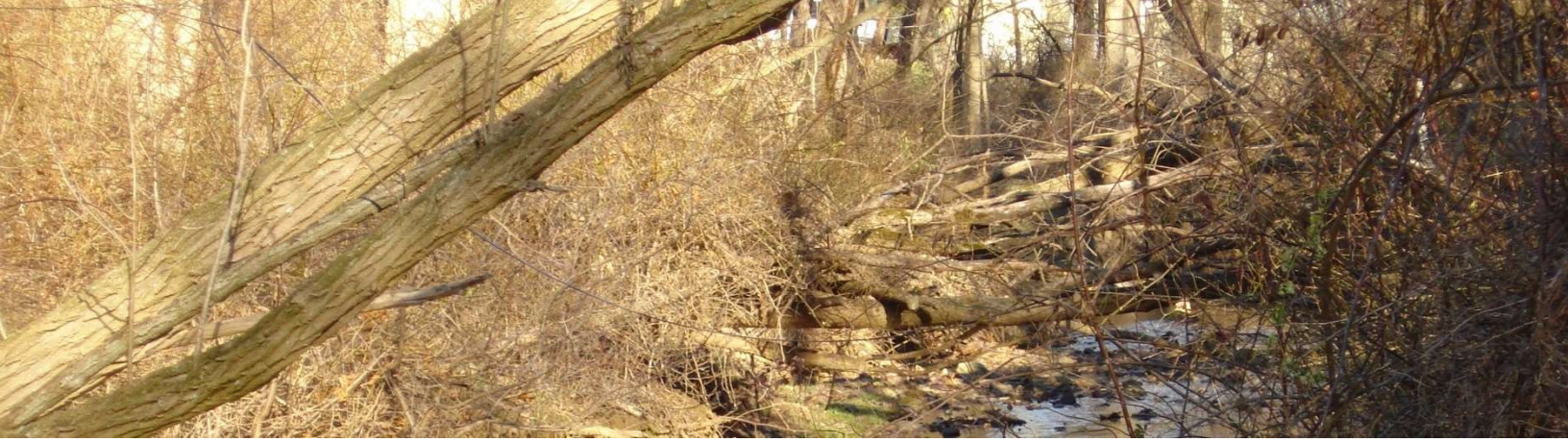

NITRATE DILUTION AND CURRENT PLANNING CAPACITY MODELING

MARCH 2020

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1.0 INTRODUCTION

Princeton Hydro, LLC was contracted by the Township of Mendham located in Morris County, New Jersey to provide services related to the preparation of updated Nitrate Dilution models and Current Planning Capacity model within the township as a component of ongoing efforts to update the township Master Plan and address sustainable development practices in the township. For this project, Princeton Hydro has teamed with Uhl & Associates, Inc, a hydrogeology consulting firm from Lambertville, New Jersey. Princeton Hydro serves as the project lead and is responsible for executing the nitrate dilution model and associated tasks, while Uhl & Associates have been tasked with the completion of the Current Planning Capacity model. This report will detail the results of these modeling efforts.

2.0 NITRATE DILUTION MODELING

Nitrates in surface and groundwater are a cause for concern both in terms of ecological health and for the protection of groundwater resources which serve as critical sources of potable water for the township residents. Nitrate loading within watersheds, for both surface waters and groundwater, has a diversity of sources including non-point source loading attributable to stormwater runoff, precipitation, decomposition of organic matter such as leaf fall, the use of nitrogenous fertilizers, and point sources including the surface discharge of treated wastewaters. Since many nitrogenous compounds are highly water-soluble surficial loading processes often induce loading to groundwater. The opposite is also true, and surficial expression of groundwater, such as sustaining baseflow in streams and rivers, can also impact surface concentrations. A major driver of loading in some developed watersheds, and the focus of this effort, is nitrate loading attributable to the groundwater discharge of effluent from onsite watershed treatment or septic systems. Nitrates in the effluent of septic systems can impact potable water supply wells, and elevated nitrate concentrations in excess of 10 mg/L can cause a health risk due to methemoglobinemia, a condition characterized by decreased hemoglobin production in babies. More recently, broader concerns related to the degradation of surface water quality and ecological services of streams, ponds, and lakes through eutrophication are also recognized.

As such, one of the tools to avoid impacts to human health and environmental health, is to address nitrate loading through municipal planning and zoning. For this project a nitrate dilution model will be executed that assesses nitrate loading in the township and calculates the appropriate lot sizes necessary to provide sufficient dilution of the nitrate load through groundwater recharge to maintain groundwater nitrate concentrations below appropriate thresholds and water quality standards to limit human health and environmental quality risks. The remainder of this section will focus on describing the selected model, the results of the model, and a carrying capacity analysis based on both the results of the model and current zoning regulations. A review of historic data related to groundwater nitrate management is also provided, as well as a review of some of the relevant regulations governing nitrate concentrations and management.

2.1 HISTORIC DATA REVIEW

In 1994, the Mendham Township Environmental Commission contracted with Connolly Environmental, Inc. and John Rakos Planning Consultant, to develop the *Critical Water Resources Study* for Mendham Township. Much like this project, that study, completed with grant funding, evaluated water supply resources from two perspectives, water quantity and water quality with a focus on nitrates in groundwater. Using the theoretical Nitrate Dilution Model (NDM) developed by Rutgers University, the study attempted to provide a scientific framework for establishing zoning ordinance to protect groundwater resources from excessive nitrate concentrations.

The NDM was used to develop estimates of permissible development density and lot sizes capable of renovating septic effluent to meet a groundwater nitrate threshold; subsequently these values were used to determine sustainable populations and housing units. The model assumes that nitrate loading to septic systems is constant on a per capita basis and that approximately 80% of the nitrate vector will be fully renovated by the system, with the remaining 20% of the load discharged to groundwater. To calculate the sustainable development density, the model assumes that there is no further treatment of nitrogen through adsorption, chemical reaction, or other mechanism and that final concentration is solely a factor of groundwater recharge. No further consideration was given to zoning ordinance, septic system performance, or limiting factors.

The basis of the model is the recharge rate of soils overlying geologic formations within the township. These infiltration rates were cited as being obtained from the New Jersey Geological Survey (NJGS) Bulletin No. 74, Land Oriented Reference Data System (LORDS), published in 1974. As a result, the model was calculated at a relatively coarse scale and considered just five geological formations within the township bounds. A summary of the recharge and land area for each formation is provided in Table 1. It should be noted that the given infiltration rates are significantly higher than the geological formation yields used in the water quantity section of the report (CPCM) and published in Bulletin No. 74.

Table 1: Recharge Rates

Geological Formation	Recharge Rate (gpd/sq. mi.)		Area in Menham Twp. (acres)
	Lower Bound	Upper Bound	
Border Conglomerate / Martinsburg Shale	190,000	380,000	457
Hardyston Quartzite	95,000	190,000	173
Hornblende-Granite-Gneiss / Hypersthene-Quarts-Andesine Gneiss / Allentown Formation	190,000	380,000	9,965
Marble and Skarn / Amphibolite	190,000	380,000	717
Leithsville Formation	470,000	565,000	199

The model identified the target dilution concentration as 10.0 mg/L of nitrate which was the US Public Health Standard for nitrate pollution. The NDM model and model terms are provided below:

$$D_{wq} = (I \times C_1) / (640 \times R \times C_2 \times Q)$$

D_{wq} = Development density to meet target threshold (households/acre)
I = Infiltration to groundwater recharge, which uses the lower bound estimate (gals/sq. miles/day)
C_1 = 10.0 mg/L of nitrate
640 = Conversion factor (acres/sq. mile)
R = Renovation factor (80% of nitrate in effluent is renovated, 20% discharges to groundwater
C_2 = 42.2 mg/L of nitrate in septic system effluent
Q = Daily household septic discharge, here 473 gallons per day based on a formula established in N.J.A.C. 7:9A-1.1 utilizing a 1990 Census data of 2.82 people/household in Mendham Township

Using the lower bound recharge rates, the theoretical development density limit was calculated and inverted from the model output of households/acre to acres/household. Using these limits, sustainable populations were calculated for each unit outputting both the total number of households and the total population. The number of household was calculated by dividing the total area of each geologic formation by the housing density. Population was calculated by multiplying the households by the per household population of 2.82. In total, the sustainable population based on a nitrate dilution target of 10.0 mg/L was calculated to be 5,953 people or 2,110

households. The minimum area required to dilute septic effluent to the target nitrate concentration ranged from 2.2 acres/household up to 11.1 acres/household. The weighted average for the township (not calculated in the original report) was 5.53 acres. A summary of the results is provided in Table 2 below.

Table 2: Theoretical Development Density Limits

Geological Formation	Theoretical Development Density Limits		
	Acres/Household	Households	Population
Border Conglomerate / Martinsburg Shale	5.5	82.3	232
Hardyston Quartzite	11.1	15.6	44
Hornblende-Granite-Gneiss / Hypersthene-Quarts-Andesine Gneiss / Allentown Formation	5.5	1,795.0	5,062
Marble and Skarn / Amphibolite	5.5	129.0	363
Leithsville Formation	2.2	89.0	252
	5.53	**2,110.9**	**5,953**

In addition to the calculations provided above, the study also examined septic system failure/repairs. The Mendham Township Environmental Commission provided a plot of all Board of Health applications for septic system repair or upgrade and noted that most of these where in the R-1 and R-2 zones and overlaying the Hornblende-Granite-Gneiss/Hypersthene-Quartz-Andesine Gneiss/ Allentown Formation. It noted that the minimum lot size of those two zones, 1 and 2 acres respectively, was insufficient to provide adequate nitrate renovation based on the model. It also highlights that suitability of site soils and other characteristics is important to avoid system failures.

2.2 RECHARGE-BASED NITRATE-DILUTION MODEL FOR NEW JERSEY V7.0

In the intervening years since the *Critical Water Resources Area* study, nitrate dilution modeling in New Jersey has changed considerably. The Water Quality Management Planning rules (N.J.A.C. 7:15-4.15(c)) identify two models for nitrate-dilution determinations: A Recharge-Based Nitrate-Dilution Model for New Jersey V6.2 developed by NJGS or a simplified HUC11 model named A Recharge-Based HUC11-Scale Nitrate-Carrying Capacity Planning Exercise for New Jersey V3.0. For this project, the Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 is utilized (hereafter "the model"), which includes some small updates to the V6.2. The model utilizes the Trela and Douglas (1978) nitrate-dilution model which utilizes per capita water demand, residents per household, effluent nitrate concentration, recharge, and nitrate groundwater concentration targets. While Trela-Douglas is a long-standing model that yields good performance, the current model incorporates a groundwater recharge model, GSR-32 developed by Charles, et al. 1993. The GSR-32 model is based on a water budget approach and incorporates specific data such as municipality, soil, land use, and basin factor as well climate data. Over time, the combined model, incorporating both nitrate-dilution and groundwater recharge, has been refined, updated, and calibrated. Relative to the previous recharge estimates, it provides much higher spatial resolution as it works at a soil unit scale and greater accuracy.

The Trela-Douglas Model and its terms are as follows:

$$4.42 \times P \times N = R \times T \times A$$

4.42 = Conversion factor
P = People per household
N = Nitrate loading rate, assumed at 10 lbs./person
R = Recharge, based on GSR-32 (inches/year)
T = Nitrate target concentration, variable
A = Minimum recharge area (acres/household)

Ultimately, the equation is solved for term A, minimum recharge area to dilute nitrate in groundwater to the target concentration.

2.3 NITRATE TARGET CONCENTRATION

For this study multiple nitrate target concentrations were modeled. Each of the target concentrations will be explored below including the statutory basis for its use and other factors highlighting its utility for this exercise.

2.3.1 10.0 MG/L

10.0 mg/L is a long-standing and important threshold for nitrogen regulation. As mentioned above, the United States Public Health Service originally adopted this standard in 1962 to protect human health, specifically to combat the risk of methemoglobinemia in infants. The United States Environmental Protection Agency (EPA) has also adopted the 10.0 mg/L standard as the maximum contaminant level (MCL) for nitrate-nitrogen. The New Jersey Department of Environmental Protection (NJDEP) also recognizes the nitrate Ground Water Quality Criterion as 10,000 µg/L (or 10.0 mg/L) per N.J.A.C. 7:9C.

This target is provided here for several reasons. First, it represents a human health standard and one that addresses severe health risks, especially for infants. It was also used in the *Critical Water Resources Study* and will primarily be used in this exercise for comparative purposes. Overall, this target concentration is superseded by stricter targets and primarily functions here to provide context.

2.3.2 2.0 MG/L

NJDEP has established a nitrate target concentration of 2.0 mg/L in N.J.A.C. 7:9C-1.8 under the antidegradation policy. The antidegradation policy is intended to: *protect existing ground water quality that is better than criteria from significant degradation.* Further, under 7:9C-1.8(b)3: *a nitrate concentration of 2 mg/L, which is representative of the average existing ground water quality Statewide, shall be used in determining that existing ground water quality is maintained on a HUC 11 basis.* This standard therefore is designed to prevent degradation of existing resources. It is much stricter than the human health-based standard and further offers a degree of environmental protection, recognizing that groundwater plays an important role in eutrophication and the protection of surface water resources. This standard should be considered the base standard for this exercise and appropriate in identifying minimum recharge areas for planning purposes on both a HUC 11 and municipal basis.

The 2.0 mg/L standard is also memorialized in N.J.A.C 7:15-4.5(c)1 which states: *For areas proposed to be served by individual subsurface sewage disposal systems discharging 2,000 gallons per day or less to ground water, the applicant shall determine the development density that can be accommodated in undeveloped and underdeveloped areas that will result in attainment of two mg/L nitrate in the ground water on a HUC 11 basis.*

Mendham Township lies within three HUC11 watersheds: 02030103010 – Passaic River Upper (above Pine Brook branch); 02030103020 – Whippany River; and, 02030105060 Raritan River North Branch (above Lamington).

2.3.3 6.0 MG/L

While the 2.0 mg/L nitrate target concentration is appropriate for planning and employment at larger scales, specifically for HUC 11 watersheds, NJDEP also utilizes a site-specific standard of 6.0 mg/L for systems that require a NJDPDES (New Jersey Pollution Discharge Elimination System) permit. N.J.A.C 7:9A-3.10(a) states that: *individual subsurface sewage disposal systems which serve single family dwelling units and which are located, designed, constructed, installed, altered, repaired and operated in conformance with the requirements set forth in these standards are exempt from NJPDES permit requirements.* As such, the most common installation in Mendham Township, a single-family dwelling with onsite septic system, are not subject to this standard. Therefore, the 6.0 mg/L standard represents a specialized case but still bears exploration. Per N.J.AC. 7:9C-1.8(b)4:

> *Excluding those in the Highlands preservation area subject to (b)2 above, the Department shall not approve a discharge from a new or expanded domestic treatment works to Class II or Class III ground water that requires a NJPDES discharge to ground water permit pursuant to N.J.A.C 7:14A unless the Department determines, through the NJDPES permit process, that the total nitrate load to the property served by the treatment works, when expressed as a concentration, shall not exceed 6 mg/L nitrate. The nitrate concentration of 6 mg/L nitrate represents half of the sum of 2 mg/L nitrate, which is representative of the average existing ground water quality Statewide, and the ground water quality criterion for nitrate of 10 mg/L set forth in Appendix Table 1.*

2.3.4 HIGHLANDS SEPTIC DENSITY STANDARD

Mendham Township is located within the New Jersey Highlands. It is within the Highlands Planning Area, and abuts the Highlands Preservation Area to the west. The Highlands Act (N.J.S.A 13:20-32e) required that a septic density standard be developed, which was memorialized in the Highlands Water Protection and Planning Act Rules (N.J.A.C. 7:38). The calculation of septic density was based on nitrate-dilution models. In the New Jersey Geological & Water Survey Technical Memorandum 14-1 groundwater sampling within the Highlands showed that within mixed-use lands the median nitrate concentration was 0.76 mg/L and within pristine or forest lands the median nitrate concentration was 0.21 mg/L. Utilizing those groundwater nitrate concentrations, the concentration of equivalent disposal units, essentially a septic system serving a single-family dwelling, is not to exceed one unit per each 88 acres of a lot in forest land, and one unit per each 25 acres in non-forest land. It is important to note that this septic density standard is only applicable within the Highlands Preservation Area, not the Planning Area and therefore there is no requirement that this standard be observed within Mendham Township. Because this is not legally-binding within Mendham Township and because the lot sizes are inconsistent with current zoning and existing development patterns, those median nitrate concentrations were not modeled, but are discussed here to provide context.

2.4 NITRATE DILUTION MODEL INPUTS AND BACKGROUND DATA

The model functions by selecting several input variables including population density, target nitrate concentration, soils, and municipality. These inputs are tied to several databases compiled within the model including climate, water budget, and land use characteristics. This section discusses those inputs and other relevant background data such as zoning.

2.4.1 POPULATION DENSITY

Population density is the number of people per household. In Mendham Township, this was calculated to be 3.004 people/home. This was based on the 2017 American Community Survey data published by the US Census

Bureau, which indicated a population of 5,877 people in 1,956 homes. This was little changed from the official 2010 Census data. This data is summarized in Table 3.

Table 3: Mendham Township Population Data

Metric	Units	Source
Census 2010 Total Population	5,869	1
2017 ACS 5-Year Population Estimate	5,877	1
Census 2010 Total Households	1,952	2
2017 ACS 5-Year Estimate Total Housing Units	1,956	1

1 - https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk
2 - https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

2.4.2 ZONING DATA

Zoning data was also reviewed as minimum lot sizes per zoning ordinance provide a point of comparison to the minimum recharge areas calculated by the models. This data will also be used in several sustainability metrics. In total, there are eleven zones in Mendham Township, as well as one overlay zone. Minimum lot sizes range from 20,000 square feet (0.46 acres) up to 10 acres. The total land mass of Mendham Township, per the municipal zoning GIS layer published by Morris County, is 11,527.48 acres. A summary of zoning characteristics is provided below.

Table 4: Mendham Township Zoning

Zone	Minimum Lot Size	Area (acres)
B - Business Zone	20,000 sq. ft.	1.587
CR-1 - Combination Residential District	Average 40,000 sq. ft.	461.217
CR-2 - Combination Residential District	20,000 sq. ft.	133.648
G - Golf Club Zone	35 acres	161.021
R - Single-Family Residential Zone (20,000 Sq. Ft.)	20,000 sq. ft.	185.276
R-1 - Single-Family Residential Zone (1 Ac.)	1 acre	561.270
R-2 - Single-Family Residential Zone (2 Ac.)	2 acres	448.935
R-3 - Single-Family Residential Zone (3 Ac.)	3 acres	2205.530
R-5 - Single-Family Residential Zone (5 Ac.)	5 acres	2822.830
R-10 - Single-Family Residential Zone (10 Ac.)	10 acres	4517.220
R-C - Residential Cluster District	20,000 sq. ft.	28.946
REB - Reuse of Existing Buildings (Overlay)[1]	10 acres	18.313
	Total	**11527.480**

1 - Overlay area not included in area total

2.4.3 SOILS DATA

One of the primary model inputs is soil series. Various characteristics of the soil series are used within the GSR-32 module to calculate groundwater recharge. In total, 21 soils series were identified within the township bounds. Of these series, five are classified as hydric, frequently flooded, and/or urban, and a sixth series is Water. These soils series output null values for the model because they do not support infiltration as a result of poor permeability and imperviousness or are otherwise considered unsuitable for the construction of septic systems.

Each soil series may also include a number of soil units. These soil units are slight variations of the parent series and are distinguished by variations in placement, quality, and other geotechnical characteristics. Slopes and soil particle size distribution are often the primary characteristics defining individual soil units, which in turn impacts permeability and suitability for septic system construction. Within the model only the soil series are used as model inputs.

A summary of the soil series including total area is provided in Table 5. Soils data is derived from the SSURGO (Soil Survey Geographic Soils) GIS layer made available by NJDEP, which were developed the Natural Resources Conservation Services (NRCS). The municipal boundary utilized in this dataset is marginally smaller than the Morris County bounds; the total difference between the datasets is 0.69 acres equivalent to an error of 0.006%.

Table 5: Mendham Township Soil Series

Soil Series	Soil Units	Hydric, Frequently Flooded, or Urban	Area (acres)
Annandale	AnoB	No	23.024
Bartley	BacC, BabB	No	439.160
Califon	CanB, CakBb, CakB, CapfB	No	1261.159
Cokesbury	CobA, CobBc, CobB, CoaBc	Yes	426.437
Fluvaquents and Udifluvents	FNAT	Yes	457.499
Gladstone	GkaoD, GkaoB, GkaoC	No	3141.688
Hibernia	HhmCa	No	5.162
Klinesville	KkrE	No	15.599
Parker	PaoC, PapD	No	1368.012
Parker-Gladstone	PauCc, PauDc	No	3296.156
Parker-Rock Outcrop	PawE	No	534.123
Pattenburg	PdtC	No	2.175
Penn	PeoB, PeoC	No	91.031
Penn-Klinesville	PgmD	No	5.776
Ridgebury	RkgBc, RkgBb	Yes	47.688
Turbotville	TurA, TurB	No	187.943
Udifluvents	UCFAT	No	1.300
Urban Land	UR	Yes	7.617
Urban Land-Gladstone	USGKAC	Yes	58.937
Washington	WadB	No	48.509
Water	WATER	Yes	107.794
		Total	**11526.789**

2.5 NITRATE DILUTION MODEL RESULTS

Using the model inputs discussed above the model was run for each soil series to calculate the minimum recharge area to meet the target nitrate concentrations using the specified per house population. Recharge areas were calculated for each of the three nitrate concentrations discussed above, although for planning purposes and potential modification of the zoning ordinance, the 2.0 mg/L nitrate criterion should be held as the governing criterion for groundwater antidegradation purposes.

As mentioned above, various soils return null values in the model because those soils or associated land cover/land use do not support septic system construction and function or sufficient groundwater recharge to provide sufficient onsite dilution of septic effluent to meet nitrate standards. In addition, two of the soil series, Parker-Gladstone and Penn-Klinesville were not recognized in the model. The parent soil series, Parker and Penn, were used respectively as the appropriate proxies.

The calculated minimum recharge areas are summarized by soil series and target concentration in Table 6 below. In addition, the model printouts for each model run of soil series and target nitrate concentration are provided in Appendix I.

Table 6: Minimum Recharge Area Summary

Soil Series	Area (acres)	Minimum Recharge Area for Target Nitrate Dilution (acres)		
		NO_3 10.0 mg/L	NO_3 6.0 mg/L	NO_3 2.0 mg/L
Annandale	23.024	1.0	1.6	4.5
Bartley	439.160	1.0	1.6	4.5
Califon	1261.159	1.0	1.6	4.5
Cokesbury	426.437		Hydric	
Fluvaquents and Udifluvents	457.499		Frequently Flooded	
Gladstone	3141.688	0.9	1.3	3.7
Hibernia	5.162	1.0	1.6	4.4
Klinesville	15.599	1.0	1.5	4.2
Parker	1368.012	0.8	1.3	3.7
Parker-Gladstone[1]	3296.156	0.8	1.3	3.7
Parker-Rock Outcrop	534.123	1.0	1.6	4.4
Pattenburg	2.175	0.9	1.3	3.7
Penn	91.031	1.0	1.6	4.5
Penn-Klinesville[2]	5.776	1.0	1.6	4.5
Ridgebury	47.688		Hydric	
Turbotville	187.943	1.0	1.6	4.5
Udifluvents	1.300	1.0	1.6	4.5
Urban Land	7.617		Urban	
Urban Land-Gladstone	58.937		Urban	
Washington	48.509	0.9	1.3	3.8
Water	107.794		Water	
Total	**11526.789**			

1 - Parker-Gladstone utilizes Parker series model

2 - Penn-Klinesville utilizes Penn series model

The model shows relatively narrow ranges of minimum recharge between the various soil series within each target nitrate concentration. With a nitrate dilution target of 2.0 mg/L, as per the Ground Water Quality Standards (N.J.A.C. 7:9C) the minimum recharge areas varied from 3.7 acres/household up to 4.5 acres/household. The difference between the calculated minimum recharge areas is much greater when viewed with respect to target nitrate concentration. For instance, the Parker soil series ranged from 0.8 acres/household at 10.0 mg/L nitrate to 3.7 acres/household at 2.0 mg/L.

2.6 ZONING AND SUSTAINABILITY

In order to provide greater context to the results of the model further analyses were conducted to address issues of sustainability within the framework of municipal zoning.

2.6.1 ZONING WEIGHTED AVERAGE

Trying to contextualize the minimum recharge areas on the basis of mapped soil series is daunting because of the geographical complexity of the soil map. Here the minimum recharge areas are presented as a weighted average per zone both to present the data in the fundamental unit for municipal-scale planning and to determine if there is a difference between the different zones. The weighted average for each zone was calculated by multiplying the minimum recharge for each soil series by the area of the respective soil series, summing the results, and dividing by the total area of the zone. This therefore accurately reflects the composition of soils within each zone.

This calculation excluded the hydric, frequently flooded, or urban lands soils and areas that are unsuitable for the use of septic systems. In some zones the difference was substantial. For example, within Zone R-1 over 93 acres of the zone consisted of soil series that do not support onsite septic systems which equates to nearly 17% of the total area of that zone. In actuality, there are many other limiting factors that would limit the suitability of a lot or site for the use of septic systems, so the model in this respect, represents low end estimates of minimum recharge areas and their distribution within the context of the zone and the broader landscape. Overall, the differences between zones is quite small, and there are two factors affecting this observation. First, the overall difference in recharge potential and therefore calculated minimum recharge area between the examined soil series is relatively small. Second, and perhaps most important, is that the zones reflect the variability of the soil map and all zones contain multiple soil types. A summary of weighted average minimum recharge areas is provided in Table 7.

Table 7: Weighted Average Minimum Recharge Areas by Zone

Zone	Tota Area (acres)	Modeled Area[1] (acres)	Weighted Average Minimum Recharge Area for Target Nitrate Dilution (acres)		
			NO_3 10.0 mg/L	NO_3 6.0 mg/L	NO_3 2.0 mg/L
B - Business Zone	1.587	1.369	0.903	1.310	3.727
CR-1 - Combination Residential District	461.217	404.936	0.886	1.346	3.814
CR-2 - Combination Residential District	133.556	130.636	0.929	1.388	3.935
G - Golf Club Zone	161.021	138.223	0.934	1.406	3.982
R - Single-Family Residential Zone (20,000 Sq. Ft.)	185.265	159.790	0.898	1.356	3.850
R-1 - Single-Family Residential Zone (1 Ac.)	561.221	467.700	0.905	1.366	3.871
R-2 - Single-Family Residential Zone (2 Ac.)	448.919	408.269	0.881	1.334	3.790
R-3 - Single-Family Residential Zone (3 Ac.)	2205.420	2060.539	0.872	1.377	3.897
R-5 - Single-Family Residential Zone (5 Ac.)	2822.808	2637.443	0.877	1.374	3.897
R-10 - Single-Family Residential Zone (10 Ac.)	4517.133	3985.689	0.878	1.379	3.904
R-C - Residential Cluster District Total	28.946	26.588	0.874	1.314	3.734
REB - Reuse of Existing Buildings (Overlay)[2]	18.313	18.313	0.871	1.397	3.925
Total	11527.094	10421.181			

1 - Modeled Area excludes hydric, frequently flooded, or urban soils

2 - Overlay area not included in area total

2.6.2 SUSTAINABLE HOUSING UNITS AND POPULATION

In order to address issues of sustainability, it is important to project the total number of households and population that can be sustained. This analysis consists of three calculations. The first is to project the total number of households that could be supported on the basis of minimum lot size per zone. This is calculated by dividing the total area of the zone by the minimum lot size to yield households, homes, or equivalent dwelling units (EDU). This represents a significant overestimate because it does not account for setbacks or any other factors limiting development in any zone. This was calculated for all zones with the exception of G – Golf Club Zone, as that only permits non-residential uses.

The second calculation is premised on the maximum supportable households on the basis of the calculated minimum recharge areas, using each of the three target nitrate concentrations. This is executed by dividing the area within each zone that supports septic system use, i.e. that excludes the hydric, frequently flooded, or urban land uses that return null values in the model, by the calculated minimum recharge areas. Again, this represents a high bound on the estimate as there is no consideration for development limitations. It should be noted that the population of Zones CR-1 – Combination Residential District and CR-2 Combination Residential District are largely served by existing sanitary sewer, however any additional development including individual subsurface systems would be governed by the minimum recharge areas.

Last, the minimum lot size analysis was compared to the analysis of 2.0 mg/L target nitrate concentration as the appropriate standard. The smaller of these two values is considered the ceiling of sustainable number of households in the township. In total, using both zoning ordinance and nitrate dilution, a maximum of approximately 1,961 houses may be supported in the township if individual septic systems are the sole means of household wastewater treatment. These analyses are summarized in Table 8.

Table 8: Sustainable Number of Households by Zone

Zone	Zoning Minimum Lot Size	Equivalent Dwelling Units In Each Zone Based On: Nitrate Dilution[1]			Minimum Lot Size
		NO_3 10.0 mg/L	NO_3 6.0 mg/L	NO_3 2.0 mg/L	and NO_3 2.0 mg/L
B - Business Zone	3.5	1.5	1.0	0.4	0.4
CR-1 - Combination Residential District[2]	502.3	457.1	300.9	106.2	106.2
CR-2 - Combination Residential District[2]	290.9	140.6	94.1	33.2	33.2
G - Golf Club Zone[3]	0.0	148.0	98.3	34.7	0.0
R - Single-Family Residential Zone (20,000 Sq. Ft.)	403.5	177.9	117.8	41.5	41.5
R-1 - Single-Family Residential Zone (1 Ac.)	561.2	516.7	342.4	120.8	120.8
R-2 - Single-Family Residential Zone (2 Ac.)	224.5	463.5	306.0	107.7	107.7
R-3 - Single-Family Residential Zone (3 Ac.)	735.1	2363.9	1496.9	528.7	528.7
R-5 - Single-Family Residential Zone (5 Ac.)	564.6	3008.0	1919.1	676.8	564.6
R-10 - Single-Family Residential Zone (10 Ac.)	451.7	4538.6	2890.1	1020.8	451.7
R-C - Residential Cluster District Total	63.0	30.4	20.2	7.1	7.1
REB - Reuse of Existing Buildings (Overlay)[4]	1.8	21.0	13.1	4.7	1.8
Total	3800.3	11846.2	7587.0	2678.0	1961.9

1 - Calculation excludes area of hydric, frequently flooded, or urban soils
2 - Zones CR-1 and CR-2 are largely serviced by sanitary sewer
3 - Zone G is non-residential zone
4 - Overlay area not included in total

Last, these analyses were repeated on the basis of population. Households were transformed to populations by multiplying the number of households by the per house population estimate. With the same limitations and assumptions stated above, Mendham Township can meet the target nitration concentration of 2.0 mg/L with a population of approximately 5,894 or fewer. This estimate is only 17 people above the most recent population estimate, suggesting that the township is near its sustainable capacity. The data is summarized in Table 9.

Table 9: Sustainable Population by Zone

Zone	Zoning Minimum Lot Size	Population In Each Zone Based On: Nitrate Dilution[1]			Minimum Lot Size
		NO_3 10.0 mg/L	NO_3 6.0 mg/L	NO_3 2.0 mg/L	and NO_3 2.0 mg/L
B - Business Zone	10.4	4.6	3.1	1.1	1.1
CR-1 - Combination Residential District[2]	1508.8	1373.0	904.0	318.9	318.9
CR-2 - Combination Residential District[2]	873.8	422.2	282.7	99.7	99.7
G - Golf Club Zone[3]	0.0	444.5	295.4	104.3	0.0
R - Single-Family Residential Zone (20,000 Sq. Ft.)	1212.1	534.5	353.9	124.7	124.7
R-1 - Single-Family Residential Zone (1 Ac.)	1685.9	1552.1	1028.7	363.0	363.0
R-2 - Single-Family Residential Zone (2 Ac.)	674.3	1392.2	919.3	323.6	323.6
R-3 - Single-Family Residential Zone (3 Ac.)	2208.4	7101.3	4496.7	1588.3	1588.3
R-5 - Single-Family Residential Zone (5 Ac.)	1695.9	9036.1	5764.8	2033.2	1695.9
R-10 - Single-Family Residential Zone (10 Ac.)	1356.9	13634.0	8681.9	3066.5	1356.9
R-C - Residential Cluster District Total	189.4	91.4	60.8	21.4	21.4
REB - Reuse of Existing Buildings (Overlay)[4]	5.5	63.2	39.4	14.0	5.5
Total	11416.0	35585.9	22791.4	8044.7	5893.6

1 - Calculation excludes area of hydric, frequently flooded, or urban soils
2 - Zones CR-1 and CR-2 are largely serviced by sanitary sewer
3 - Zone G is non-residential zone
4 - Overlay area not included in total

3.0 CURRENT PLANNING CAPACITY MODEL

This section of the report was developed as an evaluation of the available groundwater resources in the Township, an important element of municipal planning. The following elements are discussed in this section:

- Site Setting provides a geologic and hydrogeologic overview and analysis of the major aquifer units.
- Groundwater Use estimates for wells identified within the township, comprised of domestic wells, irrigation/farm wells, and Public Non-Community Water System (PNCWS) wells for various uses are developed.
- Groundwater Recharge Estimates are derived by three different approaches for periods of both normal and drought precipitation and compared for the predominant aquifer unit in the township.
- A comparison of the estimated annual groundwater usage with the annual groundwater recharge estimates for normal and drought periods, and on the basis of these analyses, conservative values for surplus groundwater availability are presented.
- The Current Planning Capacity Model estimates discussing lot sizes relative to groundwater use demand and supported population.

3.1 SITE SETTING

Mendham Township ("the township") is located in southern Morris County (Figure 1) and has a total area of approximately 18 square miles (sq. mi.). Mendham Borough is carved out of its southern-central part along the border with Somerset County. The township is situated within and near the southeastern boundary of the Highlands physiographic province (Figure 2). An extension of the Piedmont physiographic province to the south extends into the western part of the township.

3.1.1 TOPOGRAPHY AND DRAINAGE

The Township is characterized by hilly, stream-dissected uplands, with steep slopes of up to 50% in grade (Figure 1). Land elevations range from approximately 300 to 1,200 feet above mean sea level (ft., amsl).

Mendham Township comprises part of two Watershed Management Areas (WMA): the "North and South Raritan River" WMA on the west, and the "Upper Passaic, Whippany, and Rockaway" WMA on the east (Figure 3). The township comprises parts of three HUC-11 watersheds in these WMAs: (1) "Raritan River NB (above Lamington)" watershed in the "North and South Raritan River" WMA; and (2) "Whippany River" and (3) "Passaic River Upr (above Pine Brook br.)" watersheds within the "Upper Passaic, Whippany, and Rockaway" WMA. There is a total of ten HUC-14 sub-watersheds within the three HUC-11 watersheds.

3.1.2 SURFICIAL AND BEDROCK GEOLOGY

SURFICIAL GEOLOGY

The surficial geology underlying the township is predominantly weathered gneiss bedrock (Qwg); and gneiss colluvium (Qcg) consisting of loose soil and rock fragments at the base of hillsides (Figure 4). There is a small area of weathered sedimentary bedrock (Qws) in the southwest part of the township. Alluvium (Qal), alluvial fan (Qaf), and colluvium (Qcal) deposits are present along the river channels and valley floors. Hydric soils, wetlands, ponds and streams are located in the valley floors.

BEDROCK GEOLOGY

Most of the township area is underlain by Precambrian Age metamorphic rocks (gneiss, amphibolite, diorite, and marble) (Figure 5). The Precambrian Age bedrock is hard and resistant to erosion forming steep-sided slopes. The area has undergone a series of orogenic events as evidenced by the complex bedrock faulting.

A narrow southwest-to-northeast oriented series of younger early Paleozoic Age meta-sedimentary rock units are located in a highly faulted and folded area on the western side of the township. These bedrock formations from oldest to youngest include the Hardyston Quartzite; Leithsville formation (limestone); Allentown Dolomite; and Upper and Lower Beekmantown Group (dolomite and limestone). A sheet of these rock formations has been thrust to the northwest over the Jutland Klippe Sequence Unit B. The Jutland Klippe Sequence consists of a wide variety of interbedded rock types including shale, siltstone, and sandstone, quartzite, dolomite, and limestone (Figure 5).

The strike of the faulting and rock formations is from the southwest to the north-northeast. The Peapack-Ralston Fault is the prominent thrust fault in this area. An extension of this fault zone continues as the normal Rockaway Valley Fault to the northeast. Two normal faults in the northern part of the township intersect these major named faults, and trend west-southwest to east-northeast.

3.1.3 HYDROGEOLOGY

The New Jersey Geological Survey (NJGS) has categorized and mapped bedrock hydrogeologic units (aquifers) by grouping rock formations with similar properties of permeability. The three bedrock aquifers that are mapped within the township are listed in Table 10 and shown on Figure 6.

The vast majority (92.4%) of the township is underlain by the Precambrian igneous and metamorphic rock (imr) aquifer. A small area in the southwest part of the township (2.2%) is underlain by the Jutland Sequence (mfjs) sedimentary rock aquifer. These are both relatively low permeability aquifer systems. The area of the southwest-

to-northeast trending thrust fault in the southwest part of the township (5.4%) is underlain by relatively productive limestone, dolostone, and quartzite rock aquifer units (jkh).

Table 10: Bedrock Aquifer Units in Mendham Township

Symbol	Geologic Formations	Percent Area of the Township	Area (sq. miles)
imr	Pre-Cambrian igneous and metamorphic aquifer	92.4%	16.60
jkh	Carbonate bedrock aquifer units, part of the Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quartzite aquifer system	5.4%	1.00
mfjs	Interbedded sedimentary layers of the Martinsburg Formation and Jutland Sequence aquifer system	2.2%	0.40

Source: NJGS DGS98-5, Aquifers of New Jersey (1999)

3.2 GROUNDWATER USE

The water supply for residential use comes from individual domestic wells within the township, and from three public community water systems (PCWS) with sources located outside of the township, except for Southeast Morris County MUA's Clyde Potts Reservoir. There are no PCWS system wells located within the township. Three PCWS wells are located in proximity to the township in Mendham Borough. The locations of these NJ American Chester/Mendham PCWS wells are shown on Figure 7.

The three PCWS's serving water to the Township include NJ American Water, Southeast Morris County MUA, and Randolph Township MUA. As shown on Table 11, a total of approximately 2,440 people in the township are served by these systems.

Table 11: Public Community Water Supply Systems (PCWS) Serving Mendham Township, Located Outside of the Township

PWSID	Public Community Water System (PCWS)	Number of People Served
712001	NJ American Water	1840[(a)]
1424001	Southeast Morris County MUA	300[(b)]
1432003	Randolph Township MUA	300[(c)]

Sources:

a) NJDEP Data Miner

b)Environmental Resource Inventory, Mendham Township, 2013

c) Personal Communication with Randolph Township MUA, Jan. 2020

The most recent US Census (2017) reports the population of the township at 5,877 with a total of 1,956 housing units. Therefore, the remainder of the population (~3,437 persons) are being supplied by private domestic wells. Water supply wells tapping the aquifers within Mendham Township supply residential, lawn/garden irrigation, and commercial/recreational uses. The areas in the Township supplied by the three PCWS are outlined on Figure 8.

3.2.1 DOMESTIC AND LAWN/GARDEN IRRIGATION WATER SUPPLY WELLS

Water supply wells with permit/completion records with the NJDEP in the township were identified using the NJDEP XY 1-mile radius search function, with overlapping searches to cover the area of the township. A total of 644 wells were identified, of which 611 were permitted as domestic (residential) wells and 33 as irrigation wells (Appendix II). The reported range of well depths and pumping capacities (aka the well yields at the time of installation/testing) in the database are summarized in Table 12. A breakdown of these wells by hydrogeologic unit is shown in Table 13.

Table 12: Domestic and Irrigation/Farm Wells in Mendham Township

Water Use	No. of Wells	Depth Range (ft., bgs)	Average Depth (ft., bgs)	No. of Wells Reporting Capacity**	Capacity Range (gpm)	Average Capacity (gpm)
Domestic	611	30 – 1,100	346.0	151	2 – 65	10.0
Irrigation / Farm	33	72 – 1,000	513.0	11	3 – 48	33.6

***Note reported capacity is well yield at time of installation/testing and not water use.*

Table 13: Domestic and Irrigation/Farm Wells in Mendham Township Organized by Aquifer Unit

Aquifer Unit	No. of Wells	Depth Range (ft., bgs)	Average Depth (ft., bgs)	No. of Wells Reporting Capacity**	Capacity Range (gpm)	Average Capacity (gpm)
Domestic Wells (611 Total)						
Igneous and Metamorphic Rock Aquifer	535	30 – 1,100	343.0	114	2 – 33	10.0
Carbonate Rock Aquifer	60	50 – 1,020	361.0	10	5 – 25	11.0
Sedimentary Aquifer	16	105 – 1,000	501.0	3	5 – 25	13.0
Irrigation / Farm						
Igneous and Metamorphic Rock Aquifer	25	72 – 1,000	583.0	1	7	NA
Carbonate Rock Aquifer	7	140 – 800	598.0	1	48	NA
Sedimentary Rock Aquifer	1	645	NA	1	NA	NA

As described above, a population of approximately 3,437 persons is being served by domestic wells within the township. A total of 611 domestic wells were listed in the NJ databases. Based on average numbers of persons per household, it is concluded that many older domestic wells are in use which pre-date this database. The Connolly report (1994) noted that there were 1,108 household using private wells in their report.

The New Jersey Geologic Survey (NJGS) develops groundwater use data bases for domestic well withdrawals for various townships (personnel communication with Steven Domber of the NJGS on March 6, 2020). Figure 9 is an NJGS plot of domestic well withdrawals in the Township for the period 1990 to 2015. The annual fluctuation in groundwater withdrawals reflects seasonal use with a higher use during the summer months. On average, the groundwater withdrawal for domestic use from private wells is approximately 8,250,000 gallons per month or

275,000 gallons per day (gpd). (The NJGS has used 80 gallons per day per person as a threshold for individual domestic water use, so this equates to a population of ~ 3,400 persons, which is consistent with the population estimate based on the number of people being served by PCWS's and total population census data).

The Safe Drinking Water Act Rules, N.J.A.C. 7:10: Subchapter 12: Standards for Construction of Public Non-Community Water Systems and Non Public Water Systems, Section 12.6 sets forth Water Volume Requirements. Section 12.6 Table 1.1: Average Daily Water Demand specifies water unit water usage values for a variety of uses. This table specifies a daily demand of 100 gallons per person for single-family residences. Using this more conservative (maximum water demand) unit value and an estimated population of 3,400 being served, yields a total groundwater usage estimate by domestic wells of **340,000 gallons per day** (gpd).

The 33 irrigation wells are mainly used for lawn and garden watering, and supplemental uses for large residences. An estimated use of 1,000 gpd per well yields a total groundwater usage estimate for the domestic wells of **33,000 gpd**.

3.2.2 PUBLIC NON-COMMUNITY WATER SYSTEM (PNCWS) WELLS

Five wells serving Public Non-Community Water Systems (PNCWS) were found in the NJDEP databases for the township and an additional well for Lewis Morris Park was also identified in the NJDEP wellhead protection area database. Their locations are shown on Figure 7.

The PNCWS's include a golf club, a golf and tennis club (with two wells/systems), a camp, a public park, and a restaurant. As described above, N.J.A.C. 7:10-12.6 Table 1.1: Average Daily Water Demand, specifies unit water usage values for a variety of uses. This table specifies a unit daily demand per person of 25 gpd/person for a clubhouse; 40 gpd/person for a cottage-type camp; 15 gpd/person for a picnic grounds/comfort station with toilets and showers; and 10 gpd/person for a restaurant.

The NJDEP database (Data Miner) provides the maximum occupancy per day for each specific PNCWS system (Table 14). These maximum occupancy numbers and the unit demand per person were used in the calculation of conservative daily water use estimates for each water system, which range from 3,000 to 18,040 gpd.

GOLF CLUBS

Both golf clubs have water allocation permits (Roxiticus - WAP070001 and Mendham - WAP 110001). The annual reported pumpage amounts to the NJDEP for Roxiticus for 2018 and 2019 are for domestic use at 2.391 million gallons per year (MGY) and 1.871 MGY. On a daily use basis these equates to 5,840 gallons per day (gpd) which is slightly higher than the estimated average value reported on Table 14 below for the club. The NJDEP report for the Roxiticus irrigation well shows no usage in these 2 years; this is significant considering the dry conditions of the latter half of the 2019 growing season when irrigation demands would typically be high.

For the Mendham Golf & Tennis Club, the annualized domestic use reported to the NJDEP for 2018 and 2019 equates to 0.622 and 0.767 MGY which on a daily basis equates to 1,902 gpd which is much lower than the values reported in Table 14 for maximum use. The Mendham club also reports an irrigation well with use that averages out to 15,660 gpd for the 2018 and 2019 seasons and this has been added into Table 14 for PNCWS use.

Table 14: Public Non-Community Water System (PNCWS) Wells Water Use Calculation

Public Non-Community Water System (PNCWS) Well	Maximum Occupancy (persons)	Water Use (gpd/person)	Total Use (gpd)
Roxiticus Golf Club	162	25	4,050
Mendham Golf & Tennis Club	500	25	12,500
Mendham Golf & Tennis Club	162	25	4,050
Mendham Golf Course Irrigation	NA	NA	15,660
Sammy's Cider Mill Restaurant	245	10	2,450
Camp Jockey Hollow	451	40	18,040
Lewis Morris Park	200	15	3,000
		Total Estimated Use	**59,800**

3.2.3 CONTAMINATED SITES

A search of the Known Contaminated Site List (KCSL) database, yielded one site, PI Number G000011563, identified as "3 to 9 Dogwood Drive & 27-40 Tingley Road Groundwater Contamination" mapped in the northeastern portion of the Township (Figure 10). The figure also shows proximate contaminated sites in Mendham Borough. Apparent heating oil release sites (which normally can be remediated quickly and don't impact significant areas of groundwater) have not been included. There are no CEA's listed within Mendham Township. The Dogwood Drive/Tingley site has been active since 1993/4; reportedly involved PCE / TCE and is classified as a Publicly Funded Response site with "unknown sources". The area/site has been supplied with public water as per communication with the NJDEP (via email from Cristine Caballero on March 5. 2020).

3.3 GROUNDWATER RECHARGE

Three different technical approaches were utilized to estimate annual rates of recharge for the aquifers in Mendham Township:

- Land Oriented Reference Data System (LORDS) Method,
- NJGS GSR-32 Groundwater Recharge Method, and
- Stream Baseflow Analysis Methods - Posten and 7Q10.

3.3.1 LAND ORIENTED REFERENCE DATA SYSTEM (LORDS)

The LORDS method was developed by the NJGS in 1974 (NJGS Bulletin No. 74, "Land Oriented Reference Data System"), wherein groundwater recharge rates were developed for different rock (aquifer) types for years of normal and dry precipitation.

For the predominant (92.4 %) underlying bedrock aquifer unit in the township, the Precambrian igneous and metamorphic rocks, a normal-year recharge rate of 200,000 gallons per day per square mile (gpd/sq. mi.) or 0.20 million gallons per day per square mile (MGD)/sq. mi.), and a drought-year recharge rate of 120,000 gpd/sq. mi. or 0.12 MGD/sq. mi. were obtained from the NJGS publication (Atlas Sheet # 25; pages 38 to 45). Applying these rates to the total area within the township, this aquifer unit is estimated to receive **3.13 MGD in a normal year** and **1.88 MGD under conditions of drought**, as shown in Table 15.

Table 15: Groundwater Recharge Estimates by the LORDS Method

Aquifer Unit	Area	Annual Groundwater Recharge Rate (MGD/sq. mi)		Total Annual Groundwater Recharge Estimate (MGD)	
	(sq. mil)	Normal Year	Dry Year	Normal Year	Drought Year
Igneous & Metamorphic Bedrock (imr)	15.65	0.20	0.12	3.13	1.88

** Area of hydric soils, wetlands, and water bodies are excluded from the total bedrock aquifer area

Recharge rates for the two other aquifer units in the township, the carbonate rocks and sedimentary rocks aquifers, are not provided in the LORDS Method document for the Mendham Township Area.

3.3.2 NEW JERSEY GEOLOGICAL SURVEY REPORT GSR-32 METHOD

The GSR-32 Method for estimating recharge was developed by the NJGS in 1993 (NJ Geological Survey Report 32, "A Method for Evaluating Ground-Water Recharge Areas in New Jersey" by E. Charles et. al., and subsequent improvements) considers: (a) meteorological conditions, (b) soil types, (c) soil moisture water budgets, and (d) land use characteristics. The NJGS entered each of these layers used to calculate groundwater recharge into the Spatial Geographical Information System (GIS). The results are GIS polygons that are assigned groundwater recharge values in units of inches/year for average (normal) and drought groundwater conditions.

To quantify the groundwater recharge rates for Mendham Township, the groundwater recharge layers were clipped to the township boundary and then to the boundaries of the three bedrock aquifer units. The average (normal) and drought groundwater recharge rates in inches/year were then multiplied by the area of each associated polygon to calculate a recharge sub-estimate for each polygon, and then added to obtain a groundwater recharge estimate for the total area of each of the three aquifers units. The resultant recharge volumes for the three aquifer units are presented in Table 16 and Figures 11a and 11b.

Table 16: Groundwater Recharge Estimates by the NJGS GSR-32 Method

Aquifer Unit	Area	Annual Groundwater Recharge Rate (MGD/sq. mi)		Total Annual Groundwater Recharge Estimate (MGD)	
	(sq. mil)	Normal Year	Drought Year	Normal Year	Drought Year
Precambrian Igneous & Metamoprhic Bedrock	15.65	0.88	0.55	13.77	8.61
Carbonate Bedrock	1.40	0.77	0.49	1.08	0.69
Sedimentary Rock	1.17	0.86	0.54	1.00	0.63
			Total	**15.85**	**9.93**

** Area of hydric soils, wetlands, and water bodies are excluded from the total bedrock aquifer area

3.3.3 BASEFLOW ANALYSIS METHODS (POSTEN AND 7Q10)

Stream baseflow hydrograph analysis allows for a measure of groundwater recharge during periods of both normal and drought precipitation. Two United States Geological Survey (USGS) stream gauging stations proximate to the township drain areas underlain by Precambrian igneous and metamorphic rocks. These stations are: (1) the "Spruce Run at Glen Gardner NJ" station (drainage area = 11.3 sq. mi.), and (2) the "Upper Cold Brook Near Pottersville NJ" station (drainage area = 2.1 sq. mi.) (Figure 12).

The M² Associates (2005) report for Greenwich Township in Warren County provides groundwater recharge calculations for years of normal conditions by the Posten Method, and for drought conditions by the 7Q10 Method, for the same Precambrian igneous and metamorphic hydrogeologic unit that underlie Mendham Township. M² Associates utilized data from two United States Geological Survey (USGS) streamflow gauging stations located in the Highlands Province, as referenced above.

The Posten Method (1984) was used to evaluate streamflow data for the water years (a) 1973 through 1996 for Upper Cold Brook near Pottersville, and (b) 1979 through 1988 and 1993 through 2000 for Spruce Run at Glen Gardner. The groundwater recharge rate determined for Upper Cold Brook is 4.4 inches per year, and for Spruce Run at Glen Gardner, 3.6 inches per year over these periods of record. The median recharge rate to the Precambrian igneous and metamorphic rock aquifer units utilizing the yearly data from both stations was 4.0 inches per year (Table 17). The equivalent rate of groundwater recharge is 190,000 gpd/sq. mi. or 0.190 MGD/sq. mi. for years of normal precipitation conditions.

The "7Q10" represents the lowest stream flow for seven consecutive days that would be expected to occur once in ten years. The 7Q10 has also been referred to as "MA7CD10" by the NJDEP. The underlying assumption is that after this duration of low streamflow, there has been enough time for other sources of water such as stream bank flow to have drained, and the flow observed in the stream is solely baseflow, or groundwater discharge to the stream.

The USGS recorded 7Q10 flow at the 11.3 sq. mi. Spruce Run at Glen Gardner gauging station drainage basin is 1.71 cubic feet per second (cfs), and at the 2.1 sq. mi. Upper Cold Brook near Pottersville basin, 0.20 cfs. These flows translate to 1.3 and 2.1 inches per year in the Upper Cold Brook and Spruce Run drainage basins, respectively, and a median rate of 1.7 inches per year (Table 18). The equivalent rates of groundwater recharge are 80,000 gpd/sq. mi. or 0.080 MGD/sq. mi. as the recharge rate for extreme drought conditions.

Applied to the Precambrian Igneous and Metamorphic hydrogeologic Aquifer unit in Mendham Township, the annual groundwater recharge estimate to this bedrock aquifer is **3.28 MGD under normal conditions** and **1.25 MGD under extreme drought conditions** (Table 19).

Table 17: Normal Period Groundwater Recharge Rate by the Posten Method

USGS Stream Gauging Station	Period of Record	Recharge Rate		Average Recharge Rate
		(in/yr)	(MGD/sq. mi.)	(MGD/sq. mi.)
Spruce Run at Glen Gardner, NJ	1979-1988 1993-2000	4.400	0.210	0.190
Upper Cold Brook near Pottersville, NJ	1973-1996	3.600	0.170	

Table 18: Drought Period Recharge Rate by the 7Q10 Method

USGS Stream Gauging Station	Watershed Area	Baseflow	Recharge Rate		Average Recharge Rate
	(sq. mi.)	(cfs)	(inches/yr)	(MGD/sq. mi.)	(MGD/sq. mi.)
Spruce Run at Glen Gardner, NJ	11.30	1.71	1.30	0.062	0.080
Upper Cold Brook near Pottersville, NJ	2.10	0.20	2.10	0.100	

Table 19: Groundwater Recharge Estimates by the Posten and 7Q10 Baseflow Analysis Methods

Bedrock Aquifer	Area	Groundwater Recharge Rate		Total Annual Groundwater Recharge	
		Normal Year Posten	Drought Year 7Q10	Normal Year Posten	Drought Year 7Q10
	(MGD/sq. mi.)	(MGD/sq. mi.)	(MGD/sq. mi.)	(MGD)	(MGD)
Pre-Cambrian Igneous & Metamorphic Bedrock	15.65	0.190	0.080	3.280	1.250

The total annual groundwater recharge estimates derived from the three different technical approaches for the predominant Precambrian igneous and metamorphic bedrock aquifer unit that underlies 92.4% of the township are summarized in Table 20. The normal year estimates derived by the LORDS and the Posten (baseflow) methods (3.13 and 3.28 MGD, respectively) are in relatively close agreement. With respect to the drought period analysis, the dry/drought year recharge estimates derived by the LORDS and 7Q10 (baseflow) methods are 1.88 and 1.25 MGD, respectively. The 7Q10 method estimate is 30% lower and represents a condition of extreme drought.

The NJGS GSR-32 Method calculates a significantly higher total annual groundwater recharge rate for both normal times and periods of drought. The reason for this difference is because the GSR-32 method determines and includes groundwater recharge to the unsaturated soil zone as well as groundwater recharge to the aquifer (zone of saturation).

Table 20: Comparison of Groundwater Recharge Estimates by Three Methods for the Predominant Aquifer Unit**

Recharge Analysis Method	Normal Reacharge (MGD)	Year of Drought Recharge (MGD)
NJGS LORDS	3.13	1.88
Posten and 7Q10	3.28	1.25
NJGS GSR-32	13.77	8.61

**Pre-Cambrian Igneous and Metamorphic Bedrock Aquifer Unit (92.4% of Township)

3.4 GROUNDWATER AVAILABILITY

The main users of the groundwater resource in Mendham Township are private residential (domestic) wells which provide water supply to approximately 3,440 people and represent a total withdrawal estimate in the range of 344,00 gallons per day (gpd). This calculated average rate of withdrawal has also been validated by the NJGS water use analysis for the township provided in Figure 9.

The public non-community water system (PNCWS) supply wells located in the township, including golf course irrigation, have a maximum daily usage rate of about 59,800 gpd (Table 14); and irrigation usage from dedicated private wells (considered as lawn, garden, and irrigation watering) has been estimated at about 33,000 gpd.

The domestic wells water use translates to an annual use of 0.344 MGD; the irrigation/farm wells to 0.033 MGD; and the PNCWS supply wells to 0.0598 MGD. These add up to a total annual groundwater demand of 0.437 MGD.

Based on analysis by the LORDS and baseflow (Posten and 7Q10) methods of estimating groundwater recharge, average annual groundwater recharge to the predominant Precambrian igneous and metamorphic bedrock aquifer system underlying the township is in the range of 3.2 MGD during normal periods of precipitation and

recharge; this may be diminished to about 1.88 MGD during dry/drought periods; and in the range of 1.25 MGD during extreme periods of drought.

Table 21 provides a comparison of groundwater usage and recharge in both normal years and during periods of drought. In all cases, the groundwater recharge estimate exceeds groundwater use by a factor of 2 to 3. The amount of groundwater recharge during a normal year is about 2.69 MGD above (greater than) groundwater use; and during a drought year, 1.44 MGD above groundwater use. These values indicate a reasonable buffer between actual groundwater use (about 0.437 MGD) and the availability of groundwater (recharge) during both normal times and periods of drought.

Table 21: Groundwater Recharge, Use, and Availability in Predominant Aquifer Unit

Recharge Analysis Method	Recharge		Mendham Township Water Use	Groundwater Availability Buffer	
	Normal Recharge (MGD)	Drought Recharge (MGD)	(MGD)	Normal (MGD)	Drought (MGD)
NJGS LORDS	3.13	1.88	0.437	2.690	1.440
Posten and 7Q10	3.28	1.25	0.437	2.840	0.813

**Pre-Cambrian Igneous and Metamorphic Bedrock Aquifer Unit (92.4% of Township)

3.5 CURRENT PLANNING CAPACITY MODEL

Building on the analyses above, projections for sustainable population estimates and derived factors like minimum lot size and housing units were calculated. Currently, an estimated 3,437 township residents rely on private wells to supply their varying water use demands, including potable water and water used for non-commercial irrigation. In addition, there is a non-resident population, those supplied by Public Non-Community Systems wells, of approximately 1,720 that includes non-permanent residents and temporary guests or consumers including day-use park visits, camping, and diners among others. While this population is half that of the permanent residents, their water use is approximately 10% of the permanent resident population reflecting the differences in water usage. In addition, as reported above, there are also other consumptive uses including golf course irrigation. Using the per capita housing occupancy rate, it was calculated that there are approximately 1,144 houses or Equivalent Dwelling Units (EDU). Holding this as the base unit of groundwater use in the township, the sum of daily use for the township (0.437 MGD, including the resident, non-resident, and irrigation uses) was divided by total EDU utilizing township groundwater sources to yield per EDU daily groundwater use, which is 381.9 GPD.

As indicated in Table 21 above, recharge potential for Mendham Township based on the NJGS LORDS and the Posten and 7Q10 methodologies show significant available groundwater buffer, that is groundwater recharge rates far exceed modeled groundwater use, even under drought and severe drought scenarios. This is provided in Table 22 below.

Table 22: Ratio of Recharge to Current Groundwater Use

Recharge Analysis Method	Recharge		Mendham Township Groundwater Use	Ratio of Recharge to Current Groundwater Use	
	Normal Recharge (MGD)	Drought Recharge (MGD)	(MGD)	Normal	Drought
NJGS LORDS	3.13	1.88	0.437	7.16	4.30
Posten and 7Q10	3.28	1.25	0.437	7.51	2.86

Recognizing this difference in recharge capacity and usage, or groundwater availability buffer, projections regarding future maximum populations and EDU or households for residents relying on groundwater were calculated. This included resident and non-resident populations and other water uses, assuming they would grow on a similar pace. The projections were calculated under both normal and drought scenarios. Additionally, corresponding minimum lot sizes were calculated based on the projected per household groundwater demand rate and the recharge values specified by each of the analytical methods and the various climate scenarios. This information is provided in Table 23 below.

Table 23: Current Planning Capacity

Recharge Analysis Method	Maximum Allowable Users Normal Recharge				Maximum Allowable Users Drought Recharge			
	Resident Pop.	Non-Resident Pop.	EDU	Minimum Lot Size (acres)	Resident Pop.	Non-Resident Pop.	EDU	Minimum Lot Size (acres)
NJGS LORDS	24,617	12,319	8,195	1.22	14,786	7,400	4,922	2.04
Posten and 7Q10	25,797	12,910	8,588	1.29	9,831	4,920	3,273	3.06

Overall, the township has relatively abundant groundwater resources, and even under severe drought scenarios, Mendham Township could sustain, at a minimum, a nearly threefold increase in groundwater use, equivalent to 9,831 residents and 3,273 EDUs. Minimum recharge area or minimum lots sizes for each of the hydrologic/climate condition scenarios varied from 1.2 to 1.3 acres per EDU under normal recharge regimes up to 2.0 to 3.1 acres per EDU as based on current use rates and modeled drought to severe drought recharge scenarios.

It should be stressed that these carrying capacity projections are based solely on the availability of groundwater in aquifers through infiltration and recharge and the subsequent take and use of that water. The models make no allowance for other important functions of groundwater; namely baseflow in stream systems. So while the planning capacity projections can ensure sustainable groundwater sources, these projections cannot be said to be ecologically sustainable per se. Similarly, there is no consideration given to how imperviousness, infiltration, and recharge would be altered under such aggressive growth scenarios, although there is no doubt that it would be reduced, while runoff and its associated problems would increase.

4.0 SUMMARY

This report examined two important factors governing current and potential development patterns, as well as municipal planning efforts for Mendham Township. Both are inter-related and tied to groundwater recharge characteristics of the township, in turn related to geology, topology, soils, hydrography, and climate among other factors.

The first section of this report was to develop the Nitrate Dilution Model for the township. Relative to the previous effort, the nitrate dilution modeling process has changed in fundamental ways, both a consequence of improved methodology and science, but also a reflection of changing water quality and environmental standards. The ultimate goal of this effort is to identify minimum recharge areas to mitigate subsurface wastewater disposal of nitrogenous wastes, which can ultimately be used to develop projections for carrying capacity and sustainable growth. In 1994 when the previous study was completed, the goal of nitrate dilution modeling was based on the protection of human health and observance of a groundwater standard of 10 mg/L. In the intervening years, nitrate dilution has shifted focus from the protection of human health to include environmental protections and an anti-degradation-based approach, with a corresponding shift in the nitrate standard to 2 mg/L, just 20% of the previous standard. While this represents a tougher standard, the dilution portion of the model has also changed considerably. While recharge areas were based on recharge of deeper units or the saturated aquifer previously, the GSR-32 model also incorporates recharge of shallow, unsaturated zones, essentially the overlying

soils, and thus recharge is much higher. Because these two components of the model are working in opposite directions, a stricter (read lower) standard and increased recharge as a function of a shift in models, these changes are somewhat neutralized.

Minimum recharge areas were calculated for all soil units within Mendham Township, and subsequently calculated for each of the township planning zones. Across the township's zones, the minimum recharge areas ranged from a minimum of 3.72 acres to 3.98 acres per household or equivalent dwelling unit. Using the assumed per household residency rate yielded a maximum population of 8,045. If this data however was incorporated with existing prescribed minimum lot sizes per planning zone, the total maximum population is 5,894, roughly 17 people above the current estimated population. As such, under current zoning regulation, the township is currently at its maximum capacity. Given the absence of such regulation, the township could sustain a population increase of roughly 37% while maintaining the groundwater nitrate standard.

The second component of the study was to complete a Current Planning Capacity Model. This consisted of evaluating the groundwater resource characteristics of the township, with an obvious focus on the hydrogeology of the township, as well as current use practices. Here, as with the nitrate dilution modeling effort, the object of the study was to determine the carrying capacity of the township as based on the availability of groundwater, which included projections of population and again minimum recharge areas sufficient to maintain use demands. This effort was comprised of several elements including exploring site/township characteristics, accounting of current groundwater use including private wells, public non-community water systems, and golf course irrigation, modeling recharge based on three separate models under normal and drought scenarios, calculating available groundwater or the difference between recharge and use, and finally calculating the current planning capacity.

Mendham Township has abundant groundwater relative to current use demands, and therefore could support a significant increase in population and equivalent dwelling units relying on groundwater. It should be noted a minority of township residents utilize public water supplies originating outside the township. As alluded to above, projections were made for both normal years as well as drought years; it is recommended that drought years, a significant limiter on water availability, be used to guide planning. From an existing resident population of approximately 3,440 people using groundwater, the available groundwater supply as based on recharge rates and a static per capita use rate, could support a population nearly eight-fold greater, ranging from roughly 24,600 to 25,800 as well as nearly 13,000 non-resident users (campers, tourists, diners, etc.) and 8,200 to 8,600 housing units under normal conditions. Under drought conditions, these estimates are significantly lower, with a projected maximum resident population of 9,800 to 14,800 (again excluding those township residents utilizing public water supplies) or 3,270 to 4,920 houses. Even under severe drought conditions, available groundwater could support nearly a three-fold increase in groundwater use and residency. Minimum recharge areas to support an equivalent dwelling unit or household is just 1.2 to 1.3 acre, while the number increases to a range of 2.0 to 3.1 acres under drought to severe drought conditions.

In comparing the two elements of this report, the nitrate dilution model and the groundwater current planning capacity model, it is clear based on comparison of the results that nitrate dilution is the significant limiting factor of these two elements. On the basis of minimum recharge area, a metric common to both, the minimum area to successfully dilute nitrate to meet the groundwater standard is 3.72 acres per household, while regarding groundwater use it is just 1.2 acres per EDU under normal recharge conditions and up to 3.1 acres per EDU under severe drought (a more conservative, but recommended governing standard). Essentially, these findings show that a greater area is necessary to meet nitrate dilution goals than is required to provide sufficient potable water. When viewed in respect of minimum recharge area and zoning-related minimum lot size area, on the basis of nitrate modeling the township is essentially already is at capacity and cannot support future growth based on onsite wastewater disposal. On the other hand, significant groundwater could support, even at a conservative estimate, a nearly three-fold increase in population relying on groundwater, but without the ability to meet nitrate dilution, this potential growth is rendered moot.

5.0 REFERENCES

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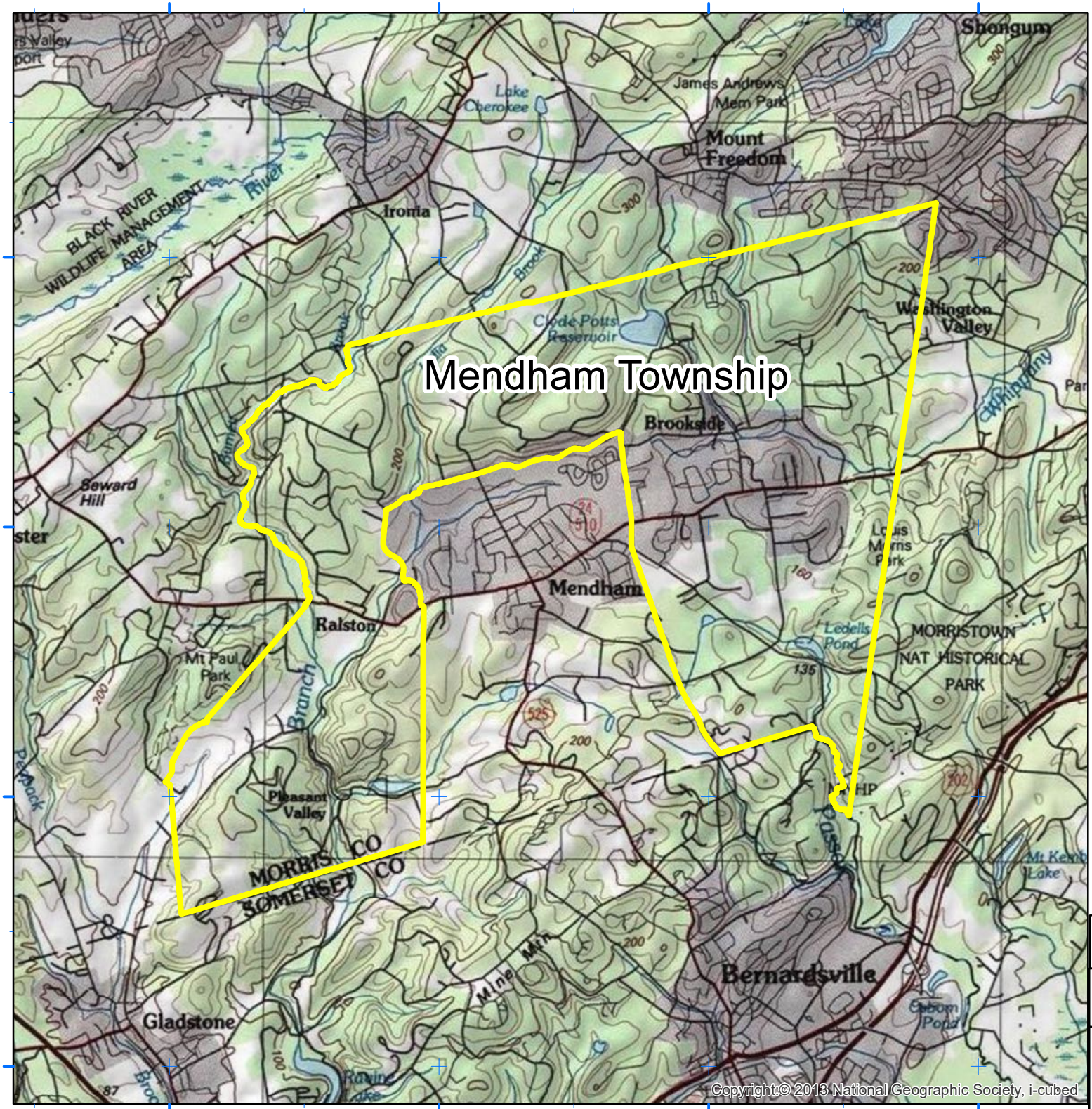
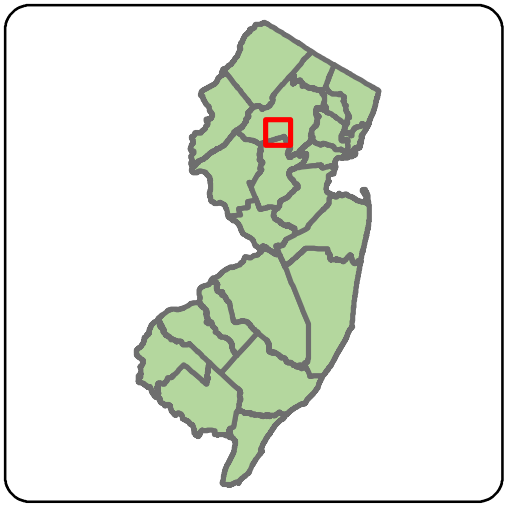
https://www.nj.gov/dep/gis/listall.html

PROJECT FIGURES





Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 12,000-foot grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

This map was developed using:

USA Topo Maps, Copyright 2014 National Geographic Socieity, i-cubed

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.

Basemap: USGS Quadrangle, Mendham, NJ

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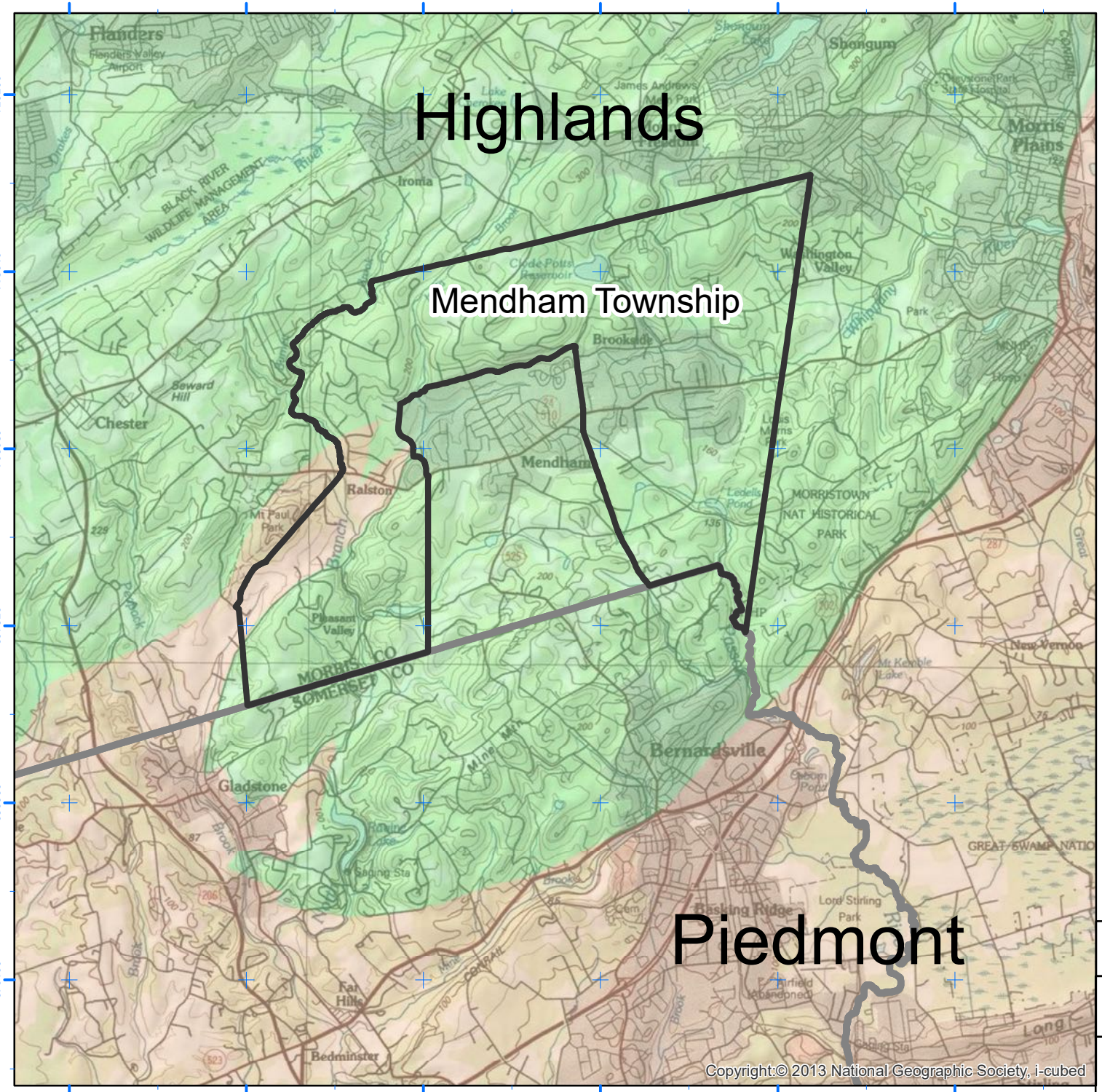
Feet

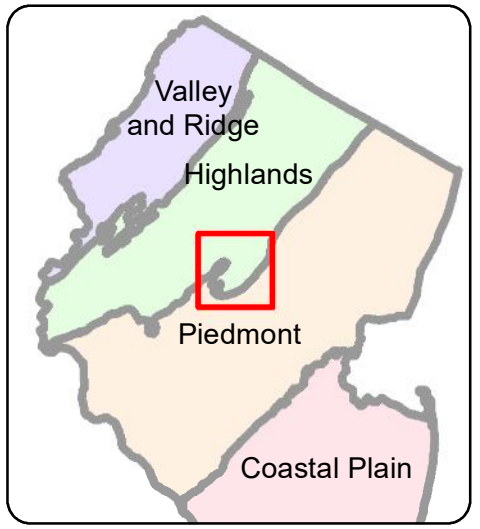
Site Location: USGS Topographic Map

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE
1





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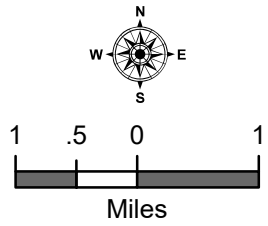
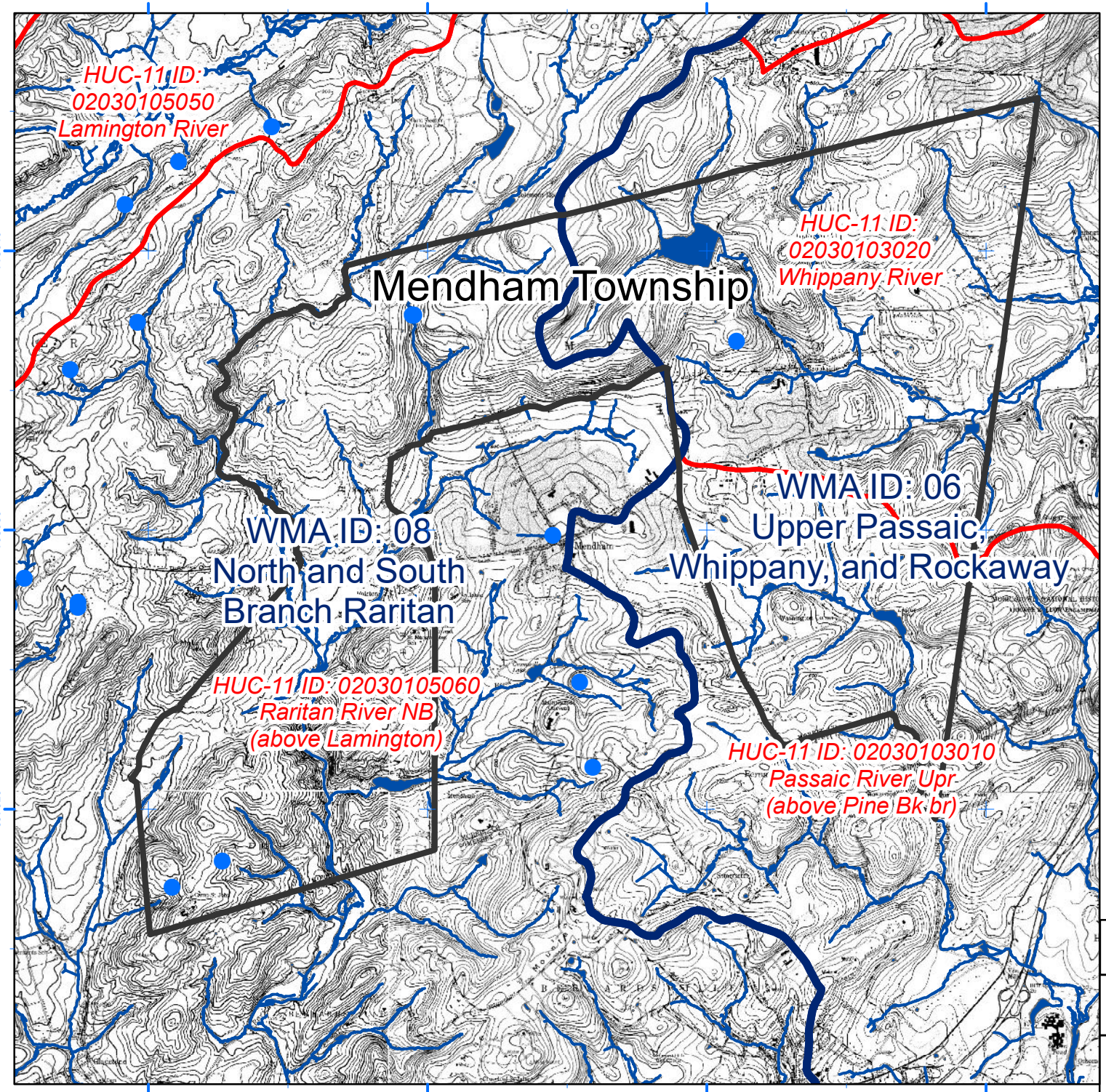


Physiographic Provinces

Mendham Township
New Jersey

UHL & Associates, Inc.
Lambertville, New Jersey

FIGURE
2



Legend

- Spring
- Stream
- Water Body
- Watershed Management Area Boundary
- HUC-11 Boundary

Transverse Mercator Projection - New Jersey State Plane FIPS 2900. 1983 North American Datum 2-milet grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

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.

Basemap: NJDEP

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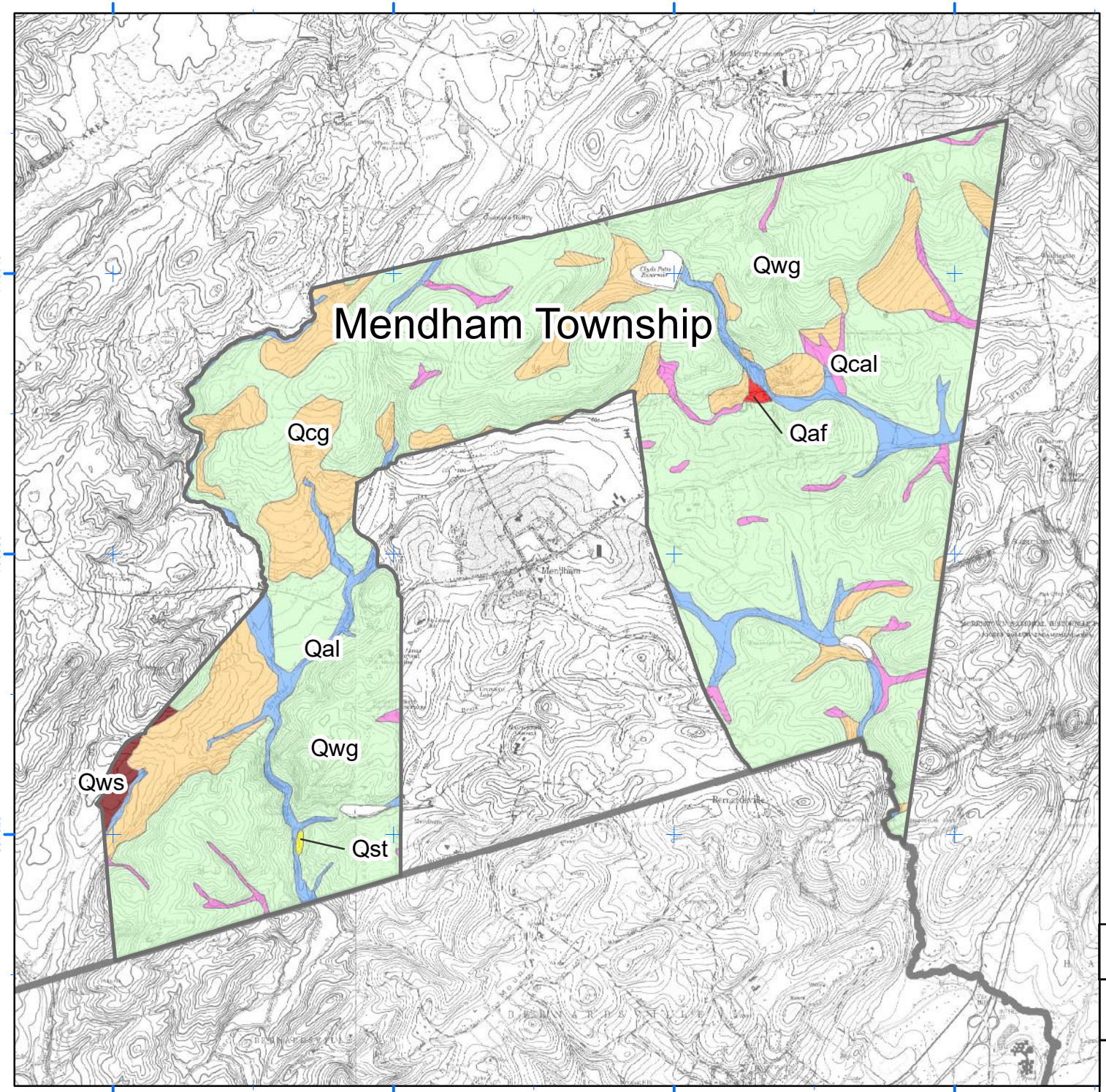
Miles

Watershed Basins & Streams

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE
3



Legend

Surficial Geology

- Qaf: ALLUVIAL FAN DEPOSITS
- Qal: ALLUVIUM
- Qcal: ALLUVIUM AND COLLUVIUM
- Qst: POSTGLACIAL STREAM TERRACE DEPOSITS
- Qcg: GNEISS COLLUVIUM
- Qwg: WEATHERED GNEISS
- Qws: WEATHERED SHALE, MUDSTONE, AND SANDSTONE

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

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Basemap: NJDEP

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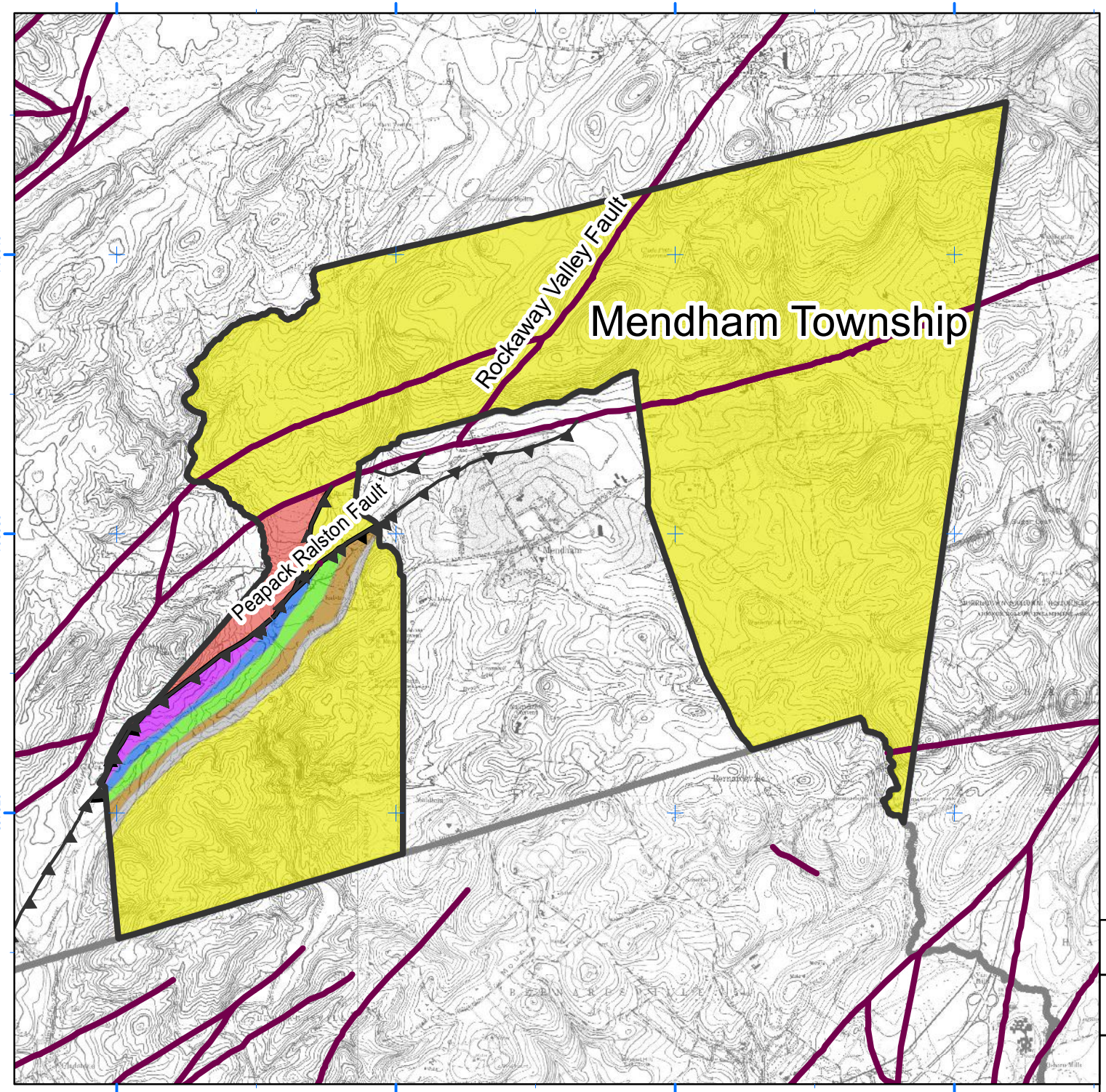
Surficial Geology

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE 4



Legend

Faults

- normal fault trace
- reverse fault trace

Bedrock Formations

- Ch, Hardyston Quartzite
- Cl, Leithsville Formation
- OCa, Allentown Dolomite
- OCjtb, Jutland Klippe Sequence Unit B
- Obl, Lower Part of Beekmantown Group
- Obu, Upper Part of Beekmantown Group
- Y, Precambrian

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

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.

Basemap: NJDEP

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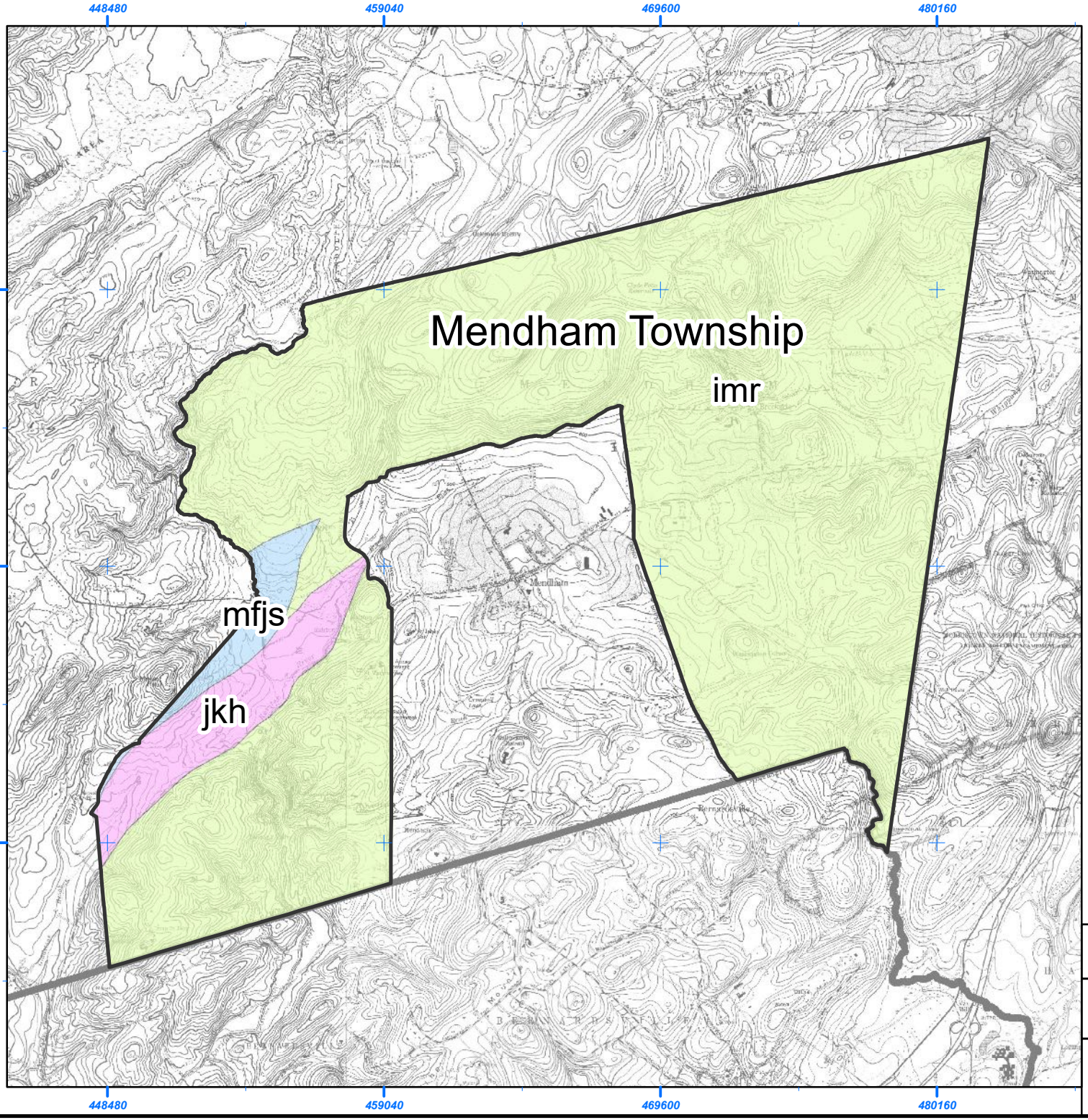
Bedrock Geology

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE 5



Legend

Bedrock Aquifer

- imr:Igneous and metamorphic rocks
- jkh:Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite
- mfjs:Martinsburg Formation and Jutland Sequence

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

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Basemap: NJDEP

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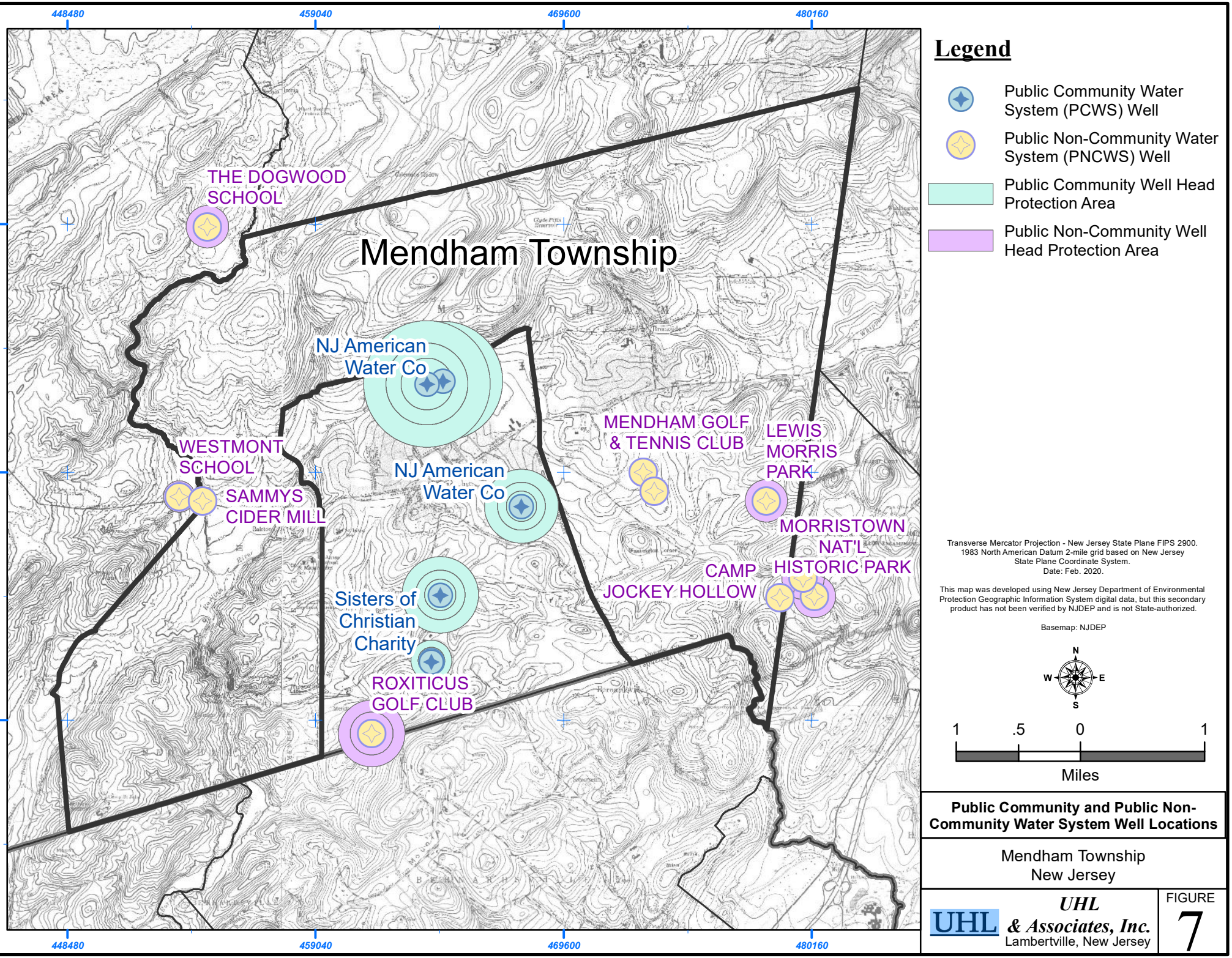
Bedrock Aquifers

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE 6


448480
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480160
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Mendham Township
THE DOGWOOD SCHOOL
NJ American Water Co
NJ American Water Co
WESTMONT SCHOOL
SAMMYS CIDER MILL
MENDHAM GOLF & TENNIS CLUB
LEWIS MORRIS PARK
MORRISTOWN NAT'L HISTORIC PARK
CAMP JOCKEY HOLLOW
Sisters of Christian Charity
ROXITICUS GOLF CLUB
Legend
Public Community Water System (PCWS) Well
Public Non-Community Water System (PNCWS) Well
Public Community Well Head Protection Area
Public Non-Community Well Head Protection Area
Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.
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.
Basemap: NJDEP
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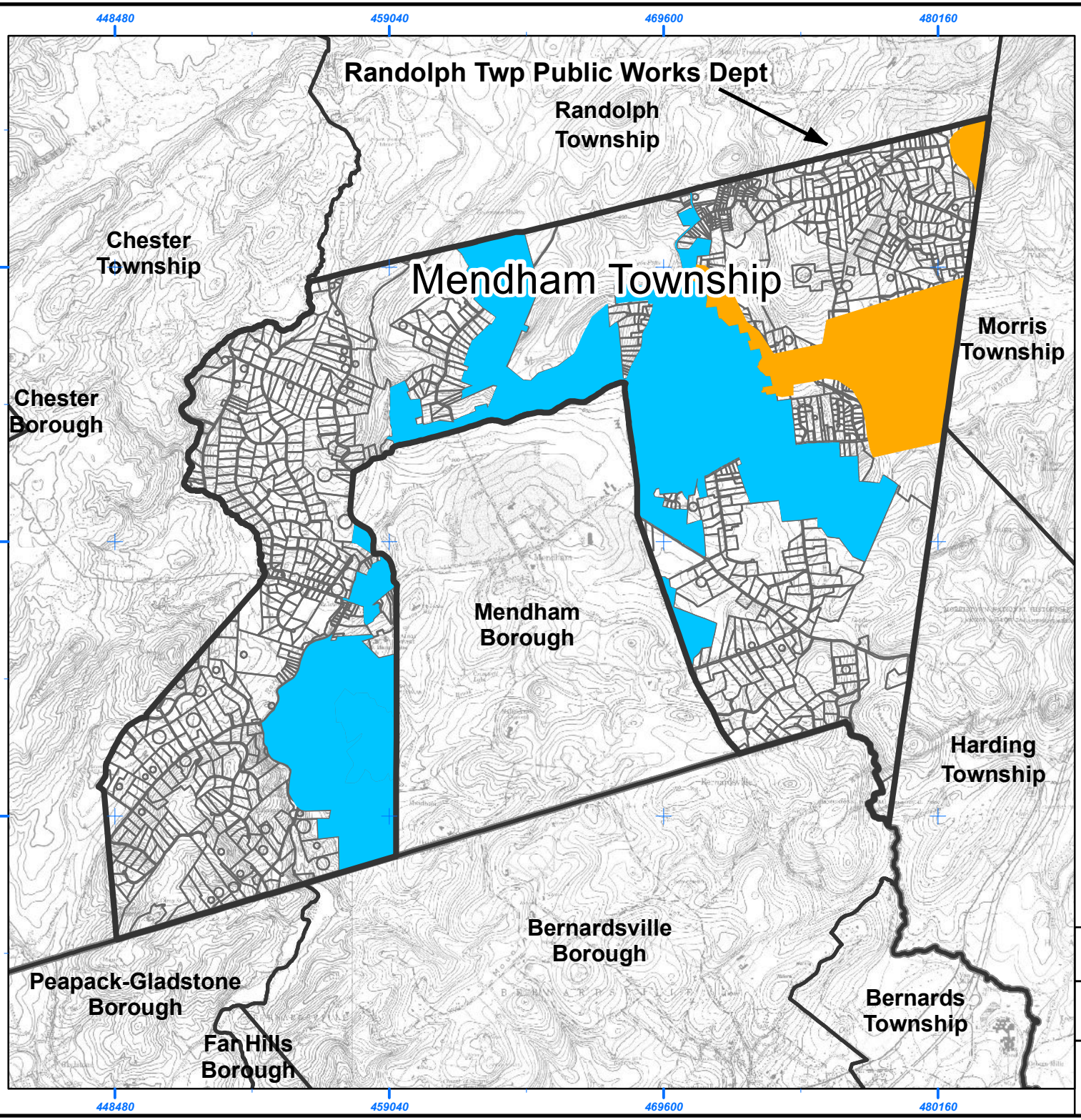
Public Community and Public Non-Community Water System Well Locations
Mendham Township
New Jersey
UHL
UHL & Associates, Inc.
Lambertville, New Jersey
FIGURE
7



Legend

Public Community Water Purveyor Service area

- NJ American - Short
- South East Morris County MUA
- Randolph Twp Public Works Dept

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

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.

Basemap: NJDEP

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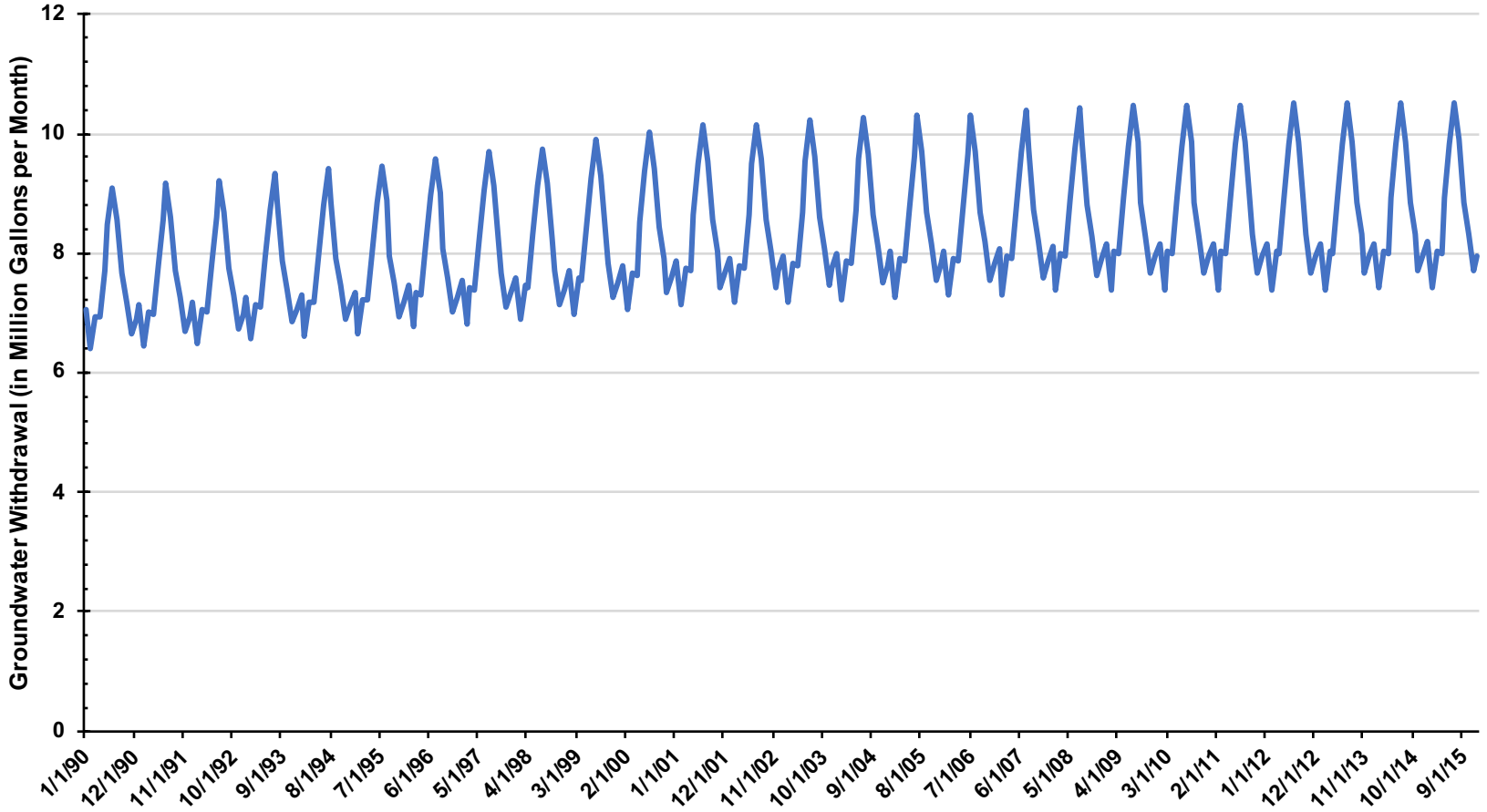
Public Community Water Purveyor Service Areas

Mendham Township
New Jersey

UHL *& Associates, Inc.*
Lambertville, New Jersey

FIGURE
8



NJGS Plot of Domestic Well Withdrawal in Mendham Township

Mendham Township
New Jersey

Source: NJGS Digital Data Series DGS01-3, New Jersey Transfer Withdrawal, Use and Return Data Summaries, 03/01/2018

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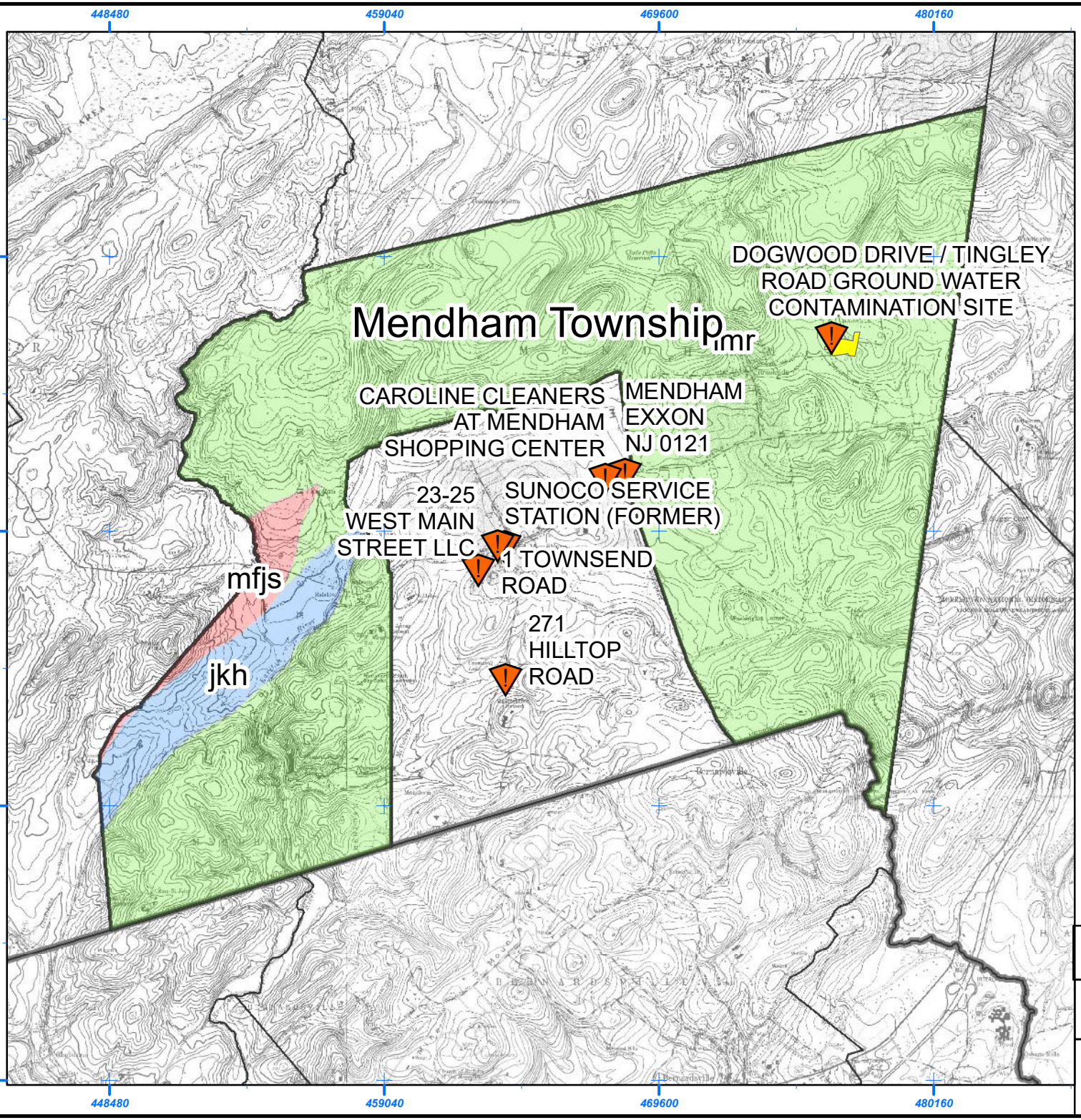
Lambertville, New Jersey

FIGURE
9



Legend

- Known Contaminated Site
- Currently Known Extent of Groundwater Contamination

Bedrock Aquifer

- imr
- jkh
- mfjs

Transverse Mercator Projection - New Jersey State Plane FIPS 2900. 1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System. Date: Feb. 2020.

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.

Basemap: NJDEP

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Miles

Known Contaminated Sites

Mendham Township
New Jersey

UHL *& Associates, Inc.*
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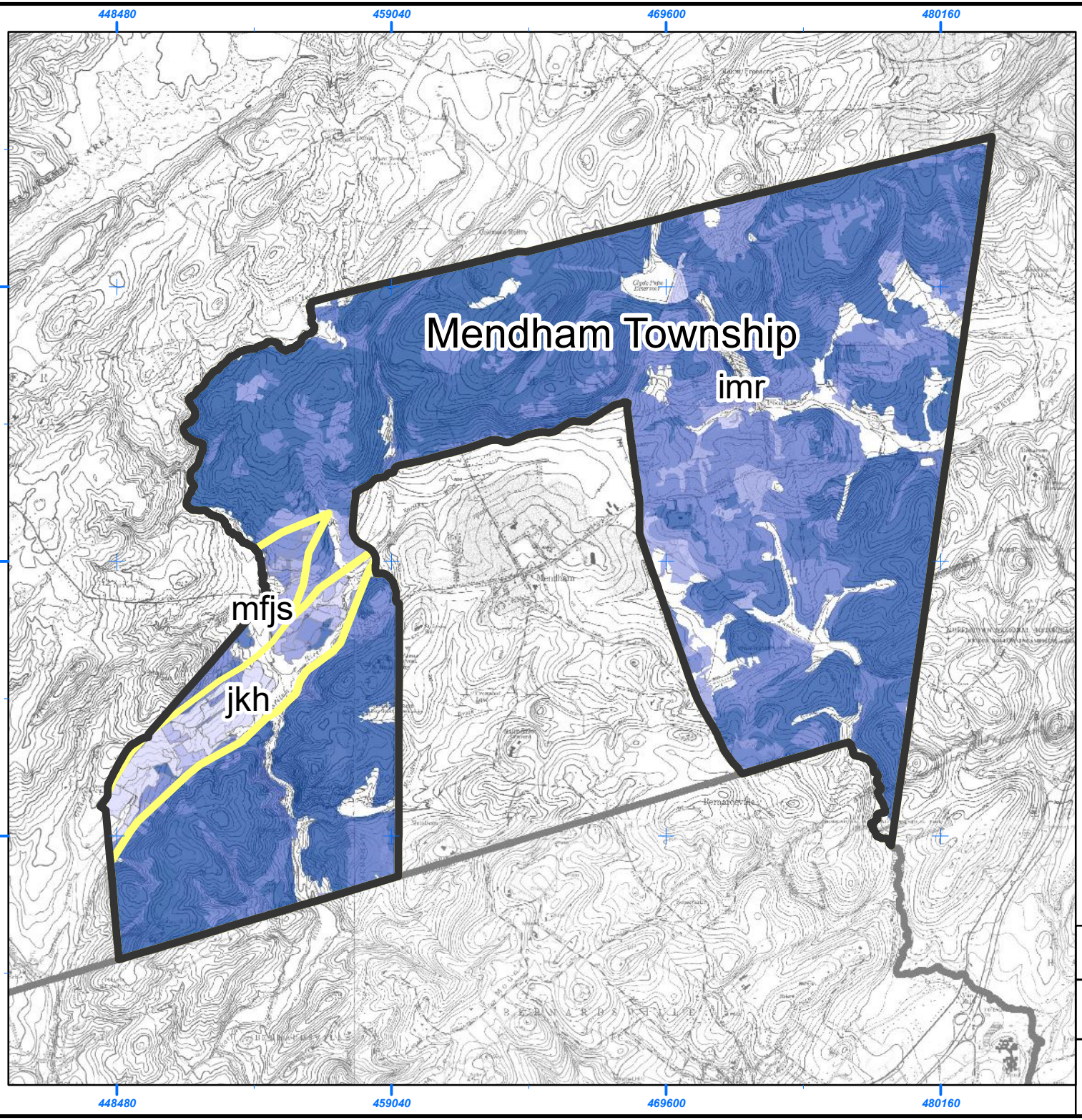
FIGURE 10



Legend

Normal Recharge
(inches/year)

- 0
- 3
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- jkl
- mfjs

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey
State Plane Coordinate System.
Date: Feb. 2020.

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.

Basemap: NJDEP

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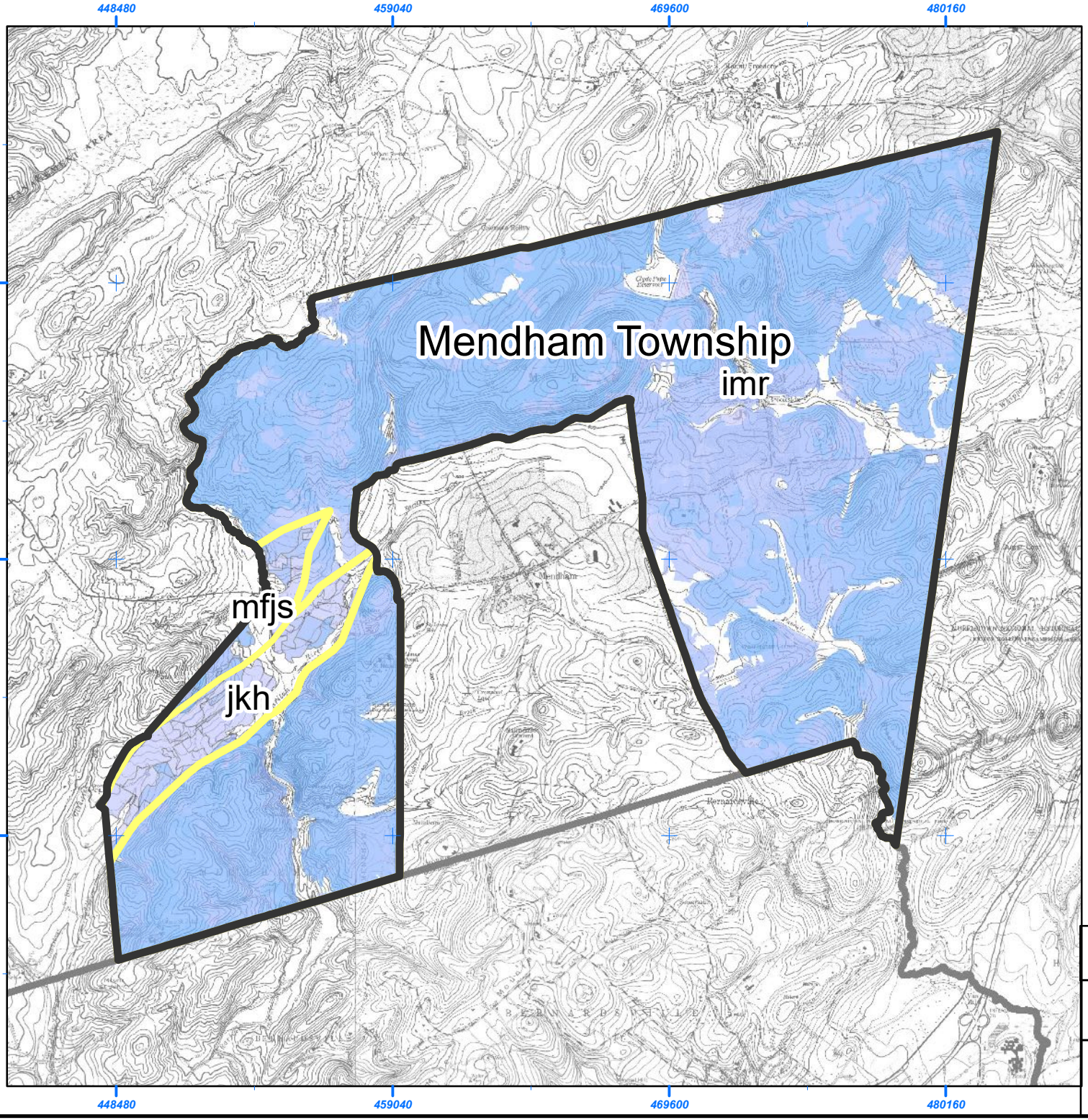
Miles

Normal Recharge
NJGS Groundwater Recharge Method

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE
11a



Legend

Drought Recharge
(inches/year)

- 0
- 2
- 8
- 9
- 10
- 11
- 12
- 13
- jkl
- mfjs

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey
State Plane Coordinate System.
Date: Feb. 2020.

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.

Basemap: NJDEP

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Miles

Drought Recharge
NJGS Groundwater Recharge Method

Mendham Township
New Jersey

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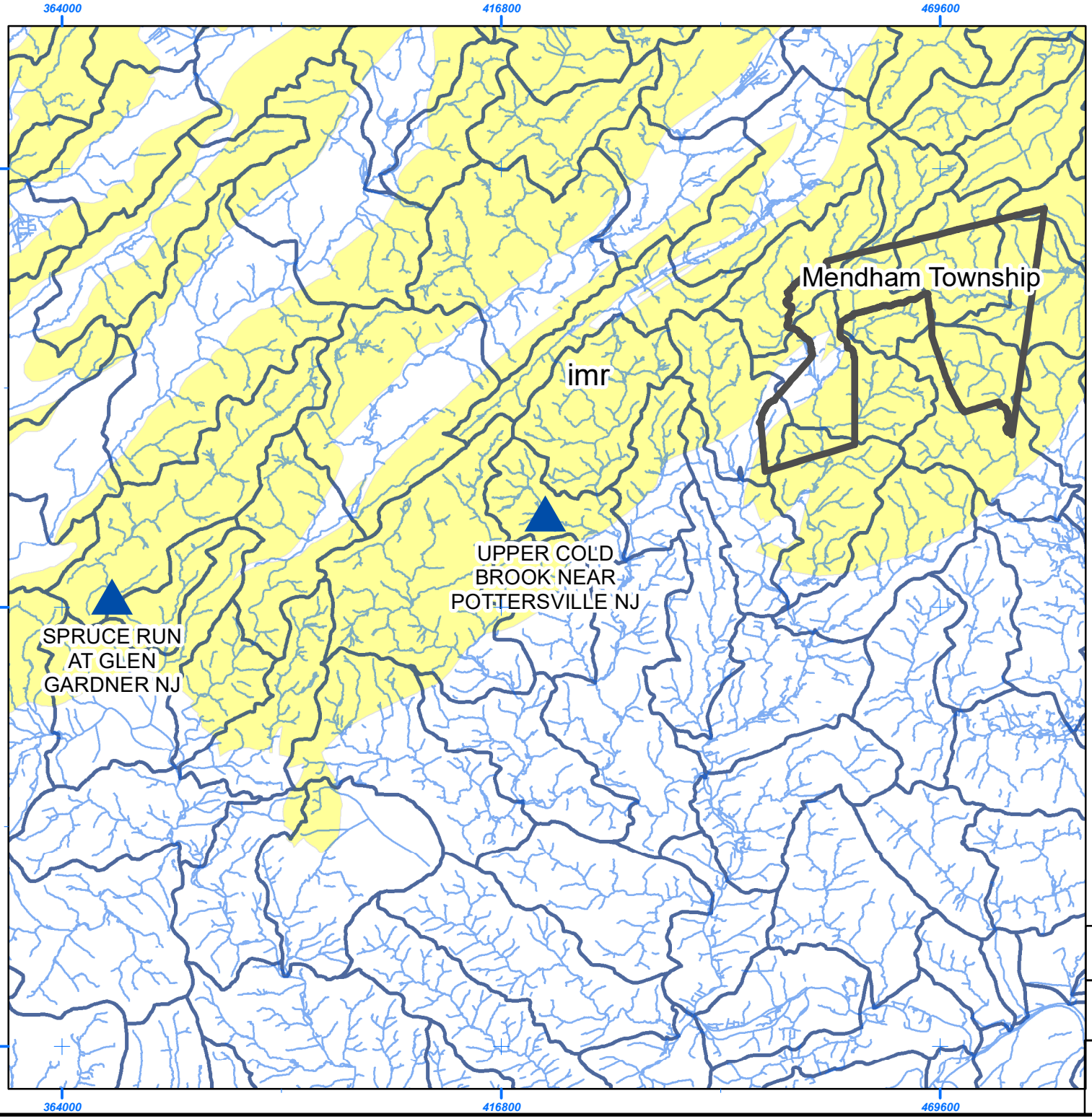
Lambertville, New Jersey

FIGURE
11b



Legend

- USGS Streamflow Gauging Station
- Stream
- Watershed Basin (HUC-14)
- New Jersey Bedrock Aquifer - imr, igneous and metamorphic

Transverse Mercator Projection - New Jersey State Plane FIPS 2900.
1983 North American Datum 2-mile grid based on New Jersey State Plane Coordinate System.
Date: Feb. 2020.

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.

Basemap: NJDEP

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Miles

USGS Streamflow Gauging Station Locations

Mendham Township
New Jersey

UHL *UHL & Associates, Inc.*
Lambertville, New Jersey

FIGURE 12

APPENDIX I: NITRATE DILUTION MODEL RUNS

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Annandale
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	7.6%	
Average recharge adjusted for impervious cover	14.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Annandale
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	13.7%	
Average recharge adjusted for impervious cover	13.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Annandale
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	17.8%	
Average recharge adjusted for impervious cover	13.1	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Bartley
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	7.6%	
Average recharge adjusted for impervious cover	14.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Bartley
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	13.7%	
Average recharge adjusted for impervious cover	13.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Bartley
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	17.8%	
Average recharge adjusted for impervious cover	13.2	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Califon
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.1	inches/year
Impervious percentage on building lots of this size	7.6%	
Average recharge adjusted for impervious cover	14.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Califon
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.1	inches/year
Impervious percentage on building lots of this size	13.7%	
Average recharge adjusted for impervious cover	13.9	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Califon
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.1	inches/year
Impervious percentage on building lots of this size	17.8%	
Average recharge adjusted for impervious cover	13.2	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Cokesbury
Municipality	Mendham Twp. (Morris Co.)

Hydric or urban soil. Can't use this method.

Minimum recharge area needed to dilute nitrate	**N.A.**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	N.A.	inches/year
Impervious percentage on building lots of this size	N.A.	
Average recharge adjusted for impervious cover	#VALUE!	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Fluvaquents
Municipality	Mendham Twp. (Morris Co.)

Hydric or urban soil. Can't use this method.

Minimum recharge area needed to dilute nitrate	**N.A.**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	N.A.	inches/year
Impervious percentage on building lots of this size	N.A.	
Average recharge adjusted for impervious cover	#VALUE!	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Gladstone
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**3.7**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.4	inches/year
Impervious percentage on building lots of this size	8.4%	
Average recharge adjusted for impervious cover	17.7	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Gladstone
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.3**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.4	inches/year
Impervious percentage on building lots of this size	15.1%	
Average recharge adjusted for impervious cover	16.4	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Gladstone
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**0.9**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.4	inches/year
Impervious percentage on building lots of this size	19.6%	
Average recharge adjusted for impervious cover	15.6	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Hibernia
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.4**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.3	inches/year
Impervious percentage on building lots of this size	7.7%	
Average recharge adjusted for impervious cover	15.0	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Hibernia
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.3	inches/year
Impervious percentage on building lots of this size	13.8%	
Average recharge adjusted for impervious cover	14.0	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Hibernia
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.3	inches/year
Impervious percentage on building lots of this size	18.0%	
Average recharge adjusted for impervious cover	13.4	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Klinesville
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.2**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	17.1	inches/year
Impervious percentage on building lots of this size	7.9%	
Average recharge adjusted for impervious cover	15.7	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Klinesville
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	17.1	inches/year
Impervious percentage on building lots of this size	14.2%	
Average recharge adjusted for impervious cover	14.7	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Klinesville
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	17.1	inches/year
Impervious percentage on building lots of this size	18.4%	
Average recharge adjusted for impervious cover	13.9	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Parker
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**3.7**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.5	inches/year
Impervious percentage on building lots of this size	8.4%	
Average recharge adjusted for impervious cover	17.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Parker
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.3**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.5	inches/year
Impervious percentage on building lots of this size	15.1%	
Average recharge adjusted for impervious cover	16.5	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Parker
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**0.8**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.5	inches/year
Impervious percentage on building lots of this size	19.6%	
Average recharge adjusted for impervious cover	15.6	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Parker-Rock Outcrop
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.4**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.5	inches/year
Impervious percentage on building lots of this size	7.7%	
Average recharge adjusted for impervious cover	15.2	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Parker-Rock Outcrop
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.5	inches/year
Impervious percentage on building lots of this size	13.9%	
Average recharge adjusted for impervious cover	14.2	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Parker-Rock Outcrop
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.5	inches/year
Impervious percentage on building lots of this size	18.1%	
Average recharge adjusted for impervious cover	13.5	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Pattenburg
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**3.7**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.3	inches/year
Impervious percentage on building lots of this size	8.4%	
Average recharge adjusted for impervious cover	17.7	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Pattenburg
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.3**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.3	inches/year
Impervious percentage on building lots of this size	15.1%	
Average recharge adjusted for impervious cover	16.4	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Pattenburg
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**0.9**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.3	inches/year
Impervious percentage on building lots of this size	19.6%	
Average recharge adjusted for impervious cover	15.6	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Penn
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.1	inches/year
Impervious percentage on building lots of this size	7.6%	
Average recharge adjusted for impervious cover	14.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Penn
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.1	inches/year
Impervious percentage on building lots of this size	13.7%	
Average recharge adjusted for impervious cover	13.9	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Penn
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.1	inches/year
Impervious percentage on building lots of this size	17.8%	
Average recharge adjusted for impervious cover	13.2	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Ridgebury
Municipality	Mendham Twp. (Morris Co.)

Hydric or urban soil. Can't use this method.

Minimum recharge area needed to dilute nitrate	**N.A.**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	N.A.	inches/year
Impervious percentage on building lots of this size	N.A.	
Average recharge adjusted for impervious cover	#VALUE!	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Turbotville
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	7.6%	
Average recharge adjusted for impervious cover	14.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Turbotville
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	13.7%	
Average recharge adjusted for impervious cover	13.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Turbotville
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	17.8%	
Average recharge adjusted for impervious cover	13.1	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Udifluvents
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**4.5**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	7.6%	
Average recharge adjusted for impervious cover	14.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Udifluvents
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.6**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	13.7%	
Average recharge adjusted for impervious cover	13.8	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Udifluvents
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.0**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	16.0	inches/year
Impervious percentage on building lots of this size	17.8%	
Average recharge adjusted for impervious cover	13.2	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 31, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Urban Land*
Municipality	Mendham Twp. (Morris Co.)

Hydric or urban soil. Can't use this method.

Minimum recharge area needed to dilute nitrate	**N.A.**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	N.A.	inches/year
Impervious percentage on building lots of this size	N.A.	
Average recharge adjusted for impervious cover	#VALUE!	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**2**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Washington
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**3.8**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.3	inches/year
Impervious percentage on building lots of this size	8.4%	
Average recharge adjusted for impervious cover	17.7	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**6**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Washington
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**1.3**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.3	inches/year
Impervious percentage on building lots of this size	15.1%	
Average recharge adjusted for impervious cover	16.4	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010

Adjusted Trela-Douglas Model Input Parameters

population density:	**3.004**	people/home
nitrate loading rage	**10**	pounds/person/year
NO_3 target:	**10**	mg/l

Ground-Water Recharge Methodology Input Parameters

Soil	Washington
Municipality	Mendham Twp. (Morris Co.)

Minimum recharge area needed to dilute nitrate	**0.9**	acres/system
Average recharge on this soil type in this municipality to a totally pervious lot is approximately	19.3	inches/year
Impervious percentage on building lots of this size	19.6%	
Average recharge adjusted for impervious cover	15.5	inches/year

This method assumes the maximum recharge rate to the pervious portion of the lot.

October 9, 2019

APPENDIX II: WELL DATA

Appendix A: List of Domestic and Irrigation/Farm Wells in Mendham Township

Domestic Wells

Permit Number	Well Use	Well Name	Date Drilled	Physical Address	Municipality	Block	Lot	Easting (X)	Northing (Y)	Depth (ft)	Capacity (gpm)
2200029092	Domestic		8/31/1989	ABBINGTON WAY	Mendham Twp	19	9.05	470703	716381	700	5
2400016320	Domestic		7/26/1983	4 CEDAR LN	Mendham Twp	114	24	453784	715727	150	0
2400016321	Domestic		7/26/1983	6 CEDAR LN	Mendham Twp	14	206	453784	715727	375	0
2400016322	Domestic		8/29/1983	3 CEDAR LN	Mendham Twp	114	21	454809	715725	100	0
2500000468	Domestic	1	7/1/1949	MENDHAM RD (RT 24)	Mendham Twp			468698	710918	250	0
2500000530	Domestic	1	4/20/1950	MENHHAM ROAD WEST	Mendham Twp			456846	706278	100	0
2500000593	Domestic	0	12/5/1949	WASHINGTON VALLEY RD	Mendham Twp			478393	715701	54	0
2500000648	Domestic	1	6/12/1950	ROXITICUS ROAD	Mendham Twp			450680	699541	88.5	0
2500000666	Domestic	#2	6/20/1950	COREY LN	Mendham Twp			471770	704237	180.5	10
2500000679	Domestic		5/2/1950	BRIANWOOD LANE	Mendham Twp			468141	717058	78	0
2500000681	Domestic		4/22/1950	COLD HILL ROAD	Mendham Twp			468138	714359	121	0
2500000928	Domestic		7/11/1951	HILLLTOP RD	Mendham Twp			463539	705561	166	0
2500000933	Domestic		7/11/1951	GOLF LANE	Mendham Twp			472234	707610	169	0
2500001248	Domestic		9/15/1951	IRONIA RD	Mendham Twp			456856	713024	75	0
2500001322	Domestic		10/29/1951	ORCHARD RD	Mendham Twp			480445	718398	108	0
2500001456	Domestic		12/14/1951	MENDHAM RD	Mendham Twp			475853	712329	77	5
2500001482	Domestic		2/1/1952	UNKNOWN	Mendham Twp			477932	716376	68	0
2500001691	Domestic		7/7/1952	BURNETT RD	Mendham Twp			455833	714375	80	0
2500001743	Domestic	#1	6/20/1952	PLEASANT VALLEY RD	Mendham Twp			456831	695484	258	11
2500001970	Domestic		11/7/1952	STONEY HILL RD	Mendham Twp			473266	715704	170	0
2500002585	Domestic	1	6/15/1953	UNKNOWN	Mendham Twp			463537	704245	195	0
2500002671	Domestic	1	7/13/1953	CORRY LANE	Mendham Twp			472231	703562	180	0
2500003137	Domestic	1	1/5/1954	IRONIA ROAD	Mendham Twp			457397	714980	114	0
2500003478	Domestic	1	8/10/1954	PLEASANT VALLEY ROAD	Mendham Twp			456376	700207	354	0
2500003865	Domestic		9/24/1954	DOGWOOD DRIVE	Mendham Twp			477368	715701	86	0
2500003927	Domestic		10/9/1954	DOGWOOD DRIVE	Mendham Twp			476932	716376	97	4
2500004527	Domestic		5/9/1955	DOGWOOD LANE	Mendham Twp			477393	715668	96	0
2500005305	Domestic		6/10/1956	ROXITICUS RD	Mendham Twp			454788	702233	533	0
2500005516	Domestic		6/18/1956	WINSTON FARM LANE	Mendham Twp			450243	713675	136	0
2500006459	Domestic		3/7/1957	MENDHAM RD	Mendham Twp			472776	712332	100	0
2500006487	Domestic		5/17/1957	JACKEY HOLLOW ROAD	Mendham Twp			475845	700186	120	0
2500006490	Domestic		3/25/1957	KENNEDY ROAD	Mendham Twp			471210	708960	79	0

2500006843	Domestic		7/12/1957	YARDLEY RD	Mendham Twp			474288	710306	110	0
2500007248	Domestic		11/25/1957	TOWNSEND RD	Mendham Twp			463001	706270	200	0
2500007393	Domestic		1/6/1958	ORCHARD ROAD	Mendham Twp			480445	718398	93	0
2500007441	Domestic		2/8/1958	CHERY LANE	Mendham Twp			473264	713006	104	0
2500007895	Domestic		8/25/1958	CHERRY LANE	Mendham Twp			469153	703564	77	0
2500007961	Domestic		9/20/1958	DOGWOOD DRIVE	Mendham Twp			477932	716376	98	0
2500008008	Domestic		10/8/1958	IRONIA ROAD	Mendham Twp			456397	714981	100	0
2500008021	Domestic	1	12/15/1958	ROXITICUS ROAD	Mendham Twp			453300	701527	417	0
2500008044	Domestic		10/22/1958	2 CHERRY LANE	Mendham Twp			473263	711656	76	0
2500008069	Domestic		11/12/1958	WASHINGTON VALLEY ROAD	Mendham Twp			478394	717050	105	0
2500008117	Domestic		11/22/1958	HOFFMAN ROAD	Mendham Twp			462545	710925	45	0
2500008120	Domestic		12/8/1958	MT PLEASANT ROAD	Mendham Twp			479935	724470	40	5
2500008145	Domestic	1	12/18/1959	MOUNTAINSIDE ROAD	Mendham Twp			466626	714968	112	0
2500008178	Domestic		1/16/1959	MENDHAM RD	Mendham Twp			475853	712329	140	0
2500008224	Domestic	#1	11/20/1959	18 STONEY HILL RD	Mendham Twp	127	14	472242	717054	220	0
2500008314	Domestic		4/7/1959	HAMILTON DR	Mendham Twp			478933	719006	125	0
2500008315	Domestic		3/17/1959	TINGLEY RD	Mendham Twp			475857	717693	163	0
2500008454	Domestic		5/18/1959	CHERRY LANE	Mendham Twp			473263	711656	68	0
2500008468	Domestic		5/9/1959	CTY RET 61A	Mendham Twp			461984	713017	100	0
2500008526	Domestic		6/1/1959	MOUNTAINSIDE AVE	Mendham Twp			459472	713661	250	0
2500008561	Domestic		7/1/1959	WEST MAIN ST	Mendham Twp			468702	714966	66	0
2500008662	Domestic		8/19/1959	ROUTE 24	Mendham Twp			473263	711656	260	3
2500008852	Domestic	0	11/14/1959	PRUDENCE LANE	Mendham Twp			480444	715700	133	0
2500008922	Domestic	0	11/20/1960	OLD ORCHARD RD	Mendham Twp			478395	719748	139	0
2500009034	Domestic		12/15/1959	CHERRY LN	Mendham Twp			473263	711656	67	0
2500009431	Domestic		7/18/1960	COLD HILL RD	Mendham Twp			468706	719014	80	0
2500009434	Domestic		7/14/1960	COLD HILL RD	Mendham Twp			469705	717697	68	5
2500009486	Domestic		8/15/1960	PRUDENCE LN	Mendham Twp			479932	717690	55	10
2500009514	Domestic		11/17/1960	OLD ORCHARD RD	Mendham Twp			478395	719748	123	6
2500009708	Domestic		1/25/1961	CHERRY LN	Mendham Twp			469691	702822	270	10
2500009825	Domestic	#1	2/21/1961	MENDHAM RD	Mendham Twp			469147	696818	151	7
2500009832	Domestic		2/23/1961	BROOKSIDE RD	Mendham Twp			472785	723058	83	4
2500009851	Domestic	#9851	3/9/1961	PRUDENCE LN	Mendham Twp			479931	716375	105	0
2500009904	Domestic		5/16/1961	ORCHARD RD	Mendham Twp			477934	720322	127	10
2500009943	Domestic		6/13/1961	OLD BROOKSIDE RD	Mendham Twp			469708	721745	175	5

2500009963	Domestic		5/29/1961	CHERRY LN	Mendham Twp			472776	712332	95	0
2500009997	Domestic		6/5/1961	ROXITICUS RD	Mendham Twp			455304	704256	80	0
2500010076	Domestic		8/24/1961	RT 24	Mendham Twp			456385	706886	70	0
2500010091	Domestic	#1	8/4/1961	TEMPE WICK RD	Mendham Twp			477925	704233	64.5	0
2500010370	Domestic		12/18/1961	IRONIA RD	Mendham Twp			457393	712349	73	0
2500010420	Domestic		1/19/1962	YARDLEY RD	Mendham Twp			474288	710306	115	7
2500010463	Domestic	#1	3/3/1962	SCHOOL HOUSE RD	Mendham Twp			479934	721738	107	0
2500010476	Domestic		3/1/1962	YARDLEY PL	Mendham Twp			473262	710307	100	0
2500010551	Domestic		4/23/1962	CALAIS RD	Mendham Twp			462553	717705	72	0
2500010696	Domestic		7/9/1962	MENDHAM ROAD	Mendham Twp			447134	696073	60	0
2500010817	Domestic		9/1/1962	SCHOOL HOUSE LANE	Mendham Twp			478397	722447	91	0
2500010831	Domestic		10/10/1962	TINGLEY ROAD	Mendham Twp			476341	714353	98	0
2500010874	Domestic		9/24/1962	COREY LANE	Mendham Twp			475311	707607	60	0
2500010981	Domestic	#1	12/21/1962	UNKNOWN	Mendham Twp			461453	698783	152	0
2500011179	Domestic	1	3/26/1963	DOGWOOD DRIVE	Mendham Twp			477368	715701	210	0
2500011187	Domestic	0	3/28/1963	YARDLEY RD	Mendham Twp			474288	710306	98	0
2500011479	Domestic		12/3/1963	DOG WOOD DRIVE	Mendham Twp			477932	716376	213	10
2500011699	Domestic	1	11/30/1963	IRONIA ROAD	Mendham Twp			457878	710324	104	0
2500011757	Domestic		3/23/1964	RT 24 AND ERB LANE	Mendham Twp			475315	713004	98	0
2500011974	Domestic		5/22/1964	ROUTE 24	Mendham Twp	28	2D	472776	712332	96	0
2500011975	Domestic		5/9/1964	ROUTE 24	Mendham Twp	28	2F	471776	712332	93	0
2500012028	Domestic	1814	5/25/1964	HARDSCRABBLE RD	Mendham Twp			472229	700863	72	0
2500012146	Domestic	1897	7/29/1964	BURNETT RD	Mendham Twp			453782	714378	273	0
2500012165	Domestic	1909	7/13/1964	KENNEDY RD	Mendham Twp			470698	710917	86	0
2500012197	Domestic	0	8/18/1964	DOGWOOD DR	Mendham Twp			478393	715701	90	0
2500012286	Domestic	1988	9/25/1964	BLISS ROAD	Mendham Twp			464019	699522	72	0
2500012357	Domestic	10-079	10/7/1964	22 ROXITICUS ROAD	Mendham Twp	104	9	457870	704927	192	0
2500012358	Domestic	2071	9/26/1964	RTE. 24 & YARDLEY RD.	Mendham Twp			473263	711656	96	0
2500012386	Domestic	2075	10/8/1964	THOMAS ROAD	Mendham Twp			458466	709615	171	0
2500012414	Domestic	2109	10/19/1964	OLD ORCHARD ROAD	Mendham Twp			480445	718398	60	0
2500012435	Domestic	2120	11/18/1964	YARDLEY PLACE	Mendham Twp			473262	710307	72	0
2500012611	Domestic		1/29/1965	97 IRONIA ROAD	Mendham Twp			457887	717070	90	0
2500012792	Domestic		4/20/1965	TINGLEY ROAD	Mendham Twp			475855	714960	92	0
2500013135	Domestic		7/31/1965	WOODS END RD	Mendham Twp			474290	713005	460	0
2500013305	Domestic		10/22/1965	COREY LANE	Mendham Twp			472231	703562	192	0

2500013306	Domestic		10/20/1965	COREY LANE	Mendham Twp			475312	708956	446	0
2500013406	Domestic	2837	11/1/1975	HARDSCRABBLE ROAD	Mendham Twp			472229	700863	95	0
2500013423	Domestic	1	11/15/1965	WASHINGTON VALLEY ROAD	Mendham Twp			479932	717690	172	5
2500013846	Domestic	3269	7/25/1966	WOODLAND ROAD	Mendham Twp			470708	721744	223	0
2500013855	Domestic		8/9/1966	PLEASANT VALLEY ROAD	Mendham Twp			455808	698184	200	0
2500013885	Domestic	MT. AVE.	7/9/1966	MOUNTAIN AVE. & MOUNTAINSID	Mendham Twp			461982	711668	157	0
2500013907	Domestic		7/28/1966	IRONIA ROAD	Mendham Twp			456395	713666	159	0
2500014173	Domestic	3499	12/15/1966	LEDDELL RD	Mendham Twp			477360	703558	98	0
2500014262	Domestic	3534	4/13/1967	COREY LANE	Mendham Twp	32	8	475309	704909	298	0
2500014505	Domestic	0	9/6/1967	COLD HILL RD	Mendham Twp			467700	712336	180	0
2500014526	Domestic	3696	9/21/1967	STONE AX & LENOPE RD	Mendham Twp			474288	710306	347	0
2500014679	Domestic	0	3/19/1968	CALAIS RD	Mendham Twp			460958	713018	141	0
2500014748	Domestic	0	4/4/1968	OLD ORCHARD RD	Mendham Twp			477934	720322	98	0
2500014849	Domestic		7/15/1968	PHOENIX DRIVE	Mendham Twp	33	6-17	462545	710925	323	0
2500015026	Domestic		11/30/1968	IRONIA ROAD	Mendham Twp			456397	714981	110	5
2500015031	Domestic		11/1/1968	KENNEDY RD.	Mendham Twp			472235	708959	148	0
2500015057	Domestic		11/29/1968	INDIAN HOLLOW ROAD	Mendham Twp			476338	708956	365	11
2500015060	Domestic	1	4/19/1969	COREY LANE	Mendham Twp			479416	710303	325	0
2500015235	Domestic		6/18/1969	FRANKLIN DRIVE	Mendham Twp			470708	721744	243	3
2500015286	Domestic		8/25/1969	NESBITT DR AND VALLEY VIEW	Mendham Twp			456848	707627	125	0
2500015296	Domestic		8/27/1969	VALLEY VIEW DRIVE	Mendham Twp			456848	707627	144	0
2500015297	Domestic		8/8/1969	COREY LANE	Mendham Twp			474289	711656	195	0
2500015397	Domestic		10/24/1969	COREY LANE	Mendham Twp		8-2	474289	711656	135	0
2500015412	Domestic		12/11/1969	MENDHAM RD	Mendham Twp			476340	711654	244	0
2500015493	Domestic		5/12/1970	BURRNETT RD	Mendham Twp			455833	714375	100	0
2500015536	Domestic		6/1/1970	RT 24	Mendham Twp			478930	713643	398	2
2500015598	Domestic		7/22/1970	COREY LANE	Mendham Twp			471769	702820	147	0
2500015681	Domestic		10/13/1970	WEST MAIN STREET	Mendham Twp			469163	714358	54	0
2500015702	Domestic		11/3/1970	INDIAN HOLLOW RD	Mendham Twp			477364	708955	148	0
2500015968	Domestic		6/15/1971	GREEN HILLS RD	Mendham Twp			476338	708956	427	0
2500015972	Domestic	1	6/3/1971	CORY LAND & TEMPE WICK	Mendham Twp			474284	704909	87	12
2500016003	Domestic	1	7/2/1971	CORY LANE (ACROSS FROM	Mendham Twp			473770	704235	190	12
2500016064	Domestic	1	3/15/1972	HARDSCRABBLE ROAD	Mendham Twp			472228	699514	157	8
2500016082	Domestic		12/16/1971	COREY LANE	Mendham Twp			475850	708180	200	0
2500016118	Domestic		10/20/1971	ROXITICUS ROAD (AT CORNER OF	Mendham Twp			457874	707625	60	10

2500016174	Domestic	1	12/2/1971	COREY LANE-TEMPO WICK	Mendham Twp			473770	704235	218	10
2500016233	Domestic	1	3/3/1972	ROXITICUS ROAD	Mendham Twp			449217	698802	549	0
2500016258	Domestic	2	3/9/1972	ROXITICUS RD & FOX CHASE RD	Mendham Twp			449217	698802	69	0
2500016299	Domestic		4/5/1972	WOODLAND RD & SHORE TERRACE	Mendham Twp			471783	720327	270	0
2500016337	Domestic		4/29/1972	COREY LANE	Mendham Twp			474851	709598	76	0
2500016345	Domestic	1	4/28/1972	COREY LANE	Mendham Twp			474850	708181	279	0
2500016363	Domestic		5/19/1972	ROXCITICUS ROAD	Mendham Twp			457384	705569	122	0
2500016473	Domestic		9/5/1972	MOUNT PLEASANT RD	Mendham Twp			476936	723055	150	0
2500016501	Domestic		9/9/1972	COREY LANE	Mendham Twp			474850	708181	339	0
2500016571	Domestic		9/29/1972	GREEN HILL ROAD	Mendham Twp			476338	708956	380	3
2500016759	Domestic		1/31/1973	HARDSCRABBLE ROAD	Mendham Twp			472228	699514	400	0
2500017443	Domestic		4/8/1975	ROXITICUS RD	Mendham Twp	1	8	449654	699543	270	10
2500017444	Domestic		6/18/1974	ROXITICUS RD	Mendham Twp	1	9	450680	699541	318	0
2500017446	Domestic		7/22/1974	ROXITICUS RD	Mendham Twp	1	12	450680	699541	329	0
2500017552	Domestic		8/2/1974	COREY LN	Mendham Twp			473771	705551	164	0
2500017668	Domestic		8/29/1974	TEMPE WICK RD	Mendham Twp			472771	705552	234	0
2500017760	Domestic		12/20/1974	MENDHAM RD	Mendham Twp	26	26A-7	477930	712328	273	5
2500017831	Domestic		3/24/1975	IRONIA RD	Mendham Twp			458478	717710	305	0
2500017919	Domestic		5/29/1975	ROXITICUS RD	Mendham Twp			448623	696846	254	0
2500018343	Domestic		4/12/1976	TEMPE WICK RD	Mendham Twp	32	1	472233	706260	175	0
2500018377	Domestic		5/7/1976	BEVERLY RD	Mendham Twp		2-3	473254	699513	300	0
2500018581	Domestic		11/8/1976	ROXCITICUS RD	Mendham Twp	2	6-2	450680	699541	399	0
2500019070	Domestic	9-2	4/20/1977	ROXITICUS RD	Mendham Twp	2	9	451220	700215	190	8
2500019098	Domestic		5/2/1977	BURNETT RD	Mendham Twp	14	3D	455321	714983	173	0
2500019241	Domestic		7/12/1979	SADDLE HILL RD	Mendham Twp	2	69	453758	699536	300	0
2500019292	Domestic		6/29/1977	THOMAS RD	Mendham Twp	16	4	462998	703571	247	0
2500019411	Domestic		8/23/1977	IRONIA RD	Mendham Twp	1	15D	456395	713666	146	0
2500019521	Domestic	1	10/7/1977	MOUNTAINSIDE ROAD	Mendham Twp	11	23-2	459470	712346	250	0
2500019527	Domestic		12/6/1977	COACH RD	Mendham Twp	23	1-1	470709	723060	248	0
2500019532	Domestic		9/6/1978	MT. PLEASANT RD	Mendham Twp	24	9	476936	723055	197	0
2500019553	Domestic		11/18/1977	8 INDIAN HOLLOW RD	Mendham Twp	33	6-18	477364	708955	275	0
2500019679	Domestic		5/8/1978	IRONIA RD	Mendham Twp	1	15-E	457391	710932	95	5
2500019681	Domestic		12/16/1977	IRONIA RD	Mendham Twp	1	15	457391	710932	173	15
2500019716	Domestic	#1	5/3/1978	CHERRY LN	Mendham Twp	13	1	464024	703570	700	0
2500019735	Domestic		4/5/1978	58 IRONIA RD	Mendham Twp	11	23	455831	713025	150	0

2500019746	Domestic		1/5/1978	LEDDELL RD	Mendham Twp	36	1 & 6	468133	708962	123	0
2500019813	Domestic		5/9/1978	COREY LN	Mendham Twp	34	8-B	473771	705551	97	0
2500019916	Domestic		5/1/1978	RT 510	Mendham Twp	33	10-13	474853	712330	148	0
2500019959	Domestic		7/24/1988	SCHOOLHOUSE LN	Mendham Twp	23	12	479422	722446	245	0
2500019997	Domestic	#1	10/14/1978	4 HAMILTON DR	Mendham Twp	26	7-11	479419	717049	65	15
2500020022	Domestic		6/12/1978	IRONIA RD	Mendham Twp	15	12-B	457397	714980	145	0
2500020164	Domestic		8/22/1978	MOUNTAINSIDE RD	Mendham Twp	13	1-4	457391	710932	123	0
2500020173	Domestic		8/2/1978	MT PLEASANT RD	Mendham Twp	23	2	473270	721101	173	0
2500020181	Domestic		8/2/1978	BEVERLY DRIVE	Mendham Twp	35	2-1	474281	700862	250	0
2500020261	Domestic	25-20261	9/14/1978	ROXITICUS RD	Mendham Twp	2	8	449654	699543	350	0
2500020294	Domestic		10/3/1978	CARRIAGE HILL DR	Mendham Twp	2	65	448621	695497	298	0
2500020310	Domestic		9/27/1978	SADDLE HILL RD	Mendham Twp	2	60	452732	699538	150	0
2500020317	Domestic		4/5/1979	BEVERLY DRIVE	Mendham Twp	35	22	472768	701504	373	0
2500020331	Domestic		12/7/1978	OLD ORCHARD RD	Mendham Twp	26	26-C	481010	720321	173	0
2500020346	Domestic		10/14/1978	COLD MILL RD	Mendham Twp	16	29A	468138	714359	200	0
2500020391	Domestic		10/30/1978	29 OLD ORCHARD RD	Mendham Twp	1782	5M	480445	718398	125	0
2500020400	Domestic		12/29/1978	CONIFER DR	Mendham Twp	29	2-8	475315	713004	400	0
2500020401	Domestic		1/9/1979	CONIFER DR	Mendham Twp	29	2-11	475315	713004	500	0
2500020523	Domestic		4/18/1979	HARDSCRABBLE ROAD	Mendham Twp	35	3-1	471767	701505	298	0
2500020626	Domestic		5/30/1979	CARRIAGE HILL RD	Mendham Twp	2	63	451702	696841	398	0
2500020716	Domestic		10/10/1979	N GATE RD	Mendham Twp	11-B	36	453782	714378	148	5
2500020874	Domestic		8/22/1979	CONIFER DR	Mendham Twp	29	2-2	475314	711655	200	0
2500020874	Domestic		8/22/1979	CONIFER DR	Mendham Twp	29	2-2	475314	711655	200	0
2500020875	Domestic		8/21/1979	CONIFER DR	Mendham Twp	29	2-7	475315	713004	710	0
2500020927	Domestic		9/28/1979	283 MOUNTAINSIDE	Mendham Twp	13	1-2	458905	711672	123	5
2500020938	Domestic		10/3/1979	COLD HILL RD	Mendham Twp	16	31	468135	711661	173	5
2500020959	Domestic	25-20959	9/16/1979	BLISS RD	Mendham Twp	17	2A	462991	698174	120	9
2500020987	Domestic		6/17/1980	6 PRUDENCE LN	Mendham Twp	30	13-4	480444	715700	148	5
2500021037	Domestic		11/2/1979	MT PLEASANT RD	Mendham Twp	23	13	473270	721101	248	0
2500021042	Domestic		11/2/1979	N GATE RD	Mendham Twp	11	11-7	454805	713027	298	2
2500021090	Domestic		1/29/1980	N GATE RD	Mendham Twp	11-B	34	454807	714376	150	7
2500021092	Domestic		2/4/1980	N GATE RD	Mendham Twp	11	11-13	453782	714378	175	7
2500021112	Domestic		11/13/1979	CONIFER DR	Mendham Twp	29	2-9	475315	713004	300	0
2500021138	Domestic	1	12/1/1979	ROXITICUS RD	Mendham Twp	2	44	451220	700215	150	0
2500021202	Domestic		2/1/1980	PLEASANT VALLEY RD	Mendham Twp	11	6 - 5	457861	698181	230	0

2500021246	Domestic		5/7/1980	RT 24	Mendham Twp	16	33-7	461465	708194	225	0
2500021247	Domestic		5/6/1980	RT 24	Mendham Twp	16	33-8	461465	708194	300	0
2500021318	Domestic	906	4/1/1980	ROXCITICUS RD	Mendham Twp	2	52-2	451222	701531	200	0
2500021325	Domestic	1	6/15/1980	CARRIAGE HILL DR	Mendham Twp	1	11	450675	696843	130	0
2500021399	Domestic	25-21399	6/8/1980	OAK KNOLL RD	Mendham Twp	11	11-23	454799	708979	450	9
2500021573	Domestic		10/7/1980	HUB HOLLOW RD	Mendham Twp	5	14	454776	694138	300	0
2500021602	Domestic		10/29/1980	OLD MILL RD	Mendham Twp	10-B	10-1	451726	711683	173	5
2500021604	Domestic		9/23/1980	38 OAK KNOLL RD	Mendham Twp	11B	24	452752	711681	197	0
2500021661	Domestic	1	10/16/1980	ROXITICUS RD	Mendham Twp	8	1 A	450680	699541	500	0
2500021692	Domestic		10/20/1980	ROXITICIUS RD	Mendham Twp	8	1 A	450680	699541	300	0
2500021705	Domestic		11/13/1980	MENDHAM RD	Mendham Twp	39	13-A	473776	712331	148	0
2500021819	Domestic		2/4/1981	ROXITICUS RD	Mendham Twp	8	23	456384	705570	148	0
2500021955	Domestic		3/19/1981	ROXITICUS ROAD	Mendham Twp	8	1 A	451708	700889	140	9
2500022141	Domestic		6/29/1981	WOODLAND RD	Mendham Twp	21	25A	470707	720328	325	0
2500022145	Domestic		6/24/1981	BRIARWOOD LN	Mendham Twp	16	3312	468141	717058	320	0
2500022156	Domestic Replacement		8/14/1981	DOGWOOD DR @ TINGLEY RD	Mendham Twp	30	10-27	476342	715702	398	0
2500022273	Domestic		6/17/1982	RTE. 24 - MENDHAM RD	Mendham Twp	33	10A	469159	710311	200	0
2500022423	Domestic		11/19/1981	HUNTERS GLEN RD	Mendham Twp	1	6	449649	696845	623	0
2500022424	Domestic		12/23/1981	BERNARDSVILLE RD (CITY RTE 525)	Mendham Twp	15	6	465610	700195	123	0
2500022503	Domestic		1/8/1982	WOODLAND RD	Mendham Twp	21	25 A-1	470707	720328	398	0
2500022620	Domestic		1/24/1983	1 INDIA BROOK DR	Mendham Twp	116	25	460960	714368	320	9
2500022650	Domestic		6/14/1982	INDIAN HOLLOW RD	Mendham Twp	33	6-15	476338	708956	670	5
2500022710	Domestic		6/9/1982	MT PLEASANT RD	Mendham Twp	23	7.02	476936	723055	148	0
2500022792	Domestic		6/15/1982	SADDLE HILL RD	Mendham Twp	2	54	452222	701529	199	0
2500022802	Domestic		3/20/1983	COREY LANE	Mendham Twp	13	1 E	468692	704240	425	0
2500022837	Domestic		1/18/1983	4 INDIA BROOK DRIVE	Mendham Twp	15	14.08	459934	714369	380	0
2500023104	Domestic		9/7/1982	TEMPE WICK RD	Mendham Twp	32	3A	473771	705551	98	0
2500023252	Domestic		10/27/1982	SCHOOL HOUSE LN	Mendham Twp	25	3	481010	721737	400	7
2500023314	Domestic		1/22/1983	3 INDIA BROOK RD	Mendham Twp	15	14.03	459934	714369	300	0
2500023364	Domestic		11/5/1982	BRIARWOOD LANE	Mendham Twp	16	33-6	468705	717698	122	0
2500023399	Domestic		12/13/1982	CONIFER DR	Mendham Twp	29	2-6	475315	713004	600	0
2500023452	Domestic		12/31/1982	6 INDIA BROOK DR	Mendham Twp	116	32	459934	714369	100	9
2500023453	Domestic		12/23/1982	8 INDIA BROOK DR	Mendham Twp	116	31	459934	714369	160	9
2500023670	Domestic		5/5/1983	OLD MILL RD	Mendham Twp	11-B	10:4	451724	710333	675	0
2500023671	Domestic		4/6/1983	OLD MILL RD	Mendham Twp	11-B	10-5	452745	707633	573	0

2500023683	Domestic		1/30/1983	2 INDIA BROOK DDR	Mendham Twp	116	34	460960	714368	300	9
2500023750	Domestic Replacement		4/28/1983	IRONIA ROAD	Mendham Twp	15	19A	456939	717004	122	0
2500023766	Domestic		12/19/1983	CARRIAGE HILL RD	Mendham Twp	TW0	41	450752	696775	500	0
2500023772	Domestic		12/20/1983	COREY LANE	Mendham Twp	39	13-3	474289	711656	425	0
2500023822	Domestic		10/31/1983	TWIN BROOK TRAIL	Mendham Twp	14	207	454858	714275	250	
2500023823	Domestic		8/1/1983	TWIN BROOK TRAIL	Mendham Twp	14	2.08	454858	714275	125	
2500023828	Domestic		6/1/1983	10 INDIA BROOK DR	Mendham Twp	116	30	459933	713020	340	9
2500023829	Domestic		6/1/1983	5 INDIA BROOK DR	Mendham Twp	116	28	459934	714369	340	8
2500023830	Domestic		6/8/1983	5 INDIA BROOK DR	Mendham Twp	116	27	459934	714369	320	8
2500023874	Domestic	431	6/1/1983	HUNTERS GLEN RD	Mendham Twp	2	46	449649	696845	400	0
2500023916	Domestic		6/23/1983	INDIAN HOLLOW RD	Mendham Twp	33	6-14	476338	708956	540	0
2500024016	Domestic		7/25/1984	RT 24 & CONIFER DR	Mendham Twp	29	2-1	475314	711655	600	0
2500024047	Domestic		8/1/1983	BURNETT RD	Mendham Twp	14	1	453858	714277	200	0
2500024103	Domestic		8/19/1983	CARRIAGE HILL RD	Mendham Twp	2	44	449647	695495	600	0
2500024125	Domestic		7/31/1984	GLEN GARY DR	Mendham Twp	20	1013	477469	712935	450	0
2500024126	Domestic		8/26/1983	GLEN GARY RD	Mendham Twp	29	9A	476341	713003	30	0
2500024127	Domestic		8/29/1983	2 CEDAR LN	Mendham Twp	114	26	453782	714378	385	0
2500024128	Domestic		11/21/1984	1 CEDAR LANE	Mendham Twp	114	20	454807	714376	150	10
2500024131	Domestic		8/25/1983	MT PLEASANT RD	Mendham Twp	25	5-8	479423	723796	200	0
2500024132	Domestic		8/27/1983	MT PLEASANT RD	Mendham Twp	25	5-7	479423	723796	200	0
2500024147	Domestic		10/11/1983	HUNTERS GLEN RD	Mendham Twp	47	2	449649	696845	623	0
2500024336	Domestic		11/7/1983	CONIFER DRIVE	Mendham Twp	29	3-01	474392	712937	498	0
2500024394	Domestic		11/14/1983	CONIFER DR	Mendham Twp	29	2-3	475315	713004	680	0
2500024421	Domestic		2/17/1984	BRIARWOOD LANE	Mendham Twp	16	33-9	468141	717058	175	0
2500024520	Domestic		11/7/1983	22 N GATE RD	Mendham Twp	11B	32	453780	713029	300	10
2500024521	Domestic		12/6/1983	CONIFER DRIVE	Mendham Twp	29	2.5	474290	713005	600	0
2500024645	Domestic		2/10/1994	PLEASANT VALLEY ROAD	Mendham Twp	16	20	458887	698179	200	0
2500024683	Domestic		10/15/1984	CALAIS RD	Mendham Twp	15	9-4	460958	713018	100	10
2500024751	Domestic		3/23/1984	MENDHAM RD	Mendham Twp	29	5-A	476341	713003	400	4
2500024798	Domestic		1/7/1985	BURNETT DR	Mendham Twp	11B	46	453782	714378	125	0
2500024803	Domestic		4/1/1984	CALAIS RD	Mendham Twp	16	26-73	462089	715581	225	6
2500024804	Domestic		4/1/1984	31 CALAIS RD	Mendham Twp	117	62	462089	715581	275	6
2500024867	Domestic	#711	6/1/1984	ORCHARD RD	Mendham Twp	26	23	479420	718399	75	10
2500024923	Domestic		9/7/1984	SCHOOLHOUSE LANE	Mendham Twp	25	1-A	478397	722447	400	0
2500025116	Domestic		3/20/1985	PRUDENCE LANE	Mendham Twp	30	13-3	480444	715700	340	0

2500025203	Domestic		8/3/1984	COLD HILL RD AND WOODLAND	Mendham Twp	19	3202	469166	717057	200	0
2500025204	Domestic		10/15/1985	COLD HILL RD	Mendham Twp	19	3203	469166	717057	300	0
2500025205	Domestic		8/3/1984	COLD HILL RD	Mendham Twp	19	3201	469166	717057	100	0
2500025206	Domestic		10/8/1984	COLD HILL RD	Mendham Twp	19	3204	469166	717057	30	0
2500025218	Domestic		7/28/1984	5 AMALIA CT	Mendham Twp	15	17-2C	459938	717067	700	0
2500025219	Domestic		3/26/1985	SADDLE HILL RD	Mendham Twp	2	5602	451755	698089	300	0
2500025221	Domestic		4/1/1985	WOODLAWN TERRACE	Mendham Twp	21	2A	472320	718302	305	0
2500025458	Domestic		2/1/1985	KENDALL CT	Mendham Twp	8	42	454795	706281	105	25
2500025464	Domestic		11/16/1984	GLEN GARY DRIVE	Mendham Twp	29	3.03	476341	713003	505	0
2500025526	Domestic		1/4/1985	39 CALAIS RD	Mendham Twp	117	65	463014	717064	175	0
2500025621	Domestic		12/12/1984	MT PLEASANT RD	Mendham Twp	23	1.19	478397	722447	200	0
2500025691	Domestic		11/12/1985	CONIFER DR	Mendham Twp	29	S2-4	474290	713005	700	0
2500025731	Domestic		12/20/1984	GLEN GARY RD	Mendham Twp	29	9.01	476392	712936	705	0
2500025788	Domestic		1/5/1985	MT PLEASANT RD	Mendham Twp	25	5-12	480447	722446	305	5
2500025814	Domestic		3/20/1985	35 CALAIS RD	Mendham Twp	117	64	461989	717065	300	5
2500025819	Domestic		2/1/1985	CALAIS RD	Mendham Twp	16	26-71	461987	715716	200	8
2500025926	Domestic		4/1/1985	WOODLAND RD	Mendham Twp	19A	48A	472317	715570	500	3
2500025940	Domestic		2/12/1985	8 CALAIS RD	Mendham Twp	116	36	460009	712952	350	7
2500026182	Domestic		4/20/1985	CALAIS RD	Mendham Twp	16	26-70	460958	713018	80	0
2500026223	Domestic		5/15/1985	GLEN GARY DR	Mendham Twp	29	9.04	476341	713003	400	0
2500026224	Domestic		6/26/1985	GLEN GARY DR	Mendham Twp	29	9.05	476341	713003	825	0
2500026240	Domestic		7/18/1985	GLEN GARY DR	Mendham Twp	29	9.11	476341	713003	700	0
2500026241	Domestic		6/5/1985	GLEN GARY DR	Mendham Twp	29	9.10	476341	713003	660	0
2500026242	Domestic		6/20/1985	GLEN GARY DR	Mendham Twp	29	9.09	476341	713003	420	0
2500026243	Domestic		7/12/1985	GLEN GARY DR	Mendham Twp	29	9.08	476341	713003	500	0
2500026245	Domestic		6/19/1985	GLEN GARY DR	Mendham Twp	29	9.06	476341	713003	480	0
2500026247	Domestic		6/4/1985	HUNTERS GLEN & CARRIAGE HILL	Mendham Twp	2	43	449647	695495	1023	0
2500026271	Domestic		6/3/1985	KENDALL CT	Mendham Twp	8	39	454793	704932	305	0
2500026279	Domestic	25-26279	6/20/1985	TINGLEY RD	Mendham Twp	28	7	475319	718401	430	30
2500026337	Domestic	#1035	7/1/1985	MT PLEASANT RD	Mendham Twp	26	3501	478397	722447	350	0
2500026338	Domestic	#1037	7/1/1985	MT PLEASANT RD	Mendham Twp	26	3502	478397	722447	300	0
2500026401	Domestic		9/28/1985	ROXITICUS RD	Mendham Twp	7	2	449756	699408	500	0
2500026482	Domestic		6/26/1986	N GATE RD	Mendham Twp	11	1117	454803	711678	130	10
2500026483	Domestic		6/27/1985	6 AMALIA CT	Mendham Twp	15	172D	459938	717067	680	0
2500026486	Domestic		8/7/1985	KENNEDY RD	Mendham Twp	31	4B-1	471312	708892	499	0

2500026502	Domestic		8/19/1985	PLEASANT VALLEY RD	Mendham Twp	5	4	458991	699394	400	0
2500026708	Domestic		9/22/1985	KENDALL CT	Mendham Twp	8	37	454795	706281	140	0
2500026709	Domestic		9/23/1985	KENDALL CT	Mendham Twp	8	36	455923	706178	240	0
2500026710	Domestic		10/23/1985	KENDALL CT	Mendham Twp	8	38	454795	706281	280	0
2500026732	Domestic		8/19/1986	GOLF LANE	Mendham Twp	32	502	472311	707475	298	0
2500026733	Domestic		10/11/1985	GOLF LANE	Mendham Twp	32	501	472311	707475	198	0
2500026735	Domestic		10/14/1985	DUKES COURT	Mendham Twp	23	104	474295	721100	250	0
2500026737	Domestic		10/18/1985	DUKES COURT	Mendham Twp	23	103	474295	721100	270	0
2500026738	Domestic		10/15/1985	DUKES COURT	Mendham Twp	23	101	474295	721100	75	0
2500026776	Domestic		12/3/1985	5 INDIA BROOK DR	Mendham Twp	116	27	459934	714369	197	0
2500026944	Domestic		1/29/1986	COREY LN	Mendham Twp	33	1A	475309	704909	150	0
2500027050	Domestic		10/23/1985	COLD HILL RD	Mendham Twp	16	31-3	468242	715574	280	0
2500027051	Domestic		6/10/1986	CALAIS ROAD	Mendham Twp	15	17-5	462091	716997	305	10
2500027181	Domestic		2/18/1986	KENDALL CT	Mendham Twp	8	34	455921	704862	298	0
2500027182	Domestic		2/17/1986	KENDALL CT	Mendham Twp	8	44	454795	706281	398	0
2500027183	Domestic		2/11/1986	KENDALL CT	Mendham Twp	8	40	454793	704932	448	0
2500027184	Domestic		2/10/1986	KENDALL CT	Mendham Twp	8	41	454793	704932	98	0
2500027185	Domestic		2/13/1986	KENDALL CT	Mendham Twp	8	43	454793	704932	498	0
2500027236	Domestic		1/13/1986	STONEY HILL ROAD	Mendham Twp	21	49B	475396	718300	255	
2500027279	Domestic		1/19/1986	230 MOUNTAINSIDE	Mendham Twp	1	12	459931	711670	320	30
2500027307	Domestic	#1410	9/1/1986	CEDAR LN	Mendham Twp	14	2.12	453784	715727	500	0
2500027358	Domestic		9/26/1986	ROXITICUS RD	Mendham Twp	9	7B	457921	704860	230	13
2500027359	Domestic		3/27/1986	ROXITICUS RD	Mendham Twp	9	7A	457921	704860	305	0
2500027646	Domestic		5/3/1986	MT PLEASANT RD	Mendham Twp	26	34.01	474398	721033	300	8
2500027667	Domestic		5/5/1986	GLEN MANOR DR RR#3	Mendham Twp	21	2302	470245	719620	700	
2500027760	Domestic		6/7/1986	MOUNT PLEASANT RD	Mendham Twp	23	3.02	472322	721035	225	0
2500027761	Domestic		9/22/1986	CALAIS RD	Mendham Twp	15	17-7	461013	715582	375	0
2500027810	Domestic		8/11/1986	98 N. PASSAIC AVENUE	Mendham Twp	15	17-3	463091	716996	305	
2500027811	Domestic		6/10/1986	ROUTE 24	Mendham Twp	8	1.10	452828	695355	95	10
2500027878	Domestic		8/12/1986	16 ABERDEEN DRIVE	Mendham Twp	15	9-3	460011	714268	355	
2500027888	Domestic		6/18/1986	KENDALL CT	Mendham Twp	45	8	454795	706281	900	0
2500027988	Domestic		7/20/1986	MOUNTAINSIDE RD	Mendham Twp	1	14	459931	711670	600	9
2500028093	Domestic		7/15/1986	CEDAR LN	Mendham Twp	114	2.08	454860	715591	140	25
2500028126	Domestic		7/25/1987	BITTERSWEET LANE	Mendham Twp	8	1.07	451711	702238	425	0
2500028305	Domestic		8/18/1986	LEDDELL RD	Mendham Twp	35	11	477462	702108	150	0

2500028332	Domestic		9/5/1986	PLEASANT VALLEY RD	Mendham Twp	16	18	461967	699525	400	0
2500028404	Domestic		10/17/1986	BRIARWOOD LN	Mendham Twp	16	3311	468141	717058	475	0
2500028478	Domestic		9/19/1987	BITTER SWEET LANE	Mendham Twp	8	108	450685	702240	325	0
2500028546	Domestic		11/18/1986	ROXITICUS RD	Mendham Twp	11	7A	457872	706276	300	5
2500028604	Domestic Replacement	`	11/6/1986	ROXITICUS RD	Mendham Twp	7	2A2	449756	699408	365	0
2500028605	Domestic		10/5/1986	GLEN GARY DR	Mendham Twp	29	9-11	476392	712936	305	0
2500028617	Domestic Replacement		10/3/1986	KENDALL CT	Mendham Twp	8	43	454793	704932	98	0
2500028682	Domestic		10/9/1987	ROXITICUS RD	Mendham Twp	7	2A-1	450680	699541	80	0
2500029500	Domestic		5/6/1987	BITTERSWEET LANE	Mendham Twp	8	109	450685	702240	725	0
2500029653	Domestic		6/9/1987	WOODLAND RD	Mendham Twp	21	2.01	470707	720328	298	0
2500030001	Domestic		7/27/1987	6 CONNIFER DRIVE	Mendham Twp	29	2-1	475854	713645	300	10
2500030082	Domestic		3/25/1988	BRIARWOOD LANE	Mendham Twp	16	33.10	468705	717698	375	0
2500030085	Domestic		9/16/1987	HILL TOP ROAD	Mendham Twp	15	1-4	463535	702828	473	0
2500030087	Domestic		8/20/1987	TEMPE WICK ROAD	Mendham Twp	34	13	468697	709603	198	0
2500030248	Domestic	1681	9/21/1987	PLEASANT VALLEY ROAD	Mendham Twp	1	1	459913	698178	410	0
2500030249	Domestic	1670	10/9/1987	PLEASANT VALLEY ROAD	Mendham Twp	1	1	459452	698786	400	0
2500030291	Domestic		10/6/1987	WINSTON FARM LANE	Mendham Twp	8	1.08	450224	702848	400	0
2500030597	Domestic		11/17/1987	CHERRY LN	Mendham Twp	15	3B	468691	702823	605	10
2500030723	Domestic		1/21/1988	SOUTH RD & IRONIA RD	Mendham Twp	14	10	458918	721117	270	0
2500030726	Domestic		12/9/1988	COBBLEFIELD DRIVE	Mendham Twp	37	4.07	474847	704235	630	25
2500030933	Domestic		2/23/1988	RT 24 & ROXITICUS RD	Mendham Twp	10	8-1	457386	706884	140	10
2500031316	Domestic		4/12/1988	SCHOOLHOUSE ROAD	Mendham Twp	23	7-01	477937	724471	430	15
2500031317	Domestic		4/22/1988	KENDALL COURT	Mendham Twp	8	33	456384	705570	505	
2500031483	Domestic		5/25/1988	STONEY HILL ROAD	Mendham Twp	21	58.01	474855	714961	505	
2500031733	Domestic Replacement		9/1/1988	7 MARTINS LN	Mendham Twp	7	2	481470	718398	330	5
2500031747	Domestic	2	11/9/1988	OAK KNOLL ROAD	Mendham Twp	11-B	32	454323	716401	445	65
2500031755	Domestic		6/22/1988	WASHINGTON VALLEY RD &	Mendham Twp	37	8.1	478933	719006	285	8
2500032119	Domestic		8/15/1988	TEMPE WICK RD	Mendham Twp	35	10D	474284	704909	398	0
2500032283	Domestic		9/8/1988	TEMPE WICK ROAD	Mendham Twp	34	9	473771	705551	105	
2500032363	Domestic		6/30/1988	WINSTON FARM ROAD	Mendham Twp	23.02	13.02	450224	702848	700	10
2500032432	Domestic		11/2/1988	FRANKLIN COURT	Mendham Twp	21	28A5	472783	720326	405	7
2500032515	Domestic		11/21/1988	COBBLEFIELD DRIVE	Mendham Twp	35	4.06	474847	704235	248	
2500032519	Domestic		11/17/1988	COBBLEFIELD DRIVE	Mendham Twp	35	4.03	475848	704234	723	
2500033161	Domestic		4/26/1989	ROUTE 202	Mendham Twp	35	4.08	473770	704235	730	
2500033420	Domestic		7/28/1989	WINSTON FARM ROAD	Mendham Twp	8	1.03	451222	701531	855	

2500033563	Domestic		11/3/1989	COBBLEFIELD DRIVE	Mendham Twp	35	4.08	473770	704235	655	7
2500033748	Domestic		2/22/1990	COBBLEFIELD DRIVE	Mendham Twp	35	4.16	475847	702817	297	
2500033897	Domestic		9/12/1989	MT. PLEASANT ROAD	Mendham Twp	23	1.18	479935	723053	170	
2500034300	Domestic		8/24/1989	22 OLD ORCHARD RD	Mendham Twp	127	117	478395	719748	150	10
2500034471	Domestic		9/16/1989	ROXITICUS RD	Mendham Twp	8	1.03	451222	701531	150	25
2500035489	Domestic		6/19/1990	MOSLE ROAD	Mendham Twp	5	2	456370	696058	800	16
2500036228	Domestic		6/8/1990	SOUTH ROAD	Mendham Twp	15	21	456403	719029	165	10
2500036368	Domestic			VALLEY VIEW DRIVE	Mendham Twp	11	3-4	455310	708203	1000	
2500036549	Domestic		8/15/1990	CORY ROAD	Mendham Twp	33	6-2	475850	708180	305	16
2500036551	Domestic		7/16/1990	STONEY HILL ROAD	Mendham Twp	21	54.02	474855	714961	805	
2500036584	Domestic		9/8/1990	MT. PLEASANT ROAD	Mendham Twp	21	30	472783	720326	305	
2500036845	Domestic		6/1/1990	MOUNTAINSIDE ROAD	Mendham Twp	15	7A	460468	710928	305	
2500036846	Domestic		2/6/1991	POST LANE ROAD	Mendham Twp	21	54.02	473778	714962	630	7
2500038160	Domestic		4/11/1991	28 CHERRY LANE	Mendham Twp	138	13	468698	710918	155	10
2500038695	Domestic		5/16/1991	32 COREY LANE	Mendham Twp	144	28	473773	708182	475	
2500038728	Domestic Replacement		5/14/1991	WASHINGTON VALLEY ROAD	Mendham Twp	140	7	477933	717691	698	
2500039159	Domestic	1	8/7/1991	363 HARDSCRABBLE	Mendham Twp	147	1A	471767	701505	150	8
2500039830	Domestic	1	12/17/1991	KENNEDY ROAD	Mendham Twp	145	9	469697	709602	600	8
2500039854	Domestic		12/7/1991	OLD ORCHARD ROAD	Mendham Twp	26	29	481010	720321	550	7
2500039988	Domestic		11/25/1991	IRONIA ROAD	Mendham Twp	116	57	457393	712349	205	7
2500040095	Domestic Replacement		11/18/1991	ALAIS ROAD	Mendham Twp	117	53	461472	713659	73	
2500040566	Domestic		1/28/1992	TEMPE WICK ROAD	Mendham Twp	146	6	470695	706869	205	13
2500040586	Domestic		3/18/1992	5 SHORES ROAD	Mendham Twp	127	52	470707	720328	355	7
2500041041	Domestic		5/12/1992	BUDDY LANE	Mendham Twp	130	22.03	469705	717697	1030	
2500041433	Domestic		10/7/1993	HORIZON DRIVE	Mendham Twp	16	23.01	464549	714970	300	
2500041496	Domestic		8/10/1992	WINSTON FARM ROAD	Mendham Twp	1.06	8.04	449221	701534	405	
2500041831	Domestic	1	11/3/1992	CHERRY LANE PO BOX 207	Mendham Twp	2301	2	471778	713648	700	
2500042019	Domestic		10/8/1992	WINSTON FARM LANE	Mendham Twp	107	57	449226	704266	800	5
2500042642	Domestic		10/4/1993	ROUTE 24	Mendham Twp	145	5.01	470698	710917	300	0
2500042643	Domestic		10/5/1993	ROUTE 24	Mendham Twp	145	5	470698	710917	300	0
2500042720	Domestic Replacement		5/17/1993	8 OLD BROOKSIDE	Mendham Twp	118	4	469708	721745	330	0
2500042721	Domestic		5/19/1993	OLD BROOKSIDE ROAD	Mendham Twp	118	4.01	469708	721745	300	
2500042864	Domestic		7/10/1993	ROUTE 24	Mendham Twp	107	22	456384	705570	300	
2500042889	Domestic		4/28/1993	RD	Mendham Twp	144	29.03	473772	706866	248	
2500042923	Domestic		7/28/1993	GOLF LANE	Mendham Twp	144	35	472773	708183	785	

2500043354	Domestic		11/18/1993	20 TANGLEWOOD LANE	Mendham Twp	35	4.10	474845	701502	305	
2500043922	Domestic		11/5/1993	COREY LANE	Mendham Twp	142	37	474852	710913	305	
2500043923	Domestic		11/16/1993	COBBLEFIELD DRIVE	Mendham Twp	147	31	474846	702818	300	
2500043939	Domestic		9/29/1993	REDMAN FARM ROAD	Mendham Twp	144	29.05	473772	706866	273	
2500043940	Domestic		12/7/1993	REDMAN FARM ROAD	Mendham Twp	144	29.04	474849	706866	298	0
2500044664	Domestic		4/27/1996	BUDDY LANE	Mendham Twp	130	8.04	469705	717697	400	10
2500044752	Domestic		4/6/1994	REDMAN FARM ROAD	Mendham Twp	144	29.07	473772	706866	448	0
2500044753	Domestic		4/4/1994	ROXITICUS ROAD	Mendham Twp	109	28.2	456387	708201	150	0
2500044754	Domestic		5/11/1994	ROXITICUS ROAD	Mendham Twp	109	28.3	456387	708201	200	10
2500044884	Domestic Replacement		5/18/1994	COREY ROAD	Mendham Twp	147	12	473770	704235	185	0
2500045120	Domestic		7/7/1994	POST LANE	Mendham Twp	127	192.02	473778	714962	300	0
2500045258	Domestic		2/14/1995	IRONIA ROAD	Mendham Twp	109	28.1	456387	708201	90	10
2500045609	Domestic		2/3/1995	INDIAN HOLLOW ROAD	Mendham Twp	142	57	476928	709596	300	0
2500045610	Domestic	1	11/17/1994	MOSLE ROAD	Mendham Twp	100	27.06	460452	698785	290	7
2500046048	Domestic Replacement		10/24/1994	WOODLAWN TERRACE	Mendham Twp	127	26	470706	719012	155	10
2500046056	Domestic		10/28/1994	DOGWOOD DRIVE	Mendham Twp	140	12	477933	717691	700	5
2500046918	Domestic		12/18/1995	BUDDY LANE	Mendham Twp	130	8.08	469705	717697	950	0
2500047038	Domestic Replacement		5/12/1995	DOGWOOD DRIVE	Mendham Twp	141	9	478932	717691	650	7
2500047090	Domestic		6/28/1995	CHERRY LANE	Mendham Twp	2101	4	468692	704240	975	0
2500047391	Domestic		7/14/1995	SPRINGCROFT ROAD	Mendham Twp	106	8.05	449221	701534	100	12
2500047489	Domestic		7/31/1995	SPRINGCROFT ROAD	Mendham Twp	106	8.06	448142	700220	555	0
2500048042	Domestic		8/15/1996	MICHAEL RD.	Mendham Twp	130	8.09	479931	716375	900	0
2500048043	Domestic		8/26/1996	MICHAEL RD.	Mendham Twp	130	8.10	479931	716375	1100	0
2500048044	Domestic		8/13/1996	MICHAEL RD.	Mendham Twp	130	8.11	479931	716375	1100	0
2500048045	Domestic		8/19/1996	MICHAEL RD.	Mendham Twp	130	7.01	471215	715706	830	0
2500048115	Domestic	1	5/1/1996	KENNEDY ROAD	Mendham Twp	145	11	471211	710309	948	0
2500048482	Domestic		2/9/1996	6 BALLBROOK DR.	Mendham Twp	2601	2.13	466610	700194	610	5
2500048624	Domestic	1	5/7/1996	28 WASHINGTON VALLEY RD.	Mendham Twp	127	145	484085	720319	300	0
2500048684	Domestic	1	11/4/1996	REDMAN FARM ROAD	Mendham Twp	144	29.06	473771	705551	298	0
2500049034	Domestic		4/12/1997	NESBITT DR.	Mendham Twp	109	39	455310	708203	240	0
2500049071	Domestic	1	8/16/1996	TIMBERRIDGE RD.	Mendham Twp	100	27.01	451220	700215	150	0
2500049286	Domestic	1	8/20/1996	OSAGE LA	Mendham Twp	106	8.07	449214	697486		18
2500049394	Domestic	1	11/1/1996	REDMAN FARM ROAD	Mendham Twp	144	29.09	473772	706866	623	0
2500049498	Domestic Replacement	2	10/1/1996	SHORES RD	Mendham Twp	127	58	471783	720327	648	0
2500049502	Domestic Replacement	2 #1	9/20/1996	11 CALAIS RD	Mendham Twp	117	52	461472	713659	146	0

2500049600	Domestic Replacement	1	12/23/1996	ROXITICUS ROAD	Mendham Twp	107	39	446072	704272	298	0
2500049638	Domestic	1	10/22/1996	7 WOODLAND TERRACE	Mendham Twp	127	27	470707	720328	305	7
2500049685	Domestic		5/2/1997	IRONIA RD	Mendham Twp	114	11.01	460470	712344	830	0
2500049792	Domestic	1	12/26/1996	IRONIA ST.	Mendham Twp	116	3	456401	717713	198	0
2500049960	Domestic		1/22/1997	#4 MANOR HILL RD	Mendham Twp	147	34	473769	702819	300	18
2500050027	Domestic	1	3/18/1997	REDMAN FARM RD	Mendham Twp	144	29.08	473771	705551	298	0
2500050056	Domestic		9/16/1997	IRONIA ROAD	Mendham Twp	109	13.01	456395	713666	705	0
2500050422	Domestic		8/5/1997	IRONIA RD	Mendham Twp	109	14	458470	712347	300	0
2500050730	Domestic		8/25/1997	6 AMALIA COURT	Mendham Twp	116	20	459477	717709	950	0
2500050786	Domestic		7/31/1997	SPRINGDALE RD.	Mendham Twp	100	61.04	450217	698800	300	0
2500051120	Domestic	2	12/4/1997	5 WINSTON FARM LANE	Mendham Twp	107	57	449221	701534	300	0
2500051297	Domestic		10/7/1997	SPRINGDALE RD.	Mendham Twp	100	61.05	450215	697485	300	0
2500051314	Domestic	1	11/17/1997	WOOLDAND TERRACE	Mendham Twp	127	28	471782	719011	298	0
2500051335	Domestic		11/5/1997	10 BUDDY LA.	Mendham Twp	130	8.07	478926	705547	750	0
2500052224	Domestic Replacement		4/14/1998	KENNADAY RD.	Mendham Twp	144	4	472236	710308	275	0
2500052245	Domestic		6/23/1998	ANDREW LANE	Mendham Twp	123	21.01	470706	719012	400	0
2500052322	Domestic Replacement		5/6/1998	2 KENDALL CT	Mendham Twp	8	34	450238	710943	425	0
2500052438	Domestic	1	8/20/1998	MOUNT PAUL ROAD	Mendham Twp	107	69	453306	705575	498	0
2500052535	Domestic	1	4/28/1999	HUNTERS GLEN	Mendham Twp	100	1	448134	696072	298	
2500052616	Domestic		6/30/1998	4 TIMBER RIDGE RD.	Mendham Twp	100	27.05	452218	698797	600	0
2500052699	Domestic		7/20/1998	ROCCONON RD.	Mendham Twp	11.4	19.04	456397	714981	400	0
2500052870	Domestic Replacement	2	9/10/1998	5 NESBITT DRIVE	Mendham Twp	109	40	457387	708200	360	7
2500052880	Domestic		8/21/1998	TIMBER RIDGE ROAD	Mendham Twp	100	27.02	453293	697479	348	0
2500052974	Domestic	1	10/16/1998	87 ROXITICUS RD.	Mendham Twp	106	8.12	446061	698808	495	8
2500052988	Domestic		2/25/1999	117 MOSLE RD	Mendham Twp	2 & 3	3C & 1A	452213	696064	600	0
2500053064	Domestic		11/3/1998	COREY LANE	Mendham Twp	20	146	471770	704237	178	0
2500053441	Domestic		3/9/1999	#47 COREY LANE	Mendham Twp	146	21	471770	704237	185	18
2500053450	Domestic Replacement		1/8/1999	17 CALAIS RD	Mendham Twp	117	55	461473	714974	300	10
2500053451	Domestic		5/6/1999	105 MOSLE RD	Mendham Twp	100	23	454292	696061	300	
2500053649	Domestic Replacement	3	1/13/1999	17 SCHOOLHOUSE	Mendham Twp	125	12	478935	721738	525	5
2500053883	Domestic	1	3/19/1999	2 WRIGHT LANE	Mendham Twp	100	61.06	451217	698798	300	0
2500053884	Domestic	1	4/16/1999	18 DOGWOOD DRIVE	Mendham Twp	40	10-9	476932	716376	870	
2500054010	Domestic	1	4/7/1999	SPRINGCROFT RD.	Mendham Twp	106	7	447139	698806	460	0
2500054012	Domestic Replacement		4/1/1999	85 ROXCITICUS RD.	Mendham Twp	106	8.13	453302	702843	645	5
2500054403	Domestic	1	10/1/1999	ROUTE 24	Mendham Twp	108	26	457386	706884	298	

2500054409	Domestic Replacement	1	6/30/1999	25 ROXITICUS RD.	Mendham Twp	107	32	463543	709608	300	8
2500054411	Domestic		7/16/1999	67 ROXITICUS ROAD	Mendham Twp	107	50	452220	700213	700	18
2500054527	Domestic	1	7/26/1999	49 COREY LANE	Mendham Twp	146	22	467703	714967	175	
2500054678	Domestic	1	8/30/1999	COREY LANE	Mendham Twp	147	6	472770	704236	750	18
2500054748	Domestic		9/15/1999	ROXITICUS ROAD	Mendham Twp	107	48.01	456384	705570	700	
2500055144	Domestic		12/1/1999	WRIGHT ROAD	Mendham Twp	100	61.02	450215	697485	600	
2500055254	Domestic		11/16/1999	WRIGHT RD	Mendham Twp	100	61.01	449214	697486	600	
2500055741	Domestic	1	3/2/2000	TIMBER RIDGE RD	Mendham Twp	100	27.07	468692	704240	250	
2500055742	Domestic		11/16/2000	RAINTREE COURT	Mendham Twp	100	34.03	453293	697479	850	
2500055744	Domestic	1	5/12/2000	MOSELE RD	Mendham Twp	102	2.04	454292	696061	748	
2500056087	Domestic	1	5/5/2000	SPRINGCROFT RD	Mendham Twp	106	6	447139	698806	660	
2500056103	Domestic		5/12/2000	COBBLEFIELD DRIVE	Mendham Twp	147	26	475847	702817	780	
2500056211	Domestic		6/7/2000	SIX PINE HOLLOW LANE	Mendham Twp	107	48.04	456384	705570	550	
2500056441	Domestic		1/3/2000	ROCANAN DR	Mendham Twp	114	19.03	454323	716401	500	
2500056454	Domestic	2	9/8/2000	14 SPRINGCROFT RD	Mendham Twp	106	6	447139	698806	700	7
2500056528	Domestic		9/22/2000	OLD MILL RD.	Mendham Twp	114	29	452244	714988	450	
2500056539	Domestic	1	8/28/2000	WOODLAND RD.	Mendham Twp	130	22.01	470704	717697	723	
2500056662	Domestic	1	10/6/2000	CARRIAGE HILL DR.	Mendham Twp	100	6	448137	697488	605	
2500056778	Domestic		9/25/2000	9 KENNADAY ROAD	Mendham Twp	31	4B	470697	709601	500	
2500056779	Domestic Replacement		8/18/2000	CALAIS ROAD	Mendham Twp	117	54	461473	714974	440	
2500056866	Domestic		10/2/2000	ROCONAN DRIVE	Mendham Twp	114	19.05	456397	714981	800	
2500057045	Domestic		10/30/2000	46 IRONIA RD.	Mendham Twp	109	17	459472	713661	350	
2500057441	Domestic Replacement		2/12/2001	COREY LANE	Mendham Twp	142	67	471774	709600	400	
2500057454	Domestic		1/29/2001	TIMBER RIDGE RD	Mendham Twp	100	27.04	454296	698793	300	
2500057544	Domestic	2	2/13/2001	MOSLE RD	Mendham Twp	102	2.01	453291	696063	790	10
2500057905	Domestic		6/29/2001	50 WASHINGTON VALLEY RD	Mendham Twp	126	14	478933	719006	700	10
2500057921	Domestic	1	5/15/2001	PINE HOLLOW LANE	Mendham Twp	107	48.05	451224	702846	945	5
2500058087	Domestic Replacement		7/26/2001	WASHINGTON VALLEY ROAD	Mendham Twp	127	155	475860	723056	500	
2500058138	Domestic		9/20/2001	MOSLE RD	Mendham Twp	100	26.01	454294	697478	275	
2500058139	Domestic		10/8/2001	MOSLE RD	Mendham Twp	100	26.03	454296	698793	500	
2500058192	Domestic	1	10/6/2000	CARRIAGE HILL DR	Mendham Twp	100	50	449212	696070	605	10
2500058282	Domestic		6/22/2001	MARTIN LANE	Mendham Twp	126	7.01	479933	719006	450	
2500058496	Domestic		8/16/2001	113 MOSLE ROAD	Mendham Twp	100	24	452213	696064	485	
2500058542	Domestic		9/4/2001	OLD ORCHARD RD	Mendham Twp	127	119	478932	717691	200	
2500058656	Domestic		9/6/2001	OLD ORCHARD RD	Mendham Twp	127	123	479933	719006	260	

2500058704	Domestic	2	9/11/2001	138 MOSLE RD	Mendham Twp	103	3	455296	698792	910	10
2500058789	Domestic	3	9/18/2001	138 MOSLE ROAD	Mendham Twp	103	3	455296	698792	800	5
2500058833	Domestic		11/27/2001	18 SCHOOLHOUSE	Mendham Twp	127	86	479935	723053	175	
2500059148	Domestic Replacement		11/2/2001	11 WASHINGTON VALLEY RD	Mendham Twp	40	17	476931	714960	615	
2500059295	Domestic Deepening	1	12/21/2001	2 WINSTON FARM ROAD	Mendham Twp	106	8.03	450221	700429	1020	
2500059365	Domestic Replacement	2	1/9/2002	77 ROXITICUS ROAD	Mendham Twp	106	8.02	452222	701529	820	5
2500059675	Domestic		3/21/2002	15 ROXITICUS RD	Mendham Twp	107	27	456384	705570	200	
2500060514	Domestic		10/30/2002	WOODLAND TERRACE	Mendham Twp	127	24	470706	719012	300	0
2500060545	Domestic Replacement	2 (#1 TO BE SEALED)	6/4/2003	51 TINGLEY RD	Mendham Twp	127	160	475857	717693	198	0
2500061503	Domestic		9/11/2003	OLD MILL RD	Mendham Twp	113	3	458464	708198	750	0
2500061786	Domestic		7/17/2003	MARTINS LANE	Mendham Twp	126	5	481548	719612	300	0
2500062090	Domestic		8/20/2003	PRUDENCE LANE	Mendham Twp	141	29	480548	719613	300	0
2500062169	Domestic Replacement		8/25/2003	174B RT 24 EAST	Mendham Twp	139	78	476392	712936	380	10
2500062178	Domestic		9/18/2003	PINE HOLLOW RD.	Mendham Twp	107	48.04	456921	704861	1000	0
2500062198	Domestic	1	8/29/2003	MOSLE RD.	Mendham Twp	100	18	452826	694040	535	0
2500062420	Domestic Replacement		1/20/2004	88 IRONIA RD	Mendham Twp	114	9	456933	712956	865	0
2500062421	Domestic		11/24/2003	53 OLD MILL RD	Mendham Twp	113	9	450775	710234	460	0
2500062711	Domestic Replacement		11/14/2003	12 BUDDY LANE	Mendham Twp	130	12.01	470242	716989	1000	0
2500062730	Domestic Replacement	2 (#1 TO BE SEALED)	3/11/2004	10 OLD ORCHARD RD.	Mendham Twp	127	124	479472	719613	83	0
2500063113	Domestic		3/18/2004	BUDDY LANE	Mendham Twp	130	8.05	470242	716989	355	0
2500063259	Domestic		4/26/2005	TANAGER LANE	Mendham Twp	123	35.01	477474	722346	400	0
2500063340	Domestic Replacement	0	4/24/2004	11 GLEN GARY DR	Mendham Twp	29	10.10	471317	714255	675	7
2500063363	Domestic		6/9/2004	RAINTREE RIDGE RD.	Mendham Twp	100	34.02	456909	696766	525	0
2500063538	Domestic		12/2/2004	9 COBBLEFIELD DRIVE	Mendham Twp	147	27	478461	699375	700	0
2500064127	Domestic		9/29/2004	RAINTREE RIDGE	Mendham Twp	100	34.04	452835	699403	405	25
2500064320	Domestic		12/15/2004	5 BURNETT RD.	Mendham Twp	114	15	457933	712955	1010	0
2500064326	Domestic	1	12/28/2004	EXMOOR DRIVE	Mendham Twp	147	42.03	472307	702111	340	0
2500064428	Domestic		1/5/2005	94 IRONIA RD	Mendham Twp	114	7.01	459009	712954	850	0
2500064444	Domestic		4/20/2005	17 MT. PLEASANT ROAD	Mendham Twp	124	5	478474	723661	400	0
2500064481	Domestic		10/4/2006	IRONIA RD. (47)	Mendham Twp	116	56.01	461009	712951	503	0
2500064488	Domestic		12/8/2004	MOSELE ROAD	Mendham Twp	102	2.02	453829	695354	700	0
2500064546	Domestic	1	2/17/2005	CORY LANE	Mendham Twp	144	29.02	474387	706158	335	0
2500065187	Domestic	1	5/12/2005	72 OLD MILL ROAD	Mendham Twp	112	13	461021	722362	600	0
2500065433	Domestic		9/11/2006	23 ROXITICUS RD	Mendham Twp	107	31	457923	706175	110	0
2500065445	Domestic Replacement	1	7/22/2005	18 CALAIS ROAD	Mendham Twp	116	22	461013	715582	248	0

2500065465	Domestic	TWO	9/13/2005	RAINTREE RIDGE ROAD	Mendham Twp	100	34.02	456909	696766	300	0
2500065675	Domestic Deepening		9/16/2005	3 PRUDENCE LANE	Mendham Twp	141	22	478471	716983	400	0
2500066078	Domestic Replacement		10/19/2005	WINSTON FARM ROAD	Mendham Twp	8	1.10	448677	698094	325	0
2500066306	Domestic		3/23/2007	8 SCHOOLHOUSE LANE	Mendham Twp	127	91	479472	721030	500	0
2500066335	Domestic Replacement		12/28/2005	PRUDENCE LANE	Mendham Twp	141	30	480548	718297	305	0
2500066362	Domestic		6/18/2007	TANAGER LANE	Mendham Twp	123	35.02	477474	722346	600	0
2500066842	Domestic		7/20/2006	PRUDENCE LANE	Mendham Twp	141	28.01	480546	714249	602	0
2500067330	Domestic Replacement		9/11/2006	92 ROXITICUS ROAD	Mendham Twp	100	70	448677	698094	300	0
2500067369	Domestic		8/19/2006	COBBLEFIELD DRIVE	Mendham Twp	148	2	478463	703423	800	0
2500067580	Domestic		3/21/2007	49 COREY LANE	Mendham Twp	146	22	472308	703427	300	0
2500067674	Domestic	W-1	11/7/2006	5 KENSINGTON COURT	Mendham Twp	35.03	123	476398	722347	700	20
2500067745	Domestic Replacement	2	8/10/2007	2 PINE HOLLOW LANE	Mendham Twp	107	49	452837	700820	600	0
2500068415	Domestic Replacement	1	10/19/2007	99 MOSLE ROAD	Mendham Twp	100	19	451748	694041	773	0
2500068546	Domestic		5/2/2007	6 KENNADAY ROAD	Mendham Twp	144	44	472311	707475	300	0
2500069148	Domestic Replacement		11/9/2007	57 TINGLEY RD	Mendham Twp	127	162	476394	716984	602	12
2500069268	Domestic	1	10/2/2007	EXMOOR DRIVE	Mendham Twp	147	42.10	472307	702111	780	0
2500069918	Domestic		3/26/2008	21 SCHOOLHOUSE	Mendham Twp	125	10	479474	723661	500	0
2500070020	Domestic	2	3/25/2008	25 COREY LANE	Mendham Twp	144	29.01	475387	706157	400	10
2500070146	Domestic		7/23/2008	187 MENDHAM ROAD	Mendham Twp	33	10	476875	711882	650	0
2500070447	Domestic		8/22/2008	24 CALIS ROAD	Mendham Twp	116	15.02	461333	717083	800	0
2500070448	Domestic		8/6/2008	24 CALIS ROAD	Mendham Twp	116	15.03	461153	716697	450	0
2500070461	Domestic		8/11/2008	AMALIA COURT	Mendham Twp	116	17	461022	715972	450	0
2500070537	Domestic		8/20/2008	BARER LANE	Mendham Twp	116	15.01	460984	717080	475	0
2500070607	Domestic	1	10/31/2008	87 IRONIA ROAD	Mendham Twp	116	67	457934	714271	960	0
2800016831	Domestic		7/1/1986	BITTERSWEET LANE	Mendham Twp	8	1.07	451711	702238	400	0
E200910441	Domestic	DW-1	9/18/2009	59 Roxiticus Rd	Mendham Twp	107	47	453874	701147	202	
E201009769	Domestic	domestic #1	9/30/2010	SCHOOLHOUSE LANE	Mendham Twp	127	87	479141	720971	762	
E201010646	Domestic	1	10/28/2010	20 Roxiticus Rd.	Mendham Twp	104	8	457253	705298	300	
E201013759	Domestic	domestic	11/18/2010	16 Schoolhouse Lane	Mendham Twp	127	87	479152	720934	742	33
E201109319	Domestic Replacement	Joe Molnar	9/17/2012	2 Woodlawn Terrace	Mendham Twp	127	22	470917	718879	250	
E201115016	Domestic	1	10/26/2011	3 Bittersweet Lane	Mendham Twp	107	59	451806	702583	905	18
E201117151	Domestic	1	2/3/2012	109 Mosle Rd.	Mendham Twp	100	22	452684	694176	300	20
E201118827	Domestic	1	12/9/2011	Cory Lane	Mendham Twp	142	56	475102	708477	450	10
E201118864	Domestic Replacement	1	2/10/2012	60 Ironia Rd.	Mendham Twp	109	12	456803	712448	440	12
E201208617	Domestic	Well 1	1/4/2013	Tempe Wick Road	Mendham Twp	146	13	473541	705437	625	