

MUNICIPAL STORMWATER MANAGEMENT PLAN



TOWNSHIP OF LONG HILL **Morris County, New Jersey**

NJPDES #: NJG0151424

Date of Adoption: October 25, 2023

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1. Introduction

This Municipal Stormwater Management Plan (MSMP) documents the strategy for the Township of Long Hill (Township) to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all the required elements described in N.J.A.C. 7.8 Stormwater Management Rules. This plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre 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.

A “build-out” analysis has been included in this plan based upon existing zoning and land available for development. The plan also addresses the review and update of the Township Master Plan, existing ordinances, and other planning documents to allow for project designs that include low impact development techniques. The Township’s Master Plan is under re-examination concurrent with the development of this Municipal Stormwater Management Plan. The goals and guidelines outlined in this plan have been included with the development of the Master Plan to ensure consistency with the two documents. The MSMP will be revised to include specific elements of the Master Plan following the completion of its re-examination and adoption.

1.1 Goals

The goals of this MSMP are to:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- Maintain groundwater recharge;

- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Maintain the integrity of stream channels for their biological function, as well as for drainage;
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- Protect public safety through the proper design and operation of stormwater basins.

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

1.2 The Hydrologic Cycle and Stormwater

The hydrologic cycle is the continual cycling of water from the earth's surface through the atmosphere. The cycle begins with the evaporation of water from land and water bodies in the form of water vapor. As the water vapor travels through the atmosphere, it cools and condenses to form clouds. The cycle continues in following ways: when the water returns to the earth's surface in the form of precipitation (rain and snow); returns directly to water bodies or land as surface runoff; infiltrates into ground, contributing to ground water; is captured by vegetation and roots and returned to atmosphere through evapotranspiration.

Land development can dramatically alter the hydrologic cycle of a site and 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 impervious cover, reducing the site's evapotranspiration and infiltration rates. During construction of the site, clearing and grading can remove depressions that store rainfall. Construction activities can also

have the potential to compact the soil, diminishing the 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 time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions.

These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in a 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 flow and increased peak flows produce great 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, volumes and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

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

Figure 1 graphically displays the hydrological cycle.

1.3 Municipal Background

The Township is located at the southern end of Morris County and bounded by Passaic River to the west and south, Chatham Township to the east, and the Great Swamp Wildlife Refuge to the north. It encompasses 12.1 square miles and is comprised of the following communities: Villages of Gillette, Millington, Stirling, and Meyersville and hamlet of Homestead Park. It is accessible by two major east-west roads, I-78 and Route 22. A system of county roads connects all four communities.

Figure 2 displays the Township boundary and USGS Topographic Map.

Development within the township has been minimal, and largely limited to residential additions and minimal new residential construction. The extent of environmentally sensitive areas and Flood Hazard Areas through considerable portions of the township minimized expansion of new development to some extent. A sanitary sewer moratorium has been in place since September 13, 2000, with the adoption of Resolution 00-321. The committed flow within the system had exceeded 80% of the permitted flow within the treatment plant, and restrictions on new sewer connections were implemented. Minor amendments were made to the sewer moratorium between 2002 and 2009 to permit minor exemptions for certain new connections. However, the restrictions in place due to the lack of available capacity has resulting in minimizing development throughout the township.

Population within the Township has declined in recent years. According to the U. S. Census Bureau data, the Township's population was 8,629 as of the 2020 census, which represents a decline from both the 2010 census population of 8,702, and the 2000 census population of 8,777.

The Township is 7,763 acres (12.1 square miles) and is characterized as low density and rural. More than 55% of the Township is vacant land, parks, conservation and open space areas, due principally to the existence of wetlands, flood plains and steep slopes. The remaining 45% of the Township is developed areas.

Figures 3 and 4 display the land use/ land cover and zoning districts of the Township respectively.

As previously stated, over 55% of the Township can be considered open space. Of the 55%, the Great Swamp Nature Wildlife Refuge (Great Swamp) encompasses 30% of that area. The Great Swamp extends across the entire northern border of the Township and consists of hydric soils that possess zero groundwater recharge potential. Zero groundwater recharge areas can also be found in several areas located south within the Township. There is a greater potential for groundwater recharge located within the developed areas of the Township. **Figure 5** presents groundwater recharge areas. There is a small area of wellhead protection located in the northeastern region of the Great Swamp. This area is classified as a Tier 3 Wellhead Protection Area (WHPA) and is defined as an area of land located within the WHPA from which groundwater will enter the well within 12 years. **Figure 6** presents the limits of wellhead protection areas within the Township.

In its entirety, the Great Swamp is 7,455 acres, approximately the same size as the Township, and traverses several municipalities within Morris County. It provides habitat to a great variety of animal and plant life, some of which are listed on New Jersey's threatened and endangered species list. Approximately one-half of the Great Swamp watershed is undeveloped, with the remainder of the Great Swamp occupied by residential and commercial properties.

The Township is located within the Upper Passaic River Watershed and the New Jersey Department of Environmental Protection (NJDEP) Watershed Management Area 6. This management area, as well as the other management areas throughout the state was established by NJDEP to restore water quality, manage, protect and control pollution to New Jersey's valuable water supply. The Upper Passaic River Watershed is supplied by Black Brook and many unnamed tributaries within the Township. The Black Brook is located within the Great Swamp and is classified by NJDEP as a Category One (C1) stream. C1 streams and rivers are defined as waters that are protected from "measurable or calculable changes" in water quality. C1 streams and rivers also require a minimum 300 foot buffer on both sides of the waterbody.

To continue further efforts to protect and monitor many of New Jersey's precious water resources, the NJDEP has established an Ambient Biomonitoring Network (AMNET) . The purpose of AMNET is to monitor and document the health of the state's waterways. There are over 800 AMNET stations throughout the state of New Jersey. The sites are sampled for benthic

macroinvertebrates by NJDEP on a five year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to the benthic macroinvertebrates community dynamics. **Figure 7** displays the Township's waterways and AMNET station locations.

AMNET stations are located along two major waterways that border the Township to the north, west and south, the Black Brook within the Great Swamp, and the Passaic River, respectively. Data from sampling periods of 2003/2004 and 2008, report impairment for station AN0223 located along the Black Brook and for station AN0224 & AN0228 located along the Passaic River. The Round 4, 2008, habitat score, which determines the habitat quality for the macroinvertebrate community, was reported as sub-optimal for each station.

Results of the Biological Monitoring program have been compiled into an integrated list of waterbodies. The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the Federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more Total Maximum Daily Load (TMDL) controls are needed. 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 nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources that will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

The stations within the township were identified as part of the stream segments within Watershed Management Area 6 that are impaired. An amendment to the Northeast Water Quality

Management Plan was adopted by EPA Region 2 on June 6, 2013 recommending short-term and long-term management strategies for impaired water bodies. The report indicated that, with respect to the stream segments within the township limits, much of the stormwater discharged to the surface waters in question is discharged through “small municipal separate storm sewer systems” (small MS4s) that are proposed to be regulated under the Department’s proposed Phase II NJPDES stormwater rules for the Municipal Stormwater Regulation Program. Under those proposed rules and associated draft general permits, nearly all municipalities (and various county, State, and other agencies) in the Northeast Region will be required to implement various control measures that should substantially reduce bacteria loadings, including measures to eliminate “illicit connections” of domestic sewage and other waste to the small MS4, adopt and enforce a pet waste ordinance, prohibit feeding of unconfined wildlife on public property, clean catch basins, perform good housekeeping at maintenance yards, and provide related public education and employee training. The WLAs and LAs in Table 7 are not themselves “Additional Measures” under proposed N.J.A.C. 7:14A-25.6 or 25.8.

In addition to water quality problems, the Township has been subjected to flooding. Major storm events, occurring in October 1996 and September 1999, caused extensive flooding in the Long Hill Township. More recently, in October 2021, Hurricane Ida caused considerable flooding within the township, including portions of the township that had not previously experienced flooding.

To mitigate damage caused by future storms, the US Army Corps of Engineers conducted a Flood Damage Reduction and Ecosystem Restoration Assessment and Report in October 2004. It was determined that the Township was plagued by periodic storms that caused severe flooding along the Upper Passaic River. The flooding problems continue to threaten several areas of the Township. The assessment resulted in the generation of a flood damage reduction plan which includes the construction of a floodwall. The Township is continuing to pursue advancement of flood control improvements through the US Army Corps of Engineers for flood protection measures that will address long-term flood protection and minimize the risk of damage to public infrastructure, and disruption of vital public services during major storm events.

2.0 Design and Performance Standard

The Township has adopted design and performance standards for stormwater management measures for major development in compliance with N.J.A.C. 7:8-5 to minimize the adverse impact of erosion, ground water recharge, stormwater runoff quantity, and stormwater quality standards to receiving waterbodies. The design and performance standards include language for the development of maintenance plans and guidelines for stormwater management measures, as well as safety standards for Stormwater Management Basins consistent with section N.J.A.C. 7:8-5.8 Maintenance Requirements and N.J.A.C 7:8-6 Safety Standards for Stormwater Management Basins.

The Township has adopted the design and performance standards contained within N.J.A.C. 7:8-5 by reference in its Stormwater Management Ordinance, §LU-146. A copy of the adopted Stormwater Control Ordinance is included in **Appendix A**. The Township's Stormwater Control Ordinance is also posted on the Stormwater Page of the Township's website: <https://www.longhillnj.gov/stormwater-management.html>

During construction, Township inspectors will observe the construction of a project to ensure that the stormwater management measures are constructed and function as designed.

3.0 Plan Consistency

The Municipal Stormwater Management Plan is consistent with Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated and consistent with any future updates to the RSIS.

The Township's model stormwater control ordinance requires all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

4.0 Nonstructural Stormwater Management Strategies

As part of the requirements for Municipal Stormwater Management Plans in the Stormwater Management Rules N.J.A.C. 7:8-4, the Township is required to evaluate the municipal master

plan and land use ordinances for incorporation of nonstructural stormwater management strategies. These strategies include minimum disturbance, disconnection and minimization of impervious surfaces, pollution prevention techniques, and minimization of lawns.

The Township is currently conducting an update of its 1995 Master Plan, and expects to be completed by the end of 2023.

The elements of the master plan that are under review are being evaluated with the Township's current Stormwater Control Ordinances which require the implementation of green infrastructure techniques, as stipulated in N.J.A.C. 7:8, to address areas where construction of impervious surfaces can be reduced, through appropriate parking standards, minimum landscaping and buffer requirements, and encouragement of disconnecting impervious areas to promote groundwater recharge. The elements of the Master Plan are being reviewed for consistency with the Best Management Practices for appropriate design standards development.

Elements adopted within the updated Master Plan, once submitted to Morris County for review and concurrence, will be incorporated into this Stormwater Management Plan, within twelve months of adoption of the Plan, and forwarded to the New Jersey Department of Environmental Protection.

Below is the evaluation of the land use ordinance with regard to incorporating green infrastructure and Best Management Practices for Stormwater Management:

TOWNSHIP OF LONG HILL: LAND USE ORDINANCE

Subsection 145 Soil Removal and Filling of Land, Sediment Control and Stream Corridor Protection

Subsection 145.3 Stream Corridor Protection- This section describes the conservation easement required for major scenic streams and streams within the watershed of the Great Swamp.

Subsection 146 Stormwater Management

This section of the ordinance was updated in 2021 to bring the Township's Stormwater Control Ordinance into conformance with N.J.A.C. 7:8. The ordinance set forth requirements for all

major developments to provide stormwater management in accordance with the Residential Site Improvement Standards (RSIS, N.J.A.C. 5:21) and the NJDEP Stormwater Management Rule (N.J.A.C. 7:8) to include green infrastructure outlines in N.J.A.C.7:8. All projects, residential and non-residential, as well as projects by the Township, Board of Education, and other agencies subject to review by the Township are required to comply with the established standards.

Section 153.1 Landscaping Design

Subsection 153.1.D states that credit for existing trees will be given against shade tree planting requirement and that a variance from parking requirement of the ordinance can be granted if any parking shortfall is necessitated by an attempt to save existing trees. This complies with minimizing land disturbance, which is a non-structural stormwater management strategy. This section will be amended to include additional measures, as applicable, and as recommended in the updated Master Plan.

Subsection 153.1.F states that planting of shrubbery, bushes, flowers and similar plantings shall be designed to serve decorative and ornamental functions as well as screening and buffering. This section will be amended to include additional measures, as applicable, and as recommended in the updated Master Plan.

Subsection 153.1.G states the requirements for landscaping features at parking areas containing at least ten (10) parking stalls.

Section 156 Buffering and Natural Features

Subsection 156.1 Buffering- This section requires that every development provide sufficient buffers when topographical or other barriers do not provide reasonable screening, where non-residential use abuts a residential zone, parking lots, trash storage, utility areas, loading/unloading areas, and where residential subdivisions abut higher-order streets. Buffers may consist of fencing, evergreens, berms, rocks, boulders or combinations thereof. This section will be amended to include additional measures, as applicable, and as recommended in the updated Master Plan.

Section 156.2 Natural Features- This section states that natural features such as trees, views, natural terrain, natural fertility of soil, and water bodies be preserved and on-site soil receive

minimal disturbance whenever possible. This section will be amended to include additional measures, as applicable, and as recommended in the updated Master Plan.

Section 157 Streets, Street Signs, Curbs, Sidewalks, and Sight Triangles

Subsection 157.3 Curbs – This section requires curbs and gutters along all streets adjacent to or within a development. This section will be amended to include additional measures, as applicable, and as recommended in the updated Master Plan.

Subsection 157.4 Sidewalks – This section describes sidewalk requirements for the Township. Sidewalks are required for all new developments in accordance with the Circulation and Sidewalk Plan Element of the Township Master Plan. This section will be amended to include additional measures, as applicable, and as recommended in the updated Master Plan.

5.0 Land Use/Build-Out Analysis

A build-out analysis allows a municipality to project future development based on existing zoning and land use regulations. It develops a picture, projected visually on a map, of what will happen if land is developed to the maximum extent allowed by law. A build-out analysis is not only useful for communities with undeveloped land. Areas with significant redevelopment potential should be considered in developing a build-out analysis. Many urban and older suburban municipalities contain properties that are not developed to the full extent allowed under current zoning. For example, properties zoned for industrial use may contain residential developments. Or, a developer might assemble several small residential and retail properties for demolition and redevelopment as an office complex. A build-out analysis can identify those properties and project impacts of their potential redevelopment.

The Build-out analysis table was prepared utilizing information about the municipality boundaries, hydrologic unit code 14 (HUC14) boundaries **Figure 8**, existing roads, surface water bodies, impervious cover, and existing development by land use type using a Geographic Information System (GIS), which is computerized system for developing, analyzing, and displaying locational data.

The developable and constrained (wetland/water) areas by land use zone within each HUC-14 were determined from the aforementioned GIS data. The existing impervious cover was also determined in a similar manner.

The significant pollutants resulting from stormwater runoff are phosphorus, nitrogen and suspended solids. The loading rates for Total Phosphorus (TP), Total Nitrogen (TN) and Total Suspended Solids Loads are from Table 3-1: Pollutant Loads by Land Cover in the New Jersey Stormwater Best Management Practices Manual (2004). The pollutant loads for TP, TN and TSS were computed for the build-out condition utilizing the area information developed above, the resulting pollutant load are presented in **Table 1**.

6.0 Mitigation Plans

A mitigation plan is required when some projects have unique, site-specific conditions that prevent them from strict compliance with the groundwater recharge, stormwater quantity and stormwater quality requirements outlined the Township's municipal Stormwater Management Plan and Ordinance.

At present the township has not developed a mitigation plan and requires full compliance with the stormwater management measures outlined in the Stormwater Control Ordinance. With the lack of significant growth in the township due in large part to the restrictions on new sewer connections that remain in place, minimal demand currently is present for development. The township will re-evaluate the need for developing mitigation parameters as development demand increases.

TABLES

Table 1: Buildout Analysis

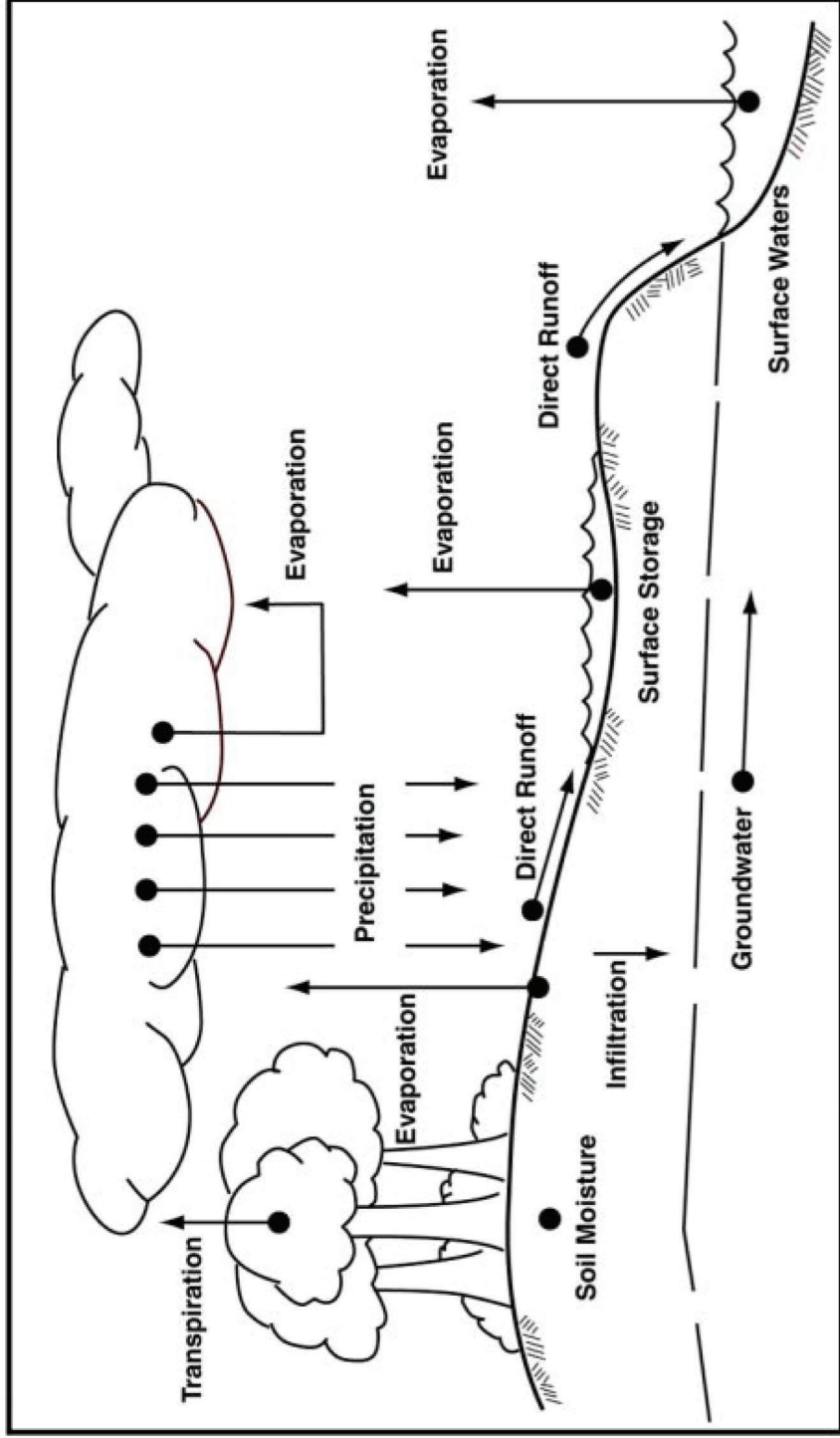
HUC 14 and Zone	Acres per Zones (acres)	Build-out Zoning	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/Water Areas (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious acres	TP (lbs/acre/year)	TN (lbs/acre/year)	TN (lbs/year)	TSS (lbs/acre/year)	TSS (lbs/year)
(A) 02030103010070													
Conservation (C)	539.22	Low Density Residential	1.75%	9.45	268.24	270.99	15%	40.65	0.60	189.42	5	2159.64	37828.11
Limited Industrial (LI-2)	12.33	Industrial	50.29%	6.20	0.00	12.33	70%	8.63	1.50	18.49	16	197.25	2465.66
Millington Village Business (M)	9.55	Mixed Urban	46.81%	4.47	0.00	9.55	60%	5.73	1.00	9.55	10	95.49	1145.90
Multifamily Residence (R-MF)	9.33	High Density Residential	1.29%	0.12	0.00	9.33	40%	3.73	1.40	13.06	15	139.90	140
Office Zone (O)	6.42	Commercial	39.75%	2.55	0.00	6.42	40%	2.57	1.40	13.47	22	141.14	1283.07
Public Use (P)	0.83	Low Density Residential	26.35%	0.22	0.00	0.83	60%	0.50	0.60	0.50	5	4.17	83.49
Residence (R-2)	379.10	Low Density Residential	4.97%	18.86	90.65	288.45	20%	57.69	0.60	182.14	5	1714.22	100
Residence (R-3)	300.77	Low Density Residential	21.47%	64.56	9.10	291.66	20%	58.33	0.60	175.91	5	1485.63	100
Residence (R-4)	25.17	Low Density Residential	23.72%	5.97	0.00	25.17	25%	6.29	0.60	15.10	5	125.84	100
Total	1,282.72			112.40	367.99	914.73	20%	184.12		617.63		6,063.29	108,630.72
(B) 02030103010060													
Conservation (C)	2,941.11	Low Density Residential	1.30%	38.34	2247.89	693.21	15%	103.98	0.60	640.72	5	10209.75	159237.09
Public Use (P)	2.37	Low Density Residential	27.38%	0.65	0.02	2.36	60%	1.41	0.60	1.42	5	11.84	236.40
Residence (R-2)	316.62	Low Density Residential	14.40%	45.58	48.89	267.74	20%	53.55	0.60	165.53	5	1485.34	100
Residence (R-3)	74.52	Low Density Residential	8.43%	6.28	4.53	69.99	20%	14.00	0.60	42.45	5	363.56	100
Residence (R-4)	53.90	Low Density Residential	28.81%	15.53	6.16	47.74	25%	11.94	0.60	29.26	5	257.20	100
Village Business (B-1-20)	10.79	Mixed Urban	56.15%	6.06	1.54	9.25	40%	3.70	1.00	9.41	10	97.16	1172.08
Total	3,399.32			112.44	2,677.01	722.31	52%	378.99		1,521.52		18,613.97	312,723.53
(C) 02030103010110													
Conservation (C)	821.93	Low Density Residential	1.33%	10.93	605.16	216.77	15%	32.52	0.60	190.58	5	2899.34	45883.47
General Commercial (B-2)	48.19	Commercial	29.82%	14.37	8.47	39.73	40%	15.89	2.10	84.27	22	899.38	200
Limited Industrial (LI-2)	22.29	Industrial	41.18%	9.18	1.93	20.36	70%	14.25	1.50	30.73	16	331.58	200
Multifamily Residence (R-MF-3)	10.47	High Density Residential	43.36%	4.54	0.00	10.47	40%	4.19	1.40	14.66	15	157.06	140
Office Zone (O)	5.22	Commercial	47.67%	2.49	0.00	5.22	40%	2.09	2.10	10.97	22	114.92	200
Planned Shopping (B-3)	9.30	Commercial	78.51%	7.3	0.24	9.06	60%	5.44	2.10	19.06	22	200.10	200
Public Use (P)	28.78	Low Density Residential	34.30%	9.87	6.70	22.08	60%	13.25	0.60	13.92	5	130.49	100
Residence (R-2)	332.50	Low Density Residential	15.54%	51.68	24.25	308.25	20%	61.65	0.60	187.37	5	1613.99	100
Residence (R-3)	217.36	Low Density Residential	1.83%	3.99	13.25	204.11	20%	40.82	0.60	123.79	5	1060.30	100
Residence (R-4)	155.39	Low Density Residential	24.45%	37.99	10.08	145.31	25%	36.33	0.60	88.20	5	756.81	100
Senior Citizen Housing (SC)	4.75	High Density Residential	36.21%	1.72	0.04	4.71	40%	1.88	1.40	6.60	15	70.77	140
Townhouse (TH)	8.76	High Density Residential	50.81%	4.45	0.08	8.68	40%	3.47	1.40	12.15	15	130.39	140
Village Business (B-1-5)	11.47	Mixed Urban	45.78%	5.25	0.73	10.74	65%	6.98	1.00	10.81	10	109.55	120
Total	1,676.42			163.75	670.94	1005.48	24%	238.75		472.86		4,187.32	76,209.34
(D) 02030103010120													
Conservation (C)	603.81	Low Density Residential	3.13%	18.89	440.35	163.46	15%	24.52	0.60	142.11	5	2138.36	33960.21
General Commercial (B-2)	18.34	Commercial	19.36%	3.55	4.68	13.66	40%	5.46	2.10	29.16	22	314.57	200
Multifamily Residence (R-MF)	28.87	High Density Residential	43.26%	12.49	0.85	28.03	40%	11.21	1.40	39.32	15	422.93	140
Multifamily Residence (R-MF-2)	10.68	High Density Residential	35.66%	3.81	4.26	6.42	40%	2.57	1.40	9.42	15	109.10	140
Office Zone (O)	48.07	Commercial	10.76%	5.17	3.76	44.31	40%	17.73	2.10	93.43	22	986.16	200
Planned Shopping (B-3)	21.32	Commercial	66.65%	14.21	0.37	20.95	60%	12.57	2.10	44.03	22	461.99	200
Public Use (P)	43.94	Low Density Residential	11.24%	4.94	13.54	30.40	60%	18.24	0.60	19.59	5	192.62	100
Residence (R-2)	186.94	Low Density Residential	10.17%	19.02	19.50	167.44	20%	33.49	0.60	102.41	5	895.69	100
Residence (R-3)	291.12	Low Density Residential	17.02%	49.55	31.36	259.75	20%	51.95	0.60	158.99	5	1392.86	100
Residence (R-4)	135.22	Low Density Residential	20.51%	27.74	18.33	116.89	25%	29.22	0.60	71.97	5	639.45	100
Village Business (B-1-20)	15.15	Mixed Urban	58.74%	8.9	0.00	15.15	40%	6.06	1.00	15.15	10	151.50	120
Total	1,403.47			168.27	537.00	866.46	25%	213.02		554.31		7,705.24	80,820.21
(E) 02030103010130													
Conservation (C)	0.74	Low Density Residential	0.00%	0.00	0.00	0.74	15%	0.11	0.60	0.44	5	3.69	73.71
Residence (R-2)	0.32	Low Density Residential	13.61%	0.04	0.00	0.32	20%	0.06	0.60	0.19	5	1.62	32.42
Total	1.06			0.04	0.00	1.06	17%	0.18		0.64		5.31	106.12

Refer to Figure 8 for the HUC 14 Boundary Map.

FIGURES

STORMWATER MANAGEMENT PLAN

Figure 1
Hydrologic Cycle
Township of Long Hill
Morris County, New Jersey



SOURCE:
NJ Stormwater Best Management Practices Manual
Chapter 5: Stormwater Management Quantity and Quality Standards and Computations, July 2023.

PREPARED BY:



**Ferriero
Engineering, Inc.**

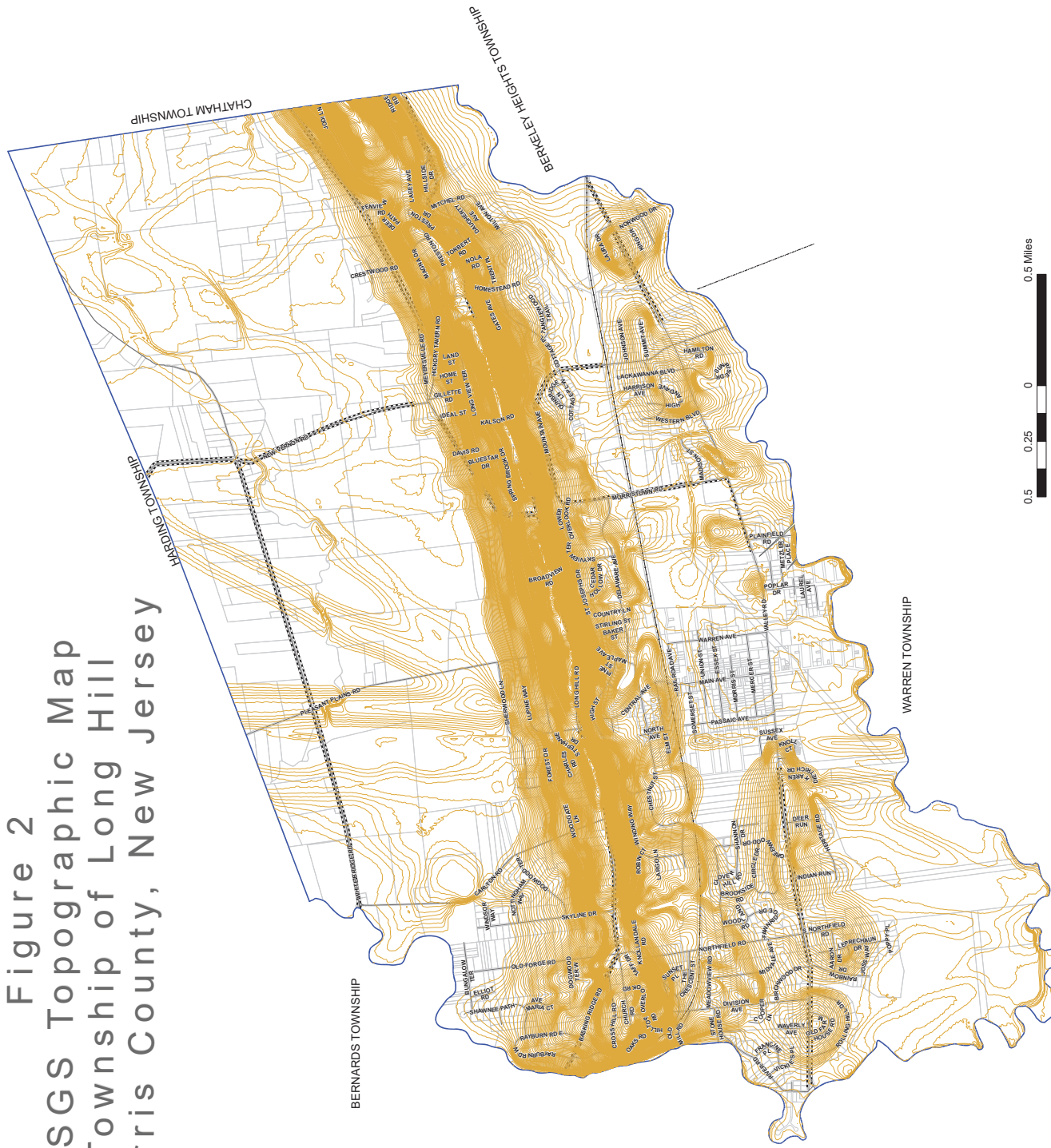
180 MAIN STREET, P.O. BOX 571
CHESTER, NEW JERSEY 07930
908-879-6209

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1	10/16/23	
NO. DRAWING	DATE	REVISION

STORMWATER MANAGEMENT PLAN

Figure 2
 USGS Topographic Map
 Township of Long Hill
 Morris County, New Jersey



- Legend**
- Conservation Easements
 - Municipal Boundary
 - Parcel Boundary
 - 2' Contour Line

PREPARED BY:

Ferriero Engineering, Inc.
 180 MAIN STREET, P.O. BOX 571
 CHESTER, NEW JERSEY 07930
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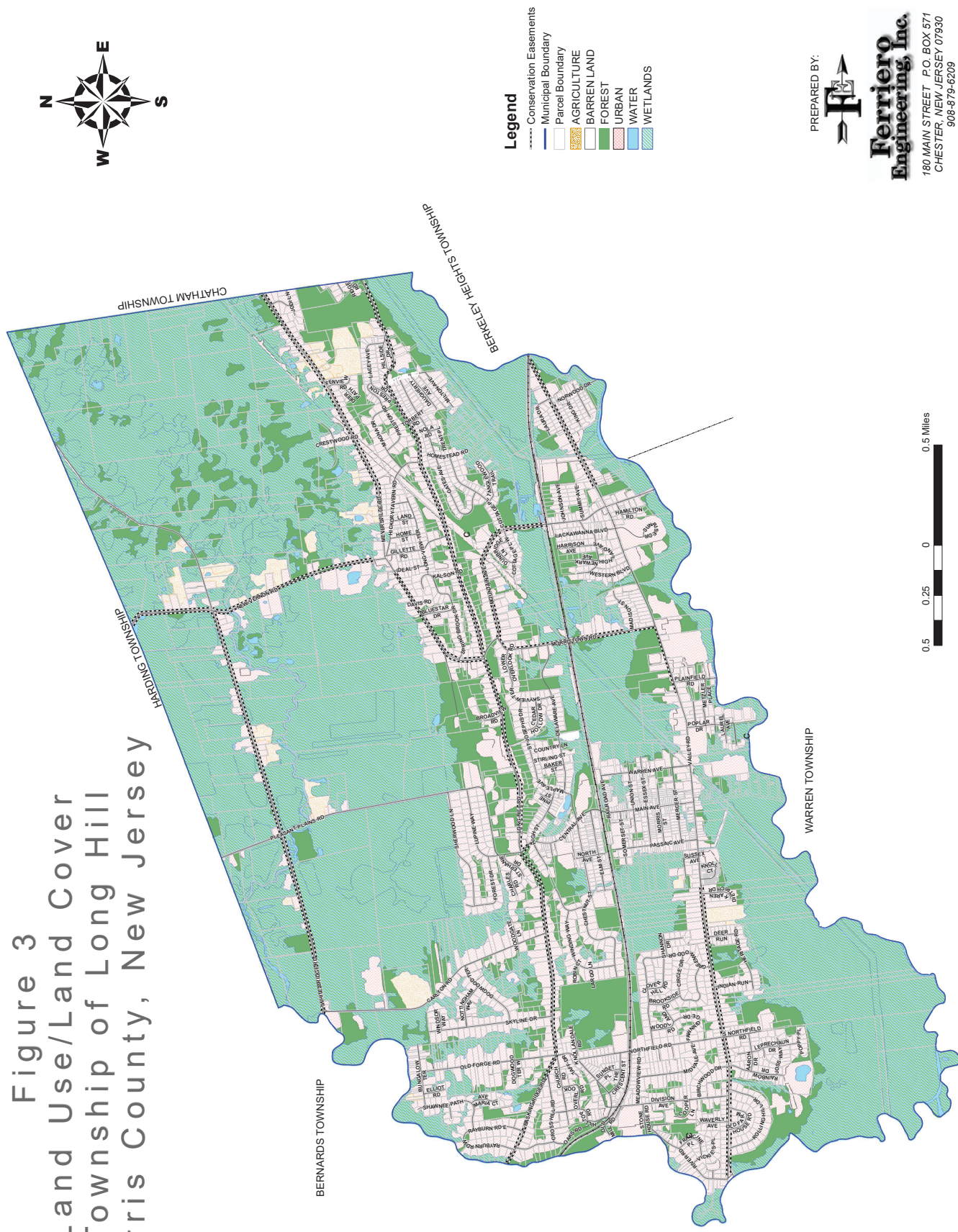


NOTES:
 Map information obtained from the Morris County Office of GIS and NJ State GIS database system:
 Coordinate System: NAD 1983 State Plane New Jersey FIPS 2900 Feet
 Projection: Transverse Mercator
 Datum: North America 1983
 Units: US Feet

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STORMWATER MANAGEMENT PLAN

Figure 3
Land Use/Land Cover
Township of Long Hill
Morris County, New Jersey



- Legend**
- Conservation Easements
 - Municipal Boundary
 - - - Parcel Boundary
 - AGRICULTURE
 - BARREN LAND
 - FOREST
 - URBAN
 - WATER
 - WETLANDS

PREPARED BY:

Ferriero Engineering, Inc.
 180 MAIN STREET, P.O. BOX 571
 CHESTER, NEW JERSEY 07930
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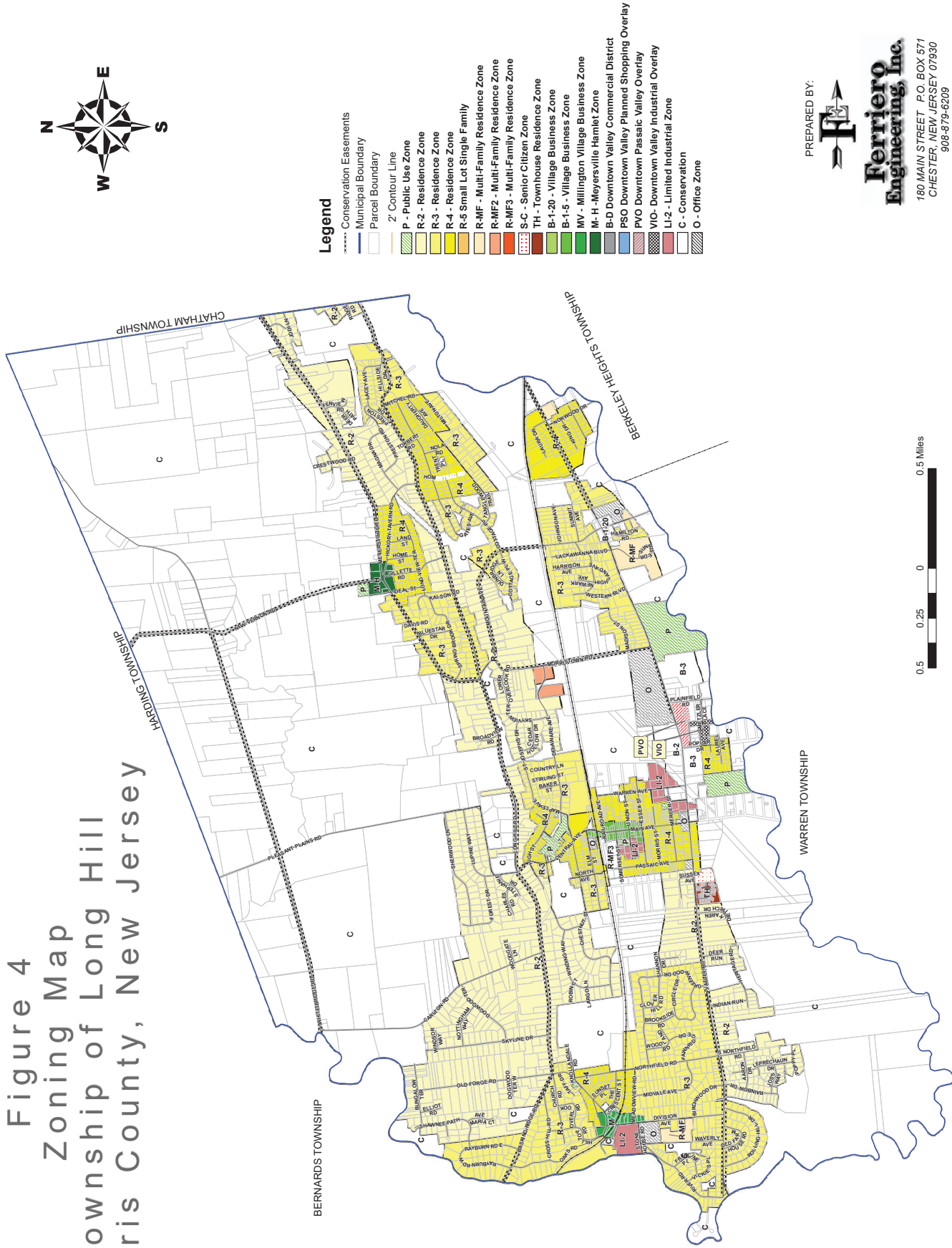
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STORMWATER MANAGEMENT PLAN

Figure 4
Zoning Map
Township of Long Hill
Morris County, New Jersey



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CHESTER, NEW JERSEY 07930
908-879-6209

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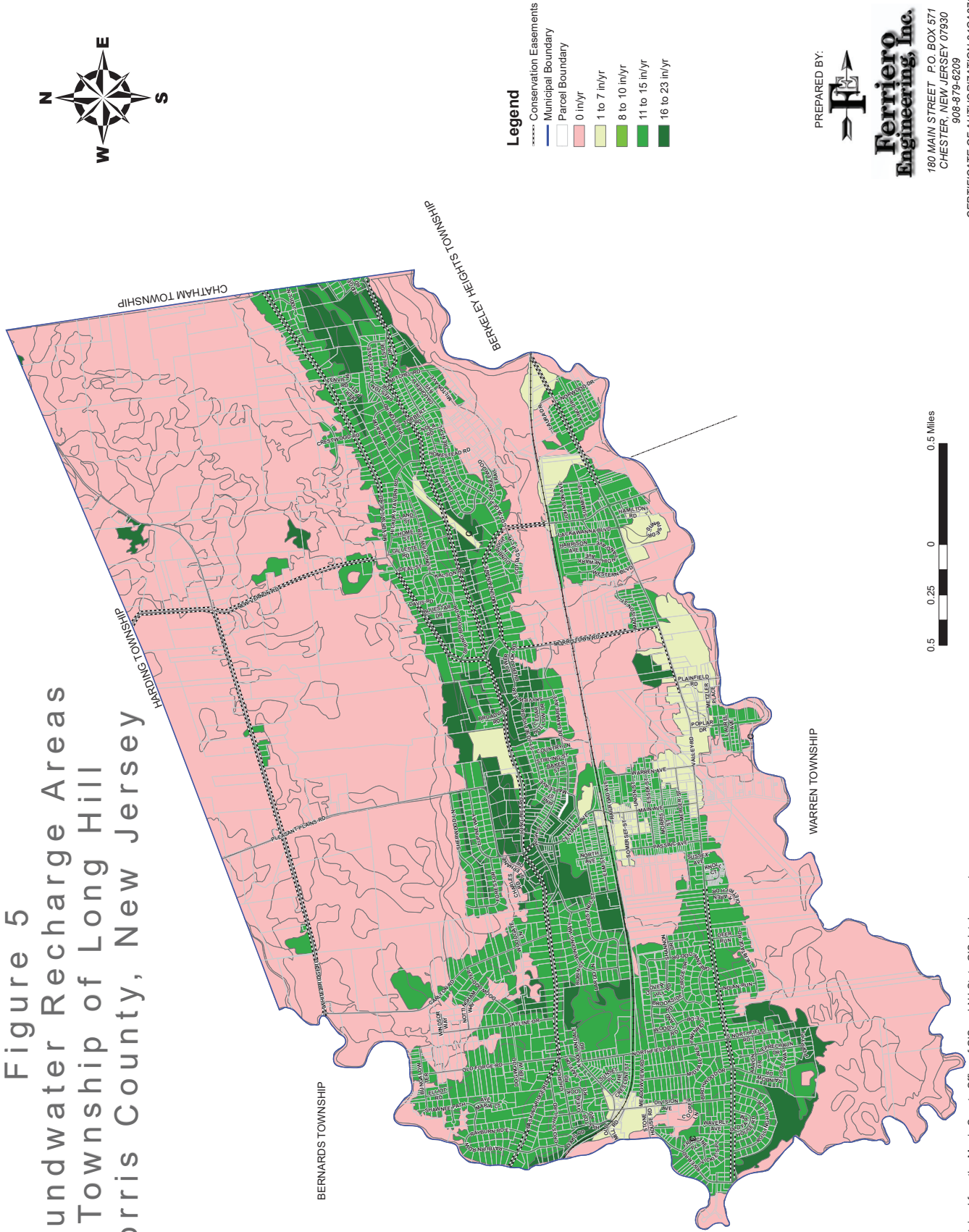


NOTES:
Map information obtained from the Morris County Office of GIS and NJ State GIS database system:
Coordinate System: NAD 1983 State Plane New Jersey FIPS 2900 Feet
Projection: Transverse Mercator
Datum: North America 1983
Units: US Feet

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STORMWATER MANAGEMENT PLAN

Figure 5
Groundwater Recharge Areas
Township of Long Hill
Morris County, New Jersey



- Legend**
- Conservation Easements
 - Municipal Boundary
 - Parcel Boundary
 - 0 in/yr
 - 1 to 7 in/yr
 - 8 to 10 in/yr
 - 11 to 15 in/yr
 - 16 to 23 in/yr

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Ferriero Engineering, Inc.
180 MAIN STREET, P.O. BOX 571
CHESTER, NEW JERSEY 07930
908-879-6209

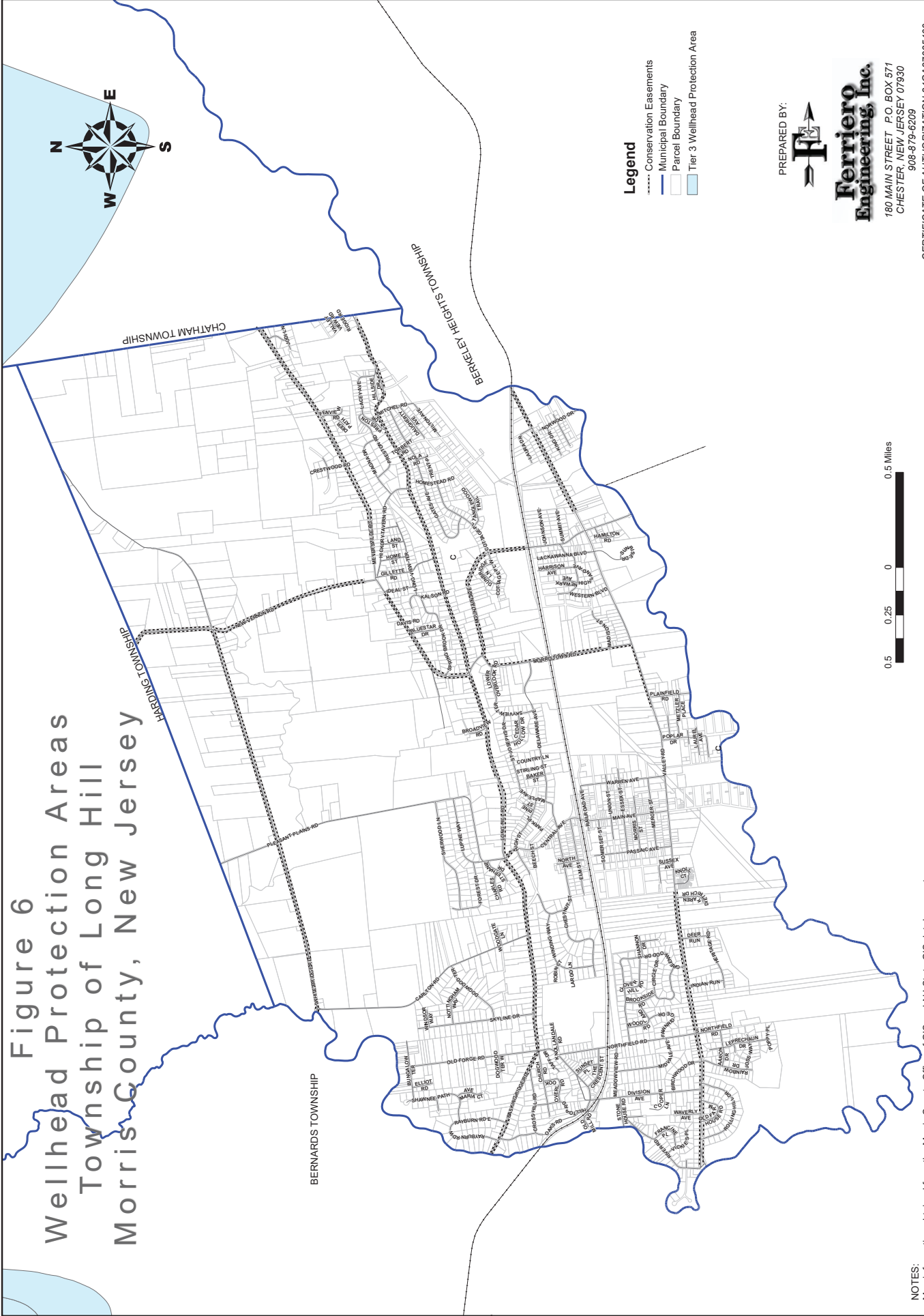
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Projection: Transverse Mercator
Datum: North America 1983
Units: US Feet

STORMWATER MANAGEMENT PLAN

Figure 6
Wellhead Protection Areas
Township of Long Hill
Morris County, New Jersey



- Legend**
- Conservation Easements
 - Municipal Boundary
 - Parcel Boundary
 - Tier 3 Wellhead Protection Area

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Ferriero Engineering, Inc.
 180 MAIN STREET, P.O. BOX 571
 CHESTER, NEW JERSEY 07930
 908-879-6209

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 Units: US Feet

STORMWATER MANAGEMENT PLAN

Figure 7
Waterways & AMNET Locations
Township of Long Hill
Morris County, New Jersey



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 180 MAIN STREET, P.O. BOX 571
 CHESTER, NEW JERSEY 07930
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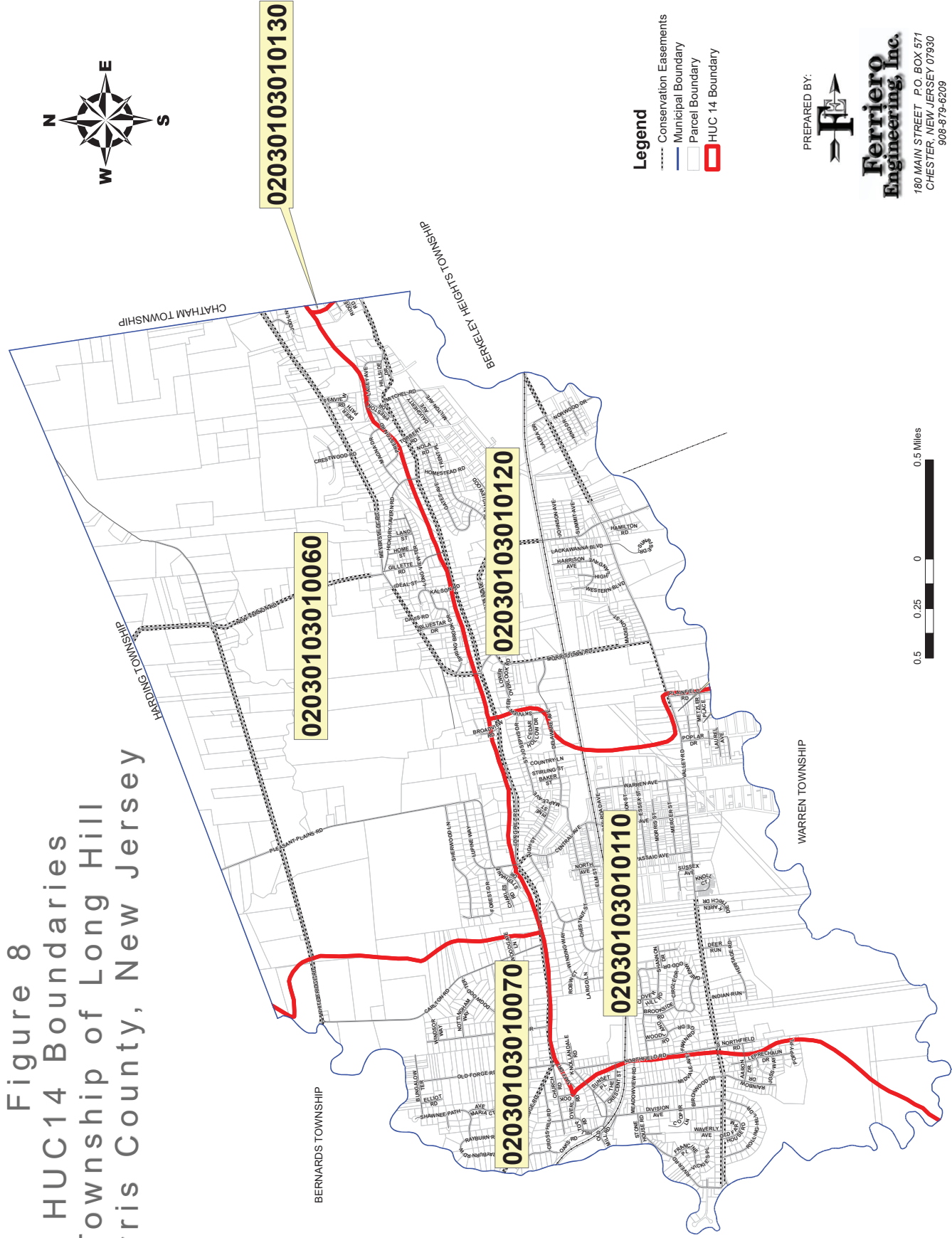
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 Map information obtained from the Morris County Office of GIS and NJ State GIS database system:
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 Projection: Transverse Mercator
 Datum: North America 1983
 Units: US Feet

STORMWATER MANAGEMENT PLAN

Figure 8
 HUC14 Boundaries
 Township of Long Hill
 Morris County, New Jersey



- Legend**
- Conservation Easements
 - Municipal Boundary
 - Parcel Boundary
 - HUC 14 Boundary

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 180 MAIN STREET, P.O. BOX 571
 CHESTER, NEW JERSEY 07930
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APPENDICES

Appendix A

Stormwater Control Ordinance

Chapter LU. Land Use

§ LU-146. STORMWATER MANAGEMENT.

[1] *Editor's Note: Prior ordinance history includes portions of Ordinance Nos. 194-06 and 357-2015.*

§ LU-146.1. Applicability.

[2-24-2021 by Ord. No. 469-21]

- a. This section shall be applicable to any minor or major site plan or subdivision that requires Planning Board or Board of Adjustment approval.
- b. This section shall also be applicable to all major developments undertaken by Long Hill Township, the Board of Education and any other agencies subject to review by the Township.
- c. This section shall also be applicable to minor developments as defined herein and any major development that does not require subdivision or site plan review.
- d. The following actions are exempt from this section provided they do not meet the definition of "major development":
 1. Any activity protected from municipal regulation by the Right-to-Farm Act,^[1] provided that the activity is being performed in accordance with a farm conservation plan.
[1] *Editor's Note: See N.J.S.A. 4:1C-1 et seq.*
 2. The planting and harvesting of crops, plants, flowers or shrubs in areas devoted to single-family use on the subject property.
 3. The removal and replacement of an existing impervious driveway where no change in grade or footprint occurs.
 4. Rehabilitation of existing vegetated areas where there is no material change in grade, surface type, or stormwater runoff patterns.
 5. Maintenance work performed by the Township through the Department of Public Works or through a municipal contract with an outside entity.
 6. Projects exempted by state law from the requirements of this section.

§ LU-146.2. Definitions.

[2-24-2021 by Ord. No. 469-21]

Unless otherwise defined herein, all terms in this section shall be as defined in N.J.A.C. 7:8.

EXEMPT DEVELOPMENT

Any project that disturbs less than 1,500 square feet of lot area and results in an increase in impervious surface of less than 1,000 square feet.

[Amended 7-14-2021 by Ord. No. 477-21]

MAJOR DEVELOPMENT

- a. Any individual "development," as well as multiple developments that individually or collectively result in:
 1. The disturbance of one or more acres of land since February 2, 2004;
 2. The creation of one-quarter acre or more of "regulated impervious surface" since February 2, 2004;
 3. The creation of one-quarter acre or more of "regulated motor vehicle surface" since March 2, 2021; or
 4. A combination of Subsections 2 and 3 above that totals an area of one-quarter acre or more. The same surface shall not be counted twice when determining if the combination area equals one-quarter acre or more.
- b. Major development includes all developments that are part of a common plan of development or sale (for example, phased residential development) that collectively or individually meet any one or more of conditions 1, 2, 3, or 4 above. Projects undertaken by any government agency that otherwise meet the definition of "major development" but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., are also considered "major development."

MINOR DEVELOPMENT

Any project that disturbs 1,500 square feet or more of lot area or results in an increase of impervious surface of 1,000 square feet or more and that does not meet the definition of "major development."

[Amended 7-14-2021 by Ord. No. 477-21]

§ LU-146.3. Design Standards.

[2-24-2021 by Ord. No. 469-21]

- a. Major Developments. All major developments shall have their stormwater management designed in accordance with the Residential Site Improvement Standards (RSIS, N.J.A.C. 5:21) and the NJDEP Stormwater Rule (N.J.A.C. 7:8) to include green infrastructure as outlined in N.J.A.C. 7:8. These standards shall apply to all projects, residential and nonresidential as well as projects by the Township, Board of Education and other agencies subject to review by the Township.
- b. Minor developments shall be designed to include the following stormwater management measures where applicable:
 1. Seepage pits or other infiltration measures shall be provided with a capacity of four inches of runoff for each square foot of increased impervious area.
 2. When the approving agency finds that the existing conditions are not conducive to infiltration, the applicant may provide other stormwater management facilities as to result in a zero net runoff as calculated by the Modified Rational Method.
 3. When the ground surface is changed in character such that an increase in runoff results, but the new surface is not impervious, seepage pits or other stormwater management facilities shall be provided to result in a zero net runoff rate as calculated by the Modified Rational Method.
- c. Drywell Design: Stone used in the infiltration devices shall be 2 1/2 inches clean stone and design void ratio of 33% shall be used. The infiltration measures shall be designed with an overflow to the surface which shall be stabilized and directed to an existing stormwater conveyance system or in a

manner to keep the overflow on the developed property to the greatest extent feasible. If the new impervious surface is not roof area, an equivalent area of existing roof may be directed to the infiltration system. This shall be permitted where the existing roof is not already directed to infiltration devices. The infiltration of water during the rainfall event shall not be counted as a "credit" toward the storage requirement.

- d. Soil erosion and sediment control measures shall be installed in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey.
- e. For the purposes of this section, gravel areas that are subject to compaction (such as driveways, parking areas and walking paths) shall be considered impervious. Pool surface areas, patios and decks shall be considered impervious. Gravel areas not subject to compaction (such as decorative stone used in planting beds) shall be considered pervious.
- f. All roof gutters shall be protected from the accumulation of leaves and litter by the installation of a gutter cap leaf separation device within the project area. Gutter screens or louvers are not acceptable.

§ LU-146.4. Waivers and Exceptions.

[2-24-2021 by Ord. No. 469-21]

- a. Standards for Relief. Waivers from strict compliance with the major development design standards shall only be granted upon showing that meeting the standards would result in an exceptional hardship on the applicant or that the benefits to the public good of the deviation from the standards would outweigh any detriments of the deviation. A hardship will not be considered to exist if reasonable reductions in the scope of the project would eliminate the noncompliance.
- b. Mitigation. If the reviewing agency for the project determines that a waiver is appropriate, the applicant must execute a mitigation plan. The scope of the mitigation plan shall be commensurate with the size of the project and the magnitude of the relief required. The mitigation project may be taken from the list of projects in the Municipal Stormwater Management Plan. All mitigation projects are subject to the approval of the Township Engineer.
- c. Reviewing Agency. All applications subject to the review of the Planning Board or Board of Adjustment shall be reviewed by the Board concurrently with subdivision or site plan review. Applications not subject to Land Use Board review shall be reviewed by the Township Engineer.^[1]

[1] *Editor's Note: Former Subsection d, Appeals, which immediately followed this subsection, was repealed 7-14-2021 by Ord. No. 477-21.*