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Municipal Stormwater Management Plan

Borough of Medford Lakes
Municipal Cabin, Cabin Circle
Medford Lakes, NJ 08055

Adopted 04/19/07
Amended & Readopted 03/20/08
per PC4-07-95 &
County Comment Letter dated 05/10/07

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Table of Contents

List of Tables

List of Figures

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Medford Lakes Borough, Burlington County, New Jersey ("the Borough") to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acres of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides base flow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

Medford Lakes is a N.J. Pinelands Community regulated in part by the Pinelands Comprehensive Management Plan. Medford Lakes is unique in that it achieved essential full build-out status several decades ago. This analysis based upon existing zoning and virtually no land being available for development. Nonetheless, Tables 1,2 and 3 describe the necessary buildout analysis in accordance with maximum allowable impervious cover. The plan will be amended in the future to address the review and update of existing ordinances, the Borough Master Plan, and other planning documents to allow for project designs that include low impact development techniques.

Goals

The goals of this Municipal Stormwater Management Plan are to:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- Maintain groundwater recharge;
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Maintain the integrity of stream channels for their biological functions, as well as for drainage;

- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and

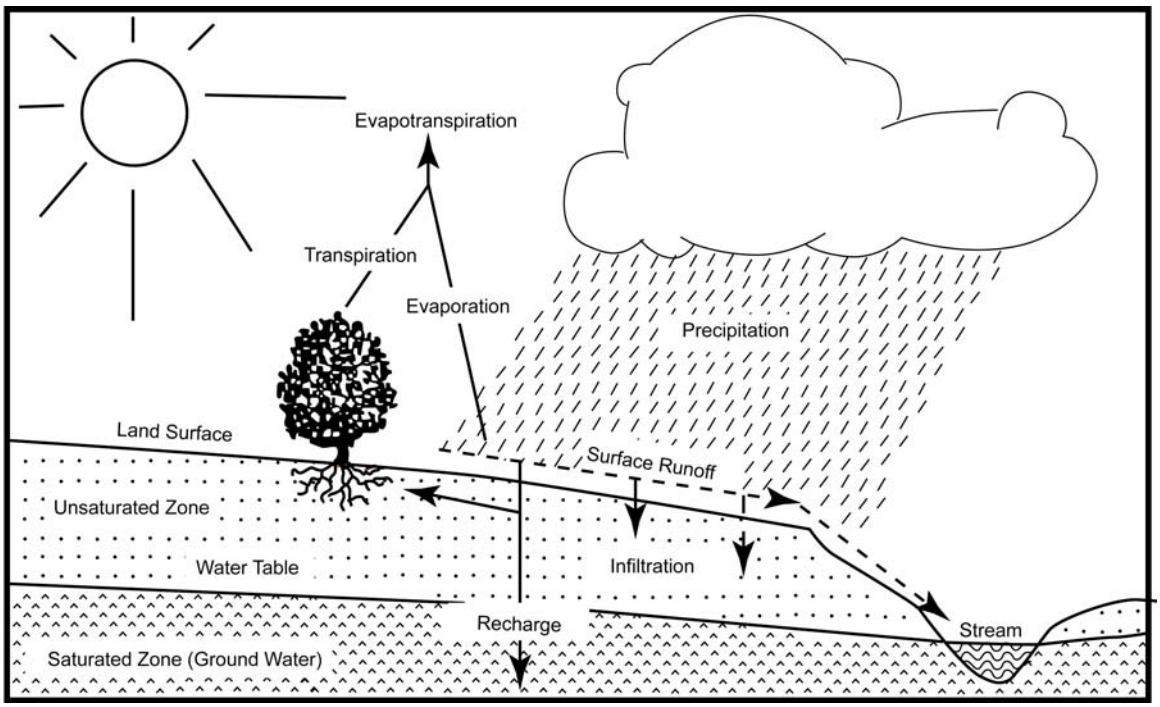
- Protect public safety through the proper design and operation of stormwater basins.

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

Stormwater Discussion

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

Figure 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

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

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

Background

Medford Lakes Borough encompasses a 1.31 square mile area (1.20 square mile Land Area) in Burlington County, New Jersey. The population of the Borough has decreased from 4,958 in 1980, to 4,462 in 1990, to 4,173 in 2000. This decrease in population is primarily due to decreases in the number of people residing in each household and not due to household vacancies and demolitions. The total number (1,555) of housing units has remained stable according to census data. Medford Lakes Borough has been built out for a number of decades, and as such, the predominant form of new development will be redevelopment. Anticipated redevelopment is focused within the Lakes Commercial District, recognizing also that historic preservation will limit the extent of redevelopment. The Borough is focusing this redevelopment and restoration effort on protecting health and safety, maintaining traditional Medford Lakes community quality of life, and preserving/restoring our infrastructure and historically significant features. Figure 2 illustrates the waterways in the Borough. Figure 3 depicts the Borough boundary on the USGS quadrangle maps.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics.

The data generated from the AMNET sampling sites within and adjacent to Medford Lakes indicates various levels of impairment in area streams. Sampling of area creeks and streams include the South Branch Rancocas Creek and streams include the Southampton on Ridge Rd.; Little Creek and Bear Swamp River in Medford at Rt. 70; Barton Run in Medford and Haynes Creek in Hammelein Rd. and at Rt. 70 Medford.

The year 3 2007 AMNET Area Lake Monitoring Program (Panel 3) includes Lake Mishe-Mokwa in Medford Lakes Borough and lake Stockwell in Medford Lakes, among numerous other lakes throughout the State.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. These data show that the instream total phosphorus concentrations and fecal coliform concentrations exceed the state's criteria. This is an indicator of impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each affected waterway.

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

body for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

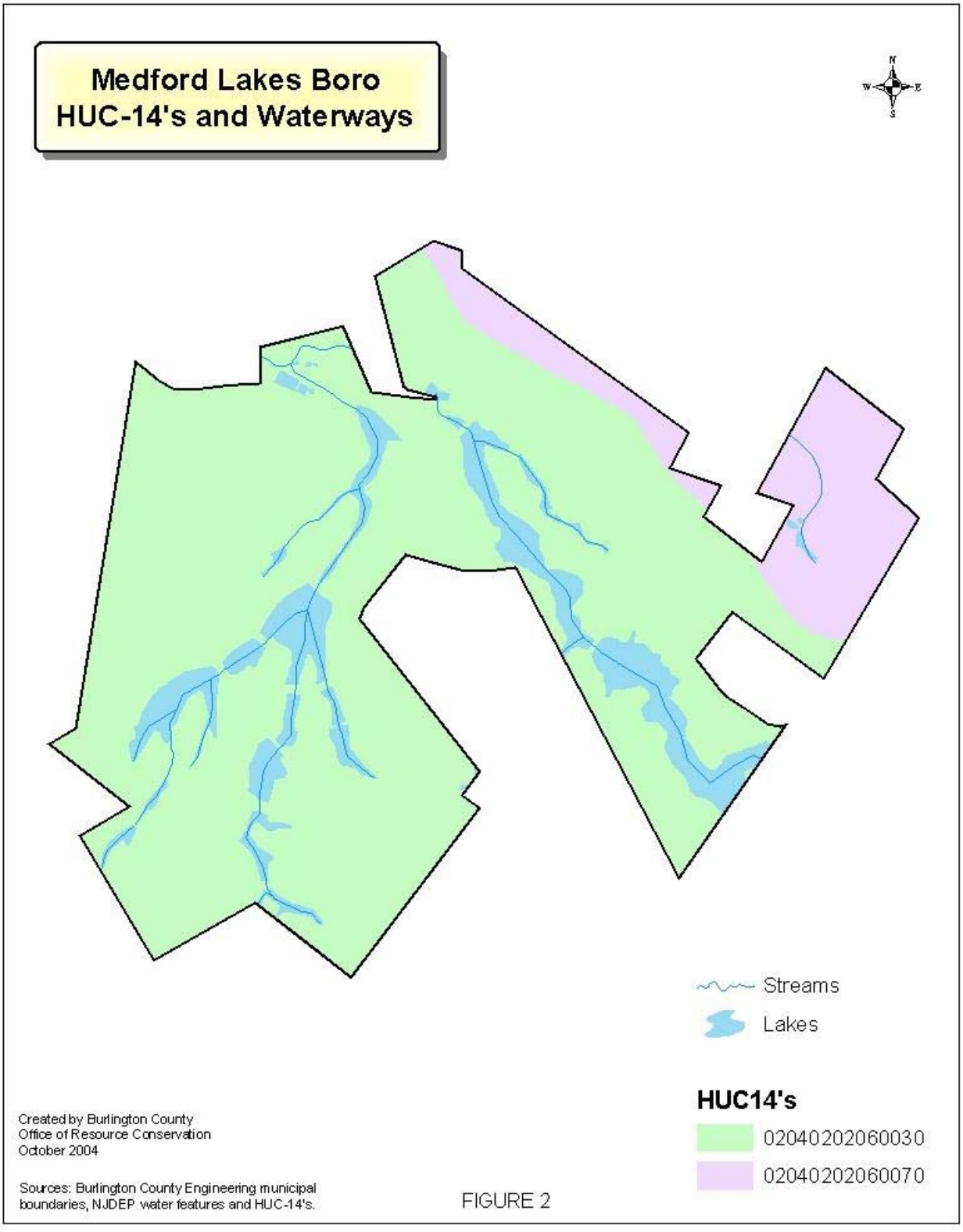
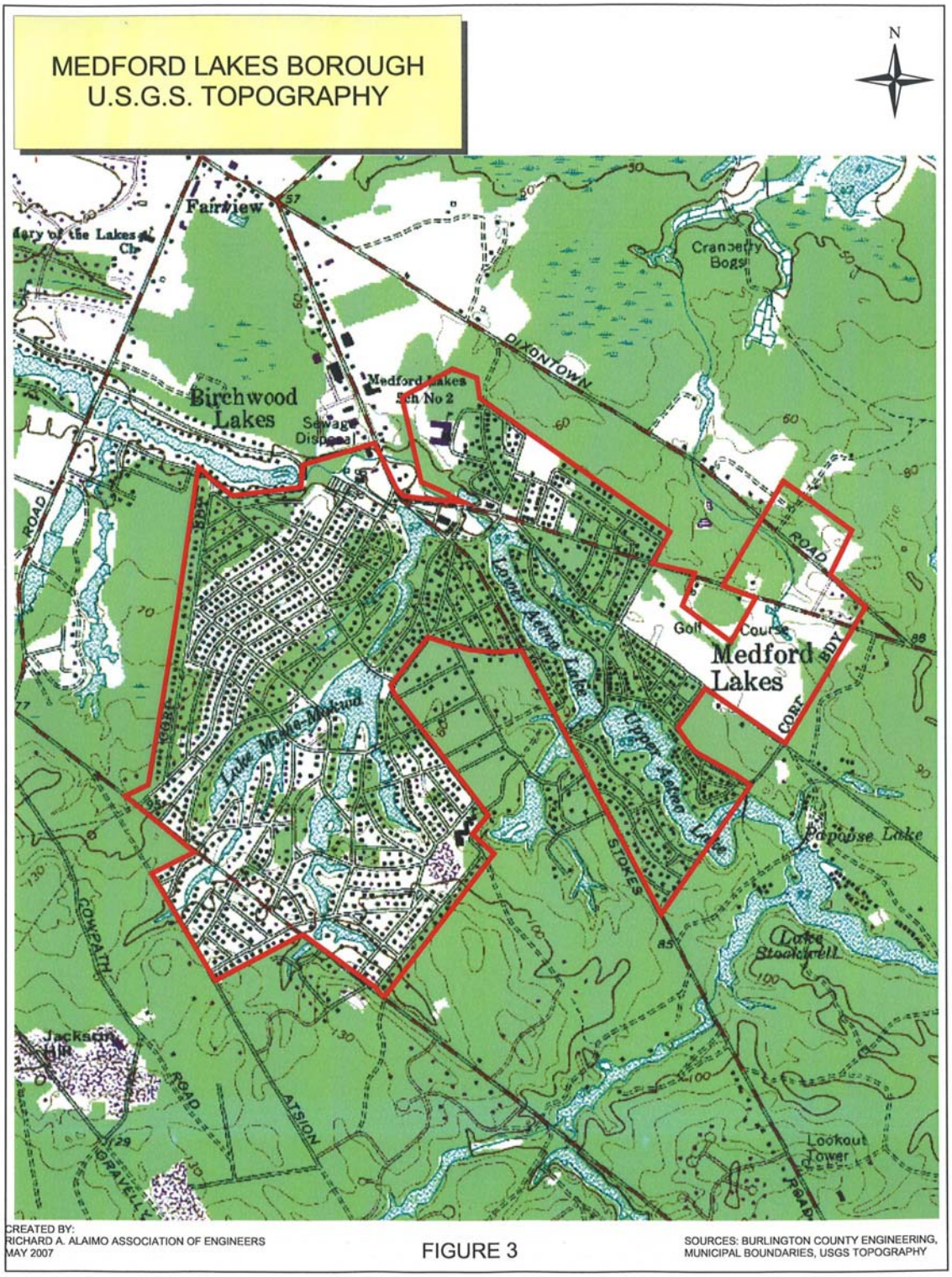

Medford Lakes Boro
HUC-14's and Waterways
N
W
E
S
Streams
Lakes
HUC14's
02040202060030
02040202060070
Created by Burlington County
Office of Resource Conservation
October 2004
Sources: Burlington County Engineering municipal boundaries, NJDEP water features and HUC-14's.

FIGURE 2


MEDFORD LAKES BOROUGH
U.S.G.S. TOPOGRAPHY
N
Fairview
Cranberry Bogs
DIXONTOWN
Birchwood Lakes
Medford Lakes Sch No 2
Sewage Disposal
ROAD
BDY
Golf Course
Medford Lakes
CORP BDY
Lower Atsion Lake
Upper Atsion Lake
Lake Mirage-Muskud
STOKES
Papoose Lake
Lake Stockwell
COMPATH
ROAD
ATSION
Jackson Hill
GRAVELLY
Lookout Tower
CREATED BY:
RICHARD A. ALAIMO ASSOCIATION OF ENGINEERS
MAY 2007
FIGURE 3
SOURCES: BURLINGTON COUNTY ENGINEERING,
MUNICIPAL BOUNDARIES, USGS TOPOGRAPHY

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

In addition to typical area water quality issues, the Borough has experienced streams and stormwater quality problems including flooding, stream bank erosion, and diminished base flow in its streams. Subsequent to devastating flooding which occurred on July 12, 2004, Medford Lakes in cooperation with NJDEP, the US Army Corps of Engineers and FEMA have embarked on a program to repair/replace and to address related storm flow problems in the Borough. As the impervious cover increases, the peak and volumes of stream flow also increases. An increased amount of water can result in stream bank erosion, which leads to unstable areas at roadway/bridge crossings, and degraded stream habitats. There has been a relatively small increase in impervious cover within the Borough over the last twenty (20) years.

Wellhead protection areas, which are required as part of the MSWMP, are shown in Figure 2. A map of the groundwater recharge rates is shown in Figure 4.
Figure 4: Groundwater Recharge Rates and Wetlands

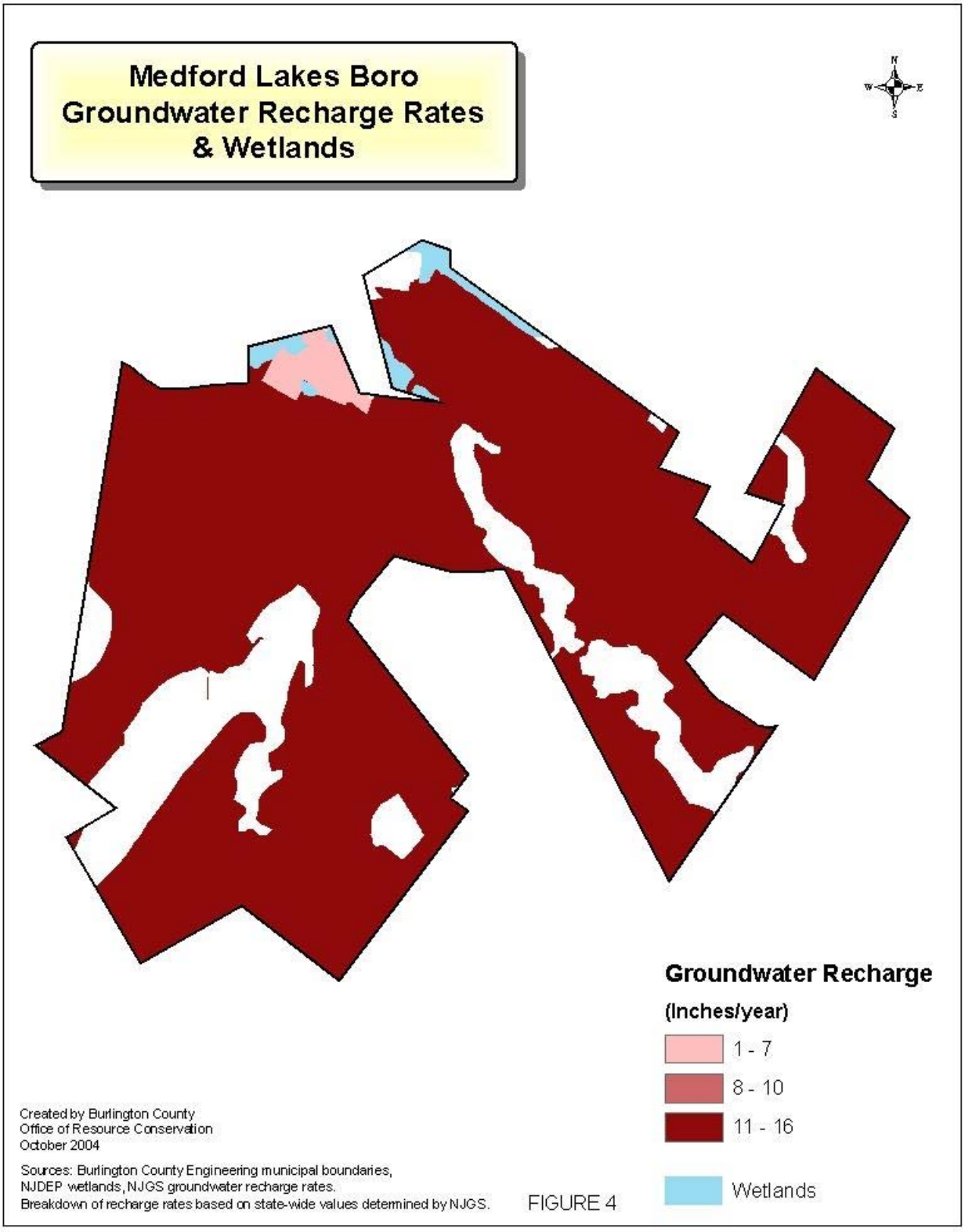

Medford Lakes Boro
Groundwater Recharge Rates
& Wetlands
N
W
E
S
Groundwater Recharge
(Inches/year)
1 - 7
8 - 10
11 - 16
Wetlands
Created by Burlington County
Office of Resource Conservation
October 2004
Sources: Burlington County Engineering municipal boundaries,
NJDEP wetlands, NJGS groundwater recharge rates.
Breakdown of recharge rates based on state-wide values determined by NJGS.

FIGURE 4

Design and Performance Standards

The Borough will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be adopted by the Borough and submitted to the county for review and approval in accordance with statutory requirements.

A draft Stormwater Control Ordinance is included in Appendix A. The design and performance standards adopted by the Borough for the Pinelands Area will be consistent with those of the Pinelands Comprehensive Management Plan. Medford Lakes Borough will adopt a Stormwater Control Ordinance consistent with the statewide stormwater requirements at NJAC 7:8 and the regulations and standards contained in the Pinelands Comprehensive Management Plan at NJAC 7:50.

During construction, Borough inspectors will observe the construction of the project to verify that the stormwater management measures are constructed in conformance with approved plans.

Plan Consistency

The Borough is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Borough; therefore this plan does 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 and the Pinelands Comprehensive Management Plan (N.J.A.C. 7:50-6.84). The municipality will utilize the most current update of the RSIS in the stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS and the Pinelands Comprehensive Management Plan.

The Borough’s Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey’s Soil Erosion and Sediment Control Standards. During construction, Borough inspectors will observe on-site soil erosion and sediment control measures and stop construction until reported inconsistencies to the local Soil Conservation District are addressed.

Nonstructural Stormwater Management Strategies

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

Chapter 3 of the Borough Code, entitled Subdivision of Land; chapter 2 site plan; and Chapter 1 Zoning (Land Development Ordinance) were reviewed with regard to incorporating nonstructural stormwater management strategies. Several changes additions and updates will need to be made to section 520 of Chapter 1, entitled “Stormwater Management” to incorporate these strategies; sections 1400 and 1401 in chapter 2 entitled “Site Plan Review Guidelines” and “Required Preliminary and Final Site Plan Details”; and Sections 2201 and 2202 “Preliminary Plat: Major Subdivision”, and “Final Plat: Major Subdivision”. Furthermore, chapter 4: Design Standards will need to be amended, in particular Article III Section 2700 et.seq. “Stormwater Management”. Acceptable definitions will also need to be added or amended in section 200 of chapter 1.

Land Use/Build-Out Analysis

A detailed land use analysis for the Borough was conducted utilizing information about the Borough based on HUC14 boundaries. A hydrologic unit code 14 (HUC14) is a specific drainage area defined by the U.S. Geological Survey. The total land area (1.20 square miles) of Medford Lakes Borough is contained within two (2) HUC14s and is illustrated on Figure 2. For every land use zone located within each HUC14, pollutant loads were calculated based on developable area in the zone and the allowable impervious cover in the zone excluding NJDEP mapped wetland areas. Figure 4 illustrates the NJDEP mapped wetlands within the Borough, the existing land use in the Borough based on 1995/97 GIS information from NJDEP and the Borough zoning map respectively. The build-out calculations for impervious cover are shown in Table 1. Table 2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table 3.

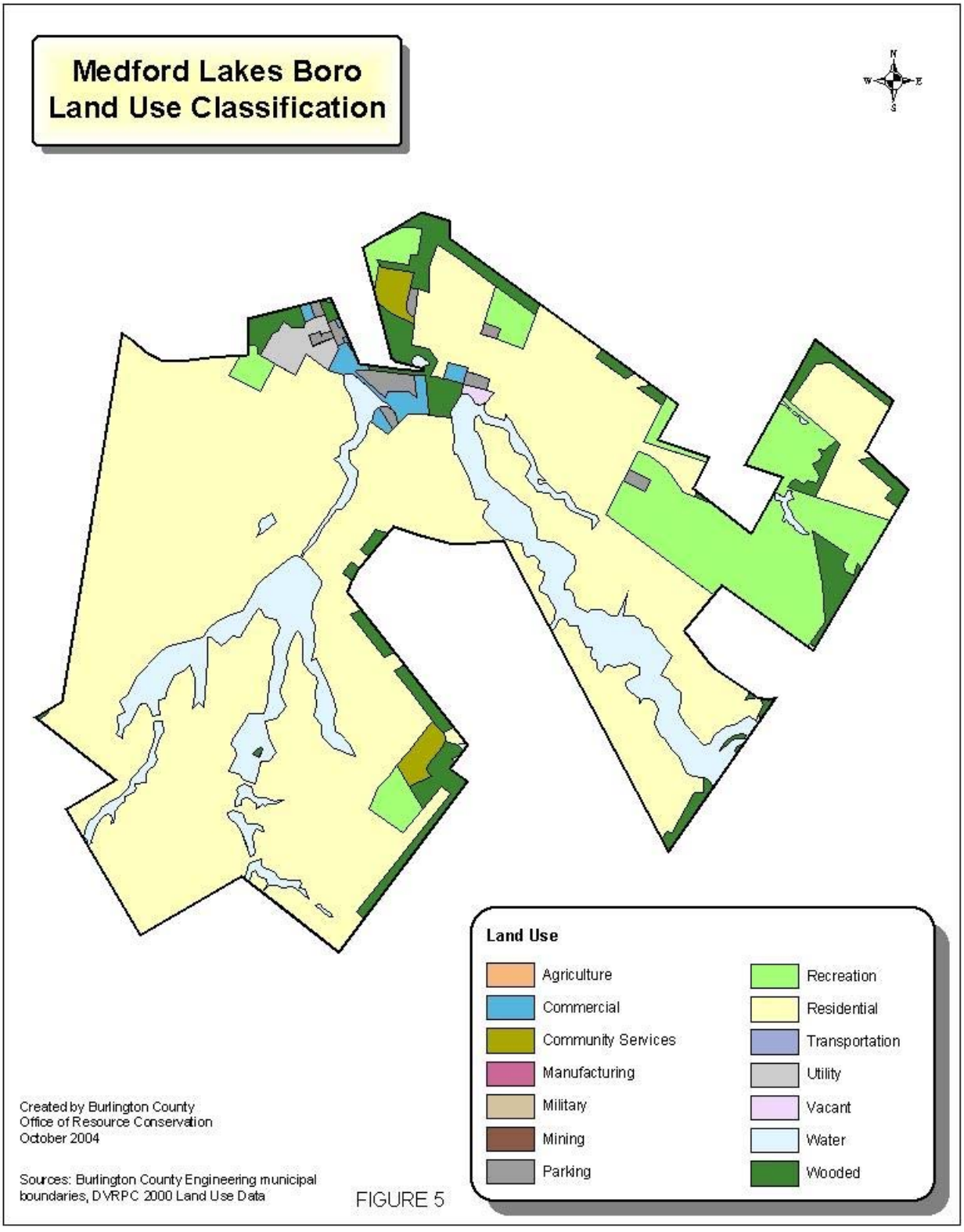

Medford Lakes Boro
Land Use Classification
N
W
E
S
Land Use
Agriculture
Commercial
Community Services
Manufacturing
Military
Mining
Parking
Recreation
Residential
Transportation
Utility
Vacant
Water
Wooded
Created by Burlington County
Office of Resource Conservation
October 2004
Sources: Burlington County Engineering municipal boundaries, DVRPC 2000 Land Use Data

FIGURE 5

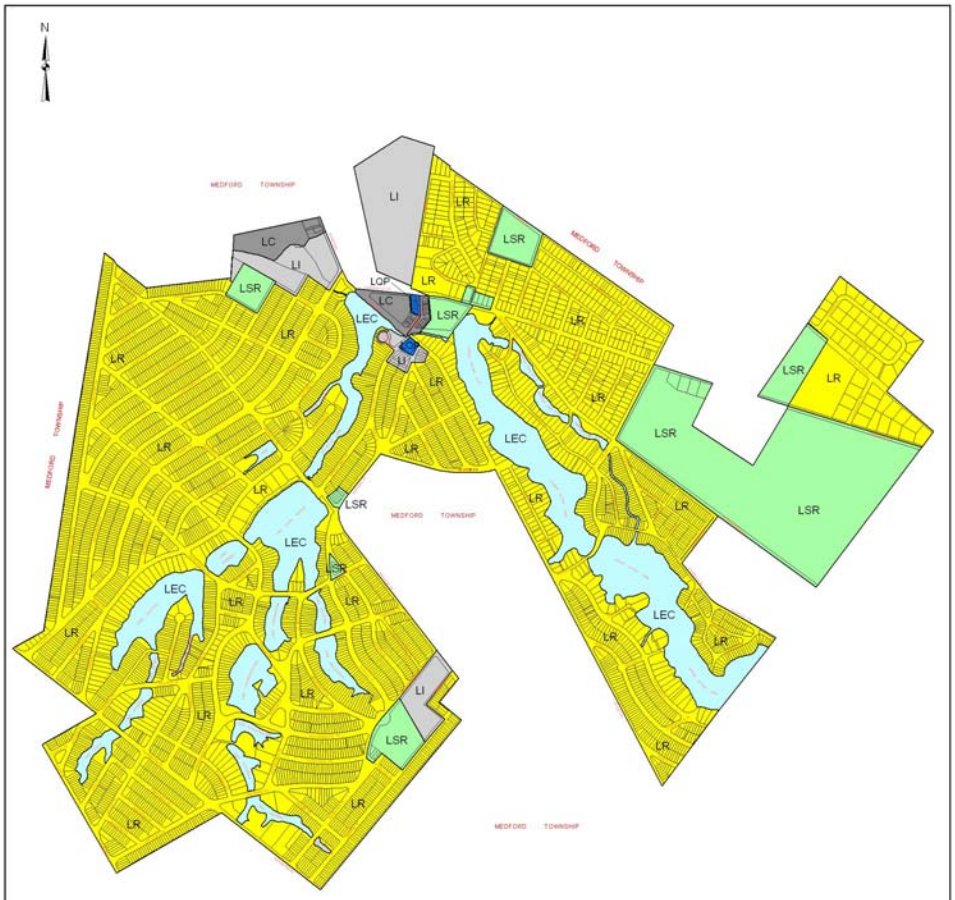

N
MEDFORD TOWNSHIP
LI
LC
LSR
LR
LQP
LEC
Legend
LR Lakes Residential
LC Lakes Commercial
LI Lakes Institutional
LEC Lakes Environmental Conservation
LQP Lakes Quasi-Public
LSR Lakes Suburban Reserve
ZONING PLAN
MEDFORD LAKES BOROUGH
BURLINGTON COUNTY, NEW JERSEY
SCALE: 1" = 400'
NOTES:
1. PARCEL MAPPING FROM BURLINGTON COUNTY DEPT. OF INFO. TECH. UPDATED FEBRUARY 2001.
2. ROAD NAMES FROM BURLINGTON COUNTY DEPT. OF INFO. TECH. GPS CENTERLINE OF ROADS DATA FILE UPDATED APRIL 2002.
3. THIS MAP IS A GIS REPRESENTATION OF THE ZONING MAP.

FIGURE 6

TABLE 1
MEDFORD LAKES BOROUGH BUILDOUT CALCULATIONS

HUC14 and Zone	Total Area (Acres)	Wetlands/ Water Area (Acres)	Developable Area (Acres)	Allowable Impervious (%)	Build-Out Impervious (Acres)
02040202060070					
Lakes Institutional (LI)	0.30	0.21	0.09	60%	0.05
Lakes Residential (LR)	41.22	0.40	40.82	32%	13.06
Lakes Suburban Reserve (LSR)	39.25	0.00	39.25	5%	1.96
TOTALS	**80.77**	**0.61**	**80.16**	**19%**	**15.08**
02040202060030					
Lakes Commercial (LC)	9.24	2.97	6.27	60%	3.76
Lakes Environmental Conservation (LEC)	95.56	0.00	95.56	0%	0.00
Lakes Institutional (LI)	33.04	5.24	27.80	60%	16.68
Lakes Quasi-Public (LQP)	0.87	0.00	0.87	60%	0.52
Lakes Residential (LR)	536.37	1.49	534.88	32%	171.16
Lakes Suburban Reserve (LSR)	52.71	0.00	52.71	5%	2.64
TOTALS	**727.79**	**9.70**	**718.09**	**27%**	**194.76**

TABLE 2

Table 2: Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
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 BUILDOUT FOR MEDFORD LAKES BOROUGH

HUC14 and Zone	Build-Out Zoning	Developable Area (Acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
02040202060070								
Lakes Institutional (LI)	Commercial	0.09	2.1	0.19	22	1.98	200	18.00
Lakes Residential (LR)	Forest, Water, Wetlands	40.82	0.1	4.08	3	122.46	40	1,632.80
Lakes Suburban Reserve (LSR)	Low Density, Rural Residential	39.25	0.6	23.55	5	196.25	100	3,925.00
TOTALS		**80.16**		**27.82**		**320.69**		**5,575.80**
02040202060030								
Lakes Commercial (LC)	Commercial	6.27	2.1	13.17	22	137.94	200	1,254.00
Lakes Environmental Conservation (LEC)	Forest, Water, Wetlands	95.56	0.1	9.56	3	286.68	40	3,822.40
Lakes Institutional (LI)	Industrial	27.80	1.5	41.70	16	444.80	200	5,560.00
Lakes Quasi-Public (LQP)	Industrial	0.87	1.5	1.31	16	13.92	200	174.00
Lakes Residential (LR)	High, Medium Density Residential	534.88	1.4	748.83	15	8,023.20	140	74,883.20
Lakes Suburban Reserve (LSR)	Low Density, Rural Residential	52.71	0.6	31.63	5	263.55	100	5,271.00
TOTALS		**718.09**		**846.19**		**9,170.09**		**90,964.60**

Mitigation Plan *Reserved*

Mitigation Project Criteria
Reserved

Groundwater Recharge
Reserved

Water Quality
Reserved

Water Quantity
Reserved