MASER CONSULTING P.A.

43A Newburgh Road, Suite 100, Hackettstown, NJ 07840
Tel: 908.684.5500 ▪ Fax: 908.684.5580
www.maserconsulting.com

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

Municipal Stormwater Managanement Plan

For the Town of Belvidere
Warren County, NJ
February 2005
Adopted April 12, 2005

Prepared By:

Paul M. Sterbenz

Paul M. Sterbenz, P.E., P.P
N.J.P.E. License No. 32549

And

Joseph J. Layton

Joseph J. Layton, P.P., AICP
N.J.P.P. License No. LI01443

MC Project No. BDT-030

The original of this report was signed and sealed in accordance with N.J.S.A. 45:14a-12

TABLE OF CONTENTS

List of Tables

List of Figures

Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Town of Belvidere ("the Town") 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 ground-water 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 or increases impervious coverage by one-quarter acre or more. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of ground-water recharge that provides baseflow 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 Town 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 ground - water 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.

In addition to the above goals, the Town's Master Plan (adopted in 1979) and all subsequent Reexaminations (1989, 1996 and 2002) were concerned with flood plain management because of the amount of residential and non-residential development located in or adjacent to the flood plains of the Delaware and Pequest Rivers. The 1979 Master Plan explains the flooding concerns of the Town in detail:

> Floods along the Delaware River have been a problem since the area was first settled in the 17th Century. The Delaware River is vulnerable to flooding at any time of the year with possible damage to homes, industry, property and life in its flood plain. Its flooding backwaters have raised the level of the Pequest River and been the cause of flooding in Belvidere on numerous occasions. The Pequest River is also subject to flooding from occasional hurricanes and long-duration extratropical storms (northeasters), especially when accompanied by melting snow.
>
> The Pophandusing Creek, which runs along Belvidere's sourthern municipal boundary line, also poses a significant danger of flooding. This Creek, having a relatively smaller watershed, is more reactive to shorter duration, high-intensity storms than either the Delaware or Pequest Rivers; thus flooding may occur at any time. (1979 Master Plan, Page 8)

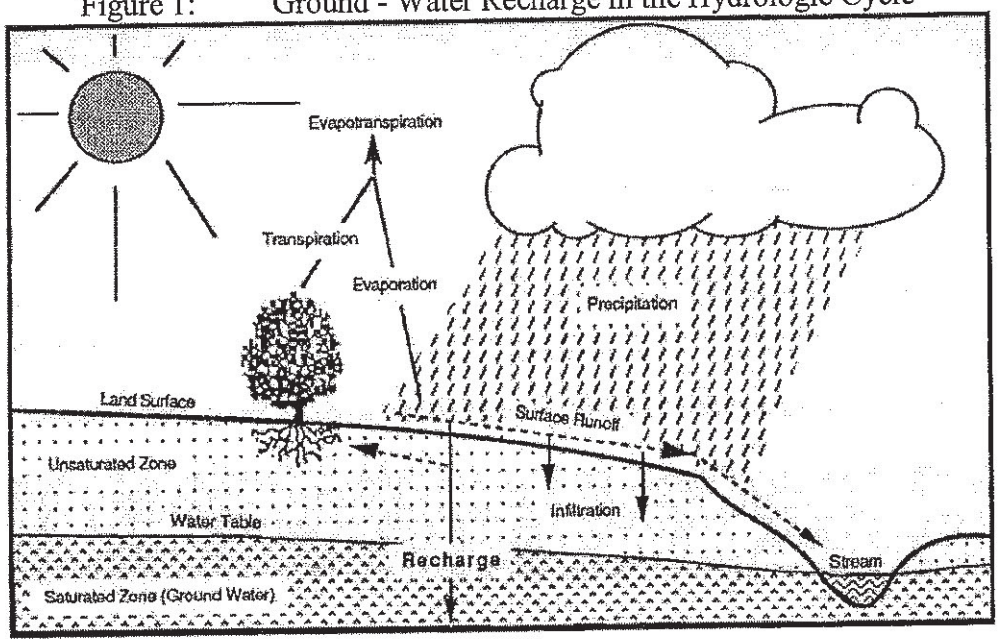
In order to address these goals and concerns, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in this 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 1) of a site and, ultimately, entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw from 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, 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 ground-water recharge. Reduced base flows and increased peak flows produce greater fluctuation between normal and storm flow rates, which 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 1: Ground - Water Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey GSR-32

In addition to increase in runoff peaks, volumes, and loss of ground-water 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 Town encompasses 1.35 square miles in Warren County, New Jersey. Belvidere is a developed Town that has not experienced significant recent development.

The population of the Town has increased from 2,475 in 1980, to 2,669 in 1990, to 2,771 in 2000. Even with relatively little in the way of new development, there have most likely been increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figure 2 illustrates the waterways in the Town. The Delaware River flows along the western municipal boundary line while the Pequest River flows through the heart of the Town, and the Pophandusing Creek flows along the southern municipal boundary line. Figure 3 depicts the Town 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 the benthic macroinvertebrate community dynamics. The AMNET data show that the Pequest River on Water Street (Site ID# 01446400, DRBCNJ0033, 1-PEQ-3) may not have acceptable phosphorus, temperature, arsenic, cadmium, chromium, lead, mercury, and pH levels.

The *New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report* ("the 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 Total Maximum Daily Load (TMDL) reports are needed. According to Appendix 1B: Sublist 5 with Priority Ranking of the Report, the development of a TMDL for phosphorous, temperature and pH levels are of medium priority, and a high priority is listed for arsenic, cadmium, chromium, lead and mercury.

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

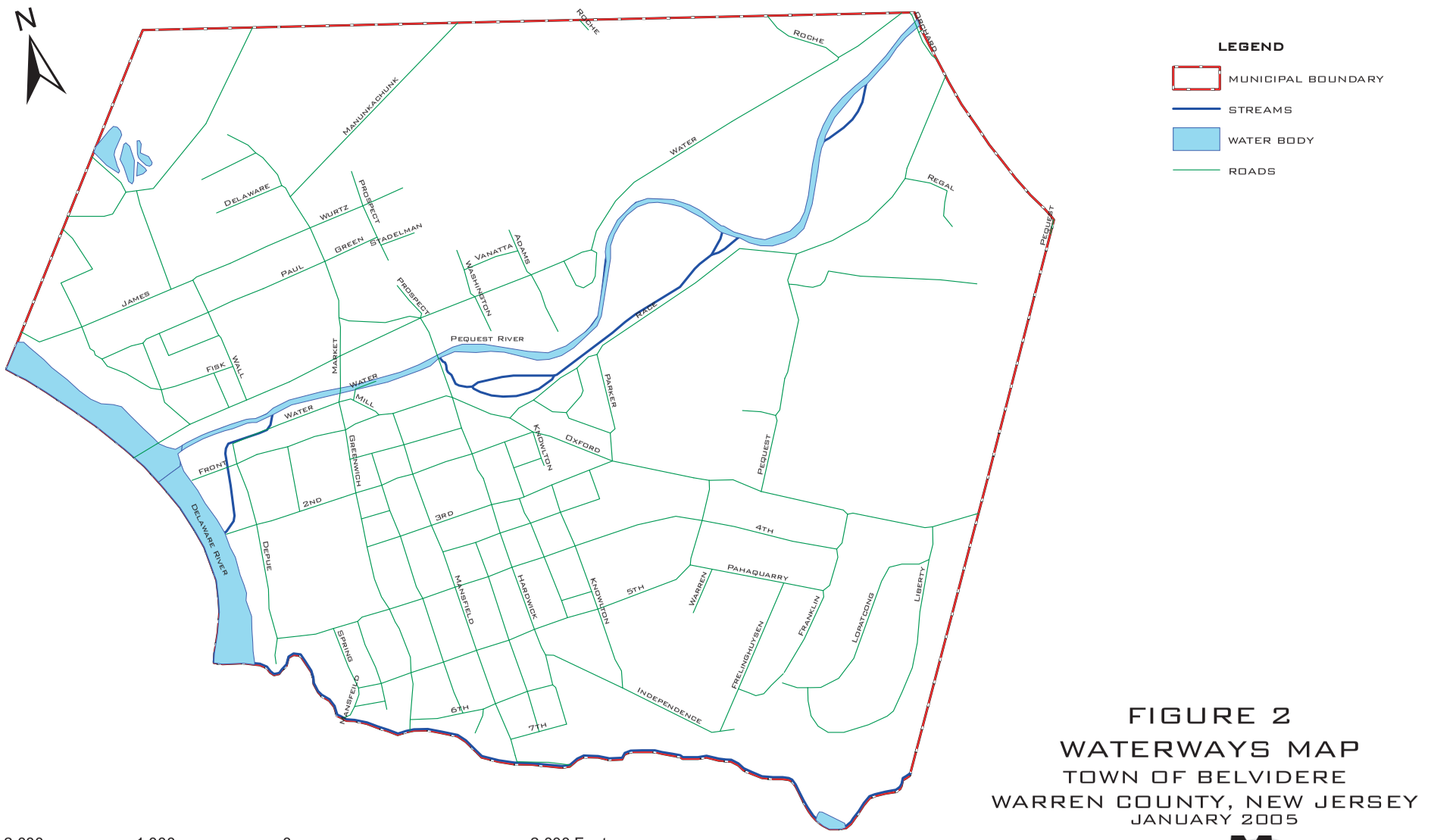
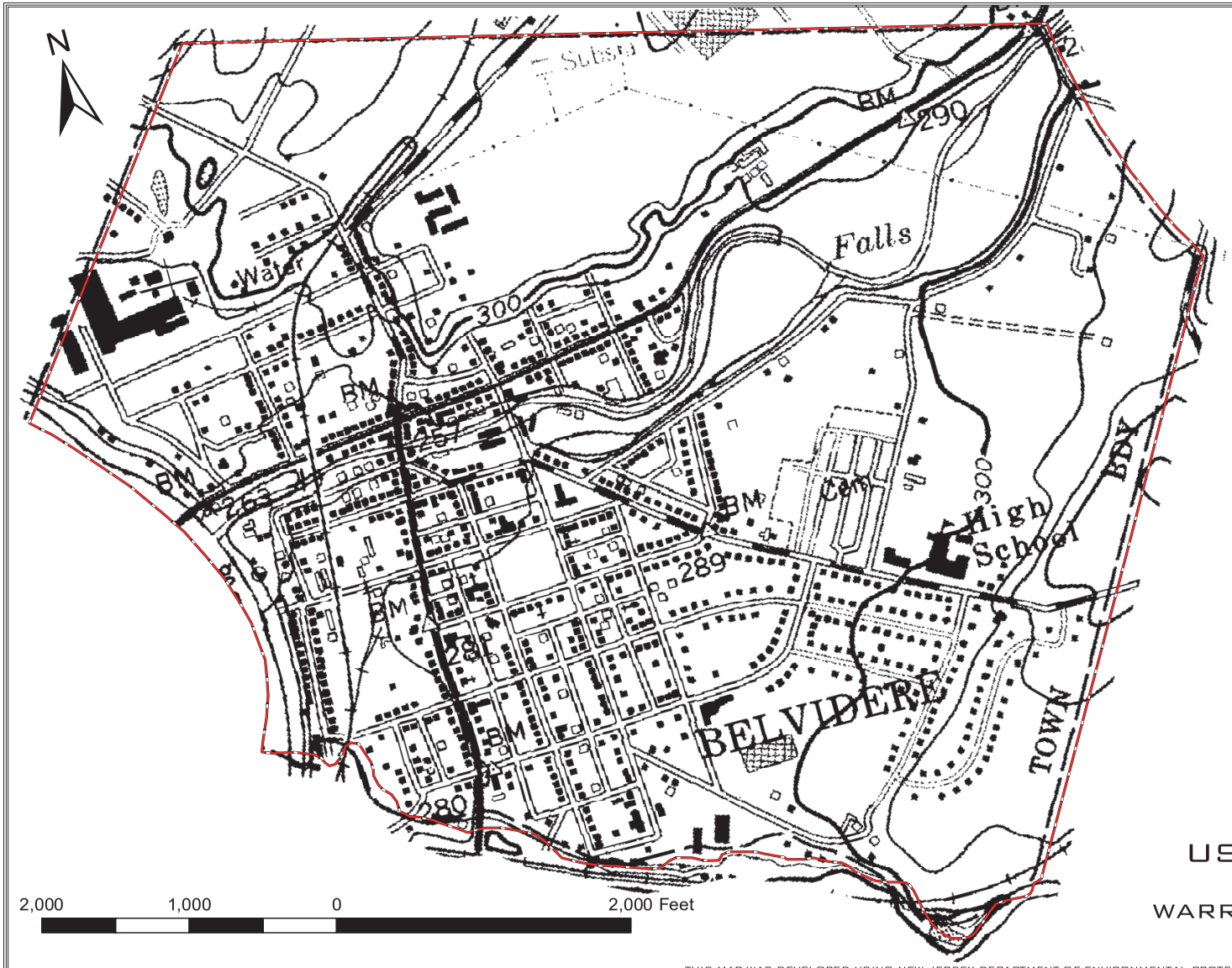


FIGURE 2
WATERWAYS MAP
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/WETERWAYS-C2



LEGEND

MUNICIPAL BOUNDARY

FIGURE 3
USGS QUADRANGLE
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/USGS-C3

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 wasterwater 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.

Belvidere is approximately 2/3 developed. The existing land use, based on 2002 aerial photography, is shown in Figure 4. The existing zoning is shown in Figure 5. The ground-water recharge rates for native soils in the Town are generally between 10 and 15 inches annually. The average annual ground - water recharge rates are shown graphically in Figure 6.

According to NJDEP, "A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two- (Tier 1), five- (Tier 2), and twelve- (Tier 3) year period of time for unconfined wells. The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations (see NJAC 7:10 – 11.7 (b)1)."

WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP. As shown in Figure 7, the Town is in a Tier 2 or Tier 3 wellhead protection area.

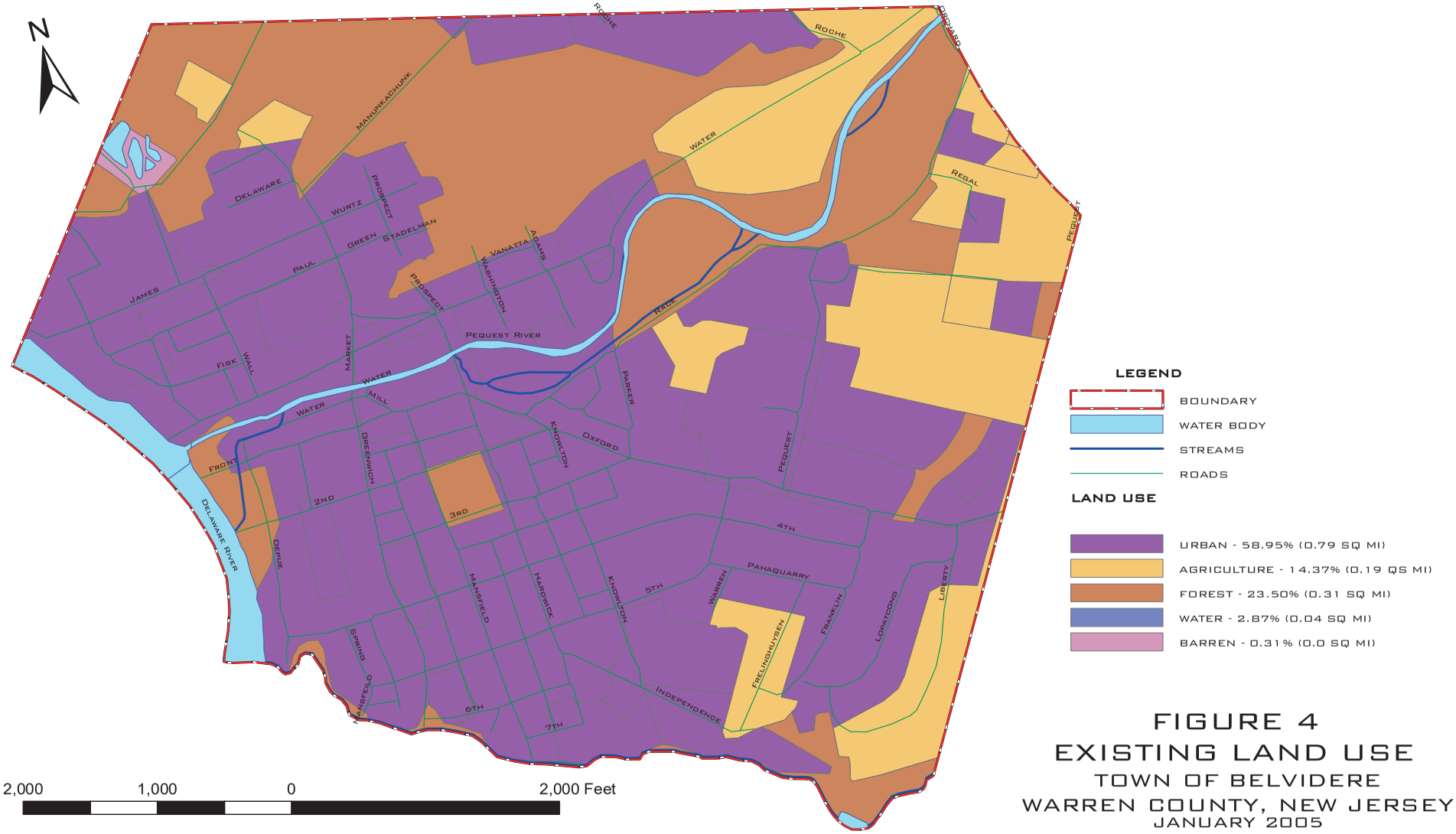


FIGURE 4
EXISTING LAND USE
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/EXISTING LAND USE-C6

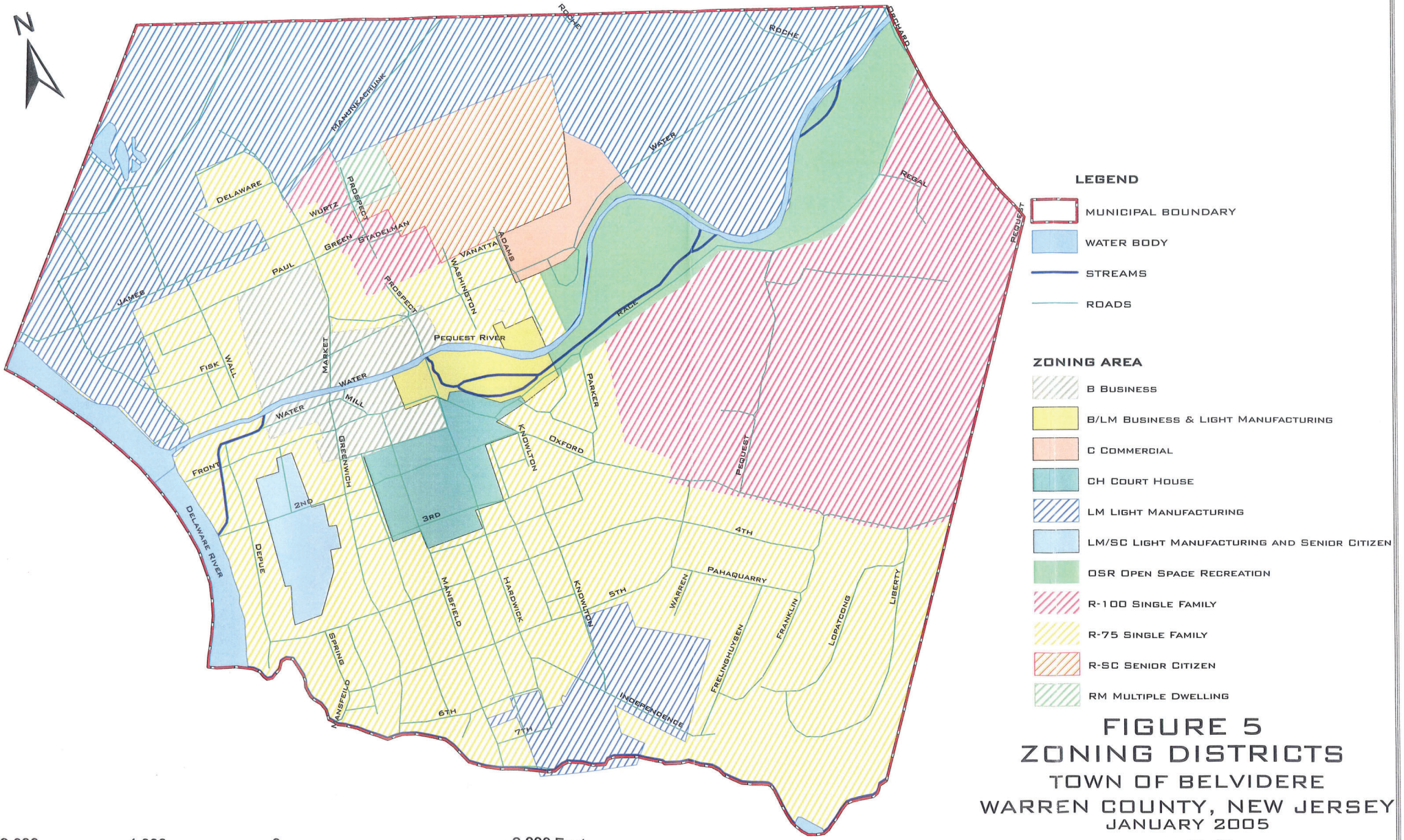


FIGURE 5
ZONING DISTRICTS
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/ZONING-C5

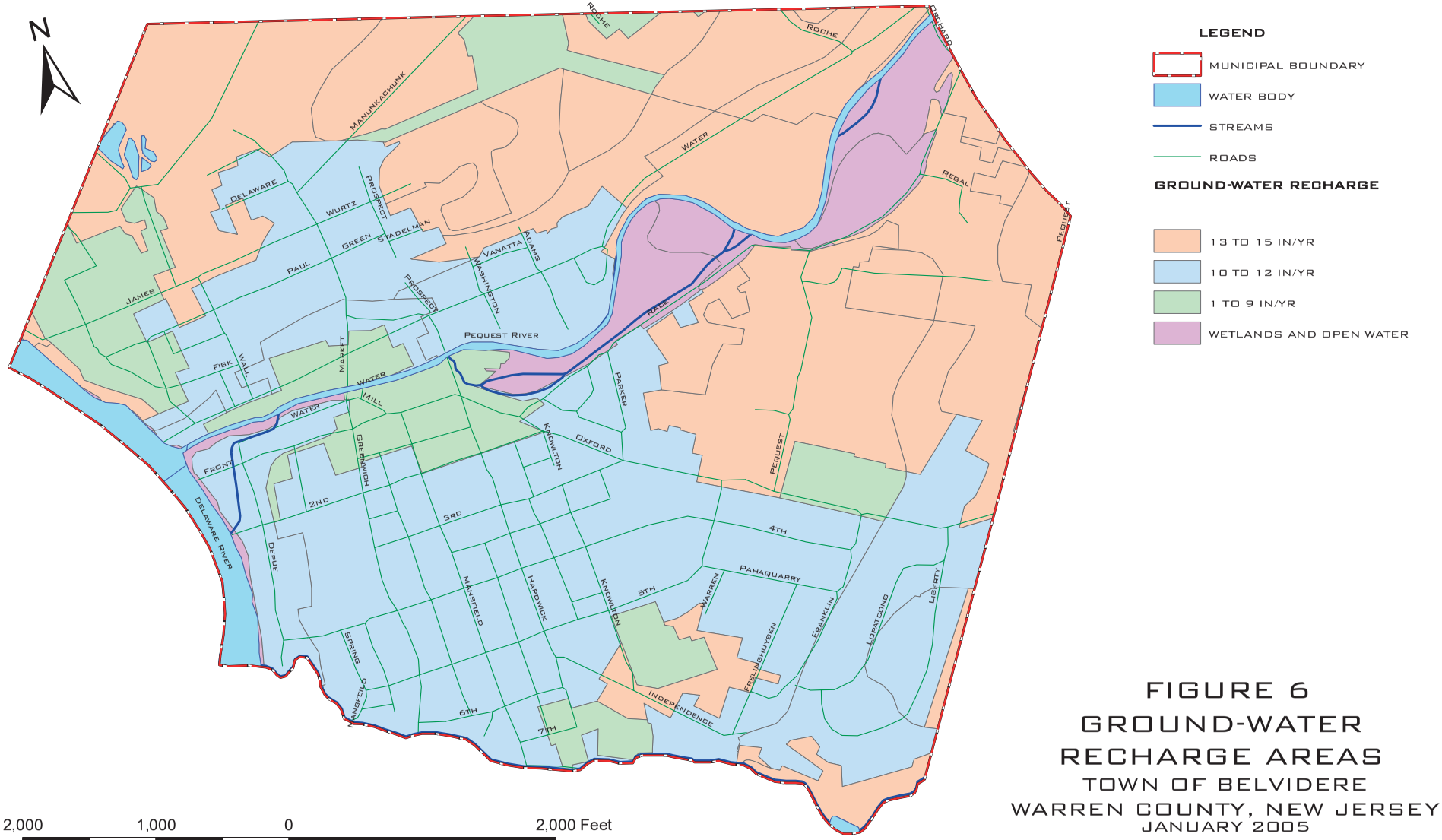


FIGURE 6
GROUND-WATER RECHARGE AREAS
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/GROUNDWATER RECHARGE-C6

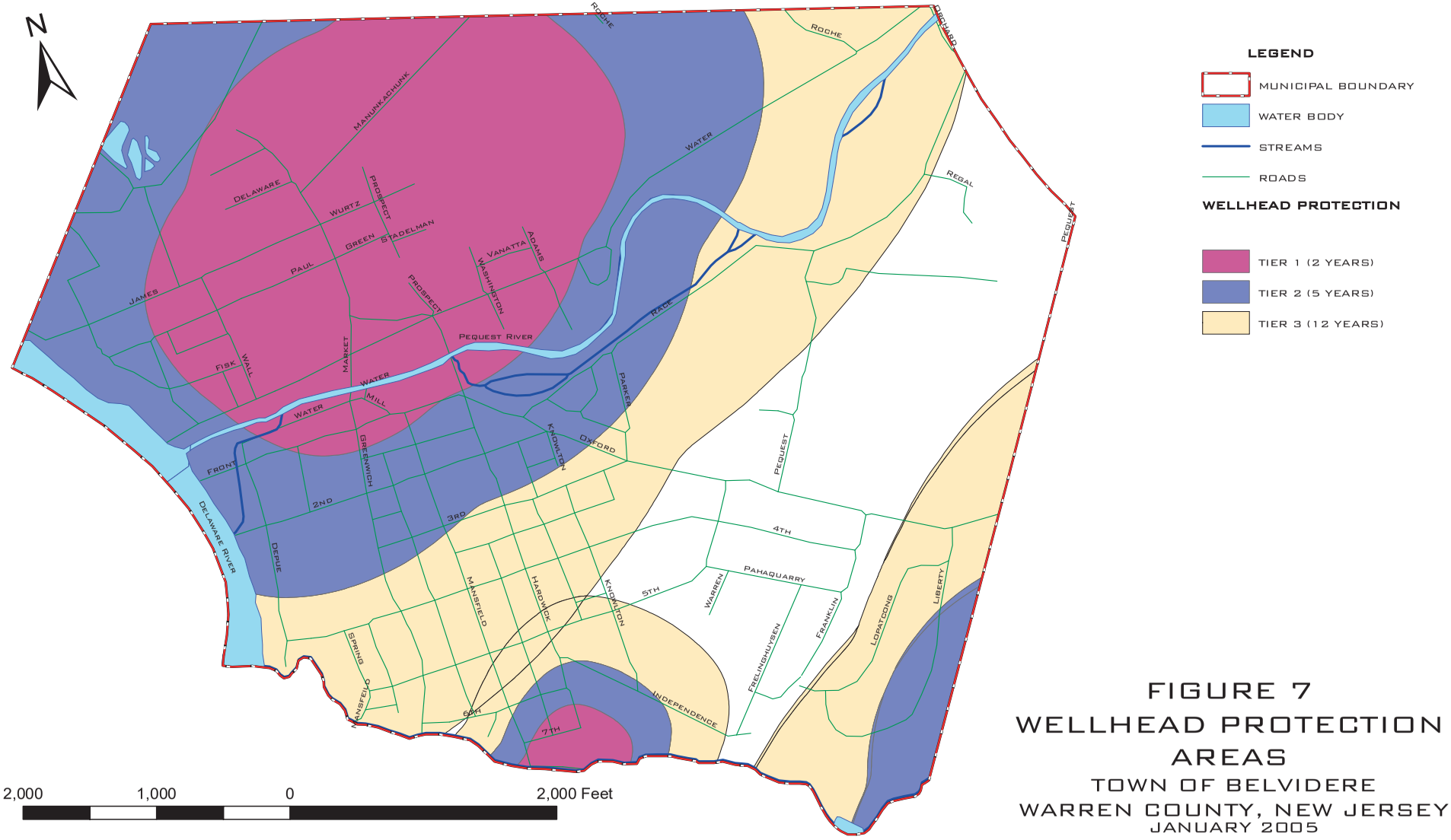


FIGURE 7
WELLHEAD PROTECTION AREAS
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/WELLHEAD-C7

Design and Performance Standards

The Town will adopt the design and performance standards for stormwater management measures as present 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 ground-water 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, Town inspectors will observe the construction of the site improvements, including drainage, to ensure that the stormwater management measures are constructed and function as designed.

Plan Consistency

The Town is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Town; therefore this plan does not 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 projects. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS.

The Town'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, Town 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 Town has reviewed the master plan and ordinances, and has provided a list of the sections in the Town land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified for revisions. Once the ordinance texts are completed, they will be submitted to the county review agency 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 submissions.

Chapters 107, 137, and 160 of the Code of the Town of Belvidere were reviewed with regard to incorporating nonstructural storm water management strategies. The following standards are in place:

Section 107-24 "Soil Erosion and Sediment Control" contains a section on Design Principles, which indicates that natural vegetation should be protected to reduce erosion, and that the drainage plan for a site must be modified to take development into account, and also to minimize runoff from the site.

Additional language must be included to address the re-establishment of vegetation and slope stabilization in these areas where development does occur. In addition, language must be added that requires land disturbance, clearing, and soil compaction to be minimized.

Section 107-26 "Stormwater Runoff" incorporates nonstructural stormwater management strategies that encourage the recharging of underground aquifers. Where detention basins are necessary, they may be provided with vertical holes filled with coarse rock to encourage percolation into the soil.

These standards are to be replaced by the design and performance standards for stormwater management per N.J.A.C. 7:8-5, the safety standards for stormwater management basins in N.J.A.C. 7:8-6, and the drainage design criteria in the RSIS (N.J.A.C. 5:21-7.1).

Section 107-29 "Driveways" describes the procedure for construction of any new driveway or alteration of any existing driveway or connection to a street.

This section will be amended to allow the use of pervious paving materials to minimize stormwater runoff and promote ground-water recharge.

Section 137-18 "Design Standards for Streets and Sidewalks" describes the requirements for streets within Town developments. It requires that all developments be served with paved streets. The Town has three street classification, "1a," which has a minimum right-of-way of 66 feet (40' paved), "1b," which has a minimum right-of-way of 50 feet (34' paved), and "2," which has a minimum right-of-way of 50 feet (30' paved). Curbs and sidewalks are generally required for all streets. Section 137-18O details the drainage requirements for streets.

Language should be added 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. In addition, the street design criteria in the RSIS will be referenced since more flexibility in the cross-section of a street is offered. For example, curbs are not always required and can be replaced by roadside swales, which will help treat runoff and promote recharge.

Section 137-19 "Construction Standards for Streets and Sidewalks" specifies structural drainage strategies. It also indicates that trees larger than 6 inches in diameter should be preserved wherever possible.

Section 160-46 "Buffers" requires that wherever the property line of a nonresidential use parcel faces or abuts any parcel zoned for residential use, a buffer is required. This section allows native vegetation within the buffer to be used to satisfy landscaping requirements.

The section should be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species. Additionally, language should be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Section 160-88 "Driveways and Parking for Multiple Dwelling Units" details the widths required of driveways and sidewalks, and also the amount of parking necessary for each unit. All parking areas must be paved. No requirements currently exist for landscaping in these areas.

This section should be amended to allow the use of pervious paving materials to minimize stormwater runoff and promote ground-water recharge.

Land Use / Build – Out Analysis

A detailed land use analysis for the Town was conducted. Figure 5 illustrates the existing land use in the Town based on current GIS information from NJDEP. Figure 8 illustrates the HUC14s within the Town. The Town zoning map is shown in Figure 5. Figure 9 illustrates the constrained lands within the Town. The build-out calculations for impervious coverage are shown in Table 1. The Total Acres, Existing Impervious (%), Existing Impervious (Acres), Critical Areas (Acres), and Existing Developed Areas

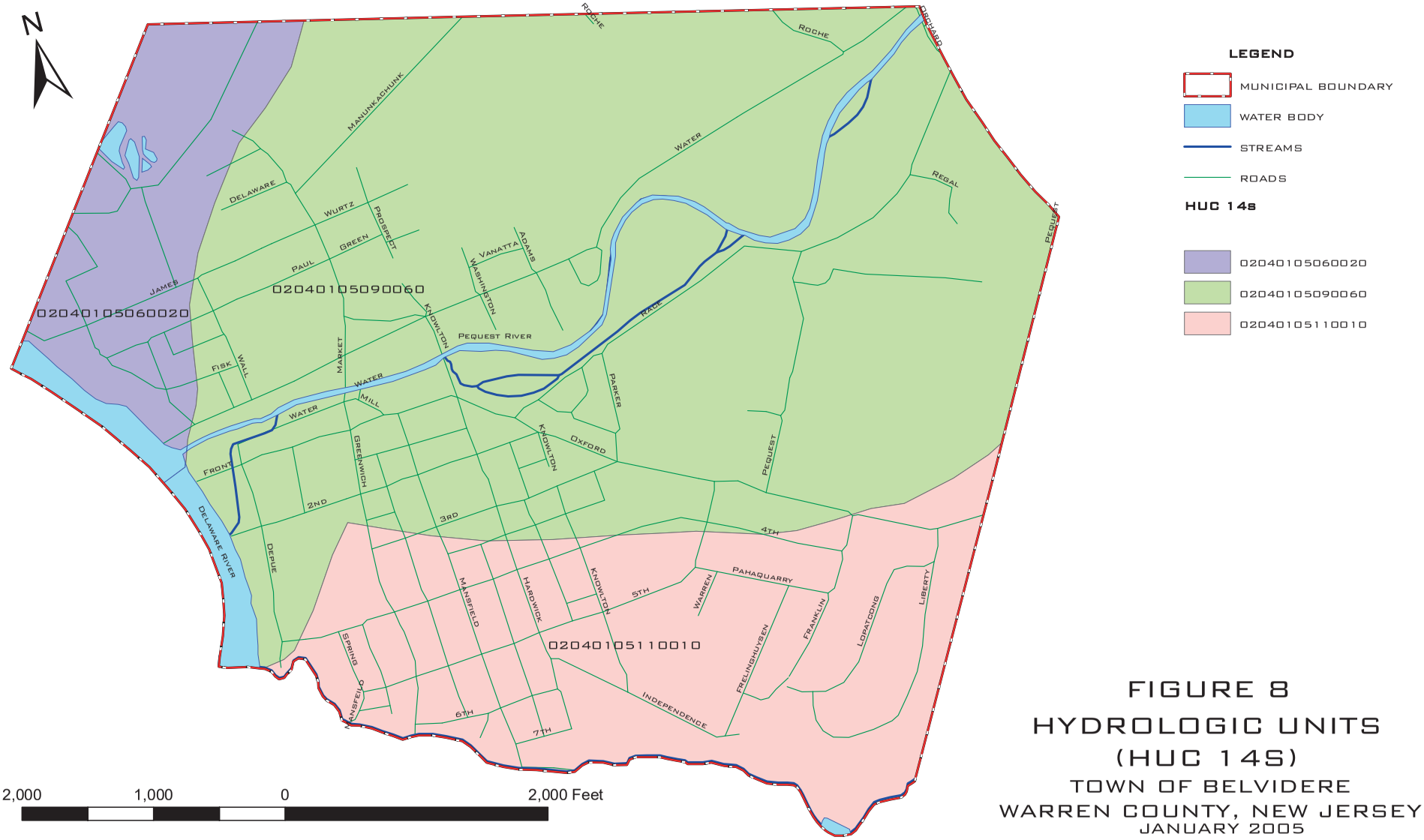


FIGURE 8
HYDROLOGIC UNITS
(HUC 14S)
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/HUC14S-C8

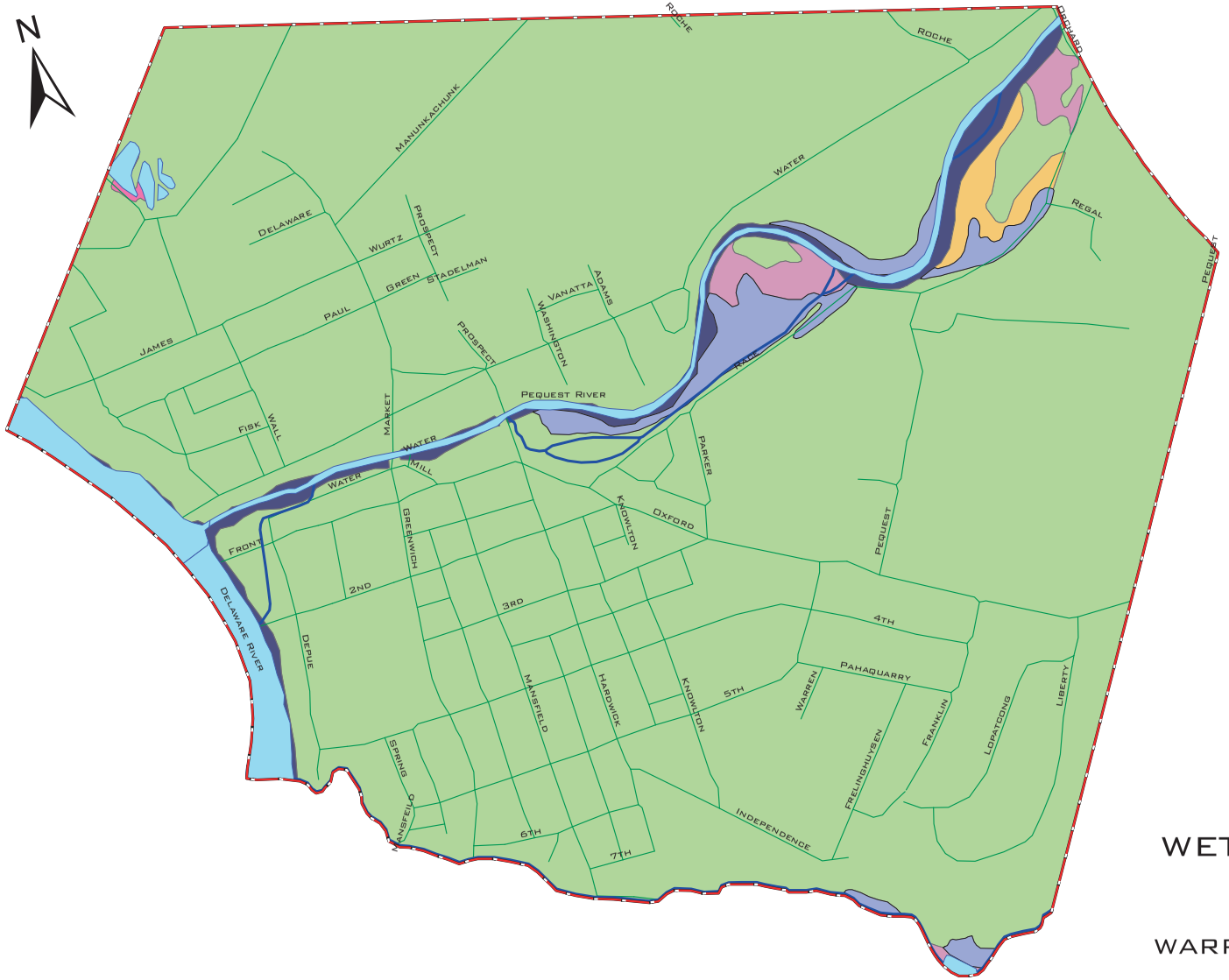


FIGURE 9
WETLANDS AND WATER LAND USES
TOWN OF BELVIDERE
WARREN COUNTY, NEW JERSEY
JANUARY 2005

THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.

MASER CONSULTING P.A.

NJNCAD/BDT-030/WETLANDS & WATER LAND-C9

(Acres) were provided by the Warren County Planning Department. It is important to note that this Build – Out Calculation provides only an estimate for potential additional impervious coverage. A portion of the critical areas has been developed, thus the remaining developable areas may also be somewhat underestimated and the total of Critical Areas (Acres) and Existing Developed Areas (Acres) may exceed the Total Acres of a given zone within a HUC14 location. Under this circumstance, a negative number appears in the Remaining Developable Areas (Acres) column, which leads to the assumption of no additional impervious coverage will result. A more accurate build – out analysis would require consideration of the amount of developed lands within critical areas. In any case, when developing agricultural and forestlands, the build-out of these HUC14s will result in a significant increase in impervious surfaces.

Table 2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table 3.

Table 1: Build – Out Calculations for HUC14s

HUC14 and Zone*	Total Acres*	Existing Impervious (%)*	Existing Impervious (Acres)*	Critical Areas (Acres)*	Existing Developed Areas (Acres)*	Remaining Developable Areas (Acres) 1	Allowable Impervious (%) 2	Build-Out Impervious (Acres) 3
02040105060 - Delawanna Creek (incl UDRV)								
LM	71.871	0.220	15.814	6.134	28.966	36.771	0.350	12.870
R-75	13.122	0.084	1.098	7.265	5.605	0.252	0.250	0.063
Total	84.993		16.912	13.399	34.571			12.933
02040105090 - Pequest R (below Furnace Brook)								
B	33.926	0.590	20.019	19.498	31.972	(17.544)	0.400	0.000
B/LM	11.658	0.362	4.219	9.632	5.594	(3.568)	0.400	0.000
C	9.973	0.144	1.436	7.948	8.113	(6.088)	0.400	0.000
CH	19.213	0.408	7.836	0.000	14.404	4.809	0.250	1.202
LM	122.140	0.044	5.365	36.752	69.073	16.315	0.350	5.710
LM/SC	8.177	0.416	3.402	0.000	6.289	1.888	0.350	0.661
OSR	47.281	0.024	1.149	44.468	5.708	(2.895)	0.000	0.000
R-100	151.983	0.100	15.181	0.111	90.762	61.110	0.200	12.222
R-75	123.087	0.290	35.648	46.631	105.957	(29.501)	0.250	0.000
R/SC	32.200	0.008	0.244	0.627	1.838	29.735	0.150	4.460

RM	3.636	0.425	1.544	0.000	3.445	0.191	0.200	0.038
Totals	563.274		96.043	165.667	343.155			24.294
02040105110010 - Pophandusing Brook								
CH	0.396	0.301	0.119	0.000	0.396	0.000	0.250	0.000
LM	25.278	0.531	13.422	1.478	23.891	(0.091)	0.350	0.000
LM/SC	2.373	0.216	0.512	0.000	1.554	0.819	0.350	0.000
R-100	6.551	0.106	0.696	0.000	2.267	4.284	0.200	0.857
R-75	173.356	0.284	49.257	18.849	155.357	(0.850)	0.250	0.000
Totals	207.954		64.006	20.327	183.465			0.857
Totals				199.393		95.637		38.083
* Information Provided by Warren County Planning Department								
1 Remaining Developable Areas (Acres) = Total Acres - Critical Areas (Acres) - Existing Developed Areas (Acres)								
2 Allowable Impervious (%) is the Maximum Impervious Coverage permitted by the Zoning Ordinance								
3 Build - Out Impervious (Acres) = Remaining Developable Areas (Acres) x Allowable Impervious (%)								

Table 2: Pollutant Loads by Land Cover

Land Cover	Total Phosphorous Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/year)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland / Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004

Table 3: Nonpoint Source Loads at Build – Out for HUC14s

HUC14 and Zone*	Build - Out Zoning	Remaining Developable Areas (Acres)	Total Phosphorous lbs/acre/year	Total Phosphorous lbs/year	Total Nitrogen lbs/acre/year	Total Nitrogen lbs/year	Total Suspended Solids lbs/acre/year	Total Suspended Solids lbs/year
02040105060 - Delawanna Creek (incl UDRV)								
LM	Industrial	36.771	1.5	55	16	588	200	7,354
R-75	High, Medium Density Residential	0.252	1.4	0	15	4	140	35
Total				56		592		7,389
02040105090 - Pequest R (below Furnace Brook)								
B *	Commercial	(17.544)	2.1	0	22	0	200	0
B / LM *	Industrial	(3.568)	1.5	0	16	0	200	0
C *	Commercial	(6.088)	2.1	0	22	0	200	0
CH	Urban, Mixed Urban, Other Urban	4.809	1.0	5	10	48	120	577
LM	Industrial	16.315	1.5	24	16	261	200	3,263
LM/SC	Industrial	1.888	1.5	3	16	30	200	378
OSR *	Barrenland / Transitional Area	(2.895)	0.5	0	5	0	60	0
R-100	High, Medium Density Residential	61.110	1.4	86	15	917	140	8,555
R-75 *	High, Medium Density Residential	(29.501)	1.4	0	15	0	140	0
R/SC	High, Medium Density Residential	29.735	1.4	42	15	446	140	4,163
RM	Low Density, Rural Residential	0.191	0.6	0	5	1	100	19
Totals				159		1,703		16,955

02040105110010 - Pophandusing Brook								
CH	Urban, Mixed Urban, Other Urban	0.000	1.0	0	10	0	120	0
LM *	Industrial	(0.091)	1.5	0	16	0	200	0
LM/SC	Industrial	0.819	1.5	1	16	13	200	164
R-100	High, Medium Density Residential	4.284	1.4	6	15	64	140	600
R-75 *	High, Medium Density Residential	(0.850)	1.4	0	15	0	140	0
Totals				7		77		764
Total Non-Point Source Loads At Build-Out				222		2,372		25,108
* No additional non-point source loads will be attributed to the Remaining Developable Areas (Acres) when a negative acreage appears								

Mitigation Plans

Due to the significance of the Delaware and Pequest Rivers and Pophandusing Creek and its tributaries to the Town from recreation and aesthetic perspectives, its water quality and capacity must be safeguarded from development activities. The safeguarding of the rivers was included as an objective in the Town's Master Plan (adopted in 1979) and all subsequent Reexaminations (1989, 1996 and 2002). Because of the language in the Master Plan, the Town does not believe it is in their interest to vary the design and performance standards in the stormwater rules. Thus, no variances and exemptions from the standards shall be granted. Applicants for development will be expected to mitigate the impacts of development on stormwater at their own site or other sites within the subject watershed that it controls.

It should also be noted that there is little or no land area within the Town at strategic downstream locations and owned by the municipality or other governmental agencies that would even allow for a flood control or water quality enhancement project

if mitigation were to be allowed in the plan by the municipality. The lack of available lands for such purposes can be seen from the USGS map provided in Figure 3. The remaining vacant lands are primarily along the northern and eastern municipal borders, which are upstream from the majority of existing development. Hence, it is more practical for any new development to provide on-site stormwater facilities rather than implementing a municipal system that would disrupt the existing built environment.