Schwanewede / Hals Engineering **Professional Engineering and Land Surveying**

9 Post Road
Suite M11
Oakland, New Jersey 07436

Phone (201) 337-0053
Fax (201) 337-0173
E-mail: halseng@optonline.net

BOROUGH OF HO-HO-KUS
BERGEN COUNTY, NEW JERSEY

Municipal Stormwater Management Plan

January 2005

Table of Contents

List of Figures

List of Tables

Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Borough of Ho-Ho-Kus to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies.

The plan describes long-term operation and maintenance measures for existing and future stormwater facilities. The plan addresses the review and update of existing ordinances, the Borough's Master Plan, and other planning documents to allow for project designs that include low impact development techniques. The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

Goals

The goals of this MSWMP are to:

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

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

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure A-1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storms sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

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

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

Background

Ho-Ho-Kus Borough is primarily a single-family community which occupies 1.74 square miles in central Bergen County, New Jersey. The Borough lies approximately 15.2 miles northwest of Manhattan, and approximately 7.6 miles northwest of Hackensack, the County seat. Main road access is provided by State Highway Route 17 which runs north-south through the middle of the Borough. A commuter train line runs north-south along the western end of the Borough, with a train station (Ho-Ho-Kus Station) near the southwest corner.

Ho-Ho-Kus is a nearly fully developed municipality, with well over 90% of the land area zoned for single-family residential housing. A business district lies in the southwest corner of the town, and an industrial zone is located west of the railroad tracks at the extreme western end of the Borough.

Public water is supplied by Ho-Ho-Kus Water, the Borough's own water utility company, to all residents of the Borough. Ho-Ho-Kus Water has five public wellheads located throughout the Borough, as indicated on Figure A-7. The wellheads provide adequate water at this time. Sanitary sewers are available to the entire borough. Sewage flows are directed to the North West Bergen County Utility Authority.

The population of the Borough is 4,060 as of the 2000 census. The resultant change from the census of 1990, which was 3,935 persons, was an increase of approximately 3%. This reversed the downward population trend from 1970 to 1990, which saw a 9.4% drop in population. The Borough has yet to return to the 1970 population. It should be noted that during the time period from 1970 to 2000, dwelling units increased steadily even as the population dropped.

Year	Population	Dwelling Units
1970	4,348	1,304
1980	4,129	1,401
1990	3,935	1,448
2000	4,060	1,465

The recent population history of Ho-Ho-Kus is provided by the data in Table 1.

Ho-Ho-Kus is an older established community where land use is fairly stable. There are very few properties where any large development can take place. Therefore, there is not an expectation of any large increase in stormwater runoff volumes or pollutant loads to the Borough's waterways.

The major waterways are as follows:

Saddle River – Flows from the north to the south almost directly through the center of the borough, with several unnamed tributaries contributing to the flow.

Ho-Ho-Kus Brook –Flows from the north to the south near the western boundary of the borough.

There are additionally two man-made ponds, designated as the lower pond and upper pond, which lie on one of the unnamed tributaries of the Saddle River.

All waterways within the Borough lie within NJ State Watershed Area Number 4. Watershed areas within the state are additionally broken down into smaller sub-watersheds designated as HUC-14s. The HUC-14 watersheds are used to perform build-out analyses for municipalities with greater than one square mile of developable or agricultural land remaining. Ho-Ho-Kus, with a total land area of less than 1.75 square miles, has far less than one square mile of remaining developable land, therefore there is no HUC-14 delineation or build-out analysis included in this report.

None of the listed waterways are Category One waterways as defined by the New Jersey Department of Environmental Protection. A Category One designation provides additional protection to water bodies that help prevent water quality degradation and discourage development where it would impair or destroy natural resources and environmental quality.

Flood Hazard Areas, as adapted from FEMA, are indicated on Figure A-4, Zoning Map.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as 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. For any waterways determined by AMNET criteria to be impaired, the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for the detected pollutants within each waterway.

A TMDL is the amount of a pollutant that can be accepted by a water body without causing an exceedance of water quality standards or interfering with the ability to use a water body for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

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

The monitoring stations upstream of Ho-Ho-Kus Borough, AN0281 (Saddle River) and AN0285 (Ho-Ho-Kus Brook), are listed as impaired for benthic macroinvertebrates on AMNET Sublist 5.

The Saddle River and the Ho-Ho-Kus Brook are subject to some flooding and bank erosion. Figure A-2 illustrates the location of the waterways in the Borough. Figure A-3 depicts the Borough boundary on a USGS quadrangle map.

Design and Performance Standards

The Borough will adopt the design and performance standards for stormwater management measures by Ordinance 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. The ordinances will be submitted to the county for review and approval within (24 months of the effective date of the Stormwater Management Rules).

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

Plan Consistency

The Borough is not within a Regional Stormwater Management Planning Area, therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs). If any RSWMPs 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 updates 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.

Nonstructural Stormwater Management Strategies

The Borough will be reviewing the master plan (last re-examined in 2001) and ordinances, and will provide a list of the sections in the Borough land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified for revision. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within (24 months of the effective date of the Stormwater Management Rules). A copy will be sent to the Department of Environmental Protection at the time of submission.

Chapter 32B of the Borough Code, entitled Land Subdivision, was reviewed with regard to incorporating nonstructural stormwater management strategies. Several changes will be made to this Chapter to incorporate these strategies, as follows:

Section 32B-10A Subdivisions

Section 32B-10A(3): **Streets** describes the requirements for streets and curbing in the Borough. Construction specifications for streets, curbs and sidewalks are covered separately under Chapter 58 of the Borough Code. Section 32B-10A(3) will be amended to encourage developers to limit on-street parking to allow for narrower paved widths. Language will also be added to this section to reduce the minimum radius of cul-de-sac designs. Cul-de-sacs with landscaped islands will have a minimum paved radius of 40 feet to accommodate larger equipment and emergency vehicles. This section will be further amended to allow for curb cuts or flush curbs to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas. Additionally, developers will be required to design sidewalks and pavements using permeable paving materials where appropriate.

Section 32B-10A(6): **Public Use and Service Areas** describes the use of suitable easements for drainage ways that run through subdivisions or development sites, and that natural features, such as trees, brooks, hilltops and views be preserved whenever possible in any development. This section will be amended to encourage the use of natural vegetated swales in lieu of inlets and pipes.

Section 32B-10B Site Plans

Section 32B-10B(2): Access Driveways and Internal Roads describes the conditions for the placement, location and dimensions of driveways and internal road systems within a site, as well as materials. This section will be amended to allow for narrower paved widths on internal roads to increase green recharge areas, and will be further amended to encourage the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Section 32B-10B(3): Off-Street Parking and Loading Areas provides guidance on the size, location and materials utilized for off-street parking spaces and truck loading areas. This section further specifies that parking areas and off-street truck loading spaces be suitably drained and lighted. Additionally, with the provisions of the Borough Zoning Ordinance, guidance is provided for the minimum number of parking spaces required. The number of spaces required is based on occupancy, dwelling units, or gross floor area. This section will be amended to allow a developer to demonstrate that fewer spaces would be required, provided area is set aside for additional spaces if necessary. This section will also be amended to allow smaller parking stalls, shared parking, and pervious pavement in areas to be used for overflow parking. This section will be further amended to allow for flush curbs with curb stops, or curbing with curb cuts to encourage developers to allow for the discharge of impervious areas into landscaped areas for stormwater management. Also, language will be added to allow for use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers.

Section 32B-10B(4): **Drainage** requires that all developed premises be provided with a storm drainage system including manholes, catch basins and pipes as may be necessary for proper collection of storm runoff. This section will be amended to encourage the uses of natural vegetated swales in lieu of inlets and pipes.

Section 32B-10B(6): **Sidewalks** provides the requirements for the location of sidewalks as needed for the safety of pedestrians. Concrete is specified as the sole material for construction. This section will be amended to require developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, or use permeable paving materials where appropriate.

Section 32B-10B(7): **Landscaping** provides the landscaping requirements, planting locations, and buffer strip criteria for site plans. Buffer strips are required on any portion of the perimeter of subdivisions or site plans where an adverse impact is likely on existing adjoining properties. The landscape requirements for buffer areas currently do not recommend the use of native vegetation. Language will be added to encourage their use. Additionally, language will be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Soil Erosion and Sediment Control is currently addressed by requiring developers to comply with the Bergen County Soil Conservation District's requirements. This section will be amended to outline some general design principals, including: whenever possible, retain and protect natural vegetation; minimize and retain water runoff to facilitate groundwater recharge; and, install diversions, sediment basins, and similar required structures prior to any on site grading or disturbance.

Changes to Chapter 85 of the Borough Code, entitled "Zoning", are being considered. The Borough has 5 types of residential districts, which includes 3 single-family districts, 1 two-family district and a planned residential townhouse district. Additionally, there is a general business district and 2 industrial park districts.

The Borough Code will be amended to remind developers that satisfying the percent impervious requirements does not relieve them of responsibility for complying with the Design and Performance Standards for Stormwater Management Measures contained in Chapter 66. The Borough is also evaluating the current maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate. The Borough is also evaluating a maximum percent of disturbance for each zone. 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 surfaces. This mitigation effort must address water quality, flooding and groundwater recharge. A detailed description of how to develop a mitigation plan is included in this Municipal Stormwater Management Plan.

Mitigation Plans

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management designs and performance standards. Presented is a hierarchy of options.

Mitigation Project Criteria

1. 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 Best Management Practices (BMP) Manual.

The applicant can select one of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Borough Engineer. Listed below are the types of projects that can be used to address the mitigation requirement.

A. Groundwater Recharge

- Retrofit existing detention basins to provide additional cubic feet of average annual groundwater recharge.
- Replace existing deteriorated overflow impervious parking lots with permeable paving to provide additional cubic feet of average annual groundwater recharge.

B. Water Quality

- Retrofit existing stormwater management facilities to provide the removal of 80 percent of total suspended solids (TSS) from parking lot.

C. Water Quantity

- Install stormwater management measures in open spaces in various developments to reduce the peak flow from the upstream development on the receiving stream for the 2, 10 and 100-year storms.

2. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, 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 Total Suspended Solids (TSS) requirement is not met, the selected project may address water quality impacts due to a fecal impairment. Listed below are specific projects that can be used to address the mitigation option.

Water Quality

- Re-establish a vegetative buffer (minimum 50 foot wide) along the shorelines of The Saddle River, Ho-Ho-Kus River and Upper and Lower Pond as a goose control measure and to filter stormwater runoff from the high goose traffic areas.
- Provide goose management measures, including public education at the Municipal Building.

Figure A-2 Borough of Ho-Ho-Kus Boundary and Waterways

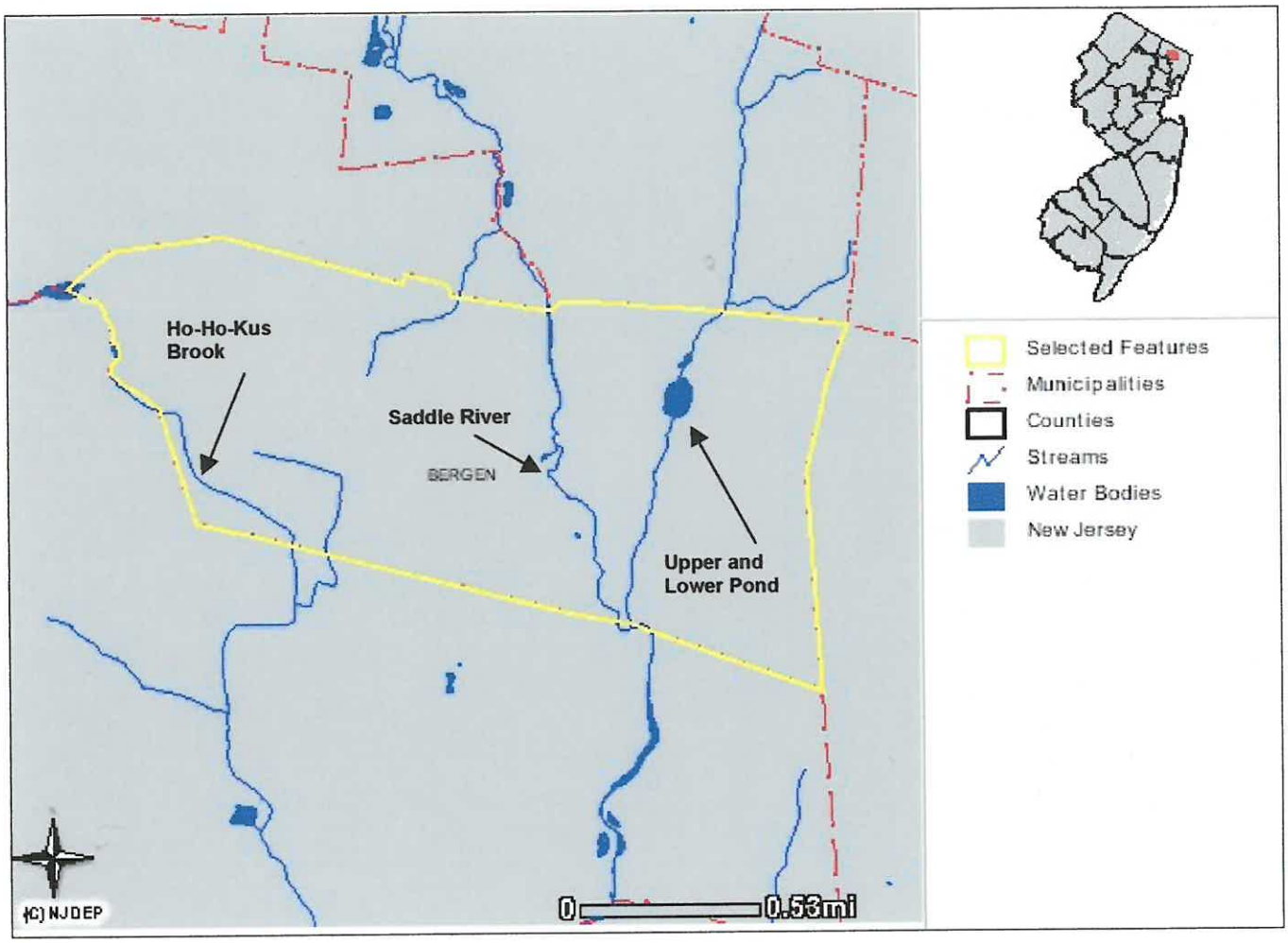
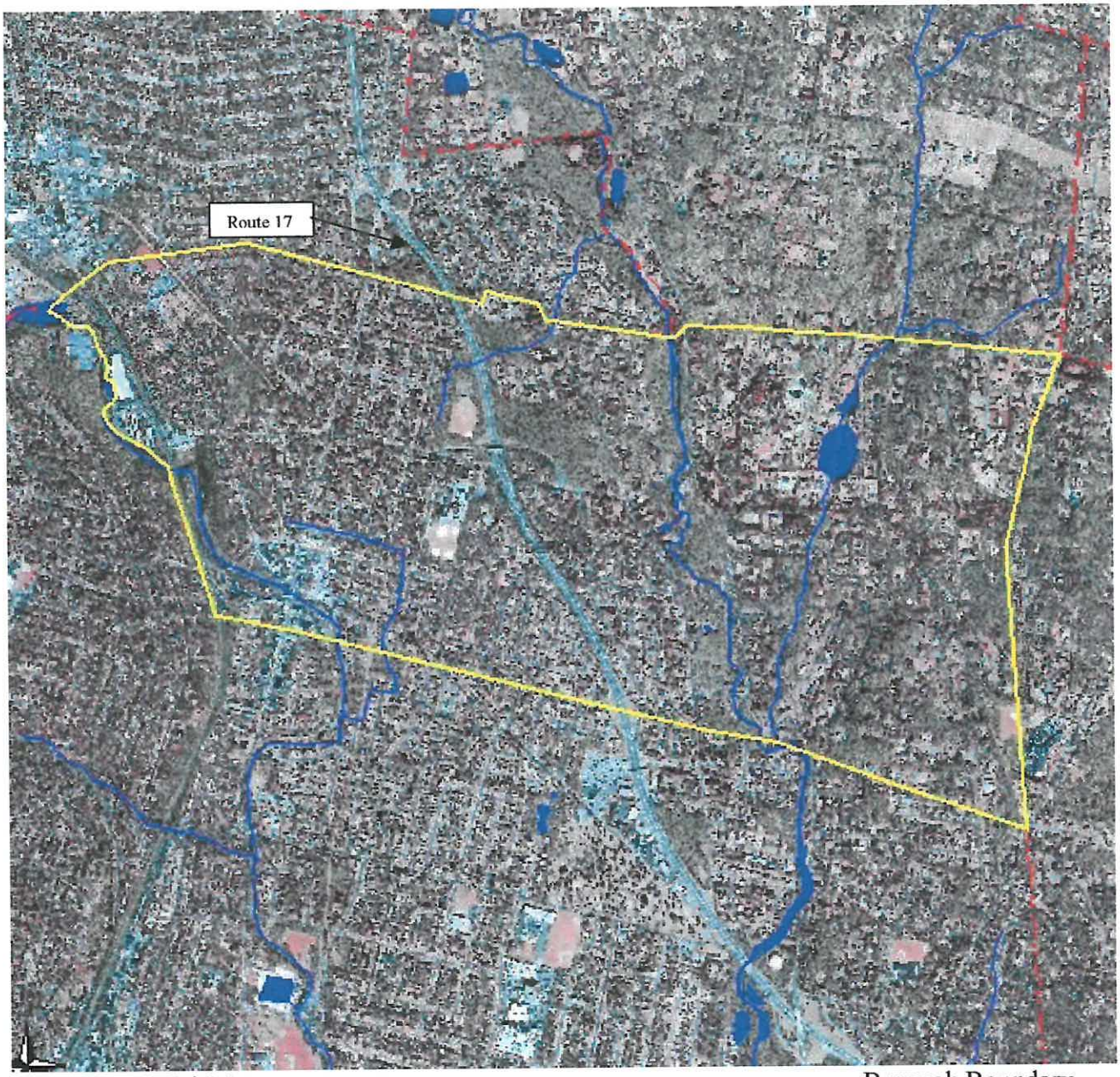


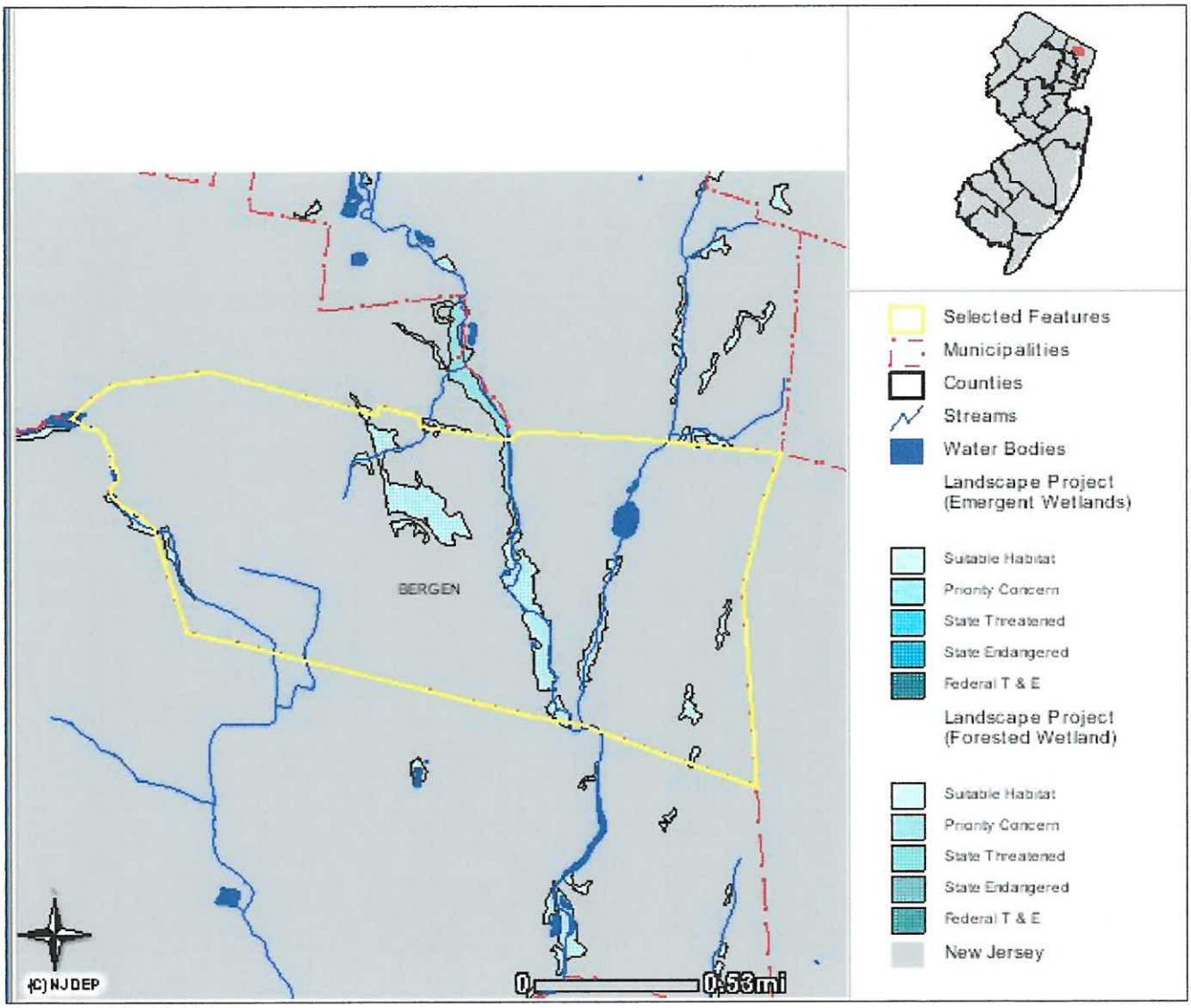
Figure A-3 Borough of Ho-Ho-Kus Aerial Photo 2002



Source: NJDEP i-Map

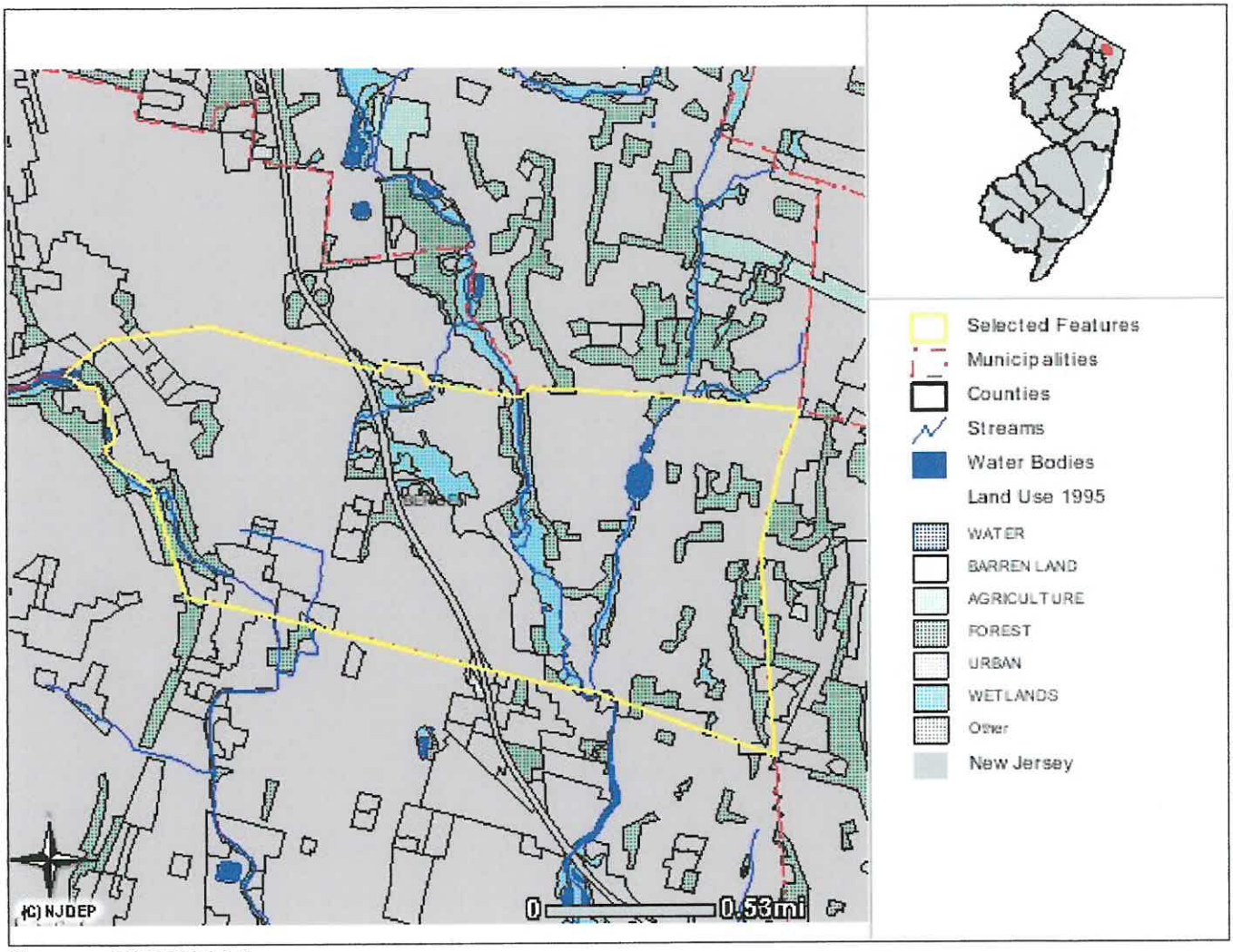
Borough Boundary

Figure A-5 Borough of Ho-Ho-Kus Forested and Emergent Wetlands



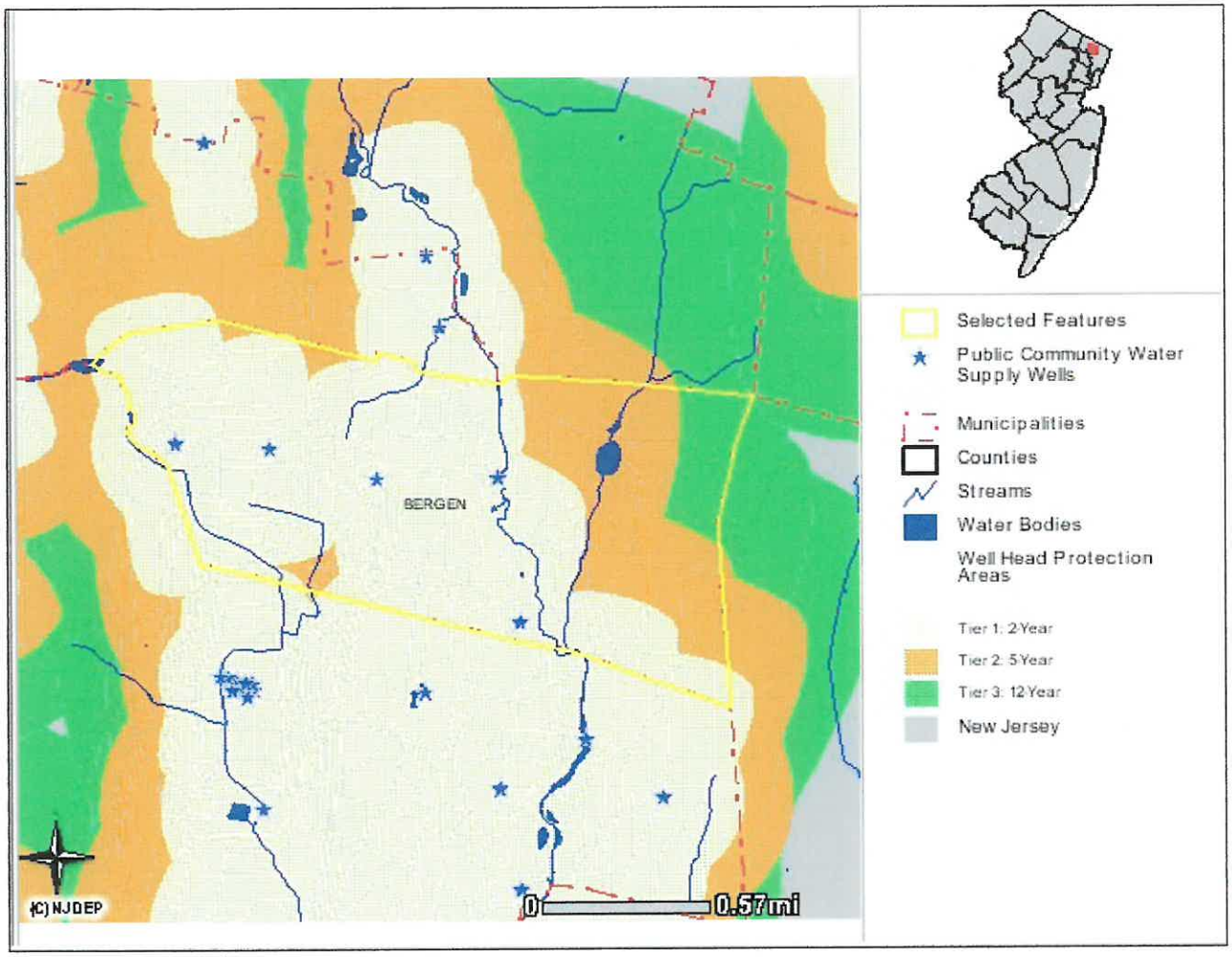
Source: NJDEP i-Map

Figure A-6 Borough of Ho-Ho-Kus Existing Land Use



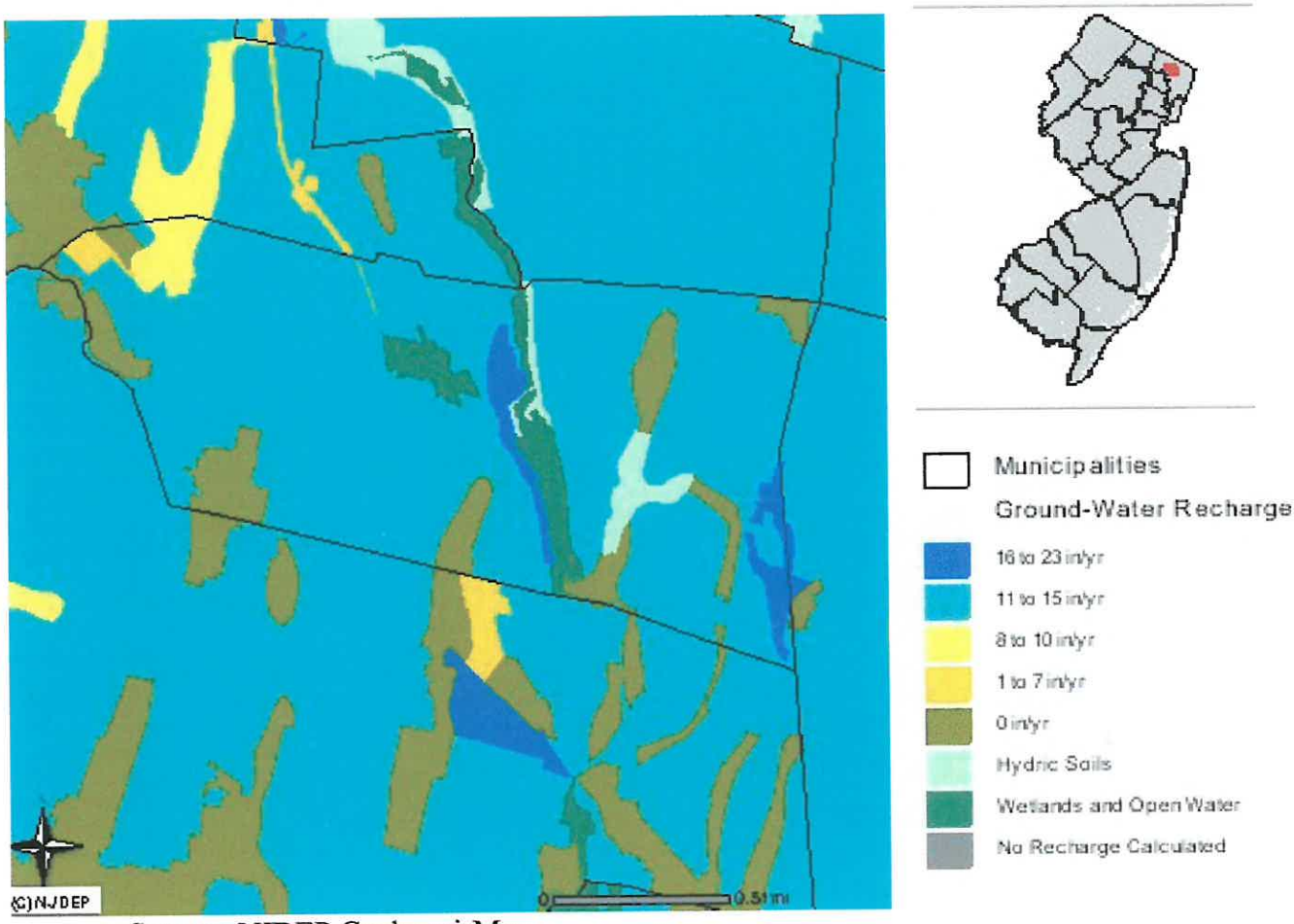
Source: NJDEP i-Map

Figure A-7 Borough of Ho-Ho-Kus Wellhead Protection Areas



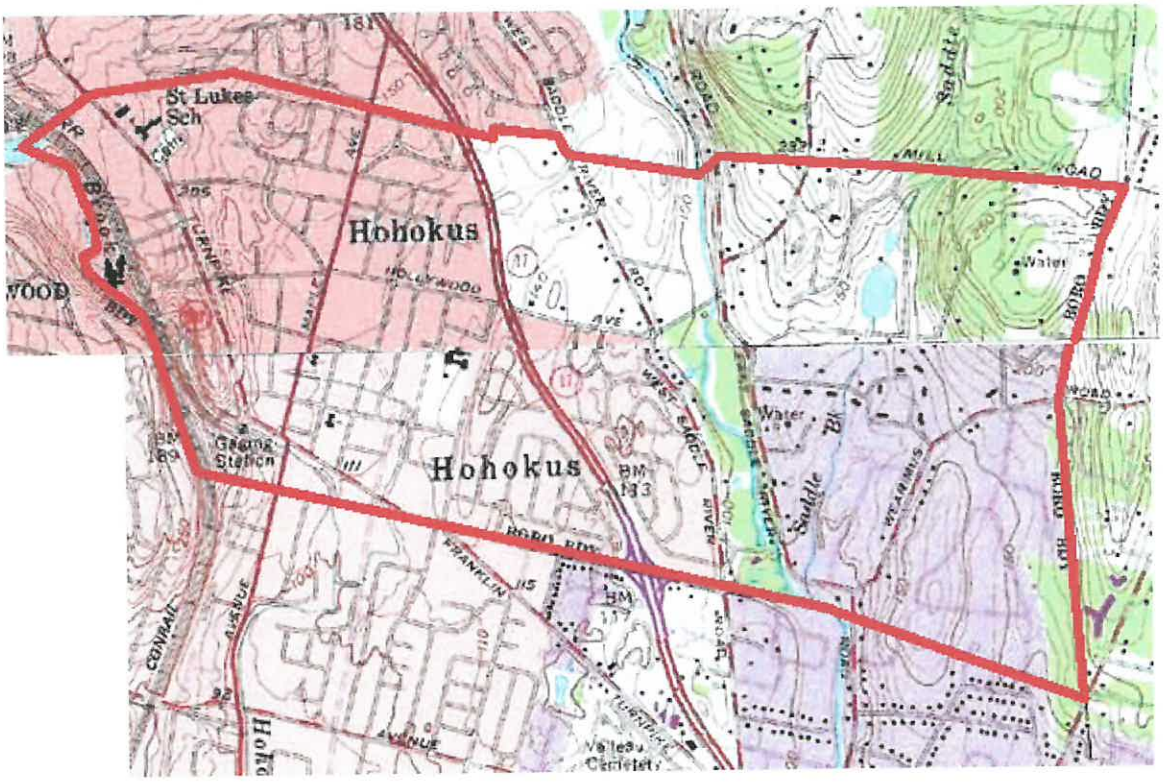
Source: NJDEP i-Map

Figure A-8 Borough of Ho-Ho-Kus Groundwater Recharge



Source: NJDEP Geology i-Map

Figure A-9 Borough of Ho-Ho-Kus on USGS Quadrangle Map



Source: US Geological Survey
Park Ridge, NJ(1955),
Hackensack, NJ(1981) Quadrangles

Borough Boundary