CONSERVATION PLAN








Contents

VII. CONSERVATION PLAN ELEMENT

A. Introduction

The environmental and ecological factors which are likely to influence development patterns and dramatically affect the development capacity of the Township are the location of wells, bedrock geology, extent of aquifer recharge areas, soil conditions, wetlands, floodplains, and the extent of wooded areas.

Stream Corridor

In addition to identifying existing natural features within the Township and discussing the importance of each feature, this plan element also discusses the importance of other environmental and environmental related actions that should be addressed to conserve scarce natural resources and to promote environmental friendly policies. These environmental actions and policies include the promotion of "Green Design Guidelines", permitting solar energy systems in all zoning districts, and encouraging the use of native plants in land development applications and other instances.

The Township also acknowledges that the D & R Canal Commission has adopted a set of standards for aesthetic review of land development applications and has adopted drainage requirements for all land within one-half mile of the Canal. The D & R Canal Commission drainage requirements apply to the entire Township. Implementation of Canal Commission regulations affects the size of parcels for development and the rate of growth in Plainsboro.

B. Well Locations

The wellhead of a well is the area surrounding the well that contributes directly to its water supply. Contaminants entering the soil in an area of low permeability are less of a threat to the aquifer as a whole than in areas of high permeability, but can still pose a significant hazard to an individual well if they are within the wellhead. Wells in recharge areas are more vulnerable to contaminants entering from the surface due to the high infiltration rates. Regulatory mechanisms to protect wellhead areas in recharge zones generally focus on prohibition of land uses that pose a risk of groundwater contamination, such as on lot waste disposal sites and certain types of commercial and industrial facilities.

Well records maintained by the NJDEP are intended to provide a complete record of all wells installed in New Jersey.

In addition to the numerous small wells in the Township, two (2) public supply wells are located in Plainsboro and maintained by the New Jersey American Water Company. The more westerly of the two is located at the end of Jeffers Road, north of Plainsboro Road. This is a 12" well, drilled 208' deep into the Magothy/Raritan Formation. It is served by a pump of 295 gallons per minute (GPM) capacity, but is normally pumped at a rate of 150-180 GPM. The second supply well is located at the end of Deer Creek Drive, near Plainsboro Pond. This well is 6" in diameter and 120' deep, also drilled into the Magothy/Raritan Formation. Its pump has a capacity of 350 GPM, but the well is normally pumped at a rate of approximately 100 GPM. Of the two, the Jeffers Lane well is used on a more regular basis.

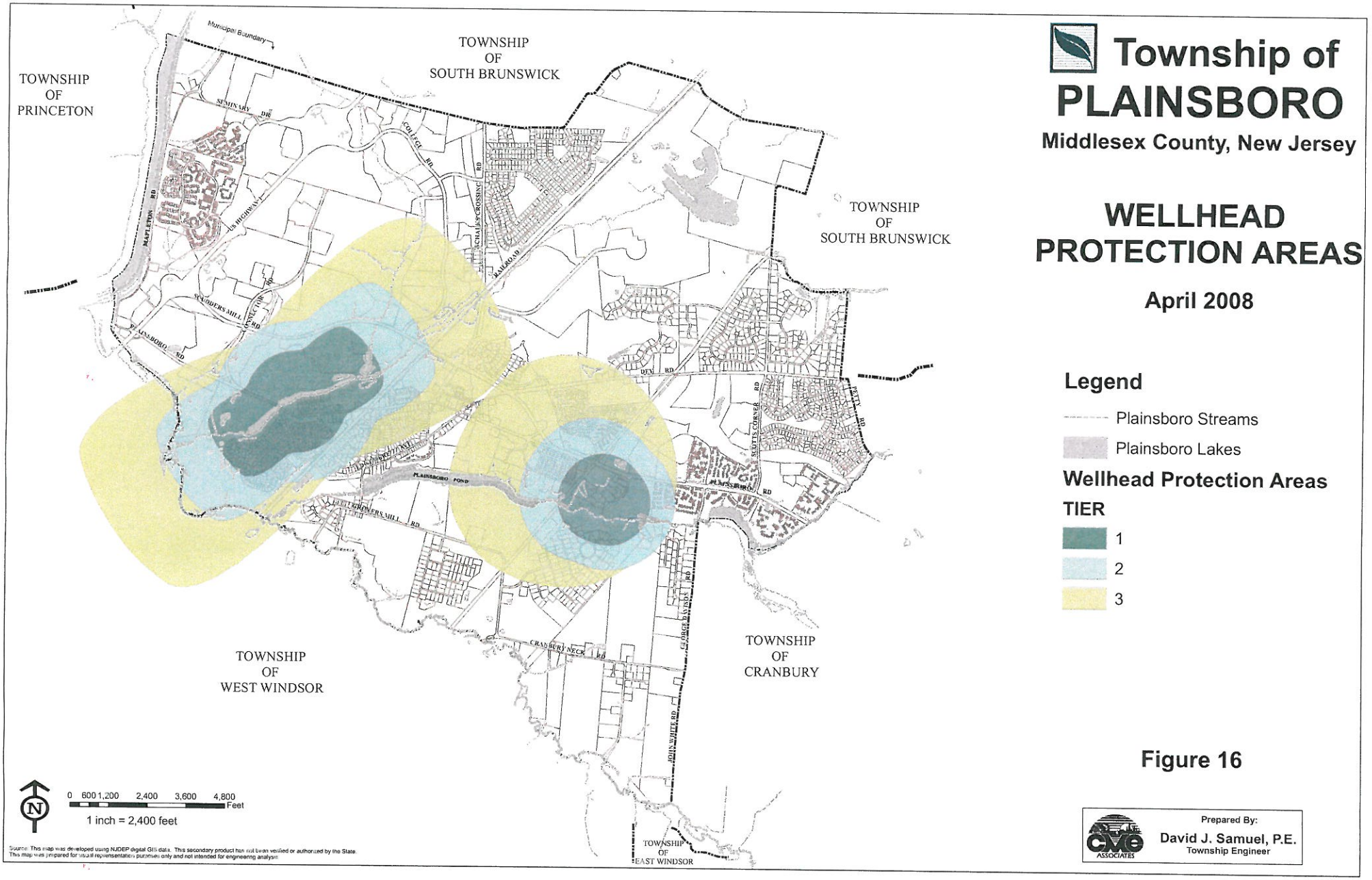
Well head protection areas should be delineated by taking into account hydrological and hydrogeological conditions, well influence zones, the presence of interfering wells, water table drawdown, actual and/or potential sources of contamination, and their transport velocities. Sources of contamination may include underground fuel storage tanks, stormwater infiltration basins, septic systems, material stockpiles, hazardous waste containers, sewer line leakage, pesticides and fertilizers, and de-icing application.

There are three (3) Tiers associated with wellhead protection areas, Tiers 1, 2, and 3, which delineate the extent of ground water captured by a pump at a specified rate calculated over a 2, 5, and 12-year periods, respectively. Of the wellhead protection areas, one of the Tier 1 and Tier 2 protection areas are located entirely within the Township, but a portion of the Tier 3 area is located within Mercer County. The third wellhead protection area is centered on the boundary between Middlesex and Mercer County. Wellhead protection areas are delineated by the NJDEP Source Water Protection Program (SWAP) and acted upon in response to the Safe Drinking Water Act Amendments 0f 1986 and 1996. Please see **Figure 16: Wellhead Protection Areas Map**, for wellhead protection locations.

C. Bedrock Geology

The Township lies along the boundary between two (2) major physiographic provinces of New Jersey: the Inner Coastal Plain to the southeast and the Piedmont to the northwest. Plainsboro is underlain by three geologic formations: the Lockatong and Stockton Formations in the northwest and the Magothy/Raritan Formation in the southeast. The boundary between the Stockton and Magothy/Raritan Formations delineates the boundary between the Piedmont and Coastal Plain Provinces.

The Lockatong Formation dips shallowly northwestward and is composed primarily of argillite, a fine-grained sedimentary rock similar to mudstone or shale. The Lockatong is a relatively poor aquifer, but is used for water supply on a limited basis by individual homes in Mercer and Middlesex Counties. Lockatong Formation bedrock underlies approximately 2% of Plainsboro Township, in the extreme northwest corner along Lake Carnegie.



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Township of PLAINSBORO

Middlesex County, New Jersey

WELLHEAD PROTECTION AREAS

April 2008

Legend

- Plainsboro Streams
- Plainsboro Lakes

Wellhead Protection Areas

TIER

- 1
- 2
- 3

Figure 16

Prepared By:
David J. Samuel, P.E.
Township Engineer
CME ASSOCIATES

The Stockton Formation, or Stockton Sandstone, dips shallowly northwestward and is composed of sandstone of Triassic age. The Stockton is locally important for water supply for both domestic and industrial uses. The Stockton underlies 33% of Plainsboro, in a band extending northeast-southwest and lying to the northwest of the Amtrak railroad line.

The Magothy and Raritan Formations, although sometimes mapped separately, act as a single aquifer unit and are therefore considered together in many reports. The Magothy/Raritan is a partially consolidated sandstone of Cretaceous age that dips to the southeast. It is an aquifer of great regional importance, providing water to large areas of the Coastal Plain. The Magothy/Raritan comprises several smaller units, including several clay units of limited permeability interlayered with water-bearing sand and gravel units.

D. Aquifer/Groundwater Recharge

In a region where an aquifer reaches the surface, areas of permeable soil allow rainwater falling on the ground to infiltrate and percolate down into the aquifer, thus replenishing its water supply. These areas are known as aquifer recharge areas. Recharge areas are regionally important because they help maintain a balance between water being withdrawn from the aquifer throughout the region and water entering the aquifer in the recharge areas. Planning options for protection of these areas generally focus on maintaining infiltration capacity of the soil. This can be accomplished through regulations requiring that the percentage of stormwater that escapes as surface runoff be no higher in the post-development condition than the pre-development levels. This is achieved through a number of techniques. Minimization of paved areas reduces the negative effect of impervious surfaces on infiltration, as does the use of porous paving material. Installation of retention basins promotes infiltration of the retained water rather than allowing it to run off directly into surface streams. Individual housing sites can be designed with infiltration beds or dry wells that receive roof runoff, promoting infiltration on a localized scale.

Stormwater Detention Pond

The fresh water cycle consists of evapo-transpiration of water as vapor into the atmosphere, condensation of the vapor and precipitation onto land and water below. Part of that water runs off into streams, part re-evaporates, and some soaks into the ground to become groundwater. This section is concerned with the identification and protection of those areas in Plainsboro Township where ground water aquifers are recharged by the percolation of surface waters through pervious soils.

Aquifers are porous underground formations which store water that seeps below ground. Aquifers come in two types: "confined" and "unconfined." Unconfined aquifers are, generally, those that lie near the ground surface and are often referred to as the "water table." They are sandy, gravelly deposits that contain water. This water can sometimes be reached by shallow wells and often appears in holes dug in these deposits. Confined aquifers are porous geologic formations that contain water and are usually sandwiched between other layers of soil, such as clay, that are relatively impermeable. They typically start at a point on the surface and slope downward, reaching very deep underground.

Aquifers receive most of their water from rainfall. Unconfined aquifers receive their rainwater over large, widespread areas. Confined aquifers, on the other hand, can only receive water at those points of limited area where they are near the surface.

Groundwater supplies are fed by rainfall and surface waters. The most effective recharge areas are those with the most permeable soils. Soils are usually two to five feet thick, consisting of layers of unconsolidated material. The recharge potential of a given soil type depends upon the permeability of its least pervious horizon.

Distribution of aquifer recharge areas is a function of soil composition and geology. In regions where an aquifer reaches the surface, recharge generally occurs in areas covered by permeable soils, as rainwater infiltrates the soil and moves downward into the rock. Recharge can also occur in areas of low-permeability soils if flooding is frequent, because water left standing over the soil will gradually percolate downward through the soil. Areas of low-permeability soil that are not frequently flooded do not provide significant aquifer recharge, because rainwater falling on these areas runs off and is conveyed as surface water.

The Soil Survey of Middlesex County lists values for several soil characteristics related to water movement. Soil types are classified into four hydrologic soil groups based on their ability to take in water when wet and receive precipitation from long-duration storms. These groups are designed to be used to estimate runoff, or conversely, infiltration, and incorporate a number of factors related to permeability and drainage. The soil groups designated A through D, are defined as follows:

1. Group A. Soils have a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmissions.

2. Group B. Soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

3. Group C. Soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

4. Group D. Soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Because the determination of hydrologic soil group is based on several factors, it is not possible to equate the groups directly with specific ranges of permeability. Most Group A soils have permeability of 6-20 inches/hour and most Group B soils lie in the range of 0.6-6 inches/hour, but there are many exceptions. Permeability of soils in Groups C and D are generally low (less than 6), but many soils with higher permeability are classed as Group C or D due to the other factors described in the definitions noted above.

Some soil mapping units are not assigned a hydrologic soil group, usually because their characteristics vary too greatly from location to location. Groups such as Humaquepts and Psamments are loosely defined and contain soils with a relatively wide range of characteristics.

Soils in Groups A and B are considered to have high aquifer recharge potential. In general, soils in Groups C and D are considered to have low aquifer recharge potential. An intermediate category of recharge potential was created to describe certain special cases. Low-permeability soils lying in the floodplains of perennial streams and categorized as frequently flooded in the Soil Survey were considered to provide intermediate recharge potential because of the special hydrologic conditions they experience. These include Manahawkin muck (symbol Ma, hydrologic group D) and Humaquepts (symbol HU, hydrologic group unassigned). Also placed in the intermediate category were Fallsington sandy loam and Fallsington loam (symbols Fa and Fb). These soils are assigned hydrologic group B/D, because their characteristics vary depending on site-specific conditions. Soils with no hydrologic soil group classification that are not frequently flooded are designated "Undetermined" on the aquifer recharge map because insufficient information is available to classify them.

Depending on specific focus, some parts of the Township could be considered more important for recharge because of the aquifer involved. The Magothy/Raritan Formation is regionally very important as a water source, and is confined by other units in much of the Coastal Plain. Its recharge area is limited to a northeast-southwest band that includes Plainsboro Township. By contrast, the Stockton and Lockatong Formations are locally important for water supply, but are unconfined (and therefore can be recharged) through most of the area in which they are used.

The Township should avoid extensive development over locally and regionally important recharge areas that would reduce the quantity or quality of percolation

reaching the aquifer. A developer should consider placing homes, parking lots, and other impervious surfaces over areas with low recharge potential and keeping high recharge potential areas in open space.

Preserved Open Space

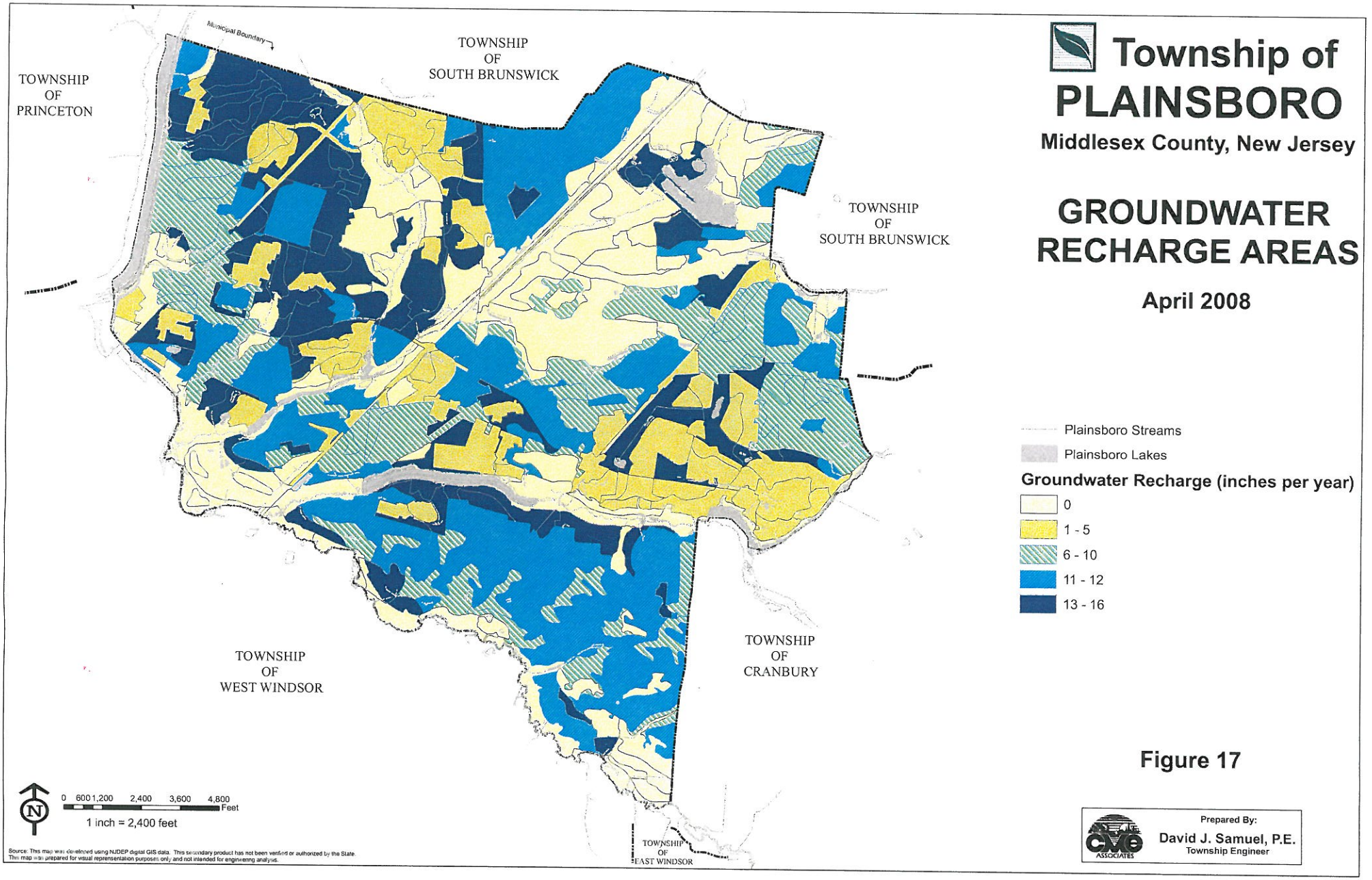
The Township lies at the western margin of the New Jersey Coastal Plain, which is underlain by sedimentary rocks of Cretaceous age and younger. Approximately two-thirds of the Township is underlain by the Magothy/Raritan Formation, a large aquifer system that provides a water supply for much of the Coastal Plain in New Jersey and other states. The Magothy/Raritan Formation outcrops along a northeast-southwest trending band that runs through Plainsboro, and dips down to the southeast, becoming a deep aquifer. The recharge areas in Plainsboro are therefore of regional importance because they are part of a somewhat limited band of recharge for a very large aquifer system.

In the northwest portion, approximately one-third of the Township is underlain by the Stockton and Lockatong Formations of Triassic age. The Stockton is a locally important aquifer and the Lockatong supplies water to a small number of homes in the area. Recharge of these aquifers, although not as important on a statewide or regional basis as recharge of the Magothy/Raritan, is nonetheless important to those residents served by them.

A map of the groundwater recharge areas is depicted in **Figure 17: Groundwater Recharge Areas Map.**

E. Soil Types

The U.S. Department of Agriculture (USDA) conducted an interim soil survey for Middlesex County as part of the National Cooperative Soil Survey Program in 1978. A 1980 updating of the USDA report did not affect either the soil types or the boundaries between them in the Township. In addition to soil types, the survey reviewed suitability of land for agriculture and its chemical and physical properties, water levels, the presence of soil conditions which would increase construction costs, suitability for on-site sewage disposal, and other characteristics. It should be understood, however, that not only are the boundaries between soil types only approximately located on soil maps due to the scale of the state-wide project, but that isolated soil types within areas dominated by other soil types may be lost altogether. The high water level, which varies on a seasonal basis, is also affected by terrain characteristics. Even though the USDA soils maps cannot be used as the sole basis for determining development or agricultural potential, thus requiring on-site testing


Municipal Boundary
TOWNSHIP OF PRINCETON
TOWNSHIP OF SOUTH BRUNSWICK
TOWNSHIP OF SOUTH BRUNSWICK
TOWNSHIP OF WEST WINDSOR
TOWNSHIP OF CRANBURY
TOWNSHIP OF EAST WINDSOR
Township of
PLAINSBORO
Middlesex County, New Jersey
GROUNDWATER RECHARGE AREAS
April 2008
Plainsboro Streams
Plainsboro Lakes
Groundwater Recharge (inches per year)
0
1 - 5
6 - 10
11 - 12
13 - 16
0 600 1,200 2,400 3,600 4,800 Feet
1 inch = 2,400 feet
Source: This map was developed using NJDEP digital GIS data. This secondary product has not been verified or authorized by the State. This map was prepared for visual representation purposes only and not intended for engineering analysis.
Figure 17
Prepared By:
David J. Samuel, P.E.
Township Engineer
CME ASSOCIATES

before the undertaking of any construction, they are still the best source of information regarding existing soils and are relied upon in all agricultural preservation and development efforts.

Brief descriptions of the major soil classifications found in the Township are set forth below.

1. Alluvial Series

   Alluvial soils are poorly drained and frequently flooded. Their prime suitability is for pasture and woodland.

2. Downer Series

   Downer soils have a relatively high agricultural productivity but are susceptible to erosion or low water availability, depending on soil subclasses.

3. Evesboro Series

   Although Evesboro soil is used for farming, it presents many difficulties: available water capacity is low; soils are droughty; crops must be irrigated frequently; natural fertility is low and added fertilizer is easily leached out; and wind erosion is common in unprotected areas.

4. Fallsington Series

   These soils appear in low places and, unless drained, they are almost constantly wet. Although the water table in Fallsington soils varies, in Plainsboro it is generally less than ½ foot from the surface. Even if drained, the residual wetness of Fallsington soils still delays plowing in springtime. Limitations for septic systems and construction are also severe because of poor drainage and frost action.

5. Fort Mott Series

   Fort Mott soils are located near rivers and streams. Their usefulness for agricultural land is sometimes limited because of low fertility, low water capacity and low organic content. For home sites, this type of land is relatively stable and presents few limitations for septic systems.

6. Hammonton Series

   Hammonton soils are capable of supporting agricultural production, but are frequently limited by a high seasonal water table which also affects construction by making septic systems susceptible to frost heaving and poor septic drainage.

7. Klej Series

The organic content and consequently the productivity of the Klej soils is low. However, when drained, this type of soil is suited to specialty crops such as tomatoes, peppers, eggplant and small fruits.

8. Manahawkin Muck

This soil is wet, acid and subject to flooding.

9. Matapeake Series

An excellent agricultural soil, the Matapeake series is particularly suited for potatoes, corn, small grains and a multitude of other crops. It also presents few limitations for home sites.

10. Mattapet Series

This soil is well suited for agricultural purposes although with some restrictions because of wetness of the subsoil during the winter and spring. This restriction, however, can be modified with artificial drainage.

11. Sassafras Series

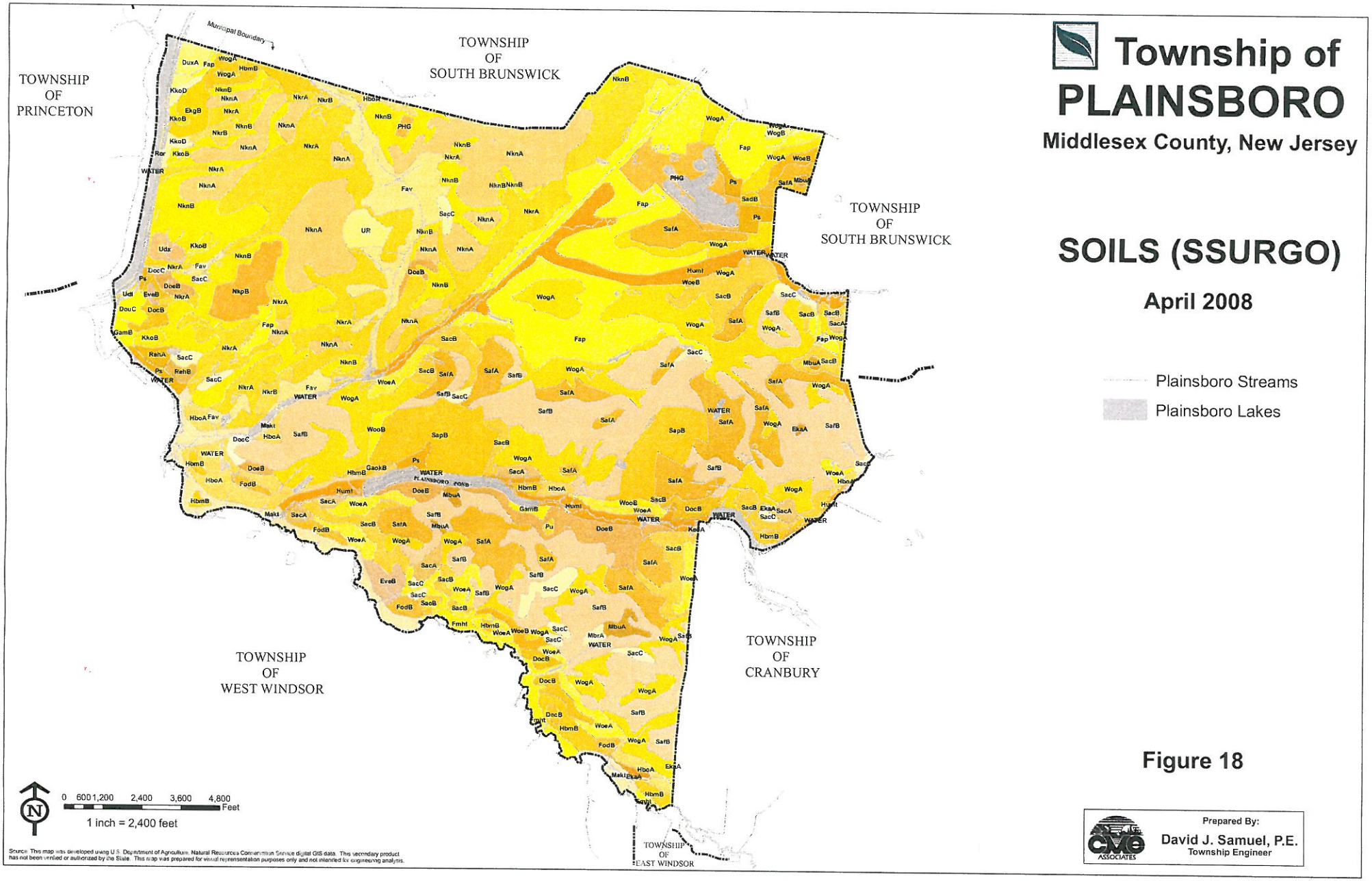
Very similar to Downer, this is an excellent soil for agriculture because of its easy workability, moderate natural fertility, and positive response to fertilization. Lime often needs to be added to lessen acidity. There are few limitations regarding residential development or septic systems. Depth to seasonal high water table is greater than five feet.

12. Woodstown Series

This is another soil type that is well suited for agriculture, but only if moderately well drained. Otherwise, the subsoil becomes saturated during the winter and spring, thus restricting the possibility of farming. For isolated pockets of Woodstown soil, it is sometimes possible to lower the water table and improve farm production. Residential development with sewer systems generally needs a depth of 4-5 feet above groundwater, while construction with septic systems needs a minimum of six feet above the seasonal high water table. Since the seasonal high water table in Woodstown type soil is normally only 1½-4 feet below grade, any residential development would require extensive lowering of the water table or costly construction to prevent seepage into basements or shifting foundations and to allow septic systems to operate properly.

A soil map of the Township is provided and references the latest SSURGO soil survey; see **Figure 18: Soils (SSURGO) Map.**

The following strategies are recommended for soils posing constraints on construction: use of low-impact development techniques, which include porous pavements, narrowed streets, minimal impervious cover, grassed



Township of PLAINSBORO

Middlesex County, New Jersey

SOILS (SSURGO)

April 2008

Plainsboro Streams

Plainsboro Lakes

Figure 18

Prepared By:
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Township Engineer
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area for bioretention and infiltration, etc.; green construction techniques, which include roof gardens, rain barrels, recycled plastic for benches and playground equipment, etc.; good construction practices such as minimizing soil compaction during construction and phasing development to minimize clear cutting and leveling; and land preservation strategies to protect areas where new construction should not occur.

F. Wetlands

Fresh water wetlands are basically associated with water bodies. Wetlands are known as palustrine systems which are non-tidal wetlands dominated by trees, shrubs, and persistent emergent vegetation. Such wetlands may occur on the shoreward side of stream channels or floodplains; ponds are also included within this type of wetland habitat. In the Township these wetlands occur along stream borders are mixed lowland forests. The dominant wetland types in the Township are immature bottomland forests and shrub swamps composed of young red maple, smooth alder, river birch, spicebush, and black willow. Jewelweed and skunk cabbage are the dominant herbaceous species in these wetlands. Emergent aquatic plant species, i.e. arrowhead, pickerelweed, and burreed line the shores of Devil's Brook and the Walker-Gordon Pond.

No extensive open marsh habitats are present. Open water areas of the Walker-Gordon Pond are utilized by various wetland bird species. No coastal wetlands regulated by the NJDEP are present in the Township.

Wetland areas, while diminishing in size during the last twenty years, have become a natural asset. Until recently, wetlands such as marshes, wet meadows, ponds, bogs, and wooded swamps were viewed as having little economic value and therefore were not beneficial to property owners As more information became available concerning wetlands, the value of these areas to local, state and federal governments has increased.

Stream Corridor

Wetlands are now seen as a vital element in protecting the environment. These areas are home to many species of birds and fish who also use wetlands for breeding and feeding during migration periods. Wetlands provide a means to protect water quality. Wetlands filter out pollutants and silt-laden water before it enters streams, lakes and the seas. Flooding is also controlled by wetlands which act as storage basins for water. Wetlands offer recreation and visual amenities such as fishing, hunting and bird watching.

The Township has several wetland areas which are mainly located along river and stream corridors that traverse the municipality. These areas are protected

from development by state and federal regulations, which Plainsboro strongly supports.

The NJDEP regulates the disturbance of wetlands under the Freshwater Wetlands Protection Act. NJDEP has adopted the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (January 1989) as the technical basis for delineating wetlands in New Jersey. The act regulates removal, excavation, disturbance or dredging of soil, sand, gravel or aggregate material of any kind; drainage or disturbance of water level and water table; dumping, discharging or filling with any materials; driving of pilings, placing of obstructions, or destruction of plant life that alters the character of wetlands; or the cutting of trees in any wetland. Any of these activities would require a permit from the NJ DEP. In accordance with the New Jersey Freshwater Wetlands Protection Act Rules, a freshwater wetland is defined as follows: "an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophylic vegetation; provided, however, that the NJDEP, In designating a wetland, shall use the three-parameter approach enumerated in the 1989 Federal manual for Identifying and Delineating Jurisdictional Wetlands, and any subsequent amendments thereto".

A map of the wetlands and other constrained land is displayed in **Figure 19: Freshwater Wetlands Map**.

G. Floodplains

Lake Carnegie

Floodplains are another environmental resource worthy of protection from development. Floodplains can be defined as a relatively level area adjoining the channel of a stream or river over which floodwater may flow.

Floodplains provide many ecological, aesthetic and recreational benefits to a community. The primary purpose of floodplains is to capture any floodwater from the adjacent streams or rivers. Another function of some floodplains is to serve as a source of aquifer recharge.

Floodplains also serve some of the same roles as wetland areas, such as slowing the velocity of water flow which limits siltation and erosion of stream and river banks caused by flooding, providing valuable and pristine wildlife habitats, supporting productive plant life which helps to maintain natural ecosystems and providing and important open space, recreational, educational and aesthetic resource.

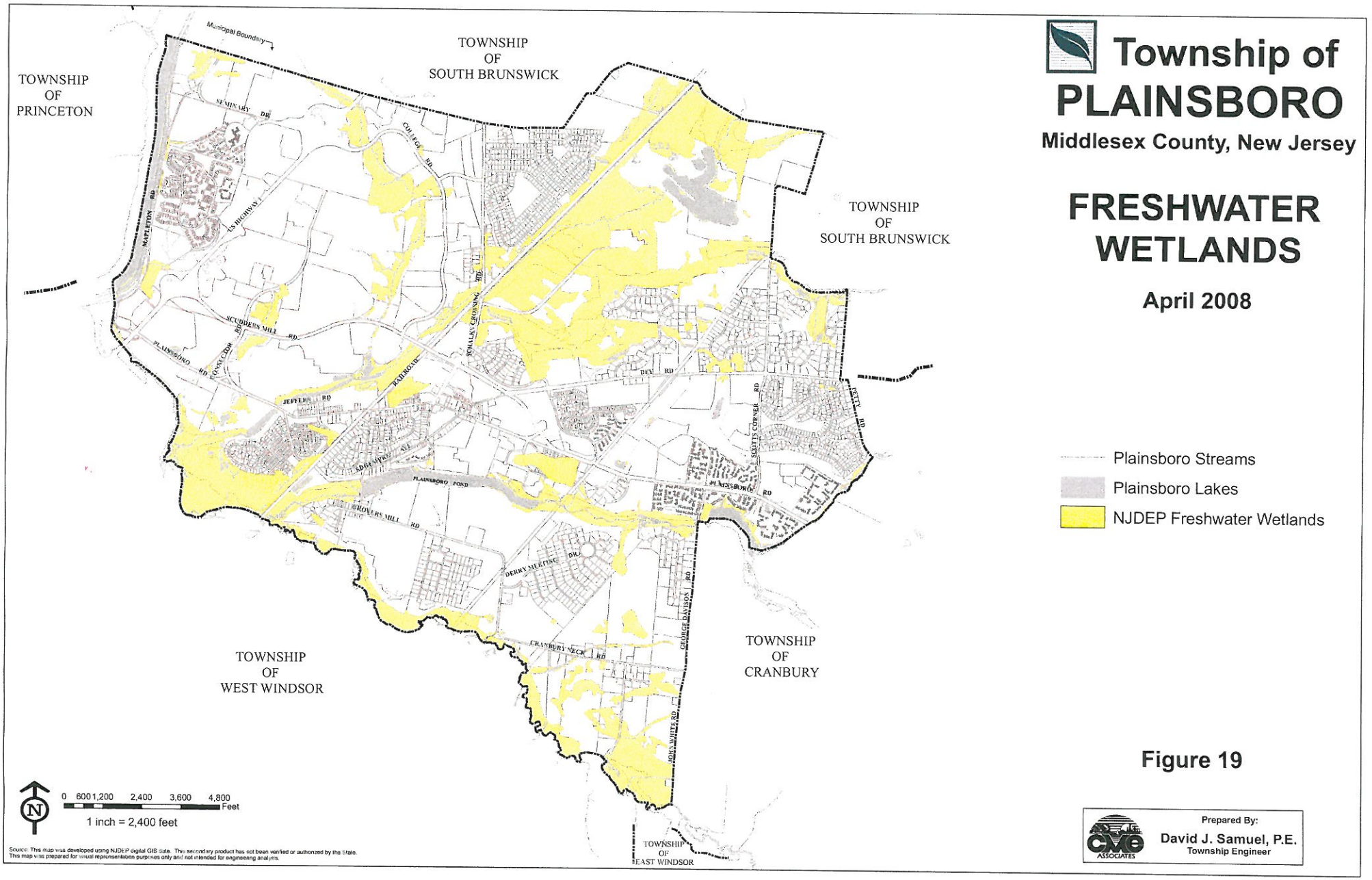
Township of
PLAINSBORO
Middlesex County, New Jersey
FRESHWATER
WETLANDS
April 2008
Plainsboro Streams
Plainsboro Lakes
NJDEP Freshwater Wetlands
TOWNSHIP OF PRINCETON
TOWNSHIP OF SOUTH BRUNSWICK
TOWNSHIP OF SOUTH BRUNSWICK
TOWNSHIP OF WEST WINDSOR
TOWNSHIP OF CRANBURY
TOWNSHIP OF EAST WINDSOR
Municipal Boundary
SEMINARY DR
COLLEGE RD
MAPLETON RD
US HIGHWAY 1
SCUDDERS MILL RD
PLAINSBORO RD
FORSGATE DR
SCHALKS CROSSING RD
RAILROAD
DEY RD
JEFFERS RD
SCOTTS CORNER RD
PERRINE RD
EDINBURGH AVE
PLAINSBORO POND
PLAINSBORO RD
GROVERS MILL RD
DERRY MEETING DR
CRANBURY NECK RD
GEORGE DAVISON RD
EDNA WHITE RD
0 600 1,200 2,400 3,600 4,800 Feet
1 inch = 2,400 feet
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Figure 19
Prepared By:
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Township Engineer
CME ASSOCIATES

Plainsboro Township's designated floodplains are located along the Millstone River, the Delaware & Raritan Canal, and various water bodies which traverse the Township. Activities in any of these floodplains are regulated by the NJ DEP which issues stream encroachment permits and the Township's Flood Damage Preservation Ordinance.

The Township seeks to protect stream corridors which include the floodplain, wetlands, steep slopes, wooded areas and any critical wildlife habitats. Protection should take the form of maintaining the streambank with native species of trees, shrubs, and grasses and the use of best management practices for streambank restoration. In addition, in some cases it is important that the edges of the stream corridor be marked or otherwise delineated in the filed so that landowners and others know where it begins and ends.

A map of flood prone areas is displayed in **Figure 20: Flood Prone Map (FEMA/FIRM Q3 Flood Data) Map**.

H. Topography and Woodlands

Plainsboro is a relatively flat municipality. Topography ranges from 120 to 60 feet above sea level west of the Amtrak line and 90 to 60 above sea level feet east of the line. The highest areas can be found in the northwest corner of the Township where the Princeton Nurseries and Forrestal Village are located, while the lowest areas are along the Millstone River and the Delaware and Raritan Canal.

Plainsboro Township consists of a diverse environment. While the Township contains several agricultural areas, woodland areas are also present. In fact, the woodland areas are located throughout the Township.

Streamside Woodlands

Woodlands in the Township are closely associated with the floodplains of the Millstone tributary, Bee Brook, and Devil's Brook. The lowland forest canopies adjacent to the Millstone tributary and Devil's Brook are composed mostly of immature red maple trees (2-10 inch caliper.) Dense shrub thickets (spicebush and arrowwood), alternating with open herb areas composed of dense carpets of jewelweed, skunk cabbage and marsh fern are also present. The Bee Brook Woods is the most mature and natural forest area along Scudders Mill Road. Relatively large (10-25 inch caliper), widely spaced beech, red oak, red maple, and tulip trees dominate the canopy. Such vegetation is typical of mature lowland forests in the Piedmont and Inner Coastal Plain.

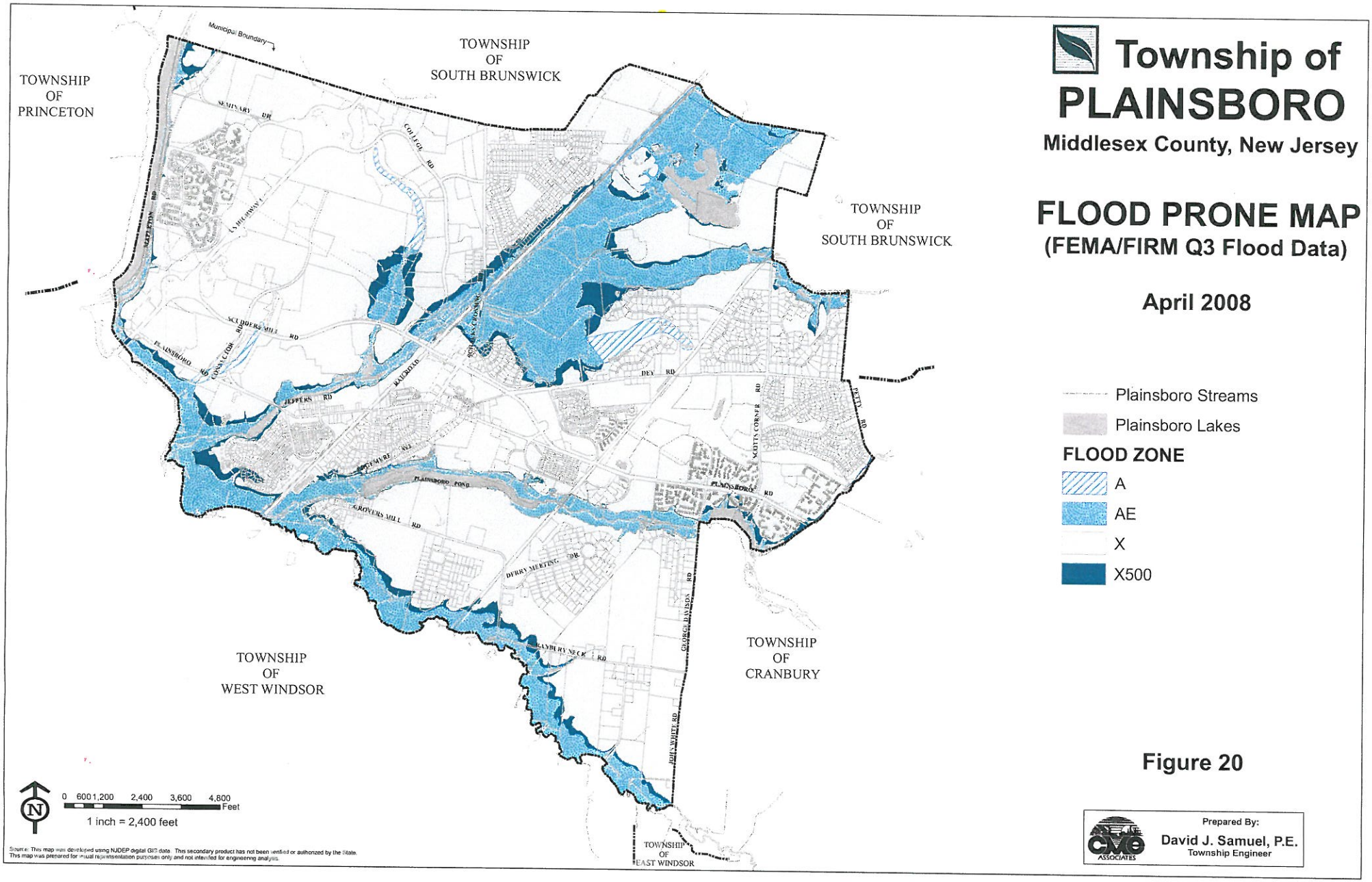
The high soil moisture and protection from heavy human access has enabled a thick and diverse cover of herb species to develop on the forest floor. Several species of ferns are present along with such flowering herbs as Canada mayflower, jack-in-the-pulpit, and whorled wood aster. The relatively dense woodland cover along the Bee Brook as well as the other stream floodplains, provide cover for area wildlife species. Cottontail rabbit, pheasant, and woodland jumping mice have been observed in these areas. Deer tracks have also been observed along stream banks, and raccoon, opossum, skunk, and gray squirrel probably also utilize these woodlands.

Like the other natural resources discussed previously, woodlands provide many benefits. Woodlands provide diverse habitats for many wildlife and bird species which use woodlands for breeding, food supplies and protection. The root systems of the trees and its associated vegetation slow the flow of surface water runoff which controls soil erosion and stream sedimentation. In addition, some of the surface water is retained and drains into the ground, thus replenishing an area's groundwater supply. Plants in woodlands produce oxygen while filtering out carbon dioxide which cleanses the air. Soils are also enriched by the presence of woodlands which use nitrogen and water to increase soil fertility. Woodlands also moderate the effects of strong winds, storms and other climatic extremes.

Trees serve a valuable function by helping to keep the earth’s ecology in balance. By transforming carbon dioxide into the vital oxygen we breathe, trees help to support the human and animal habitat around them. A forty foot tall tree takes in 50 gallons of dissolved nutrients from the soil every day. It raises this mineral brew to its topmost leaves, converts it into 10 pounds of carbohydrate food and releases 60 cubic feet of pure oxygen into the air. Trees also filter dust and reduce airborne lead contamination and radioactivity. The removal of trees makes man more susceptible to the effects of pollution caused by man made devices such as automobiles. The removal of trees inexorably disturbs and alters the plant and animal life and disrupts the balance of nature in a given area.

There is also an aesthetic, scenic, educational and recreation value in preserving woodlands. Wooded areas are among the most scenic and serve to break up the view pattern. Woodlands may be mature forests, reforested woodlands, groves or wooded lots, which serve as excellent buffers between uses and provide unique educational opportunities for residents. From a recreational viewpoint, woodlands may serve as hunting areas, locations for active or passive trails, or informal play areas for residents. Woodlands also support and reinforce scenic drives and historic sites and areas.

Presently the Plainsboro Township Code requires the preservation of trees, woodlands management, and reforestation of developed lands. The Code prevents the indiscriminate cutting and removal of trees, and other activities during construction which, in the past, have led to the general demise of woodlands, critical areas, and natural features, and have increased soil erosion and dust. The Code has resulted in the submission of the first developer prepared woodland management and reforestation reports and a commitment to plant thousands of new trees on development sites as well as off-site on Township and School Board property. Specifically, the K. Hovnanian Companies



Source: This map was developed using NJDEP digital GIS data. This secondary product has not been verified or authorized by the State. This map was prepared for visual representation purposes only and not intended for engineering analysis.

of Central New Jersey agreed to plant 263 trees at their Princeton Crossing development and 151 trees off-site. Bristol-Myers Squibb agreed to plant not fewer than 800 trees and not more than 1000 trees on-site at locations to be determined by their forester and the project landscape architect, and 252 trees to be planted by Bristol-Myers Squibb off-site at a location determined by the Township. Other significant reforestation efforts included Calton Homes (58 on-site), the 650 College Road office development (144 on-site), Plainsboro Acres (28 on-site and 157 off-site), and most recently the ZAHAB project at 175 on the site and 225 off-site.

The Code requires that areas of mature woodland scheduled to be destroyed by new construction shall be replaced with on-site or off –site with new vegetation indigenous to the area. Of notable importance in the Reforestation section of the ordinance are the specific requirements for tree replacements as noted below from the Plainsboro Township Ordinance, Chapter 85.30.1.B(1-5).

1. All newly planted trees and shrubs shall be of nursery grown stock. All landscape material shall be of species native to the area approved by the Planning Board, and developer or property owner and shall guarantee replacement for two (2) years.

2. The quantity of trees to be replaced shall be equal to the number of trees that would be necessary to cover the entire wooded area impacted by the development, based on a grid of twenty (20) feet by twenty (20) feet. Of this number of trees, ten percent (10%) shall be balled and burlapped 2' to 2 ½ "caliper; twenty percent (20%) shall be balled and burlapped 1 ¾" to 2" caliper, thirty percent (30%) shall be bare-root 1 ¼" to 1 ½" caliper; and forty percent (40%) shall be bare-root six (6) to eight (8) feet tall whips. A mixture of tees indigenous to the area and site shall be utilized.

3. Trees shall be planted in natural roves and spaced five (5) feet to fifteen (15) feet on center.

4. The ground plane shall be seeded with meadow grass mix. The specific blend shall be approved by the Township Planning Board.

5. All wood herbaceous plants shall be species indigenous to the area.

According to the Township ordinance, replacements are to supply the Township with a re-vegetation environmentally stable, low maintenance, natural landscape asset. The replacement species will provide shade, wind protection, noise and visual screening for wildlife. All species will be indigenous thus, naturally being environmentally stable, low maintenance and able to provide a natural landscape. The Township ordinance requires that new plant material be planted in natural groves and be spaced five (5) to fifteen (15) feet on center. This requirement is to re-create the natural setting of forest stands. Generally, a wider spacing is more acceptable to better develop canopy growth before crown spacing is absorbed. Eventually, however, the more dominant plants will evolve and spacing will increase to site specific values. Concurrently, the increased cover may be beneficial in attracting wildlife habitat. See Table 9: Typical Woodland Re-Forestation Process.

Table 13 Typical Woodland Re-Forestation Process

1. Identify and establish the wooded areas to remain in the field.
2. Erect protective fencing around the canopies of the exterior tree groups to remain. Fencing should remain until the reforestation is completed.
3. Remove existing trees as required
4. Prune, thin and trim undesirable tee growth from all newly exposed tress on the perimeter of the woodlands.
5. Prepare soil by roots and desirable undergrowth, etc. from removing stumps.
6. Treat newly exposed area with herbicide as necessary to remove unwanted growth, etc.
7. Treat soil with chemical amendments such as lime, fertilizer as required.
8. Stabilize ground plane by seeding all cleared areas with meadows grass mixture and mulch.
9. Plant reforestation trees at spacing and locations as required.
10. Maintain ground cover free of weeds with herbicide applications.
11. Mow meadow grass as required.
12. Prune, thin or remove newly planted trees as necessary.
13. After the two year warranty period expires, remove dead trees to permit hardier trees to survive.

I. Agricultural Capability Ratings

The USDA capability rating system categorizes the suitability of soils for agricultural production, pasture, woodland, or wildlife, based on chemical and physical properties, steepness of slope, and wetness. In total, there are eight capability ratings, with the primary ratings for commercial crop production ranging from Class I, which has the best soil, to Class III, which has severe soils limitations. Soils below Class III are generally unsuitable for agriculture.

Farmland

There are few limitations that restrict the use of Class I soils which have the widest range for crop use and present the least risk of crop damage. Accordingly, these soils are prime for agricultural use.

Class II soils impose limitations on the range of possible crops or require moderate conservation practices. These limitations, which may be caused by wetness, high susceptibility to erosion, or shallowness, are expressed as subclasses. A thorough understanding of the extent of any such limitation is an essential prerequisite to a determination as to whether a given Class II classification is

potentially suitable for agricultural uses or whether it is best suited for wildlife, woodlands, or development.

Analysis of the Soil Series Map reveals that the area between the Millstone River and Cranbury Brook which was designated for agriculture in the existing Master Plan is well suited for this designation. Due to its Sassafras and Woodstown soils, it is a prime agricultural area. The use of sites near the river and on the Woodstown soils for homes intended to rely on septic systems or with basements may be difficult.

The most abundant Class II soils include Woodstown and Downer soils which appear in wooded areas in the vicinity of Devil's Brook as wet spots or low ground which may impede both agriculture and development. The area in the vicinity of Dey Road including some lands to the north, consist of a mixture of soils in terms of their suitability for development, ranging from excellent (Sassafras) to extremely difficult (Alluvial).

Farmland

The Township has largely supported the preservation of soils suitable for agriculture by out lining clear goals and objectives for preserving farmland, identifying areas where farmland can be preserved, encouraging and educating farmers about participating in farmland preservation programs, supporting agriculture by adopting a Right-to-Farm ordinance and allowing farm stands and other structures that foster economic diversity for local farms, and supporting clustering and the transfer of development rights that concentrate housing amidst preserved farmland.

J. Sustainable Design

Green building guidelines ensure that development within the Township preserves the unique character of a site. The Township desires that developers construct sustainable or “green” buildings. The guidelines that follow are intended to result in environmentally friendly and economically vibrant projects. According to the U.S. Green Building Council (USGBC) LEED evaluates environmental performance from a whole building perspective over a building’s life cycle, providing a definitive standard for what constitutes a “green building”. It is based on accepted energy and environmental principles and strikes a balance between known established practices and emerging concepts. LEED is a performance oriented system in which scoring points are earned for satisfying performance criteria in the categories of sustainable site development for new construction: reducing the urban heat island, energy efficiency, water savings, materials selection and in indoor environmental quality. Different levels of green

building certification are awarded by the USGBC based on the total points earned. As a means of evaluation and measuring achievements in sustainable design, the Township encourages design, construction, and operation of developments that meet criteria for a LEED certified rating as follows:

1. General

   a. All new development located within the Township should be encouraged to meet a minimum LEED™ Certification rating under the LEED Rating System and be so certified by the US Green Building Council.

   b. If possible, all building projects should have a LEED accredited professional as a principal member of the design team from the beginning of the project.

   c. Energy Star: For multi-family residential projects; appliance and fixtures should meet US EPA's Energy Star Standards. Projects should be encouraged to include Energy Star compliant clothes washers', dishwashers, refrigerators, ceiling fans, ventilation fans (including kitchen and bathroom fans), light fixtures (halls and common areas), and exit signs. To further enhance energy efficiency, the project could also choose to install two of the following Energy Star components: programmable thermostats (in residential units), residential light fixtures, windows and doors; and HVAC systems.

   d. Applicants may submit to the Township the following information at the time of site plan application:

      1) The name of the LEED Accredited professional working on the project.

      2) A LEED score card as part of the plan. The scorecard should be accompanied by an explanation of how each credit will be achieved or why it cannot be achieved for the project.

2. Reducing the Urban Heat Island

   The ambient air in urban environments is usually significantly warmer (sometimes more than 10° F warmer) than air in less developed areas – an effect known as the Urban Heat Island. Dark, non-reflective surfaces absorb heat from the sun and then radiate it back to the surrounding area. Such hotter temperatures lead to an increased need for air conditioning, which costs money and consumes significant amounts of energy. Current statistics show that air conditioning consumes one sixth of all electricity used in the United States. The following guidelines will help to mitigate the formation of an Urban Heat Island:

   a. Provide shade trees for thirty percent (30%) of a site's non-roof

impervious surfaces.

b. Use light-colored/high albedo materials (reflectance of at least 0.3) for at least thirty percent (30%) of a site's non-roof impervious surfaces.

c. Use highly reflective and high emissive roofing materials (at least 0.9 when tested in accordance with ASTM 408) for at least seventy-five percent (75%) of the roof surface. In addition to the operational benefits to the building, this application helps to extend the life span of a roof.

d. Use a "green" vegetative roof for at least fifty percent (50%) of the roof area. In addition to its ability to reduce stormwater flows and provide insulation, this application helps to extend the life span of the roof.

3. Energy Efficiency

Following the guidelines below can lead to making building more energy efficient:

a. Buildings should be designed to exceed by twenty percent (20%) the state energy code or the most recent edition of ASHRAE/IENA Standard 90.1 (without amendments), whichever is more stringent.

b. Building owners are encouraged to provide a portion of the total energy used by a building with on-site sources, such as photovoltaic systems.

4. Water Savings

The following guidelines help decrease the amount of municipal water needed for buildings:

a. Decrease the quantity of potable water used for landscape irrigation by fifty percent (50%).

b. Install ultra low flow fixtures in bathrooms and consider reusing roof runoff volumes for flushing toilets in order to reduce the amount of potable water required.

5. Materials Selection and Indoor Environmental Quality

The following materials can ensure quality environments that help decrease the environmental impact of the materials needed for buildings:

a. Divert as much construction waste away from disposal in landfills as possible by recycling construction materials including metal, wood concrete, brick, drywall and cardboard.

b. Incorporate building materials that contain a high percentage of recycled content.

c. Incorporate building materials that have been manufactured and where possible generated, regionally. Using regional products not only reduces the amount of energy required for transportation, but also supports the local economy.

d. Incorporate bio-based building materials where possible. This includes materials incorporating certified wood, bamboo, wool, cotton, cork, natural linoleum and agricultural fiber boards.

e. Limit the amount of indoor air contaminants that are introduces through building materials where possible. Materials, including adhesives, sealants, paints and carpets with lower VOC values shall be preferred over standard versions. Materials made of wood and agricultural fiber shall contain no added urea formaldehyde.

Buildings can be designed with progressive green design, such as green roofs, harvesting of natural light, and use of solar screens and landscaping to reduce solar gain.

Green roofs can be employed where possible and where roofs are visible from upper-level floors. All buildings are encouraged to be designed to LEED standards. LEED certification is encouraged.

All exterior lighting, including building lighting, streetlights, and pathway and parking lot lighting, is encouraged to comply with “dark sky” standards that reduce energy use and eliminate glare and nighttime light pollution. Recommended light fixtures and additional information is available from the International Dark-Sky Association (IDA).

6. <u>Building and Building Systems</u>

a. LEED Certification is a project goal and will utilize the following strategies among others:

1) Use of sustainable landscaping techniques.

2) Water efficiency through plumbing design and fixture selections.

3) Use of sustainable building materials.

4) Use of energy efficient building systems.

b. Energy conservation of building systems.

7. Site

a. Lighting

1) Eliminate over-lighting site areas.

2) Use the most efficient lighting sources available for proper applications.

3) Use photocells to control lighting (lights will not operate when adequate daylight is available) as well as programmable time clocks.

b. Minimal Use of Culture Lawn Areas

1) Reduce water use.

2) Reduce fertilizer use.

3) Reduce pesticide use.

c. Minimal Use of Irrigation Systems

1) Reduce material use.

2) Reduced installation equipment use.

d. Use of Deciduous Trees at Southern Exposure

1) Reduce HVAC usage in summer and winter because of the predominate use of deciduous trees at southern exposures.

2) Reduce HVAC usage in winter because of predominant use of evergreen trees at northern exposures.

e. Green Roofs

1) Reduce HVAC usage in summer.

f. Reduce Maintenance of Planted Areas

1) Reduce maintenance equipment use for cultured lawns.

2) Reduce water use because of drought-tolerant plants.

3) Reduce fertilizer use because of proper plant selection.

3) Reduce pesticide use because of proper plant selection.

g. Existing Wood Areas to Remain

1) Reduce HVAC usage in summer (i.e. ambient air temperatures 15 to 20 degrees cooler under the tree canopies which mitigates heat island effects, especially if prevailing breezes carry this cooler air towards the building).

The new Medical Center is focused on environmental design and includes the incorporation of many elements that represent time tested approaches to sustainable design. Major sustainable design elements and strategies include: an overall east-west building orientation that facilitates control of the sun and takes advantage of efficiencies in heating and lighting, solar shades on the south elevation that reduce heat gain in the summer, site stormwater recharge, a heat recovery system for the mechanical systems, and use of recycled construction materials and landscape design consisting of native species of plants requiring minimal irrigation. The hospital will be built according to LEED standards and it should achieve the equivalent of a silver level of certification. This will not only make the facility more energy efficient and create a better healing environment for patients, but will also have significant impact in the community. Among the many sustainable aspects to the site, UMCP is looking into taking the lead on a power generation initiative that would bring energy efficiency and cost savings not only to the Hospital but also to community partners on and off the Campus.

Other recent examples of sustainable development initiatives in the Township include the PNC Bank application before Zoning Board where the bank officials spoke of their decision to obtain LEED certification. The Forrestal Center will be looking into the possibility of installing photo-voltaic panels (solar cells) on their Art Museum Storage Facility and in association with this project - will be constructing a porous pavement parking lot.

K. Solar Energy Systems

The Township may consider the introduction and use of solar energy systems through the land development and zoning permit process. The following are suggested guidelines for the implementation of solar energy systems:

1. Solar energy systems could be permitted use in all zoning districts.

2. If utilized, roof mounted systems should not be more than three (3) feet higher than the finished roof to which it is mounted.

3. Ground mounted systems and systems attached to accessory buildings should

Solar Array

be not less than ten (10) feet from any side or rear property line. Solar energy systems should be prohibited in all front yards and should not be located past the front wall of the principal building.

4. There should be no limit to the number of modules and arrays installed on each property that comprise a solar energy system, except for the exclusions contained herein in 5 and 7 below.

5. Solar energy farms should be prohibited. These are systems whose main purpose is to generate energy for sale back into energy grid systems, rather than being consumed directly on site.

6. Ground mounted solar energy systems should not be categorized as accessory buildings.

7. If solar energy systems are attached to accessory buildings the number of accessory buildings allowed should be regulated in accordance with the provisions set forth in the land development code.

8. The height of ground mounted solar energy systems and systems included on accessory buildings should be limited.

9. Zoning and construction permits should be required.

10. Limit the amount of a lot that could be covered with a solar energy system.

L. Native Plants

The native plants (perennials, grasses, ferns, shrubs, trees and vines) identified in Table 14 are recommended for use in the Township.

Table 14 Native Plants of New Jersey

Native Perennials

Blue hear-leaved aster .....(Aster cordifolius)
• violet with yellow centers • 2-3' • August - October •
Charming small aster that provides starry flowers for butterflies.

Boneset .....(Eupatorium perfoliatum)
• white • 4' • August - September •
Unimposing plant that is a top favorite with butterflies.

Wild bergamont .....(Monarda fistulosa)
• pale violet flowers • 36" • July •
A spreading favorite nectar plant for many summer butterflies.

Broadleaf mountain mint .....(Pycnanthemum muticum)
• white to violet • 3-4' • July - August •
A top butterfly nectar plant with tiny flowers surrounded by lovely silvery bracts.

Hoary vervain.....(Verbena stricta)
• violet • 2-3' • July - August •
Uprights spikes of lovely purple flowers top undemanding plants; butterfly favorite.

New England aster ..... (Aster novae-angliae)
• deep violet • 36" • late August - October •
New Jersey native; butterfly favorite; thrives in moist soil but tolerates drier conditions.

New York aster ..... (Aster novae-belgii)
• light purple • 36" • late August - September •
Lovely bushy, slow spreading New Jersey native; favorite of butterflies.

Showy aster .....(Aster spectabilis)
• blue with yellow central disk • 18" • September - October •
New Jersey native, especially in the south; thrives in dry conditions.

Black cohosh ..... (Cimicifuga racemosa)
• white • 54" • July - August •
Woodland plant with graceful candle-like flowers.

Blazing star 'Rosea' .....(Liatris spicata 'Rosea')
• rosy-purple • 28-30" • July - September •
Spiked flowers; nectar for butterflies; seeds goldfinches.

Cardinal flower .....(Lobelia cardinalis)
• scarlet red • 32" • July - September •
Commanding spike of deep red; humming bird dessert; plant near birdbath for moisture.

Columbine.....(Aquilegia Canadensis)
• red spurs, yellow sepals • 18" • April - June •
Early season nectar for hummingbirds; charming woodland plant that gently reseeds.

Coneflower ..... (Enchinacea purpurea)
• purple-pink with orange/brown center • 36" • July - August •
Flowers attract a variety of butterflies; seeds a favorite of goldfinches.

Culver's root ..... (Veronicastrum virginicum)
• white • 48" • August - September •
Curved spikes of flowers for butterflies; charming but under-used garden plant.

Dutchman's breeches ..... (Dicentra cucullaria)
• white • 10" • April - May • 4" pot •
Spring ephemeral with pantaloon-like flowers; early season food for hummingbirds.

Stiff goldenrod ..... (Solidago rigida)
• yellow • 2-5' • August - October •
Nectar for monarchs and other butterflies; flowers form a flattened panicle on upright stems; does well in moist to dry soil; in the wild it prefers a bit of lime in its soil.

Great merrybells ..... (Uvularia grandiflora)
• yellow • 18-24" • April - May •
Lovely plant for the woodland shade garden; thrives if given a bit of lime.

Green and gold "Allen Bush" ..... (Chrysogunum virginianum 'Allen Bush')
• yellow • 18-24" • April - May •
Lovely groundcover for many soil types; flowers may continue into summer.

Joe pye weed ..... (Eupatorium maculatum)
• rose pink • 5-6' • July - September •
Dramatic nectar plant; prefers damp soil but thrives in drier areas once established.

New York ironweed ..... (Vernonia noveboracensis)
• purple • 5-8' • August - October •
Nectar plant for many butterflies; thrives in both damp dry soils.

Great blue lobelia ..... (Lobelia siphilitica)
• blue • 30" • July - September •
Spikes of blue flowers attract hummingbirds and large butterflies; prefers moist soil.

Butterfly weed (milkweed) ..... (Asclepias tuberose)
• bright orange • 24" • July - August •
A top butterfly plant for drier soil; host for Monarch caterpillars; brilliant flowers.

Swamp milkweed ..... (Asclepias incarnate)
• pink • 40" • July - August •
A leading nectar plant for butterflies; host for Monarch caterpillars; lovely flowers; prefers moist soil in the wild but is easily established in average garden conditions.

Woodland phlox 'London Grove' ..... (Phlox divaricata 'London Grove')
• violet-blue • 10-12" • April - May •
Cultivar of endangered plant of New Jersey's deciduous woods; delightful early spring blooms.

Rose mallow 'Southern Belle' ..... (Hibiscus moscheutos 'Southern Belle')
• mixed colors (red, white or pink) • 3' • July •
Large flowered cultivar of plant native to mulch of New Jersey; prefers rich, evenly moist soil.

Wild stonecrop ..... (Sedum ternatum)
• white • 4-8" • May •
Adaptable, creeping nectar plant favored by the small spring butterflies.

Virginia spiderwort..... (Tradescantia virginiana)
• mixed (predominantly blues, purples, lavenders) • 26-30" • June - September •
Strap-like leaves and flowers that last for a single day; thrives in any soil type.

Great white trillium..... (Trillium grandiflorum)
• white • 10-12" • April •
Tall, showy woodlander; relatively easy to grow in rich, woodsy soil.

White turtlehead .....(Chelone glabra)
• white • 32" • August - September •
Spreading favorite of butterflies and other insects; excellent companion plant for Cardinal Flower.

Bleeding heart .....(Dicentra eximia)
• pink • 12" • May - July •
Northern native with fern-like foliage; long bloom period; food for hummingbirds.

Tall tickseed coreopsis.....(Coreopsis tripteris)
• yellow • 5' • July - September •
Clouds of butterflies from midsummer on; grows happily in the meadow or at the back of the border.

Foam flower .....(Tiarella wherryr)
• white • 8-10" • May - June •
Frothy wands of flowers; clumping form with heart-shaped leaves; endangered in New Jersey.

Wild geranium .....(Geranium maculatum)
• violet rose • 15-24" • May - June •
Perennial nodding flowers for the edge of the woodland garden; nectar for early butterflies.

Wild ginger..... (Asarum canadensis)
• mahogany • 3" • April •
Unassuming ground cover for the woodland garden; exotically shaped flowers.

Native Grasses

Indian grass ..... (Sorghastrum nutans)
• golden seed heads • 5-6' • August •
Beautiful native meadow grass with strong, upright growth habit.

Switchgrass 'Heavy Metal' .....(Panicum virgatum 'Heavy Metal')
• metallic blue blades • 3-4' • August •
Short cultivar of native meadow grass selected for sturdy, erect growth habit.

Native Ferns

Christmas fern .....(Polystichum acrostichoides)
• 24-26" •
Evergreen, once-divided, leathery deep-green fronds; easy and essential.

Cinnamon fern .....(Osmunda cinnamomea)
• 30" •
Cinnamon-colored fertile fronds emerge before green sterile ones; stately, handsome plant provides vertical accent and nesting material for hummingbirds.

Eastern hay scented fern .....(Dennstaedtia punctilobula)
• 18-20" •
Light green, lacy fronds that release the sweet scent of fresh hay when crushed.

Leatherwood fern .....(Dryopteris marginalis)
• 24-30" •
Evergreen, shiny fronds; strong, upright, and vigorous; makes a pool of green in the shade; endures considerable dry spells.

Maidenhair fern .....(Adiantum pedatum)
• 18-24" •
Delicate rounded fronds that spread slowly through the shade garden.

Ostrich fern .....(Matteuccia struthiopteris)
• 48" •
Imposing plume-like fronds create either a handsome focal point or stunning backdrop for other shade lovers; waits 2-3 years and then spreads; fiddle-heads may be eaten.

Woodfern..... (Dryopteris)
• 18-24" •
Evergreen, erect, outward curving fronds; easy naturalizer.

Native Shrubs and Trees

Lowbush blueberry .....(Vaccinium angustifolium)
• white flowers; blue fruit • 18-24" • May - June •
Something for everyone: nectar for early spring butterflies and hummingbirds, habitat for caterpillars, fruit for birds, and wonderful fall color; prefers dry soil.

Buttonbush .....(Cephalanthus occidentalis)
• creamy white • 6-12' • July - August •
Butterfly favorite; lovely round "button" flowers shine against glossy deep green leaves; thrives in wet soil and even in standing water.

Black chokeberry .....(Aronia melanocarpa)

• black fruit • 3-8’ • May •
Spring flowers, lovely fall color, fruit for winter birds; adaptable plant for dry to moist conditions.

Red maple ..... (Acer rubrum)
• red • 40-70’ • March - April •
Flowers provide crucial food for early spring butterflies; brilliant red leaves in fall; adaptable tree that tolerates a wide range of soil types and moisture levels.

Gray dogwood ..... (Cornus racemosa)
• white flowers • 3-8’ • May - June •
Fruit is a favorite snack for birds; naturally occurs in damp to wet soil but is more drought tolerant than many other dogwoods; best for naturalizing.

Shadblow ..... (Amelanchier canadensis)
• white flowers; blue fruit • 10’ • April •
Early spring flowers for insects followed by edible fruit for us if the birds don’t get it first; adaptable plant that tolerates dry garden soil once established.

Spicebush ..... (Lindhera benzoin)
• soft yellow • 8-12’ • April •
Essential, understated understory shrub for much of the woodlands of northern New Jersey; nectar for early insects and forage for birds; blue-green leaves, turn yellow in autumn.

Sweet pepperbush (summersweet) ..... (Clethera alnifolia)
• ivory • 4-9’ • July - August •
Butterfly favorite; the native alternative to the invasive Butterfly Bush; blooms in midsummer; sweet scent perfumes the garden; non-cultivar farely found in the trade.

Fragrant sumac ..... (Rhus aromatica)
• yellow • 3-6’ • May •
Spring flowering, colonial plant ideal for stabilizing banks; thrives in poor quality soil and hot sun; red to burgundy fall foliage.

Blackhaw viburnum ..... (Viburnum prunifolium)
• clusters of white flowers, blue-black fruit • 6-15’ • May - June •
Understated small tree providing shelter for caterpillars, late summer fruit loved by the birds and deep red leaves in the autumn landscape.

Cranberry bush viburnum ..... (Viburnum trilobum)
• clusters of white flowers, bright red fruit • 6-15’ • May - June •
The American Cranberrybush; flowers in spring, with autumn berries much appreciated by birds; red foliage in fall; flowering and fruiting best with some sun.

Winterberry holly ..... (Ilex verticillata)
• greenish flowers, red berries • 6-10’ • May - June •
Fruit for winter birds; non-cultivar rarely found in the trade; prefers moist to damp soil; only female holly produce fruit; our plants are not identified by sex so we can not guarantee that you will receive a female plant; for best chances of having fruit, order at least two plants.

Native Vine

Coral honeysuckle ..... (Lonicera sempervirens)
• red-orange • 8-10’ • June-August •
Trumpet-shaped blossoms; a hummingbird favorite throughout its long bloom period.

M. Action Plan

1. Seek to continue to permanently preserve existing sensitive environmental features and encourage sustainable developments.

2. Promote a healthy environment for all citizens by providing adequate air, light, water, and open spaces.

3. Protect existing wildlife in the community.

4. Proactively address any and all noise issues that may create negative impacts.

5. Protect scenic view sheds from negative influences.

6. Promote the dedication of conservation easements to permanently protect sensitive properties.

7. Become actively aware of and, if possible, participate with the County in its drafting of the “Sustainable Middlesex Plan” which has been funded by the NJ Office of Smart Growth.

8. Explore the possibility of drafting a “Green Buildings and Environmental Sustainability” Plan Element, as recently included in the Municipal Land Use Law as a permitted Master Plan Element.