TABLE 10
PERSONS AND FAMILIES BELOW POVERTY LEVEL

FAMILIES	PERCENT	NON-FAMILY HOUSEHOLD	PERCENT
6	1.18	3	2.2

Source: 2000 Census

TABLE 11
FAMILIES AND MEAN FAMILY INCOME
BY NUMBER OF WORKERS IN FAMILY, 1999

Number of Workers	Families	Mean Income
No workers	34	$ 55,653
1 worker	167	70,745
2 workers (husband & wife worked)	261	98,805
2 workers (other)	26	71,638
3 or more workers(husband & wife worked)	72	108,336
3 or more workers (other)	8	78,913

Source: 2000 Census

Statistics provided by the real estate industry indicate the median closing price of a house in this area in 1999 was $250,000. Rental data from the same source indicates that new leases are now averaging $800. Incomes, particularly those of low and moderate income households, have not kept pace with the increases in housing costs.

2. PROJECTED HOUSING STOCK

Municipal zoning, market conditions, availability of sewer and water facilities and adequate transportation are among the components which will influence future residential development in Frelinghuysen Township.

Changes in the zoning ordinance of Frelinghuysen Township resulting from changes in this Master Plan will lead an increase in the minimum required lot size in most of the Township.

Frelinghuysen lies some distance from the existing major transportation routes. New Jersey Route 94 is the major state road which traverses the Township. This north-south route does not provide convenient access to the east-west arterials and freeways, such as I-80, which leads to the major employment centers of the New York-Northern New Jersey Region. I-80 does cut across the southern-most part of the township, but there are no interchanges in the Township and the nearest access to I-80 is on narrow, twisting local roads.

Currently, there is no local or interurban public transportation. However, there is an abandoned railroad right-of-way which passes through the Township and is close to the Village of Johnsonburg. The New Jersey Department of Transportation (N.J.D.O.T.) has performed initial feasibility studies regarding reestablishment of commuter rail service along this right-of-way, and has condemned the right-of-way.

The Township has little control over market conditions other than to attempt to provide or encourage the adoption of the abovementioned incentives. The State Development and Redevelopment Plan, adopted in 1993, projected population to increase in Warren County by about 10,500 over a twenty year span between 1990 to 2010. Frelinghuysen, with its low existing population, a high level of undeveloped land and prospective rail transportation could expect to attract 10 percent to 15 percent of the County's population projection, (1,050 to 1,575 additional people) by 2010. This would mean somewhere between 350 and 525 housing units constructed over the twenty year span or 18 to 26 units on an average, per year.

According to the 2000 census, Warren County had a population of 102,437. The latest population projections developed by Warren County show an increase of 14,521 by 2010, 29,103 by 2020, and 42,900 by 2030. Frelinghuysen is projected to increase population by 224 by 2010, 513 by 2020, and 784 by 2030. Under the county's scenario, Frelinghuysen's proportion of increase is 10.75 percent by 2010, 12.53 percent by 2020, and 10.44 percent by 2030. This is around the same as the 10 to 15 percent used with the State projections. The county projection translates into 80 units from 2000 to 2010, an average of 8.0 units per year, 103 units from 2010 to 2020, an average of 10.3 units per year, and 97 units from 2020 to 2030, an average of 9.7 units per year. This seems reasonable given the rate of growth experienced over the past two decades.

3. POPULATION AND HOUSEHOLD EVALUATION AND PROJECTIONS

The population of Frelinghuysen, as of the 2000 Census, consisted of 2,083 persons. For the purposes of this element, the 2000 Census data gives an adequate picture of the characteristics of the population of Frelinghuysen.

TABLE 12
PERSONS BY SEX AND AGE

Age	Total	%	Male	Female
0 – 4	132	6.3	71	61
5 – 9	148	7.1	84	64
10 – 14	158	7.6	72	86
15 – 17	105	5.0	55	50
18 – 19	43	2.1	19	24
20	10	0.5	5	5
21	15	0.7	6	9
22 - 24	31	1.5	12	19
25 – 29	76	3.6	39	37
30 – 34	126	6.0	63	63
35 – 39	188	9.0	90	98
40 – 44	202	9.7	84	101
45 – 49	206	9.9	103	103
50 – 54	173	8.3	94	79
55 – 59	139	6.7	70	69
60 – 61	42	2.0	20	22
62 – 64	59	2.8	32	27
66 - 66	18	0.9	6	12
67 - 69	26	1.2	16	10
70 – 74	60	2.9	23	37
75 – 79	53	2.5	24	29
80 – 84	30	1.4	9	21
85+	43	2.1	14	29
TOTAL	2,083	100.0	1,028	1,055

Source: 2000 Census

The population group 20-29 years show a relatively low percentage as compared to the next two older age groups, 30-34 and 35-39. Most of the "twenties" are "out of the house" and on their own. But if they grew up in Frelinghuysen there probably are no local affordable housing or nearby job opportunities. Beyond this, the population distribution is fairly typical for this area. The median age of all males was 39.9; of all females was 40.5; of all persons was 40.3 years. This is slightly higher than that of the State (36.7 years), or Warren County (37.6 years).

Table 13 shows the distribution of income by family and household as of 1999. As might be expected, family incomes were somewhat higher than household incomes. Non-family households tend to have fewer wage earners than families. Table 14 shows that the mean income of renter households was 56.0 percent of the mean income of owner households.

TABLE 13
HOUSEHOLD, FAMILY, AND NON-FAMILY
INCOME IN 1999

Income	Households	Families	Non-family Households
Under $9,999	18	6	11
$ 10,000 - 14,999	14	4	14
$ 15,000 - 24,999	35	13	9
$ 25,000 - 34,999	21	18	0
$ 35,000 - 49,999	96	76	3
$ 50,000 - 74,999	181	150	9
$ 75,000 - 99,999	145	130	14
$100,000 - 149,999	135	115	1
$150,000 - 1949,999	45	41	2
$200,000 or more	23	15	0
TOTAL	713	568	63
Median Income	$72,434	$78,464	$26,500
Mean Income	$79,912	$61,006	$41,525

Source: 2000 Census

TABLE 14
MEAN HOUSEHOLD INCOME BY TENURE

Owner Occupied	$79,897
Renter Occupied	$44,750

Source: 2000 Census

In order to further develop an understanding of the population of Frelinghuysen, Table 15 outlines the sources and average amounts of income received during 1999.

TABLE 15
HOUSEHOLDS AND MEAN HOUSEHOLD INCOME IN 1999
BY INCOME SOURCE

	HOUSEHOLDS	MEAN INCOME
Wage or salary income	604	$ 77,376
Self-employment income	141	28,431
Interest, dividend, or rental income	361	9,376
Social security income	146	12,590
SSI Income	11	6,109
Public assistance income	11	3,836
Retirement income	127	21,265
Other type of income	77	6,477
With earnings	635	
No earnings	78	

Earnings = wage & salary + self-employed
Note: Many households received income from more than one source

Source: 2000 Census

It is very clear that Frelinghuysen is no longer a farm community. Only 4 persons reported farming as an occupation.

Between 1990 and 2000 the population of Frelinghuysen Township increased by 304, from 1779 to 2083, an increase of 17.1 percent. This is slightly less than the 24.0 percent for the 1980 - 1990 period. The percentage increase for Frelinghuysen for the 1990 - 2000 period was generally in line with the neighboring municipalities of Green (18.0%), Hardwick (16.7%), and higher than Fredon, (3.5%), Blairstown (7.8%), Hope (10.0%), and Allamuchy (11.3%), and substantially lower than Independence (44.2%).

The growth rates for the Green and Hardwick and Frelinghuysen was greater than that of Warren County which grew from 91,607 in 1990 to 102,437 in 2000, and 11.8 percent increase. The rest of the above municipalities had less of an increase.

Based on the August 2004 population estimates prepared by the Warren County Planning Department, the increase from 2000 for Frelinghuysen was 5.2 percent. This was substantially lower than in Hardwick, 10.1% and slightly higher than Independence, 3.9%; Blairstown, 4.9%, Hope, 3.9%, and Allamuchy, 4.2%. The growth rate for the County was 8.4%.

The State Planning Commission in the Development and Redevelopment Plan, adopted in June, 1993, has projected Warren County's population to be 102,000 in 2010, an 11.3 percent increase over the 1990 population. The Warren County Planning Department has also projected population for its constituent municipalities for 2010, 2020 and 2030.

These figures for Frelinghuysen Township are a projected population in 2010 at 2,307, 2,596 in 2020, and 2,867 in 2030, and an estimated population in July 2005 of 2,215.

Although there was a slightly negative growth rate for Phillipsburg from 1990 to 2000 (-3.75%), the County's major center, the county is projecting a significant portion of the county's growth will take place in Phillipsburg. The rest of Warren County's municipalities with buildable land and direct or close access to major transportation facilities, will feel development pressures greater than those communities less well situated. Frelinghuysen fits into the latter category and should continue to experience growth at a rate greater than that of the County as a whole, but less than more accessible municipalities.

Therefore, the population projections for Frelinghuysen Township, produced by the Warren County Planning Department for 2000 and 2030, appear to be valid and the 1997 estimates are in line with the projections.

4. EMPLOYMENT CHARACTERISTICS

Frelinghuysen Township has not directly shared in the economic growth in the region to any significant extent. This fact is reflected in the relative lack of new non-residential development described earlier and the fact that in excess of 61.2% of the Frelinghuysen workforce works out of Warren County. Still others (25.8%) are employed out of town but within Warren County. The following tables describe the labor force in Frelinghuysen.

TABLE 16
LABOR FORCE STATUS

	TOTAL	MALE	FEMALE
Persons 16 years and over	1,594	763	831
Labor force:			
Armed forces	0	0	0
Civilian employed	1,046	591	455
Civilian unemployed	36	13	23
Unemployment rate	3.3%	2.2%	4.8%
Not in labor force	512	159	353

Source: 2000 Census

TABLE 17
PLACE OF WORK, RESIDENTS OF FRELINGHUYSEN

Place of Work		Percentage
Frelinghuysen	133	13.0
Rest of Warren County	265	25.8
Rest of New Jersey	578	56.3
Outside of New Jersey	50	4.9
Total Reported	1,026	100.0

Source: 2000 Census

Given the fact of the rural nature of Warren County, a relatively high percentage (38.8%) of Frelinghuysen's labor force works in the county, but only a relatively small proportion (13.0%) in the Township. Ninety-five percent of the labor force works in New Jersey.

5. PRESENT AND PROSPECTIVE FAIR SHARE

The Council on Affordable Housing (COAH) in the First and Second Rounds (1987-1999) determined that Frelinghuysen Township had a fair share obligation of nineteen (19) affordable housing units. This obligation was defined as an indigenous need of fifteen (15), an estimate of low and moderate income households living in Frelinghuysen in housing indicated to be substandard and seven (7) units of reallocated present regional need and one (1) prospective need unit (1993-1999). These were offset by four (4) credits involving two (2) for spontaneous rehabilitation and two (2) for "filtering" yielding the net obligation of nineteen (19) affordable housing units.

According to COAH's records (Appendix B Third Round Regulations) Frelinghuysen Township has met all but two of its Mt. Laurel housing requirements from Rounds 1 and 2. All but two units of its indigenous need were met by rehabilitating poor housing stock. In 1994, the Township applied for and received a grant of almost $146,000 from the New Jersey Department of Community Affairs Small Cities Community Development Block Grant Housing Rehabilitation Program. These funds were to be used to rehabilitate nine substandard housing units owned and occupied by qualified low and moderate income households. Though interest was expressed by a number of the Township's residents prior to the application submission, only eight (8) applicants were funded.

There are currently three agencies which have facilities which house developmentally disable people. The Matheny School and Hospital has two residential buildings on one site which houses six (6) adults with physical and mental disabilities. The REM Agency serves four (4) developmentally disabled older women. The Center of Humanistic Change has a facility which houses four (4) elderly adults who are developmentally disabled. This brings the total to fourteen (14) lower cost bedrooms at three (3) sites in Frelinghuysen.

There will be the need for a new Housing Plan Element and Fair Share Plan for Frelinghuysen Township which will involve calculating the municipal Mount Laurel housing obligation for the period January 1, 2004 to December 31, 2014. As of February 1, 2007, it is uncertain how the preparation of the Housing Plan Element and Fair Share Plan as the result of the Appellate Court decision, In the Matter of the Adoption of N.J.A.C.5.94 and 5.95 by the New Jersey Council on Affordable Housing announced on January 25, 2007. In that decision, the Appellate Court rejected how the Council on Affordable Housing (COAH) calculated housing need, the allocation of that need and compliance mechanism and gave COAH six months to correct these deficiencies. The court found that COAH had undercounted the amount of affordable housing needed in the State by an over reliance on the process of filtering of old homes to create affordable housing opportunities. The court asked COAH to assign the allocation of affordable housing need to the growth areas proposed in the State Plan as a means of continuing down-zoning to avoid growth and affordable housing. Finally, the court rejected COAH's reliance on affordable housing methods which offered no incentive or density bonus to builders to construct affordable housing. The court also cut back of allowable

percentage of age-restricted affordable housing from 50% to 25% of a municipality's fairshare plan. The concept of growth share was not wholly rejected but the court required COAH to justify this approach consistent with the court's findings in the rest of this decision.

Regarding the Third Mt. Laurel Round's growth share approach, the now rejected COAH regulations would have required an affordable housing program for between 8 and 12 units based on the projected growth in Frelinghuysen Township over the 2004 and 2014 period and 80 new homes and 53,000 square feet of non-residential floor area. The Township cannot proceed with the preparation of a new Housing Plan Element and Fair Share Plan until the new COAH regulations are formulated and adopted.

CIRCULATION ELEMENT

CIRCULATION ELEMENT

INTRODUCTION

The circulation plan consists of recommended changes and improvements that will help foster safe, efficient and energy saving travel within and through the Township. The Circulation plan will also provide the foundation for an official map indicating those areas where new roads should be constructed, existing roads extended or abandoned. The road network within Frelinghuysen Township is generally adequate to meet the current need.

The Township must set standards for improvements to the existing road network as well as for construction of new roads within that network. An important element in this process is the standards promulgated by the Site Improvements Standards Committee created pursuant to the Uniform Site Improvement Act. Those standards will supersede municipal standards.

The Township should prepare a road improvement program focusing on those roads which have the greatest traffic volume and which are deficient as to width or alignment. In order of priority, Greendell Road, Lincoln Laurel Road, Lanning Road, and Ackerson Road should be addressed.

REGIONAL PERSPECTIVE

The Township of Frelinghuysen is located in east central Warren County adjacent to Sussex County municipalities of Fredon, Green and Stillwater. Warren County is served by a diverse transportation network, consisting of federal, state, county and local roadways, limited commuter rail service and freight rail service. This network links Warren County and its municipalities with New York City as well as employment centers in eastern and central New Jersey.

The extension of Interstate 80 through northern New Jersey and on into Pennsylvania has had a significant impact on the rate and pattern of growth in the northern part of the state. Areas once accessible via two lane state highways (U.S. 206, 46, N.J. 94) may now be reached via a six and eight lane highway. Although Warren County has developed have developed with its own regional centers, such as Phillipsburg, Belvidere, Hackettstown, the principal residents employment acts as its focus south and east of Warren County. The continued growth of Warren County and in particular Frelinghuysen Township will continue to be a function of the increased accessibility of this area and its attractiveness as a place of residence.

As with Warren County, Frelinghuysen Township is served by a variety of roadways. Although Interstate 80 passes through the southwestern corner of the Township, there is no direct access to Frelinghuysen from Interstate 80. Principal roadways serving Frelinghuysen Township are N.J. Route 94, a two lane highway as well as primary

Warren County Route 519. Other county roads, classified as secondary roads are County Routes 661, 612 and 608.

Route 94, the only state highway serving Frelinghuysen, is a relatively lightly traveled secondary road in the state system. It originates at the intersection of Routes 46 and I 80 in Columbia and connects this point with regional centers in Blairstown, the Town of Newton and Vernon Township in Sussex County, continuing north into New York State.

COUNTY ROADS

Warren County roadways compliment N.J. 94 and function as the remaining arterial streets within the Township. Warren County Route 519 connects the County Administration Complex in White Township with Interstate 80, U.S. 46 and the regional center, the Town of Newton in Sussex County. Silver Lake Road connects I-80 with N.J. 94 at its terminus at Marksboro. Ramsey Road serves to form part of an arterial pair with Allamuchy Road connecting N.J. 94 with Warren County Route 517 in Allamuchy which provides immediate access to Interstate 80.

EXISTING ROAD CONDITIONS

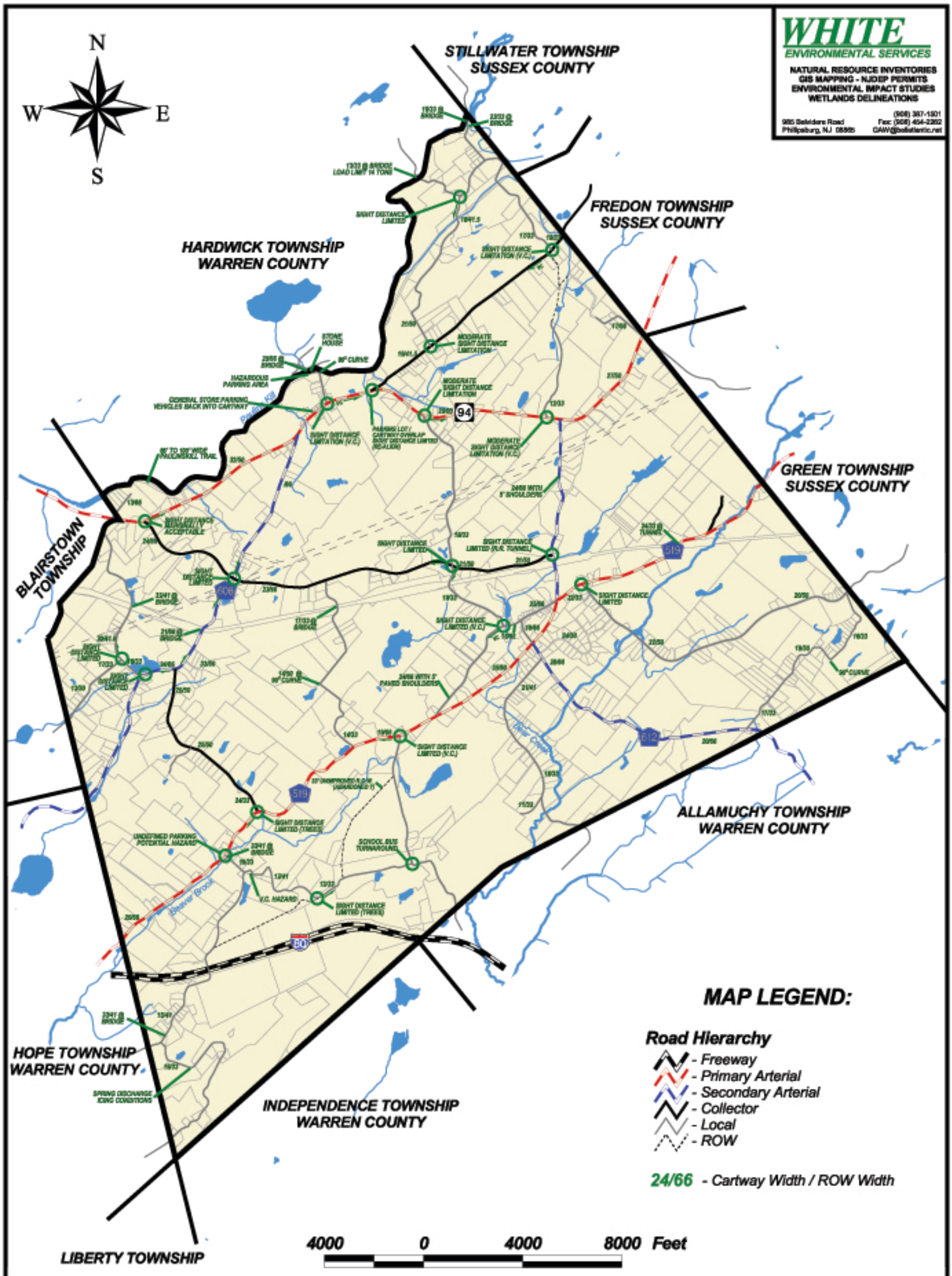
Exhibit 2 (Roadway Conditions) describes the width of right-of-way, width of the cartway (the actual paved portion of the roadway) for all roads within the Township. Additionally, all intersections within the Township have been surveyed and the degree to which sight distances are limited has been indicated.

Road rights-of-way vary widely throughout the Township. The original road widths were determined at the time of the colonial survey being either two rods (33 feet) or the original Great Roads with a four rod right-of-way (66 feet). Subsequently, a municipal standard of 50 feet has been employed. This is the maximum permitted pursuant to the Municipal Land Use Law for municipalities. The county has continues to adhere to the original 66 foot right-of-way. The state highway system looks to greater rights-of-way as the through traffic function becomes more greatly emphasized. Rights-of-way up to 80 feet exist on some parts of the state highway system. However, in Frelinghuysen Route 94 has a right-of-way of only 50 feet.

Most of the roadways within the Township are far narrower than called for in the Township Code. That does not mean that all of the roads in the Township are dangerous because they fail to meet the width standards adopted after they were constructed.

The width of the cartway has a much greater effect on the passage of vehicles than does right-of-way width. Cartway widths within the Township range from a low of 13 1/2 feet at the Paulinskill Bridge on Hess Road and Pippin Hill Road to a width of 32 feet on Route 94. There are numerous municipal roads with widths less than 20 feet, among those are Golden Chain Road, Hess Road, Pippin Hill Road, Lincoln Laurel Road, Heller Road, State Park Road.

EXHIBIT 2
ROADWAY CONDITIONS



WHITE
ENVIRONMENTAL SERVICES

NATURAL RESOURCE INVENTORIES
GIS MAPPING - NJDEP PERMITS
ENVIRONMENTAL IMPACT STUDIES
WETLANDS DELINEATIONS

935 Belvidere Road
Phillipsburg, NJ 08865
(908) 387-1501
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MAP LEGEND:

Road Hierarchy

- Freeway
- Primary Arterial
- Secondary Arterial
- Collector
- Local
- ROW

24/66 - Cartway Width / ROW Width

REFERENCES & NOTES:

Road widths and hazards based upon "Roadway Conditions, Township of Frelinghuysen, Warren County, New Jersey", by Eric K. Snyder & Associates, Inc., May 15, 1995.

Road Hierarchy based upon "Circulation Plan / Roadway Hierarchy, Township of Frelinghuysen, Warren County, New Jersey", by Eric K. Snyder & Associates, Inc., May 10, 1995.

Property boundaries were taken from a composite tax map of FrelinghuysenTownship and adjusted accordingly.

Lakes and Streams based upon NJDEP GIS database.

This map has been prepared as a guide for the Frelinghuysen Township Master Plan. Data on this map should not be relied upon for individual lot planning.

This map was developed using NJDEP & NJGS Geographic Information System digital data, but this secondary product has not been verified by the NJDEP or NJGS and is not State - authorized.

Roadway Conditions

Municipal Master Plan
Township of Frelinghuysen
Warren County, NJ

Scale: 1" = 4000' Date: 10/21/04

ERIC K. SNYDER & ASSOCIATES, INC.
LAND DEVELOPMENT AND COMMUNITY PLANNING CONSULTANTS
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The State of New Jersey, in the Site Improvement Standards Act, has taken a wide ranging look at street standards and made a number of recommendations for change. The principal impact of these recommendations is that local roads will be constructed to widths more in line with those now in existence.

ROAD HIERARCHY

An important key to understanding a roadway network is the road hierarchy. This basically sets up an ordering system for roadways which defines roadways according to their function and their place in the overall system. All roadways do not serve the same function. In fact, if all functions were merged the hazards involved in utilizing the road system would be far greater than they are. The road network can be visualized in much the same way as a stream and river system with small streams meeting larger streams which eventually flow into the largest rivers. In the hierarchy, roads are classified as follows:

Arterial. An arterial is a high-volume street that should have no residences on it. Its function is to conduct traffic between communities and activity centers and to connect communities to major state and interstate highways.

Collector. As the principal traffic artery within residential or commercial areas, the collector carries relatively high traffic volumes and conveys traffic from arterial streets to lower-order streets. Its function is to promote the free flow of traffic; as such, communities should not encourage parking or residences along a collector. The collector's secondary function is to serve abutting land uses.

Access Street. Sometimes called a place or lane, the access street is designed to conduct traffic between dwelling units and higher-order streets. As the lowest-order street in the hierarchy, the access street usually carries no through traffic and includes short streets, cul-de-sacs, and courts. The cul-de-sac, a dead-end street with a turnaround area at the end, is used extensively because it provides a quiet, low-traffic environment, eliminates through traffic, and permits the efficient use of land. While some observers classify residential streets as either collectors or locals. Local streets may be subdivided into subcollectors and access streets because of the desirability of distinguishing between the function and needs of these two significantly different street types. Access streets are noteworthy for their complete lack of through traffic and for the fact that they serve only a few dwelling units. Subcollectors usually serve more dwellings and carry a small volume of through traffic to one or more access streets.

Streets serve various functions based on their location and endpoints, not according to their widths or geometric configurations. In other words, if a street which is wide, flat and straight has numerous points of direct access on it, it will serve both a local access street function as well as an arterial through traffic function. In much the same way a narrow, winding road connecting two or more important points, will serve an arterial

function even if it is to narrow or is lined with residential driveways. It is very important, to the extent possible, that the functions of the various roadways be kept separate.

The function of intermediate roads in the road hierarchy, those which are secondary arterial or principal collector roads, is mixed and because of this may be ambiguous. Arterial highways have the function of relatively rapid through traffic accommodation. Local streets serve as the initial point of access to the road system. Those roadways in the middle of the spectrum share the characteristics of both to one extent or another, depending on their location and relationship to other roads in the network. It is important that direct access from individual land uses to collector and arterial roads be limited so as to reduce the conflict between initial entry and through traffic. By the same token, collector streets should be designed so as to be clearly differentiated from arterial streets. Effective means of accomplishing this purpose are the introduction of stop signs and forcing offsets in road intersections.

Exhibit 2 indicates the classification of the roadways in the Township. These should be given careful consideration when land use regulations are considered which could affect the need for access to the road network.

MASS TRANSIT

The Erie Lackawanna Cutoff, abandoned as part of the Conrail consolidation, has been repurchased by the State of New Jersey. This right-of-way is proposed for reactivation for passenger rail by the year 2010. A return of passenger rail service to the Johnsonburg area will provide a much needed alternative to the motor vehicle for commuter traffic and will facilitate tourist travel to this area.

ALTERNATIVE TRANSPORTATION

One of the objectives outlined at the beginning of this section is specifically to foster alternatives within the transportation system which are pedestrian friendly and make it possible for cyclists, horseback riders and the like to travel safely between destination points within the Township. These alternatives will have the immediate effect of reducing air and water pollution and bringing back the sense of place which is lost to the driver of a motor vehicle.

There is no provision in the township (other than in a portion of Johnsonburg) for pedestrian, bicycle, horseback or any other kind of non-motorized transportation. Notwithstanding this lack, people are using the roadways now in existence for these purposes. This creates hazardous conditions which should be systematically eliminated. A specific program should be begun to identify those roads most commonly used for pedestrian, bicycle and equestrian travel and a concerted effort made, in conjunction with Warren County, to insure that any road improvement projects taken within the Township take into account the need to provide a safe area for non-motorized travel. The most easily realized provision could simply be the provision of a wider shoulder along at least one side of a roadway along with signage indicating that motorists should exercise

caution and be alert to the presence of pedestrians, bicyclists, etc. Where necessary, guiderail or other barriers should be installed.

In the case of local streets, regulations should be strengthened so as to require that provision be made for off street pedestrian and bicycle access wherever possible. Where this is not possible, some means by which pedestrians, etc. may be separated from traffic flows should be investigated. Other possibilities include provision of a marked and paved shoulder area for non-motorized traffic.

In addition to providing access ways along streets, the Township should investigate means by which open space parcels may be connected by pedestrian pathways so as to permit residents not wishing to use their cars to gain access to these parcels by foot or by bicycle. Of particular concern is the recreation area at Frelinghuysen school. This area could serve a greater range of needs, particularly in the summer, if provisions were made to provide safe access. Perhaps a formal cross walk, blinker light or some other signage could be requested from NJDOT.

PROPOSED ADDITIONS TO THE CIRCULATION SYSTEM

The road network in Frelinghuysen Township developed over many years in response to local and regional needs. Those needs remained fairly constant for much of the Township history and safe access to the regional transportation network has been available. Minor changes have been made to the road system in the Township through the construction of new subdivision streets but these have been of little impact.

The Township is in the position to look back over some of the actions taken with regard to streets and determine whether or not those actions should be reversed.

Muller Road and Kerr Road were once connected to Lincoln Laurel Road. These interconnections should be reestablished. There should be a Township policy established which would discourage the vacating of existing roadways. The principal result of vacating an existing road is that the time required for emergency vehicle access to various areas in the Township will increase where an interconnection is removed. Where undeveloped streets are vacated, the Township loses the opportunity to reduce response time. Only where development of a mapped street is not feasible should it be vacated.

Consideration should also be given to expanding the road network through the general mapping of arterial and collector streets. This will enable the Township to reestablish control over some local streets which may be serving a higher level function and redirect traffic more appropriately. (See Exhibit 2)

As a general policy, all subdivision roads and cul-de-sacs should show a section dedicated for future extension thereby creating loops in the road network. These need not be constructed at the time the subdivision is occupied. However, in the event that public safety considerations warrant the extension, it is important that the right-of-way be available.

DESIGN STANDARDS

As indicated earlier, the New Jersey Site Improvement Standards Act has resulted in the recommendation to the Commissioner of the Department of Community Affairs of various road design standards which will supersede the municipal regulations. These standards, which apply to only to new residential streets, parking facilities, etc. are similar, for the most part, to the regulations now in place in the Township. These new regulations will not have any direct effect on Warren County road standards. It is the County roads along with existing municipal streets, that determine the character of a municipality such as Frelinghuysen. Accordingly, it is extremely important to work with the County as much as possible to avoid the removal of hedge and tree lines and stone rows and to alter the consideration of roadways as functioning only to convey of motorized traffic. The aesthetic function, the conveyance of pedestrian and bicycle traffic ought to be formally included along with considerations of motorized traffic safety in any County or local efforts to alter the character of a particular road.

The Institute of Transportation Engineers publishes various volumes regarding roadway design, traffic safety and the like. From Residential Street Design and Traffic Control, the following statement is instructive:

> "It is an internationally accepted rule that motorized traffic must drive slowly in a residential district. An emergency stop at 35 miles per hour takes a stopping distance ranging from 115 to 165 feet for an automobile. This distance is not acceptable so long as drivers can be faced, at any moment, by children or pets playing or suddenly crossing the road.
>
> Moreover, research has shown that pedestrians are not seriously injured when hit by a car traveling less than 20 miles per hour at the time of impact. If impact speeds are between 20 and 35 miles per hour injuries are usually serious while above 35 miles per they usually endanger life or are fatal."(page 64)

In rural areas like Frelinghuysen, design speeds for local roads should be between 20 and 30 miles per hour where the terrain is "mountainous" and between 20 and 40 miles per hour where the terrain is rolling. This concept is distinctly different from traditional design theory which would design for fifty mile per hour speeds in rural areas. Designing roadways to limit the speeds at which prudent drivers will be comfortable is an important element in retaining a safe, convenient, and aesthetically pleasing transportation network.

NATURAL RESOURCES ELEMENT

NATURAL RESOURCES ELEMENT

Introduction

The natural resource base of a community is one of the most critical elements of its identity. The topography of an area (rolling hills, flat lands) not only provides visual points of identification but also has a significant effect on settlement patterns. Geology, both surface and subsurface, greatly affects the ability of land to provide water, the degree to which the soils which develop from parent rock are fertile, as well as structural issues which arise as they relate to actual development. The character of municipalities in the northern part of the State, partly rural, partly agricultural, is in large part a function of soils, rainfall patterns and surface hydrology.

Wildlife habitat, and the plants and animals are integral parts of that habitat are not only interesting identifiers of an area but are also significant indicators of the health of the local ecosystem. They act to identify the pressures exerted upon the local environment by development and other external sources. Taken together, the natural base serves as the platform on which human activities take place.

Natural resources are, to a certain extent, exploitable. We mine sand and gravel and in some areas we mine stone, and in some we mine water. We use the natural fertility of the soils to raise crops and try to avoid overloading air and water with noxious pollutants. With all this, natural systems are remarkably resilient. Rivers that were so polluted that they caught fire, air that was visible, soils poisoned by chemicals all can and have been rehabilitated. However, the costs of rehabilitation and the interim social costs of pollution are far greater than the short-term benefits to polluters.

Philosophy of Land Use

Land use philosophy has changed greatly over the past 25 years. Swamps used to be worthless; therefore they were great places to put garbage. Rivers, because they came up over their banks, were great places to dump waste and to wash away piles of unwanted materials, some toxic. Sinkholes were useful as waste disposal areas as they seemed to have infinite capacity. Resources were to be used and when exhausted, simply abandoned. We now are beginning to understand that we have to be stewards of the land. We do not own the land, we only hold it in trust for future generations.

As a result of the greater understanding of natural systems, land use approaches have begun to change. We now perform carrying capacity analyses. These analyses are carried out to see to what extent natural systems can assimilate pollution without having a significant impact on the plant and animal populations. Animal populations include people. The idea that land and resources are available for exploitation is now understood to have significant limits.

This revision in the approach of resource management includes all industries, including the agricultural industry. Farmers have altered their practices over the years from the

movement toward contour plowing, significantly reducing soil erosion, to minimizing the application of fertilizer and pesticides which maximizes efficiency of dollars spent, and manages the nutrient grading of streams, ponds, and lakes. We now vehemently oppose public utility projects which pollute air and water.

What is the resource base in Frelinghuysen Township? The following sections will address topography, geology, soils, hydrology, wildlife habitat, and will define the platform on which activities within the Township rest.

Physiography

Frelinghuysen Township lies within the Reading Prong of the New England Highland physiographic province. The physiographic province is an area exhibiting a like history and composition as recorded in the rock structure. The Reading Prong of the New England Highland runs roughly from northeast to southwest and comprises the south and eastern portions of Frelinghuysen Township. The Highlands are characterized by rock of great resistance to weathering. This distinguishes this province from the Ridge and Valley province. The Ridge and Valley province comprises the majority of Frelinghuysen Township. It is located in the center of the Township and runs west to the Delaware River. (See Exhibit 3, Physiographic Provinces)

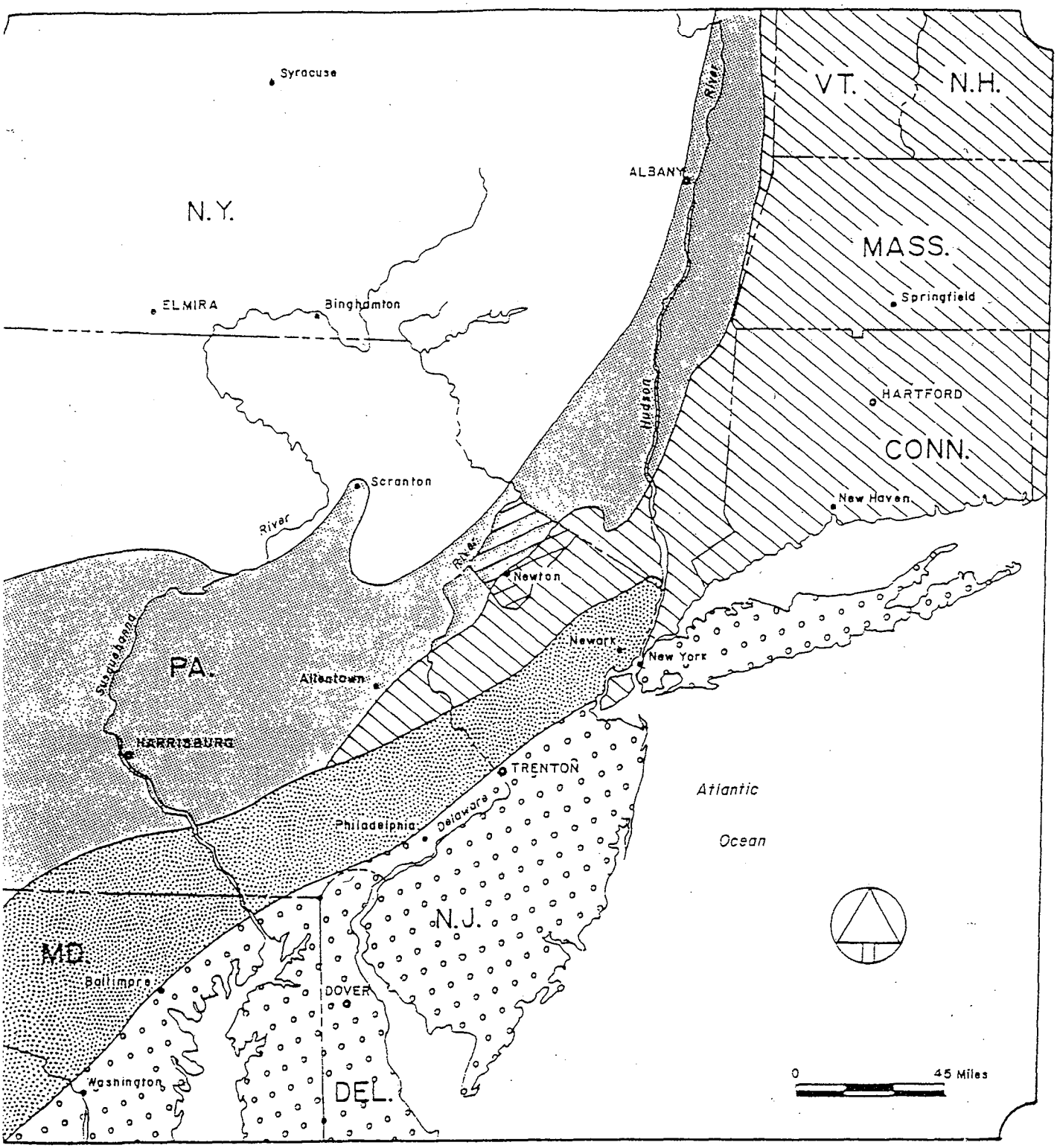
Description of Provinces

The New England Highlands are principally composed of granite and gneiss. The Highlands are collectively known as the Pre-Cambrian crystalines, having been laid down during the middle and late proterosoic era. This period was approximately 1.4 to 0.9 billion years ago. The most salient feature of the highlands in the vicinity of Frelinghuysen Township is Jenny Jump Mountain and High Rock. These salient features stand as they do, as they are highly resistant to weathering.

The Ridge and Valley province, which runs to the west of the Highlands, is characterized by both highly weathered and soluble rocks of the Kittatinny Supergroup as well as the resistant rock of the Shawngunk. The rocks of the Ridge and Valley Province were laid down during the Cambrian and Ordovician periods. The most prominent member of this particular region is the Martinsburg Shale. It is an intensely crumpled and faulted sequence of slate, shale, sandstone, and calcareous siltstone. A resin element, the Jacksonburg Limestone, is found as a narrow belt of rock running along the border of the Kittatinny Supergroup of formations.

Finally, the Kittatinny Supergroup was laid down approximately 560 to 420 million years ago and consists of relatively young formations.

EXHIBIT 3
PHYSIOGRAPHIC PROVINCES



PHYSIOGRAPHIC PROVINCES OF THE REGION

LEGEND

- APPALACHIAN PLATEAU PROVINCE
- RIDGE & VALLEY PROVINCE
- HIGHLANDS PROVINCE
- PIEDMONT PLATEAU PROVINCE

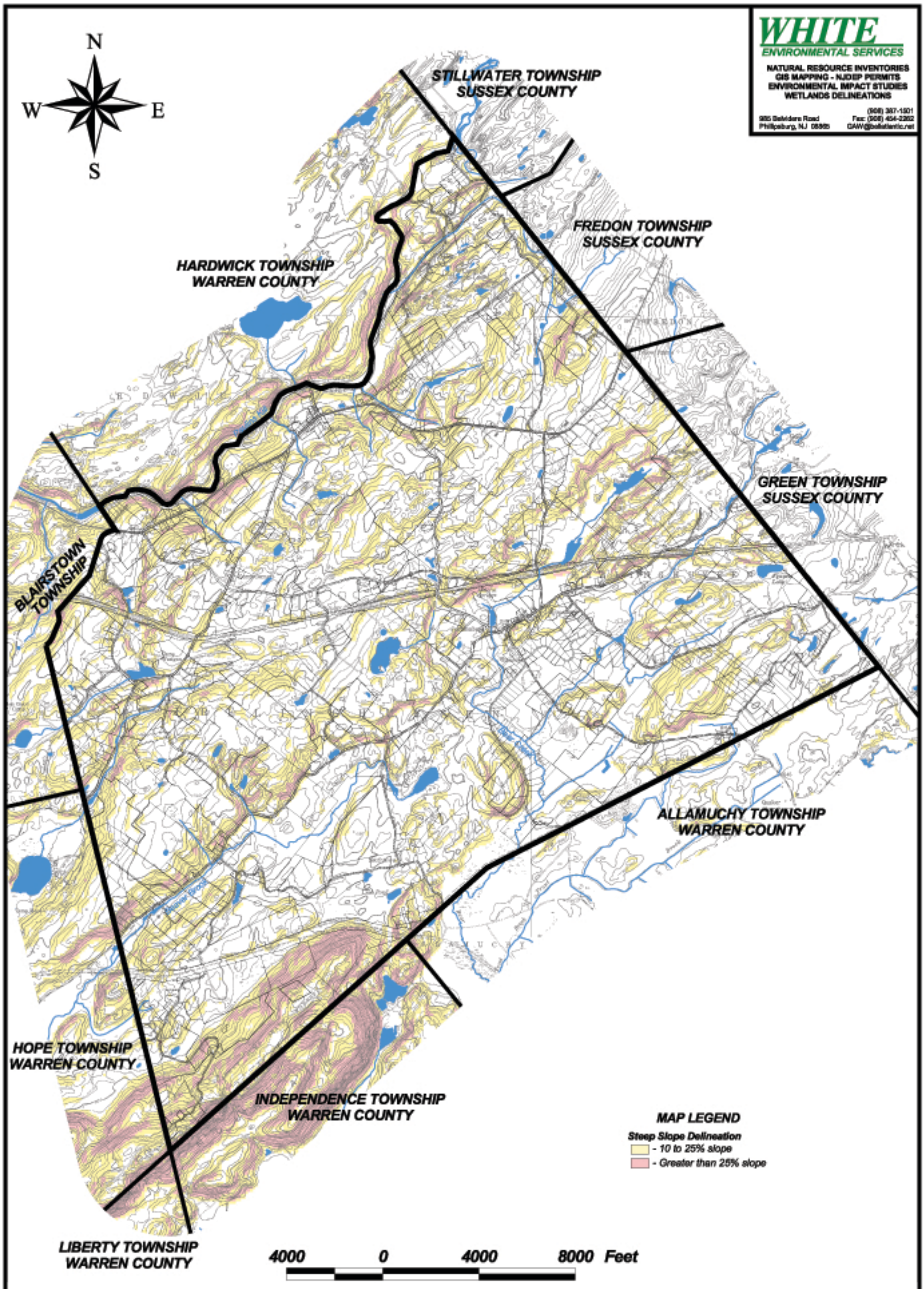
Topography

Topographically, Frelinghuysen Township exhibits a wide range in elevations. (See Exhibit 4, Topography and Steep Slopes) Topography was significantly affected by various glaciations, the last of which was the Wisconsin Glaciation which was approximately 10,000 years ago. Looking at the topographic map we can see that running roughly northeast/southwest, consistent with the division between the New England Highlands and the Kittatinny Ridge and Valley Provinces, there is Jenny Jump Mountain which begins roughly at the common boundary between Allamuchy, Independence and Frelinghuysen Townships and runs southwest from that point.

The range in elevations in Frelinghuysen Township is 1,135 feet above mean sea level at the Jenny Jump Mountain down to approximately 475 feet above mean sea level intersection of the Paulinskill River with the Blairstown Township boundary. The Highlands area is a relatively small portion of the southerly corner of the Township is an intensely folded and varied terrain. North of this point running towards the Paulinskill River is the Kittatinny Valley sequence. The valley is broad and flat and in such is home to most of the development of the Township.

Topography is very important as it has directed the developed road network and has an impact on future interconnections. Further, it greatly affects the degree and severity of stormwater runoff and soil erosion. Together, these affect the rate and type of soil formation. For purposes of regulations of land use activities it should be noted that the New Jersey State Planning Commission and the State Development and Redevelopment Plan have indicated that steep slopes are those slopes in excess of 20%. Fifteen percent slopes are areas where the rise in elevation over a 100 foot distance is 15 feet. All of these features have a direct impact on land development and occupancy.

EXHIBIT 4
TOPOGRAPHY AND STEEP SLOPES



REFERENCES & NOTES:

Property boundaries were taken from a composite tax map of FrelinghuysenTownship and adjusted accordingly.

USGS Quadrangle Maps supplied by NJDEP.

Lakes and Streams based upon NJDEP GIS database.

This map has been prepared as a guide for the Frelinghuysen Township Master Plan. Data on this map should not be relied upon for individual lot planning.

This map was developed using NJDEP & NJGS Geographic Information System digital data, but this secondary product has not been verified by the NJDEP or NJGS and is not State - authorized.

Topography & Steep Slopes

Municipal Master Plan
Township of Frelinghuysen
Warren County, NJ

Scale: 1" = 4000' Date: 11/19/03

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Geology

The Township is divided between highly resistant rocks formed during the Pre-Cambrian era and rocks formed later on during the Cambrian and Ordovician periods. (See Exhibit 5, Geologic Timetable) The resistant granites and gneisses of the Highlands not only contribute to relief (the differences in elevation as well as the severity of those transitions) but also have a dramatic effect on water supply. Frelinghuysen Township is dependant entirely on subsurface supplies to support commercial and residential activities.

Given the lack of any surface impoundments (reservoirs), the sustained availability of subsurface supplies of potable water is critical to all activities within the Township. Available water supply in the Highlands is generally poor. The highly resistant granite and gneisses represent the least productive aquifer in the Township. The remainder of the Township is comprised of the Kittatinny Valley sequence and the Kittatinny Super Group. This is a group of formations consisting of the Beekmantown Group-Upper Part, Beekmantown-Lower Part, Allentown, Dolomite, Leithsville Formation, and the Hardyston Quartzite. The Kittatinny Valley Sequence, which also is divided into subsections, consists of the Ramseyburg Member, Bushkill Member, Jacksonburg Limestone, the Jacksonburg Limestone and sequence at Wantage undivided and the Wantage Sequence.

Inspection of Exhibit 6 provides a clear indication that the types and distributions of bedrock formations is highly variable and that the vast majority of the Township is made up of the Appalachian Valley and Ridge Province with only a small section located in southeastern most of Frelinghuysen belonging to the Highlands.

Geologic Unit	Occurrence/Topography	Hydrologic Characteristics
Martinsburg Shale (Omb)	Upper (Ramseyburg) member forms prominent ridges, with abundant rocks ledges, thin, coluviated soil cover, with isolated pockets of glacial drift. Valleys are usually long and narrow. Member forms smooth, rolling hills and underlies poorly drained valleys. Soil cover thin (less than 15 feet) to absent, with local deposits of glacial drift up to 50 feet thick.	Well yields generally prove to be adequate for domestic needs, with most wells exceeding 3 gpm. Yields often improve with proper well development or stimulation. Some very good well yields with poor drainage. Lower (Bushkill) near faults and near fold axes; yields of 100 gpm have been reported. Thick overburden may help contribute to good sustained yields. Most water-bearing streams shallower than 200 feet, with some streams up to 400 feet deep.

Geologic Unit	Occurrence/Topography	Hydrologic Characteristics
Jacksonburg Formation Ojb	Forms subdued topography between rock Kittatinny terrain and smooth, rolling Martinsburg terrain. Outcrops infrequent, but soil cover may be thin. May receive significant runoff from adjacent units. Locally thick deposits of drift up to 30 feet thick may occur.	Yields generally poor to moderate, 5 to 20 gpm, but generally adequate for domestic supplies; most wells exceed 10 gpm. Yields tend to be higher in lower part, with occasional yields of 100 gpm.
Ontelaunee Formation Oo	Forms an irregular, hummocky to rocky, terrain with bedrock exposures. Soil cover generally thin to absent, but thicker in depressions.	Yields poor to moderate, with better yields in lower member. Frequent dry holes and very marginal wells in upper (Harmonyvale) member. Yields may range from poor to fair (3 to 20 gpm) in lower.
Epler Formation Oe	Forms a steep, elevated rocky terrain with many bedrock exposures. Typical limestone "pinnacle-and trough" topography, with thin soil in shallow depressions and intervening rocky pinnacles.	Yields range from poor to fair, 1 to 20 gpm. Yields improve near top and bottom of formation, or where blue limestone faces is present. Yields particularly poor where strata are steeply inclined.
Allentown Formation Ca	Highly variable topography. Upper (Upper Allentown) member forms irregular, steep, rocky terrain with bedrock pinnacles and shallow soil cover in intervening depressions. Numerous small sinkholes may occur. Lower (Limeport) member forms benched topography, with lowest units underlying steam valleys or wetlands, and middle and upper units forming rocky terraces with shallow to moderate soil cover and subdued rocky exposures. Numerous large springs and sinkholes occur in lower member, with largest springs in state occurring here.	Yields highly variable. Yields in upper member poor to fair, 3 to 25 gpm, with occasional dry holes; most wells barely adequate for domestic needs. Yields in lower member good to prime, with most wells yielding between 10 and 50 gpm. Frequent wells in lower member in excess of 100 gpm, with some yields exceeding 500 gpm.

Geologic Unit	Occurrence/Topography	Hydrologic Characteristics
Leithsville Formation Cl	Variable topography. Upper (Wallkill) member underlies stream valleys and marshes. Soil cover shallow to deep, usually with shallow water table. Middle (Hamburg) member forms topographic high separating lower and upper members. Hamburg terrain often a prominent ridge, sometimes steep, with shaley rock exposures or thin soil cover on dip slope. Lower (Califon) member rarely exposed, forms shallow depression with moderate to deep soil cover. Many sinkholes in lower unit.	Well yields range from moderate to prime, depending on unit encountered. Yields in lower and upper members good to prime, with typical yields form 10 to over 1,000 gpm. Yields in middle member tend to be significantly lower, with some good yields of 50 gpm where conditions are favorable.
Hardyston Sandstone Ch	Forms smooth topographic bench at base of granitic uplands. Soil cover thin to moderate.	Well yields tend to be poor, with few wells finished in this unit.
Precambrian granitoid gneiss Pc	Forms prominent ridges with rocky prominences. Soil cover thin, often containing significant boulders. Colluvium is often thick on mountain flanks.	Well yields vary, depending on geologic unit encountered and geologic structure. Layered gneisses often more prolific than massive granitic units. Proximity to brittle faults may affect yield greatly.