



**SECTION XIII -  
STORMWATER MANAGEMENT PLAN**

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## INTRODUCTION

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Township of Livingston (Township) to address stormwater management primarily in new development and redevelopment projects that involve greater than one (1) acre of disturbance. The development of this plan is required by N.J.A.C. 7: 14a-25 Municipal Stormwater Regulations.

This MSWMP contains all of the elements that were required to be completed in 2005 as described in New Jersey Department of Environmental Protection's (NJDEP) Stormwater Management Rules published at N.J.A.C. 7:8. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts to projects subject to the requirements of N.J.A.C. 7:8 by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one acre or more of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides base flow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities. The final component of this plan is a mitigation strategy to be applied when a waiver or exemption of the design and performance standards is required. The Planning Board has performed a detailed land use analysis which shows that there are only 80.20 acres of land that are available for development, including 46.14 acres of total gross developable land and 34.06 acres of land in prior-approved applications for development, under the current zoning regulations.

The MSWMP includes recommendations that extend strict stormwater management design and performance standards to new non-residential development. Stormwater management for new residential development is under the Residential Site Improvement Standards (RSIS) with additional requirements found in the Township's Lot Surface Drainage Ordinance adopted in 2008. These recommendations result in the Township meeting the requirements of the NJDEP Stormwater Management Rules as required by its New Jersey Pollutant Discharge Elimination System (NJPDES) Tier A Municipal Stormwater General Permit.

## REGULATORY FRAMEWORK

According to the United States Environmental Protection Agency (USEPA) polluted stormwater runoff is a leading cause of impairment of the nearly 40 percent of surveyed U.S. water bodies which do not meet water quality standards. Over land, or via storm sewer systems, polluted runoff is discharged, often untreated, directly into local water bodies. When left uncontrolled, this water pollution can result in the destruction of fish, wildlife, and aquatic life habitats; a loss in aesthetic value; and threats to public health due to contaminated food, drinking water supplies, and recreational waterways.

Mandated by Congress under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) Stormwater Program is a comprehensive two-phased national program for addressing the non-agricultural sources of stormwater discharges which adversely affect the quality of our nation's waters. The program uses the NPDES permitting mechanism to require the implementation of controls designed to prevent harmful pollutants from being washed into local water bodies by stormwater runoff.

In response to the requirements of the USEPA's national NPDES Phase II regulations published in December 1999, the State of New Jersey developed the Municipal Stormwater Regulation Program. This program addresses

pollutants entering our waters from storm drainage systems operated by local, county, state, interstate, and federal government agencies. These systems are referred to as “municipal separate storm sewer systems” or “MS4s” and are regulated under the NJPDES Rules (N.J.A.C. 7:14A). The NJDEP created four (4) NJPDES Stormwater General Permits for small Municipal Separate Storm Sewer System (MS4s). These general permits are the Tier A Municipal Stormwater General Permit, Tier B Municipal Stormwater General Permit, the Public Complex Stormwater General Permit, and the Highway Agency Stormwater General Permit.

For each General Permit, NJDEP has mandated Statewide Basic Requirements (SBRs), which include minimum standards, measurable goals, and implementation schedules. The minimum standards are one or more actions that must be taken to comply with the permit. The measurable goals are the mechanism for reporting to the NJDEP the progress that the municipality has made to implement the requirements of the permit. Reporting is accomplished primarily through the submission of an Annual Report, Questionnaire and Certification. The implementation schedule sets the deadlines for permit compliance. All municipalities within the State have been classified as either Tier A or Tier B communities, depending on population density as determined in the 2000 United States Census. Since the census was updated in 2010, the assignment of Tier A municipalities is under review by the NJDEP; however, no reassignments are being implemented at this time. Tier A Municipalities are generally located within the more densely settled regions of the State or along or near the Atlantic Ocean. There are currently 457 listed Tier A Municipalities. Tier A Municipalities are found in every county.

The Township is regulated under NJPDES Stormwater Tier A General Permit No. NJ0141852, with a unique NJPDES permit number of NJG0148245 assigned to the Township. The Township’s permit was last issued on November 9, 2017 and became effective on January 1, 2018.

As part of the permit issued by the NJDEP, several Statewide Basic Requirements (SBRs), Best Management Practices (BMPs) and measurable goals were mandated and an associated implementation schedule was established (refer to Appendix A of this Plan for a copy of the Tier A Permit). To satisfy the proposed permit requirements, each Tier A municipality is required to develop, implement, and enforce a Stormwater Program. The following SBRs apply to all Tier A municipalities, including the Township:

- 1. Minimum Standards for Public Involvement and Participation Including Public Notice** - Municipalities must comply with State and local public notice requirements when providing for public participation in the development and implementation of their stormwater program, including the open public meetings act, relevant statutory procedures and the Municipal Land Use Law. Municipalities shall make their current Stormwater Pollution Prevention Plan (SPPP) and MSWMP available to the public online and by request. Municipalities may involve other entities to satisfy permit conditions and must maintain sufficient records to demonstrate compliance with these public participation requirements.
  
- 2. Minimum Standards for Local Public Education and Outreach** - Each municipality shall develop a local public education program that focuses on educational and pollution prevention activities about the impacts of stormwater discharges on surface water and groundwater that involves the public in reducing pollutants in stormwater and mitigating flow. Records shall be kept to demonstrate compliance. The following SBRs shall be included in the public education program:
  - a. Label all storm drain inlets for those drains that do not have permanent wording cast into the structure of the inlet. Maintain the legibility of those labels and replace any that are missing or not legible. The requirement shall include the following:
    - i. Storm drain inlets along sidewalks that are adjacent to municipal streets;
    - ii. Storm drain inlets within plazas, parking areas or maintenance yards that are operated by the municipality.



- f. The Municipality shall adopt, amend and implement a written MSWMP.
  - i. The Municipality shall submit the adopted plan for approval to the County review agency;
  - ii. The Municipality shall notify the Department and post the approved plan and any amendments on its website within thirty days of the effective date of the plan.
  - iii. The Municipality shall review and update its MSWMP as necessary, and as a part of the reexamination of its municipal master plan.
- g. In order to implement the post construction stormwater management program, the Tier A Municipality shall adopt, amend, implement and enforce a municipal stormwater control ordinance.
- h. The Tier A Municipality shall only grant a variance or exemption from the design and performance standards for stormwater management measures if the municipality has a mitigation plan which meets the following requirements:
  - i. A mitigation plan must be included in an approved MSWMP and stormwater control ordinance(s). The mitigation plan shall identify measures that are necessary to offset the deficit created by granting the variance or exemption, and can be provided through a menu of design and performance standards with corresponding mitigation projects for different drainage areas within the municipality; and
  - ii. The municipality submits, within 30 days after the grant of a variance or exemption a written report to the county review agency and the Department describing the variance or exemption and the required mitigation.
- i. The Municipality shall enforce, through ordinance, compliance with the standards set forth in Attachment C of the proposed permit (Design Standards for Storm Drain Inlets) to control passage of solid and floatable materials through storm drain inlets.
- j. The Municipality shall ensure adequate long-term cleaning, operation and maintenance of stormwater management measures.
- k. For each structural and non-structural stormwater measure, the Municipality shall:
  - i. Complete a Major Development Stormwater Summary;
  - ii. Update the Major Development Stormwater Summary while stormwater measures are being installed;
  - iii. Finalize the Major Development Stormwater Summary once a certificate of occupancy is issued; and
  - iv. Maintain a completed Major Development Stormwater Summary and make it available to the Department upon request.

**5. Minimum Standards for Pollution Prevention / Good Housekeeping for Municipal Operators**

- Municipalities must adopt and enforce the following waste disposal ordinances:

a. Community Wide Ordinances

- i. Pet Waste - Requires pet owners or pet keepers to immediately and properly dispose of their pet's solid waste deposited on their property, or any other property, public or private, not owned or possessed by that person.
- ii. Wildlife Feeding - Prohibit the feeding in any public park or on any other property owned or operated by the municipality of any wildlife (excluding confined wildlife in zoos, parks, or rehabilitation centers or unconfined wildlife at educational centers).
- iii. Litter - Adopt and enforce a litter ordinance or enforce the existing State litter statute (N.J.S.A. 13:1E-99.3).
- iv. Improper Disposal of Waste - Prohibit the improper spilling, dumping, or disposal of materials other than stormwater into the small MS4.
- v. Containerized Yard Waste / Yard Waste Collection Program Ordinances - Prohibit placing non-containerized yard wastes in the street or develop a non-containerized yard waste collection and disposal program that prohibits placing non-containerized yard waste at the curb or along the street within 10 feet of any storm drain inlet and at any time other than a set yard waste collection schedule.
- vi. Private Storm Drain Inlet Retrofitting Ordinance – Require the retrofitting of existing storm drain inlets on private property.

b. Community Wide Measures

- i. Street Sweeping: Municipalities shall sweep, at a minimum of once per month, all that meet all of the following criteria: (1) the street is owned or operated by the municipality; (2) the street is curbed and has storm drains; (3) the street has a posted speed limit of 35 miles per hour or less; (4) the street is not an entrance or exit ramp; and (5) the street is in a predominantly commercial area.
- ii. Catch Basin and Storm Drain Inlet Inspection and Cleaning: The Municipality shall inspect storm drain inlets and catch basins that it owns or operates and remove sediment, trash, or debris when present. Each catch basin and inlet shall be inspected at least once every five years. The Municipality shall clean any municipally owned or operated storm drain inlet or catch basin as frequently as necessary to eliminate recurring problems and restore proper function.
- iii. Tier A Municipality Storm Drain Inlet Retrofit: The Municipality shall retrofit existing owned or operated storm drain inlets that are: (1) in direct contact with any repaving, repairing (excluding individual pothole repair), or resurfacing (including top coating or chip sealing with asphalt emulsion or a thin base of hot bitumen); or (2) in direct contact with any reconstruction or alteration of facilities.

- c. **Municipal Maintenance Yards and Other Ancillary Operations:** The Municipality shall implement best management practices for municipal maintenance yards and other ancillary operations. Ancillary operations include but are not limited to impound yards, permanent and mobile fueling locations, and yard trimmings and wood waste management sites.
  - d. **Employee Training:** The Municipality shall develop, update and implement an employee training program to address Tier A MS4 NJPDES permit components and SPPP requirements.
  - e. **Management Design Review Training:** The Municipality shall ensure that all design engineers, municipal engineers and other individuals that review the stormwater management design for development and redevelopment projects on behalf of the municipality, complete the Department approved Stormwater Management Design Review Course once every five years.
  - f. **Municipal Board and Governing Body Member Related Training:** The Tier A Municipality shall ensure that municipal board and governing body members that review and approve applications for development and redevelopment projects, complete the “Asking the Right Questions in Stormwater Review Training Tool”.
6. **Minimum Standards for MS4 Outfall Pipe Mapping and Illicit Discharge and Scouring and Detection Control**
- a. Municipalities shall develop, update and maintain an outfall pipe map showing the location of the end of all MS4 outfall pipes owned or operated by the Municipality which discharge to a surface water body.
  - b. Stream Scouring: Municipalities shall develop, update and implement a program to detect, investigate and control any localized stream scouring from stormwater outfall pipes owned or operated by the municipality.
  - c. Illicit Discharge Detection and Elimination: The Municipality shall develop, update, implement and enforce an ongoing Illicit Discharge Detection and Elimination Program.
  - d. The Municipality shall adopt and enforce an ordinance that prohibits illicit connections.

## **GENERAL REQUIREMENTS FOR STORMWATER MANAGEMENT PLANNING**

Subchapter 2 of N.J.A.C. 7:8 includes general requirements for municipal and regional stormwater management planning. For municipal stormwater management planning the requirements are, at a minimum, applicable to the management of stormwater related impacts of major developments, defined in this case as new non-residential development or redevelopment projects that ultimately disturb one or more acres of land. Accordingly, the stormwater management plan shall be designed in the context of the following goals for major developments:

- 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 for new development and redevelopment projects, Ordinance No. 11- 2006, adding a new Article XIX “Stormwater Control” to Chapter 170 Land Use of The Code of the Township, was adopted by the Township on March 20, 2006 and Ordinance No. 35-2008, adding a new Section “Lot Surface Drainage” To Chapter 170 Land Use of the The Code of the Township was adopted on November 3, 2008. These ordinances (Appendix B) outline specific stormwater design and performance standards for new development; preventative and corrective maintenance strategies to ensure long-term effectiveness of stormwater management facilities; and safety standards for stormwater infrastructure to be implemented to protect public safety.

Furthermore, the above goals will be considered should additional ordinances related to storm water-related water quality, groundwater recharge, and water quantity impacts of existing land uses be considered by the Township. Consideration will be given, in cooperation with the property owners, NRCS, Soil Conservation District, and affected stakeholders, to mechanisms for improved management of stormwater runoff and groundwater recharge associated with existing and new open space and under-utilized properties.

On April 11, 2011, the Township adopted Ordinance No 8-2011, supplementing Chapter 170 Land Use by adding a new article Riparian Zones (Appendix B). Pursuant to N.J.A.C. 7:8 5.5(h), a special water resource protection area or riparian zone 300 feet wide on both sides is established along all waters designated Category One as defined by the Surface Water Quality Standards, N.J.A.C. 7:9B and all upstream tributaries situated within the same Hydrologic Unit Code 14 (HUC 14) watershed, including Special Water Resource Protection Areas, shown on the United States Geological Survey (USGS) quadrangle map or in the County Soil Surveys within the associated HUC 14 drainage area.

A 150 feet wide riparian zone is established along the following waters not designated as C1 waters:

- Trout production water and all upstream waters (including tributaries);
- Trout maintenance water and all upstream waters (including tributaries) within one linear mile as measured along the length of the surface water body;
- Any segment of a water flowing through an area that contains documented habitat for a threatened or endangered species of plant or animal, which is critically dependent on the surface water body

for survival, and all upstream waters (including tributaries) within one (1) linear mile as measured along the length of the surface water body; and,

- Any segment of a surface water body flowing through an area that contains acid producing soils.

For all other surface water bodies, a riparian zone of 50 feet wide is maintained along both sides of the water.

Figure XIII-1 (Appendix C) illustrates the location of HUC14s and water bodies within the Township. As there are currently no CI waters within the Township, or within the same HUC 14 downstream of the Township, there are no special water resource protection areas designated in Livingston. The below table includes a breakdown of the drainage areas within each of the HUC 14s in the Township, by percent of the Township and by percent of the total HUC 14 within the Township.

<b>Township of Livingston HUC 14s</b>				
HUC 14	Total Square Miles	Square Miles Inside Township	Percent of Township	Percent of HUC 14 in Township
Canoe Brook	12.01	4.95	35.16%	41.22%
Passaic River Upstream (Columbia Road to 40d 45 m)	8.41	1.85	13.14%	22.00%
Passaic River Upstream (Hanover RR to Columbia Road)	8.56	5.88	41.76%	68.69%
Passaic River Upstream (Rockaway to Hanover RR)	6.89	1.40	9.94%	20.32%
<b>Total</b>	<b>35.87</b>	<b>14.08</b>	<b>100%</b>	

Source: New Jersey Geological Survey Report GSR-32.

On June 1, 2009, the Township adopted Ordinance No: 24-2009 adding a new article XIX Regulation of Steep Slopes to Chapter 170 of the Code of the Township (Appendix B), establishing and defining steep slopes within the Township as:

- Area 1: 0 to 14.9 percent – Non-regulated;
- Area 2: 15 to 24.9 percent – Precautionary; and
- Area 3: 25 percent or greater – Prohibitory.

Because the disturbance of steep slopes results in accelerated erosion processes from stormwater runoff and the subsequent sedimentation of water bodies with the associated degradation of water quality and loss of aquatic life support, this Ordinance regulates the intensity of their use to maintain the natural topography and drainage patterns of land.

## **LONG TERM GOALS OF THE MSWMP**

As discussed in this Plan under Regulatory Framework, the municipal stormwater permitting program was founded in response to requirements in the Federal Clean Water Act (CWA). For surface waters of the State, the CWA goals are in part expressed in policy and standards included in N.J.A.C. 7:9B Surface Water Quality Standards. These standards include requirements for maintenance and protection of the designated uses of surface waters

of the State and, where economically feasible, are adhered to wherever these uses are not precluded by natural conditions. Where the in-stream water quality parameters exceed the applicable State water quality criteria, the water is considered impaired, and the NJDEP may be required to develop a Total Maximum Daily Load (TMDL) for those pollutants for that waterway. When the non-point source pollution component of the TMDL is considered to be contributing to the exceedance of water quality parameters it may be necessary for the Township to take action addressing stormwater-related impacts of existing land uses.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges which require an NJPDES permit to discharge, and non-point sources which include 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, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the Federal Clean Water Act to be prepared biennially (last prepared 2016) and is a valuable source of water quality information. This report, available at:

[http://www.nj.gov/dep/wms/bears/2016\\_integrated\\_report.htm](http://www.nj.gov/dep/wms/bears/2016_integrated_report.htm)

presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired.

### **Stormwater Discussion**

The NJDEP has developed a wealth of stormwater management information both as background for development of the stormwater rules published as NJ.A.C. 7:8 and as support for implementation of the municipal stormwater permitting program.

This information is readily available on the NJDEP stormwater website: [www.njstormwater.org](http://www.njstormwater.org).

The full text of the NJ Stormwater BMP manual can be found on that website. Of particular relevance is Chapter 1 of the manual, entitled “Impacts of Development on Runoff”, from which much of the following information was derived.

Land development can dramatically alter the hydrologic cycle (illustrated above in Figure XIII-1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site’s evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfallrunoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than under natural conditions. These increases can create new, and aggravate existing, downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration, which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations

between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

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

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

## **Township Background**

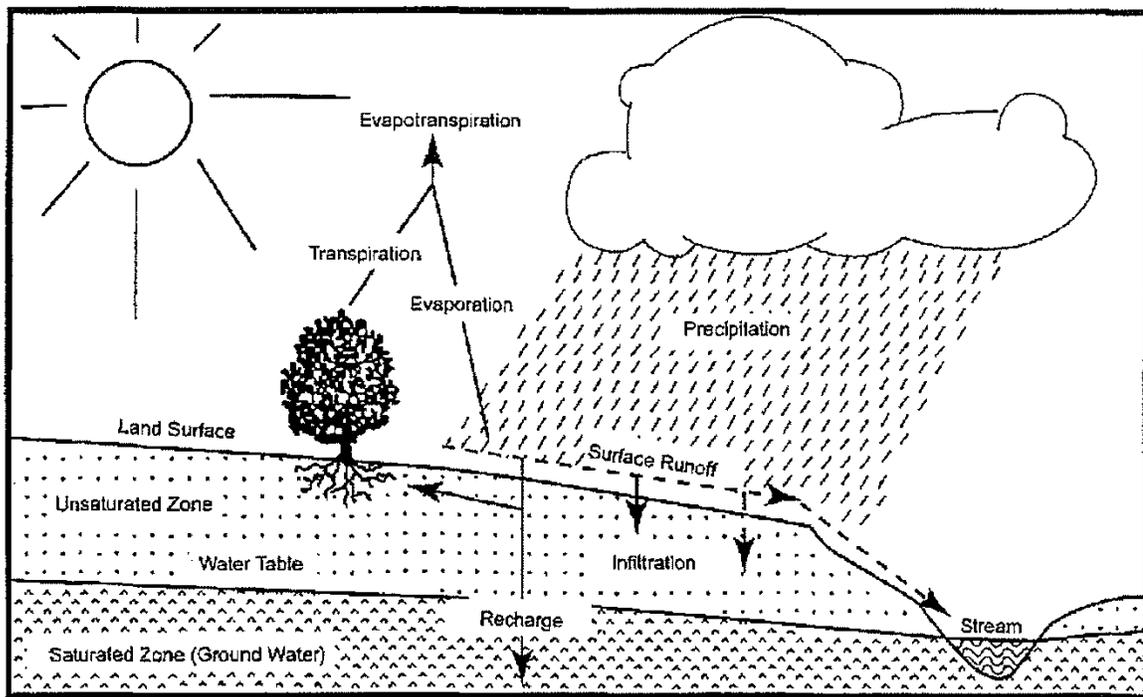
The Township is a suburban community in western Essex County. Adjacent Essex County communities are Roseland Borough, West Orange Township and Millburn Township. To the west are two Morris County communities, the Township of East Hanover and the Borough of Florham Park. The Township is a primarily residential community, of approximately 14 square miles, with limited light industry and business and office properties. The Township is traversed east to west by Route 10. Its major retail and general business areas are along Northfield Avenue, Livingston Avenue and Mt. Pleasant Avenue (Route 10). In the western and northwestern areas of the Township are a regional mall, commercial and educational facilities, a light industrial base, and a several shopping centers. In recent years the Township has experienced moderate population growth. According to the 2015 census, the Township of Livingston then had a population of 29,674; an increase of 7.2 percent from the 27,391 counted in 2000. The population is expected to continue to increase over the next several years as higher density housing is built in the community.

## **Watersheds**

Livingston lies within the Passaic River drainage basin. The Township borders on that river, and contains several tributaries of the Passaic River System. Generally, the Township drains to the south. There, multiple tributaries form the Slough and Canoe brooks that flow directly to the Passaic River to the west. Several smaller tributaries in the western portion of the Township also feed into the river, which flows north around the Watchung Mountains and eventually into Newark Bay. The South Branch of the Foulertons Brook extends across the northern border of the Township and flows north through Roseland and into the Passaic River. All tributaries within the Township ultimately drain to the Passaic River system.

In addition, Livingston also houses a New Jersey American Water Company reservoir in the westerly area, and two more reservoirs are located just outside the southern border of the Township between Canoe Brook and Slough Brook.

The New Jersey Integrated Water Quality Monitoring and Assessment Report was most recently published in 2014 and identifies several waterways within or near Township borders as impaired (Sub-list 4) and having the need for development of a TMDL (Sub-list 5). Based on the 2014 Integrated List, available water quality data indicates a need for development of TMDL's (arsenic and total dissolved solids) for Slough Brook and Canoe Brook. There is



**Figure XIII-1 - Schematic of Hydrologic Cycle**

also a Sub-list 4 impairment listed for E. Coli for a portion of Slough Brook and an impairment for E. Coli as well as Phosphorus listed for a portion of Canoe Brook. There are several TMDLs (arsenic, total suspended solids, pH, dissolved Oxygen, total dissolved solids, mercury in fish tissue, DDT in fish tissue, chlordane in fish tissue and PCB in fish tissue) needed for portions of the Passaic River within the Township's Watershed Management Area (WMA).

A review of the NJDEP Geographic Information System (GIS) surface water coverage files indicates that the NJDEP has classified all surface waters in Livingston as "FW2-NT". This indicates that the waterways of the Township do not support trout, an indicator species used by NJDEP to broadly assess water quality (NJDEP 1998).

The NJDEP has divided the State into 20 WMAs, which conform to topographic and geologic boundaries. Livingston falls within WMA 6, Upper Passaic, Whippany and Rockaway.

The NJ State GIS currently indicates that there are wellhead protection areas covering much of the Township. Currently, twenty-four (24) public community water supply wells have been identified within the Township borders, in addition to several others of other communities in close proximity along the Passaic River. Due to these wells, the Township exhibits extensive coverage of 2, 5, and 12-Year Time of Travel Protection Areas. Figure XIII-3 (Appendix C) illustrates both the well locations and the associated well protection areas.

Protection of groundwater resources is an important part of stormwater management. It entails protection of aquifer recharge areas where permeable soils and natural drainage patterns permit the infiltration of surface runoff into the underlying geologic structure. Protection of aquifer recharge areas requires, for example, limitations on impervious coverage, and proper management of contaminated stormwater to assure that recharge areas remain open to infiltration of suitable quality water. However, groundwater recharge areas for Essex County have not been delineated by NJDEP.

## Wetlands

Wetlands are important natural features that serve a number of purposes. Wetlands act as natural filtering systems for the surface waters that pass through them; they also provide flood control and offer diverse wildlife habitat. While many wetlands in Livingston are found along the Passaic River and along the Slough and Canoe Brooks, isolated wetlands are located throughout the Township in low-lying areas. A review of the NJDEP GIS generally identifies these areas as deciduous wooded or herbaceous systems.

## Land Use

The most common land use in this suburban community is single family residential. The 2015 Census indicates that there were 10,130 housing units in the Township up from 9,457 in 2000. These residential housing units are predominately single-family detached units; however, higher density housing is being increasingly incorporated into the community. Commercial activities are predominantly located along Livingston Avenue, Eisenhower Parkway, Route 10 (East and West Mount Pleasant Avenue), and West Northfield Road.

## Topography

The topography of Livingston generally slopes to the west towards the Passaic River, with elevations ranging from 540 down to 200 feet above mean sea level. The highest areas within the Township are located in the northwest corner and can be attributed to the transitioning surface relief of the Watchung Mountains located east of the border. A smaller peak of about 440 feet is located in the northern area of the Livingston. Figure XIII-4 (Appendix C) depicts the Township boundary on the U.S. Geological Survey Topographic map.

## Soils

As identified by the SGS State Soil Geographic Database, the Township contains four main soil types: Urban Land-Dunellen-Riverhead; Boonton-Urban Land-Wethersfield; Urban Land-Boonton-Wethersfield; and Urban Land-Parsippany-Haledon.

The northwestern part of the Township contains Urban Land-Dunellen-Riverhead soils. These soils are nearly level to strongly sloping, deep and very deep, well drained gravelly, sandy loams. These soils formed in sandy stratified glacial outwash on outwash plains and terraces and on river and stream terraces. These soils are categorized as non-hydric and listed under hydrological group B; meaning that they have a moderate infiltration rate when thoroughly wetted, are moderately deep to deep, moderately well drained to well drained soils with moderately fine to moderately coarse textures, as well as having a moderate rate of water transmission.

Spanning from the southwest corner of the Township through the center of the Township to the northeast corner are Boonton-Urban Land-Wethersfield soils. These soils are gently sloping to very steep, well drained and moderately well drained, very deep and deep gravelly loams formed in acid, reddish sandstone, shale, basalt bedrock. These soils occur on upland glacial till plains and ridges. These soils are non-hydric and are categorized under hydrological group C; meaning that they have a slow infiltration rate when thoroughly wetted, often due to a layer that impedes downward movement of water or moderately fine to fine texture, as well as a slow rate of water transmission.

The southeastern portion of the Township contains Urban Land-Boonton-Wethersfield soil. These soils are described as gently sloping to moderately steep; well drained and moderately well drained. They contain very deep and deep gravelly loams formed in acid, reddish sandstone, shale, basalt and conglomerate glacial till over shale and basalt bedrock. These soils occur on upland glacial till plains and ridges and are non-hydric. These soils are in hydrologic group C.

The western segment of the Township contains Urban Land-Parsippany-Haledon soils. These soils are described as nearly level to strongly sloping, poorly drained and somewhat poorly drained, very deep silt loams. Parsippany soils are formed in stratified, silty, old lake sediments in depressions and on low, level areas. Haledon soils are formed in sandstone, shale and basalt glacial till over shale and basalt bedrock along drainage ways, on broad till plains and ridges, and at the bases of till plains and ridges. Haledon soils are in hydrologic group C and are non hydric. Parsippany soils are hydric and are classified under hydrologic group *CID* meaning that the soils have the same drained conditions as group C and undrained conditions of group D. Group D soils have a high runoff potential, and a very slow infiltration rate when thoroughly wetted. They chiefly consist of clay soils that have high swelling potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. They have a very slow rate of water transmission/penetration.

### **Design and Performance Standards**

The Township has adopted the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The applicability of Article XIX “Stormwater Control” of Chapter 170 “Land Use” of the Code of the Township is limited to non-residential developments that involve disturbance of one or more acres and aspects of residential major developments that are not preempted by the Residential Site Improvement Standards at N.J.A.C. 5:21. The design and performance standards in the ordinance include requirements for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The Stormwater Control Ordinance was submitted to Essex County for review on March 21, 2006 and deemed approved, as the review agency failed to act within 60 days. Township staff will continue to observe the construction of projects to ensure that the stormwater management measures are constructed and function as designed.

### **Plan Consistency**

The Township is not currently within an adopted Regional Stormwater Management Planning Area (RSWMP). If any RSWMPs or TMDLs are developed in the future, the Municipal Stormwater Management Plan will be updated, as appropriate, to be consistent with those programs. The MSWMP is consistent with the RSIS at N.J.A.C. 5:21. The Township will utilize the most current update of the RSIS in the stormwater management review of residential applications. The MSWMP will be updated to be consistent with any future updates to the RSIS.

The Township’s Stormwater Management Ordinance requires covered new development and redevelopment plans to comply with New Jersey’s Soil Erosion and Sediment Control Standards. During construction, Township staff will observe on-site soil erosion and sediment control measures and report any inconsistencies to the Hudson-Essex-Passaic Soil Conservation District.

### **Nonstructural Stormwater Management Strategies**

The NJDEP encourages the use of low impact development techniques and nonstructural stormwater management strategies. Nonstructural BMPs seek to reduce stormwater runoff impacts through sound site planning and design and may include such practices as minimizing site disturbance, preserving important site features, reducing and disconnecting impervious cover, flattening slopes, utilizing native vegetation, minimizing turf grass lawns, and maintaining natural drainage features and characteristics.

Subchapter 5 of the NJDEP Stormwater Management Rules requires the maximum practical use of the following nine nonstructural strategies at all major developments:

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

Applicants seeking approval for a major development must specifically identify which and how these nonstructural strategies are incorporated into the development’s design. For each strategy not incorporated due to engineering, environmental, or safety reasons, a basis for this contention must be provided.

### **Land Use/Build-Out Analysis**

The Township of Livingston is almost fully developed, with well-established residential neighborhoods and business districts. In keeping with the goals of the Master Plan, the Township plans to preserve and strengthen its positive aspects.

The Planning Board has performed a detailed land use analysis which shows that there are only 80.20 acres of land that are available for development, including 46.14 acres of total gross developable land and 34.06 acres of land in prior-approved applications for development, under the current zoning regulations. Since the total undeveloped area is less than 1 square mile (640 acres) a Build-Out analysis for this MSWMP is not required.

### **Mitigation Plan**

Municipal stormwater management plans must incorporate design and performance standards that are as protective as those outlined in the State Stormwater Management Rules or alternative standards in an adopted regional stormwater management plan. These design and performance standards focus on three areas: maintaining groundwater recharge from proposed development, minimizing the proposed development’s impact on flooding, and minimizing the proposed development’s water quality impact on State waters. Some projects have unique, site-specific conditions that prevent strict compliance with the performance standards. However, mitigation should not be an option until it is clearly demonstrated that on-site compliance is not practical. The mitigation plan must identify the measures

required to offset any potential impact created by granting the waiver or exemption to the performance standards. Several strategies can be used to mitigate a development project and its impacts. Applicants can: identify, design, and implement a compensating measure to mitigate impacts; complete a project identified by the municipality as equivalent to the environmental impact created by the exemption or variance; or, provide funding for municipal projects that would address existing stormwater impacts.

If the applicant for a proposed development demonstrates to the satisfaction of the reviewing Board that on-site compliance with the stormwater performance standards is not practical, the Board will entertain a request for a waiver or exemption from said standards. In order to obtain the waiver or exemption from strict compliance with the groundwater recharge, stormwater quantity and/or stormwater quality requirements as outlined in the MSWMP and the Township ordinances, the applicant would be required to provide mitigation in accordance with the requirements established in the Township's mitigation plan.