TOWNSHIP OF ELK

GLOUCESTER COUNTY, NEW JERSEY

680 Whig Lane,

Monroeville, New Jersey

STORMWATER MANAGEMENT PLAN

June 2025

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Introduction

The Municipal Stormwater Management Plan (MSWMP) documents the strategy for Elk 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 of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as an 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 ¼ acre or more of regulated impervious surface since February 2, 2004;
3) The creation of ¼ acre or more of regulated motor vehicle surface since March 2, 2024; or
4) A combination of (2) and (3) above that totals an area of ¼ acre or more. The same surface shall not be counted twice when determining if the combination area equals ¼ acre or more.

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 parts 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.

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 in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

This plan also addresses the review and update of existing ordinances, the Township Master Plan, and other planning documents to allow for project designs that include low impact development techniques.

Goals

The goals of this MSWMP are to:

1. reduce flood damage, including damage to life and property;
2. minimize, to the extent practical, any increase in stormwater runoff from any new development;
3. reduce soil erosion from any development or construction project;

4. assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
5. maintain groundwater recharge;
6. prevent, to the greatest extent feasible, an increase in nonpoint pollution;
7. maintain the integrity of stream channels for their biological functions, as well as for drainage;
8. minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
9. protect public safety through the proper design and operation of stormwater basins.

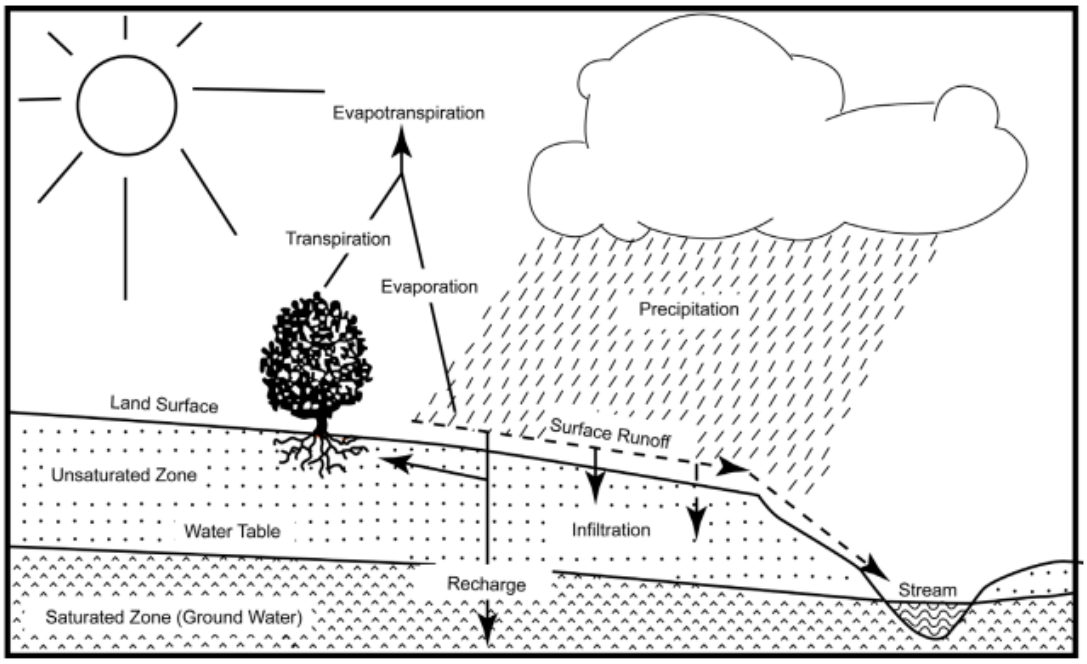
To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan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

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure C-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 rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend

on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

Figure C-1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

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

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

Background

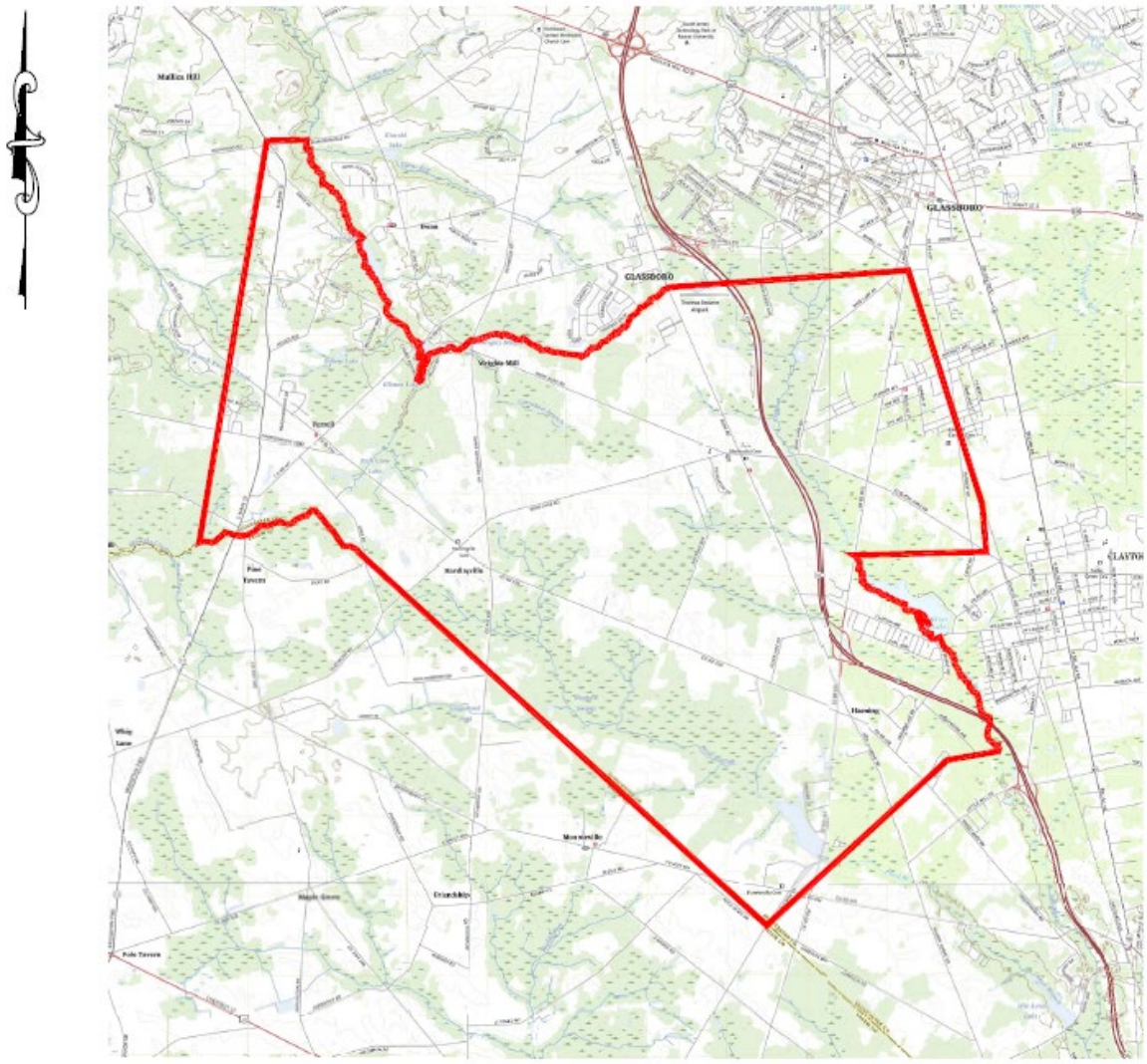
The Township encompasses 19.2 square mile area in Gloucester County, New Jersey. In recent years, the Township has been under significant development pressure. The population of the Township has increased from 3,514 in 2000, to 4,216 in 2010, to 4,424 in 2020 and looks to continue to increase with the new major development projects that are currently happening

within the Township, with the most recent development projects of Aura III and Silvergate. This has resulted in changes in the landscape, most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figure C-2 illustrates the waterways in the Township. Figure C-3 depicts the Township boundary on the USGS quadrangle maps.

Figure C-2: Township and Its Waterways

Source: NJ-GeoWeb

Figure C-3: Township Boundary on USGS Quadrangles



Source: Get Maps | topoView

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics. The three major waterways that border the Township to the north, east, and south, are Raccoon Creek, Still Run, and Reed Branch, respectively. Based on AMNET data, Raccoon Creek and Reed Branch are moderately impaired, while Still Run is non-impaired. In addition to the AMNET data, the NJDEP and other

regulatory agencies collect water quality chemical data on the streams in the state. If these data show that instream pollutant concentrations exceed the State's criteria then the river is impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

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 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 ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

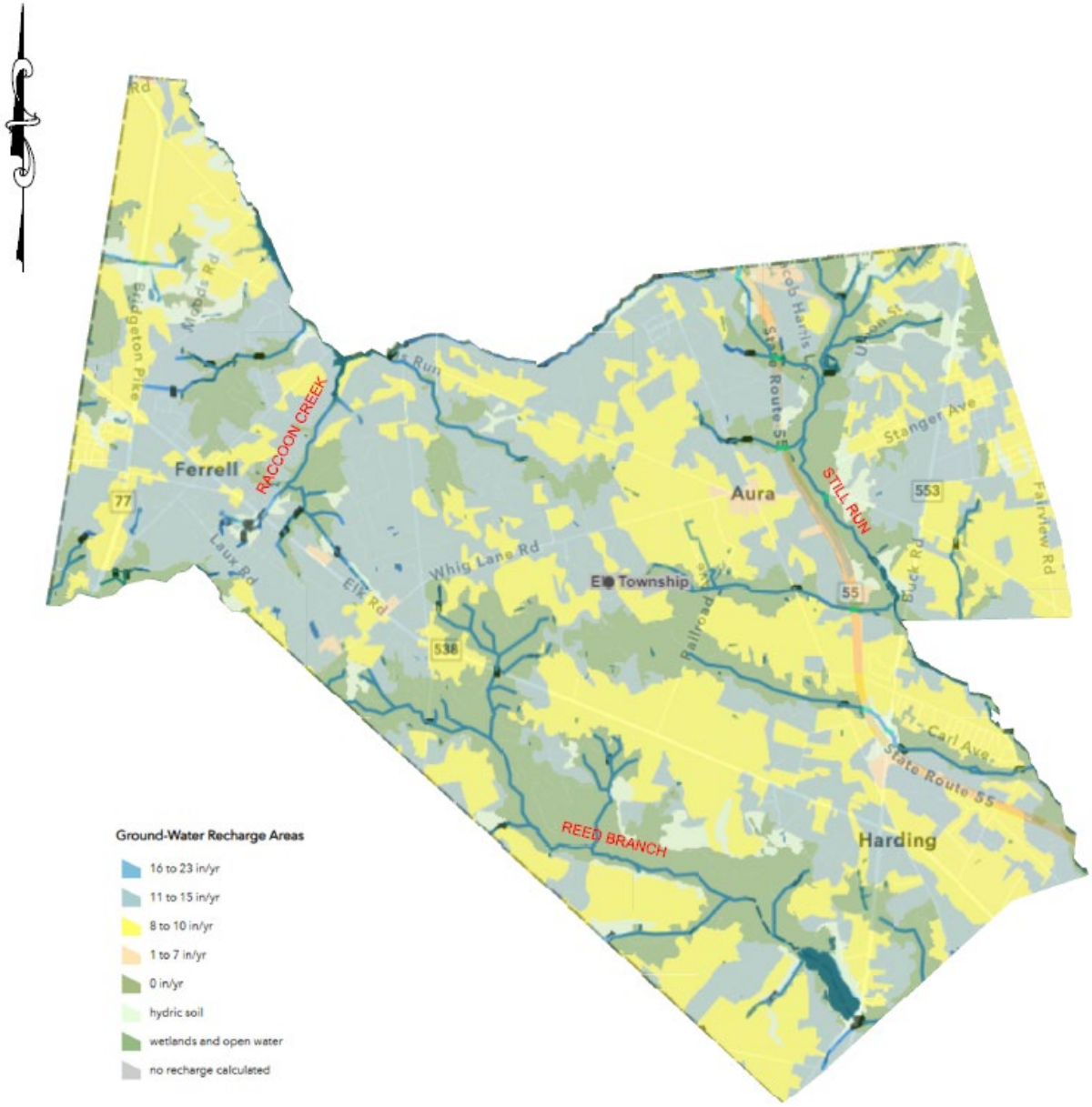
The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters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

The following waters are listed on Sublist 5 (May 2017):

1) Still Run, Cause Unknown (AN0730, AN0732 – NJDEP AMNET) Low Priority for TMDL.
2) Raccoon Creek, Arsenic (01477070 – NJDEP USGS DATA) Low Priority for TMDL.
3) Reed Branch, Arsenic (0141145260 – NJDEP USGS DATA) Low Priority for TMDL.

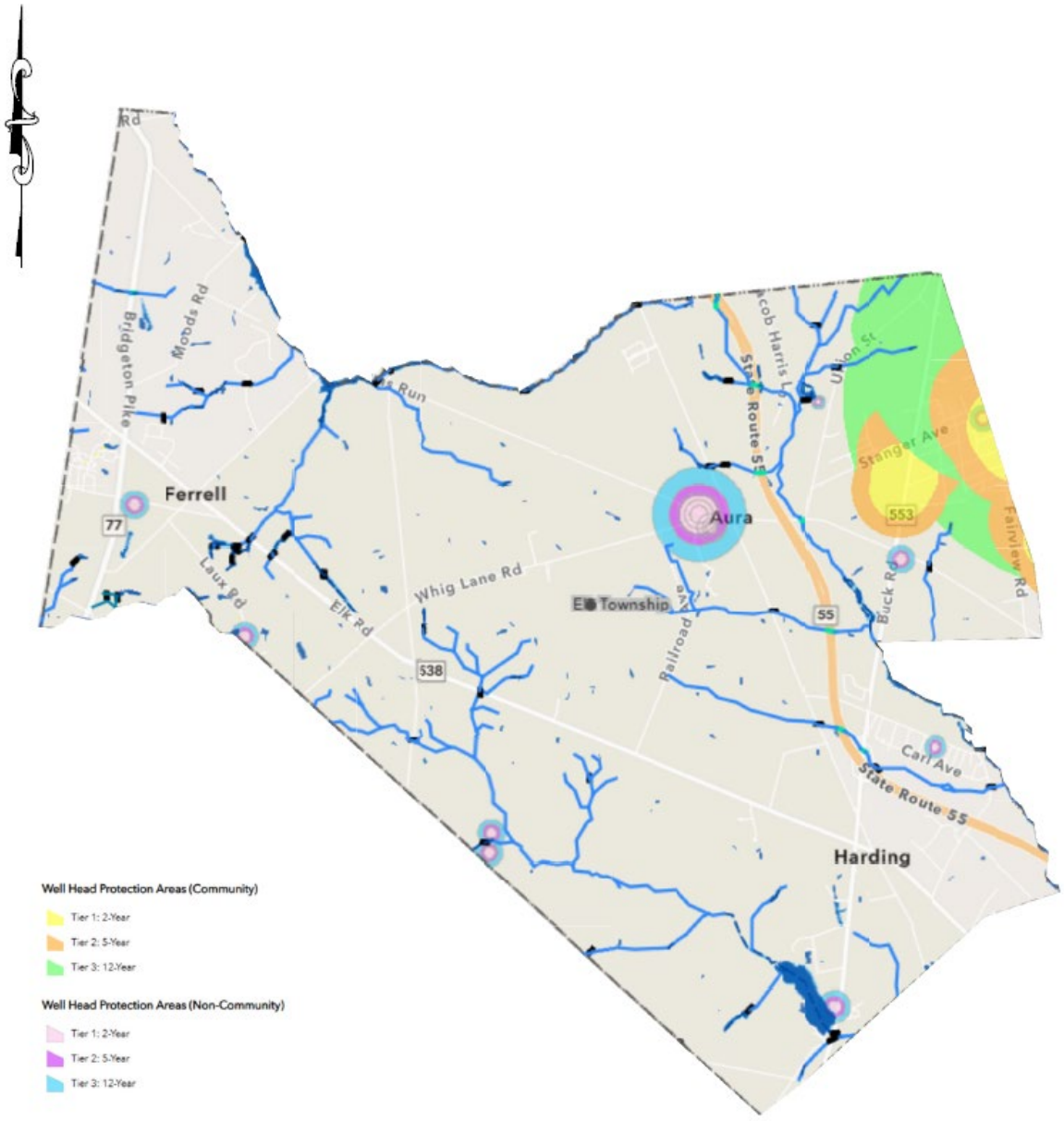
A map of the groundwater recharge areas are shown in Figure C-4. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-5.

Figure C-4: Groundwater Recharge Areas in the Township



Source: NJ-GeoWeb

Figure C-5: Wellhead Protection Areas in the Township



Source: NJ-GeoWeb

Design and Performance Standards

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6

Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the county for review and approval within 24 months of the effective date of the Stormwater Management Rules.

Plan Consistency

The Township is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Township; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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

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

Nonstructural Stormwater Management Strategies

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

Chapter 96 of the Township Code, entitled Unified Development, was reviewed with regard to incorporating nonstructural stormwater management strategies. Several changes were made to Article VIII of this Chapter, entitled "Design Standards" to incorporate these strategies.

§ 96-47.1 Agricultural buffers purpose is to compliment and further support the Township's Right to Farm Ordinance. The agricultural buffer requirements do not recommend the use of native ground cover. The language of this section should be amended to require the use of native plants, which can provide a low-maintenance alternative, resulting in lower fertilizer and water needs. This section currently requires the preservation of the naturally wooded area or the planting of a double row of six-foot-tall to eight-foot-tall evergreen trees.

§ 96-50 Landscaping and buffers primary purpose is for screening views and reducing noise penetration beyond the lot. The buffer requirements also do not mention the use of native ground cover. The language of this section should be amended to require the use of native plants, which can provide a low-maintenance alternative, resulting in lower fertilizer and water needs. This section currently requires the preservation of natural wooded tracts.

§ 96-53 Nonconforming uses and lots primary purpose is that no nonconforming lot to be further reduced in size, that no nonconforming building shall be enlarged, and that no nonconforming use may be expanded. The ordinance focuses on the continuance, abandonment, restoration, reversion, alterations, prior approved construction, and district changes of nonconforming uses and lots. This section should be amended, so that any nonconforming building that is being restored or altered into a conforming building, should have a maximum impervious cover limit. Additionally, language should be included for the use of vegetation as filters for stormwater runoff.

§ 96-54 Off-street parking, loading and circulation gives the minimum standards for off-street parking, loading, and circulation requirements. This section provides guidance on the minimum parking space requirements for different types of establishments and provides a brief detail that parking areas should be suitably drained. This section should be amended to allow for pervious paving material to be used in all parking areas and driveways, particularly for overflow parking areas and for driveways that are used infrequently. This section should also be amended to show design requirements to help reduce the total impervious coverage by concentrating the total required parking area into smaller footprints.

§ 96-55 Open space gives an amount of space that should be preserved as open space for developments, and that it is restricted against any future development except for recreational, conservation, agriculture or aesthetic satisfaction of the residents of said development or of the general public. This section should be amended to include limitation on the disturbance of existing vegetation, requirements to re-establish vegetation in disturbed areas, and having a maximum allowable impervious cover.

§ 96-63 Stormwater management and residential site improvement standards primary purpose is to make sure that all stormwater sewer requirements and standards meet the New Jersey Residential Site Improvement Standards (NJRSIS) within all developments. This section currently requires the disturbance to land to be minimal, but doesn't specify how much land can be disturbed, and requires the application of fertilizer when establishing vegetation after land disturbance. The language of this section should be amended to require the use of native plants, which can provide a low-maintenance alternative, resulting in lower fertilizer and water needs. Additionally, language should be included to limit the amount of disturbance, by setting a maximum impervious cover limit.

Several changes should be made to Article IX of the Township Code entitled "Zoning Districts and Regulations." The Township has 5 types of residential districts. Each district has a maximum

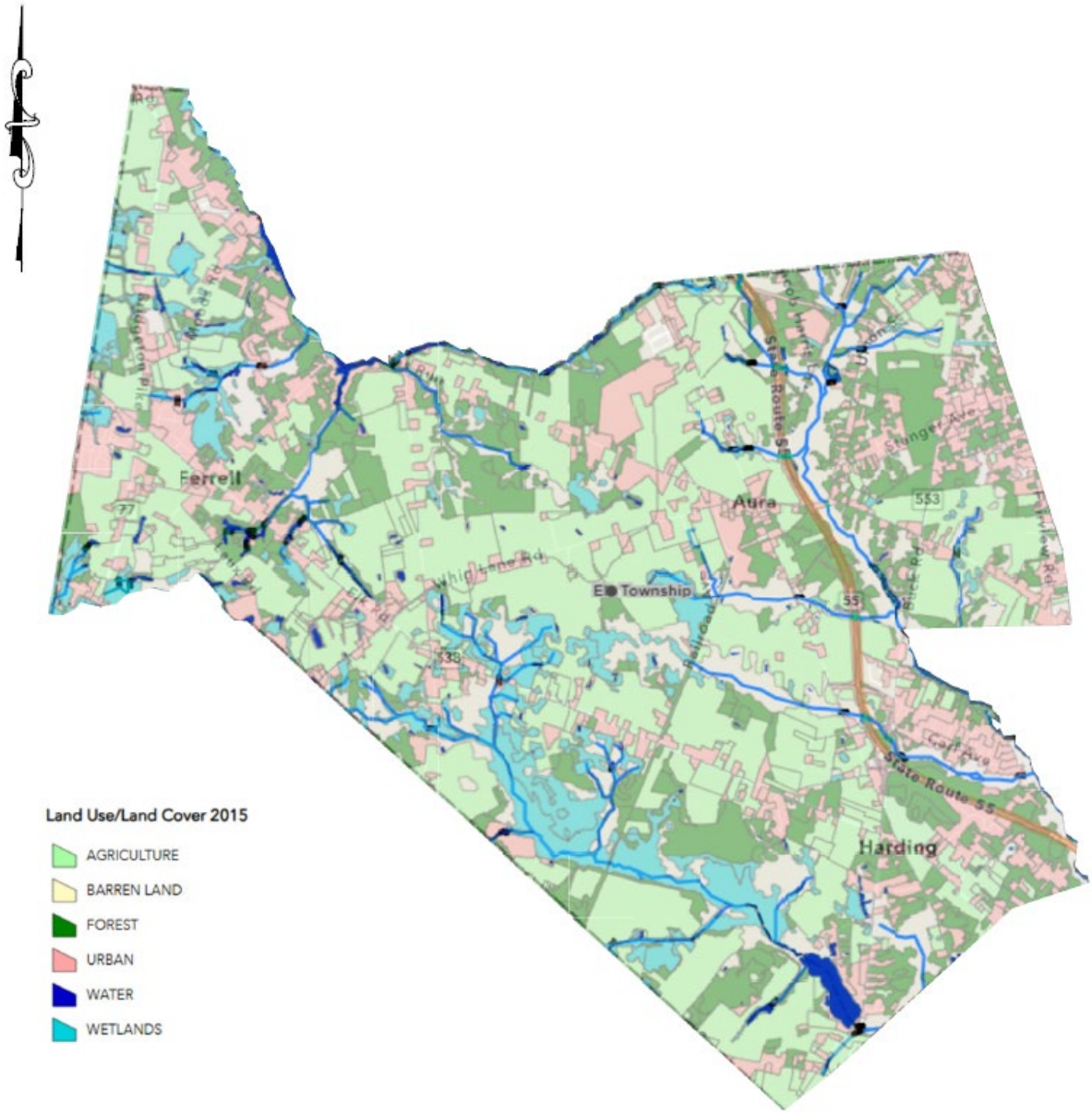
percent impervious surface allocation, ranging from 20 percent for the RE District, which has a minimum lot size of 80,000 square feet for standard and 40,000 square feet for cluster, to 40 percent for the MD Districts, which have a minimum lot size of 20,000 square feet. The Township has 4 types of nonresidential districts. Each of these districts has a maximum percent impervious surface allocation of 20 percent for all zones. Although each zone has a maximum allowable percent impervious surface, the Township Code was amended to remind developers that satisfying the percent impervious requirements does not relieve them of responsibility for complying with the Design and Performance Standards for Stormwater Management Measures contained in Chapter 86 – Stormwater Management, Article I – Stormwater Control. The Township is evaluating the maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate.

Land Use/Build-Out Analysis

Since the Township of Elk has a combined total of more than one square mile of vacant lands, the Township is required to do a build-out analysis. A detailed land use analysis for the Township was conducted. Figure C-6 illustrates the existing land use in the Township. Figure C-7 illustrates the HUC14s within the Township. The Township zoning map is shown in Figure C-8. Figure C-9 illustrates the constrained lands within the Township. The build-out calculations for impervious cover are shown in Table C-1. As expected, when developing agricultural and forest lands, the build-out of these two HUC14s will result in a significant increase in impervious surfaces.

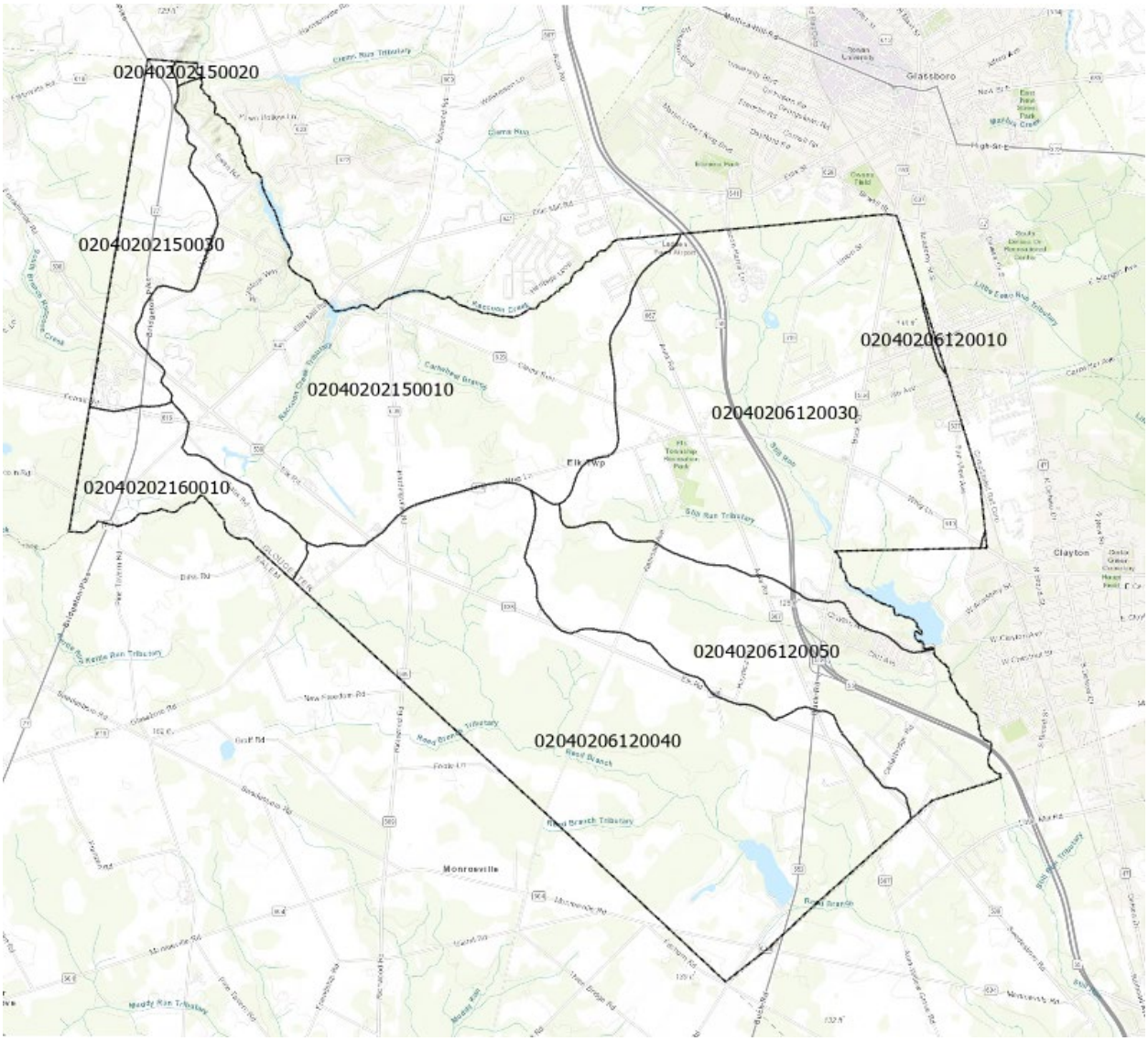
Table C-2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table C-3.

Figure C-6: Township's Existing Land Use



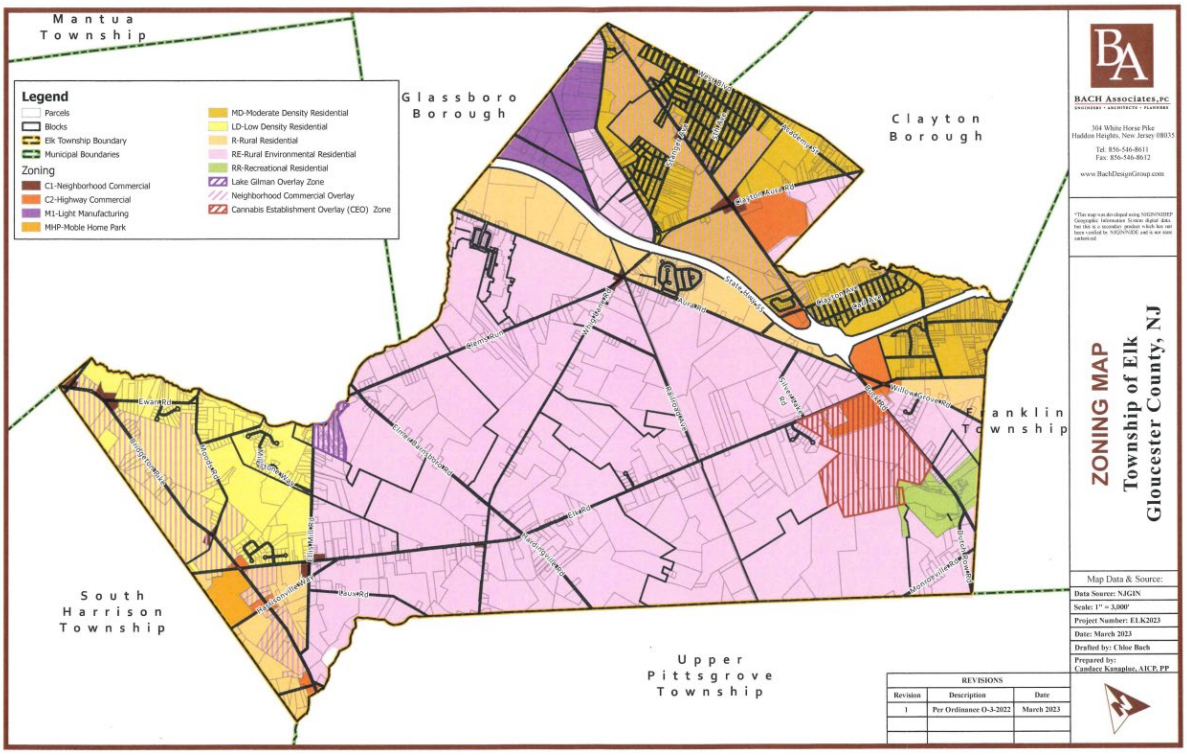
Source: NJ-GeoWeb

Figure C-7: Hydrologic Units (HUC14s) Within the Township



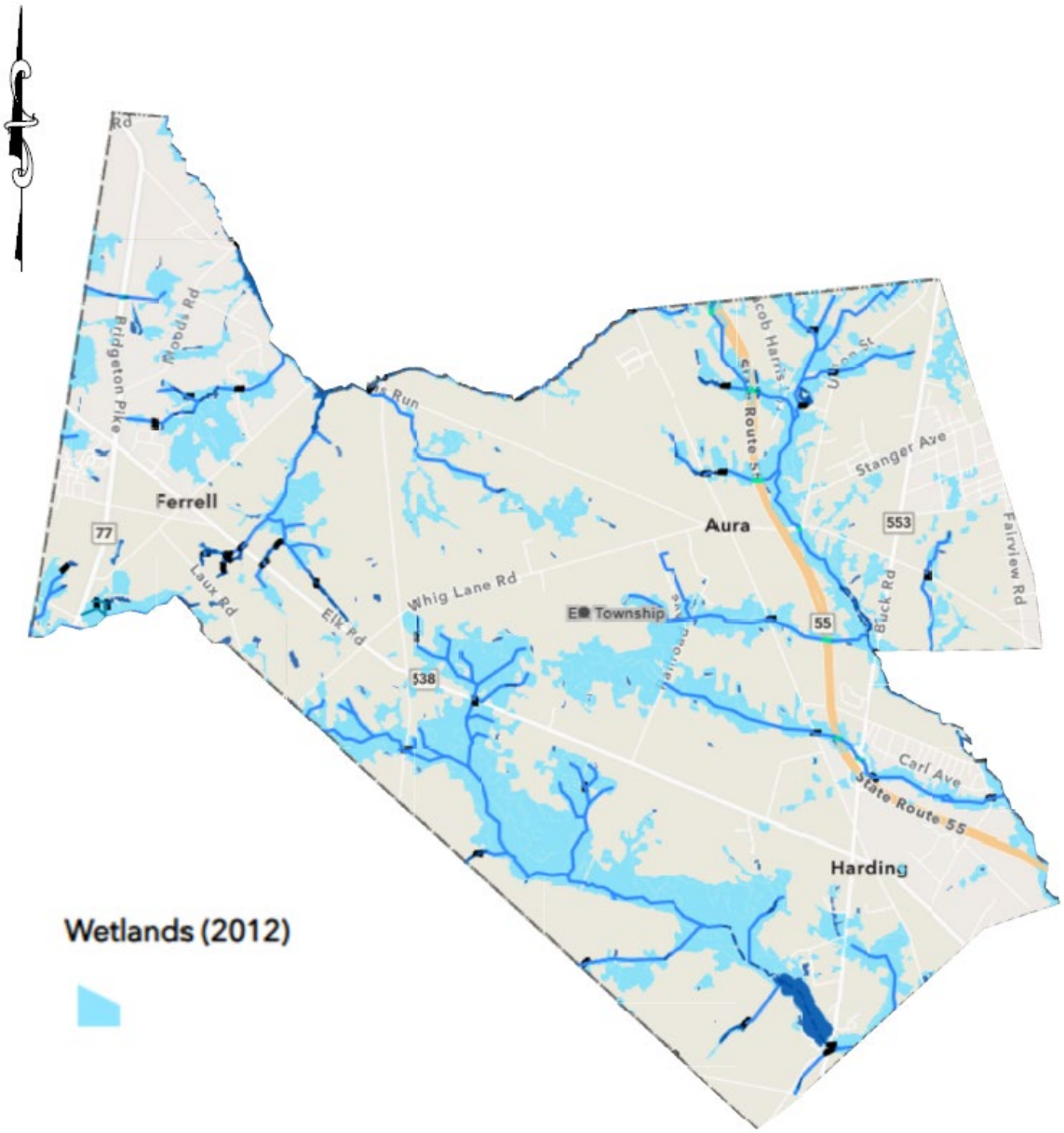
Source: ArcGIS Pro

Figure C-8: Zoning Districts Within the Township



Source: ZONING-MAP-2023-ADOPTED-O-3-2022.pdf

Figure C-9: Wetlands and Water Land Uses Within the Township – Constrained Land



Source: NJ-GeoWeb

Table C-1: Sample Build-Out Calculations for Two HUC14s

HUC14 and Zone	Total Area (acres)	Wetlands/Water Area (acres)	Developable Areas (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
02040202150010					
C-1	20.50	0.00	20.50	20	4.10
C-2	4.81	0.00	4.81	20	0.96
LD	740.02	162.25	577.77	25	144.44
R	64.10	7.56	56.54	20	11.31
RE	2,200.89	228.15	1,972.74	20	394.55
TOTALS	**3,030.32**	**397.96**	**2,632.36**		**555.36**
02040202150020					
C-1	0.23	0.00	0.23	20	0.05
LD	13.27	3.46	9.81	25	2.45
TOTALS	**13.50**	**3.46**	**10.04**		**2.50**
02040202150030					
C-1	15.73	0.00	15.73	20	3.15
C-2	9.81	0.00	9.81	20	1.96
LD	467.55	80.75	386.80	25	96.70
MHP	67.17	10.48	56.69	20	2.10
R	48.71	6.19	42.52	20	8.50
TOTALS	**608.97**	**97.42**	**511.55**		**112.41**
02040202160010					
C-1	0.01	0.00	0.01	20	0.002
C-2	19.99	1.59	18.40	20	3.68
R	226.04	31.62	194.42	20	38.88
RE	250.47	58.99	191.48	20	38.30
TOTALS	**496.51**	**92.20**	**404.31**		**80.86**
02040206120010					
MD	7.89	0.00	7.89	35	2.76
TOTALS	**7.89**	**0.00**	**7.89**		**2.76**

HUC14 and Zone	Total Area (acres)	Wetlands/Water Area (acres)	Developable Areas (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
02040206120030					
C-1	28.01	0.51	27.50	20	5.50
C-2	111.51	32.07	79.44	20	15.89
M-1	267.61	103.29	164.32	20	32.86
MD	1,317.51	258.58	1,058.93	35	370.63
R	458.86	79.15	379.71	20	75.94
RE	945.32	263.14	682.18	20	136.44
TOTALS	**3,128.82**	**736.74**	**2,392.08**		**637.26**
02040206120040					
C-2	88.46	1.96	86.50	20	17.30
MD	9.09	0.00	9.09	35	3.18
R	76.59	2.43	74.16	20	14.83
RE	3,076.28	1,140.01	1,936.27	20	387.25
RR	149.77	28.62	121.15	20	24.23
TOTALS	**3,400.19**	**1,173.02**	**2,227.17**		**446.79**
02040206120050					
C-2	54.07	2.94	51.13	20	10.23
MD	498.07	143.02	355.05	35	124.27
R	48.51	9.39	39.12	20	7.82
RE	840.23	263.83	576.40	20	115.28
TOTALS	**1,440.88**	**419.18**	**1,021.70**		**257.60**

Table C-2: Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Suspended Solid Load (lb/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004, Chapter 3

Table C-3: Nonpoint Source Loads at Build-Out for Two Example HUC14s

HUC14 and Zone	Zoning Build-out	Developable (ac)	TP (lb/acre/yr)	TP (lb/yr)	TN (lb/acre/yr)	TN (lb/yr)	TSS (lb/acre/yr)	TSS (lb/yr)
02040202150010								
C-1	Commercial	21	2.1	44	22	462	200	4,200
C-2	Commercial	5	2.1	11	22	110	200	1,000
LD	Low Density Residential	578	0.6	347	5	2,890	100	57,800
R	Rural Residential	57	0.6	34	5	285	100	5,700
RE	Agriculture	1,973	1.3	2,565	10	17,930	300	591,900
TOTALS		**2,634**		**3,001**		**21,677**		**660,600**
02040202150020								
C-1	Commercial	0	2.1	0	22	0	200	0
LD	Low Density Residential	10	0.6	6	5	50	100	1,000
TOTALS		**10**		**6**		**50**		**1,000**
02040202150030								
C-1	Commercial	16	2.1	33	22	352	200	3,200
C-2	Commercial	10	2.1	21	22	220	200	2,000
LD	Low Density Residential	387	0.6	232	5	1,935	100	38,700
MHP	Medium Density Residential	57	1.4	80	15	855	140	7,980
R	Rural Residential	43	0.6	26	5	215	100	4,300
TOTALS		**513**		**392**		**3,577**		**56,180**
02040202160010								
C-1	Commercial	0	2.1	0	22	0	200	0
C-2	Commercial	18	2.1	38	22	396	200	3,600
R	Rural Residential	194	0.6	116	5	970	100	19,400
RE	Agriculture	191	1.3	248	10	1,910	300	57,300
TOTALS		**403**		**402**		**3,276**		**80,300**
02040206120010								
MD	Medium Density Residential	8	1.4	11	15	120	140	1,120
TOTALS		**8**		**11**		**120**		**1,120**

HUC14 and Zone	Zoning Build-out	Developable (ac)	TP (lb/acre/yr)	TP (lb/yr)	TN (lb/acre/yr)	TN (lb/yr)	TSS (lb/acre/yr)	TSS (lb/yr)
02040206120030								
C-1	Commercial	28	2.1	59	22	616	200	5,600
C-2	Commercial	79	2.1	166	22	1,738	200	15,800
M-1	Industrial	164	1.5	246	16	246	200	32,800
MD	Medium Density Residential	1,059	1.4	1,483	15	15,885	140	148,260
R	Rural Residential	380	0.6	228	5	1,900	100	38,000
RE	Agriculture	682	1.3	887	10	6,820	300	204,600
TOTALS		**2,392**		**3,069**		**27,205**		**445,060**
02040206120040								
C-2	Commercial	87	2.1	183	22	1,914	200	17,400
MD	Medium Density Residential	9	1.4	13	15	135	140	1,260
R	Rural Residential	74	0.6	44	5	370	100	7,400
RE	Agriculture	1,936	1.3	2,517	10	19,360	300	580,800
RR	Low Density Residential	121	0.6	73	5	605	100	12,100
TOTALS		**2,227**		**2,830**		**22,384**		**618,960**
02040206120050								
C-2	Commercial	51	2.1	107	22	1,122	200	10,200
MD	Medium Density Residential	355	1.4	497	15	5,325	140	49,700
R	Rural Residential	39	0.6	23	5	195	100	3,900
RE	Agriculture	576	1.3	749	10	5,760	300	172,800
TOTALS		**1,021**		**1,376**		**12,402**		**236,600**

Mitigation Plans

Elk Township has not adopted a mitigation plain nor has a regional stormwater management plan (RSMP) or a water quality management plan (WQMP) been adopted that includes any part of Elk Township. Therefore, no variances or waivers of strict compliance, or alternative design and performance standards can be considered or approved by the Township of Elk, the Elk Township Planning/Zoning Board, or the Township Engineer, except as specifically provided for at § 86-4D and § 86-4 of the Township Code Book.