

PLANNING BOARD
BOROUGH OF BERNARDSVILLE, NEW JERSEY

RESOLUTION AMENDING MASTER PLAN

WHEREAS, on September 28, 2000, the Planning Board of the Borough of Bernardsville adopted the "Comprehensive Master Plan, Borough of Bernardsville, Somerset County, New Jersey", dated September 28, 2000, as prepared for the Board by P. David Zimmerman, A.I.C.P./P.P., Planning Consultant; and

WHEREAS, thereafter, by Resolution adopted on October 17, 2002, the Planning Board approved the insertion of certain narrative in the Land Use Plan Element of the Master Plan relative to cluster subdivisions (which language had previously been omitted from the document due to a printing or clerical error or oversight); and

WHEREAS, thereafter, by Resolution adopted on October 28, 2004, the Planning Board approved additional amendments to the Master Plan, in the following respects:

- (a) By including the Environmental Resources Inventory of the Borough dated May 2002 as part of the Conservation Plan Element of the Master Plan;
- (b) By adding to the text of the Land Use Plan Element of the Master Plan the omitted narrative relative to cluster subdivisions (in accordance with the Planning Board's October 17, 2002 Resolution); and
- (c) By making certain corrections to the Conservation Plan Element and the Land Use Plan Element of the Master Plan, which corrections acknowledge that Indian Grave Brook and the Passaic River (at the border with Harding Township and up to Interstate Route 287) are trout production streams; and

WHEREAS, the Planning Board currently wishes to further amend the Borough Master Plan to incorporate therein a Stormwater Management Plan, in order to comply with the New Jersey Department of Environmental Protection's Municipal Stormwater Regulation Program; and

WHEREAS, following due and proper notice in compliance with N.J.S.A. 40:55D-13, the Planning Board has held a public hearing on March 3, 2005, with respect to the adoption of the last mentioned amendment to the Borough Master Plan; and

WHEREAS, the Planning Board has carefully considered any public commentary relative to such proposed amendment to the Borough Master Plan as well as the recommendations of Ferriero Engineering, Inc., the Borough's Engineer, and P. David Zimmerman, A.I.C.P./P.P., the Borough Planning Consultant; and

WHEREAS, the Planning Board finds that it would be in the best planning interests of the Borough to adopt the aforementioned amendment to the Master Plan:

NOW, THEREFORE, BE IT RESOLVED by the Planning Board of the Borough of Bernardsville on this 3rd day of March, 2005, that the document entitled "Comprehensive Master Plan, Borough of Bernardsville, Somerset County New Jersey" prepared for the Bernardsville Planning Board by P. David Zimmerman, A.I.C.P./P.P. Planning Consultant, dated September 28, 2000 is hereby amended to incorporate therein the "Stormwater Management Plan For Bernardsville Borough, Somerset County, New Jersey" as prepared by Paul W. Ferriero, PE., of Ferriero Engineering, Inc., and dated February 2005, subject to amending such document as follows:

(A) Reflect the date of adoption on the cover and the fact that the document is an

amendment to the Borough Master Plan,

- (B) Update the Zoning Map to include the R-1-10 Zone,
 - (C) Clarify or correct certain wording in the middle paragraph of page 12, namely by inserting "maximum" before "impervious" in the sixth line and by changing "required" to "permitted" in the seventh line,
- ;and

BE IT FURTHER RESOLVED that true copies of this Resolution and said Stormwater Management Plan shall, within thirty (30) days of the date hereof, be transmitted by the Planning Board Secretary to the Borough Council and, by certified mail, return receipt requested, to the Somerset County Planning Board.

ROLL CALL VOTE:

Those in Favor: *Mr. Knudsen, Mrs. Paluck, Mayor Parsons, Mr. Scioff, Mr. Sullivan, Mrs. Walton*

Those Opposed: *None*

The foregoing is a true copy of a Resolution adopted by the Planning Board of the Borough of Bernardsville at its meeting on March 3, 2005, as copied from the Minutes of said meeting.

Joy W. Vavrek

JOY W. VAVREK, Recording Secretary

Dated: *March 3, 2005*

**Stormwater Management Plan
Amendment to Master Plan**

For

**Bernardsville Borough
Somerset County, New Jersey**

Prepared by:



Paul W. Ferriero

NJPE 32978

February 2005

Adopted March 3, 2005

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Bernardsville Borough (“the Borough”) 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. 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.

A “build–out” analysis will be included in this plan in the future. It will be based upon existing zoning and land available for development. This plan also addresses the review and update of existing ordinances, the Borough Master Plan and other planning documents to allow for project designs that include low impact development techniques. The final component of this plan includes a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

MSWMP Goals

The goals of this MSWMP are to:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- Maintain groundwater recharge;
- Prevent, to the greatest extent feasible, any increase in non-point pollution;
- Maintain the integrity of stream channels for their biological functions and drainage capabilities;
- Minimize pollutants in stormwater from new and existing development to restore, enhance and maintain the chemical, physical and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values and to enhance the domestic, municipal, recreational, industrial and other uses of water; and
- Protect public safety through the proper design and operation of stormwater basins.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventive 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. This plan will ultimately address all of the requirements of the Borough's Stormwater Management Discharge (NJPDES) permit.

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (see Figure 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, reduce 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 create disruption to habitat to which some species cannot adapt.

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

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and

raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization and leaf litter that falls into streams and becomes food for the aquatic community.

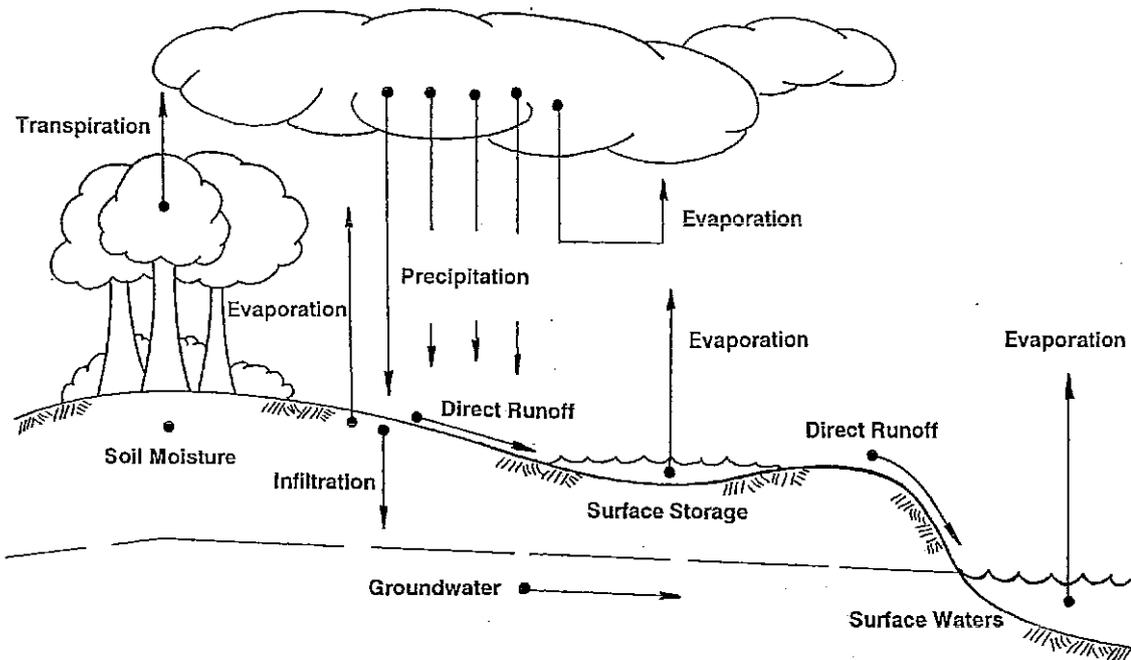


Figure 1 – Hydrologic Cycle

Background

The Borough encompasses 12.85 square miles in the northern most part of Somerset County and is primarily known for its small-town charm where prominent and wealthy New York visitors came to spend their summers in the past. The Borough was originally a section of Bernards Township known as Vealtown. In 1840, Vealtown was renamed Bernardsville after Sir Francis Bernard, Colonial Governor of New Jersey from 1758 to 1760. The Borough did not become a separate borough until 1924 when it split from Bernards Township, although the area attracted people well before then. It attracted people because of the railroad line, which was built in 1872.

Although the lands in the Borough are lightly developed, there is a town area, located in the southeastern section of the Borough.

Bernardsville Borough has made efforts at preserving open space for future generations. With aggressive planning and 10-acre zoning in the central portion of the Borough, the rural character will be retained. Private land owners have been supporting these efforts, and Borough residents, present and future, are most grateful for these acts of vision.

Bernardsville is bounded on its western side by Far Hills Borough. There are a number of waterways within Bernardsville Borough that are classified as Category I waterways. They include Mine Brook, the North Branch of the Raritan River, the Passaic River, and the Indian Grave Brook [please note that the NJDEP I-Map website (<http://www.state.nj.us/dep/gis/depsplash.htm#>) labels this brook as Indian Grove Brook]. These exceptional streams are trout production streams. Streams and rivers within the Borough are shown in Figure 2 and the topography of the Borough is shown in Figure 3.

According to the 2000 census, the Borough has 7,345 residents. The population rose approximately 11.3 percent since the 1990 census. This population increase is more than the overall state increase of 8.9 percent but less than the County increase of 23.8 percent over the same period.

The Borough is bordered along its northwest side by the North Branch of the Raritan River and its northeast side by the Passaic River. It is located in Watershed Management Area (WMA) 8 – North and South Branch Raritan River as well as Watershed Management Area (WMA) 6 – Upper Passaic, Whippany and Rockaway Rivers. The Borough contains portions of seven Hydrologic Unit Code (HUC) areas:

HUC14 Area	Watershed
02030103010010	Upper Passaic River
02030103010070	Upper Passaic River
02030103010090	Upper Passaic River
02030103010080	Upper Passaic River
02030105060030	N. Branch Raritan River
02030105060040	N. Branch Raritan River
02030105060070	N. Branch Raritan River

These HUC14 areas are shown in Figure 4.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Bio-monitoring Network (AMNET) to document the health of the state’s waterways. There are over 800 AMNET sites throughout New Jersey. These sites are sampled for benthic macro-invertebrates 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 macro-invertebrate community dynamics.

There are two AMNET sites within or bordering Bernardsville Borough as follows:

Site Number	Location
AN0214	Indian Grove Brook at Hardscrabble Road

Based on the AMNET data, Indian Grave Brook [please note that the NJDEP I-Map website (<http://www.state.nj.us/dep/gis/depsplash.htm#>) labels this brook as Indian Grove Brook] is not impaired, although Mine Brook at Bernardsville Road is moderately to severely impaired.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. This data shows that Mine Brook is impaired based upon the in stream total benthic macroinvertebrate assessment. This data shows that the in stream total mercury of the Passaic River exceeds the allowed amount. This data also shows that the Raritan River exceeds the allowed amounts of contaminants. This means that the water bodies are impaired waterways and the NJDEP is required to develop Total Maximum Daily Loads (TMDL's) for these pollutants.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and non-point 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 Best Management Practices (BMP's).

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 TMDL's are needed.

In addition to water quality problems, the Borough has occasional flooding problems. The 100-year floodplain, shown in Figure 5, depicts the floodplains within the borough.

The USGS operates a Flood Information System for municipalities within the state. The Flood Information System consists of a network of stream and precipitation gauges throughout the state. Information from these gauges is automatically transmitted to a central location via telephone, radio and satellite. The information is then processed and appropriate actions are taken. These actions include notifying municipal police, fire and emergency management personnel with flood potential and water level information.

There are several stream and precipitation gauges near Bernardsville Borough. There are stream gauges on the following streams:

Passaic River near Bernardsville New Jersey

Information from these latter gauges is available on the United States Geological Survey (USGS) web site in real time (<http://waterdata.usgs.gov/nj/nwis>).

The Borough has a moderate amount of developable land. The existing land use, based on 1995/1997 aerial photography, is shown in Figure 6. The existing zoning is shown in Figure 7. A current aerial photo with parcel lot lines overlain on it is shown in Figure 8. The Borough is not within the State Plan Designation PA1 Metropolitan Planning Area. Groundwater recharge rates for native soils in this area are generally between 0 and 19 inches annually. The average annual groundwater recharge rates are shown graphically in Figure 9.

According to the NJDEP, “A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two-, five-, and twelve-year period of time for unconfined wells. ... The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations (see NJAC 7:10-11.7(b)1).”

WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP.

As shown in Figure 10, portions of the Borough are located in a Tier 3 well head protection area.

In addition to the rivers and streams that run through and along the Borough, there are a number of wetland areas. These wetland areas, shown in Figure 11, provide flood storage, non-point pollutant removal and habitat for flora and fauna.

Design and Performance Standards

The Borough 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.

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

Plan Consistency

The Borough is not within a Regional Stormwater Management Planning Area and no TMDL's have been developed for waters within the Borough; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) or any TMDL's. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

The Borough is within the Raritan Basin and much information on the basin and its characteristics has been developed as part of the Raritan Plan. Additional information concerning this plan can be found at: <http://www.raritanbasin.org>. The Borough supports the Raritan Plan. The following summarizes the plan:

- Protection and preservation of lands that play a critical role in the protection of Raritan Basin water resources, including headwaters streams.
- Maintenance and restoration of ground water recharge to ensure sufficient supplies for dry weather stream flow and public use, and to minimize stormwater runoff.
- Improved control of stormwater through watershed-based management plans, improved site design techniques and attention to the impacts of stormwater on stream stability and flooding.
- Management of water supply resources on a subwatershed, watershed and regional basis so that substantial levels of resources use are not exceeded, ensuring adequate water for both human and ecosystem uses.
- Restoration of streams and riparian areas that have been physically damaged by harmful land use and stormwater management practices, and protection of high-quality streams and riparian areas.
- Restoration and protection of ground and surface waters that are currently or prospectively impaired by excessive pollutant loads, through a combination of regulatory and non-regulatory programs affecting both point and nonpoint sources of pollutants.
- Understanding by residents, landowners, businesses and government decision-makers of the basic aspects of water resources and critical watershed management issues in the Raritan River Basin and tools to resolve them, so that they are moved to help solve these issues.

The Borough supports the Raritan Plan as the Raritan Plan's strategy is similar in nature to the principles mandated by Phase II of the EPA Clean Water Act.

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The Borough will utilize the most current update of the RSIS in the stormwater review of all projects. The Borough ordinances will require that all projects, both residential and non-residential, be designed

in accordance with the Stormwater Design Standards of the Residential Site Improvement Standards. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates of the RSIS.

The Borough'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, Borough inspectors and those from the Somerset-Union Soil Conservation District 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 Borough has begun a review of the master plan and ordinances, and has provided a partial list of the sections in the Borough land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. Below are a portion of 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.

The Borough Code contains a chapter entitled Development Design Standards that is being reviewed with regard to incorporating non-structural stormwater management strategies. Several changes are being made to articles 9-11 of this chapter to incorporate these strategies. Other articles of this chapter, as well as other chapters of the Borough Code, may also be changed to incorporate these strategies.

Article 9

Sections 9-10.1b.: needs to be amended to require that all drainage design for major projects must be in accordance with the Stormwater Design Standards of the New Jersey Residential Site Improvement Standards (RSIS) N.J.A.C. 5:21-1 et seq. These design standards shall apply to all nonresidential projects as well as residential developments. A part of these standards requires that detention or retention basins or other stormwater facilities shall be required to hold stormwater runoff. A waiver of this requirement may be granted only when the applicant demonstrates that the impact from the additional runoff resulting from the proposed development will be negligible. These sections will be amended to state that a waiver may be granted only when the applicant provides different measures chosen from the mitigation plan that are similar to the measures for which the applicant seeks a waiver. These sections will be amended to encourage the use of natural vegetated swales in lieu of inlets and pipes.

Section 9-10.1: (I) requires for site plans, that the site shall be effectively screened on any side which adjoins or faces premises situated in any residence zone district, by a fence or wall not less than four (4) nor more than six (6) feet in height, maintained in good condition, provided, however, that a screening of hedge or other natural landscaping may be substituted for the required fence or wall if approved by the Approving Authority. The landscape requirements for these buffer areas in the existing section do not

recommend the use of native vegetation. The language of this section will be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species.

Section 9-10.2: Location of Parking and Loading will be amended to describe the procedure for construction of any new parking area, loading area, and driveway or accessway to any street. This section will also be amended to allow the limited use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Section 9-10.3: Landscaping within Parking Lots details landscaping requirements for all parking areas. This section states that at least five (5%) percent of the area of any parking area for ten (10) or more vehicles shall be reserved as landscaped area. This section will be amended to allow for flush curb with curb stops, or curbing with curb cuts to encourage developers to allow for the discharge of impervious areas into landscaped areas for stormwater management. Also, language will be added to allow for use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers. This section will be amended to allow pervious paving to be used in areas to provide overflow parking, vertical parking structures and shared parking. Additionally, language will be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Article 10

Section 10-8.3: Streets describes the requirements for streets in the Borough. This section will be amended to encourage developers to limit on-street parking to allow for narrower paved widths consistent with the Residential Site Improvement Standards.

Section 10-8.8: Dead End Streets requires that cul-de-sacs have a minimum radius of 30 feet. This complies with minimizing land disturbance, which is a nonstructural stormwater management strategy.

Article 11

Provisions Applicable to Both Site Plans and Subdivisions will be amended to include Off-tract Improvements which will describe essential off-site and off-tract improvements. Language will be added to this section to require that any off-site and off-tract stormwater management and drainage improvements must conform to the “Design and Performance Standards” described in this plan and provided in the Stormwater Management Ordinance. Additionally, language will be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Chapter 13

Protection of Trees requires that trees be preserved whenever possible, and that care be taken to preserve selected trees to enhance soil stability and landscaped treatment of the area. This section will be amended to expand trees to forested areas, to ensure that leaf litter and other beneficial aspects of the forest are maintained in addition to the trees.

13-15: Tree Replacement and Reforestation requires a certain number of replacement trees be planted based on the diameters of the trees removed. This ordinance recognizes that the preservation of mature trees and forested areas is a key strategy in the management of environmental resources, particularly watershed management, air quality, and ambient heating and cooling. This complies with minimizing land disturbance, which is a

nonstructural stormwater management strategy. This section currently requires the preservation of natural wood tracts and limits land disturbance for new construction.

Chapter 14

Streets and Sidewalks: will be amended to allow for curb cuts or flush curbs to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas. Although sidewalks are not required along all streets, the Borough can require them in areas where the probable volume of pedestrian traffic, the development's location in relation to other populated areas and high vehicular traffic, pedestrian access to bus stops, schools, parks, and other public places, and the general type of improvement intended indicate the advisability of providing a pedestrianway. Language will be added to this section to require developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, or use permeable paving materials where appropriate.

As a result of the municipality's Master Plan preparation and review in the past, there has been a substantial reduction in impervious coverage that is allowed in each zone. Therefore, a reduction in stormwater runoff was achieved while retaining a reasonable opportunity for development.

Several changes may still be made to the Borough Code entitled "Zoning". The Borough has 10 types of residential districts. Each district has a maximum percent impervious surface allocation. The Borough has 6 types of nonresidential districts. Each of these districts has a maximum percent impervious surface allocation. Although each zone has a maximum allowable percent impervious surface, the Borough Code will be 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. The Borough is evaluating the maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate. The Borough is also evaluating a maximum percent of disturbance for each zone, for those areas identified as natural features. Also, if a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge as described in the Design and Performance Standards for Stormwater Management Measures.

Land Use/Build-Out Analysis

Since the Borough of Bernardsville has a combined total of more than one square mile of vacant lands, the Borough is required to do a build-out analysis. A preliminary build-out analysis is being performed for the Borough of Bernardsville as described below.

The first of two phases of the build out analysis is to construct a map that includes the municipal boundary, existing roads, surface water bodies, HUC-14 boundaries, impervious cover, existing development by land use types, groundwater recharge areas, and wellhead protection area layers. A majority of the layers described above are being

taken directly from the website provided by the state of New Jersey, at <http://www.nj.gov/dep/gis/>. After constructing the map, the identification and delineation of land that cannot be developed because of legal restrictions, physical constraints, and environmental sensitivity are performed. Examples of the restrictions include lands in permanently preserved open space, public ownership, deed restrictions, utility easements, steep slopes, wetlands, floodplains, and Category 1 Waters with associated special resource protection areas. Next, the identification and delineation of developable land under current zoning and land use regulations, as well as land that is vacant or not restricted as discussed above will be performed. The identification and delineation of the developed areas within the municipality that have significant redevelopment potential and that have not been developed to the maximum allowed will also be performed. For these undeveloped and underdeveloped areas, the maximum future development by projecting the largest number of housing units allowed in residential zones and the largest number of buildings and most intensive land uses in commercial and industrial zones will be determined.

The second phase of the build-out analysis quantifies the impact of the changes based on information provided by the maps. This includes calculations of percentage of impervious surfaces, number of housing units and their density, and remaining farmland and open space acreage. GIS can also assist in this computation by providing values for specific sets of layers such as the combination of the municipality, HUC14, and impervious area layers. This set of variables can provide the maximum impervious cover for each HUC14 permitted by the Stormwater Management Rules. Values can be exported to other programs from GIS for more comprehensive computations, including the pollutant loading calculations also required by the regulations.

In simpler terms, all of the HUC-14's within the municipality will be identified as well as the zones within each HUC-14. The area for each zone within each HUC-14 will be calculated. The existing impervious areas will be calculated in acres and in a percentage for each zone within each HUC-14. The same will be done for the wetlands/constrained areas. An area will then be calculated for the developable area within each zone for each HUC-14. A table will be created itemizing each calculation described above. The maximum allowable impervious coverage in a percentage will be applied to the developable area within each zone for each HUC-14. The result will be the "Build-Out Impervious" area for each zone within each HUC-14. One will then compare the build-out impervious to the existing impervious within each zone for each HUC-14. Once the build-out analysis is completed, the tables and maps will be presented for review and approval.

Mitigation Plans

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards. Presented is a hierarchy of options.

Mitigation Project Criteria

1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.

- a. The applicant can select one or more of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Borough Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

Stream Stabilization at Sanitary Sewer Crossing behind Friendly's Restaurant

Municipal Building Pond Dredging

Addition of Storm Filters or other Mechanical Devices at Major Outfalls

[Additional Mitigation Projects]

2. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts that impact aquatic life along a certain stream. Listed below are specific projects that can be used to address the mitigation options.

Stream Cleaning at High School

*Addition of Storm Filters or other Measures at Municipally owned property
Such as Library, Train Station, Municipal Building, etc.*

[Additional Mitigation Projects]

The Borough may allow a developer to provide funding or partial funding to the Borough for an environmental enhancement project that has been identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

APPENDIX A

**Copy of Bernardsville Borough's NJPDES Tier A Municipal
Stormwater General Permit NJG0151068**



Bureau of Nonpoint Pollution Control
Division of Water Quality
PO Box 029
Trenton, NJ 08625-0029
Phone: (609) 633-7021
Fax: (609) 984-2147

AUTHORIZATION TO DISCHARGE
R9 -Tier A Municipal Stormwater General Permit

Facility Name:

PI ID #: 222564

BERNARDSVILLE BORO

Facility Address:

NJPDES #: NJG0151068

166 MINEHILL RD
BERNARDSVILLE, NJ 07924

Type of Activity: Stormwater Discharge General Permit Authorization New

Owner:

BERNARDSVILLE BORO
PO BOX 158
BERNARDSVILLE, NJ 07924

Operating Entity:

BERNARDSVILLE BORO
PO BOX 158
BERNARDSVILLE, NJ 07924

Issuance Date:

03/22/2004

Effective Date:

04/01/2004

Expiration Date:

02/28/2009

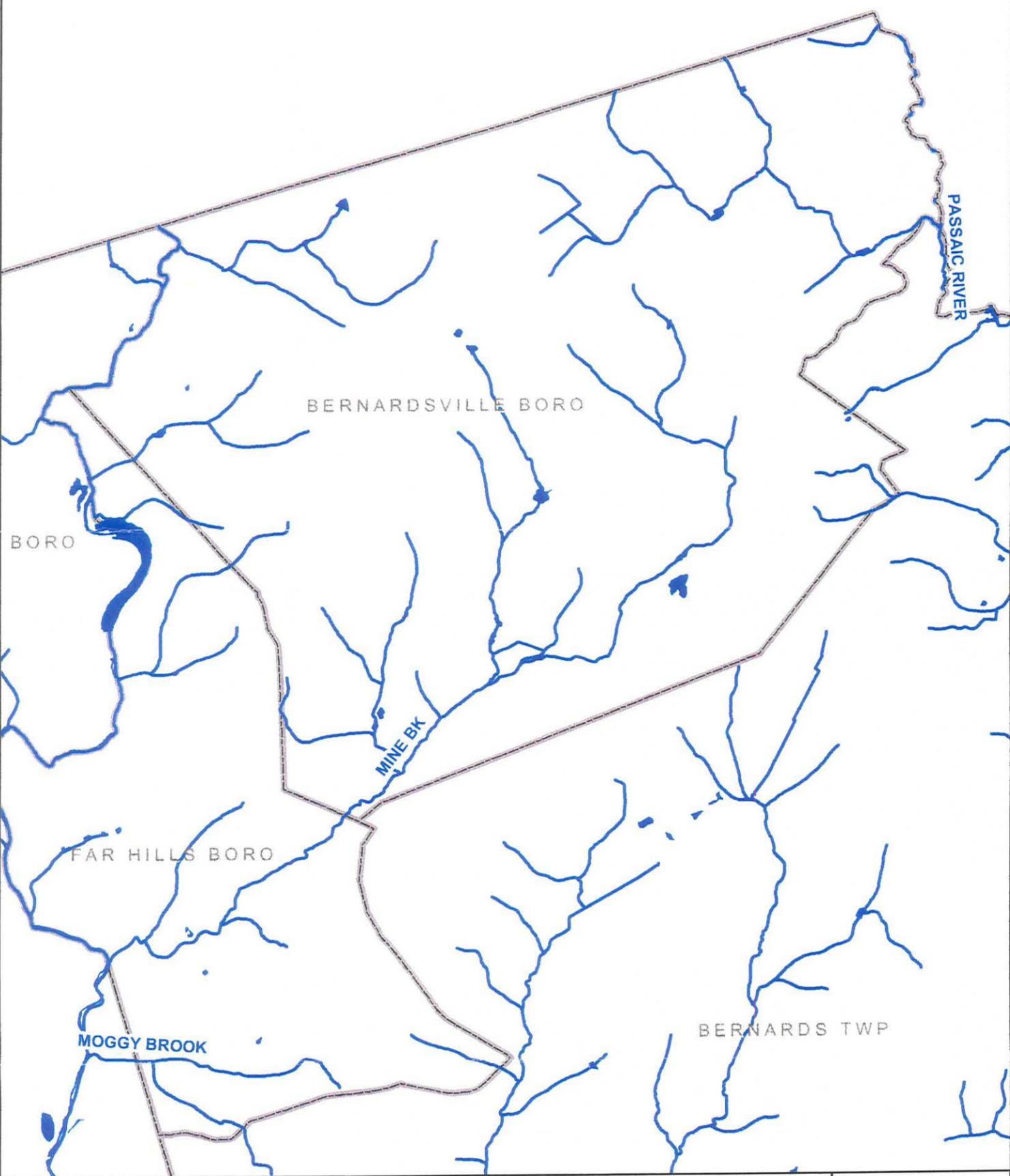
Your Request for Authorization under NJPDES General Permit No. NJ0141852 has been approved by the New Jersey Department of Environmental Protection.

Date: 03/22/2004

Barry Chalofsky, P.P., Chief
Bureau of Nonpoint Pollution Control
Division of Water Quality
New Jersey Department of Environmental Protection

APPENDIX B

FIGURES

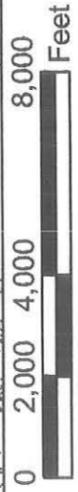
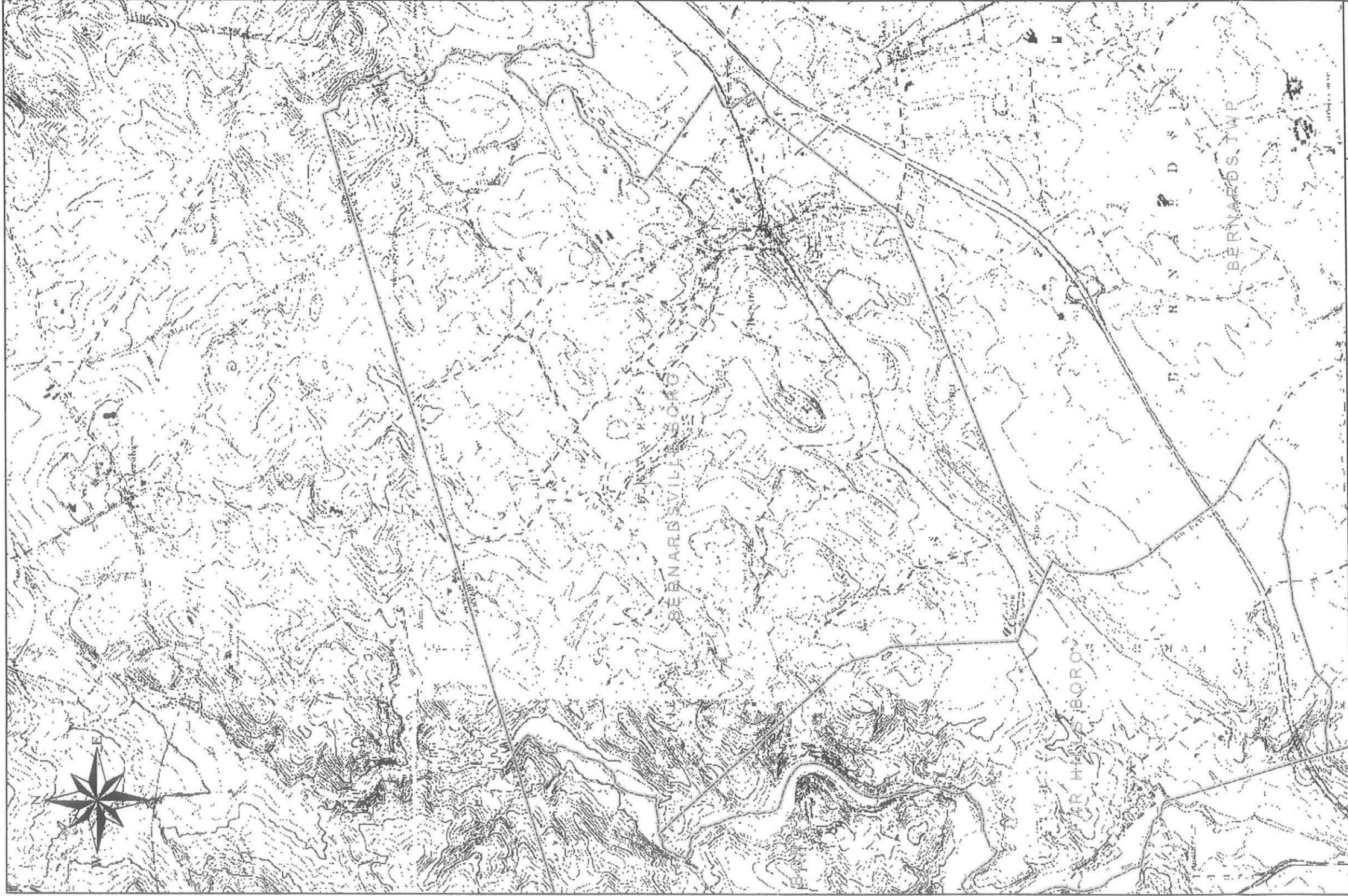


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Prepared By: Somerset County, May 2004
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Bernardsville Borough Waterways

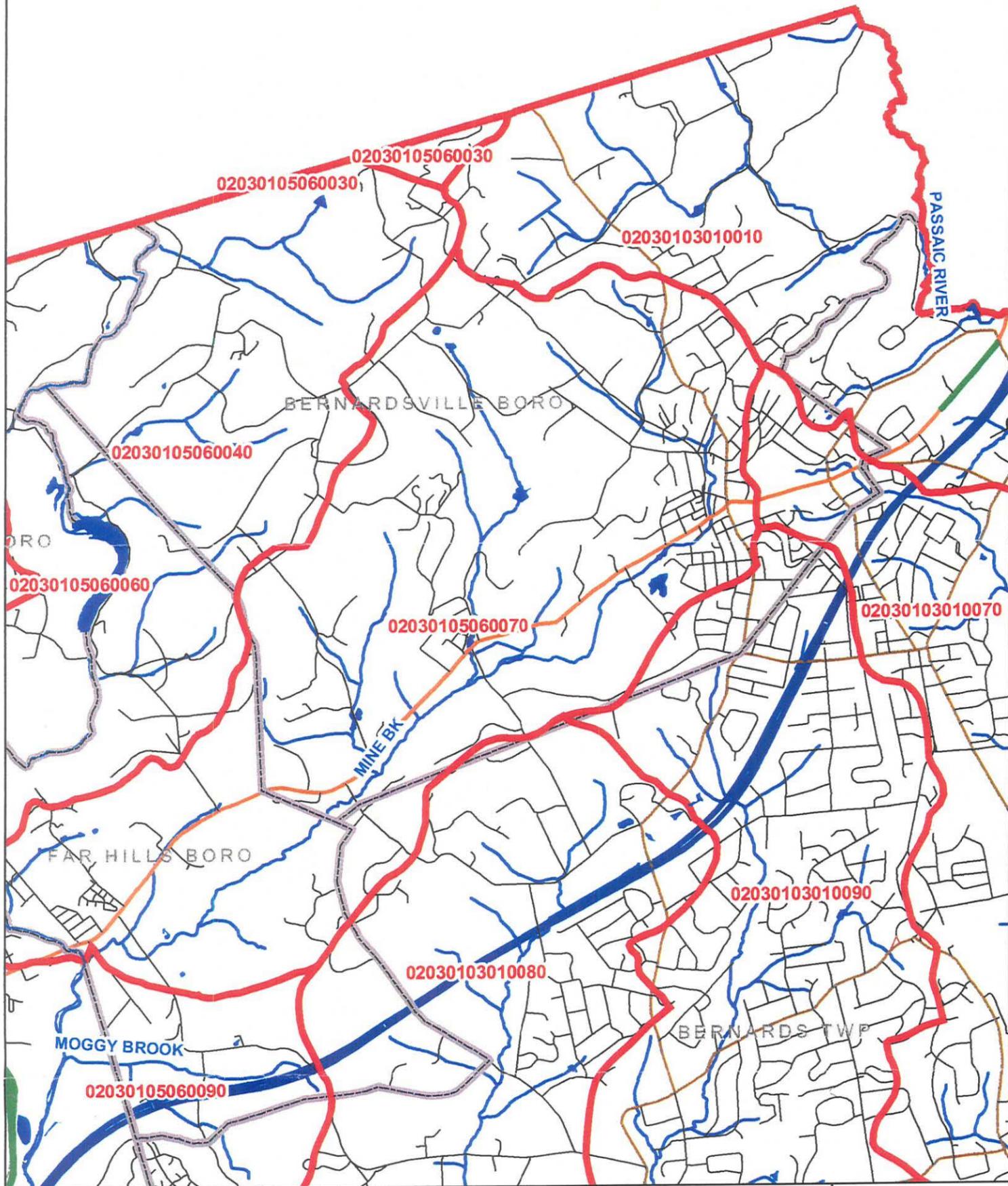
Figure 2



Prepared By: Somerset County, May 2004
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

**Bernardsville Borough
USGS Quadrangle Map**

Figure 3

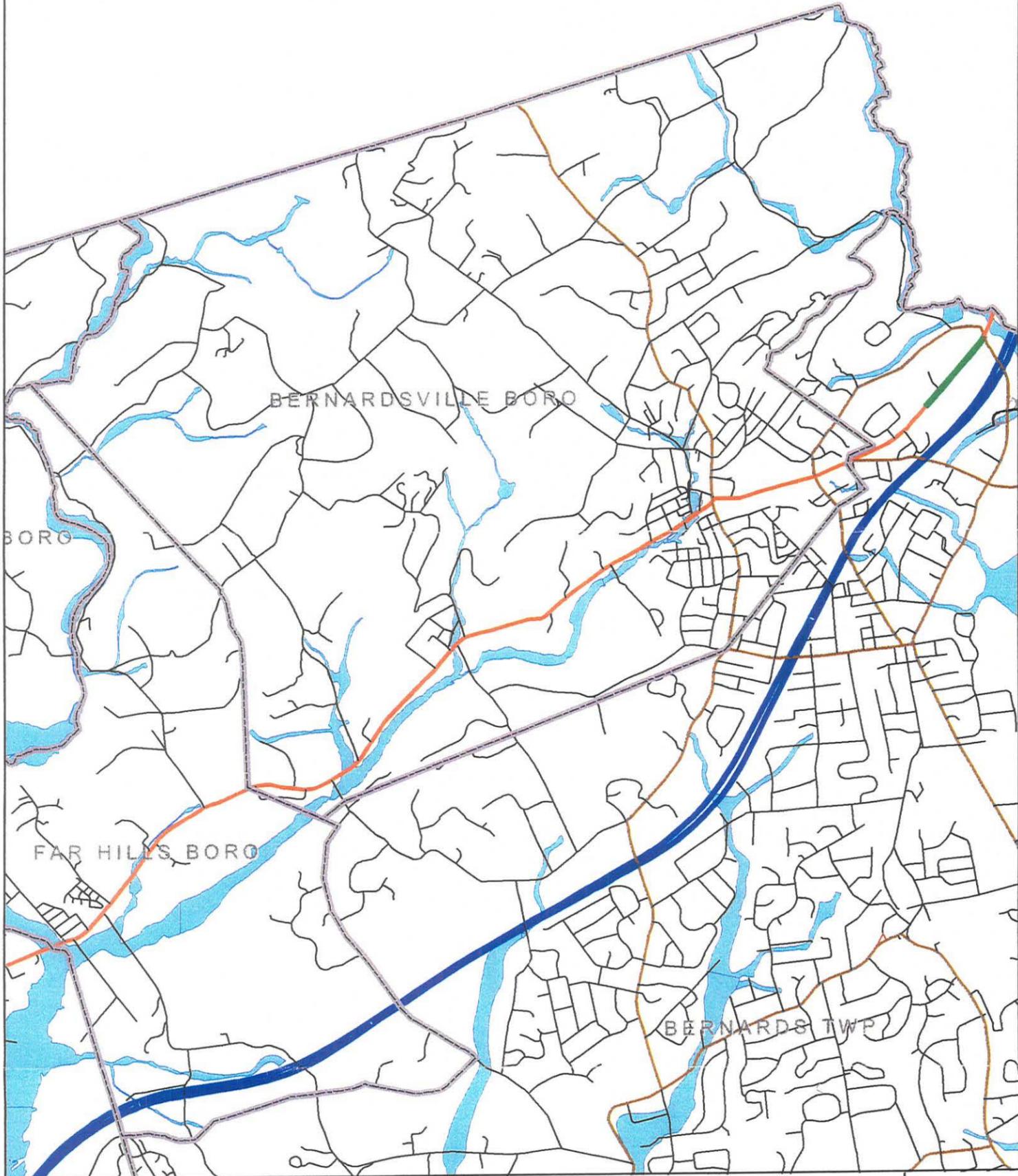
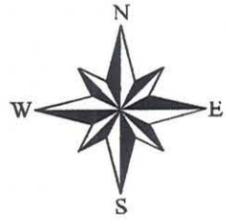


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Feet

Prepared By: Somerset County, May 2004
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

**Bernardsville Borough
Hydrologic Unit Code 14 (HUC14) Areas**

Figure 4



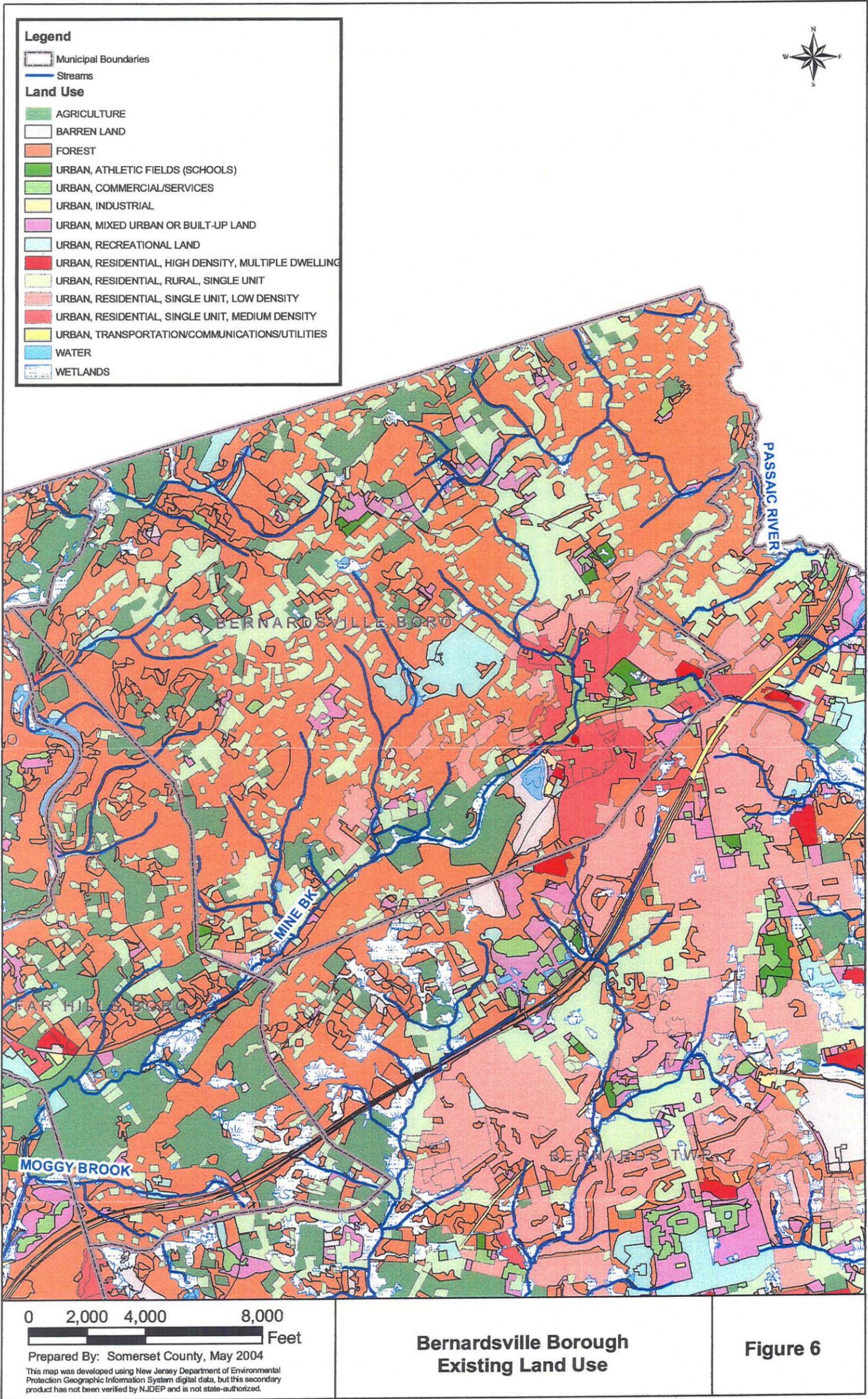
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Feet

Prepared By: Somerset County, May 2004

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

**Bernardsville Borough
100-Yr Flood Plain**

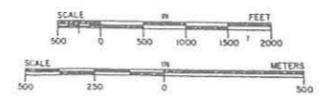
Figure 5





- REV. 6/03, FERRERO ENGINEERING
- REVISED BY FERRERO ENGINEERING, INC. MARCH 2002 PER ORDINANCES 2000-1259 & 2002-1271
- REVISED 1999 FREDERICK C. LOSOWSKI L.S. 18262
- REVISED BY FERRERO ENGINEERING, INC. 4-20-98; PER ORDINANCES #781 (R-2/R-4), #801 (R-10 & R-10B), #85-1030 (R-1A, R-4), #95-1041 (R-1A to R-2) and #96-1057 (R-2)
- REVISED 1997 FREDERICK C. LOSOWSKI L.S. 18262
- REVISED BY REMINGTON & VERNICK ENGINEERS BLK. 80, LOTS 15 & 54 ON 6/15/92 1803T028
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 5/9/92 (AMEND GALLAWAY WRIGHT BLOCK 118, LOTS 12, 13 1803T028)
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 8/9/92 (AMEND STINE, BLOCK 16, LOTS 16.01, 16.04 1803T028)
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 5/9/92 (AMEND MACMILLAN, BLOCK 19, LOTS 18.01, 18.02 1803T028)
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 6/9/92 (AMEND PEARSON BLOCK 14, LOTS 16, 18.01, 18.02) 1803T028
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 6/9/92 (AMEND) HOONETT SUB-DIVISION 1803T028
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 5/6/92 (AMEND) HORCHNER SUB-DIVISION 1803T028
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 5/5/92 (AMEND SOMERSET HILL VILLAGE) 1803T028
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 2/14/92 (MINOR SUB-DIVISION, GARIBOLDI ST.) 1803T028
- REVISED BY REMINGTON & VERNICK ENGINEERS ON 2/14/92 (AMEND PARK LANE & BROOK HOLLOW LANE) 1803T028

- R-1-10 RESIDENCE DISTRICT
- R-1 RESIDENCE DISTRICT
- R-1A RESIDENCE DISTRICT
- R-2 RESIDENCE DISTRICT
- R-3 RESIDENCE DISTRICT
- R-4 RESIDENCE DISTRICT
- R-5 RESIDENCE DISTRICT
- B-1 BUSINESS DISTRICT
- C-1 COMMERCIAL DISTRICT
- I INDUSTRIAL DISTRICT
- R-8 ATTACHED RESIDENCE DISTRICT
- OB OFFICE BUILDING DISTRICT
- HD HIGHWAY DEVELOPMENT
- R-10A MULTI-FAMILY HOUSING DISTRICT
- R-10B MULTI-FAMILY HOUSING DISTRICT
- I-2 LIGHT INDUSTRIAL DISTRICT



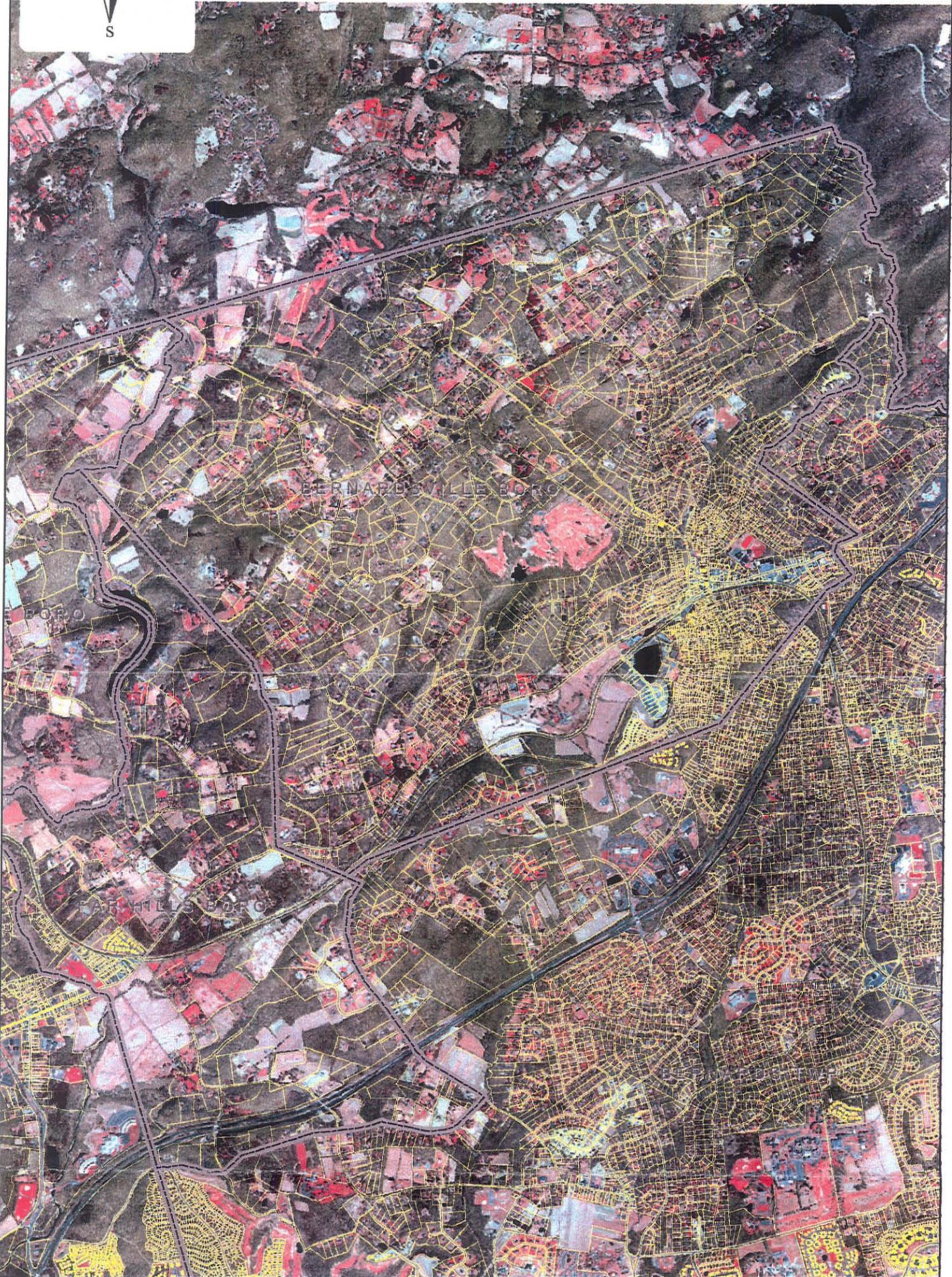
ZONING MAP
BOROUGH OF BERNARDSVILLE
SOMERSET COUNTY, NEW JERSEY

THE PREPARATION OF THIS MAP WAS FINANCED IN PART THROUGH AN URBAN PLANNING GRANT FROM THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, UNDER THE PROVISIONS OF SECTION 701 OF THE HOUSING ACT OF 1954, AS AMENDED.
 THE REMAINDER HAS BEEN FINANCED BY LOCAL FUNDS AND BY AN APPROPRIATION OF THE STATE OF NEW JERSEY AS PART OF THE COOPERATIVE GOVERNMENTAL PLANNING PROGRAM.
 AMENDED BY ORD. 672 - ADOPTED 2/14/83
 AMENDED BY ORD. 592 - ADOPTED 6/18/79
 BASE MAP REFLECTS APPROVED SUBDIVISIONS AS OF 3/1/77
 BASE MAP PREPARED BY ROBERT CAULK AND ASSOCIATES - 1947

PLANNING CONSULTANT: CARREW, FLEISCH AND ASSOCIATES
 JAN., 1979

CONTINUED TO DATE FEB. 3, 1982
 CONTINUED TO DATE FEB. 5, 1985
 CONTINUED TO DATE JAN. 18, 1988
 CONTINUED TO DATE JAN. 22, 1992

REVISED BY ORD. 672 - ADOPTED 2/14/83
 REVISED BY ORD. 592 - ADOPTED 6/18/79
 Amended Ord 592 - 6/18/79



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Feet

Prepared By: Somerset County, May 2004
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

**Bernardsville Borough
Aerial Photo with Parcels**

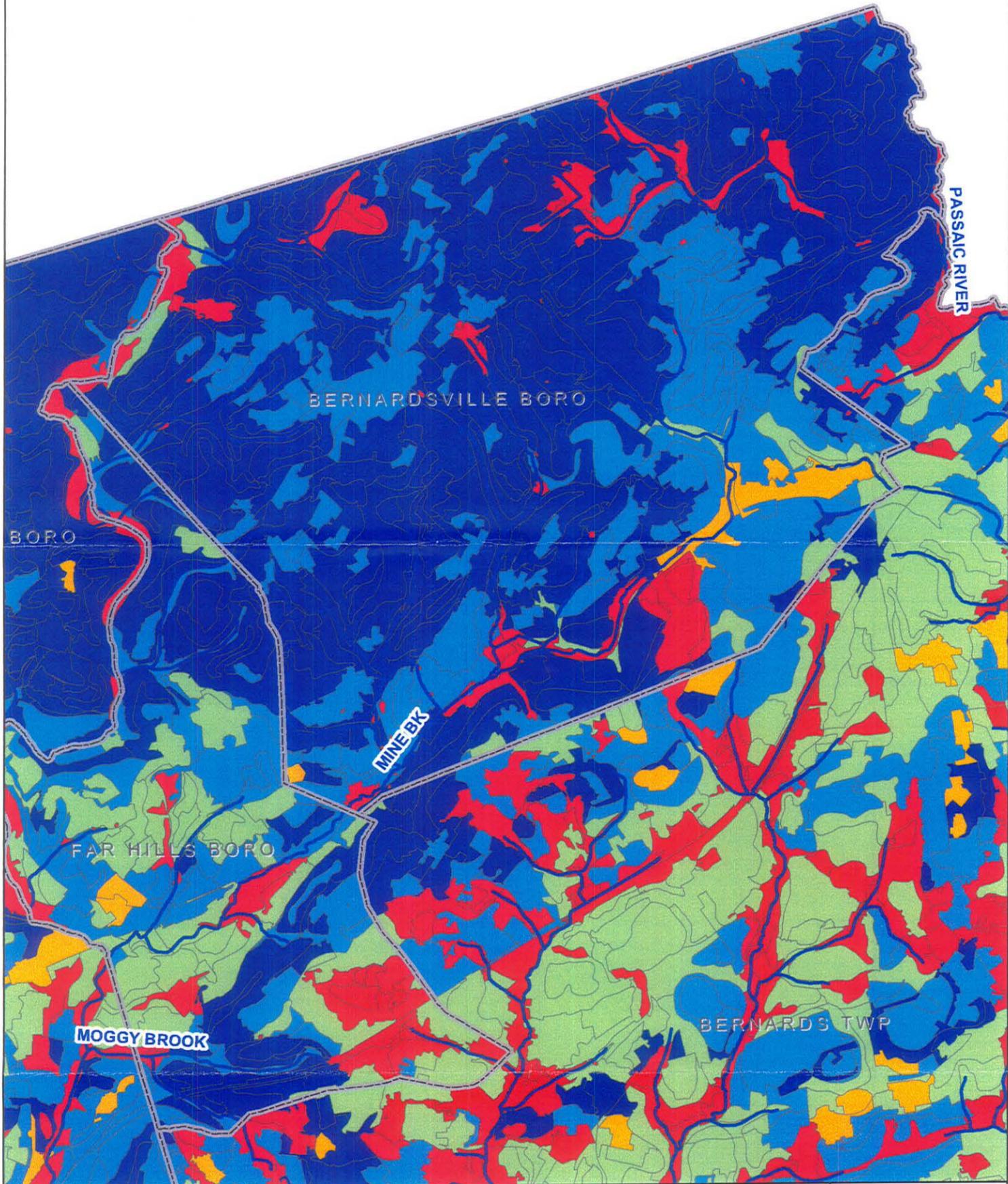
Figure 8

Legend

-  Municipal Boundary
-  Streams

Average Annual Groundwater Recharge (inches)

-  0
-  1 - 6
-  7 - 11
-  12 - 14
-  15 - 19



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Feet

Prepared By: Somerset County, May 2004
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**Bernardsville Borough
Groundwater Recharge**

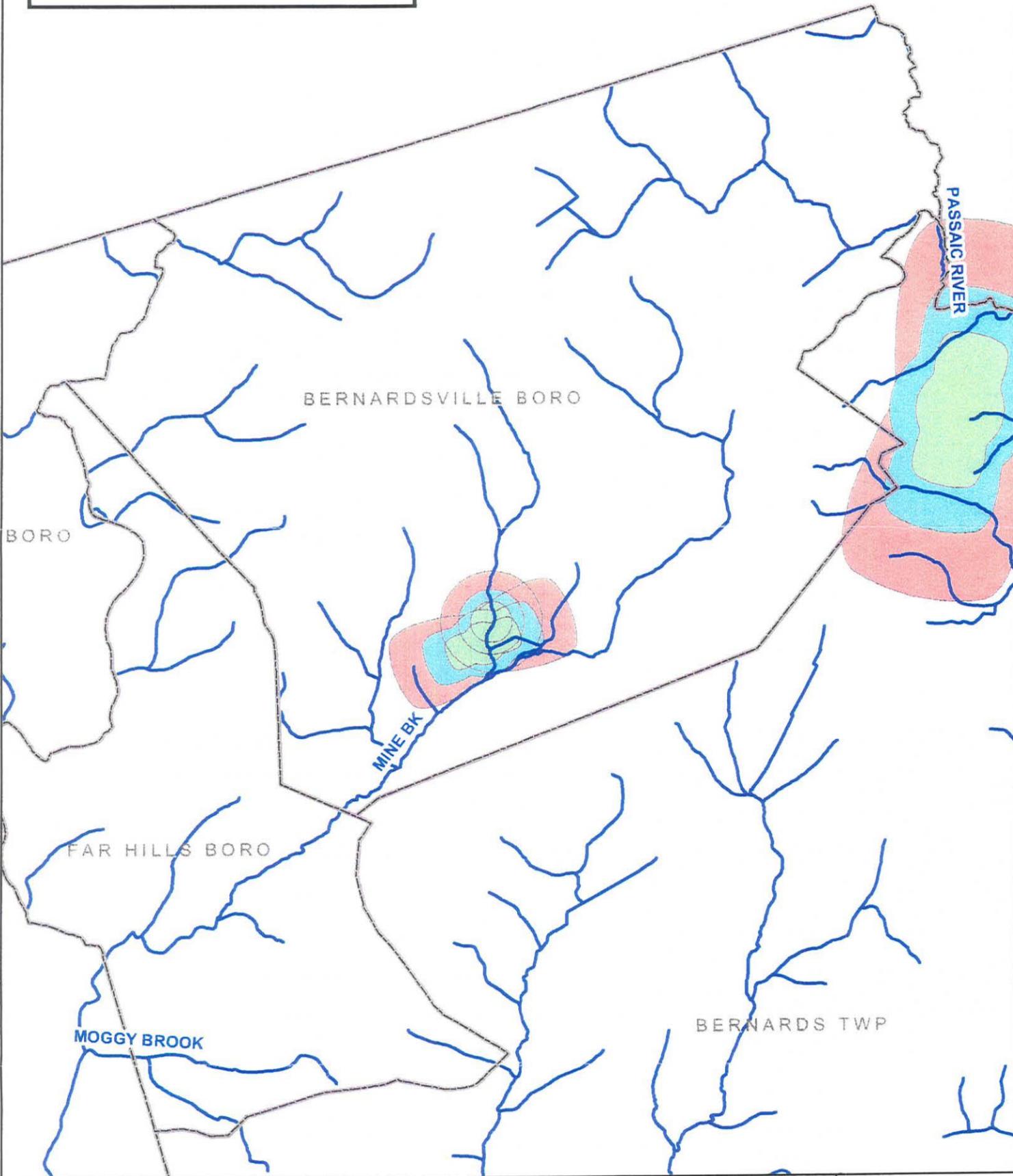
Figure 9

Legend

-  Municipal Boundaries
-  Streams

Well Head Protection Areas

-  Tier 1
-  Tier 2
-  Tier 3

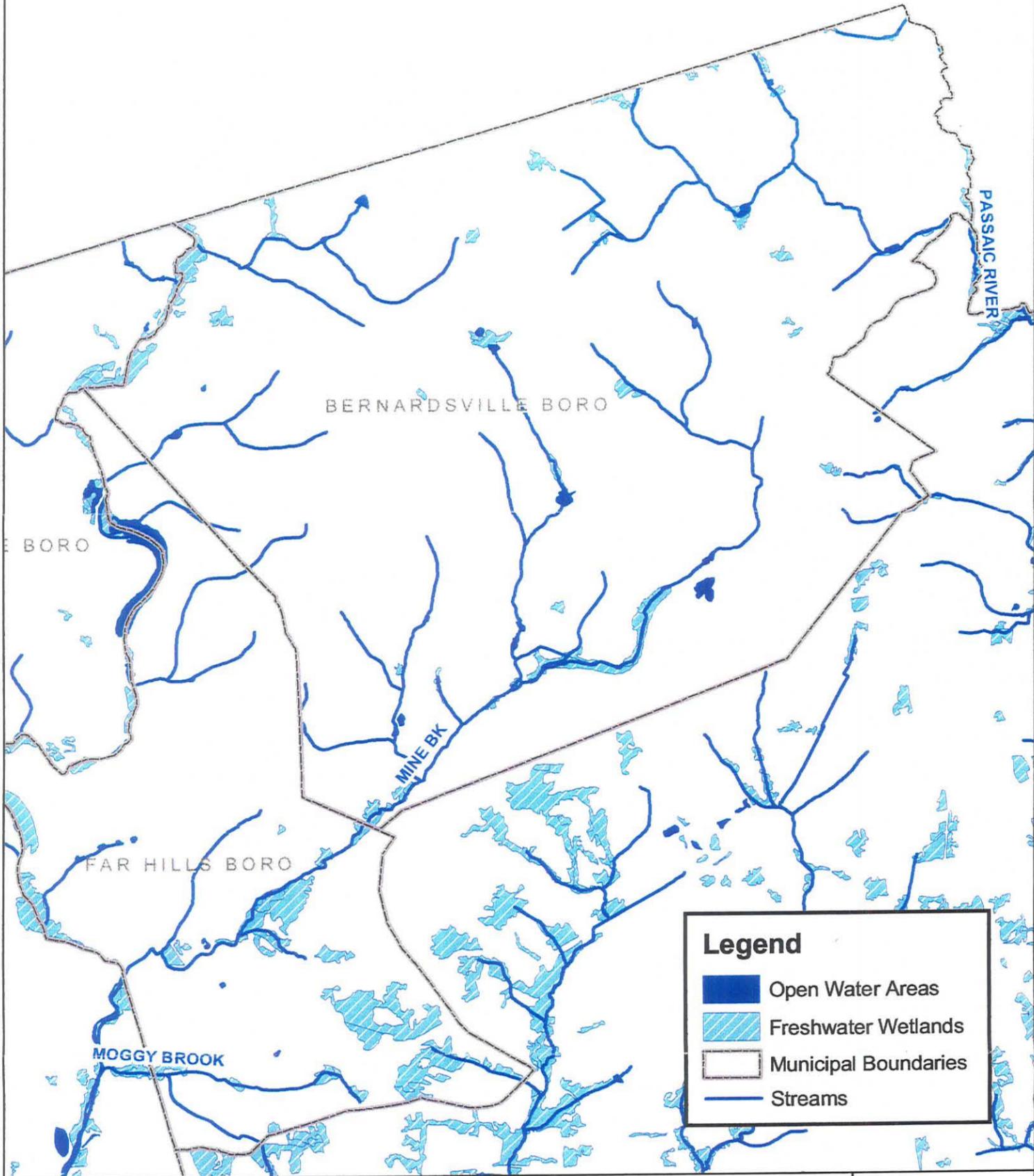


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Feet

Prepared By: Somerset County, May 2004
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

**Bernardsville Borough
Well Head Protection Areas**

Figure 10



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Feet

Prepared By: Somerset County, May 2004
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Bernardsville Borough Wetlands and Water

Figure 11