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MUNICIPAL STORMWATER MANAGEMENT PLAN

LAKEWOOD TOWNSHIP OCEAN COUNTY, NEW JERSEY

LAKEWOOD PLANNING BOARD

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**STORMWATER MANAGEMENT PLAN
TOWNSHIP OF LAKEWOOD**

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1.0 INTRODUCTION

The Township of Lakewood has consulted with Birdsall Engineering, Inc. (BEI) to devise a Municipal Stormwater Management Plan (MSWMP) for the Township. This MSWMP outlines a strategy for Lakewood to alleviate the Township's stormwater management problems through the incorporation of more stringent stormwater policies within their Land Use Regulations. The creation of this MSWMP is required through N.J.A.C. 7:14A-25 Municipal Stormwater Regulations, which were proposed in the New Jersey Registrar on January 6, 2003, and made effective on February 2, 2004. This plan also includes a Stormwater Control Ordinance (Appendix A) which would incorporate both the goals of this plan and the new stormwater management standards into existing Township's regulations by applying the newly adopted design standards to "Major Development", which includes development or redevelopment projects that either disturb one or more acres of land, or proposes to add ¼ acre or more of impervious surface.

This plan will incorporate all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules as well as the nine planning goals that should be addressed when devising municipal level stormwater management plans (N.J.A.C. 7:8-2.2). Further, the plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating the newly adopted stormwater design and performance standards for new major development proposals. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow to receiving water bodies. Also, to reduce the discharge of pollutants to the maximum extent practicable and protect water quality, the plan incorporates the six control measures outlined within the Phase II New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rules (N.J.A.C. 7:14A).

To accomplish these ends, Birdsall Engineering has completed a review of the Township's existing ordinances, the Lakewood Township Master Plan, and other planning documents to ensure that nonstructural stormwater management techniques have been integrated into these documents to the maximum extent practicable. Also included is a Mitigation Plan (Section 6.4) that allows Lakewood Township, in limited circumstances, to waive the strict compliance of one or more of the stormwater management design and performance standards where full compliance cannot be reasonably accommodated on site. Finally, this MSWMP also describes the methods that Lakewood Township is employing to ensure the long term operation and maintenance of both its existing and future stormwater management facilities.

2.0 GOALS AND OBJECTIVES

To improve water quality, reduce the risk of flooding, and in turn improve the quality of life for residents of Lakewood, the incorporation of more stringent stormwater management techniques have been identified as a priority by both state and local level government agencies. The new stormwater management requirements and best management practices will advance the goals and objectives of the New Jersey Department of Environmental Protection and Lakewood Township itself. A number of goals and objectives stated within the Lakewood Master Plan. They include:

- Through public and private endeavors, preserve environmentally sensitive areas including stream corridors, wetland areas, woodlands and other environmentally sensitive lands and waters.
- Protect and preserve existing green space and parkland.
- Encourage the development of additional parkland in both the downtown area and more remote residential neighborhoods.
- Limit the permitted disturbance of natural features, including tree clearance, during land development.
- Promote awareness of businesses that may produce environmental concerns such as water quality and pollution impacts.
- Encourage the establishment of a waterway protection system and the protection of endangered wildlife species.

Further, the New Jersey Department of Environmental Protection (NJDEP) has established a minimum set of goals and objectives that all municipal stormwater management plans should follow, they include to:

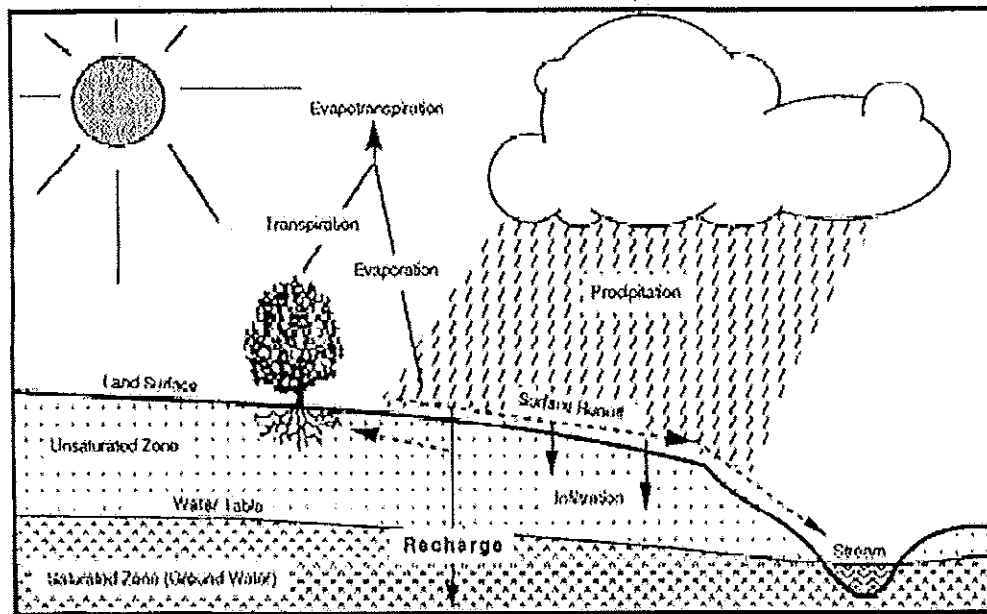
- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other 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 examines the most pressing stormwater related issues facing Lakewood, and in turn proposes possible amendments to the Township's design and performance standards to incorporate a more comprehensive code for managing stormwater. Further, in accordance with NJAC 7:8-5.6, preventative and corrective maintenance strategies are included in the plan to ensure the long-term effectiveness of stormwater management facilities, and the plan also outlines safety standards for stormwater infrastructure that will be implemented to protect public safety. Lastly, by examining the Township's history, demographics, and current conditions concerning water quality, water quantity, and flooding issues, a clearer picture can be drawn in regards to what the stormwater management issues are at this time, and what type of policy amendments should be taken to improve them.

3.0 EFFECTS OF STORMWATER RUNOFF

The hydrologic cycle is defined as the constant cyclical movement of water from the ground to the atmosphere and back to the ground. As illustrated by the figure below, this process includes evaporation, transpiration, evapotranspiration, condensation, transport, precipitation, infiltration, percolation, surface runoff, interflow, and groundwater flow. Land development has a dramatic effect on the natural function of this process.

GROUNDWATER RECHARGE IN THE HYDROLOGIC CYCLE



Source: New Jersey Geological Survey Report GSR-32.

Prior to development, native vegetation acts to both intercept falling precipitation, and return water that has infiltrated into the ground through evapotranspiration. By clearing vegetation, compacting soil, and replacing it with impervious cover, lawns, or landscaping, the development process serves to reduce the natural rate of water that may infiltrate into the soil, and in turn evapotranspiration.

In developed areas, following a precipitation event, both the volume and the rate of stormwater runoff will increase in proportion to the amount of additional impervious cover generated through a given development. Often streets, gutters, channels and storm sewers, are the tools with which this additional stormwater is carried to local waterways. These man-made stormwater management tools transport water more quickly which causes the stormwater flows in downstream waterways to peak faster and higher than would be produced in a natural state.

The increased peak flow during and shortly after a precipitation event produces greater fluctuations between normal and storm flow rates, which can increase channel erosion.

| Table 1: The Effect of Impervious Cover on Runoff | |
|---|---|
| Share of Land With Impervious Cover | Share of Rainwater that Becomes Runoff |
| 0% (natural state) | 10 % |
| 10-20% | 20% |
| 35-50% | 30% |
| 75-100% | 75-100% |
| Source: NJDEP <i>Planning for Clean Water: The Municipal Guide</i> Trenton, NJ 2000. | |

Not only does the development process increase the peak rate of stormwater flows, the addition of impervious cover also results in water pollution. Pollutants carried within stormwater runoff can take the form of nutrients such as nitrogen and phosphorous which encourage the growth of algae in downstream water ways, or trash and oils that accumulate on sidewalks and roadways between precipitation events. In locations where stormwater sewers discharge runoff directly into a stream, the aggregate accumulation of sediment and pollutants that are carried within it are dumped directly into local waterways. In addition to the chemical and physical contaminants, runoff from impervious systems also requires another form of pollution, heat. When rain falls on pavement that has collected heat through the day, the temperature of runoff can reach as high as 83 degrees Fahrenheit, which is sufficiently warm enough to damage sensitive plant and animal species. Table 2 below, includes a comprehensive list of the possible pollutants contained within untreated stormwater flows.

Table 2: Pollutants Carried in Stormwater

The following pollutants collected and carried in stormwater runoff can seriously degrade water quality in the community:

Nutrients- Include nitrogen and phosphorous, which plants need to grow. However, high levels can cause a health hazard in drinking water and stimulate excessive aquatic plant growth, which can ultimately lower dissolved oxygen levels in the water, causing fish and other aquatic life to smother. Algae blooms are examples of how excess nutrients pollute. Sources of excess nutrients include animal waste, fertilizers, septic systems, road salt applications and auto emissions. About half of the fertilizers applied to lawns in the New Jersey coastal zone enter streams and head to the bay and ocean.

Pathogens- Are disease causing bacteria and viruses associated with the presence of fecal matter. They affect human health directly when people contact contaminated water and consume shellfish. Sources include failing septic systems, animal waste, and boat sanitation facilities.

Sediment- Is fine particles of eroded soil or sand. Common origins are concentrated, excessive stormwater runoff from construction sites. Sediment smothers aquatic habitat, carries pollutants bound to soil particles, makes water cloudy and inhibits the breeding and movement of aquatic species.

Toxic Contaminants- Include pesticides as well as heavy metals such as copper, lead and zinc which are commonly found in old paint, tires, lawn chemicals and preservatives. They attach to sediments, resist breakdown, accumulate in organisms and represent threats to the food chain.

Debris- Consists of various items of trash, such as old tires, shopping carts and plastics. It comes from illegal dumping, street litter, and boating waste. It threatens aquatic life and detracts from recreational and aesthetic values.

Oil- Is one of the worst offenders. One gallon of oil dumped down a storm drain can create a slick up to 8 acres and may pollute up to 1 million gallons of water.

Thermal Stress- From elevated water temperatures reduces survival rates and disease resistance of valued native species and allows the spread of non-native (exotic) species. Water temperature rises because of increased pavement near streams, loss of vegetated stream buffers and stream channelization.

Source: Association of New Jersey Environmental Commissions (1998, Spring). *ANJEC Report*

4.0 CURRENT CONDITIONS

4.1 SETTING

The Township of Lakewood is located in northern Ocean County, east of Jackson Township, west of Brick Township, north of Dover Township and south of Howell Township. The Township maintains excellent regional highway access and is served by the Garden State Parkway, Route 9, Route 70, Route 88 and numerous County Routes. Additionally, freight rail service is provided to the industrial parks, and there is a continued desire for a passenger rail station in the downtown area. Access to educational, employment and tourism facilities is possible through the six (6) New Jersey Transit (NJT) bus routes that traverse the municipality. Lakewood Township also operates the Job Link Bus Service. This multi-stop route connects downtown Lakewood to the 2,200 acre Industrial Park and other employment centers. Furthermore, Lakewood Airport, which is located within the Industrial Park, services the Township and the region. A significant portion of the Township south and southeast of the Jersey Southern Railroad right-of-way is under the jurisdiction of the Coastal Area Facilities Review Act (CAFRA), which is illustrated in Figure 2-Waterways Map. The Township hosts several large parks including the Ocean County Park, and is home to Georgian Court University and the largest Rabbinical School in the Country, Beth Medrash Govoha. In addition, the Township has a designated Urban Enterprise Zone (UEZ), a Foreign Trade Zone, and several Redevelopment Areas.

4.2 DEMOGRAPHICS

The Township of Lakewood is a highly diverse and developed municipality. The Township has a land area of 24.82 square miles, and has grown from a small, sleepy town to a bustling community of 60,352 residents as of the 2000 census.

Development in Lakewood has been a recent event, with over 90% of homes built in the last half century. Lakewood has had a steady population increase since the 1940's, and the population increased by more than 15,000 people between 1990 and 2000. The North Jersey Transportation Planning Authority (NJTPA) forecasts continued population growth into 2015, to a population of 73,395. The Township's population density of 2,431.8 persons per square mile surpassed both the County (803 p/sm) and the State (1,134 p/sm) averages. Though the Township has had rapid population growth since 1970, the population growth is projected to slacken as Lakewood reaches build-out in the upcoming decades.

| Table 3: Lakewood Township Population Characteristics | | |
|--|-------------------|-----------------|
| Year | Population | % Change |
| 1970 | 25,223 | N/A |
| 1980 | 38,464 | 52.5% |
| 1990 | 45,048 | 17.1% |
| 2000 | 60,352 | 34% |
| 2005 (Projected) | 67,912 | 12.5% |
| Source: Ocean County Department of Planning: <i>Cross Acceptance-Final Report</i> , February, 2005. http://www.co.ocean.nj.us/planning/stateplan/18_Lakewood_Twp.pdf | | |

4.3 WATERWAYS

KETTLE CREEK

As it flows eastward, the Kettle Creek crosses through the southerly portion of Lakewood Township before it moves through Brick Township and empties into Barnegat Bay. Several tributaries of the Kettle Creek including the Tarkilm Branch and the Green Branch also traverse the Township. Due in large part to the highly developed nature of its watershed, the Kettle Creek is subject to flooding after bouts of heavy precipitation. Also, the creek and its stream corridors have incurred a substantial amount of contamination. As the Kettle Creek passes under New Hampshire Avenue in Lakewood Township, it was deemed "moderately impaired" in the State of New Jersey's 1998 List of Impaired Water Bodies.

METEDECONK RIVER

The Metedeconk River forms the northern boundary of Lakewood Township. The rivers 232.1 km² watershed, which flows from forested wetlands in the headwaters through densely populated portions of Lakewood, provides drinking water to about 100,000 homes in both Ocean and Monmouth Counties. Several branches of the Metedeconk including the: Schoolhouse, Cabinfield, Watering Place, and Cedar Bridge, also flow through Lakewood Township.

On November 3, 2003, the NJDEP proposed additional amendments to the SWQS at N.J.A.C. 7:9B-1.15, to classify the Metedeconk River a C-1 waterbody based upon its "exceptional water supply significance". The South branch of the Metedeconk, all of its tributaries, as well as the North branch of the Metedeconk as it passes between Aldrich Road and Lanes Mills in Lakewood have now been granted Category One status. As such, these water bodies are now subject to more rigid land development standards regarding buffering and impervious area, which include a 300 foot buffer requirement for all land development proposals. The portions of Lakewood that are subject to these regulations are illustrated in Figure 2-Wetlands Map.

The land use regulations have been implemented as a response to the detrimental impact land development has had on water quality in Lakewood and across the State of New Jersey. Land development within the Cabinfield Branch of the Metedeconk, which flows through the northern portion of Lakewood Township has aggravated the threat of flooding along the waterway, and also degraded water quality. Recently a Stormwater Management Report along a critical segment of the Cabinfield Branch where known impairments exist was completed by Birdsall Engineering, Inc. (BEI). The critical segment is a ±1,000 foot stretch of the watercourse located in the headwaters region, east of Squankum Road (County Route 547) and west of the NJ Transit railroad right-of-way, where its base flow is generated from groundwater, direct precipitation, and stormwater runoff. This critical segment of the Cabinfield Branch is of an appropriate size to ensure that the proposed stormwater management and water quality measures will have a significant, quantifiable impact on improving water quality within the watershed.

The report, which served as a significant first phase towards improving the water quality and regulating the flow of stormwater throughout the watershed proposed the following improvements:

- **Inflow Structures:** It is proposed to combine the two outfalls pipes into one conduit with an outfall relocated in an area where it can be easily accessed for regular maintenance and inspection. The plan involves combining the two flows at a catch basin, which is to be constructed at the existing curblin within the Squankum Road right-of-way. All flows would then be conveyed to a water quality structure. The maximum flow, which can be treated through this structure, is 70 cfs. Flows from larger storm events will bypass treatment within the structure, and outfall directly to the stream.
- **Stream Cleaning:** Stream cleaning activity will include the removal of sediment and foreign debris along the streambed and within its lower banks. Additionally, dead and decaying vegetation shall be pruned and removed.
- **Outlet Structures:** The proposed outlet structure is to be replaced. The new structure is to be equipped with a 3 inch diameter orifice to enhance water quality. The storm event used to analyze water quality is a 2.5" rainfall occurring uniformly for 2 hours. Once the water surface elevation of the water quality storm was established (56.30), a second stage spillway grate is proposed at this elevation to accommodate more flows from the greater storms. The downstream pipe from the new outlet structure will be a 36" diameter asphalt lined steel pipe with a design slope of 1%.
- **Slope Improvements:** The area in the vicinity of the outfall structures is to be cleared of overgrown vegetation, regraded at a slope not to exceed ten percent (10%) and stabilized with 3/4" blue stone surface. This will be done to provide ease of access for routine maintenance and inspection.

These recommendations to alleviate flooding occurrences and improve water quality are restricted to the Cabinfield Branch. However, degraded water quality and occurrences of flooding in Lakewood extend beyond just this watershed. In the future, initiatives that have been identified in the Township's Mitigation Plan (Section 6.4) are encouraged to be utilized to fund stormwater management improvement projects to assist Lakewood in achieving the goals it has set to improve water quality and reduce the risk of flooding throughout the Township.

LAKE CARASALJO

Lake Carasaljo is a man made reservoir that can be viewed from Route 9 near its junction with Route 88, and along much of the winding North and South Lake Drives. The lake is an extremely popular site among both residents and visitors of Lakewood. The lake has a trail surrounding it, a beach and recreation area on its north side, footbridges at both ends, and a "safety pond" designed for ice-skating. Adjoining it to the south is another body of water, Lake Manetta.

LAKE SHENANDOAH

Lake Shenandoah is contained within the 149 acre Lake Shenandoah County Park, which is owned and maintained by Ocean County Department of Parks and Recreation. The 100 acre, trout stocked lake is the focal point of the park which includes fishing piers, an on-site bait-and-tackle shop with boat rentals, a bike trail and conservation area. The lake recently suffered a tragedy when, on June 4, 2004, runoff from a fire that destroyed two Main Street businesses in Lakewood contaminated Lake Shenandoah and killed thousands of fish. The contaminated runoff entered the sewer system in Lakewood, and entered a stream that runs directly into Lake Shenandoah. Although they may not have avoided the contamination of this catastrophe, more stringent water quality techniques are vital to the sustenance of the lake as it flows into the Metedeconk River, which has now been adopted as a Category One waterway.

4.4 WATER QUALITY

Water quality will remain a critical factor to maintain a high quality of life for residents of the Lakewood community. As stated within the objectives of the Lakewood Master Plan, the utilization of additional stormwater management techniques to maintain and improve water quality have been identified as a priority by the Township. Specifically, these stated objectives include “through public and private endeavors, preserve environmentally sensitive areas including stream corridors, wetland areas, woodlands and other environmentally sensitive lands and waters” and also “to encourage the establishment of a waterway protection system and the protection of endangered wildlife species.”

Changes in Lakewood’s landscape have increased stormwater runoff volumes and pollutant loads to waterways that flow through the Township. Environmental concerns have brought about the development of studies, programs and networks intended to monitor the health of waterways and aid in determining methods to mitigate pollution where it is encountered. Among many programs, 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 now 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 upon a standardized inspection process. The data is used to generate a New Jersey Impairment Score (NJIS). According to these scores, a studied waterway is then classified as “non-impaired”, “moderately impaired”, or “severely impaired”. These designations are determined by the following criteria:

| Table 4: New Jersey Department of Environmental Protection AMNET Program Waterway Classification Criteria | |
|--|--|
| Non-Impaired | Benthic community comparable to other undisturbed streams within the region. A community characterized by a maximum taxa richness, balanced taxa groups and good representation of intolerant individuals. |
| Moderately Impaired | Macroinvertebrate richness is reduced, in particular EPT taxa. Taxa composition changes result in reduced community balance and intolerant taxa become absent. |
| Severely Impaired | A dramatic change in the benthic community has occurred. Macroinvertebrates are dominated by a few taxa that are very abundant. Tolerant taxa are the only individuals present. |
| Source: New Jersey Department of Environmental Protection Bureau of Freshwater and Biological Monitoring (NJDEP/BFBM): http://www.state.nj.us/dep/wmm/bfbm/ . Accessed: March 30, 2005. | |

Based on AMNET data, the south branch of the Metedeconk River at Cedar Bridge Road in Lakewood has been deemed “unimpaired”. However, further downstream, along the south branch, the benthic macroinvertebrate community was found to be “severely impaired”, and the site was allocated to Sublist 5 on the State’s Integrated List of Waterbodies. The Kettle Creek at New Hampshire Avenue in Lakewood was also tested through the AMNET program, but the benthic macroinvertebrate data was insufficient to determine an impairment status at the site.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. 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. The integrated list is divided into five different sublists. The following table illustrates how those sublists were determined:

| Table 5: New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d) Integrated List) Sublist Criteria | |
|---|---|
| Sublist 1 | Attaining a water quality standard and no use is threatened. |
| Sublist 2 | Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened. |
| Sublist 3 | Insufficient or no data and information to determine if any designated use is attained. |
| Sublist 4 | Impaired or threatened for one or more designated uses but does not require the development of a TMDL. (Three Categories). 1. TMDL has been completed. 2. Other enforceable pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future. 3. Impairment is not caused by a pollutant. |
| Sublist 5 | The water quality standard is not attained. The waterbody is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL. |
| Source: New Jersey Department of Environmental Protection: http://www.state.nj.us/dep/wmm/sgwqt/wat/integratedlist/integratedlist2004.html . Accessed March 30, 2005 | |

Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDL’s are needed. A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant such as

stormwater and wastewater discharges, which require an NJPDES permit to discharge, and non-point sources, which interfere with stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of new ordinances, reforestation of stream corridors, retrofitting stormwater systems and other BMP's.

Kettle Creek, the Metedeconk River, and Lake Carasaljo were all listed on The New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(b)). Within Lakewood, the north branch of the Metedeconk River does not attain water quality standards for both temperature and pH. When more than one pollutant impairs an individual waterway, said waterway will remain on Sublist 5 until TMDL's for all pollutants are established and approved by the USEPA. Lake Carasaljo is also included on Sublist 5 due to excessive mercury levels in fish. This testing was completed by the NJDEP, which conducts fish tissue monitoring as part of the department's Clean Lakes program.

Further, as a number of waterways within Lakewood are tributaries of the Metedeconk River, a Category One waterbody, certain subwatersheds within Lakewood Township have been designated Special Resource Protection Areas (SPRA). As such, these areas are subject to more stringent stormwater management regulations pursuant N.J.A.C. 7:9B. These regulations require 300-foot buffers and additional best management practice techniques to be incorporated into new development that takes place within these designated HUC-14 subwatershed areas. Also, a small portion of the southeast corner of Lakewood falls within the Barnegat Bay watershed, which is also a Category one waterbody, and whose tributaries have also been designated as SRPA's. As illustrated through Figure 2-Wetlands Map, a significant portion of Lakewood Township is already subject to these more stringent regulations as over two thirds of the Township has been classified as Special Resource Protection Areas.

Lakewood Township and the Metedeconk Watershed in general will continue to face pressure to develop land. As development and in turn impervious cover continues to increase, stormwater related issues such as maintaining water quality, reducing impervious cover, and improving groundwater recharge will become even more crucial in order to attain the goals and objectives of both Lakewood Township and the State of New Jersey.

Also, on September 23, 2003 a TMDL for Fecal Coliform was established for the North Branch of the Metedeconk River at Lakewood. The TMDL established that Fecal Coliform Levels Shall Not Exceed a Geometric Average of 200 CFU/100 ml, nor should more than 10 percent of the total samples taken during any 30-day period exceed 400 CFU/100 ML. Within the TMDL report for this location, the EEPA has recommended that, as the watershed is currently generally urban in nature, being comprised of mixed commercial and residential facilities. However, there are also many horse farms along the stream and geese were observed on inactive farm fields. There is a golf course within the watershed that may attract Canada geese. As such, within the

TMDL release, the EPA recommends that a fecal survey be undertaken to narrow the scope of the major sources of impairment as a first step towards improving the Fecal Coliform impairment levels within the north branch of the Metedeconk.

IMPERVIOUS COVER/ POLLUTANT LOAD ANALYSIS

In compliance with the Stormwater Management Rules, the NJDEP has requested that municipalities with over one square mile of vacant and/or agricultural land complete an analysis of additional pollutant loadings that would be incurred by waterways within that municipality at full build out, according to current zoning provisions. This analysis would utilize baseline impervious coverage data that has been published digitally in a GIS format within the NJDEP's 1995/1997 Land Use/Land Cover data set. The analysis would then project additional pollutant loadings in the form of Phosphorous, Nitrogen and Total Suspended Solids (TSS), according to the maximum amount of impervious coverage, which is allowed within each zoning designation in each of the Township's HUC-14 subwatersheds, which were illustrated in Figure 2-Wetlands Map.

Understanding the concept of impervious cover is essential to understanding how stormwater is managed and how it affects waterways. Impervious cover is defined as the sum total of all hard surfaces within a watershed including rooftops, parking lots, streets, sidewalks, driveways, and surfaces that are impermeable to infiltration of rainfall into underlying soils/groundwater. Impervious cover changes the natural landscape and is a major influence on aquatic resources because instead of allowing precipitation to permeate the ground, it runs off. Figure 4-Groundwater Recharge Map, illustrates the recharge rates for lands within Lakewood. Also, Figure 5-Soils Map, illustrates the soils that are present in the Township.

Generally the more impervious surface that is present within a watershed, the less stormwater is able to permeate back into the soil and eventually back into the groundwater table. As the amount of impervious coverage expands, so to does the amount of runoff that is discharged into adjacent waterbodies and sediment that is deposited into these streams. Further, studies show a direct correlation between the percentage of impervious cover in a watershed and the level of degradation to aquatic organisms. Streams that are degraded due in part to the high percentage of impervious surfaces within their watersheds are often prone to larger and more frequent floods (which cause property damage as well as ecological harm) and lower base flows (which degrades or eliminates fish and other stream life, as well as diminishes the aesthetic of the stream). Impervious surfaces also raise the temperature of runoff, which reduces dissolved oxygen in the stream, harms some gamefish populations, and promotes excess algal growth. In sum, the unintended results of urban development attributed to imperviousness include:

- Removal of natural storage, retention, and recycling of precipitation
- Significant increases in overland runoff into surface waters
- Decreases in stream base flow and groundwater recharge
- Widening of stream channels

- Increases in floodwater velocities
- Increases in the magnitude and frequency of flooding
- Channel morphology changes because of the altered hydrology

Since impervious cover has such a strong influence on stormwater runoff and water quality, Lakewood Township has completed an analysis to critically examine the effect that the expansion of impervious cover has had on pollutant loads in the Township's waterways.

In order to assess the current and plan for the future effects impervious coverage has had on degrading water quality, Lakewood has undertaken an analysis to calculate the amount of impervious cover that currently exists in the Township and also the maximum amount of impervious coverage that is allowed by the Township's Land Use Ordinance. In turn, from these figures Lakewood was able to project both the existing and the maximum pollutant loads that can be imposed on the Township's waterways. As illustrated through the table below the results of the Pollutant Loading Analysis that was completed for the Township indicates very high existing pollutant loads, and ea large future, additional pollutant loadings that will be imposed on waters within the Township due to the additional more impervious cover.

The pollutant loading analysis was completed according to criteria set for the by the New Jersey Department of Environmental Protection based on the New Jersey Department of Environmental Protection's (NJDEP) Land Use/Land Cover file, the NJDEP HUC-14 watershed boundary data layer, and also file that contained the Township's zoning designations were incorporated into ArcView 9.0, a Geographical Information System (GIS).

As anticipated, the projected pollutant load levels in the Township at full build out would stand to be substantially higher than the projected current pollutant load that is transported through the Township by its waterways. To determine the extend to which pollutants will affect each HUC 14 subwatershed, multipliers projecting the additional Phosphorous, Nitrogen, and Total Suspended Solids to be incurred by land use type, which are included in Appendix D of this report, which are also available in the NJDEP's Best Management Practices Manual, were used to project both the current and the maximum additional pollutant loads at build out. Table 6 below provides a summary of pollutant loads within each of the Township's HUC-14 watersheds according to existing impervious cover, and also projects future pollutant load levels at full build out. The pollutant load projection multipliers as well as the complete pollutant load build out analysis table have been included within this report in Appendix D.

Table 6: Lakewood Township Pollutant Loading Analysis Results

| HUC 14 Watershed | Acres | Existing Impervious Acres | TP* | TN** | TSS*** | Maximum Additional Impervious Acres | TP* | TN** | TSS*** |
|------------------|---------------|---------------------------|--------------|---------------|----------------|-------------------------------------|---------------|----------------|------------------|
| 02040301020020 | 1,092.57 | 316.84 | 428.97 | 4,528.06 | 43,337.60 | 654.03 | 679.94 | 7,458.35 | 72,020.04 |
| 2040301030040 | 3,956.45 | 687.51 | 909.57 | 9,575.19 | 98,637.0 | 2,505.78 | 1,693.74 | 19,274.55 | 227,522.70 |
| 2040301030040 | 3,664.57 | 767.76 | 1,110.72 | 11,672.73 | 115,336.60 | 1,994.46 | 1,560.98 | 17,341.76 | 209,817.40 |
| 02040301030050 | 4,126.08 | 819.60 | 1,298.12 | 13,744.51 | 139,058.60 | 2,445.38 | 1,286.78 | 16,578.13 | 183,001.00 |
| 02040301060060 | 123.70 | 18.14 | 9.01 | 90.14 | 1,102.80 | 104.49 | 40.52 | 462.37 | 5,783.0 |
| 2040301040020 | 2,633.92 | 422.09 | 573.02 | 6,000.35 | 70,085.20 | 1,921.58 | 754.16 | 24,590.69 | 123,013.20 |
| 2040301060070 | 2,006.19 | 94.53 | 107.44 | 1,071.30 | 14,050.40 | 1,863.94 | 521.86 | 7,794.11 | 115,882.40 |
| 02030105156080 | 534.48 | 99.50 | 164.91 | 1,725.81 | 16,735.00 | 417.96 | 216.59 | 2,668.97 | 33,977.20 |
| 02030105050010 | 1,417.97 | 702.79 | 1,036.75 | 10,849.98 | 115,542.80 | 2,067.30 | 1,432.11 | 14,786.90 | 172,341.60 |
| 2030105050020 | 891.37 | 148.22 | 631.91 | 4,550.4 | 42,807.8 | 3,753.31 | 7,067.60 | 51,431.18 | 485,494.40 |
| TOTAL | 20,447 | 4,077 | 6,270 | 63,808 | 656,694 | 17,728 | 15,254 | 162,387 | 1,628,853 |

*TP= Total Phosphorous (lbs./acre/year)

**TN= Total Nitrogen (lbs./acre/year)

***TSS=Total Suspended Soils (lbs./acre/year)

Since there are no specific limitations on impervious cover by zone in Lakewood, the pollutant loading analysis, which is summarized above, one hundred percent (100%) was the maximum allowable impervious coverage allowed from the remaining undeveloped property within the Township. As there are currently no specific limitations on impervious coverage for zoning designations within the Township, through this analysis it is evident that the expansion of impervious cover on currently vacant lots threatens to further impair the Township's waterways. However, with the adoption of Ordinance 2006-11, Lakewood has taken a proactive approach to enforce more stringent water quality, water quantity, and groundwater recharge requirements for new major development applications to minimize the threat that new development poses on exacerbating the current stormwater management and flooding issues within Lakewood. However, in order to control the amount of impervious cover that may be developed on parcels within the Township, Lakewood is also encouraged to adopt impervious coverage limits for each zoning designation.

4.5 WATER QUANTITY

Lakewood Township has exhibited water quantity problems including flooding, stream bank erosion, and many of the culverts associated with road crossings in the Township are undersized. As such, the design of culverts have been cited as a contributor to both the frequency and the severity of stormwater flow flooding, which is experienced in several locations in the Township. Lakewood's most pressing stormwater quantity management issues are discussed in greater detail below in Section 4.6 *Flooding & Proposed Solutions*.

Also, the continuous expansion of impervious surfaces in the Township has significantly decreased groundwater recharge, and in turn contributed to the stormwater management issues that exist in Lakewood. The average annual groundwater recharge rates are shown graphically in

Figure 5- Ground Water Recharge Areas. New Jersey Geologic Survey (NJGS) estimates groundwater recharge using methodology from NJGS Report GSR-32 "A Method for Evaluation of Ground-Water-Recharge Areas in New Jersey". Land-use/land-cover, soil and municipality-based climatic data were combined and used to produce an estimate of ground-water recharge in inches/year. Recharge was then ranked by volume (billions of gallons/year) using natural breaks in the percentage of total volume.

Wellhead protection areas, also required as component of the MSWMP, are illustrated in Figure 6-Wellhead Protection Areas. According to the NJDEP, "A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two, five, and twelve-year period of time for unconfined wells. ...The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations" (see NJAC 7:10-11.7(b) 1). Well Head Protection Area delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP program. However, it is important to note that the NJDEP's Wellhead Protection Mapping effort only includes wellhead protection areas for public supply wells. As such, individual home or property owner wells are excluded.

To assess Lakewood's current potable water supply system, the Bureau of Safe Drinking Waters Water Supply Administration, within the New Jersey Department of Environmental Protection administers the Source Water Assessment Program (SWAP). According to the 2004 Source Water Assessment Report for Lakewood, the Township receives potable water from 2 different entities. The first, NJ American Water Company (NJAWC) is a public community water system. The system draws water from one surface water intake source and does not draw from any wells under the influence of surface water. NJAWC also, purchases potable water from two ground water sources, and two surface water sources. Source water comes from the following aquifers and/or surface water body's: Englishtown aquifer system, Kirkwood-Cohansey water-table aquifer system, Mount Laurel-Wenonah aquifer, NJWSA Manasquan System, Potomac-Raritan-Magothy aquifer system, upper Potomac-Raritan-Magothy aquifer, and the Vincentown aquifer. The other remaining well taps the Raritan Formation on Sunset Road, requiring treatment for iron deposits. In 1997, the company installed water mains north from Lakewood to interconnect with the company's Howell Service Area, which enabled the company to pump surface water from its Oak Glen Water Treatment Plant in Howell for consumption in Lakewood. In addition, NJ American Water Company purchases water from the following water systems: Route 9 & Route 70 in Dover Township, Route 9 near the Metedeconk River Crossing, the Jackson Township MUA, and along Route 88 at the Victor Lakewood apartments.

The second potable water supply source for residents, the Lakewood Township MUA, is a public community water system consisting of 9 well(s) The system draws water from zero wells under the influence of surface water, zero surface water intakes, 2 purchased ground water sources, and zero purchased surface water sources. This system's source water comes from the following aquifers and/or surface water body's: Potomac-Raritan-Magothy aquifer system, Englishtown aquifer system, Kirkwood-Cohansey water-table aquifer system Also, this system purchases water from the following water systems: Brick Township MUA, and NJAWC-Lakewood.

Also, independent water-quality laboratories regularly test water samples from around the Township. The results of these water tests show no contaminants present that contain maximum contaminants levels (MCL's), as established by Federal and NJ State government agencies. Under Federal law, all water users now receive an annual report on the quality of their drinking water, listing only the contaminants that are detected in the water.

4.6 FLOODING & PROPOSED SOLUTIONS

The portions of Lakewood that are affected by excess stormwater flows extends beyond the floodplains since many of the existing structural stormwater management facilities cannot sustain the flow of water created from severe storm events. During these events, the existing facilities do not have adequate capacity, thereby causing a backwater effect and increased flooding upstream. The increased amounts of stormwater result in stream bank erosion, undercutting, scouring, overbank erosion, habitat loss and degradation of roadways and bridge crossings. Lakewood's stormwater management capacity deficit is a result of the continually increasing amount of impervious surfaces throughout the Township.

Also, many of the culverts in the Township are undersized. These culverts were designed for much different hydrologic conditions (i.e., less impervious area) than presently exist both within and upstream of Lakewood. Through the adoption of more stringent stormwater management regulations, and the implementation of the Township's Mitigation Plan, a coordinated systematic system of retrofitting and reconstruction to improve stormwater flooding and quality management will emerge.

Further, several areas located along the Cabinfield Branch of the Metedeconk River have experienced flooding from stormwater flows. In order to reduce the risk of flooding and improve the management of stormwater, Lakewood Township recently consulted Birdsall Engineering to complete a Stormwater Management Report for the area. Lakewood Township's Mitigation Plan will be utilized to implement the recommendations contained within the Cabinfield Branch study.

Finally, Lakewood actively addresses drainage and flooding issues and they arise and are reported by residents. Each year Lakewood includes drainage improvements as part of their Capital Improvement Program. As such, most of the reported flooding and drainage problems

have been corrected. However, Lakewood will continue to utilize this program, along with its Mitigation Plan, which is included within this report as Section 6.4, as tools to remediate the most pressing flooding and stormwater management issues that face the Township.

5.0 STORMWATER MANAGEMENT

5.1 INFRASTRUCTURE

Lakewood Township receives 46 inches of rain in an average year. To manage the public risk that flooding imposes on residents, a substantial stormwater management system has been developed. As illustrated earlier through Table 2, the pace, amount, and condition of the water that finds its way into local waterways is in large part determined by the amount of impervious cover the land contains. With less absorption of rainwater into the ground, the increased runoff moves faster and collects more pollutants from the surface, which promotes erosion, damages stream banks, and in turn dumps sediment into streambeds.

N.J.A.C. 7:8 spells out guidelines for how to manage stormwater more effectively and also how to incorporate best management practices into the planning stages of project design. These standards now require stormwater detention capacity to hold and slowly release the runoff from storms that have a likelihood of occurring once every two, ten and one hundred years. Some sites may be able to achieve these standards through vegetative swales, buffers, and landscaping to control non-point source pollution. Other sites may require the building of a structural stormwater management facility. In situations where the development of structural stormwater facilities is necessary, the NJDEP's Best Management Practice Manual should be consulted as it outlines alternatives and strategies to incorporate Best Management Practices into a projects site design. Possible alternatives include surface structures such as Infiltration Basins, Vegetative Filters, and Pervious Paving Systems as well as subsurface measures such as Sand Filters. These BMP's are strongly encouraged to be incorporated into the Township's existing stormwater management infrastructure to enhance groundwater recharge, and reduce the velocity and amount of runoff that originates on site; thus improving the quality and reducing the quantity of stormwater that originates within Lakewood.

Also, Low Impact Development techniques, which coincide with the goals and functions of Stormwater Management BMP's, include additional means to promote the goals stated within this Municipal Stormwater Management Plan. When practical, incorporating such techniques as maximizing the amount of pervious land to be preserved, utilizing native vegetation for replanting, adding curb cuts to detain and filter stormwater, and using vegetated buffers are also encouraged.

5.2 STORM DRAINS

The Township has an annual Capital Improvement Program through which infrastructure improvements are designed and constructed. The construction or reconstruction of drainage best management practices, and stormwater management improvements are included in this program.

Further, to inform the public of the presence of storm drains, Lakewood Township is initiating a storm drain labeling program. Due to the urban nature of the Township, and to ensure the safety of the individuals that perform the labeling process, this procedure will be completed by the Township's Public Works department. The labeling program will include all storm drain inlets that are along municipal streets with sidewalks, and all storm drain inlets within plazas, parking areas, or maintenance yards that are operated by the Township of Lakewood. By April of 2007, the Township will have labeled over 50% of all storm drain inlets, and by April 2009, all storm drain inlets located in the above referenced areas will be labeled.

Lakewood has also initiated programs to more effectively maintain and manage its existing stormwater infrastructure as Township initiated a storm drain outfall pipe mapping program. Storm drain outfall locations will also be mapped. For management purposes, the Township of Lakewood has been divided into two sectors: Sector A is the area west of US Route 9, (Lakewood Road/River Road/Madison Avenue), and Sector B is the area east of US Route 9. Sector A will be mapped by April 2007, and Sector B will be mapped by April of 2009. The Public Works department will use a GPS unit to map out the location of the end of all outfall pipes operated by the Township that discharge into a surface waterbody within the Township's jurisdiction. They will identify, GPS, map, and investigate each outfall pipe that is located. Once all the outfall locations have been established, a map will be developed displaying these outfall pipe locations, with an alphanumeric identifier for each outfall pipe. All the waterbodies receiving outfall pipe discharges will also be identified on the map. The outfall pipes will be mapped on a tax map prepared in accordance with Title 18, Chapter 23A of the New Jersey Administrative Code or another map drawn to an equal or larger scale. Through the future, as new development and/or redevelopment changes the current storm sewer system through the creation of new outfalls, these maps will be updated accordingly.

Lakewood Township will also investigate the storm drains for illicit connections and will check outfall pipes for signs of scouring. The Township will begin performing the initial inspection of outfall pipes within 18 months of the EDPA (by October 1, 2005) and will complete the initial physical inspection of all outfall pipes within 60 months of the EDPA (April 2009). The Township will use the NJ Department of Environmental Protection (NJDEP) Illicit Connection Inspection Report Form to conduct these inspections, and each of these forms will be kept within the SPPP records. Outfall pipes that are found to have dry weather flow or evidence of an intermittent non-stormwater flow will be investigated to locate the illicit connection. If the Township is able to locate the illicit connection (and the connection is located within Lakewood), the responsible party will be cited, and the connection will be eliminated

immediately. If an illicit connection is found to originate from another public entity, the Township of Lakewood will report the illicit connection to the NJDEP.

As part of its illicit connection elimination program, Lakewood is also checking outfall points for signs of scouring. All sites where scouring is observed will be placed on a prioritized list and repairs will be made in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey. Those repairs that do not need NJDEP permits for implementation may be done first. Each repair will be followed up to ensure that scouring has not resumed. This program will be implemented in conjunction with the illicit connection elimination program by October 1, 2005 (within 18 months of the EDPA).

Further, Lakewood Township will implement a stormwater facility maintenance program to insure that all stormwater facilities operated by the Township are functioning properly, as it will implement an annual catch basin cleaning program to maintain catch basin function and efficiency. Through this program, all catch basins will be inspected once a year even if the facility had been found to be "clean" the previous year. At the time of cleaning, the catch basins will also be inspected for proper function, and maintenance will be performed on those facilities that are not operating to capacity. The catch basin cleaning and maintenance will be recorded through the " Stormwater Facility Inspection and Maintenance Log", which will be submitted to the NJDEP annually.

5.3 STORMWATER BASINS

Most of the stormwater management system within Lakewood Township relies on storm drains. However, there are two types of stormwater basins and both are present in Lakewood. First, "detention basins" are built strictly to detain the stormwater for a period of time, while releasing water at a slow and controlled rate. They are designed to be dry between storm events. A second type of basin that is designed to manage stormwater flows is a "retention basin". These basins are designed to stay "wet" by retaining a permanent pool so as to mimic a natural pond or lake. Over the past quarter century, as the number of subdivisions have multiplied in the Township, so to have the number of stormwater basins. Many of the existing basins in Lakewood are suited to be retrofitted to accommodate more volume, or to improve the quality of stormwater that is dispended into the basin. Due to their potential to improve the quality and manage the quantity of stormwater that enters the basin, the retrofitting of existing stormwater basins have been identified by the Township as a priority for potential mitigation projects and are identified as such within the Township's Mitigation Plan, which is included as Section 6.4 of this report.

Together, these coordinated stormwater basin operation and maintenance programs will enable Lakewood to improve the way stormwater is managed in the Township. Through mapping, maintenance, and retrofitting of the Township's existing stormwater infrastructure, Lakewood will begin to alleviate the threat of flooding, protect potable water supplies, and improve the quality of stormwater that enters local waterways.

5.4 WATERSHED

The Township of Lakewood is contained within the Metedeconk River and Kettle Creek watersheds, both of which are part of the larger Barnegat Bay watershed system. The United States Geological Service has developed a method for identifying and inventorying watersheds in the U.S. called the hydrologic unit code system. Through this system all U.S. watersheds have a name and a corresponding number, this number is called the hydrologic unit code (HUC) or watershed address.

The term "HUC-14" is from the hydrologic unit code system for delineating and identifying drainage areas. The system starts with the largest possible drainage area (basin) and progressively breaks it down into smaller subdivisions (subbasins, watersheds and subwatersheds respectively). These subdivisions are delineated and numbered in a nested fashion. A drainage area with a 14 numbered address, or HUC-14, is a subwatershed of a larger watershed with 11 numbers, or a HUC-11. There are 921 HUC-14 subwatersheds in New Jersey that average 8.5 square miles. There are 150 HUC-11 watersheds in New Jersey with an average size of 51.9 square miles. A statewide graphic depiction of the breakdown of these watershed areas is available at: <http://www.nj.gov/dep/watershedmgmt/hucmap.htm> (Source: NJDEP – Division of Watershed Management).

Lakewood Township is located within the bounds of 10 different HUC-14 subwatersheds. Five of these HUC-14 subwatershed areas eventually drain into the Metedeconk River and as such, have been classified as Special Resource Protection Areas. Specifically these watersheds have been identified as HUC-14 unit codes 02040301030040 Metedeconk River-South Branch (Route 9 to Bennets Pond), 02040301030050 Metedeconk River-South Branch (Confluence to Route 9) 02040301030050 Metedeconk River-North Branch (confluence to Route 9), 02030401020020 Metedeconk River-North Branch (Route 9 to I-195) and 02030401040020 Metedeconk River (Beaverdam Creek to Confluence). Also, a small portion of the southeast corner of Lakewood is located within HUC 14 unit code 02030401060020 Kettle Creek (below Lake Riviera Outlet), as these subwatersheds drain into the Barnegat Bay, a designated Category One waterbody, they are designated as Special Resource Protection Areas (SRPA's). The three remaining HUC-14 subwatersheds within Lakewood that have not been designated as Special Resource Protection are 02040301060070 Toms River (Route 70 to Hope Chapel Road), 02040301060080 Toms River (Oakridge Parkway to Route 70), and 02040301050010 Kettle Creek (above Lake Riviera outlet). These subwatershed areas are all illustrated on Figure 2-Wetlands Map.

6.0 DESIGN AND PERFORMANCE STANDARDS

To minimize the adverse impact of stormwater runoff on water quality, water quantity and the loss of groundwater recharge in receiving water bodies, the Township will adopt design and performance standards that comply with the stormwater management measures as presented in N.J.A.C. 7:8. The design and performance standards include amended language for the inclusion

of maintenance requirements, and safety standards consistent with N.J.A.C. 7:8-6. The ordinances will be submitted to the County for review and approval within 24 months of the effective date of permit authorization (EDPA).

Further, by amending their current Land Use Regulations, it is the intention of the Township of Lakewood to incorporate both structural and nonstructural stormwater management strategies as presented in N.J.A.C. 7:8-5 to the maximum extent practicable. So as to minimize the adverse impact on water quality which is imposed by stormwater runoff, the proposed amendments to the Township's current development regulations include the incorporation of stricter stormwater management guidelines relating to water quantity, water quality, and groundwater recharge as identified in the design and performance standards as presented in N.J.A.C. 7:8-5. Further, by amending their current Land Use Regulations, it is the intention of the Township of Lakewood to incorporate both structural and nonstructural stormwater management strategies as presented in N.J.A.C. 7:8-5 to the maximum extent practicable.

Said regulations address erosion control, groundwater recharge, runoff quantity standards, stormwater runoff quality standards, standards for calculating stormwater runoff and groundwater recharge, structural stormwater management standards, and maintenance requirements, as stated above. The major development must meet the established design and performance standards set forth in the Soil Erosion and Sediment Control Act.

Major developments must also meet one of two standards for groundwater recharge (N.J.A.C. 7:8-5.4(a)2.): (1) maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site or (2) infiltrate the increase in the stormwater runoff volume from pre-construction to post-construction for the two-year storm. For water quality (N.J.A.C. 7:8-5.5), stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in the stormwater runoff generated by the water quality design storm by 80 percent of the anticipated load from the major development.

To control stormwater runoff quantity impacts (N.J.A.C. 7:8-5.4 3.), a major development must meet one of three design standards: (1) demonstrate at no point in time that the post-construction runoff hydrograph exceed the pre-construction runoff hydrograph, (2) demonstrate there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10, 100-year storm event and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site, and (3) demonstrate the postconstruction peak runoff rates for the 2, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction runoff rates. However, for stormwater water runoff quantity requirement (3), stream encroachment standards (N.J.A.C. 7:13-2.8) will require for the 100-year storm event 75 percent of the pre-construction peak runoff rates. Prior to adoption, these ordinances will all be submitted to the Ocean County Planning Board for review and approval within 24 months of the EDPA.

The second set of rules is the Phase II New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rules (N.J.A.C. 7:14A). These Rules are intended to address and reduce pollutants associated with existing stormwater runoff. The Rules establish a regulatory program for existing stormwater discharges as required under the Federal Clean Water Act. These rules govern the issuance of permits to entities that own or operate small municipal separate storm sewer systems, known as MS4s. Under this program permits must be secured by municipalities, certain public complexes such as universities and hospitals, and State, interstate and Federal agencies that operate or maintain highways. The permit program establishes the Statewide Basic Requirements that must be implemented to reduce nonpoint source pollutant loads from these sources. The Statewide Basic Requirements include measures such as: the adoption of ordinances (litter control, pet waste, wildlife feeding, proper waste disposal, etc.); the development of a municipal stormwater management plan and implementing ordinance(s); requiring certain maintenance activities (such as street sweeping and catch basin cleaning); locating discharge points and stenciling catch basins; and a public education component.

In compliance with these regulations, owners or operators of MS4's are be required to develop and implement a stormwater management program designed to reduce the discharge of pollutants to the maximum extent practicable and protect water quality.

Control measures are expected to include, at a minimum, the following components:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site storm water runoff control
- Post-construction storm water management in new development and redevelopment
- Pollution prevention/good housekeeping for municipal operations

6.1 IMPLEMENTING NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The implementation of non-structural Best Management Practices are strongly encouraged to be added to the Township's existing development regulations and applied to all new site design proposals. Whenever possible, the following nine strategies should be incorporated into site design:

- Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
- Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
- Maximize the protection of natural drainage features and vegetation;

- Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of Concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;
- Minimize land disturbance including clearing and grading;
- Minimize soil compaction;
- Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
- Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and
- Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
 - i. Site design features that help to prevent accumulation of trash and debris in drainage systems;
 - ii. Site design features that help to prevent discharge of trash and debris from drainage systems;
 - iii. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
 - iv. When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act N.J.S.A. 4:24-39 et seq., and implementing rules.

The Township of Lakewood's newly adopted Unified Development Ordinance (UDO), which is Chapter XVIII of the Township's Code, was reviewed to evaluate the extent to which non-structural stormwater management techniques have been implemented into the site design of a proposed development. This review included, but was not limited to existing provisions for Curbs and Gutters, Driveways and Accessways, Off-Street Parking and Loading, Streets, and Sidewalks. A summary of the of the pertinent provisions is presented below:

Section 807 Off Street Parking, Loading, and Circulation This section is encouraged to be amended to incorporate language to reduce the minimum parking space standards by land use minimum standards, incorporate shared parking requirements, or provide incentives for pervious materials to be used when practicable.

Section 814 Streets/Residential Site Improvement Standards This section states that curbs and sidewalks encouraged to promote the use of vegetated open swale conveyance, as opposed to standards curb and gutter system. Also, the Township is encouraged to enact and ordinance promoting the use of pervious pavement in sidewalks. Further, as there is no mention of

disconnecting impervious surfaces, Lakewood is encouraged to promote disconnecting large areas of impervious surface to promote groundwater recharge and pollutant removal.

Section 820 Environmental Impact Statement This section requires that every major site plan, and every application that consists of over 5,000 ft² of commercial space submit an Environmental Impact Statement. This section also states that site plans shall minimize adverse impact upon environmental elements such as the preservation of trees, protection of watercourses, topography, soil, and wildlife. As such, the natural features of a site shall be preserved, floodplains shall be respected, and excessive cuts, and the use of fill shall be avoided.

Section 822 Soil Removal and Grading This section states that no topsoil shall be removed within the Township of Lakewood. Also, in regards to grading, no construction or regrading shall be permitted which creates or aggravates water stagnation, siltation, or a drainage problem on adjacent properties.

Section 803 Landscaping and Buffers This sections states that that when a buffer area is required that they meet the provisions of this section, which pertain to the height, bulk, quantity and species of vegetation to be utilized in the buffer areas. This section of the ordinance is encouraged to be examined to determine the feasibility of utilizing these buffer areas as stormwater management tools to foster additional groundwater recharge on site.

As illustrated above, Lakewood has adopted a number of provisions to incorporate nonstructural stormwater management into their Land Development Regulations. However, several sections of the existing ordinance may be examined to determine if it is practicable to incorporate additional nonstructural stormwater management regulations into the Township's design standards. For example, the Township may consider revising its landscaping provisions to require the planting of native vegetation (which requires less fertilization and watering than non-native species) on site. Also, the Township is also encouraged to consider the feasibility of requiring a variance for existing single-family homes that propose additions that exceed the imposed maximum percent of impervious cover. Such a variance would require the homeowner to mitigate the impact of adding impervious cover unless the stormwater management plan provided for such an increase. If the plan does not accommodate such an increase the owner shall complete a proportionate mitigation measure alternative from the Township's Mitigation Plan

Further, Lakewood may examine the feasibility of amending their current design standards to incorporate language encouraging vegetated open swale conveyance as opposed to standard curb and gutter conveyance. Whenever feasible, the design standards may be amended to encourage pervious paving materials to be used in the construction of sidewalks and driveways. Also, applicants should be required to disconnect impervious surfaces, where practical, to promote pollutant removal and groundwater recharge. Although, additional amendments may be made, the Borough's existing provisions have been found to be compatible with N.J.A.C. 7:8-5.3 (Nonstructural Stormwater Management Strategies).

In addition, Appendix B provides a model ordinance that has been provided by the NJDEP to assist municipalities in drafting stormwater control ordinances that comply with the State's newly adopted stormwater management design and performance standards. Following the adoption of this plan a new Stormwater Management Control Ordinance per the NJDEP's new Stormwater Management Rules will be prepared and adopted by the Township. A number of additional provisions which are outlined in NJAC 7:8 including stormwater basin fees and maintenance, design standards pertaining to both structural and nonstructural methods that must be incorporated into a projects design, safety standards for stormwater basins, and maintenance and repair fees and responsibility will all be included within the amended ordinance. Upon completion, the ordinances will then be sent to the Ocean County Planning Board for review and approval within 24 months of the EDPA. A copy will also be sent to the Department of Environmental Protection at the time of submission.

6.2 IMPLEMENTING STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

As mentioned earlier, the NJDEP has implemented more rigid regulations regarding the volume, rate, and quality of stormwater originating on a new development site. Some sites may be able to achieve these standards through vegetative swales, and buffers, and landscaping to control non-point source pollution. Other sites may require the building of a stormwater basin. In these cases, where the development of structural stormwater facilities is necessary, the New Jersey Department of Environmental Protection's BMP guide should be consulted. The structural BMP's utilized in low impact development concentrate on the following practices to be utilized in site development in conjunction with the non-structural methods described above:

- Bio-retention Systems – A bioretention system consists of a soil bed planted with native vegetation located above and underdrained sand layer. It can be configured either as a basin or a swale.
- Constructed Stormwater Wetlands – Constructed wetlands are wetlands systems designed to maximize the removal of pollutants from stormwater runoff through settling and both uptake and filtering by the vegetation.
- Dry Wells - A dry well is a subsurface storage facility that receives and temporarily stores stormwater runoff from roofs and structures. Discharge of the accumulated stormwater from a dry well occurs through infiltration into the surrounding soils.
- Extended Detention Basins - An extended detention basin is a facility constructed through excavation or embankments that provides temporary storage of stormwater runoff. It has an outlet structure that detains runoff inflow and allows for controlled outflow to aid in mitigating stormwater flows from development. Usually this type of structure is utilized to provide both water quantity and water quality mitigation.
- Infiltrative Basins – Infiltration Basins are similar to detention basins in that they both temporarily store stormwater runoff generated from development project. The principal outlet to this type of basin is not a constructed outlet structure, but rather the highly permeable soils allowing for infiltration into the surrounding subsoils.

- Manufactured Treatment Devices – A manufactured treatment device is a pre-fabricated stormwater treatment structure utilizing settling, filtration, absorptive materials, vortex separation, vegetative components, and/or other appropriate technology to remove pollutants from stormwater runoff.
- Pervious Paving Systems – Pervious pavement utilizes paving material which allows for stormwater to infiltrate through the pavement rather than accumulate as is the case with standard paving material. Pervious pavement utilizes void areas within the paving material to provide for this permeable feature.
- Sand Filters – A sand filter consists of a forebay and an underdrained sand bed. Runoff entering the sand filter is conveyed first through the forebay, which removes trash, debris and coarse sediments, and then infiltrates through the sand bed to an outlet pipe at the bottom of said filter.
- Vegetative Filters – 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 vegetative filter strip. The vegetation in a filter strip can range from turf grass to woody vegetation.
- Wet Ponds - A wet pond is a facility constructed through excavation or embankments 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 promoting the settlement of pollutants.

Further, all structural stormwater management measures (structural BMP's) shall be designed according to the following conditions:

- They should take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).
- They should be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall be parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of N.J.A.C. 7:8-7.D.
- They should be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvements Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement.

- At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.
- Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section N.J.A.C. 7:8-7.
- Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by this subchapter.
- Manufactured treatment devices may be used to meet the requirements of this subchapter, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.
- In order to ensure adequate long term operation as well as preventative and corrective maintenance of stormwater management measures and structural BMP's, the designers of such facilities should submit to the municipality a *Maintenance Plan* indicating specific maintenance tasks and schedules as indicated in N.J.A.C. 7:8-5.8 "Maintenance Requirements". This maintenance plan will require the ultimate user of said structural BMP's to provide an annual certification that the stormwater management measures approved are functioning as designed and that the proper maintenance and inspection of said measures have been performed. Random spot inspections by the municipality will be conducted to ensure compliance along with appropriate enforcement actions such as fines to be levied should non-compliance result.

By adhering to the State's newly adopted design standards, the BMP's engineered for each proposed development project will serve to improve stormwater quality, enhance groundwater recharge, and reduce stormwater runoff. Combined, these facilities will protect the public interest by minimizing the risk of flooding and maintain the Township's water supply through the future.

6.3 PLAN CONSISTENCY

Upon review, the Lakewood Township Master Plan, its subsequent reexaminations, and the Township's Zoning Map have been found to be consistent with the principles of the State of New Jersey's newly adopted Stormwater Management Rules (NJAC 7:8-5.3). In addition, no lands in Lakewood are currently contained within the bounds of an adopted Regional Stormwater Management Plan (RSWMP). Therefore, at this time, it is not necessary for the amendments proposed in this plan to adhere to standards developed through the adoption of a RSWMP. However, a TMDL for fecal Coliform has been developed for the north branch of the Metedeconk River at Lakewood. Although no specific enforcing measures for this TMDL have been promulgated to date, if such measures are developed in the future, this MSWMP will be reviewed and updated accordingly.

Also, this Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) N.J.A.C. 5:21, and the Township will utilize the most current

update of the RSIS in the stormwater management review of residential areas. The new stormwater management design and performance standards that have been adopted by the State are already in effect for development application in the Township whose review falls under the purview of the RSIS. Further, any major development that requires a stream encroachment, freshwater wetlands, waterfront development, or Coastal Area Facility Review Act (CAFRA) permit from the NJDEP must also demonstrate compliance with the new stormwater management standards. It should be noted that all areas in the State of New Jersey that fall under the purview of the NJDEP's Coastal Area Facility Review Act are automatically required to comply with the State's more stringent stormwater standard provisions. Therefore, if a development application were to be submitted on a parcel in Lakewood and requests a waiver from the State's newly adopted stormwater management design and performance standards, the NJDEP may require compensatory mitigation to be completed either on the parcel site, or at a proximate location.

The Township's Stormwater Management Ordinance requires all new development and redevelopment plans to comply when necessary applications will be submitted to the Ocean County Soil Conservation District to ensure that that proposed project is consistent with New Jersey's Soil Erosion and Sediment Control Standards. Further, upon adoption, the Township's amended Stormwater Control Ordinance will ensure compliance with the Safety Standards for Stormwater Management Basins within N.J.A.C. 7:8-6.

6.4 MITIGATION PLAN

OVERVIEW

A municipal mitigation plan is an element of the Municipal Stormwater Management Plan that allows municipalities to grant a waiver from the design and performance standards for stormwater runoff quality, stormwater runoff quantity, and groundwater recharge established in N.J.A.C. 7:8-5, and adopted into the municipal stormwater control ordinance. The existence of a mitigation plan does not preclude the requirement that an applicant meet the design and performance standards for any one of the three key stormwater requirements, namely maintaining pre-development recharge, stormwater runoff quantity reduction and stormwater runoff quality. Instead, this mitigation plan, once it has been approved by the Ocean County Planning Board under the requirements of N.J.A.C. 7:8-4, will allow the Lakewood Township in limited circumstances to waive the strict compliance with one or more of the performance standards where full compliance cannot be reasonably accommodated on site. In addition, approval of a waiver or exemption from one of the three criteria outlined above provides no guarantee that, if requested, an exemption or waiver will be granted for either or both of the remaining criteria. However, under no circumstances shall Lakewood Township waive the Special Resources Protection Area (SRPA) established under the stormwater management rules at N.J.A.C. 7:8-5.5 (h).

Supporting evidence for an exemption or waiver shall be prepared in the form of a "stormwater management report" which will be signed and sealed by a New Jersey licensed professional engineer. The report shall include at a minimum:

- Detailed hydrologic and hydraulic calculations identifying the sizing criteria for each BMP and the stormwater collection system based upon the anticipated peak flow and/or volume.
- A map of the planned project showing existing conditions with drainage boundaries and land features, including delineated wetlands, proposed improvements, including all BMPs, grading, utilities, impervious features, and landscaping.
- Construction details for each BMP with appropriate contact information.

When applying for a waiver, the applicants professional engineer must first demonstrate that on-site compliance is either a) not possible, or b) possible but would result in tangible negative environmental or structural impacts. Such impacts may include:

- If the strict application of the regulations would result in a reduction of open space and/or undisturbed buffer areas. It is important to note that in this situation, the applicant must demonstrate that such reductions are caused by compliance with State and local regulations and not an attempt to maximize buildable area.

- The degradation of groundwater quality due to the infiltration of poor quality runoff. For example, if runoff from a shopping plaza with heavy traffic volume will be directed to a protected water supply aquifer to achieve compliance, alternative recharge locations may be more practical and environmentally sound.
- The modification to the elevation of the groundwater table due to rapid infiltration of stormwater will have demonstrable negative impacts on local structures and/or local groundwater quality. For example, rapid infiltration in a highly pervious soil near a basement may cause flooding and settlement; and also
- Flooding due to changes in the time of peak for a storm attenuated in compliance with *N.J.A.C. 7:8* and the *New Jersey Stormwater Best Management Practices Manual*. Despite the requirement for peak reductions to be applied to the 2-year, 10-year and 100-year events, peak runoff from a sub-basin of a HUC-14 may actually experience increases due to changes to peak timing.

An applicant may also propose a mitigation project on a site that has not been identified in this mitigation plan. However, in each circumstance the selection of a mitigation project must incorporate the following requirements:

- The project must be within the same area that would contribute to the receptor impacted by that project. If there is no specific sensitive receptor impacted, then the location of the mitigation project may be located anywhere within the municipality, preferably at a location that would provide the greatest benefit.
- Legal authorization must be obtained to construct the project at the location selected. This includes the maintenance and any access needs for the project throughout its operation.
- The mitigation project should be located close to the original development project. If possible, the mitigation project should be located 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 a project for which a waiver is obtained discharges to a tributary, but the closest location discharges to the main branch of a waterway, it may be more beneficial to identify a location discharging to the same tributary.
- 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.
- The project location must demonstrate no adverse impacts to other properties.

- For projects addressing the groundwater recharge performance standard, a mitigation project site upstream of the location of the actual project site is preferable to a downstream location.
- Mitigation projects that address stormwater runoff quantity can choose to provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction.
- Mitigation projects that address stormwater runoff quality can choose to address another pollutant other than TSS, which has been demonstrated to be of particular concern, such as streams that have been listed as an impaired waterbody for other pollutants. However, care must be taken to ensure that waivers that are granted for the TSS requirements do not result in the impairment of an existing unimpaired area.

All mitigation plans and reviews should consider the location of the mitigation project in relation to the property where the projected damage will occur. For example, if a project were unable to achieve the stormwater quantity performance standards upstream of an inadequate culvert, a mitigation project downstream of that culvert would not offer similar protection. Or, if the groundwater recharge is the major contributor to a wetlands area, the new project should continue to provide recharge to the wetlands area.

Also, in environmentally critical areas, the quality of stormwater that is being directed to infiltration facilities should be assessed. If the quality of stormwater that would be infiltrated following development poses a threat to groundwater supplies, off-site mitigation should be considered. Off-site mitigation should also be undertaken when on-site recharge is precluded by site conditions, or when stormwater quality assessments indicate that on-site stormwater infiltration will degrade ambient groundwater quality in environmentally sensitive areas. Environmentally critical areas include locations where groundwater is classified by the State as holding either special ecological significance, wellhead protection areas, areas of known groundwater contamination, or areas of on-going groundwater remediation. Groundwater recharge is of particular concern in areas discharging to Category 1 (C1) groundwater or in wellhead protection areas. Options for off-site groundwater recharge include:

- Retrofitting an existing stormwater basin
- Reducing the amount of impervious cover on site by adding vegetation or incorporating pervious paving materials
- Splitting flows to isolate high quality runoff and constructing infiltration basins to receive only the high quality runoff
- Acquiring upland recharge areas

SENSITIVE RECEPTORS

Within Figure 7, entitled Sensitive Receptor Map, Lakewood has indicated the sensitive receptor areas within the Township that are especially susceptible to stormwater changes. As many of the mitigation measures that will be employed to these sensitive receptor areas are in the planning and preliminary design stage, when appropriate, Lakewood will allow developers to fund studies to plan and engineer the most suitable mitigation measure for each project site, and each performance standard. An applicant may also provide compensatory mitigation through the contribution of funds when, due to the small amount of the waiver given for the performance standard, it is not practical to provide a full mitigation project. In these circumstances, the receipt of financial contributions shall be considered the completion of mandatory mitigation for that project. However, in these instances, Lakewood Township itself would be responsible to ensure that mitigation occurs based on the collection of these funds. If such a situation were to arise, a detailed description of the circumstances, funding amount and performance standard that was mitigated will be provided in Lakewood's annual NJPDES report.

MITIGATION CRITERIA

The mitigation requirements listed below offer a hierarchy of options that are intended to offset the effect on groundwater recharge, stormwater quantity control, and/or stormwater quality control to an equal or greater extent than was created by the granting of a waiver or exemption from the stormwater management requirements.

The mitigation criteria are listed below in order of preference:

- 1) **Identify, design, and implement a compensating measure to mitigate impacts-** The preferred option is to identify and develop a compensating mitigation project in the same drainage area as the proposed development. In these cases, the applicant will address the same issue within the design and performance standards for which the variance or exemption is being sought, and demonstrate that the proposed mitigating measures provide equal or greater compensation to offset the non-complying aspect of the stormwater management system on site. The developer must also ensure the long-term maintenance of the project as outlined in Chapters 8 and 9 of the NJDEP Stormwater BMP Manual. If the Township agrees to control a new stormwater management facility, arrangement in the form of an escrow account will be made to stipulate the payment amount, schedule, and long term responsibilities of the facility to ensure that it functions to capacity.
- 2) **Complete a project identified by the municipality as equivalent to the environmental impact created by the exemption or variance-** If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in option 1, the mitigation project may provide measures that are not directly equivalent to the impacts for which the

variance or exemption is being sought, but that addresses the same issue to an equal or greater extent. For example if a variance is given because the 80% TSS requirement has not been met, the selected project may address water quality impacts that increase the siltation of a waterbody within the applicable HUC 14 subwatershed.

Lakewood Township has identified the Cabinfield Branch of the Metedeconk River, which flows through the northern portion of Lakewood Township as the most pressing stormwater management problem within the Township. To remedy impaired water quality and the increased frequency and severity of flooding, specific mitigation alternatives for the most critical segment of the stream (a $\pm 1,000$ foot stretch of the watercourse located in the headwaters region, east of Squankum Road (County Route 547) and west of the NJ Transit railroad right-of-way) have been developed. Upon completion, these mitigative measures will have a significant, quantifiable impact on improving water quality and minimizing flooding potential not only within this critical segment, but also throughout the Cabinfield branch as a whole. The specific improvements that have been identified and prioritized are as follows:

1. **Inflow Structures:** To provide applicants with an opportunity to compensate for the Stormwater Quality, Stormwater Quantity, and Groundwater Recharge performance standards, an applicant may complete or contribute to a mitigation project that would combine two outfall pipes into one conduit and relocate them to an area where the facility can be more easily accessed for regular maintenance and inspection. This mitigation measure, which involves combining the two outfall flows at a catch basin, would be constructed at the existing curblin within the Squankum Road right-of-way. All flows would then be conveyed to a water quality structure. The maximum flow, which can be treated through this structure, is 70 cfs. Flows from larger storm events will bypass treatment within this structure, and outfall directly to the stream.
2. **Stream Cleaning:** An applicant who has documented hardship may also provide stream cleaning and or bank stabilization through the removal of sediment and foreign debris along the rivers streambed and within its lower banks, if they are able to document that the project will improve water quality to an equal or greater extent from which their proposed project was unable to attain the water quality standards that have been adopted by Lakewood Township. To improve water quality within the Cabinfield Branch an applicant may compensate by providing The stream cleaning mitigation alternative would improve water quality
3. **Outlet Structures:** An applicant who has documented hardship may also provide mitigation from the water quality design standards that have been adopted by the

Township by completing a mitigation alternative that would equip an outlet structure with a 3-inch diameter orifice in order enhance water quality. In addition, once the water surface elevation of the water quality storm was established, a second stage spillway grate is proposed at this elevation to accommodate more flows from the greater storms.

4. **Slope Improvements:** An applicant who has documented hardship from either the groundwater recharge, water quality, or water quantity stormwater design standards may also complete mitigation by providing slope improvements to areas located adjacent or proximate to the Cabinfield Branch. These improvements will be completed through the cleaning, grading, and stabilization of slopes in the vicinity of outfall structures that release into the waterway. This measure will be done to provide ease of access for routine maintenance and inspection.

As many of the developments in Lakewood were constructed with curb and gutter drainage, stormwater is often funneled and released directly into an adjoining waterbody. These engineering methods are contrary to the stormwater management BMP's that are outlined in the NJDEP's BMP Manual and recently endorsed through the adoption of the State's new stormwater regulations. Therefore, the retrofitting of many of the Township's existing basins can dramatically improve the Township's existing stormwater management infrastructure. To improve these facilities, a potential water quality project could utilize a number of Best Management Practices to offset a project that cannot comply with the new regulations including the construction of a vegetative filter strip or wetland basin. Constructed vegetative filter strips and/or wetland basins can be designed to maximize the removal of pollutants and stormwater runoff through wetland vegetation uptake, retention and settling prior to discharge. If an alternative mitigation measure such as the retrofitting of an existing basin, or the construction of additional structural stormwater BMP can sufficiently compensate the non-complying extent of the groundwater recharge, stormwater quality, or stormwater quantity management of a project can be identified and demonstrated by the applicant, than it is eligible to receive a waiver or exemption from the design and performance standards. Additional information concerning these mitigation projects can be obtained from the Lakewood Township Engineer or the Township's Director of Public Works.

First and foremost, the applicant that is unable to meet the water quality design and performance standards is encouraged to propose a compensatory mitigation project in the confines of the drainage area within which the proposed project is located. However, an appropriate mitigation measure may take place within the larger confines of a proposed projects HUC-14 subwatershed area, or another portion of the Township, rather than the contributing area if the Lakewood Township Planning Board or Zoning Board of Adjustment finds that the mitigation will equally protect public health, safety and welfare, the environment, and public and private property.

Also, the retrofitting of outfalls in the Township have been identified by the Lakewood as a mitigation alternative for applicants who are able to demonstrate that they are unable to meet the new stormwater design and performance standards due to hardship. The retrofitting of outfalls in the township along the Metedeconk River will serve to improve water quality and assist Lakewood in attaining the parameters that will be established through the TMDL for the north branch of the Metedeconk River to reduce Fecal Coliform levels in the waterbody. In particular the Township has identified the outfall along the Metedeconk that is located proximate to the old Jamesway store structure along Route 9 as being suited for retrofitting as it contributes contaminants, which degrade water quality in the River downstream of the outfall structure.

- 3) **Provide funding for municipal projects that would address existing stormwater impacts-** The third and least preferable stormwater mitigation option is for the applicant to provide funding or partial funding for an environmental enhancement project that has been identified in the Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The contributed funds must be equal or greater than the cost to implement the required on-site stormwater measure for which relief is requested including the cost of land, easements, engineering design, and long-term maintenance. However, with this option Lakewood Township, not the applicant is ultimately responsible for the design, property acquisition, construction, construction management, maintenance (short-term and long-term) and follow-up study, unless that project and its prospective costs have been outlined within this Mitigation plan.

REQUIREMENTS FOR MITIGATION PROJECTS

Whether the applicant is proposing the mitigation project, or Lakewood has identified the project within this Mitigation plan, the following requirements for mitigation must be included in the project submission.

- **Impact from noncompliance-** The applicant must provide a table to show the required values, and the values provided in the project, and include an alternatives analysis that demonstrates that on-site compliance was maximized to the greatest extent practicable.
- **Narrative and Supporting Information Regarding the Need for the Waiver-** The waiver cannot be granted for a condition that was created by the applicant. If the applicant can provide compliance with the stormwater rules through a reduction in the scope of the project, the applicant has created the condition and a waiver cannot be issued. The applicant must provide a discussion and supporting information of the site conditions that would not allow the construction of a stormwater management facility to provide compliance with these requirements, and/or if the denial of the application would impose an extraordinary hardship on the applicant brought about by circumstances peculiar to the subject property. The site conditions to be considered are soil type, the

presence of limestone, acidic soils, a high groundwater table, any other unique conditions that would create an unsafe design, as well as conditions that may provide a detrimental impact to public health, welfare, and safety.

- **Sensitive Receptor-** Identify the sensitive receptor related to the performance standard for which a waiver is sought. Demonstrate that the mitigation site contributes to the same sensitive receptor.
- **Design of the Mitigation Project-** Provide the design details of the mitigation project. This includes, but is not limited to, drawings, calculations, and other information needed to evaluate the mitigation project.
- **Responsible Party-** The mitigation project submission must list the party or parties responsible for the construction or maintenance of the mitigation project. Documentation must be provided to demonstrate that the responsible party is aware of, has authority to perform, and accepts the responsibility for the construction and the maintenance of the mitigation project. Under no circumstances shall the responsible party be an individual single-family homeowner.
- **Maintenance-** The applicant must include a maintenance plan that addresses the maintenance criteria at N.J.A.C. 7:8-5.6 as part of a mitigation plan. In addition, if the maintenance responsibility is being transferred to Lakewood Township, or another entity, the entity responsible for the cost of the maintenance must be identified. Lakewood provides applicants with the option of conveying the mitigation project to the Township, provided that the applicant funds the cost of long term maintenance of the facility in perpetuity.
- **Permits-** The applicant is solely responsible to obtain any and all necessary local, State, or other applicable permits for the identified mitigation project or measure. The applicable permits must be obtained prior to the municipal approval of the project for which the mitigation is being sought.
- **Construction-** The applicant must demonstrate that the construction of the mitigation project coincides with the construction of the proposed project. A certificate of occupancy or final approval by the municipality for the application permit cannot be issued until the mitigation project or measure receives final approval. Any mitigation projects proposed by the municipality to offset the stormwater impacts of the Township's own projects must be completed within six months of the completion of the municipal project, in order to remain in compliance with Lakewood's NJPDES General Permit.

FIGURES

APPENDIX A

**LAKWOOD TOWNSHIP STORMWATER
CONTROL ORDINANCE**

TOWNSHIP OF LAKEWOOD

ORDINANCE # 2006-22

AN ORDINANCE WITHIN ARTICLE VIII "DESIGN STANDARDS" OF THE TOWNSHIP OF LAKEWOOD'S LAND USE REGULATIONS AND ADOPTING A NEW SECTION 815.1 "STORMWATER MANAGEMENT/RESIDENTIAL SITE IMPROVEMENT STANDARDS" OF ARTICLE VIII "DESIGN STANDARDS"

SECTION 815.1

PURPOSE:

It is the purpose of this Ordinance to establish minimum stormwater management requirements and controls for "major development," as defined in section §815.1.1.

APPLICABILITY:

1. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review:
 - a. Non-residential major developments; and
 - b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards at N.J.A.C. 5:21.
2. This ordinance shall also be applicable to all major developments undertaken by the Township of Lakewood.

DESCRIPTION:

- §815.1.1 Definitions
- §815.1.2 General Standards
- §815.1.3 Stormwater Management Requirements for Major Development
- §815.1.4 Calculation of Stormwater Runoff and Groundwater Recharge
- §815.1.5 Standards for Structural Stormwater Management Measures
- §815.1.6 Sources for Technical Guidance
- §815.1.7 Safety Standards for Stormwater Management Basins
- §815.1.8 Requirements for Site Development Stormwater Plan
- §815.1.9 Maintenance and Repair
- §815.1.10 Penalties
- §815.1.11 Effective Date: This ordinance shall take effect immediately upon the approval by the county review agency, or sixty (60) days from the receipt of the ordinance by the county review agency if the county review agency should fail to act.
- §815.1.12 Penalties
- §815.1.13 Severability
- §815.1.14 Fees

NOTICE

NOTICE IS HEREBY GIVEN that the foregoing Ordinance will be introduced and passed on first reading at the regular meeting of the Township Committee of the Township of Lakewood in the County of Ocean and State of New Jersey held on the 9th day of March, 2006 and will be considered for second reading and final passage at the regular meeting of the Township Committee to be held on the 23rd day of March, 2006 at 7:30 P.M. at the Lakewood Township Municipal Building, 231 Third Street, Lakewood, New Jersey 08701 at which time and place any person desiring to be heard upon the same will be given an opportunity to be so heard. Copies of the new "Stormwater Management/Residential Site Improvement Standards" Section 815.1 are available for review at the Office of the Township Clerk and the Township Engineer's Office in the Township Municipal Building during regular office hours.

BERNADETTE STANDOWSKI, RMC/CMC
LAKEWOOD TOWNSHIP CLERK