Roberts
ENGINEERING GROUP LLC
Women Business Enterprise Certified

1670 Whitehorse-Hamilton Square Rd.
Hamilton, New Jersey 08690
609-586-1141 fax 609-586-1143
www.RobertsEngineeringGroup.com

Stormwater Management Plan

For

City of Trenton
Mercer County, New Jersey

August 2018

Revised: September 9, 2024

Our File No: T2302

Roberts Engineering Group, LLC
WBE/SBE Certified
1670 Whitehorse-Hamilton Square Road
Hamilton, New Jersey 08690

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Carmela Roberts, P.E., C.M.E., C.P.W.M.
NJPE License #NJ24GE034419000

Stormwater Program Coordinator: Dalia Ghobrial
609-954-0337 Cell
1502 Lamberton Road
Trenton NJ 08611

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Women Business Enterprise Certified

1670 Whitehorse-Hamilton Square Rd.
Hamilton, New Jersey 08690
609-586-1141 fax 609-586-1143
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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the City of Trenton ("the City") to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that individually or collectively result in:

1. The disturbance of one or more acres of land since February 2, 2004;

2. The creation of one-quarter acre or more of “regulated impervious surface” since February 2, 2004;

3. The creation of one-quarter acre or more of “regulated motor vehicle surface” since March 2, 2021; or

4. A combination of 2 and 3 above that totals an area of one-quarter acre or more. The same surface shall not be counted twice when determining if the combination area equals one-quarter acre or more.

Major development includes all developments that are part of a common plan of development or sale (for example, phased residential development) that collectively or individually meet any one or more of paragraphs 1, 2, 3, or 4 above. Projects undertaken by any government agency that otherwise meet the definition of “major development,” but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., are also considered “major development.”

These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

This plan also addresses the review and update of existing ordinances, the February 2015 City of Trenton Natural Resource Inventory[1], the May 2017

[1]Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

Trenton 2050 Environmental Report[2] and other planning documents to allow for project designs that include low impact development techniques. In addition, the plan includes a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

A "build-out" analysis has been included in this plan based upon existing zoning and land available for development.

MSWMP Goals

The goals of this MSWMP are to:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in- stream structures;
- Maintain groundwater recharge;
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Maintain the integrity of stream channels for their biological functions, as well as for drainage;
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water;
- Protect public safety through the proper design and operation of stormwater basins;
- Maintain and put into practice the stormwater control ordinance in

[2] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May

accordance with N.J.A.C. 7: 8-4 and continue complying with New Jersey Soil Erosion and Sediment Control Standards; and

- Advance the City of Trenton's Trenton250 Master Plan framework which consists of four key areas in which the City must make improvements to effectively achieve the community-driven vision and align with the guiding principles. These key areas are Safe Environment; Natural Resources and Open Space; Climate and Natural Hazard Resiliency; and Conservation and Energy Efficiency

The anticipated adoption of this report along with the City of Trenton Stormwater Pollution Plan (May 2024)", and stormwater management ordinances will provide a strong and supportive stormwater management standard throughout the City.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventive and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (**Figure 1**) of a site and an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site' s evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel.

Filtration of runoff and removal of pollutants by surface and channel vegetation is

eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious areas can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

Background

General background information relevant to the City's stormwater control was previously provided in the August 2018 Municipal Stormwater Management Plan[3] and originally excerpted from the City of Trenton Natural Resources Inventory[4] completed in February 2015 by the Delaware Valley Regional Planning Commission (DVRPC). All maps and data pertinent to the information discussed have been updated and are provided in the attachments.

Development within the City resulted in changes in the landscape and increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. **Figure 2** depicts the City's boundary on the USGS Quadrangle Map. **Figure 4** depicts the Existing Land Use Map and **Figure 8** is the City's Zoning Map. **Figure**

[3] Municipal Stormwater Management Plan, City of Trenton, August 2018
[4] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

7 illustrates the waterways in the City. Recognizing that the City is small, less than 9 square miles for its population, it is important that new development and any redevelopment will not negatively impact stormwater management.

Social Character

The City is located along the banks of the Delaware River and is bordered by the Mercer County municipalities of Ewing Township (north), Lawrence Township (east), and Hamilton Township (south). The total area of Trenton is 5.270.09 acres, or about 8.23 square miles. The boundary of the City extends to the middle of the Delaware River and includes several small uninhabited islands. Several major transportation corridors pass through Trenton, including US Route I and the Northeast Corridor Railroad. In the 2020 United States census, Trenton was the state's 10th-most-populous municipality, with a population of 90,871 an increase of 5,958 (+7.0%) from the 2010 census count of 84,913, which in turn had reflected a decline of 490 (−0.6%) from the 85,403 counted in the 2000 census[5].

Streams and Surface Water Quality Threats to Streams

The most significant body of surface water is the Delaware River, which is tidal until reaching the Falls of the Delaware, south of the Route 1 bridge. Another major surface water resource is the man-made Delaware and Raritan (D & R) Canal, built in the 1830s to transport freight between the Delaware and Raritan Rivers[6]. All waterways in the City drain to the Delaware & Raritan Canal or the Delaware River except for an area in the most southern and eastern portion of the City which drains toward the Crosswicks Creek. The largest tributary creeks and streams in the City include the Shabakunk Creek, Pond Run, and the Assunpink Creek. The southeastern portion of the City drains to either Spring Lake or Rowan Lake which lie within tidally influenced wetland area of Crosswicks Creek. (See ·Figure ??[7]

Assunpink Creek is the third major surface water resource in Trenton. There are several dams along the creek, which create lakes, including Assunpink and Mercer Lake. Assunpink Creek is channelized through much of Trenton, and it is buried in a culvert beneath the interchange of Routes 1, 33, and 129. Another culverted section of the stream between Broad and Warren Streets is the subject of an Army Corps of Engineers “daylighting” project that will expose and restore the stream to natural daylight and channel conditions[8].

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[5] Total Population: Census 2010 - Census 2020 New Jersey Municipalities
[6] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015
[7] Municipal Stormwater Management Plan, City of Trenton, August 2018
[8] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May 2017

Nonpoint source pollution is the primary source of surface water and groundwater contamination. Nonpoint source pollution may be defined as pollution originating from a diffuse, unconfined discharge of water from the land to a receiving body of water.

Nonpoint pollution results when rain or snow melt flows over land that has been modified through use or activities, such as excavation, dumping of chemicals, fuels or lubricants and application of fertilizers or pesticides. Existing conditions in Trenton may contribute to nonpoint pollution of surface water. Agriculture, urban runoff, construction activities and illegal dumping can lead to discharges of sediment, phosphorus, nitrogen, metals, pesticides, herbicides, and salts. These contaminants can result in deleterious impacts to fish populations, water supply, wetlands, and recreational resources.

Non-point source pollution can be managed through public education, regulatory controls and facility management. Public education may include newsletters, brochures, information hotlines, workshops, and signage. Local regulatory controls may include impervious surface limitations, overlay zoning districts, and stream buffers. Facility management may include reduced road salting, proper storage of bulk materials, street cleaning, filter swales and urban forestry.

According to the draft New Jersey Department of Environmental Protection (NJDEP) NJDEP 2012 Integrated Water Quality Report, every subwatershed in Trenton is characterized as Not Supporting (NS) for at least one designated use. There is Insufficient Information (II) for many designated uses[9]. This characterization is reported as the same in the NJDEP 2018-202 Integrated Water Quality Report[10].

Topography

Trenton rests along the fall line separating the Piedmont Plateau and the Atlantic Coastal Plain. The land to the north of the Delaware and Raritan Canal is higher in elevation than areas to the south. However, the majority of Trenton is relatively flat, with slopes of less than five percent. A band of steep slopes, or bluffs, is located along the Delaware River waterfront. Another area of steep slopes is a wooded area between Enterprise Avenue and Route 1, as well as on the banks of the Assunpink Creek[9]. (See Figure ??' Topography)

Watersheds

[9] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

[10] NJDEP 2018-202 Integrated Water Quality Report, https://njdep.maps.arcgis.com/apps/MapSeries/index.html?appid=b5d39074f9ab424689caa8ec387dcef7

The City of Trenton is in the regional Mid-Atlantic HUC2 accounting unit (02), which includes all of New Jersey. Trenton falls within two HUC8 watersheds with the north and west areas of the city being in the Central Delaware watershed, while the southern area of the city is in the Assiscunk, Crosswicks, and Doctors watershed. These areas are further divided into smaller HUC11 and HUC14 sub watersheds. All land in the city eventually drains to the Delaware River[11]. (See Figure ?? Watershed)

Soils

Most soils in Trenton are categorized as urban land consisting of land that was cut and filled for development and has lost the properties of its original soil horizon. Dredged fill material classified as Udorthents encompasses the eastern and southern portions of Trenton. The westernmost areas of Trenton maintain their soil profiles, which include a variety of sandy and loam soils[11]. (See Figure ?? 'Soils Map')

Land Use/Land Cover

Land use is a description of how people use the land, such as commercial or residential, whereas land cover is a description of the physical cover of the earth's surface, including vegetation, manmade structures, pavement, forest, or grasslands. Land cover can be determined by analyzing aerial and satellite imagery. The NJDEP analyzes the land use and land cover of the state based on aerial photography. The last completed analysis is based on aerials from 2007. The largest land use type found in Trenton is residential, which covers over 40 percent of the city and is mostly categorized as high density. This is followed by commercial/services covering 20 percent of the city, which includes institutional and government buildings[11]. (See Figure ?? Land Use Land cover Map)

The quantity of impervious surfaces draining directly to local waterways is the primary cause of stormwater runoff, nonpoint source pollution flooding and erosion. Many of these impervious surfaces are immediately connected to local waterways, meaning that the total volume of stormwater that lands on these surfaces will go straight into the waterways without any chance of recharging or treatment. Water resources are typically managed on a watershed/sub watershed basis. Table I provides an impervious cover analysis for each subwatershed within the City. On a subwatershed basis, impervious cover ranges from 35.2% to 61.9%[12]. Evaluating impervious cover on a subwatershed basis can help focus the City's efforts to reduce the stormwater impacts of impervious cover in areas where flooding occurs most frequently, and water quality is compromised.

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[11] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

[12] Municipal Stormwater Management Plan, City of Trenton, August 2018

Natural Vegetation

Land classified as natural vegetation includes those areas where plants exist spontaneously without regular management or maintenance. Natural vegetation types are categorized as wetlands, upland forests, and grasslands.

The wetlands, upland forests, and grasslands of Trenton are significant, principally, in two ways: they provide large contiguous expanses of wildlife habitat, and they form the green infrastructure of the city. Substantial benefits are derived from the preservation of the State's open space. These benefits are accorded to the ecological systems that are within, and connected to, open space lands and the organisms that depend on open space for habitat.

Forests, wetlands, grasslands, and streams, each a distinct habitat within the City of Trenton, accommodate a great diversity of native and indigenous plant and animal species. Forests, wetlands, and grasslands serve as pollutant filters, reducing the number of contaminants in overland stormwater runoff prior to reaching streams and other bodies of water.

Threats to wetlands exist, without the potential for development, through the behavior and practices of existing residents and businesses. Removal of vegetation, soil disturbance, dumping of household yard waste and the use encroachment can all act deleteriously upon existing wetland areas. The Trenton 250 Report indicates that one of the major issues raised by the community was the pervasiveness of litter and trash in Trenton along with issues with solid waste management and illegal dumping. This
poses health risks to residents and contributes to contamination of rivers and natural environments[13].

The largest area of natural vegetation in Trenton is Rotary Island, an undeveloped area of mostly forested wetlands. Other areas identified as natural vegetation include Mercer Cemetery, Stacey Park, and portions of the D & R Canal, the Assunpink Greenway, Cadwalader Park, the Trenton Psychiatric Hospital, and other areas[14].

The southern end of Trenton adjacent to the Abbott Marshlands consists of a variety of wetland types along with deciduous forest. There are a total of 241 acres of natural vegetation in Trenton, excluding water. The largest type is deciduous

[13] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May 2017

[14] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

forest, covering approximately 130 acres[14].

Wetlands are home to nearly 33% of the State's threatened and endangered species. Forests, in addition to reducing stormwater runoff and preventing soil erosion, also reduce the number of pollutants in the air by absorbing carbon dioxide and releasing oxygen. These actions are beneficial to the health and wellbeing of wildlife and humans.

Floodplains

Areas naturally subject to flooding are called floodplains or flood hazard areas. The 100-year floodplain is defined as the land area that will be inundated by the overflow of waterways resulting from a flood that has a 1-in-100 chance of flooding in any given year. The 500-year floodplain is defined as the area that has a 1-in-500 chance of flooding in any given year. Within Trenton the 100-year floodplain includes portions of the Glen Afton and Island neighborhoods. a residential area south of Ferry Street in South Trenton, the entire Route 29 corridor, the Route 1 interchange area, and portions of the Northeast Corridor railroad[15]. (See Figure ?? 100 Year and 500 Year Flood Plain)

Rare Wildlife

The Landscape Project is a project of the NJDEP Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) to identify and record threatened and endangered species habitat. The Landscape Project identifies species-specific habitat in the state based on a combination of two factors: (1) land use/land cover areas specific for each species and (2) species occurrence records from the Biotics database. Within Trenton, important habitat for rare species is predominantly located within and along the banks of the Delaware River, the D & R Canal, and Assunpink Creek. Two endangered species (the Shortnose Sturgeon and the Bald Eagle) as well as two species of special concern (Great Blue Heron and Cobra Clubtail) are found in Trenton[15].

Potential Impacts

The NJDEP has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as excellent, good, fair, or poor based on the AMNET data. The information gathered contributes to state water quality management and pollution mitigation efforts.

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[15] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

As noted previously, for the municipality of Trenton, the most significant body of surface water is the Delaware River. The largest tributary creeks and streams in the City include the Shabakunk Creek, Pond Run, and the Assunpink Creek. The southeastern portion of the City drains to either Spring Lake or Rowan Lake which lie within tidally influenced wetland area of Crosswicks Creek.

The AMNET station ANO116 located on Mulberry St, Trenton on the Assunpink Creek is classified as poor[16,17].

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the Federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

According to the NJDEP 2018-20 Integrated Water Quality Report, every subwatershed in Trenton is characterized as Not Supporting (NS) for at least one designated use. There is Insufficient Information (II) for many designated uses[18].

The NJDEP Total Maximum Daily Load (TMDL) Look-Up Tool[19] was developed to allow New Jersey's municipal stormwater program coordinators to quickly identify Total Maximum Daily Load (TMDL) information in relation to Municipal Separate Storm Sewer Systems.

The below data is reported for City of Trenton, Mercer County.

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[16] https://www.nj.gov/dep/wms/bfbm/amnet.html
[17] Ambient Biomonitoring Network, Northwest Water Region, Upper Delaware and Wallkill River Drainages, page 44, Map 7
[18] 2018 – 2020 Integrated Report, State https://njdep.maps.arcgis.com/apps/MapSeries/index.html?appid=b5d39074f9ab424689caa8ec387dcef7
[19] https://dep.nj.gov/njpdes-stormwater/municipal-stormwater-regulation-program/tmdl/

Total Maximum Daily Load (TMDL) Information

Municipality and County
Trenton City
Mercer County

Total Maximum Daily Load(TMDL) Information for Selected Municipality:

Applicable Stream TMDL(s)

- Total Maximum Daily Loads for Fecal Coliform to Address 28 Streams in the Northwest Water Region

  Fecal Coliform - 2003 : Assunpink Creek, Shabakunk Creek, Little Shabakunk Creek, Pond Run : View the TMDL Document
- Total Maximum Daily Load for Mercury Impairments Based on Concentration in Fish Tissue Caused Mainly by Air Deposition to Address 122 HUC 14s Statewide

  Mercury - 2017 : Shabakunk Creek WB : View the TMDL Document
- Total Maximum Daily Loads for Polychlorinated Biphenyls (PCBs) for Zones 2 - 5 of the Tidal Delaware River

  Polychlorinated Biphenyls (PCBs) - 2003 : Duck Creek and UDRV to Assunpink Ck : View the TMDL Document
- Total Maximum Daily Loads for Polychlorinated Biphenyls (PCBs) for Zones 2 - 5 of the Tidal Delaware River

  Polychlorinated Biphenyls (PCBs) - 2003 : Shady Brook/Spring Lake/Rowan Lake : View the TMDL Document

Applicable Lake TMDL(s)

None

Applicable Shellfish TMDL(s)

None

Within Trenton, important habitat for rare species is predominantly located within and along the banks of the Delaware River, the D & R Canal, and Assunpink Creek. Efforts to enhance and protect riparian areas will help protect endangered species while making improvements to water quality. The City should consider City-wide efforts such as a 'Green Infrastructure Program' and/or a 'Riparian Area Protection and Enhancement Program' both of which have allowed other cities to filter water before pollutants meets major waterways. Anti-litter campaigns and antidumping will block trash and contamination from entering waterbodies in the first place, easing the burden on the natural system. Since this trash ultimately ends up in the stormwater system, stopping it at the source helps tackle polluted stormwater and groundwater[20].

Specific projects that seek to enhance certain assets, like the Assunpink Creek, can also make major impacts on water quality while providing residents with key amenities. Many of the problems with Trenton's water quality is the result of pollutants entering the system from upstream. As such, the City must advocate for comprehensive watershed management strategies that enhance water quality throughout the region[20].

[20] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May 2017

Strategic greening of the city will serve to remove a percentage of stormwater from Trenton's sewer system and allow riparian buffers to function naturally to mitigate storm flows from upstream areas. The City should follow Philadelphia's example and implement a comprehensive green infrastructure program that captures stormwater before it enters the CSO. In addition, greening the city, "will improve air quality, reduce urban heat island effects and providing open areas for city residents and visitors take advantage of physical exercise opportunities. The interconnection of these green spaces will restore the natural ecosystem functions sustaining clean air and water." (APA – City Parks Forum Briefing Papers 05 "How cities use parks for Green Infrastructure", 2001).

The Trenton 250 notes that "Greening the City can also function as a key component to improving resident health, removing barriers to redevelopment through brownfield remediation, increasing property values and providing venues for social interaction. New and improved parks and greenways will serve to better connect multiple wards within the City, providing opportunities for increased understanding and, when properly monitored, ultimately leading to long-range crime reduction. Moreover, greening of the City will have a positive impact on property values in neighborhoods: they make streets more attractive and enjoyable to walk down, which has a positive impact on property values. As such, greening the City can be an effective way of supporting the City's economic development and housing goals"[21].

The Trenton 250 report also notes the implementation of a Combined Sewer Overflow Management Program to eliminate the potential for discharges. In addition, the potential for two major projects -the Assunpink Creek Greenway Park and the Waterfront Reclamation and Redevelopment Project can add major open space areas to meet the needs of current and future generations. The parks provide an opportunity to expand the amount of passive and active open space available to residents and expand the types of open space offered in response to Trenton's changing demographics

Flooding continues to be a significant issue in the City. As imperviousness has increased in and around the Trenton, the peak and volumes of stream flows also increased. The increased amount of water resulted in stream bank erosion, which

[21] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May 2017

resulted in unstable areas at roadway crossings, and degraded stream habitats. The increased imperviousness within the City has decreased groundwater recharge, decreasing base flows in streams during dry weather periods. Lower base flows can have a negative impact on instream habitat during the summer months. A map of the groundwater recharge areas is shown in **Figure 3**.

Trenton is located at the confluence of the Assunpink Creek and the Delaware River. The combination of these major geographic features reduces the ability for stormwater to leave the drainage basin and leads to back water effects and "stacking" of floodwaters within the City Limits. Nearly 20% of Trenton is within the 100 and/or 500-year floodplain. Approximately 50% of the Transportation/Communications and Utility infrastructure areas of the city are affected by floodplain issues. To a large degree, these areas are located along the low-lying natural waterways of the City. The protection of this transportation, utility and communication infrastructure is essential to Trenton's ability to prevent widespread damage and recover from large-scale storm events[22].

In accordance with the Federal Disaster Mitigation Act of 2000 the City of Trenton has a natural hazard mitigation plan that is organized into ten sections. The plan is part of the Mercer County Hazard Mitigation Plan, which also includes other jurisdictions in Mercer County and was last updated in 2021[23]. The plan helps local, and state governments identify their needs for mitigation, which can lead to faster funding and more effective risk reduction projects.

Category One Waterways

Special water resource protection areas shall be established along all waters designated Category One, in accordance with N.J.A.C. 7:9B, and perennial and intermittent streams that drain into or upstream of Category One waters as shown on, the USGS Quadrangle Maps.

The Category One areas are established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance and exceptional fisheries significance of the established Category One waters. The Category One areas shall be designated and protected by a 300-foot special water resource protection area on each side of the waterway, consisting of existing vegetation or vegetation

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[22] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May 2017

[23] Mercer County Multi-Jurisdictional Hazard Mitigation Plan 2021, https://www.mercercounty.org/departments/emergency-management-public-safety/mercer-county-hazard-mitigation-plan

allowed to follow natural succession. [These waters require protection from measurable changes in their water quality characteristics, including clarity, color, scenic setting, and other characteristics (N.J.A.C. 7:9B-1,4)]

Category One designations are a significant effort to safeguard high-quality drinking water supplies and will also help preserve water quality for streams and waterways that serve as critical habitat for many threatened and endangered species.

There are no Category one rivers in Trenton.

According to the NJDEP, “A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two-, five-, and twelve-year period for unconfined wells. The confined wells have a fifty-foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations (see NJAC 7:10-11.7(b)1).” WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well, assigning potential contamination and appropriate monitoring.

There are no Well head protection areas rivers in Trenton.

Groundwater recharge rates for native soils in this area are generally between ?? and ?? inches annually. The average annual groundwater recharge rates are shown graphically in **Figure 3**.

Design and Performance Standards

Trenton has adopted the design and performance standards for stormwater management measures as presented in NJ.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity in receiving water bodies and loss of groundwater recharge in receiving water bodies The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with NJ.A.C. 7:8-6 Safety Standards for Stormwater Management Basins.

Included in the attachments is a questionnaire outlining the specific requirements for the design and performance of stormwater management measures as set forth in N.J.A.C. 7:8. All applicants are encouraged to review the questionnaire prior to submitting a stormwater management plan to the City for review. The planning board requires that all applicants, applicant professionals, and planning board review professionals testify that all items have been addressed as outlined in the questionnaire prior to stormwater management plan approval.

During and after construction, City of Trenton inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed.

Plan Consistency

The City is ????? within a Regional Stormwater Management Planning Area and ?? TMDLs have been developed for waters within the City to date; therefore, this plan does ?? need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent????.

This Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) a N.J.A.C. 5:21. The City will utilize the most current update of the RSIS in the stormwater review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates of the RSIS. This Municipal Stormwater Management Plan is consistent with the draft 2024 Stormwater Pollution Plan.

The City's Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey' s Soil Erosion and Sediment Control Standards. During construction, City inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District. Additionally, the City will copy the ??? Soil Conservation District on key correspondence.

The Municipal Stormwater Management Plan is consistent with the Trenton 250 Master Plan[24]. The Trenton250 Master Plan culminates multiple plans and studies for various environmental and redevelopment issues over the past 15 plus years. The previous plans were well researched and structured but, in some instances,

[24] Environmental Topic Report, Trenton 250, Trenton Division of Planning, Group Melvin Design, May 2017

lacked stakeholder involvement and substantial public participation and therefore did not have universal acceptance. The studies represented within these previously conducted plans, together with stakeholder and public input were key components to focus the recommendations and develop the environmental initiatives of the Trenton250 Master Plan.

The Trenton250 Master Plan framework consists of four key areas in which the City must make improvements to effectively achieve the community-driven Vision and align with the Guiding Principles. These key areas are:

• Safe Environment;
• Natural Resources and Open Space;
• Climate and Natural Hazard Resiliency; and
• Conservation and Energy Efficiency

Initiatives recommended and outlined in the Trenton250 Master Plan and as noted below are consistent and align with the Municipal Stormwater Management Plan. These initiatives address one or all the key areas noted above. It is recommended that Trenton continue to ???? to move these initiatives.

- Assunpink Creek Park Project
- Brownfield Action Plan Implementation
- Environmental Services Department
- Floodplain Restoration Program
- Lead Paint Home Stabilization Initiative
- Lead Hazard Control Assistance Fund Advocacy
- Vacant Lot Stabilization Program
- Trenton250 Stormwater Management Report
- Anti-Litter & Anti-Dumping Campaign
- Assunpink Daylighting Project
- Blight to Open Space Program
- Comprehensive Watershed Management Advocacy
- Green Infrastructure Program
- Recycling Education Campaign
- Riparian Area Protection and Enhancement Program
- Community Garden and Urban Agriculture Support Program
- Street Tree Planting and Maintenance Program
- Island Neighborhood Flood Plan
- Trenton250 Utilities Report
- Utility Resiliency Partnership
- Waterfront Reclamation and Redevelopment Project

- Chief Resilience Officer (CRO)
- Sustainable Jersey Gold Certification
- Resiliency and Sustainability Strategy Report
- Develop Environmental Commission

Nonstructural Stormwater Management Strategies

The City has reviewed the master plan and ordinances and has provided a list of the sections in the City land use and zoning ordinances that have been modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified as recommended. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within 12 months of adoption of the stormwater management plan. A copy will be sent to the Department of Environmental Protection at the time of submission.

The following ordinances have been adopted to address the requirements of the Stormwater Management Rules.:

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Illicit Connections to the Municipal Separate Storm Sewer System and to amend Chapter 254 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Littering and to amend chapter 150 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Pet Waste and to amend chapter 21 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Feeding of Wildlife and to amend chapter 21 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Privately-owned Refuse Containers and Dumpsters and to amend chapter 254 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Yard Waste and to amend chapter 312 and 248 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Spilling, Dumping or Disposal of Materials other than Stormwater and to amend chapter 254 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Privately-owned Salt Storage and to amend chapter 254 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Retrofitting of Storm Drain Inlets and to amend chapter 254 of the Code of the City of Trenton.

An ordinance of the City of Trenton to adopt NJDEP's model ordinance regarding Tree Removal and Replacement to amend chapter 287 of the Code of the City of Trenton.

The following Chapters have been in effect prior to the 2018 Stormwater Management Plan and continue to support the City's dedication to supporting a solid Stormwater Management program:

1. ??

2. ?? et

Land Use/Build-Out Analysis

A detailed land use/build out analysis for the City was conducted. **Figure 4** illustrates the existing land use in the City based on 1995/97 GIS information from NJDEP. This figure also illustrates the constrained lands with the City. **Figure 7** illustrates the HUC14s within the City. The City's Zoning Map is shown in **Figure 8**.

As previously noted, Table I provides an impervious cover analysis for each subwatershed within the City. On a subwatershed basis, impervious cover ranges from 35.2% to 61.9%. Evaluating impervious cover on a subwatershed basis can help focus the City's efforts to reduce the stormwater impacts of impervious cover in areas where flooding occurs most frequently, and water quality is compromised.

According to the 2015 Natural Resource Inventory, there remains 185.44 acres of developable land in the City which is significantly less than one square mile of developable lands, as one square mile is equivalent to 640 acres[25]. Impervious areas within the acres of developable land could be as much as ?? acres under

[25] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

current ordinances. Since developable lands are less than one square mile no additional analysis has been performed to address pollutant loadings at full build-out.

Mitigation Plans

Applicants for development will be expected to mitigate the impacts of development on stormwater at their own site or other sites within the subject watershed that it controls. No variances and exemptions from the standards shall be granted unless it is technically infeasible to meet the requirements.

It is more practical for any new development to provide on-site stormwater facilities rather than implementing a municipal system that would disrupt the existing built environment.

If it is technically infeasible to meet the requirements, the mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project including the maintenance requirements under Chapters 8 through 11 of the NJDEP Stormwater BMP Manual (Revised March 2021)[26].

Additionally, the previous 2018 Plan notes that the applicant shall provide sufficient information and documentation to the satisfaction of the Planning Board and their professionals that the variance can be granted, and mitigation can be approved with no detrimental impact on the environment and/or adjoining properties. Further that the applicant/developer shall enter into a developer's agreement with the City. The subject agreement shall address issues related to the mitigation project specifically construction and maintenance.

The City of Trenton is proposing this mitigation plan as an element of its Municipal Stormwater Management Plan which will allow the municipality to grant variances or exemptions to the design and performance standards for storm water runoff quality, storm water runoff quantity, and groundwater recharge, established under the Stormwater Management rules at N.J.A.C. 7:8-5. This mitigation plan does not preclude the requirement that an applicant must meet the design and performance standards for storm water runoff quality, storm water runoff quantity, and

[26] The New Jersey Stormwater Best Management Practices Manual (BMP manual), https://dep.nj.gov/stormwater/bmp-manual/

groundwater recharge on site to the maximum extent practicable. This plan will allow the City of Trenton to waive strict compliance of one or more of the performance standards, where full compliance cannot be reasonably accommodated on site, including through a reduction in the size or scale of the development.

Sensitive Receptors

Sensitive receptors are areas with specific sensitivity to impacts of storm water, whether through changes in storm water runoff quality, storm water runoff quantity, and groundwater recharge. Sensitive receptors within the City for which mitigation may be requested are listed below:

- **Storm Water Quality**
    - Category One Waters
    - Threatened and Endangered Species Habitats
- **Storm Water Quantity**
    - Inadequate Culvert
    - Property Subject to Flooding
    - Category One Waters
    - Freshwater Wetlands
- **Groundwater Recharge**
    - Freshwater Wetlands
    - Category One Waters
    - Aquifers

According to the Natural Resource Inventory, Rotary Island, an undeveloped area of mostly forested wetlands is largest area of natural vegetation in Trenton. Other areas identified as natural vegetation include Mercer Cemetery, Stacey Park, and portions of the D & R Canal, the Assunpink Greenway, Cadwalader Park, the Trenton Psychiatric Hospital, and other areas. The southern end of Trenton adjacent to the Abbott Marshlands consists of a variety of wetland types along with deciduous forest. There are a total of 241 acres of natural vegetation in Trenton, excluding water. The largest type is deciduous forest, covering approximately 130 acres[27].

[27] Natural Resource Inventory, Trenton Division of Planning, Delaware Valley Regional Planning Commission, February 2015

The NRI notes that within Trenton, important habitat for rare species is predominantly located within and along the banks of the Delaware River, the D & R Canal, and Assunpink Creek. The Shortnose Sturgeon and the Bald Eagle are two endangered species found in Trenton and the Great Blue Heron and Cobra Clubtail are two species of special concern also found in Trenton.

Within Trenton, the 100-year floodplain includes portions of the Glen Afton and Island neighborhoods, a residential area south of Ferry Street in South Trenton, the entire Route 29 corridor, the Route 1 interchange area, and portions of the Northeast Corridor railroad. An effective Flood Hazard Map for City of Trenton and surrounding was released by the Federal Emergency Management effective July 20, 2016.

Mitigation Projects

Mitigation projects should also be as close in terms of hydrology and hydraulics to the proposed development/redevelopment as possible. The applicant must ensure the long-term maintenance of the project including all maintenance required in Chapters 8 and 9 of the NJDEP BMP Manual. Applicants must propose a mitigation project that is equivalent to the type requested in the variance, meaning a "stormwater quality" variance can only be mitigated by a "stormwater quality" mitigation project. Proposed mitigation projects cannot adversely impact the existing environment.

Applicants are encouraged to discuss potential mitigation projects with the Trenton Green Team and Green Infrastructure Partners. Efforts are ongoing to identify and prioritize green infrastructure projects throughout the City of Trenton and are being compiled in a City-wide green infrastructure feasibility plan. It is the applicant's responsibility to provide a detailed study of any proposed mitigation project and must provide the City with a proposed mitigation plan for review and approval prior to granting final approval for site development. Applicants should include the following in a developer proposed mitigation plan:

Developer Proposed Mitigation Projects

The City of Trenton will consider a developer-initiated mitigation project. However, the following must be considered when making a proposal:

1. The location of the mitigation project must be located such that it will provide the most benefit.

2. Legal authorization must be obtained to construct the project at the selected location. This includes the maintenance and any access needs for the project in the future.

3. The project should be close to the location of the original project.

4. It is preferred that one location addresses all the performance standards.

5. The project location must demonstrate no adverse impacts to other properties.

6. Projects addressing the groundwater recharge performance standard are preferred to be located upstream of the actual project site. Groundwater recharge mitigation may include rehabilitation of existing detention or retention basins. installation of permeable pipe underdrains. and/or other proposed and approved projects that would encourage infiltration of runoff to groundwater recharge.

7. Projects that address storm water runoff quantity can choose to provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction. Water quality/water quantity mitigation projects may include installation of BMPs within the municipal drainage system and/or outfall locations, total suspended solid and nutrient load reduction. desilting and de-snagging of stream corridors. rehabilitation of culverts and/or ditches in major watershed basins, and rehabilitation of existing ponds. lakes, and waterways and/or other proposed and approved projects that would result in meeting water quality and water quantity improvements.

8. Stream corridor protection mitigation projects may include bank stabilization, restoration of floodplain areas, vegetation improvement/enhancement and/or other proposed and approved projects that protect the stream corridors.

Requirements for Mitigation Projects

The following requirements for mitigation projects, proposed by a developer must be included in the project submission. All mitigation projects must provide mitigation for storm water runoff quantity, storm water runoff quality and groundwater recharge at a one-to-one ratio. For example, if the developer is unable to provide recharge at the development site due to a high groundwater condition or other reason, the developer must provide an exact amount of groundwater recharge at the mitigation site.

1. General

a. Mitigation project name, owner name and address, developer name and address, mitigation project location. drainage area, cost estimate

2. Impact from Noncompliance

a. Provide a table to show the required values, and the values proposed in the project, and include an analysis demonstrating that on-site compliance was maximized.

3. Narrative regarding Waiver

a. The waiver cannot be due to a condition created by the applicant.

b. Site specific conditions inhibiting the placement of a storm water management facility must be discussed and supporting information submitted. The City will consider whether an extraordinary hardship on the applicant has been brought about by circumstances peculiar to the property.

4. Sensitive Receptor

a. The applicant is to identify the sensitive receptor related to the performance standard from which a waiver is sought.

b. Proposed mitigation strategy and impact to sensitive receptor, what is being impacted, mitigated, and how

5. Design of the Mitigation Project

a. The applicant is to provide the design details of the mitigation project including but not limited to drawings or calculations or other information necessary.

b. Groundwater recharge mitigation may include rehabilitation of existing detention or retention basins. installation of permeable pipe underdrains. and/or other proposed and approved projects that would encourage infiltration of runoff to groundwater recharge

6. Responsible Party

a. The applicant is to provide the party or parties responsible for the construction and the maintenance of the mitigation project.

b. The developer will be the construction party and the party responsible for the maintenance of the mitigation project for a period of up to one year after construction is complete. Depending upon the type of developer selected mitigation project the party responsible for maintenance may be an entity other than the City itself.

7. Maintenance

a. Include a maintenance plan that addresses the criteria at N.J.A.C. 7:8-5.8.

b. Should the developer select a mitigation project and desire to have the project be maintained by the municipality, the City may consider the transfer of maintenance responsibility if the applicant provides for the cost of maintenance in perpetuity. This decision will be made on a project-by-project basis. The developer is not guaranteed that the City will become the party responsible for maintenance of any mitigation project.

8. Permits

a. For any developer-initiated mitigation project, all permits and fees are to be obtained and paid for directly by the developer.

b. Permits for any mitigation project will be considered a condition of approval from the municipality and must be obtained prior to final approval.

9. Construction

a. Construction of the mitigation project must coincide with the construction of the proposed project. In no case shall the proposed project be completed prior to the mitigation project. A Certificate of Occupancy or other final approval by the municipality will not be issued until the mitigation project receives final acceptance.

Figure 1: Groundwater Recharge in the Hydrologic Cycle

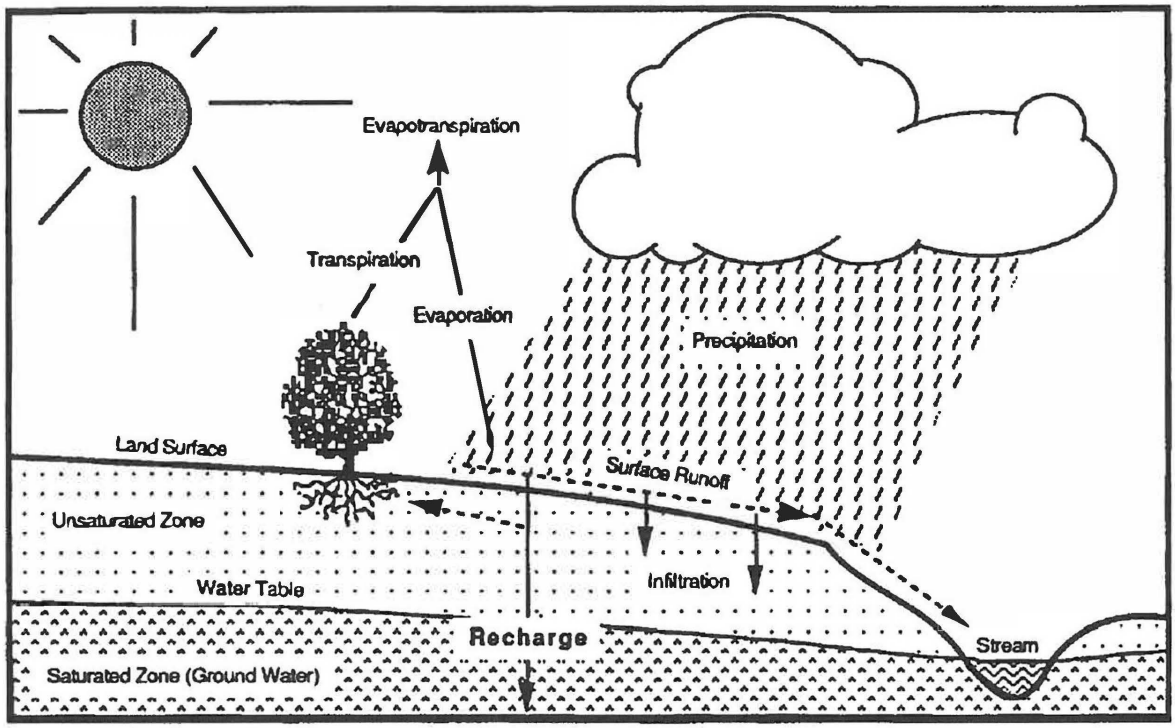

Figure 2: Borough Boundary on USGS Quadrangles

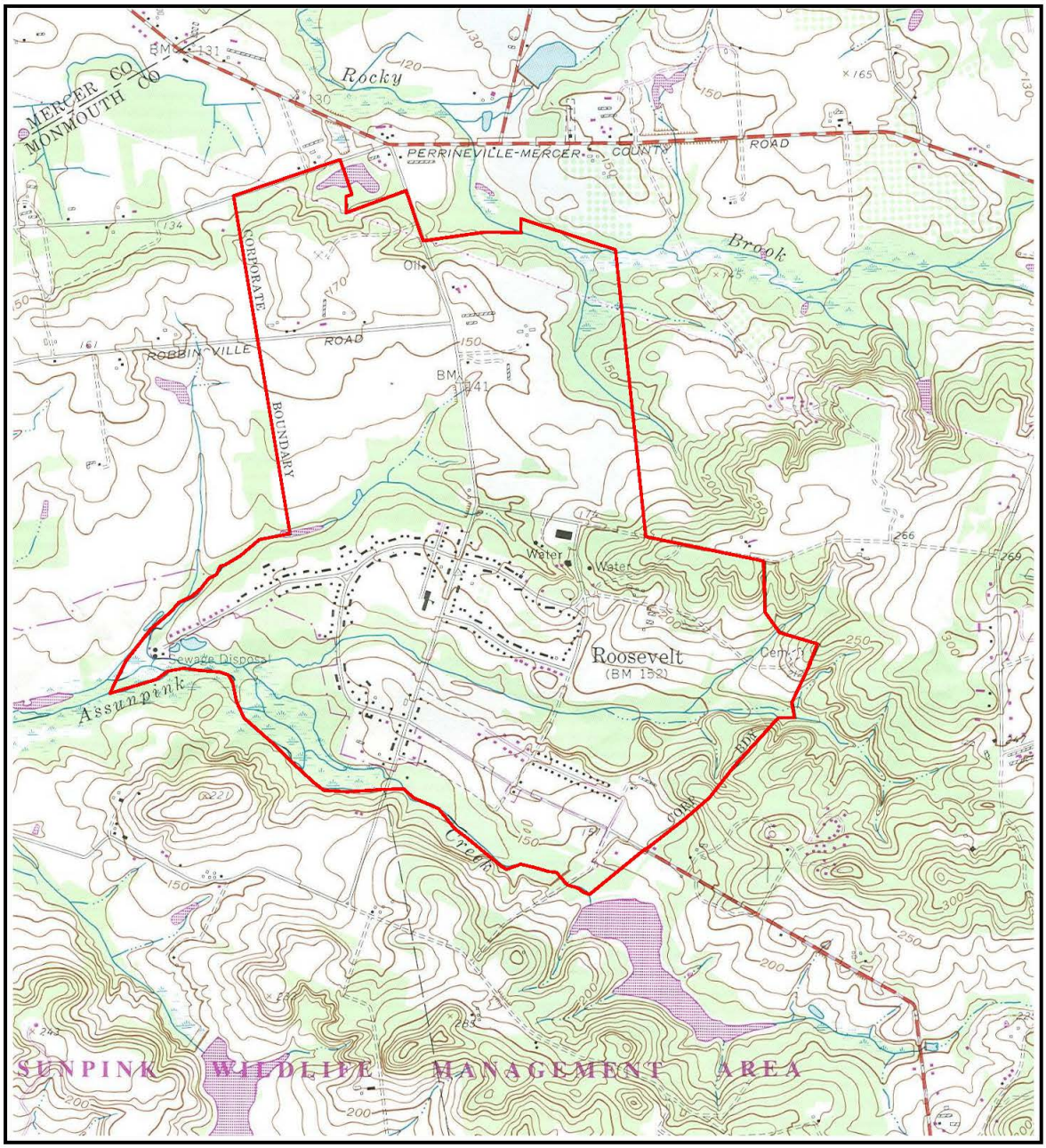

Figure 3: Groundwater Recharge Areas in the Borough

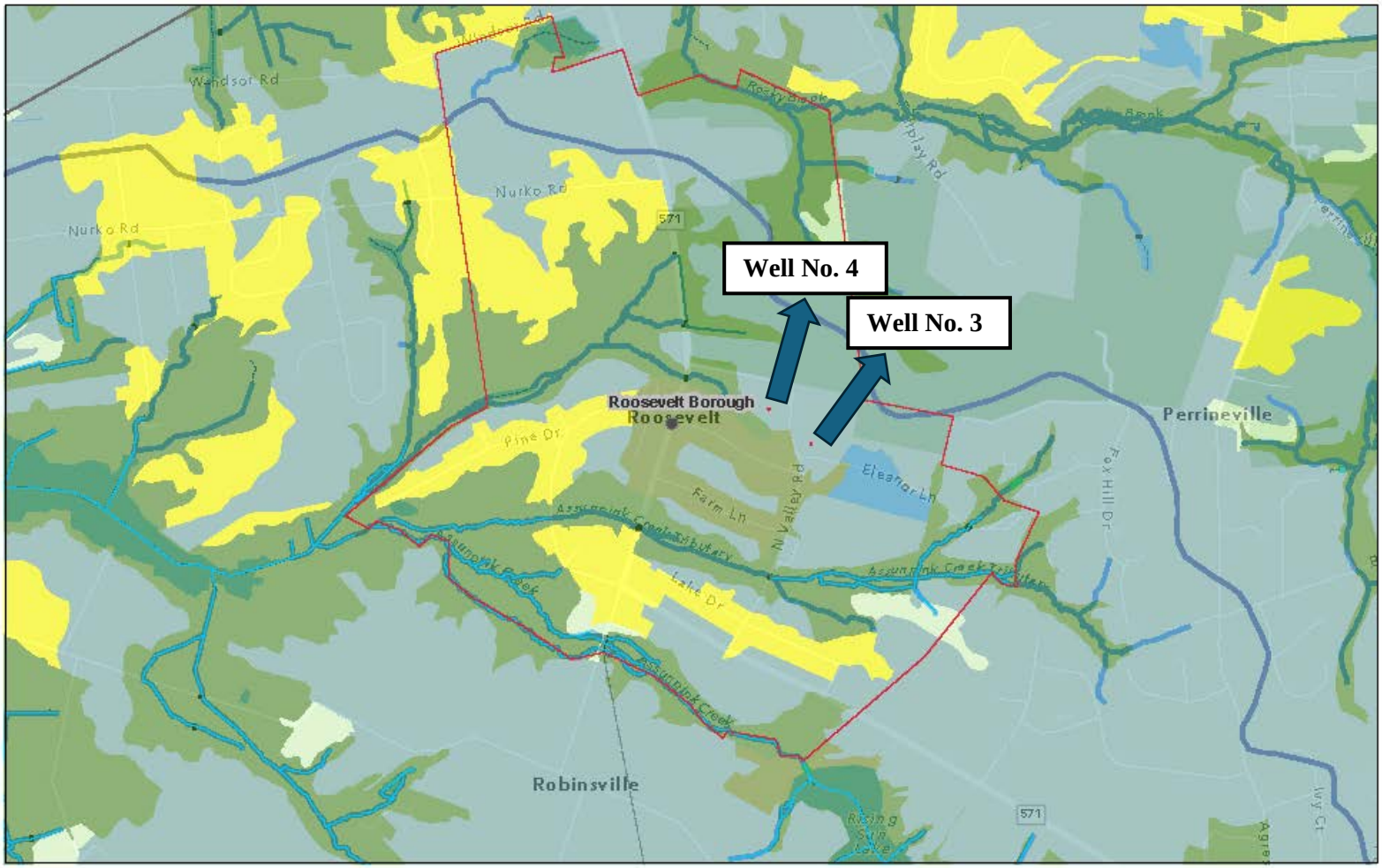

Figure 4: Borough 's Existing Land Use Map

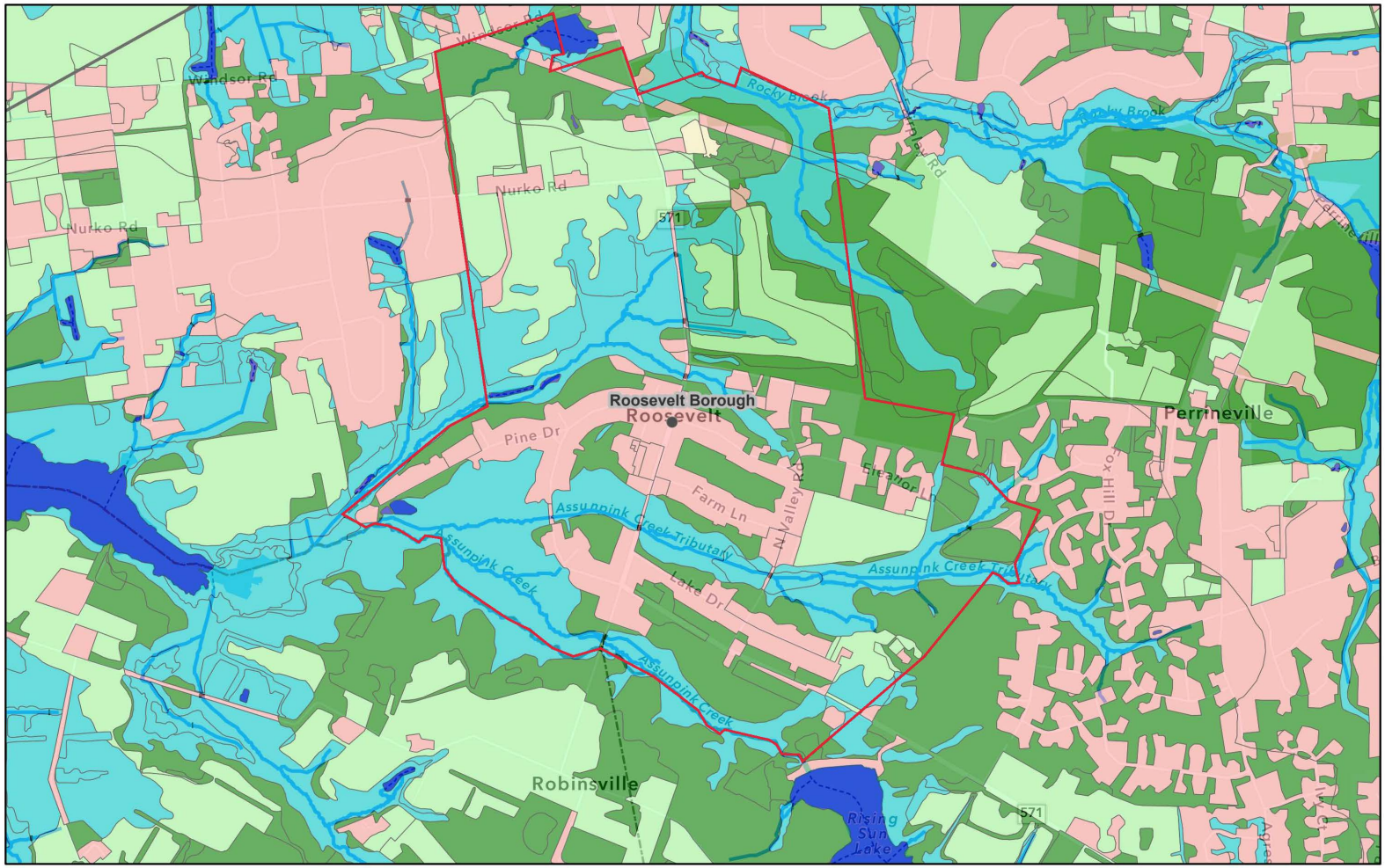

Figure 5: Well Head Protection Overall

Figure 6: Well Head Protection Enlarged

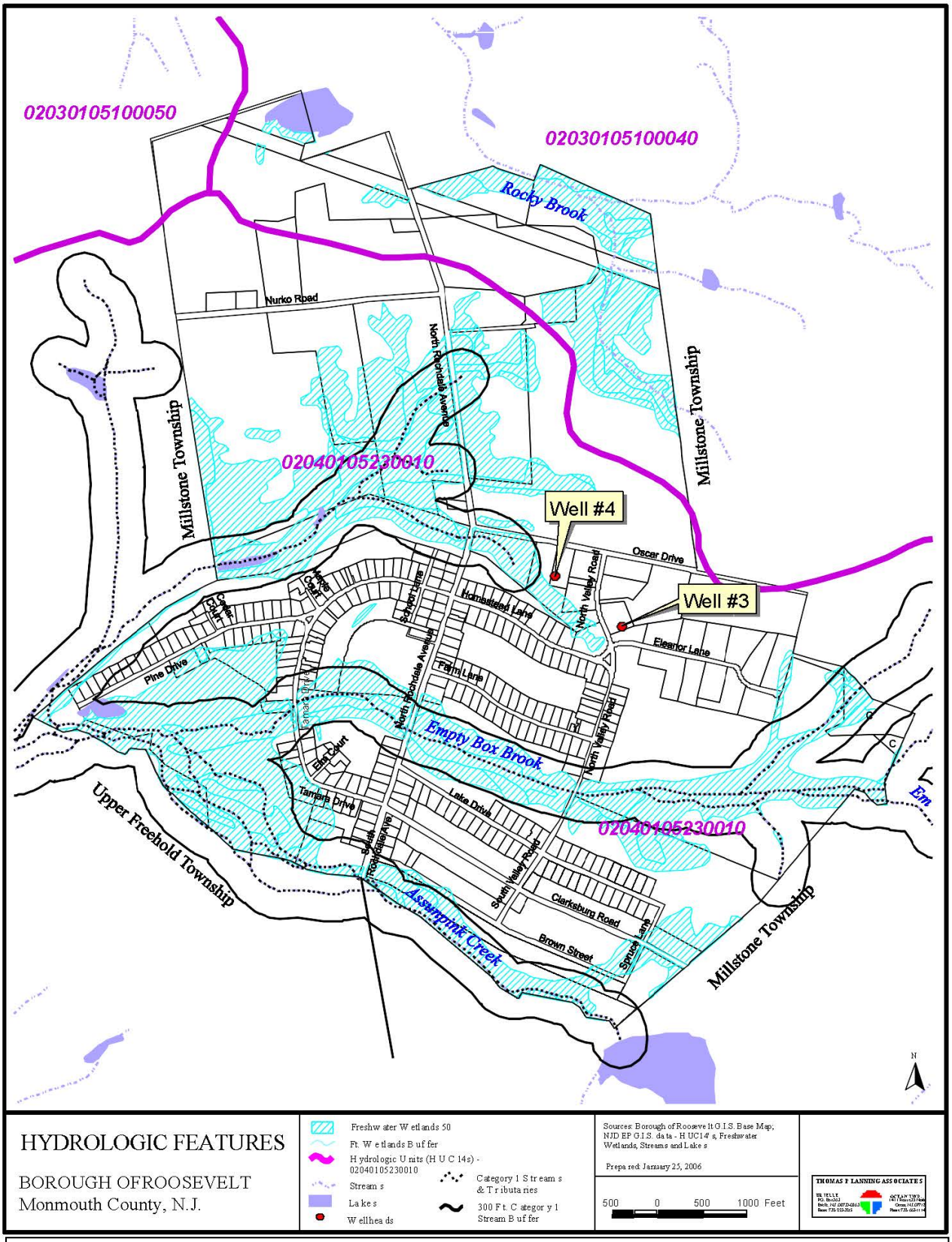

Figure 7: Hydrologic Features (HUC14s) Within the Borough

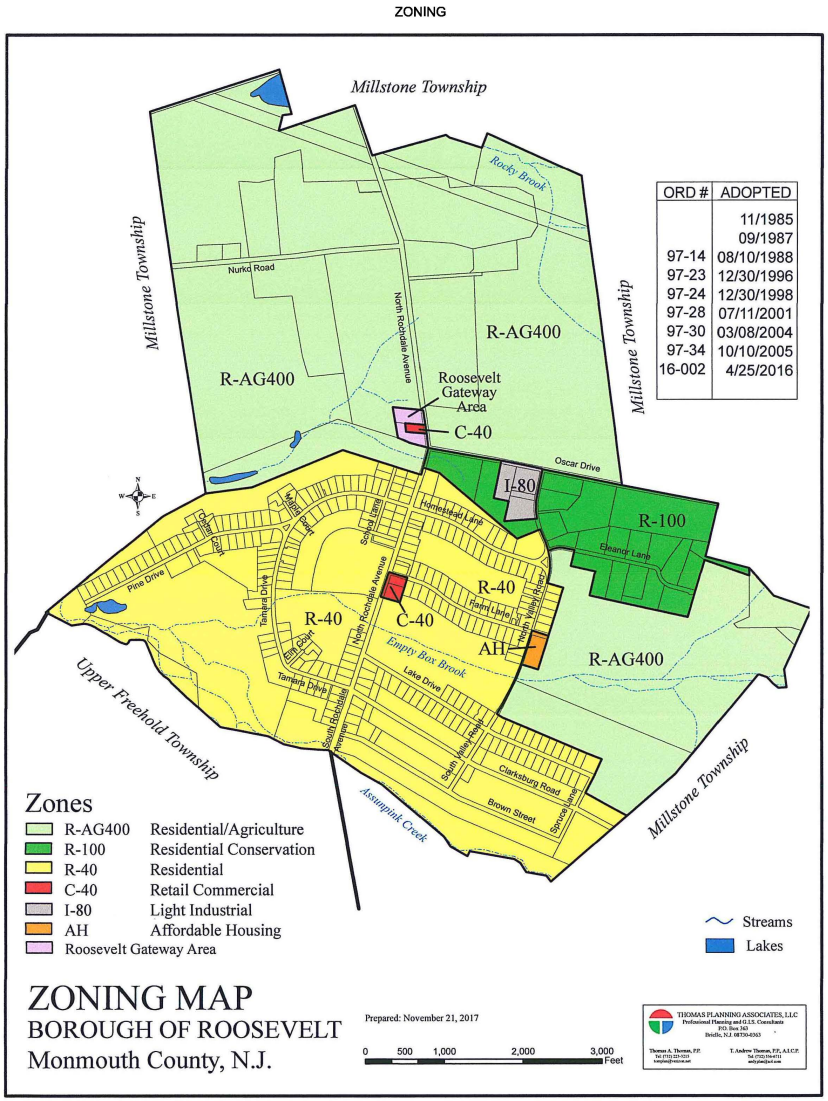

Figure 8: Zoning Map 2017

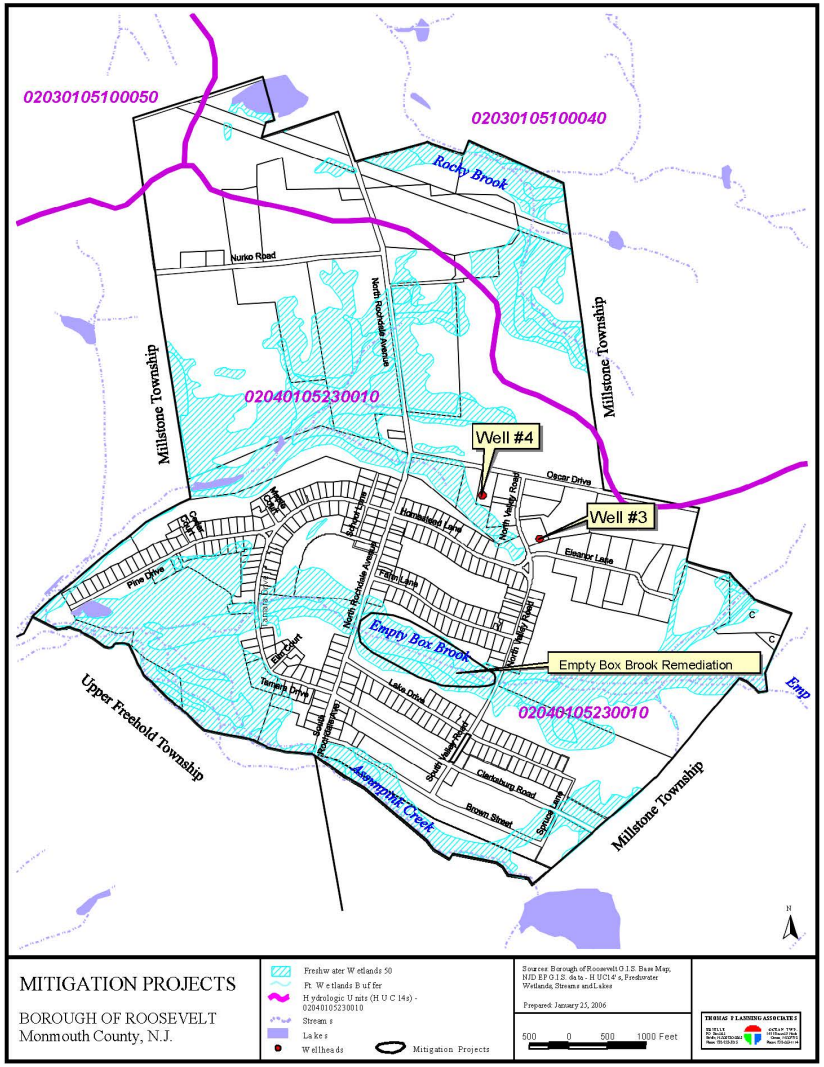

Figure 9: Mitigation Projects