MUNICIPAL STORMWATER MANAGEMENT PLAN
MASTER PLAN ELEMENT

BOROUGH OF MATAWAN
MONMOUTH COUNTY, NEW JERSEY

Adopted: March 7, 2005

Amended: April 16, 2007

Memorialized: October 3, 2005

PREPARED FOR

BOROUGH OF MATAWAN PLANNING BOARD

PREPARED BY:

ROBERT W. BUCCO, JR., P.E., C.M.E.
CONSULTING ENGINEER
Licensed Professional Engineer No. GE 38132

STAN SLACHETKA, A.I.C.P, P.P.
ASSISTANT DIVISION MANAGER
Licensed Professional Planner No. LI 03508

TM ASSOCIATES

11 Tindall Road
Middletown, New Jersey 07748
(732) 671-6400

FEBRUARY 2005

The original of this document has been signed and sealed in accordance with N.J.S.A. 45:14A-1 et. seq.
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Ken Cassidy ,Chairman

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Michael A. Irene Jr., Esq., Board Attorney

Bob White, Board Engineer

Joe Layton, Municipal Planner

T&M Associates, Stormwater Management Consultant

Resolution of the Unified Planning & Zoning Board of Adjustment of the Borough of Matawan

AMENDMENT OF MASTER PLAN REGARDING MUNICIPAL STORMWATER MANAGEMENT PLAN ELEMENT

WHEREAS, as required by the Municipal Stormwater Regulations (N.J.A.C. 7:14A-25), the Borough of Matawan has developed a Municipal Stormwater Management Plan ("MSWMP") to set forth the Borough's approach to addressing the impacts resulting from stormwater related issues associated with future development and land use changes;

WHEREAS, the Municipal Stormwater Management Plan, dated February 24, 2005, revised August 15, 2005, has been prepared by T&M Associates and submitted to the Unified Planning & Zoning Board ("Board");

WHEREAS, the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., authorizes the Board to amend the Borough's Master Plan from time to time as may be necessary, appropriate, or otherwise required by applicable law;

WHEREAS, the Board conducted public hearings on March 7, 2005 and September 7, 2005 with regard to this matter, upon due and proper notice as required by law, at which hearing interested parties were afforded an opportunity to comment regarding this matter, and at which hearing the Board considered the referenced Municipal Stormwater Management Plan; and

WHEREAS, at the conclusion of the March 7, 2005 public hearing, the Board voted to adopt the Municipal Stormwater Management Plan, but subsequent thereto, the Board was advised by its professionals that certain technical amendments/revisions were proposed to be made thereto (particularly including revisions/amendments to the "Developer Mitigation Plan Requirements" section of the Plan); and whereas, the Municipal Stormwater Management Plan was thereafter revised by T&M Associates, and presented by Rick Donohoe, P.E. of T&M Associates to the Board for review and comment at the Board's September 7, 2005 public hearing, and at the conclusion of said public hearing, the Board voted to adopt the Municipal Stormwater Management Plan as revised and to amend the Borough's Master Plan by incorporating therein the Municipal Stormwater Management Plan so adopted as a Master Plan Element;

NOW THEREFORE BE IT RESOLVED by the Unified Planning & Zoning Board of Adjustment of the Borough of Matawan, that it makes the following findings and conclusions with regard to this matter:

1. The Municipal Stormwater Management Plan ("MSWMP") addresses groundwater recharge, stormwater quantity, and stormwater quality impacts through the incorporation of stormwater design and performance standards for new development and redevelopment projects that disturb one or more acres of land or increase the impervious cover by more than one-quarter acre. The standards are intended to minimize negative or adverse impacts of stormwater runoff

such as decreased water quality, increased water quantity and reduction of groundwater recharge that provides base flow to receiving bodies of water. In addition to minimizing these impacts, the Borough's MSWMP provides long term operation and maintenance measures for existing and proposed stormwater management facilities.

2. The MSWMP provides recommendations for ordinance modifications in order to expedite the implementation of stormwater management strategies. The MSWMP also includes mitigation strategies to permit the Borough to grant variances or exemptions from proposed design and performance standards set forth by the Municipal Stormwater Regulations (N.J.A.C. 7:8-5.5).

3. The goals and objectives of the MSWMP are to:

(a) Reduce flood damage, including damage to life and property;

(b) Minimize, to the extent practical, any increase in stormwater runoff from any new development;

(c) Reduce soil erosion from any development or construction project;

(d) Encourage the adequacy of existing and proposed culverts and bridges, and other in-stream structures;

(e) Maintain groundwater recharge;

(f) Prevent, to the greatest extent feasible, an increase in nonpoint pollution;

(g) Maintain the integrity of stream channels for their biological function, as well as for drainage;

(h) 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;

(i) Protect public safety through the proper design and operation of stormwater basins;

(j) Increase public awareness of stormwater management through public education.

4. The MSWMP interfaces with a number of the goals of the Borough's Master Plan, including, the goals and objectives to: (a) achieve a realistic approach for maintaining the existing residential and commercial character of the Borough, while providing for quality development of the few remaining tracts within the Borough; (b) preserve environmentally sensitive lands such as flood plain areas and along Matawan Creek and to protect established and future development from the negative effects of flooding, erosion, and lack of conservation; and

(c) insure the harmonious inter-relationships of the various land use activities throughout the Borough and with neighboring municipalities.

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

6. The MSWMP as revised August 15, 2005 incorporates therein certain technical revisions/amendments (particularly including revisions/amendments to the "Developer Mitigation Plan Requirements" section of the Plan) as recommended by the Board's professional consultants.

NOW THEREFORE BE IT FURTHER RESOLVED by the Unified Planning & Zoning Board of Adjustment of the Borough of Matawan, that it adopts the above-referenced Municipal Stormwater Management Plan as revised and hereby amends the Borough's Master Plan by incorporating therein the Municipal Stormwater Management Plan as revised as a Master Plan Element.

ROLL CALL VOTE

The above resolution was moved by Esther Rinear, seconded by Robert Montfort, and on a roll call, the following vote was recorded:

THOSE IN FAVOR: Councilman Buccellato, J. DeYoung, J. Duffy, E. Rinear R. Montfort, Kevin Dolan, T. Fitzsimmons.

THOSE OPPOSED:

THOSE ABSTAINING: K. Cassidy, Jos. Roselli

THOSE ABSENT: Kevin Groody

CERTIFICATION

The undersigned Recording Secretary of the Unified Planning & Zoning Board of Adjustment of the Borough of Matawan, do hereby certify that the foregoing is a true copy of a Resolution duly adopted by the Board at its meeting held on October 3, 2005.

DATED:

Pamela J. Pennipleder
Recording, Secretary

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INTRODUCTION

As required by the Municipal Stormwater Regulations (N.J.A.C. 7:14A-25), the Borough of Matawan has developed this Municipal Stormwater Management Plan (MSWMP) to outline its approach for addressing the impacts resulting from stormwater related issues associated with future development and land use changes. The MSWMP addresses groundwater recharge, stormwater quantity, and stormwater quality impacts through the incorporation of stormwater design and performance standards for new development and redevelopment projects that disturb one or more acres of land. The standards are intended to minimize negative or adverse impacts of stormwater runoff such as decreased water quality, increased water quantity and reduction of groundwater recharge that provides base flow to receiving bodies of water. In addition to minimizing these impacts, the Borough MSWMP provides long term operation and maintenance measures for existing and proposed stormwater management facilities.

The MSWMP provides recommendations for ordinance modifications in order to expedite the implementation of stormwater management strategies. The MSWMP also includes mitigation strategies to permit the Borough to grant variances or exemptions from proposed design and performance standards set forth by the Municipal Stormwater Regulations (N.J.A.C. 7:8-5.5).

It should also be noted that though this MSWMP is specific to addressing stormwater related impacts within the Borough, contributions of stormwater runoff are not limited by municipal boundaries rather stormwater contributions are limited by the topography of the watershed.

GOALS AND OBJECTIVES

The goals of this MSWMP are to:

1. Reduce flood damage, including damage to life and property;
2. Minimize, to the extent practical, any increase in stormwater runoff from any new development;
3. Reduce soil erosion from any development or construction project;
4. Encourage the adequacy of existing and proposed culverts and bridges, and other in-

stream structures;

5. Maintain groundwater recharge;
6. Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
7. Maintain the integrity of stream channels for their biological function, as well as for drainage;
8. 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;
9. Protect public safety through the proper design and operation of stormwater basins.
10. Increase public awareness of stormwater management through public education.

Within the Borough's *Master Plan*, the following two goals were described:

11. To achieve a realistic approach for maintaining the existing residential and commercial character, while providing for quality development of the few remaining tracts within the Borough.
12. To preserve environmentally sensitive lands such as flood plain areas and along Matawan Creek and protect established and future development from the negative effects of flooding, erosion, and lack of conservation.
13. To insure the harmonious inter-relationships of the various land use activities throughout the Borough and with neighboring municipalities.

To achieve these goals, the MSWMP outlines specific stormwater design and performance standards for new development and proposes stormwater management controls for addressing impacts from existing developments. Preventive and corrective maintenance strategies are also included to ensure the long-term effectiveness of stormwater management facilities and the MSWMP outlines safety standards for stormwater infrastructure to be implemented to protect public safety. In addition to the MSWMP, the Borough has established a stormwater management program through the implementation of it Stormwater Pollution Prevention Plan

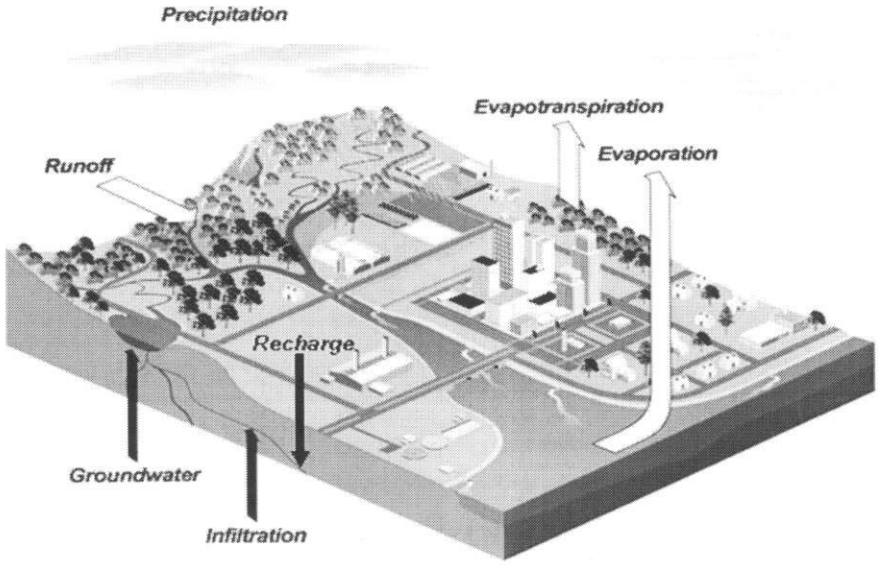
(SPPP). This document incorporates existing and new programs to improve stormwater management, promote public education, maximize solids and floatables control, and maintain stormwater facility maintenance. The SPPP and stormwater management programs will allow the Borough to address stormwater management from existing development.

STORMWATER DISCUSSION

HYDROLOGIC CYCLE

The hydrologic cycle, or water cycle (Figure 1), is the continuous circulation of water between the ocean, atmosphere, and land. The driving force of this natural cycle is the sun. Water, stored in oceans, depressions, streams, rivers, waterbodies, vegetation and even land surface, continuously evaporates due to solar energy. This water vapor then condenses in the atmosphere to form clouds and fog. After water condenses, it precipitates, usually in the form of rain or snow, onto land surfaces and waterbodies. Precipitation falling on land surfaces is often intercepted by vegetation. Plants and trees transpire water vapor back into the atmosphere, as well as aid in the infiltration of water into the soil. The vaporization of water through transpiration and evaporation is called evapo-transpiration. Infiltrated water percolates through the soil as groundwater, while surface water flows overland. Groundwater and surface water flow to major waterbodies and eventually flows to the Earth's seas and oceans. This constant process of evapo-transpiration, condensation, precipitation, and infiltration comprises the hydrologic cycle.

Figure 1: The Hydrologic Cycle



Source: http://www.creativille.org/kernriver/watershed.htm

IMPACTS OF STORMWATER

Prior to any land development, native vegetation often intercepts precipitation directly or absorbs infiltrated runoff into their roots. Development often replaces native vegetation with lawns or impervious cover, such as pavement or structures, thereby reducing the amount of evapo-transpiration and infiltration. Regrading and clearing of lots disturbs the natural topography of rises and depressions that can naturally capture rainwater and allow for infiltration and evaporation. Construction activities often compact soil, thereby decreasing its permeability or ability to infiltrate stormwater. Development activities also generally increase the volume of stormwater runoff from a given site.

Connected impervious surfaces and storm sewers (such as roof gutters emptying into paved parking lots that drain into a storm sewer) allow the runoff to be transported downstream more rapidly than natural areas. This shortens travel time and increases the rainfall- runoff response of the drainage area, causing downstream waterways to peak higher and quicker than natural areas, a situation that can cause or exacerbate downstream flooding, erosion, and sedimentation in stream channels. Furthermore, connected impervious surfaces do not allow pollutants to be filtered, or for infiltration and ground water recharge to occur prior to reaching the receiving waters. Increase volume combined with reduced base flows, results in a greater fluctuation between normal and storm flows allowing for greater channel erosion. Additionally, reduced base flows, increased fluctuation, and soil erosion can affect the downstream hydrology of the watershed, impacting the ecological integrity of the watershed.

Water quantity impacts combined with land development often adversely impact stormwater quality. Impervious surfaces collect pollutants from the atmosphere, animal wastes, fertilizers and pesticides, as well as pollutants from motor vehicle usage. Pollutants such as hydrocarbons, metals, suspended solids, pathogens, and organic and nitrogen containing compounds, collect and concentrate on impervious surfaces. During storm events, these pollutants are washed directly into municipal storm sewer systems. In addition to chemical and biological pollution, thermal pollution can occur from water collected or stored on impervious surfaces or in heated stormwater impoundments by the sun. Thermal pollution can affect aquatic habitats, adversely

impacting cold water fish. Removal of shade trees and stabilizing vegetation from stream banks also contributes to thermal pollution.

Historically, as towns and cities develop from rural agricultural communities, the landscape is altered in dramatic ways. Both residential and nonresidential development on former agricultural fields and pastures can have a great impact on the hydrologic cycle for the specific site. Localized impacts to the hydrologic cycle will ultimately impact the hydrologic cycle of the entire watershed encompassing that development site.

Proper stormwater management will help mitigate the negative impact of land development and its effects on stormwater. This MSWMP outlines the Borough's plan to improve stormwater quality, decrease stormwater quantity, and increase groundwater recharge. By managing stormwater, the Borough will improve the quality of aquatic ecosystems and restore some of the natural balance to the environment.

BACKGROUND

The Borough of Matawan encompasses 2.4 square miles of Monmouth County, New Jersey. Included in that 2.4 square miles are 0.12 square miles of water area and 2.28 square miles of land area (*2000 U.S. Census*). The Borough is primarily single-family residential with some areas of commercial development. The Borough is bounded to the north, east, and south by Aberdeen Township and to the south by Marlboro Township. To the west, the Borough is bounded by Old Bridge Township in Middlesex County. Figure 2 delineates the Borough's boundary on United States Geological Survey (USGS) quadrangle maps.

DEMOGRAPHICS AND LAND USE

The population of Matawan has fluctuated minimally in the past 30 years, from 9,136 in 1970 to 8,910 people in the year 2000 (See Table 1 - Population Trends). With these population changes, came a slow increase of development from 2,882 housing units in 1970 to 3,640 housing units in 2000. While a slow increase in housing has occurred over the long term, the number of housing units actually decreased between 1990 and 2000. This indicates a possible decrease in impervious coverage in recent years. According to the January 2003 *Borough of Matawan Housing Element and Land Use Plan 2003*, Monmouth County does not project much growth for the Borough's population. The 2010 population projection is 9,300.

Table 1 : Population Trends

	Matawan		Monmouth County		New Jersey	
Year	Population	% Change	Population	% Change	Population	% Change
1970	9,136	--	461,849	--	6,066,782	--
1980	8,837	- 3.3	503, 173	8.9	7,364,823	18.2
1990	9,270	4.7	553,124	9.9	7,730,188	5.0
2000	8,910	- 3.9	615,301	11.2	8,414,350	8.9
2010	9,300	4.4				

Source: 1990, 2000 US Census, Re-examination Report: Housing and Land Use Elements of Matawan Master Plan

Figure 2: Topographic Map
Borough of Matawan
Monmouth County, New Jersey

N

0 2000 4000

Source: U.S.G.S. Keyport (1970) and South Amboy (1981), NJ Quadrangle Maps

Table 2: General Housing Characteristics

	1990		2000		Change
	Number	Percent	Number	Percent	Number
OCCUPANCY STATUS					
Total Housing Units	3,730	100	3,640	100	-90
Occupied Housing Units	3,523	94.5	3,531	97.0	-199
Vacant Housing Units	207	5.5	109	3.0	- 98
Tenure					
Occupied Housing Units	3,730	100	3,531	100	-199
Owner- Occupied Housing Units	2,117	60.0	2,067	58.5	-50
Renter- Occupied Housing Units	1,406	40.0	1,464	41.5	60
Vacancy Status					
Vacant Housing Units	207	100	109	100	- 98
Population	9,270	100	8,910	100	- 360
Households	3,523	100	3,531	100	8
Family Household	2,513	71.3	2,375	66.7	- 138
1 Person Household	782	22.2	904	25.6	122
Persons/ Household	2.6		2.52		- 0.08

Source: 1990, 2000 US Census

Matawan has approximately 194 acres of vacant land (*2003 Vacant Land Inventory*) of which approximately 71 acres are developable and not environmentally constrained. Environmentally constrained lands are those where development is limited or denied based on environmental factors and may include lands located in freshwater wetlands, within the 100 year flood hazard area, open water, steep slopes, and other lands deemed constrained. The remaining 71 acres mostly consist of easements, parks, open space, County owned lands or lots too small for 5 or more housing units. The majority of these lands appear to be zoned either residential or commercial. According to the most recent *Re-examination Report: Housing and Land Use*

Elements of Matawan Master Plan, the Borough has concluded that there is very little of this developable land left.

Figure 3 illustrates the Borough zoning map. As shown on this map, commercial areas are located along portions of State Route 34, Freneau Avenue (Route 79) and Main Street. Additionally, the Borough has designated approximately 44 acres near the Matawan train station as a Redevelopment Zone. This area will be redeveloped in the future for mixed uses, including residential, office, commercial, and hotel development.

Existing land use is shown on Figure 4 and environmentally constrained lands are shown in Figure 5.

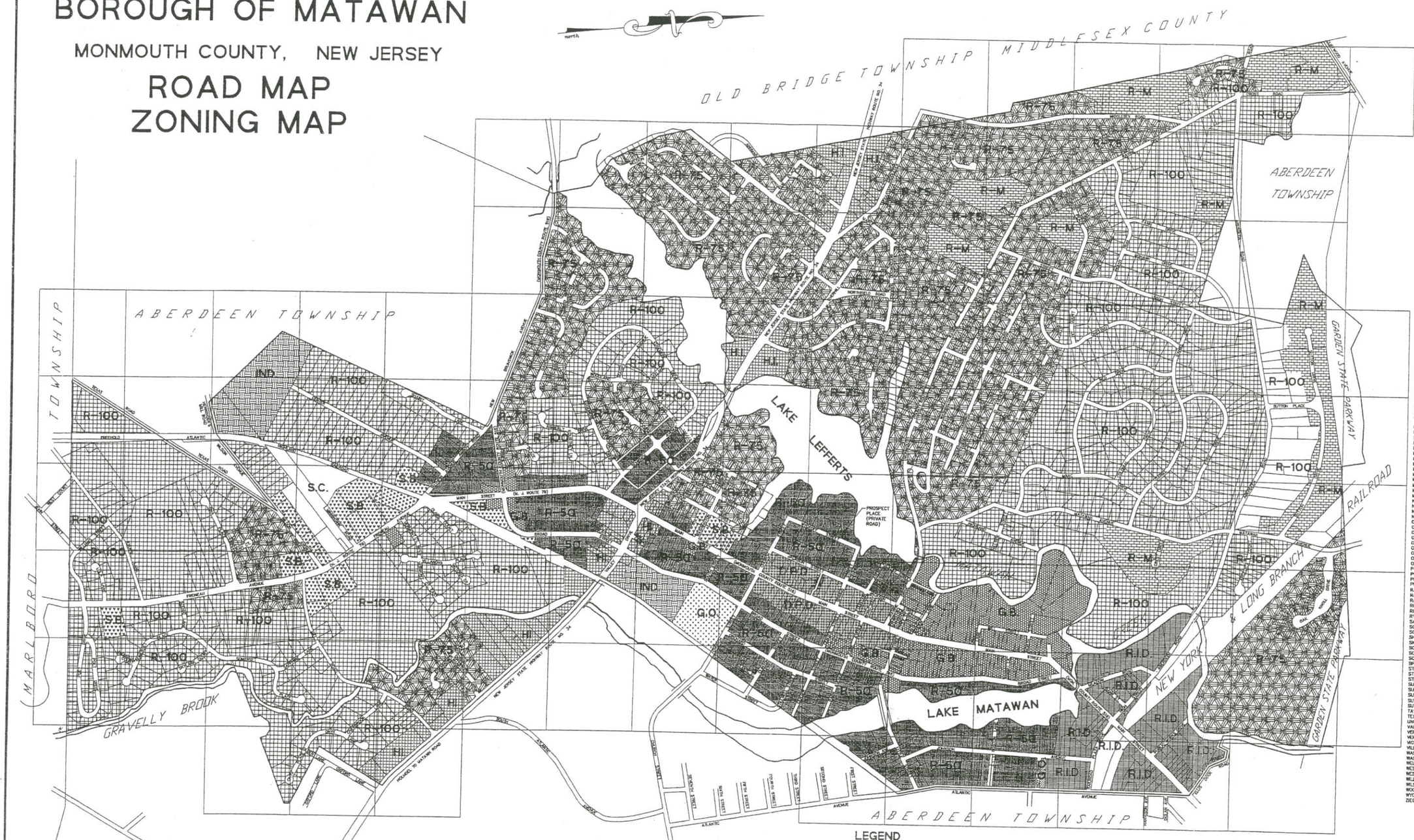
EXISTING NATURAL RESOURCE MEASURES

The Borough has areas of delineated wetlands within its borders. Conservation easements have been placed over these wetland areas, along with other environmental critical areas. These easements restrict property development for easement covered areas. In addition, the Borough has adopted an ordinance to prohibit construction or disturbance upon lands with slope of 15% grades or steeper. This ordinance also preserves other natural features including trees, topsoil, elevations and grading, and natural drainage ways.

BOROUGH OF MATAWAN

MONMOUTH COUNTY, NEW JERSEY

ROAD MAP
ZONING MAP



STREET LISTING

ABERDEEN ROAD
ANGELICA COURT
ANNMAR DRIVE
ARROWSMITH ALLEY
ATLANTIC AVENUE
ATLANTIC STREET
BANK STREET
BEECHWOOD TERRACE
BELLEVUE LANE
BOSTON LANE
BROAD STREET (MON. CO. RT. 516)
CARTAN LANE
CEDAR STREET
CENTER AVENUE
CENTER ALLEY
CENTER STREET
CHESTNUT DRIVE
CHURCH STREET
CHRISTINE COURT
CLAIR COURT
CLIFFWOOD AVENUE
CLINTON STREET
COLONIAL DRIVE
CRESENT PLACE
CREST CIRCLE
CRESTWOOD ROAD
CROSS ROAD (MON. CO. ROUTE J)
CROWN PLACE
DANEMAR DRIVE
DANIEL DRIVE
DOCK STREET
DUNLAP STREET
EDGEMORE DRIVE
EDGEWATER DRIVE
EISENHOWER COURT
ELIZABETH DRIVE
ELM PLACE
ESSIE DRIVE
FAWN DRIVE
FIERRO AVENUE
FOREST AVENUE
FOUNTAIN AVENUE
FRANKLIN STREET
FREEHOLD PLACE
FRENEAU AVENUE
GARDEN STATE PARKWAY
GRANT STREET
HARDING BOULEVARD
HENNINGERS MILL ROAD
HIGH STREET
HOLMDEL TO MATAWAN RD. (N.J. HWY. 34)
HOYT STREET
INDIAN TRAIL
IVY COURT
JACKSON STREET
JOHN STREET
JOHNSON AVENUE
KIMBERLY DRIVE
KOURTNEY DRIVE
LAKELAND
LAKESIDE DRIVE
LIBERTY STREET
LITTLE STREET
LOLA LANE
MacARTHUR DRIVE
MAGNOLIA COURT
MAIDEN LANE
MAIN STREET (N.J. RT. 79, MON. CO. RT. 516)
MAPLE AVENUE
MARC DRIVE
MATAWAN AVENUE
MATAWAN GREEN LANE
MEADOW ROAD
MIDDLESEX ROAD
MILL STREET
MILL ROAD
MINNISINK DRIVE
MIRIAM DRIVE
MIRIAM PLACE
MOHAWK DRIVE
MONROE STREET
MORRISTOWN ROAD
NED DRIVE
NEW BRUNSWICK AVENUE (MON. CO. RT. 516)
NORTH STREET
NORTHFIELD ROAD
OAK LANE
OAK STREET
OAK KNOLL DRIVE
OAKLAND STREET
OLDEN LANE
ONYX PLACE
ORCHARD STREET
OVERBROOK LANE
OVERHILL ROAD
PARK AVENUE
POET DRIVE
PROSPECT PLACE (PRIVATE ROAD)
PUBLIC WORKS DRIVE
RABBIT LANE
RAILROAD PLAZA DRIVE
RAVINE DRIVE (MON. CO. RT. 3)
ROBERT STREET
RUSTIC LANE
RYERS LANE
SAPPHIRE LANE
SCENIC LANE
SCHENCK AVENUE
SHANEY LANE
SKYLARK COURT
SOMERSET PLACE
SONIA AVENUE
SOUTH STREET
SPRING STREET
STATE HIGHWAY 34
STATE HIGHWAY 79
STILLWELL STREET
SUMMIT STREET
SUNSET AVENUE
SUPPAH AVENUE
SUTTON DRIVE
SUTTON PLACE
TAYLOR ROAD
TEXAS ROAD
UNION STREET
VALLEY DRIVE (N.J. HWY. 34)
VERMONT COURT EAST
VERMONT COURT WEST
VICTORIA COURT
VILLANOVA PLACE
WASHINGTON AVENUE
WASHINGTON STREET
WELDON ROAD
WEST COURT
WESTERLY PLACE
WILLIAM STREET
WILSON AVENUE
WOODLAND AVENUE
WYCKOFF STREET
ZIEGLER PLACE

LEGEND

- C.B. GENERAL BUSINESS
- R-M RESIDENTIAL GARDEN APARTMENTS
- R-100 RESIDENTIAL ONE FAMILY DWELLING
- H.I. HIGHWAY IMPROVEMENT
- G.O. GENERAL OFFICE
- R-75 RESIDENTIAL ONE FAMILY DWELLING
- S.C. SENIOR CITIZENS
- IND. INDUSTRY
- S.B. SPECIAL BUSINESS
- R-50 RESIDENTIAL ONE FAMILY DWELLING
- D.P.D. DOWNTOWN PRESERVATION DISTRICT
- R.I.D. RAILROAD IMPROVEMENT DISTRICT

GRAPHIC SCALE

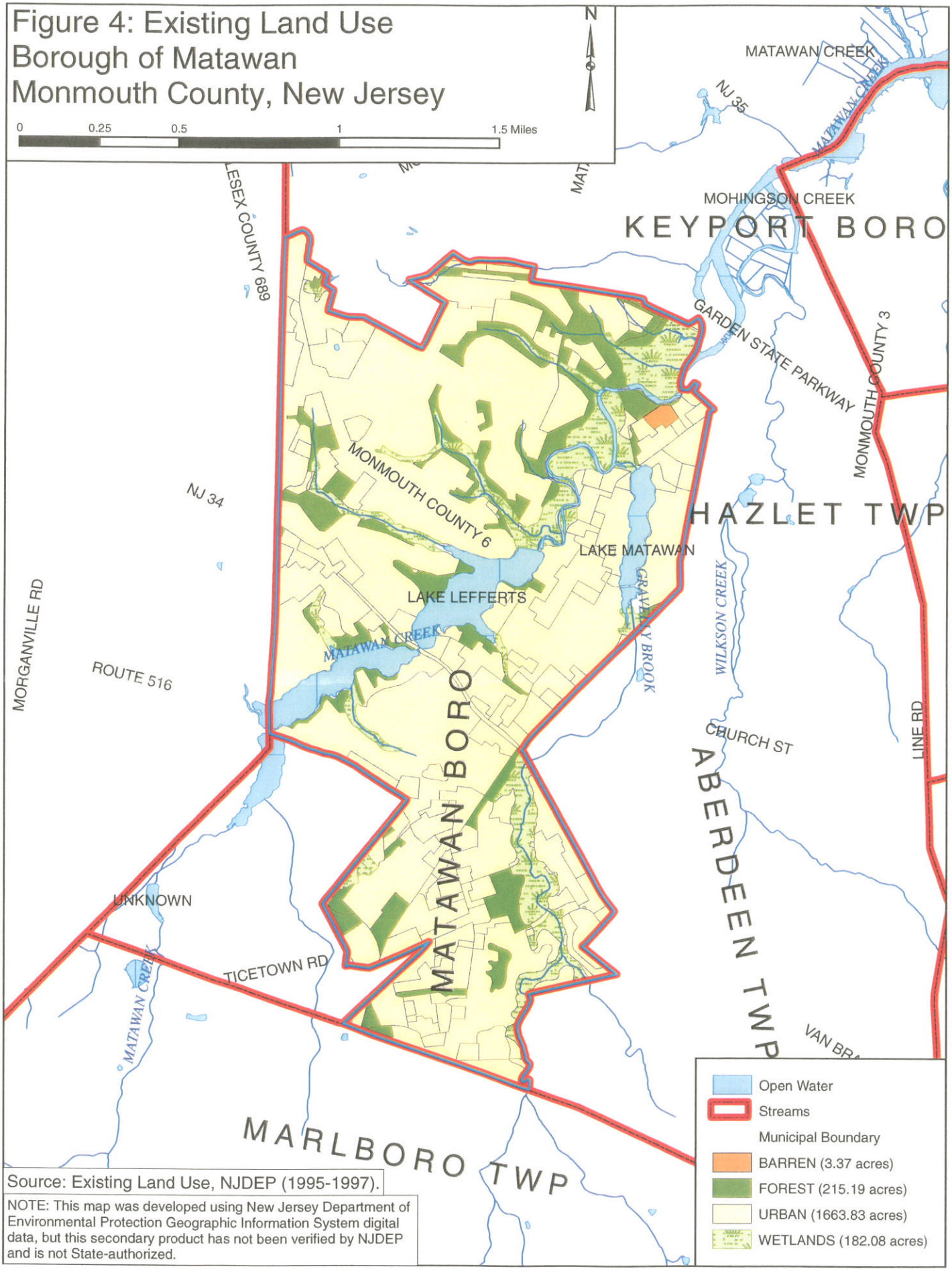
500 0 250 500 1000 2000

(IN FEET)
1 INCH = 500 FT.

PREPARED BY:
SCHOOR & DePALMA, INC.
Engineers and Design Professionals
908/577-9000
Justin Corporate Center
200 State Highway Nine, P.O. Box 1149, Manalapan, NJ 07726

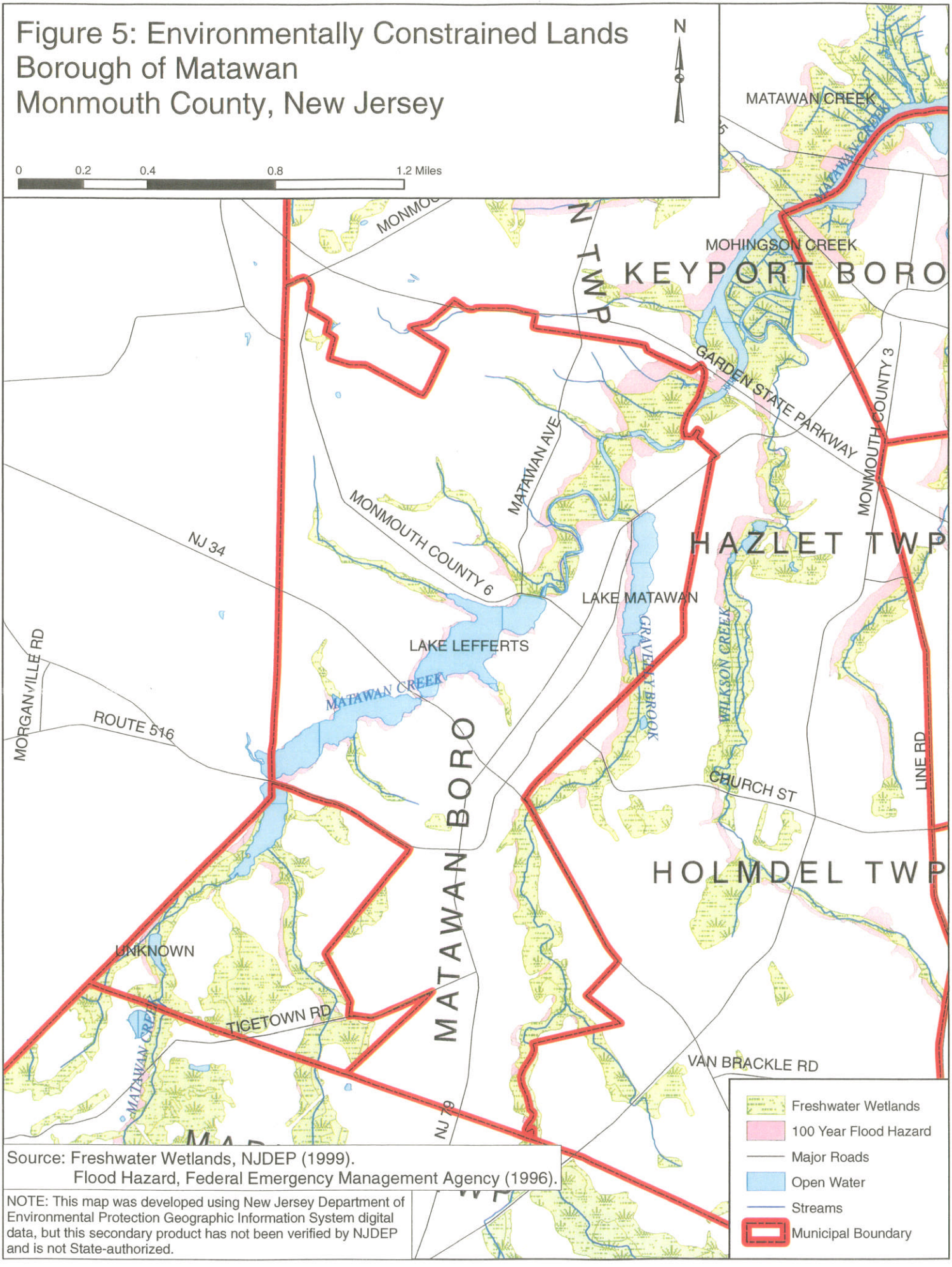
ROBERT W. BUCCO JR., N.J.P.E. LIC. NO. 38132
BOROUGH ENGINEER

Figure 3



Source: Existing Land Use, NJDEP (1995-1997).

NOTE: 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.



Source: Freshwater Wetlands, NJDEP (1999).
Flood Hazard, Federal Emergency Management Agency (1996).

NOTE: 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.

WATERWAYS

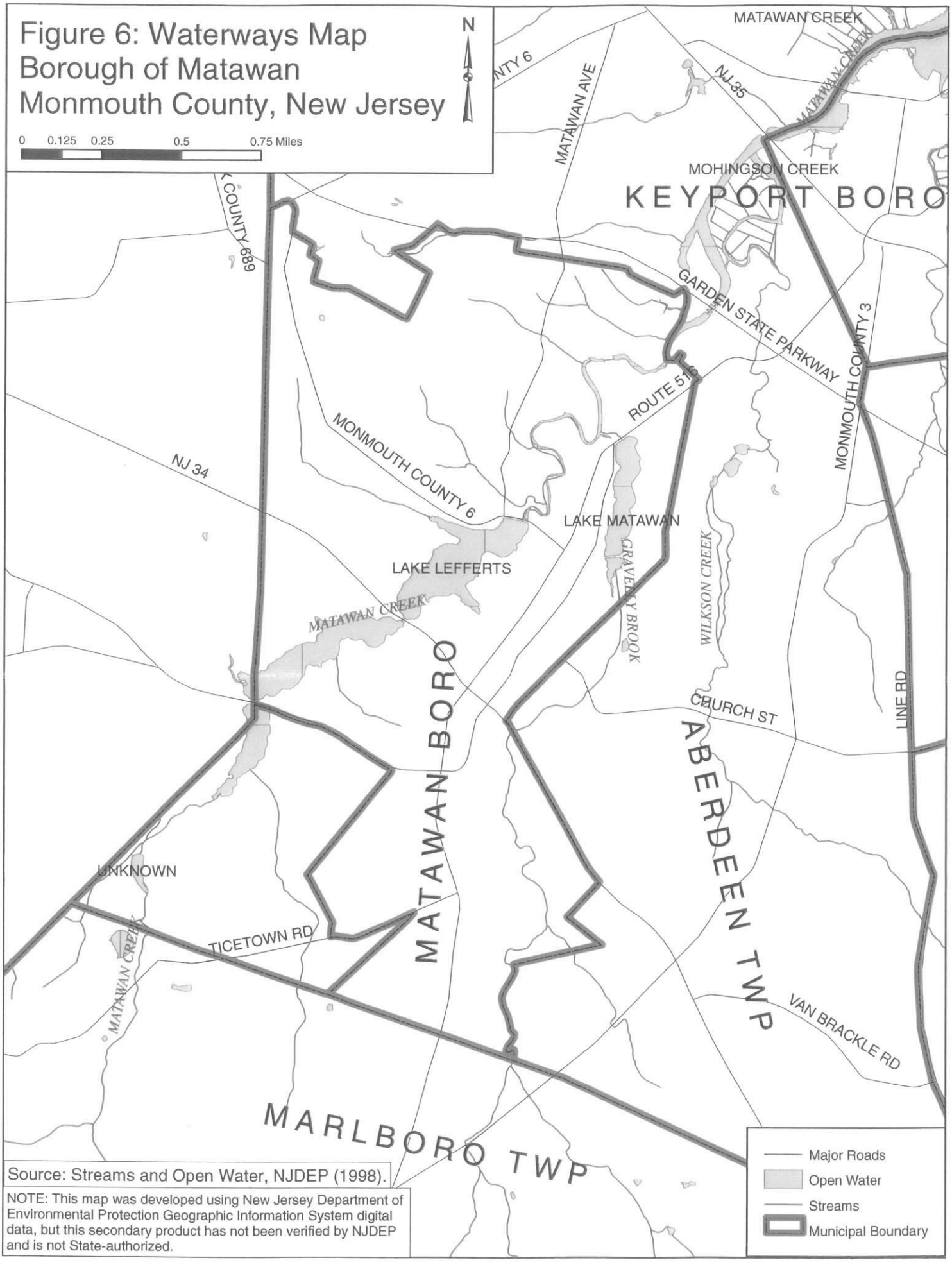
The Borough is located in Watershed Management Area 12, within the Bayshore watershed. The Borough's waterways include Lake Lefferts, Matawan Creek, Lake Matawan, Gravelly Brook, and their associated tributaries and wetlands. This watershed area drains to Raritan Bay, therefore is considered an FW2-NT/SE1 waterway. Figure 6 illustrates the waterways of the Borough. Lake Lefferts, located approximately in the middle of the Borough is fed by Matawan Creek flowing from Marlboro Township. The Gravelly Brook feeds Lake Matawan located south and east of Lake Lefferts. The Gravelly Brook also flows from Marlboro Township, then through sections of both Aberdeen Township and the Borough. Both lakes feed Matawan Creek to the north along with several other unnamed tributaries. Tests in the late 1970's indicated that the water quality for Lake Lefferts was designated as water quality Class IV.

The Borough is also located within the Matawan Creek (Below Ravine Drive) and the Matawan Creek (Above Ravine Drive) HUC-14 subwatersheds. A HUC-14 subwatershed is a hydrologic unit code which NJDEP and USGS use to map small subwatersheds. HUC-14s are usually about 3,000 acres in size, according to the NJDEP. Figure 7, delineates the Borough's HUC-14 subwatersheds.

WATER QUALITY

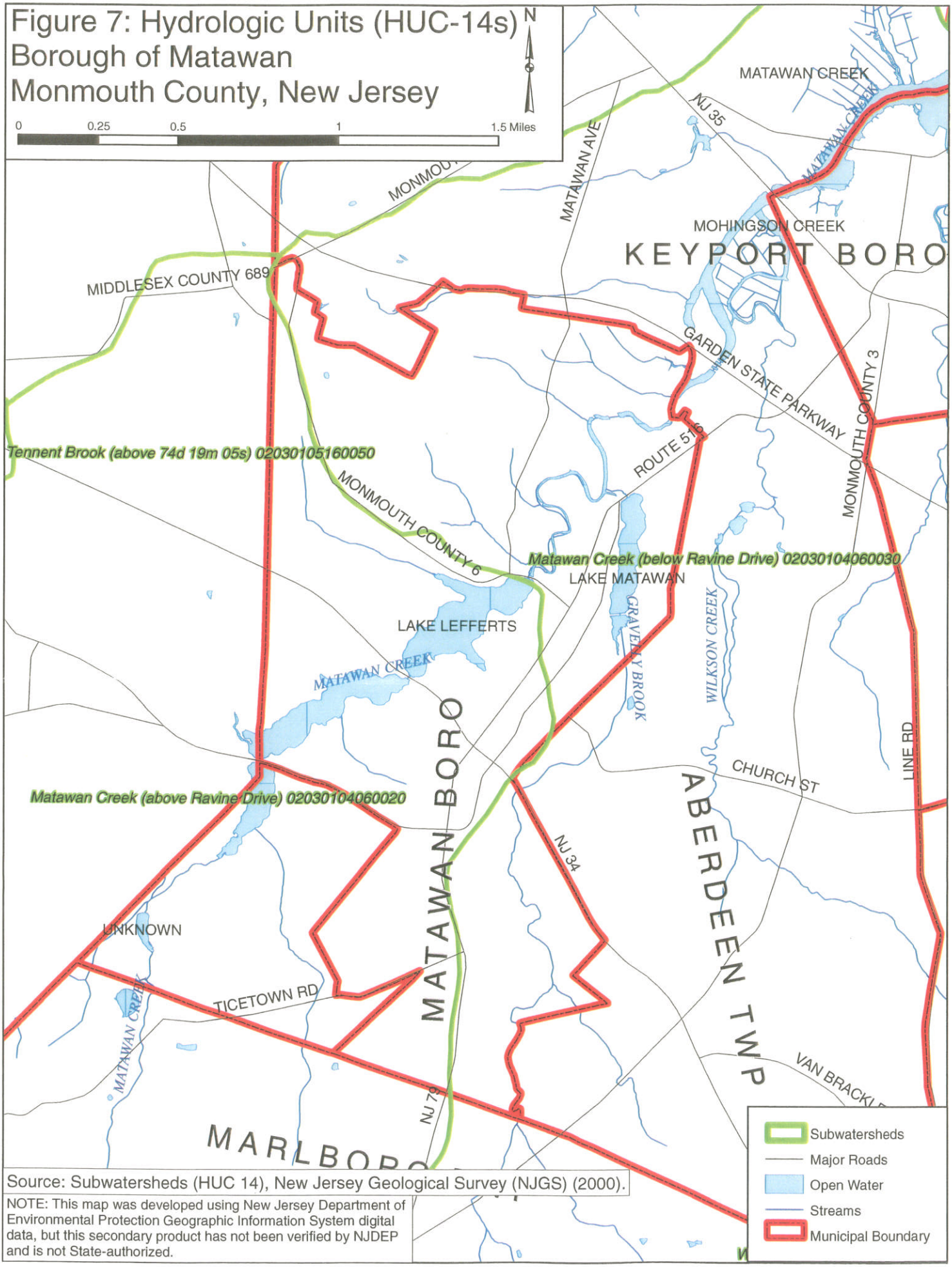
The Ambient Biomonitoring Network (AMNET) was established by the New Jersey Department of Environmental Protection (NJDEP) to monitor and document the health of New Jersey's waterways. AMNET currently has 820 sites in five drainage basins that it monitors for benthic macroinvertebrates on a five-year cycle. Waterways are scored based on the data to generate the New Jersey Impairment Score (NJIS) and then categorized as severely impaired, moderately impaired, and non-impaired. The NJIS is based on biometrics and benthic macroinvertebrate health. (http://www.state.nj.us/dep/wmm/bfbm/)

The Matawan Creek at Morganville Road in Old Bridge Township is listed as moderately impaired (AMNET AN0457), while the Gravelly Brook at Church Road in Aberdeen (AN0457) is listed as severely impaired. Neither site is directly in Matawan, though the waterways flow



Source: Streams and Open Water, NJDEP (1998).

NOTE: 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.



Source: Subwatersheds (HUC 14), New Jersey Geological Survey (NJGS) (2000).

NOTE: 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.

through the Borough. (http://www.state.nj.us/dep/wmm/bfbm/downloads.html#atl)

Category One (C1) waters, as defined by the NJDEP, are also areas with special levels of protection. Waterways can be designated C1 because of exceptional significance for ecological, water supply, recreational, shellfish or fisheries resources. There are no C1 waterways within the Borough; however, sections of the Gravelly Brook outside of the Borough boundary are listed. (http://www.nj.gov/dep/cleanwater/c1_waters_list.pdf)

In addition to biological health, chemical data are gathered by the NJDEP and other organizations, and used to determine the health of waterways. The data are then used to determine which waters require the development of Total Maximum Daily Loads (TMDLs). A TMDL is the carrying capacity of a waterbody for a given pollutant. This is the quantity of pollutants that can enter a waterbody without exceeding water quality standards or interfering with the ability to use the waterbody for its designated usage. Point and non-point source pollution, surface water withdrawals and natural background levels are included in the determination of a TMDL, as required by section 303(d) of the Clean Water Act. Point source pollution includes, but is not limited to New Jersey Pollutant Discharge Elimination System (NJPDES) permitted discharges, while non-point source pollution may include stormwater runoff from agricultural lands or impervious surfaces. TMDLs determine the allowable load from each source, with a factor of safety, of the pollutant entering the waterbody. TMDLs can be used to limit further deterioration of a waterbody, or to improve the current water quality. The following waterbodies are listed on the NJDEP's 2004 Integrated List of Waterbodies (Table 3). The sublist ranking indicates the quality of a given waterbody. Waterbodies on Sublist 1 have the highest or best water quality, and those on Sublist 5 have the lowest or worst quality water.

Table 3: 2004 Borough of Matawan - Integrated List of Water Bodies

Sublist	Station Name/Waterbody	Site ID	Parameters	Data Source
3	Lefferts Lake-12	66, Lefferts Lake	pH, Total Suspended Solids	Monmouth Co HD, NJDEP Freshwater Fisheries
1	Lefferts Lake-12	66, Lefferts Lake	Nitrate, Fecal Coliform	Monmouth Co HD, NJDEP Freshwater Fisheries
5	Lefferts Lake-12	66, Lefferts Lake	Phosphorus, Fish Community	Monmouth Co HD, NJDEP Freshwater Fisheries
1	Lake Matawan-12	65	Phosphorus, Fecal Coliform	Monmouth Co HD
5	Gravelly Brook at Church St in Aberdeen	AN0457	Benthic Macroinvertebrates	NJDEP AMNET
5	Gravelly Brook at Lloyd Rd in Marlboro	20	Phosphorus	Monmouth Co HD
1	Gravelly Brook at Lloyd Rd in Marlboro	20	Fecal Coliform, Nitrate	Monmouth Co HD
3	Gravelly Brook at Lloyd Rd in Marlboro	20	pH, Total Suspended Solids	Monmouth Co HD

Source: New Jersey's 2004 Integrated List of Waterbodies. http://www.state.nj.us/dep/wmm/sgwqt/wat/index.html

An implementation plan should be developed to identify how various sources of pollution will be reduced to the levels specified in any issued TMDL. Some of the strategies that may be implemented include stormwater treatment, implementation of updated ordinances, restriction of impervious surfaces, retrofitting stormwater systems, disconnection of impervious surfaces, and other use of other BMPs. However, according to the Division of Watershed Management of the NJDEP, there is no stormwater specific TMDLs for the waterways in the Borough of Matawan, and as such are not governed under this MSWMP.

Both lakes are also classified as Environmentally Sensitive. This classification means the Borough should control new development to maintain the integrity and capacity of these natural resources through planning, intensity of development, and design.

Both Lake Matawan and Lake Lefferts also appear to have sedimentation issues. In addition to state monitoring, the Monmouth County Health Department also monitors the health of these waterways, as well as other waterways that are in or flow through the Borough. Lake Lefferts

and Lake Matawan, as well as Gravelly Brook in Marlboro, and the Matawan Creek in Aberdeen are monitored for fecal coliform, ammonia, phosphorous, pH, Total Suspended Solids (TSS) and Turbidity approximately four times per year. Both lakes have acidic waters averaging a pH of 3.87 for Lake Matawan, and a pH of 4.2 for Lake Lefferts. According to the Monmouth County Health Department, Lake Matawan and Gravelly Brook are acidic because the source is spring fed through iron containing, acidic soils. Both waterbodies are habitats for a green filamentous alga, which gives the water a greenish color. Both lakes have a widely varying turbidity and a TSS of between 1 mg/L and 23mg/L.

It should also be noted that the Imperial Oil Co. site, which is located in the Township of Marlboro, contained a hazardous waste with organic compounds, metals and PCBs that in the past affected Lake Lefferts. This site is currently listed on the "Known Contaminated Sites" list. According to the New Jersey Health Department, and the December 2003 USEPA Site Fact Sheet, site clean-up is progressing. Several "immediate actions" were taken including fencing and contamination removal. The long term clean-up process is currently ongoing. Per the Environmental Protection Agency's (EPA) five year review of the site, the completion of the on-site and off-site clean-up work will prevent the recontamination of the adjacent areas.

WATER QUANTITY

There are some flooding issues within the Borough. One notable location is Aberdeen Road along the Matawan Creek. This road floods frequently during storms. Flooding is exacerbated during extremely high tides, as there is some tidal influence in this area. Matawan Avenue at Ravine Drive will occasionally flood during very large storm events, approximately every 10 years. The Borough will continue to evaluate its flooding issues within its boundaries. These locations are depicted in Figure 8.

GROUNDWATER RECHARGE

The Borough's drinking water is purchased from New Jersey American Water. In times of high demand, the Borough will also draw from two Borough owned wells. In addition, past studies evaluated the use of Lake Lefferts and Lake Matawan as potable water sources, however, to date;

LEGEND

FLOOD PRONE AREA

BOROUGH OF MATAWAN

TM ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

BOROUGH OF MATAWAN FLOOD AREAS MAP

FIGURE NO. 8

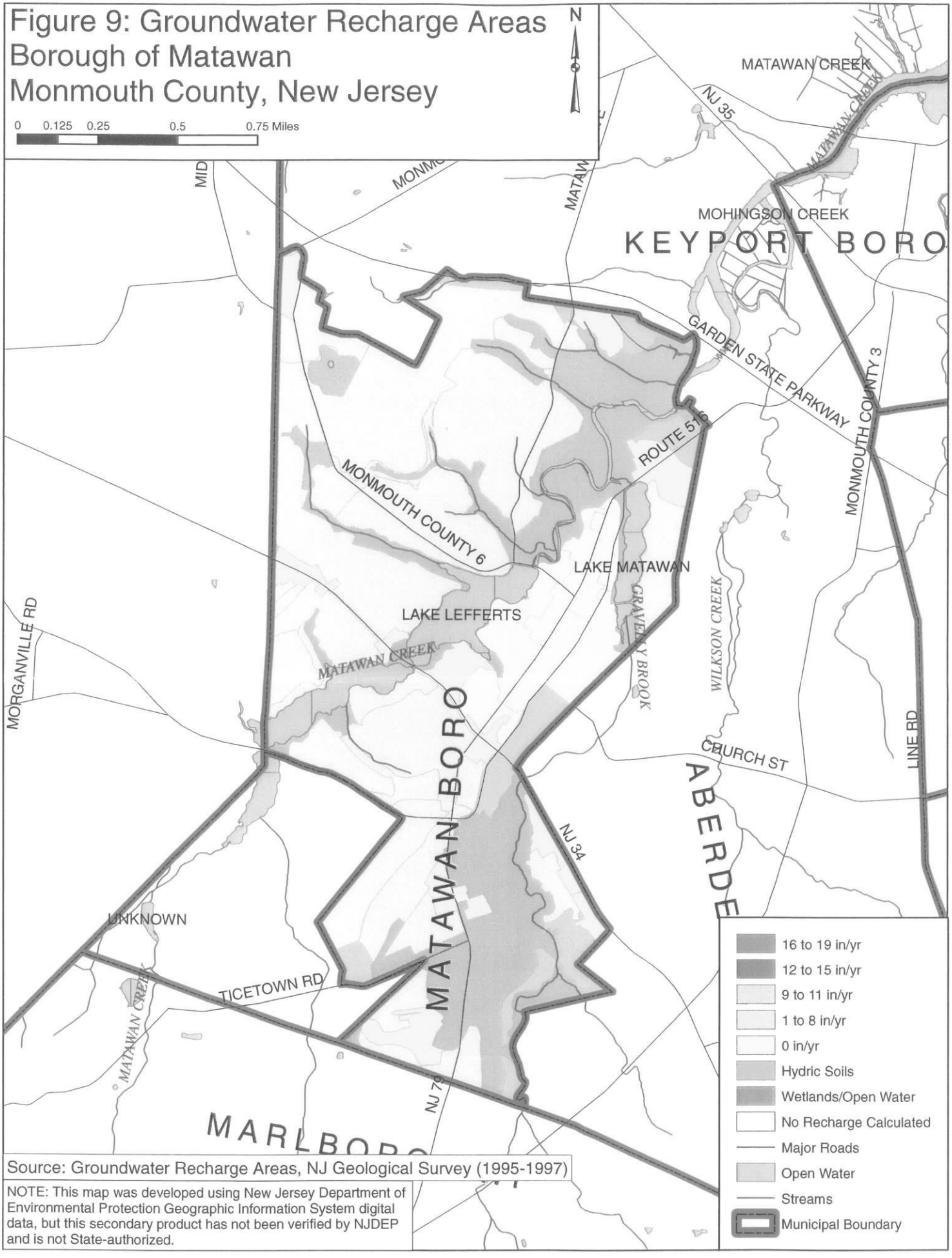
MATN.01160 | MATN116-SM | FEB. 2005

there has been no further analysis or movement to use alternate drinking water supplies. As previously mentioned, Gravelly Brook, the major tributary of Lake Matawan is spring fed. This means that the stream corridor is fed by outcropping of the aquifer below, and therefore the volume of flow, as well as velocity of the stream is dependent on groundwater recharge.

Groundwater recharge is the calculated amount of water actually absorbed into the groundwater from the surface. Impervious surfaces do not allow water to recharge these aquifers. It should be noted that groundwater recharge is also not calculated for surface water bodies, wetlands, or hydric soils because they may discharge, or recharge any area, or they may have no net effect, depending on each specific site, and its conditions. (http://www.state.nj.us/dep/njgs/pricelst/ofmap/ofm32.pdf) A hydric soil, by definition, is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part .(59 Fed. Reg. 35680, 7/13/94)

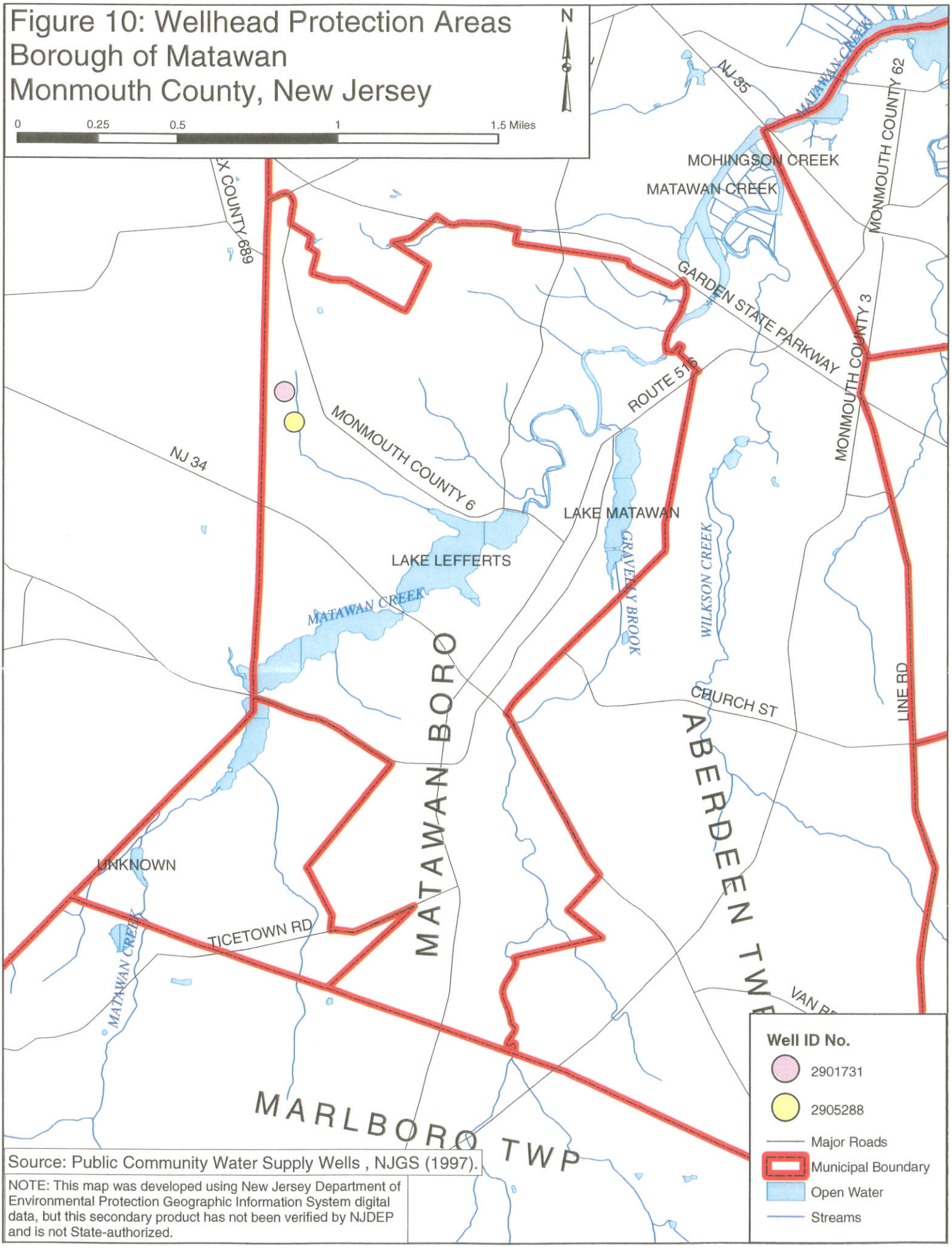
Increases in development have increased impervious surface area. Increased imperious surface area can, as previously mentioned, result in an increase in peak and volume of the Borough's stream flow. Any increase in the amount of water can result in stream erosion and degradation of stream habitats. Additionally, increasing impervious area decreases the base flows of streams during dry weather periods, which, in turn, can negatively impact stream habitats. The Borough's groundwater recharge areas are mapped in Figure 9.

Wellhead Protection Areas (WHPA) are delineations of the horizontal extent captured by well pumping at a given rate over a two-, five-, and twelve-year period of time. These areas are the first step in defining the source of a public drinking supply well. It should be noted, however, that all confined wells have a fifty foot radius delineation which serves as an area to protect the well head. This fifty foot radius is controlled by the water purveyor. No WHPAs with delineated and tiered capture areas are located within the Borough (see Figure 10).



Source: Groundwater Recharge Areas, NJ Geological Survey (1995-1997)

NOTE: 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.



Source: Public Community Water Supply Wells , NJGS (1997).

NOTE: 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.

DESIGN AND PERFORMANCE STANDARDS

The Borough has adopted applicable design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to reduce the negative impact of stormwater runoff on water quality and quantity, and loss of groundwater recharge in receiving waterbodies. The section of this MSWMP, entitled Stormwater Management Strategies, indicates actions appropriate for various types of development in Matawan. Ultimately, design and performance standards were created to contain the necessary language to maintain stormwater management measures consistent with the applicable stormwater management rules, N.J.A.C. 7:8-5.8 - Maintenance Requirements. This included language for safety standards consistent with N.J.A.C. 7:8-6 - Safety Standards for Stormwater Management Basins. Upon adoption, the Stormwater Control Ordinance was submitted to the Monmouth County Planning Board for review and approval.

A number of structural and nonstructural strategies require water to be retained for long periods of time. These requirements may increase the promulgation of mosquito breeding habitats. New development and redevelopment activities should be coordinated with the Monmouth County Mosquito Extermination Commission so that proposed structural and nonstructural strategies are properly maintained.

Proper inspection and maintenance are critical components for the successful performance of a stormwater management system. The Borough has prepared a Stormwater Pollution Prevention Plan (SPPP) to address inspection and maintenance for existing stormwater infrastructures throughout the Borough. Also included in the SPPP is the development of a Local Public Education Program to educate property owners on methods to reduce nonpoint stormwater pollution such as proper waste disposal, solids and floatable controls, fertilizer and pesticide use, pet waste disposal, wildlife feeding, goose management, etc. Public Education of improper waste disposal on the Borough's steep slopes will also be stressed in this program. In addition, the Borough's SPPP outlines modifications to existing Borough programs, and introduces new programs to aid in the Borough's stormwater management effort. These programs include

stormwater facility maintenance, catch basin labeling, improved street sweeping, and employee training.

New development and redevelopment projects will be required to develop and submit a detailed operation and maintenance plan for each best management practice (BMP) established in accordance with the N.J.A.C. 7:8 - 5.8. Recommendations for proper maintenance procedures are available in the NJDEP's *Stormwater Best Management Practices Manual* (BMP Manual). Copies of the maintenance plan(s) will be filed with the Borough Department of Public Works.

Borough representatives will monitor construction of the BMP project to ensure that the appropriate stormwater management measures are constructed and function as designed. Borough personnel will conduct inspections as needed to ensure public systems are functioning properly and to identify maintenance needs, if any. For privately owned and operated BMPs, the Owner shall inspect the BMPs as needed. After this, annual checks shall be done to identify any additional maintenance needs required. This may include clearing of blockages from inlets and/or outlet structures, removal of unhealthy vegetation or accumulated debris/materials.

Borough ordinances provide for the inspection of systems on private property, provided the necessary easements are in place, upon giving reasonable notice. Ordinances provide a time frame for maintenance procedures to occur upon receiving notice from the Borough that maintenance is required. Additionally, ordinances require Maintenance Plans for privately owned BMPs which include information such as contact information for the responsible party, schedule of required maintenance, estimated costs of maintenance, etc. in accordance with State regulations.

PLAN CONSISTENCY

REGIONAL STORMWATER MANAGEMENT PLANS

Currently, there are no Regional Stormwater Management Plans (RSWMP) developed for waters within the Borough. This plan will be updated to be consistent with any RSWMP that are established in the future. The Borough plans to take part in the development of any RSWMP that affects waterbodies within or adjacent to the municipality.

TOTAL MAXIMUM DAILY LOADS

Though there are waterways, such as Gravelly Brook, which flow into the Borough listed on Sublist 5 of the 2004 Integrated Waterbodies list, currently there are no specific stormwater TMDLs for these waterways. This plan will be updated with prioritized waterbodies in the future, when such regulations affecting the waterbodies of the Borough are established.

RESIDENTIAL SITE IMPROVEMENT STANDARDS (RSIS)

This Municipal Stormwater Management Plan is consistent with regulations established under the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The Borough will utilize the most current update of the RSIS for stormwater management review of residential areas. This Plan incorporates the statute of RSIS and acknowledges that RSIS is periodically updated.

SOIL CONSERVATION

The Borough's Stormwater Management Control Ordinance will require that all new development and redevelopment projects comply with the Soil Erosion and Sediment Control Standards of New Jersey. In cooperation with the Freehold Soil Conservation District, Borough representative will observe on-site soil erosion and sediment control measures as part of the construction site inspections.

All development and redevelopment projects shall use the most recent DelMarVa unit hydrograph for stormwater calculations. In addition the Freehold Soil Conservation District requires the use of the most recent design storm rainfall data for stormwater calculations. The

National Oceanographic and Atmospheric Administration (NOAA), the agency that develops statistical estimates of rainfall amounts, has increased its estimates for the majority of storm events, particularly the larger events. The following table indicates the old and new twenty-four hour rainfall amounts in inches for Monmouth County.

Table 4: NRCS 24 Hour Design Storm Rainfall Depth (inches) – September 2004

Storm Period	1 yr.		2 yr.		5 yr.		10 yr.		25 yr.		50 yr.		100 yr.	
Monmouth County	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New
	2.8	**2.9**	3.4	**3.4**	4.4	**4.4**	5.3	**5.2**	6.0	**6.6**	6.5	**7.7**	7.5	**8.9**

Source: NOAA, NJ Department of Agriculture

MONMOUTH COUNTY GROWTH MANAGEMENT GUIDE

The Monmouth County Growth Management Guide, adopted in December 1995, sets forth a series of goals and objectives designed to enhance the quality of life for residents of Monmouth County. This plan is consistent with those objectives, which include:

- Encouraging the protection of the County's unique, diverse, natural and scenic natural resources; and
- Promoting the protection of non-renewable natural resources; and
- Encouraging the protection and conservation of all water resources; and
- Promoting the preservation and improvements of surface water quality; and
- Encouraging the preservation and improvements of groundwater quality and quantity; and
- Promoting the preservation, restoration, and enhancement of wetlands and stream corridors in order to protect the adjacent water bodies, such as streams, rivers and lakes.

This plan is consistent with the County Growth Management Guide by encouraging the protection of stream corridors and encouraging flood control and ground water recharge through the implementation of the principals of non-structural and structural strategies. This Plan is also consistent with the County Growth Management Guide, by preserving and protecting valuable natural features within the Borough.

STATE DEVELOPMENT OR REDEVELOPMENT PLAN (SDRP)

This plan is consistent with the plans and policies of the SDRP, which was adopted in 2001. The SDRP places non-environmentally constrained areas in the Borough in the Metropolitan Planning Area (PA1). Exceptions to the PA1 designation are wetlands and floodplain areas that are located within the Environmentally Sensitive Planning Area (PA5). According to the State Plan, most of the communities within the PA1 planning area are fully developed or almost fully developed with little vacant land available for new development. This Plan is consistent with the State Plan by preserving and protecting the established residential character of the Borough, preserving and upgrading the existing utility infrastructure, providing adequate open space facilities, and preserving and protecting valuable natural features within the Borough.

STORMWATER MANAGEMENT STRATEGIES

The Borough has reviewed its Master Plan and pertinent development ordinances. Below is a list of recommended revisions to existing ordinances and new strategies that the Borough should consider implementing in order to incorporate the NJDEP's nonstructural strategies for stormwater management. It should be noted that the Borough is fully developed and minimal "major development[1]" is anticipated.

- **Section 304-41: Buffer Strips:** This section states the requirements for Buffer strips between Residential and other Land uses. This section should be updated to encourage the use of native vegetation in buffer areas.

- **Section 304-70: HI Highway Improvement Districts:** This section states the requirements for Buffer strips between Highways and other land uses. This section should be updated to encourage the use of native vegetation in buffer areas.

- **Section 304-75: Cluster Development:** This section describes the Borough's requirements for cluster developments. This section should be updated to include a maximum impervious cover requirement. Additionally, this section should be updated to encourage the use of native vegetation, which requires less watering and fertilization, in designated open spaces.

- **Section 304-35: Preservation of Natural Features:**

  - **A**: This section describes the Borough's requirement to preserve natural features and prevent soil erosion. This section should be modified to be in conformance with Freehold Soil Conservation District.

  - **B**: Section B discusses stream setback requirements. This section should be evaluated to

[1] Major Development – means any development that provides for ultimately disturbing one or more acres of land. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation. Projects undertaken by any government agency which otherwise meet the definition of 'major development' but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., are also considered "major development."

determine if a stream corridor buffer is necessary.

- **Section 304-29. (3): Off Tract Improvements: Other Improvements:** This section outlines the fees that developers may pay into escrow for off tract improvements to the drainage system. This section should be updated to include the "Design and Performance Standards" described in this MSWMP and as outlined in N.J.A.C. 7:8.

- **Section 304-43: Off-street Parking and Loading:** This section describes required stall sizes and ratios. This section should be evaluated and updated to require a minimum stall width of 9 feet, and a reduction in the number of parking stalls per use if possible. This section also requires parking areas to have sidewalks wherever there will be pedestrian traffic. This section should be modified to allow the use of porous or permeable paving systems for these sidewalks.

- **Section 304-30: Performance and Design Standards: Applicability or Regulations:** This section identifies which developments subject to the Borough's Performance and Design Standards should apply. This section should be modified to include the stormwater management "Design and Performance Standards" outlined in this MSWMP and as outlined in N.J.A.C. 7:8.

- **Article XIII- Stormwater Control:** This section states the Borough's current stormwater management regulations. This section should be updated to include the "Design and Performance Standards" and long term maintenance and safety requirements and provisions described in this MSWMP and as outlined in N.J.A.C. 7:8.

Revised ordinances will be submitted to the Monmouth County Planning Board for review and approval. Upon approval from the County, copies will be forwarded to the Department of Environmental Protection.

NONSTRUCTURAL STRATEGIES

This Plan recommends the practical use of the following nonstructural strategies for all major developments in accordance with the NJDEP BMP Manual:

1. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.
2. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.
3. Maximize the protection of natural drainage features and vegetation.
4. Minimize the decrease in the pre-construction "time of concentration."
5. Minimize land disturbance including clearing and grading.
6. Minimize soil compaction.
7. Provide vegetated open-channel conveyance systems that discharge into and through stable vegetated areas.
8. Provide preventative source controls.

In addition, the NJDEP's BMP Manual further requires an applicant seeking approval for a major development to specifically identify which strategies have been chosen and how these nonstructural strategies have been incorporated into the development's design. Finally, for each of those nonstructural strategies that were not able to be incorporated into the development's design due to engineering, environmental, or safety reasons, the applicant must provide a basis for this contention.

Recommended Measures

Recommendations in the BMP Manual may be implemented in part through the use of:

- **Vegetated Filter Strips**

  Vegetated filter strips are best utilized adjacent to a buffer strip, watercourse or drainage swale since the discharge will be in the form of sheet flow, making it difficult to convey the stormwater downstream in a normal conveyance system (swale or pipe).

- **Stream Corridor Buffer Strips**

  Buffer strips are undisturbed areas between development and the receiving waters. There are two management objectives associated with stream and valley corridor buffer strips:

  - To provide buffer protection along a stream and valley corridor to protect existing ecological form and functions; and
  - To minimize the impact of development on the stream itself (filter pollutants, provide shade and bank stability, reduce the velocity of overland flow).

  Buffers only provide limited benefits in terms of stormwater management; however, they are an integral part of a system of best management practices.

- **The Stabilization of Banks, Shoreline and Slopes**

  The root systems of trees, shrubs and plants effectively bind soils to resist erosion. Increasing the amount of required plant material for new and redeveloped residential and non-residential sites should be encouraged throughout the Borough where applicable. Planting schemes should be designed by a certified landscape architect to combine plant species that have complementary rooting characteristics to provide long-term stability.

- **Deterrence of Geese**

  Maintaining or planting dense woody vegetation around the perimeter of a pond or wetland is the most effective means of deterring geese from taking over and contaminating local lakes and ponds. Minimizing the amount of land that is mowed will limit the preferred habitat for geese.

- **Fertilizers**

  The use of fertilizers to create the "perfect lawn" is an increasingly common problem in many residential areas. Fertilizer run-off increases the level of nutrients in water bodies and

can accelerate eutrophication[2] in the lakes and rivers and continue on to the coastal areas. The excessive use of fertilizers causes nitrate contamination of groundwater. Good fertilizer maintenance practices help in reducing the amount of nitrates in the soil and thereby lower its content in the water. Initially, the Borough should work with the NJDEP to educate homeowners of the impacts of the overuse of fertilizers. This discussion should include other techniques to create a "green lawn" without over fertilizing. Almost as important as the use of fertilizer, is the combination of over fertilizing and over watering lawns. In many cases this leads to nutrient rich runoff, which ultimately migrates to a nearby stream, lake or other water body. If fertilizer is applied correctly, the natural characteristics of the underlying soils will absorb or filter out the nutrients in the fertilizer.

STRUCTURAL STORMWATER MANAGEMENT[3]

In Chapter 9 of *its Stormwater Management Best Management Practices Manual*, the Department of Environmental Protection identifies several structural stormwater management options. Structural methods should only be used after all non-structural strategies are deemed impracticable or unsafe. Specifically, the Borough encourages the use of structural stormwater management systems in a manner that maximizes the preservation of community character:

- **Bioretention Systems**

  A bioretention system consists of a soil bed planted with native vegetation located above an underdrained sand layer. It can be configured as either a bioretention basin or a bioretention swale. Stormwater runoff entering the bioretention system is filtered first through the vegetation and then the sand/soil mixture before being conveyed downstream by the underdrain system. Runoff storage depths above the planting bed surface are typically shallow. The adopted Total Suspended Solids (TSS) removal rate for bioretention systems is 90 percent.

[2] Eutrophication – The normally slow aging process by which a lake evolves into a bog or marsh and ultimately assumes a completely terrestrial state and disappears.
[3] Definitions provided in the NJDEP – Stormwater Best Management Practices Manual at: http://www.njstormwater.org/tier_A/ bmp_manual.htm

- **Constructed Stormwater Wetlands**

  Constructed stormwater wetlands are wetland systems designed to maximize the removal of pollutants from stormwater runoff through settling and both uptake and filtering by vegetation. Constructed stormwater wetlands temporarily store runoff in relatively shallow pools that support conditions suitable for the growth of wetland plants. The adopted removal rate for constructed stormwater wetlands is 90 percent.

- **Dry Wells**

  A dry well is a subsurface storage facility that receives and temporarily stores stormwater runoff from roofs of structures. Discharge of this stored runoff from a dry well occurs through infiltration into the surrounding soils. A dry well may be either a structural chamber and/or an excavated pit filled with aggregate. Due to the relatively low level of expected pollutants in roof runoff, a dry well cannot be used to directly comply with the suspended solids and nutrient removal requirements contained in the NJDEP Stormwater Management Rules at N.J.A.C. 7:8. However, due to its storage capacity, a dry well may be used to reduce the total stormwater quality design storm runoff volume that a roof would ordinarily discharge to downstream stormwater management facilities. Care should be taken with the location and size of dry wells due to potential adverse impacts on basements and foundations.

- **Extended Detention Basins**

  An extended detention basin is a facility constructed through filling and/or excavation that provides temporary storage of stormwater runoff. It has an outlet structure that detains and attenuates runoff inflows and promotes the settlement of pollutants. An extended detention basin is normally designed as a multistage facility that provides runoff storage and attenuation for both stormwater quality and quantity management. The adopted TSS removal rate for extended detention basins is 40 to 60 percent, depending on the duration of detention time provided in the basin.

- **Infiltration Basins**

  An infiltration basin is a facility constructed within highly permeable soils that provides

temporary storage of stormwater runoff. An infiltration basin does not normally have a structural outlet to discharge runoff from the stormwater quality design storm, but may require emergency overflow for extraordinary storm events. Instead, outflow from an infiltration basin is through the surrounding soil. An infiltration basin may also be combined with an extended detention basin to provide additional runoff storage for both stormwater quality and quantity management. The adopted TSS removal rate for infiltration basins is 80 percent.

- **Manufactured Treatment Devices**

  A manufactured treatment device is a pre-fabricated stormwater treatment structure utilizing settling, filtration, absorptive/adsorptive materials, vortex separation, vegetative components, and/or other appropriate technology to remove pollutants from stormwater runoff. The TSS removal rate for manufactured treatment devices is based on the NJDEP certification of the pollutant removal rates on a case-by-case basis. Other pollutants, such as nutrients, metals, hydrocarbons, and bacteria can be included in the verification/certification process if the data supports their removal efficiencies.

- **Pervious Paving Systems**

  Pervious paving systems are paved areas that produce less stormwater runoff than areas paved with conventional paving. This reduction is achieved primarily through the infiltration of a greater portion of the rain falling on the area than would occur with conventional paving. This increased infiltration occurs either through the paving material itself or through void spaces between individual paving blocks known as pavers. Pervious paving systems are divided into three general types. They are porous paving, permeable pavers with storage beds, and permeable pavers without storage beds. Porous paving and permeable pavers with storage bed systems treat the stormwater quality design storm runoff through storage and infiltration. Therefore, these systems have adopted TSS removal rates similar to infiltration structures. Care must be taken in the use of pervious systems to avoid subgrade instability and frost related deterioration.

- **Sand Filters**

  A sand filter consists of a forebay and underdrained sand bed. It can be configured as either a surface or subsurface facility. Runoff entering the sand filter is conveyed first through the forebay, which removes trash, debris, and coarse sediment, and then through the sand bed to an outlet pipe. Sand filters use solids settling, filtering, and adsorption processes to reduce pollutant concentrations in stormwater. The adopted TSS removal rate for sand filters is 80 percent.

- **Vegetative Filters**

  Vegetated filter strips are engineered stormwater conveyance systems that treat small drainage areas. Pollutants suspended in the runoff or attached to the suspended soil particles are removed by filtration, absorption and gravity sedimentation.

  A vegetative filter is an area designed to remove suspended solids and other pollutants from stormwater runoff flowing through a length of vegetation called a vegetated filter strip. The vegetation in a filter strip can range from turf and native grasses to herbaceous and woody vegetation, all of which can either be planted or indigenous. It is important to note that all runoff to a vegetated filter strip must both enter and flow through the strip as sheet flow. Failure to do so can severely reduce and even eliminate the filter strip's pollutant removal capabilities. The total suspended solid (TSS) removal rate for vegetative filters will depend upon the vegetated cover in the filter strip.

- **Wet Ponds**

  A wet pond is a stormwater facility constructed through filling and/or excavation that provides both permanent and temporary storage of stormwater runoff. It has an outlet structure that creates a permanent pool and detains and attenuates runoff inflows and promotes the settlement of pollutants. A wet pond, also known as a retention basin, can also be designed as a multi-stage facility that also provides extended detention for enhanced stormwater quality design storm treatment and runoff storage and attenuation for stormwater quantity management. The adopted TSS removal rate for wet ponds is 50 to 90 percent

depending on the permanent pool storage volume in the pond and the length of retention time provided by the pond.

Each of these structures has advantages and disadvantages to manage stormwater. As previously noted Matawan is a fully developed community and anticipates the majority of new construction as residential infill development.

LAND USE/ BUILD-OUT ANALYSIS

Figure 4 illustrates the existing land use in the Borough based on the 1995/1997 GIS information from the NJDEP. As previously stated, the Borough has significantly less than one square mile of developable or vacant land, and therefore this MSWMP does not include a Land Use/Build-Out Analysis. Figure 7 illustrates the Hydrologic Units (HUC-14s) and Figure 5 shows the environmentally constrained lands including wetlands, flood areas, and open water.

MITIGATION PLAN

This mitigation plan is provided for proposed development or redevelopment projects that seek a variance or exemption from the stormwater management design and performance standards set forth in this MSWMP and N.J.A.C. 7:8-5.

MITIGATION PROJECT CRITERIA

To grant a variance or exemption from the stormwater regulations, new development and redevelopment plan applications must propose a mitigation project affecting the impacted sensitive receptor and located within the same drainage basin as the proposed development/redevelopment project. Proposed mitigation projects must provide for additional groundwater recharge benefits, protection from stormwater runoff quantity or quality from previously developed property that does not currently meet the design and performance standards outlined in this MSWMP.

The proposed mitigation project must be completed for the performance standard for which the variance or exemption is requested. Performance standards must ensure the long-term maintenance of the approved mitigation system, which include the maintenance requirements under Chapters 8 and 9 of the NJDEP BMP Manual. The Borough does not anticipate granting variances or exemptions for "major developments" until a detailed mitigation plan is developed and approved. The Borough will consider granting variances or exemptions for "major developments" subject to the following NJDEP and local requirements:

1. The Developer shows that literal compliance is technically impractical or presents a substantial economic hardship.

2. The project must be within the same area that would contribute to the receptor impacted by the project. Note that depending on the specific performance standard waived, the sensitive receptor and/or the contributory area to that receptor may be different. If there are no specific sensitive receptors that would be impacted as the result of the grant of the waiver/exemption, then the location of the mitigation project can be located anywhere

within the Borough, and should be selected to provide the most benefit relative to an existing stormwater problem in the same category (quality, quantity or recharge).

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

4. The project should be close to the location of the original project, and if possible, be located upstream at a similar distance from the identified sensitive receptor. This distance should not be based on actual location, but on a similar hydraulic distance to the sensitive receptor. For example, if the project for which a waiver is obtained discharges to a tributary, but the closest location discharges to the main branch, it may be more beneficial to identify a location discharging to the same tributary.

5. For ease of administration, if sensitive receptors are addressed, it is preferable to have one location that addresses any and all of the performance standards waived, rather than one location for each performance standard.

6. It must be demonstrated that implementation of the mitigation project will result in no adverse impacts to other properties or the environment.

7. Mitigation projects that address stormwater runoff quantity can provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction.

DEVELOPER MITIGATION PLAN REQUIREMENTS

Proposed projects shall have Mitigation Plans submitted to the Borough for review and approval prior to granting final approval for site development. Developers should include the following in a Mitigation Plan:

- Mitigation Project Name, Owner name and address, Developer name and address, Mitigation Project Location, Drainage Area, Cost Estimate;

- Proposed Project and Mitigation Project Descriptions, Proposed mitigation strategy and impact to sensitive receptor. Descriptions should include what is being impacted, how it is impacted, what is being mitigated and how;
- Sensitive Receptor: Identify the sensitive receptor(s) related to the performance standard from which a waiver is sought. Demonstrate that the mitigation site contributes to the same sensitive receptor;
- Legal authorization required for construction , maintenance, and access;
- Responsible Party including: a schedule of required maintenance or maintenance plan, who will perform the maintenance, proposed cost of maintenance, and how it will be funded;
- All other permits required for construction of the mitigation project;
- Cost estimate of construction inspection; and
- Reason a waiver or exemption is required and supporting evidence.

Due to the minimal amount of vacant or developable land available, it is anticipated that the majority of the mitigation projects proposed will result in retrofitting/rehabilitation of existing stormwater facilities and natural infrastructures. Any applicant seeking relief via a mitigation option shall provide such relief that is equal to or greater than the parameter being sought for relief. Mitigation options shall be quantifiable in order to be compared to that being substandard on the proposed site. More detailed information may be available from the Borough or the Borough Engineer's office.

It is the developer's responsibility to provide a detailed study of any proposed mitigation project, and provide the Borough with a proposed mitigation plan for review and approval. Mitigation projects should meet all applicable safety, design and performance standards. Approval of the mitigation option will be under the sole discretion of the Board based on calculations provided by the applicant and reviewed by the Board's professional consultants. The applicant will be required to submit an alternative mitigation option if one listed below is not suitable or the Board deems the selected option not applicable.

Water Quality

- Lake Lefferts: Sediment removal (dredging & installation of BMPs to limit pollutant loading)
- Lake Matawan: Sediment removal (dredging & installation of BMPs to limit pollutant loading)
- Sanitary Sewer Repairs to decrease pollutant loading in areas identified in the June 1997 *Smoke Testing Report*. These repairs include manhole lining, sanitary sewer replacement NJ State Highway 34. Also, the early investigation and repair of possible connections between storm sewer system and the sanitary sewer system.

Water Quantity

- Union Street near Aberdeen Road is very prone to flooding during storm events.

Groundwater Recharge

- Sanitary Sewer Repairs to decrease the infiltration of groundwater into the sanitary sewer, and increase groundwater recharge, in areas identified in the June 1997 *Smoke Testing Report*. These repairs include manhole lining, sanitary sewer replacement on NJ State Highway 34 and investigation and repair of possible connections between storm sewer system and the sanitary sewer system.

RECOMMENDATIONS

The following are additional recommendations associated with this Stormwater Management Plan Element of the *Master Plan*:

- ***Recommendation A: Encourage the Planning Board and Borough Council to review, discuss, update and amend the Borough's existing development ordinances to be in compliance with the design, performance and safety standards outlined in this MSWMP and in the NJDEP's stormwater regulations.***

  Portions of the existing development ordinances are inconsistent with recently adopted New Jersey Department of Environmental Protection (NJDEP) Stormwater Management Regulations and the NJDEP's *Stormwater Best Management Practices Manual*. Some of these inconsistencies are identified in the Stormwater Management Strategies section above. The Borough should update their existing regulations to be in conformance with these regulations and to eliminate inconsistencies or conflicts.

- ***Recommendation B: Educate residents on the impacts of the overuse of fertilizers and good fertilizer maintenance practices.***

  As stated in the Stormwater Management Strategies section above, the overuse of fertilizers has a significant detrimental impact on surface water bodies and groundwater. The Borough should work with the NJDEP to educate residents and lawn care or landscaping professionals on these impacts and encourage them to use techniques to create a "green lawn" without over- fertilizing and/or to convert lawn areas to other kinds of vegetation that do not require fertilization and other chemical treatments. Many lawn services also "overspray" fertilizer onto roadways and adjacent properties. The Borough should investigate methods to minimize the application of fertilizers beyond property lines.

- ***Recommendation C: Evaluate the need to adopt a Stream Corridor Buffer Ordinance.***

  The NJDEP Stormwater Regulations requires any development with more than 1 acre of disturbance or ¼ acre of impervious coverage to provide a 300-foot Buffer along a Category 1 stream from the center line of the stream. Though waterbodies within the Borough's boundaries are not listed as Category 1 streams, there are sections of Category 1 streams that flow through the Borough. Matawan should evaluate the need to adopt stream corridor buffers along tributaries of Category 1 waterways.

- ***Recommendation D: Seek to ensure the proper inspection, monitoring, and maintenance of all stormwater management facilities and develop strategies for all existing and future maintenance and improvements.***

  Stormwater facilities require regular maintenance to ensure effective and reliable performance. Failure to perform the necessary maintenance can lead to diminished performance, deterioration and failure. In addition, a range of health and safety problems, including mosquito breeding and the potential for drowning, can result from improperly maintained facilities. To minimize these risks, the Borough should implement a procedure for regular inspection, monitoring, and maintenance of Borough owned stormwater facilities.

  Additionally, there are a number of privately maintained stormwater facilities within the Borough. The Borough should work with the various property owners, residents and business owners to identify maintenance and/or improvement needs and develop strategies for regular inspection and maintenance of these facilities. During this investigation, the Borough should evaluate the merits of creating a "back charge" to pay for maintenance of existing BMPs should owners not comply with the continued maintenance requirements.

  The Borough should also encourage the use of low impact design methods and non-structural strategies that require less maintenance.

- ***Recommendation E: Evaluate the installation of sediment traps at both Lake Lefferts and Lake Matawan.***

  Both lakes are known to have sedimentation issues the Borough should consider the installation of sediment traps, which are BMPs designed to prevent the flow of sediment into the lakes. The Borough should also investigate funding options for possible installation of these BMPs.

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DRAFT

ORDINANCE _____

AN ORDINANCE OF THE BOROUGH OF MATAWAN COUNTY OF MONMOUTH, STATE OF NEW JERSEY AMENDING THE CODE OF THE BOROUGH OF MATAWAN, ORDINANCE 06-22, LAND USE AND DEVELOPMENT REGULATIONS, BY AMENDING REGULATIONS FOR THE STORMWATER MANAGEMENT AND CONTROL IN THE BOROUGH OF MATAWAN, COUNTY OF MONMOUTH

BE IT ORDAINED by the Borough Committee of the Borough of Matawan, County of Monmouth, State of New Jersey that Ordinance 06-22, Stormwater Management and Control in the Land Use and Development Regulations of the Code of the Borough of Matawan is hereby amended and supplemented as follows:

SECTION 1.

Header is hereby amended and supplemented to as follows:

BOROUGH OF ~~MATAWANN~~ MATAWAN

SECTION 2.

Section 1.2 Scope and Purpose, is hereby amended and supplemented to as follows:

a. Policy Statement

Flood control, groundwater recharge, and pollutant reduction through nonstructural or low impact techniques shall be explored before relying on structural Best Management Practices (BMPs). Structural BMPs should be integrated with nonstructural stormwater management measures and proper maintenance plans. Nonstructural measures include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site or from being exposed to stormwater. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated loading of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

SECTION 3.

Section 2.1 Definitions, is hereby amended and supplemented to as follows:

For the purpose of this section, the following terms, phrases words and their derivations shall have the meaning given herein. When not inconsistent with the context, words used in the present tense include future, ~~works~~ words in the plural number include the singular

and words in the singular number include the plural number. The ~~work~~ word "shall" is always mandatory and not merely directory.

SECTION 4.

Section 2.1 Definitions is hereby amended and supplemented to as follows

CAFRA Planning Map, means the geographic-depiction of the boundaries for ~~coastal~~ Coastal Planning Areas, CAFRA Centers, CAFRA Cores ad CAFRA Nodes pursuant to N.J.A.C. 7:7E-5B.3

SECTION 5.

Section 2.1 Definitions is hereby amended and supplemented to as follows:

Major development means any ~~development~~ "development" that provides for ultimately disturbing one or more acres of land. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation.

SECTION 6.

Section 2.1 Definitions is hereby amended and supplemented to as follows

Site means the lot or lots upon which a major development is to occur or has occurred.

SECTION 7.

Section 3.1.a.2 General Standards , is hereby amended and supplemented to as follows:

The standards in this ~~Section~~ Ordinance apply only to new major 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 major 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 8

Section 4.1 General Stormwater Management Requirements for Major Development – is hereby amended and supplemented to as follows:

~~General~~ Stormwater Management Requirements for Major Development

SECTION 9.

Section 4.1 f Erosion Control, Groundwater Recharge and Runoff Quantity Standards is hereby amended and supplemented to as follows:

1 (b) (i), The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section ~~7.1~~, 5 either:

SECTION 10. Severability.

The various parts, sections and clauses of this ordinance are hereby declared to be severable. If any section, subsection, sentence, clause, phrase or portion of this Ordinance is for any reason held invalid or unconstitutional by any court or federal or state agency of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision and such holding shall not affect the validity of the remaining portions hereof.

SECTION 11. Repealer.

All ordinances or resolutions or parts of ordinances or resolutions inconsistent herewith are hereby repealed to the extent of such inconsistency

SECTION 12. Effective Date of Ordinance.

This Ordinance shall take effect immediately upon the approval by the County review agency.

Introduced:
Passed:
Adopted:

_____
Honorable Mary Aufseeser, Mayor

CERTIFICATION OF ORDINANCE

I, Jean B. Montfort, Borough Clerk of the Borough of Matawan, County of Monmouth, and State of New Jersey, do hereby certify the foregoing to be a true and correct copy of an ordinance adopted by the Borough Council of the Borough of Matawan on _____.

IN WITNESS WHEREOF, I Have hereunto set my hand and seal of the Borough of Matawan on this _____ day of _____, _____.

_____
JEAN B. MONTFORT, RMC
MUNICIPAL CLERK

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