BOROUGH OF HOPATCONG
SUSSEX COUNTY, NEW JERSEY

MUNICIPAL STORMWATER MANAGEMENT PLAN

March 2005
Revised March 2021

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1.0 INTRODUCTION

This document has been prepared in accordance with the New Jersey Department of Environmental Protection (herein referred to as NJDEP) *Tier A Municipal Stormwater Guidance Document* dated October, 2018, and the *New Jersey Stormwater Best Management Practices (BMP) Manual*, dated April 2004 revised September 2014, February 2016, September 2016, November 2016, September 2017, & March 2020 in order to document Hopatcong Borough's strategy to address and reduce stormwater runoff and related non-point source pollution impacts. It is important to note that this plan will require several updates. Hopatcong Borough must reexamine the Stormwater Management Plan at each reexamination of the Borough's Master Plan in accordance with N.J.S.A 40:55-D89.

1.1 How Does Stormwater Runoff Affect Us?

Figure 1

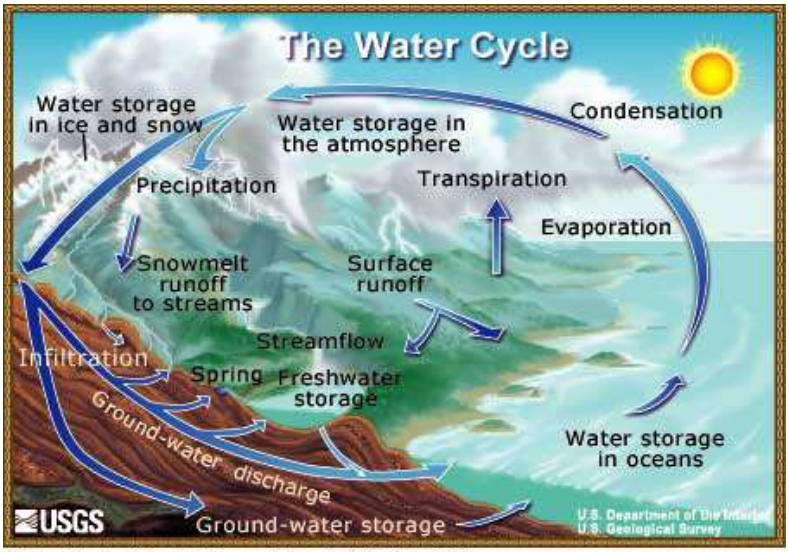


Illustration by John M. Evans, Colorado District, USGS

Stormwater runoff is one of the largest detrimental impacts to our nation's water resources and is a major component of non-point source pollution. It is estimated that up to 60 percent of existing water pollution problems are attributable to non-point source pollution. Non-point source pollution, and particularly, stormwater runoff is difficult to identify, control, and treat. In natural environments, those undisturbed by anthropogenic activities, native vegetation either directly intercepts precipitation or draws from runoff that has infiltrated into the ground and returns it to the atmosphere through the process of evapotranspiration. A portion of precipitation runs off the land's surface replenishing the surface waters. Further, a portion of the rainfall that lands on the ground's surface infiltrates through the soil to the groundwater table and provides natural recharge of the groundwater and either replenishes aquifers or provides baseflow to rivers and streams. This process, known as the hydrologic cycle (or water cycle), functions in equilibrium, but is extremely susceptible to impacts resulting from changes to the cycle's processes. The hydrologic cycle is illustrated on Figure 1.

It has been shown that development can dramatically impact the hydrology of a watershed if stormwater runoff related impacts are not considered carefully. Development typically alters natural vegetation through replacement of forests and fields with lawns, impervious cover, and motor vehicle surfaces, thereby reducing the

watershed's evaporation, transpiration and infiltration rates. Construction activities compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. In the past, development typically involved the construction of impervious areas connected to each other through gutters, channels, and storm sewers. These structures can transport runoff more quickly than natural surfaces and cause erosion, water quality and flooding problems in areas downstream of development. Many times, the general public does not know or understand that there are alternatives to the traditional way of managing *improved* properties. For example, homeowners can have a green lawn without excessive doses of fertilizers and pesticides; pet owners should collect and properly dispose of pet waste and not leave it at the curb. Typically, people are unaware that storm drains often discharge directly to waterbodies. When people allow motor oil, trash, and their pet's waste to enter the storm sewer in their street, they don't realize that it may end up in Lake Hopatcong, the Muscontcong River or their public drinking water supply. Individually these acts may seem insignificant, but the cumulative impacts of these activities contribute to stormwater runoff non-point source pollution, and thus reduce water quality.

1.2 Municipal Separate Stormwater Systems (MS4) Program

In response to the United States Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) Phase II regulations adopted in December 1999, the State of New Jersey developed the Municipal Stormwater Regulation Program. This program addresses pollutants entering our waters from storm drainage systems operated by local, county, state, interstate, and federal government agencies. These systems are referred to as "municipal separate storm sewer systems" or MS4s and are regulated under the New Jersey Pollutant Discharge Elimination System (NJPDES) Rules (N.J.A.C. 7:14A). The NJDEP created four (4) NJPDES Stormwater General Permits for the various Municipal Separate Storm Sewer System (MS4s). These general permits include the Tier A Municipal Stormwater General Permit, Tier B Municipal Stormwater General Permit, Public Complex Stormwater General Permit, and the Highway Agency Stormwater General Permit.

For each General Permit, NJDEP has mandated Statewide Basic Requirements (herein referred to as SBRs), which include minimum standards, measurable goals, and implementation schedules. The minimum standards are one or more actions that must be taken to comply with the requirement of the permit. The measurable goals are the mechanism for reporting to the NJDEP the progress that the Municipality has made to implement the requirements of the permit and are accomplished primarily through the submittal of an Annual Report and Certification. The implementation schedule sets the deadlines for permit compliance.

All municipalities within the State of New Jersey have been classified as either Tier A or Tier B communities depending on population density as determined in the 2000 United States Census. Hopatcong Borough is regulated under the NJPDES Stormwater Tier A General Permit, NJPDES No. NJ0141852. Tier A Municipalities are generally located within the more densely settled regions of the State or along or near the Atlantic Ocean.

As part of the permit, several SBRs were mandated and implemented. To satisfy the permit requirements, each Tier A municipality is required to develop, implement, and enforce a Stormwater Program. In addition, Tier A municipalities are required to prepare and implement a Stormwater Pollution Prevention Plan (SPPP) that describes the stormwater program and serves as the mechanism for the implementation of the SBRs.

The following SBRs apply to all Tier A municipalities, including Hopatcong Borough.

1. **Minimum Standards for Public Involvement and Participation Including Public Notice** – Municipalities must comply with State and local public notice requirements when providing for public participation in the development and implementation of their stormwater program. Municipalities must make elements of the MS4 program available to the public upon request and post copies of the SPPP, MSWMP & related ordinances on the municipal website. The Municipality shall maintain records necessary to demonstrate compliance with the public participation requirements and the existing permittee shall meet the minimum standards of this permit, and the measurable goals.

2. **Minimum Standards for Local Public Education** – Each municipality shall develop a local public education program that focuses on educational and pollution prevention activities about the impacts of stormwater discharges on surface water and groundwater and to involve the public in reducing pollutants in stormwater and mitigating flow. The activities must total 12 points and include activities from at least three of the five categories set forth in Attachment B of the Tier A permit

    a. The municipality shall label all storm drain inlets for those drains that do not have permanent wording cast into the structure of the inlet. These labels shall be maintained.

    b. The municipality shall advertise public involvement programs pertaining to education and outreach activities on the municipality's website, through a mailing, a newspaper advertisement, or similar.

3. **Minimum Standards for Construction Site Stormwater Runoff** – Construction site stormwater runoff activities are authorized under separate NJPDES permit. These are not required to be referenced in the SPPP.

4. **Post Construction Stormwater Management in New Development and Redevelopment** – Municipalities shall develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that discharge into the municipality's small MS4. In its post construction program, the municipality shall complete the following:

a. Adopt and reexamine a municipal stormwater management plan (or adopt amendments to an existing municipal stormwater management plan) in accordance with N.J.A.C. 7:8-4.

b. Adopt and implement a municipal stormwater control ordinance or ordinances in accordance with N.J.A.C. 7:8-4. The ordinance(s) will control stormwater from non-residential development and redevelopment projects.

c. Ensure that any residential development and redevelopment projects that are subject to the Residential Site Improvement Standards (RSIS) for stormwater management (N.J.A.C. 5:21-7) comply with those standards (including any exception, waiver, or special area standard that was approved under N.J.A.C. 5:21-3).

d. Where necessary to implement the municipal stormwater management plan, the municipal stormwater control ordinance(s) will also:

    i. Control aspects of residential development and redevelopment projects that are not pre-empted by the RSIS; and

    ii. Set forth special area standards approved by the Site Improvement Advisory Board for residential development or redevelopment projects under N.J.A.C. 5:21-3.5.

e. Ensure adequate long-term operation and maintenance (O&M) of Best Management Practice (BMPs).

f. Enforce, through stormwater control ordinance(s) or a separate ordinance, compliance with standards set forth in Attachment C of the permit to control passage of solid and floatable materials through storm drain inlets.

g. Require compliance with the applicable design and performance standards established under N.J.A.C. 7:8 for major development, unless:

    i. Those standards do not apply because of a variance or exemption granted under N.J.A.C. 7:8; or

    ii. Alternative standards are applicable under an area-wide or Statewide Water Quality Management Plan adopted in accordance with N.J.A.C. 7:15.

5. Minimum Standards for Pollution Prevention/Good Housekeeping for Municipal Operator

a. Each municipality shall adopt and enforce the following community wide ordinances to address improper disposal of waste
   i. Pet Waste – Requires pet owners or their keepers to immediately and properly dispose of their pet's solid waste deposited on their property or any other property, public or private, not owned or possessed by that person.
   ii. Wildlife Feeding – Prohibits the feeding in any public park or on any other property owned or operated by the municipality of any wildlife (excluding confined wildlife in zoos, parks, or rehabilitation centers or unconfined wildlife at educational centers).
   iii. Litter – Adopt and enforce a litter ordinance or enforce the existing State litter statute (N.J.S.A. 13:1E-99.3).
   iv. Improper Disposal of Waste – Prohibits the improper spilling, dumping, or disposal of materials other than stormwater into the small MS4.
   v. Containerized Yard Waste Ordinance / Collection Program – Prohibits placing non-containerized yard wastes in the street and/or the municipality shall develop a yard waste collection and disposal program.
   vi. Private Storm Drain Inlet Retrofitting Ordinance

b. Each municipality shall develop and continue to implement the following community wide pollution prevention/good housekeeping measures to control solids and floatables:

   i. Street Sweeping – Municipalities shall sweep all municipally owned curbed streets with storm drains that have a posted speed limit of 35 miles per hour (mph) or less in predominantly commercial areas at a minimum of once each month and that are not entrance or exist ramps.

   ii. Catch Basin & Storm Drain Inlet Inspection – Municipalities are required to inspect and clean storm drain inlets once every five years, or more frequently.

   iii. Storm Drain Inlet Retrofit - Municipalities are required to retrofit any existing municipal owned storm drain inlet in direct contact with any repaving, repairing, or resurfacing or in direct contact with any reconstruction or alterations of facilities.

c. Maintenance Yard Operations (Including Maintenance Activities at Ancillary Operations) – Tier A Municipalities are required to implement the best management practices described in Attachment E of the Tier A permit for municipal maintenance yards and ancillary operations which include the following:

   i. Fueling Operations
   ii. Discharging of Stormwater from Secondary Containment
   iii. Vehicle Maintenance
   iv. On-Site Equipment and Vehicle Washing and Wash Wastewater Containment
   v. Salt and de-icing Material Storage
   vi. Aggregate Material and Construction Debris Storage
   vii. Street Sweepings, Catch basin clean out, and other material storage
   viii. Yard Trimmings and Wood waste Management Sites
   ix. Containment of vehicle wash water
   x. Roadside Vegetation Management

d. Employee Training – Each Tier A municipality shall develop and conduct an annual employee training program. All employees shall receive training on these stormwater topics within three months of commencement of duties and every two years thereafter. Records should be kept and certified annually. The program must include at minimum the following topics:
   i. Yard Waste Collection Program
   ii. Monthly Sweepings of Certain Streets in Predominantly Commercial Areas
   iii. Illicit Connection Elimination and Outfall Pipe Mapping
   iv. Outfall Pipe Stream Scouring Remediation
   v. Maintenance Yard operations
   vi. Waste Disposal Education
   vii. Municipal Ordinances
   viii. Stormwater Facility Maintenance
   ix. Construction Activity/Post-Construction Stormwater Management in New Development and Redevelopment
   x. Tier A Municipalities SPPP
   xi. Other stormwater related topics

e. Stormwater Management Design Review Training - Each Tier A municipality shall ensure that all design engineers, municipal engineers, and other individuals that review the stormwater management design for development and redevelopment projects complete the Department approved Stormwater Management Design Review Course once every five years.

f. Municipal Board & Governing Body Member Related Training - Each Tier A municipality shall ensure that all municipal board and governing body members that review and approve applications for development and redevelopment projects complete the required online training available on the NJDEP website within six months of commencing duties.

6. Minimum Standards for MS4 Outfall Pipe Mapping and Illicit Discharge and Scouring Detection and Control – Each Tier A Municipality must complete the following requirements:

a. Develop a map showing the end of all MS4 outfall pipes that are operated by the Municipality, and discharge within the municipality's jurisdiction to a surface water body. The map shall show the location and name of all surface water bodies receiving discharges and each pipe shall be assigned an alphanumeric identifier. A copy of the map shall be provided to the NJDEP annually if revisions have been made. Electronic submission is required by December 21, 2020.

b. Develop and implement a program to detect, investigate, and control any localized stream scouring from stormwater outfall pipes. The program, at minimum, must include an initial inspection of all outfall pipes once every five years, and all new pipes. When scour is detected, they should be further investigated, prioritized, scheduled, and remediated.

c. Each municipality shall adopt and implement a program to detect and eliminate illicit connections into the MS4. The program, at minimum, must include an initial inspection of all outfall pipes, and further investigate any found to have dry weather flow in accordance with Permit A requirements. After the completion of the initial inspection of all outfall pipes, Tier A municipalities shall maintain an ongoing program to detect and eliminate illicit connections.

7. Minimum Standards for Stormwater Facility Maintenance –Develop and implement a stormwater facility maintenance program for cleaning and maintaining all stormwater facilities in accordance with permit requirements.

a. Maintenance must be performed pursuant to any maintenance plans or more frequently as needed

b. A maintenance log shall be maintained to demonstrate compliance

c. Must certify annually that municipal owned or operated stormwater facilities are property functioning.

d. Develop and implement a program to ensure adequate long-term cleaning, operation, and maintenance of stormwater facilities not owned or operated by the Tier A Municipality not subject to the conditions of another NJPDES stormwater permit and constructed after February 7, 1984.

8. Minimum Standards for Total Maximum Daily Load (TMDL) Information – Each Tier A Municipality must incorporate the TMDL information into the SPPP and annually review approved or adopted TMDL reports. These reports should also be used to prioritize stormwater facility maintenance including schedules for repairs required.

1.3 Stormwater Management Regulations

On February 2, 2004 the State of New Jersey adopted the revised Stormwater Management Rules (N.J.A.C. 7:8). The revisions to the State's Stormwater Management Rules serve as the first major update to the rules since their inception in 1983 and detail fundamental changes in the management of stormwater runoff in New Jersey. Through the revision of these rules other regulations were modified, including the Residential Site Improvement Standards (RSIS) (N.J.A.C. 5:21), the Freshwater Wetlands Protection Act (N.J.A.C. 7:7A), the Flood Hazard Area Control Act (N.J.A.C. 7:13), the Watershed Management Rules (N.J.A.C. 7:15), and the New Jersey Dam Safety Standards (N.J.A.C. 7:20). The Stormwater Management Rules were most recently amended on March 2, 2020.

The Stormwater Management Rules provide a framework and incentives for managing runoff and resolving non-point source impairment on a drainage area basis for new development, redevelopment and existing developed areas. Additionally, they establish a hierarchy for implementation of BMP stormwater management measures with initial reliance on low impact development (LID) site design techniques to maintain natural vegetation and drainage patterns before incorporating structural measures. These rules also establish runoff control performance standards for groundwater recharge, water quality, and water quantity, establish special protection area measures for pristine and exceptional value waters; provide regulatory consistency among local and State regulatory agencies; and provide safety standards for stormwater management basins.

As of February 2, 2004, the design requirements identified in the Stormwater Management Rules including groundwater recharge, water quality and water quantity must be met for all projects regulated under RSIS. The Stormwater Rules (N.J.A.C. 7:8-

4) require that all municipalities within the State of New Jersey adopt a municipal Stormwater Management Plan.

The Department adopted amendments to the Stormwater Management rules , N.J.A.C. 7:8, on March 2, 2020, to replace the current requirement that major developments incorporate nonstructural stormwater management strategies to the "maximum extent practicable" to meet groundwater recharge standards, stormwater runoff quantity standards, and stormwater runoff quality standards, with a requirement that green infrastructure (GI) be utilized to meet these same standards. The adopted amendments clarify and modify the definition of major development, which defines the scope of projects to which these rules apply. The Department adopted changes to apply the total suspended solids (TSS) removal requirement to the runoff from motor vehicle surfaces and to eliminate the TSS removal requirement as it applies to runoff from other impervious surfaces not traveled by automobiles, such as rooftops and sidewalks. The Department also adopted several changes that will improve water quality and stormwater management improvements in communities with combined sewer systems.

2.0 STORMWATER MANAGEMENT PLAN GOALS

Minimum goals for the municipal stormwater management plans for Tier A communities in the NJDEP Guidance Document are listed as follows:

- 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 non-point 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 in order 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 management basins.

In addition to the minimum goals required by NJPDES General Permit, in accordance with the Hopatcong Borough Master Plan, the following goals are set forth in this Stormwater Management Plan:

- Establish a balance of residential and nonresidential uses so as to provide a full range of services as well as residential opportunities to the residents of Hopatcong Borough.
- Provide safe and convenient access to all areas of the Borough.
- Provide adequate sewerage and water services throughout the Borough so as to protect the public health and surface and groundwater quality.
- Provide a range of year-round recreation activities for residents of the Borough.

- Protect environmentally sensitive lands from the impacts of development.

- Ensure that new development within the community be designed with the environmental resources of the Borough in mind.

To achieve the above 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. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines specific design standards for stormwater infrastructure to protect public safety.

3.0 BACKGROUND

3.1 Municipal Background

Hopatcong Borough encompasses an area of 12.34 square miles (1.38 square miles is open water within the Borough Municipal limits) located in Sussex County. Hopatcong Borough occupies the entire southeastern corner of Sussex County, abutting Morris County to the east and south. The Borough lies along the western and northern shores of Lake Hopatcong, the largest lake in New Jersey. Hopatcong Borough is easily reached via Interstate 80 (exit 28) and State Highways 206 and 46. The location and boundaries of Hopatcong Borough are depicted on Figure 2.

Hopatcong Borough experienced a large increase in growth between 1960 and 1980, increasing from 3,391 residents in 1960 to a population of 15,531 in 1980. Census information is presented in Table 2. In recent years, the population of Hopatcong Borough has slowed, growing to 15,147 residents in 2010. The Borough estimates its maximum population will be reached at 20,000 persons or fewer.

Table 2
Hopatcong Borough Census Data

2010	15,147
2000	15,888
1990	15,586
1980	15,531
1970	9,052
1960	3,391
1950	1,172
1940	660
1930	534
1920	179
1910	146
1900	75

Source: U.S. Census

There are approximately 6,200 residences in Hopatcong, the majority of which are single family homes. Currently, 79% (6,204 acres) of the Borough is zoned for residential use. The remaining 21% (1,202 acres) of the Borough is designated as non-residential. Because of restraints on the land by steep slopes, water, and rock, the residential growth of the Borough is most likely to be restricted to an additional 300 acres or less with some locations for business and light industrial use.

The Borough water utility provides public water, from municipal wells, to 2,200 residences. The remainder of the homes utilize private wells. Prior to 2004, all residences in Hopatcong Borough were on private septic systems. However, the Borough has installed a public sewer system, which reaches approximately 45% of the Borough. Approximately 2,900 homes are now connected to the public sewer system.

3.2 Environmental Resources Summary

Geology

Hopatcong Borough is located within the Highlands physiographic province, with hilly topography characterized by hard, crystalline, resistant Precambrian igneous and metamorphic rock dominating the areas geology. The general rock formations in the area consist of highly metamorphosed marble, granite, and gneiss. The area was developed as a series of northeast trending fault blocks, resulting in abrupt changes in topography that characterize the surrounding watershed. Two main ridges, oriented in roughly an east/ west direction, define the northern and southern boundaries of the surrounding watershed. These ridges rise to approximately 1,000 feet above mean sea level (Princeton Hydro, 1995).

Soils

The soils in the area are primarily represented by three soil associations. The Rockaway-Hibernia-Urban Land Association, comprised of deep, well-drained to somewhat poorly-drained, gently sloping to steep gravely sandy loams and stony to extremely stony loams and sandy loams that overlie granitic gneiss, and includes strongly sloping to very steep rock outcrops. The Rockaway-Rock Outcrop-Whitman Association is comprised of steep and very steep, deep, well-drained gravely to very stony, loamy soils, rock outcrops and nearly level, deep, very poorly drained extremely stony, loamy soils. These soils are typically marginally suited or unsuited for on-site wastewater (septic) treatment.

Surface Water

New development and subsequent changes in the Borough's landscape as well as in surrounding municipalities has resulted in considerable demand and have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. The attached figures illustrate the waterways within and surrounding Hopatcong Borough. Hopatcong Borough is located within the Upper Musconetcong River Watershed, which includes the Upper Musconetcong River, Lake Musconetcong, Lake Hopatcong, Lake Shawnee, Beaver Brook and Mountain Brook, as well as a number of smaller tributaries and intermittent streams.

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 New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics. Beaver Brook and Mountain Brook have both been designated by NJDEP as FW2-NT waters. FW2-NT or Non-trout waters are not considered suitable for trout, but may be suitable for other fish species. Lake Hopatcong, Lake

Musconetcong, and the Musconetcong River have been designated as FW2-TM waters. FW2-TM waters are those recognized by the state as suitable for trout maintenance.

Hopatcong Borough is situated on the western and northern shores of Lake Hopatcong. Lake Hopatcong is New Jersey's largest and most heavily utilized inland freshwater recreational waterbody. It has been designated by NJDEP as a State Aquatic Park and facilities are used extensively throughout the year. For example, more than a half million people visited Lake Hopatcong in 1997 (Princeton Hydro, 1999). Lake Hopatcong is also designated by NJDEP as an emergency water supply reservoir. However, over the past 40 years there has been a significant decline in the water quality of the lake. The visible symptoms of this decline include periodic algal blooms, excessive aquatic weed growth, depletion of oxygen in the deep water (hypolimnion) of the lake and the accumulation of organic sediments in shallow coves. These impacts have been directly attributed to non-point sources. The following Section 3.3 summarizes the investigations conducted to determine these non-point sources of pollution in the area surrounding Hopatcong Borough.

3.3 Water Quality Issues

Non-point source pollution has emerged as a public issue in New Jersey, and in response to Section 319 of the Clean Water Act, the State has developed a Non-point Source Assessment and Monitoring Program (NJDEP, 1989). As part of that process, New Jersey's existing non-point source pollution problems were identified and an assessment of waterbodies potentially affected by non-point sources was conducted. The Upper Musconetcong River Watershed, was identified as an area suspected of having received significant impacts from non-point source pollution. These findings are consistent with earlier studies of Lake Hopatcong (1984) and Lake Musconetcong (1990) conducted through the U.S. Environmental Protection Agency (USEPA) Clean Lakes Program (Section 314).

In an effort to address non-point source pollution issues, a storm sewer inventory was initiated in 1994 by Hopatcong Borough in accordance with the Coastal Storm sewer Infrastructure Act (N.J.S.A 58:25-33 et seq) (Coastal, 1994). The inventory, *Municipal Non-Point Source Abatement Program for the Borough of Hopatcong*, collected data to determine areas where BMPs would be logistically feasible and/or appropriate from a cost/benefit perspective.

In 1995, the *Regional Non-Point Source Pollution Control Management Plan for the Upper Musconetcong River Watershed* was prepared for the NJDEP by the Lake Musconetcong and Lake Hopatcong Regional Planning Boards in conjunction with Princeton Hydro, LLC. This study focused on identifying and quantifying pollutant loadings from non-point sources. This study also developed management recommendations for the headwaters portion of the Upper Musconetcong River. The Musconetcong River is recognized as being impacted by stormwater runoff. Smaller tributaries located in the headwaters of the Musconetcong River Watershed, notably Beaver Brook and Mountain Brook, have also experienced increased pollutant loading as

a result of the development of their respective sub-watersheds. This is reflected in the water quality data compiled over the past 15 years as part of the monitoring efforts at Lake Hopatcong (Princeton Hydro, 1995)

The 1995 Regional Non-Point Source Pollution Control Management Plan for the Upper Musconetcong River Watershed, along with other studies, also documented that septic systems (on-site disposal systems (OSDS)) are a significant source of pollutants in the Lake Hopatcong portion of the Upper Musconetcong watershed. This study, combined with soils data, indicates the entire watershed has severe limitations for septic system design and operation.

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. 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 Total Maximum Daily Loads (TMDLs) are needed. Both Lake Hopatcong and Lake Musconetcong were listed as Sublist 5 waterbodies in the June, 2002 Integrated Water Quality Monitoring and Assessment Report. Lake Hopatcong did not meet the water quality standards for nutrients/sedimentation, aquatic life, fecal coliform, and fish-mercury. Lake Musconetcong did not meet the water quality standards for nutrient/sedimentation.

In response to the June 2002 Integrated Water Quality Assessment, the State of New Jersey recently completed a TMDL analysis of the Upper Musconetcong River watershed. The TMDL focused primarily on phosphorus, which is typically the primary nutrient that limits algal and aquatic plant growth. Phosphorus has also been identified by the State, under the 303(d) program, as one of the parameters responsible for the documented impairment of Lake Hopatcong and Lake Musconetcong (NJDEP, 2003a). Thus, the TMDL analysis for the two major waterbodies within the Upper Musconetcong River watershed focuses on phosphorus (Princeton Hydro, 2005).

The completion and acceptance of the phosphorus TMDL resulted in the delisting of both Lake Hopatcong and Lake Musconetcong on the New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report to Sublist 4a for phosphorus (formerly listed as nutrients/sedimentation). Former Sublist 5 Waterways are delisted to Sublist 4a once all TMDL(s) have been developed and approved by EPA that, when implemented, are expected to result in full attainment of the standard. Lake Hopatcong remains on Sublist 5 for fecal coliform, fish community (formerly listed as aquatic life), and fish-mercury until all TMDLs for each pollutant have been completed and approved by EPA.

As described previously in Section 3.1, in order to reduce phosphorous loads to Lake Hopatcong, the Borough of Hopatcong sewered significant portion of its homes. The sewering of houses which previously used on-site wastewater disposal systems (septic systems) in the Borough of Hopatcong is one of the primary restoration measures recommended for Lake Hopatcong to reduce watershed-based phosphorous load to the

targeted levels (Princeton Hydro, 2005). The proper management of remaining septic systems is extensively discussed in the *Municipal Non-Point Source Abatement Program for the Borough of Hopatcong* (Coastal, 1994), with the objectives of the septic management program two-fold; to prevent the installation of new septic systems in areas where soil absorption systems will not provide adequate treatment of effluent; and regular maintenance of existing systems with emphasis on their pump-out and certified inspection at least once every three to five years.

Additional recommendations of the TMDL study were the installation of structural BMPs and retrofits designed to reduce existing surface water phosphorous loads. The implementation of this Stormwater Management Plan is intended to further reduce the impacts of phosphorus attributed to non-point source pollution to surface water resources of Hopatcong Borough.

A study conducted by Princeton Hydro to develop the Upper Musconetcong Watershed Implementation plan (WIP), identifies several sites for stormwater and/or shoreline restoration projects aimed at removing phosphorus loading to the lake. For additional information, the WIP can be found on the New Jersey Highlands Council Website.

3.4 Existing Stormwater Infrastructure

Hopatcong Borough has a total of 39 municipal stormwater outlets that discharge into Lake Hopatcong. Their locations, descriptions and associated water quality characteristics are presented in the Municipal Non-Point Source Abatement Program for the Borough of Hopatcong (Coastal, 1994). The Borough has mapped inlets and related piping, however it is recommended that this mapping be revisited and updated accordingly. The Borough will be assessing the condition of these structures and developing a maintenance plan to address deficiencies.

3.5 Flooding & Erosion Issues

Water quality is within the Borough is significantly impacted by flooding and erosion. Significant portions of the Borough's infrastructure is undersized and in poor condition. The Borough is improving its infrastructure on a priority basis.

Note: Figures from the Highlands Environmental Resource Inventory, prepared by the New Jersey Highlands Council and dated April 2020, can be found in the "FIGURES" section at the end of this report for reference.

4.0 DESIGN AND PERFORMANCE STANDARDS

To prevent or minimize water quality impacts, the Borough has developed, implemented, and enforces a program to address stormwater runoff from new development and redevelopment projects (including projects operated by the municipality itself) that disturb one acre or more, including projects less than 1,500 square feet that are part of a larger common plan of development or sale, that discharge into the municipality's MS4.

The Borough has adopted the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity 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 N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins.

A copy of the Borough's Stormwater Control Code is included in Appendix A of this report.

The Borough will continue to enforce the stormwater control ordinance. The Borough will ensure adequate long-term operation and maintenance of BMPs on property not owned or operated by the municipality; and the Borough will enforce, through the stormwater control ordinances, controlling the passage of solid floatable materials through storm drain inlets for storm drain inlets not installed by the Tier A Municipality.

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

The Borough will comply with the applicable and meet several different but related requirements. These requirements are concerned with:

- The Department's Stormwater Management rules (N.J.A.C. 7:8), which are implemented in part through the Residential Site Improvement Standards: govern the contents of municipal stormwater management plans and stormwater control ordinances, and establish stormwater management design and performance standards for new development and redevelopment.

- The Residential Site Improvement Standards (RSIS) for stormwater management established by the New Jersey Department of Community Affairs (NJDCA) at N.J.A.C. 5:21.

- Municipal stormwater management plans and stormwater control ordinances adopted under the Stormwater Management Act (N.J.S.A. 40:55D-93 to 99), which is a portion of the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.)

- Long-term operation and maintenance of BMPS.

- Storm drain inlets.

The Borough's post-construction program will comply with the applicable design and performance standards for major development established in N.J.A.C 7:8, unless those standards do not apply because of a variance or exemption granted under N.J.A.C. 7:8, or unless alternative standards under a Water Quality Management (WQM) Plan (adopted in accordance with the Department's Water Quality management Planning rules at N.J.A.C. 7:15) are applicable. The Borough will require such compliance through the RSIS, and through municipal stormwater management plans and stormwater control ordinances.

The requirements in N.J.A.C. 7:8-5.2 AND 5.3 to incorporate the following nonstructural stormwater management strategies into the design.

- Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;

- Minimize impervious and motor vehicle surfaces and break up or disconnect the flow of runoff over impervious and motor vehicle surfaces;

- Maximize the protection of natural drainage features and vegetation;

- Minimize the decrease in the "time of concentration" from pre-construction to post-construction. "Time of Concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;

- Minimize land disturbance including clearing and grading;

- Minimize soil compaction;

- Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;

- Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and

- Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff (see N.J.A.C. 7:8-5.3(a)9 and the New Jersey Stormwater Best Management Practices Manual for examples).

March 2020 Amendments to the Stormwater Management Rules, N.J.A.C. 7:8, propose the use of green infrastructure to replace the current requirement to incorporate nonstructural stormwater management strategies to the "maximum extent possible". The selection of green infrastructure BMPs to incorporate into a project should be selected based on a review of the site characteristics and needs. The following green infrastructure structural Best Management Practices should be considered for each project in accordance with N.J.A.C. 7:8-9.

- Bioretention systems;
- Constructed stormwater wetlands;
- Dry wells;
- Extended detention basins;
- Infiltration basins;
- Pervious paving systems;
- Rooftop vegetated cover;
- Sand filters;
- Vegetative filters; and
- Wet ponds.

The standard in N.J.A.C. 7:8-5.5 to encourage and control infiltration and groundwater recharge, including requirements that the design engineer (except in certain specified circumstances) either:

- Demonstrate through hydrologic and hydraulic analysis thatfor stormwater leaving the site, post-construction runoff hydrographs for the two-, 10- and 100-year storm events do not exceed the pre-construction runoff hydrographs for the same storm events; **or**

- Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the two-year storm is infiltrated.

- The "Stormwater runoff quality standards" in N.J.A.C. 7:8-4, including:

    - □ The requirement that stormwater management measures be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from the developed site, expressed as an annual average. Table 4-1 in N.J.A.C. 7:8-4 presents the presumed TSS removal rates for certain BMPs designed in accordance with the New Jersey Stormwater Best Management Practices Manual.

    - □ The requirement that stormwater management measures be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm.

- The requirement that the applicant preserve and maintain 300-foot "special water resource protection areas" along all waters designated "Category One" in the Department's Surface Water Quality Standards at N.J.A.C. 7:9B, and along perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the U.S. Geological Survey (USGS) Quadrangle Maps or in the County Soil Surveys, within the associated hydrologic unit code 14 (HUC14) drainage. The Borough currently does not have a Category One waters within the municipal boundary.

- The maintenance requirements in N.J.A.C. 7:8-5.8

The requirements for "compliance with the applicable design and performance standards established under N.J.A.C. 7:8" pertains to all applicable design and performance standards established under the Stormwater Management rules, not just to the "Stormwater Management Quantity and Quality Standards" in N.J.A.C. 7:8-5. Problems such as human-induced base-flow reduction (due to reduced recharge) and exacerbation of flooding and erosion also present water quality problems because they alter the chemical, physical, or biological integrity of the waters of the State, or otherwise contribute to water pollution.

- The Highlands Council Stormwater Control Ordinance Amendments

The Highlands-specific amendments required in order to comply with the Highlands Regional Master Plan (RMP) and reflect RMP resource protection standards.

5.0 PLAN CONSISTENCY

The Borough is not currently within a Regional Stormwater Management Planning Area. However, a TMDL study has been undertaken. This plan does not need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDLs at this time. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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

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

The Municipal Stormwater Management Plan is consistent with and conforms with the standards of the Highlands Regional Master Plan (RMP).

6.0 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The Borough has reviewed the Master Plan, Official Map and Ordinances to incorporate nonstructural stormwater management strategies. The Borough has revised all ordinances which relate to land development and incorporate NJDEP's nonstructural stormwater management strategies.

Also, if a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious and motor vehicle surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge.

It is noted that although attempts to mimic pre-existing natural conditions may be adequate to satisfy the State stormwater rules, alteration of land always modifies hydrology. Therefore, some measure (or BMP) will be required for every project qualifying as a major development. The New Jersey Stormwater Best Management Practices Manual ("BMP Manual") April 2004 Revised September 2014, February 2016, September 2016, November 2016, September 2017,November 2018, & March 2020 should be utilized for the development of all stormwater BMPs. A copy of the most current BMP manual can be found at: https://www.njstormwater.org/bmp_manual2.htm

7.0 LAND USE/BUILD-OUT ANALYSIS

There are four steps to preparing a build-out analysis that satisfies the requirements for a municipal stormwater management plan:

1. Determine the total land area within each of the HUC14s of the municipality.

2. Determine the area of constrained lands within each HUC14 of the municipality.

3. Determine the land available for development by simply subtracting the constrained lands from the total land area for each HUC14. In essence, the land available within each HUC14. Existing residential, commercial, and industrial areas are also eligible for redevelopment and should be considered as land available for development.

4. For each HUC14, complete a build-out analysis by using the municipal zoning map and applicable ordinances to determine the acreage of new development. Once the build-out acreage of each land use is determined for each HUC14, nonpoint source loadings can be determined for the build-out scenario.

A detailed land use/build out analysis for the Borough was conducted by the New Jersey Highlands Council in August 2009 for Highlands Regional Master Plan Conformance. The entire report can be found in Appendix B of this report.

8.0 MITIGATION PLAN

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards. 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 and 9 of the NJDEP Stormwater BMP Manual.

If a suitable site cannot be located in the same drainage area as the proposed development as discussed above, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts.

The Borough may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in an addendum to this Municipal Stormwater Management Plan or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation and the cost associated with the long-term maintenance requirements of the mitigation measure. In those cases where an applicant has demonstrated the inability or impracticality of strict compliance with the stormwater management requirements set forth in this plan, and in N.J.A.C. 7:8-5, a waiver from strict compliance may be granted by Hopatcong Borough. In such cases, the applicant must submit a mitigation plan detailing how the project's failure to strictly comply will be compensated.

A mitigation plan must identify measures required to offset any potential impact(s) created by the granting of the waiver. For example, because of natural site constraints, a proposed development might be unable to fully meet the groundwater recharge criteria, with the projected impact being an annual net loss of 50,000 cubic feet of groundwater recharge volume. In this case, a mitigation plan might require recovery of the lost recharge volume by capturing existing runoff from an impervious area on a site within the same drainage basin. Applicants may identify potential properties suitable for the mitigation project, secure the easements necessary to implement the projects and ensure long-term maintenance requirements are met.

Strategies that may be used to mitigate a development project and its impacts include, in the order of their preference, the following:

1. **Equivalent, or "in-kind"** mitigation (as per the requirements of N.J.A.C. 7:8-4.2c(11)) is the most preferred method where a mitigation project is identified

within the same drainage area, or HUC-14, within which the subject project is proposed, so that it provides benefits and protection similar to those that would have been achieved if the stormwater and recharge performance standards had been satisfactorily completed. In-kind mitigation must also directly compensate for the projected impact for the performance standard(s) for which the waiver was granted.

If there are no "in-kind" mitigation options available within the same HUC-14 drainage area, the Borough may consider implementation of a similar compensating measure to mitigate the same impact(s) of the proposed project, but within a different watershed.

2. **Non-equivalent, or alternative** mitigation options may be considered by the Borough if equivalent or "in-kind" mitigation measures for the projected environmental impact(s) is not feasible. In this case, the Borough may consider implementation of an alternative compensating measure at a designated municipal site or as part of an adopted regional stormwater management plan.

3. **Funding, or "in-lieu"** mitigation is the least preferred option. In this case, an applicant may provide contributions in the form of funding to the Borough for future or alternative stormwater management projects. In this case, the funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the costs associated with the long-term maintenance requirements of the mitigation measure.

The following projects have been identified by Hopatcong Borough for potential consideration as mitigation projects. These projects were listed as priority sub-watershed target areas for BMP installation and/or retrofit of the current stormwater infrastructure in the *Refined Phosphorus TMDL and Restoration Plans for Lake Hopatcong and Lake Musconetcong, Morris and Sussex Counties* (Princeton Hydro, 2005) report to maximize the Borough's pollutant removal efficiency and meet the targeted phosphorus reduction to Lake Hopatcong. **Before proceeding with any actions involving these projects, an applicant must receive prior approval by, and direction from the Borough.**

- **Priority Area H-A.** This area falls mainly between sub-watersheds 22 and 23 and is located near Route 607 and the Roxbury Township border, bounded by Stone Avenue, Lakeside Boulevard and Randolph Avenue. To achieve the targeted phosphorus reduction in this area, recommended BMPs include a three-tiered approach for sub-watershed 22 consisting of a subsurface sand filter, infiltration basin and a bioretention system, combined with a two-tiered approach to sub-watershed 23 consisting of a sub-surface sand filter and a bioretention system. The combination of these five BMPs applied to Priority Area H-A would remove a predicted level of 21 kg/yr of total phosphorus to Lake Hopatcong.

Priority Area H-A		
BMP Description	**Sub-watershed Number**	**Predicted TP Removal Level (kg/yr)**
Subsurface sand filter	22	6
Infiltration basin		4
Bioretention system		2
Sub-surface sand filter	23	7
Bioretention system		2
Total		**21**

- **Priority Area H-B.** This area falls within sub-watersheds 20 and 21 and includes the immediate drainage discharging into the southern end of Crescent Cove. The area is bounded by Mountain Road and River Styx Road, Jefferson Trail and Lehigh Way, Brooklyn Mountain Road and Squire Road, and River Styx Road. Emphasis should be placed in the area where Crescent Road, Lakeside Boulevard and Bell Avenue intersect because of the high pollutant loading associated with this area. To achieve the targeted phosphorus reduction in this area, recommended BMPs include a three-tiered approach to sub-watershed 20 consisting of a sub-surface sand filter, a bioretention system and an infiltration basin, combined with a four-tiered approach to sub-watershed 21, consisting of a sub-surface sand filter, an infiltration basin, a bioretention system and a pervious paving system. The combination of these seven BMPs applied to Priority Area H-B would remove a predicted level of 29 kg/yr of total phosphorus to Lake Hopatcong.

Priority Area H-B		
BMP Description	**Sub-watershed Number**	**Predicted TP Removal Level (kg/yr)**
Sub-surface sand filter	20	7
Bioretention system		2
Infiltration basin		4
Sub-surface sand filter	21	6
Infiltration basin		4
Bioretention system		2
Pervious paving system		4
Total		**29**

- **Priority Area H-C.** This area falls mainly within sub-watersheds 18 and 19 and includes the immediate drainage area discharging to the southern end of Bryam Cove. The area is bounded by Maxim Drive, Squaw Trail and Brooklyn Mountain Road, and Rollins Trail. Emphasis should be placed on the drainage area of the small unnamed tributary (from Rocky Trail to where Maxim Drive circles the cove toward the west) because of the high pollutant loading associated with this area. To achieve the targeted phosphorus reduction in this area,

recommended BMPs include a three-tiered approach to sub-watershed 18 consisting of two (2) sub-surface sand filters and an infiltration basin, combined with a single-tiered approach consisting of a subsurface sand filter for sub-watershed 19. The combination of these four BMPs applied to Priority Area H-C would remove a predicted level of 26 kg/yr of total phosphorus to Lake Hopatcong.

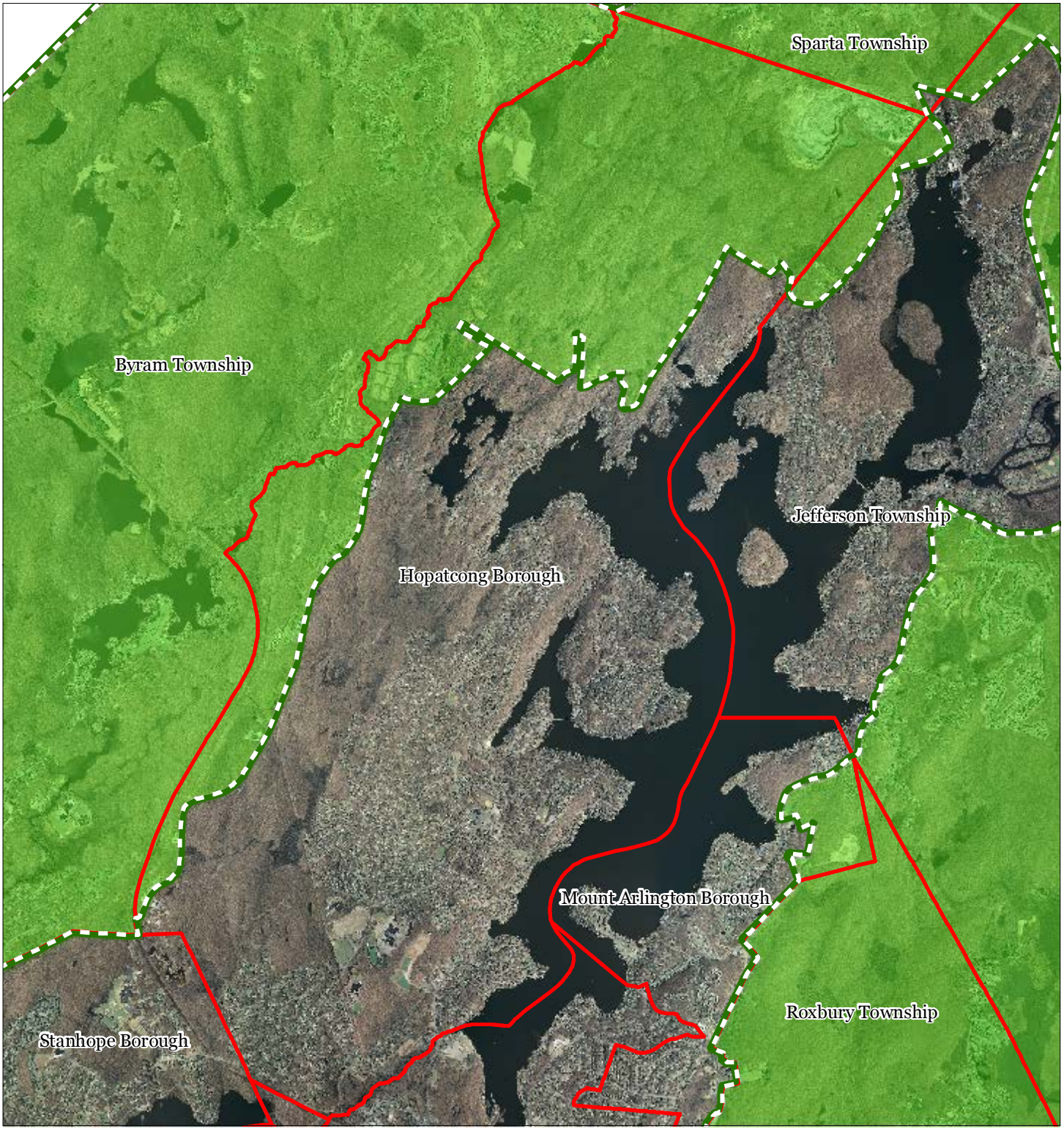
Priority Area H-C		
BMP Description	**Sub-watershed Number**	**Predicted TP Removal Level (kg/yr)**
Sub-surface sand filter	18	10
Sub-surface sand filter		6
Infiltration basin		4
Sub-surface sand filter	19	6
Total		**26**

In addition to those listed above, the Rutgers University Water Resources Program study of the Borough includes recommendations for specific mitigation projects to restore groundwater recharge, improve water quality and reduce flooding throughout the Borough. The projects recommended within this report can be utilized for mitigation projects. Background information on the Rutgers project as well as the corresponding reports and webmap can be found here:
http://water.rutgers.edu/Projects/William_Penn/WilliamPenn.html

Note: Before proceeding with any actions involving these projects, an applicant must receive prior approval by, and direction from the Borough.

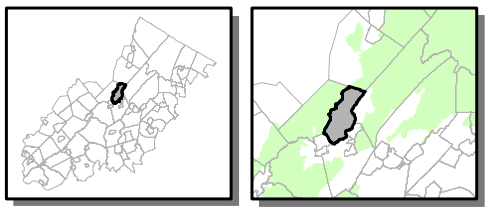
FIGURES

Figure 1: Preservation Area



Preservation Area
Municipal Boundaries

Hopatcong Borough



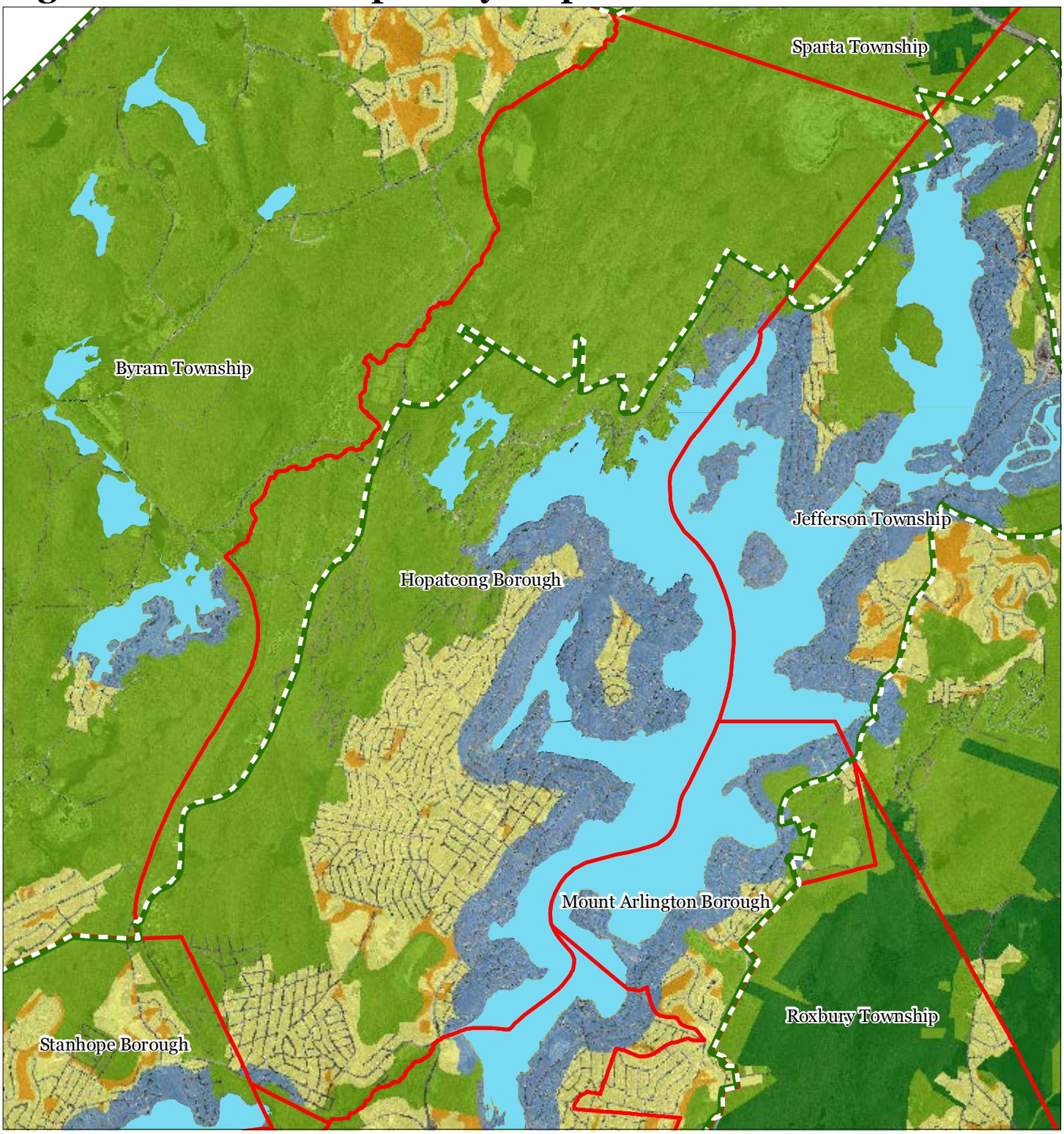
1 inch = 0.72 miles

Highlands Council
New Jersey

N

April 2012

Figure 2: Land Use Capability Map Zones



Regional Master Plan Overlay Zone Designation

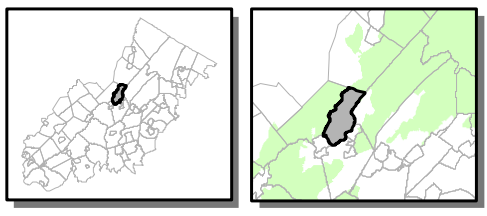
Zone

- *Protection*
- *Conservation*
- *Existing Community*
- Lakes Greater Than 10 acres
- Preservation Area
- Municipal Boundaries

Sub-Zone

- *Existing Community Environmentally Constrained*
- *Conservation Environmentally Constrained*
- *Lake Community*
- *Wildlife Management*

Hopatcong Borough



1 inch = 0.72 miles

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New Jersey

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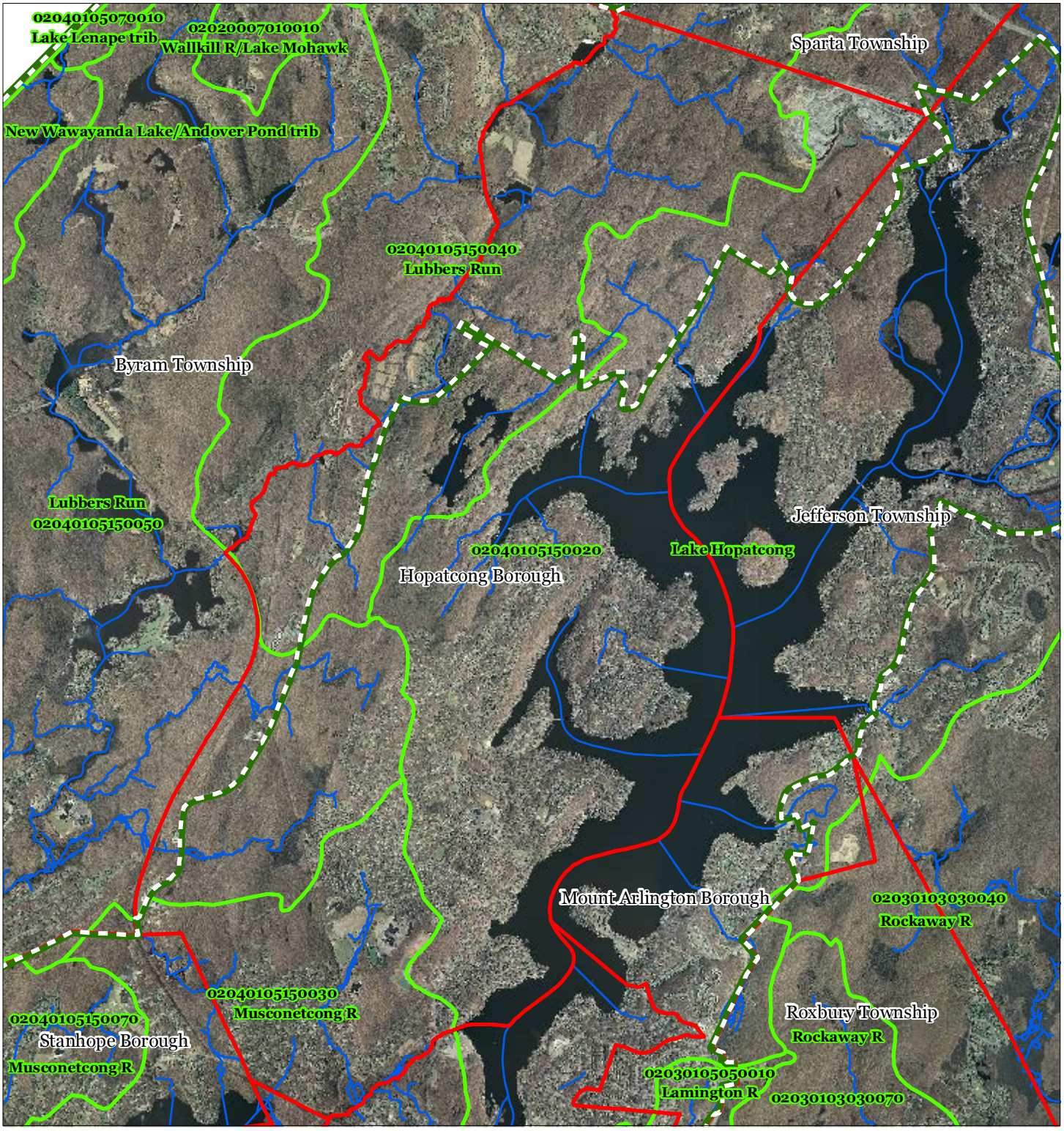
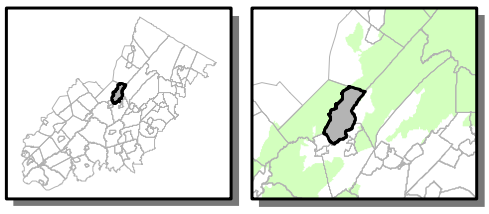
April 2012

Figure 3: HUC 14 Boundaries



HUC 14 Subwatersheds
Stream Centerlines
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

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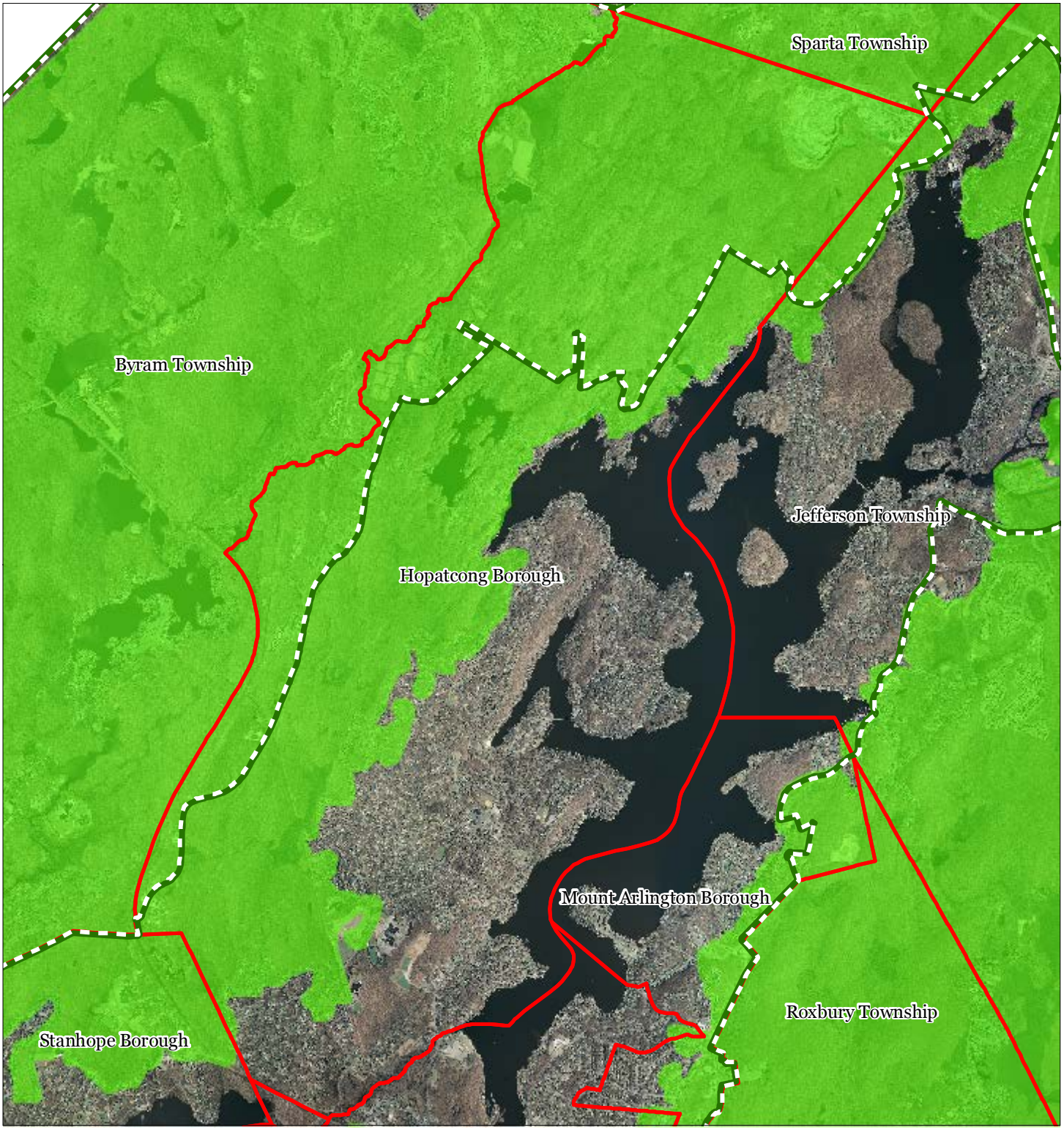
Figure 4: Forest Resource Area



Forest Resource Area
Preservation Area
Municipal Boundaries

Hopatcong Borough

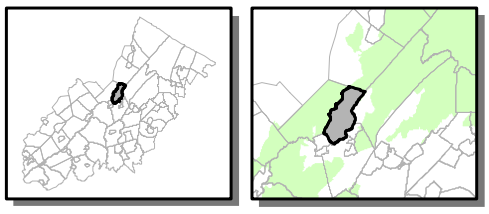


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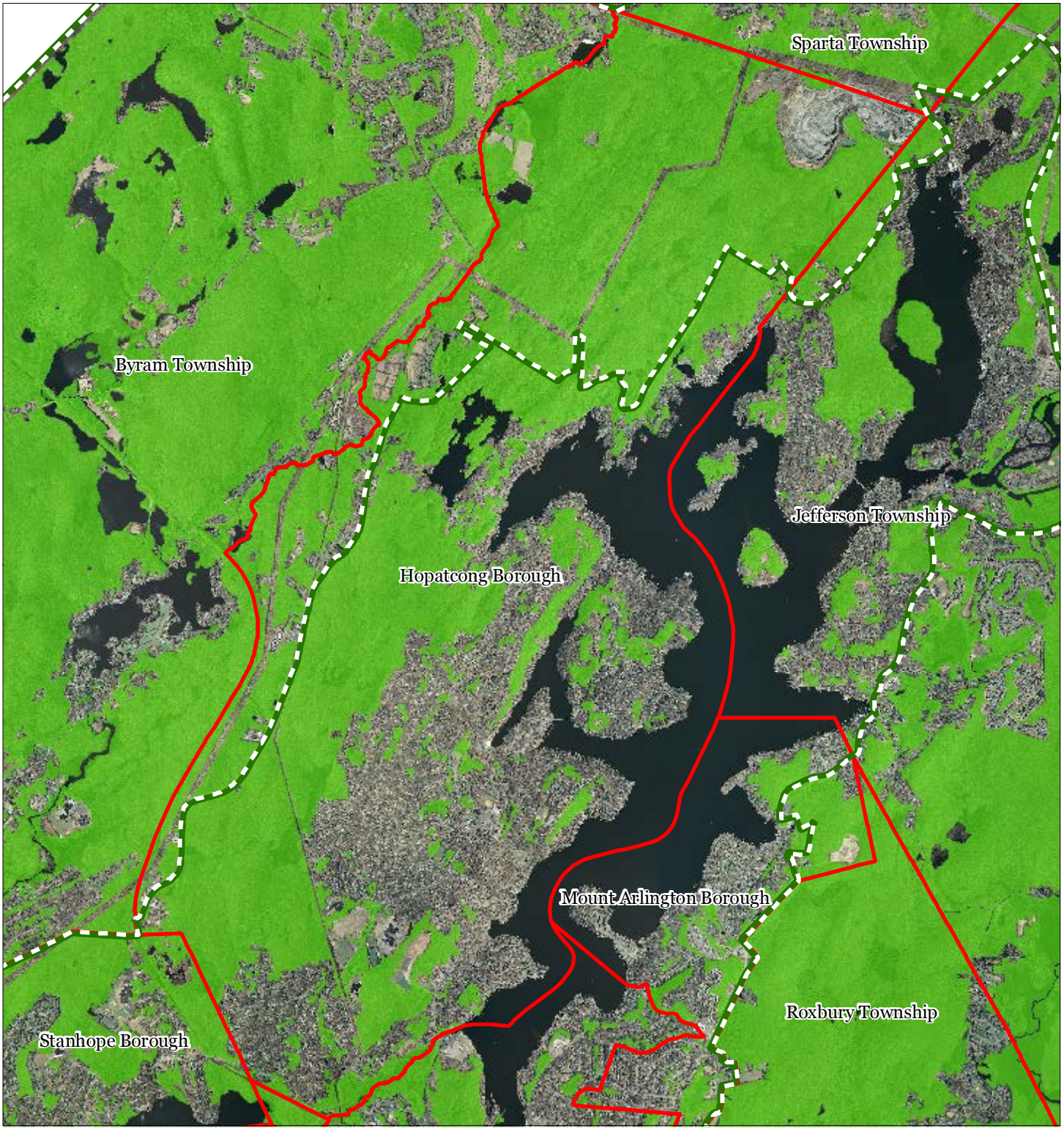
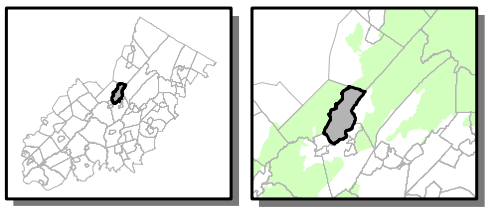
Figure 5: Total Forest Area



Forested Areas
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

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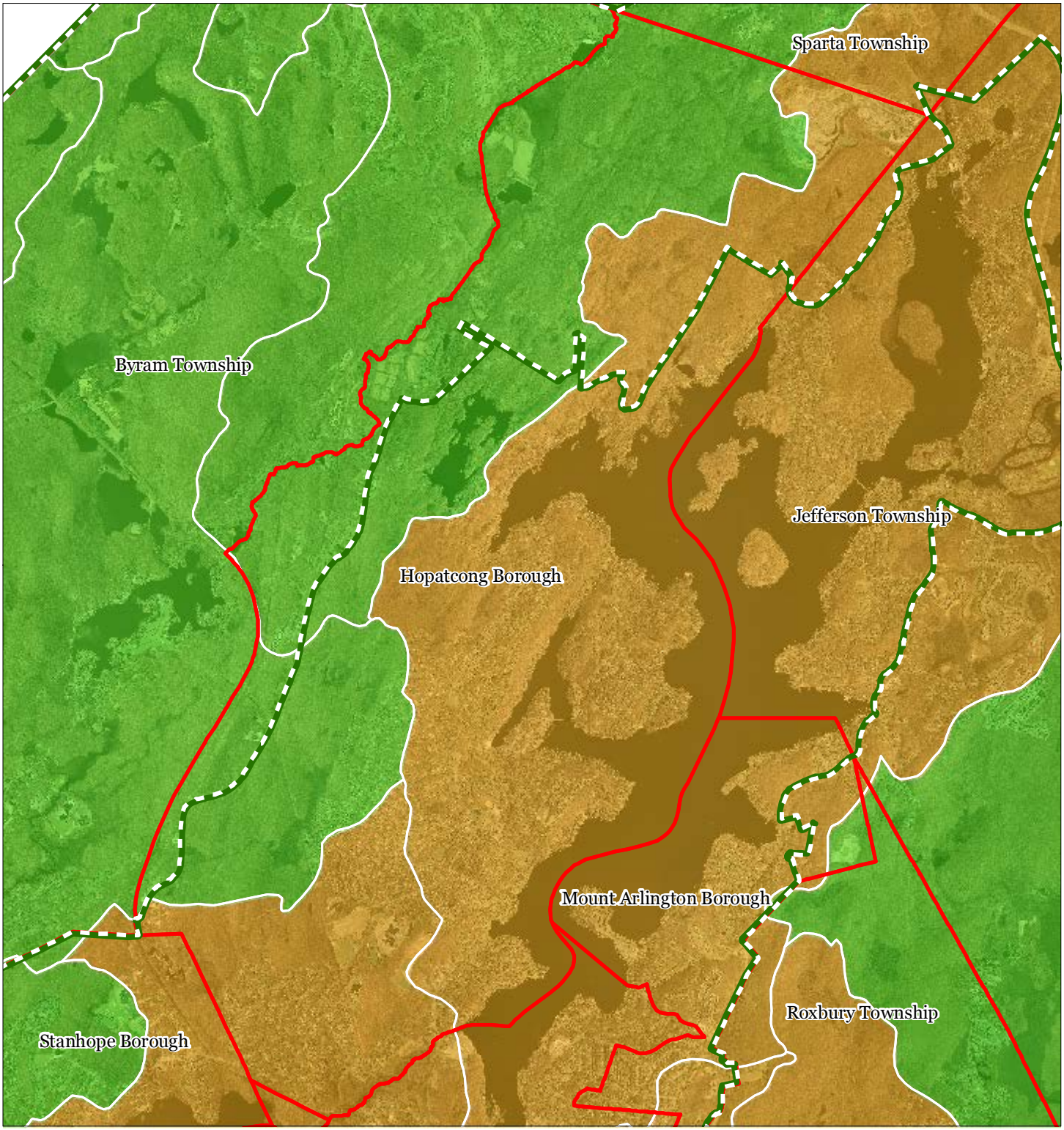
April 2012

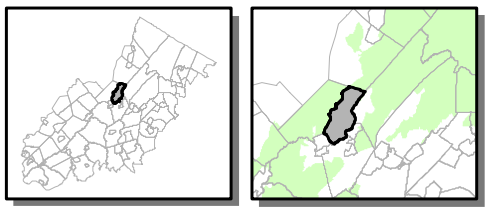
Figure 6: Forest Subwatersheds



Forest Integrity by HUC14 Subwatershed

- *Low*
- *Moderate*
- *High*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

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New Jersey

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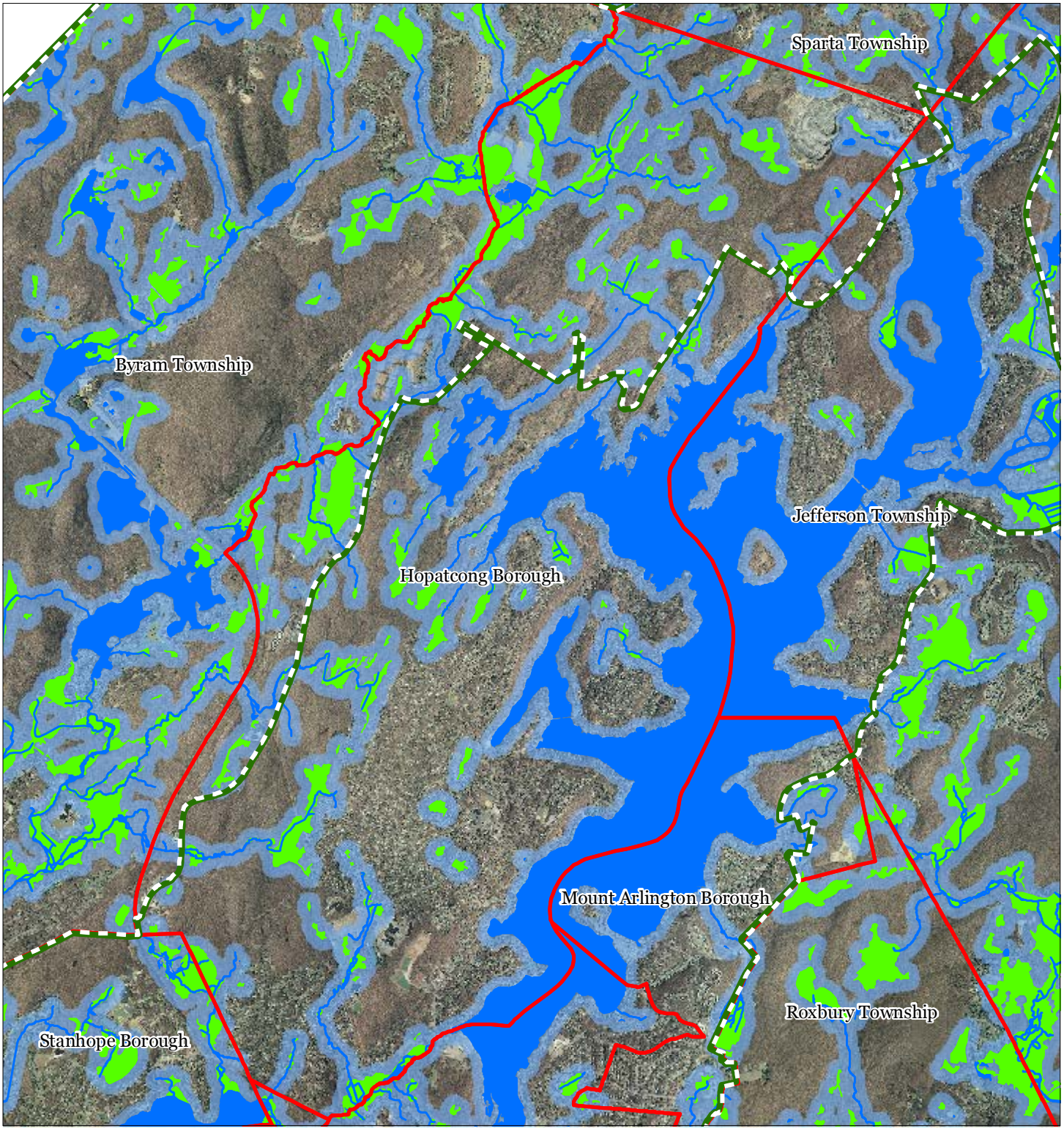
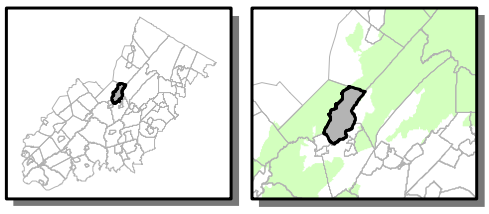
April 2012

Figure 7: Highlands Open Waters



Highlands Open Water Buffers (300ft)
Streams
Wetlands
Lakes & Ponds
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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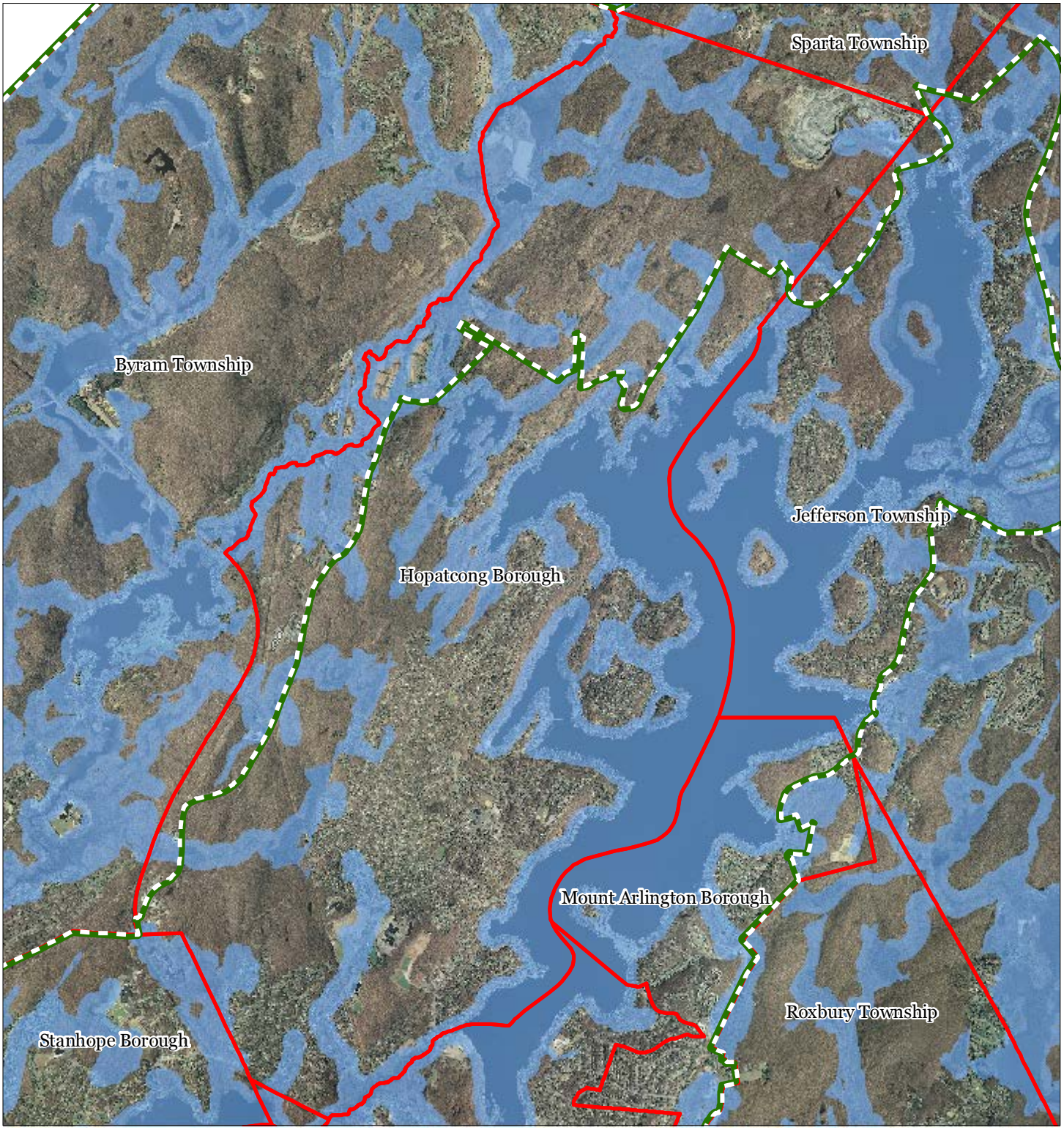
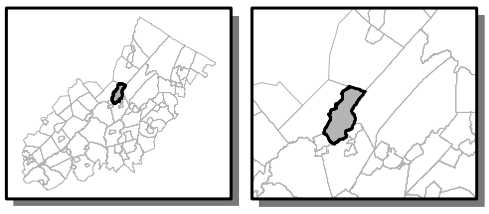
April 2012

Figure 8: Highlands Riparian Areas



Riparian Area
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

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New Jersey

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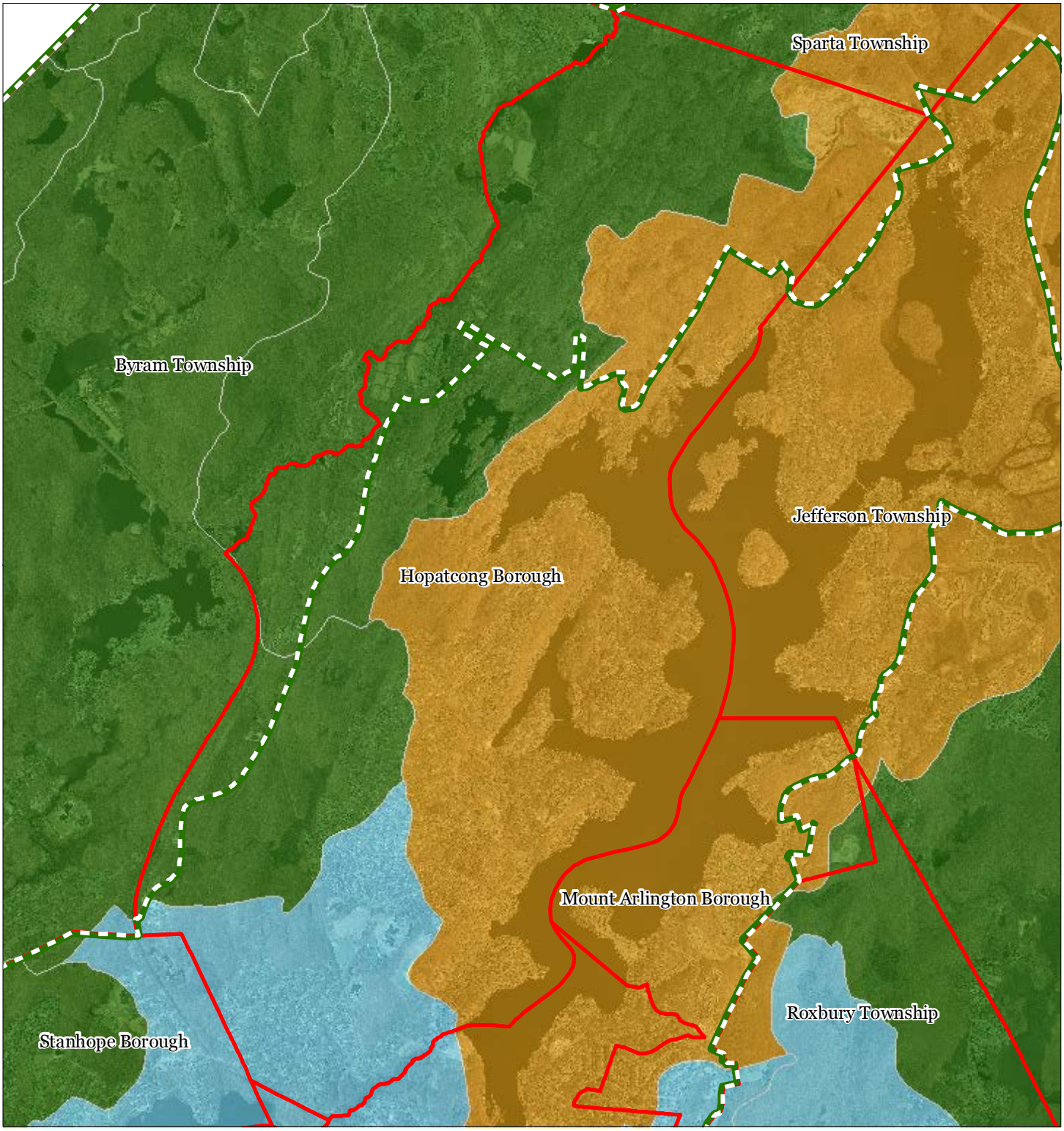
April 2012

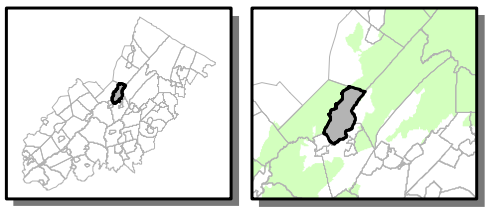
Figure 9: Watershed Values



Watershed Values by HUC14 Subwatershed

- *Low*
- *Moderate*
- *High*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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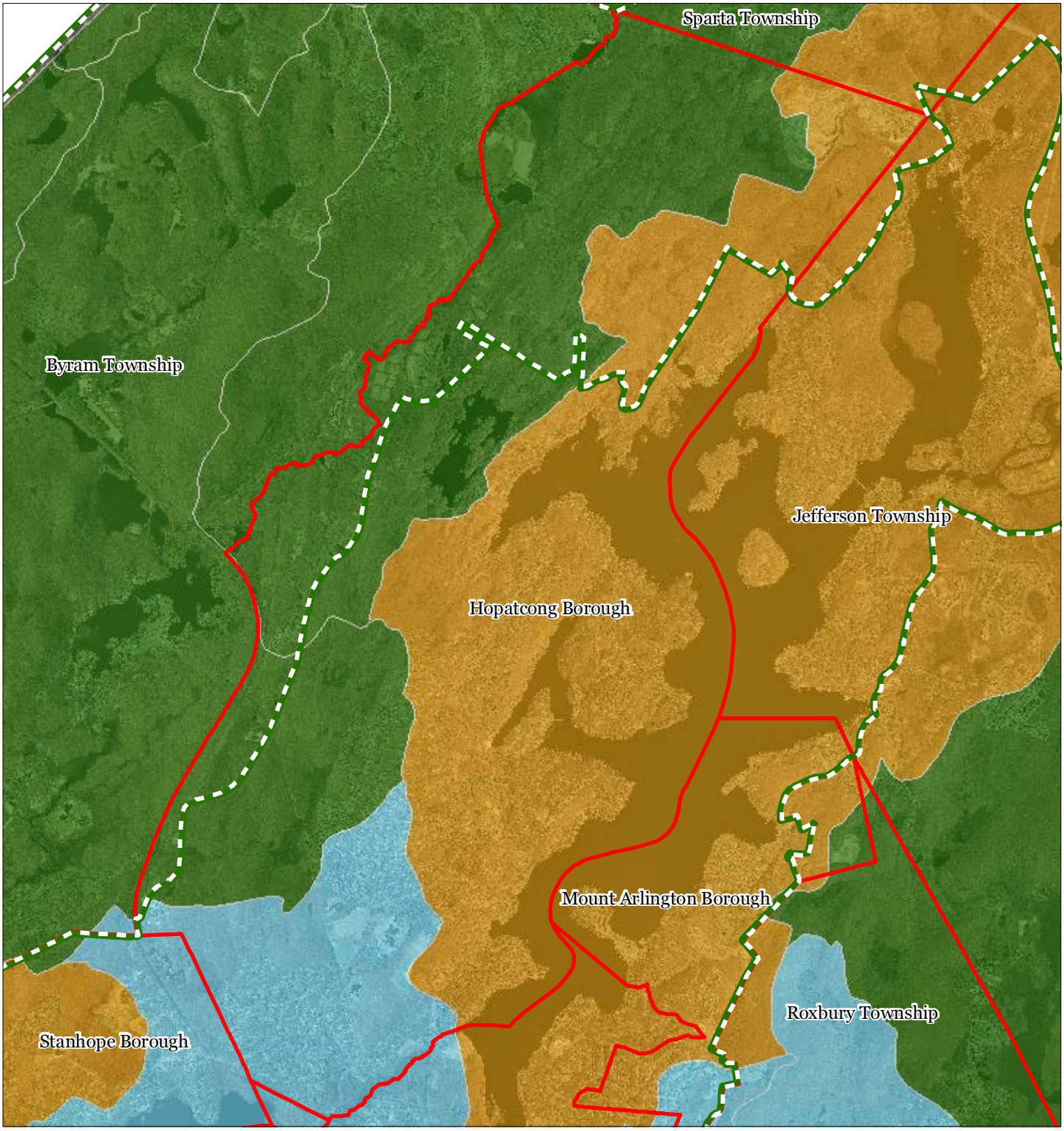
April 2012

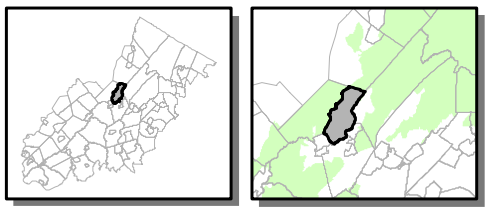
Figure 10: Riparian Integrity



Riparian Integrity by HUC14 Subwatershed

- *Low*
- *Moderate*
- *High*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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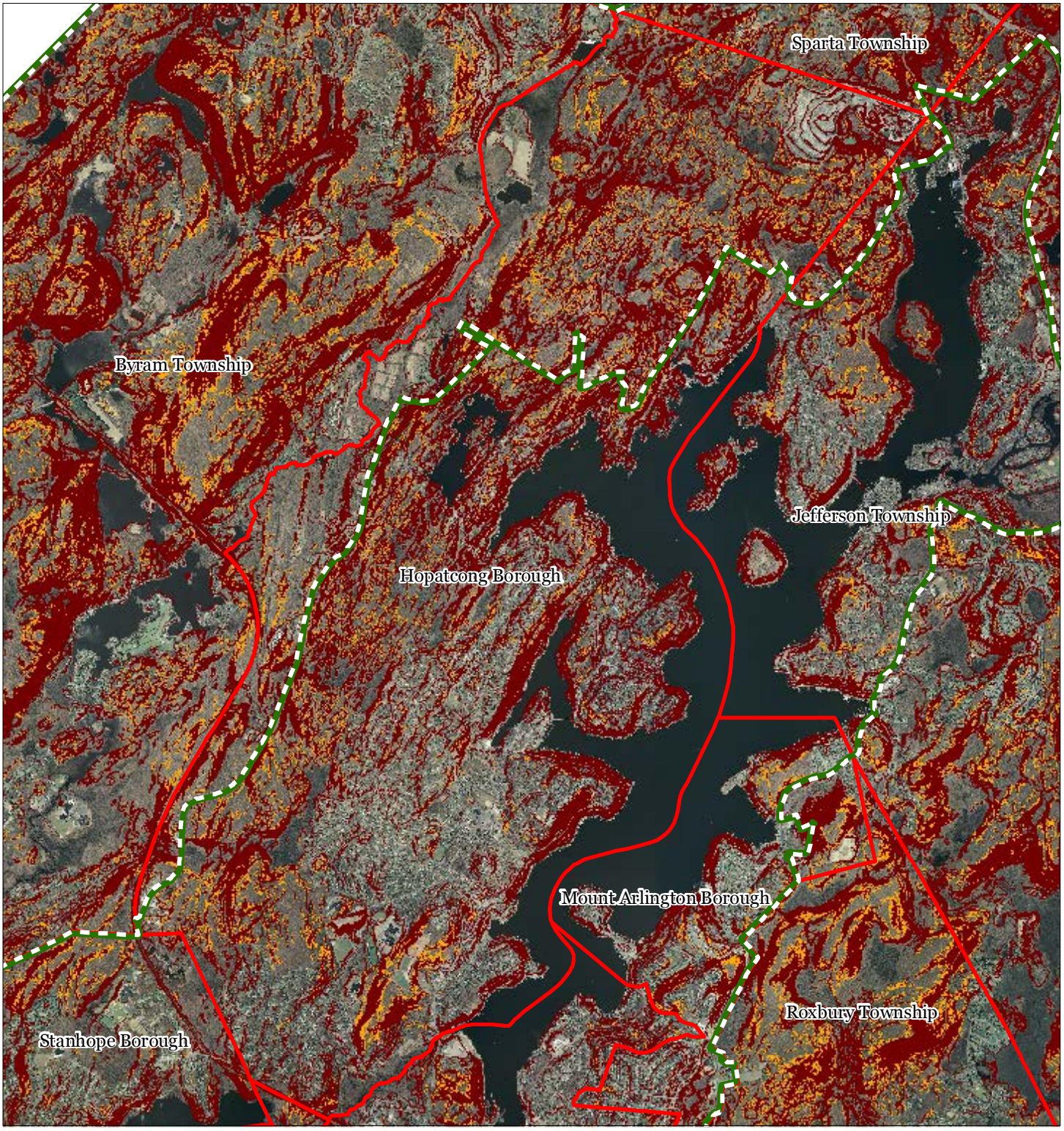
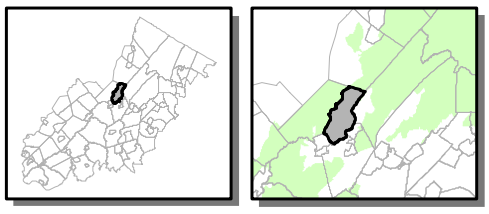
April 2012

Figure 11: Steep Slope Protection Areas



Steep Slopes
- *Moderate*
- *Severe*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



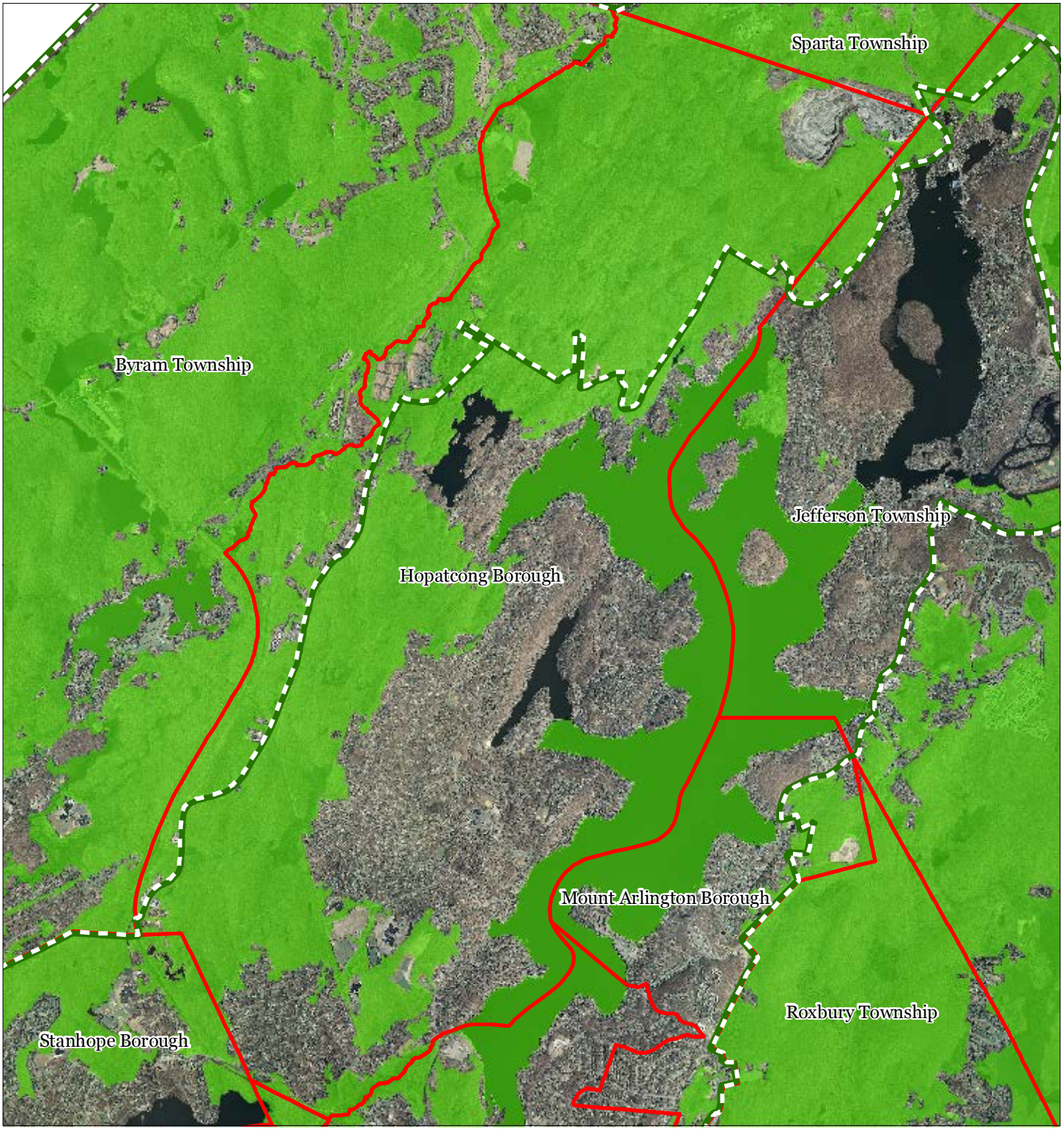
1 inch = 0.72 miles

Highlands Council
New Jersey

N

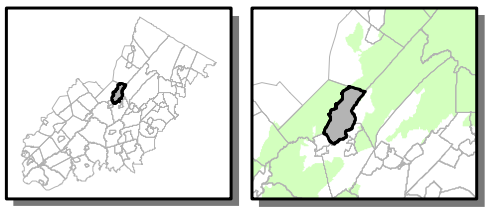
April 2012

Figure 12: Critical Wildlife Habitat



Critical Wildlife Habitat
Preservation Area
Municipal Boundaries

Hopatcong Borough



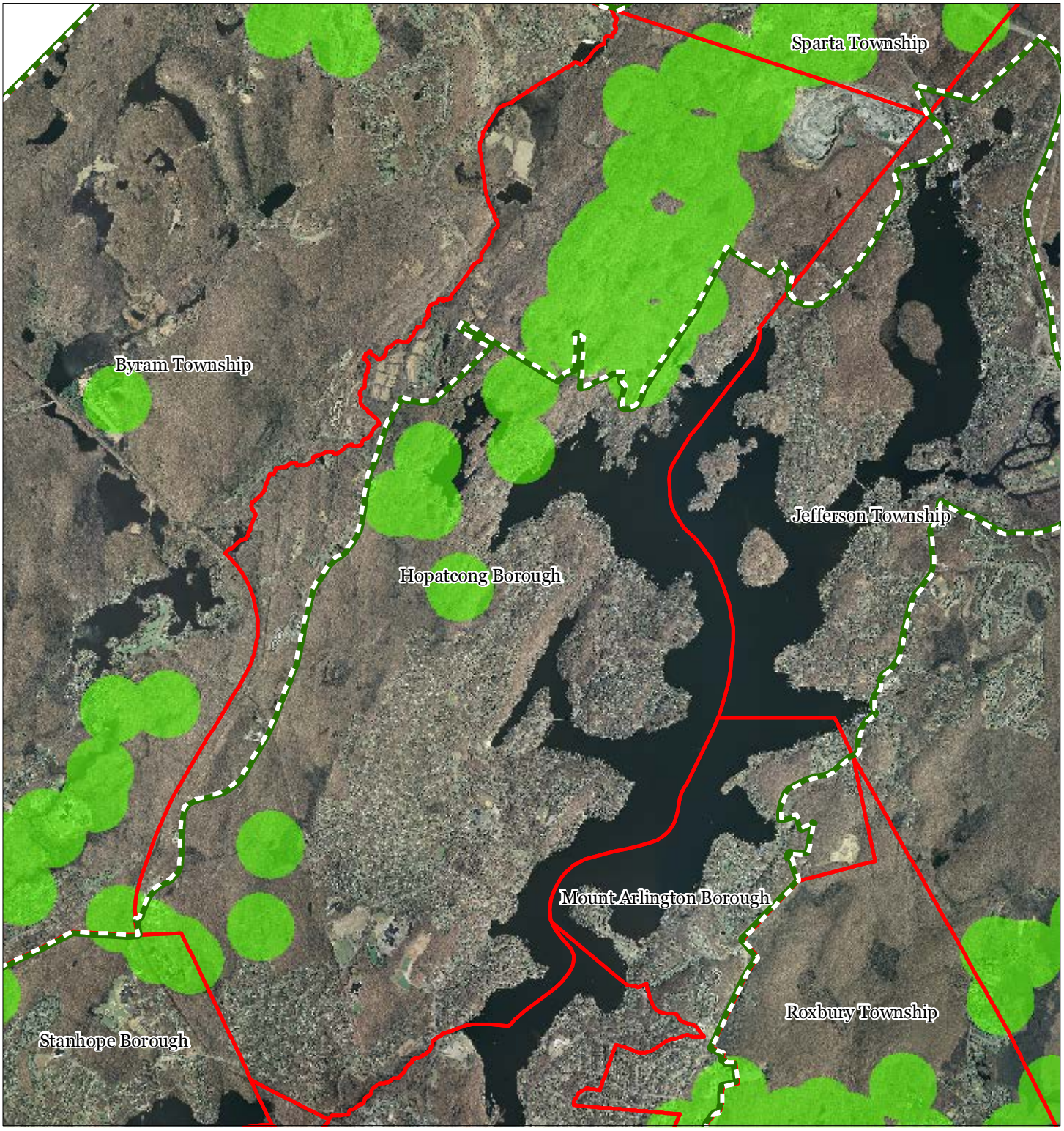
1 inch = 0.72 miles

Highlands Council
New Jersey

N

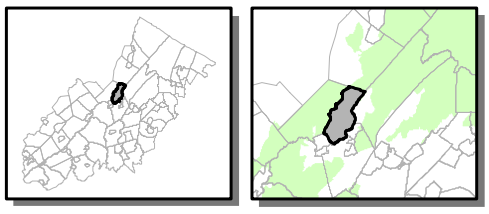
April 2012

Figure 14: Vernal Pools



Vernal Pools + 1000ft Buffer
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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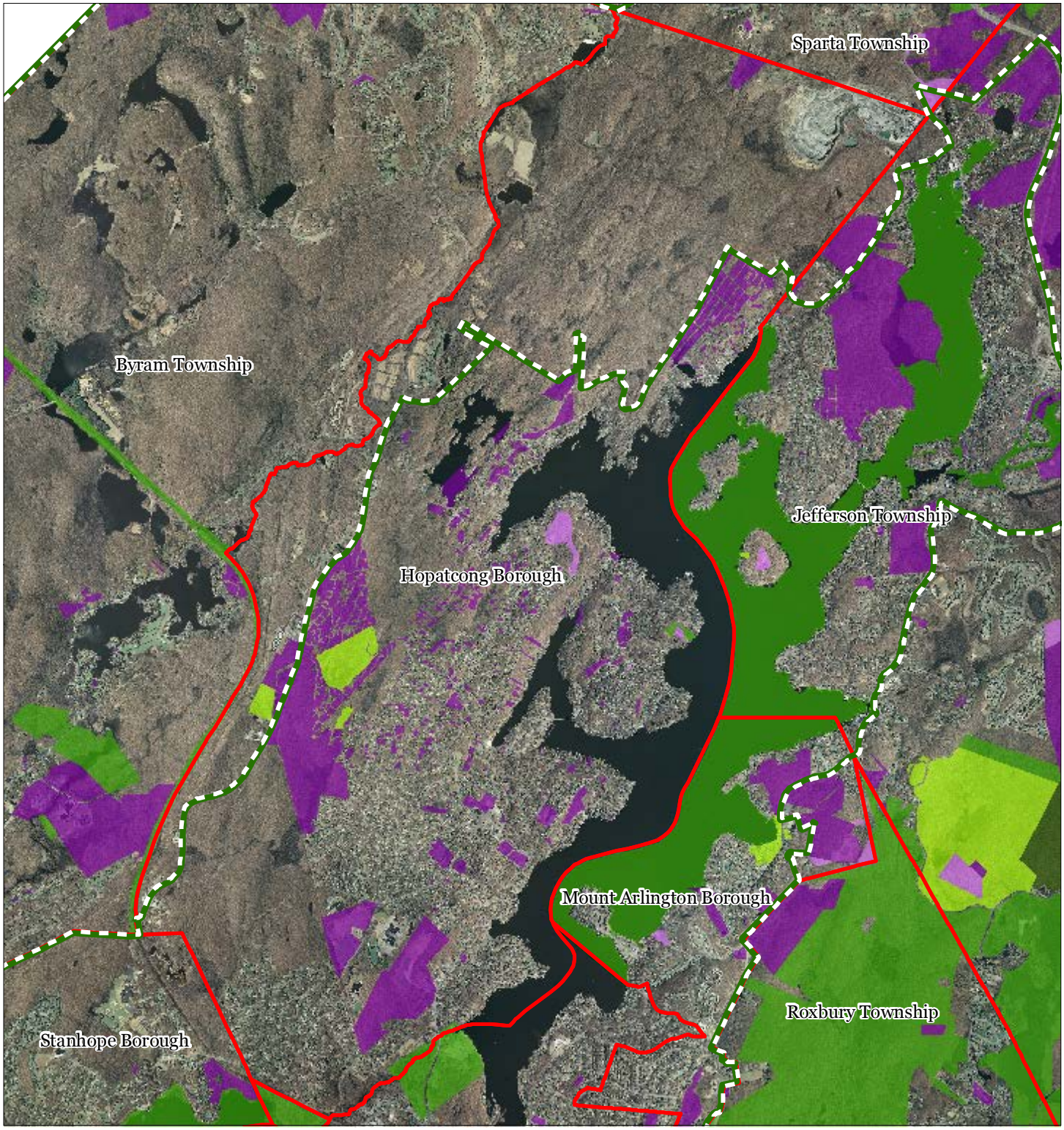
April 2012

Figure 15: Preserved Lands

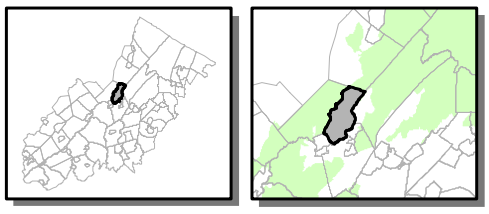


Preserved Lands
- *Federal Open Space*
- *State Open Space*
- *County Open Space*
- *Municipal Open Space*
- *Non-Profit/Private Open Space*
- *Water Supply Watershed Lands*
- *Preserved Farmland*
- *Highlands Transfer of Development Lands*

Conservation Easements
- *Green Acres*

SADC Easements
- *SADC Final*
- *SADC Preserved*
- Municipal Boundaries
- Preservation Area

Hopatcong Borough



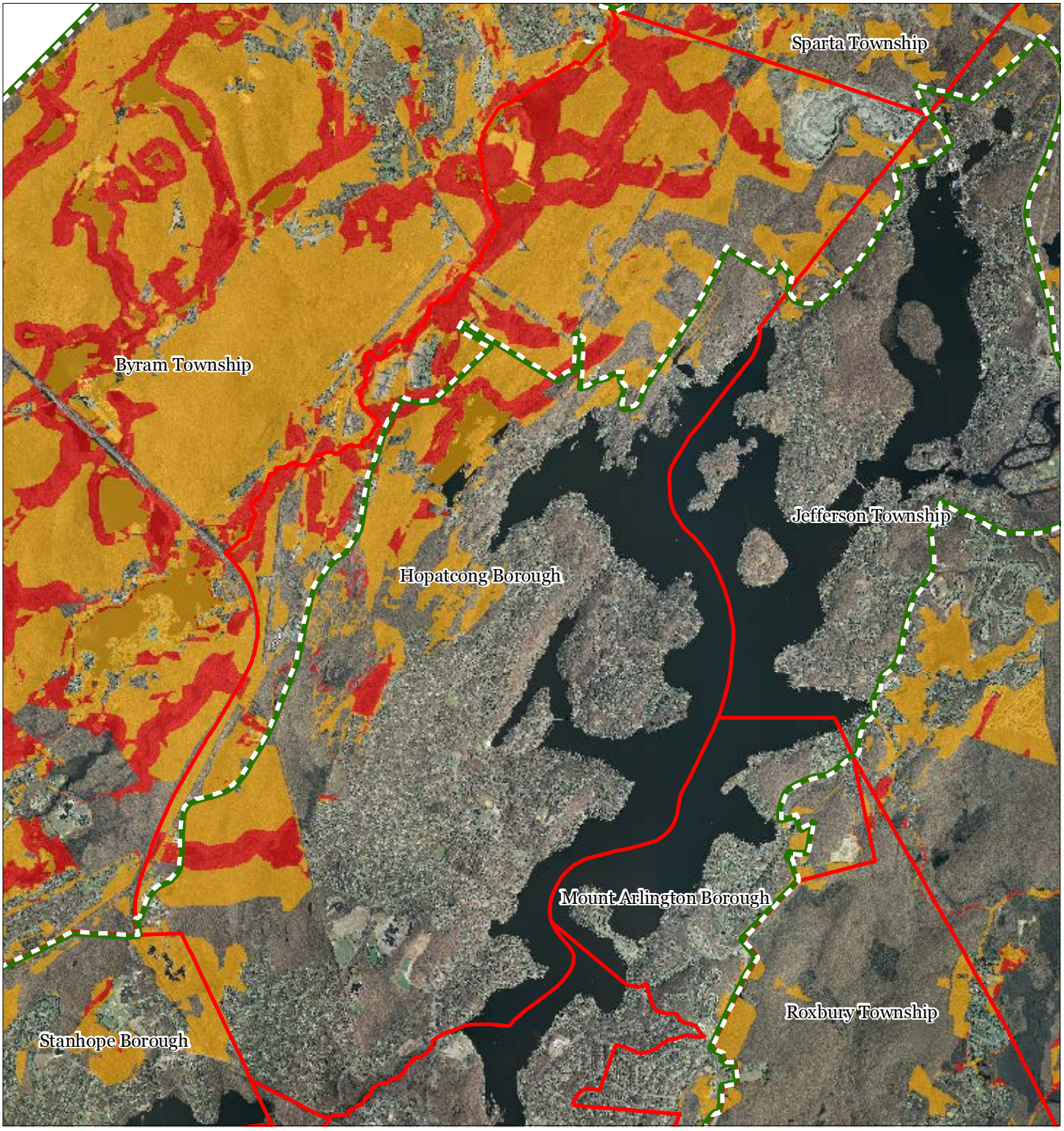
1 inch = 0.72 miles

Highlands Council
New Jersey

N

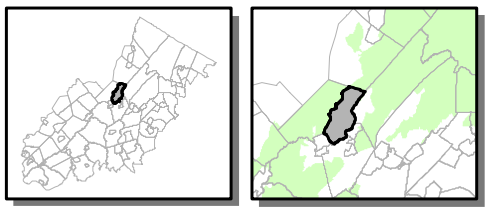
April 2012

Figure 16: Highlands Conservation Priority Areas



Conservation Priority Areas
- *Moderate*
- *High*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



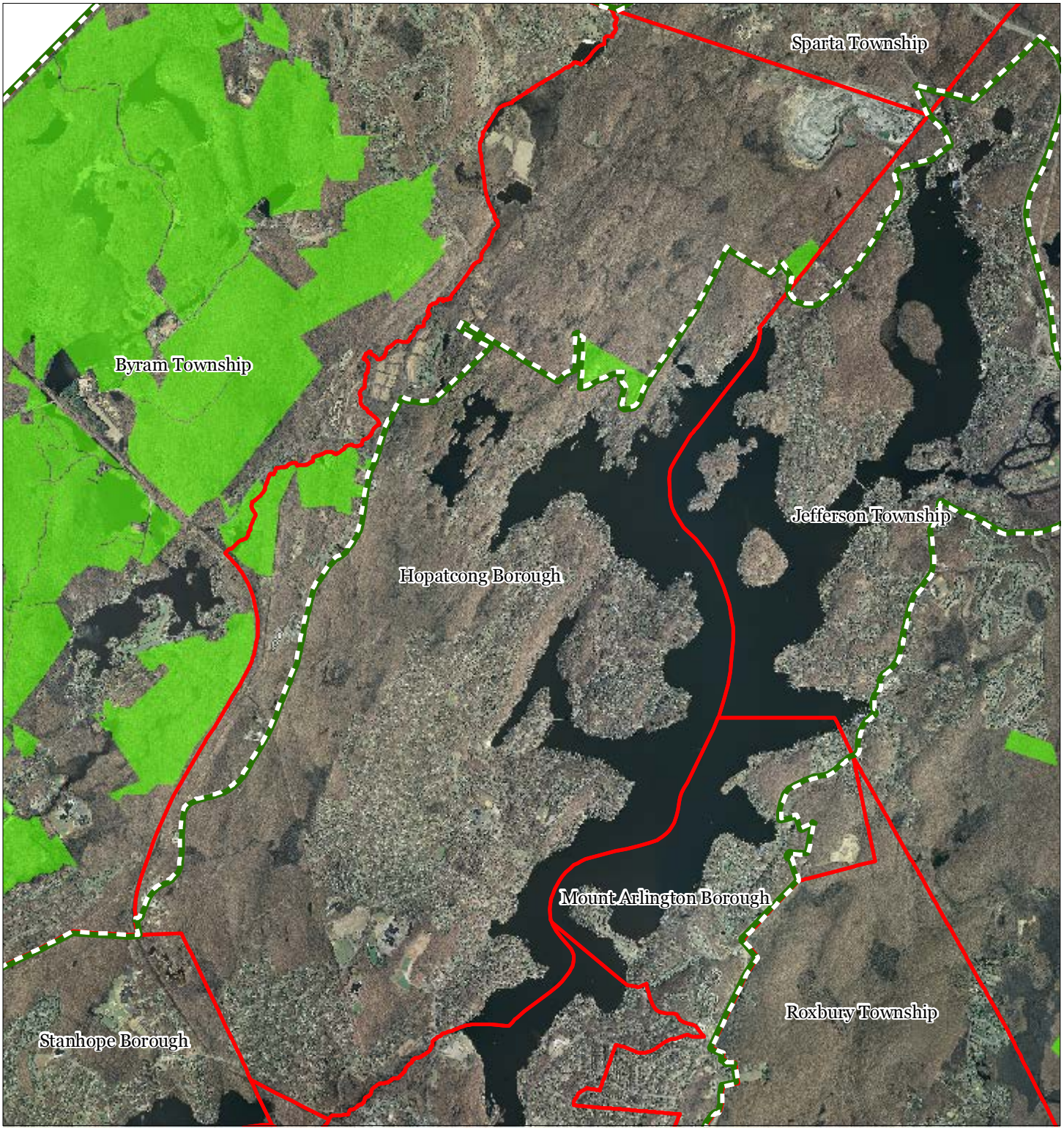
1 inch = 0.72 miles

Highlands Council
New Jersey

N

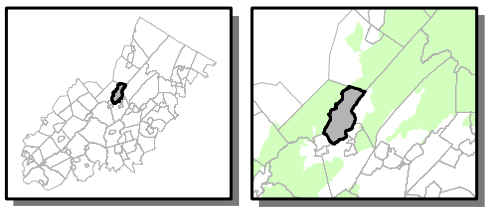
April 2012

Figure 17: Highlands Special Environmental Zone



Special Environmental Zones
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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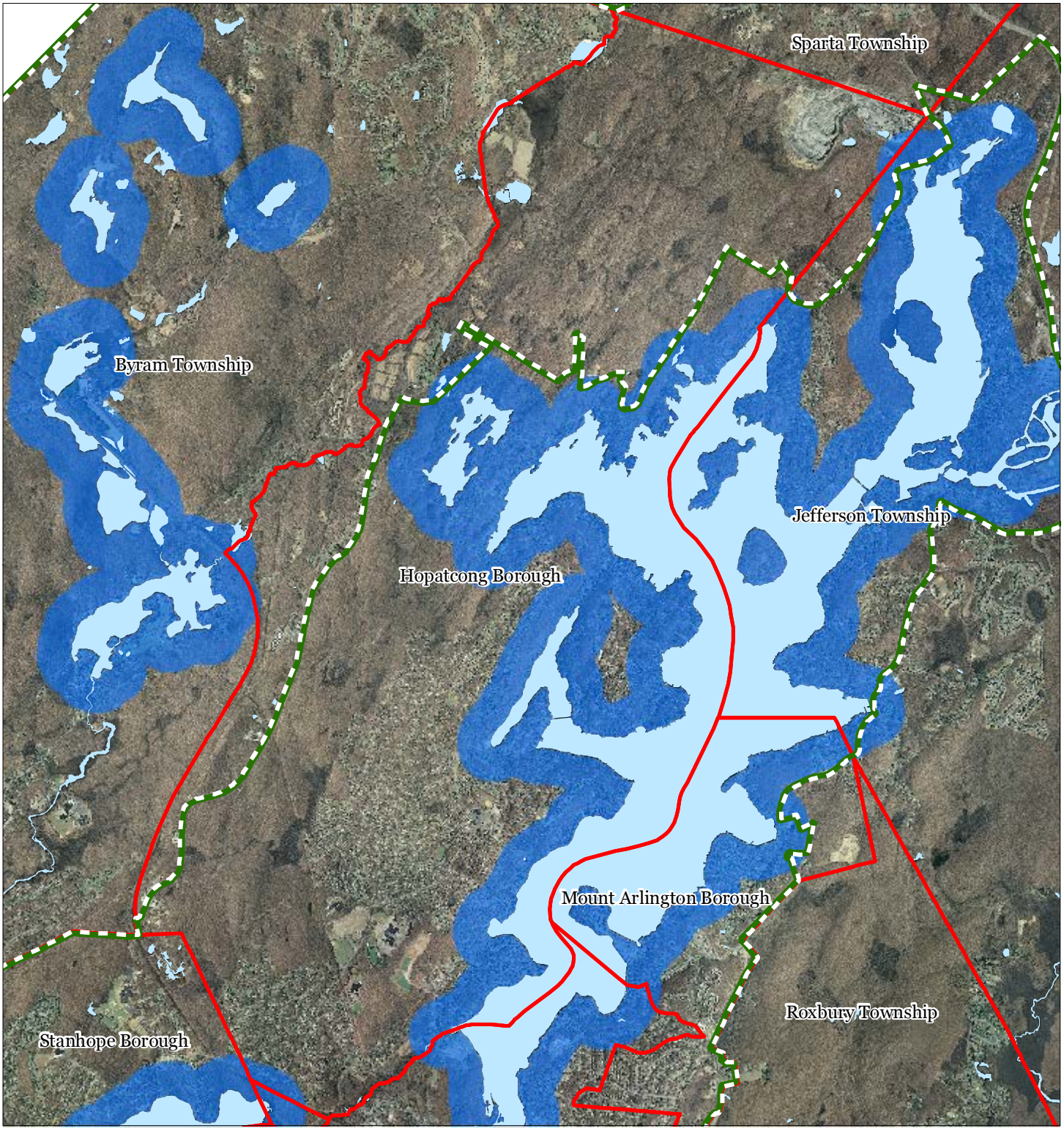
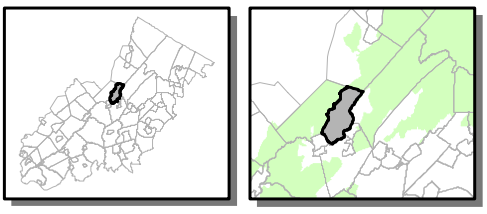
April 2012

Figure 19: Lake Management Area



Lakes & Ponds
Lake Management Area
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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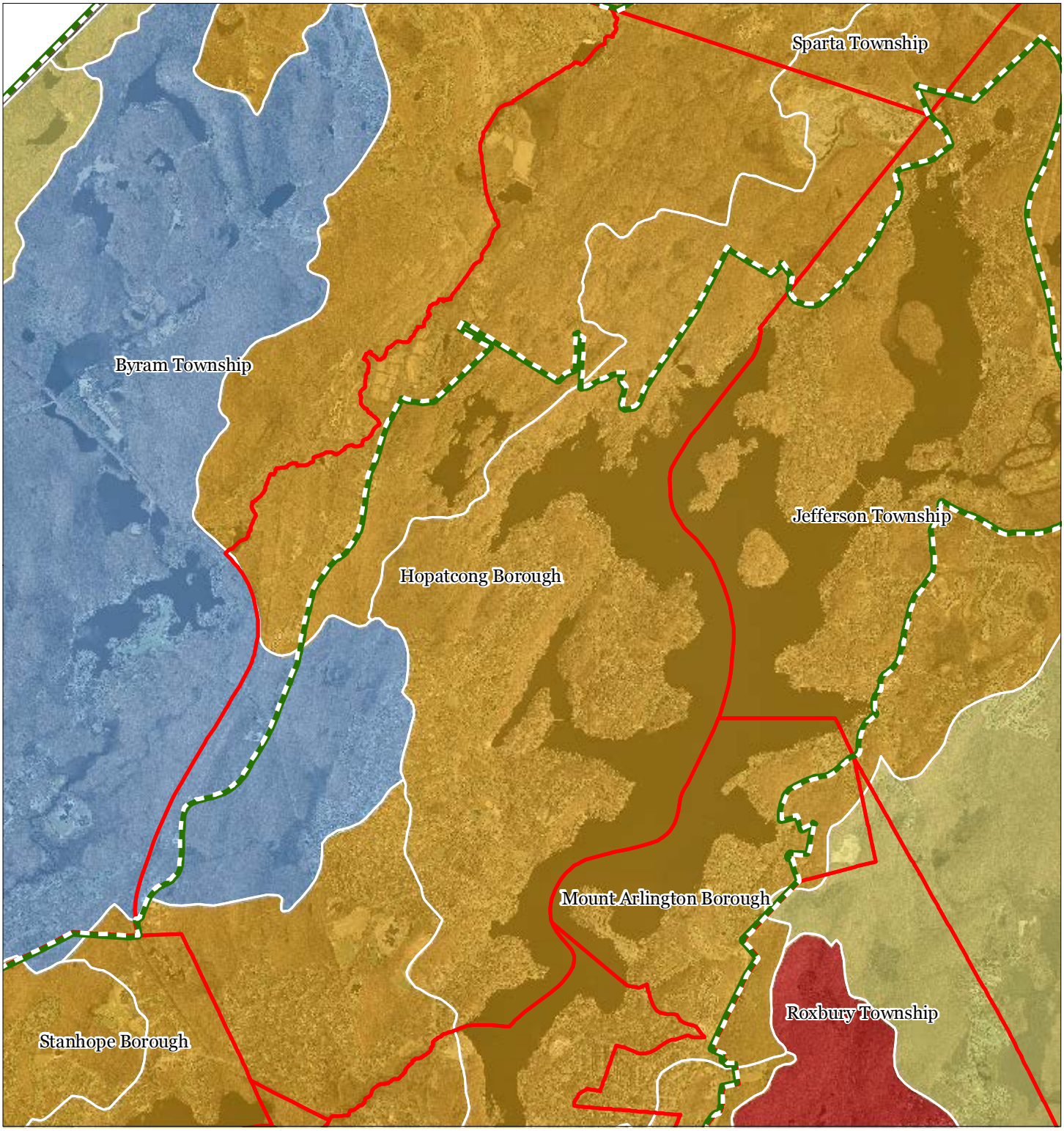
April 2012

Figure 20: Net Water Availability



Net Water Availability By HUC14

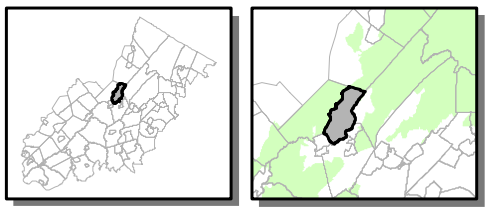
Million Gallons Per Day (MGD)

- 0.10 - 0.39
- 0.05 - 0.09
- 0.00 - 0.04
- -0.09 - 0.00
- -0.99 - -0.10
- -7.10 - -1.00

Preservation Area

Municipal Boundaries

Hopatcong Borough



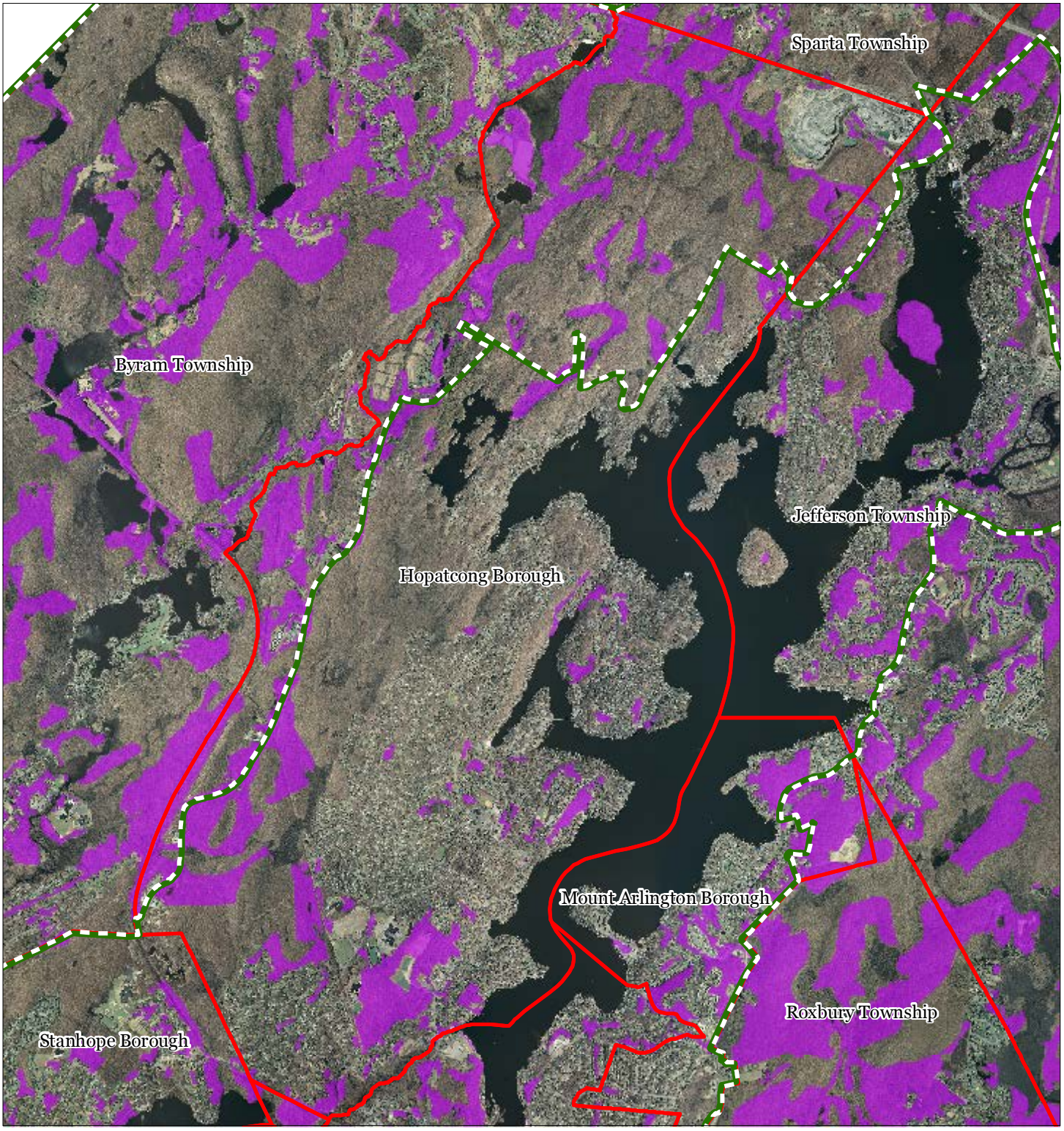
1 inch = 0.72 miles

Highlands Council
New Jersey

N

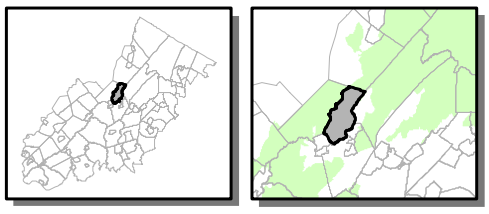
April 2012

Figure 21: Prime Ground Water Recharge Areas



Prime Ground Water Recharge Areas
Preservation Area
Municipal Boundaries

Hopatcong Borough



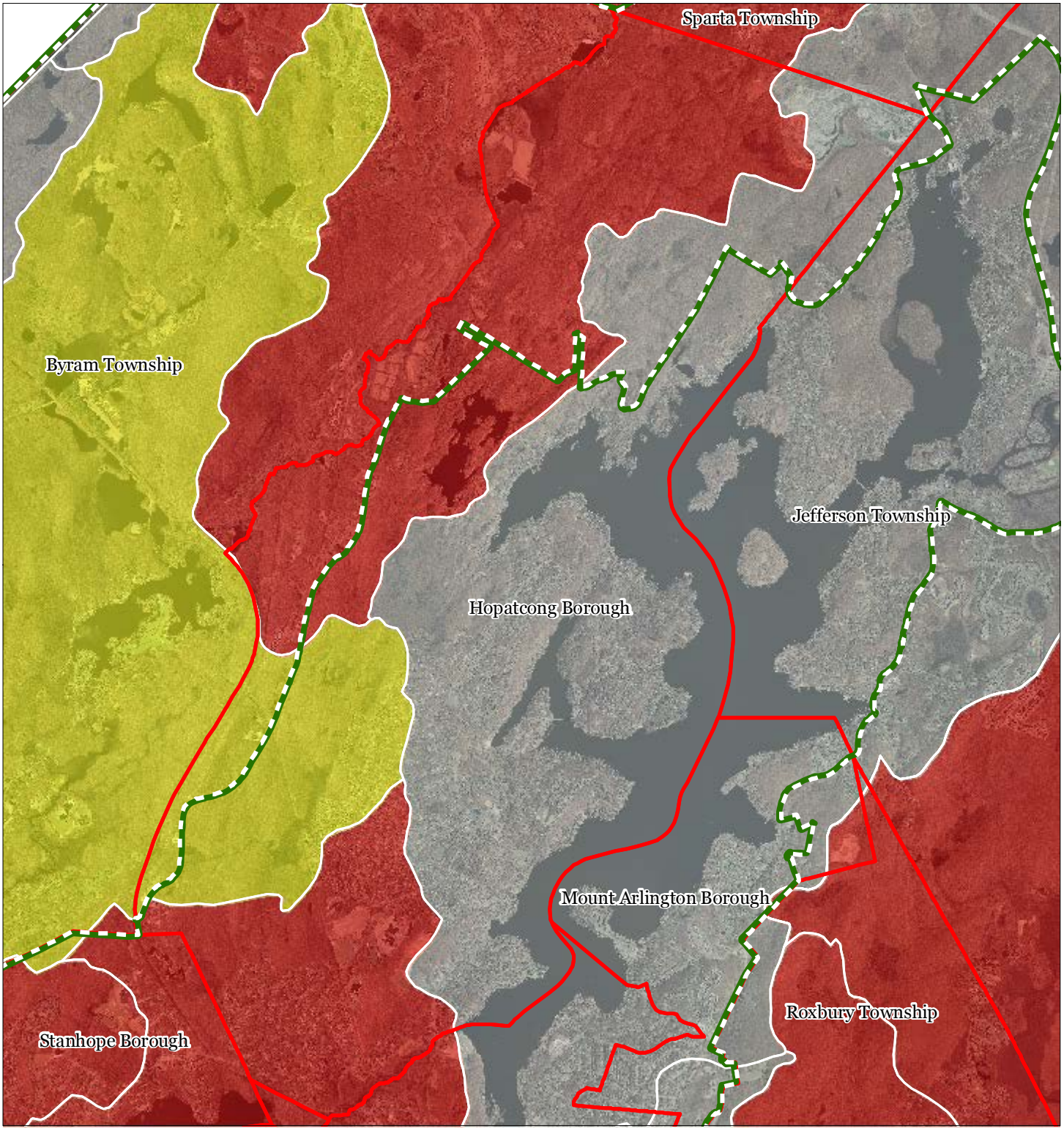
1 inch = 0.72 miles

Highlands Council
New Jersey

N

April 2012

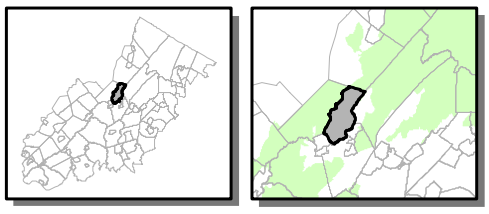
Figure 22: HUC 14s on NJDEP Impaired Waters List



Impaired Waters Overall Assessment by HUC14 Subwatershed

- *Non Impacted*
- *Insufficient Data Available*
- *Moderate*
- *Water Quality Impaired*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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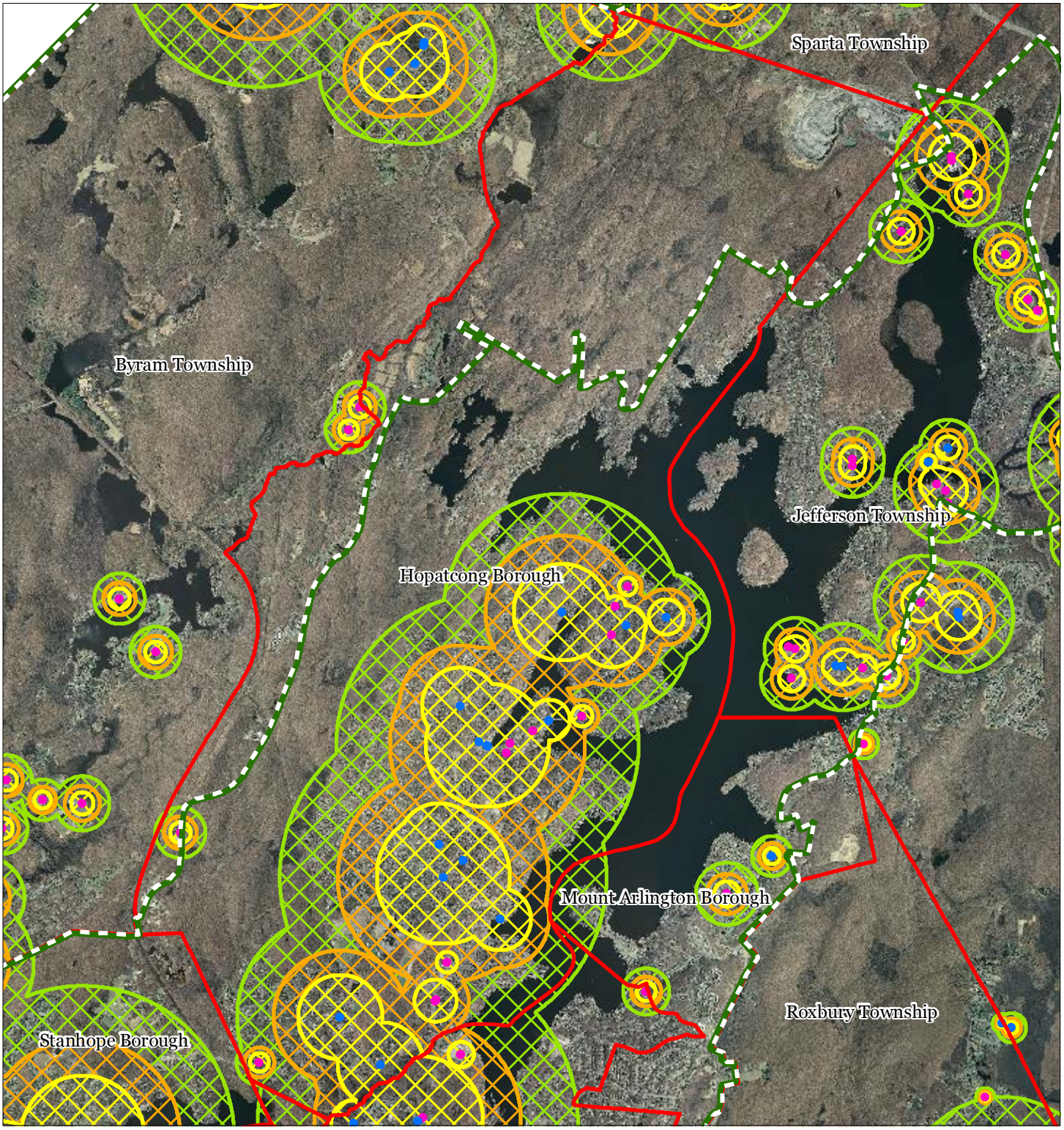
Figure 23: Wellhead Protection Areas



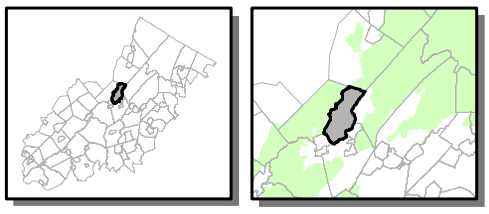
- Public Community Wells
- Public Non-Community Wells

Wellhead Protection Areas

- *2-Year Tier*
- *5-Year Tier*
- *12-Year Tier*

- Preservation Area
- Municipal Boundaries

Hopatcong Borough



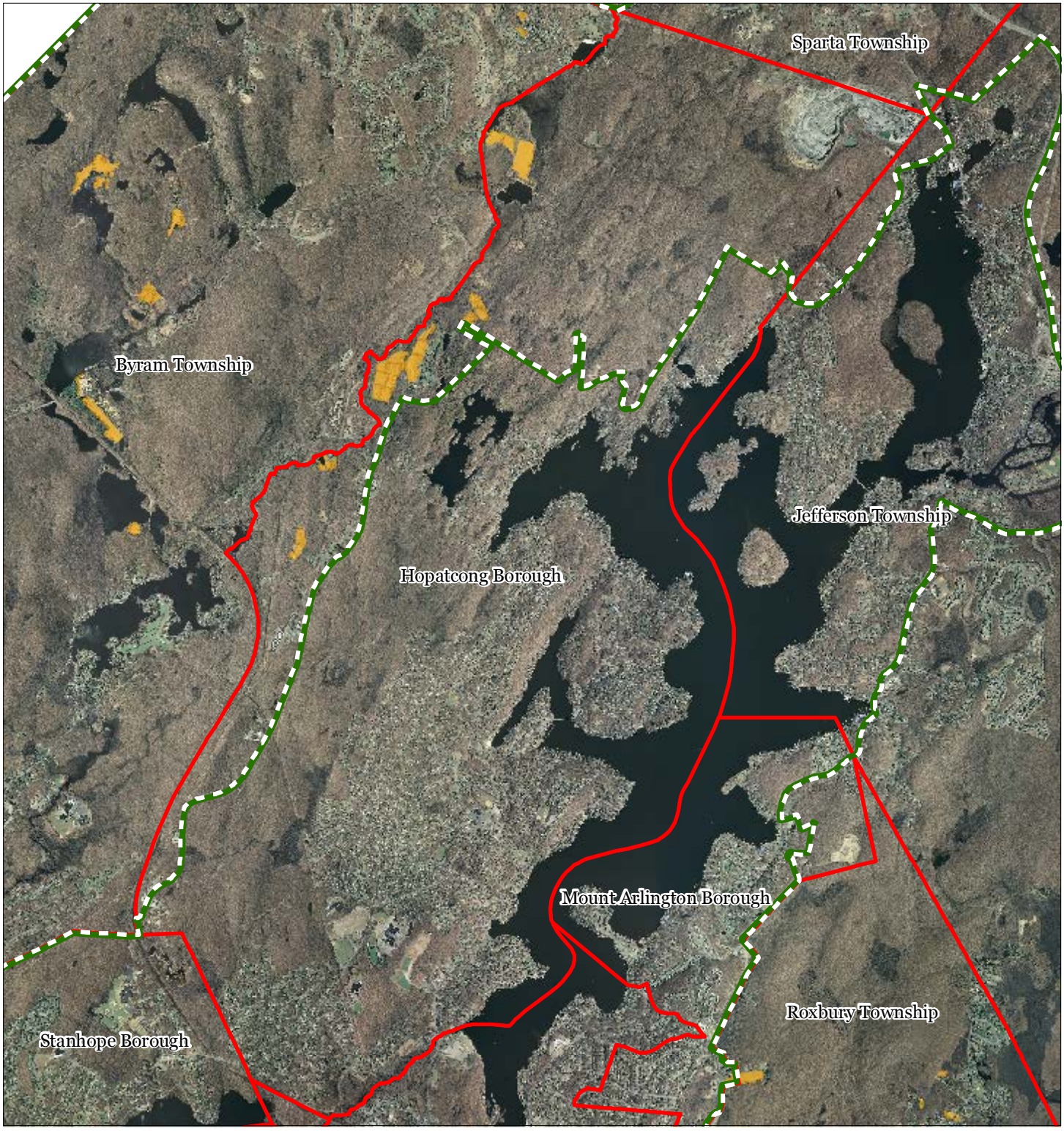
1 inch = 0.72 miles

Highlands Council
New Jersey

N

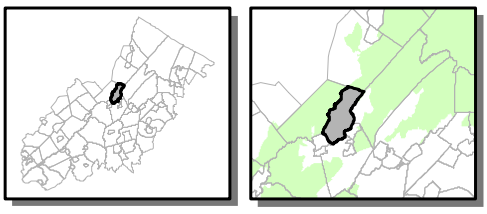
April 2012

Figure 26: Preserved Farms, SADC Easements, All Agricultural Uses



SADC Easements
- *SADC Final*
- *SADC Preserved*
- Preserved Farmland
- Agriculture Uses
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



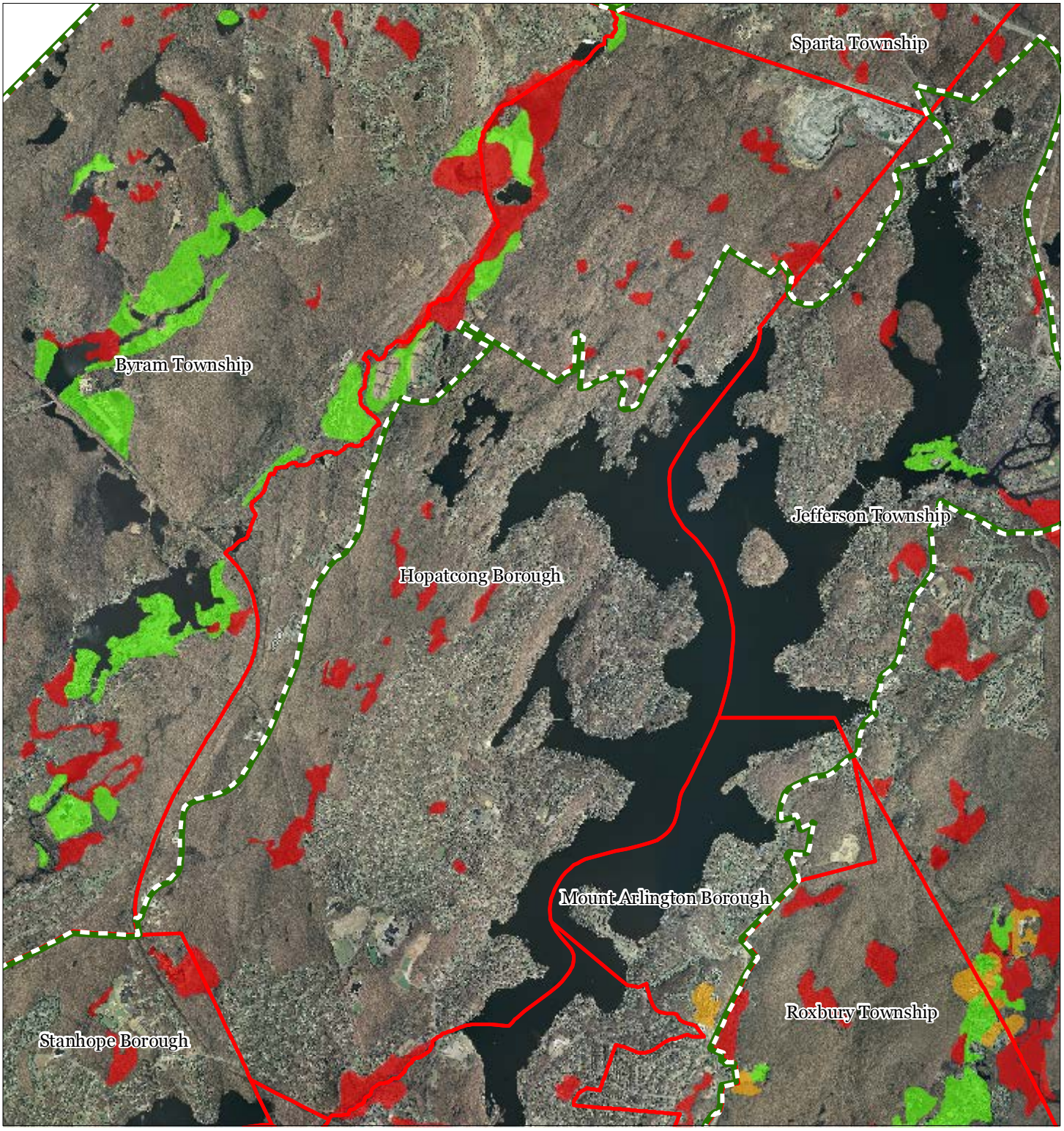
1 inch = 0.72 miles

Highlands Council
New Jersey

N

April 2012

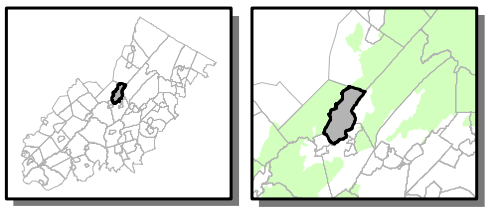
Figure 27: Important Farmland Soils



Important Farmland Soils

- *Prime Farmland*
- *Farmland of Local Importance*
- *Farmland of Statewide Importance*
- *Farmland of Unique Importance*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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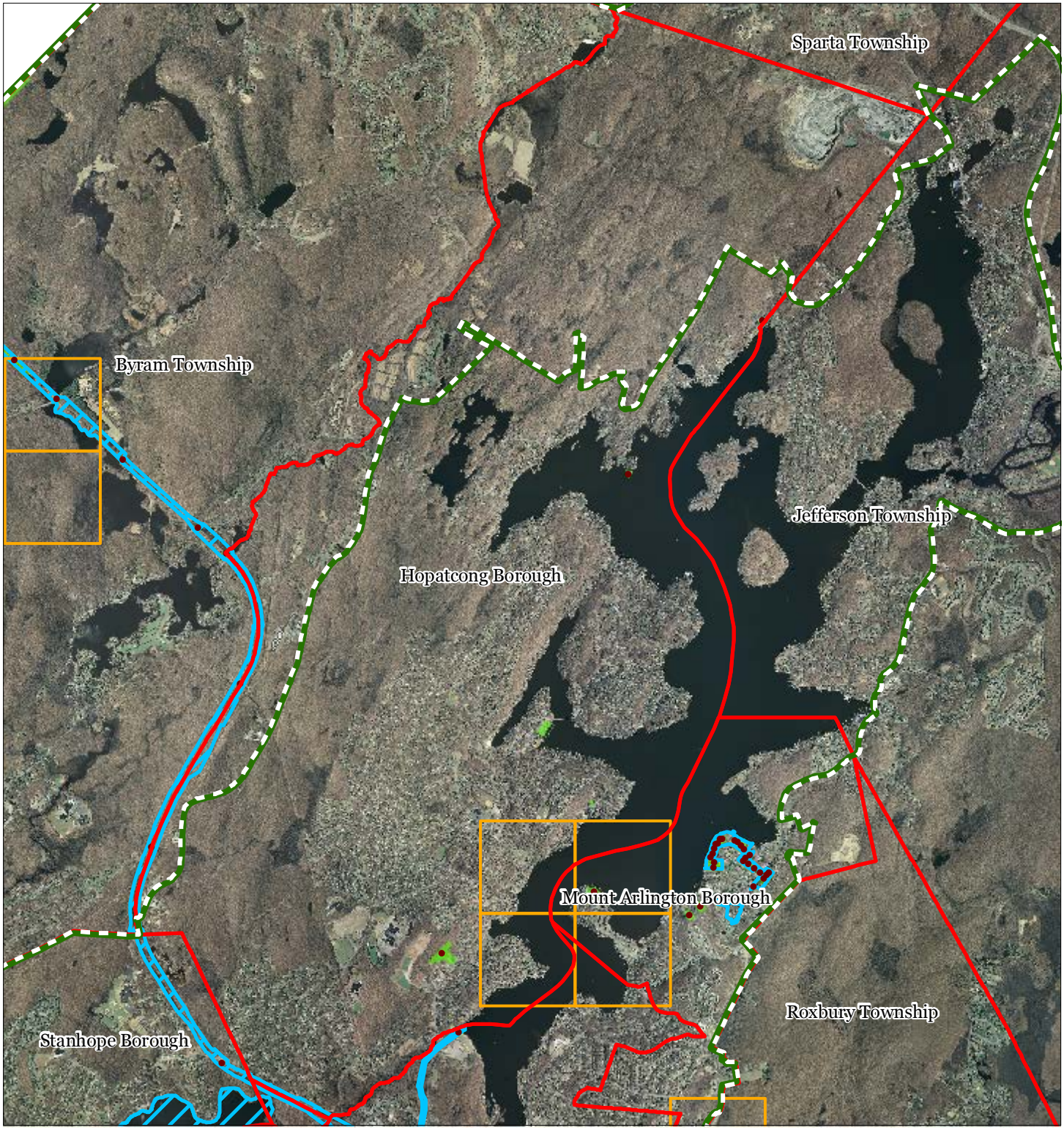
April 2012

Figure 28: Historic, Cultural, and Archaeological Resources Inventory



Preservation Area
Municipal Boundaries
Archaeological Grids (1 sqmi)
NJ Historic Districts
Historic Property Points
Historic Property Polygons

Hopatcong Borough

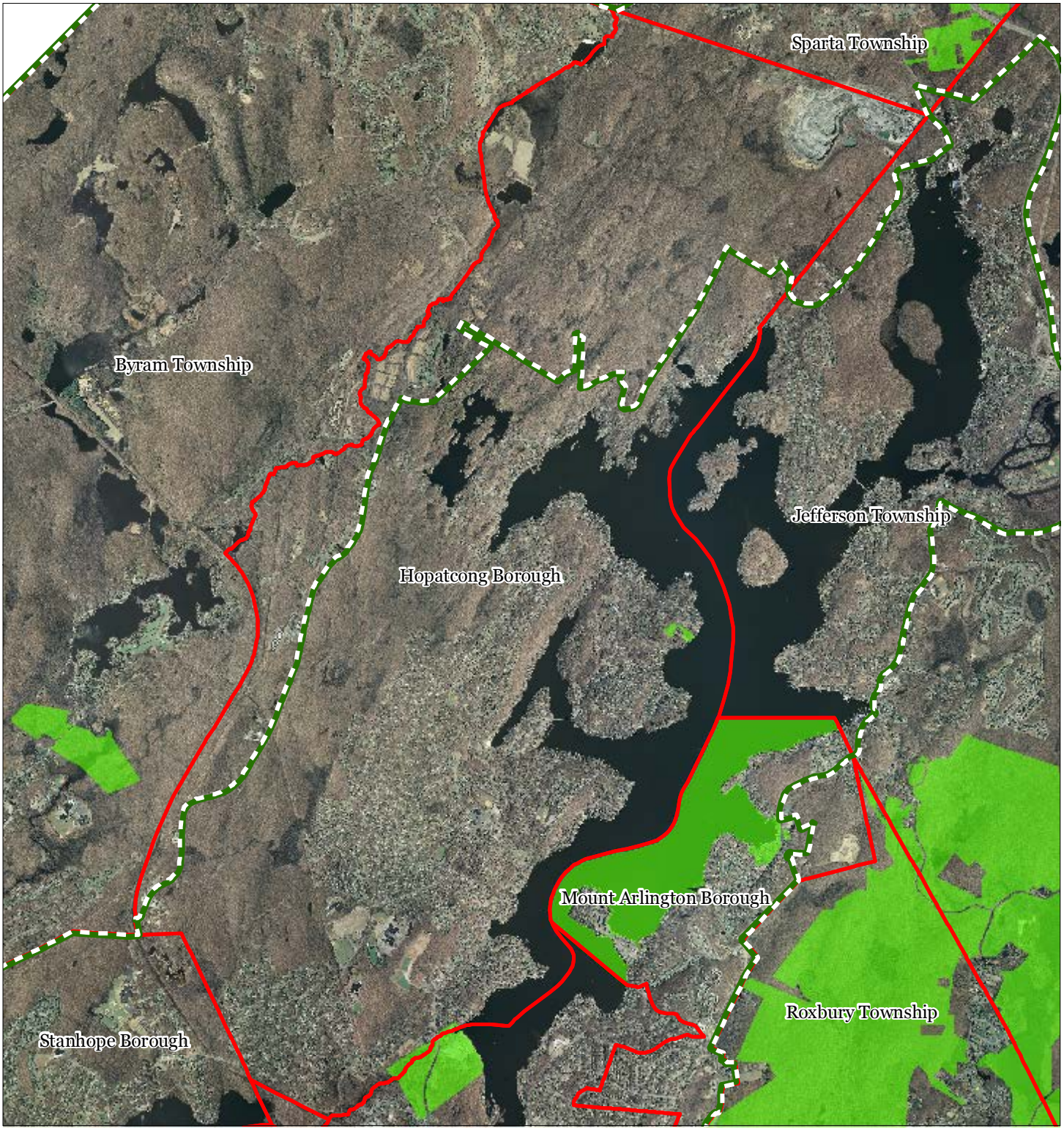
1 inch = 0.72 miles

Highlands Council
New Jersey

N

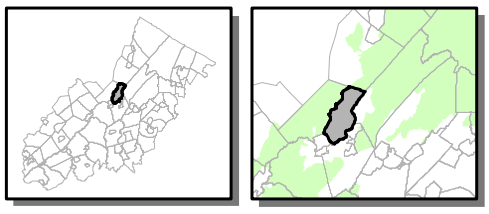
April 2012

Figure 29: Baseline Scenic Resources Inventory



Scenic Resources
Municipal Boundaries
Preservation Area

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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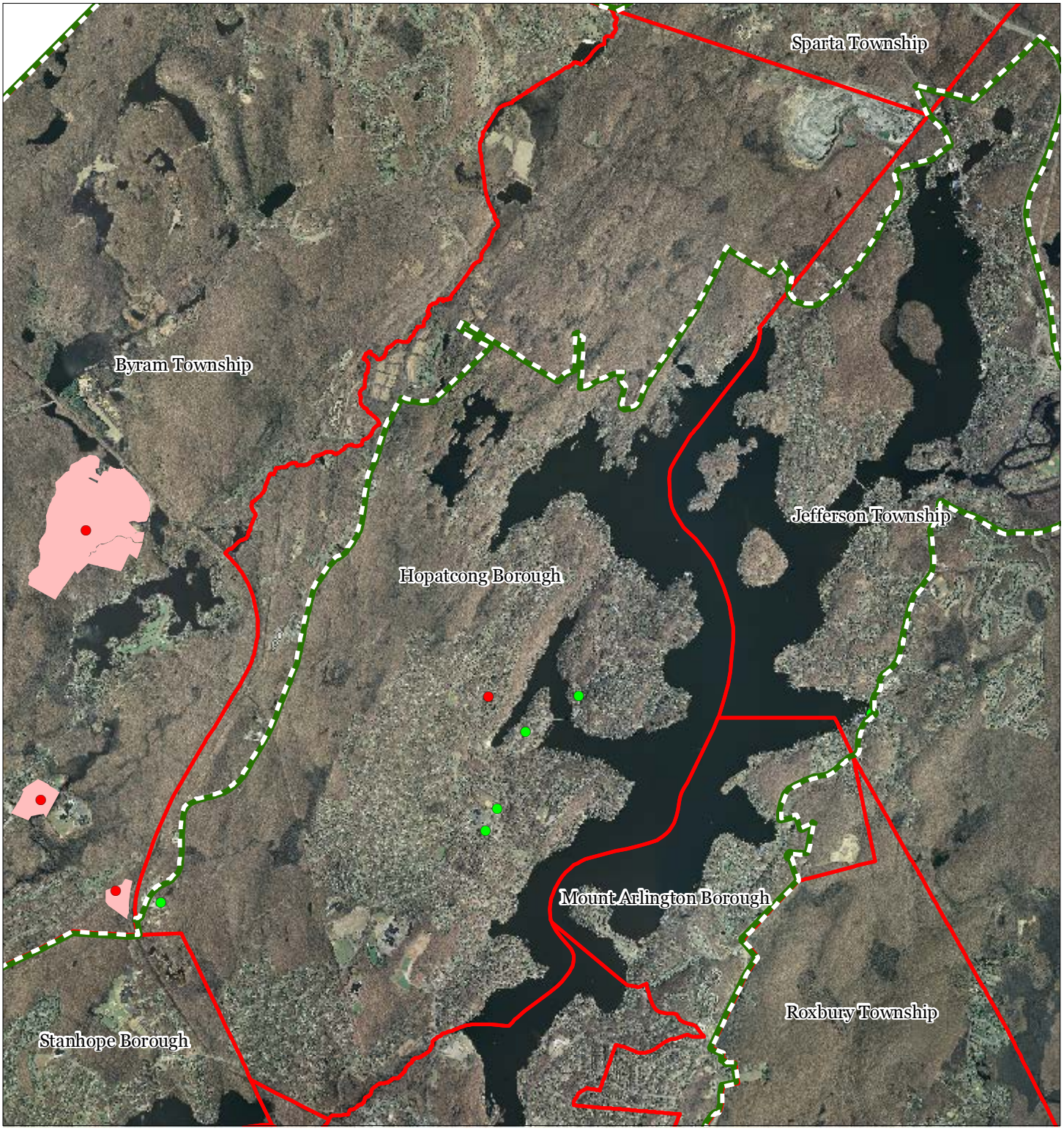
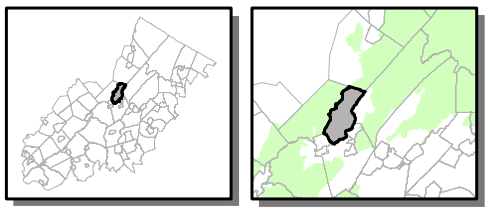
Figure 30: Highlands Contaminated Site Inventory



Highlands Contaminated Site Inventory

- *Tier 1 Sites*
- *Tier 1 Sites (Polygons)*
- *Tier 2 Sites*
- Preservation Area
- Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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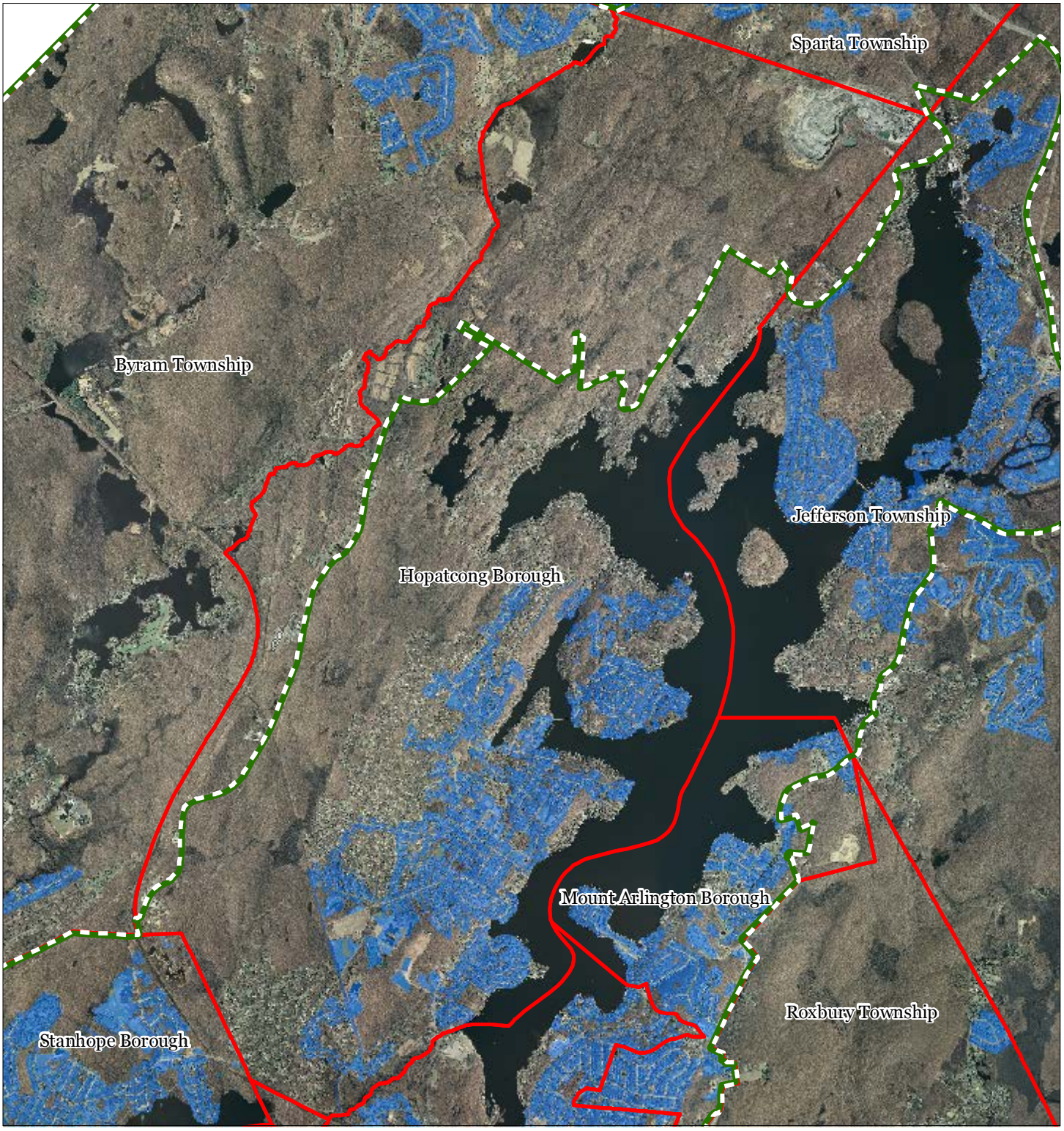
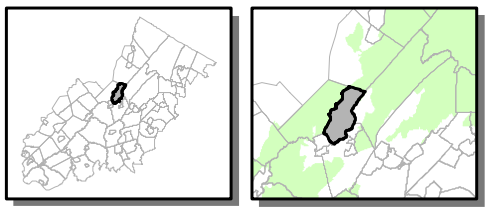
Figure 31: Public Community Water Systems



Public Community Water Systems
Preservation Area
Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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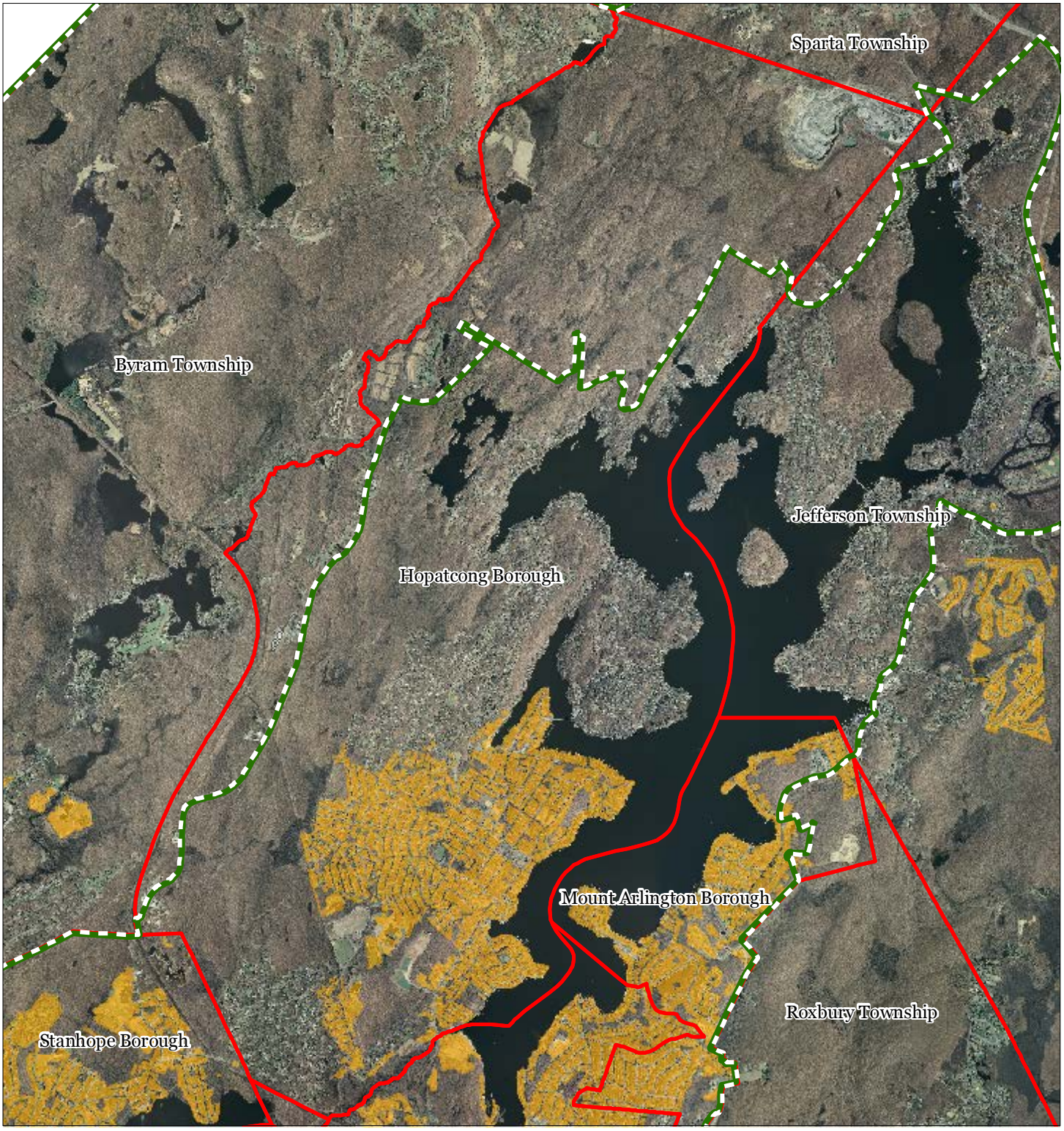
Figure 32: Highlands Domestic Sewerage Facilities



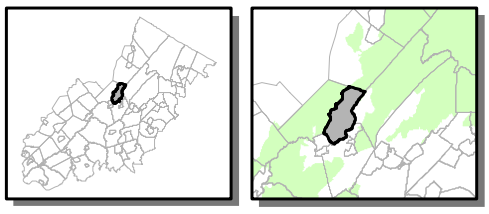
Highlands Domestic Sewerage Facilities

Existing Area Served

Preservation Area

Municipal Boundaries

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

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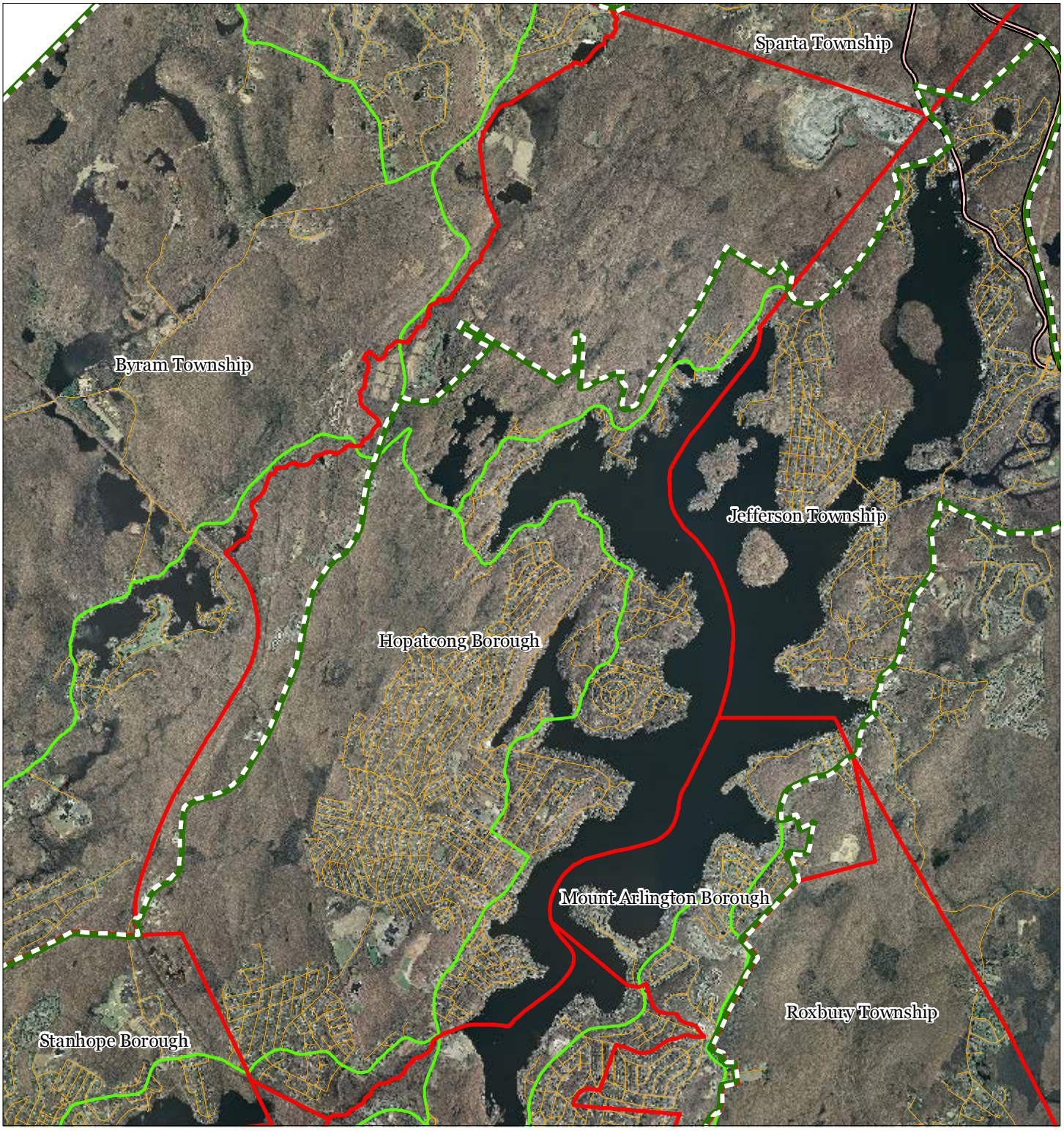
April 2012

Figure 33: Highlands Roadway Network



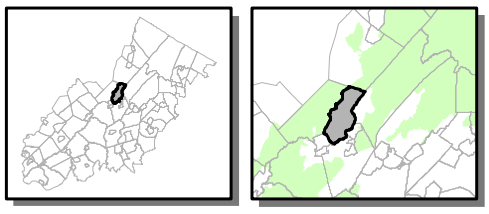
Roadway Network

- *Interstate Highways*
- *U.S. Routes*
- *State Routes*
- *County Routes*
- *Local Routes*

Preservation Area

Municipal Boundaries

Hopatcong Borough



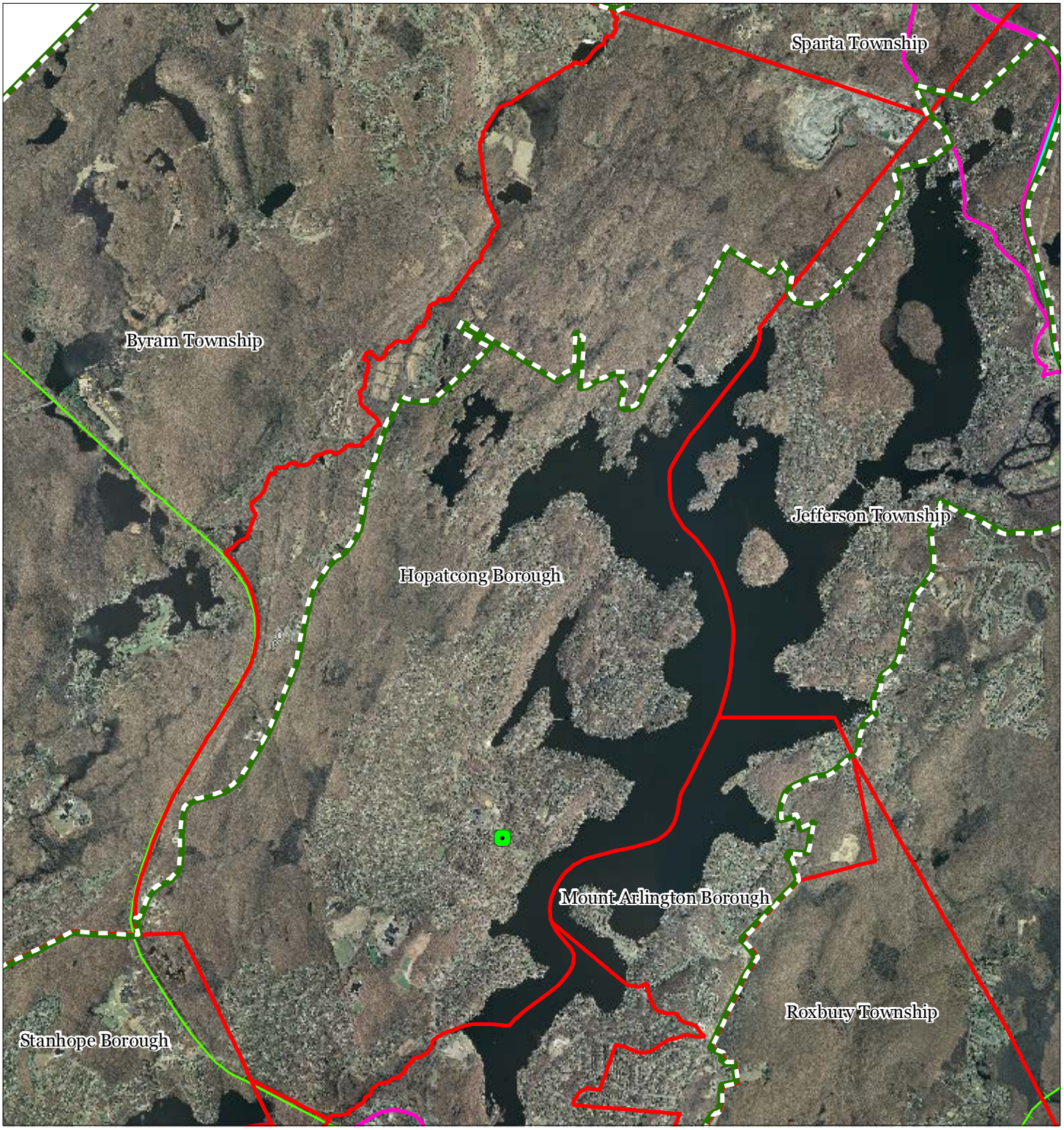
1 inch = 0.72 miles

Highlands Council
New Jersey

N

April 2012

Figure 34: Highlands Transit Network

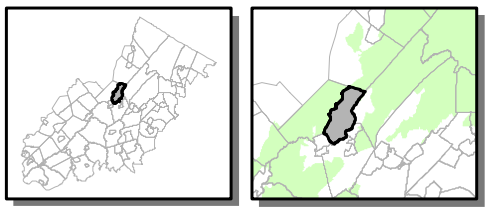


Rail Network
- *Boonton Line*
- *Main Line & Bergen County Line*
- *Morris and Essex Line*
- *Raritan Valley Line*

Freight Rail Lines
- *Freight Rail Lines*
- *Abandoned Freight Rail*

- Rail Stations
- Park and Ride Sites
- Private Bus Lines
- NJ Transit Bus Lines
- Airports

Hopatcong Borough



1 inch = 0.72 miles

Highlands Council
New Jersey

N

April 2012

APPENDIX A

ORDINANCE 2-2021

AN ORDINANCE OF THE BOROUGH OF HOPATCONG, COUNTY OF SUSSEX REPLACING ARTICLE IX OF CHAPTER 242 OF THE CODE OF THE BOROUGH OF HOPATCONG REGARDING STORMWATER CONTROL

BE IT ORDAINED, by the Borough Council of the Borough of Hopatcong, County of Sussex, State of New Jersey, as follows:

Section 1. Article IX of Chapter 242, Sections 242-73 through 242-86, are hereby replaced as follows:

Section 242-73. Scope and Purpose:

A. Policy; Purpose. Flood control, groundwater recharge, and pollutant reduction shall be achieved through the use of stormwater management measures, including green infrastructure Best Management Practices (GI BMPs) and nonstructural stormwater management strategies. GI BMPs and low impact development (LID) should be utilized to meet the goal of maintaining natural hydrology to reduce stormwater runoff volume, reduce erosion, encourage infiltration and groundwater recharge, and reduce pollution. GI BMPs and LID should be developed based upon physical site conditions and the origin, nature and the anticipated quantity, or amount, of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge. It is the purpose of this Section to establish minimum stormwater management requirements and controls for major development as defined in 242-74.

B. Applicability. This Section shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review: Nonresidential major developments; and aspects of residential major developments that are not preempted by the Residential Site Improvement Standards at N.J.A.C. 5:21.

C. This subsection shall also be applicable to all major developments undertaken in the Borough of Hopatcong.

Section 242-74. Definitions. For the purpose of this ordinance, the terms, phrases, words and their derivations shall have the meanings set forth in the Stormwater Management Rules at N.J.A.C. 7:8-1.2.

Section 242-75. Design and Performance Standards for Stormwater Management Measures

A. Stormwater management measures for Development regulated by this Section shall be designed to provide erosion control, groundwater recharge, stormwater runoff quantity control, and stormwater runoff quality treatment as follows:
    1. The minimum standards for erosion control are those established under the Soil and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules at N.J.A.C. 2:90.
    2. The minimum standards for groundwater recharge, stormwater quality, and stormwater runoff quantity shall be met by incorporating green infrastructure.

B. The standards in this ordinance apply only to new Development and are intended to minimize the impact of stormwater runoff on water quality and water quantity in receiving water bodies and maintain groundwater recharge. The standards do not apply to new Development to the extent that

alternative design and performance standards are applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

Section 242-76. Stormwater Management Requirements for Regulated Development

A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a Development regulated by this Section in accordance with Section 242-82.

B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department's Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).

C. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity requirements of Section 242-76P, Q and R:
   1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;
   2. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and
   3. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material.

D. A waiver from strict compliance from the green infrastructure, groundwater recharge, stormwater runoff quality, and stormwater runoff quantity requirements of Section 242-76O, P, Q and R may be obtained for the enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:
   1. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
   2. The applicant demonstrates through an alternatives analysis, that through the use of stormwater management measures, the option selected complies with the requirements of Section 242-76O, P, Q and R to the maximum extent practicable;
   3. The applicant demonstrates that, in order to meet the requirements of Section 242-76O, P, Q and R, existing structures currently in use, such as homes and buildings, would need to be condemned; and
   4. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under 242-76D3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Section 242-76O, P, Q and R that were not achievable onsite.

E. N.J.A.C. 7:8-5.2(f) Tables 5-1, 5-2 and 5-3 summarize the ability of stormwater best management practices identified and described in the New Jersey Stormwater Best Management Practices Manual to satisfy the green infrastructure, groundwater recharge, stormwater runoff quality and stormwater runoff quantity standards specified in Section 242-76 O, P, Q and R. When designed in accordance with the most current version of the New Jersey Stormwater Best Management Practices Manual, the stormwater management measures found at N.J.A.C. 7:8-5.2(f) Tables 5-1, 5-2 and 5-3 are presumed to be capable of providing stormwater controls for the design and performance standards as outlined

in the tables below. Upon amendments of the New Jersey Stormwater Best Management Practices to reflect additions or deletions of BMPs meeting these standards, or changes in the presumed performance of BMPs designed in accordance with the New Jersey Stormwater BMP Manual, the Department shall publish in the New Jersey Registers a notice of administrative change revising the applicable table. The most current version of the BMP Manual can be found on the Department's website at: https://njstormwater.org/bmp_manual2.htm.

F. Where the BMP tables in the NJ Stormwater Management Rule are different due to updates or amendments, the BMP Tables in the Stormwater Management rule at N.J.A.C. 7:8-5.2(f) shall take precedence.

G. An alternative stormwater management measure, alternative removal rate, and/or alternative method to calculate the removal rate may be used if the design engineer demonstrates the capability of the proposed alternative stormwater management measure and/or the validity of the alternative rate or method to the municipality. A copy of any approved alternative stormwater management measure, alternative removal rate, and/or alternative method to calculate the removal rate shall be provided to the Department in accordance with Section VI.B. Alternative stormwater management measures may be used to satisfy the requirements at Section 242-76O only if the measures meet the definition of green infrastructure at Section 242-74. Alternative stormwater management measures that function in a similar manner to a BMP listed at Section O2 are subject to the contributory drainage area limitation specified at Section O2 for that similarly functioning BMP. Alternative stormwater management measures approved in accordance with this subsection that do not function in a similar manner to any BMP listed at Section O2 shall have a contributory drainage area less than or equal to 2.5 acres, except for alternative stormwater management measures that function similarly to cisterns, grass swales, green roofs, standard constructed wetlands, vegetative filter strips, and wet ponds, which are not subject to a contributory drainage area limitation. Alternative measures that function similarly to standard constructed wetlands or wet ponds shall not be used for compliance with the stormwater runoff quality standard unless a variance in accordance with N.J.A.C. 7:8-4.6 or a waiver from strict compliance in accordance with Section 242-76D is granted from Section 242-76O.

H. Whenever the stormwater management design includes one or more BMPs that will infiltrate stormwater into subsoil, the design engineer shall assess the hydraulic impact on the groundwater table and design the site, so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table, so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems or other subsurface structures within the zone of influence of the groundwater mound, or interference with the proper functioning of the stormwater management measure itself.

I. Design standards for stormwater management measures are as follows:

   1. Stormwater management measures shall be designed to take into account the existing site conditions, including, but not limited to, environmentally critical areas; wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability, and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone);

2. Stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure, as appropriate, and shall have
parallel bars with one-inch spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third the width of the diameter of the orifice or one-third the width of the weir, with a minimum spacing between bars of one inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 242-80C;
3. Stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement;
4. Stormwater management BMPs shall be designed to meet the minimum safety standards for stormwater management BMPs at Section 242-80; and
5. The size of the orifice at the intake to the outlet from the stormwater management BMP shall be a minimum of two and one-half inches in diameter.

J. Manufactured treatment devices may be used to meet the requirements of this subchapter, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department. Manufactured treatment devices that do not meet the definition of green infrastructure at Section 242-74 may be used only under the circumstances described at Section 242-76O4.

K. Any application for a new agricultural development that is regulated by this Section shall be submitted to the Soil Conservation District for review and approval in accordance with the requirements at Sections 242-76O, P, Q and R and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For purposes of this subsection, "agricultural development" means land uses normally associated with the production of food, fiber, and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacture of agriculturally related products.

L. If there is more than one drainage area, the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards at Section 242-76P, Q and R shall be met in each drainage area, unless the runoff from the drainage areas converge onsite and no adverse environmental impact would occur as a result of compliance with any one or more of the individual standards being determined utilizing a weighted average of the results achieved for that individual standard across the affected drainage areas.

M. Any stormwater management measure authorized under the municipal stormwater management plan or ordinance shall be reflected in a deed notice recorded in the Office of the County Clerk A form of deed notice shall be submitted to the
the municipality for approval prior to filing. The deed notice shall contain a description of the stormwater management measure(s) used to meet the green infrastructure, groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards at Section 242-76O, P, Q and R and shall identify the location of the stormwater management measure(s) in NAD 1983 State Plane

New Jersey FIPS 2900 US Feet or Latitude and Longitude in decimal degrees. The deed notice shall also reference the maintenance plan required to be recorded upon the deed pursuant to Section 242-82B5. Prior to the commencement of construction, proof that the above required deed notice has been filed shall be submitted to the municipality. Proof that the required information has been recorded on the deed shall be in the form of either a copy of the complete recorded document or a receipt from the clerk or other proof of recordation provided by the recording office. However, if the initial proof provided to the municipality is not a copy of the complete recorded document, a copy of the complete recorded document shall be provided to the municipality within 180 calendar days of the authorization granted by the municipality.

N. A stormwater management measure approved under the municipal stormwater management plan or ordinance may be altered or replaced with the approval of the municipality, if the municipality determines that the proposed alteration or replacement meets the design and performance standards pursuant to Section IV of this ordinance and provides the same level of stormwater management as the previously approved stormwater management measure that is being altered or replaced. If an alteration or replacement is approved, a revised deed notice shall be submitted to the municipality for approval and subsequently recorded with the Office of the County Clerk and shall contain a description and location of the stormwater management measure, as well as reference to the maintenance plan, in accordance with M above. Prior to the commencement of construction, proof that the above required deed notice has been filed shall be submitted to the municipality in accordance with M above.

O. Green Infrastructure Standards

1. This subsection specifies the types of green infrastructure BMPs that may be used to satisfy the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards.
2. To satisfy the groundwater recharge and stormwater runoff quality standards at Section 242-76P and Q, the design engineer shall utilize green infrastructure BMPs and/or an alternative stormwater management measure approved in accordance with Section 242-76G. The following green infrastructure BMPs are subject to the following maximum contributory drainage area limitations:

Best Management Practice	Maximum Contributory Drainage Area
Dry Well	1 acre
Manufactured Treatment Device	2.5 acres
Pervious Pavement Systems	Area of additional inflow cannot exceed three times the area
Small-scale Bioretention Systems	2.5 acres
Small-scale Infiltration Basin	2.5 acres
Small-scale Sand Filter	2.5 acres

3. To satisfy the stormwater runoff quantity standards at Section 242-76 R, the design engineer shall utilize BMPs and/or an alternative stormwater management measure approved in accordance with Section 242-76G.
4. If a variance in accordance with N.J.A.C. 7:8-4.6 or a waiver from strict compliance in accordance with Section 242-76D is granted from the requirements of this subsection, then BMPs and/or an alternative stormwater management measure approved in accordance with Section 242-76G may be used to meet the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards at Section 242-76P, Q and R.
5. For separate or combined storm sewer improvement projects, such as sewer separation, undertaken by a government agency or public utility (for example, a sewerage company), the requirements of this subsection shall only apply to areas owned in fee simple by the government agency or utility, and areas within a right-of-way or easement held or controlled by the government agency or utility; the entity shall not be required to obtain additional property or property rights to fully satisfy the requirements of this subsection. Regardless of the amount of area of a separate or combined storm sewer improvement project subject to the green infrastructure requirements of this subsection, each project shall fully comply with the applicable groundwater recharge, stormwater runoff quality control, and stormwater runoff quantity standards at Section 242-76P, Q and R, unless the project is granted a waiver from strict compliance in accordance with Section 242-76D.

P. Groundwater Recharge Standards

1. This subsection contains the minimum design and performance standards for groundwater recharge as follows:
2. The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section V, either:
    i. Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or
    ii. Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.

Additional standards set forth in iii. and iv. below may apply as required.

iii. Non-Exempt Projects located in a Current Deficit Area: Where the project is located in a Current Deficit Area , the project shall demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures provide for enhanced recharge standards set forth in (5.) below.

iv. Non-Exempt Projects located in a Prime Ground Water Recharge Area: Where the project is located in a Prime Ground Water Recharge Area, the following standards shall apply:

a. Where disturbance is permitted in accordance with this subsection, it shall be limited to no greater than 15% of the Prime Ground Water Recharge Area on the site and shall preferentially be sited on that portion of Prime Ground Water Recharge Area that has the lowest groundwater recharge rates.

b. Where disturbance to the Prime Ground Water Recharge Area is permitted, the project shall demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures provide for enhanced recharge standards set forth in (5) below.

3. This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to 4 below.
4. The following types of stormwater shall not be recharged:
   i. Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and
   ii. Industrial stormwater exposed to "source material." "Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to groundwater. Source materials include, but are not limited to, raw materials; intermediate products; final products; waste materials; by-products; industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.
   iii. Carbonate Rock Areas. Where surficial or subsurface karst features have been identified and recharge facilities cannot be designed in a manner that would eliminate the concentrated subsurface release of stormwater. (*Note: the mere presence of carbonate bedrock does not constitute a karst feature*)
5. Enhanced Recharge Standards: Non-Exempt Projects that are subject to the enhanced recharge requirements by P2iii. or P2iv above, shall apply the following standards, either:
   i. Recharge 125 percent of the percentage of the average annual pre-construction groundwater recharge volume for the site; or
   ii. In addition to complying with the recharge requirements of section 242-76P, retain on-site with no discharge, the Stormwater Quality Design Volume (SWQDv), defined as the runoff from the 1.25-inch, 2-hour rainfall event. Where meeting the recharge requirement will not result in retention of the full SWQDv, the Development shall retain any additional volume to meet the requirements of this section through additional infiltration, or through evapotranspiration or capture and on-site re-use of rainfall.

6. Mitigation Required for Non-Exempt Projects: In lieu of on-site recharge, the applicant shall be responsible for providing mitigation of the groundwater recharge volume in the required amount. The applicant should provide mitigation within the following areas, in order of priority:
   i. the same development site where feasible;

ii. the same HUC14 subwatershed, or

iii. an interrelated HUC14 subwatershed where no feasible option exists in the same HUC14 subwatershed.

If none of the above options are feasible or achievable, then the applicant shall comply with the mitigation requirements set forth in 7.

7. Mitigation Required for Non-Exempt Projects: A waiver from strict compliance with the requirements of the Municipal Stormwater ordinance shall be approved by the municipality only in those cases where an applicant has demonstrated the inability to strictly comply with any standard of the municipal stormwater ordinance. A waiver from strict compliance for such projects can only be obtained if the applicant agrees to undertake a suitable mitigation measure identified in the mitigation section of the municipality's Stormwater Management Plan. In such cases, the applicant must submit a mitigation plan detailing how the project's failure to strictly comply will be compensated. In cases where a waiver is granted, an applicant should provide mitigation, if possible and/or practical, within the same drainage area within which the subject project is proposed, or contribute funding toward a municipal stormwater control project, or provide for equivalent treatment at an alternate location, or provide for another equivalent water quality benefit, in lieu of implementing the required stormwater control measures on their specific site.

Q. Stormwater Runoff Quality Standards

1. This subsection contains the minimum design and performance standards to control stormwater runoff quality impacts of regulated Development. Stormwater runoff quality standards are applicable when the Development results in an increase of one-quarter acre or more of motor vehicle surface.
2. Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm as follows: Eighty percent TSS removal of the anticipated load, expressed as an annual average shall be achieved for the stormwater runoff from the net increase of motor vehicle surface.
3. If the surface is considered regulated motor vehicle surface because the water quality treatment for an area of motor vehicle surface that is currently receiving water quality treatment either by vegetation or soil, by an existing stormwater management measure, or by treatment at a wastewater treatment plant is to be modified or removed, the project shall maintain or increase the existing TSS removal of the anticipated load expressed as an annual average.
4. The requirement to reduce TSS does not apply to any stormwater runoff in a discharge regulated under a numeric effluent limitation for TSS imposed under the New Jersey Pollutant Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a NJPDES permit from this requirement. Every Development, including any that discharge into a combined sewer system, shall comply with 2 above, unless the Development is itself subject to a NJPDES permit with a numeric effluent limitation for TSS or the NJPDES permit to which the Development is subject exempts the development from a numeric effluent limitation for TSS.

5. The water quality design storm is 1.25 inches of rainfall in two hours. Water quality calculations shall take into account the distribution of rain from the water quality design storm, as reflected in Table 1, below. The calculation of the volume of runoff may take into account the implementation of stormwater management measures.

Table 1 - Water Quality Design Storm Distribution

Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)
1	0.00166	41	0.1728	81	1.0906
2	0.00332	42	0.1796	82	1.0972
3	0.00498	43	0.1864	83	1.1038
4	0.00664	44	0.1932	84	1.1104
5	0.00830	45	0.2000	85	1.1170
6	0.00996	46	0.2117	86	1.1236
7	0.01162	47	0.2233	87	1.1302
8	0.01328	48	0.2350	88	1.1368
9	0.01494	49	0.2466	89	1.1434
10	0.01660	50	0.2583	90	1.1500
11	0.01828	51	0.2783	91	1.1550
12	0.01996	52	0.2983	92	1.1600
13	0.02164	53	0.3183	93	1.1650
14	0.02332	54	0.3383	94	1.1700
15	0.02500	55	0.3583	95	1.1750
16	0.03000	56	0.4116	96	1.1800
17	0.03500	57	0.4650	97	1.1850
18	0.04000	58	0.5183	98	1.1900
19	0.04500	59	0.5717	99	1.1950
20	0.05000	60	0.6250	100	1.2000
21	0.05500	61	0.6783	101	1.2050
22	0.06000	62	0.7317	102	1.2100
23	0.06500	63	0.7850	103	1.2150
24	0.07000	64	0.8384	104	1.2200
25	0.07500	65	0.8917	105	1.2250
26	0.08000	66	0.9117	106	1.2267
27	0.08500	67	0.9317	107	1.2284
28	0.09000	68	0.9517	108	1.2300
29	0.09500	69	0.9717	109	1.2317
30	0.10000	70	0.9917	110	1.2334
31	0.10660	71	1.0034	111	1.2351
32	0.11320	72	1.0150	112	1.2367
33	0.11980	73	1.0267	113	1.2384
34	0.12640	74	1.0383	114	1.2400
35	0.13300	75	1.0500	115	1.2417
36	0.13960	76	1.0568	116	1.2434
37	0.14620	77	1.0636	117	1.2450
38	0.15280	78	1.0704	118	1.2467
39	0.15940	79	1.0772	119	1.2483
40	0.16600	80	1.0840	120	1.2500

6. If more than one BMP in series is necessary to achieve the required 80 percent TSS reduction for a site, the applicant shall utilize the following formula to calculate TSS reduction:

   $R = A + B - (A \times B) / 100$,

   Where

   R = total TSS Percent Load Removal from application of both BMPs, and

   A = the TSS Percent Removal Rate applicable to the first BMP

   B = the TSS Percent Removal Rate applicable to the second BMP.

7. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include green infrastructure BMPs that optimize nutrient removal while still achieving the performance standards in Section 242-76P, Q and R.
8. In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW1.
9. The Flood Hazard Area Control Act Rules at N.J.A.C. 7:13-4.1(c)1 establish 300-foot riparian zones along Category One waters, as designated in the Surface Water Quality Standards at N.J.A.C. 7:9B, and certain upstream tributaries to Category One waters. A person shall not undertake a Development that is located within or discharges into a 300-foot riparian zone without prior authorization from the Department under N.J.A.C. 7:13.
10. Pursuant to the Flood Hazard Area Control Act Rules at N.J.A.C. 7:13-11.2(j)3.i, runoff from the water quality design storm that is discharged within a 300-foot riparian zone shall be treated in accordance with this subsection to reduce the post-construction load of total suspended solids by 95 percent of the anticipated load from the developed site, expressed as an annual average.
11. This stormwater runoff quality standards do not apply to the construction of one individual single-family dwelling, provided that it is not part of a larger development or subdivision that has received preliminary or final site plan approval prior to December 3, 2018, and that the motor vehicle surfaces are made of permeable material(s) such as gravel, dirt, and/or shells.

R. Stormwater Runoff Quantity Standards

1. This subsection contains the minimum design and performance standards to control stormwater runoff quantity impacts of a Development regulated by this section.
2. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section V, complete one of the following:
   i. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2-, 10-, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
   ii. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater

leaving the site for the 2-, 10- and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

iii. Design stormwater management measures so that the post-construction peak runoff rates for the 2-, 10- and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed; or

iv. In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with 2.i, ii and iii above is required unless the design engineer demonstrates through hydrologic and hydraulic analysis that the increased volume, change in timing, or increased rate of the stormwater runoff, or any combination of the three will not result in additional flood damage below the point of discharge of the Development. No analysis is required if the stormwater is discharged directly into any ocean, bay, inlet, or the reach of any watercourse between its confluence with an ocean, bay, or inlet and downstream of the first water control structure.

3. The stormwater runoff quantity standards shall be applied at the site's boundary to each abutting lot, roadway, watercourse, or receiving storm sewer system.

Section 242-77. Calculation of Stormwater Runoff and Groundwater Recharge:

A. Stormwater runoff shall be calculated in accordance with the following:

1. The design engineer shall calculate runoff using one of the following methods:

i. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in Chapters 7, 9, 10, 15 and 16 Part 630, Hydrology National Engineering Handbook, incorporated herein by reference as amended and supplemented. This methodology is additionally described in *Technical Release 55 - Urban Hydrology for Small Watersheds* (TR-55), dated June 1986, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the Natural Resources Conservation Service website at:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044171.pdf
or at United States Department of Agriculture Natural Resources Conservation Service, 220 Davison Avenue, Somerset, New Jersey 08873; or

ii. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations. The rational and modified rational methods are described in "Appendix A-9 Modified Rational Method" in the Standards for Soil Erosion and Sediment Control in New Jersey, January 2014. This document is available from the State Soil Conservation Committee or any of the Soil Conservation Districts listed at N.J.A.C. 2:90-1.3(a)3. The location, address, and telephone number for each Soil Conservation District is available from the State Soil Conservation Committee, PO Box 330, Trenton, New Jersey 08625. The document is also available at:

http://www.nj.gov/agriculture/divisions/anr/pdf/2014NJSoilErosionControlStandardsComplete.pdf.

2. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term "runoff coefficient" applies to both the NRCS methodology above at Section VA1i and the Rational and Modified Rational Methods at Section VA1ii. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than one land cover have existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation).
3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and volumes.
4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS *Technical Release 55 – Urban Hydrology for Small Watersheds* or other methods may be employed.
5. If the invert of the outlet structure of a stormwater management measure is below the flood hazard design flood elevation as defined at N.J.A.C. 7:13, the design engineer shall take into account the effects of tailwater in the design of structural stormwater management measures.

B. Groundwater recharge may be calculated in accordance with the following:

The New Jersey Geological Survey Report GSR-32, A Method for Evaluating Groundwater-Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual; at the New Jersey Geological Survey website at: https://www.nj.gov/dep/njgs/pricelst/gsreport/gsr32.pdf or at New Jersey Geological and Water Survey, 29 Arctic Parkway, PO Box 420 Mail Code 29-01, Trenton, New Jersey 08625-0420.

Section VI. Sources for Technical Guidance:

A. Technical guidance for stormwater management measures can be found in the documents listed below, which are available to download from the Department's website at: http://www.nj.gov/dep/stormwater/bmp_manual2.htm.

1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended and supplemented. Information is provided on stormwater management measures such as, but not limited to, those listed in Tables 1, 2, and 3.

2. Additional maintenance guidance is available on the Department's website at: https://www.njstormwater.org/maintenance_guidance.htm.

B. Submissions required for review by the Department should be mailed to:
The Division of Water Quality, New Jersey Department of Environmental Protection, Mail Code 401-02B, PO Box 420, Trenton, New Jersey 08625-0420.

Section 242-78. Solids and Floatable Materials Control Standards:

A. Site design features identified under Section 242-76F above, or alternative designs in accordance with Section 242-76G above, to prevent discharge of trash and debris from drainage systems shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this paragraph, "solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Section 242-79A2 below.

1. Design engineers shall use one of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:
    i. The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines; or
    ii. A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension. Examples of grates subject to this standard include grates in grate inlets, the grate portion (non-curb-opening portion) of combination inlets, grates on storm sewer manholes, ditch grates, trench grates, and grates of spacer bars in slotted drains. Examples of ground surfaces include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater system floors used to collect stormwater from the surface into a storm drain or surface water body.
    iii. For curb-opening inlets, including curb-opening inlets in combination inlets, the clear space in that curb opening, or each individual clear space if the curb opening has two or more clear spaces, shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.
2. The standard in A1 above does not apply:
    i. Where each individual clear space in the curb opening in existing curb-opening inlet does not have an area of more than nine (9.0) square inches;
    ii. Where the municipality agrees that the standards would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets;
    iii. Where flows from the water quality design storm as specified in N.J.A.C. 7:8 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:

a. A rectangular space four and five-eighths (4.625) inches long and one and one-half (1.5) inches wide (this option does not apply for outfall netting facilities); or
b. A bar screen having a bar spacing of 0.5 inches. Note that these exemptions do not authorize any infringement of requirements in the Residential Site Improvement Standards for bicycle safe grates in new residential development (N.J.A.C. 5:21-4.18(b)2 and 7.4(b)1).

iv. Where flows are conveyed through a trash rack that has parallel bars with one-inch (1 inch) spacing between the bars, to the elevation of the Water Quality Design Storm as specified in N.J.A.C. 7:8; or

v. Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.

Section 242-79. Safety Standards for Stormwater Management Basins:

A. This section sets forth requirements to protect public safety through the proper design and operation of stormwater management BMPs. This section applies to any new stormwater management BMP.

B. The provisions of this section are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management BMPs. Municipal and county stormwater management plans and ordinances may, pursuant to their authority, require existing stormwater management BMPs to be retrofitted to meet one or more of the safety standards in Section 242-80C1,242-80C2, and 242-80C3 for trash racks, overflow grates, and escape provisions at outlet structures.

C. Requirements for Trash Racks, Overflow Grates and Escape Provisions

1. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the Stormwater management BMP to ensure proper functioning of the BMP outlets in accordance with the following:
    i. The trash rack shall have parallel bars, with no greater than six-inch spacing between the bars;
    ii. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure;
    iii. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack; and
    iv. The trash rack shall be constructed of rigid, durable, and corrosion resistant material and designed to withstand a perpendicular live loading of 300 pounds per square foot.
2. An overflow grate is designed to prevent obstruction of the overflow structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:
    i. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance.

ii. The overflow grate spacing shall be no less than two inches across the smallest dimension

iii. The overflow grate shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 pounds per square foot.

3. Stormwater management BMPs shall include escape provisions as follows:

i. If a stormwater management BMP has an outlet structure, escape provisions shall be incorporated in or on the structure. Escape provisions include the installation of permanent ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management BMPs. With the prior approval of the municipality pursuant to 242-80C, a free-standing outlet structure may be exempted from this requirement;

ii. Safety ledges shall be constructed on the slopes of all new stormwater management BMPs having a permanent pool of water deeper than two and one-half feet. Safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See 242-80E for an illustration of safety ledges in a stormwater management BMP; and

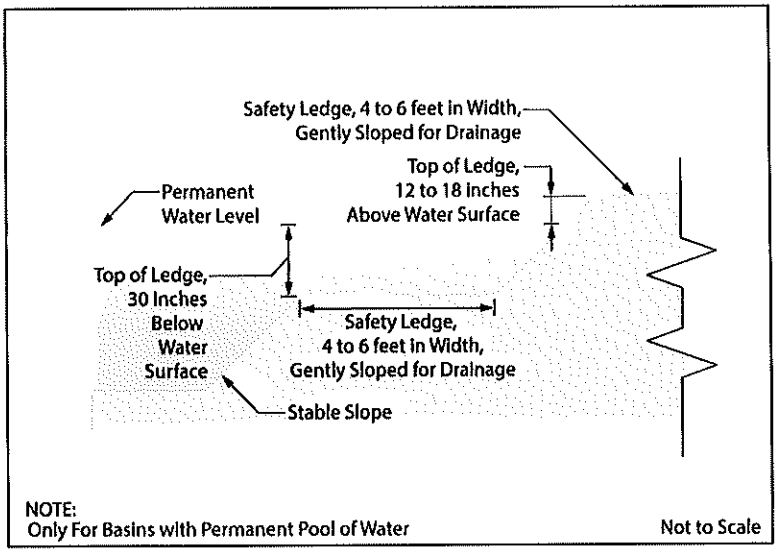
iii. In new stormwater management BMPs, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than three horizontal to one vertical.

D. Variance or Exemption from Safety Standard

A variance or exemption from the safety standards for stormwater management BMPs may be granted only upon a written finding by the municipality that the variance or exemption will not constitute a threat to public safety.

E. Safety Ledge Illustration

Elevation View –Basin Safety Ledge Configuration



Section 242-80. Requirements for a Site Development Stormwater Plan:

A. Submission of Site Development Stormwater Plan

1. Whenever an applicant seeks municipal approval of a development subject to this ordinance, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan at Section IX.C below as part of the submission of the application for approval.
2. The applicant shall demonstrate that the project meets the standards set forth in this ordinance.
3. The applicant shall submit three (3) copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 242-81C of this ordinance.

B. Site Development Stormwater Plan Approval

The applicant's Site Development project shall be reviewed as a part of the review process by the municipal board or official from which municipal approval is sought. That municipal board or official shall consult the municipality's review engineer to determine if all of the checklist requirements have been satisfied and to determine if the project meets the standards set forth in this ordinance.

C. Submission of Site Development Stormwater Plan

The following information shall be required:

1. Topographic Base Map

   The reviewing engineer may require upstream tributary drainage system information as necessary. It is recommended that the topographic base map of the site be submitted which extends a minimum of 200 feet beyond the limits of the proposed development, at a scale of 1"=200' or greater, showing 2-foot contour intervals. The map as appropriate may indicate the following: existing surface water drainage, shorelines, steep slopes, soils, erodible soils, perennial or intermittent streams that drain into or upstream of the Category One waters, wetlands and flood plains along with their appropriate buffer strips, marshlands and other wetlands, pervious or vegetative surfaces, existing man-made structures, roads, bearing and distances of property lines, and significant natural and manmade features not otherwise shown.

2. Environmental Site Analysis

   A written and graphic description of the natural and man-made features of the site and its surroundings should be submitted. This description should include a discussion of soil conditions, slopes, wetlands, waterways and vegetation on the site. Particular attention should be given to unique, unusual, or environmentally sensitive features and to those that provide particular opportunities or constraints for development.

3. Project Description and Site Plans

   A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings roads, parking areas, utilities, structural facilities for stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations will occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high groundwater elevations. A written description of the site plan and justification for proposed changes in natural conditions shall also be provided.

4. Land Use Planning and Source Control Plan

   This plan shall provide a demonstration of how the goals and standards of Sections 242-75 through 242-77 are being met. The focus of this plan shall be to describe how the site is being developed to meet the objective of controlling groundwater recharge, stormwater quality and

stormwater quantity problems at the source by land management and source controls whenever possible.

5. Stormwater Management Facilities Map

   The following information, illustrated on a map of the same scale as the topographic base map, shall be included:

   i. Total area to be disturbed, paved or built upon, proposed surface contours, land area to be occupied by the stormwater management facilities and the type of vegetation thereon, and details of the proposed plan to control and dispose of stormwater.

   ii. Details of all stormwater management facility designs, during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention and emergency spillway provisions with maximum discharge capacity of each spillway.

6. Calculations

   i. Comprehensive hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in Section 242-76 of this ordinance.

   ii. When the proposed stormwater management control measures depend on the hydrologic properties of soils or require certain separation from the seasonal high water table, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure.

7. Maintenance and Repair Plan

   The design and planning of the stormwater management facility shall meet the maintenance requirements of Section X.

8. Waiver from Submission Requirements

   The municipal official or board reviewing an application under this ordinance may, in consultation with the municipality's review engineer, waive submission of any of the requirements in Section 242-81C1 through 242-81C6 of this ordinance when it can be demonstrated that the information requested is impossible to obtain or it would create a hardship on the applicant to obtain and its absence will not materially affect the review process.

Section 242-81. Maintenance and Repair.

A. Applicability. Projects subject to review as in Section 242-73C of this ordinance shall comply with the requirements of Section 242-82B and 242-82C.

B. General Maintenance

   1. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a Development.

   2. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). The plan shall contain information on BMP location, design, ownership, maintenance tasks and frequencies, and other details as specified in Chapter

8 of the NJ BMP Manual, as well as the tasks specific to the type of BMP, as described in the applicable chapter containing design specifics.

3. If the maintenance plan identifies a person other than the property owner (for example, a developer, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's or entity's agreement to assume this responsibility, or of the owner's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.
4. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project. The individual property owner may be assigned incidental tasks, such as weeding of a green infrastructure BMP, provided the individual agrees to assume these tasks; however, the individual cannot be legally responsible for all of the maintenance required.
5. If the party responsible for maintenance identified under Section 242-82B3 above is not a public agency, the maintenance plan and any future revisions based on Section 242-82B 7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.
6. Preventative and corrective maintenance shall be performed to maintain the functional parameters (storage volume, infiltration rates, inflow/outflow capacity, etc.) of the stormwater management measure, including, but not limited to, repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.
7. The party responsible for maintenance identified under Section 242-82B3 above shall perform all of the following requirements:
    i. maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders;
    ii. evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed; and
    iii. retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Section 242-82B6 and B7 above.
8. The requirements of Section 242-82B3 and B4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency, subject to all applicable municipal stormwater general permit conditions, as issued by the Department.
9. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for

effecting maintenance and repair for good cause. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person. Nonpayment of such bill may result in a lien on the property.

C. Nothing in this subsection shall preclude the municipality in which the Development is located from requiring the posting of a performance or maintenance guarantee in accordance with N.J.S.A. 40:55D-53.

Section 242-82. Violations & Penalties. Any person(s) who erects, constructs, alters, repairs, converts, maintains, or uses any building, structure or land in violation of this ordinance shall be subject to the following penalties:

A. Upon receiving a complaint or determining that there is a violation of this chapter, the Zoning Officer shall issue a notice to correct or abate the violation. The notice shall allow at least seven days to abate or correct the violation unless it is a matter of public health or safety. Where there is a likelihood of a danger to people or property, the Zoning Officer may shorten the time to abate or correct. Where the complaint relates to a campaign sign for Mayor or Borough Council, the administrator shall immediately be authorized to retain a Zoning Officer from another town for enforcement proceedings.

B. Any person who shall violate any of the provisions of this chapter or fail to comply therewith or with any of the requirements thereof, or who shall erect, structurally alter, enlarge, rebuild or move any stormwater management device, or who shall refuse a reasonable opportunity to inspect any premises, shall be liable to a fine of not more than $500 or to imprisonment for not more than 90 days, or to both. Each and every day such violation continues after the expiration of an abatement notice or after initial construction, as the case may be, shall be deemed to be a separate and distinct violation.

C. In addition to the fines and penalties set forth herein, any person who shall violate any of the provisions of this chapter shall reimburse the Borough of Hopatcong for all costs incurred in correcting or terminating any adverse effects upon the environment as a result of the violation. Any person shall further reimburse the Borough of Hopatcong for all costs of investigation, inspection and prosecution involved in the correction of any violation of this chapter, including reasonable costs for litigation and attorneys' fees. All costs awarded to the Borough of Hopatcong pursuant to this section constitute an assessment and a lien against the subject property and shall accrue interest as provided by law.

[Sections 242-83 through 242-86 are reserved for future use.]

SECTION II. If any article, section, subsection, sentence, clause or phrase of this Ordinance is, for any reason, held to be unconstitutional or invalid, such decision shall not affect the remaining portions of this Ordinance and they shall remain in full force and effect.

SECTION III. In the event of any inconsistencies between the provisions of this Ordinance and any prior ordinance of the Borough, the provisions hereof shall be determined to govern. All other ordinances of the Borough are hereby ratified and confirmed, except where inconsistent with the terms hereof.

SECTION IV. This Ordinance shall take effect immediately upon final passage and publication according to law.

NOTICE

NOTICE is hereby given that the foregoing Ordinance was introduced to pass on first reading at a regular meeting of the Council of the Borough of Hopatcong held on February 17, 2021, at 7:30 p.m. and ordered published in accordance with the law. Said Ordinance will be considered for final reading and adoption at a regular meeting of the Borough Council to be held on March 3, 2021, at 7:30 p.m., or as soon thereafter as the Borough Council may hear this Ordinance at the Municipal Building, 111 River Styx Road, Hopatcong, New Jersey 07843 or at an online meeting , at which time all persons interested may appear for or against the passage of said Ordinance.

Valerie Egan
Borough Clerk

CERTIFICATION

I, Valarie Egan, Clerk of the Borough of Hopatcong, do hereby certify that the Borough of Hopatcong Council duly adopted the foregoing Ordinance on the 3rd day of March, 2021.

Valerie Egan, Clerk
Borough of Hopatcong

Michael Francis, Mayor

Introduced: 2-17-2021
Adopted: 3-3-2021

APPENDIX B

Hopatcong Borough
Municipal Build-Out Report

Prepared by the State of New Jersey Highlands Water Protection and Planning Council in Support of the Highlands Regional Master Plan: Report on the Results of Modules 1 and 2 of the 2009 Plan Conformance Process

August 2009

HOPATCONG BOROUGH
MUNICIPAL BUILD-OUT REPORT
for
HIGHLANDS REGIONAL MASTER PLAN CONFORMANCE

Purpose and Scope

The Highlands Regional Master Plan (RMP) requires that conforming municipalities develop a local build-out analysis that incorporates the policies and objectives of the RMP. Specifically, conforming municipalities are required to "use the Highlands Build-Out Model to develop a local build-out analysis that incorporates RMP policies and objectives to evaluate land use capability and capacity planning" (Objective 6G4c). The RMP build-out process requires a Limiting Factor Analysis to examine three categories of constraints:

1. Land Based Capacity (potential developable lands);
2. Resource Based Capacity (Septic System Yield and Net Water Availability); and
3. Utility Based Capacity (public water and wastewater).

This Municipal Build-Out Report provides the results of the local build-out analysis based on potential developable lands and existing municipal conditions, including sewer and water supply capacity and Net Water Availability where relevant. It incorporates the results of the first two modules of the 2009 Plan Conformance Grants Program: Module 1 "Current Municipal Conditions and Build-Out Analysis," and Module 2 "Land Use and Resource Capacity Analysis." Both modules were completed through a detailed process involving a cooperative effort of the municipality and the Highlands Council. This process was designed to ensure use of the most current municipal information available and proper application of RMP requirements in the conduct of all analyses. The results for Hopatcong Borough are presented in the section "**Full Build-Out and Constraints Summary**" and tabulated in Table 4 below.

The results of the local build-out analysis are for use by conforming municipalities for other planning activities required for Plan Conformance, such as development of Fair Share Plans addressing affordable housing obligations (Module 3). They also will be useful in complying with the New Jersey Department of Environmental Protection (NJDEP) wastewater management planning requirements under the Water Quality Management Planning rules at N.J.A.C. 7:15-5. The results are intended to assess current municipal conditions as they relate to specific RMP policies and objectives. It is important to note that the build-out analysis incorporates many but not every constraint to development included in the RMP, State regulations or local zoning. Future activities under Plan Conformance will address issues such as more refined or current analyses of land availability, resource capacity, resource protection and utility capacity that may modify these results to either increase or decrease the projected build out of the municipality (e.g., reducing build-out

projections through land preservation, increasing build-out projections by increasing Net Water Availability or designation of Highlands Redevelopment Areas).

The results of the municipal build-out analysis are designed to be utilized at a municipal scale and are not appropriate for determining if a particular parcel or development project is consistent with the RMP. Therefore, the Highlands Build-Out Model is not intended to be applied at a parcel level to determine the development potential of that parcel, as the municipality must apply additional planning and zoning analyses to determine appropriate future sustainable development.

All of the data and figures regarding specific parcels, including, but not limited to, preserved lands and water and sewer service, are based on a review of currently available information; however, unintentional inaccuracies may occur and may be formally addressed as RMP Updates. Any request for a formal determination to address updated information may be submitted to the Highlands Council in accordance with the RMP policies and procedures for RMP Updates. In addition, this report does not address any Map Adjustments that a municipality may seek to revise the Land Use Capability Zone Map; these will be addressed at a later date.

It is critical to note that this build-out analysis was conducted based on the requirements of Plan Conformance with the RMP, as applied to parcels deemed potentially developable (vacant, over-sized and redevelopable) as of early 2009. These results do not include:

- development that has been approved but not completed as of early 2009, which may yield more or less growth than the build-out results calculated for the affected parcels;

- the potential impact of some future development that may be deemed exempt from the Highlands Act, which may yield more or less growth than the build-out results calculated for those lands;[1]

- the potential impact of future redevelopment that may be approved through designation of Highlands Redevelopment Areas or other approvals granted with waivers as authorized by the Highlands Act, which may yield more growth than the build-out results calculated for those lands;

- the potential impact of certain land use restrictions based on State regulations and local ordinances that could not be assessed through a municipal level of analysis; and

[1] Where such development is located in an approved wastewater service area in the RMP Existing Community Zone (not including the Environmentally-Constrained Sub-Zone) or the Lake Community Sub-Zone, the results should be similar because the build-out analysis used local zoning. Future developments that may be authorized within the Environmentally-Constrained Sub-Zones, Protection Zone or Conservation Zone that use public or community on-site wastewater systems will have significantly different yields than calculated through the RMP build-out process. Likewise, the Septic System Yields for lands that will rely on septic systems may be significantly different from what those allowed by current municipal zoning.

- any reductions in build-out projections due to land preservation for open space or farmland beyond those preserved lands identified by the municipality through Module 1.

Therefore, the Highlands Municipal Build-Out Report for a municipality is a result of current conditions and application of RMP requirements. It provides a critical planning tool but cannot be used as a definitive prediction of the future or as a basis for parcel-based development potential.

This is a final Municipal Build-Out Report, which supersedes the Module 1 Summary Report. The results may be used in Module 3 by the municipality in support of its Housing Element and Fair Share Plan and other relevant purposes.

Report Structure

This Highlands Council report is based on the municipal build-out results from Modules 1 and 2 performed by Hopatcong Borough and the Highlands Council, in conformance with the Highlands Regional Master Plan (RMP). These results include consideration of potential land availability, utility capacity, municipal zoning in wastewater utility service areas, Septic System Yield and Net Water Availability in accordance with the RMP. The RMP build-out analysis estimates the potential for new development in Hopatcong Borough, for the entire municipality (see **Full Build-Out and Constraints Summary**, below).

First, the analysis addressed the build-out potential of the available lands, assuming application of RMP requirements for septic system yields and utility service areas without constraints related to the available capacity of public water supply and wastewater utilities or Net Water Availability. Essentially, the land-based build out represents the maximum potential for development in conformance with the RMP if no other constraints exist. Where sewered development is in conformance with the RMP, municipal zoning is used to determine build-out potential. Where septic systems will be used, the RMP requirements apply and the resulting septic system yield is assumed to be entirely residential in nature. To the extent that septic system capacity is used for non-residential development based on a proportional reallocation from residential development, the projected growth will be different than those reported above. Any reallocations of septic system yield will be addressed in Module 3 – Housing Element and Fair Share Plan.

Second, the public water supply and wastewater demands of development projected for the utility service area are compared to the utility capacity available to the municipality, regarding both public water supply and wastewater utilities. Where capacity is insufficient to support the build-out demand, the build-out estimates are reduced.

Third, the resulting water supply demands from build out in both public water supply utility service areas and domestic well service areas are compared to the Net Water Availability for the HUC14 subwatershed. In many cases, this step required information regarding water supply demands from other municipalities, so that the full demands against each HUC14 subwatershed could be assessed. Again, where Net Water Availability is insufficient to support the build-out demand, the build-out estimates are reduced.

Finally, where a wastewater utility had available capacity for a municipality after meeting all build-out demands, the Highlands Council investigated whether sufficient Net Water Availability exists to support the use of all or part of that wastewater utility capacity for such purposes as affordable housing, TDR Receiving Zones and other purposes supported by the RMP.

This report also includes a discussion of technical methods used in the build-out process, including quality control assessments and build-out impact factors.

Full Build-Out and Constraints Summary for Hopatcong Borough

Overview

The Hopatcong Borough is located within both the Preservation Area and Planning Area. The RMP build-out analysis for Hopatcong Borough estimates the following new development results for potential developable lands for the entire municipality, which are discussed in detail in the following section and summarized in Table 4:

1. Development in Wastewater Utility Service Areas: 42 residential dwelling units and 46,786 square feet of non-residential development, resulting in a wastewater demand of 14,128 gallons per day (gpd), or 0.014128 million gallons per day (MGD), and estimated public water supply demands of 18,448 gpd, or 0.018448 MGD.

2. Development in Septic System Areas: 55 septic systems in the Planning Area for all RMP Land Use Capability Zones and HUC14 subwatersheds, and 24 septic systems in the Preservation Area.

The build-out results based on potential developable lands are constrained by water supply utility capacity but not wastewater utility capacity resulting in a constraint on the land-based build-out potential within the utility service areas of 0.014128 MGD, which is 100 percent of the total build-out demand. Since the public water facility is in deficit, the utility-based build out zeros out, as reflected in Table 4.

The water supply demands from the build-out are constrained by water availability resulting in a constraint on build-out potential of 0.000578479 MGD, which is 4 percent of the land-based total build-out demand. However, the utility constraint is applied because it is a larger shortfall than the water availability constraint. The remaining wastewater utility capacity, after all RMP build-out demands are met, is constrained by water availability.

Municipal Capacity Conditions and Analysis

A summary of findings on municipal build-out capacity conditions appears in Table 1. It includes the following: potential developable vacant, over-sized and redevelopable lands in the RMP wastewater utility area; potential developable vacant, over-sized and redevelopable parcels in the septic system areas; RMP Septic System Yield; RMP Build-Out Environmentally Constrained lands; available wastewater utility capacity; and available Public Community Water Supply utility capacity.

All figures are the results of an RMP consistency analysis applied to the information supplied by the Highlands Council, as supplemented and verified by Hopatcong Borough. Each Figure shows all of the parcels that were used in the build-out process, whether for Septic System Yield or for build out of RMP wastewater utility areas.

- **Figure 1** presents the parcel-based potential developable lands and their association with HUC14 subwatersheds and Land Use Capability Zones, which relate to the RMP Septic System Yield values where the parcels will be served by septic systems.
- **Figure 2** presents the parcel-based potential developable lands and the RMP Build-Out Environmentally Constrained lands (i.e., steep slopes, flood prone areas and Highlands Open Water buffers). Some of these areas are within the RMP Environmentally-Constrained Sub-Zones while others are smaller-scale environmental features outside those sub-zones.
- **Figure 3** presents the parcel-based potential developable lands and their association with the RMP utility area[2] for RMP HDSF[3] wastewater utilities.
- **Figure 4** presents the parcel-based potential developable lands associated with the RMP utility area[4] for RMP Public Community Water System utilities.

RMP Build-Out Developable Land, Over-Sized Lot Analysis and Redevelopable Land

Hopatcong Borough identified 1,761 acres of potential developable vacant lots and 1,352 acres of potential developable lands on over-sized lots within areas that will be served by septic systems, for a total of 3,113 acres of potential developable Septic System Yield lands. These lands were used as the basis for Septic System Yield, regardless of the extent to which any of the lands were steep slopes, flood prone areas or Highlands Open Water buffers.

In addition, there are 14 acres of potential developable vacant lands and 14 acres of identified potential redevelopable land (either over-sized lots or specifically identified by the municipality as being a redevelopment target) within the Existing Area Served by utilities. The municipal information for potential developable lands, over-sized lots and redevelopable land was evaluated by the Highlands Council in accordance with the RMP for the build-out analysis. The results for all report figures are summarized in Table 1.

[2] The RMP utility area for wastewater includes the Existing Areas Served based on the RMP, plus any NJDEP-approved Sewer Service Area that is within the Existing Community Zone (not including the Environmentally-Constrained Sub-Zone) or the Lake Community Sub-Zone.

[3] HDSF - Highlands Domestic Sewerage Facility. These are wastewater treatment works that provide wastewater treatment primarily of sanitary sewage rather than industrial wastewater as a public utility, and may include service areas and treatment capacities sufficient to support redevelopment and regional growth opportunities. As such, they provide service to multiple parcels under different ownership, rather than to specific developments (e.g., schools, shopping centers, public institutions).

[4] The RMP utility area for public water supply includes the Existing Areas Served based on the RMP, plus any additional properties identified by the municipality that are within the Existing Community Zone (not including the Environmentally-Constrained Sub-Zone) or the Lake Community Sub-Zone.

RMP Septic System Yield Analysis

There are four (4) HUC14 subwatersheds located entirely or partially within the Planning Area of Hopatcong Borough. The RMP Septic System Yield analysis for the Planning Area determined a yield of 0 units for the Conservation Zone, 15 units for the Existing Community Zone and 40 units for the Protection Zone. The RMP Septic System Yield analysis determined a yield of 24 units for the Preservation Area. The total RMP Septic System Yield for Hopatcong Borough is 79 units. Refer to Table 1 and Figure 1 for additional details.

The build out for septic systems in the Preservation Area identifies the number of septic systems that would be considered permissible under the NJDEP Preservation Area Rules at N.J.A.C. 7:38-3.4. Each vacant or over-sized lot identified through Module 1 and 2 was assessed to determine whether it was of sufficient size to accommodate one or more septic systems, based on NJDEP requirements for 1 unit per 25 acres of non-forested lands, 1 unit per 88 acres of forested lands, or some proportional combination thereof. The yield is assigned by parcel, not by aggregate acreage across multiple parcels, and is compiled for the entire Preservation Area of the municipality as shown in Table 1. Parcels that were too small to accommodate a new septic system under these provisions received no Septic System Yield.

In the Planning Area, the build out for septic systems is based on a yield evaluation for the aggregate of two areas: the acreage of vacant parcels and the net acreage of over-sized parcels. These areas are divided into HUC14 subwatershed/RMP Land Use Capability Zone combinations. Each combination of HUC14 subwatershed and Land Use Capability Zone within the municipality receives its own Septic System Yield, which is not transferable. The yield is based on RMP Policy 2L2, which establishes nitrate targets for each Land Use Capability Zone and incorporates the relevant drought recharge values for each HUC14 subwatershed.

The RMP Septic System Yield is calculated for all potential developable lands reliant on septic systems, which may include lands zoned for both residential and non-residential development. Any yields are provided in "equivalent residential units" which may later be allocated among residential and non-residential development using flow translation factors provided in the *Highlands Regional Build-Out Technical Report* (see Appendix B of this report). Therefore, Septic System Yield calculated for Hopatcong Borough would equate to 79 residential units only if no yield is allocated to non-residential development. Septic System Yield may be allocated to non-residential development by reducing the number of residential units and increasing the amount of non-residential development proportionally based on relative flows. This allocation process and the implications for affordable housing requirements will be addressed in Module 3 - Housing Element and Fair Share Plan; this analysis is not part of this report. Therefore, no estimate is made here of non-residential development. All development on septic systems is assumed to rely on domestic wells for the purposes of this analysis.

RMP Build-Out Environmentally Constrained Lands

The RMP Build-Out analysis identified portions of the potential developable lands that are environmentally constrained based on the RMP (i.e., steep slopes, flood prone areas and Highlands Open Water buffers). These constraints were used in the build-out analysis to determine, where wastewater utility service was anticipated based on conformance with the RMP and approved sewer service areas, whether specific parcels had at least 1,400 square feet of unconstrained area. In addition, the nature and extent of these lands may influence the future development of lands in the septic system areas regarding the allocation of Septic System Yield to them and utility lands that are suitable for development. Out of the 3,141 gross developable acres in Hopatcong Borough, for vacant parcels there is a potential net developable area of 254 acres in the Planning Area and 81 acres in the Preservation Area; for over-sized parcels there is a potential net developable area of 40 acres in the Planning Area and -115 acres in the Preservation Area. These values are a summation of the parcel-specific analyses. Refer to Table 1 and Figure 2 for additional details. This analysis should be viewed as an indicator of the level of environmental constraints in potentially developable lands, not as a parcel-based measure of development capacity.

In certain instances, the municipal potential net developable acres may be under-reported relative to actual buildable area conditions, and may even show a zero or negative value. A zero or negative value indicates that a very high degree of environmental constraints exists on the potential developable parcels of the municipality as a whole and especially on the over-sized lots; however, some potential developable lands may still exist. This result reflects the evaluation of over-sized lots and of vacant lots that are partly included in the sewer service build-out analysis. The potential developable acres for over-sized parcels are calculated by subtracting the equivalent of a buildable area for a single unit of development (e.g., one house) under the RMP from the total parcel size. Likewise, some parcels are only partially eligible for sewered development. In both cases the environmental constrained acres for these parcels are calculated based on the entire parcel area due to GIS processing issues. This section of the Municipal Build-Out Report uses a municipal aggregate land area analysis. This information will be used in later aspects of Plan Conformance at a parcel level and not as a municipal land aggregate value. Evaluation of the relationship of septic system yield and buildable lands will be based on the build-out parcel data information and not the Table 1 municipal summary reported values.

As part of that analysis, the municipality will be able to use the database to analyze vacant parcels in septic system areas, to help identify parcels that could be considered to have some reasonable potential for development based on the amount of unconstrained land within them. Further analysis in later phases of Plan Conformance would then identify additional constraints to the realistic development potential of these parcels based on one or more of the following factors:

1. lack of a minimum one-acre contiguous, unconstrained building site;
2. the potential building site is not accessible or access will result in damage to environmentally constrained lands;

3. application of municipal zoning constraints such as those prohibiting creation of flag lots, landlocked parcels, etc.; or
4. parcel configuration or other parcel-specific issues.

This information on vacant lands with a reasonable potential for development can be used to support the evaluation of Septic System Yield assignment in later phases of Plan Conformance.

Available HDSF Wastewater Utility Capacity

The HDSF facility serving Hopatcong Borough is Musconetcong Sewerage Authority. The current available Highlands Region capacity for the utility is 1.899 million gallons per day (MGD) (2003 data) for all municipalities served by the system. Data through 2008 indicate available capacity of 1.463 MGD, or 34% of the 4.303 MGD facility capacity. Musconetcong Sewerage Authority is a utility with contracts in Hopatcong Borough and other municipalities. According to information available to the Highlands Council, the total contract for Hopatcong Borough is 0.58 MGD. Essentially all of this contracted capacity is for the extension of sewers into developed portions of the Borough that historically have relied on septic systems. The total estimated wastewater generation from the build out for the Musconetcong Sewerage Authority facility is 0.014128 MGD for the Planning Area and 0 MGD for the Preservation Area and does not exceed the utility capacity conditions. Refer to Table 1 and Figure 3 for additional details.

Based on the current municipal available capacity minus the build-out demands for this wastewater utility, there may be capacity available for future allocation. Priority shall be given to addressing additional needs based on Objective 2K3e, such as imminent threats to public health from areas of failing septic systems (an established priority in Hopatcong Borough), designated TDR Receiving Zones, and to infill or redevelopment projects in the Existing Community Zone (not including the Environmentally-Constrained Sub-Zone) and the Lake Community Sub-Zone that are consistent with the RMP and either address affordable housing obligations or have final municipal approval. Additional priorities include Highlands Redevelopment Areas or cluster development consistent with the RMP. Capacity may also be allocated to the Existing Area Served for redevelopment purposes.

Available Public Community Water System Utility Capacity

The public water supply utility serving Hopatcong Borough is the Hopatcong Water Department. The current available Highlands Region and municipal capacity for the utility is -4.84 million gallons per month (MGM). The total estimated public water demand from the build out is 0.018448 MGD for the Planning Area and 0 MGD for the Preservation Area (0.005 MGD of consumptive water use) and does exceed the utility capacity conditions. Since Hopatcong Water Department in is significant deficit, the facility cannot support additional demands.

Sparta Township Water Utilities serves a very small area in northern Hopatcong Township. The current available Highlands Region capacity for the utility is 30.69 and the municipal availability is

not available at this time. There is no public water demand from the build out for this facility. Refer to Table 1 and Figure 4 for additional details.

Water Availability Constraints

The build-out results for Hopatcong Borough, based on developable land and utility capacity, were compared to Net Water Availability by the Highlands Council to determine if Net Water Availability posed an additional constraint on development capacity. This analysis determined the potential for Net Water Availability constraints by HUC14 subwatershed, including water demands from both Hopatcong Borough and other municipalities and water users that withdraw water from the same HUC14 subwatershed. The Highlands Council determined whether each demand was consumptive or depletive. For the purpose of this analysis, all septic system units were considered to represent a residential land use in accordance with the Highlands Module 2 Build-out Impact Factors presented in Appendix B, and were addressed as consumptive water uses.

The results were compared to Net Water Availability, whether for non-deficit (surplus) subwatersheds, or deficit (Conditional Water Availability) subwatersheds. These values, whether from a deficit or surplus subwatershed, are collectively referred to as Net Water Availability. In HUC14 subwatersheds dominated by Conservation Zone lands, the water availability dedicated for agricultural purposes is not used for this analysis.

Based on this analysis, the Highlands Council determined that the following HUC14 subwatersheds, both within the municipality and in other municipalities but relied upon for municipal water supply, have insufficient Net Water Availability to support the build out demand:

Table 2 – Net Water Availability Constraints Analysis – Deficits

HUC14 Subwatershed	Build-Out Demand (MGD)*	Net Water Availability (MGD)	Shortfall (MGD)
02040105150050 Lubbers Run (below Dallis Pond)	0.007289	0.0025	-0.004789

*Subsequent to any reductions due to utility constraints.

Based on these results for this HUC14 subwatershed, the build-out results based on potential developable land and utility constraints, as reported above, exceed water availability. Not the entire shortfall is a result of build-out in Hopatcong Borough, as water from the HUC14 subwatershed is shared among municipalities. The portion of the shortfall resulting from Hopatcong Borough represents a constraint on build-out potential of 0.000578 MGD, which is 4 percent of the land-based total build-out demand). The sewer-based wastewater demands and build-out results for Hopatcong Borough would therefore be reduced by 4 percent, applied proportionally (as a percentage of relative demand) to residential and non-residential development. However, since the utility constraint represents a much larger shortfall than the water availability constraint, the utility constraint is applied to the build out analysis.

These results will not change the RMP Existing Area Served, but may affect the allowable sewer service areas in Wastewater Management Plans, by restricting the potential for sewer extensions into lands that are not currently in the RMP Existing Area Served but are otherwise eligible in the RMP for sewer service (i.e., in a NJDEP-approved sewer service area within the Existing Community Zone or Lake Community Sub-Zone). Under RMP policies, the demands from such lands must be reduced by restricting this part of the sewer service area, to the point that the deficit is eliminated. Where the deficit exceeds the water demand from such lands, the build out from the RMP Existing Area Served would be restricted as well (but without any change to the EAS boundary). However, for the purposes of a municipal build-out analysis, there is no need to assign the reduction in demand to specific parcels; instead, the reduction is applied generally to all sewered development.

For the remaining HUC14 subwatersheds partially or entirely in the municipality, the Highlands Council also assessed the amount of Net Water Availability remaining after build out. The results are in Table 3, which indicates the remaining Net Water Availability for each HUC14 subwatershed (where positive) and the associated public water supply systems that rely upon the HUC14 subwatershed for supply. This information can be used by the municipality to determine whether there is water available to the public water supply system that could support development within any associated wastewater utility service area, whether within the same HUC14 subwatershed or another, for purposes consistent with the RMP as describe above. The wastewater utility must also have remaining capacity available to the municipality. (Note: this available water cannot be used to increase the Septic System Yield beyond the amount calculated by the Highlands Council, nor can it be used to justify creation or expansion of utilities in violation of RMP requirements.) A decision as to the allocation of this capacity may occur in Module 3 regarding affordable housing needs identified in the Fair Share Plan, or later in the Plan Conformance process regarding other uses. Where a HUC14 subwatershed is relied upon by more than one municipality for water supply, whether on-site or a public water supply system, coordination will be needed among the municipalities to ensure that proposals for additional use do not exceed the remaining Net Water Availability. Also, there may be additional HUC14 subwatersheds not within the municipality that supply water to the municipality, which are not assessed here.

Table 3 – Net Water Availability – Remaining Capacity

HUC14 Subwatershed	Remaining Net Water Availability (MGD)	Public Water Supply System(s) Reliant Upon the HUC14 Subwatershed (w/ PWSID)
02040105150040 Lubbers Run (above/incl Dallis Pond)	0.006629	1918004 Sparta Township Water (Lake Mohawk)
02040105150020 Lake Hopatcong	0.032375	1414011 Jefferson Township Water Utility 1414003 Jefferson Twp MUA-Milton System 1436006 Roxbury Twp Water Dept (Evergreen) 1912001 Hopatcong Water Department
02040105150030 Musconetcong R (Wills Bk to LkHopatcong)	0.003702	1428001 Netcong Water Department 1436006 Roxbury Twp Water Dept (Evergreen) 1919001 Stanhope Water Department

Final Build-Out Results

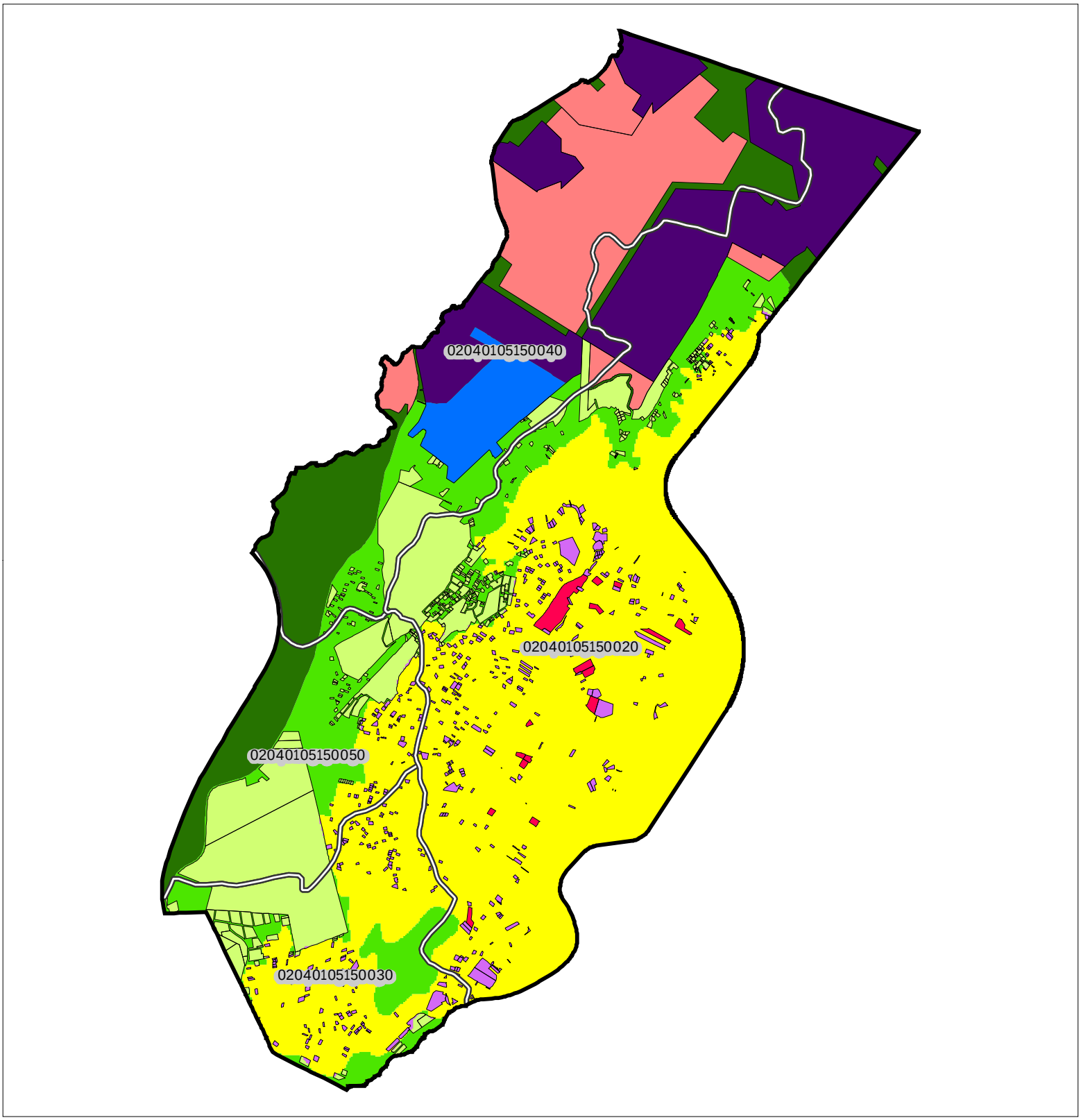
The build-out results for Hopatcong Borough are summarized in Table 4, based on land based capacity (potential developable land in both wastewater and septic system service areas), utility capacity and resource based capacity (Net Water Availability). These results are to be applied in Module 3 - Housing Element and Fair Share Plan toward the determination of affordable housing obligations. To assist in the evaluation of this information, an Excel file of the Module 2 database has been prepared by the Highlands Council for use in Module 3, where applicable. The Excel file is included on the Module 2 CD.

Table 4 – Municipal Build-Out Results With Resource and Utility Constraints

	Preservation Area	Planning Area	Totals
Residential units – Sewered	0	0	0
Septic System Yield	24	55	79
Total Residential Units	24	55	**79**
Non-Residential Jobs – Sewered	0	0	**0**

Figure 1: Municipal Build-out Report Septic System Yield by HUC14 and LUCM Zone *

HOPATCONG BOROUGH



Potential Undevelopable Lands	Potential Oversized Lots	Potential Developable Lands	Potential Redevelopable Lands
Conservation Zone	*in Conservation Zone*	*in Conservation Zone*	*in Conservation Zone*
Existing Community Zone	*in Existing Community Zone*	*in Existing Community Zone*	*in Existing Community Zone*
Protection Zone	*in Protection Zone*	*in Protection Zone*	*in Protection Zone*
Preservation Area	*in Preservation Area*	*in Preservation Area*	*in Preservation Area*

HUC14 Subwatersheds

02040105150020 HUC14 ID Number

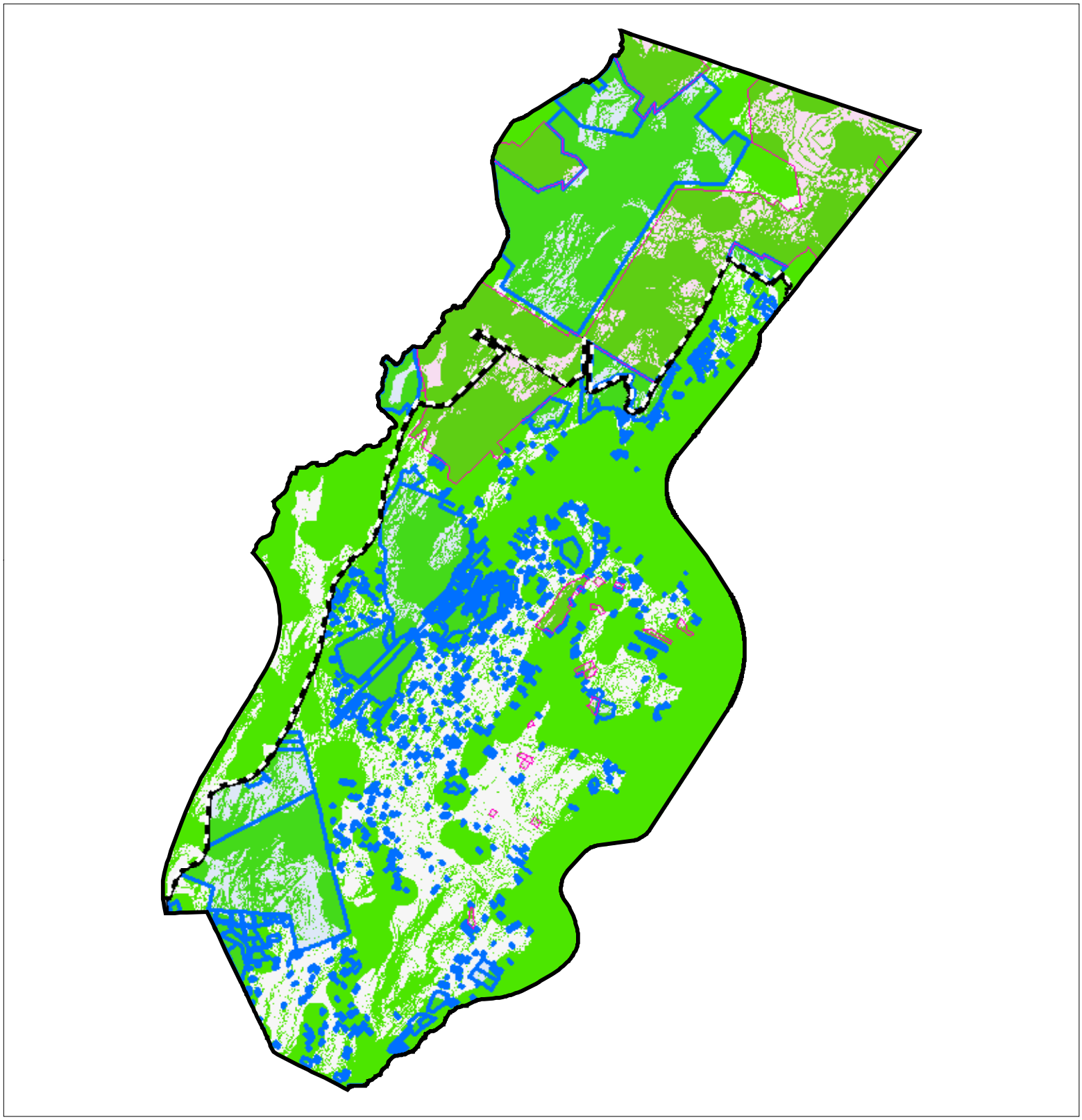
Miles

0 0.5 1

Highlands Council New Jersey

* Refer to Table 1 for Septic System Yield values, indexed by HUC14 ID

Figure 2: Municipal Build-out Report Environmental Constrained Lands



Highlands Build-out Environmental Constrained Lands

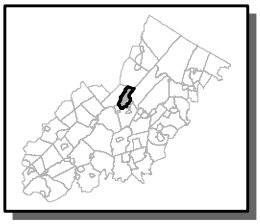
Constraints:
Highlands Open Water Buffers (300ft)
Flood Prone Areas
Steep Slopes (Moderate and Severe)

Potential Oversized Lots

Potential Developable Lots

Preservation Area

HOPATCONG BOROUGH

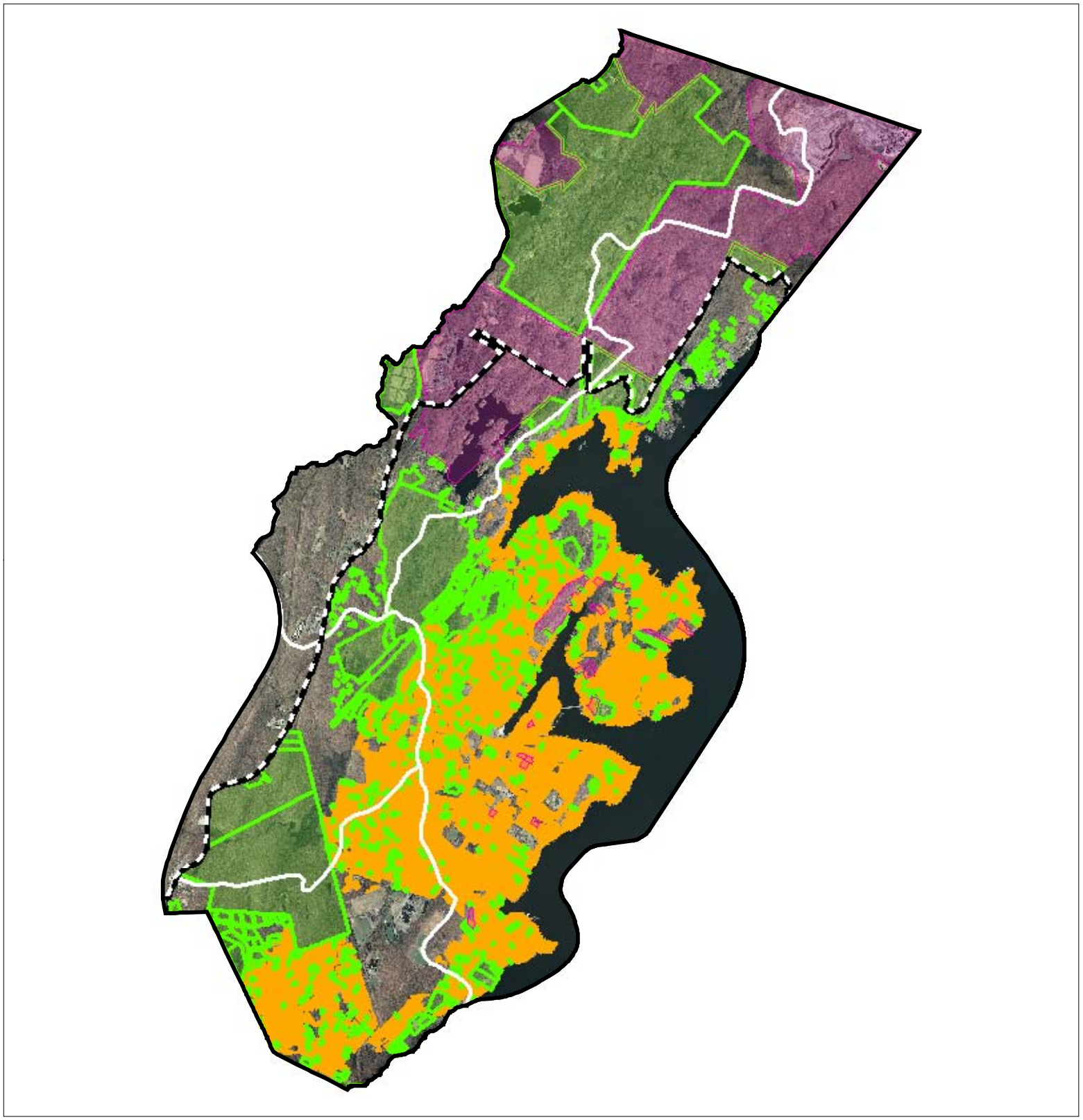


Miles

0 0.5 1

Highlands Council
New Jersey

Figure 3: Municipal Build-out Report RMP HDSF Wastewater Utilities



Highlands Domestic Sewerage Facilities "2008 RMP Existing Area Served"

Musconetcong SA

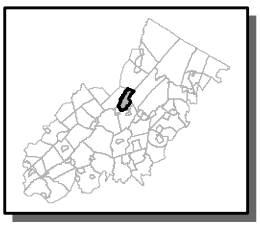
HUC14 Subwatersheds

Potential Oversized Lots

Potential Developable Lots

Preservation Area

HOPATCONG BOROUGH

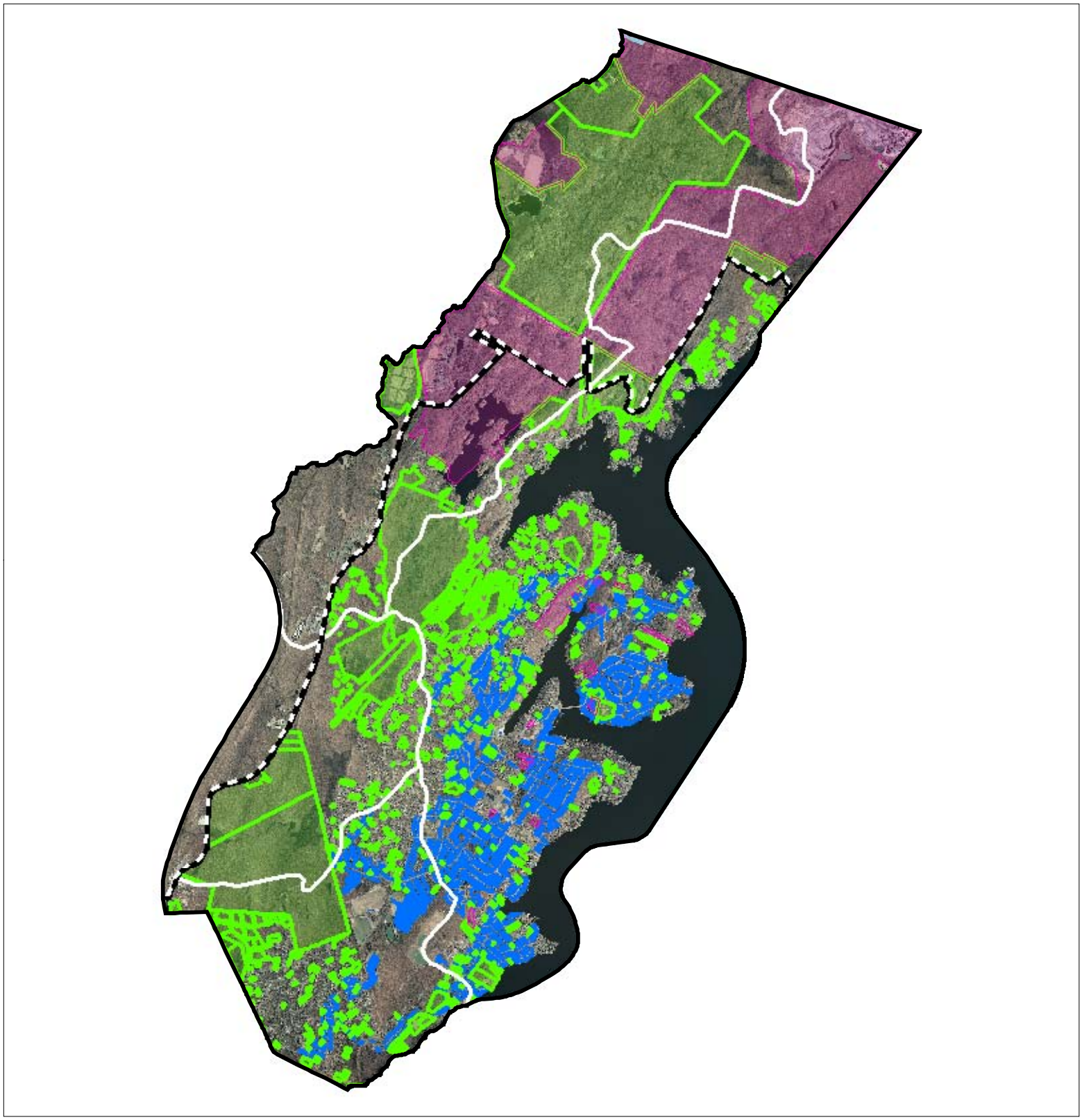


Miles

0 0.5 1

Highlands Council
New Jersey

Figure 4: Municipal Build-out Report RMP Public Community Water System Utilities



Public Community Water Systems "2008 RMP Existing Area Served"

HOPATCONG WATER DEPARTMENT

SPARTA TOWNSHIP WATER (SUMMIT LAKE)

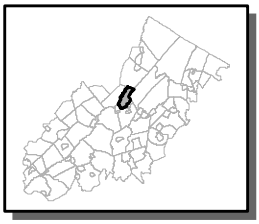
HUC14 Subwatersheds

Potential Oversized Lots

Potential Developable Lots

Preservation Area

HOPATCONG BOROUGH



Miles

0 0.5 1

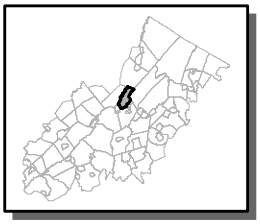
Highlands Council
New Jersey

Figure 5: Municipal Build-out Report Final Build-out Results

Table 4 - Municipal Build-out Results With Resource and Utility Constraints			
	Preservation Area	Planning Area	Totals
Residential Units - Sewered	0	0	0
Septic System Yield	24	55	79
Total Residential Units	24	55	79
Non-Residential Jobs - Sewered	0	0	0

Preservation Area Boundary

HOPATCONG BOROUGH



Miles

0 0.5 1

Highlands Council
New Jersey

Highlands Module 2 Municipal Summary Report

Table 1: RMP Municipal Capacity Conditions based on Module 2 Potential Developable Lands- HOPATCONG BOROUGH

RMP Build-Out WASTE WATER UTILITY Existing Areas Served (EAS) Analysis

MUNICIPALITY	WASTEWATER UTILITY	Total Wastewater Generation (MGD) - Planning Area	Total Wastewater Generation (MGD) - Preservation Area	Municipal Assigned Percentage	Current Available Highlands Capacity (MGD)	Municipal Available Wastewater Capacity (MGD)
HOPATCONG BOROUGH	NJ0027821 / Musconetcong SA / HDSF	0.014128	0	36%	1.899	Contract total of 0.58 MGD

RMP Build-Out POTABLE WATER UTILITY Existing Areas Served (EAS) Analysis

MUNICIPALITY	WATER UTILITY	Total Water Demand (MGD) - Planning Area	Total Water Demand (MGD) - Preservation Area	Municipal Assigned Percentage	Water Utility Available Capacity (MGM)	Municipal Available Water Utility Capacity (MGM)
HOPATCONG BOROUGH	1912001 / HOPATCONG WATER DEPARTMENT / Facility #46	0.018448	0	100%	-4.840	-4.840

RMP Build-Out WASTEWATER UTILITY Existing Areas Served (EAS) Analysis Build-out Impact Results

MUNICIPALITY	WASTEWATER UTILITY	Residential Units	Nonresidential Square Feet	People	Jobs
HOPATCONG BOROUGH	NJ0027821 / Musconetcong SA / HDSF	42	46786	126	73

RMP Build-Out WATER UTILITY Existing Areas Served (EAS) Analysis Build-out Impact Results

MUNICIPALITY	WATER UTILITY	Residential Units	Nonresidential Square Feet	People	Jobs
HOPATCONG BOROUGH	1912001 / HOPATCONG WATER DEPARTMENT / Facility #46	42	46786	126	73

RMP Build-Out Septic System Yield Analysis

Planning Area

MUNICIPALITY	HUC14	SUBWATERSHED NAME	PLAN CZ YIELD	PLAN ECZ YIELD	PLAN PZ YIELD
HOPATCONG BOROUGH	02040105150020	Lake Hopatcong	0	11	9
HOPATCONG BOROUGH	02040105150030	Musconetcong R (Wills Bk to LkHopatcong)	0	3	6
HOPATCONG BOROUGH	02040105150040	Lubbers Run (above/incl Dallis Pond)	0	0	11
HOPATCONG BOROUGH	02040105150050	Lubbers Run (below Dallis Pond)	0	1	14
		totals	**0**	**15**	**40**

Preservation Area

MUNICIPALITY	PRES YIELD
HOPATCONG BOROUGH	24

RMP Build-Out Potential Developable Lands Analysis

POTENTIAL DEVELOPABLE VACANT LOT SEPTIC SYSTEM ACRES

MUNICIPALITY	CZ ACRES - PLANNING	ECZ ACRES - PLANNING	PZ ACRES - PLANNING	PRESERVATION ACRES
HOPATCONG BOROUGH	0	144	934	683

POTENTIAL DEVELOPABLE OVERSIZED LOT SEPTIC SYSTEM ACRES

MUNICIPALITY	CZ ACRES - PLANNING	ECZ ACRES - PLANNING	PZ ACRES - PLANNING	PRESERVATION ACRES
HOPATCONG BOROUGH	0	35	406	911

POTENTIAL DEVELOPABLE WASTEWATER UTILITY ACRES

MUNICIPALITY	PLANNING ACRES	PRESERVATION ACRES
HOPATCONG BOROUGH	14	0

POTENTIAL DEVELOPABLE OVERSIZED LOT WASTEWATER UTILITY ACRES

MUNICIPALITY	PLANNING ACRES	PRESERVATION ACRES
HOPATCONG BOROUGH	14	0

RMP Build -Out Environmentally Constrained Lands Analysis

Potential Developable Lot Acres

MUNICIPALITY	POTENTIAL FULL DEVELOPABLE ACRES - Planning Area	ENVIRONMENTAL CONSTRAINED ACRES - Planning Area	NET DEVELOPABLE ACRES - Planning Area	POTENTIAL FULL DEVELOPABLE ACRES - Preservation Area	ENVIRONMENTAL CONSTRAINED ACRES - Preservation Area	NET DEVELOPABLE ACRES - Preservation Area
HOPATCONG BOROUGH	1091	836	254	683	602	81

Potential Oversized Lot Acres

MUNICIPALITY	POTENTIAL FULL DEVELOPABLE ACRES - Planning Area	ENVIRONMENTAL CONSTRAINED ACRES - Planning Area	NET DEVELOPABLE ACRES - Planning Area	POTENTIAL FULL DEVELOPABLE ACRES - Preservation Area	ENVIRONMENTAL CONSTRAINED ACRES - Preservation Area	NET DEVELOPABLE ACRES - Preservation Area
HOPATCONG BOROUGH	456	415	40	911	1026	-115

Overview of Technical Method for Build-Out Analysis

Module 1 "Current Municipal Conditions and Build-Out Analysis" (results of which are incorporated into or modified as appropriate for this report) was based on municipal information regarding potential developable lands (including identification of preserved lands and fully developed lands) and areas currently served with public water supply and wastewater utilities. It also included the current capacity conditions of public water supply and wastewater utilities, and was evaluated for municipal Land Use Capability in accordance with the RMP. The information was initially prepared by the Highlands Council and has been edited and verified by the municipality as representing the best available information on existing potential developable lands, which include vacant, non-preserved lands, as well as partially-developed lands having potential for further development (i.e., over-sized parcels) or redevelopment. The Highlands Council performed a quality control assessment to ensure that the database was technically sufficient for the build-out process (see Appendix A – Module 1). The build-out capacity conditions represent the complete build out of potential developable lands in accordance with the RMP, assuming no constraints other than location within areas served by water supply or wastewater utilities or, for those lands not within a wastewater utility service area, the Septic System Yield based upon RMP Land Use Capability Zone Map policies (which incorporate the NJDEP Rules for the Preservation Area at N.J.A.C. 7:38-3.4). The Module 1 Summary Report was prepared by the Highlands Council and provided to the municipality, which further verified or corrected land availability and municipal zoning information in the report as the first step in Module 2.

The build-out capacity conditions in Module 1 identified the available utility capacity (in units of flow) allocated to the municipality for associated Highlands Domestic Sewerage Facilities (HDSF), on-site wastewater facilities, and Public Community Water Supply Systems. The Highlands Council initially used available capacity information from the *Utility Capacity Technical Report (2008)*, which used 2003 data for wastewater utilities (comparing permitted flows to the rolling maximum three month daily average in million gallons per day, or MGD) and 2004 data for public water supply utilities (comparing permitted flows to the maximum monthly demand, in million gallons per month, or MGM). The available capacity estimates initially assumed that the capacity for regional utilities (i.e., serving more than one municipality) would be allocated on a first-come, first-served basis; available capacity was apportioned among the municipalities based on relative land availability in the service area municipalities. In the Module 1 process, municipalities and regional utilities were requested to provide both updated flow data and any available information on contracted flows for a municipality. Where such information was provided and verified, it was used to update both utility-wide and municipal available capacity estimates.

The build-out impacts analysis within RMP utility areas was performed by the Highlands Council using build-out environmental constraints, municipal zoning and various impact factors (e.g., water demand, sewerage demand, population, jobs) as identified in the *Highlands Regional Build-Out Technical Report* (2008) and listed in Appendix B of this report. This analysis was applied only within the RMP utility service areas, defined as the lands within a NJDEP approved utility service area that are also

located within the Existing Community Zone or Lake Community Sub-Zone (not including the Existing Community-Environmentally-Constrained Sub-Zone). Of these lands, only parcels with at least 1,400 square feet of land that is not environmentally constrained based on the RMP (i.e., steep slopes, flood prone areas and Highlands Open Water buffers) were evaluated for build out in RMP utility service areas. Potential developable lands that did not meet the criteria of the build-out RMP utility areas were evaluated as lands contributing to Septic System Yield.

In addition, the RMP Septic System Yield was calculated for the municipality. The build out for septic system areas in the Planning Area is based on the RMP Septic System Yield Analysis and does not incorporate or evaluate the effects of environmental constraints or municipal zoning. The build-out of septic system areas in the Preservation Area is based on the NJDEP Preservation Area Rules at N.J.A.C. 7:38-3.4, as required by the RMP. The total acreage of all vacant lands, the net acreage of over-sized parcels (i.e., the total lot size minus the acreage needed for one lot under the RMP) and redevelopable lands were used in the Septic System Yield analysis. In the Planning Area, the analysis used the nitrate target for the appropriate Land Use Capability Zone and the drought recharge value for the appropriate HUC14 subwatershed. In the Preservation Area, the analysis used the forested and non-forested lands at a parcel level. In keeping with RMP policies, preserved lands (including SADC, Green Acres, federal, State, county and local lands, and land trust properties and conservation easements where known) were excluded from this analysis. Environmentally constrained lands (i.e., steep slopes, flood prone areas and Highlands Open Water buffers) were included in the septic system yield analysis because the methodology assumes a mixture of constrained and unconstrained lands, but will affect how Septic System Yield is allocated in later stages of the Plan Conformance Process.

The information from Module 1 directly supported the Module 2 Land Use and Resource Capacity Analysis, results of which are incorporated into this report. In Module 2, the Highlands Council and the municipality evaluated the build-out impacts and the associated wastewater and water supply demands within the RMP utility areas as identified in Module 1.

In Module 2, municipalities reviewed the RMP build-out impacts for RMP utility areas and verified that they reflect densities allowed by existing municipal zoning. Areas included in the build-out process for sewer service included those lands within the wastewater Existing Area Served, as defined by the RMP, and also those lands within an NJDEP-approved Sewer Service Area that is also within the Lake Community Sub-Zone or the Existing Community Zone (excluding the Existing Community-Environmentally Constrained Sub-Zone). If the existing municipal zoning conditions have changed from the 2005 data used by the Highlands Council, then the municipality provided the current zoning and the Highlands Council revised the build-out impacts accordingly. The Highlands Council performed a quality control assessment to ensure that the database was technically sufficient for the build-out process (see Appendix A – Module 2).

When the land based build out of potential developable lands in Module 1 exceeded the available utility capacity conditions, further analysis by the Highlands Council was required in Module 2 to

determine the extent to which the build out was constrained by the lack of utility capacity. In such cases, the land-based build-out potential is lowered proportionately for residential and non-residential development within the service area. It is important to note that no change is made to the Existing Area Served for the utility; only the build-out potential is reduced.

Where utility capacity exceeded the land-based build out of potential developable lands in Module 1, the utility capacity is potentially available for future demands. The municipality will evaluate utility capacity assignment in Module 3 where appropriate to support affordable housing, and in support of later phases of Plan Conformance.

For some HUC14 subwatersheds in the municipality, the projected consumptive or depletive water demand based on both domestic well sources (either as derived from Septic System Yield, which is assumed to be supplied by domestic wells, or within a RMP wastewater utility area served by domestic wells) and water supply utility service indicate that the complete municipal build out of potential developable lands might exceed the Net Water Availability. In such cases, the Highlands Council then calculated Net Water Availability values in Module 2 for use as a further constraint on growth, and determined the extent to which the Net Water Availability would reduce the build out. The Highlands Council also assessed the extent to which the use of remaining wastewater utility capacity (i.e., beyond full build-out), if any, would be constrained by Net Water Availability. This information can be used by the municipality to determine whether the wastewater utility capacity can reasonably be used for purposes consistent with the RMP (e.g., affordable housing projects, TDR receiving zones, Highlands Redevelopment Areas, redevelopment within the Existing Area Served) as provided for by Objective 2K3e. A decision as to the allocation of this capacity will occur in Module 3 regarding affordable housing needs identified in the Fair Share Plan, or later in the Plan Conformance process regarding other uses.

Appendix A: Technical Sufficiency Review

MODULE 1

The Module 1 Geodatabase (GDB) and utility capacity spreadsheet information submitted by the municipality were evaluated for technical sufficiency and quality assurance and quality control purposes by the Highlands Council staff. The Highlands Council reviewed the GDB (GDB#1 and GDB#2, with GDB#3, where relevant) to determine that all the changes that the municipality made to the GDB are technically sufficient in order to process for RMP Build-out. All revisions made to a GDB by the Highland Council are reflected in the NJHC_QA_QC_COMMENTS field of the GDB. The same Build-out QA/QC Review method is conducted for both GDB#1 and GDB#2. These results were reviewed by the municipality in Module 2 (see below). Any database issues that were not specifically responsive to the technical sufficiency review and not specific to the Module 1 Build-Out Analysis were flagged in the GDB by the Highlands Council for future reference.

When a municipality received GDB#3 (the updated public water utility database), the Council joined and updated the PWSID data from GDB#3 into GDB#1 so all the Module 1 information was in GDB#1 for build-out processing.

Before a GDB is processed for Build-out, the Highlands Council reviewed the material submitted by the municipality including cover letters and any email correspondence for additional information relevant to the build-out analysis. The Highlands Council utilizes Microsoft Access to process the GDB through the NJHC QA/QC review method to create a Technical Protocol Status (TPS) report that flags all parcels that have contradictory data, as well as a SDE check which identifies inserted, deleted and updated information in the GDB. The Highlands Council utilized the TPS Report and the GDB along with the supporting documentation to evaluate any contradictory data reported as Error Codes on the TPS Report.

The TPS report created by the Highlands Council identifies parcels that may contain contradictory data in the GDB and therefore not process correctly in the build-out. There are 11 Error Codes and 5 Data Conditions that may potentially be flagged by the Highlands Council within a GDB. The identification of an Error Code may or may not result in an edit by the Council. If an edit was required in order to technically correct the GDB for build-out processing, the edit was conducted by the Highlands Council and recorded in the GDB. The following is a list of the TPS Error Codes and Data Conditions that may be applicable to the municipality:

- **Error Code 01: Municipal Verification Field Missing -** every verifiable field and row should include the Module 1 verifier's name. If a row was blank, the NJHC QA/QC reviewer would populate the field with the verifier's name or consult with the municipality as required, and enter a comment in the NJHC_QA_QC_COMMENTS field in the GDB.

- **Error Code 02: Parcels identified as both a Condo and Open Space -** the Highlands Council evaluated the parcel's development and land preservation status to determine if the necessary data fields were populated correctly by the municipality.
- **Error Code 03: Parcels identified as both Developable and Open Space -** the Highlands Council evaluated the parcel's development status and land preservation status and determined if the necessary data fields were populated correctly by the municipality.
- **Error Code 04: Parcels identified as Oversized or Redevelopable and missing the oversized or redevelopable acreage value -** the Highlands Council would either consult with the municipality in order to edit the data field or utilized the GDB information to determine the missing value.
- **Error Code 05: Parcels identified as Oversized or Redevelopable that were also listed as Not Developable -** the Highlands Council evaluated the parcel and edited the PARC_STAT_DEV_STATUS data field accordingly.
- **Error Code 06: Parcels identified as connected to a wastewater utility however no System Provider was identified -** the Highlands Council would consult with the municipality and/or review the GDB and supporting documentation in order to edit the missing entry.
- **Error Code 07: Parcels identified as a "Yes" indicating they are currently both connected and not connected to a wastewater utility** - the Highlands Council edited Not Developable, oversized or redevelopable parcels in the wastewater no connect field to a "No." and if the parcel is vacant and developable then the Highlands Council edited the wastewater existing served field to a "No."
- **Error Code 08: Parcels identified as being connected to a wastewater utility and also identified as vacant or developable -** the Highlands Council evaluated these parcels to see if they are developable, redevelopable or oversized and edited and documented accordingly in the GDB.
- **Error Code 09: Parcels identified as connected to a public water utility however no System Provider was identified -** the Highlands Council would consult with the municipality and/or review the GDB and supporting documentation in order to edit the missing entry.
- **Error Code 10: Parcels identified as a "Yes" indicating they are currently both connected and not connected to a public water utility** - the Highlands Council edited Not Developable, oversized or redevelopable parcels in the public water no connect field to a "No." and if the parcel is vacant and developable then the Highlands Council edited the public water existing served field to a "No."
- **Error Code 11: Parcels identified as being connected to a public water utility and also identified as vacant or developable -** the Highlands Council evaluated these parcels to see if they are developable, redevelopable or oversized and edited and documented accordingly in the GDB.

- **Data Condition 1: Parcels identified as Not Developable due to Environmental Constraints or Inadequate Lot Geometry -** these parcels were evaluated in septic served areas to ensure that the environmentally constrained parcels in the GDB were not a water body and therefore not appropriate for inclusion in the RMP Septic System Area analysis. Otherwise, vacant parcels indicated to be "Not Developable" due to environmentally constrained lands were included in the Septic System Yield analysis. Parcels that were identified as an inadequate lot geometry but developable with an adjacent parcel may require further review by the municipality to ensure that the build-out process was applied correctly because the Highlands Council is not able to discern the adjacent parcel record that is in common ownership and referenced by the municipality.
- **Data Condition 2: Parcels identified as having a WW Utility with a Contractual Allocation** were flagged in the TPS Report.
- **Data Condition 3: Parcels identified for PW Utility with a Contractual Allocation** were flagged in the TPS Report.
- **Data Condition 4: Parcels containing entries as "OTHER" with associated comments** were reviewed to see if the proper data field associated with the comment had been completed correctly and to assist in the review of the GDB information.
- **Data Condition 5: Parcels with entries in any of the "Comment" data fields-** the Council reviewed this information as a means to assist in GDB technical evaluation and QA/QC review.

In addition to going through the TPS Report as described above, the Council evaluated all open space parcels to ensure they are technically correct in the GDB. The Council also reviewed parcels that have no provider listed for public water or wastewater to ensure that there are no "Yes" data fields in the utility connection status data field, as these parcels are on septic/domestic wells and not relevant regarding a utility connection status in the GDB. Lastly, the Council QA/QC reviewer initialed and dated the GDB to complete the TPS Report and QA/QC Review process.

The municipality then received a modified GDB that:

1. incorporated the results of all edits by the Highlands Council;
2. merged the final results of GDB's #1 and, where applicable, #2 and #3 into a single GDB;
3. identified the parcels that were processed for build out as potential developable vacant, redevelopable and over-sized lots in both septic system and sewer areas; and
4. incorporated additional fields used by the Highlands Council in running the build-out process, including municipal zoning for potential developable vacant and redevelopable parcels associated with sewer service conforming with RMP requirements, and having at least 1,400 square feet of land that is not environmentally constrained. Where such parcels were associated with public water supply service, they were also evaluated for water demands.

The Municipal Conditions Geodatabase may include in some cases duplicate parcel records within the municipality. These duplicates derive from the process of creating a spatial representation of parcels in GIS. The Highlands Council has taken the necessary steps to avoid double counting of developable duplicate parcels, in the summary reports and in the geodatabase and any derivatives thereof.

MODULE 2

In Module 2, the municipality completed a final check on parcel information and verified the municipal zoning applicable to parcels that were processed for build out in RMP utility areas. Where edits were made and returned to the Highlands Council, the Council incorporated the edits and, where necessary, performed a revised build-out analysis, the results of which are reflected in this report.

Please note that the Type A and Type B edits conducted by the municipality were reviewed by the Highlands Council and only when an edit was relevant to the RMP Build-out analysis was it incorporated and re-processed for build-out analysis as required.

Type A Edits – Tabular

- The information will be updated in the GDB as indicated.
- The nature and extent of the information may or may not affect the build-out results.
- Type A tabular edits that require a revised build-out will be processed and reported as a Module 2 Municipal Build-out Summary Report.

Type A Edits – Spatial

- The revised spatial information will be reviewed in accordance with the Module 1 Technical Review Protocols.
- Type A spatial edits that require a revised build-out will be processed and reported as a Module 2 Municipal Build-out Summary Report.

Type B Edits – Municipal Zoning

- The information will be updated in the GDB as indicated.
- Updated zoning changes only affect parcels in RMP utility areas.
- Type B edits that require a revised build-out will be processed and reported as a Module 2 Municipal Build-out Summary Report.

Appendix B – Highlands Module 2 Build-Out Model Impact Factors

Highlands Zone Type	Comparison Zone/Unit Type	Source	Region	Density Dwelling unit (du)/acre *	Efficiency Factor % (1)	Average Household Size (2)	Average School Children in Household (2)	Percent Impervious (3)	Consumptive/Depletive Water Use includes Indoor demand (gpd per person) plus outdoor demand as (gpd per unit) multiplied by Consumptive/Depletive Use Coefficient (4)	Public Water System Demand (5)	Public Wastewater System Generation (6)
SF Estate Residential or (PA-5)				0.05 to 0.20 (0.17 maximum)	95			0.075* acres	(75 gpd/person + 50 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-family Detached 4-5 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			3.809	1.072				
	Single-family Detached 4-5 BR		Central[2]			3.780	1.094				
SF Rural Residential, Resource Residential, or (PA-4B)				0.21 to 0.5 du/acre (0.17 maximum)	95			0.075* acres	(75 gpd/person + 50 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-family Detached 4-5 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			3.809	1.072				
	Single-family Detached 4-5 BR		Central[2]			3.780	1.094				
SF Low Density or (PA-4)				0.51 to 1.0 du/acre (1.16 maximum)	80			0.075* acres	(75 gpd/person + 50 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-family Detached 4-5 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			3.809	1.072				
	Single-family Detached 4-5 BR		Central[2]			3.780	1.094				
SF Medium Density, Suburban Residential, or (PA-3)				1.01 to 3.0 du/acre (3.81 minimum)	75			26.7	(75 gpd/person + 30 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-Family Detached, 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			3.137	0.607				
	Single-Family Detached, 2-3 BR		Central[2]			2.578	0.367				
SF High Density or (PA-2)				3.01 to 8.0 du/acre (7.04 minimum)	75			33.7	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
	Single-Family Attached, 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			2.477	0.296				
	Single-Family Attached, 2-3 BR		Central[2]			2.296	0.292				
Attached/Townhouse or (PA-1)				8.01 to 16.0 du/acre (9.78 minimum)	75			45.7	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day

Appendix B – Highlands Module 2 Build-Out Model Impact Factors

Highlands Zone Type	Comparison Zone/Unit Type	Source	Region	Density Dwelling unit (du)/acre *	Efficiency Factor % (1)	Average Household Size (2)	Average School Children in Household (2)	Percent Impervious (3)	Consumptive/Depletive Water Use includes Indoor demand (gpd per person) plus outdoor demand as (gpd per unit) multiplied by Consumptive/Depletive Use Coefficient (4)	Public Water System Demand (5)	Public Wastewater System Generation (6)
	Single-Family Attached, 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			2.477	0.296				
	Single-Family Attached, 2-3 BR		Central[2]			2.296	0.292				
Garden Apartment or (PA-1)				16.01+ du/acre (9.78 minimum)	70			57.1	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
	5+ Units (Own/Rent), 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern[1]			2.262	0.308				
	5+ Units (Own/Rent), 2-3 BR		Central[2]			2.342	0.373				
Mixed use/Age Restricted Housing (percent mix based on 40% residential and 60% non-residential as Office/Commercial)		Municipal Zoning		Apply zone density and FAR value Note: Use Retail/Commercial Impact factors for non-res %	70	Varies Based on zoning Du/Acre description	0.00	68.8	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
Mixed use (percent mix based on 40% residential and 60% non-residential as Office/Commercial)		Municipal Zoning		Apply zone density and FAR value Note: Use Retail/Commercial Impact factors for non-res %	70	Varies Based on zoning Du/Acre description	Varies Based on zoning Du/Acre description	42.0	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
Senior or Age restricted Housing		Municipal Zoning		Varies Based on zoning Du/Acre description	70	Varies Based on zoning Du/Acre description	0.00	60.3	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day

Highlands Build-Out Residential Impact Factors – Sources

* Residential dwelling units generated by the build-out model include both market rate and affordable units.

(1) Source: Efficiencies are given as a percentage, between 0 and 100, where a 100 value means complete efficiency (no land lost to development), and a 0 value means no buildings will be estimated for that land use. For example an efficiency of 70% may be representative of developable land that has a 10% set aside for parks and 20% for roads (100% - 10% - 20% = 70%). Project determined values.

(2) Source: Who Lives in New Jersey Housing? New Jersey Demographic Multipliers, The Profile of Occupants of Residential and nonresidential Development. Listokin, D., Voicu, I., Dolphin, W., Camp, M. Center for Urban Policy Research. Rutgers University. November 2006. Northern NJ values were applied to Bergen, Morris, Passaic, Sussex and Warren County municipalities. Central NJ values were applied to Hunterdon and Somerset County municipalities.

1 Table II-C-1 North Region of New Jersey Total Persons and Persons by Age (2000) (p. 85) 2 Table II-D-1 Central Region of New Jersey Total Persons and Persons by Age (2000) (p. 99)

(3) Source: NCNBR, Rutgers University, April 27, 2006. The impervious surface area for new dwelling units large lot zoned areas (*) is based on an average 15% impervious surface value (per NJDEP LU/LC) and a project determined average homestead area of 0.50 acres. No impact value is attached to the remaining undeveloped area. The impact percentage factors for the other residential composite zones represent weighted averages of NJ Highlands Percent Impervious Surface for all residentially developed lands in that composite zone. The raw data was obtained by overlaying NJ Highlands Zoning and DEP 2002 LU/LC spatial data files, and extracting the calculated percent impervious surface area attached to each LU/LC residential developed land polygon and the acres of associated developed land in each intersecting municipal zone polygon. The impervious surface areas in each municipal zone within the composite zone were aggregated and then divided by the total developed residential land area, to produce a weighted IS average for each composite zone.

(4) Source: Center for Urban Policy Research (CUPR), September 2000. NJGS Consumptive Use Coefficients. For consumptive uses, a factor of 29% is utilized. For depletive uses, a factor of 100% is used

(5) Source: NJDEP N.J.A.C. 7:10 Safe Drinking Water Act Regulations Adopted November 4, 2004, 7:10-12.6 Water Volume Requirements and State Plan Impact Assessment

(6) Source: NJDEP N.J.A.C. 7:14A-23.3 Pollutant Discharge Elimination System: Technical Requirements For TWA Applications; Projected flow criteria

Appendix B – Highlands Module 2 Build-Out Model Impact Factors

Highlands Composite Zone Type	Floor Area Ratio	Efficiency Factor % (1)	Region	Jobs per 1,000 sf (2)	Percent Impervious (3)	Consumptive/Depletive Water Use multiplied by Consumptive/Depletive Use Coefficient (4)	Public Water System Demand (5)	Public Wastewater System Generation (6)
Office/Commercial	Based on zoning	80	Northeast US	2.99	78.3	0.125 gpd/sf * Consumptive/Depletive Coefficient	0.125 gallons/day/sf	0.10 gallons/day/sf
Retail	Based on zoning	80	Northeast US	1.63	72.5	0.125 gpd/sf * Consumptive/Depletive Coefficient	0.125 gallons/day/sf	0.10 gallons/day/sf
Industrial	Based on zoning	80	Northeast US	1.11	53.4	25 gpd/person * Consumptive/Depletive Coefficient	25 gallons per person per day	25 gallons per person per day

Highlands Build-Out Non-Residential Impact Factors – Sources

(1) Source: Efficiencies are given as a percentage, between 0 and 100, where a 100 value means complete efficiency (no land lost to development), and a 0 value means no buildings will be estimated for that land use. For example an efficiency of 70% may be representative of developable land that has a 10% set aside for parks and 20% for roads (100% - 10% - 20% = 70%). Project determined values.

(2) Source: Who Lives in New Jersey Housing? New Jersey Demographic Multipliers, The Profile of Occupants of Residential and nonresidential Development. Listokin, D., Voicu, I., Dolphin, W., Camp, M. Center for Urban Policy Research. Rutgers University. November 2006.

a Table II-I-3 Commercial - Office Employees per 1,000 Square Feet of Gross Floor Area (GFA) (p. 136)
(Reported Northeast mean value).

b Table II-I-4 Commercial – Retail Employees per 1,000 Square Feet of Gross Floor Area (GFA) (p. 139)
(Value derived by averaging the mean number of employees per 1,000 sq. ft. of GFA for retail (excluding mall), retail (enclosed mall), and retail (strip shopping mall) space in the Northeast).

c Table II-I-6 Industrial – Warehouses Employees per 1,000 Square Feet of Gross Floor Area (GFA) (p. 143)
(Value derived by averaging the mean number of employees per 1,000 sq. ft. of GFA for Non-Refrigerated and Refrigerated space in the Northeast).

(3) Source: NCNBR, Rutgers University, April 27, 2006. The impervious surface area for new dwelling units large lot zoned areas (*) is based on an average 15% impervious surface value (per NJDEP LU/LC) and a project determined average homestead area of 0.50 acres. No impact value is attached to the remaining undeveloped area. The impact percentage factors for the other residential composite zones represent weighted averages of NJ Highlands Percent Impervious Surface for all residentially developed lands in that composite zone. The raw data was obtained by overlaying NJ Highlands Zoning and DEP 2002 LU/LC spatial data files, and extracting the calculated percent impervious surface area attached to each LU/LC residential developed land polygon and the acres of associated developed land in each intersecting municipal zone polygon. The impervious surface areas in each municipal zone within the composite zone were aggregated and then divided by the total developed residential land area, to produce a weighted IS average for each composite zone.

(4) Source: Center for Urban Policy Research (CUPR), September 2000. NJGS Consumptive Use Coefficients. For consumptive uses, a factor of 29% is utilized. For depletive uses, a factor of 100% is used

(5) Source: NJDEP N.J.A.C. 7:10 Safe Drinking Water Act Regulations Adopted November 4, 2004, 7:10-12.6 Water Volume Requirements and State Plan Impact Assessment

(6) Source: NJDEP N.J.A.C. 7:14A-23.3 Pollutant Discharge Elimination System: Technical Requirements For TWA Applications; Projected flow criteria