



2022 MASTER PLAN UPDATE PLAINSBORO TOWNSHIP - CHAPTER III

Plainboro Township, New Jersey

DATE: October 17, 2022



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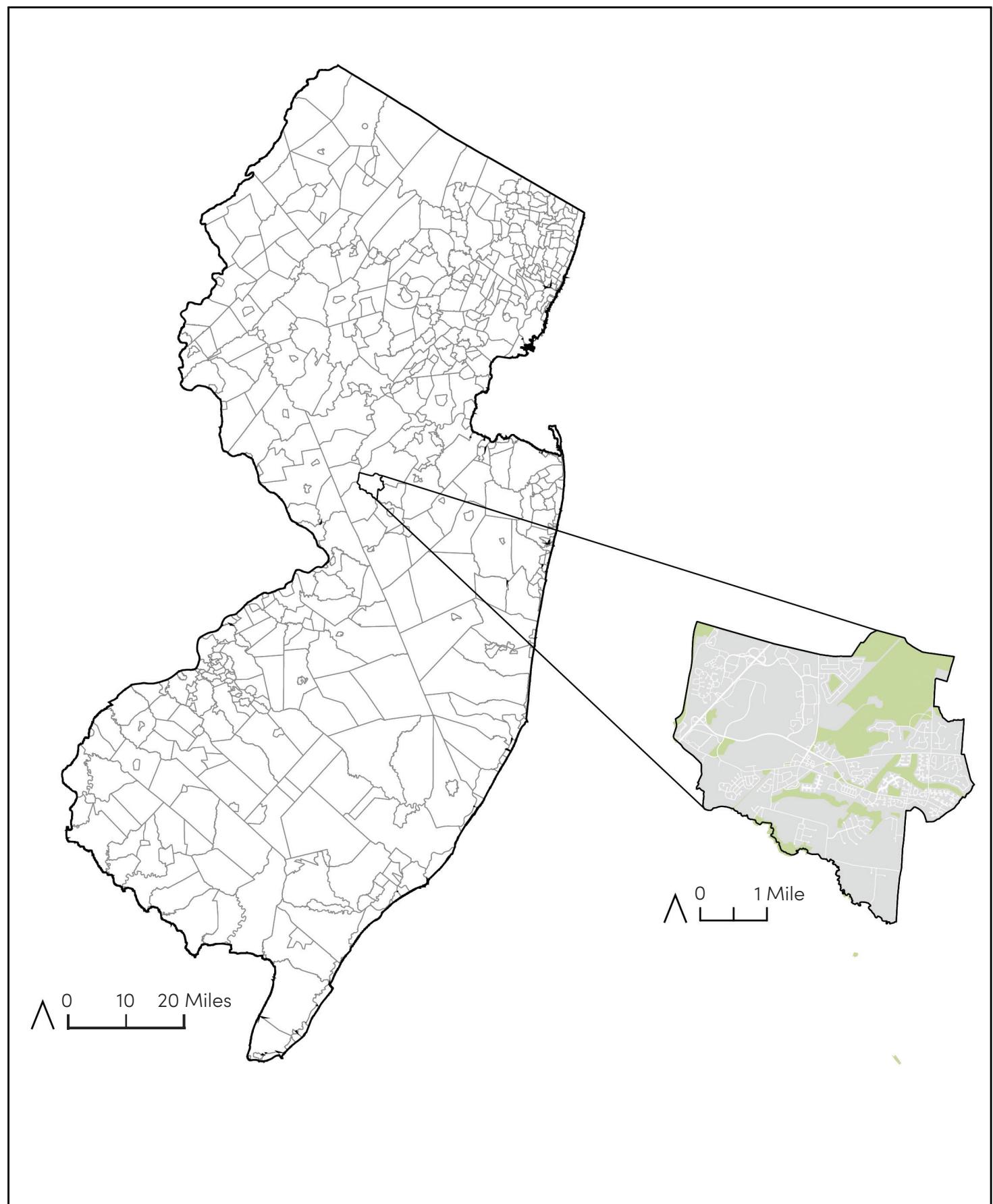
INTRODUCTION

The major goal of Plainsboro's land use policies has been to concentrate development in desired growth areas through the timely provision of supportive infrastructure facilities, such as roads, public sewers and centralized water systems, while preserving the prime farmland for agricultural activities and high-quality woodland, meadows, and sensitive environmental areas (water features and wetlands) as preserved open space.

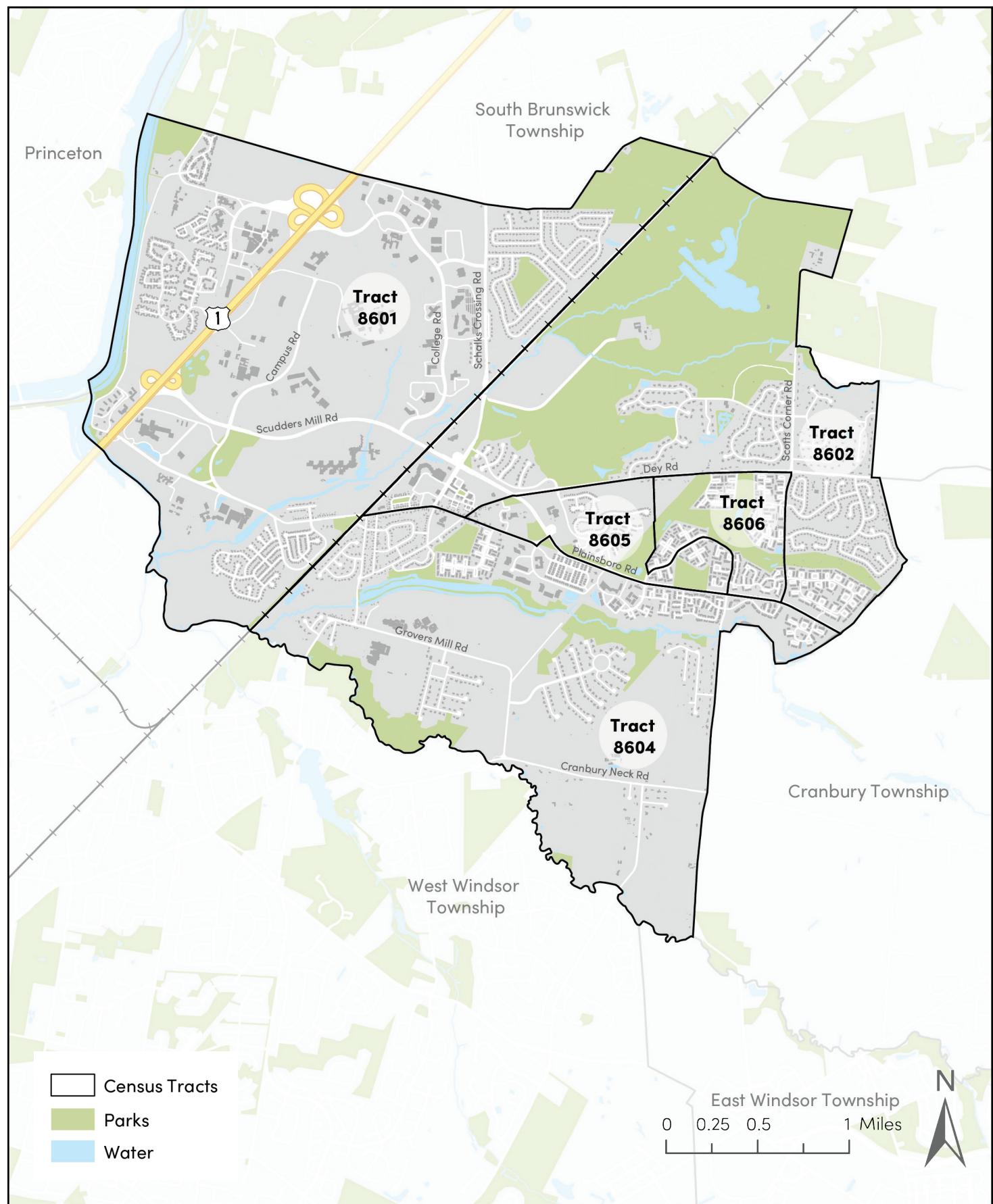
The Land Use Plan Element is based on an overall development strategy for Plainsboro Township and is designed to achieve its principles, assumptions, policies, standards, and objectives as set forth in Chapter Two of the Master Plan. The Land Use Plan is closely related to all Master Plan elements, but more specifically to the Housing, Circulation, Utility, Community facilities, and Recreation Plan Elements, in that all are designed to accommodate a desired level and quality of development within the Township, while being respectful of the need to preserve natural environments and historic resources within the township.

As of 2021, the New Jersey Municipal Land Use Law (MLUL) requires that Land Use Elements of municipal Master Plans include a Climate Change-Related Hazard Vulnerability Assessment (CCRHVA). The CCRHVA provides a comprehensive overview of the climate change-related hazards impacting the Township and presents a land use planning strategy that is designed to increase the Township's resiliency to such impacts. Plainsboro Township has done much to promote a land use pattern that is resilient to climate change. By adopting the recommended strategies and design standards presented in the CCRHVA, the Township can build on its sustainable planning foundation and continue to implement land use regulatory policies that encourage development that is resilient to the impacts of climate change-related natural hazards, minimize loss due to natural hazards, and sustain the quality of life of the community.

Map 1. Context Map



Map 2. Township Base Map



BACKGROUND

POPULATION DENSITY AND DEVELOPMENT INTENSITY

According to the 2020 Decennial Census, 24,084 people reside in the Township. Comprised of approximately 12 square miles, the Township's population density is 1,951 people per square mile. This is denser than the state (1,263 people per square mile) but less dense than Middlesex County (2,794 people per square mile).¹ As discussed in the Build-Out Analysis of the Climate Change-Related Hazard Vulnerability Assessment, half of the Township is protected from development, resulting from the clustering of residential uses. While roughly 70% of the Township is zoned for residential uses, much of this area contains the public and private open space, public facilities, and preserved farmland contained in the Township.

Table 1 shows population projections for New Jersey counties from 2014 to 2034 provided by the New Jersey Department of Labor and Workforce Development.² Over this time period Middlesex County is forecasted to have the greatest increase in population out of all twenty-one counties in the state, suggesting that there will be high demand for additional housing in and around Plainsboro. As shown in the Build-Out Analysis, Plainsboro is largely built-out. Opportunities for additional development, residential and otherwise, are limited to less than five percent of the Township area, or can take place through the redevelopment or reimaging of existing developed areas.

Since there are limited opportunities for the types of residential development that occurred in the past, residential growth in the future will mostly come in the form of infill development and the addition of mixed-use, including residential, in zones that previously did not include the flexibility of allowing integrated mixed residential and non-residential development.

1. U.S. Census Bureau 2020 Decennial Census

2. *Labor Market Information | Population and Labor Force Projections* <<https://www.nj.gov/labor/labormarketinformation/demographics/population-labor-projections>>

Table 1. Population Projections

County	Current Pop		Population Projections			% Change 2014-2034
	2014	2019	2024	2029	2034	
New Jersey	8,938,200	9,132,700	9,338,000	9,530,900	9,733,400	8.9%
Atlantic	275,200	276,200	278,900	280,600	282,900	2.8%
Bergen	933,600	967,500	998,700	1,031,500	1,065,500	14.1%
Burlington	449,700	450,000	460,400	464,900	472,700	5.1%
Camden	511,000	511,800	519,400	521,000	525,600	2.9%
Cape May	95,300	94,100	94,400	93,300	93,400	-2.0%
Cumberland	157,400	158,600	159,700	162,000	164,400	4.4%
Essex	795,700	808,300	819,100	829,800	840,100	5.6%
Gloucester	291,000	292,000	301,200	305,800	312,500	7.4%
Hudson	669,100	708,100	718,700	747,400	766,500	14.6%
Hunterdon	126,100	124,200	123,200	120,700	119,800	-5.0%
Mercer	371,500	379,000	388,900	397,400	406,300	9.4%
Middlesex	836,300	873,400	900,000	932,200	965,000	15.4%
Monmouth	629,300	633,400	649,500	655,300	665,200	5.7%
Morris	499,700	509,100	523,700	535,600	548,000	9.7%
Ocean	586,300	600,300	624,200	644,100	665,700	13.5%
Passaic	508,900	521,700	528,100	536,100	542,500	6.6%
Salem	64,700	63,000	62,600	61,000	59,800	-7.6%
Somerset	332,600	342,900	354,800	366,700	378,700	13.9%
Sussex	144,900	141,800	140,400	137,300	136,600	-5.7%
Union	552,900	573,000	588,300	605,600	620,000	12.1%
Warren	106,900	104,300	104,100	102,600	102,100	-2.1%

RELATIONSHIP TO THE STATEMENT OF OBJECTIVES, PRINCIPALS & OBJECTIVES, POLICIES & STANDARDS AND OTHER MASTER PLAN ELEMENTS

A new Statement of Objectives, Principals & Assumptions, Policies & Standards (SOPAPS) was created in conjunction with this Land Use Element. The SOPAPS includes the following land use policy which provided the framework for the creation of this Land Use Element:

Land use planning in Plainsboro will seek to establish a balance of uses that support the current village center, provide for a diversity of housing opportunities, allow for the growth of commerce and employment opportunities, provide for appropriate infrastructure to support growth, protect the Township's natural resources and open space, and consider all environmental impacts of such development.

The Township's Master Plan contains a number of discretionary elements that are intended to be included "where appropriate" but not required. These elements include:

- Circulation Plan
- Community Facilities Plan
- Open Space and Recreation Plan
- Conservation Plan
- Economic Plan
- Historic Preservation Plan
- Utility Service Plan
- Recycling Plan
- Housing and Fair Share Plan

This Land Use Plan Element took into consideration the previously existing elements. The Climate Change-Related Hazard Vulnerability Assessment enumerates the relationship with each of the above listed master plan elements and provides recommendations the Township may wish to consider when updating other plan elements to incorporate climate change recommendations and policy.

STATEMENT OF STRATEGY CONCERNING SMART GROWTH AND THE INSTALLATION OF ELECTRIC VEHICLE CHARGING STATIONS

The American Planning Association defines Smart Growth as "that which supports choice and opportunity by promoting efficient and sustainable land development, incorporates redevelopment patterns that optimize prior infrastructure investments, and consumes less land that is otherwise available for agriculture, open space, natural systems, and rural lifestyles."³ The Township has applied a variety of smart growth strategies in its approach to land use and development. As discussed in the Build-Out Analysis of the CCRHVA, the

3. APA Policy Guide on Smart Growth <<https://www.planning.org/policy/guides/adopted/smartgrowth.htm>>

Township has clustered much of its residential development in order to preserve half of the Township's land area as open space and farmland.

The CCRHVA further recommends that the Township reduce reliance on fuel-burning automobiles. As discussed in the CCRHVA and the Re-examination report that preceded this Land Use Element, ten electric vehicle (EV) charging stations have been installed in the Township. As part of the policy to move towards more sustainable modes of transportation, which also includes promoting the creation of more walkable and bikeable communities and neighborhoods. This Land Use Plan has designated Plainsboro Road, Scudders Mill Road, College Road East, and Schalks Crossing Road as future EV charging corridors. Eight of the existing EV charging stations are located on properties in close proximity to these roads.

STATEMENT OF STRATEGY CONCERNING STORM RESILIENCY WITH RESPECT TO ENERGY SUPPLY, FLOOD-PRONE AREAS, ENVIRONMENTAL INFRASTRUCTURE, AND ENVIRONMENTAL SUSTAINABILITY

As discussed in the Critical Facilities and Infrastructure section of the CCRHVA, Electricity and gas in Plainsboro Township are provided by New Jersey Public Service Electric & Gas (PSE&G). This includes strategies to minimize threats to health and safety caused by power outages in the event of major weather events. It is recommended that future updates to the Utility Service Element identify needed critical infrastructure during and after a natural disaster and evaluate potentially vulnerable components of the Township's utility network.

The CCRHVA further identifies areas, buildings, infrastructure, and community facilities that fall within the 100-year and 500-year floodplains. Plainsboro existing environmental infrastructure includes both protected natural areas that comprise roughly half of the Township, as well as on-site green infrastructure ranging from rain gardens, detention basins, and tree planting programs. The Strategies and Design Standards section of the CCRHVA provides further recommendations to encourage resilient site design for new development and redevelopment.

STATEMENT ON LOCATION OF EXISTING AND PROPOSED AIRPORTS

Pursuant to New Jersey Municipal Land Use Law, land use plan elements are required to show existing and proposed location of any airports and the boundaries of any airport safety zones delineated pursuant to the "Air Safety and Zoning Act of 1983" (N.J.S.A. 40:55D-28(2)(c)). There are no airports within the Township nor are there airport safety zones from neighboring municipalities that spill over Township borders.

STATEMENT ON MILITARY FACILITIES

Pursuant to New Jersey Municipal Land Use Law, land use plans are required to show the existing and proposed location of military facilities (N.J.S.A. 40:55D-28(2)(e)). There are no military facilities within the Township nor within areas of neighboring municipalities that would affect land use decisions in the Township.

LAND USES

INSTITUTIONAL AND PUBLIC FACILITIES LAND USES

This land use includes public/semi-public land owned by public or private nonprofit entities that are accessible to the general public and contribute to the fabric of the community. These uses include the public buildings owned and maintained by the Township, county, state, and federal governments, as well as privately-owned and maintained institutions such as places of worship.

Plainsboro has continuously taken actions to provide and support excellent community facilities to meet the needs of all township residents and businesses. Maintaining this momentum requires that careful planning of community facilities be done to ensure that residents have access to the services they need as demographics and land uses change. An ongoing focus on accessibility will ensure that all residents can access institutional and public facilities including civic and recreational facilities.

All or portions of the following existing zoning districts are recommended to be permitted within the Institutional Land Use area. See the Land Use Map on page III-50 and Zoning Map on page III-51 for more information:

- ECA Educational and Cultural Arts
- PMUD Planned Unit Development
- R-85 Residence Zone
- R-100 Rural Zone
- R-300 Low-Density Zone
- The Princeton HealthCare System at Plainsboro Redevelopment Area
- VC Village Center

All or portions of the following existing zoning districts are recommended to be permitted within the Public Facilities Land Use area. See the Land Use Map on page III-50 and Zoning Map on page III-51 for more information:

- GB General Business
- PMUD Planned Unit Development
- R-85 Residence Zone
- R-95 Residence Zone
- R-100 Rural Zone
- R-300 Low-Density Zone

Institutional and public facilities land uses are either permitted or conditional uses in each of the zones where they are found.

MIXED-USE LAND USES

The Mixed-Use Land Use category allows for the Township to better address community goals as specifically identified in the SOPAPS and respond to changing trends by including more flexibility for mixed-use infill development options in many locations, including the existing corporate office complexes along College Road East, and in existing retail centers like Plainsboro Plaza, and at other key locations to support opportunities for creative land use planning.

Parcels that may be considered for mixed-use development, but which currently contain only a single use (e.g., office), will now have the opportunity to evolve in the future as land use trends and markets change. The Mixed-Use Land Use permits a healthy combination of retail business, personal service establishments, general corporate offices, education, research, and limited multifamily residential uses within a relatively compact, interconnected pedestrian-oriented environment. Similar in some ways to traditional commercial and office zones, development in this area can promote the sharing of parking and stormwater management facilities, have well-landscaped and adequate building setbacks from surrounding roads, provide off-street parking that is well screened from public view, and includes a coordinated internal pedestrian and vehicular circulation system.

Mixed-Use areas provide shopping and work opportunities for people who live in Plainsboro and surrounding areas. Differences with traditional commercial and office zones include the addition of limited residences as ancillary uses to the primary use – office, retail, service, or restaurant. As a result, Mixed-Use areas can reflect more of a compact-style environment where appropriate, such as along College Road East, and a compact pedestrian-oriented environment in others. That appropriate character can be achieved by applying some new design principles that are similar to those contained in the Township Master Plan “Village Area Plan” that was adopted by the Planning Board as part of the Land Use Element, including but not limited to:

- a. Encourage innovation in design and reflect changes in land development technology to enhance the existing character.
- b. Encourage the highest quality design and architecture.
- c. Encourage better movement and transportation of people.
- d. Prevent strip commercial development.
- e. Provide a more defined “sense of place”.
- f. Preserve the residential integrity of adjacent areas.
- g. Create a zone with enough flexibility that permits the land use variety of a village yet prohibits the chaotic character of an unplanned area.

Throughout every zone in the Mixed-Use areas, warehouse and wholesale storage activities would only be permitted as accessory uses within retail operations, and would be subject to the following minimum design standards:

- Such facilities must be within completely enclosed buildings.
- No loading dock or service area may be on or visible from the lot line or any street frontage. Provisions for handling all freight must be on those sides of any buildings which do not face on any street or proposed streets.
- No accessory use will be construed to permit open storage of materials or goods on the lot.

Furthermore, coordination with the Circulation Plan Element to encourage pedestrian and bikeway interconnection(s) between properties, where feasible, and increased bicycle and pedestrian options along College Road East will enhance the fulfilment of these community-centered principles.

The form and general type of mixed-use development envisioned for the sites identified on the Land Use Plan map should necessarily be guided by existing and approved examples in the Township today. These examples are useful for developers to study and consider as they formulate their plans for Township review and approval and they are: the existing Village Center, the Princeton Forrestal Village, the build-out at the Princeton Healthcare System at Plainsboro, and the Master Plan approval of a walkable pedestrian mixed-use development to be ultimately constructed on the Princeton Nurseries property. All these projects have been and will be designed to reflect a high-quality environment and a sense of place.

All or portions of the following existing zoning districts are recommended to be permitted within the Mixed-Use Land Use area. See the Land Use Map on page III-50 and Zoning Map on page III-51 for more information.

NB Neighborhood Business Zone

In the NB zone, the following uses are permitted:

- Stores and shops
- Personal service establishments
- Small offices
- Repair and servicing establishments
- Buildings and uses owned or operated by the Township
- Newspaper offices
- Carpentry, electrical, masonry, plumbing and painting services
- Detached single-family dwellings
- Mixed use structures with no more than two (2) dwellings in conjunction with another permitted use
- Family day care homes
- Home occupations and professional offices
- Necessary public utilities and services

SR Service Residential Zone

In the SR zone, the following uses are permitted:

- All uses permitted in R-200 Low Density Residential Zone
- Motels or motor courts
- Multi-family dwellings or apartments
- Childcare centers
- Family day care homes
- Home occupations and professional offices

VC Village Center Zone

In the VC zone, the following uses are permitted:

- Stores and shops
- Personal service establishments
- General, administrative, and professional services offices
- Restaurants
- Cafes, luncheonettes and delicatessens
- Indoor recreation facilities, instructional studios, and fitness centers
- Repair and servicing establishments
- Banks and similar financial institutions
- Attended laundry and retail dry-cleaning services
- Book, newspaper, periodical and stationery stores and copy centers
- Parcel package shipping store or mailing center
- Buildings and uses owned or operated by the Township
- Museums, art galleries and other cultural facilities of a similar nature
- Parks and playgrounds
- Public or private open space
- Institutional uses
- Single-family detached, townhouse, multifamily and live-work dwelling units
- Family day-care homes and childcare centers
- Home occupations/professional offices
- Necessary public utilities and services

See also "Village Area Plan" on page III-46 under Planned Development Areas.

GB General Business Zone

The General Business Zone contains approximately 35 acres of land. The primary use within this zone is a 225,000± square foot shopping center (Plainsboro Plaza) which includes a main anchor store (Asian Food), two junior anchors (Lightbridge Academy and Planet Fitness), and numerous smaller stores, restaurants, and other uses providing an assortment of personal services. The shopping center also includes a 12,000± square foot pad site pharmacy store (CVS) with a drive-up window for pharmacy items only. Other than the shopping center property, the GB Zone includes an existing freestanding bank (PNC), a Post Office, and the Plainsboro Fire District firehouse. The GB zone is bordered by the Amtrak railroad lines, Plainsboro Road, Schalks Crossing Road, and Scudders Mill Road.

In the General Business Zone, it is recommended that the following uses be permitted:

- Stores and shops for any retail business
- Personal service establishments
- Educational and instructional services within a shopping center environment
- General corporate and administrative offices
- Offices for professional service
- Small commercial and government offices
- Restaurant and neighborhood taverns, excluding drive-in and curb service
- Repair and servicing
- Funeral parlors
- Banks
- Attended laundry and retail dry cleaning
- Buildings and structures owned and operated by the Township
- Agricultural uses
- Carpentry, electrical, masonry, plumbing and painting services
- Copy centers and newspaper offices
- Childcare centers
- Common open space
- Parks and playgrounds
- Shopping centers
- Pad site pharmacy store with drive-up service window
- Pad site bank or other low impact permitted commercial use with drive-up facilities (e.g., service window and/or automatic teller machines)
- Necessary public utilities and services

Conditional uses are permitted for the following:

- Facilities for the covering, altering, finishing, or assembling of goods for sale

In response to the development of the shopping center in the 1980s, a minimum lot size of twenty-five acres was established for the zone, with a minimum frontage of 425 feet. The maximum improvement coverage was set at 65% and the maximum building height at 30 feet. For all business, commercial, and office uses in the General Business Zone, the maximum permitted floor area ratio was set at 0.20, which would allow approximately 245,000 square feet of development on the shopping center lot (including pharmacy pad site parcel).

The General Business Zone is intended to permit retail business, personal service establishments, general corporate and administrative offices and other non-residential uses within a shopping center-style environment. Development within the zone strives to promote the sharing of parking and storm water management facilities, have well-landscaped and adequate building setbacks from surrounding roads, provide off-street parking that is well screened from public view, control means of access and coordinate internal pedestrian and vehicular traffic flows relating to existing and proposed development, and insure design compatibility with existing development that considers building height, materials, colors, landscaping and signage.

Development on adjacent properties has been designed to "fit" with the existing shopping center, including existing out-parcels (i.e., firehouse, bank, and post office) and residential land uses along Plainsboro Road.

Some of the most desirable site planning aspects that exist in the zone includes pedestrian and bikeway interconnection(s) to the shopping center, turning lanes along Plainsboro Road, common detention and shared parking with the shopping center, adequate, well-landscaped building setbacks from Plainsboro Road, off-street parking screened from public view, and architectural compatibility with the existing shopping center to include building height, materials, and colors.

As a result of market conditions, especially for retail related activities, the center has struggled in recent years with high vacancy rates. In response to such conditions and to provide an opportunity for new development that better reflects emerging market conditions, it is recommended that consideration be given to allowing a second pad site at the shopping center. If such a pad site is to be allowed, it is recommended that it be located and designed to be integrated into the existing parking and circulation system of the center, including bicycle and pedestrian circulation, and that such pad site be located to avoid any adverse impact on nearby residential development, and be designed to architecturally reflect and respect the existing and evolving character of the village center area. To minimize any adverse impacts on parking and vehicular circulation, or from noise and odors from a tenant utilizing the second pad site, it is recommended that its use be limited to a bank or other low impact permitted commercial use.

The introduction of additional uses into the General Business Zone are supported but will require further investigation as zoning revisions are studied. Uses that fall into this category are mixed uses with a residential component, a "Micro Fulfillment" type store which is a blend of retail and storage devoted to delivery, and "Home Suites" where individuals, homeowners, and business tenants can rent a small office space to conduct business.

OB-1 Office Business Zone

In the OB-1 zone, the following uses are permitted:

- General corporate, administrative and professional offices
- Computer centers
- Training centers for business and professional office personnel
- All farm and agricultural activities
- Childcare centers
- Necessary public utilities and services

It should be noted that only one property in the Township remains zoned OB-1, which is the approximately three acre parcel used for the New Jersey State Police Barracks on US Route One. This single parcel zone district reflects what remains of the former OB-1 Zone in this area of the Township. At this time, no future mapping of this zone district to other properties is anticipated. At such time as the current use of this property ceases, it is recommended that this parcel be rezoned to the surrounding PMUD Zone, which permits mixed use development.

PCD Planned Unit Development

In the PCD zone, the following uses will be permitted:

- All uses permitted in R-200 Low-Density Zone
- Agricultural uses
- Recreational and cultural facilities
- Places of worship, facilities for social and civic clubs
- Public buildings
- Schools and other community facilities
- Retail commercial centers, limited to uses permitted in the Town Center Zone
- Office, research, and light industrial uses permitted in the OB-1 Zone and the I-100 Zone
- Childcare centers
- Family day care homes
- Home occupations and professional offices
- Residential
- Necessary public utilities and services

The minimum land area for a PCD development must be 250 contiguous acres. A reasonable mix of units must be provided including single-family dwellings, patio homes, semi-detached and two-family dwellings, townhouses, and multi-family units. The minimum total area to be developed must be 50 contiguous acres with 25% devoted to common open space. The dwelling unit density is 2.5 dwelling units per acre. The minimum frontage is 300 feet and the maximum building height 35 feet. The maximum improvement coverage is 40%. This zone totals 950.15 acres.

Not more than five (5) percent of the land area within a PCD Zone can be devoted to retail commercial centers and not more than thirty (30) percent of the land area can be devoted to office, research, and light industrial uses. The zone includes the Princeton Meadows Neighborhood Shopping Center, an adjacent bank, and office and research uses. It is recommended that the shopping center be upgraded to reflect many of the design qualities that now exist in the Village Center, i.e., signage, landscaping, and building materials.

For more information on the PCD Zone, please refer to the Planned Development Areas Section in "Other Plans and Planning Areas" on page III-41.

PMUD Zone

The minimum land area required for a PMUD planned unit development is 100 contiguous acres. In the PMUD zone, the following uses are permitted:

- Office, research, and industrial uses permitted in the I-100 Limited Industrial Zone
- General educational and research activities
- Business and commercial uses permitted in the GB Business Zone
- Dwelling units in detached, semidetached, attached, groups of attached or clustered structures, or any combination thereof
- Public buildings, public schools, and private schools not for pecuniary profit, places of worship, facilities for social or civil clubs or organizations, hospitals, and other community facilities
- Recreational and cultural facilities, including but not limited to golf courses, clubhouses, and swimming pools
- Agricultural uses
- Common open space
- Accessory uses, including but not limited to facilities for administration, maintenance and fire prevention and safety.
- Child-care centers located next to or within residential areas
- Child-care centers located within non-residential areas
- Child-care centers as an accessory use
- Family day-care homes
- Home occupations and professional offices
- Retirement community
- Mixed-use multiple dwellings
- Integrated mixed-use neighborhood development

In the future, those uses may also include:

- Stores and shops
- Personal service establishments
- Mixed use structures with dwelling units only in conjunction with (above) another permitted use.

The PMUD zone should be allowed to evolve with a mix of uses on existing developed parcels, including limited dwelling units only in conjunction with another permitted use, which would be the primary use of the property. Accommodating this in a manner that would encourage a compact, pedestrian-oriented environment throughout the zone may require changes to bulk regulations.

For more information on the PMUD Zone, please refer to the Planned Development Areas Section in "Other Plans and Planning Areas" on page III-41.

OFFICE LAND USES

Office land uses allow for areas within the PMUD zone that are more appropriate as a standalone use than the combination of uses described in the Mixed-Use Land Uses above. Large office complexes are found extensively along College Road and Campus Road. This land use covers the Robert Wood Johnson office campus.

PUBLIC AND PRIVATE OPEN SPACE LAND USES

Open space land uses may be publicly or privately owned, recreation facilities or preserved natural landscape. Such areas are major contributors to the scenic quality of the Township, and also provide social, economic, environmental, and health benefits essential to the quality of life and well-being of residents and visitors alike.

Open space and land use development are linked by consideration of community objectives to promote conservation and preservation. Plainsboro intends to maintain the low density of development allowed in the Rural land use areas in order to protect an open, rural character, and provide for new development that complements the existing public and private open space.

All or portions of the following existing zoning districts are recommended to be permitted within the Open Space Land Use area. See the Land Use Map on page III-50 and Zoning Map on page III-51 for more information:

- ECA Educational and Cultural Arts
- I-100 Limited Industrial
- PCD Planned Unit Development
- PMUD Planned Unit Development
- R-85 Residence Zone
- R-90 Planned Medium Density Zone
- R-95 Residence Zone
- R-100 Rural Zone
- R-150 Rural Zone
- R-200 Rural Zone
- R-300 Low-Density Zone

- R-350 Low-Density Light-Impact Zone
- S-R Service Residential
- VR-1 Village Residential 1 Zone
- VR-2 Village Residential 1 Zone
- The Princeton HealthCare System at Plainsboro Redevelopment Area

RESEARCH AND LIMITED INDUSTRIAL USES

The Research and Limited Industrial component of the Land Use Plan is consistent with all Master Plan policies, standards, and assumptions. The plan promotes job growth within the Route 1 corridor and permits a level of development that is compatible with its immediate surroundings.

All or portions of the following existing zoning districts are recommended to be permitted within the Research and Limited Industrial Land Use area. See the Land Use Map on page III-50 and Zoning Map on page III-51 for more information:

I-100 Limited Industrial Zone

In the I-100 zone, the following uses are permitted:

- General corporate, administrative and professional offices
- Computer centers
- Training centers for business and professional office personnel
- Product development and research laboratories
- Limited manufacturing
- Childcare centers
- Agricultural activities
- Buildings, structures and uses owned and operated by the Township
- Necessary public utilities and services

Along that portion of Plainsboro Road that lies west of the railroad and adjacent to the PMUD zone is located the largest area of Plainsboro's second research and industrial development zone, which includes the unique and extensive research, industrial and office campus facilities of FMC and Firmenich. Because of their unusual blend of highly visible research and manufacturing activities with prestigious office buildings, this area excludes heavy manufacturing.

Warehouse and wholesale storage activities would only be permitted as accessory uses and subject to the following minimum design standards:

- Such facilities must be within completely enclosed buildings.
- No loading dock or service area may be on or visible from the lot line or any street frontage. Provisions for handling all freight must be on those sides of any buildings, which do not face on any street or proposed streets.

- No accessory use will be construed to permit open storage of materials or goods on the lot.
- Rear and side yards must be screened by a solid masonry wall and/or landscaped so as to provide an effective screen, at the time of planting, to obscure from view at ground level the permitted use from adjoining uses and streets.
- The exterior design of all permitted buildings on lots that abut a residential district or any street opposite land in a residential district must be in harmony with the general character of the residential neighborhood.

The smaller I-100 zone is located east of the Amtrak railroad lines on Block 6 Lot 6.01 and includes direct roadway access to Schalks Crossing Road. The IRL buildings on the lot constitute approximately 61,000 square feet of administrative, limited manufacturing and storage use, which has been present on the site since 1958. The facility is located along an access roadway approximately 1 mile off of Schalks Crossing Road. Under current use, approximately 25 full-time and 9 part-time employees are present at the site, which houses a modest pharmaceutical business.

There are no significant differences between the I-100 zone located west of the Amtrak lines including its uses and standards with the PMUD zone. However, the permitted maximum floor area ratio does take into consideration and, in fact, accommodates long range expansion plans of both FMC and Firmenich. Land areas adjacent to the Millstone River, Devil's Brook and the Walker-Gordon Pond are shown as open space conservation, which becomes an extension of the Princeton Forrestal private open space system.

The I-100 ordinance limits uses in a way that clearly states that no adverse effect to the normal use of any adjoining property can result from nuisances or hazards that may occur. It is clear from the location of the IRL site, far removed from roadway frontages and nearby residential uses, that it does not present an adverse impact on its neighbors. Bulk standards will limit the future development or expansion of this use.

RESIDENTIAL LAND USES

The Land Use Plan makes provision for eight (8) residential land use categories which range from the traditional single-family homes on 3-acre lots to village residential areas to multi-family housing at up to twelve (12) units per gross acre.

The residential component of the Land Use Plan is generally consistent with the Utility Service Element since those areas located outside of sewer service areas are classified as low density, which can be serviced by on-site wastewater disposal systems. Similarly, the low-density residential areas correspond to environmentally sensitive areas, thereby being consistent with the Conservation Plan Element. The Planned Medium-High Density and Medium Density residential areas are consistent with the Housing and Fair Share Element because they provide opportunities for low- and moderate-income housing construction and a variety of housing styles and types. The medium and high-density residential areas are located adjacent to major collector and arterial roadways and are serviced by public sewer and centralized water systems.

All or portions of the following existing zoning districts are recommended to be permitted within the Residential Land Use area. See the Land Use Map on page III-50 and Zoning Map on page III-51 for more information:

Low Density Residential Light Impact Zone

In the R-350 low density residential zone, the following uses are permitted:

- Detached single-family dwellings
- Parks, playgrounds, and golf courses
- Childcare centers
- Family day care homes
- Membership clubs for outdoor sports
- Necessary public utilities and services
- Buildings and structures owned and operated by the Township
- Home occupations and professional offices
- Planned residential clusters with no less than 50% of tract area devoted to common space

Conditional uses are permitted for the following:

- Agricultural activities
- Institutions
- Camps for children

This low-density residential category is located adjacent to South Brunswick Township, to the north, bordered by Scotts Corner Road and Friendship Road to the east, the existing R-300 zone and a stream corridor to the south and the existing railroad tracks to the west. The existing R-350 zone also completely surrounds the new I-100 zone district, which has vehicular access from Schalks Crossing Road. Lands located in the R-350 zone are generally impacted by a lake, soils with seasonal high-water table, wetlands, flood hazard areas and woodlands, which make them generally unsuitable for intense development. Only small islands of developable land exist within the zone. No public sewer or centralized water service exists within or in proximity to this zone. Because of the area's varied and important natural conditions, the planning is sufficiently flexible to allow development on suitable sites and to encourage the conservation of those areas that are environmentally sensitive.

The area placed in this residential classification includes most of the lands north of Shallow Brook, which were previously planned and zoned for heavy industrial development (formerly the I-200 Industrial zone district), totaling approximately 943.98 acres. The land use change from I-200 to R-350 was made to avoid obvious future incompatibility between residential and industrial uses, especially the possibility of heavy industrial and commuter traffic traveling by and through nearby residential areas. The existing IRL buildings with access from Schalks Crossing Road on 38.28 acres will continue to remain as a permitted activity within the I-100 Limited Industrial zone district.

The R-350 Low Density Residential Light Impact Zone has been found to specifically implement many of the goals and policies of this Master Plan. Specifically, it contributes to a better local balance between total jobs and housing units thereby moving the Township toward regional plan consistency, it provides for more single family detached housing units, permits clustering to preserve critical environmental and open space corridors, and reduces negative industrial traffic impacts, i.e., noise, congestion, and safety at intersections and on nearby bridges. The R-350 zone is compatible with planning and zoning in adjacent municipalities and other zones within Plainsboro Township. To the north and east in South Brunswick, the land is planned for open space, conservation, recreation and rural residential. South Brunswick zoning requires a minimum of 2 acres and 3 acres of land per dwelling unit and also permits clustering on minimum 1 acre lots. The minimum lot area for agricultural uses is 5 acres. An area located further to the east of the zone in nearby Cranbury Township is classified Light Impact Residential which also permits single family detached residential on minimum 4 acre lots. To the south in Plainsboro Township are the Shallow Brook and associated flood plains, wetlands and woodlands which function as a substantial natural buffer between the R-300 low density residential zone and the R-350 zone. Residential single-family detached development on minimum 1-acre lots is currently permitted in the R-300 zone.

This low-density residential area contains a desirable natural setting for housing. Residential development is compatible with and preserves environmentally sensitive areas and enhances wildlife corridors.

This low-density residential area also permits single family detached dwellings clustered on minimum 1 acre lots, provided that the maximum number of clustered dwelling units cannot exceed the number arrived at by an applicant submitting a sketch plat showing a conventional 3-acre subdivision which meets all the Township's site plan and subdivision requirements.

In addition, the zone also permits a cluster bonus of one building lot for each upland acre (as defined in the land development ordinance) to be conveyed to the Township, provided that the developer permits direct vehicular access to the conveyed property and to the lake, that the property adjoins lands already dedicated or conveyed to the Township, and that the Township has already agreed to accept such a conveyance prior to the submission of a development application. Clustering in the zone also requires that no less than 50% of the tract be devoted to common open space and that recreational facilities be provided by the developer.

This zone is largely defined by preserved open space and the 1,000-acre Plainsboro Preserve and Environmental Education Center which has all but removed all development potential from this zone other than the recognition of existing houses located along roadway frontages.

Low Density Residential Zone

In the R-300 low density residential zone, the following uses are permitted:

- Detached single-family dwellings on one acre lots
- Type I planned residential cluster on minimum 100-acre tracts at a maximum gross residential density of 0.65 du/acre

- Type II planned residential cluster on minimum 50-acre tracts at a maximum gross residential density of 0.55 du/acre
- Type III planned residential cluster on minimum 100-acre tracts at a maximum gross residential density of 0.34 du/acre
- Low and/or moderate-income dwelling units
- Parks and playgrounds
- Conservation and open space areas
- Necessary public utilities and services
- Cemeteries
- Volunteer organizations
- Childcare centers
- Family day care homes
- Home occupations and professional offices

Conditional uses are permitted for the following:

- Agricultural activities
- Institutions
- Camps for children

This land use classification is located east of the Amtrak railroad tracks along Dey Road. The northern boundary of this area consists of the Shallow Brook which, with its stream corridor and adjacent poor-quality soils and mature tree masses, provides a permanent buffer and land use separation between any residential development within the zone and the existing R-350 zone to the north of the Shallow Brook. The R-350 zone allows for single-family detached residential development at one du/3 acres and clustering on minimum 1 acre lots and even smaller lots provided septic system suitability is proven by the developer.

The southern border of the R-300 area abuts the existing high density PCD zone. The PCD zone contains thousands of residential dwelling units developed by Lincoln Properties or Linpro, an 18-hole Middlesex County Golf Course, the Enterprise Business Park, and the Princeton Meadows Neighborhood Shopping Center. The PCD zone also permits the development of low and moderate-income housing.

To the west, the R-300 zone is bordered by the VC Village Center Zone and the Amtrak railroad tracks. The Queenship of Mary Church is located opposite the Municipal Center within the R-300 zone along the western edge. To the east, the zone is bordered by South Brunswick Township and is also within proximity to Cranbury Township. The land in South Brunswick is planned for open space conservation, recreation, and rural residential development. South Brunswick requires a minimum of 2 acres and 3 acres of land per dwelling unit and also permits clustering on minimum 1 acre lots. The area in Cranbury is classified Light Impact Residential which permits single family detached residential on minimum 4 acre lots. Two (2) minimum 1-acre single-family residential development projects known as Harding Hills and Brentwood Estates are located within the eastern portion of the R-300 zone. The construction at both of these projects has been completed for a number of years.

The R-300 zone contains approximately 840.31 total acres. Dey Road, Scudders Mill Road, and Plainsboro Road are the three major roadways which service the zone. Middlesex County someday plans to widen Dey Road from 2 to 4 lanes and the Township has implemented a secondary parallel collector roadway network to interconnect various development parcels located north of Dey Road in the R-300 zone. The collector roadway is known as Woodland Drive. The zone contains many scattered single-family detached dwellings located along Dey Road, Scotts Corner Road and Eiker Road. A significant amount of residential development within the R-300 zone is serviced by public sewer and centralized water.

The R-300 zone permits single-family dwellings on minimum 1-acre lots as well as parks and playgrounds, conservation and open space areas, and planned residential clusters on minimum 100-acre tracts. The maximum residential density of a planned residential cluster is not permitted to exceed .65 dwelling units per gross acre. In addition, planned residential clusters must devote at least 45 percent of the land mass to conservation, open space, and/or recreational purposes and be serviced with a public sewer and centralized water system. Single-family homes in a planned residential cluster development would have to be located on minimum 20,000 square foot lots. The R-300 zone provides the Township with a low-density residential environment that promotes a desirable and necessary contrast from townhouse and garden apartment living in the nearby PCD zone and elsewhere.

Much of the new residential subdivision activity in the R-300 zone has been clustered to create significant amounts of common open space that has been permanently preserved as natural conservation areas, buffer areas, farm land or land used for a Township Community Park and the Township Public Works facility.

In addition to the predominant single-family development that serves the demand for market rate housing in this area of town, is an undeveloped 30± acre parcel owned by the Township on Dey Road that is suitable for low and/or moderate-income housing development in recognition and partial satisfaction of the Township's affordable housing obligation under the current state requirements for such housing. The development of low and/or moderate-income housing on this parcel shall be permitted subject to compliance with a number of development standards set forth in the R-300 Zone regulations, intended to ensure that such housing will be developed in a manner that results in high quality development that is integrated into the character and fabric of the immediate neighborhood and overall community.

Low Density Residential Zone

In the R-200 low-density residential zone, the following uses are permitted:

- Detached single-family dwellings
- Agricultural activities, farms, and nurseries
- Existing cluster development
- Parks and playgrounds
- Childcare centers
- Family day care homes

- Home occupations and professional offices
- Necessary public utilities and services

Conditional uses are permitted for the following:

- Institutions
- Cemeteries
- Camps for children
- Volunteer organizations
- Non-profit clubs for outdoor sports
- Housing for transient or migratory farm workers

This low-density residential land use zone has been developed to reflect a traditional single-family development pattern. The area contains 299.46 acres and is located in the northwest part of the Township, which includes the existing 420-unit Princeton Collection (U.S. Homes) housing development and other smaller residential subdivisions that have located along Perrine Road and Schalks Crossing Road, i.e., the completed Plainsboro Acres subdivision, the approved and under construction Levico development which includes a daycare center, and the ZAHAB residential development which is also under construction.

Planned Medium-High Density Residential Zone

In the R-95 zone, the following uses are permitted:

- Planned residential cluster developments
- Parks, playgrounds, and golf courses
- Farm and agricultural activities
- Necessary public utilities and services
- Buildings and structures owned and operated by the Township
- Childcare centers
- Family day care homes
- Home occupations and professional offices

Conditional uses are permitted for the following:

- Institutions
- Cemeteries

This 156.42 acre planned medium-high density residential category is adjacent to the existing R-85 medium density residential zone to the west and includes the Municipal Center, borders the existing R-300 low density residential zone and Dey Road to the north, and is next to Linpro's PCD medium-high density zone to the east and south which includes the 18-hole Middlesex County Golf Course, condominiums, apartments and single family homes, the Enterprise Business Park, the Princeton Meadows Neighborhood Shopping Center and a professional office building complex. Lands within the planned medium-high density residential zone are characterized by flat and gentle slopes. Soils within the zone are

predominantly Sassafras, which contain slight limitations for the construction of dwellings, picnic areas, paths and trails, and moderate limitations for the construction of streets and playgrounds. No flood plains or wetlands exist within the zone. The two (2) major treed areas located in the zone have been protected as much as possible through the development process and more trees have been added through reforestation efforts. Development is serviced by public sewer and centralized water service. The area placed in this residential classification includes lands between Plainsboro Road and Dey Road, which was previously planned and zoned for low density residential, and a portion of the PCD zone which had been designated a Mt. Laurel COAH housing site. The area zoned R-95 was originally zoned R-300 and PCD with a theoretical build-out of 558 dwelling units. The change to R-95 was proposed to implement the Township's Mt. Laurel II settlement agreement with the Greater Civic League of New Brunswick for the provision of moderate-income for-sale units and rental units equally divided between low and moderate income. As envisioned only 423 dwelling units have been constructed in the R-95 zone as follows: 162 single-family detached patio homes, 96 for-sale townhouses with garages, 40 moderate income for-sale Mt. Laurel condominium flat units, and 125 low- and moderate-income rental Mt. Laurel flats. Mt. Laurel buildings have the same exterior treatments as the market units and the 40 moderate-income for-sale units have been located in separate buildings mixed in with various market rate units.

The R-95 zone has been found to specifically implement many of the goals and policies of this Master Plan. Specifically, it has increased the amount of housing construction for middle- and low-income families, provided affordable housing opportunities for young families and senior citizens, and clustered dwelling units to achieve over 70% common open space which included the public dedication of 34 acres located adjacent to the Municipal Center. Development within this zone has resulted in the construction of Wyndhurst Drive, a collector roadway, which connects Plainsboro Road and the signalized entrance to the Princeton Meadows Neighborhood Shopping Center with Dey Road. The Town Center Elementary School is also located within this zone.

The R-95 zone is compatible with planning and zoning in adjacent zones within Plainsboro Township. To the north the land is zoned R-300 and planned for single family detached construction on minimum 1 acre lots and located to the east is the PCD zone which has permitted single family detached, townhouse, and multi-family development. To the south is the existing Enterprise Business Park, a new senior citizen housing development and the Princeton Meadows Neighborhood Shopping Center which provides convenient employment and retail opportunities for new residents located within the zone. Governmental services are provided by the nearby Municipal Center, which includes the police department and rescue squad.

This zone reflects a desirable natural setting for housing. Residential development is compatible with adjacent land uses and the existing treed environment. Any residential development within this zone has been effectively screened from Dey Road and Plainsboro Road.

This zone permits agricultural uses, detached, and attached residential dwelling units (i.e., patio homes, townhouses, and 2 or 3 story multi-family buildings), parks, playgrounds and golf courses and municipal uses, and permitted conditional uses such as home occupations, churches, nursery schools and child day-care centers.

Planned Medium Density Residential Zone

In the R-90 Planned Medium Density Zone, the following uses are permitted:

- Planned residential cluster developments
- Parks, playgrounds, and golf courses
- Necessary public utilities and services
- Childcare centers
- Family day care homes
- Buildings and structures owned and operated by the Township
- Home occupations and professional offices

Conditional uses are permitted for the following:

- Institutions
- Cemeteries
- Church day care centers

The planned medium density residential zone is located on the former Walker-Gordon farm site. The R-90 zone, containing 250.21 acres, is bounded by the Devil's Brook, Plainsboro Road, the Millstone River, and the existing railroad tracks. The former farm site contains mature tree masses and other vegetation. Southern portions of the site are heavily wooded on both sides of the Millstone River and Devil's Brook. Large Oak, Maple, and Sycamore trees line both sides of existing on-site driveways and Plainsboro Road. Many older buildings including barns and silos and foundations were once located on the site. The site is relatively level, with the highest elevation occurring near Plainsboro Road at 86 feet and dropping off to a flat 54 feet along the Millstone River. Water drains in two major directions from a ridge running from the northeast corner to the southwest corner of the site.

The Walker-Gordon site has been determined to be a desirable natural setting for single-family housing. The geology of the site includes the Stockton Formation, or Stockton Sandstone and the Magothy and Raritan Formations. The Stockton is composed of sandstone of Triassic age, which is locally important for water supply for both domestic and industrial uses. The Magothy and Raritan Formations is partially consolidated sandstone of Cretaceous age that is of great regional importance, providing water to large areas of the Coastal Plain. The site has a high aquifer recharge potential. Wetlands, floodplains, and the DRCC buffer are located on the site adjacent to the Walker-Gordon Pond, Devil's Brook, and the Millstone River. All water features are perennial and aesthetically significant.

Prior to its current residential land use classification, the site had been zoned I-100 which permitted general corporate, administrative and professional office, computer center, publishing houses and printing plants, research laboratories, limited manufacturing, and agricultural activities. The change from I-100 to R-90 was proposed to protect the existing 2-lane Plainsboro Road treed environment and adjacent single-family neighborhood from significant non-residential through traffic impacts and the widening of Plainsboro Road. Housing implementation on the site has protected existing internal tree-lined driveways and scenic views of the site, preserved wildlife corridors, wetlands, and flood hazard areas.

Another significant positive by-product of the exclusive single-family detached development has been usable open space located within and next to housing areas and a permanent open space corridor along Plainsboro Road.

The Planning Board granted conceptual approval for a 560-unit planned residential development consisting of 141 patio homes, 58 manor homes, 321 townhouses and 40 Mt. Laurel affordable condominium units in 1988 under the provisions of the new R-90 zone. Pursuant to N.J.S.A. 40:55D-10.1, this approval was non-binding on the Board and the developer. The developer (Linpro Princeton, Inc.) failed to submit preliminary and final subdivision plans for development of the concept plan for over 5 years. In 1993, the same developer submitted a new concept plan to the Planning Board for a 515-unit residential development consisting of 86 single-family, 165 zero lot line, and 264 townhouses of which 40 were affordable units. The Board did not approve or reject the new concept plan but instead identified many areas of concern including vehicular traffic, signalization, off-tract improvements for streets and roads, pedestrian access, residential garages, construction phasing, environmental issues, the pond and dam, off-site sanitary sewers, recreation facilities, and sound attenuation along the Amtrak railroad tracks. The Board felt it necessary to re-do the R-90 zone by reducing its overall gross density, eliminating the requirement for townhouses and low- and moderate-income Mt. Laurel housing units, and increasing the common open space requirement.

A planned residential development is permitted on the site subject to specific design criteria to encourage creative use of the land area, protect environmentally sensitive areas and providing adequate noise buffers from the railroad. The minimum total area to be developed into a planned residential development is 50 acres. The maximum unit density is 1.13 dwelling units per gross acre. No more than 275 dwelling units are permitted within the entire zone. No less than 60% of the entire tract would be designated as common open space. A mix of two (2) housing types is required between single-family detached on minimum 10,000 square foot lots and single-family zero lot line dwellings on minimum 5,000 square foot lots. The maximum building height is 35 feet. The R-90 zone must be serviced by public sewer from the Stony Brook Sewerage Authority Treatment Plant and centralized water service.

The R-90 zone helps promote a better Township balance between single-family detached construction and the development of multi-family and townhouse units, permits the construction of affordable non-Mt. Laurel housing for individuals and families who will be moving up the housing ladder, and provides yet another opportunity for many of Plainsboro's renters to own a single-family house. The existence of a variety of housing types increases consumer choice and in turn permits the filtering of sound housing units for all income sectors within the Township.

Residential development trends within the Township during the 1970's and into the early 80's resulted in the approval and construction of over 6,000 units of which over 80% were multi-family and only 17% were single-family detached and townhouses. Since the mid-80's the total number of new units had dropped by over 4,000 and the mix had changed to reflect over 56% single-family detached with only 20% multi-family. The desire on the part of the Township was to encourage the construction of more single-family detached homes to balance the large

amount of multi-family development that occurred in the 1970's. The goals of the Master Plan are to provide affordable housing including Mt. Laurel units, to encourage the construction of more single-family detached dwellings, and to provide a better balance between the different housing types.

Housing implementation within the R-90 zone creates a better Township balance between total jobs and housing units, thereby moving toward better regional plan consistency; provides for more single-family detached housing units; permits clustering to preserve critical environmental and open space corridors; and eliminates negative traffic impacts, i.e., poor industrial access, widening of Plainsboro Road, and increased traffic volumes within the village area of the Township.

The Walker-Gordon site has been and continues to be predominantly surrounded by single-family detached residential development, open space, and environmentally sensitive areas.

Most of the existing and ongoing development activity adjacent to the site is residential single-family detached. Thirty-five (35) single-family homes are located in the Jeffers Road neighborhood and along Plainsboro Road, forty-nine (49) homes have been constructed in the Pond's End development across the railroad tracks and another 13 are located on the Jefflands II site located off of Grovers Mill Road. Firmenich office and warehouse construction is the only exception to residential development in the immediate area. Visual and aesthetic impacts associated with Firmenich construction have been dealt with through enhanced levels of landscaping, the upgrading the building facades, and appropriate site lighting.

The existing Walker Gordon Farm development is consistent with the Master Plan and current zoning in that conventional single-family detached units were built on minimum 9,500 square foot lots and patio homes were built on minimum 4,500 square foot lots. The site contains 121 conventional units and 234 patio units and related roads, utilities, recreation facilities and common open space. The project complies with the net residential densities for single-family and patio single-family homes which are 2.75 dwelling units per acre and 5 dwelling units per acre, respectively. The project provides for 55.1% of the tract or 133.23 acres in common open space and active recreation. Total impervious site coverage is at 39% of the development tract.

Development of only single-family detached residential units on the Walker-Gordon site is in keeping and totally compatible with existing development adjacent to and surrounding the site.

The Devil's Brook and Walker-Gordon Pond provide satisfactory buffering between the R-90 zone and the I-100 and ROM-1 industrial zones and afford visual and aesthetic protection to new R-90 dwelling units from existing industrial uses.

The entire zone has frontage on Plainsboro Road which is classified as a major collector. One of the original goals of rezoning the property from I-100 to R-90 was to protect the existing treed environment along Plainsboro Road and to maintain its existing 2-lane character. Residential development of the site has resulted in the following improvements to Plainsboro Road:

- 4-way intersection with Pasture Lane; the design consists of one (1) lane of travel in the eastbound and westbound approaches, an exclusive left-turn lane, and a shared thru/right-turn lane on the westbound approach and two (2) exit lanes on the northbound approach.
- A one-way entrance driveway for vehicles traveling eastbound on Plainsboro Road and designed to also permit westbound emergency vehicles to use the entrance.

Only a few existing trees had to be removed as a result of making these intersection improvements because pavement widening and transition to existing pavement at the 4-way intersection were kept to a minimum and the development of the one-way entrance utilized mountable Belgium block curb, stabilized turf, and transitions into the existing Plainsboro Road edge of pavement.

Development on the Walker-Gordon site benefits from the installation of the traffic signal at the 4-way intersection with Pasture Lane.

The primary trade-off in signalizing this intersection has been reduced delay for exiting traffic with the addition of a delay for Plainsboro Road traffic. To the extent that good levels of service and short delays are encountered for Plainsboro Road traffic the signal does not pose a serious problem.

Secondary benefits to nearby driveways and intersections result from the stopping of Plainsboro Road traffic at the 4-way intersection. The signal tends to group or platoon Plainsboro Road traffic with corresponding larger gaps than would occur under a free flow, random arrival condition. Review of future traffic volumes and the impact of Route 1 and Scudders Mill Road improvements need to be completed to determine if this type of secondary benefit will occur or be measurable in terms of effects on other locations.

Medium Density Residential Zone

In the R-85 Residential Zone, the following uses are permitted:

- Detached single-family dwellings and accessory structures and uses
- Parks and playgrounds
- Garage facilities for only the motor vehicles owned by the occupant of any single dwelling to which such garage is accessory
- Family day care homes
- Childcare centers
- Home occupations and professional offices
- Necessary public utilities and services

The maximum unit density will be one unit per lot. Minimum lot size is 15,000 square feet with a minimum frontage of 85 feet. The maximum building height is 25 feet. The zone includes bulk provisions consistent with the Village Area Plan recommendations, (i.e., FAR and building coverage restrictions, reduced front building setbacks for front porches and covered front stoops, subdivision restrictions to prevent demolition of existing dwellings) and a maximum building lot coverage of 20% of the lot area.

Conditional uses are permitted for the following:

- Institutions, including charitable organizations, houses of worship, and parochial and private schools and nursery schools
- Cemeteries
- Volunteer organizations

The medium density residential land use classification comprises the Jeffers Road neighborhood, historic cemetery, Merrill Lynch open space west of the railroad tracks, and the old Village area, which is currently mapped in the R-85 zone, for a total of 346.32 acres. The Land Use Plan reflects its traditional boundaries as a predominant single-family residential neighborhood zone.

Village Residential (VR) Zones

In the VR-1 Zone, the following uses are permitted:

- Detached single-family dwellings, and accessory structures and uses
- Townhouse units
- Parks and playgrounds
- Public or private open space
- Family day-care homes
- Home occupations and professional offices
- Necessary public utilities and services

In the VR-2 Zone, the following uses are permitted:

- Planned age-restricted village residential development, subject to the zoning restrictions related thereto
- Detached single-family dwellings, and accessory structures and uses
- Townhouse units
- Multifamily
- Parks and playgrounds
- Childcare centers
- Family day-care homes
- Home occupations and professional offices
- Necessary public utilities and services

For both the VR-1 and VR-2 Zones, see also Village Area Plan under "Other Planning Areas" on page III-46.

RURAL LAND USES

Township efforts to preserve agricultural lands are likely to produce results only if three essential pre-conditions exist. The first is that the amount of contiguous agricultural land must be sufficient to permit the creation of an environment conducive to the continuation of farming and the provision of support facilities. The second is a clear separation of agricultural lands from other types of land uses, and especially from residential ones. The third is that the value of land in the agricultural area continues to reflect farming as a viable alternative to development. These three pre-conditions are believed to be operative, with farmland preservation as an important policy objective, the Township will continue to develop and enact effective preservation programs as outlined herein.

Since 1982, the Township has been successful in encouraging agricultural activities and in preserving farmland within its agricultural zones south of the Plainsboro Pond and Cranbury Brook. The only development "intrusions" into this 1,400-acre area has been 14 single-family detached homes on 1-acre lots at the corner of Nostrand Road and Cranbury Neck Road, which were approved prior to the adoption of the 1982 Master Plan, modest residential expansion of the Beechwood neighborhood, and some scattered housing on minimum 6 acre lots. In addition, the West Windsor-Plainsboro Regional School District has constructed a new Community Middle School on a 30.47-acre parcel along Grovers Mill Road just south of the Plainsboro Pond. The School District has also constructed the Millstone Elementary school on an adjacent 38.95-acre parcel and a new High School North on an 89.76-acre parcel.

The R-100 and R-150 rural residential areas, which comprise the Township's agricultural and farmland preservation zones, remain extremely viable for preserving farmland because of their predominant agricultural use. The R-100 zone contains 798.12 acres and the R-150 zone contains 661.87 acres. Over 70% of the area's total acreage continues to be farmed. The lack of adequate major road access coupled with little or no public sewer capacity has helped to preserve this area from intense development. Those municipalities which adjoin Plainsboro to the south and east (Cranbury and West Windsor Townships) have primarily agricultural and low-density residential land uses which complement the agricultural districts in the Township. Both zones continue to exist in relative isolation, being well buffered from adjoining zones and not located in the direct path of major outside regional growth influences and pressures. There are no public sewer and centralized water lines within the area, except for those which have been designed with limited capacity solely to service the aforementioned public-school sites and clustered housing developments. No major regional roadways provide access into and out of the area and none are planned.

The 1982 Township Master Plan recommended the permanent preservation of farmlands be attempted through use of the Transfer of Development Credits (TDC) technique, combined with an increase in the minimum lot area requirement in the agricultural "preservation" area from one (1) acre to six (6) or ten (10) acres. This transfer technique recommendation resulted from a detailed study of varied agricultural preservation programs and their applicability to the Township, undertaken by the Planning Board in the early 1980's.

To encourage landowners in the agricultural preservation area to participate in the preservation program, by placing the necessary deed restrictions on their land, it was recommended that they be awarded one (1) development credit for each acre of developable

land. The R-300 zone was designated as the receiving area because it was capable of absorbing higher density development. The TDC classification in the R300 zone would have permitted a single family detached house at an as of-right base density of one unit per acre. A Conditional Use zoning provision would permit lot area reductions below a one-acre lot size if either a public water or sewer system was available and if any increase in density in the area was accompanied by a significant preservation of land in the agricultural preservation area through the transfer mechanism. A detailed transfer of development credits mechanism was to have been developed as part of an ordinance following adoption of the 1982 Master Plan. To determine the number of credits to which he or she would have been entitled, a landowner in the agricultural preservation area would prepare a sketch plat meeting all basic requirements of the ordinance for a one-acre residential lot subdivision and submit it to the Planning Board for its review and approval. The number of credits available for sale and transfer into the receiving area would equal the number of one-acre minimum lots in the approved sketch plat.

Absent state enabling legislation, which would have clearly permitted implementation of transfer of development credits at the local level, the Township has sought since 1982 to foster agricultural activities and to encourage farming to continue by zoning for agricultural development with minimum 6-acre lots.

In order to encourage the retention of significant areas of contiguous acreage for use as farming and related agricultural activities, a variety of techniques must be utilized where feasible including TDC and variations on its premise, the use of agricultural clustering, permanent agricultural deed restrictions and acquisition of farmland easements which appear to be but a few of the techniques that continue to warrant further evaluation in order to provide a broad range of options from which a permanent preservation scheme can be derived.

This Rural Land Use section is consistent with all Township policies, standards, and assumptions. Specifically, the planning in this section implements the Circulation Plan Element by discouraging the widening of roadways beyond 2-lanes. The Utility Plan Element is supported because planned housing areas will only be serviced with community septic systems or public sewer in combination with centralized water. It is recommended that the approximately 1,400 acres of primarily Class I soils be designated on the Land Use Plan as an agricultural preservation area. As explained below, this area will always remain well insulated from any adjacent residential development both in Plainsboro and in adjoining municipalities.

- **Regional Guidelines** – The above recommendations are in accordance with applicable regional guidelines. The State Plan Policy Area Map specifically designates this area for agriculture (PA4 Rural Planning Area formerly Tiers 6a and 6b) as does the Middlesex County Master Plan and the final Route One Regional Forum Plan.
- **Adjoining Municipalities** – The proposed agricultural lands merge harmoniously with similar lands in Cranbury, which are also planned and zoned for agricultural preservation with a permitted residential density of one unit per six (6) acres in the A-100 Agricultural Preservation Zone. The adjacent lands in West Windsor Township, which are buffered from those in Plainsboro by the Millstone River, are mapped in a low-density residential zoning classification east of the railroad tracks and research and development west of the railroad tracks. To the north, across Cranbury Brook,

lies existing multi-family housing development which is separated from the proposed agricultural area by the substantial setback and buffers provided by Cranbury Brook and associated wetlands and existing ramble easements. All of these land uses will prevent any future conflicts between residential and agricultural uses.

The R-100 and R-150 Rural Residential Zones correspond to the Rural Land Use classification and permit the following uses:

- Agriculture and farms
- Farm buildings
- Nurseries and greenhouses
- Riding academies, bridle paths and stables
- Detached single-family dwellings
- Parks and playgrounds
- Conservation and open space areas
- Rural residential planned village clusters
- Childcare centers
- Family day care homes
- Necessary public utilities and services
- Public schools
- Buildings and structures owned and operated by the Township
- Home occupations and professional offices

The minimum total area to be developed as a planned village cluster development is 150 acres in the R-100 zone and 150 acres in the R-150 zone. The maximum unit density must be calculated on the basis of 0.3 dwelling units per acre of developable land plus 0.166 dwelling units per acre of environmentally constrained land. A minimum of 75% of the site must be devoted to permanent open space or recreational areas. The minimum house lot size is 20,000 square feet with the average lot not less than 25,000 square feet and with a minimum lot frontage of 125 feet. The maximum building height is 35 feet. All clustered residential lots must also be serviced by a public centralized water system, community septic system or individual septic systems acceptable to the New Jersey Department of Environmental Protection and to the Township.

Conditional uses are permitted for the following:

- Farm stands, primarily for the sale of dairy and agricultural products grown on the farm
- Churches or other places of worship
- Camps for children
- Housing for transient or migratory farm workers
- Detached single-family clusters on minimum 150-acre tracts with homes on minimum one-acre lots

Conditional use detached single-family cluster development is permitted only if the maximum number of residential lots is no greater than the number arrived at by the applicant submitting a sketch plat showing a conventional 6-acre lot subdivision conforming to the permitted zoning bulk and area regulations of the land development ordinance.

To the maximum extent practicable, cluster developments must be located on land not well suited for agricultural purposes because of size, location, proximity to neighboring land uses, existing tree mass, access, shape, quality of soil and drainage. The design and location of rural village clusters must give priority to protecting the most suitable soils for subsurface septic disposal in unsewered areas only; to leaving prime agricultural soils for agricultural uses; to avoiding environmentally constrained areas; to locating dwellings along wooded areas to reduce impacts upon agriculture; to provide summer shade and shelter from winter wind and to enable new residential construction to be visually absorbed by natural landscape features; to not blocking or interrupting scenic vistas, as seen from the public roadways; and to locating dwelling units and other improvements on the lower-quality agricultural soils.

When the major purpose of a rural village cluster is to preserve open space for agricultural and farming purposes, all dwelling units must be located and constructed at such places on the tract and in such a manner that, to the greatest extent possible, they will not segment land of any one farm into awkward or odd-shaped parcel sizes difficult to support viable farming operations, nor interfere with the conduct of agriculture, on- or off-site, by limiting or interfering with the access to fields or the effectiveness and efficiency of the farmer and farm equipment, including crop-spraying aircraft.

The Rural Land Use areas are compatible with planning and zoning in adjacent municipalities and other land uses within Plainsboro Township. To the north is Linpro's high density PCD zone, which has been effectively separated from rural areas by a wide band of environmentally sensitive areas. To the east is Cranbury Township's A-100 Agricultural Preservation Zone, which permits residential development on minimum 6- acre lots. To the south in West Windsor Township is the R-2 Low-Density Residential Zone. This area is both visually and physically separated from the R-100 and R-150 areas by the Millstone River. To the west is the existing R-85 Zone in Plainsboro Township, which permits single family residential development on minimum 15,000 square foot lots.

The Planning Board has broadened its efforts to protect agricultural lands and open space by establishing a program that redirects growth pressure away from these two sensitive zones. The Planning Board has chosen to continue to permit agricultural and residential development on minimum 6 acre lots, to permit the clustering of the base 6-acre residential yield on minimum 1 acre lots given a large minimum tract size, and to permanently preserve at least 75% of its rural land mass by permitting the clustering of a maximum 342 new homes within three (3) designated housing areas. Although the location of these housing areas is fixed, their general shapes can change as a result of Planning Board input and refinements at the time of actual site plan and subdivision review and approval. Two of the three areas in the R-100 Zone have been developed and the third area in the R-150 Zone is occupied by preserved and pending preserved farmland. The Rural Land Use areas naturally permit and even encourage agriculture and farms, farm buildings, nurseries and greenhouses, riding academies, bridle paths and stables, parks and playgrounds, and conservation and open space areas.

Homes located within clustered housing areas are permitted to locate on an average lot area of not less than 25,000 square feet and the minimum lot area would be 20,000 square feet. The Rural Land Use areas implement the following major Township land use objectives:

1. Protect environmentally sensitive lands, i.e., floodplains, wetlands and wooded areas.
2. Permanently protect large contiguous agricultural and open space parcels with desirable vistas and views from roadways.
3. Promote Township jobs/housing balance.
4. Minimize undesirable farmland/residential development conflicts.
5. Provide for middle and upper income single-family detached housing.
6. Locate rural village clusters next to public schools, parks and utilities or along minor and/or scenic roadways with sufficient setbacks to promote open space views.

The three (3) clustered housing areas take full advantage of existing 12 and 16-inch New Jersey American Water lines, which have been reasonably extended to promote fire protection and a reliable and safe source of drinking water with the additional benefit of not having to impact upon the Township's valuable ground water resources. A maximum 342 dwelling unit yield within these housing areas also permits the Township to not only meet but exceed the NJ DEP nitrate dilution model target water quality standard of 5 milligrams per liter based upon a 1.6-to-2-acre minimum lot size for this watershed, because cluster development within the Rural Land Use areas is dependent upon either individual or community septic systems in the absence of public sewer. In addition, the maximum development density permits the Township's rural areas to maintain their existing 2-lane rural roadway network with minimal shoulder and intersection improvements while also maintaining a Level of Service "C" to accommodate existing traffic, site traffic and other regional growth.

Today, the Grovers Mill residential development has taken place in the R100 zone which has resulted in the permanent preservation of hundreds of acres of farmland and has created meaningful open spaces within the development. The Grovers Mill residential development was built in two cluster locations in accordance with the Master Plan recommendations noted above and being consistent with the ordinance requirements that permitted clusters in exchange for permanent farmland preservation. In addition, the Grovers Mill residential development also resulted in the preservation of lands located in the R-350 zone, which are now part of the Plainsboro Preserve, by transferring residential units into this rural village cluster development.

One aspect of land development within these zones that should be explored in some depth by the Township is "Agritourism". Agritourism promotes the use of agricultural amenities and resources for the purpose of offering fee-based recreational opportunities. Agritourism can benefit the Township by attracting tourists to the area who not only spend time at participating farms but spend money in other local businesses. Farmers benefit by supplementing their income from these added activities.

There are many potential agritourism opportunities for farmers. Farm related activities include roadside stands, farm market, Christmas tree farm/cut your own, gift shop/ agricultural crafts, winery, picnic areas, petting zoos, agricultural fair/show/festivals, serving food and drinks, wagon/sleigh rides, corn maze, hay rides, farm tours, and pick-your-own fruits and vegetables. Non-farm activities may include hunting, fishing, bed and breakfast, camping, horseback riding, hiking, and cross-country skiing.

Other agritourism activities may include school tours, farm-related museum, garden/nursery tours, agricultural exhibits/tours, and crop identification programs.

Take note the Land Use Map and Zoning Map shows all of the present land use/zoning categories as discussed in this Element as well as the location of all other major land use categories. The land use categories on this map identifies zones in which agriculture is a permitted use. The following is a listing of these zones and uses:

1. R-100 Zone Agriculture and farms, farm buildings, nurseries and greenhouses, riding academies, bridle paths and stables, farm stands, housing facilities for transient or migratory farm workers.
2. R-150 Zone Agriculture and farms, farm buildings, nurseries and greenhouses, riding academies, bridle paths and stables, farm stands, housing facilities for transient or migratory farm workers.
3. R-200 Zone All farm and agriculture activities, including nurseries, small animal and livestock raising; the sale of farm or dairy produce.
4. R-300 Zone Conservation and open space areas, e.g., wilderness areas, forest, scenic areas, and woodlot management; agriculture.
5. R-350 Zone Agriculture.
6. GB Zone All farm and agricultural uses.
7. OB-1 Zone All farm and agricultural activities, including nurseries and small animals and livestock.
8. I-100 Zone Agricultural activities.
9. PCD Zone Agricultural activities.
10. PMUD Zone Agricultural activities.
11. R-95 Zone Farm and agricultural activities.
12. VC Zone Farm market.

OTHER PLANS AND PLANNING AREAS

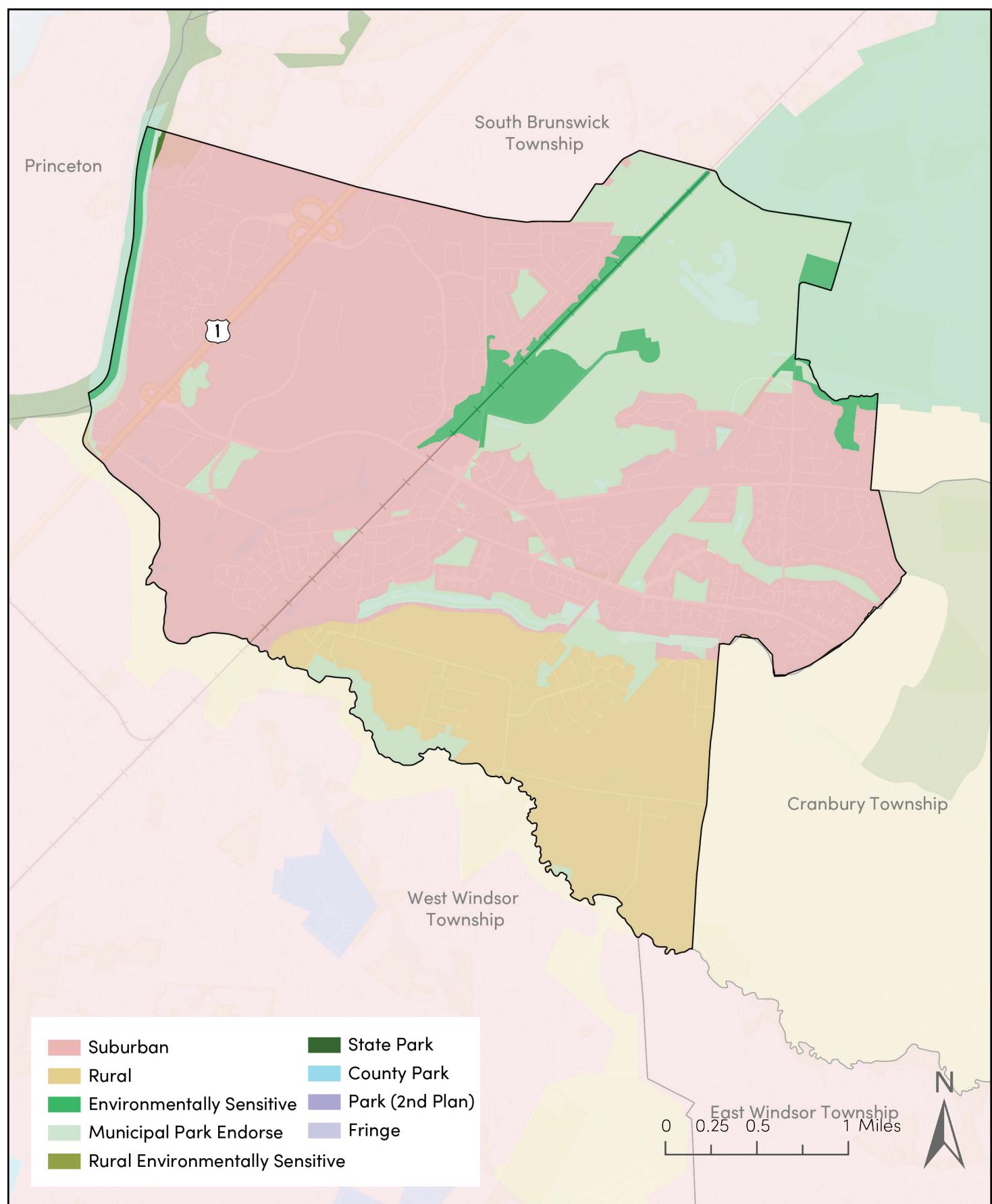
NEW JERSEY STATE DEVELOPMENT AND REDEVELOPMENT PLAN

The most recent New Jersey State Development and Redevelopment Plan (the State Plan) was adopted on March 1, 2001. The Township received State Plan Endorsement on January 18, 2006, from the State Planning Commission.

Despite sporadic efforts to be revived, the State Plan has largely remained dormant for years, making obsolete many of the incentives and oversight of municipal land use. Because of this limited applicability, Plainsboro Township allowed its plan endorsement to expire. However, the Township's Master Plan and zoning remain consistent with the State Plan. The Township may pursue endorsement in the future if the State Plan is updated or revived, and there are meaningful incentives to doing so.

The State Plan Policy Map identifies planning areas to encourage appropriate development throughout the state. These planning areas, in particular those considered Smart Growth and Environmentally Sensitive areas, still have relevance for some state-wide policies. The part of the Township to the north of Cranbury Brook and Plainsboro Pond is predominantly within the Suburban Planning Area (PA 2), one of the Smart Growth areas considered to have capacity to support development. The part of the Township to the south of Cranbury Brook and Plainsboro Pond is predominantly within the Rural Planning Area (PA 4), which is typically comprised of contiguous agricultural and open space with some development in Centers. Many of the areas identified as public and private open space and parks in the Township Land Use Plan map are considered Environmentally Sensitive Planning Areas or Parks & Natural Areas on the State Plan Policy Map ([Map 3](#)).

Map 3. State Plan Policy Map



REDEVELOPMENT PLANS

Amended Redevelopment Plan for The Princeton Healthcare System at Plainsboro Site

The Township adopted a resolution designating Block 1701, Lots 3 & 4, Block 1703, Lots 1, 2 & 3, and Block 1704, Lot 1 as an area in need of redevelopment on September 10, 2007. The Township subsequently adopted the “Redevelopment Plan for FMC Corporation Site” on January 23, 2008. On December 12, 2012, the Township amended the redevelopment area to add Block 1701, Lots 1 & 2 (known as the “Crescent Parcel”). The combined 170-acre area in need of redevelopment is now known as the “Princeton HealthCare System at Plainsboro Site.”

The Amended Redevelopment Plan for the Princeton HealthCare System at Plainsboro Site⁴, which was adopted on March 13, 2013, creates eight “separate but interrelated districts within the Redevelopment Area.” Three districts were substantially complete at the time the amended plan was adopted, including the Hospital Medical Office Complex (HMOC), Skilled Nursing Facility (SNF), and Public Park (PP). Five districts were yet to be undertaken, including the Pediatric Medical Office (PMO), Day Care Complex (DCC), Adult Retirement Community (ARC), Office/Residential Complex (ORC), and Hospital Auxiliary District (HAD). Permitted uses and bulk standards for each district are detailed within the Amended Redevelopment Plan of 2013.

The full Redevelopment Plan can be found on the [Plainsboro Township website](https://www.plainsboronj.com/DocumentCenter/View/66/Amended-Redevelopment-Plan-).

Dey Road Redevelopment Plan

The Township adopted a resolution designating Block 1304, Lots 1.02 and 1.03 as a Non-Condemnation Area in Need of Redevelopment on July 8, 2020. The Dey Road Redevelopment Area comprises roughly 20 acres and is located at 52-54 Dey Road. The Dey Road Redevelopment Area Plan was adopted on October 14, 2020. The plan “seeks to provide a variety of age-restricted housing types.” Permitted uses and development standards are detailed within the Dey Road Redevelopment Area Plan.⁵

The full Redevelopment Plan can be found on the [Plainsboro Township website](https://www.plainsboronj.com/DocumentCenter/View/10945/Dey-Road-Redevelopment-Area-Plan-).

4. Amended Redevelopment Plan for the Princeton HealthCare System at Plainsboro Site <<https://www.plainsboronj.com/DocumentCenter/View/66/Amended-Redevelopment-Plan->>

5. Dey Road Redevelopment Area Plan <<https://www.plainsboronj.com/DocumentCenter/View/10945/Dey-Road-Redevelopment-Area-Plan->>

PLANNED DEVELOPMENT AREAS

The Planned Development Areas are fully supported in the Master Plan. They encourage innovative land use planning while protecting the health, welfare, and general well-being of resident, visitors, and workers within both areas.

PCD Planned Unit Development

In the PCD zone, the following uses will be permitted:

- All uses permitted in R-200 Low-Density Zone
- Agricultural uses
- Recreational and cultural facilities
- Places of worship, facilities for social and civic clubs
- Public buildings
- Schools and other community facilities
- Retail commercial centers, limited to uses permitted in the Town Center Zone
- Office, research, and light industrial uses permitted in the OB-1 Zone and the I-100 Zone
- Childcare centers
- Family day care homes
- Home occupations and professional offices
- Residential
- Necessary public utilities and services

The minimum land area for a PCD development must be 250 contiguous acres. A reasonable mix of units must be provided including single-family dwellings, patio homes, semi-detached and two-family dwellings, townhouses, and multi-family units. The minimum total area to be developed must be 50 contiguous acres with 25% devoted to common open space. The dwelling unit density is 2.5 dwelling units per acre. The minimum frontage is 300 feet and the maximum building height 35 feet. The maximum improvement coverage is 40%. This zone totals 950.15 acres.

Not more than five (5) percent of the land area within a PCD Zone can be devoted to retail commercial centers and not more than thirty (30) percent of the land area can be devoted to office, research, and light industrial uses. The zone includes the Princeton Meadows Neighborhood Shopping Center, an adjacent bank, and office and research uses. It is recommended that the shopping center be upgraded to reflect many of the design qualities that now exist in the Village Center, i.e., signage, landscaping, and building materials.

This zone has over the years received approval for thousands of dwelling units of all types, including garden apartments, townhouses, and single-family homes, as well as a supporting commercial center and a substantial amount of office, research, and flex development space.

PMUD Planned Unit Development

In the PMUD zone, the following uses should be permitted:

- Dwelling units in detached, semi-detached, attached, groups of attached or clustered structures, or any combination thereof
- Mixed-use multiple dwellings
- Integrated mixed-use neighborhood development
- Recreational and cultural facilities, including but not limited to, golf courses, clubhouses and swimming pools
- Planned Retirement Community
- Common open space
- Childcare centers
- Family day care homes
- Home occupations and professional offices
- Agricultural uses
- Public buildings, public schools and private schools
- Places of worship and other community facilities
- Office, research and industrial uses permitted in the I-100 zone
- General educational and research activities
- Business and commercial uses permitted in the GB and OB-1 zones
- An indoor motion picture theater and a hotel or motel and related facilities, including but not limited to a conference center auxiliary to the hotel or motel use
- Necessary public utilities and services

In March 2020, the Township adopted a “use location map” to guide where within the PMUD zone the above-listed permitted uses should be located to complete the build-out of the zone consistent with sound planning and the development of supportive infrastructure.

This PMUD Zone totals 1,800± acres. It is recommended that the minimum land area for a planned unit development in the PMUD Zone be 100 contiguous acres.

In 1995, the Planning Board approved the Windrow at Princeton Forrestal full-service retirement community development consisting of a skilled nursing facility with 180 beds, 83 assisted-living units, 192 independent living units, 101 age-restricted villa units, a common building, a community medical center and related support facilities.

The Princeton Forrestal Center General Development Plan permitted the former Holiday Inn site together with Block 3, Lot 7 (approximately 3.7 acres in size) and part of Block 3, Lot 1.22 (approximately 4 acres in size) to be developed for a total of 300 hotel rooms in one or two lodging facilities, which could include restaurant and conference facilities, and a free-standing restaurant of not more than 10,000 square feet. In fact, this area has been developed into a 157-room Marriott Courtyard Hotel and a new 143-room Homewood Suites Hilton Hotel.

An existing 14-acre site has been added to the PMUD zone. It is known as Block 5.02, Lot 11Q and 59 and is located on the border of the Township with South Brunswick Township. Vehicular access is and will be provided from Schalks Crossing Road and from within the Princeton Forrestal Center. A theoretical maximum of 150,000 square feet of new office and research use could develop on the property subject to Planning Board review and approval. The intent of this land use change was to make it more consistent with the existing PMUD zoning of the Princeton Forrestal Center and the adjacent non-residential office and research zoning in South Brunswick Township. The site will be fully integrated into the Princeton Forrestal Center with regard to all aspects of traffic and pedestrian circulation, utilities, building design and architecture and on-site amenities including landscaping and signage. In 2002, a developer known as CRA II secured Planning Board approval to construct 150,000 square feet of office/research consisting of one (1) single story building (75,000 square feet) and one (1) four story building (75,000 square feet).

The property known as the Princeton Nurseries (Nurseries) is located between U.S. Route 1 to the east and the Delaware & Raritan (D&R) Canal to the west, and between the township border with South Brunswick Township to the north and College Road West and Seminary Drive to the south. Originally the property contained approximately 164 acres of land. The western-most portion, which contains approximately 55 acres, has been developed with 220 multifamily rental units (Barclay Square at Princeton Forrestal) and one single family home, at a maximum gross residential density of 4 dwelling units per acre. Approximately 31 of the 55 acres includes land located west of Mapleton Road that has been preserved as open space; approximately 24.5 acres of which is under the control of the New Jersey Green Acres program. In 2002, in addition to approving this residential development and preserved open space, the Planning Board approved the realignment of Mapleton Road and Seminary Drive, and the construction of off-tract multiuse pathways to the Forrestal Village and the D&R Canal.

The balance of the Nurseries property referenced above contains approximately 109 acres. Under the 1999 General Development Plan (GDP), this portion of the property was designated for up to two million square feet of non-residential development, including up to 100,000 square feet for retail and commercial uses. The only improvements on the property today include a partially completed roadway (Nursery Road) that extends from the intersection of College Road West and Seminary Drive north to the South Brunswick border, and stormwater management facilities designed to accommodate future non-residential development of the property. This site would be an ideal location for an integrated mixed-use neighborhood development to provide a mix of residential, retail, office, hotel and related commercial uses.

On-going major issues in the PMUD Zone include the revitalization of the Forrestal Village shopping center by introducing a new mix of retail and commercial uses, as well as approval of a street/pedestrian oriented multiple dwelling development of 394 units in three and four story buildings; replacing and improving signage; the construction of additional outdoor recreational facilities; the construction of earthen berms between Route 1 and Princeton Landing to mitigate the noise effects of Route 1 improvements; the future planned construction of a Route 1 off-ramp through the State Police Barracks site; and realignment of College Road West and Seminary Drive, along with a new road (Nursery Road) extending from the new Seminary Drive/College Road West intersection north into the Princeton

Nurseries property. More recent additions to the Village now include the Salt Creek Grille pad site restaurant, Ruth Chris pad site restaurant, and the Eden Autism Services facility.

The Campus Road project consists of the creation of the right-of-way for a road to access campus parcels from Scudders Mill Road. This road has been identified and included in this Master Plan; but, in light of the defunding of the Route 92 project, may need to be re-examined based upon current traffic data. To the north, the right-of-way follows the Bristol-Myers Squibb property line and an existing tree line at the northernmost end. The southern portion of the road alignment was chosen so that the road would share an intersection with the proposed Connector Road (recently renamed as Campus Road) from Plainsboro Road.

At its intersection with Scudders Mill Road, the access road has a 100 feet right-of-way, accommodating four travel lanes with a landscaped median and turning lanes. At approximately 500 feet north of this intersection with Scudders Mill Road, a four-way intersection is planned, allowing access to parcels both east and west of the roadway. After this point, the roadway begins to taper to a 40 feet cartway (66 feet right-of-way), which remains for the rest of its length. Traffic volumes indicate the need for only two travel lanes, with the additional right-of-way width to provide for turning movements. The 66 feet right-of-way would allow for expansion to four travel lanes if deemed necessary at some point in the future. The road specifications will meet the criteria for a public road in anticipation of possible dedication sometime in the future.

As noted above, the $109\pm$ acre undeveloped portion of the Nurseries property was designated in the 1999 GDP for a substantial amount of non-residential development; however, due to the persistent lack of demand for large scale office development and the high office vacancy rate in the local real estate market, the Trustees of Princeton University, the owner of the property, have proposed an integrated mixed-use neighborhood development. The Planning Board concludes that mixed-use development of the site will provide new retail and entertainment opportunities to Township residents, provide new housing options, and enhance the economic viability of the Princeton Forrestal Center that is necessary to retain and attract high quality corporations and businesses and the type of employment talent needed for the Princeton Forrestal Center to remain competitive in the regional marketplace.

The development of the Nurseries property should include mixed-use development containing residential and non-residential uses within a walkable, amenity-rich environment that includes an abundance of open space, pedestrian amenities (e.g., walkways and streetscape improvements), and building and site improvements that create a distinctive, pedestrian-oriented environment; one that's not currently found in the region.

In an effort to integrate this development into the surrounding community (both Plainsboro and South Brunswick), it is recommended that a minimum of two roadway connections be provided into the development from existing township roadways, and that two connections from the development into planned development areas to the north in South Brunswick be provided; one connection being an extension of a major roadway in the Nurseries development into South Brunswick, and the second connection being either a roadway or a pedestrian/bikeway connection, depending on the compatibility of planned uses immediately north in South Brunswick relative to the planned uses in the Nurseries in Plainsboro (e.g., residential to residential).

PMUD Zone Generally:

In view of the history of the PMUD Zone and its development as a planned multi-use development district, the zone was amended to incorporate a Floor Area Ratio (FAR) restrictions into the zone regulations consistent with prior GDP policies pertaining to its development (e.g., overall average 0.25 FAR for non-residential development east of US Route 1).

Within the PMUD Zone, for each acre of land devoted to a residential use, at least seven acres must be devoted to non-residential uses, excluding common open space. It is recommended that in view of their unique nature, any retirement community, mixed-use multiple dwelling development, or integrated mixed-use neighborhood development should be exempt from this requirement.

There must be an average of not more than eight (8) dwelling units per acre of land devoted to residential use; unless the development involves mixed-use multiple dwellings at the Princeton Forrestal Village (PFV), in which case the density shall not exceed seven (7) dwelling units per acre of land associated with the PFV. In view of its unique nature, a Planned Retirement Community should not be deemed either a residential use or a non-residential use for the purpose of this requirement. In a retirement community, only age-restricted units shall be deemed dwelling units.

There must also be a set aside for common open space not less than one (1) acre of land for every eight (8) dwelling units. In view of the unique nature of mixed-use multiple dwellings at the PFV and the anticipated future integrated mixed-use neighborhood development at the Princeton Nurseries, such uses should not be deemed either a residential use or a non-residential use for the purpose of this requirement. There must be a set aside for common open space not less than 3 acres of land for every 10 acres of land devoted to office, research, industrial uses and/or educational-research uses, and/or business and commercial uses. The location of common open space should be consistent with its declared function. In view of the unique nature of integrated mixed-use neighborhood development, the non-residential component of such development should not be subject to this requirement.

There should be a set aside for common space not less than three (3) acres of land for every ten (10) acres of land devoted to independent living units, assisted living units and nursing care units within a Retirement Community and not less than one (1) acre of land for every (8) age-restricted units. This provision should not apply to age-restricted residential development within an integrated mixed-use neighborhood development.

The height of any residential building cannot exceed 35 feet, unless the development involves mixed use multiple dwellings at the PFV, in which case the building height shall not exceed four (4) stories or sixty (60) feet, whichever is less. The height of any other building cannot exceed 60 feet. In a Planned Retirement Community, a building containing nursing care units may have a height not exceeding 40 feet and a building containing assisted living units and/or independent living units may have a height not exceeding 60 feet.

Integrated Mixed-Use Neighborhood Development:

To achieve the vision for an integrated mixed-use neighborhood development, while at the same time maintaining flexibility, it is recommended that any changes to the PMUD zoning regulations to allow such development to incorporate maximum square footage limitations for the various permitted non-residential uses in the development (e.g., maximum floor areas for retail, office, and hotel). Similarly, for residential uses, consideration should be given to incorporating restrictions on the number and type of residential uses permitted in such a development (e.g., maximum number of age-restricted and non-age-restricted dwelling units).

In addition, it is recommended that the general height restrictions for the PMUD Zone not apply; rather consideration should be given to incorporating building height restrictions in the PMUD Zone regulations that are tailored to the specific types of residential and non-residential buildings permitted in such a development.

Common open space is an especially critical element in such a development, in that its form should be varied (e.g., from large conservation area to mixed use district pocket park) and it should be integrated into the mix of residential and non-residential uses that characterize the development. Any amendments to PMUD zoning regulations to allow such development should include minimum overall common open space requirements, minimum area or size of common open space features, accessibility from adjoining uses, and requiring various forms of open space (e.g., centralized civic space, neighborhood parks, pocket parks, linear parks, and conservation areas). Stormwater management facilities should not be considered common open space unless they are designed as an integral element of the overall open space landscape design.

Due to the interrelated nature of the uses within an integrated mixed-use neighborhood development, the build-out of such a development should take place in a coordinated fashion, and any changes to the PMUD zoning regulations to allow such a development should include a phasing requirement, whereby portions of both the residential and non-residential uses are developed concurrently.

VILLAGE AREA PLAN

As part of the 1998 Master Plan Review, the Planning Board identified the need to evaluate the Township's Village Area in a comprehensive fashion. The general purpose of this review was to see that future plans for the Village Area would ensure that the existing character of the Village was protected and enhanced, and that future development would evolve in a manner consistent with agreed upon Village Design Principles.

Since the adoption of the Village Area Plan in 1999, three sites identified in the plan were rezoned to provide residential (Village Residential 1 and Village Residential 2 Zones) and mixed-use development (Village Center Zone) consistent with the village design principles in the plan. Among the noteworthy features of the new residential zones in the plan were their compact nature, with many of the homes having usable front porches or stoops, sidewalks throughout that connect to the areawide network, and a central park element serving the neighborhood. Similarly, the Village Center is a compact pedestrian-oriented environment

containing a mix of uses including residential (single family, townhouse, and multifamily) and nonresidential uses (retail shops, restaurant, office, Township Library), with sidewalks throughout connected to the areawide network, and a central park element (Market Square) upon which the VC is focused.

The remainder of The Village Area is identified as the central portion of the Township bounded by Scudders Mill Road to the north, the Amtrak railroad tracks to the west, the Cranbury Brook to the south, and the Enterprise Business Center and Centers Drive to the east. In 2004, the historic R-85 Zone in the Village Area was amended to incorporate some of the Village Design Principles, including roof slope restrictions, reduced from setbacks, provision to encourage open and usable front porches and stoops.

It is recommended that the Township investigate opportunities to allow additional development in this area, particularly in areas abutting the Village Center Zone, to include more mixed-use development and supportive residential development.

ST JOSEPH'S SEMINARY DEVELOPMENT AREA

The St. Joseph Seminary Development Area is an area which, because of its unique characteristics, including its existing buildings, site/landscape features, location and land uses, justifies creating a special land use development area that is designed to preserve and protect the unique qualities specific to this area.

The St. Joseph Seminary property at 75 Mapleton Road contains approximately 45 acres of land and has been owned and operated since 1914 by the Eastern Province of the Congregation of St. Vincent DePaul. A proposal was made in 2008 to utilize and substantially preserve the existing buildings and property in association with a proposed non-profit educational and cultural arts use and non-profit cemetery use.

The property is primarily characterized by a series of connected buildings formerly used by the seminary for various purposes. On the premises there are also accessory freestanding buildings including a gymnasium, a maintenance building and a caretaker's house. A small cemetery along the eastern portion of the property has been used by the religious order that has owned and occupied the property for nearly a 100 years.

The proposal that was presented to the Township involved utilizing approximately 33 acres of the property for a non-profit educational and cultural arts institution, and approximately 12 acres for a non-profit cemetery. The educational/cultural arts use would utilize the existing buildings on the property, along with parking, recreational facilities, care takers house, and open space. The proposed cemetery use would utilize the balance of the property, including the Seminary's existing cemetery, and the chapel on the property.

With the preservation of the existing buildings and the overall character of the property viewed as the principal goal that should guide the future development of this property, it was decided that a set of new zoning regulations was in order.

Given the educational and cultural arts uses contemplated for the majority of the property versus the cemetery use for the remaining portion, it was determined that utilizing two separate zone districts specifically designed to attend to the unique attributes of these two

distinct uses would be the most appropriate approach. Appropriate bulk restrictions and design and development standards were developed to ensure that both uses of the property are handled in a manner that protects the integrity of the existing property and its buildings.

The design and development standards that were incorporated into the educational/cultural arts use (Educational and Cultural Arts (ECA) Zone) include standards that relate to: A) possible future building expansion, both in terms of location and architectural design relative to the existing buildings; B) the type of materials and design elements (e.g., roof slopes) appropriate to future building expansion and various accessory site improvements; C) the preservation of the “Great Lawn” area between the existing seminary buildings and Mapleton Road; D) the location and treatment of parking areas, including vehicular and pedestrian circulation elements; and E) landscaping improvements intended to enhance and integrate future building and site improvements into an overall design concept for the property, including additional in-fill landscaping along the perimeter of the property, to further buffer adjacent residential properties as appropriate.

Unlike the zoning regulations for the education/cultural arts use, the “New Jersey Cemetery Act, 2003” (Act) does not permit cemetery zone regulations to contain the level of design and development controls contemplated for the educational/cultural arts use. Consistent with the Act, the Cemetery Zone was to include restrictions that limit the height and setback of mausoleum and other cemetery structures, and provide for reasonable parking standards.

The Act places local authority to approve a plan of cemetery development with the local governing body. As a result, it was recommended that the Township Committee require the cemetery operator to meet a number of requirements, together with such other conditions as was deemed appropriate. Those requirements were addressed in a document entitled “Princeton Abbey and Cemetery Master Plan” which was adopted by the Township Committee in May 2015.

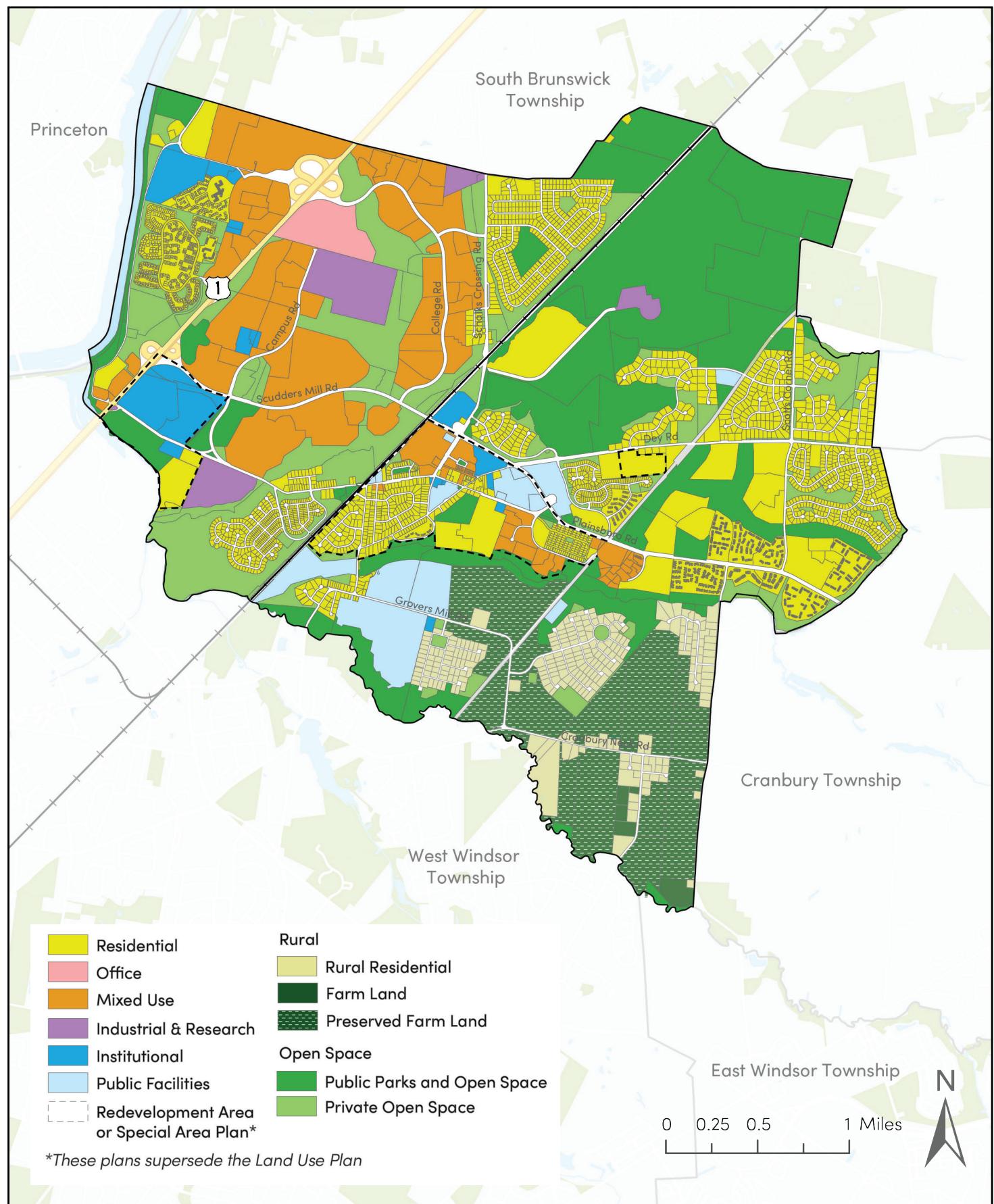
LAND USE PLAN & CATEGORIES

The major proposed land use categories are discussed below. The Land Use Plan map ([Map 4](#)) shows the major land use patterns and development proposals, but without the supportive features, such as local roads or recreation and other public facilities.

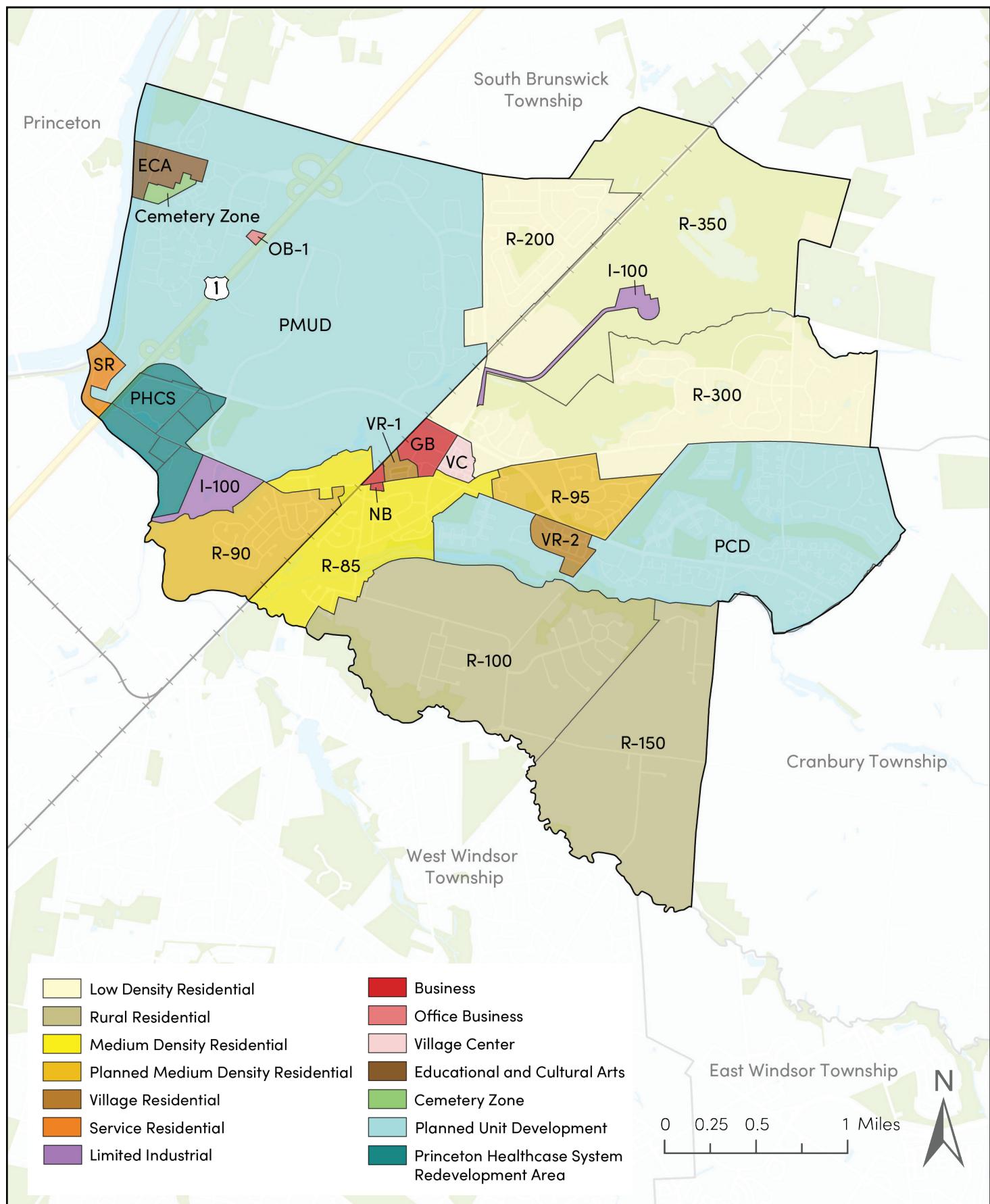
Table 2. Land Use Map Categories

Land Use	Acres	Percentage
Public Parks and Open Space	1,711.5	24%
Residential	1,636.7	23%
Mixed Use	1,003.4	14%
Private Open Space	966.2	14%
Preserved Farm Land	687.4	10%
Rural Residential	318.8	5%
Public Facilities	267.5	4%
Institutional	201.5	3%
Research and Limited Industrial	164.5	2%
Office	79.5	1%
Farm Land	30.8	0.4%
Total	7,067.9	100%

Map 4. Land Use Plan Map



Map 5. Zoning Map



CLIMATE CHANGE-RELATED HAZARD VULNERABILITY ASSESSMENT (CCRHVA)

Recognizing the increasing impact of climate change on New Jersey, and the important role that local land use policies can play in helping to mitigate the impacts of climate change-related hazards, the New Jersey Municipal Land Use Law (MLUL) was amended to require a Climate Change-Related Hazard Vulnerability Assessment (CCRHVA) be incorporated into the Land Use Plan Element.

The MLUL specifically requires the CCRHVA to include the following components:

1. Analyze current and future threats to, and vulnerabilities of, the municipality associated with climate change-related natural hazards
2. Include a build-out analysis of future residential, commercial, industrial, and other development in the municipality, and an assessment of the threats and vulnerabilities identified above related to that development;
3. Identify critical facilities, utilities, roadways, and other infrastructure that is necessary for evacuation purposes and sustaining quality of life during a natural disaster, to be maintained at all times in an operational state;
4. Analyze the potential impact of natural hazards on relevant components and elements of the master plan;
5. Provide strategies and design standards that may be implemented to reduce or avoid risks associated with natural hazards;
6. Include a specific policy statement on the consistency, coordination, and integration of the climate-change related hazard vulnerability assessment with certain other plans adopted by the municipality; and
7. Rely on the most recent natural hazard projections and best available science provided by the New Jersey DEP.

A section was dedicated to each of the first six requirements. These largely follow the order presented above, with the exception of the build-out analysis being completed after critical facilities and infrastructure were identified. The final requirement to rely on the best available science was incorporated throughout the CCRHVA and therefore does not have a standalone section.

In conjunction with the preparation and adoption of the current Master Plan Reexamination Report, the Plainsboro Township Planning Board has prepared a new Land Use Plan Element of the Township's Master Plan. Accordingly, and pursuant to the new statutory requirements, the following CCRHVA is hereby incorporated as part of the Township's new Land Use Plan Element.

KEY FINDINGS

Plainsboro Township has already done much to promote a land use pattern that is resilient to climate change. By adopting the recommended strategies and design standards presented herein, the Township can build on this sustainable planning foundation and continue to implement land use regulatory policies that encourage development and redevelopment that is resilient to the impacts of climate change-related natural hazards, minimize loss due to natural hazards, and sustain the quality of life in the community.

CLIMATE CHANGE-RELATED NATURAL HAZARDS

Flooding, increased temperatures, drought, air pollution, and extreme weather events such as hurricanes and tornadoes are natural hazards that are anticipated to increase in frequency or severity due to the impacts of climate change according to the 2020 New Jersey Scientific Report on Climate Change. While the Township has undertaken meaningful land use policy initiatives to mitigate the effects of climate change, most notably by protecting over half of the municipality from development, the global nature of climate change means that the Township will still feel its effects.

Many of these adverse climate change impacts will be felt Township-wide. The dangers to people and property from an increased risk of flooding, by contrast, will be more geographically focused on certain areas of the Township. Within a land use context, flooding therefore demands particular emphasis. While the 100-year floodplain has traditionally been used as the standard for land use decisions, the Township may have to increase its resiliency to flood events by recognizing the 500-year floodplain as a more appropriate indicator of risk which requires further analysis.

CRITICAL FACILITIES AND INFRASTRUCTURE

A total of twenty-eight public and private community facilities, including the municipal building, public library, hospital, among others, provides a variety of services and support to Township residents. Reflecting the well-informed siting of community facilities, only two are within a 100-year floodplain. This suggests that the Township's community facilities are largely resilient to the most severe threats of extreme flooding, which will allow the community to rely on these critical locations after a natural disaster. However, the Township should continue to take proactive measures to preempt major threats to health and safety, particularly at these two community facilities.

A few key components of infrastructure, namely roads and railroad tracks, fall within the 100-year or 500-year floodplains. During a major flooding event key roads may become temporarily unusable, dissecting the Township into three separate geographic areas. While dispersed throughout the Township, the heaviest concentration of community facilities is in the central section of the Township, which is also where the majority of the population lives. However, in the event of a major flood event, access to key services could be cut off from certain sections of the Township, namely emergency services to the southern and northwestern sections and the hospital to the central and southern sections.

BUILD-OUT ANALYSIS

The build-out analysis undertaken as part of the CCRHVA identified areas within the Township that have the potential to experience future development and which of those areas are at heightened risk of climate change-related natural hazards. Over half of the Township (51.4%) is protected from development as public or private open space, public facilities, or preserved farmland. A further 44.2% of the Township is developed with Institutional, Mixed Use, Office, Research and Limited Industrial, Residential, and Rural Residential uses. The approach of clustering relatively high-density development has been a successful strategy of the Township to help preserve the protected areas.

After accounting for the areas protected from development and areas that are already developed, 95.6% of the Township is either developed or protected from future development. The remaining 4.4%, covering 62 total parcels, is conversely identified as potentially developable. Only eight of these parcels intersect a flood hazard area. This suggests most of the remaining developable areas in the Township are relatively resilient against major flood events. In addition, the eight developable parcels that do intersect a floodplain are only partially covered by the flood hazard area, suggesting that there are still opportunities to pursue appropriate development.

ASSESSMENT OF THREATS AND VULNERABILITIES

Using the results of the analysis of climate change-related hazards affecting the Township, the review and assessment of critical facilities and infrastructure, and the build-out analysis, an assessment of threats and vulnerabilities was undertaken to inform Township land use planning decisions and policies. Based on the assessment of the climate change-related threats affecting Plainsboro and the Township's vulnerabilities to climate change it is concluded that:

1. Flooding resulting from future storm events is the primary climate change-related impact affecting the Township and the one that has the most direct and specific geo-spatial relationship to the Township's land use planning strategy.
2. The Township has done a good job in its prior planning efforts to create a resilient land use pattern in the Township. Accordingly, no significant changes are proposed to the comprehensive land use plan and zone plan of the Township.
3. The Township may need to review the distribution and availability of critical facilities and infrastructure to ensure that flooding does not isolate portions of the Township and that there is an appropriate distribution and redundancy to support the Township's quality of life and serve the needs of all segments of the community after a natural disaster.
4. The Township should implement the land use regulatory policies described in Strategies and Design Standards to ensure that new development and redevelopment is designed in a manner that promotes community resiliency.

IMPACT ON THE MASTER PLAN

The Township Planning Board may wish to consider updating as part of a comprehensive climate change planning strategy the following master plan elements:

- Circulation
- Community Facilities
- Open Space and Recreation
- Conservation
- Economic
- Historic
- Utility Service
- Recycling
- Housing and Fair Share Plan (when required to be updated in 2025)

Possible revisions or amendments to each of these plan elements are described in the relevant section that follows.

STRATEGIES AND DESIGN STANDARDS

To continue promoting land use policies that are resilient to the impacts of climate change-related natural hazards, it is recommended that the Township incorporate the following strategies and design standards:

1. Encourage the adaptive re-use and redevelopment of existing developments rather than significant new areas of development.
2. Prohibit development with large areas of impervious coverage or large building footprints/roofs such as big-box commercial and warehouse distribution facilities.
3. Continue to explore ways to encourage cluster development in both residential and non-residential developments, which the Township has effectively used to promote the preservation of open space and compact or clustered development.
4. Provide opportunities for more compact development, including mixed-use development, that reduces reliance on automobiles, creates walkable and bikeable communities, and promotes the use of alternative fuel sources.
5. Adopt development regulations to ensure that any new development and redevelopment incorporate sustainable and resilient site design, including:
 - » The use of green infrastructure techniques and best practices, such as rain gardens and natural drainage features, to manage stormwater runoff and quality
 - » Reviewing impervious coverage and parking standards and modify as necessary to reduce heat island impacts and stormwater runoff

- » Additional tree plantings and landscaping in parking lots to reduce heat island impacts and incorporate into an overall green infrastructure system
6. Evaluate whether to reduce permitted densities or limit infill development in 500-year flood hazard areas.
 7. Review all available sources of information on climate change and consider other strategies and approaches as may be appropriate and necessary to promote resilient development within the Township.

CONSISTENCY AND COORDINATION WITH OTHER PLANS

The MLUL requires a specific policy statement on the consistency, coordination, and integration of the CCRHVA with any existing or proposed natural hazard mitigation plan, floodplain management plan, comprehensive emergency management plan, emergency response plan, post-disaster recovery plan, or capital improvement plan. Plainsboro either has or is included in the following relevant plans:

- Plainsboro Emergency Operations Plan (EOP).
- Middlesex County Multi-Jurisdictional All-Hazards Mitigation Plan (County HMP), with specific reference to Appendix A-18: Township of Plainsboro.
- Plainsboro Municipal Stormwater Management Plan, revised through January 2007, and related ordinances including the Plainsboro Stormwater Management and Flood Damage Prevention Ordinances
- Plainsboro 2022 Capital Budget and Capital Improvement Plan (CIP)

A review of these plan documents indicates that the CCRHVA is generally consistent with each of them. Recommendations include:

- Continue to coordinate with the Plainsboro Office of Emergency Management in the maintenance and regular updating of both the EOP and Master Plan to address climate change-related hazards.
- Continue to coordinate with the County on the implementation of the hazard mitigation action strategy and plan maintenance process described in the County HMP and participate in updates of the plan.
- Update the current Plainsboro Municipal Stormwater Management Plan to include an assessment of the impact of climate change on the stormwater management strategy in the Township. The Township's Stormwater Management Ordinance and Flood Damage Protection Ordinances were recently adopted and no changes to these ordinances are recommended.
- No new capital projects related to climate change are currently proposed. However, the Township should continue to evaluate the potential impacts of climate change and consider including in the CIP any needed capital projects that improve the Township's resiliency to climate change-related hazards in the future.

CLIMATE CHANGE-RELATED NATURAL HAZARDS

The following are some of the anticipated climate change impacts that will affect the Township. The CCRHVA is included here as an important part of the Land Use Plan which recognizes the ever-increasing impact that climate change has and will continue to have on Township land use policy.

FLOODING

There are three types of flooding: coastal, fluvial (riverine), and pluvial (flash) flooding. While flooding is naturally occurring, each type of flooding is exacerbated by climate change.¹

Coastal Flooding

While coastal communities have always been vulnerable to coastal flooding, it has become more common and destructive due to sea level rise. Rising sea levels and increasing storm surge allows coastal waters to inflict damage that is more extensive and felt further inland. While coastal flooding is a major concern for many of New Jersey's municipalities, given its location, this type of flooding does not directly affect Plainsboro Township. However, coastal storms could cause local flooding, downed trees and limbs, and power outages.

Fluvial Flooding

Fluvial, or riverine, flooding occurs when rain causes rivers and streams to exceed their typical channels. Waterbodies are prominent features throughout the Township, comprising 260 total acres (0.4 square miles). Communities depend on these types of waterbodies for irrigation, sewer service, drinking water, recreation, and travel. However, as increasingly extreme weather events cause larger amounts of precipitation to fall, particularly in a short period of time, the ability of rivers, streams, and wetlands to absorb stormwater can become overwhelmed. The resulting fluvial flooding sends water into areas not typically designed to handle its flow, which can cause major damage to infrastructure and the built environment. According to the 2020 New Jersey Scientific Report of Climate Change, precipitation increased by 10% between 1895 and 2011.² Additionally, between 1958 and 2010, the Northeast received more than a 70% increase in the amount of precipitation falling during "very heavy events," or the heaviest 1% of all daily events.³ Precipitation in Middlesex County is forecasted to increase a further 33% by 2100.⁴

Carnegie Lake, an impounded portion of the Millstone River and the Delaware and Raritan Canal, serves as the Township's western boundary. Plainsboro Pond and the Walker Gordon Pond can be found along Cranbury Brook and Devils Brook, respectively. The manmade

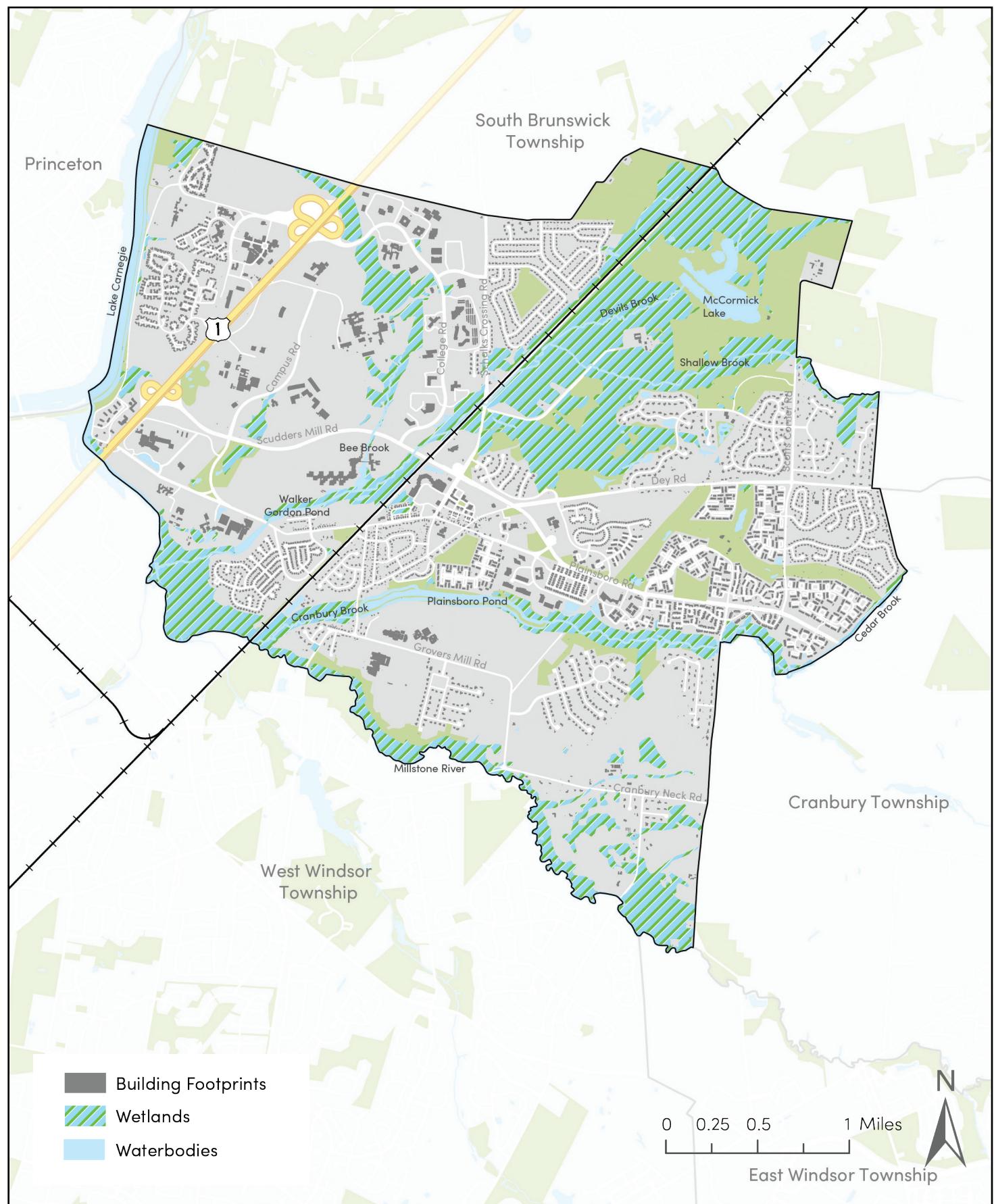
1. *Infrastructure Report / Climate Snapshots* <<https://climatesnapshots.rutgers.edu/1218/infrastructure/>>

2. *NJDEP / 2020 Scientific Report on Climate Change* <<https://www.nj.gov/dep/climatechange/docs/nj-scientific-report-2020.pdf>>

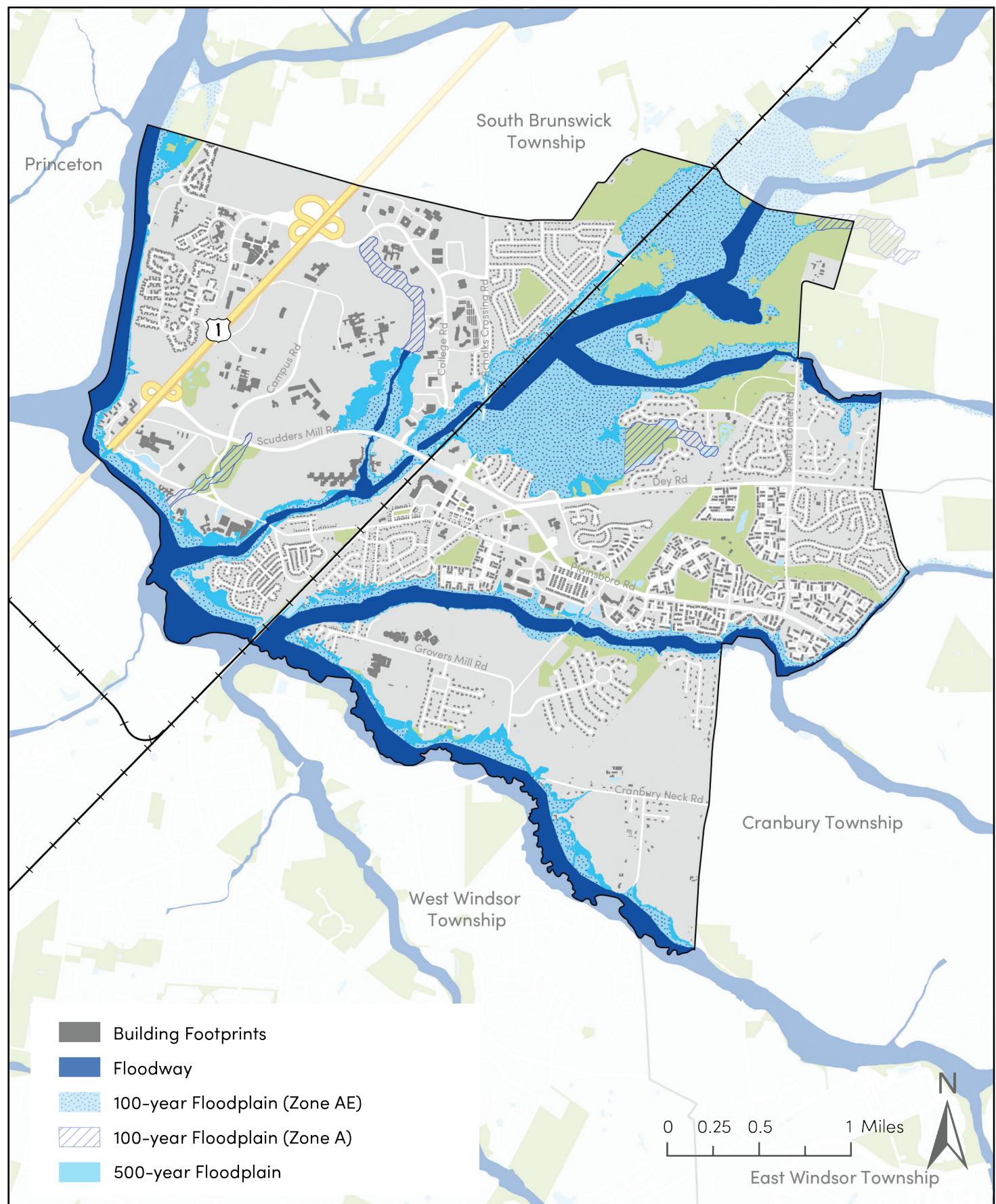
3. *NJDEP / 2020 Scientific Report on Climate Change*

4. *nj-rainfall-studies-summary.pdf* <<https://www.nj.gov/dep/dsr/publications/nj-rainfall-studies-summary.pdf>>

Map 6. Water Bodies



Map 7. Flood Hazard Areas, 100-year and 500-year Floodplains



McCormack Lake is located within the Plainsboro Preserve. The Township's floodplains are located along the Millstone River, the Delaware and Raritan Canal, and various other waterbodies which traverse the community. Wetlands, which serve as natural filtration systems that filter out pollutants and silt-laden water before entering streams and lakes, are also home to many species of fish and birds. Wetlands are critical for an area's ecological health. They extend from these waterbodies and comprise a further 1,435 acres (2.24 square miles) of the Township. Flooding is in part controlled by wetlands which act as storage basins for water.

Flood Hazard Areas, represented by areas determined to have a 1% chance of flooding annually (also known as the 100-year floodplain), delineate areas most at risk for fluvial flooding. As shown in [Map 7](#), flood hazard areas cover a wide swath extending from the Township's waterbodies and wetlands. Most of the Township's developed areas fall outside of the 100-year floodplain. This has allowed for natural buffers to protect the built environment from the impacts of this level of flooding.

Regulating development near waterbodies in Plainsboro typically has used the 100-year floodplain as a reference point, in addition to the New Jersey Flood Hazard Limit Line and the Delaware and Raritan Canal Commission Buffer. However, as fluvial (and coastal) flooding becomes more extreme, there is growing evidence to suggest that the real probability of a flood occurring in a given year in the 100-year floodplain is actually greater than 1%. This suggests that it will be increasingly prudent to base land use decisions on modelling that reflects more extreme flooding possibilities. The 500-year floodplain, the area determined to have a 0.2% chance of flooding in a given year according to current modeling may be more appropriate indicators to influence decisions regarding land development. Note that the 500-year floodplain encompasses the area denoted as the 100-year floodplain.

Additionally, there are other non-regulatory sources of data and mapping, such as the 100-year floodplain plus three feet in added flooding generated by the Federal Emergency Management Agency (FEMA), that could be used by the Township for future planning purposes. Such sources should be monitored and evaluated for their usefulness and possible application in the Township's resiliency planning on an ongoing basis.

[Map 8](#) shows the location of buildings that fall within flood hazard areas. Thirty-eight (38) buildings are within the 100-year floodplain. Note that these buildings were determined using an impervious coverage layer from 2015, the most recent publicly available data produced by the New Jersey Department of Environmental Protection. Buildings constructed since then, including development at the Place at Plainsboro Apartments and the Icon Riverwalk, are therefore not reflected in this analysis. When considering the 500-year floodplain, an additional 73 buildings are identified as being at risk for flooding. Note that the 500-year floodplain encompasses the 100-year floodplain, so there is a total of 111 buildings within the 500-year floodplain. The significant increase in the number of buildings considered to be at risk when the flood hazard area expands to include the 500-year floodplain identifies the increasing risks to properties caused by climate change-related hazards if flooding impacts occur more frequently and are more intense.

[Table 3](#) shows the types of buildings that fall within the 100-year and 500-year floodplains. This was determined by overlaying the impervious surface coverage provided by the New

Jersey Department of Environmental Protection with property classification identified within MOD-IV data provided by the New Jersey Division of Taxation. Note that a small number of buildings covered multiple property classification areas.

Purely residential properties comprise 11 of the buildings within the 100-year floodplain and an additional 36 buildings when expanding to the 500-year floodplain. This is the property classification that is most affected by flood hazard areas followed by commercial and other exempt (real property exempt from taxation that does fit within other property classifications⁵).

Table 3. Property Classification of Buildings Within 100-year and 500-year Floodplains

Property Classification	# Buildings in 100-year Floodplain	# Buildings in 500-year Floodplain but outside of 100-year Floodplain	# Buildings in 500-year Floodplain
Residential	11	36	47
Farm	3	4	7
Commercial	10	11	21
Industrial	0	1	1
Public	4	1	5
Church and Charitable	1	1	2
Other Exempt	6	12	18
Multiple Property Classes (All Non-Residential)	2	4	6
Multiple Property Classes (Some Residential)	1	3	4
Total Buildings	38	73	111

Source: New Jersey Division of Taxation and New Jersey Department of Environmental Protection

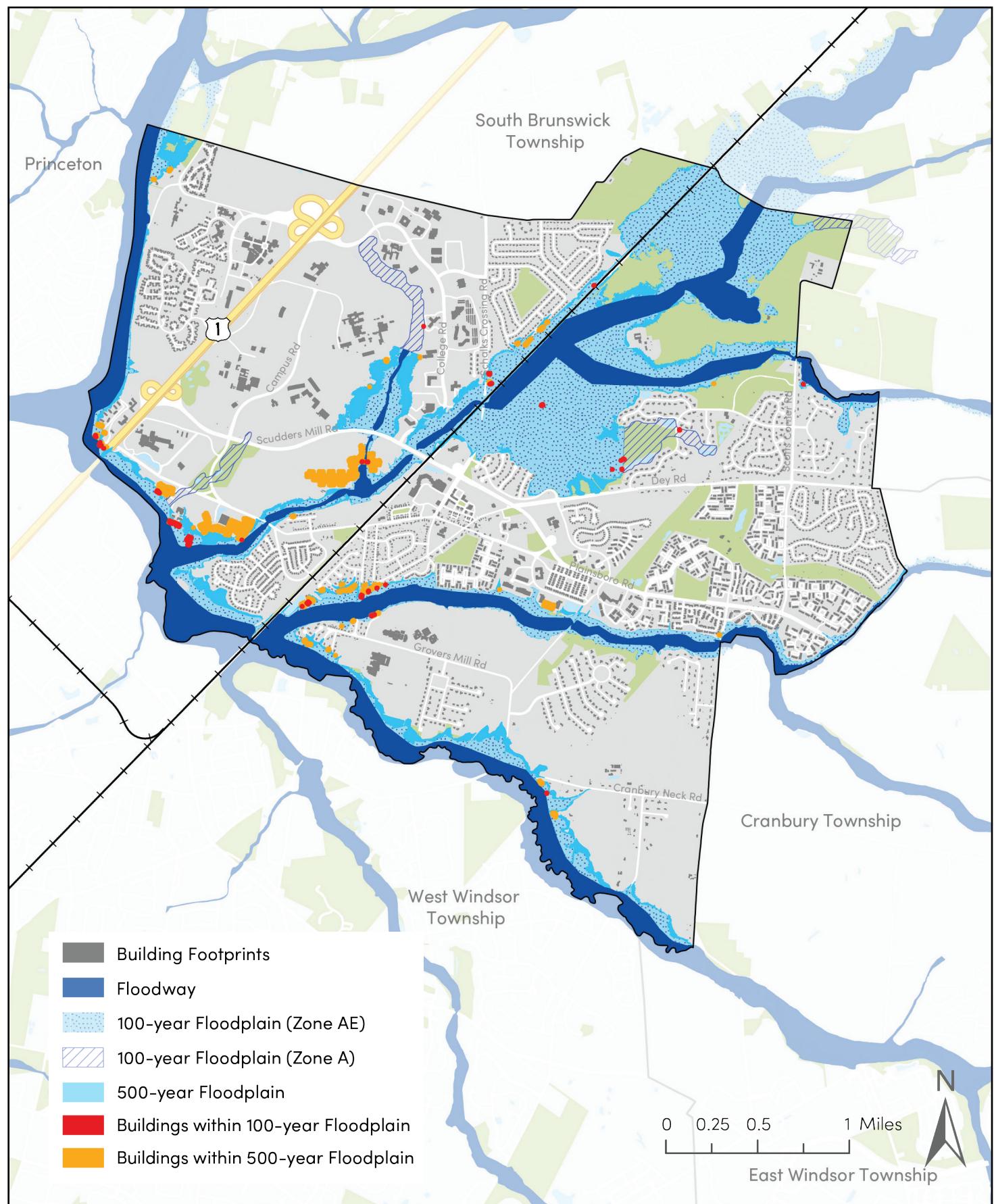
Flash Flooding

In contrast to coastal and fluvial flooding, flash, or pluvial, flooding is not associated with an existing waterbody or wetland area. Instead, flash flooding occurs when a heavy rainfall overwhelms an area's ability to manage stormwater runoff that typically occurs over a short period of time.

Undeveloped areas naturally absorb stormwater. Water filters into the ground where it soaks into the roots of trees and plants or recharges underground aquifers. If the amount of water exceeds what can be absorbed into the ground, it will follow gravity along the topographic contours within a given watershed or sub-watershed, eventually leading to a body of water.

5. Section 18:12-2.2 - *Property classifications with definitions*, N.J. Admin. Code § 18:12-2.2 <<https://casetext.com/regulation/new-jersey-administrative-code/title-18-treasury-taxation/chapter-12-local-property-tax-general/subchapter-2-preparation-of-local-property-tax-list-and-duplicate/section-1812-22-property-classifications-with-definitions>>

Map 8. Buildings Within Flood Hazard Areas



Human development typically impedes the natural absorption of stormwater. Buildings, roads, driveways, and parking lots are impervious surfaces that interrupt the natural movement of stormwater. The runoff from these impervious surfaces is redirected to surrounding areas, which will be overwhelmed if the capacity of the soil to absorb water (permeability) is exceeded. The Township is covered by 2.74 square miles of impervious surface, accounting for 22.6% of the total area. This broadly suggests that development has replaced roughly a quarter of the Township's ability to naturally manage stormwater. Buildings alone account for a total of 0.66 square miles (5.4% of total area). Roads take up another 0.80 square miles (6.6% of total area). Parking lots and driveways comprise the biggest share with 1.27 square miles (10.5% of total area) devoted to impervious coverage. Surface parking lots at office parks and shopping centers and on individual driveways contribute to more total land being devoted to parking cars than driving them. It can be said that impervious surfaces worsen the impacts of climate change-related natural hazards by decreasing available pervious surface to mitigate extreme rain events.

Manmade stormwater management systems seek to supplement, if not replace, natural stormwater management in areas where the natural environment has been disturbed by development and in necessary ways to accommodate development drainage impacts. Most commonly this is by collecting stormwater through drains or other openings in impervious surfaces and channeling it to an appropriate output location, typically a river or stream. However, while drainage pipes are designed to efficiently handle "normal" amounts of rainfall, they can become overwhelmed in extreme weather events. When pipe capacity is exceeded and impervious surfaces prevent an alternative place for the stormwater to be absorbed, it will flow elsewhere, creating the temporary streams that can infringe on developed areas.

Over time, flash flooding will naturally dissipate as stormwater is processed by natural or manmade systems. However, during and immediately after an extreme rain event, flash flooding can cause significant damage to houses, businesses, and infrastructure, while also presenting a threat to human health and safety. Standing water or even washouts may occur on roadways making driving hazardous.

INCREASING TEMPERATURES

There is scientific consensus that the increase in carbon dioxide and other greenhouse gases in the atmosphere has caused an increase in the Earth's temperature beyond the natural variability expected. According to the 2020 New Jersey Scientific Report on Climate Change, the Earth's surface temperature increased by an average of 1.5°F between 1901 and 2016.⁶ There are significant regional variations in the degree that temperature change, as well as many other aspects of climate change, are felt. New Jersey experienced an average temperature increase of 3.5°F over the course of the twentieth century, significantly higher than the 2.0°F increase felt in the rest of the Northeast region and over twice the increase felt globally.

6. NJDEP | 2020 Scientific Report on Climate Change

The 2020 New Jersey Scientific Report on Climate Change also notes that by 2100 temperatures in New Jersey are expected to increase between 3°F and 9°F in the lower emissions scenario and 6°F and 13°F in the higher emissions scenario compared to the average between 1901 and 1960.

Extreme heat, defined by the national Centers for Disease Control and Prevention (CDC) as “summertime temperatures that are much hotter and/or humid than average,”⁷ poses a serious threat to human safety, in particular to vulnerable populations. More people are killed by heat than all other weather-related hazards combined.⁸ The 2020 New Jersey Scientific Report on Climate Change warns that summer heat-related deaths in the state could increase by 55% by 2030.⁹

Similar to stormwater management, undeveloped and open spaces help to naturally absorb some of the effects of heat coming from the sun. Conversely, the steel, glass, asphalt, and concrete of developed areas magnifies the heat coming from the sun, creating a “heat island” effect that further increases the temperature in urban areas.

The large amount of protected open space and farmland in the Township is beneficial on the municipal scale for helping to minimize the “heat island” effect. However, as noted in the Flooding section above, impervious surfaces cover 22.6% of Plainsboro Township. While not as densely developed as larger cities, the Township still must contend with the increased heat that results from this type of development. The concentration of development into areas with relatively high densities, which is overall a beneficial strategy at reducing the causes and impacts of climate change, also results in most people living and working in areas that are more susceptible to the heat island effect. There are a number of sites within the Township that are developed with large surface parking lots, including corporate office developments in the PMUD Zone and along Route 1. As documented by scientific research, large surface parking lots, can reach 150°F during the summer,¹⁰ magnifying the effects of the sun and increasing the threats to people using these areas, both within the parking lot and the adjacent buildings. Much of the roughly 1.1 square miles of Township rights-of-way are public roads, which are typically made of asphalt, an impervious surface.

Certain populations are particularly vulnerable to the effects of extreme heat. The elderly, young, and others with compromised health are more sensitive to the potentially lethal effect of extreme heat. Socioeconomic status and race may also affect the potential susceptibility to heat, which is directly related to their access to quality housing with adequate ventilation and modern cooling systems. However, given the demographic make-up of the Township, this is comparatively less prevalent in Plainsboro.

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7. About Extreme Heat | Natural Disasters and Severe Weather | CDC <https://www.cdc.gov/disasters/extremeheat/heat_guide.html>
 8. Urban Heat Resilience PAS Quicknote <<https://planning-org-uploaded-media.s3.amazonaws.com/publication/online/PAS-QuickNotes-95.pdf>>
 9. NJDEP | 2020 Scientific Report on Climate Change
 10. Using Cool Pavements to Reduce Heat Islands | US EPA <<https://www.epa.gov/heatislands/using-cool-pavements-reduce-heat-islands>>

In addition to the direct threat that increased heat presents on its own on human health, temperature change also contributes to a variety of other climate change-related hazards. Warmer temperatures are correlated with an increase in precipitation, more intense storms, and sea level rise.

DROUGHT

The 2020 New Jersey Scientific Report on Climate Change notes that although overall precipitation and the number of very heavy events are increasing, the region is also experiencing longer periods without rainfall.¹¹ Drought, the “prolonged period of abnormally low precipitation with respect to local and regional averages, leading to a shortage of water”, is a relevant climate change-related hazard to the Township.

Plainsboro Township is located within the New Jersey American Water Company water source area. The Utility Service Plan noted that the long-term availability of water was not considered a problem because surface water was utilized for 95% of the American Water supply.¹² Nonetheless, because water is such a critical resource, the Township may wish to consider water conservation measures in response to the potential effects of drought conditions.

Drought can have a tremendous effect on land uses that are heavily dependent on water. During periods of drought, changes in behavior can be implemented on the personal scale, particularly at residences by decreasing or eliminating water used to water lawns and other landscaping. However, it is more difficult to decrease the water consumption of many agricultural uses, at least in the short term. An entire season of crops can be lost if there is insufficient access to water. Over 1,600 acres, or roughly 23% of the Township is designated as farmland according to MOD-IV data provided by the Division of Taxation. Nearly 1,000 acres (13% of the Township) are Preserved Farmland.¹³

Drought also creates the conditions for wildfires, which can be caused when dry vegetation ignites, either from lightning, a downed power line, or human negligence. Wildfires that start in natural areas often pose a risk to human settlements as the built environment encroaches further into previously undeveloped areas. Forested areas, which are interspersed with many of the Township's residential and mixed-use areas, comprise almost 1,000 acres of the Township.

Farmland is a prominent land use in Plainsboro Township. While agriculture has always been at the mercy of extreme weather that occurs as part of the natural variability in an area's climate, the increasing temperatures and changing weather patterns pose a long-term threat to the types of produce that can be grown in the region. Drought is the most visceral threat to agriculture, which tends to be heavily water dependent. Extreme weather events

11. NJDEP | 2020 Scientific Report on Climate Change

12. Utility service plan.doc <<https://www.plainsboronj.com/DocumentCenter/View/77/Chapter-10---Utility-Service-Plan-With-Figures-PDF#:~:text=Plainsboro%20Township%20is%20located%20within,for%2095%25%20of%20its%20supply>>

13. NJDEP | 2020 Scientific Report on Climate Change

and increased rainfall can also influence the ability of certain crops to grow in the Township and surrounding region which may necessitate a transition to new types of crops.¹⁴ Extreme weather cycles can also contribute to the presence of insects and other pests that could negatively impact crops.

HURRICANES AND OTHER EXTREME WEATHER EVENTS

Hurricanes are tropical weather systems with sustained winds of at least 74 mph that form in the Atlantic Ocean.¹⁵ Hurricanes, as well as tropical storms (winds <74 mph) and tropical depressions (winds <39 mph), are created by warm, moist air that rises from tropical waters. As air temperatures rise more moisture is held in the atmosphere which causes storms to become more intense.

An increase in the overall number of hurricanes forming in tropical Atlantic waters means hurricanes are an increasingly prevalent concern in New Jersey. Of the four hurricanes that have caused at least ten fatalities in New Jersey, three have occurred since 2011: Sandy (37 deaths in 2012), Ida (23 deaths in 2021), and Irene (10 deaths in 2011).

Hurricanes begin to weaken as soon as they make landfall because they no longer have access to the warm water that fuels them. However, hurricanes can cause substantial damage as the storm slowly loses strength, including in inland communities like Plainsboro. The high winds that define a hurricane are one of the most destructive forces. Winds in excess of 100 mph can cause significant damage to property, either directly by the sheer force of the winds, by falling branches or entire trees, or debris. Torrential rains are also typical during hurricanes as the moisture that has accumulated in the air is finally released. This can contribute to the fluvial and pluvial flooding events.

High winds and flooding caused by hurricanes, tropical storms, and tropical depressions, are a major threat to Township resident's safety, as well as buildings and infrastructure. Damage and injury caused by a major storm can be exacerbated when access to emergency services is compromised when the transportation network is temporarily or permanently impaired and when power outages occur.

Although still relatively rare in New Jersey, hurricanes and severe thunderstorms create the atmospheric conditions that also could lead to tornadoes.¹⁶ Tornadoes are funnel clouds that are much smaller than hurricanes but also inflict damage due to extremely high wind speeds.

After a storm that impacts the Township it is important to quickly conduct post disaster planning and recovery, and to undertake timely reconstruction focusing on business resumption, environment cleanup and restoration, and the repair and reconstruction of houses.

14. *Agricultural Adaptation in a Changing Climate* | USDA Climate Hubs <<https://www.climatehubs.usda.gov/agricultural-adaptation-changing-climate>>

15. *What is a hurricane?* <<https://oceanservice.noaa.gov/facts/hurricane.html>>

16. *Tornadoes* | NJ OEM <<https://nj.gov/njoem/plan-prepare/tornadoes.shtml>>

AIR QUALITY

Many of the sources of greenhouse gases also contribute to air pollution. Air pollution leads to increases in respiratory and cardiovascular health issues, causing an increase in premature deaths. Climate change further compounds the problem by altering the chemical and physical processes that filter, dissipate, or remove air pollution at ground level.¹⁷ The entire state of New Jersey is in non-compliance with the threshold for ground-level ozone. Elevated ozone levels are influenced by high temperatures, sunshine, and stagnant air.

Particulate matter is another air pollutant of concern. The entire state has been determined to be below federal air-quality standards, though there is still concern that localized concentrations could cause adverse health effects. These could occur as a result of wildfires, dust stirred up during droughts, or the effect that increased heat has on particulate matter components.

¹⁷ NJDEP | 2020 Scientific Report on Climate Change

CRITICAL FACILITIES AND INFRASTRUCTURE

The Climate Change-Related Hazard Vulnerability Assessment must "identify critical facilities, utilities, roadways, and other infrastructure that is necessary for evacuation purposes and for sustaining quality of life during a natural disaster, to be maintained at all times in an operational state" (N.J.S.A. 40-55D-28b.2h-iii). In Plainsboro Township, these include a variety of municipal and other community facilities that are designated to provide support in an emergency.

POST-EMERGENCY NECESSITIES

Municipal facilities and infrastructure are essential in supporting the wellbeing of Township residents and others. During emergency events, most commonly resulting from a natural hazard, this becomes critical to minimize the extent of short and long-term adverse effects to the community and its residents and businesses including physical harm, property damage, and other major disruptions. Local government plays an essential role in directly providing, or facilitating, access to services and facilities necessary to sustain quality of life, especially during times of crisis.

The most immediate concern in the event of an emergency is mitigating the immediate dangers that threaten physical wellbeing. While sheltering at home is often the safest and most practical option, evacuation may be necessary if the natural hazard makes the home unsafe. In the aftermath of an emergency event, local services and facilities provided by the municipality continue to play an essential role ensuring that the community will be able to access everything necessary to sustain quality of life, including electricity and gas, water, sanitation, cooling and heating, communication, and security.

ELECTRICITY AND NATURAL GAS

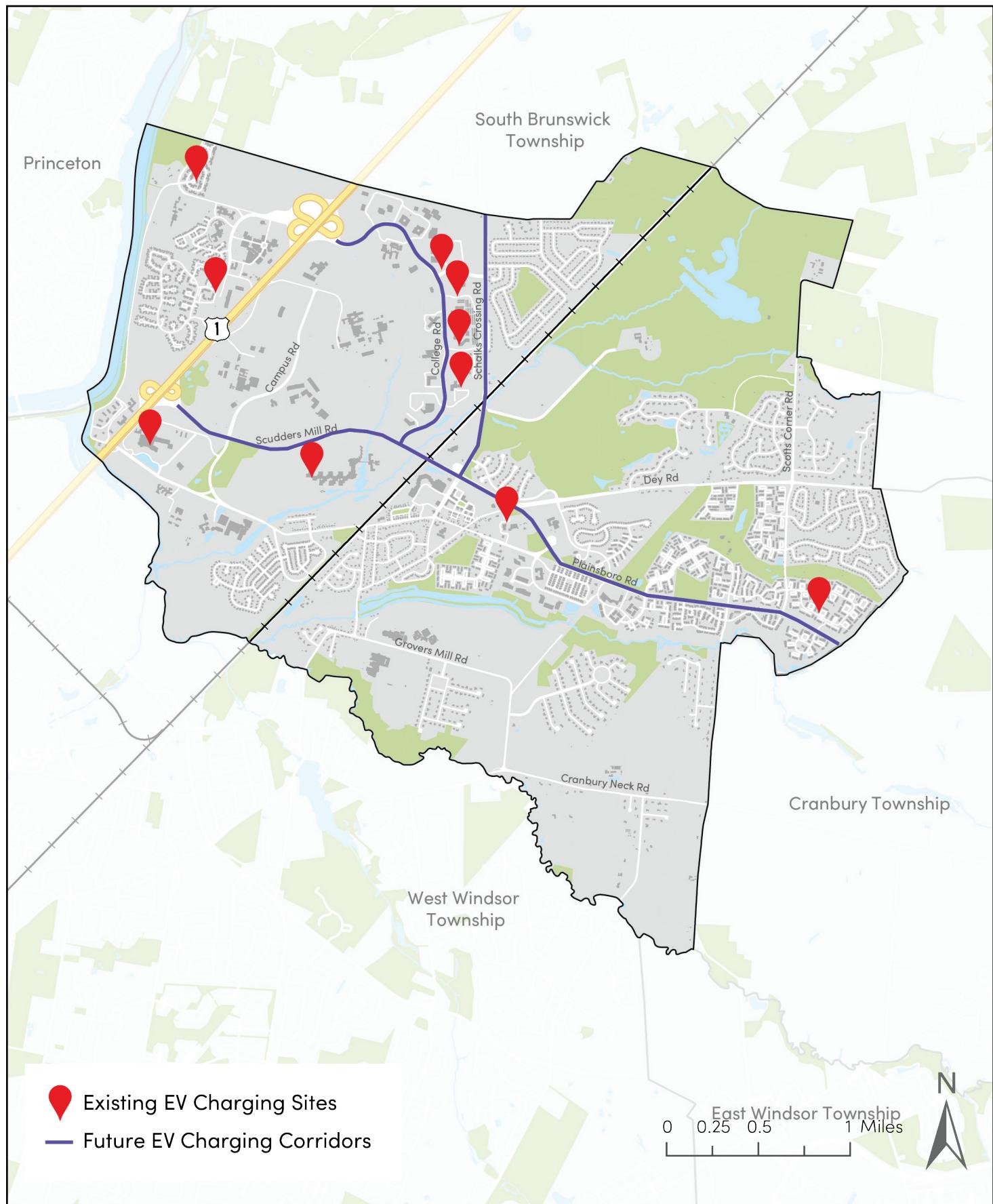
Homes depend on an uninterrupted supply of electricity to provide lighting, refrigeration, and charging of communication devices. Stoves and ovens are powered either by electricity or gas. During natural hazards, above ground power lines are susceptible to damage and disruption due to high winds or falling trees and branches. Electricity and gas in Plainsboro Township are provided by New Jersey Public Service Electric & Gas (PSEG).

FUEL

Given that personal vehicles are the primary means of transportation within the Township, gas stations and electric vehicle charging stations are also a critical energy component. The Township does not have any gas stations, but nearby stations are found along U.S. Route 1, U.S. Route 130, and Princeton Hightstown Road (County Road 526). The Township could be affected by regional supply chain disruptions in vehicle gas supply, because gas is typically transported to stations by truck.

Electric vehicle charging stations, by contrast, are connected to the local power grid. As shown on [Map 9](#), ten electric vehicle charging stations are currently within the Township. These are primarily located along Plainsboro Road and Scudders Mill Road. Schalks Crossing

Map 9. Electric Vehicle Charging Stations



Road and College Road East are designated as future electric vehicle charging routes, where the installation of electric vehicle infrastructure should be focused.

WATER

Plainsboro Township is located within the New Jersey American Water Company water service area. The long-term availability of water is not seen as a problem because American Water utilizes surface water for ninety-five percent of its supply. Natural hazards can jeopardize immediate access to water and even the quality of water.

Prior to flowing into the sinks, showers, and toilets, water entering into homes is treated to remove dangerous bacteria and water-borne diseases. Natural disasters and other emergency events may disrupt water supply or require community water treatment facilities to provide additional treatment to disinfect compromised water.¹⁸ Homes that are equipped with wells might need to have the water tested and disinfected if breached by floodwater.¹⁹

SANITATION

Wastewater collection and treatment systems safely and efficiently remove human waste from the home and send it to treatment facilities. After a natural disaster, this process could also be affected, potentially leaving untreated waste in dangerous proximity to human habitation. A related concern occurs when untreated wastewater mixes with floodwaters, particularly when these waters pool into temporary ponds.

The Stony Brook Regional Sewerage Authority (SBRSA) provides waste treatment to an area in the Township generally to the northwest of the Northeast Corridor rail tracks. The treatment facility for this sewer service area is within the municipality of Princeton.²⁰ The Viola-Princeton Meadows Waste Water Treatment Facility generally covers the developed area to the east of the railroad tracks with a treatment plant off of Maple Road near Plainsboro Pond and the railroad tracks.

The existing treatment facility is being substantially replaced and upgraded to both meet the new NJDEP effluent discharge standards and to increase the plant's resiliency, and replace aging infrastructure and equipment.

The SBRSA's location outside of the Township highlights the need for a regional perspective and intergovernmental coordination to deal with, or ideally prevent, service disruptions caused by natural disasters.

18. *Community Drinking Water Systems / Water, Sanitation, & Hygiene-related Emergencies & and Outbreaks / Healthy Water* <<https://www.cdc.gov/healthywater/emergency/drinking/community-water-systems.html>>

19. *Food and Water Safety During Power Outages and Floods* / FDA <<https://www.fda.gov/food/buy-store-serve-safe-food/food-and-water-safety-during-power-outages-and-floods>>

20. *Utility service plan.doc (plainsboronj.com)* <<https://www.plainsboronj.com/DocumentCenter/View/77/Chapter-10---Utility-Service-Plan-With-Figures-PDF>>

The Middlesex County Office of Health Services is contracted as the primary agency for public health concerns during and after emergency events in Plainsboro Township.²¹

COOLING AND HEATING

Regulating indoor temperatures is necessary to ensure safe living conditions. Without sufficient heating and cooling, people could be susceptible to heat related illness such as heat stroke in the summer and cold-related issues such as hypothermia in the winter. Newer homes tend to have centralized heating, ventilation, and air ventilation (HVAC) systems and are generally more efficient at preventing the loss of heat or cold through insulation and building materials. Window air conditioning units are common in homes without a central air system.

Heating and cooling systems depend on gas or electricity. If the supply of these energy sources is disrupted, internal air temperature can quickly become dangerously hot or cold, which is a particular concern for the elderly, young children, and other at-risk populations. Given that the type of storms that may take out the energy supply are more prominent in summer and winter, continual access to heating and cooling is vital for a community's health and safety. While many homes now have natural gas or portable gas emergency generators, access to heating or cooling stations are an important consideration in addressing the impacts of a natural disaster.

COMMUNICATION

Communication capabilities are critical during an emergency for Township residents to contact emergency services when needed and for the Township to transmit vital health and safety information to residents. This type of communication predominantly occurs using cellphones and Wi-Fi-connected devices including computers and tablets.

Extreme weather events, particularly those that have high winds, may knock out cellphone towers. This can decrease cell-phone coverage, potentially creating areas without any cell service at all. This problem can be exacerbated during and after emergency events when the system is inundated with a higher volume of calls as people attempt to reach 911 or make contact with family and friends.

Although an increasing number of people are foregoing landlines in their homes, they are still the primary means of communication for certain segments of the population, such as the elderly. Downed telephone wires can have the same impact as damaged cellphone towers.

²¹ Plainsboro Emergency Operations Plan – Annex J. Public Health

CRITICAL TRANSPORTATION INFRASTRUCTURE

The importance of the Township's transportation network is often overlooked because its use is so ubiquitous in daily life. It is often only when there is a disruption to the transportation network that most people generally realize how critical it is to respond to natural disasters by providing evacuation routes, access to critical facilities, and routes for first responders. As shown on [Map 10](#), most of the Township's road segments do not fall within the 100-year or 500-year floodplains. While this suggests that the Township's transportation network is largely resilient against flooding, the threat of flooding is present at enough locations along roads that Township-wide connectivity could be compromised in the event of a major flood event.

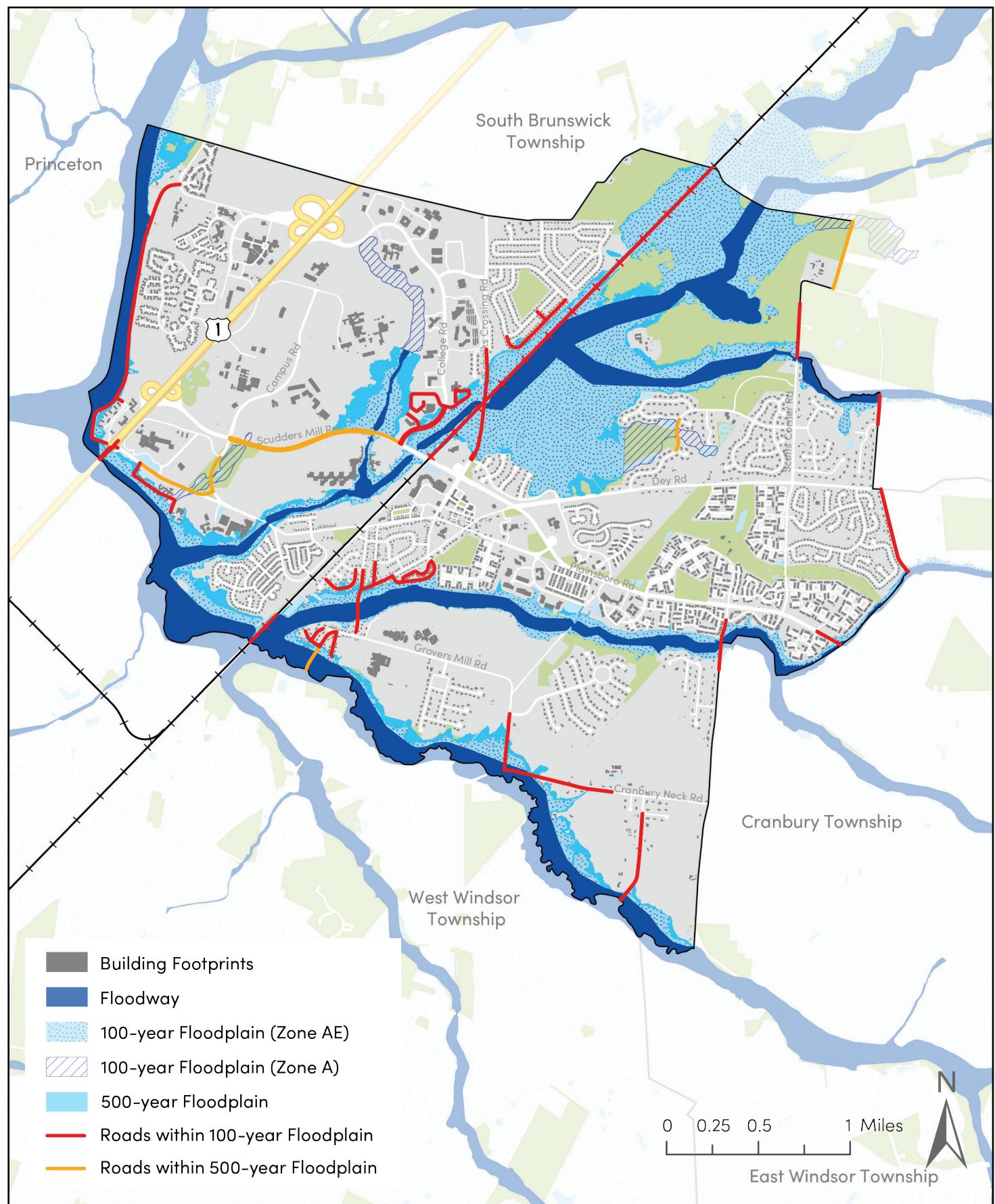
There are 20 roads within the Township that include portions that are vulnerable to flooding during a 100-year flood. While this represents only a small fraction of roads in the Township, the disruption of one or two key connectors can severely hinder connections within and beyond the Township. Key roads that fall within the 100-year floodplain include the segments of Plainsboro Road near the Penn Medicine Princeton Medical Center at Plainsboro and Cranbury Neck Road at the municipal boundary with Cranbury Township. Portions of Maple Avenue and George Davison Road, which are the only roads that connect the part of the Township separated by Cranbury Brook/Plainsboro Pond are also within the 100-year floodplain near these waterbodies. The Northeast Corridor rail tracks also fall within the 100-year floodplain.

When considering the expanded 500-year floodplain, portions of an additional eight roads become vulnerable to flooding, while also covering more of the roads that were determined to be vulnerable to 100-year flooding. Most significantly, the segment of U.S. Route 1 at the southwestern edge of the Township is within the 500-year floodplain. This stretch of road sees traffic volumes exceeding 80,000 vehicles daily.²² Even temporary disruptions in traffic flow caused by flooding would have major impacts for both the Township and the region.

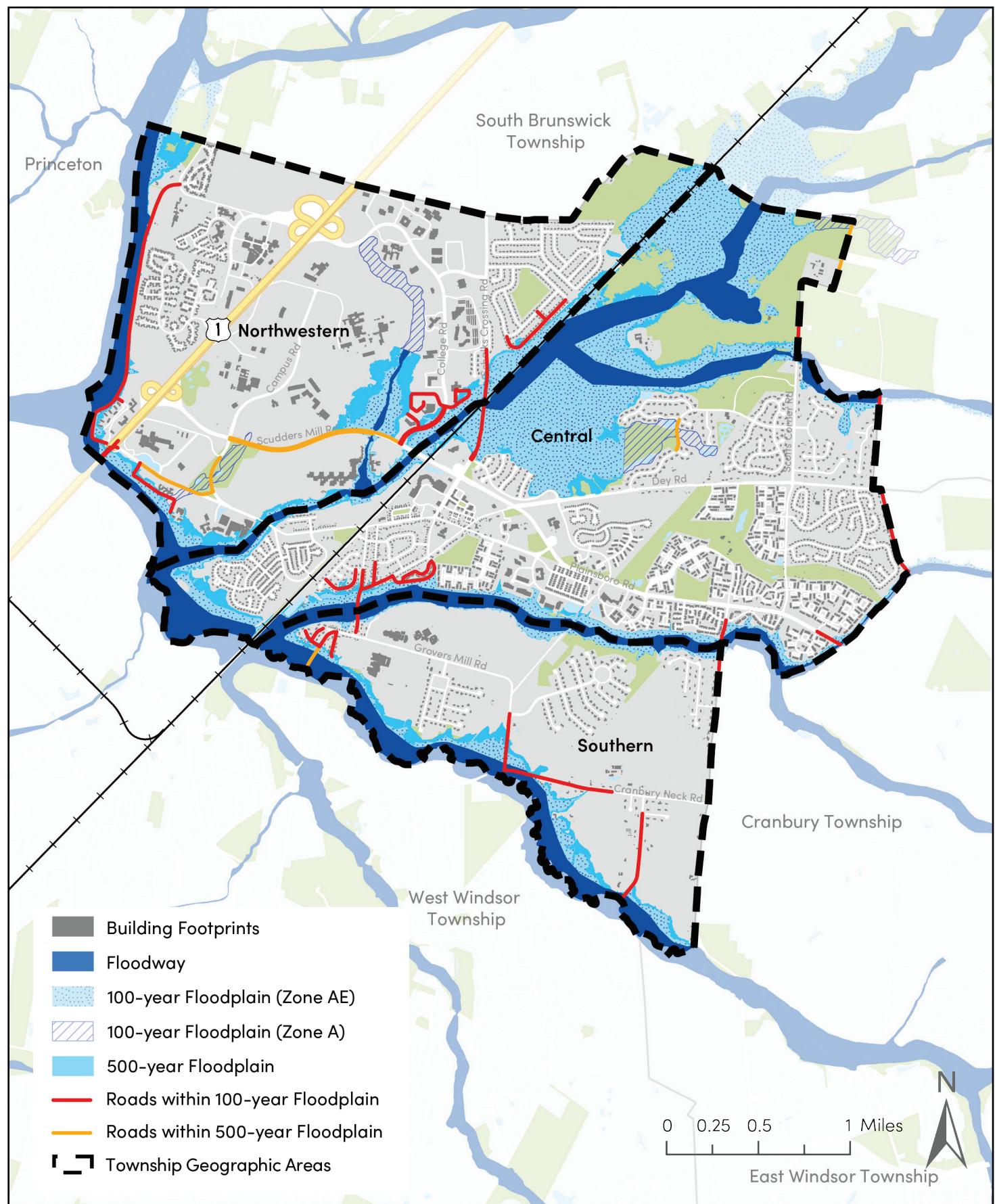
In the event of a major flooding event where all roads that fall within the 100-year floodplain are made impassable, the Township could become largely separated into three major geographic areas. Flooding along Scudders Mill Road, College Road East, and Schalks Crossing Road, each of which are within the 100-year floodplain, would effectively section off the portion of the Township to the northwest of Devils Brook. As noted, Maple Avenue and George Davison Road are likewise the only connections across Cranbury Brook. [Map 11](#) shows where the Township would become divided when experiencing a 100-year flood. The implications that the creation of this sort of boundary on access to population centers and community facilities is discussed in the following section describing Critical Municipal Facilities.

22. New Jersey DOT TMS Stations <<https://www.njtms.org/map/>>

Map 10. Roads Within 100-year and 500-year Floodplains



Map 11. Township Geographic Areas Created by Flooding in 100-year Flood Event



CRITICAL MUNICIPAL FACILITIES

During an emergency event where access to some or all the above listed necessities are compromised, municipal facilities can play a critical role in maintaining quality of life by providing a variety of support services and shelters within the Township.

As shown on **Map 12**, the Township provides a number of community facilities, both in services to provide during an emergency event and locations to go if evacuation is necessary. Many Township facilities are located within, or near, the Municipal Complex that is located in a central part of the municipality along Plainsboro Road.

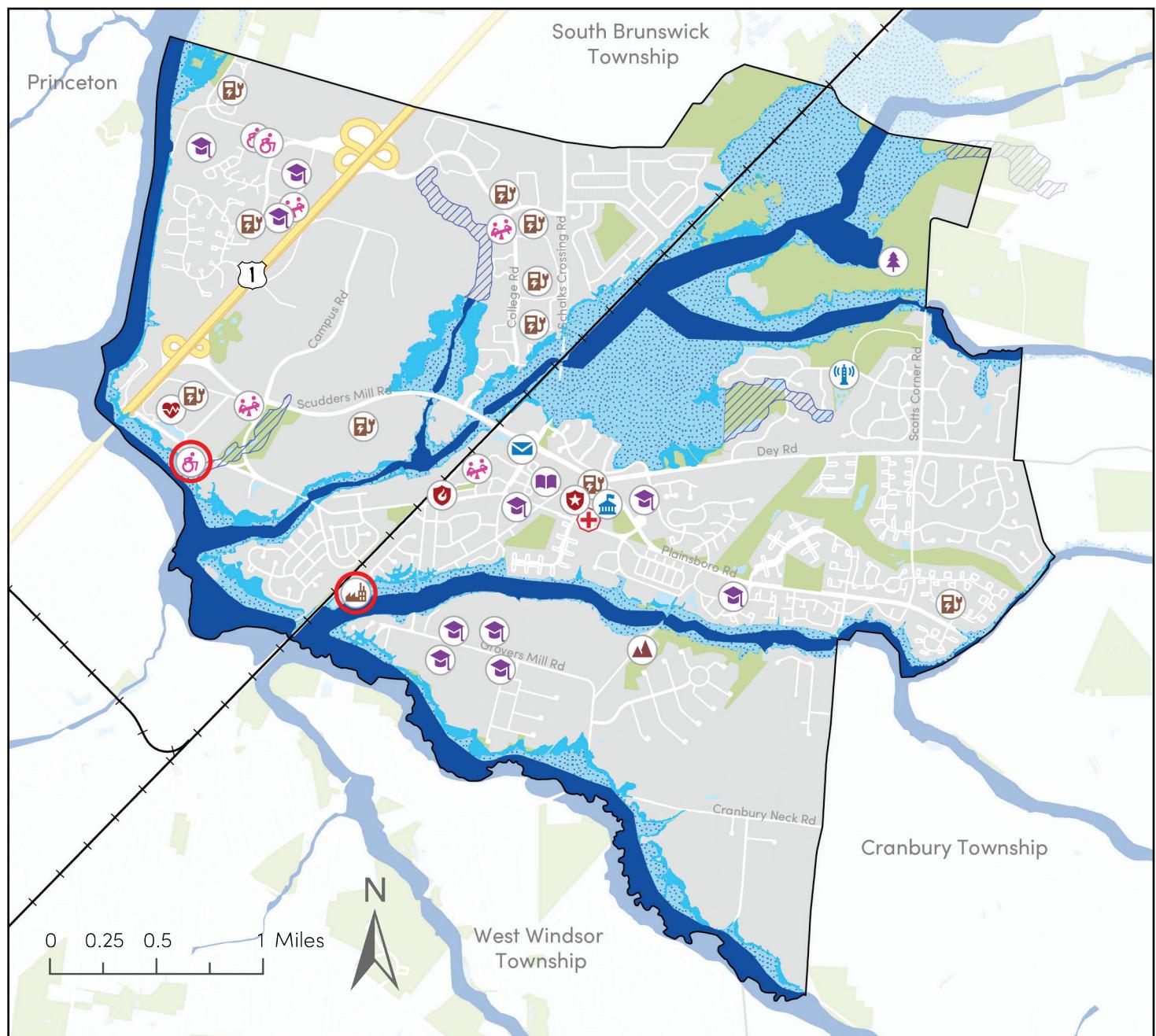
The Township Municipal Building and the Police Station are located in the Municipal Complex, while the Rescue Squad is located on an adjacent site. The Plainsboro Fire Department is also on Plainsboro Road, to the immediate east of where the road crosses over the Northeast Corridor rail tracks. The Plainsboro Public Library is within the Village Center, on the opposite side of Dey Road from the Municipal Complex. The Department of Public Works is located along Woodland Drive opposite from the Plainsboro Community Park. The Conservation & Recycling Center, located at a former landfill site, is accessible off Grovers Mill Road.

Other community facilities include the hospital, schools, childcare facilities, and long-term care facilities. While there are multiple medical research facilities in the Township, the only hospital is the Penn Medicine Princeton Medical Center at Plainsboro, a multi-building complex off of U.S. Route 1 that includes a range of healthcare services. The U.S. Post Office is located next to Plainsboro Plaza across Schalks Crossing Road from the Village Center. The Viola-Princeton Meadows Waste Water Treatment Facility is in the southwestern corner of the municipality adjacent to the railroad tracks.

Ten schools are spread throughout the Township. This includes public and private schools. The public Millstone River Elementary School, Community Middle School, and West Windsor-Plainsboro High School North are found on a complex that spans both sides of Grovers Mill Road. Four childcare facilities are found mixed into the Township's office and commercial uses, reflecting the location of the Township's employment centers near the Village Center, the hospital, U.S. Route 1, and College Road. Two long-term care facilities are found to the west of U.S. Route 1 while a third is within the hospital complex.

Of the 28 community facilities identified, only two, the Merwick Care and Rehabilitation Center and the Viola-Princeton Meadows Waste Water Treatment Facility, are within a flood hazard area. This suggests that the Township's community facilities are largely resilient to the most severe threats of extreme flooding, which will allow the community to rely on these critical locations.

Map 12. Community Facilities



Community Facilities

Township Facilities

- Fire Station
- Police Station
- Rescue Squad (EMS)
- Municipal Building
- Dept. of Public Works
- Library
- Conservation & Recycling Center

Other Community Facilities

- Hospital
- Post Office
- Environmental Education Center
- School
- Waste Mgmt
- Electric Vehicle Charging Station
- Childcare Facilities
- Long-term Care Facilities

- Floodway
- 100-year Floodplain (Zone AE)
- 100-year Floodplain (Zone A)
- 500-year Floodplain
- Facility within Flood Hazard Area

Access to Community Facilities

As shown on **Map 11**, in the event of a major flood event the Township potentially could be divided into three discrete geographic areas. If roads become impassable because of flooding, access to the above community facilities could be cut off to certain areas. As shown on **Map 13**, the largest concentration of Plainsboro's population is within the central area of the Township. More than two-thirds of the Township, or 16,473 residents, live in this area. By comparison, only 5,063 people live in the northwestern section and 1,382 live in the southern section. Note that these totals were derived by adding the total population for the census block groups within each section. One census block group (Tract 86.01, Block Group 2) overlaps both the northwestern and central sections while another (Tract 86.04, Block Group 3) overlaps both the central and southern sections. The population in these census block groups were assigned to the northwestern and southern sections, respectively, because the majority of the census block groups' areas fell into those sections.

In addition to the unequal distribution of population within the Township, community facilities are not evenly dispersed throughout the Township. In the event of a major storm that results in significant flooding, residents in certain sections could be cut off from the support provided by some facilities.

As shown in **Table 4** and **Map 14**, the central section has the highest concentration of community facilities. With the exception of the Conservation & Recycling Center, all the Township facilities are found in this section, including the municipal building, fire station, rescue squad, and police station (a.k.a. Municipal Complex). Most community facilities in the central section are centralized near the Municipal Complex and Village Center.

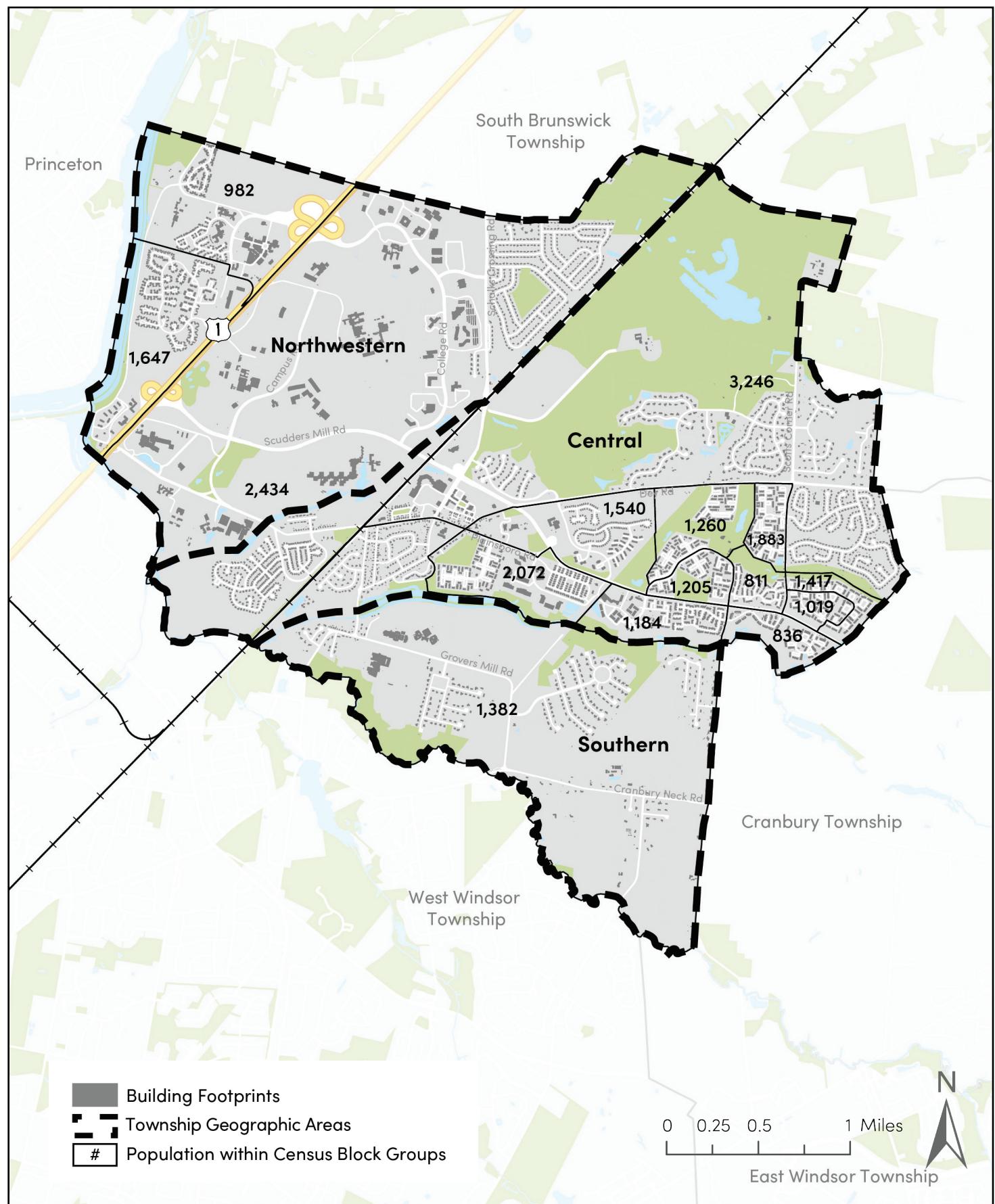
Table 4. Community Facilities Access by Township Section

Township Geographic Area	Population	Community Facilities in Geographic Area
Northwestern	5,063	Hospital, School (x3), Childcare Facility (x3), Long-term Care Facility (x3), Electric Vehicle Charging Station (x8)
Central	16,473	Municipal Building, Fire Station, Police Station, Rescue Squad, Public Works, Library, School (x3), Childcare Facility, Post Office, Environmental Education Center, Wastewater Treatment Facility, Electric Vehicle Charging Station (x2)
Southern	1,382	School (x4), Conservation & Recycling Center

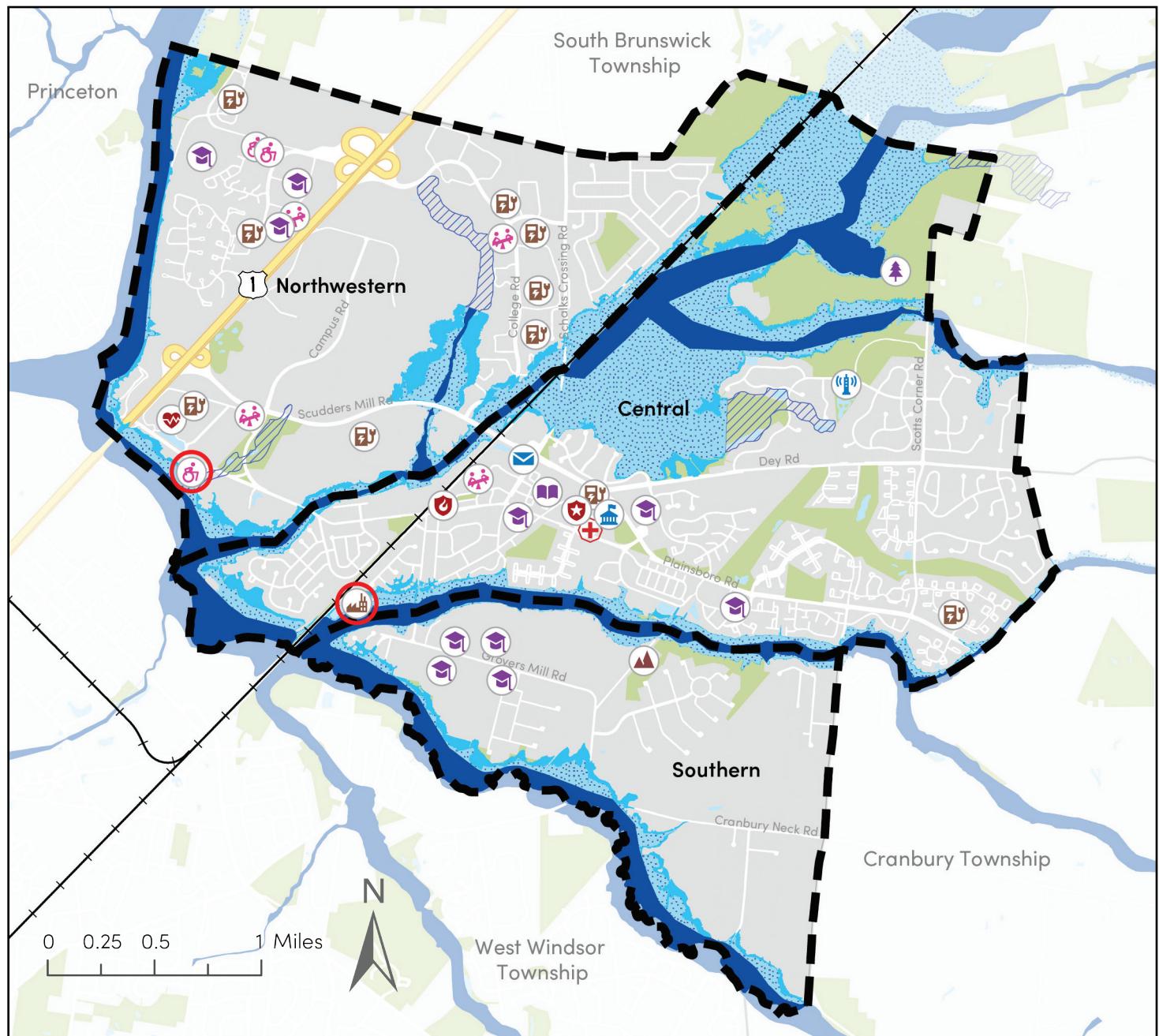
Source: U.S. Census Bureau 2010 DEC Summary File 1 Total Population in Occupied Housing Units

There is a correlation between the high concentration of both population and community facilities. This suggests that the Township will be able to service a large proportion of its residents after a major flood or other extreme weather event has occurred. This also highlights how disconnected each geographic area can potentially become in a major flooding event. As climate change results in higher levels of precipitation and more frequent and intense storm events, this will continue to be an area of concern.

Map 13. Population Distribution in the Township



Map 14. Community Facilities in Township Geographic Areas



Community Facilities

Township Facilities

- Fire Station
- Police Station
- Rescue Squad (EMS)
- Municipal Building
- Dept. of Public Works
- Library
- Conservation & Recycling Center

Other Community Facilities

- Hospital
- Post Office
- Environmental Education Center
- School
- Waste Mgmt
- Electric Vehicle Charging Station
- Childcare Facilities
- Long-term Care Facilities

- Floodway**
- 100-year Floodplain (Zone AE)**
- 100-year Floodplain (Zone A)**
- 500-year Floodplain**
- Facility within Flood Hazard Area**
- Township Geographic Areas**

VULNERABLE POPULATIONS AND ACCESS TO COMMUNITY FACILITIES

In addition to considering the geographic distribution of the Township's population, special attention must be given to Township residents considered particularly vulnerable to the threats of natural hazards. These residents include both those most at-risk to adverse health effects directly caused by a major weather event and those whose access to essential community facilities is comparatively limited.

Elderly and Children

As shown in **Table 5**, Plainsboro Township has the same median age (38.2) as the United States, which is slightly lower than Middlesex County (39.0) and New Jersey (40.0). While the Township has a relative low percentage of residents over 65 years old – 10.3% compared to over 15% at the county, state, and national level – there are particular locations within the Township with higher concentrations of older residents. Census Tract 86.01, which comprises the section of the Township west of the Northeast Corridor rail tracks, has a median age of 51.3 and over one fifth of the population is over 65 years old. Furthermore, 6.9% of the population in this census tract is over 85 years old, an even more vulnerable population. This age cohort comprises only roughly 2% of the population of the Township, as well as the county, state, and nation. Two assisted living facilities which are located to the west of the Northeast Corridor rail tracks – Atrium Senior Living of Princeton and Maplewood at Princeton – likely account for the majority of the elderly community in this area.

Table 5. Age Characteristics for U.S., New Jersey, Middlesex County, and Plainsboro Township

	United States	New Jersey	Middlesex County	Plainsboro Township
Median age (years)	38.2	40.0	39.0	38.2
Under 18 years	22.4%	22.0%	21.8%	22.4%
65 years and over	16.0%	16.2%	15.1%	10.3%
Total Population	326,569,308	8,885,418	825,015	22,928

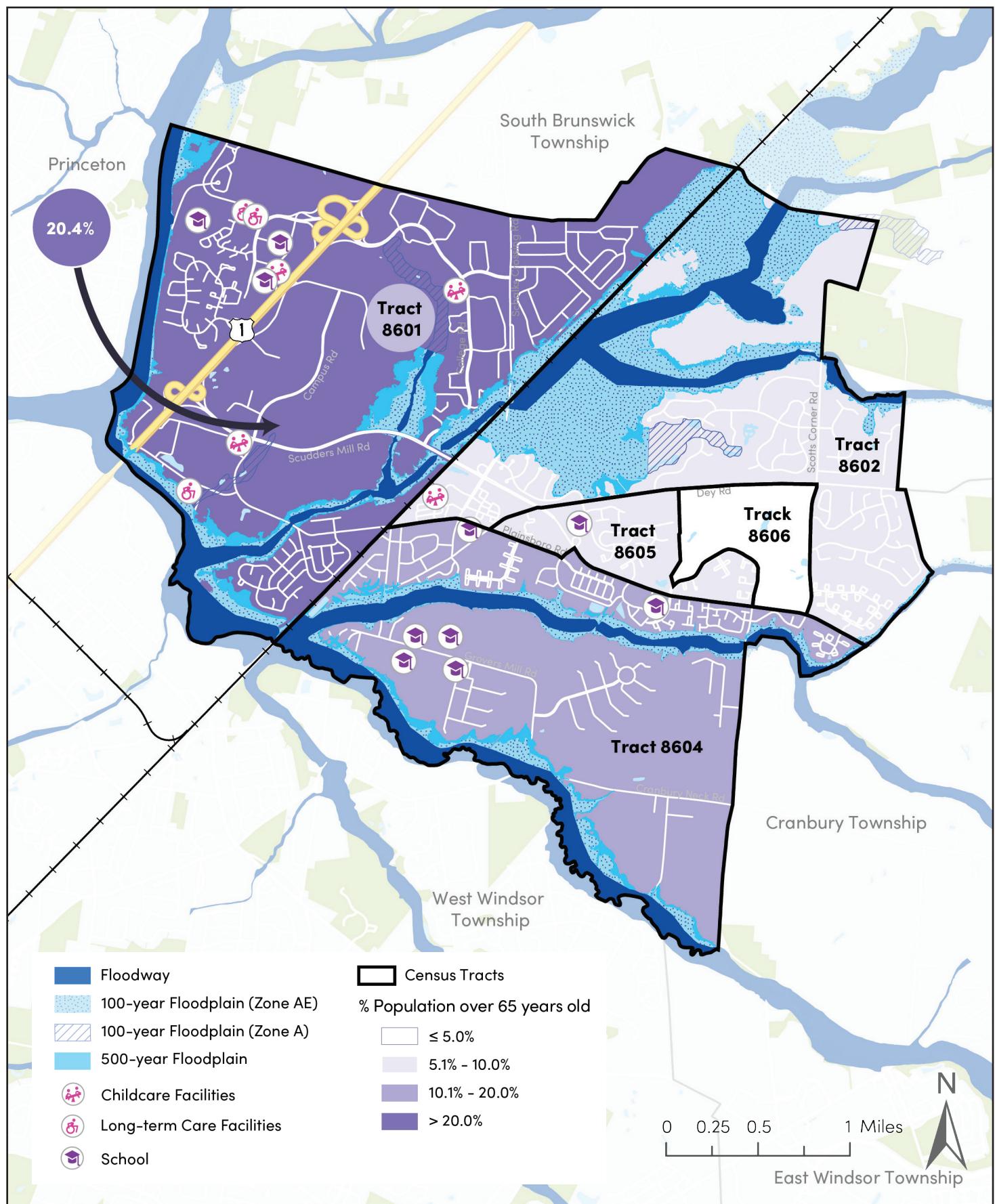
Source: U.S. Census Bureau American Community Survey 2020 5-Year Survey DP05 Demographic and Housing Estimates

Table 6. Age Characteristics for Township Census Tracts

	Census Tract 86.01	Census Tract 86.02	Census Tract 86.04	Census Tract 86.05	Census Tract 86.06
Median age (years)	51.3	42.3	36.2	35.6	31.3
Under 18 years	20.0%	18.5%	25.4%	24.5%	25.5%
65 years and over	20.4%	7.9%	10.1%	6.8%	3.5%
Total Population	5,063	5,692	5,474	2,745	3,954

Source: U.S. Census Bureau American Community Survey 2020 5-Year Survey DP05 Demographic and Housing Estimates

Map 15. Percent of Population Over 65

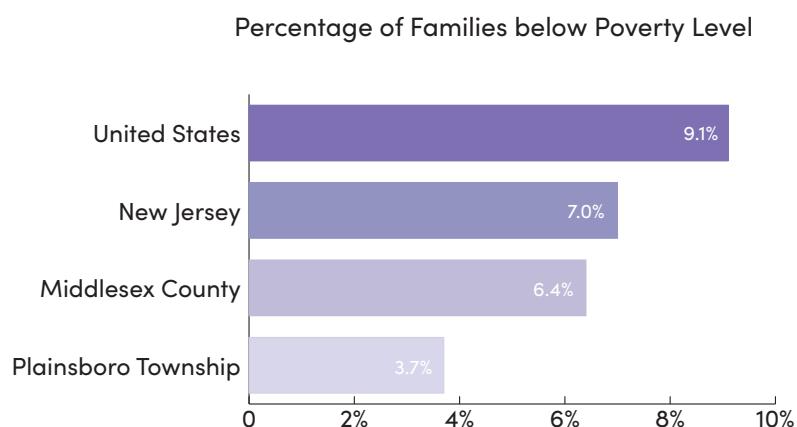


Children, particularly young children who may be oblivious to the threat, are also particularly vulnerable to the dangers related to extreme heat. As shown on **Map 14**, ten schools and four childcare centers are in the Township.

Socio-Economic Level

The percentage of households below the poverty level in Plainsboro Township is much lower than the county, state, or nation, suggesting that the Township is relatively affluent. However, when broken down to the Census Block Group level, certain areas are shown to be over-represented at the lower end of the economic scale, most prominently Block Groups 1 and 2 in Census Tract 86.06 where the percentage of households below the poverty level is 18.6% and 14.7%, respectively. The U.S. Census Bureau determines poverty status based on “a set of money income thresholds that vary by family size and composition” but not geography.²³ Particular attention will need to be placed on ensuring that these household’s needs are addressed and that they have adequate access to those critical community facilities that will support their quality of life after a natural disaster.

Figure 1. Poverty Rate for U.S., New Jersey, Middlesex County, and Plainsboro Township



Source: U.S. Census Bureau American Community Survey 2020 5-Year Survey S1702 Poverty Status in the Past 12 Months of Families

23. U.S. Census Bureau <<https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html>>

Map 16. Percent of Households Below Poverty Line

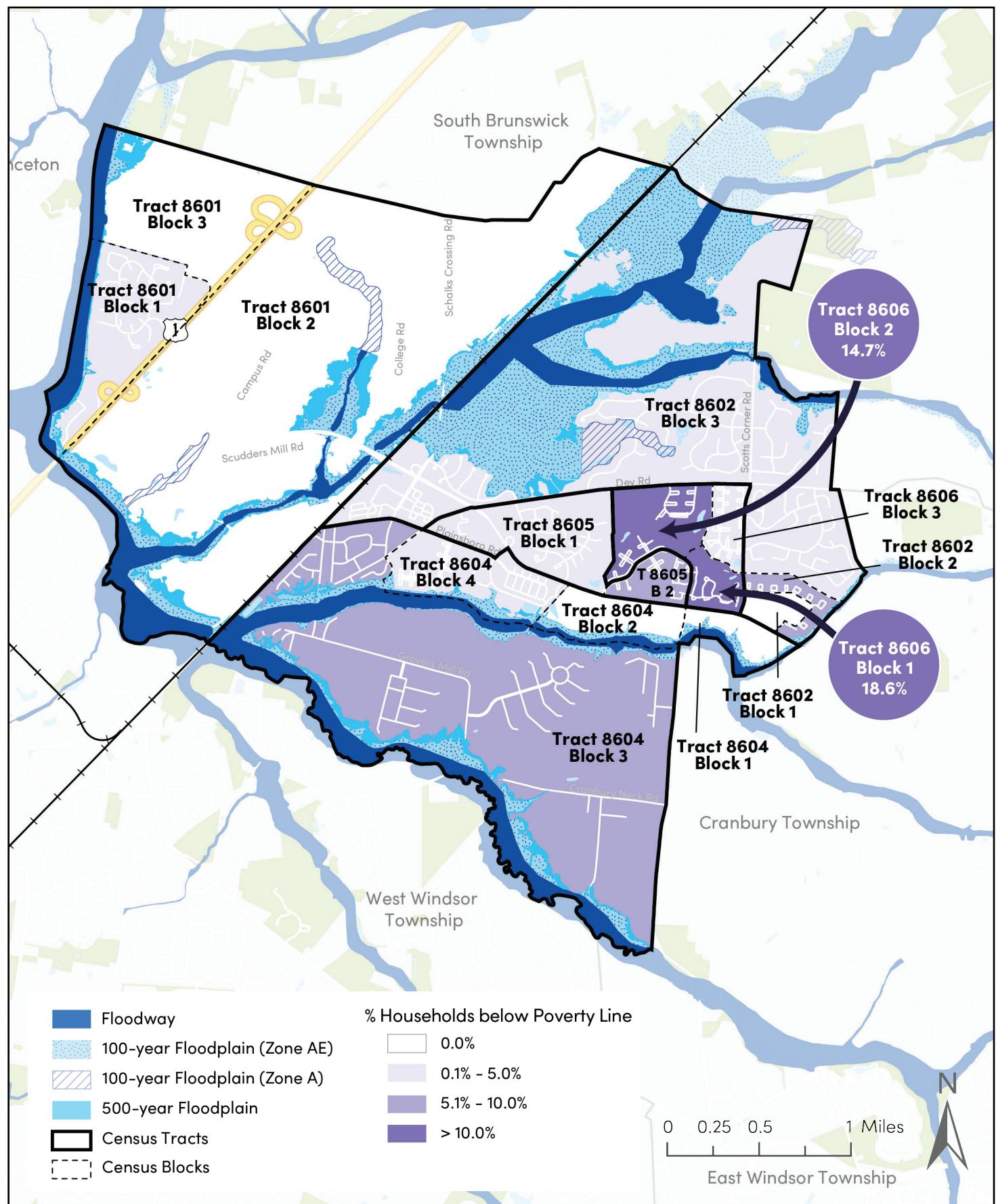


Table 7. Poverty Rate for Township Census Block Groups

	Total Households	% Below Poverty Level
Block Group 1, Census Tract 86.01	866	1.8%
Block Group 2, Census Tract 86.01	804	0.0%
Block Group 3, Census Tract 86.01	482	0.0%
Block Group 1, Census Tract 86.02	495	0.0%
Block Group 2, Census Tract 86.02	673	5.3%
Block Group 3, Census Tract 86.02	1,115	3.5%
Block Group 1, Census Tract 86.04	268	0.0%
Block Group 2, Census Tract 86.04	349	0.0%
Block Group 3, Census Tract 86.04	514	6.2%
Block Group 4, Census Tract 86.04	1,017	2.4%
Block Group 1, Census Tract 86.05	597	2.7%
Block Group 2, Census Tract 86.05	533	5.1%
Block Group 1, Census Tract 86.06	258	18.6%
Block Group 2, Census Tract 86.06	739	14.7%
Block Group 3, Census Tract 86.06	711	1.7%

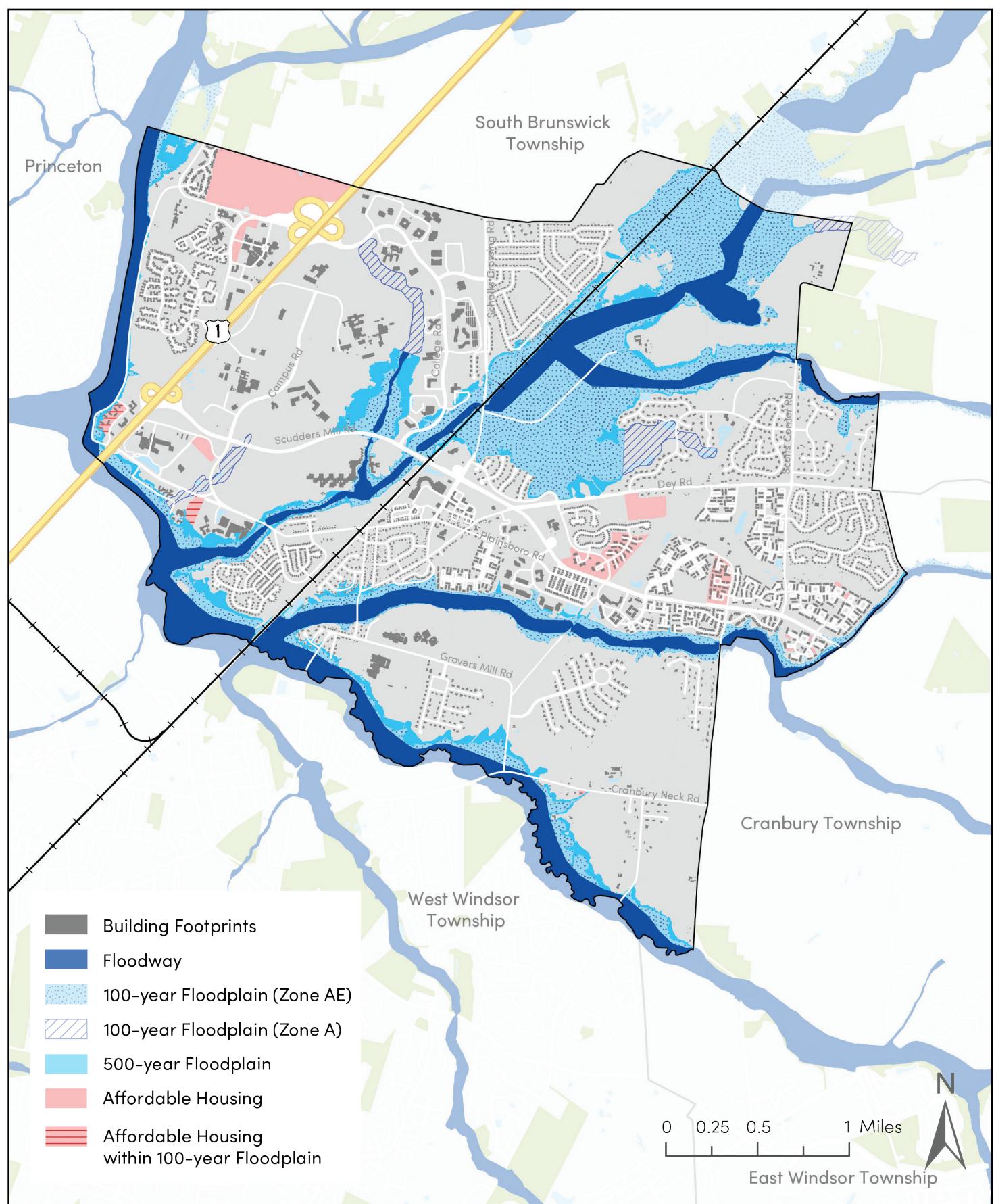
Source: U.S. Census Bureau American Community Survey 2020 5-Year Survey B1707 Poverty Status in the Past 12 Months by Household Type by Age of Householder

Affordable Housing

New Jersey municipalities are expected to provide a fair share of low- and moderate-income housing to ensure that there are opportunities for a variety of income levels. Municipalities should be particularly cognizant of the climate change-related threats to affordable housing sites. [Map 17](#) shows the location of affordable housing within Plainsboro Township. Affordable housing is found in a variety of locations throughout the Township, both in the northwestern and central geographic areas.

Similar to the distribution of residential generally, the Township's affordable housing sites are located outside of areas at elevated risk of flooding. The 100-year floodplain intersects two sites, the Lakeview Apartments to the west of U.S. Route 1 and the newly constructed Icon Riverwalk on the south side of Plainsboro Road. The buildings on both sites are located outside of the 100-year floodplain, reflecting current standards in determining where to site buildings in relation to flood hazards. The Township should consider the impact of climate change-related hazards and flooding in the next update of the Housing Plan Element and Fair Share Plan, with a focus on resilient and sustainable sites for affordable housing.

Map 17. Affordable Housing Locations Within the Township



Overburdened Communities

As part of the 2020 Environmental Justice Law, the New Jersey Legislature identified "Overburdened Communities," defined as any census block group that meets at least one of the following criteria:²⁴

1. At least 35% of the households qualify as low-income households
2. At least 40% of the residents identify as minority or as members of a State recognized tribal community
3. At least 40% of the households have limited English proficiency

The Township's 15 Census Block Groups are considered Overburdened Communities because they meet the second criteria of minorities comprising at least 40% of residents. As it relates to understanding the true impact of climate change on socially vulnerable populations in Plainsboro, the more useful information to evaluate would be the data on senior population and households below the poverty line as discussed above. However, it is important to note that the existence of "overburdened communities" as defined in the Environmental Justice Law may qualify the Township for future technical and financial assistance from available State programs.

24. Overburdened Communities Technical Document <<https://www.nj.gov/dep/ej/docs/obc-technical-document.pdf#:~:text=If%20at%20least%20one%20block%20group%20in%20the,small%20E2%80%9Cslivers%E2%80%9D%20of%20block%20groups%20may%20be%20visible>>

BUILD-OUT ANALYSIS

This assessment follows an iterative process that first identifies areas within the Township where development is not likely to occur, either because the land is protected from development, or the land is already developed. The remaining land is considered potentially developable. The final step is to determine which areas that are not yet built out are in locations that are particularly vulnerable to climate change-related hazards, such as flooding.

AREAS PROTECTED FROM DEVELOPMENT

The first step in the build-out analysis is determining which areas of the Township are unlikely to develop in the future. The Township has made significant efforts to responsibly manage environmentally significant areas within the Township that have been protected from development. These fall into four primary land uses: Public Parks and Open Space, Private Open Space, Public Facilities, and Preserved Farmland.

Public and Private Open Space is typically almost exclusively natural areas. According to the Open Space and Recreation Plan, Public Parks and Open Space consist of "land that has been secured in some form by local, County, or State government and is accessible to the public."¹ As shown on **Map 18** and detailed in **Table 8**, Public Parks and Open Space comprise 2.7 square miles or 24.2% of the Township. This generally covers environmentally sensitive areas such as waterbodies, wetlands, and wooded areas, with the largest concentration found in the Plainsboro Preserve.

Private Open Space is "land required to remain open through Township zoning requirements, easements and condition of Planning Board approval."² This type of protected area covers 1.5 square miles (13.7%) of the Township. Generally conditioned as part of the subdivision and site plan process, Private Open Space is mixed in with many of the large developments within the Township, both residential and non-residential. The highest concentration of Private Open Space is to the northwest of the Northeast Corridor rail tracks, both near the confluence of the Millstone River and Devils Brook and behind the large office parks on the west side of College Road East.

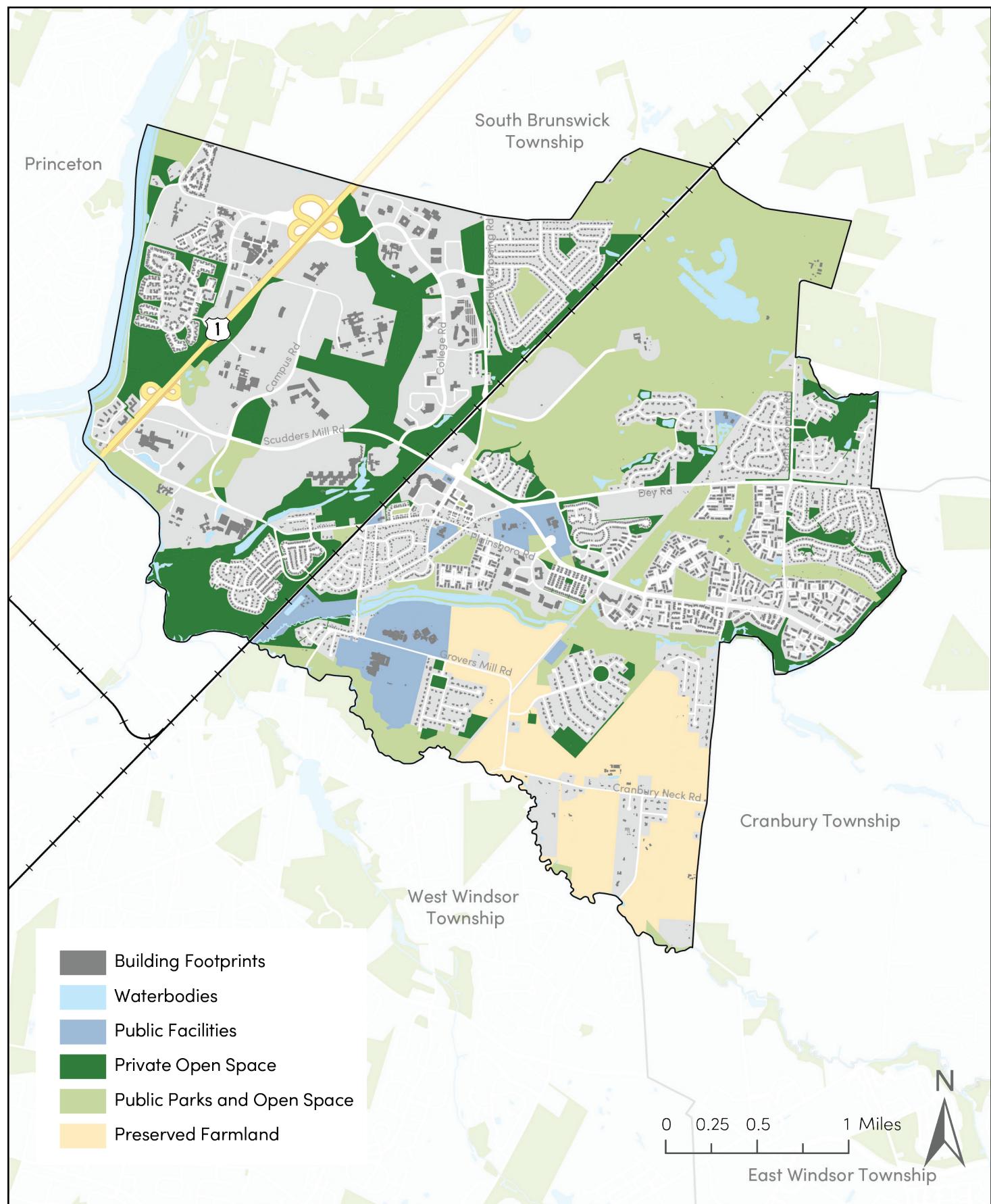
Public facilities cover municipal, county, and state-owned land that is used for schools, utilities, and emergency services, among other uses. While developed at a greater intensity than the other protected uses, significant additional development on public lands is unlikely. Land designated for Public Facilities covers an additional 0.42 square miles (3.8%). Public school grounds, particularly the complex on either side of Grovers Mill Road, comprise the majority of this type of use.

Preserved Farmland is protected through the Township's residential cluster and planned development zoning regulations, the State Agricultural Development Committee, or the

1. Plainsboro Open Space and Recreation Plan <<https://plainsboronj.com/DocumentCenter/View/73/Chapter-6--Open-Space-and-Recreation-Plan-With-Figures-and-Drawings-PDF>>

2. Plainsboro Open Space and Recreation Plan

Map 18. Areas Protected from Development in the Township.



Middlesex County Agricultural Development Board. While the vast majority of the land on Preserved Farmland is used for agriculture, a small portion of this land use type is typically dedicated to built structures that support farming operations. Preserved Farmland comprises 1.1 square miles (9.7%) of the Township, and is located primarily in the southeast corner of the Township.

Table 8. Undevelopable Areas Within the Township

Areas Protected from Development	Total Square Miles	Total Acres	% of Township
Public Parks and Open Space	2.7	1,711.5	24.2%
Private Open Space	1.5	966.2	13.7%
Public Facilities	0.42	267.5	3.8%
Preserved Farmland	1.1	687.4	9.7%
Total	5.7	3,632.6	51.4%

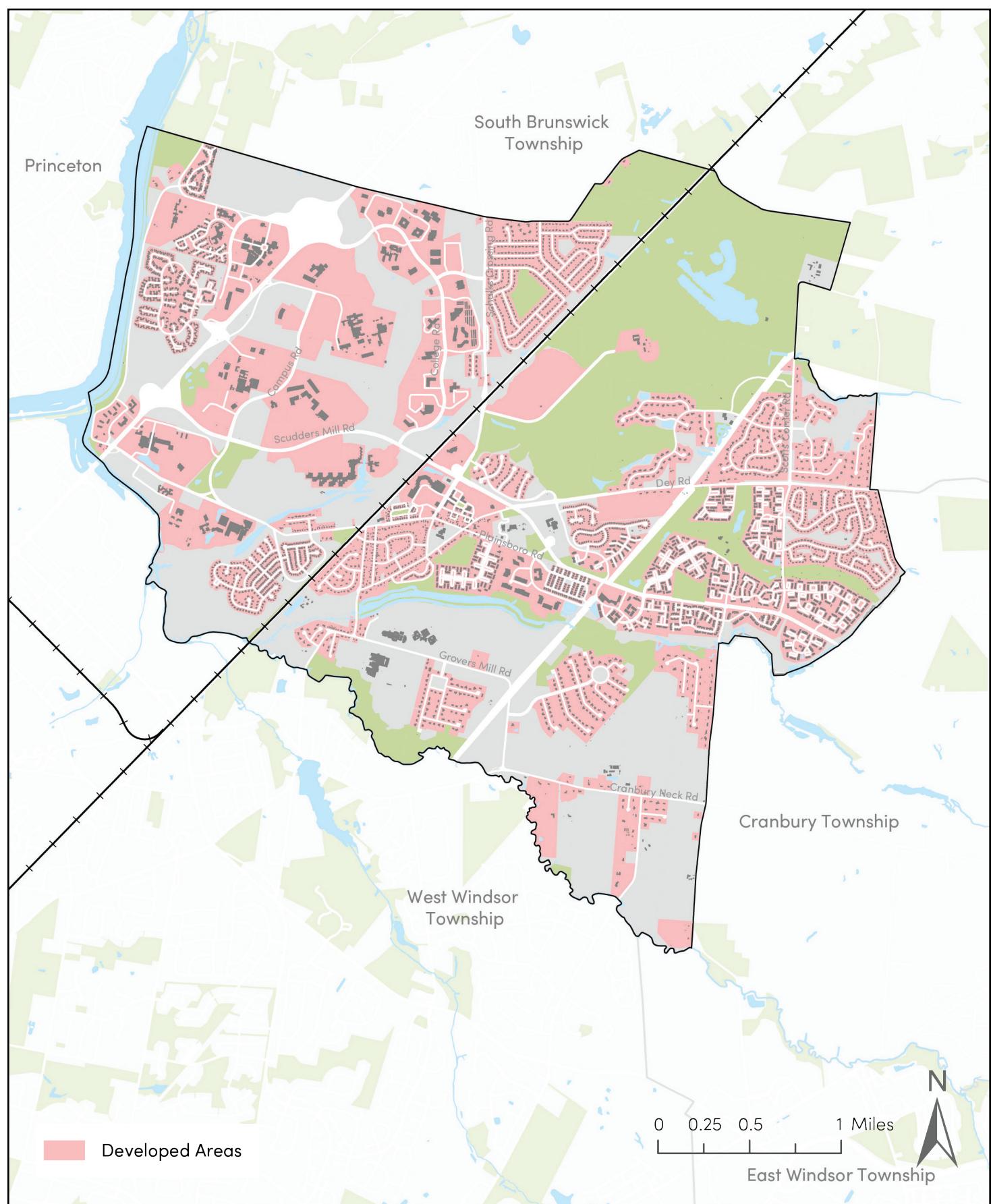
Taken together, these protected areas comprise 5.6 square miles or just over half of the Township (51.4%). While this limits the places where future development can occur, the large degree of dedicated protected land suggests that the Township has taken aggressive measures to conserve and preserve much of its most ecologically important land.

DEVELOPED AREAS

Areas that are already fully or almost fully developed to the maximum allowable density, according to what is permitted in their zone, are also unlikely to experience much development. **Map 19** shows areas with land uses of Institutional, Mixed Use, Office, Research and Limited Industrial, Residential, and Rural Residential. The presence of existing buildings within the parcel boundaries was used to confirm that each of these parcels has been developed to some degree. Note that these buildings were determined using an impervious coverage layer from 2015, the most recent publicly available data produced by the New Jersey Department of Environmental Protection. Buildings constructed since then, including development at the Place at Plainsboro Apartments and the Icon Riverwalk, are therefore not shown, but the parcels they are on are shown as developed. Also note that parcels that were subdivided after the most recent parcel layer was published are represented in this analysis as developed or undeveloped based on the status on the whole parcel prior to its subdivision.

Table 9 shows the total area dedicated to each of the existing land uses for developed areas. Residential and Rural Residential comprises a combined total of 3.0 square miles or over a quarter of the Township. Residential uses are generally clustered together within large subdivision style developments that include space set aside for the type of privately or publicly dedicated open space discussed above. Over 65% of residential parcels are less than a quarter acre, though there are some larger residential lots found in the rural residential zones (R-100 and R-150) and in the low-density residential zones (R-200, R-300, and R-350).

Map 19. Developed Areas in the Township



Mixed Use space takes up an additional 1.2 square miles (10.7%). The majority of Mixed Uses are located along College Road East and Scudders Mill Road within the PMUD zone. Institutional (0.28 square miles or 2.6%), Research and Limited Industrial (0.24 square miles or 2.1%), and Office (0.12 square miles or 1.1%) are similarly predominantly located within the PMUD zone, with some of these uses also spread along Plainsboro Road and Scudders Mill Road. Farmland that has not been preserved comprises only 0.05 square miles (0.4%). This land use was considered "developed" for this build-out analysis because the land has been improved for agricultural uses but it is not otherwise protected from development.

Map 19 shows the coverage of areas developed as these land uses, which collectively represent a total of 4.9 square miles or 44.2% of the Township.

Table 9. Developed Areas Within the Township

Land Use of Developed Areas	Total Square Miles	Total Acres	% of Township
Institutional	0.28	182.1	2.6%
Mixed-Use	1.2	755.5	10.7%
Office	0.12	79.5	1.1%
Research and Limited Industrial	0.24	151.0	2.1%
Residential	2.5	1,613.7	22.8%
Rural Residential	0.5	313.1	4.4%
Farm Land	0.05	30.8	0.4%
Total	4.9	3,125.6	44.2%

TOTAL DEVELOPED NON-DEVELOPABLE AREAS

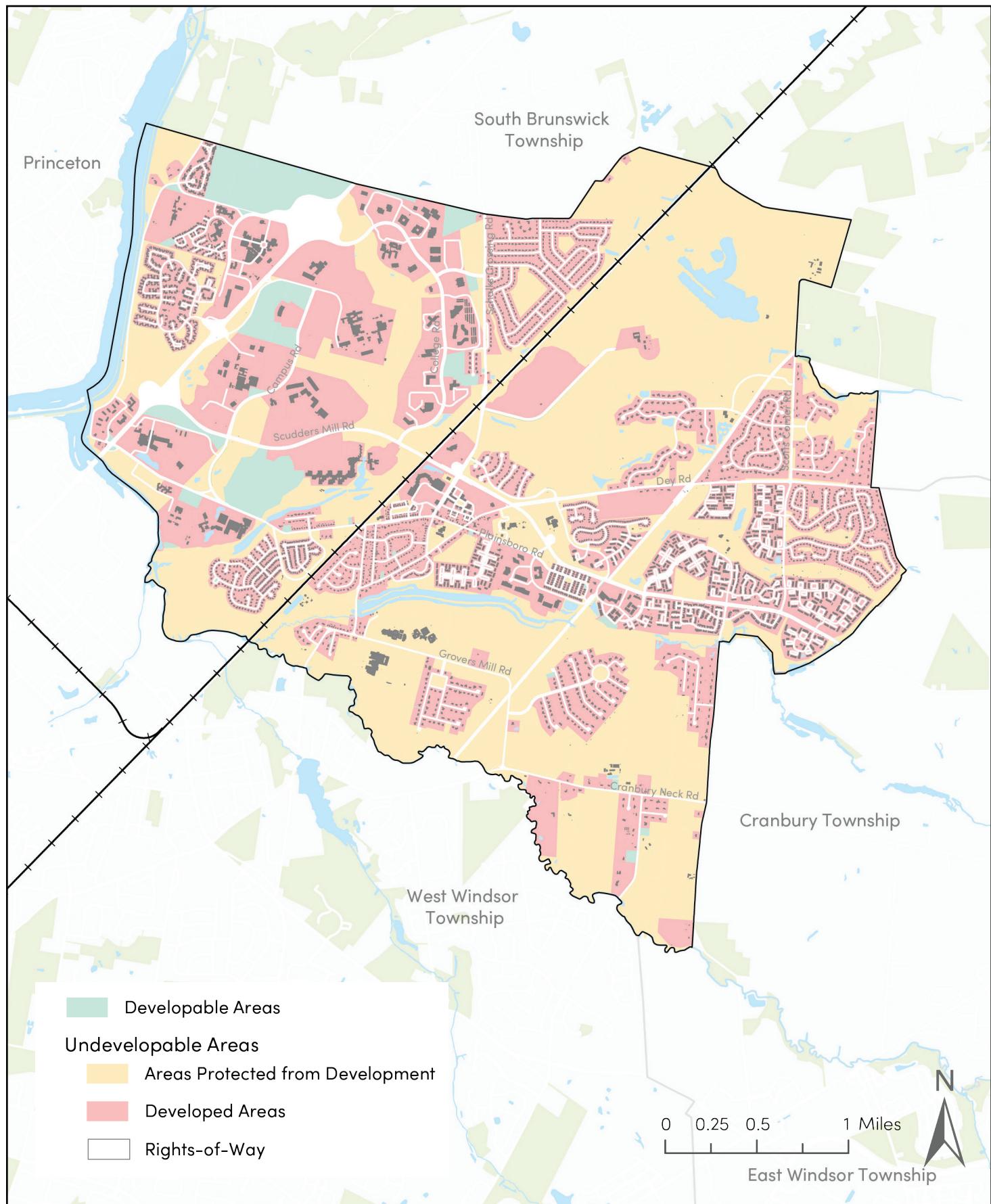
Table 10 shows the total area of the Township that is preserved or otherwise protected from development or already developed, covering a combined 95.6% of the Township. This reinforces the perception that the Township is nearly built out. **Map 20** shows the location of the non-developable and developable land within the Township.

Note that the calculation of percentages of the Township excludes rights-of-way, which are publicly controlled areas typically designated for transportation or utility use. Approximately 1.1 square miles of the Township is allocated for rights-of-way, which include all of the State, County, and public local roads, the Northeast Corridor rail tracks, and the PSE&G utility path.

Table 10. Total Township Area Not Likely to Experience Further Development

Non-Developable Areas	Total Square Miles	Total Acres	% of Township
Areas Protected from Development	5.7	3,632.6	51.4%
Developed Areas	4.9	3,125.6	44.2%
Total	10.6	6,758.2	95.6%

Map 20. Developed and Non-Developable Areas



DEVELOPABLE AREAS

The remaining 0.48 square miles (or 4.4%) of the Township are considered developable for this build-out analysis. This includes areas with land uses currently classified as Institutional, Mixed Use, Research and Limited Industrial, Residential, and Rural Residential but lacking any impervious surface. Note that parcels that have been subdivided after the most recent parcel layer was published may represent development opportunities that are not reflected in this analysis.

Thirty-three (33) of the 62 parcels considered developable are less than one acre in area. These areas tend to be interspersed with existing development and may be appropriate for infill development that complements existing development patterns.

By contrast, there are also several large contiguous areas within the Township that also meet the definition of "Developable." These include the roughly 109 acres to the north of Seminary Drive already designated for mixed use development in a general development plan, the three parcels to the east of U.S. Route 1 that form a 60-acre horseshoe around the Integra Life Sciences building (1100 Campus Road), roughly 75 acres to the east of the Northeast Corridor rail tracks near the Schalks Crossing Road overpass, and the roughly 56 acres to the west of the Novo Nordisk office complex along the south side of Scudders Mill Road. These larger areas allow more flexibility in design, particularly if done as part of a subdivision of land, which would allow the Township to apply compact development and clustering techniques or other similar approaches to find an appropriate balance between development and the preservation of open space.

Given that there has been further development since the most recent impervious surface layer was created in areas considered undeveloped and not protected from development, the amount of developable area is even less than 4.4% of the Township.

DEVELOPABLE AREAS VULNERABLE TO CLIMATE CHANGE-RELATED HAZARDS

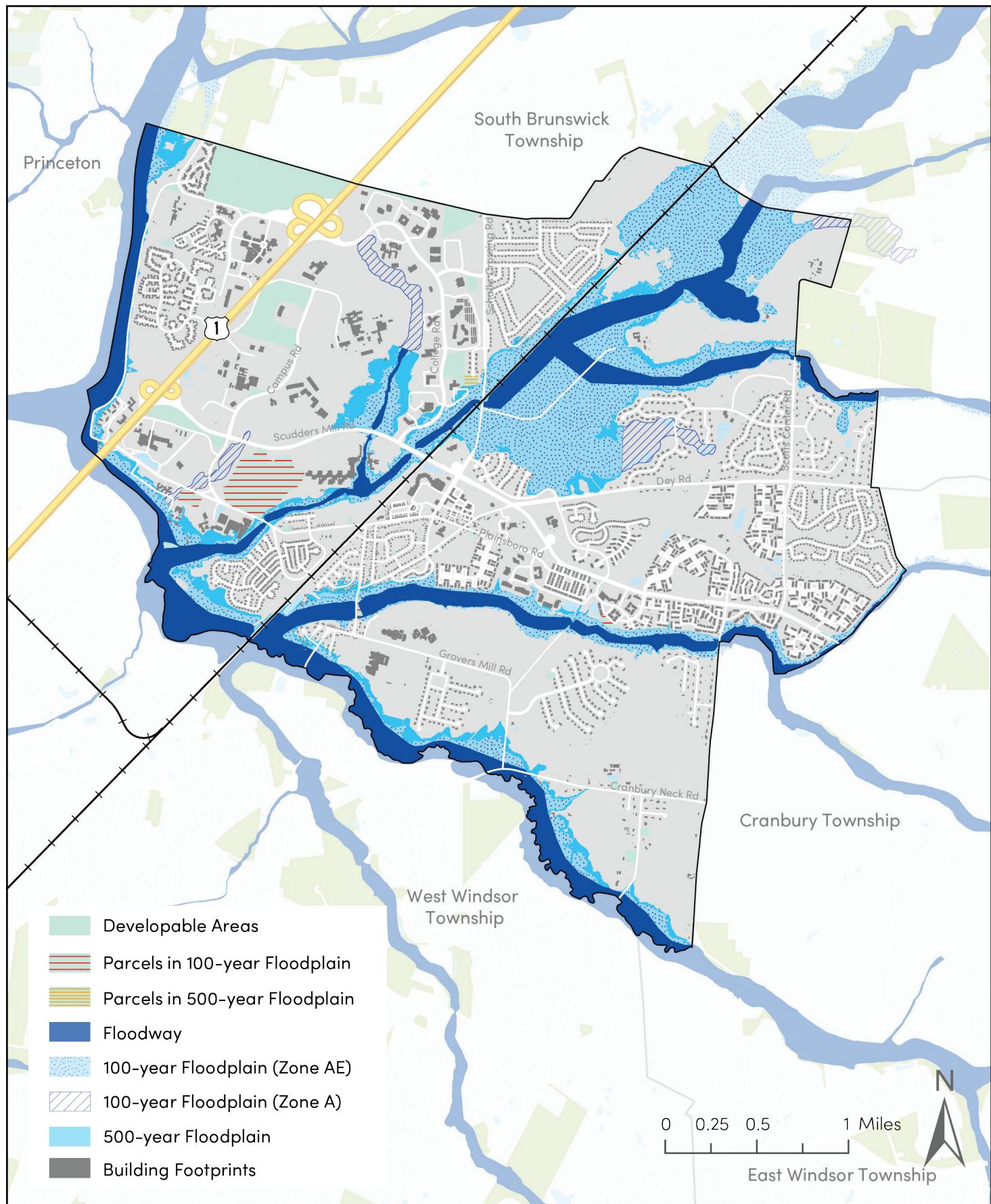
Determining which parts of the Township's developable land are at elevated risk of climate change-related hazards is the final, and essential, component of this build-out.

As shown in **Table 11** and illustrated in **Map 21**, of the 62 developable parcels that comprise a total of 0.48 square miles within the Township, only five intersect with the 100-year floodplain while a further three also fall within the 500-year floodplain. It is notable that the majority of the parcels identified as developable do not intersect with a flood hazard area. Once again, this reflects how the Township has benefited from thoughtful land use planning decisions over the years.

Table 11. Developable and Re-developable Areas Vulnerable to Climate Change-Related Hazards

Areas Vulnerable to Climate Change-Related Hazards	Total # Parcels	# Parcels in 100-year Floodplain	# Parcels in 500-year Floodplain
Developable Parcels	62	5	8

Map 21. Developable and Re-developable Areas Vulnerable to Climate Change-Related Hazards



To continue with existing efforts to focus development away from sensitive areas, the Township must recognize the increased risk of flooding when making land use development decisions for the thirteen parcels that intersect a flood hazard area. It is also important to note that every developable parcel that is identified as intersecting a floodplain is only partially covered by a flood hazard area. Development of a portion of these sites is therefore not fully constrained. Many of these parcels can still accommodate development designed to be protected from potential impacts of flooding.

Based on the build-out analysis, it is apparent that there are only a very few vacant and potentially developable parcels located within areas that are either within the 100-year or 500-year flood hazard area. For the most part, these are in areas of the Township subject to low density residential zoning. Any development of these parcels will necessarily be subject to NJDEP regulations that would limit or require the avoidance of these flood hazard areas and may trigger the delineation of wetlands and the use of wetland buffers. It is anticipated that the value of such improvements also will be limited. Therefore, an empirical evaluation of the value of improvements and potential tax assessments is not needed. Fundamentally, this is a confirmation of the soundness of the Township's existing zone plan and its overall resilient characteristics.

ASSESSMENT OF THREATS AND VULNERABILITIES

This section of the CCRHVA assesses the threats and vulnerabilities resulting from the identified climate change-related hazards impacting Plainsboro Township and describes the land use planning strategies and policies designed to mitigate any adverse impacts resulting from these threats and vulnerabilities. Using the results of the analysis of climate change-related hazards affecting the Township, the review and assessment of critical facilities and infrastructure, and the build-out analysis, the assessment of threats and vulnerabilities is designed to inform the land use planning decisions and policies of the Township, including the type and distribution of land uses and corresponding zoning regulations that can be implemented to reduce risk and minimize the economic and societal impacts resulting from climate change.

In evaluating the climate change-related hazards impacting the Township that were identified in the first section of the CCRHVA, it is apparent that flooding resulting from future storm events is the primary climate change-related impact affecting the Township and the one that has the most direct and specific geo-spatial relationship to the Township's comprehensive land use planning strategy. In fact, the anticipated increases in rainfall and storm intensity and frequency will continue to increase flooding risks in the Township and exacerbate corresponding impacts. Other anticipated impacts from climate change, such as increased temperatures, drought, and decreased air quality will be more universally felt and less affected by the Township's zone plan. However, development regulations that promote green building and resilient site design may help improve site-specific micro-climates, support natural drainage systems, and reduce certain impacts, such as heat island affects.

As discussed in the Build-Out Analysis section, over one-half of the Township's land area consists of dedicated public and private open space, parks, or preserved farmland. In addition, most residential areas are either fully developed or have very limited additional development potential. Where such development potential exists, is in undeveloped areas of the Township where the zoning permits only very low density single-family development (R-350 zoned property east of Schalks Crossing Road) or undeveloped properties in the PMUD Zone that were the subject of prior development approvals, but which have yet to be developed.

Other than these areas, most of the potential for new development will be primarily through the adaptive re-use or redevelopment of existing corporate office, research, industrial, and commercial uses. In addition, these areas are located in portions of the Township that are the least impacted by flooding.

The Township can be divided into three geographic areas by the stream corridors bounding and bisecting the Township, as well as a portion of the railroad right-of-way of the Northeast Corridor Line (See Map 7). The key stream corridors in the Township include the Cranbury Brook, Devils Brook, and Millstone River. In the northwest corner, Devils Brook enters Plainsboro from South Brunswick Township and flows southwest into a large artificial lake, and then continues southwest into Millstone River. Cedar Brook enters Plainsboro from Cranbury Township. Cranbury Brook flows across the southern portion of Plainsboro, flowing east to west, before draining into Millstone River. The Millstone River is the southern boundary between Plainsboro and West Windsor Township, and flows northwest, and drains into

Carnegie Lake and the Delaware and Raritan Canal. As noted in Map 7, Devils Brook and Cranbury Brook and their corresponding floodplains form the primary natural boundaries separating the northeastern, central, and southern parts of the Township.

It is important to recognize and understand the impact of these natural and man-made boundaries in evaluating the efficacy and availability of the Township's critical facilities and infrastructure. Given the limited number of road crossings across these boundaries and the potential for flooding where such crossings take place, the Township should plan for and ensure that there is an appropriate distribution and redundancy in the critical facilities and infrastructure that will be needed both to respond to a natural disaster and maintain the quality of life in the community after a natural disaster takes place. As part of this analysis, it also is important to evaluate and affirm the ability of the Township to meet the needs of vulnerable populations such as seniors and low-income families. This issue also is identified and discussed in the Township's Emergency Operations Plan (EOP) and Hazard Mitigation Plan (HMP). Moving forward, the recommended strategies to address climate change in the CCRHVA, the EOP, and HMP should be coordinated to ensure that there is adequate and appropriately distributed critical facilities and infrastructure in the Township to address climate change-related hazards.

For the most part, the aforementioned strategies to address climate change do not affect the Township's land use plan or require any changes to the Township's zone plan. In fact, the Township's current land use plan designates flood hazard areas for either preservation or consists of low density residential and agricultural development. Further, the Township's zoning ordinances and development regulations requires that new development avoid flood hazard areas and be designed in a manner consistent with the Township's existing Stormwater Management Ordinance and Flood Damage Prevention Ordinance. Areas where new development or redevelopment is anticipated, such as in the planned development areas in the northwest of the Township, are generally not impacted by flooding or flood hazard areas.

In conclusion:

1. Plainsboro Township has done a good job in its prior planning efforts to create a resilient land use pattern.
2. No significant changes are proposed to the comprehensive land use plan and zone plan.
3. The Township may need to review the distribution and availability of critical facilities and infrastructure to ensure that flooding does not isolate portions of the Township and that there is an appropriate distribution and redundancy to support the Township's quality of life and serve the needs of all segments of the community after a natural disaster
4. The Township should implement the land use regulatory policies described in Recommended Strategies and Design Standards to ensure that new development and redevelopment in Plainsboro is designed in a manner that promotes resiliency.

IMPACT ON THE MASTER PLAN

Taking into consideration the specific climate change-related hazards affecting the Township and the findings from the other sections, including the review of critical facilities and infrastructure, the following are the relevant master plan elements that the Township Planning Board may wish to consider updating as part of a comprehensive climate change planning strategy.

- Circulation Plan
 - » Update circulation plan element to include recommended strategies for green infrastructure systems.
 - » Identify and address flooding issues for roads, particularly for those roads where flooding could divide the Township into the three identified geographic areas.
 - » Identify evacuation routes.
 - » Continue to implement strategies to support pedestrian and bicycle usage and minimize the use of automobiles as much as possible.
 - » Increase the number of publicly available EV charging stations.
- Community Facilities Plan
 - » Identify designated shelters and facilities used to provide services and to support the quality of life in the Township after a natural disaster.
 - » Identify facilities that may be cut off during a flood and establish a strategy for redundancy as necessary.
 - » Continue to evaluate emergency power availability for all community facilities used to address or provide support during and after a natural disaster.
 - » Incorporate the siting of future community facilities in a manner that implements the recommendations of the CCRHVA.
 - » Use green building technology and site design in the reconstruction and construction of new community facilities.
- Open Space and Recreation Plan
 - » Continue to protect and enhance existing public open space areas to mitigate the effects of flooding, increased temperatures, and other climate change-related impacts.
 - » Monitor the potential impact of drought and fire risk on forested open space areas and implement appropriate monitoring and mitigation measures as necessary.
 - » Incorporate green infrastructure, such as rain gardens, in new park designs.
 - » Consider the inclusion of park and green areas in the design of any redevelopment and adaptive re-use of existing office and commercial developments in the Township.

- Conservation Plan
 - » Incorporate natural environmental systems in any comprehensive strategy to address climate change-related hazards.
 - » Avoid building in or near any flood hazard areas in anticipation of increased precipitation and flooding impacts.
 - » Limit development in environmentally sensitive areas that may be used to address climate change.
- Economic Plan
 - » Revise or update the plan to support the economic viability of the Township after a natural disaster.
 - » Assess the potential impacts on the local tax base from a natural disaster.
 - » Recognize the economic impact that natural disasters and climate change-related hazards may have on the local economy and develop strategies to address these impacts.
 - » Evaluate the impact of climate change on the agricultural component of the Township's economic base.
 - » Analyze the uneven economic impacts that climate change-related hazards may have on the residents in the Township.
- Historic Plan
 - » Identify any climate change-related hazards, such as flooding, that may impact historic sites and resources.
- Utility Service Plan
 - » Identify needed critical infrastructure during and after a natural disaster.
 - » Evaluate potentially vulnerable components of the Township's utilities, such as the existing wastewater treatment plant and pump stations.
- Recycling Plan
 - » Evaluate the location of the Conservation and Recycling Center and determine alternatives if the facility is cut off during a major flooding or storm event.
- Housing and Fair Share Plan
 - » Any new affordable housing fair share plan should focus on resilient and sustainable sites.

No specific time frame is recommended for the update of the foregoing listed plan elements. However, given the findings and recommendations presented here, the Planning Board may wish to consider prioritizing the Circulation and Community Facilities Plan Elements. The timetable for updating any of the Master Plan elements will be in accordance with a schedule determined to be appropriate by the Planning Board and Township Committee.

The Housing Plan Element will likely need to be updated when the Judgment of Compliance and Repose granted by the Court for the Township's current Housing Element Plan Element and Fair Share Plan expires in July 2025 and the next round of municipal affordable housing obligations is promulgated by the Court. Therefore, no amendments are being recommended to the Housing Plan Element pending the required update in 2025.

STRATEGIES AND DESIGN STANDARDS

This section of the CCRHVA describes the proposed land use strategies and policies to prevent or mitigate the impacts of climate change-related hazards in Plainsboro Township. The intent is to provide the Township with a comprehensive and coordinated land use planning and regulatory strategy that minimizes the costs and risks associated with climate change.

No significant changes to the Township's land use plan or zone plan are recommended. However, there are additional opportunities to improve Plainsboro's overall level of resiliency and resistance to the impacts of climate change by updating the Township's development regulations to ensure that new development or redevelopment is more resilient. The recommendations presented below, which by their inclusion, are incorporated into the Land Use Plan Element of the Master Plan.

Certain revisions to the other elements of the Master Plan are recommended to ensure that the Township's response to climate change-related hazards is comprehensive and coordinated with the Township's other planning goals and objectives. These are discussed in the section of the CCRHVA describing the impact on other elements of the Master Plan.

To continue promoting land use policies that are resilient to the impacts of climate change-related natural hazards, it is recommended that the Township consider incorporating the following strategies and design standards:

1. To ensure that the Township's land use development pattern continues to be resilient, the land use plan emphasizes the adaptive re-use and redevelopment of existing developments rather than significant new areas for development. Mechanisms to promote such development may include one or a combination of the following:
 - » Conditional use standards and incentive zoning.
 - » Overlay zones.
 - » Redevelopment areas (where the area qualifies as an area in need of redevelopment or rehabilitation).

Areas that may be appropriate for the foregoing implementation mechanisms and the specific recommendations by zone district are set forth in this plan element.

2. Prohibit development with large areas of impervious coverage or large building footprints/roofs such as big-box commercial and warehouse distribution uses. Such uses generate significant amounts of truck traffic which may adversely impact the Township's air quality and increase the amount of greenhouse gasses generated through vehicle emissions.

3. The Township has effectively used cluster development to promote a more efficient and compact development pattern and to preserve open space. Continue to explore ways to encourage cluster development in both residential and non-residential settings.
4. Provide opportunities for development that reduces reliance on automobiles, creates walkable and bikeable communities, and promotes the use of alternative fuel sources. The following land use development strategies and development forms may be appropriate to utilize:
 - » Mixed-use development.
 - » Incorporate pedestrian and bicycle paths and complete street designs into development and coordinate with and link to existing and proposed pedestrian and bicycle paths and routes along Township roads.
 - » Include EV charging stations in site design.
5. Adopt development regulations that ensure that any new development and redevelopment reflect sustainable and resilient site design. This may include:
 - » The use of green infrastructure techniques and best practices, such as rain gardens and natural drainage features, to manage stormwater runoff and quality.
 - » Review impervious coverage and parking standards, particularly for areas having the greatest potential for development, and modify as necessary to reduce heat island impacts and stormwater runoff.
 - » Require additional tree plantings and landscaping in parking lots to reduce heat island impacts and incorporate into an overall green infrastructure system.
6. The potential for flooding in the Township, particularly along existing stream corridors, will likely increase due to increased precipitation and the frequency and intensity of storm events. This may require a reconsideration of the appropriateness of development in areas beyond the delineated 100-year flood hazard area. Accordingly, the Township should evaluate whether to reduce permitted densities or limit infill development in 500-year flood hazard areas.
7. Continue to review and monitor best practices in land use planning and development strategies that mitigate these impacts and increase community resiliency.

CONSISTENCY WITH OTHER PLANS

The MLUL requires that the CCRHVA include a specific policy statement on the consistency, coordination, and integration of the CCRHVA with any existing or proposed natural hazard mitigation plan, floodplain management plan, comprehensive emergency management plan, emergency response plan, post-disaster recovery plan, or capital improvement plan. The Township either has or is included in the following relevant plans and ordinances:

- Plainsboro Emergency Operations Plan (EOP).
- Middlesex County Multi-Jurisdictional All-Hazards Mitigation Plan (County HMP), with specific reference to Appendix A-18: Township of Plainsboro.
- Plainsboro Municipal Stormwater Management Plan, revised through January 2007, and related ordinances including:
 - » Ord 21-02 Plainsboro Stormwater Management Ordinance
 - » Ord 22-09 Plainsboro Flood Damage Prevention Ordinance
- Plainsboro 2022 Capital Budget and Capital Improvement Plan (CIP)

EMERGENCY OPERATIONS PLAN (EOP)

The Plainsboro Emergency Operations Plan (EOP) represents the Township's comprehensive emergency management plan and emergency response plan. The EOP is adopted each year by resolution from the Township Council. The EOP is renewed and certified every four (4) years by the New Jersey State Police. The EOP provides a framework for coordination of emergency response operations through the Township Office of Emergency Management. The EOP supports priorities of life safety and property protection through the description of roles and responsibilities of participating departments and authorities, basic concepts of operations for event response, and the discussion of function-specific activities to support emergency response operations. It also supports related emergency management program activities, such as strategic planning, staff orientation, and training, tests, and exercises.

The Emergency Operations Plan includes the following sections:

Basic Plan	Describes the general administrative processes, roles and responsibilities and operational structure for managing emergencies through the Plainsboro Office of Emergency Management.
Attachments	The segments of the EOP that provide support for response operations as related to goals and responsibilities as stated in the EOP.
Annexes	The segments of the EOP that describe operations for functions that support emergency management and response by the relevant departments.

The EOP encompasses an “all-hazards” perspective, meaning that the principles, organization, roles and responsibilities, concepts of operations, and functional guidance may be applied to the wide spectrum of hazards experienced in Plainsboro.

Overall hazard and threat risk and vulnerability are considered low in Plainsboro. Even larger events such as hurricanes and severe storms rarely result in significant impacts to the community. Resilience is high in Plainsboro and most emergency events in Plainsboro are handled effectively through standard operating procedures (SOPs) of the Police Department, Fire Department, First Aid Squad, and mutual aid partners. It is uncommon for the EOC to be activated. The most common hazards that may require EOP activation in order of probability are:

- » Severe Storms & Flooding (thunderstorms/nor'easters: including heavy rain, hail, and lightning)
- » Hazmat truck transportation on the Route 1 and County truck routes
- » Fire (structural)
- » Utility Failure
- » Extreme Temperature

Plainsboro's capabilities to prepare for and respond to these hazards include personnel, resources, and programs associated with the Township's departments and response partners. The capability assessment presented in the EOP concludes that Plainsboro has adequate resources, facilities, and capabilities to address identified hazards, but may require support and assistance in the case of more extreme or multiple-hazard events.

Relationship to the CCRHVA

The EOP focuses on operational issues in planning for and responding to the hazards identified in the plan, some of which are directly related to and may be exacerbated by climate change. The CCRHVA's focus is on land use planning strategies designed to make the Township more resilient and mitigate the impact of climate change-related hazards. Implementing the recommended strategies in the CCRHVA will help to minimize loss, sustain the quality of life after natural disasters, and provide opportunities for more effective and efficient responses to climate change-related hazards. Accordingly, the CCRHVA is consistent with and supportive of the Township's EOP, while providing additional information on climate change-related hazards that may be affecting the Township in the future.

Recommendation

Continue to coordinate with the Plainsboro Office of Emergency Management in the maintenance and regular updating of both the EOP and CCRHVA to address climate change-related hazards.

COUNTY MULTI-JURISDICTIONAL ALL-HAZARDS MITIGATION PLAN

The most recent version of the Middlesex County Multi-Jurisdictional All-Hazards Mitigation Plan (County HMP) was adopted by Middlesex County Board of County Commissioners and each participating municipality in the County in January 2022 and which expires in 2027. Plainsboro Township is specifically referenced and the relevant hazards and mitigation strategies for the Township are described in Appendix A-18 of the County HMP. The County HMP is continually updated in accordance with state and federal standards and requirements governing the preparation and adoption of the HMP.

In preparing the current County HMP, the identified hazards, the risk assessment, mitigation goals, strategies, and mitigation priorities were re-evaluated to identify changes and updates that may have occurred since approval and adoption of the original plan. The elements of the County HMP were reviewed in the context of recent storm events, new data on hazards, and the 2019 New Jersey State Hazard Mitigation Plan.

The current version of the County HMP includes changes in the framework for the prioritization of mitigation actions, two of which are relevant to the evaluation of climate change-related hazards and the components of the Township's CCRHVA. As noted in the County HMP:

- The plan considers changes in climate through the year 2050. Each hazard section includes a summary of the climate change drivers that subsequently impact the likelihood or ongoing frequency of experiencing a given hazard.
- The mitigation actions and prioritization explicitly consider the vulnerability of particular populations that may be more sensitive to hazard impacts, and for whom recovery may be more difficult. The County HMP refers to these populations as 'socially vulnerable' groups and individuals.

As part of the ongoing update process, County staff from various departments, municipalities, and stakeholders in the community will work together to identify risks, quantify those risks, assess existing County and Municipal capabilities, and create a strategy and actions to reduce vulnerability.

Relationship to the CCRHVA

The CCRHVA builds on the information and data provided in the County HMP and Appendix 18 as specifically related to Plainsboro Township. The CCRHVA also is consistent with the mitigation strategy presented in the plan.

Recommendation

Continue to coordinate with the County on the implementation of the hazard mitigation action strategy and plan maintenance process described in the County HMP and participate in updates of the plan.

STORMWATER MANAGEMENT PLAN

The Plainsboro Municipal Stormwater Management Plan (MSWMP) was prepared by CME Associates and originally adopted in April 2005 and revised through January 2007. The MSWMP describes and documents the Township's strategy to address stormwater related impacts in a manner consistent with relevant stormwater management regulations promulgated by the NJDEP as set forth in N.J.A.C. 7:8-1 et seq. The preparation and adoption of a MSWMP is required pursuant to N.J.A.C. 7:14a-25, the New Jersey Municipal Stormwater Regulations (N.J.A.C. 7:14a-25). Pursuant to the New Jersey Municipal Land Use Law at N.J.S.A. 40:55D-94, the Stormwater Management Plan is an "integral" part of the Master Plan, but it is not listed as a separate Master Plan element.

The MSWMP addresses the ongoing operation and maintenance of the Township's stormwater management facilities and infrastructure and describes the strategy for evaluating variances or exemptions from the design and performance standards described in the Township's Stormwater Management Ordinance. The mitigation section of the MSWMP identifies stormwater management measures to lessen the impact of existing development. Accordingly, the MSWMP supersedes conflicting provisions of the Utility Service Plan.

The MSWMP is implemented through the adoption of the requisite municipal ordinances codifying the requirements for stormwater management in the review of proposed site plans and subdivisions. The Township's current Stormwater Management Ordinance (Ordinance 21-02) was adopted in 2021 and is included in Chapter 85 of the Township Code entitled Subdivision and Site Plan Review.

The Township also has adopted a Flood Damage Protection Ordinance (Ordinance 22-09). The ordinance provides for the delineation of flood hazard areas in the Township in accordance with standards for their delineation established by the U.S. Federal Emergency Management Agency (FEMA) and sets forth the regulations, in conjunction with the Uniform Construction Code, that provide minimum requirements for development located in flood hazard areas, including the subdivision of land and other developments.

Relationship to the CCRHVA

Given the fact that the most recent Township MSWMP was prepared in 2007, there is no explicit reference to climate change or climate change-related hazards in the plan. Having said that, many of the recommended strategies to minimize the adverse impacts of excessive impervious coverage and corresponding stormwater runoff in the Township, including the quantity of stormwater runoff, the impact to water quality of the Township's streams and water bodies, and groundwater recharge that are presented in the MSWMP are relevant to the strategies described in the CCRHVA for addressing the impacts of increased precipitation and flooding related to climate change.

Recommendation

Update the current Plainsboro Municipal Stormwater Management Plan to include an assessment of the impact of climate change on the stormwater management strategy in the Township. The Township's Stormwater Management Ordinance and Flood Damage Protection Ordinances were recently adopted and no changes to these ordinances are recommended.

2022 CAPITAL BUDGET AND CAPITAL IMPROVEMENT PLAN (CIP)

The 2022 Plainsboro Capital Improvement Plan (CIP) was adopted by the Township Committee as part of the municipal budget. The CIP identifies capital investments proposed for the current municipal fiscal year and a six-year capital program, including the anticipated project schedule and capital funding requirements through from 2022 through 2027.

Relationship to the CCRHVA

In analyzing the CIP and its relationship to the CCRHVA, specific focus is placed on any capital projects designed to address or improve resiliency to climate change-related hazards. In reviewing the current CIP, only one project—the Mill Pond Dam Study—appears to have any direct relationship to climate change-related hazards. The CCRHVA does not recommend any new capital projects to be included in the CIP.

Recommendation

No new capital projects related to climate change are currently proposed. However, the Township should continue to evaluate the potential impacts of climate change and consider including in the CIP any needed capital projects that improve the Township's resiliency to climate change-related hazards in the future.

ACTION PLAN

- A. The Land Use Plan Element is based upon the principles and assumptions contained in Chapter Two of the Master Plan, Statement of Principles and Assumptions, A Vision Statement and Policies, Standards, and Objectives or SOPAPS. The Land Use Element should be read in conjunction with the SOPAPS which gives an overview of all the elements of the Master Plan. Taken together these elements provide a comprehensive plan for the development of Plainsboro.
- B. The Land Use Plan Element spells out the existing and proposed location, extent, and intensity of development of land to be used in the future for residential, commercial, mixed use, industrial, agricultural, educational, and other public and private purposes. While the Master Plan is substantially consistent with the existing zoning regulations, it anticipates changes where necessary to achieve the vision set forth under the SOPAPS.
- C. The population density and development intensity recommended for the Township are those specified above. The Land Use Plan recommends continuation of the existing zoning and the level of development permitted through and by it.
- D. The Land Use Plan Element supports the redevelopment of properties in the public interest.
- E. The Land Use Plan Element encourages the ongoing careful and comprehensive planning of individual development sites that may need to be re-envisioned through the introduction of infill development, including new and different mixes of land uses, and physical site upgrades to become more attractive and smart growth oriented.
- F. Continue to support local and state planning objective within PA 4: preserve high values agricultural soils and agrarian properties and cluster development within such areas.
- G. Amend to the Township's zoning and subdivision/site plan regulations, as appropriate, to implement the Mixed-Use recommendations in the Land Use Plan.
- H. Work toward implementation of the recommendations in the Climate Change-Related Hazard Vulnerability Assessment.