

The municipal stormwater management plan was previously adopted by the planning board and is included in this master plan unmodified.

B O R O U G H O F G A R W O O D
M U N I C I P A L S T O R M W A T E R
M A N A G E M E N T P L A N

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Garwood Borough ("the Borough") 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 base flow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

A "build-out" analysis has been included in this plan based upon existing zoning and land available for development. The plan also addresses the review and update of existing ordinances, the Borough 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 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 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

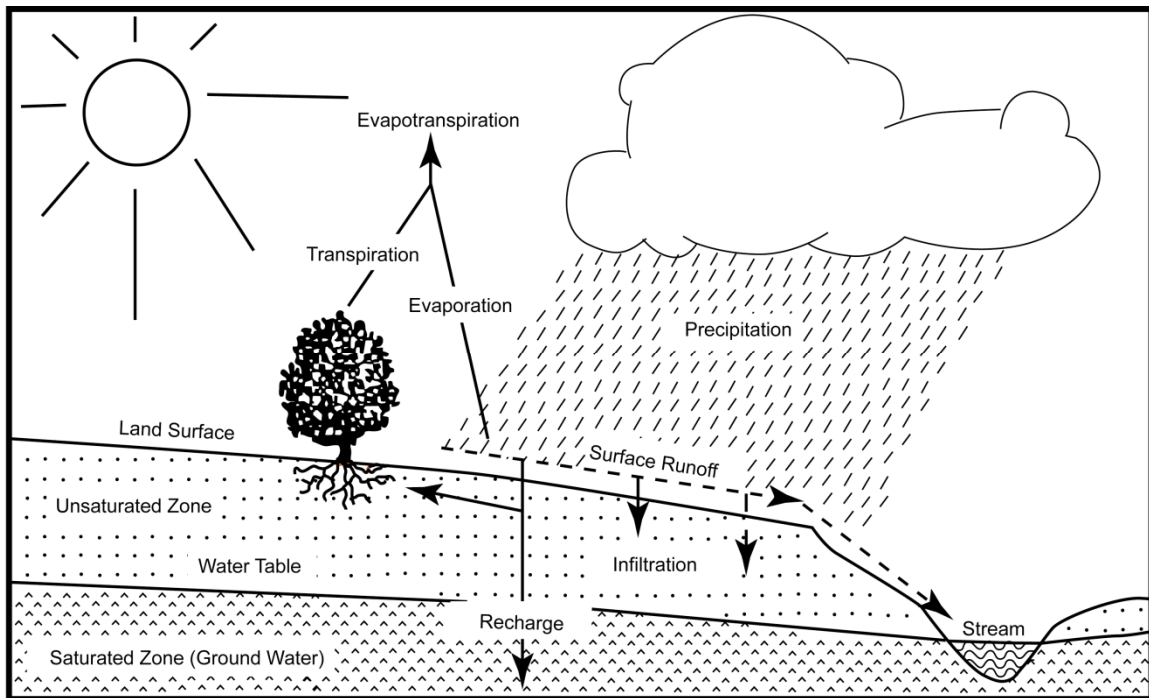
- protect public safety through the proper design and operation of stormwater basins.

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 C-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 storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious 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.

Figure C-1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

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

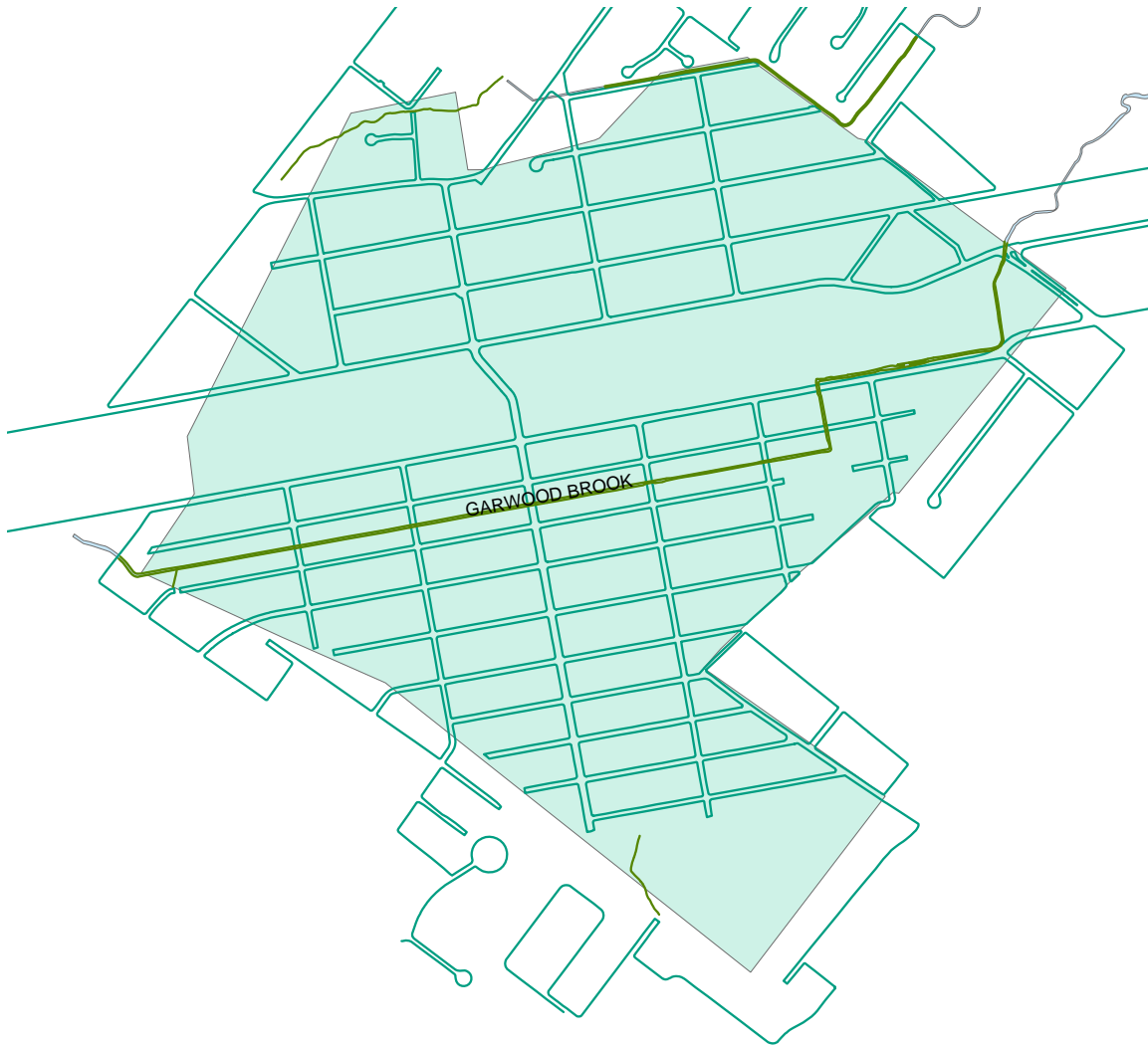
In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway,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

Background

The Borough encompasses 0.65 square mile area in Union County, New Jersey. The Borough has been nearly fully developed for many years with its only growth, in recent years, coming from two or three lot subdivisions. During the period from 1990 to 2000 the Borough's census population dropped from 4,227 to 4,153. The borough has seen some major redevelopment in recent years resulting from the closing of many industrial properties. Some of these have resulted in commercial developments and 2004 saw the approval of a mixed use development of commercial units, 40 apartments and 44 age restricted townhouses. These 84 units will most likely show a growth in the population during the next census. The Borough has the potential to see a few more major developments like this before the current redevelopment cycle ends. Changes in the landscape have not necessarily increased stormwater runoff volumes however pollutant loads to the waterways of the municipality will have increased. . Figure C-2 illustrates the waterways in the Borough. Figure C-3 depicts the Borough boundary on the USGS quadrangle maps.

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. There are two tributaries of the Rahway River which are affected by runoff from Borough Streets. The Garwood Brook runs west to east, from the Town of Westfield into the Township of Cranford on the south side of the Borough. Another Branch of the Rahway River Runs along the northerly and easterly lines of the Borough from Westfield to Cranford.

Figure C-2: Borough and Its Waterways



The two tributaries that flow through the Borough to the Rahway River are moderately impaired based on AMNET data. In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. These data show that the instream total phosphorus concentrations and fecal coliform concentrations of the Raritan River frequently exceed the state's criteria. This means that these rivers are impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody 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 non-point 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.

In addition to water quality problems, the Borough has exhibited water quantity problems including flooding and diminished base flow in its streams. Downstream culverts at North Avenue as well as the Culvert under the old Lehigh Valley Railroad Right-of-way and the culvert just upstream of the Railroad at South Avenue are undersized. During severe storm events, these undersized culverts do not have adequate capacity, thereby causing a backwater effect and flooding upstream. Storms of the magnitude of 50 year

design will cause flooding over South Avenue and Willow Avenue between Oak and New Street.

These culverts were designed for much different hydrologic conditions (i.e., less impervious area) than presently exist in the Borough. As the imperviousness increased in the Borough, the peak and volumes of stream flows also increased. The increased amount of water resulted in stream bank overtopping, which resulted degraded stream habitats. The high imperviousness of the Borough has significantly decreased groundwater recharge, decreasing base flows in streams during dry weather periods. Lower base flows can have a negative impact on instream habitat during the summer months. A map of the groundwater recharge areas are shown in Figure C-4. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-4.

Since Garwood is in a Metropolitan Planning Area (PA1), the groundwater recharge requirements of the Stormwater management rules do not apply to projects within urban redevelopment areas. N.J.A.C. 7:8-5.4(a) 2ii defines Urban Redevelopment Areas as previously developed portions of areas delimited on the State Plan Policy Map (SPPM) as Metropolitan Planning Areas (PA1).

Based upon the above sections of the N.J.A.C. groundwater recharge is required for projects located on sites within PA1, which has not been previously developed (vacant land) and exempts projects located on sites within PA1 that were previously developed (redevelopment projects)

Ground Water Recharge Figure C-4

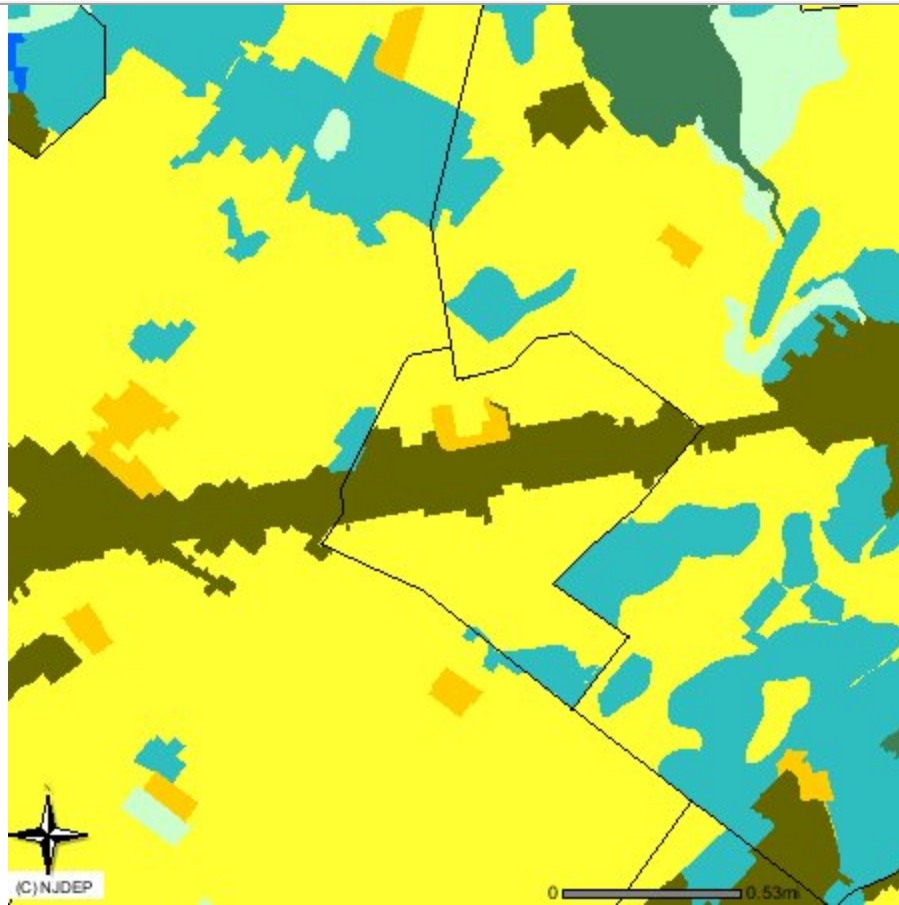
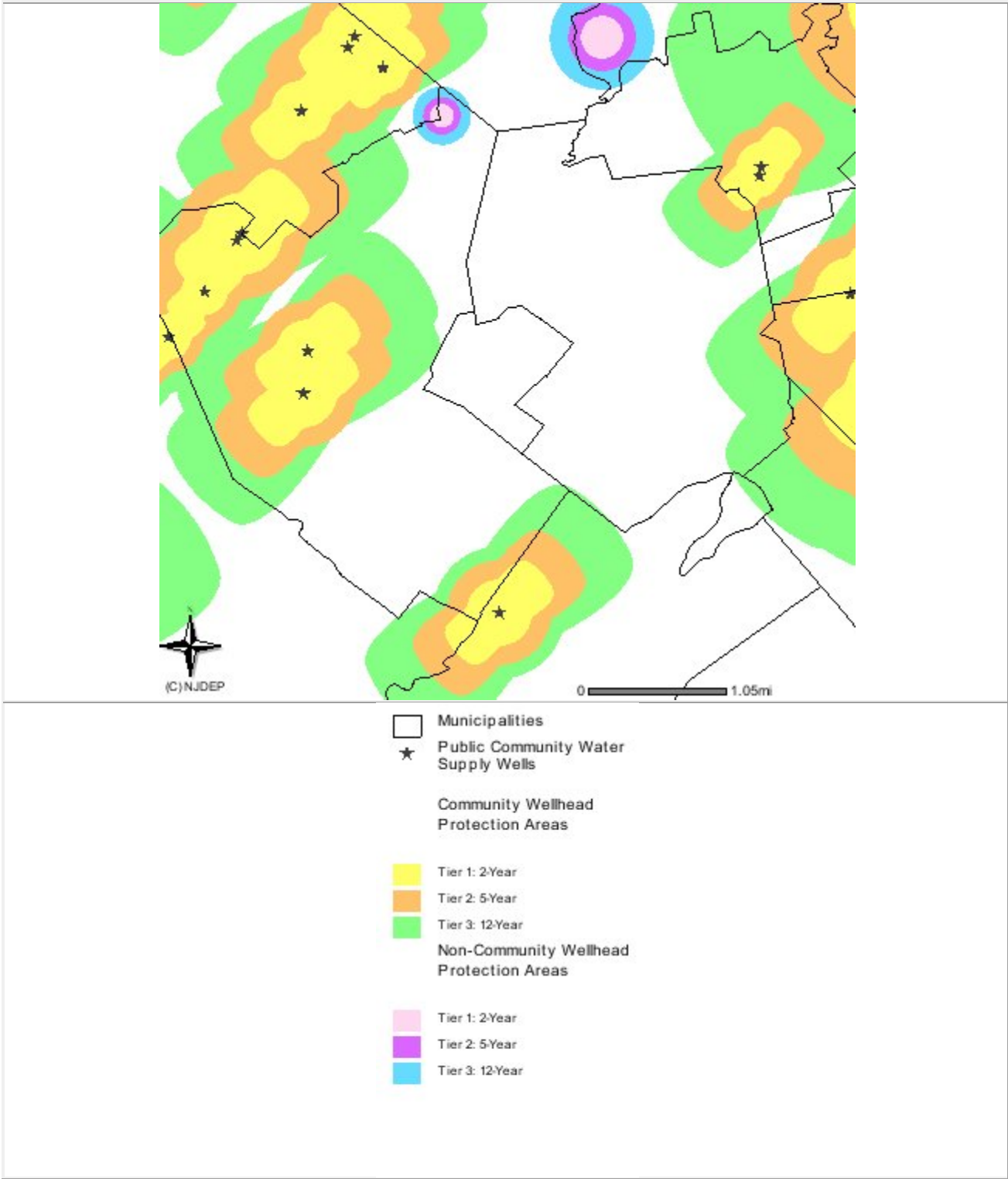


Figure C-5: Wellhead Protection Areas in the Borough



Design and Performance Standards

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. 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 and no TMDLs have been developed for waters within the Borough; therefore this plan does neither need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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 requires 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 review the master plan and ordinances, and will provide a list of the sections in the Borough's land use and zoning ordinances that can be modified to incorporate additional 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 106 of the Borough Code, entitled Land Use, will be reviewed with regard to incorporating nonstructural stormwater management strategies. Changes will be made to Article IX of this Chapter, entitled "Design Standards" to incorporate these strategies.

Section 106-130-D&G: Curbs and Gutters require that concrete curb and gutter, concrete curb, or Belgian block curb be installed along every street within and fronting on a development. This section can be amended to allow for curb cuts or flush curbs with curb stops to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

Section 106-130-I: Drainage- Paved Areas requires that all streets be provided with inlets and pipes where the same are necessary for proper drainage. This section can be amended to encourage the used of natural vegetated swales in lieu of inlets and pipes.

Section 106-130-F: Driveways and Access ways: Describes the procedure for construction of any new driveway or access way to any street. This section can be amended to allow the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Section 106-132: Landscaping requires a minimum of one shade tree per lot to be planted in the front yard. The Borough will consider a Tree Preservation Ordinance to restrict and otherwise controls the removal of mature trees throughout the Borough. Recognizing that the preservation of mature trees and forested areas is a key strategy in the management of environmental resources, particularly watershed management, air quality and ambient heating and cooling. Although it would be desirable to establish a "critical footprint area" that extends 20 feet beyond the driveway and building

footprint where clearing of trees cannot occur this could only be applied to larger tract development since the Borough has been completely developed almost exclusively on 40' x 100' lots . This complies with minimizing land disturbance, which is a nonstructural stormwater management strategy. These critical footprint areas will be investigated and where possible will require the identification of forested areas, and that a percentage of forested areas are protected from disturbance.

Section 106-130 H: "Sidewalks" describe sidewalk requirements for the Township. Although sidewalks are not required along all streets, the Township can require them in areas where the probable volume of pedestrian traffic, the development's location in relation to other populated areas and high vehicular traffic, pedestrian access to bus stops, schools, parks, and other public places, and the general type of improvement intended indicate the advisability of providing a pedestrian-way. Sidewalks are to be a minimum of four feet wide and constructed of concrete. Language can be considered to add to this section 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. Consideration should be given for the State to eliminate the RSIS requirements for sidewalk construction on some of the smaller traffic volume streets.

Section 106-136: Regulatory Standards requires sediment and soil erosion control measures are provided. This ordinance requires developers to comply with the New Jersey Soil Erosion and Sediment Control Standards and outlines some general design principles, 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.

Article 10 Stormwater Control in the Borough Code has been updated to include all requirements outlined in N.J.A.C. 7:8-5.

Section 106-126: Streets describes the requirements for streets in the Borough. The Borough has several street classifications, ranging from "Arterial," which has a minimum right-of-way of 80 feet, to "Minor Streets," which has a minimum right-of-way of 50 feet. Street paving widths are a function of the number of units served, whether a street is curbed, whether on-street parking is permitted, whether the interior streets serve lots of

two acres or larger, and whether on-site topographical constraints allow design flexibility. It should be remembered that streets are generally dictated in the RSIS at least for residential developments. Consideration should be given by the State to allow for more flexibility in this area to encourage minimum pavement surface. Depending on these factors, paving width for secondary local streets has a range from 20 to 32 feet. This section could be amended to encourage developers to limit on-street parking to allow for narrower paved widths. This section also required that cul-de-sacs have a minimum radius of 50 feet. Language could be added to this section to reduce the minimum radius of cul-de-sac designs. Cul-de-sacs with landscaped islands have a minimum radius of forty, cul-de-sacs.

THE Borough adopted a new Storm-water Control Ordinance last year basically as recommended in the Model ordinance however since that Ordinance only affects Major development Applications it is recommended that further changes be incorporated to address minor developments which would be defined as "any application where there is an increase in impervious surface" which would require a "zero" increase in the rate of runoff for a 100 year design storm. This will discourage the construction of any unnecessary impervious surfaces. This was the case prior to the adoption of the recent changes in the storm-water ordinance.

The Borough has also made recent changes in the Zoning Ordinance limiting the size of structures and establishing a FAR for all districts.

It is also recommended that the Borough change its definition of "Major development" to include and increase in 10000 s.f. of impervious surface.

Land Use/Build-Out Analysis

Garwood Borough is approximately one square mile and is completely developed as shown on the aerial map C-5. Since it does not have a combined area of one square mile of vacant or agricultural lands, it is exempt for a land use analysis.

Mitigation Plans

This mitigation plan is recommended for a proposed development that is granted a variance or exemption from the stormwater management design 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 BMP Manual.

a. The applicant can propose a project that includes one of the following to compensate for the deficit from the performance standards resulting from the proposed project.

Groundwater Recharge

- Suggest a location in the Borough that will provide additional Ground Water Recharge on another site. •

Or

Suggest a location where existing paved parking lot where the pavement could be repaved with a permeable pavement.

Water Quality

- Suggest a location where an existing Stormwater management facility could be retrofitted to removal 80% of total suspended solids.

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.

Water Quality

- Re-establish a vegetative buffer (minimum 50 foot wide) along a goose control measure and to filter stormwater runoff from the high goose traffic areas.
- Provide goose management measures, including public education.

A developer may provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a 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.