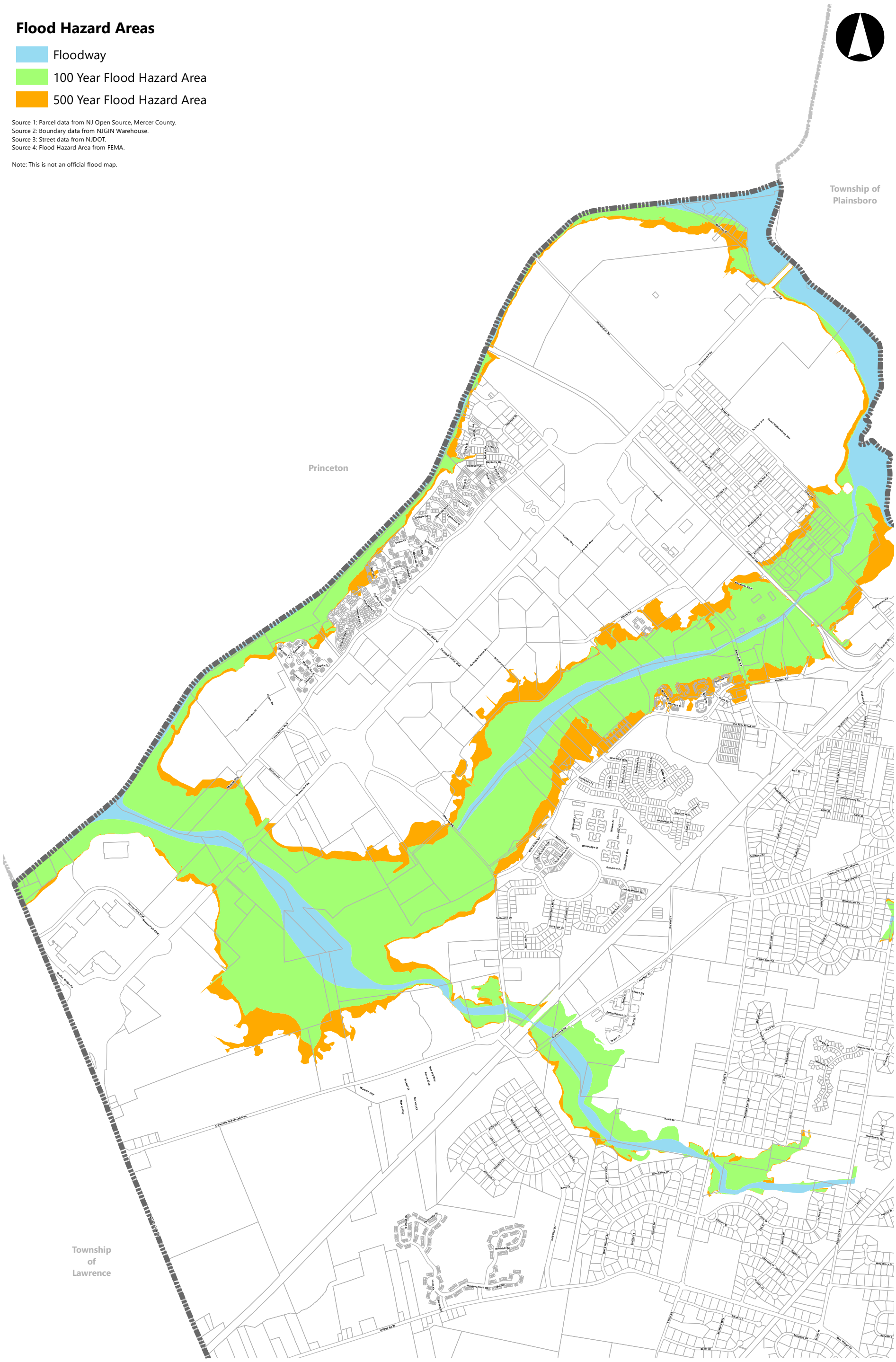
Scale	Dwg. No.
1 " = 3,500 '	map 05

Flood Hazard Areas

- Floodway
- 100 Year Flood Hazard Area
- 500 Year Flood Hazard Area

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Flood Hazard Area from FEMA.

Note: This is not an official flood map.



Project Title:	Project No.	Date	Drawn By
Map 05: Flood Hazard Areas - Quad 01	3442.22	02.06.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
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Westwood, New Jersey 07675
p: 201.666.1811
f: 201.666.2599

Project Title	Scale	Dwg. No.
2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	1 " = 1,800 '	map 05

Flood Hazard Areas

- Floodway
- 100 Year Flood Hazard Area
- 500 Year Flood Hazard Area

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Flood Hazard Area from FEMA.

Note: This is not an official flood map.

Township of Plainsboro

Township of East Windsor

Project Title: Map 05: Flood Hazard Areas - Quad 02	Project No. 3442.22	Date 02.06.23	Drawn By DN
Burgis Associates, Inc. Community Planning | Land Development and Design | Landscape Architecture 25 Westwood Avenue p: 201.666.1811 Westwood, New Jersey 07675 f: 201.666.2599	Project Title 2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	Scale 1 " = 1,800 '	Dwg. No. map 05

Township of Lawrence

Township of Hamilton

Township of Robbinsville

Flood Hazard Areas

- Floodway
- 100 Year Flood Hazard Area
- 500 Year Flood Hazard Area

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Flood Hazard Area from FEMA.

Note: This is not an official flood map.

Project Title:
Map 05: Flood Hazard Areas - Quad 03

Project No.	Date	Drawn By
3442.22	02.06.23	DN

Burgis Associates, Inc.
Community Planning | Land Development and Design | Landscape Architecture
25 Westwood Avenue
Westwood, New Jersey 07675
p: 201.666.1811
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 1,800 '	map 05

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Flood Hazard Area from FEMA.

Note: This is not an official flood map.

Flood Hazard Areas

- Floodway
- 100 Year Flood Hazard Area
- 500 Year Flood Hazard Area

Project Title:
Map 05: Flood Hazard Areas - Quad 04

Project No.	Date	Drawn By
3442.22	02.06.23	DN

BURGIS ASSOCIATES, INC.
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25 Westwood Avenue
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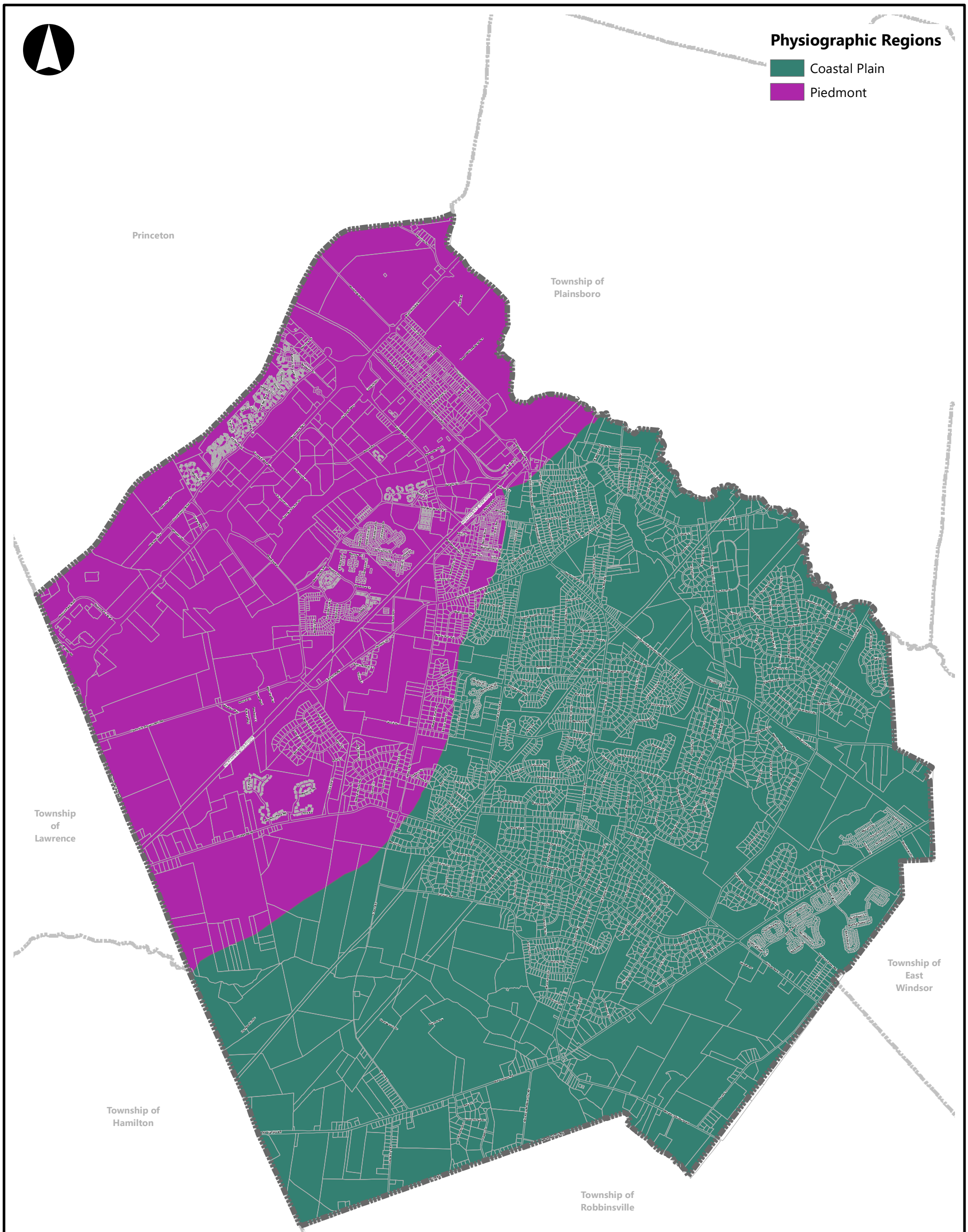
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 1,800 '	map 05



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Physiographic Regions from NJDEP.

Project Title:
Map 06: Physiographic Regions

Project No. 3442.22 | Date 02.06.23 | Drawn By DN

Burgis Associates, Inc.
Community Planning | Land Development and Design | Landscape Architecture
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f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale 1 " = 3,500 ' | Dwg. No. map 06

Drainage Classification

- Excessively Drained
- Moderately Well-Drained
- Poorly Drained
- Somewhat Excessively Drained
- Somewhat Poorly Drained
- Very Poorly Drained
- Well-Drained
- None Identified

Princeton

Township of Plainsboro

[Quad 1]

[Quad 2]

Township of Lawrence

Township of East Windsor

[Quad 3]

Township of Hamilton

[Quad 4]

Township of Robbinsville

Source 1: Boundary data from NJOGIS.
Source 2: Street data from NOGIS.
Source 3: Soil data from Web Soil Survey, NRCS.

Project Title:	Project No.	Date	Drawn By
Map 07: Soils Map	3442.22	05.01.23	DN

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25 Westwood Avenue
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p: 201.666.1811
f: 201.666.2599

Project Title	Scale	Dwg. No.
2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	1 " = 3,500 '	map 06

Drainage Classification

- Excessively Drained
- Moderately Well-Drained
- Poorly Drained
- Somewhat Excessively Drained
- Somewhat Poorly Drained
- Very Poorly Drained
- Well-Drained
- None Identified

Township of Plainsboro

Princeton

Township of Lawrence

Township of Lawrence

Source 1: Boundary data from NJOGIS.
Source 2: Street data from NOGIS.
Source 3: Soil data from Web Soil Survey, NRCS.

Project Title: Map 07: Soils Map - Quad 01	Project No. 3442.22	Date 05.01.23	Drawn By DN
Burgis Associates, Inc. Community Planning | Land Development and Design | Landscape Architecture 25 Westwood Avenue, Westwood, New Jersey 07675 p: 201.666.1811 f: 201.666.2599	Project Title: 2023 Conservation Plan Element, Township of West Windsor | Mercer County, New Jersey	Scale 1 " = 1,800 '	Dwg. No. map 07
		2015 COPY RIGHT BA - NOT TO BE REPRODUCED	

Drainage Classification

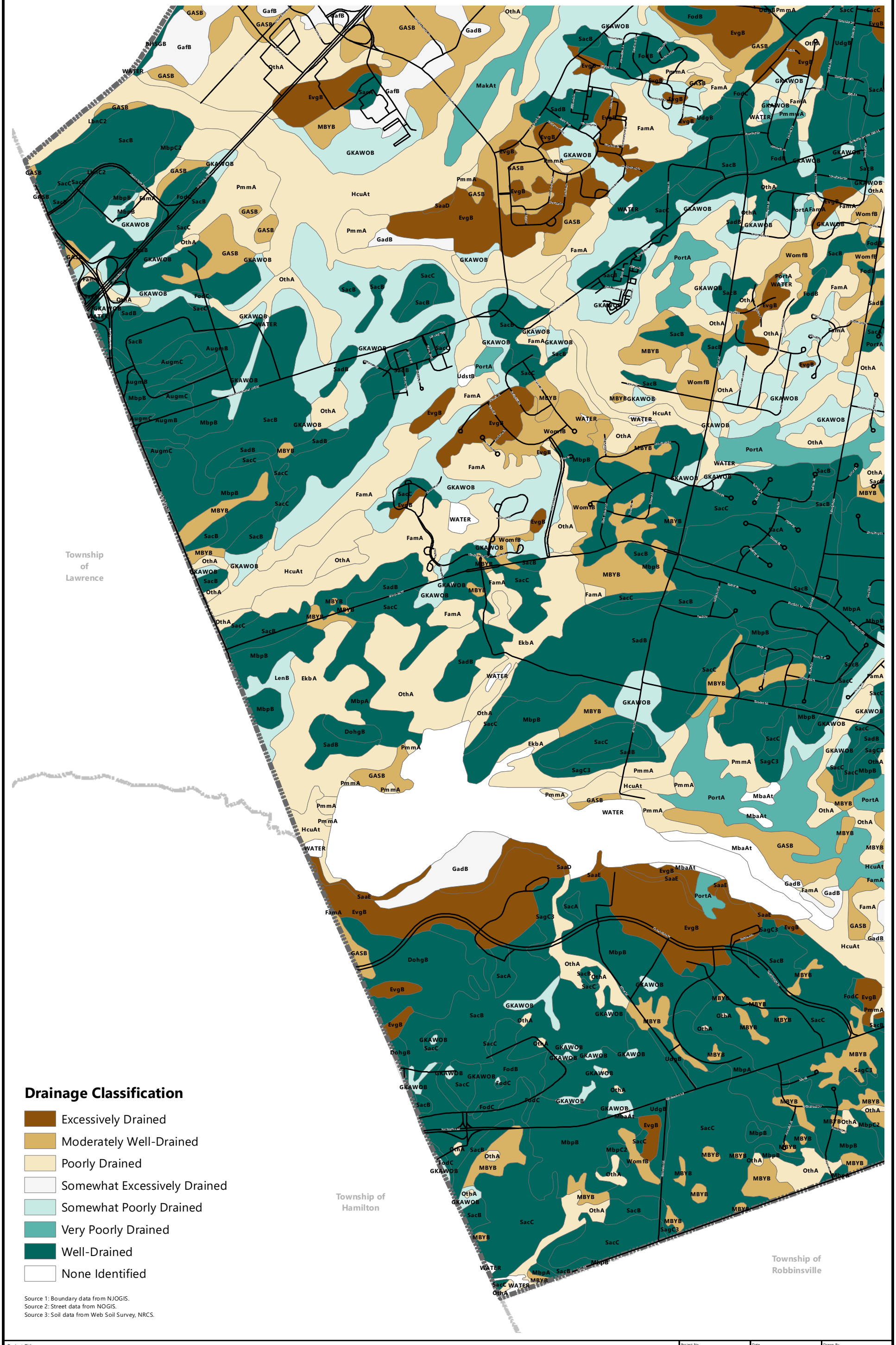
- Excessively Drained
- Moderately Well-Drained
- Poorly Drained
- Somewhat Excessively Drained
- Somewhat Poorly Drained
- Very Poorly Drained
- Well-Drained
- None Identified

Source 1: Boundary data from NJOGIS.
Source 2: Street data from NOGIS.
Source 3: Soil data from Web Soil Survey, NRCS.

Township of Plainsboro

Township of East Windsor

Project Title: Map 07: Soils Map - Quad 02	Project No. 3442.22	Date 05.01.23	Drawn By DN
Burgis Associates, Inc. Community Planning | Land Development and Design | Landscape Architecture 25 Westwood Avenue, Westwood, New Jersey 07675 p: 201.666.1811 f: 201.666.2599	Project Title: 2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	Scale 1 " = 1,800 '	Dwg. No. map 07
		2015 COPY RIGHT BA - NOT TO BE REPRODUCED	



Drainage Classification

- Excessively Drained
- Moderately Well-Drained
- Poorly Drained
- Somewhat Excessively Drained
- Somewhat Poorly Drained
- Very Poorly Drained
- Well-Drained
- None Identified

Source 1: Boundary data from NJOGIS.
Source 2: Street data from NOGIS.
Source 3: Soil data from Web Soil Survey, NRCS.

Project Title:	Project No.	Date	Drawn By
Map 07: Soils Map - Quad 03	3442.22	05.01.23	DN

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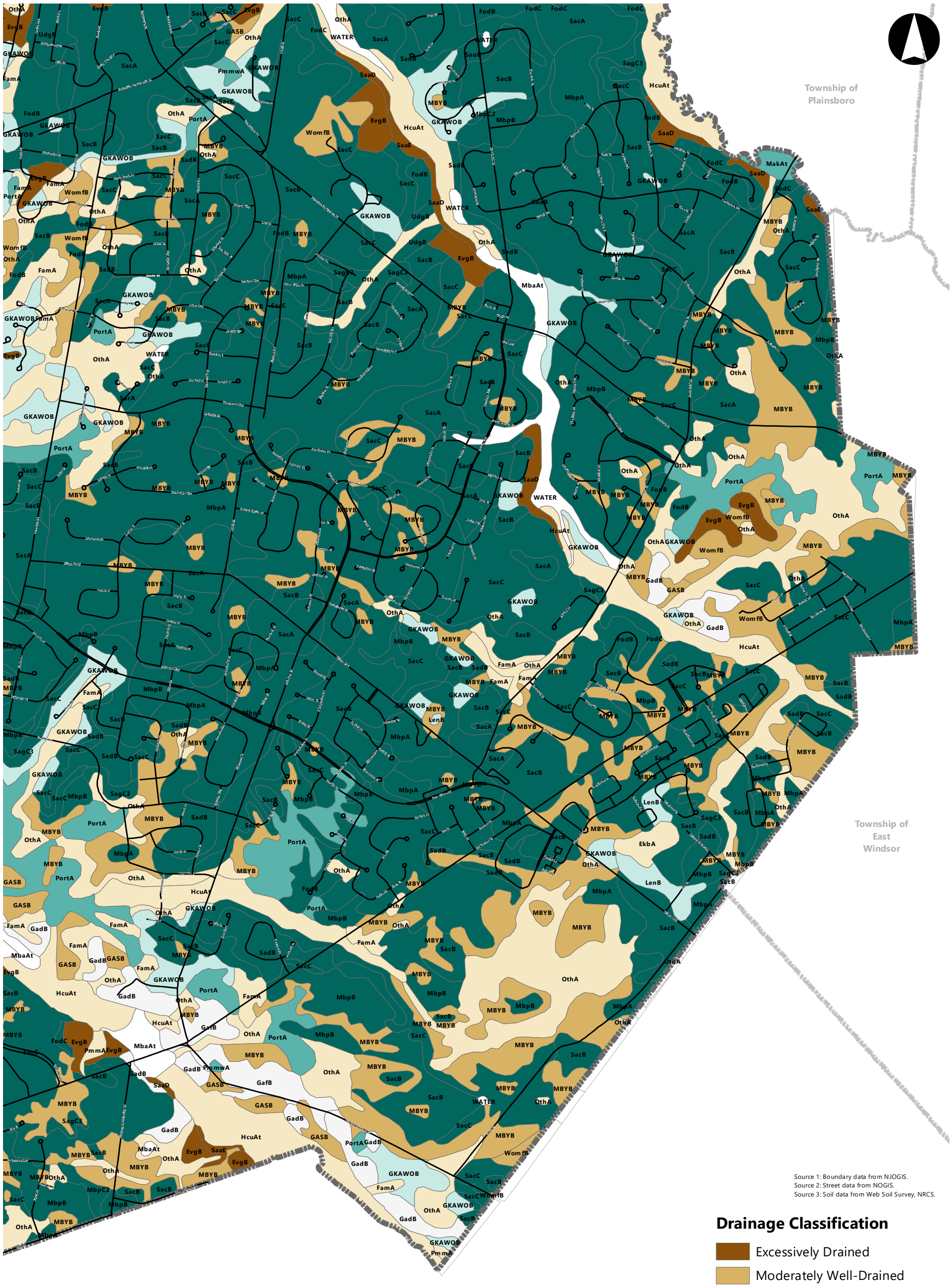
Project Title	Scale	Dwg. No.
2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	1 " = 1,800 '	map 07



Source 1: Boundary data from NJOGIS.
Source 2: Street data from NOGIS.
Source 3: Soil data from Web Soil Survey, NRCS.

Drainage Classification

- Excessively Drained
- Moderately Well-Drained
- Poorly Drained
- Somewhat Excessively Drained
- Somewhat Poorly Drained
- Very Poorly Drained
- Well-Drained
- None Identified

Project Title:	Project No.	Date	Drawn By
Map 07: Soils Map - Quad 04	3442.22	05.01.23	DN

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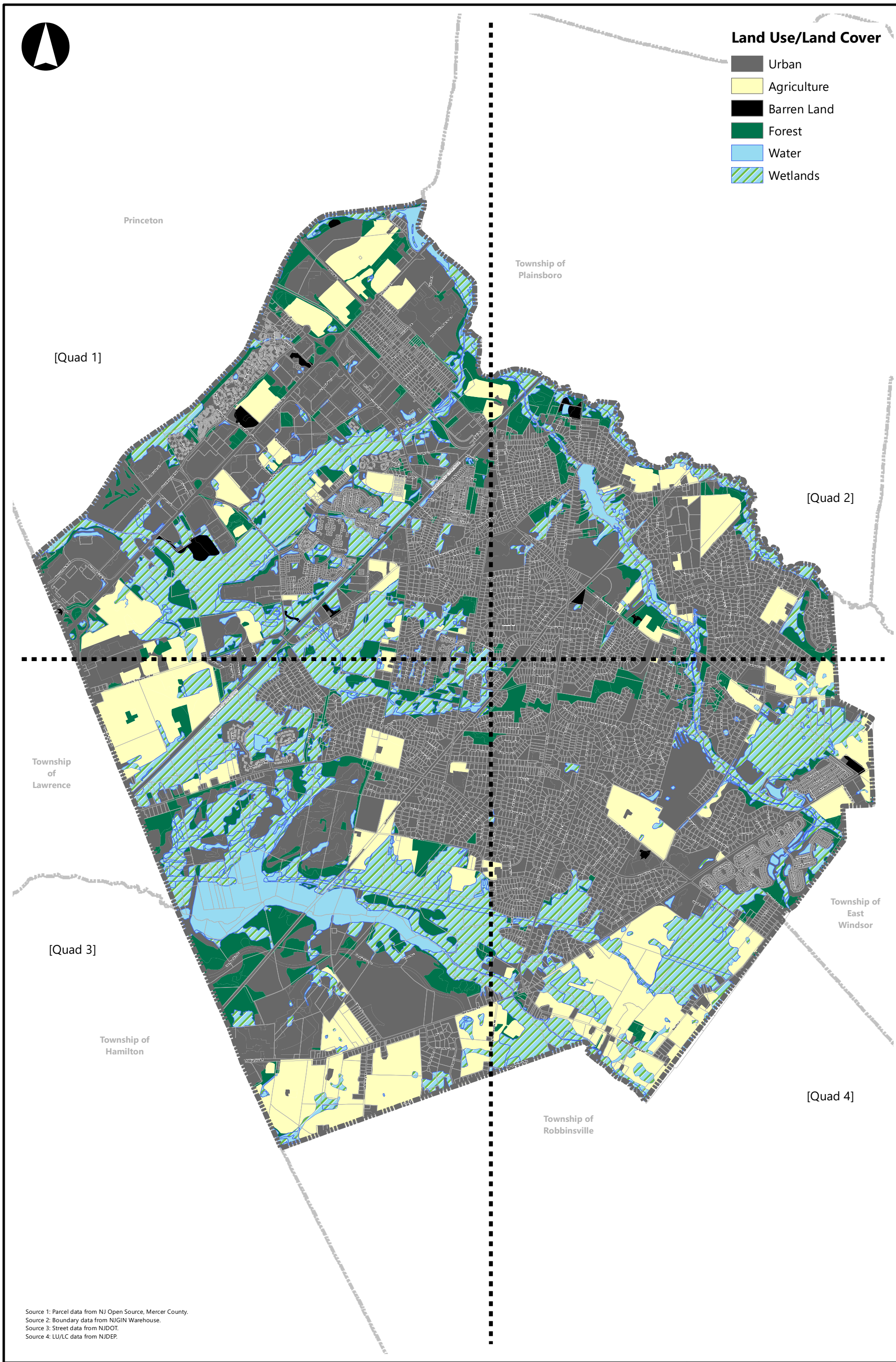
Project Title	Scale	Dwg. No.
2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	1 " = 1,800 '	map 07



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: LU/LC data from NJDEP.

Project Title:
Map 08: Land Use/Land Cover

Project No. 3442.22 | Date 08.24.23 | Drawn By DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
Westwood, New Jersey 07675
p: 201.666.1811
f: 201.666.2599

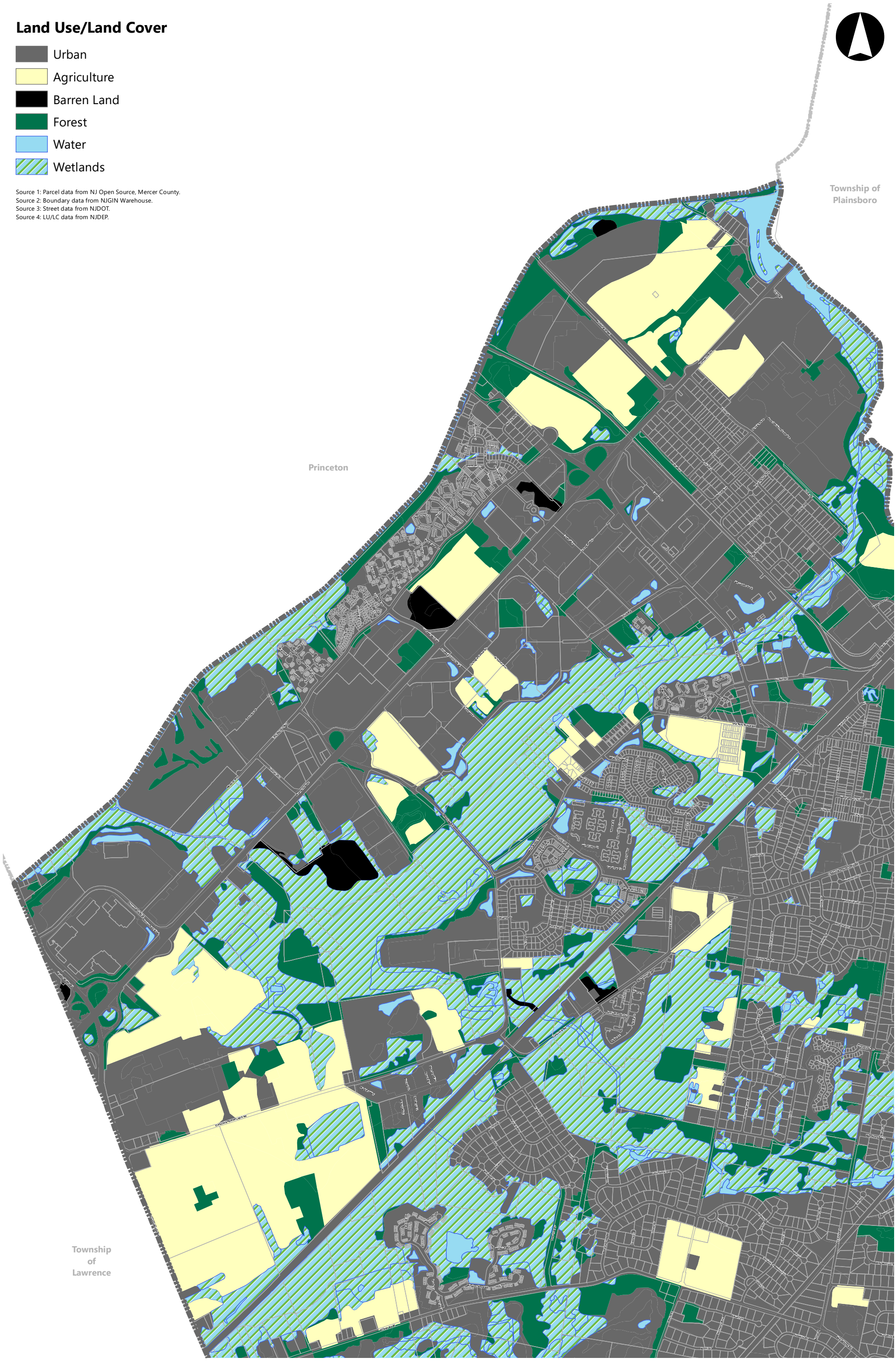
Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale 1 " = 3,500 ' | Dwg. No. map 08

Land Use/Land Cover

- Urban
- Agriculture
- Barren Land
- Forest
- Water
- Wetlands

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: LU/LC data from NJDEP.



Project Title:	Project No.	Date	Drawn By
Map 08: Land Use/Land Cover Quad 01	3442.22	08.24.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue p: 201.666.1811
Westwood, New Jersey 07675 f: 201.666.2599

Project Title	Scale	Dwg. No.
2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	1 " = 1,800 '	map 08

Land Use/Land Cover

- Urban
- Agriculture
- Barren Land
- Forest
- Water
- Wetlands

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: LU/LC data from NJDEP.

Township of Plainsboro

Township of East Windsor

Project Title: Map 08: Land Use/Land Cover Quad 02	Project No. 3442.22	Date 08.24.23	Drawn By DN
Burgis Associates, Inc. Community Planning | Land Development and Design | Landscape Architecture 25 Westwood Avenue, Westwood, New Jersey 07675 p: 201.666.1811 f: 201.666.2599	Project Title: 2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	Scale 1 " = 1,800 '	Dwg. No. map 08

Township of Lawrence

Township of Hamilton

Township of Robbinsville

Land Use/Land Cover

- Urban
- Agriculture
- Barren Land
- Forest
- Water
- Wetlands

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: LU/LC data from NJDEP.

Project Title:
Map 08: Land Use/Land Cover Quad 03

Project No.	Date	Drawn By
3442.22	08.24.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
Westwood, New Jersey 07675
p: 201.666.1811
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale: 1 " = 1,800 '
Dwg. No.: map 08

Township of Plainsboro

Township of East Windsor

Township of Robbinsville

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: LU/LC data from NJDEP.

Land Use/Land Cover

- Urban
- Agriculture
- Barren Land
- Forest
- Water
- Wetlands

Project Title:
Map 08: Land Use/Land Cover Quad 04

Project No.	Date	Drawn By
3442.22	08.24.23	DN

BURGIS ASSOCIATES, INC.
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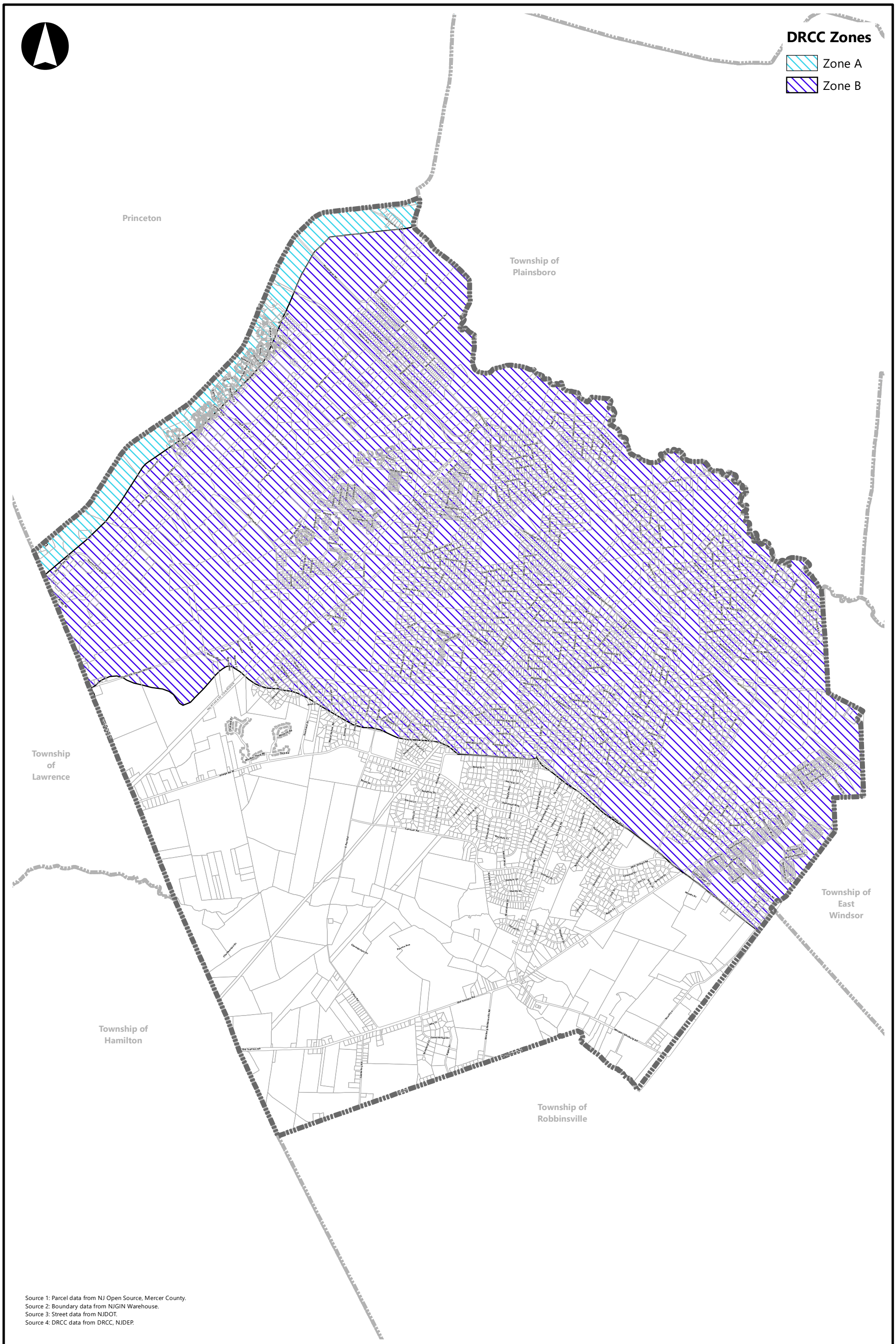
p: 201.666.1811
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale: 1 " = 1,800 '
Dwg. No.: map 08



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: DRCC data from DRCC, NJDEP.

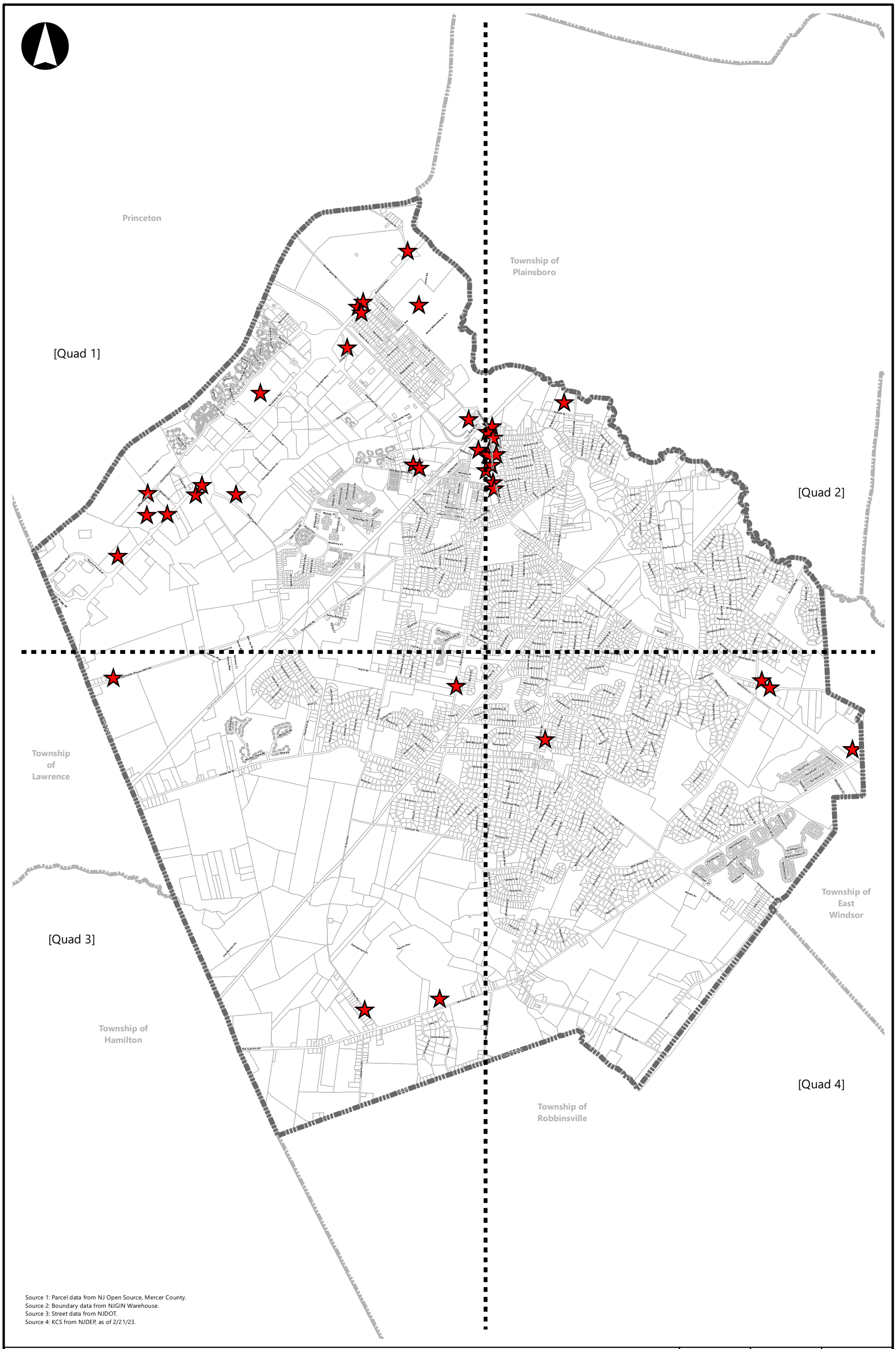
Project Title:
Map 09: Delaware and Raritan Commission (DRCC) Zones

Project No.	Date	Drawn By
3442.22	02.21.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
Westwood, New Jersey 07675
p: 201.666.1811
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 3,500 '	map 09



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: KCS from NJDEP, as of 2/21/23.

Project Title:
Map 10: Known Contaminated Sites

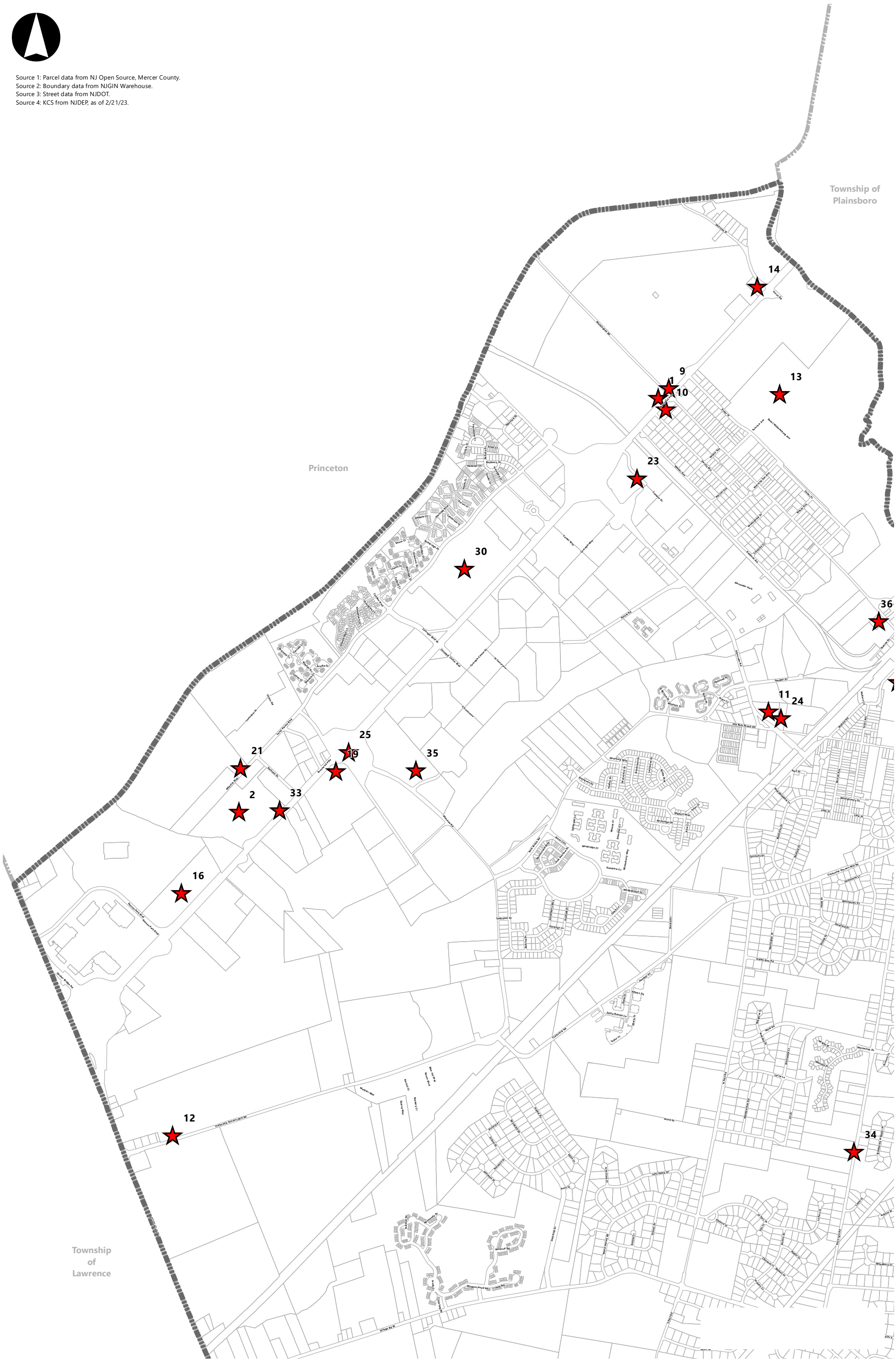
Project No.	Date	Drawn By
3442.22	11.08.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
Westwood, New Jersey 07675
p: 201.666.1811
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 3,500 '	map 10

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: KCS from NJDEP, as of 2/21/23.



Project Title:
Map 10: Known Contaminated Sites - Quad 01

Project No.	Date	Drawn By
3442.22	11.08.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
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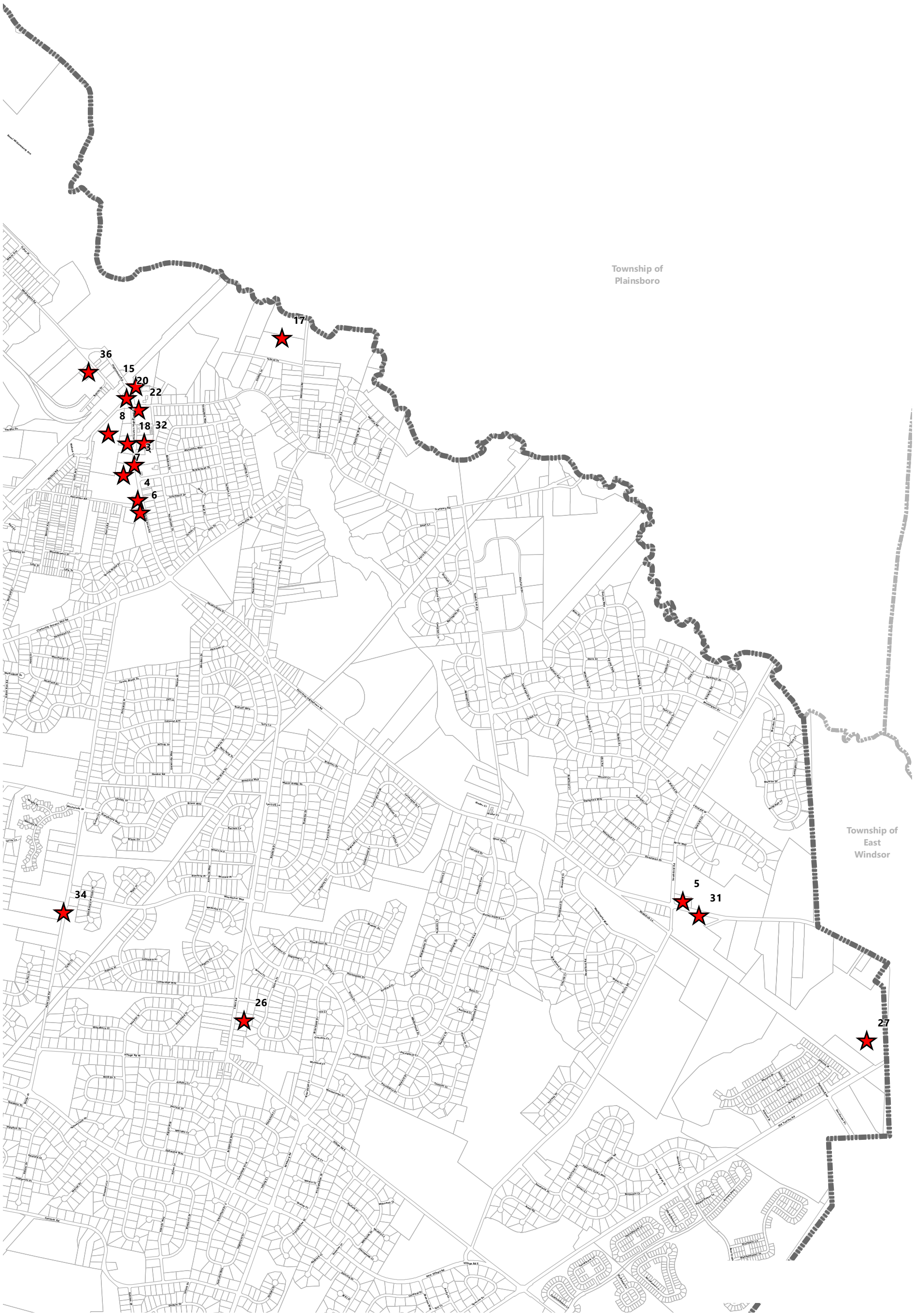
Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale: 1 " = 1,800 '
Dwg. No.: map 10

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: KCS from NJDEP, as of 2/21/23.



Project Title:
Map 10: Known Contaminated Sites - Quad 02

Project No.	Date	Drawn By
3442.22	11.09.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue p: 201.666.1811
Westwood, New Jersey 07675 f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 1,800 '	map 10

Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: KCS from NJDEP, as of 2/21/23.

Project Title:
Map 10: Known Contaminated Sites - Quad 03

Project No.	Date	Drawn By
3442.22	11.09.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
25 Westwood Avenue
Westwood, New Jersey 07675
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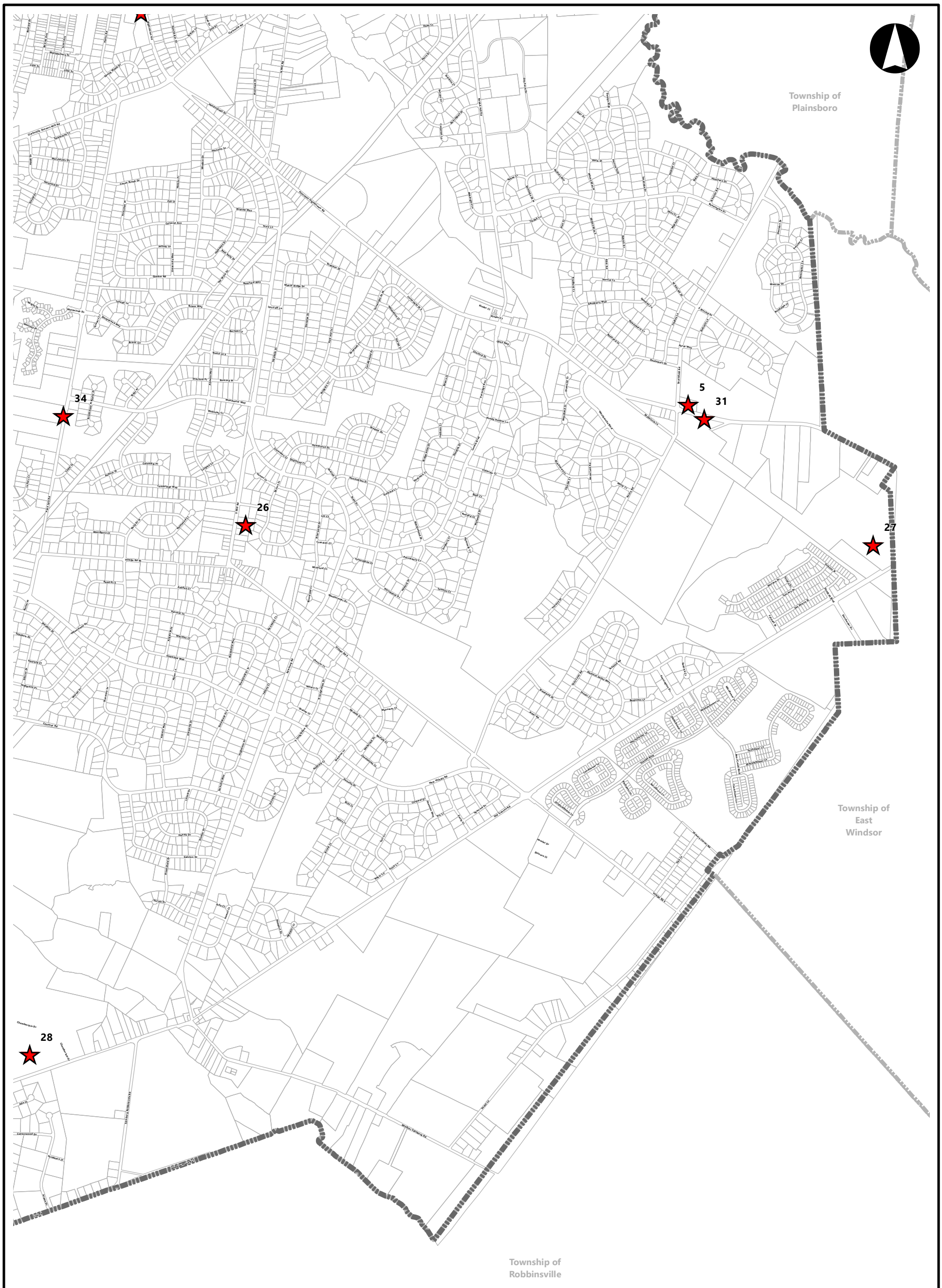
f: 201.666.2599

Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale: 1 " = 1,800 '
Dwg. No.: map 10



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: KCS from NJDEP, as of 2/21/23.

Project Title:	Project No.	Date	Drawn By
Map 10: Known Contaminated Sites - Quad 04	3442.22	11.09.23	DN

BURGIS ASSOCIATES, INC.
COMMUNITY PLANNING | LAND DEVELOPMENT AND DESIGN | LANDSCAPE ARCHITECTURE
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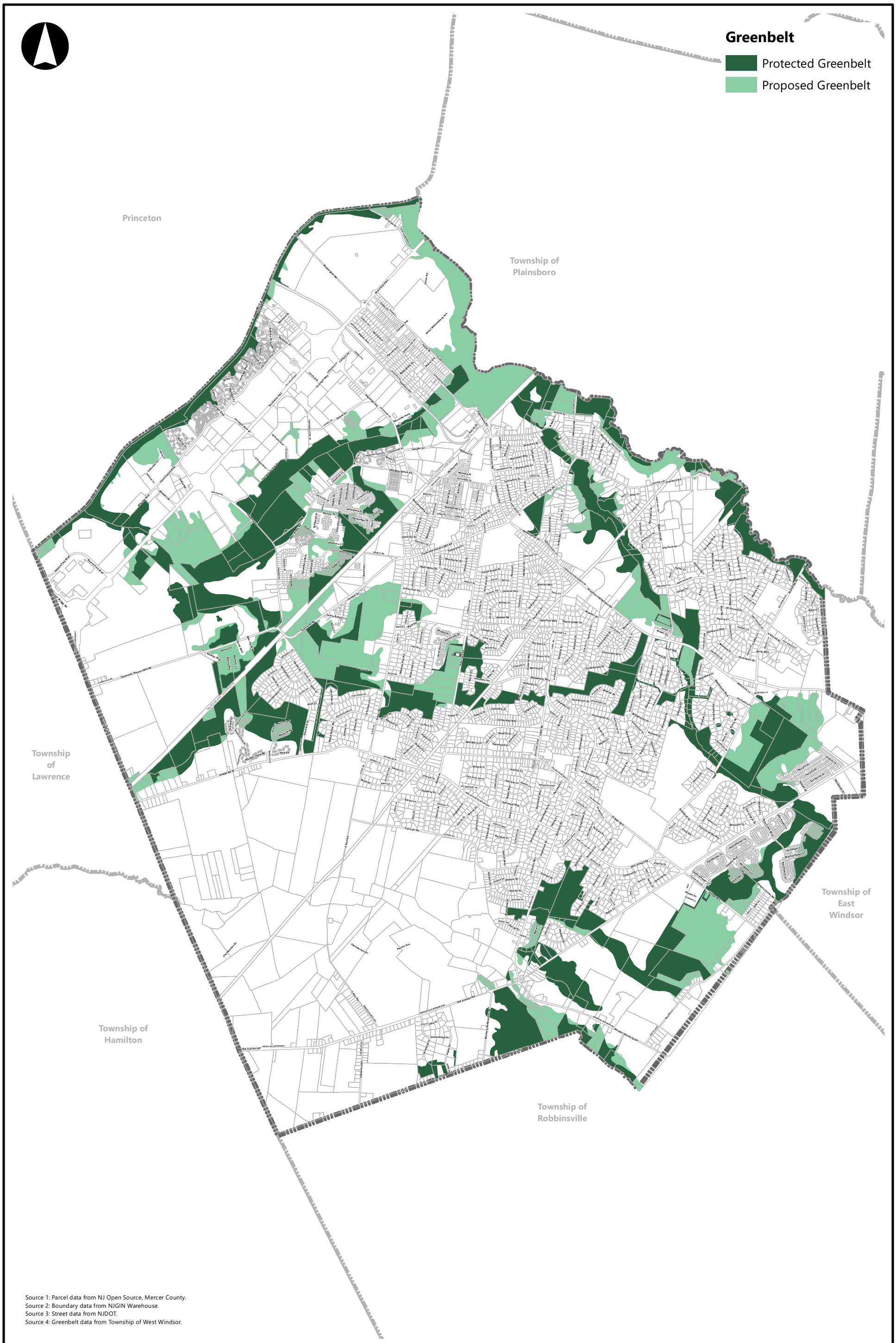
Project Title	Scale	Dwg. No.
2023 Conservation Plan Element Township of West Windsor | Mercer County, New Jersey	1 " = 1,800 '	map 10



Source 1: Parcel data from NJ Open Source, Mercer County.
Source 2: Boundary data from NJGIN Warehouse.
Source 3: Street data from NJDOT.
Source 4: Greenbelt data from Township of West Windsor.

Project Title:
Map 11: Greenbelt Map

Project No.	Date	Drawn By
3442.22	11.08.23	DN

Burgis Associates, Inc.
Community Planning | Land Development and Design | Landscape Architecture
25 Westwood Avenue
Westwood, New Jersey 07675
p: 201.666.1811
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Project Title
2023 Conservation Plan Element
Township of West Windsor | Mercer County, New Jersey

Scale	Dwg. No.
1 " = 3,500 '	map 11