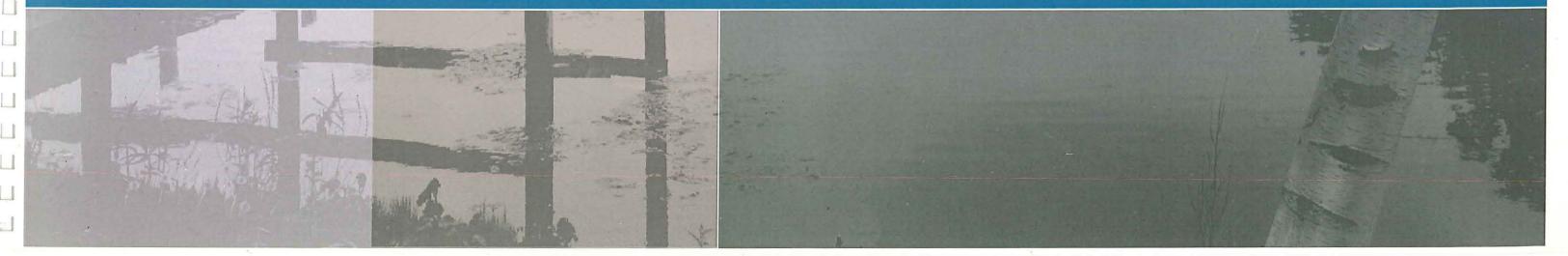




LAKEFRONT DEVELOPMENT PLAN

SUSSEX COUNTY, NEW JERSEY SEPTEMBER 2003 Prepared by # HEYER GRUEL+ASSOCIATES COMMUNITY PLANNING CONSULTANTS

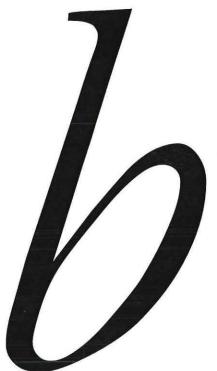




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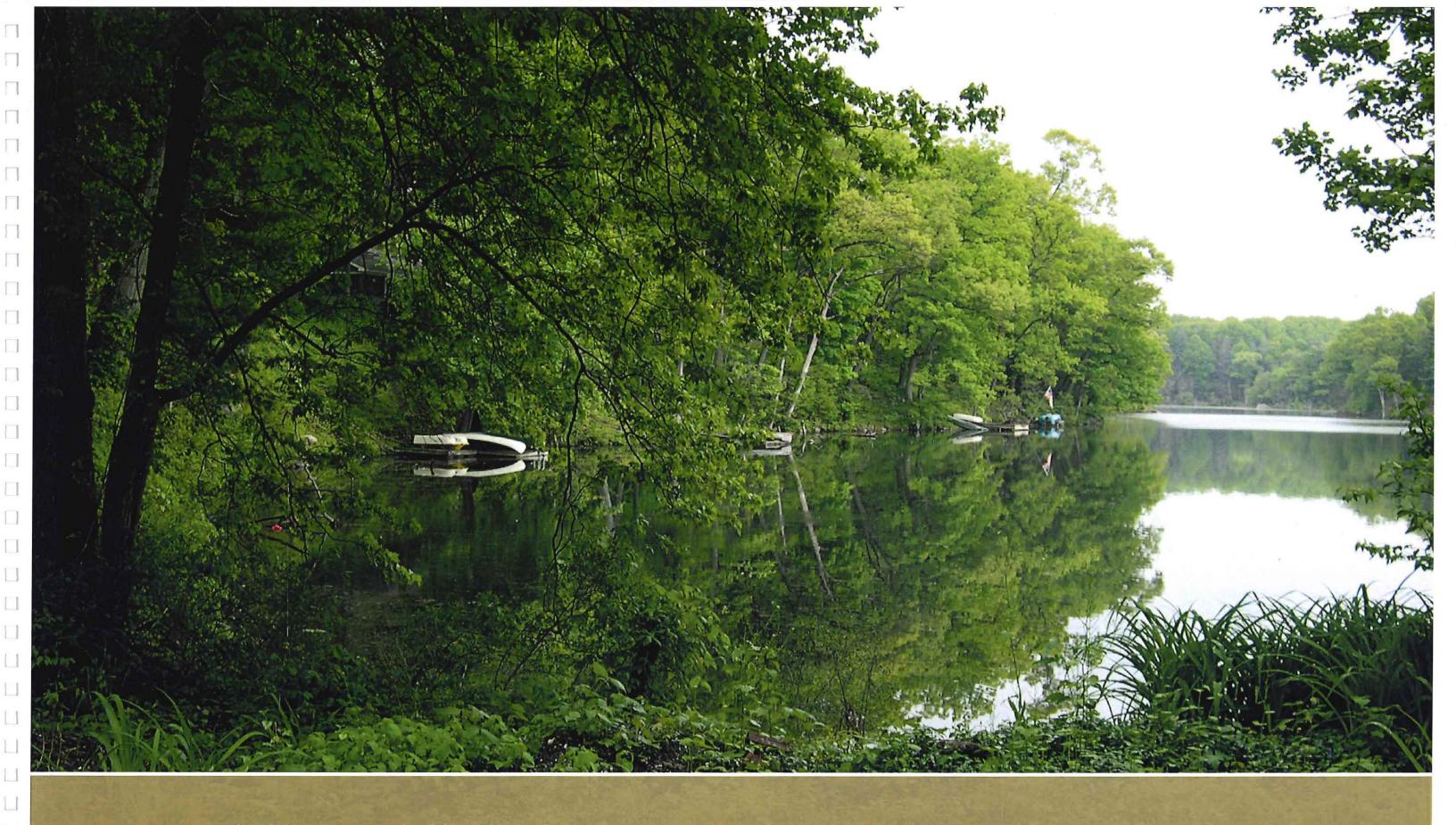
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yram Township, known locally as 'the Township of Lakes', is located in the southeast corner of Sussex County, nestled in the heart of the Highlands region of New Jersey. The township lies about 50 miles west of New York City and is traversed by Interstate 80 and State Route 206. Interstate 80 crosses the southwestern corner of the township and Route 206 bisects the township east and west. Containing more than two-dozen lakes and ponds, this 'Township of Lakes' finds the majority of its settlements around the larger lakes.

This Lakefront Development Study and Plan examines six of the twenty-five lakes and ponds as established residential communities. The lake communities included in this study are

Cranberry Lake, Lake Lackawanna, Forest Lake, Johnson Lake, Panther Lake and Lake Mohawk. The purpose of this report is to formulate a plan for these heavily developed lakes based on an examination of the current and future potential land use as well as the environmental constraints present at each of the Lake Districts, both in isolation and as a system. The plan is designed to maintain the current character of development in each of these communities and to help ensure the basic water quality of these man-made lacustrine systems.



The Lake Districts serve as identifiable neighborhoods that engender a sense of place and foster neighborhood cohesion, with each lake serving as a 'hamlet' or small 'village'. From a land use planning perspective, this layout and design reduces land consumption and reduces the cost of infrastructure improvements, such as water supply and road networks. These centers are set in a matrix of environmentally sensitive environs.



Some of Byram's lake districts began as seasonal summer communities with small, rustic cottages on narrow lanes that were used for recreation and relaxation. Others were planned communities based on a lakefront lifestyle; still others have developed slowly, over time, with less intensity. All of these lake areas and their housing, surrounded by environmentally sensitive and largely undeveloped lands, established the distinct land use pattern for the Township.

Some of Byram's lake districts began as seasonal summer communities with small, rustic cottages on narrow lanes that were used for recreation and relaxation. Others were planned communities based on a lakefront lifestyle; still others have developed slowly, over time, with less intensity. All of these lake areas and their housing, surrounded by environmentally sensitive and largely undeveloped lands, established the distinct land use pattern for the Township.

In this study, the Lake Districts are defined as the extent of developed parcels surrounding the immediate vicinity of the lakes. The environs are defined as the remainder of the sub watershed areas that form the groundwater and surface water system for each of the lakes. The environs have a distinct impact on the Lake Districts, since both are inextricably linked hydrologicaly with, both ground water and surface water. While many of the recommendations will focus on the Lake Districts, land use planning in the environs will be addressed as well.

This study presents a brief review of the entire Township from a planning, land use, demographic and environmental perspective, as well as examining lake issues, the findings of past lake studies and smart growth principles.

A more comprehensive review of each Lake District follows, including:

- Vital Statistics
- The History Of Development
- Surface Water and Potable Water Supply
- Environmental Constraints
- Current Planning Issues

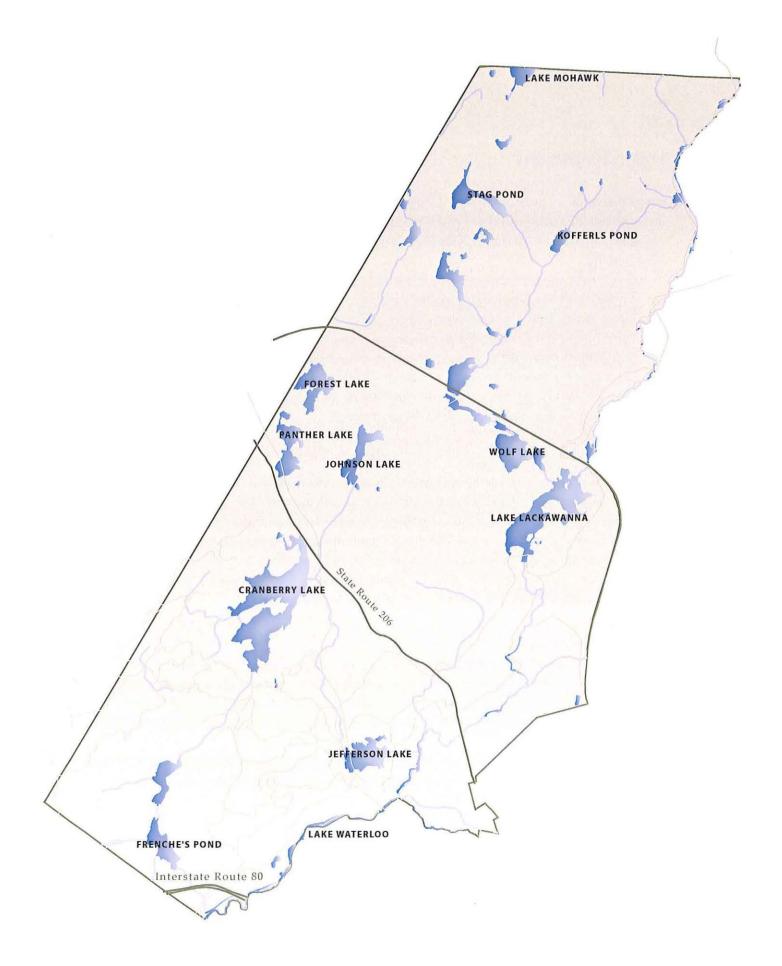
The study also includes a review and the applicability of other planning efforts in the town, including:

- The Smart Growth Plan
- The Lubbers Run Greenway Project
- The Open Space and Recreation Plan

A review of applicable state regulations will include the scope and purpose of each regulation and the controls it places on development in the Lake Districts.

A detailed description of recommendations including:

- Changes In Zoning Areas
- Changes In Zoning Bulk Standards
- Improved Design Recommendations
- Septic Management Ordinances for the Lake Districts
- Conservation Easements
- Open Space Acquisition
- Consolidating Land Ownership
- New and Improved Township Planning Documents



EXECUTIVE SUMMARY

Zoning - General

Recommended zoning changes are specific to each Lake District and take into account the current development patterns, existing undeveloped tracts and environmental constraints. Recommendations include the following:

- Create an Open Space zoning district, to recognize those areas already in permanent open space
 protection. Those areas identified in the Open Space plan as candidates for inclusion in the open space
 inventory would be added following acquisition.
- Create a Golf Course zoning district and include those areas already developed as golf courses.
- Update the R-1A and R-1 zoning to reflect the recommendations in the Smart Growth Plan. The R-1A zone
 will change from one dwelling per 3.5 acres to one dwelling unit per five acres. The R-1 zone will change
 from one dwelling per five acres to one dwelling unit per ten acres. These zones will be useful for
 protecting adjacent upland areas and the lake bottoms.

Cranberry Lake

- Retain the R-4 zone for the developed portions of the established neighborhoods of Frenches Grove,
 Briar Heights and Della Heights, Strawberry Point and portions of the North Shore.
- Rezone the remainder of the North Shore, Cranberry Ledge and Strawberry Neck to R-3.
- Rezone the remaining areas R-1A. This includes the area immediately adjacent to Route 206 and North Shore Road, and areas north and west of the North Shore.
- Rezone the lake bottom and publicly-owned uplands in to Open Space.
- · Rezone the remainder of the Lake bottom like the environs to R-1.

Lake Lackawanna

- · Retain the R-4 zoning only in developed areas immediately adjacent to the lake.
- Rezone the area in the northwest corner of the district along the Erie Lackawanna Right Of Way to R-2, as well as the development on the slopes above the lake accessible by Carpenter Road.
- Rezone the Bank Street Corridor to R-3, in order to bring these already developed parcels closer to zoning compliance.
- Rezone the remainder of the largely undeveloped parcels to the southeast and west to R-1 to protect these forested slopes from a density of development detrimental to Lake Lackawanna.
- Rezone the lake bottom to R-1 like the environs.
- · Rezone the golf course to Golf Course only.

6 PLAN OVERVIEW Executive Summary

Forest Lake

- Rezone the entire district from R-4 to a mix of R-3, R-2, R-1 and OS.
- Rezone the majority of the Forest Lake District to R-3.
- · Rezone the areas east of Lake Forest Drive and on the slopes south of Sleepy Hollow Drive to R-2.
- Rezone the lake bottom and the current beaches and forested lakefront tracts that buffer the lake to R-1.
- Rezone C. O. Johnson Memorial Park to Open Space.

Johnson Lake

- · Retain R-3 zoning where it exists.
- Retain the R-2 zoning in the area south of Tamarack Road and west of Colby Drive.
- Rezone the remainder of the District to R-1 to preserve the forested areas that buffer the shoreline and the uplands surrounding Johnson Lake.
- Rezone the lake bottom and the forested areas immediately adjacent to the lakefront to R-1.

Panther Lake

- · Retain the CR zoning.
- Rezone the portion of ICP that lies in the campground to CR.
- Retain the R-2 zone along the western shore of Panther Lake, but limited to the extent of the developed parcels.
- Rezone the remaining R-2 and R-3 zoned upland areas to R-1 zoning, including the small portion of R-4 in the north.
- Rezone the lake bottom and the forested areas immediately adjacent to the lakefront to R-1.

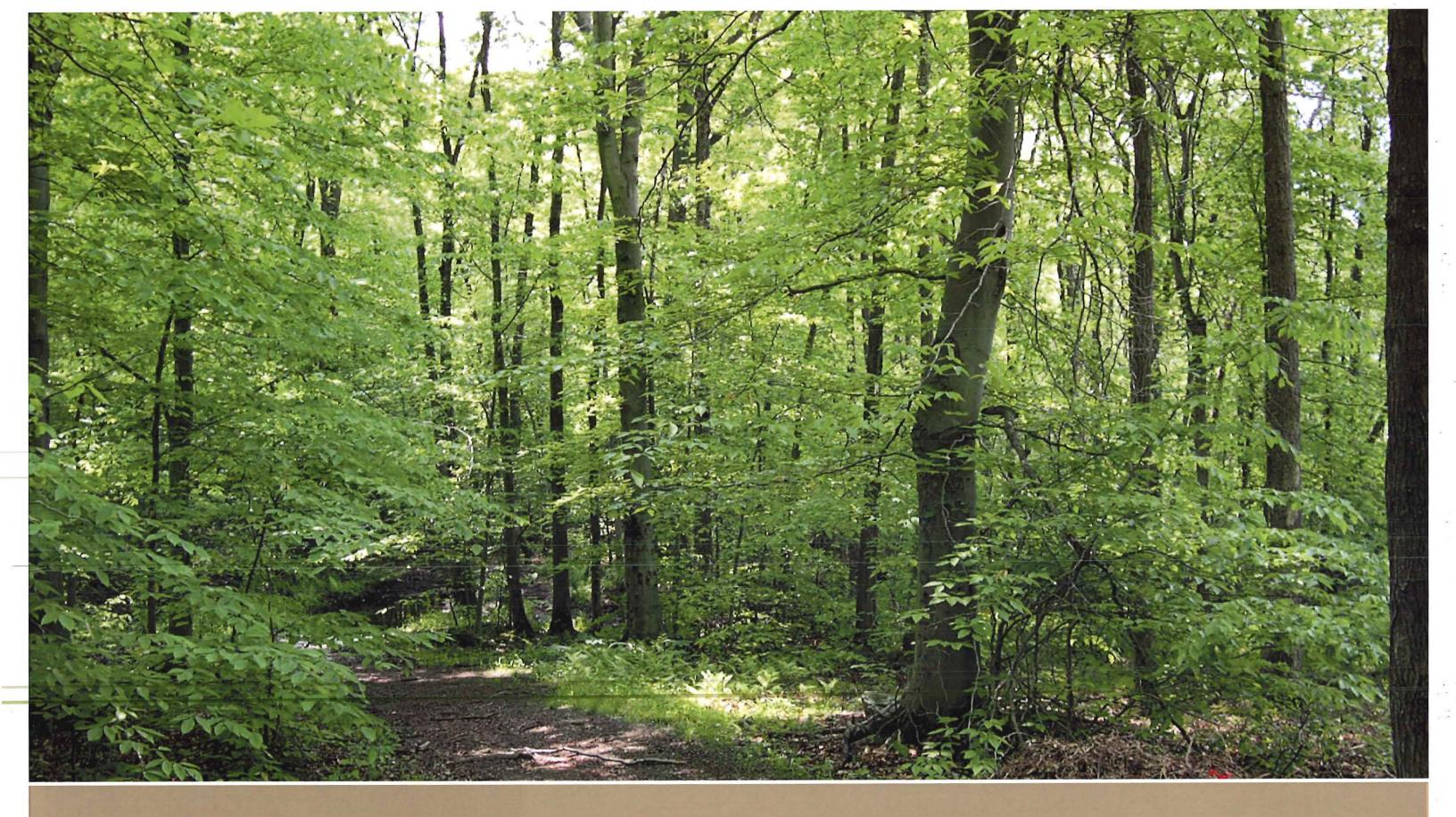
Lake Mohawk

- Retain the R-4 zone in those areas that are immediately adjacent to the lake.
- Expand the R-2 zone west of the development along West Shore Trail to include those areas along West Shore Trail south of the P.S.E.&G Right Of Way and west of Meadowbrook Terrace.
- Rezone the lake bottom and the current beaches and forested lakefront tracts that buffer the lake to R-1.

The Environs

Rezone the areas beyond the community development boundaries of the Lake Districts - the sub watershed areas that form the groundwater and surface water system for each of the lakes - consistent with the Smart Growth Plan to densities of between 1 unit per 5 acres and 1 unit per 10 acres.





Lot sizes/Infrastructure: Any new lot proposed to utilize on site well and septic systems shall be a minimum of 40,000 square feet in size. Any new lots created or new home construction on lots less than 40,000 square feet in size are required to connect to a potable water supply.

Proposed R-4 Zone Regulations:

- Minimum Lot Area: 10,000 square feet
- Maximum Height: 2.5 stories, with a 30 foot maximum height from grade on any facade
- Minimum Setback of Building Envelope from existing lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of water's edge
- · Minimum Lot Width (Frontage): 100 feet
- · Maximum Building Coverage: 15% of lot

Proposed R-3 Zone Regulations:

- · Minimum Lot Area: 20,000 square feet
- Maximum Height: 2.5 stories, with a 30 foot maximum height from grade on any façade
- Minimum Setback of Building Envelope from existing lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of water's edge
- · Minimum Lot Width (Frontage): 100 feet
- Maximum Building Coverage: 10% of lot

Proposed R-2 Zone Regulations:

- · Minimum Lot Area: 40,000 square feet
 - Maximum Height: 2.5 stories, with a 30 foot maximum height from grade on any façade
 - Minimum Setback of Building Envelope from existing lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of water's edge
 - · Minimum Lot Width (Frontage): 150 feet
 - · Maximum Building Coverage: 7% of lot

Proposed R-1A Zone Regulations:

- Maximum Density: 1 Unit per 5 Acres
- Maximum Height: 2.5 stories, with a 30 foot maximum height from grade on any façade
- Minimum Setback of Building Envelope from existing lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of water's edge
- · Minimum Lot Width (Frontage): 200 feet
- · Maximum Building Coverage: 5% of lot

Proposed R-1 Zone Regulations:

- · Maximum Density: 1 Unit per 10 Acres
- Maximum Height: 2.5 stories, with a 30 foot maximum height from grade on any façade
- Minimum Setback of Building Envelope from existing lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of water's edge
- · Minimum Lot Width (Frontage): 200 feet
- Maximum Building Coverage: 3% of lot

BULK STANDARDS FOR ALL LAKE DISTRICTS

Lot sizes/Infrastructure: Any new lot proposed to utilize on site well and septic systems shall be a minimum of 40,000 square feet in size. Any new lots created or new home construction on lots less than 40,000 square feet in size are required to connect to a potable water supply.

SEPTIC MANAGEMENT ORDINANCE

Lake Mohawk and Cranberry Lake presently participate in a Septic Management Area Ordinance. It is recommended that the remaining Lake Districts engage in similar programs. The key provisions of a Septic Management Plan include:

- Septic management certificate and a copy of NJDEP's Septic Operation and Maintenance Manual
- Septic system cleaning every 3 years
- Map of the septic system components and private water sources

DESIGN GUIDELINES

The establishment of design guidelines is intended to maintain the rural character and a sense of identity in the Lake Districts, to preserve scenic views and the scenic quality of the lake areas, and to improve the water quality and quantity by improving septic tolerance by design.

- Careful consideration to be given to existing development in surrounding lots.
- The natural setting of the site and characteristics of the area should be the bases for design.
- Considerable landscaped or wooded areas must be preserved on lake front lots.
- Native plants should be used for all landscaping in or near environmentally sensitive areas, while exotic or invasive plants should be avoided.

CONSERVATION EASEMENTS

- Conservation easements are conservation tools that limit the development rights of a property, while allowing the owner to retain possession and use of the property. They should be encouraged for undeveloped lands in private ownership surrounding lakefront areas.
- Properties in private ownership that are appropriate for conservation easements should be listed in the Township Open Space Plan.

OPEN SPACE ACQUISITION

- The Township can purchase private property in fee-simple ownership. This provides the Township with greater control than conservation easements, but it is more expensive and completely removes the property from the tax rolls. It should be sought for undeveloped lands in private ownership surrounding lakefront areas
- Properties in private ownership that are appropriate for open space acquisition should be listed in the Township Open Space Plan.

LAKE BOTTOM CONSOLIDATION

- Tax records indicate that the Cranberry Lake bottom is owned by three different owners including the State of NJ and Byram Township, three different owners own the Johnson Lake bottom and two different owners own the Panther Lake bottom. This creates a situation where no single entity is responsible for maintenance of the lake and for the drafting of a lake management plan. This can lead to a lack of a cohesive management regime.
- The Lake Lackawanna investment Company owns the Lake Lackawanna bottom, the Forest Lake
 Club owns the Forest Lake bottom, and the Lake Mohawk Country Club owns the Lake Mohawk
 bottom. Single ownership allows these entities to draft management plans, monitor water quality
 and manage the lakes for a variety of recreation activities.

SEPTIC FAILURE AND IMPROVEMENT MONITORING PROGRAM

Neither the County health department nor the Township keeps a database to track of failed septics. Creation of a database in the Township to monitor failed septics and septic system improvements is recommended, especially in the Lake Districts. This will allow Byram to identify areas in need of improvement and to inform the Township of possible water quality testing and monitoring needs.



STORM WATER MANAGEMENT PLAN

The Township lacks a cohesive storm water management plan. While several different ordinances address the larger issue of storm water management from the standpoint of roads, right-of-way improvements and tract disturbance, there is no single cohesive plan for storm water management. Storm water runoff can have significant impacts on lake systems, increasing sedimentation and Non-Point Source (NPS) pollution. The Township should adopt a storm water management plan in accordance with the standards outlined in N.J.A.C 7:8.

WASTEWATER MANAGEMENT PLAN UPDATE

The Township has an adopted wastewater management plan. It is recommended that the findings of this report be incorporated into that plan, to better protect the water quality and quantity in the Lake Districts.

DAM SAFETY MANAGEMENT PLAN

All of the lakes identified in this Plan were created and maintained by dams. With the exception of the state-owned dam at Cranberry Lake, these dams remain in private ownership and need to be monitored and maintained. The state is responsible for inspection and enforcement, but this office is under-funded and under-staffed. This is not only an issue of lake maintenance, but public safety. A dam safety management plan should be implemented to assess the condition of each of the dams and identify improvements or repairs necessary as outlined in N.J.A.C 7:20.

WATER QUALITY MONITORING PROGRAM

The Sussex County Health Department conducts regular tests for fecal coliform at Township lake beaches throughout the summer. Individual lake community groups also engage in some limited water quality monitoring, such as the Lake Mohawk monitoring program. These existing testing regimes need to be formalized as a Township function and expanded to more sites. The testing regime needs to occur at regular time intervals and be diverse in the types of tests administered.

LAKE MANAGEMENT PLANS FOR EACH LAKE

Aside from the land use controls and Township planning documents, it is suggested that each lake community adopt its own lake management plan. The lake management plan is a citizens' document, crafted by the Lake District residents. It is an examination of each lake's current condition, current and future recreational uses and a list of steps necessary to maintain the quality of the lake for its continued recreational use. The lake management plans should include.

- · Ecological Inventories
- Goals And Objectives For the Lake
- Problems And Issues Facing the Lake
- · Water Quality Assessment
- Action Agenda Based on Current Principles of Watershed Management
- · Implementation Plan for the Action Agenda
- Continued Monitoring of Water Quality Measurements
- · Reassessment of Actions Taken

OUTREACH AND PUBLIC EDUCATION PROGRAM

The recommendations of this Lakefront Development study should be made public by way of meetings and informational materials. Township residents should be informed that the preservation of lakes is a common interest of all concerned residents and is thus a common responsibility. Apart from programs organized by the Township to oversee the quality of the lakes and the surrounding area, each individual lot owner/developer is responsible for correcting or reducing the effects of development on the environment.



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LOCATION

yram Township, known locally as 'the Township of Lakes', is located in the southeast corner of Sussex County, nestled in the heart of the Highlands region of New Jersey. The township lies about 50 miles west of New York City and is traversed by Interstate 80 and State Route 206. Interstate 80 crosses the southwestern corner of the township and Route 206 bisects the township into east and west. Byram is known as the 'Gateway to Sussex County'.

Containing more than two-dozen lakes and ponds, this 'Township of Lakes' finds the majority of its settlements around the larger lakes. The Township is composed of three

watersheds, feeding three major regional rivers: Lake Mohawk is in the headwaters of the Wallkill River; Forest and Panther Lakes are in the headwaters of the Pequest River; and the Musconetcong River watershed comprises about 90% of the Township and, with its tributary Lubbers Run, forms the Township's southern border.

DEMOGRAPHICS

Five of the six lakes that are the focus of this study have sizable and dense developments around them, a concentration of nearly half of the population in Byram Township. These lakes are Cranberry Lake, Forest Lake, Johnson Lake, Lake Mohawk and Lake Lackawanna. Panther Lake, the sixth lake in the study, is less densely populated.

Byram Township's population in 1990 stood at 8,109 persons and increased by 145 persons or 1.8% to 8,254 in 2000. This is not consistent with the population trends of the county and state. While the Township experienced a modest gain of 1.8% in its population during the decade, the county's population increased by 10% and the state's population increased by nearly 9%. The Lake Districts house a population of 4,000 or 48% of the Township's total. There is an ongoing debate at the moment regarding the accuracy of the census data counts in the Lake Mohawk District in Byram for the year 2000. This has yet to be settled and may affect some of the populations totals in the area.

There were no significant changes in the housing stock of Byram over the past decade. In the period from 1980 to 1990, the number of housing units in the Township increased by 18.1% but in the period from 1990 to 2000, the number of housing units increased by only 3.6%. The majority of housing, almost 64%, in Byram Township was constructed between 1940 and 1980, an indication of a middle-aged housing stock. Nearly 25% of the housing stock in the Township was constructed between 1980 and 2000. The total number of housing units in the Lake Districts is 1,589, 51% of the total number of housing units in the entire Township.

16 BYRAM TOWNSHIP OVERVIEW

BYRAM LAKE DISTRICT CENSUS INFORMATION SUMMARY*

	Population	Households	Average Household Size	Families	Housing Units
Cranberry Lake**	1214	475	2.55	326	525
Forest Lake	1099	371	2.96	321	379
Johnson Lake	248	85	2.92	71	87
Lake Lackawanna	788	286	2.76	216	306
Lake Mohawk	595	234	2.54	179	264
Panther Lake***	56	25	2.24	14	28
Lake District Totals	4000	1476	2.71	1127	1589
Byram Township Totals	8254	2833	2.91	2317	3078
Percentage	48%	52%		49%	52%

^{*} Taken from 2000 Census, by Census Block. For Census Blocks that overlapped one or more Lake District Boundaries, the number of developed parcels was determined for each Lake District and for the remainder of Environs within the Census Block and then Census figures were adjusted by the percentage of total developed lots in each.

^{**} Cranberry Lake has a full-time population of 911, according to 2000 census figures. The seasonal population increases by 1/3rd each summer, so that number has been adjusted up for this study. The number of housing units was also increased to reflect this.

^{***} Panther Lake also hosts a Campground featuring 458 sites, 8 bathrooms, 3 bathrooms with showers, 1 shower room, 1 laundry, 2 dumping stations, a pool and hot tub.



LAND USE / LAND COVER

Byram Township has a land area greater than 14,000 acres, or 22 square miles. The 2002 tax records used to inventory land use for this study put the figure at 14,235 acres or 22.24 square miles. The GIS data used to inventory land cover for this study puts the total at 14,618 acres or 22.84 square miles. The following chart is a summary of land uses in the Township. Land use classification is an examination of the dominant use of each of the taxable land parcels in the Township and their relative numbers and sizes.

B	ased on Augu	ist 2002 Townsh	nip of Byram M	OD IV Electro	nic Tax File	
Tax Classification	# of Parcels	% of Total	Total Acreage	% of Total	Net Taxable Value	% of Total
Residential	3,112	73.2%	2,125	14.9%	\$443,381,800	87.5%
Misc. Tax Exempt	16	0.4%	822	5.8%	Exempt	N/A
Commercial	101	2.4%	334	2.3%	\$40,954,500	8.1%
Schools	3	0.1%	108	0.8%	Exempt	N/A
Unimproved Vacant Land	655	15.4%	1,325	9.3%	\$14,246,800	2.8%
Apartments	3	0.1%	1.4	0.01%	\$643,600	0.1%
Farm (regular and qualified)	155	3.6%	5,337	37.5%	\$5,480,230	1.1%
Industrial	9	0.2%	178	1.3%	\$1,877,900	0.4%
Public Property	195	4.6%	3,997	28.1%	Exempt	N/A
Churches & Charitable	3	0.1%	7.1	0.05%	Exempt	N/A
Total	4,252	100%	14,235	100%	\$506,584,830	100%

As is clear from the summary, the largest land use category within the Township in terms of acreage is regular and qualified farmland, which represents approximately 5,337 acres or 37.5% of total land area. The majority of these lands are managed forests regulated by NJDEP that are constrained by the presence of steep slopes, wetlands, lakes and streams, floodplains, and limestone areas. Accordingly, these 5,337 acres represent \$5,480,230 of total assessment or 1.1% of the total net taxable value.

Residential parcels constitute the majority of the number of parcels in the Township. They represent 73.2% of the total number of parcels, but only 14.9% of the total land area. Apartments are an insignificant land use classification in the Township, representing only three parcels and 0.1% of net taxable value. Almost 86% of the municipal tax base is generated by residential properties.

Public property is the second largest tax classification in the Township, comprising 28.1% of the Township's land area or 3,997 acres of land. Allamuchy Mountain State Park, at over 3,000 acres, comprises more than 20% of the township. Another 850 acres, adjacent to the park, are owned by the Boy Scouts of Sussex and Morris County, placing nearly the entire southern quarter of the Township in open space protection. Approximately 3.1% of the township's area is dedicated to commercial recreation uses such as campgrounds, picnic grounds, recreation vehicle parks, golf courses and amusements.

Unimproved vacant land comprises 1,325 total acres or over 9% of the total land area. When vacant lands and farmland are combined they total over 6,600 acres or 47% of the Township. Under current zoning regulations, the majority of this land is zoned R-1, R-1A or R-2 Residential, which permit development on 5 acre, 3.5 acre and just under 1 acre lots respectively.

Industrial and commercial properties combined represent 3.6% of the total land area and 8.5% of the net taxable value of property. These commercial and industrial areas in Byram primarily exist along a small part of the travel corridor (Route 206).

BYRAM LAND COV	ER SUMMARY	
Based on 1995/96 NJDEP L	and Use/Land Cover	
	Acres	Percent
Residential (Single & Multi Family)	1,568	10.7%
Commercial (Retail)	90	0.6%
Industrial & Transportation & Utilities	171	1.2%
Agriculture (Crops & Plantations)	131	0.9%
Recreational Land (Public & Private)	199	1.4%
Subtotal - Developed Lands	2,159	14.8%
Mixed Forest	10,046	68.7%
Shrub & Scrub	252	1.7%
Mixed Wetlands	1,226	8.4%
Barren Lands	87	0.6%
Surface Waters (Lakes, Ponds, & Tributaries)	848	5.8%
Subtotal – Natural Lands (Inc. Open Space)	12,459	85.2%
TOTAL	14,618	100%

Land cover classification is an examination of the land cover classifications and their relative numbers and sizes determined by NJDEP using the 1995/1996 statewide multi-spectral digital aerial photos in the Township. The following chart is a summary of land cover types in the Township.

In contrast to the land use study, agricultural land cover is not the largest designation. The overwhelming majority of the township, at 68.7%, is forest covered. Residential is the next largest designation at 10.7% of the total land cover; at 1,568 acres it is the largest developed land classification. The discrepancy between 1,568 acres of residential land cover and 2,125 acres of residential land use is explained by the fact that many of the residential parcels in the land use study have other types of land cover on them, including forest and surface water. Industrial and commercial land cover designations total 1.8% and reflect the same minority ranking as seen in the land use study.

The subtotal of developed lands coverage is 2,159 acres or 14.8% of the total land cover for the Township, in contrast to the 12,259 acres of natural land cover that comprises 85.2% of the Township. This reinforces the assertion that the majority of development in the Township is clustered in high-density neighborhoods surrounded by largely undeveloped tracts of forestland. Key areas of undeveloped lands include mountainous regions southeast of Lake Mohawk, the areas surrounding the Lake Lackawanna community, the area west of the Lake Cranberry community and the former quarry area on the mountain east of Route 206.

Surface waters comprise 848 acres of the Township and represent 5.8% of the total area. Additionally, as defined by their boundaries, the Lake Districts cover a total area of 3.86 square miles or 2,469 acres, which amounts to 16.9% of the Township area.



SURFACE WATER

Byram has more than 25 lakes, ponds and streams, of which 15 are major water bodies. These include Frenches Pond, Jefferson Lake, Cranberry Lake, Lake Lackawanna, Wolf Lake, Roseville Pond, Panther Lake, Forest Lake, Kofferls Pond, Stag Pond, Lake Mohawk, Lake Waterloo, Johnson Lake, Dallis Pond and Tomahawk Lake. These lakes and ponds occupy a total of 734 acres, or 5.6% of the total area in the township, while total surface waters total 848 acres or 5.8%. These lakes and ponds are linked in three main hydrologic systems, the Musconetcong, the Pequest and the Wallkill watersheds.

Lake Lackawanna is the only Lake District in the larger Lubbers Run (below Dallis Pond) watershed, which also includes Stag Pond, Kofferls Pond, Roseville Pond, and Wolf Lake. This sub-watershed encompasses nearly a third of the Township and drains in to Lubbers Run and eventually into the Musconetcong River. The hydrological system that is comprised of Stag Pond, Kofferls Pond, Roseville Pond, and Wolf Lake all combine to form the headwaters of the inlet stream to Lake Lackawanna.

The Cranberry Lake/Jefferson Lake and Tributaries sub-watershed is composed of the inlet streams draining into Cranberry Lake, whose outlet stream joins with the outlet stream of Johnson Lake to form the tributary that fills Jefferson Lake. Jefferson Lake then drains to Lubbers Run and then onto the Musconetcong River. Forest Lake and Panther Lake form the headwaters of the New Wawayanda Lake/Andover Pond sub-watershed that flows north and is part of the larger Pequest River watershed. This watershed essentially follows the western border of Byram Township.

Lake Mohawk, along with Hughes Pond and the surrounding uplands, are contained within the Wallkill River/Lake Mohawk (above Sparta Station) watershed. This area drains north and eventually feeds into the Wallkill River.

SURFACE WATER

Byram has more than 25 lakes, ponds and streams, of which 15 are major water bodies. These include Frenches Pond, Jefferson Lake, Cranberry Lake, Lake Lackawanna, Wolf Lake, Roseville Pond, Panther Lake, Forest Lake, Kofferls Pond, Stag Pond, Lake Mohawk, Lake Waterloo, Johnson Lake, Dallis Pond and Tomahawk Lake. These lakes and ponds occupy a total of 734 acres, or 5.6% of the total area in the township, while total surface waters total 848 acres or 5.8%. These lakes and ponds are linked in three main hydrologic systems, the Musconetcong, the Pequest and the Wallkill watersheds

ENVIRONMENTAL CONSTRAINTS

The Byram Township Master Plan, Smart Growth Plan, and Natural Resource Inventory each note environmental characteristics that will influence the Township's future growth. The environmental features that are expected to impact/constrain development significantly include soils, geology, steep slopes, wetlands, and flood plains.

Soils

Byram includes 23 different soils that can be divided into 11 major soil types. Data on soil depth, permeability, water table and other physical properties are useful when determining the suitability of soils for foundation construction, location of septic fields, landscaping, and the construction of roads, athletic fields and parks. Since Byram Township has a limited sanitary sewage system, the suitability of soils for septic systems becomes an important criterion in evaluating land use and density.

The most prevalent soils are the Rockaway series and these are located on Byram's ridges and steeper slopes. Most of the Rockaway soils are steeply sloped (15 – 35%). Nearly 65% of the Township lies within areas having slopes greater than 15% and approximately 50% of the Township has slopes greater than 25%. Hibernia is the second most common type of soils in the Township, followed by Riverhead soils. Riverhead soils are characterized as sandy loams occurring in and near valleys having slopes ranging from 3 – 15%. Approximately 70% of the Township is subject to severe limitations on septic suitability due to the soils. Physical characteristics of these soils include poor percolation capacity and shallow depth to bedrock. Compounding these limitations are soils that are unsuitable because of their inclusion in wetlands and floodways, soils with high numbers of rock outcrops, soils typified by steep slopes or a seasonal high water table. Another 15% of the Township is subject to moderate/severe limitations on septic suitability. The remainder of the Township is subject to moderate or slight limitations.

Of the six lakes in this study, only three of the lakes fall in the area where soils exhibit the most suitability for septic systems; Lake Lackawanna, Panther Lake and Lake Mohawk. Cranberry Lake suffers from some of the most severe limitations on septic suitability. Forest Lake and Johnson Lake have soil types with moderately severe limitations on septic suitability.

Geology

The bedrock geology of Byram Township is varied, but crystalline gneissic and granitic rocks underlie most of the Township. With the exception of the Leithsville formation of dolomite and areas of deep glacial deposit, the Township's bedrock is relatively impervious and produces poor to moderate yields of underground drinking water. Available drinking water is found in infrequent fissures and fractures.

The surficial geology of Byram is predominantly glacial till, a result of the Wisconsin glacier's terminal moraine lying just south of Byram. Some valleys have stratified drift deposits and moraine deposits can be found along the Musconetcong River. Swamp and stream deposits are found throughout the Township.

Steep Slopes

The Smart Growth Plan states that steep slopes cover 4,332 acres or approximately 30.6% of the Township. Disturbance to steep slopes can affect plant life and drainage patterns, increase the amount and speed of runoff and can cause erosion, soil creep, slumping (sections of soil shifting down and outward on the slope), and landslides.

Runoff carries eroded sediments to lowland areas, to wetlands, ponds, lakes and streams, where the resulting turbidity and siltation can damage or destroy aquatic life and disrupt the ability of wetlands to filter and purify water. This combination of increased runoff and siltation affects the ability of streams and wetlands to retain water, changing the pattern and rate of the water's rise and fall and causing increased flooding. Turbidity and siltation also contribute to the eutrophication process in lakes, speeding the natural aging process.

Dramatic runoff problems often result when slopes are covered with impervious surfaces, such as buildings, roads, driveways and parking lots. Since water can't percolate into the soil, it runs off the site, picking up speed as it travels across these surfaces. Eroding surrounding soils, this high velocity runoff carries increased amounts of silt into nearby surface waters.

In addition to the obvious problems of runoff, erosion and landslides, altering the soils or vegetation on slopes may also reduce the percolation of water into the soil and disrupt the recharge of groundwater and aquifers. Aquifers in areas of steep bedrock, as in parts of northern New Jersey, do not contain much water. Poorly designed or excessive development that disrupts aquifer recharge while increasing the demand for water for human consumption can result in periodic or permanent water shortages. Aquifers can be damaged by the heavy road salting typical in hilly areas and from septic installation on slopes, where soils are thin or otherwise unsuitable for leach fields. In such areas, septic effluent may seep out on the face of the hillside.

Byram Township is mountainous, traversed by ridgelines and valleys, with its highest elevations distributed mostly in the southwest and northeast regions. Portions of the Township's central and west central area are strewn with steep slopes. Five major ridgeline areas occur in the Township. The first ridge runs along the Lackawanna cutoff and rises to three prominent peaks of 1,096 feet, 1,120 feet and 1,165 feet above mean sea level (MSL). The second ridge runs between Amity and Sparta-Stanhope Road (Rt. 605) reaching a height of 1,220 feet above MSL. The third ridge runs east of Lackawanna Drive to just north of Tamarack road forming a plateau about 1,000 feet above MSL. The fourth and fifth ridges rise above the stream connecting Frenches Pond and Cranberry Lake in the western portion of the township rising to 1,070 feet and 1,063 feet above MSL.

For the purpose of this study, steep slopes are defined as slopes ranging between 15 to 25% and severe slopes as those that are more than 25%. The Steep Slope maps reveal that a considerable percentage of the township is covered by steep slopes (15-25%) and severe slopes (25+%).

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Wetlands

Wetlands cover 1,226 acres or approximately 8.6% of the Township. Wetland areas provide natural flood control by storing excess water and releasing it to surface waters over time. Wetlands also serve as filtration systems, removing pollutants from the water table and storing them in biomass; and they serve as ground water recharge areas. As the total wetland area decreases and their natural functions decrease over a period of years, the overall quality and quantity of the surface water flow within the watershed is altered. Often, expensive man-made utilities are required to make up for the loss of wetlands

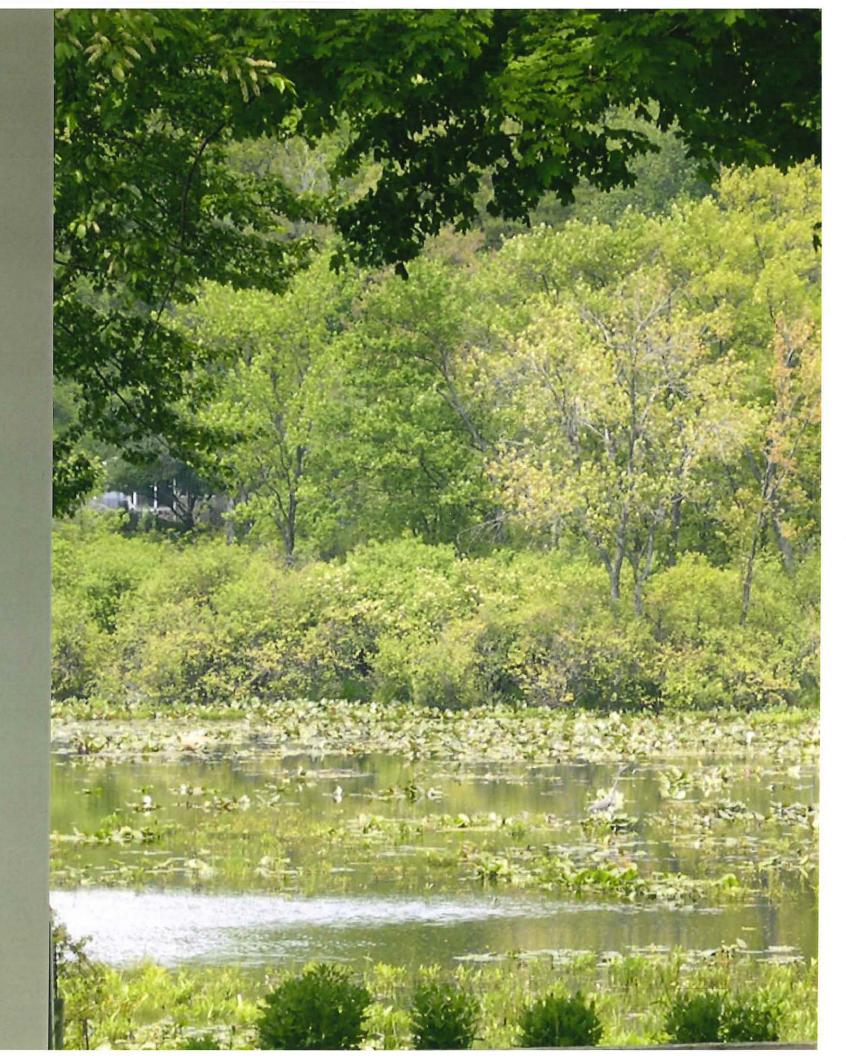
A community that incorporates growth while maintaining or improving wetlands and wetlands function can achieve lower flood peaks, fewer drought periods, more wildlife and wildlife habitat, and better surface water quality than comparable watersheds with fewer wetlands. Wetlands also provide recreational opportunities for boating, hiking and bird watching.

Freshwater wetlands occur in different parts of the Township, typically in the swales and valleys that parallel the ridgelines. These wetlands occur mostly along stream channels and low-lying areas. There are some concentrations of wetlands in the central eastern edge of the Township around Lake Lackawanna and along Lubbers Run and in the southwestern and southernmost areas around and beyond Cranberry Lake. There is a large concentration north of Forest Lake and smaller, scattered pockets throughout the Township.

Flood Plains

Floodplains represent 825 acres or approximately 5.8% of the Township. Floodplains are a vital part of any river ecosystem, acting as water filters and wildlife nurseries. They are important for the maintenance of water quality; providing fresh water to wetlands and backwaters while diluting salts and nutrients. Floodplains are major centers of biological life in the river ecosystem and improve the overall health of the habitat used by many species of birds, fish and plants. They are important biologically as they represent areas where many species reproduce and as such are important for breeding and regeneration cycles.

NJDEP identified floodplains occur in relatively small portions of the northern and central portions of the Township, with a large area north of Forest Lake and in the Panther Lake vicinity. The southern area of the township contains a larger proportion of floodplains in the vicinity of Cranberry Lake, Lake Lackawanna and Jefferson Lake, where large areas of residential development has already occurred on the boundaries of these floodplains.





BYRAM TOWNSHIP LAKE ISSUES

Lake Health

The 1988 Master Plan and the 1994 Natural Resources Inventory lament that the Township's major water bodies suffer from various degrees of eutrophication (the aging process of lakes and ponds). While this natural process often takes centuries or more, human activities such as construction, road building and maintenance, lawn care and agriculture; and inadequate or malfunctioning septic systems can greatly accelerate sedimentation and the introduction of nutrients into the lakes, rapidly accelerating the eutrophication process.

These sediments and pollutants have many environmental impacts on the lakes including turbidity, oxygen depletion and excessive aquatic plant growth. The lakes of Byram Township are shallow, either man-made or enlarged, and are even more susceptible to eutrophication because the shallow water depth permits sunlight to reach the lake bottom, encouraging weed growth. Most of the larger lakes are heavily developed, such as Cranberry Lake, Lake Lackawanna and Lake Mohawk. Forest Lake, Panther Lake and Johnson Lake are less heavily developed and retain some undeveloped shoreline, but are impacted by development nonetheless.

Recognized as environmentally sensitive lands, the lakes and their environs in Byram have been under study and management for several years. Studies and tests have been conducted by various agencies in order to determine the status of the lakes and monitor their progress. Some of the studies examined a cross section of the Township's lakes and established their similarities and differences. Others focused on individual lakes, but their findings are applicable to all of Byram's lakes. What follows is a review and summary of these studies.

Multiple Lake Studies

The Pytlar Thesis: A Study of Six of Byram's Lake- 1976

Theodore Pytlar, a Rutgers graduate student, studied and ranked six of Byram Township's lake for his graduate thesis. Cranberry Lake, Lake Lackawanna, Forest Lake, and Panther Lake were studied, as were Roseville and Stag Ponds. Pytlar outlined the three major, interrelated causes of diminished lake health- accelerated eutrophication, sedimentation and bacterial contamination. The eutrophication process involves algal blooms and a shift in algae types that affect fish populations and cause shifts in the normal food chain. Nitrogen and Phosphorous are the primary nutrients of interest in the eutrophication process, with each found to be the limiting factor controlling lake productivity under certain conditions. Sedimentation and erosion in shallow lakes is linked to the fact that shallowness and eutrophication often form a positive feedback system.

Pytlar found that all of the lakes shared many characteristics, including climate, geographic proximity, soil types, surface area, shallow mean depths and water quality characteristics such as pH, temperature, hardness, dissolved oxygen levels, clarity and alkalinity. The presence of aquatic macrophytes in shallow areas linked all the lakes studied, as well as their man-made genesis. The lakes varied little in their trophic state within a narrow range. Cranberry Lake and Lake Lackawanna share the additional characteristics of relatively larger

surface area and developed shorelines. He concluded that all six lakes were mildly eutrophic, with Lake Lackawanna being the most eutrophic, Cranberry Lake and Roseville Pond slightly less eutrophic and Forest Lake, Panther Lake and Stag Pond being slightly better than Cranberry Lake. Forest Lake appears to be in the best condition. Pytlar also felt that Cranberry Lake and Lake Lackawanna were the most susceptible to increased eutrophication due to their shallow depths, development patterns and water quality characteristics.

Pytlar remarked on the probability of declining home values and increased costs of lake maintenance as eutrophication progressed. In his description of the accelerated cultural eutrophication process he outlined the adverse affects of construction on sedimentation and turbidity and the need for proper development controls. Wastewater disposal is the second contributing factor to accelerated cultural eutrophication, with malfunctioning septic systems contributing organic nutrients and fecal coliform bacteria. Construction and wastewater disposal lead to increased sedimentation and nutrient loading, hastening eutrophication.

The Lakes Study by the Byram Township Environmental Commission – Summer 1982

The Byram Township Environmental Commission, in an effort to meet the requirements of the Township's Water Quality Management Plan, embarked on a lake water-testing program in 1982. Four lakes were chosen, Cranberry Lake, Lake Lackawanna, Forest Lake and Lake Mohawk, since they were the largest and most heavily developed at the time. The testing involved eight chemical measures including levels of phosphorous, dissolved oxygen, alkalinity, water hardness, pH, nitrate, nitrite and chloride. The testing also included the three physical parameters of temperature, depth and turbidity. The testing occurred on four dates in the summer of 1982 and involved not only sampling from the center of the lakes for comparison between the lakes, but at the inlets and outlets of the water bodies, in an effort to determine if the water flowing in was different than the water flowing out of the lakes.

The results showed Lake Mohawk was acting as a "sink" for phosphate and nitrate, as well as magnesium and calcium. This means that the aquatic vegetation was capturing these nutrients and the outflow was less alkaline and softer than the inflow. The dissolved oxygen rates and pH were normal and the chloride rates grew as the sampling approached the outflow, indicating a concentration of road salts. There were some anomalous readings for nitrates at two of the lakes feeder streams.

The results showed Cranberry Lake was not acting as a sink or a source for chemical nutrients. The inflow and outflow measurements were compatible. All of the measurements taken compared favorably to the other lakes tested. There was an event at the end of the sampling that produced high phosphate levels and 'soap bubbles' on the surface. It is likely that an isolated release of household cleaning supplies was the culprit.

The results showed Lake Lackawanna to be the 'cleanest' having the most consistent readings of inflow and outflow to the lake. There were no testing anomalies during the study. The inflow streams from Wolf Lake and Dallis Pond were relatively clean. The outflow to Lubbers Run had elevated chloride rates indicating a concentration of road salts from Lackawanna Drive.

The results showed that Forest Lake had higher readings for phosphates, nitrates, chlorides and alkalinity. The study concluded that the inflow water sources had higher levels of these contaminants. Forest Lake was shown to be less eutrophic in the Pytlar thesis and it is protected by wooded lake frontage. However, it is felt that since Forest Lake is surrounded by developed ridges and surrounded by a road network that provides direct access to the lakeshore, it is more susceptible to fertilizer and road salt runoff. This is supported by the findings that the contaminant levels increased throughout the season.

Methyl Tert-Butyl Ether (MTBE) and Other Volatile Organic Compounds in Lakes in Byram Township, Sussex County, NJ – Summer 1998

The U.S. Geological Survey and Sussex County Health Department collected water samples from four lakes in Byram Township in the summer of 1998 as part of an investigation into the occurrence of volatile organic compounds (VOCs) in potable drinking water wells in lakeside communities. Gasoline oxygenates have been blended into gasoline in urban areas with poor air quality since amendments were made to the Clean Air Act in 1992. MTBE is by far the most widely used oxygenate. Tert-amyl-methyl-ether (TAME) and benzene, toluene, ethyl benzene, and xylenes (BTEX) are also used as gasoline additives. There is now considerable debate over whether the benefits to air quality outweigh the occurrence of MTBE and other VOCs, possible carcinogens, in groundwater and surface waters.

Cranberry Lake and Lake Lackawanna were tested as lakes with dense, lakeside development dependent on individual lakeside wells where gasoline-powered watercraft is permitted. Forest Lake was tested as a lake with dense development where gasoline-powered watercraft is not permitted. Stag Pond is privately owned, is sparsely developed and is not used by gasoline-powered watercraft.

In Cranberry Lake, concentrations of the gasoline oxygenate MTBE ranged from 1.6 to 15.0 micrograms per liter in the early summer and decreased with depth. The depth-related density concentration gradient is attributable to density stratification due to temperature stratification in the early summer. MTBE concentrations ranged from 7.4 to 29.0 micrograms per liter in the late summer and were uniform in depth, due to vertical temperature mixing by late summer. Therefore, the mass of MTBE was estimated to be 15 kilograms in June and 27 kilograms in September. These mass estimates are equal to the amount of MTBE in 52 gallons and 95 gallons, respectively, of gasoline that contains 10% MTBE by volume. Levels of tert-amylmethyl-ether (TAME) and benzene, toluene, ethyl benzene, and xylenes (BTEX) were also tested for and found in quantities less than 1.3 micrograms per liter in June and less than 0.2 micrograms per liter in September.

In Lake Lackawanna, concentrations of MTBE ranged form 3.7 to 14.0 micrograms per liter in the late summer and were uniform in depth, due to vertical temperature mixing by late summer. Therefore, the mass of MTBE was estimated to be 6 kilograms in September. This mass estimate is equal to the amount of MTBE in 21 gallons of gasoline that contains 10% MTBE by volume.

Levels of TAME and BTEX were also tested for and found in quantities less than 0.4 micrograms per liter. All VOC concentrations (MTBE, TAME & BTEX) were less than 0.2 micrograms per liter in samples collected from Forest Lake and Stag Pond at the end of the summer.

The U.S. Geological Survey and Sussex County Health Department found that the MTBE concentrations in Cranberry Lake and Lake Lackawanna were of immediate concern. The State on New Jersey DEP set a maximum contaminant level (MCL) of 70 micrograms per liter, but this MCL is under review and may be made more stringent based on the findings of other states like Maine and California. The US EPA has classified MTBE as a possible human carcinogen and issued a drinking-water advisory for aesthetic concerns of 20 to 40 micrograms per liter in 1997.

MTBE is introduced into the lake systems by gasoline-powered watercraft, either through simple operation or in spills associated with refueling. This can lead to underlying aquifer contamination. The occurrence of MTBE and other VOCs in wells surrounding Cranberry Lake and Lake Lackawanna needs to be determined to evaluate the quality of the local water supply.

Cranberry Lake Diagnostic Feasibility Study - 1992

In 1988, the Township was awarded a 314 Clean Lakes Program grant to conduct a diagnostic/feasibility study of Cranberry Lake. The purpose of the study was to characterize the lake, quantify the causes of the lake's decline and develop a plan for restoration and long-term management. Coastal Environmental Service, Inc prepared the study.

The characterization was based on previous studies, such as Pytlar and field studies. Fish populations were surveyed, a bathymetric profile was created, the soils and geology were cataloged and land use categorized. A hydrological budget found that the majority of the lake's annual flow is attributable to watershed runoff and one third of the lake's water budget is derived from groundwater interflow. The flushing rate is moderate and areal water loading is low, promoting sedimentation.

The nutrient loading model predicted 8,600 kilograms (kg) of nitrogen, 1000 kg of phosphorous and 340,000 kg or sediments are loaded into Cranberry Lake each year. Water quality monitoring included in-lake water sampling and tributary water sampling, a macrophyte survey, a fishery survey and most telling a septic leachate detector survey.

The septic leachate survey of the entire shoreline found septic plumes at:

- Laurel Cove, western shore, North Shore Trail
- Cabin Springs, near Cabin Springs Trail
- Weaver House Cove, near Division Lane
- · Strawberry Point, north side of canal
- · Strawberry Point, south side of canal
- Eastern Shore, vicinity of main spillway

The study also reiterated Pytlar's assertion that Cranberry Lake is eutrophic. Under the current phosphorous loading conditions, the eutrophication will only accelerate and worsen.

The study concluded that the long-term management of the lake would require implementation of measures that emphasize nutrient and sediment load reduction. These would include a septic management plan, ordinances to control soil erosion and tract disturbance, land use ordinances that limit development based on environmental constraints, and a storm water quality management plan.

Additional efforts should be made to curb the use of certain consumer products that are high in phosphorous and promote septic system maintenance.

In lake restoration measures would also be necessary to improve the lakes recreational and aesthetic attributes. These would include aquatic macrophyte harvesting, spot dredging, judicious herbicide applications, hypolimnetic applications of alum and even limitations on gasoline-powered watercraft.

Cranberry Lake Sensitive Land Management Plan - 1997

Coastal Environmental Service, Inc. prepared a follow up study in 1997, building on the findings of the diagnostic/feasibility study. The sensitive land management plan recommends sensitive land use planning related primarily to non-developed areas with environmental constraints that are sensitive to disturbance as well as infill areas with similar limitations. The plan identified the sensitive areas and made basic recommendations for each. These sensitive areas included:

- Surface Water
- Sensitive Soils Based On Erodibility, Slope or Septic Suitability
- Wetlands
- Critical Habitats
- Riparian Corridors
- Floodplains

Lake Lackawanna Non-Point Source (NPS) Pollution Control Study - 1998

In 1998, Byram Township received a Public Education and Outreach Grant from the NJDEP Office of Watershed Management, to fund a study to determine the costs and benefits of controlling NPS pollution at Lake Lackawanna by extending sewer service into the area or by implementing a septic management plan. Thonet Associates, Inc. prepared the study.

The study's investigations included;

- Projecting NPS pollution under current conditions,
- Projecting NPS pollution under build-out conditions without any control actions taken,
- Projecting NPS pollution under build-out conditions if sewers were extended, projecting NPS pollution
 under build-out conditions if a septic management plan were in place and
- A determination of the costs and benefits of each course of action or inaction.

The study concluded that Lake Lackawanna, though significantly impacted by NPS nutrients, is a clean lake that, with current chemical treatment, generally meets State surface water quality standards aimed at continuing the lake's existing uses. Implementation of a septic management plan would yield immediate and long-term water quality benefits at low cost, but would not significantly change the appearance of the lake and the need for active management would continue.

The study concluded that extension of sewers to Lake Lackawanna would be costly and would result in significant initial reduction in the current nutrient loading at the lake, but would not significantly change the appearance of the lake and the need for active management would continue. However, in the long term, extension of sewers would increase the development potential of the lake area and the resulting increased development would increase nutrient inputs and off-set the benefits of the sewer system. Additionally, the increased impervious surface area resulting from the increased development would limit ground water recharge resulting in decreased base flows and average annual flows to Lake Lackawanna. Also water would be lost to the pipeline instead of recharged, this also reduces base low.

A third option of limited sewers to serve only the existing homes and infill lots in the Lake Lackawanna area would result in significant water quality benefits at the lake with minimal impacts on base flows and average annual flows to Lake Lackawanna. This option would be costly and would not significantly change the appearance of the lake and the need for active management would continue. This ability of this option to be strictly limited is not likely and could increase the development potential in the area.

Lake Mohawk Phosphorous Management Program - 2002

The Lake Mohawk Country Club has an active lake management program and a Lake Master Plan. The master plan identified the primary cause of the lake's continuing eutrophication to be excessive phosphorous loading from storm water runoff, internal recycling of lake sediments and loading from septic systems.

The storm water control system was updated, including nineteen siltation basins around the lake. An innovative, in-lake alum dosing system was also installed in the lake to bind with phosphorous, reducing the levels available for algae. The dosing system is designed to release alum at a rate equal to the inflowing phosphorous loading. Additionally, an alum blanket was laid in two separate years in an effort to control lake sediment cycling. The lake has benefited from a five-fold decrease in phosphorous levels. A destratification system was installed in the deepest parts of the lake to ensure proper mixing, thus maintaining dissolved oxygen levels and further facilitating the alum blanket functions.

The Country Club has also engaged in a thorough public outreach and education program, coupled with voluntary restrictions on phosphorous fertilizers and household products and requests to the local golf course for integrated pest management practices. The Mohawk Lake Country Club entered into a septic management program in both Sparta and Byram, much like the Cranberry Lake program.

Lake Mohawk Monitoring Report - 2002

The Country Club also has initiated a Lake Mohawk Monitoring Program and contracted with Princeton Hydro, LLC, to manage the testing and reporting program. The 2002 report presented results for a variety of water characteristics. In spite of the destratification system, the lake still suffers from some anoxic conditions near the lake bottom, potentially allowing for internal phosphorous loading and deep-water algal blooms. The mean surface concentration of phosphorous was 0.04 mg/L, above the US EPA threshold of 0.03 mg/L for a eutrophic lake, but less than 0.06 mg/L threshold established in the Lake Mohawk Management Plan. The mean bottom water phosphorous concentration was 0.055 mg/L, below the 0.10 mg/L threshold established in the Lake Mohawk Management Plan. Dissolved organic phosphorous concentrations were consistently low, less than 0.02 mg/L throughout the 2002 season.

Water clarity suffered somewhat in August, with Secchi disc readings less than 1 foot in the coves and shoreline areas from a blue-green algae bloom; but for the rest of the summer, Secchi depths were 3 feet or more. The overall phytoplankton community dynamics of Lake Mohawk followed a pattern that is typical of eutrophic lakes. Blue-green algae, and to a lesser extent green algae, were responsible for the nuisance conditions in August.

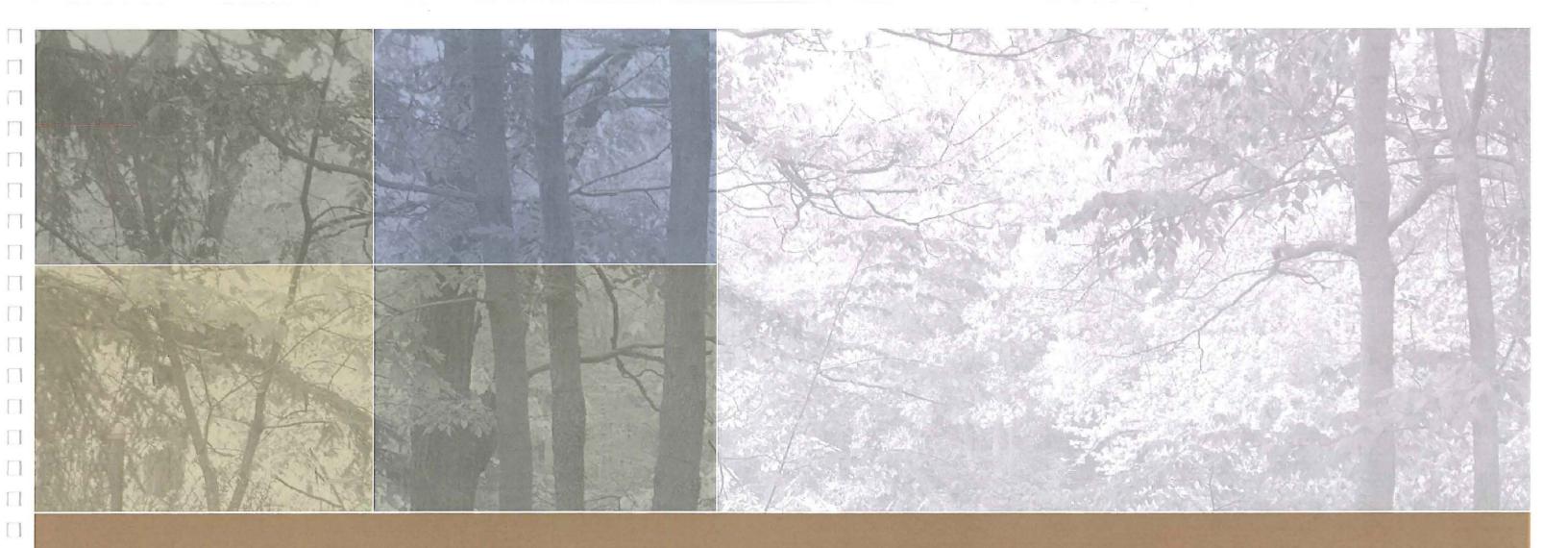
Overall water quality conditions were generally acceptable through the 2002 season. Water clarity was high and total phosphorous and chlorophyll concentrations were similar to those measured in 2000 and 2001. August water quality conditions were lower than 2000 and 2001, attributable to drought conditions and applications of copper sulfate.

Smart Growth Recommendations for the Environs

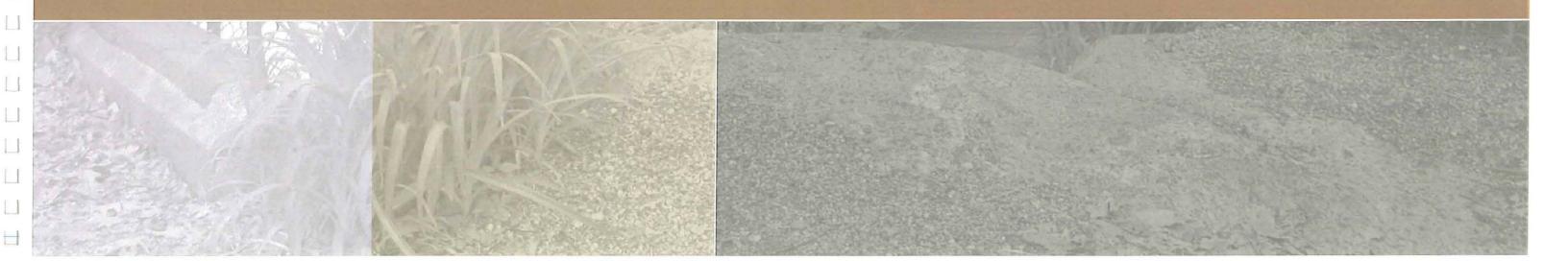
The Byram Township Smart Growth Plan of 2002 presents a strategy to alter current development trends by directing growth to population centers while protecting rural resources and environmentally sensitive areas of the Township. The following list of recommendations work in accord with the Future Land Use Plan of the Smart Growth Plan. Accordingly, these recommendations are designed to protect critical environmental areas of the Township, preserve rural character and redirect growth from areas lacking infrastructure to the proposed Village Center.

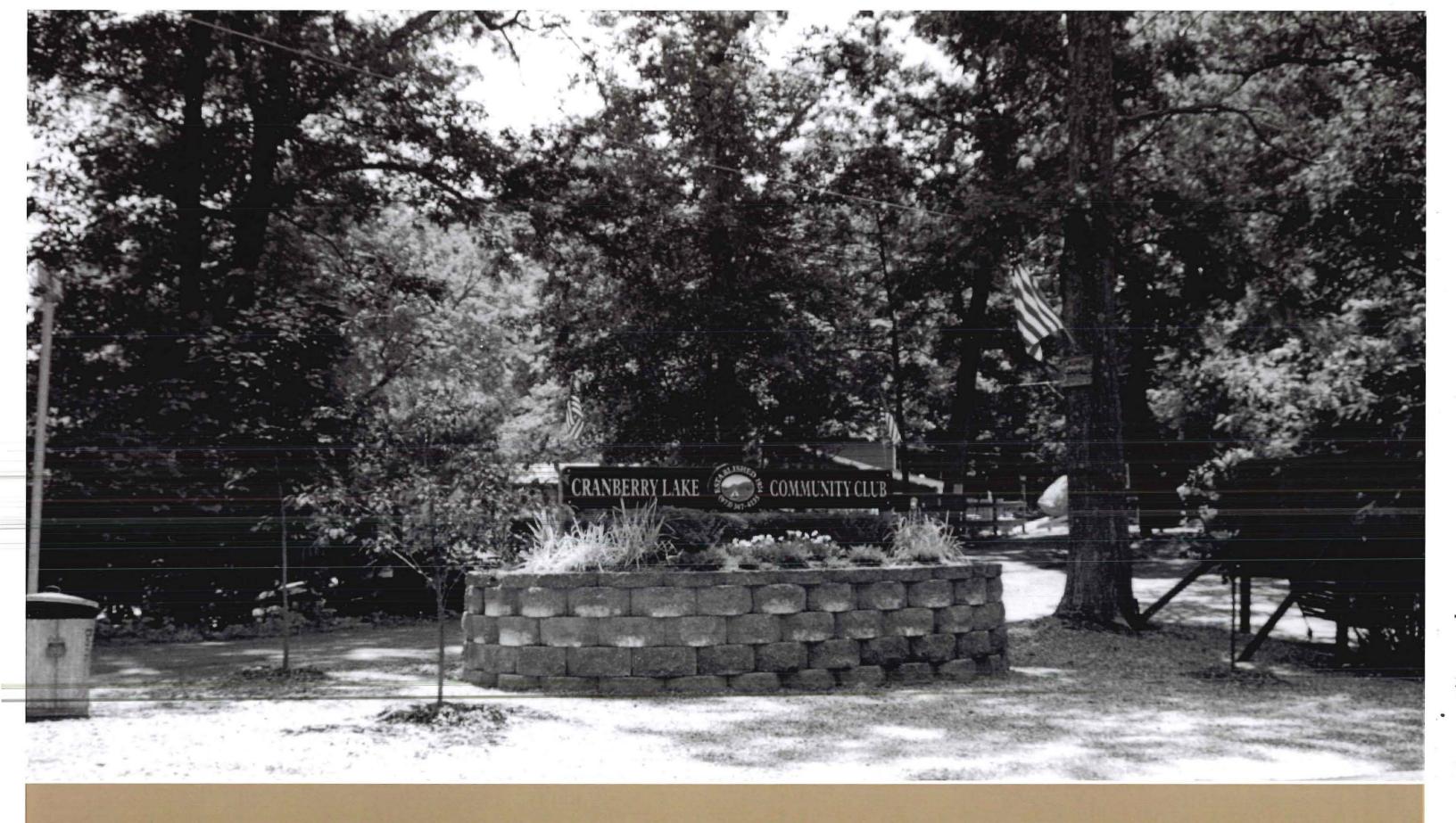
Recommendations for the Township's environs include:

- · Improve existing cluster housing ordinances.
- Adopt ordinances/design guidelines to create land-use patterns that ensure appropriate development and economic growth, while preserving environmentally sensitive lands and rural character.
- Create specific design guidelines to preserve rural character.
- Revise the zoning districts in the environs in accordance with the Future Land Use Map
- o Decrease the minimum density in the R-1 district from 0.2 to 0.1 (average density of one unit per ten acres).
- o Decrease the minimum density in the R-1A district from 0.285 to 0.2 (average density of one unit per five acres).
- o Increase the size of the R-1 district to include all environmentally sensitive areas of the Township.
- o Create a conservation district to ensure the preservation of the Boy Scout lands adjacent to Allamuchy Mountain State Park and other state and municipal parklands.
- Continually monitor and update the Township's recreation and open space inventory (ROSI) with NJDEP to be eligible for state grant monies.
- Expand the existing system of trails to connect residential areas with community facilities.
- Eliminate Industrial Commercial Park (ICP) districts in critical areas.
- Create a public district to properly regulate public facilities and services.
- Create a quarry district









Cranberry Lake District

Development around Cranberry Lake is concentrated on its north and south shores, in Cranberry Ledge, and on Strawberry Point. The housing stock is diverse and ranges from small vacation bungalows to multi-bedroom single-family homes. The community's roads are narrow, laid out in a winding pattern and are often on steep grades.

By examining the extent of developed and potentially developable parcels around the lake, the boundaries of the Cranberry Lake District are defined as:

- Route 206, a small strip of commercial properties and a parcel of state owned land to the East
- Allamuchy State Park, beyond Cranberry Ledge, to the West
- · Allamuchy State Park, beyond the North Shore, to the North
- Allamuchy State Park, beyond Briar Heights and Della Heights, to the South

Vital Statistics

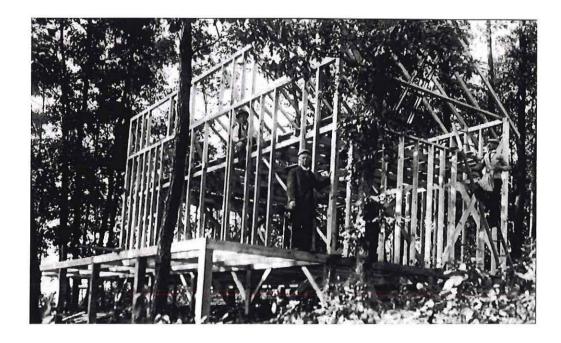
- o Total Lake District Size 532 acres
- o Cranberry Lake Size 190 acres
- o Net Residential Area Size 342 acres
- o Number of Lots 776 lots
- o Number of Sub Dividable* Lots 67 lots
- o Number of Non Conforming* Lots 446 lots
- o Population 911 full time, 1212 total including seasonal
- o Households 475
- o Average Household Size 2.55
- o Housing Units 525
- o Gross Density 0.99 units per acre (525 units on 532 acres)
- o Net Density 1.54 units per acre (525 units on 342 acres)
- o Zoning Predominantly R-3 and R-4 (20,000 & 10,000 sq. ft. minimum lot areas) with pockets of R-1 (5 acre lots) and B-1 zoning.
- o Land Uses Cranberry Lake provides a variety of recreational opportunities for area residents including fishing, boating and swimming. The Allamuchy Tract Mountain State Park surrounds the Cranberry Lake neighborhood. The Cranberry Lake Community Club provides two beach areas with several rafts and boat docks. Public access is at the boat ramp on the dam, on Sussex Branch Trail.

*(Sub dividable in size only. No other attributes were examined such as frontage or access. Non-conforming lots in size only. Non-conforming lots are undersized per current zoning. This is an analysis tool to gain an understanding of the basic development pattern and possibility of further development.)

History

Dammed in the 1830s, this lake was originally called Cranberry Bog and then Cranberry Reservoir. It was dammed to serve as a feeder for the Morris Canal to help maintain water levels. In the late 1920's, the level of the lake was raised three feet to its current 190 acres to provide better recreational use, and the Cranberry Lake Development Commission then built roads and sold lots for vacation homes. The Cranberry Lake Community Club (CLCC) was formed in 1924 and has approximately 2/3 of the lake's homeowners as its members. By 1994, about 34 of the 525 homes were being used year-round.

From 1902 until 1911, Cranberry Lake had a popular amusement park developed by the Lackawanna Railroad, which delivered a thousand people a weekend to the Cranberry Lake Station. A 30-acre picnicking ground stood in what is now Frenches Grove and rowboat rentals were a popular recreation, along with fishing, sailing and regattas. A large hotel was built in 1903, where the Community Club now stands, and was a popular dance hall. The Community Clubhouse was built after the hotel burned down in 1910, much to the delight of local residents who disliked the liquor sales and rowdy nature conservancy parties behavior of the hotel guests.



Cranberry Lake BYRAM TOWNSHIP LAKE DISTRICTS 31

Surface Water

Cranberry Lake has been designated by the NJDEP Surface Water Quality Standards classifications for the waters of the State of New Jersey as FW2-TM (C1), where FW2-TM waters are waters recognized as suitable for trout maintenance and FW2-NT are not recognized as suitable for trout maintenance. C1 are those waters designated for implementing anti-degradation policies in the New Jersey Surface Water Quality Standards for protection from changes in existing water quality. The lake's outlet streams within the lake's state park area are classified as FW2-NT (C1), while streams outside the park are classified as FW2-NT.

The 1982 Lakes Study described Cranberry Lake as not acting as a sink or a source for chemical nutrients. The inflow and outflow measurements were compatible. All of the measurements taken compared favorably to the other lakes tested. Pytlar, in his 1976 study, characterized Cranberry Lake as more susceptible to further rapid eutrophication due to its depth, development along the shores and conditions within the lake itself. He concluded that the rate at which lakes further decline depends heavily on the impact of human activity in the watershed and the lake area.

The Cranberry Lake Diagnostic Feasibility Study of 1992 conducted a septic leachate survey of the entire shoreline and found septic plumes at Laurel Cove on the western shore near North Shore Trail, at Cabin Springs near Cabin Springs Trail, at Weaver House Cove near Division Lane, at Strawberry Point on the north side of the canal, at Strawberry Point on the south side of canal and on the Eastern Shore in the vicinity of main spillway.

Non-Point Source pollution (NPS) studies have shown a direct relationship between water quality degradation and development within a watershed. When pollutants and sediments are transported off site in increasing quantities, both during and after development, to nearby surface water, turbidity increases and water quality decreases. It is recommended that adequate soil and erosion control plans be implemented to moderate such pollutants.

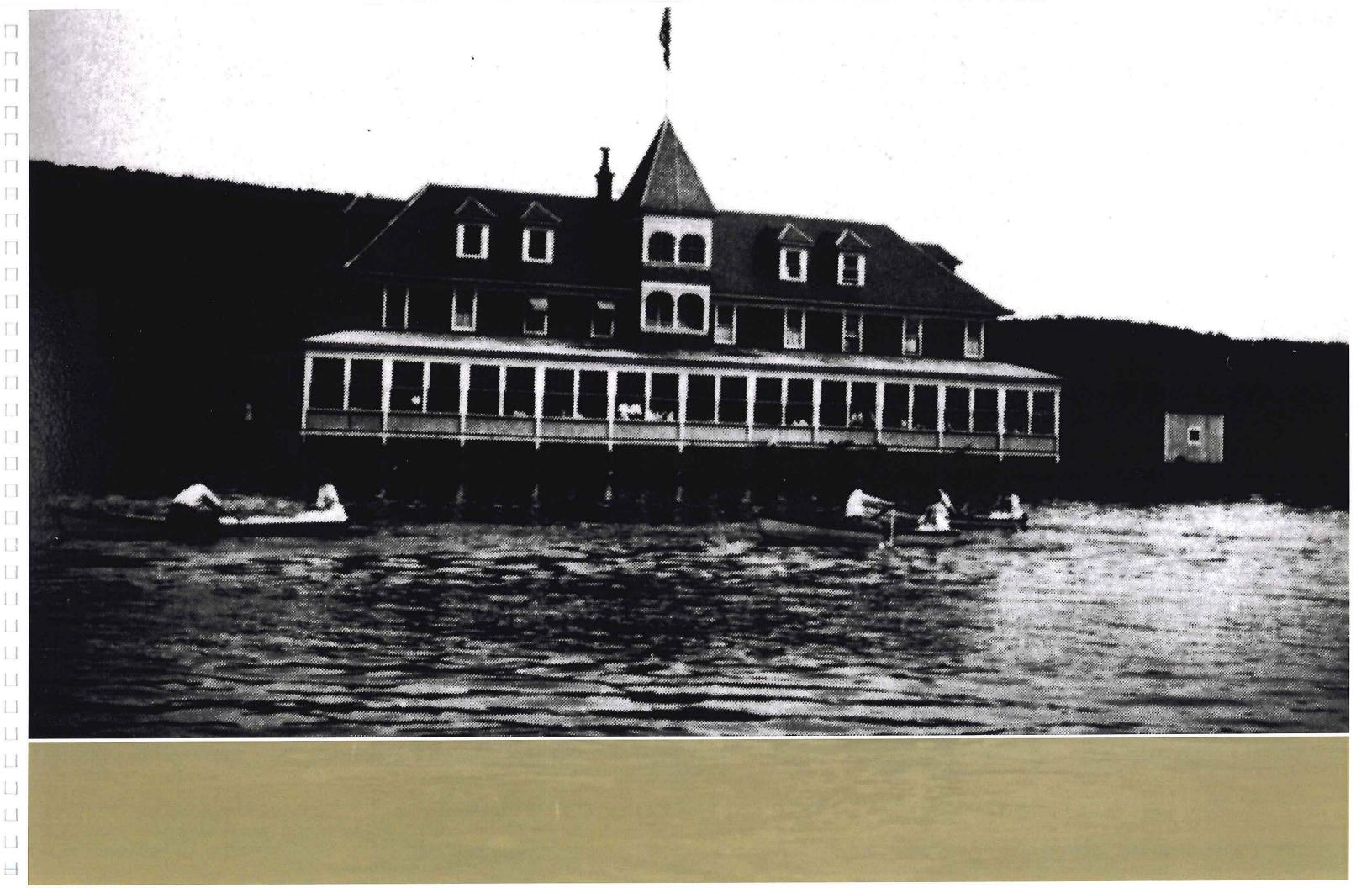
Potable Water Supply

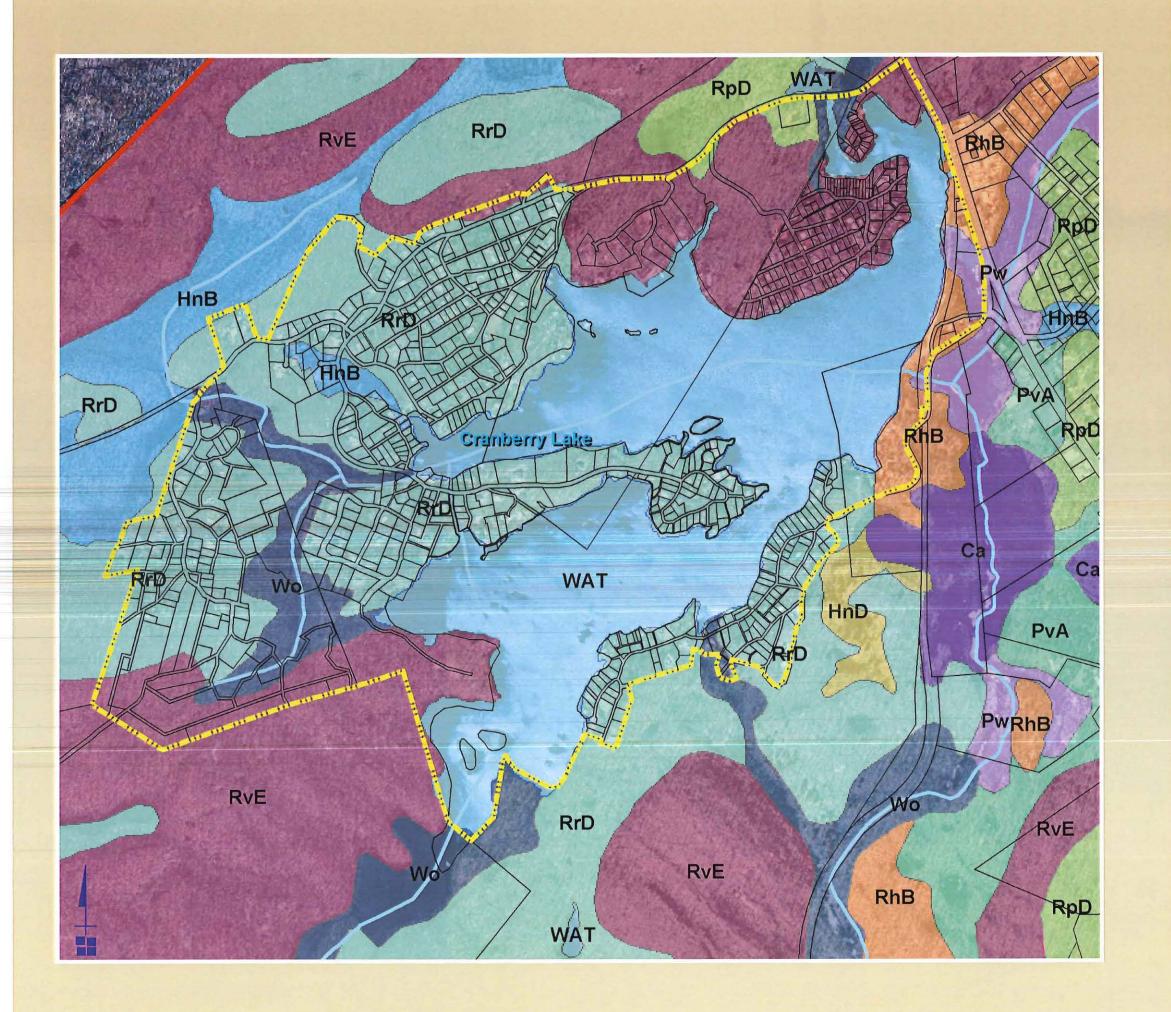
Four water supply companies, the Frenches Grove Water Association, the North Shore Water Association, the Briar Heights & Della Heights Property Owners Association, and the Strawberry Point Property Owners Association, supply the Cranberry Lake District.

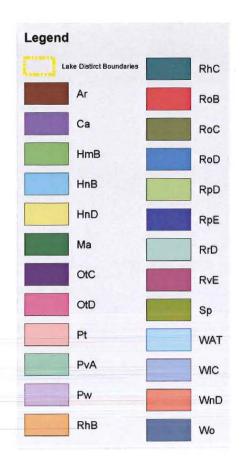
Frenches Grove Water Association has 82 units hooked up to its supply. There are some homes in the Frenches Grove neighborhood that are not hooked up to the water supply, most of the homes are year round residences and most have private wells. At present they are reported to not have any water quality or quantity issues; and they test daily, weekly and monthly for bacteria, metals and VOCs. The North Shore Water Association has 30 units hooked up to one of their supply wells and 3 additional houses hooked up to a second supply well. The North Shore Water Association is an old system, with low water pressure; and the supply lines are reported to have maintenance issues. Most of the residences are year round with only 3 or 4 seasonal residences. At present they are reported to not have any water quality issues and they test quarterly for bacteria, metals and VOCs.

The Briar Heights & Della Heights Property Owners Association has only 9 hook ups, a minority in the neighborhood, with the remainder of the households on private wells. All of the residences are seasonal, and the testing regime is limited to the beginning of each season. This is an older system dating from the 1920s. There are no reported water quality or quantity issues at Briar Heights & Della Heights. The Strawberry Point Property Owners Association has 36 hook ups, with 31 full time residences and 5 seasonal. There are 3additional homes in the neighborhood on private wells. At present they are reported to not have any water quality or quantity issues, and they test monthly for bacteria, metals and VOCs. The water has also been tested for traces of MTBE.

These water supply companies provide service to 160 customers, leaving the assumption that there are an additional 365 units that rely on private wells for their potable water supply. This raises concerns about water quality, since the dense development is loading the surface water and ground water with nutrients, chemicals, and bacteria.









SOIL TYPES IN CRANBERRY LAKE AREA

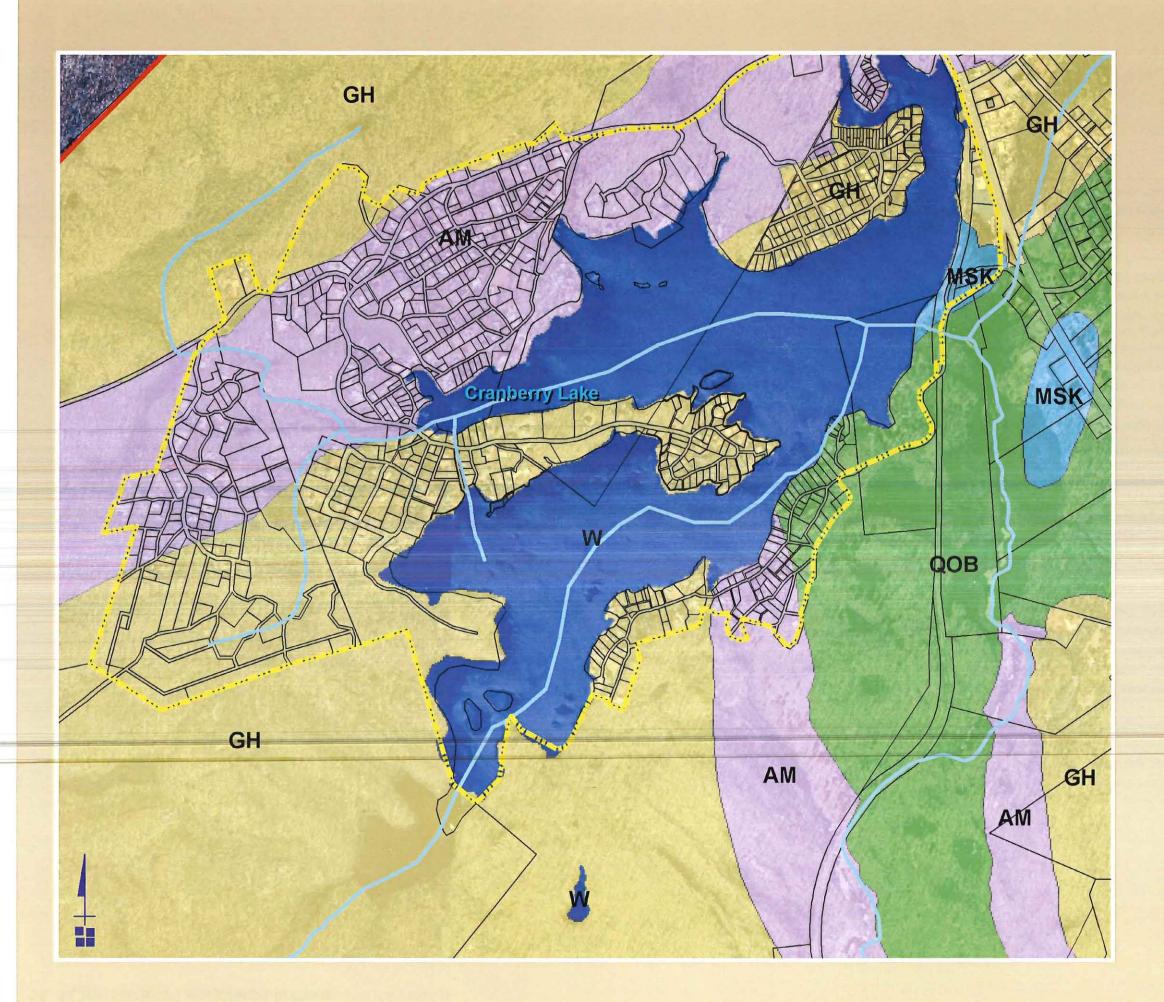
DOIL TIT	ES IN CRANBERRY LAKE AREA	
RrD	Rockaway-Rock Outcrop Association, Sloping & Moderately Steep.	Consists of deep, moderately well drained and well-drained soils on uplands. Very stony or extremely stony sandy loam surface layer 4 inches thick. Subsoil 4 to 22 inches gravelly sandy loam. Fragipan 22 to 38 inches gravelly sandy loam.
RvE	Rock Outcrop – Rockaway Association, Steep.	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to bedrock outcrops and stony soil.
RpD	Rockaway - Very Stony Loam, 5-25% Slope	Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields and roads & trails due to seasonal high water table perched over fragipan and high stone content. Severe limitations for sewage lagoons, sanitary landfills, golf courses, etc. and all uses (see above) in steep (15-20%) slope areas due to steep slopes and stony soil.
RhB	Riverhead Sandy Loam, 3-8% Slope	Slight limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, roads & trails, golf courses, etc. but ground water pollution hazard is possible due to rapid permeability in substratum. Severe limitations for sewage lagoons and sanitary landfills due to rapid permeability in substratum and ground water pollution hazard.
Pw	Preakness Sandy Loam	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface, subject to occasional stream overflow.
HnB	Hibernia Very Stony Loam, 3-8% Slope.	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, golf courses and roads due to seasonal high water table at depth of 0.5 to 1.5 feet.
Wo	Whitman Extremely Stony Sandy Loam.	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface.

Environmental Constraints

Soils

Limitations of soils for septic suitability are classified as slight, moderate or severe, and the majority of the Cranberry Lake watershed has severe limitations on development. Soils with severe limitations are typified by unfavorable conditions for wastewater reclamation and are difficult to correct with engineering solutions, thus highly constrained in their use for septic systems. The soils series that underlies the majority of the existing development on the lakefront consists of Rockaway very stony loam with 5% to 25% slopes, exhibits moderate limitations for foundations for dwellings with or without basements, septic tank absorption fields, roads and trails due to steep slopes and stony soil. Recommendations for septic use in such areas include, soil addition and reclamation, special engineering systems designs and intensive septic management to reduce or prevent failure.

In addition, the New Jersey Standards for Subsurface Disposal Sewage Systems (chapter 199) state that soils types like those that exist in the Cranberry Lake area are unsuitable for septic disposal field installation and may necessitate either soil replacement or mound installation systems. This limitation of underlying soils contributes to Cranberry Lake's unsuitability for continued development.



Geology

The Cranberry Lake District has four distinct bedrock geology formations. A Hornblende Granite/Mostly Hornblende Granite and Gneiss/Hornblende Granite and Gneiss formation and an Amphibolite formation underlie the majority of the district. There is a small pocket of Marble and Skarn formation and Quartz-Oligoclase-Biotite Gneiss formation underlying the eastern shore of Cranberry Lake.

Depth to bedrock is a crucial factor for septic suitability and thus for development in the watershed and lake area. Where soil depth to bedrock is shallow, sufficient area for wastewater treatment may not be present. In such soil conditions, water may not percolate vertically through the soil and instead may leach horizontally along bedrock and eventually reach the lake. It is noted that the majority of Cranberry Lake has a depth to bedrock of less than five feet and thus faces issues of septic unsuitability and surface water quality.

Geology Type

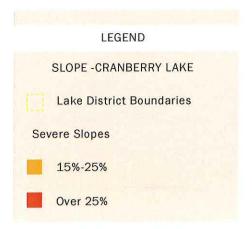
SY MBOL	LABEL.
AM	AMPHIBOLITE
- BH	HARDY STON FORMATION/HARDY STON
	QUARTIZITE/HARDYSTON SANDSTONE
B.	LETHSVILLE FORMATION
EOK	KITTATINNY GROUP/KITTATINNY FORMATION
EUK	(UNDIFFERENTIATED)
GH	HORNBLENDE GRANITE/MOSTLY HORNBLENDE
	GRANITE & GNESS/HORBLENDE GRANITE & GNESS
GHB	HORNBLENDE AND BIOTITE GNESS
GNM	MIXED GNESS
GPX	PY ROXENE GNESS
GS	INDICATES SYENITE
MSK	MARBLE AND SKARN
QO	QUARTZ-OLIGOCLASE GNESS
QOB	QUARTZ-OLIGOCLASE-BIOTITE GNESS
W	WATER

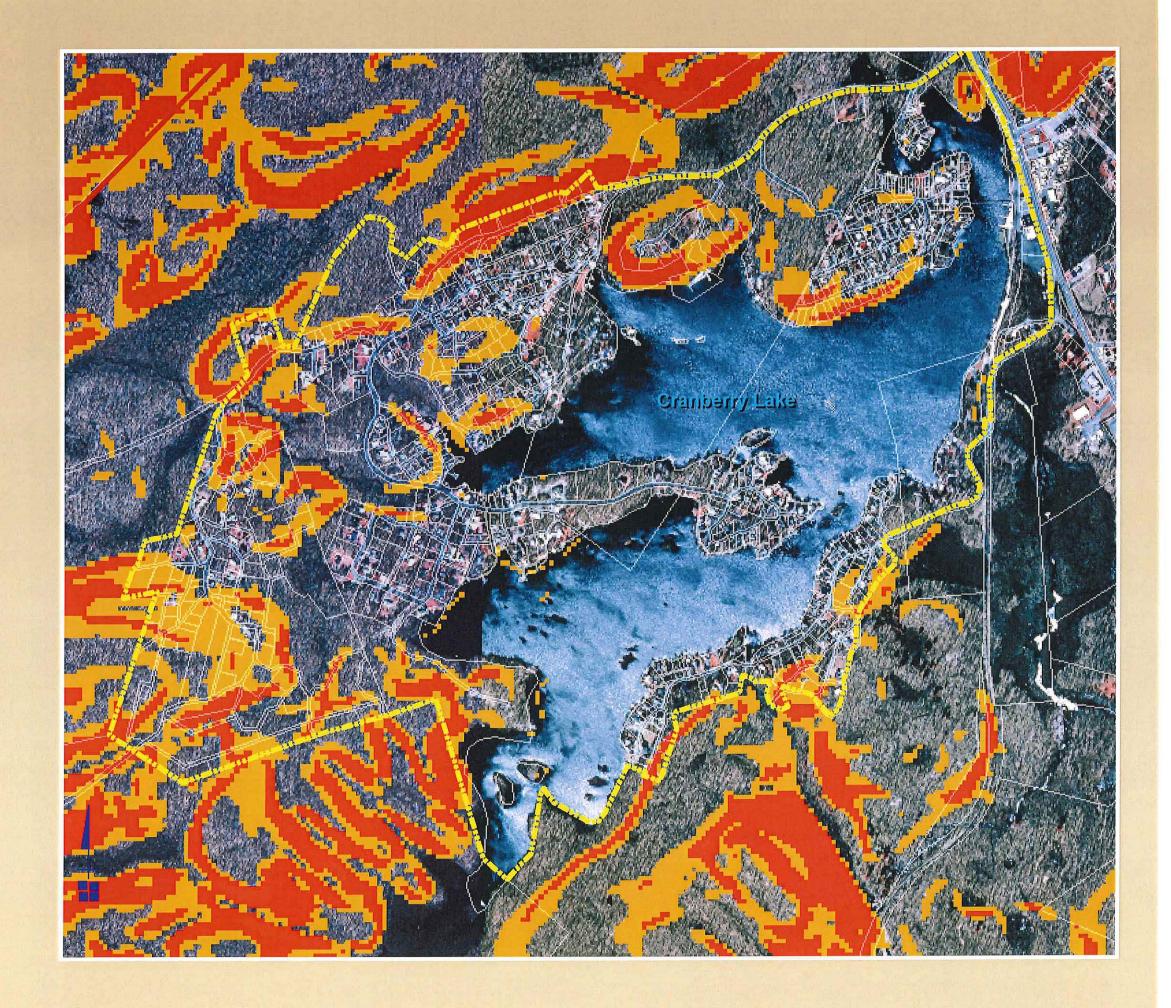
Steep Slopes

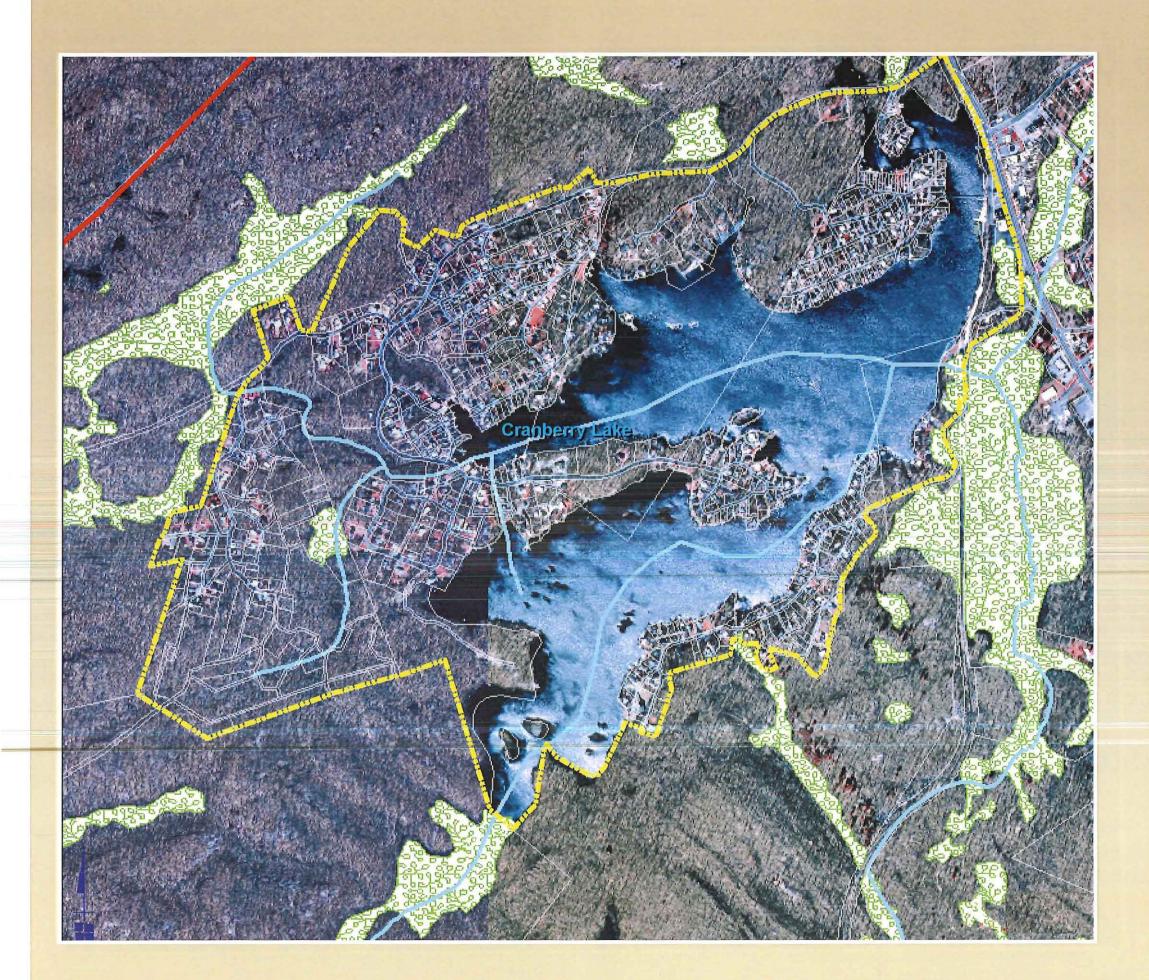
The Cranberry Lake District has variable slopes with a considerable area of steep slopes (15-25%) and severe slopes (over 25%), particularly along the North Shore and Cranberry Ledge. Slopes from 8% to 25% and above impose various limitations on development, including requirements for grading, specially designed septic systems and restrictions on construction. Erosion and sedimentation caused by site clearing and grading are highly problematic to land use and development where stringent and well-designed controls on development are absent. Such constraints imposed by topography and slopes can be overcome by appropriate excavation, soil erosion control during and after on-site construction, and storm water management plans.

Seasonal High-Water Table

The majority of the Cranberry Lake District has a depth of 3 to 5 feet to the seasonal high-water table. Such areas, where the water table is close to the surface, constrain development and require special management. These areas are extremely unsuitable for various types of foundation construction and most septic systems. Sufficient soil depth from the bottom of the septic system disposal bed to the top of the water table is necessary if septic inputs such as phosphorous, nitrogen and bacteria are to be prevented from leaching into the lake water.

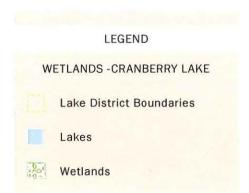






Wetlands

The types and location of wetlands in the Cranberry Lake watershed have been identified in the New Jersey Freshwater Wetlands Maps. There are no extensive areas of wetlands in the District per se, only small pockets of isolated wetlands, but there are extensive areas of wetlands along the feeder streams that are the inlets to Cranberry Lake and along the outlet stream. There should be a site-by-site analysis for the determination of wetlands wherever development is considered. These wetlands serve as critical habitats for various wildlife and vegetation species, and act as retention areas to reduce flooding and improve water quality through deposition, filtration and uptake. The state Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) regulates development within wetlands. Any construction activity within the wetlands and designated buffer areas is prohibited unless approved by the state. Wetland buffers or transition areas are areas of land adjacent to wetlands that minimize adverse impacts on wetlands and form an integral part of the wetlands ecosystem. The NJDEP establishes a minimum buffer of 150 feet for wetlands of exceptional value and 50 feet for wetlands of intermediate value.

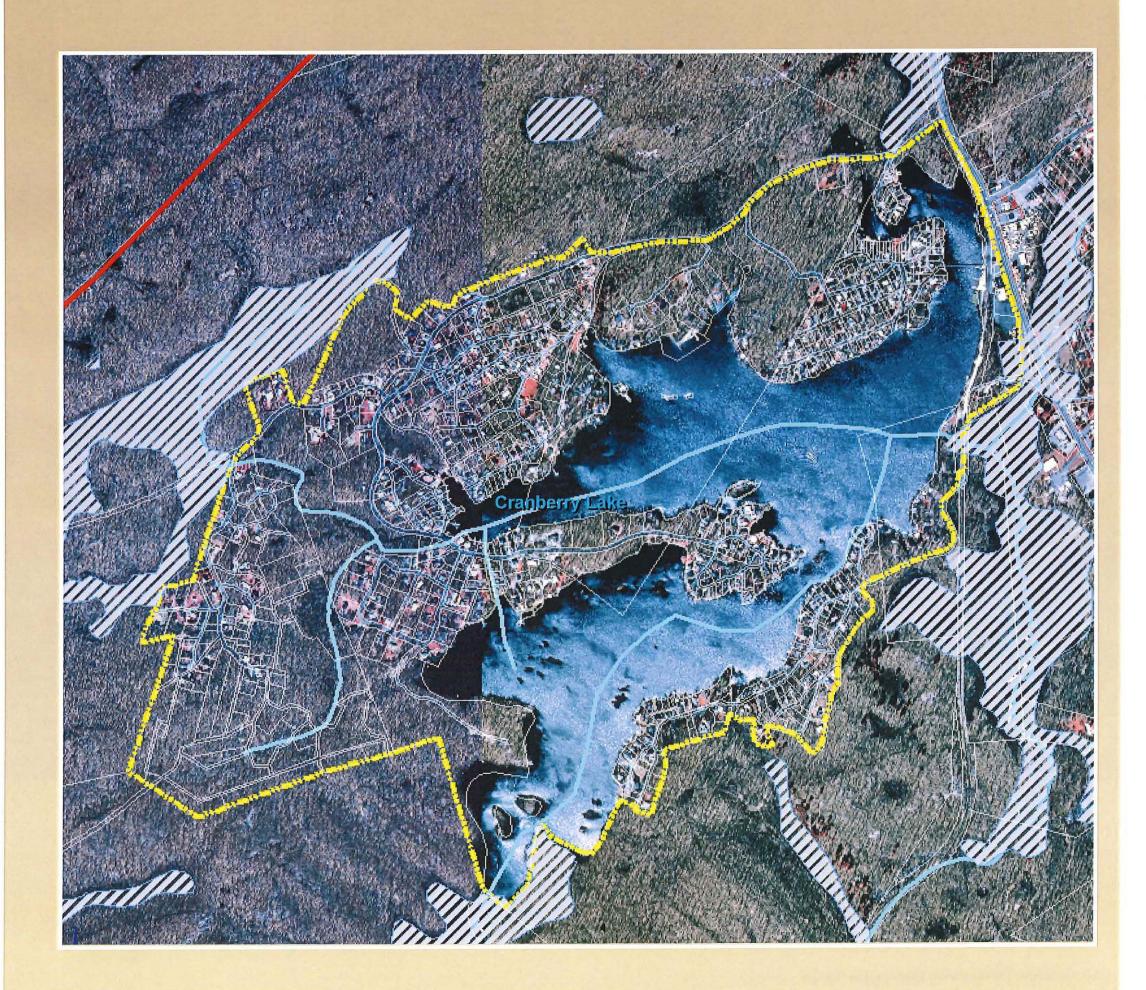


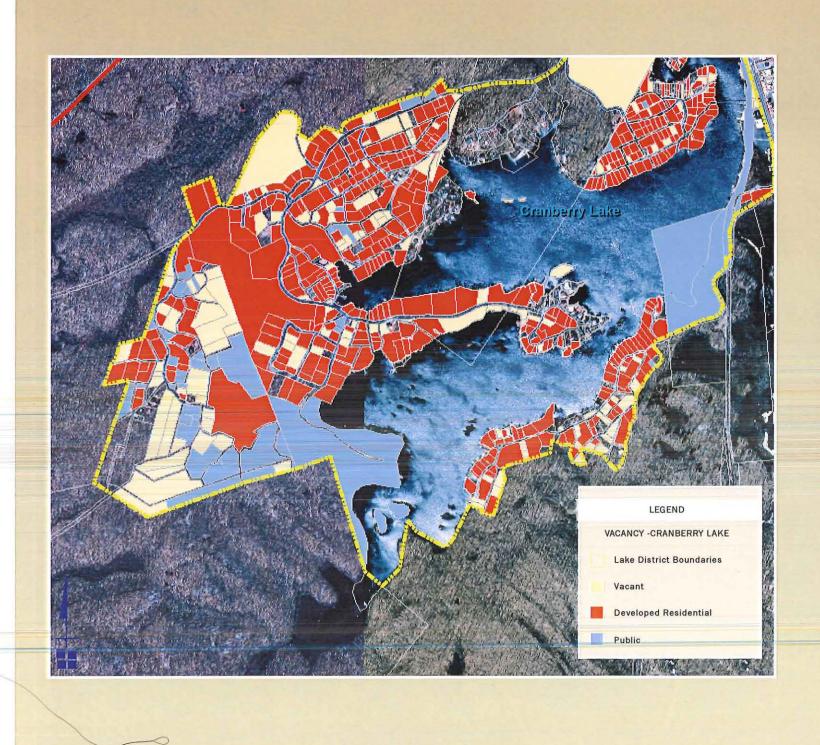
Floodplains

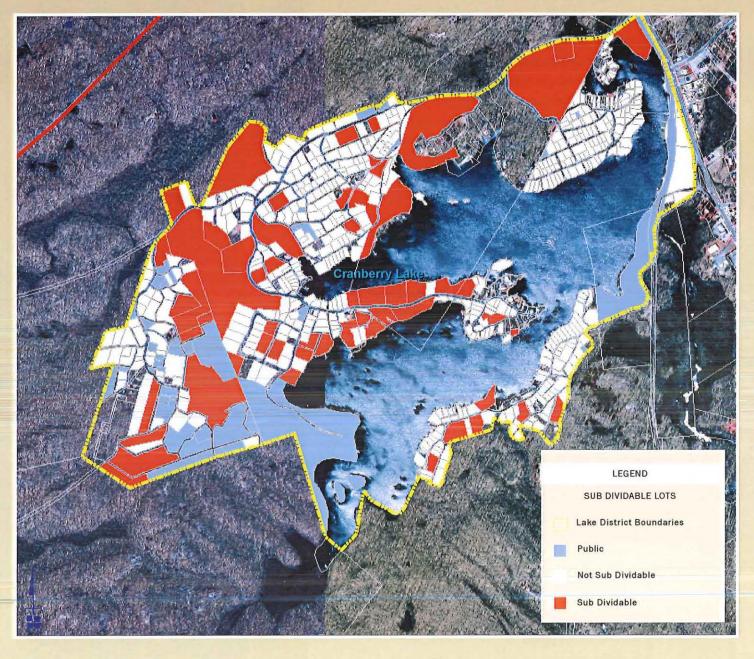
There are no extensive areas of floodplains in the District per se. The lake itself is the dammed portion of the original floodplain, but there are extensive floodplains along the feeder streams that are the inlets to Cranberry Lake and along the outlet stream. Floodplains are subject to periodic flooding and provide flood storage capacity, physical and biochemical water filtering and wildlife habitat. Development in these areas increases runoff, reduces flood storage capacity, and increases the size and frequency of downstream flooding, erosion of stream banks, deposition of sediments and loss of wildlife habitat.

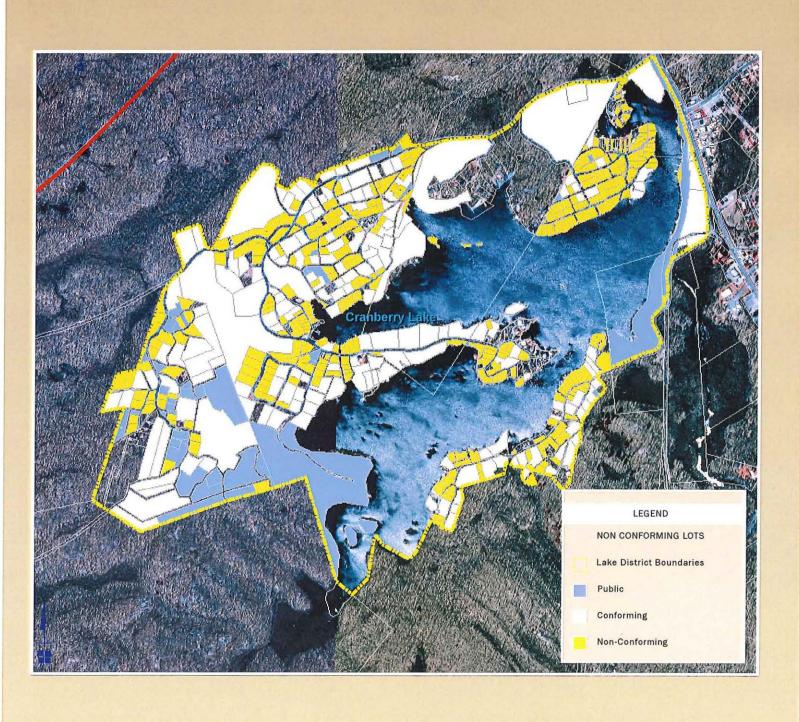
Since Cranberry Lake has an existing dense development, any further development in the floodplains should be discouraged. Development activities occurring within a stream or channel or in its floodplain are subject to NJDEP Bureau of Inland Regulation. These activities include filling or alteration of a flood plain, discharge of storm water into a stream, or the modification of a stream channel.











Cranberry Lake District Planning Issues

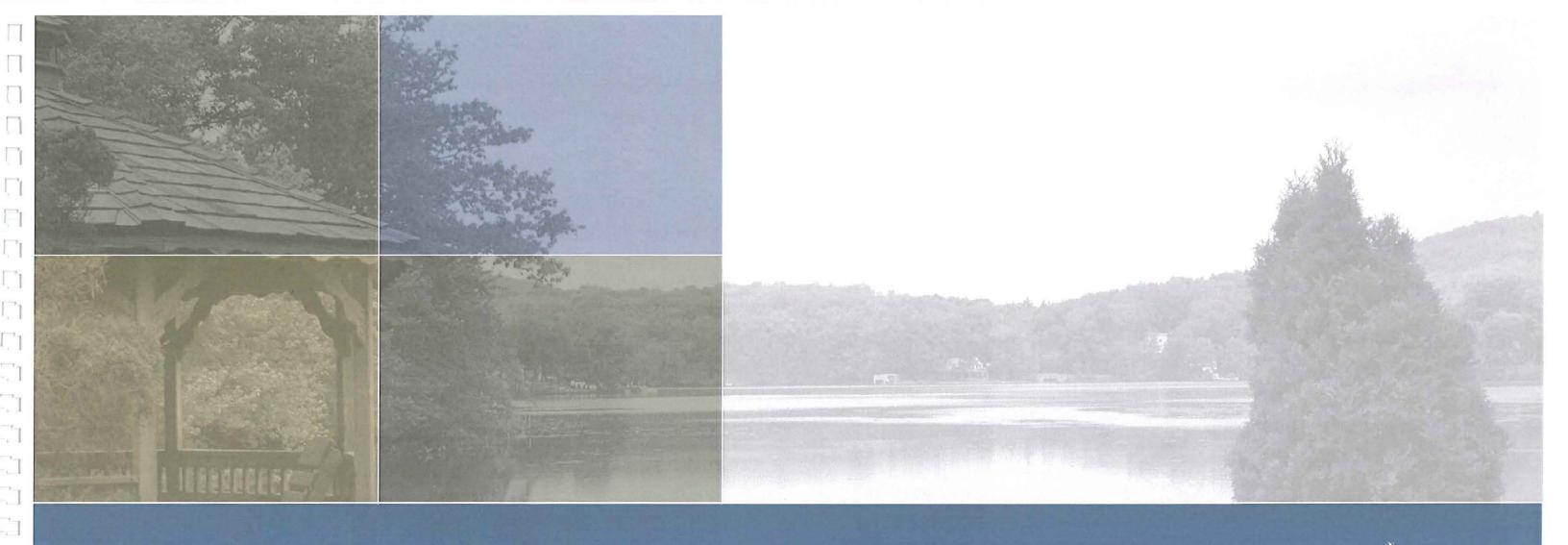
Development and Septics

Cranberry Lake has the largest concentration of development in the Township, with density being greatest along the north and south shores of the lake. The street plan is old and based on outdated concepts of seasonal cabin use, thus restricting traffic flow and limiting access to emergency vehicles. Many of the septic systems are old, of outdated design and failing. This fact, combined with existing severe limitations on septic suitability of local soils creates a crisis of water quality and threatens public health, property values and neighborhood cohesion.

Recent years have seen an increase in conversion of seasonal cabins to full-time residences. This is often followed by permit applications for expanding existing cabins or razing the original structure and replacing it with a much larger residential structure. This puts additional stresses on septic systems in soils with severe limitations and increases the impervious surface area in the watershed, reducing ground water recharge and groundwater inflow to the lake.

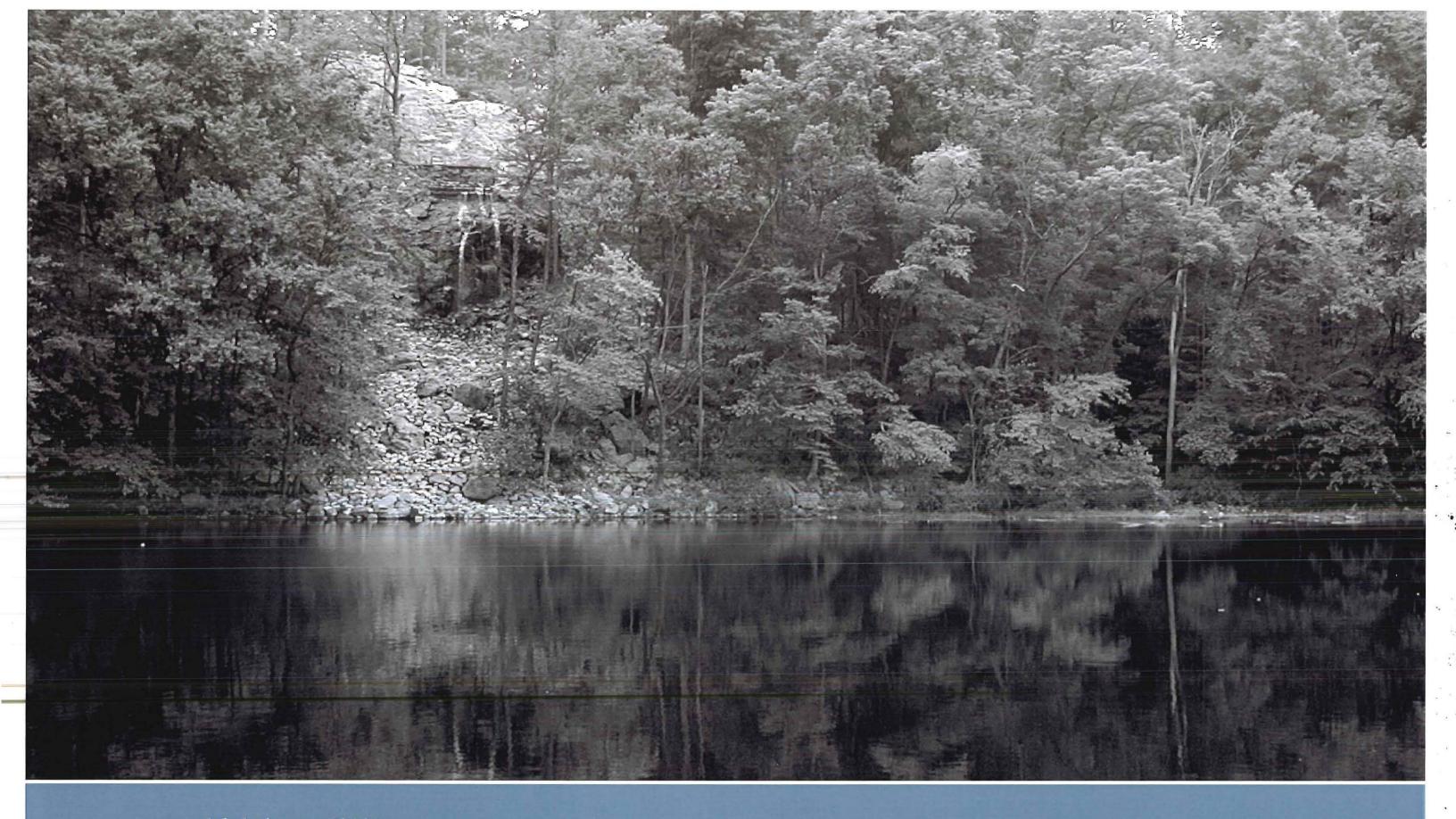
The Master Plan Reexamination of 1995 mentions signs of poor housing maintenance as a problem in the area. It notes that Byram's Housing Rehabilitation Program has helped to alleviate housing conditions and improve some failed septic systems. Examination of the data of the last ten years shows that the area has 3 new septic installations, 17 alterations and 6 repairs, and 1 reported failure.

It is presumed that many more failed septics go unreported. The Cranberry Lake Sensitive Land Management Plan, based on a comprehensive study of the lake, asserts that continuing development of the lake's watershed has impacted the lake's water quality. That analysis indicated that external loading accounts for 25% of the total nutrient load; and, while NPS pollution control measures can be implemented to reduce this load, future development can negate these efforts. Any plan to ameliorate the lake's condition must incorporate external control of sediment and phosphorus inputs through both NPS pollution control and development and land use control measures to achieve water quality improvements.









Lake Lackawanna District

Lake Lackawanna, Byram's first summer community, is surrounded by residential development and a nine-hole golf course. The housing stock is diverse and varies from densely concentrated small vacation bungalows to multi-bedroom single-family homes. Larger home sites occupy the steeply sloped wooded areas on the periphery of the lake area. Lackawanna Drive runs along the circumference of the Lake and the neighborhood is easily accessed.

By examining the extent of developed and potentially developable parcels around the lake, the boundaries of the Lake Lackawanna District area define as:

- The abandoned Erie-Lackawanna Railroad Cut-off to the East
- The wooded vacant land and scattered site development to Wolf Lake to the North
- · Municipally owned land and steeply sloped rocky terrain to the South and West

Vital Statistics

- o Total Lake District Size 767 acres
- o Lake Lackawanna Size 117 acres
- o Net Residential Area Size 650 acres
- o Number of Lots 465 lots
- o Number Sub dividable* Lots 94 lots
- o Number of Non-conforming* Lots 163 lots
- o Population 788
- o Households 286
- o Average Household Size 2.76
- o Housing Units 306
- o Gross Density 0.39 units per acre (306 units on 767 acres)
- o Net Density 0.47 units per acre (306 units on 650 acres)
- o Zoning R-4 and R-2 (10,000 & 40,000 sq. ft. minimum lot areas)
- Land Uses Lake Lackawanna provides a variety of recreational opportunities for area residents including fishing, boating and swimming. Amenities include a beach, boat launch and clubhouse as well as a nine-hole golf course for residents located near the lakefront.

*(Sub dividable in size only, no other attributes were examined such as frontage or access. Non-conforming lots in size only. Non-conforming lots are undersized per current zoning. This is an analysis tool to gain an understanding of the basic development pattern and possibility of further development.)

History

Created in 1910 by damming Lubber's Run at the foot of Hopatcong Mountain, Lake Lackawanna now covers 117 acres. Byram's first summer colony, the lake community was originally a private community on 657 acres of land surrounding the lake. There are now 306 homes in the community and only 10 of these homes remain summer vacation homes, the balance having become year-round residences.

The Lake Lackawanna Investment Company bought most of the property surrounding the lake in 1925. The Investment Company continues to own about 280 acres, which lies at the eastern end between the lake and the Cut-off railroad bed, and has discussed plans to keep the property undeveloped. Also included in the company's ownership are the lake, the beach, and the boat launch. A fee is charged for access to the lake. In 1925 the Company built a clubhouse and a nine-hole golf course on the lake's southern shore. The Investment Company has discussed plans to expand this golf course from a nine-hole to an eighteen-hole course.

Lake Lackawanna BYRAM TOWNSHIP LAKE DISTRICTS 45

Surface Water

Lake Lackawanna is not specifically listed in the NJDEP Surface Water Quality Standards classifications for the waters of the State of New Jersey, and is therefore to be considered FW2-NT, where FW2-TM waters are waters recognized as suitable for trout maintenance and FW2-NT are not recognized as suitable for trout maintenance. However, Lake Lackawanna drains directly into Lubbers Run, which is classified FW2-TM.

The 1982 Lakes Study found Lake Lackawanna to be the 'cleanest', having the most consistent readings of inflow and outflow to the lake. These results for Lake Lackawanna were contradictory to Pytlar's conclusions in 1976 when he concluded that Lake Lackawanna was the most eutrophic among the six lakes. He characterized Lackawanna as more susceptible to further rapid eutrophication due to its depth, development along the shores and conditions within the lake itself. He concluded that the rate at which lakes further decline depends heavily on the impact of human activity in the watershed and the lake area.

Non-Point Source pollution (NPS) studies have shown a direct relationship between water quality degradation and development within a watershed. When pollutants and sediments are transported off site in increasing quantities, both during and after development, to nearby surface water, turbidity increases and water quality decreases. It is recommended that adequate soil and erosion control plans be implemented to moderate such pollutants.

Potable Water Supply

Lake Lackawanna has no water supply company, and thus all units rely on private wells for their potable water supply. This raises concerns about water quality, since the dense development is loading the surface water and ground water with nutrients, chemicals and bacteria.

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SOIL TYPES IN THE LAKE LACKAWANNA DISTRICT

	FES IN THE LAKE LACKAWAIN	
RrD	Rockaway – Rock Outcrop Association, Sloping & Moderately Steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to steep slopes and stony soil.
RpD	Rockaway Very Stony Loam, 5- 25% Slope	Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields and roads & trails due to seasonal high water table perched over fragipan and high stone content. Severe limitations for sewage lagoons, sanitary landfills, golf courses, etc. and all uses (see above) in steep (15-20%) slope areas due to steep slopes and stony soil.
RhB	Riverhead Sandy Loam, 3-8% Slope	Slight limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, roads & trails, golf courses, etc. but ground water pollution hazard is possible due to rapid permeability in substratum. Severe limitations for sewage lagoons and sanitary landfills due to rapid permeability in substratum and ground water pollution hazard.
RvE	Rock Outcrop-Rockaway Association, Steep.	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to bedrock outcrops and stony soil.
PvA	Pompton Fine Sandy Loam, 0-3% Slopes	Moderate limitations for foundations for dwellings w/out basements, golf courses and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, and roads due to seasonal high water table at depth of 1 to 2 feet.
Pw	Preakness Sandy Loam	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface, subject to occasional stream overflow.
HnB	Hibernia Very Stony Loam, 3-8% Slope	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, golf courses and roads due to seasonal high water table at depth of 0.5 to 1.5 feet.
HnD	Hibernia Very Stony Loam, 8-25% Slope	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads, golf courses, etc. due to seasonal high water table perched at depth of 0.5 to 1.5 feet and excessive stone content.
Ca	Carlisle Muck	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface frequent flooding and severe subsidence.
OtC	Otisville Gravelly Loamy Sand, 3-15% Slopes.	Slight limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, trails and roads if slopes are 3-8%. Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, trails and roads if slopes are 8-15%. Sever limitations for sewage lagoons, sanitary landfills, golf courses, etc. due to rapid permeability of soil and surface texture.
Wo	Whitman, Extremely Stony Sandy Loam	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface.

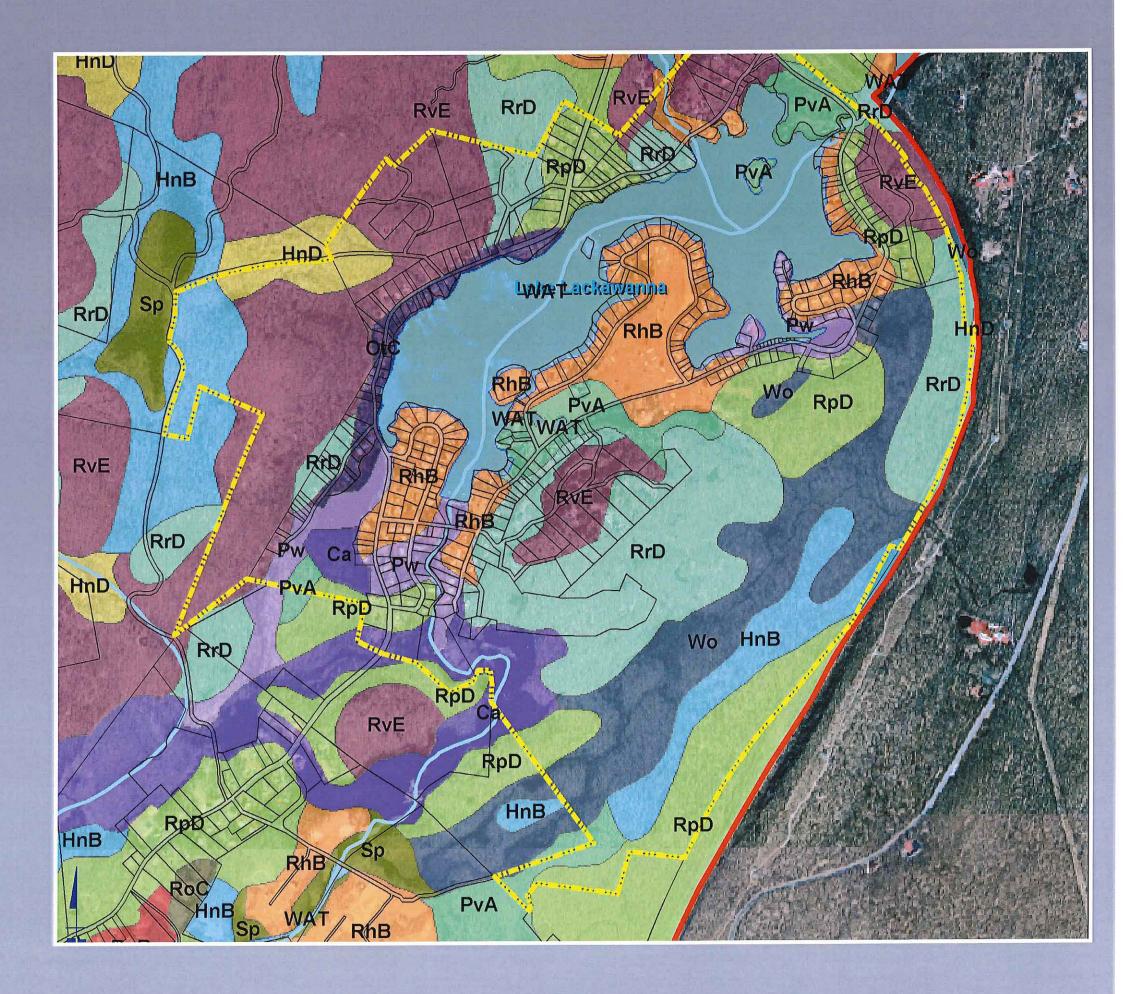
Environmental Constraints

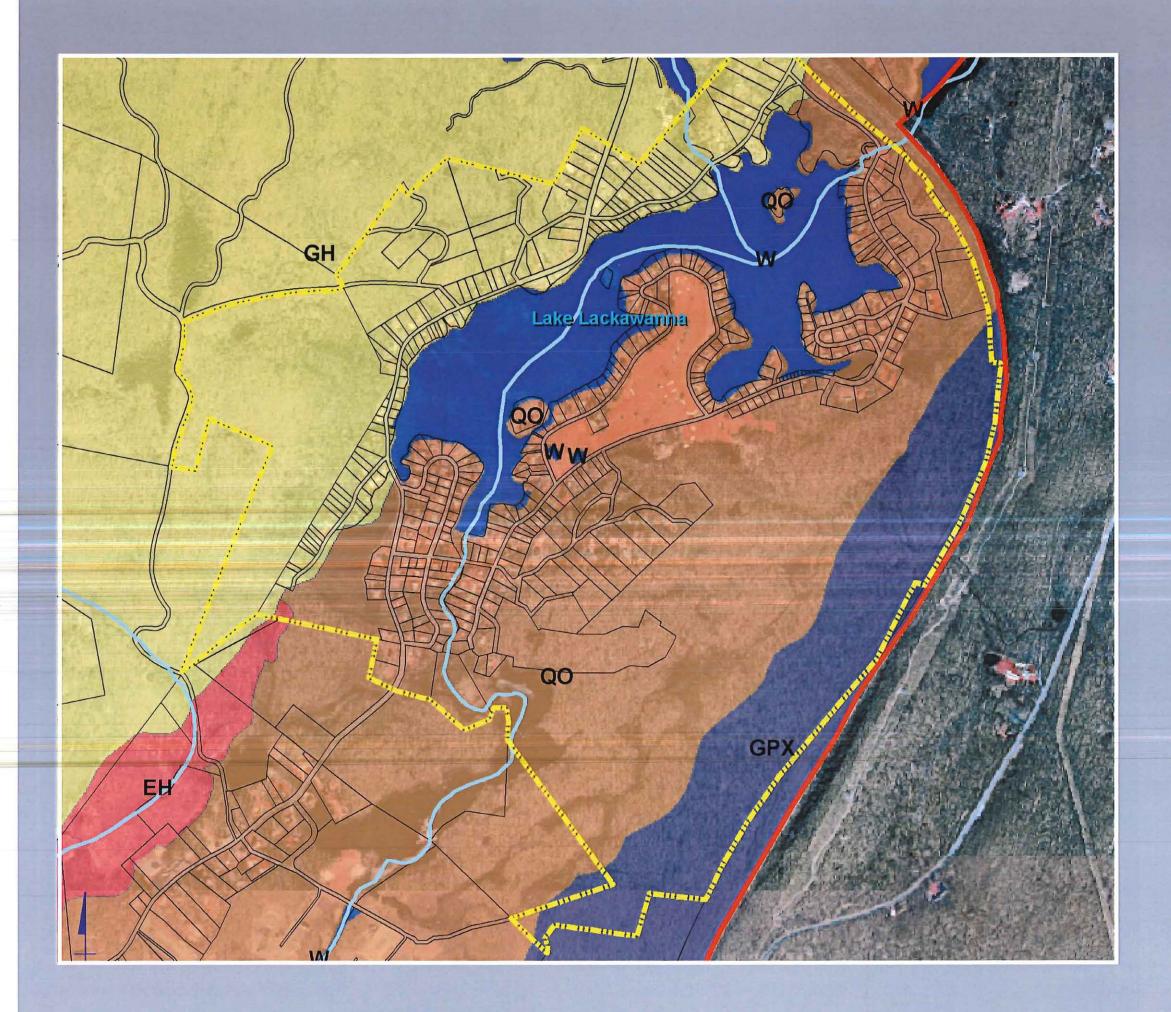
Soils

The majority of the Lake Lackawanna District has soils with severe limitations on development. However, some of the soils in the District are classified as having slight or moderate limitations for building and septics if the slopes are less than 8%. The soils series that underlies the majority of the existing development on the lakefront consists of Rockaway very stony loam with 5% to 25% slopes, exhibits moderate limitations for foundations for dwellings with or without basements, septic tank absorption fields, roads and trails due to steep slopes and stony soil. Most of the existing residential development occurs on these soils. Soils with severe limitations are typified by unfavorable conditions for wastewater reclamation and are difficult to correct with engineering solutions, thus highly constrained in their use for septic systems. Recommendations for septic use in such areas include, soil addition and reclamation, special engineering systems designs and intensive septic management to reduce or prevent failure.

In addition, the New Jersey Standards for Subsurface Disposal Sewage Systems (Chapter 199) state that soils types like those that exist in the Lake Lackawanna area are unsuitable for septic disposal field installation and may necessitate either soil replacement or mound installation systems. This limitation of underlying soils contributes to Lake Lackawanna's unsuitability for continued development.







Geology

The Lake Lackawanna District has two distinct bedrock geology formations. A Hornblende Granite/Mostly Hornblende Granite and Gneiss/Hornblende Granite and Gneiss formation and a Quartz-Oligoclase Gneiss formation underlie the majority of the district.

Depth to bedrock is a crucial factor for septic suitability and thus for development in the watershed and lake area. Where soil depth to bedrock is shallow, sufficient area for wastewater treatment may not be present. In such soil conditions, water may not percolate vertically through the soil and instead may leach horizontally along bedrock and eventually reach the lake. It is noted that the majority of the Lake Lackawanna District has a depth to bedrock of less than five feet and thus faces issues of septic unsuitability and surface water quality.

Geology Type

SY MBOL	LABEL	
AM	AMPHIBOLITE	
BH	HARDY STON FORMATION/HARDY STON	
	QUARTIZITE/HARDY STON SANDSTONE	
B.	LETHSVILLE FORMATION	
EOK	KITTATINNY GROUP/KITTATINNY FORMATION	
	(UNDIFFERENTIATED)	
GH	HORNBLENDE GRANITE/MOSTLY HORNBLENDE	
	GRANITE & GNESS/HORBLENDE GRANITE & GNESS	
GHB	HORNBLENDE AND BIOTITE GNESS	
GNM	MIXED GNESS	
GPX	PY ROXENE GNESS	
GS	INDICATES SYENITE	
MSK	MARBLE AND SKARN	
QO	QUARTZ-OLIGOCLASE GNBSS	
QOB	QUARTZ-OLIGOCLASE-BIOTITE GNESS	
W	WATER	

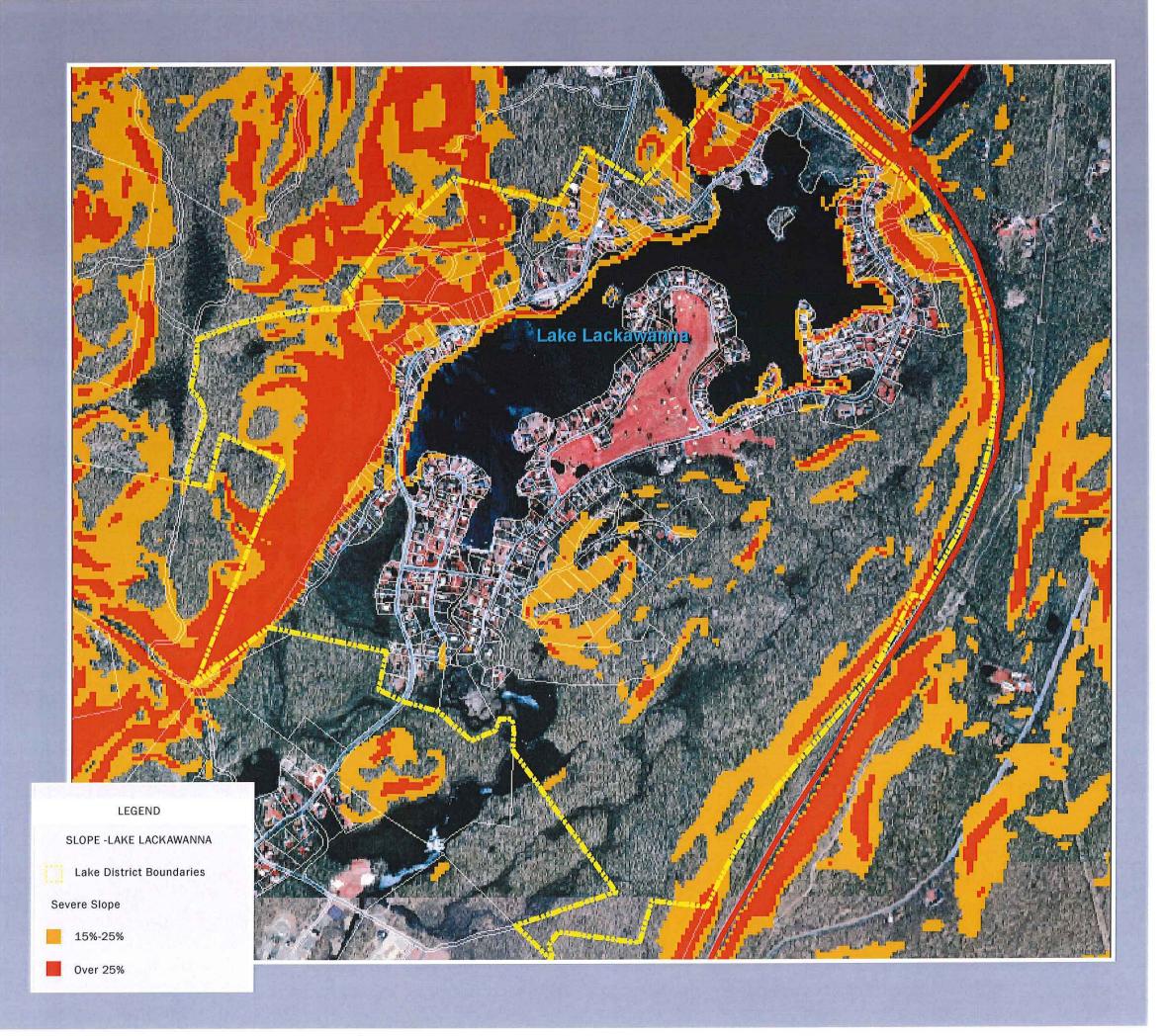
Steep Slopes

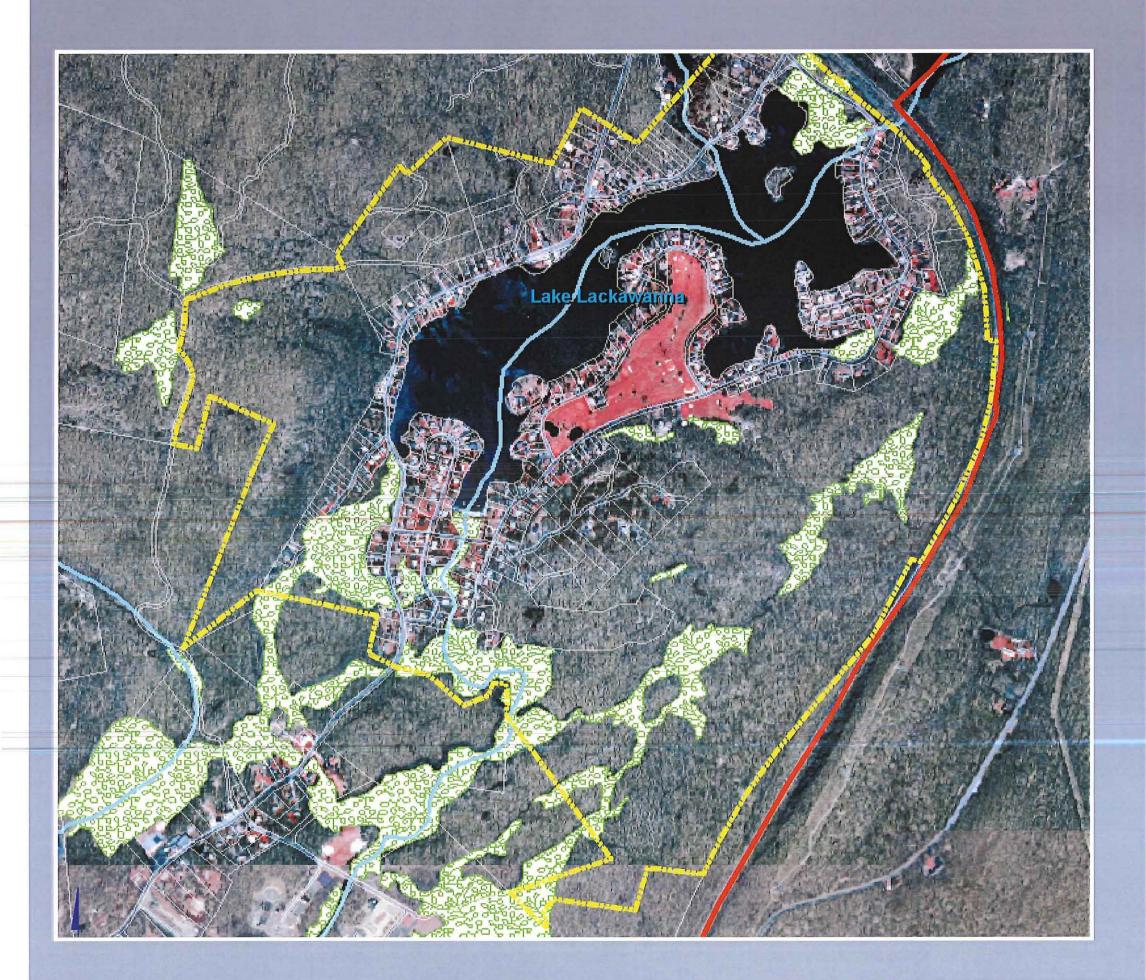
The Lake Lackawanna District has variable slopes, with new development located on very steep slopes along Carpenter Drive. Most of the developed areas immediately adjacent to the north, south and eastern shores are on slopes less than 8-10%. The western part of District yet to be developed is on slopes of 15-25%. In fact, the majority of the western portion of the District is made up of slopes of 25-35%.

Such sloped areas impose various limitations on development, including requirements for grading, need for specially designed septic systems and restrictions on construction. Erosion and sedimentation caused by site clearing and grading are highly problematic where stringent and well-designed controls on development are absent. Such constraints imposed by topography and slopes can be overcome by appropriate excavation, soil erosion control during and after on-site construction, and storm water management plans.

Seasonal High Water Table

The majority of the Lake Lackawanna District has a depth to the seasonal water table of 2 to 4 feet. A small portion of the shore on the south eastern shore has a depth of about 6 feet, which is more suitable for development than the remaining area around the lake. Areas in the southeastern edge of the Lake area have very shallow depths of 0.5 to 1.5 feet to the water table. Such areas, where the water table is close to the surface, are constrained from development and are unsuitable for various types of foundation construction and septic systems. Sufficient soil depth from the bottom of the septic system disposal bed to the top of the water table is necessary if septic inputs such as phosphorous, nitrogen and bacteria are to be prevented from leaching into the lake water.





Wetlands

Numerous wetland areas have been identified in the Lake Lackawanna District by the NJDEP Freshwater wetlands maps primarily on the northeastern shore of the lake, along the outlet stream that leads to Lubbers Run, and in a series running through the eastern half of the district. There should be a site-by-site analysis for the determination of wetlands wherever development is considered. These wetlands act as storm water retention areas to reduce flooding and they improve water quality through deposition, filtration and uptake.

The state Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) regulates development within wetlands. Any construction activity within the wetlands and designated buffer areas is prohibited unless approved by the state. Wetland buffers or transition areas are areas of land adjacent to wetlands that minimize adverse impacts on wetlands and form an integral part of the wetlands ecosystem. The NJDEP establishes a minimum buffer of 150 feet for wetlands of exceptional value and 50 feet for wetlands of intermediate value.

These buffers serve a number of important environmental and ecological functions, function as linkages between habitat types, and play an important role in maintaining the environmental quality of the Lubbers Run. These corridors stabilize soils to avoid erosion caused by overland runoff, storm surges and fluctuations in water depths.

LEGEND

WETLANDS - LAKE LACKAWANNA



Lake District Boundaries



Lakes



Wetlands

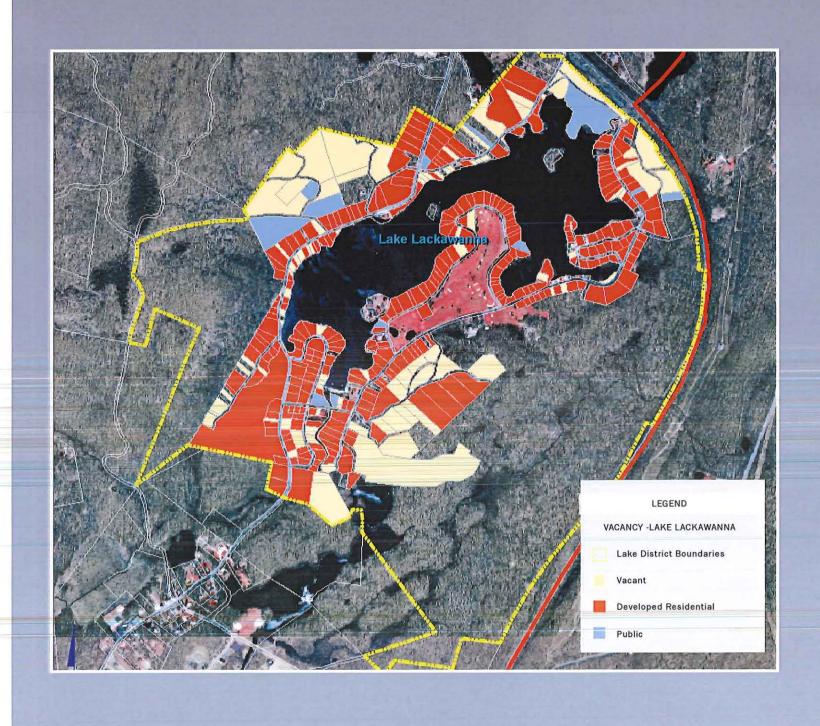
Floodplains

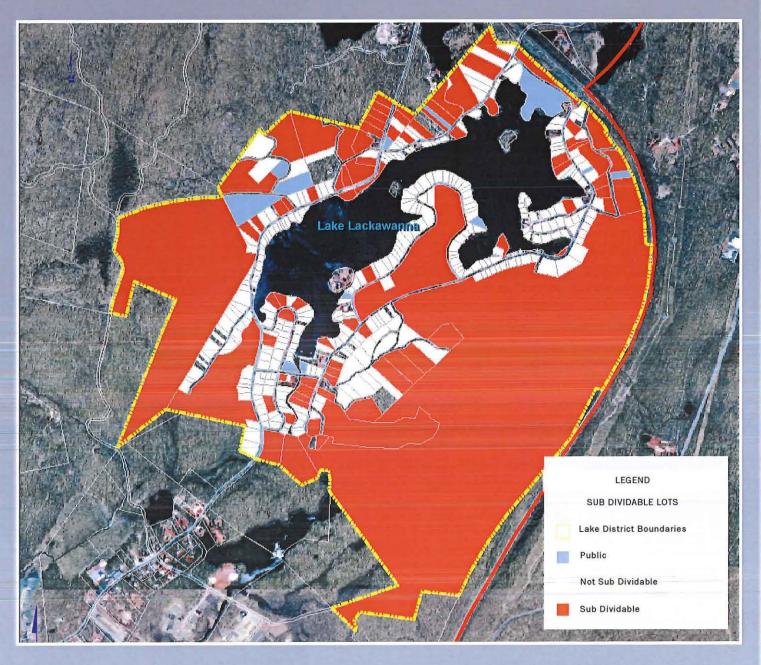
There are extensive areas of floodplains in the District. The lake itself is the dammed portion of the original floodplain and there are extensive floodplains that surround the lake, including the entire golf course. There are floodplain areas along Lubbers Run and the unnamed tributaries that feed Lubbers Run. Much of the development on the eastern shore is in the floodplain. Floodplains are subject to periodic flooding and provide flood storage capacity, physical and biochemical water filtering and wildlife habitat. Development in these areas increases runoff, reduces flood storage capacity, and increases the size and frequency of downstream flooding, erosion of stream banks, deposition of sediments and loss of wildlife habitat.

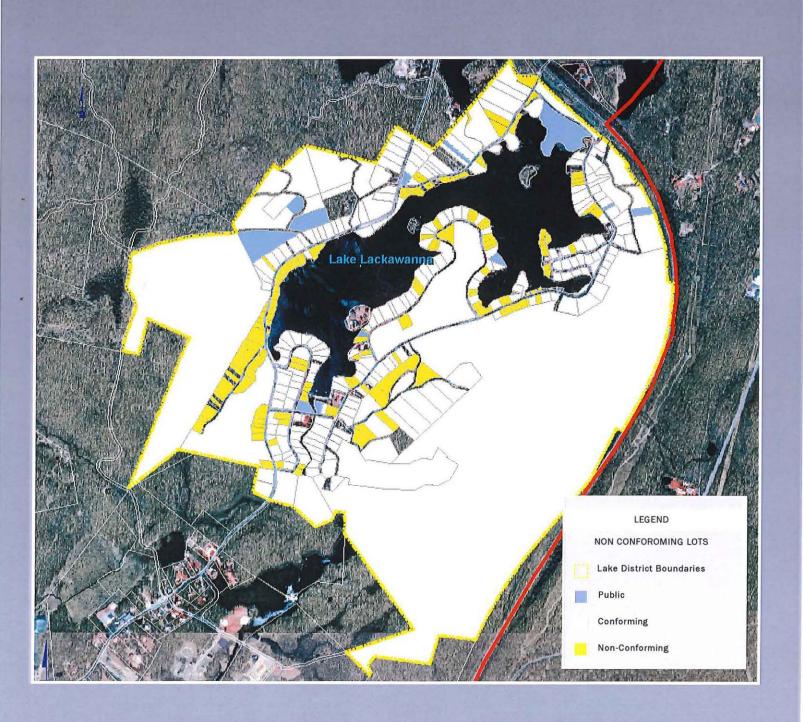
Since Lake Lackawanna has existing dense development, any further development in the floodplains should be discouraged. Development activities occurring within a stream or channel or in its floodplain are subject to NJDEP Bureau of Inland Regulation. These activities include filling or alteration of a flood plain, discharge of storm water into a stream or the modification of a stream channel.











Lake Lackawanna District Planning Issues

Development and Septics

Lake Lackawanna is another of the large, densely populated lake communities in the Township, surrounded by over 300 homes. Each one of the homes is serviced by private wells and septic systems, and this situation is proving detrimental to water quality in Lake Lackawanna. Many of the septic systems are old, of outdated design and possibly failing. This fact, combined with existing limitations on septic suitability of local soils creates a crisis of water quality and threatens public health, property values and neighborhood cohesion.

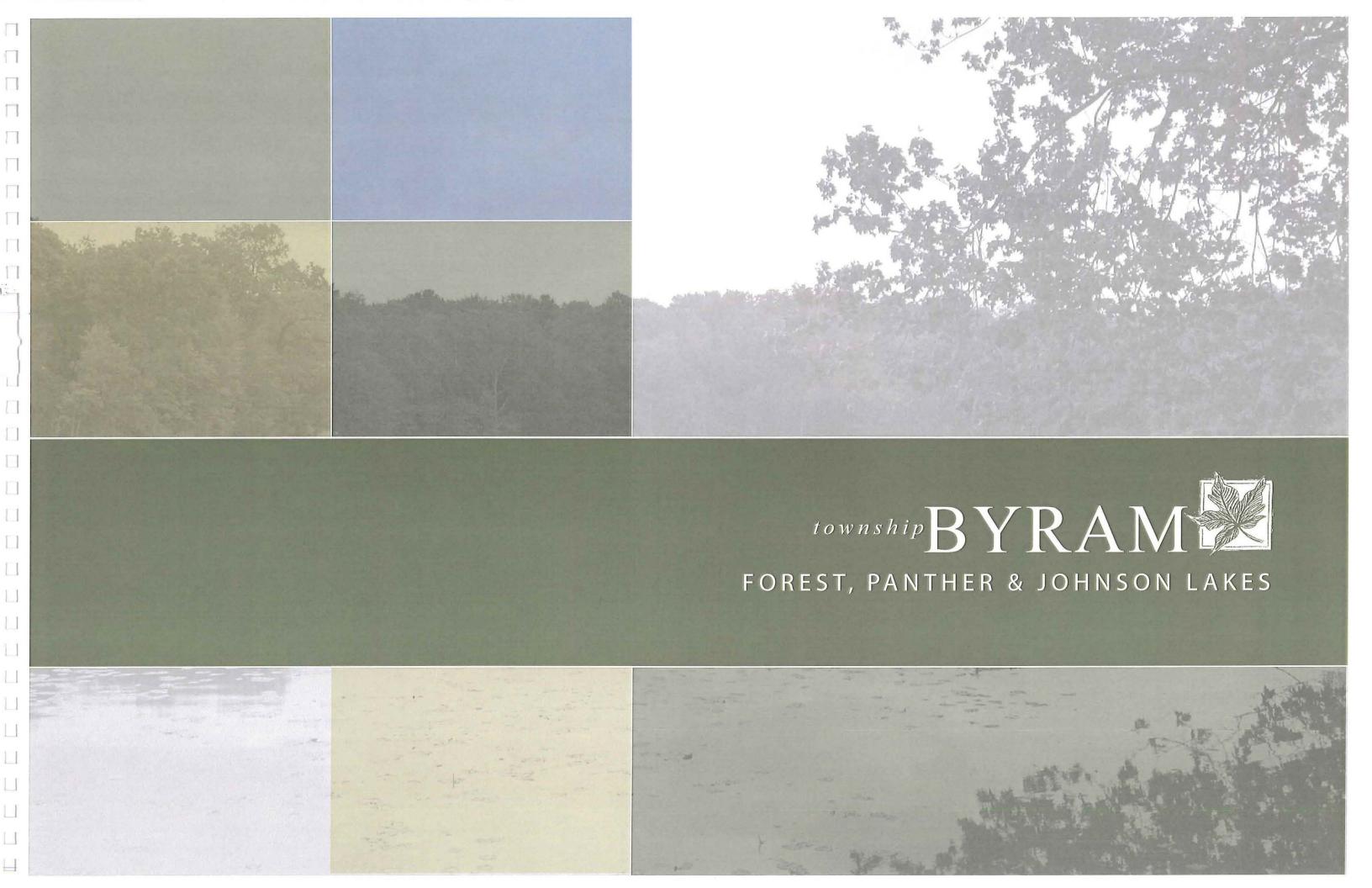
Additionally, the lakefront properties have extensive lawns that extend up to the waters edge and this inevitably causes a higher flow of nutrients and fertilizer chemicals into the surface water of the lake. Compounding the situation further is the fact that Lake Lackawanna is down stream of four other lakes and ponds and finds itself in the center of a large watershed leading to Lubbers Run. All of this is leading to the continued eutrophication of Lake Lackawanna.

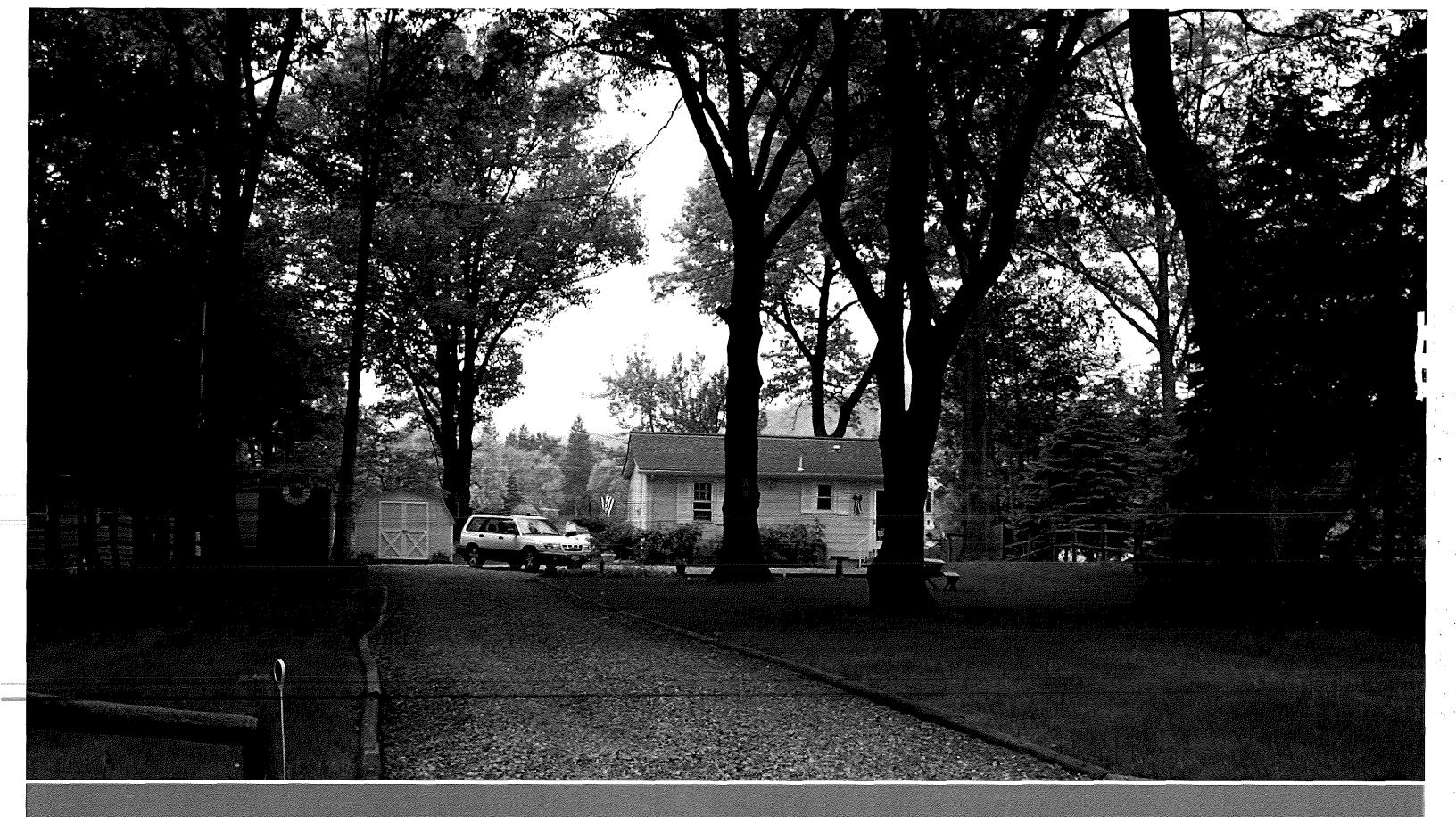
Recent years have seen an increase in conversion of seasonal cabins to full-time residences. This is often followed by permit applications for expanding existing cabins or razing the original structure and replacing it with a much larger residential structure. This puts additional stresses on septic systems in soils with severe limitations and increases the impervious surface area in the watershed, reducing ground water recharge and groundwater inflow to the lake.

Examining the data of the past ten years shows that septic systems installations have increased, with 18 new septics systems being installed, 32 systems altered (possibly due to expansion of housing units), 20 repaired, and 8 failures have been reported. It is presumed that many more failed septics go unreported. The small lots sizes in the District practically guarantee that the septic systems are not sufficient for the level of waste treatment required in the local soils before the effluent enters the ground water column.

Another concern in the District is proper site development planning for areas with steep slopes and woodlands. The steep slope areas surrounding the lake have experienced increased individual home site development on increasingly steep slopes. The subsequent forest clearing has increased sediment runoff and lake siltation. There are extensive areas of undeveloped steep slopes surrounding the lake; and if residential development continues to eat at away at these slopes, the future health of the lake will be doubtful.

Lake Lackawanna, owned by the Lake Lackawanna Investment Co., provides recreational activities to the residents along its shores. Beach areas and boat launches are available for limited access by club members. Gasoline powered watercraft can pose a threat to water quality. Additionally, a nine-hole golf course exists in close proximity to the lake's shore. With careful management of the golf course with new, Integrated Pest Management techniques and barring expansion of the golf course to 18 holes or more, the golf course might not further damage the lake. But more intense recreational uses may contribute to the further eutrophication of the lake.





Forest Lake District

The Forest Lake community was created fifty years ago as a planned lakeside development. The housing stock is relatively uniform and consists of multi-bedroom single-family homes. The home sites occupy the steeply sloped wooded areas throughout the District, and slightly larger tracts are located at the periphery of the lake area. Forest Lake Drive runs along the circumference of the Lake and the neighborhood is easily accessed by numerous roads leading to the lakefront and by winding roads throughout.

By examining the extent of developed and potentially developable parcels around the lake, the boundaries of the Forest Lake District area define as:

- Andover Township to the Northwest
- · The abandoned Erie-Lackawanna Cut-Off to the Northeast
- · Johnson Lake, Panther Lake and their surrounding residential areas to the South

Vital Statistics

- o Total Lake District Size 388 acres
- o Forest Lake Size 46 acres
- o Net Residential Area Size 342 acres
- o Number of Lots 506 lots
- o Number of Sub Dividable* Lots 180 lots
- o Number of Non Conforming* Lots 75 lots
- o Population 1099
- o Households 371
- o Average Household Size 2.96
- o Housing Units 379
- o Gross Density 0.98 units per acre (379 units on 388 acres)
- o Net Density 1.1 units per acre (379 units on 342 acres)
- o Zoning R-4 zoning (10,000 sq. ft. minimum lot areas)
- Land Uses Forest Lake provides a variety of recreational opportunities for area residents including fishing, non-motorized boating and swimming. Recreational amenities include beaches and a clubhouse.

*(Sub dividable in size only. No other attributes were examined such as frontage or access. Non-conforming lots in size only. Non-conforming lots are undersized per current zoning. This is an analysis tool to gain an understanding of the basic development pattern and possibility of further development.)

History

The mid-nineteenth century saw the Sussex Mine Railroad crossing what is now Forest Lake on its way from the Andover mine to the Waterloo iron works. The early twentieth century brought the Colby family, which owned a large portion of the area, and a mansion on Tamarack Road. The family is interred in a small family plot; and the mansion is abandoned, but still visible on the former MKY corporation property.

Created in the 1950s by the Casperson family, Forest Lake covers about 44 acres and was created as the center of a 300-acre year-round residential development. There were only fifty homes built by 1960 but the number of homes reached 400 by 1994. Aware of the problems created by lakefront development at Cranberry Lake and Lake Hopatcong, the Casperson family reserved a green belt around the lake, unusual at the time, and this greenbelt remains today.



Forest, Panter and Johnson Lake BYRAM TOWNSHIP LAKE DISTRICTS 57

Surface Water

Forest Lake is not specifically listed in the NJDEP Surface Water Quality Standards classifications for the waters of the State of New Jersey, and is therefore to be considered FW2-NT, where FW2-TM waters are waters recognized as suitable for trout maintenance and FW2-NT are not recognized as suitable for trout maintenance.

In the 1982 Lakes study, Forest Lake had the highest readings in phosphorus, alkalinity, nitrate and chloride. This study suggested that since Forest Lake is surrounded by the greatest degree of topographic relief, the high readings for phosphorus and nitrate could be the result of fertilizer run-off and the high chlorine content may be from road salt runoff. A 1991 Natural Resource Inventory Update described Forest Lake as the lake least affected by eutrophication in Byram. This was attributed to the fact that development had been more recent at Forest Lake as compared to other lakes and therefore had more stringent controls on septic system construction and maintenance. Pytlar's thesis of 1976 notes that while all lakes were eutrophic, Forest Lake was in slightly better condition than Cranberry Lake and Lake Lackawanna for example.

Non-Point Source pollution (NPS) studies have shown a direct relationship between water quality degradation and development within a watershed. When pollutants and sediments are transported off site in increasing quantities, both during and after development, to nearby surface water turbidity increases and water quality decreases. It is recommended that adequate soil and erosion control plans be implemented to moderate such pollutants.

Potable Water Supply

The Forest Lakes Water Company supplies drinking water to the Forest Lakes District. As of 1985, there were 380 service hookups and the system was unable to accommodate any further additions to the service population. It seems apparent that with 379 housing units, the water company serves each home. There is no recent data available.

58 BYRAM TOWNSHIP LAKE DISTRICTS Forest, Panter and Johnson Lake

SOIL TYPES IN FOREST LAKE DISTRICT

RrD	Rockaway - Rock outcrop association sloping & moderately steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to steep slopes and stony soil.
RvE	Rock outcrop-Rockaway association, steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to bedrock outcrops and stony soil.
RoC	Rockaway gravelly loam, 8- 15% slopes	Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, roads, golf courses, etc. due to strong slopes. Deep ditches and special design may be needed for septics. Severe limitations for sewage lagoons and sanitary landfills due to strong slopes and depth to bedrock. Slight limitations for trails.
RoB	Rockaway gravelly loam, 3-8% slopes	Slight limitations for foundations for dwellings w/ or w/out basements, trails and golf courses, etc. Moderate limitations for septic tank absorption fields, sewage lagoons and roads due to water table perched above fragipan. Deep ditches may be needed for septics. Severe limitations for sanitary landfills due to bedrock at depth of 4 feet or more.
HnB	Hibernia very stony loam, 3-8% slopes	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, golf courses and roads due to seasonal high water table at depth of 0.5 to 1.5 feet.
HnD	Hibernia very stony loam, 8- 25% slopes	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads, golf courses, etc. due to seasonal high water table perched at depth of 0.5 to 1.5 feet and excessive stone content.
Wo	Whitman, Extremely Stony Sandy Loam	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface.

Environmental Constraints

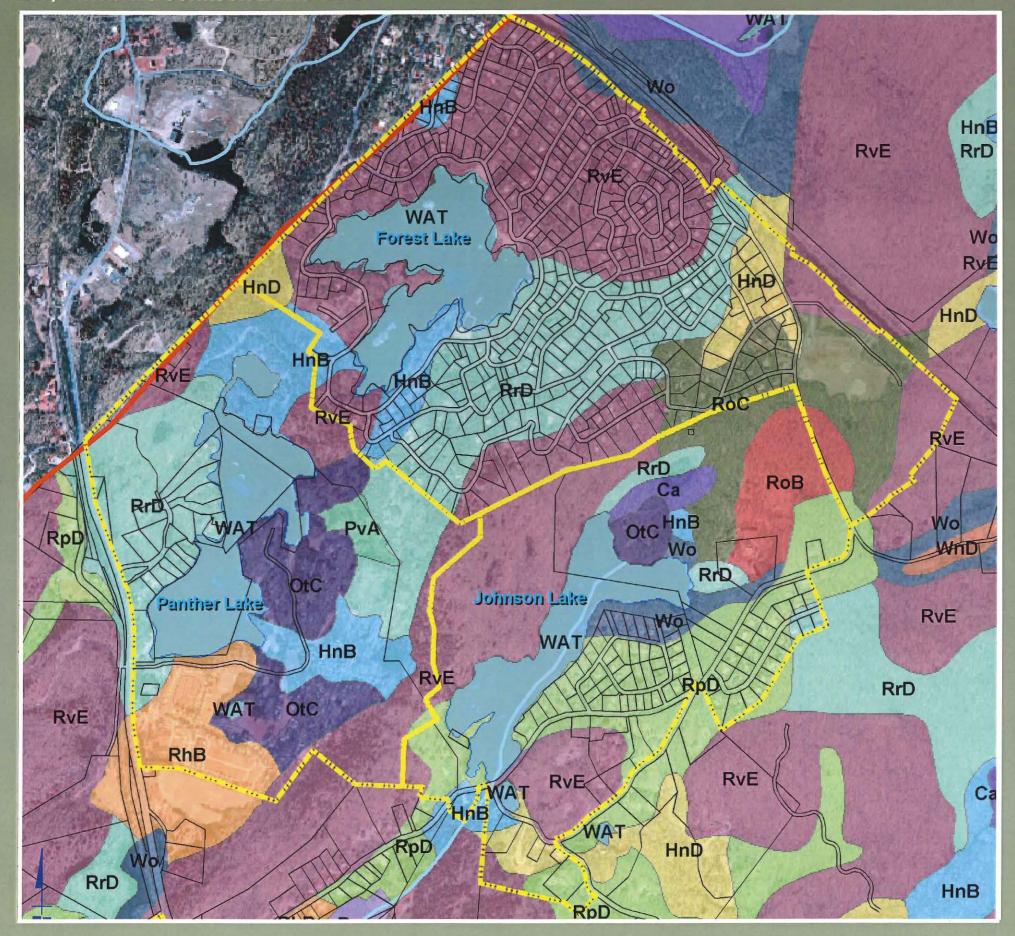
Soils

The majority of the Forest Lake District has soils with severe limitations on development. However, some of the soils in the District are classified as having moderate or slight limitations for building and septics. The soils series that underlies the majority of the existing development on the lakefront consists of Rockaway very stony loam with 5% to 25% slopes, exhibits moderate limitations for foundations for dwellings with or without basements, septic tank absorption fields, roads and trails due to steep slopes and stony soil. Most of the existing residential development occurs on the soils with severe limitations. Soils with severe limitations are typified by unfavorable conditions for wastewater reclamation and are difficult to correct with engineering solutions, thus highly constrained in their use for septic systems. Recommendations for septic use in such areas include soil addition and reclamation, special engineering systems designs, and intensive septic management to reduce or prevent failure.

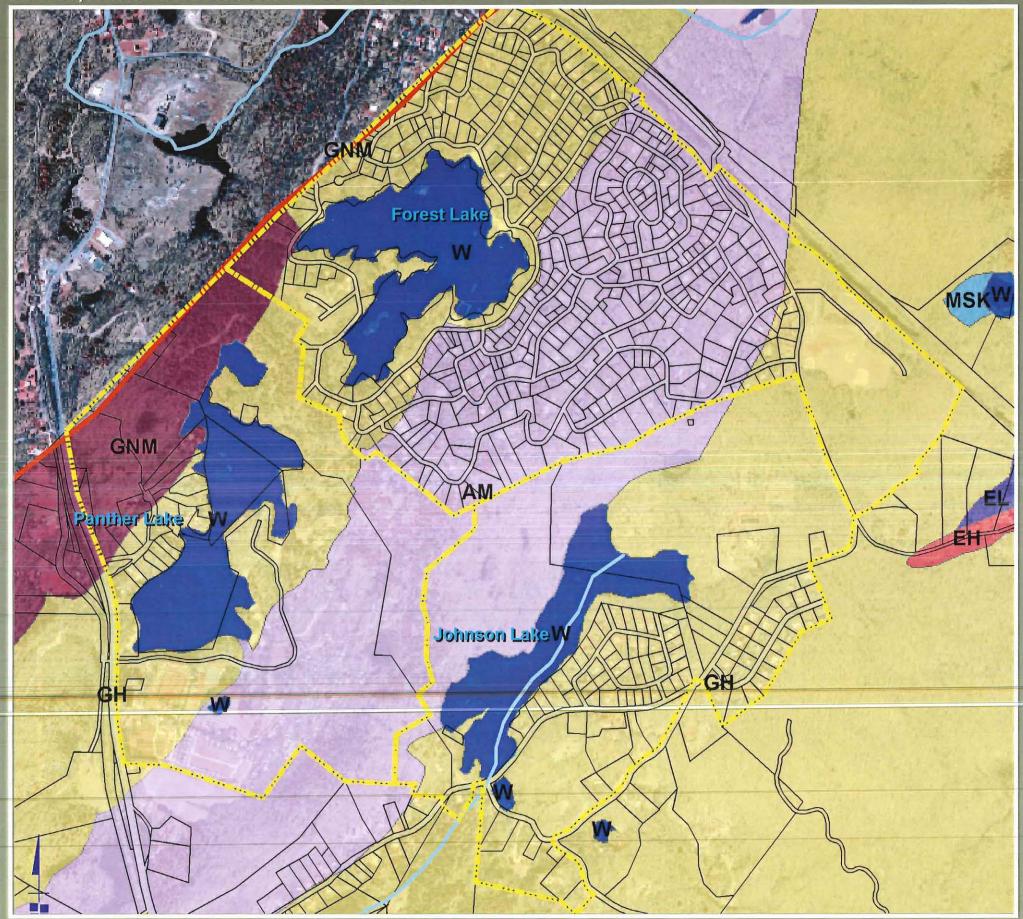
In addition, the New Jersey Standards for Subsurface Disposal Sewage Systems (chapter 199) state that soils types like those that exist in the Forest Lake area are unsuitable for septic disposal field installation and may necessitate either soil replacement or mound installation systems. This limitation of underlying soils contributes to Lake Lackawanna's unsuitability for continued development.



FOREST, PANTHER & JOHNSON LAKES- SOILS



FOREST, PANTHER & JOHNSON LAKES- GEOLOGY



Geology

The Forest Lake District has two distinct bedrock geology formations. A Hornblende Granite/Mostly Hornblende Granite and Gneiss/Hornblende Granite and Gneiss formation and an Amphibolite formation underlie the district.

Depth to bedrock is a crucial factor for septic suitability and thus for development in the watershed and lake area. Where soil depth to bedrock is shallow, sufficient area for wastewater treatment may not be present. In such soil conditions, water may not percolate vertically through the soil, and instead may leach horizontally along bedrock and eventually reach the lake. It is noted that the majority of the Forest Lake District has a depth to bedrock of less than five feet and thus faces issues of septic unsuitability and surface water quality.

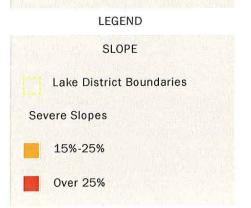
Geology Type

SY MBOL	LABEL
AM	AMPHIBOLITE
BH	HARDY STON FORMATION/HARDY STON
	QUARTIZITE/HARDYSTON SANDSTONE
且	LETHSVILLE FORMATION
EOK	KITTATINNY GROUP/KITTATINNY FORMATION
EUK	(UNDIFFERENTIATED)
GH	LIODNIDI FAIDE ODANITE/MOSTI V. LIODNIDI DIDE
GH	HORNBLENDE GRANITE/MOSTLY HORNBLENDE
	GRANITE & GNESS/HORBLENDE GRANITE & GNESS
GHB	HORNBLENDE AND BIOTITE GNESS
GNM	MIXED GNEISS
GPX	PY ROXENE GNESS
GS	INDICATES SYENITE
MSK	MARBLE AND SKARN
QO	QUARTZ-OLIGOCLASE GNESS
QOB	QUARTZ-OLIGOCLASE-BIOTITE GNESS
W	WATER

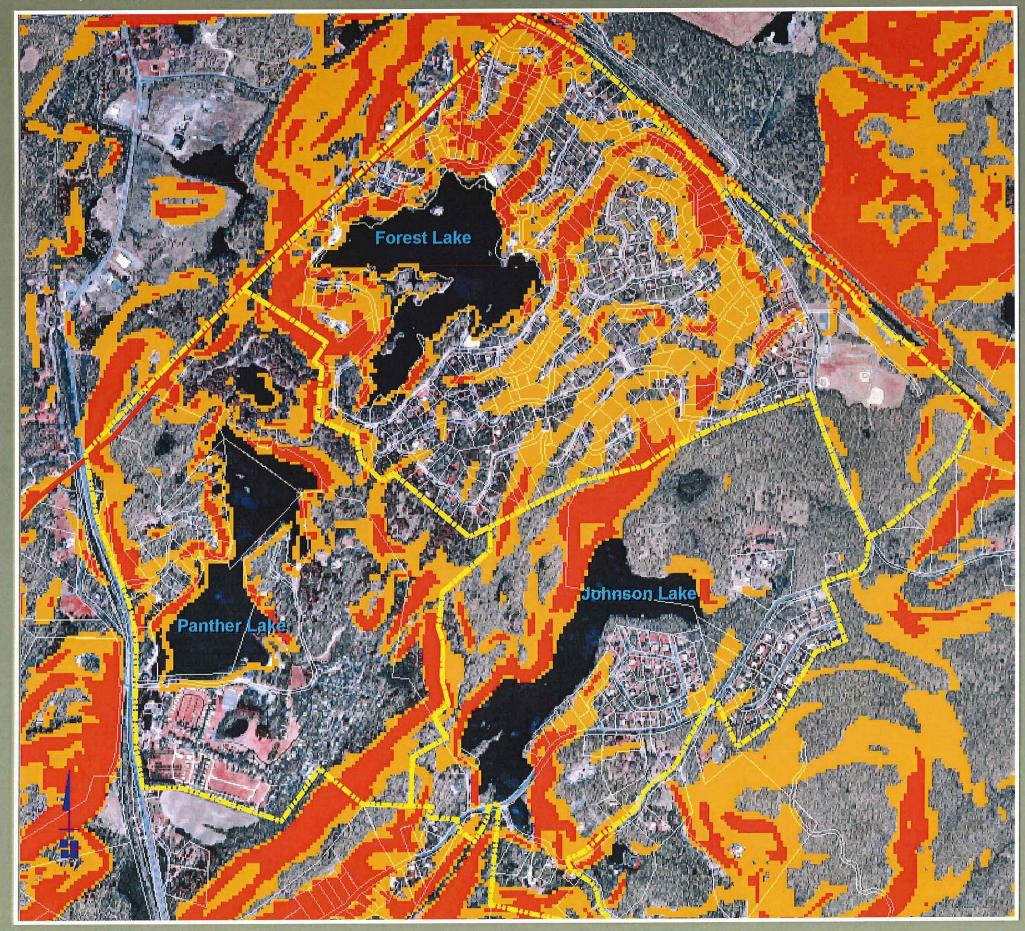
Steep Slopes

The Forest Lake District has variable slopes, and the majority of its development occurs on slopes of 15 to 25% and even on slopes over 25%. There are some scattered areas with slopes less than 15%, particularly in the south and in the area of C.O. Johnson Memorial Park. Such steep slopes result in various constraints on development. The development that does occur on this topography often results in overloading storm water controls and polluting surrounding environmentally sensitive areas, especially the lake at its center.

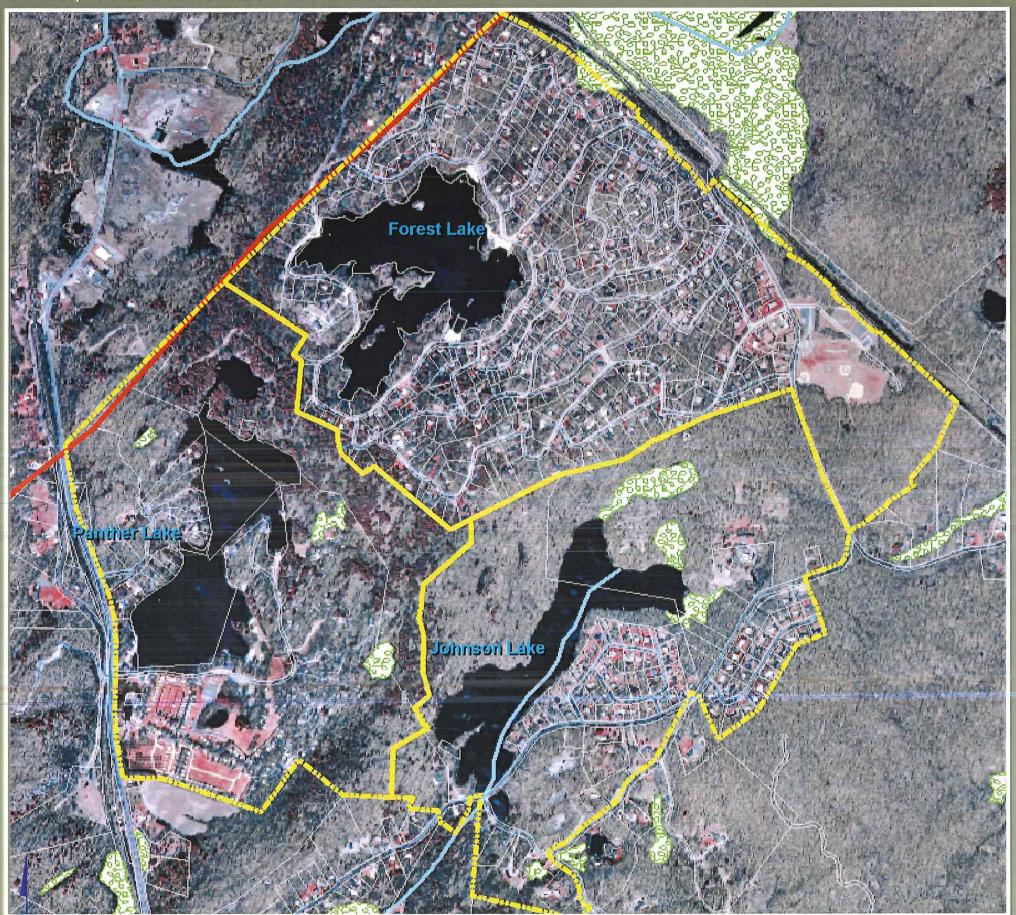
Such sloped areas impose various limitations on development, including requirements for grading, a need for specially designed septic systems and restrictions on construction. Erosion and sedimentation caused by site clearing and grading are highly problematic where stringent and well-designed controls on development are absent. Such constraints imposed by topography and slopes can be overcome by appropriate excavation, soil erosion control during and after on-site construction, and storm water management plans.



FOREST, PANTHER & JOHNSON LAKES- SLOPE



FOREST, PANTHER & JOHNSON LAKES- WETLANDS



Seasonal High Water Table

The Forest Lake District and its shores have soils that have a seasonal high water table depth of 2 to 4 feet. There are some areas along the south eastern shore and dispersed in small pockets in other areas, where the soils have a depth to water table between 0.5 to 1.5 feet. The areas with depth of 2 to 4 feet are slightly more suitable for development as compared to those areas in the district with less. Such areas, where the water table is close to the surface, are constrained from development and are unsuitable for various types of foundation construction and septic systems. While depths of 2 to 4 feet are considered unsuitable or unfavorable for development, the depths of 0.5 to 1.5 feet are extremely unsuitable. Sufficient soil depth from the bottom of the septic system disposal bed to the top of the water table is necessary if septic inputs such as phosphorous, nitrogen and bacteria are to be prevented from leaching into the lake water.

Wetlands

There are no NJDEP identified wetlands in the Forest Lake District, but there should be a site-by-site analysis for the determination of wetlands where development is considered. Based on the soil classifications and types, it can be inferred that there are wetlands present on the northern edge of the area near where there is one extensive area of wetlands north of the railroad cut. These wetlands serve as critical habitats for various



wildlife and vegetation species and act as retention areas to reduce flooding and improve water quality through deposition, filtration and uptake. The state Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) regulates development within wetlands. Any construction activity within the wetlands and designated buffer areas is prohibited unless approved by the state. Wetland buffers or transition areas are areas of land adjacent to wetlands that minimize adverse impacts on wetlands and form an integral part of the wetlands ecosystem. The NJDEP establishes a minimum buffer of 150 feet for wetlands of exceptional value and 50 feet for wetlands of intermediate value.

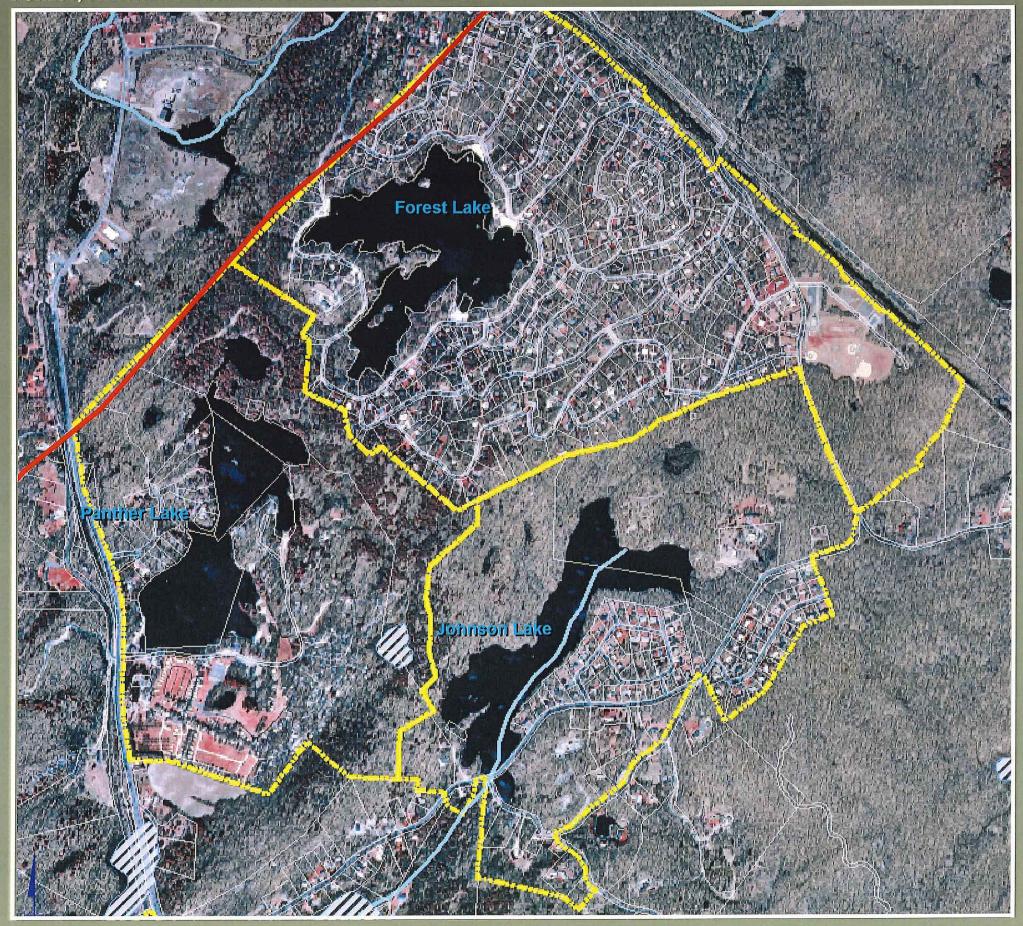
Flood Plains

Although there are no floodplains identified in the Forest Lake area, a closer look at the issues identified in the area identifies flooding during storm water events as a concern. Flood hazard areas should be identified, future development in and around them restricted, and storm water control measures introduced. Development in flood hazard areas, as has apparently occurred in the Forest Lake District, result in increased run-off, reduced flood storage capacity, erosion of stream banks, and sedimentation.

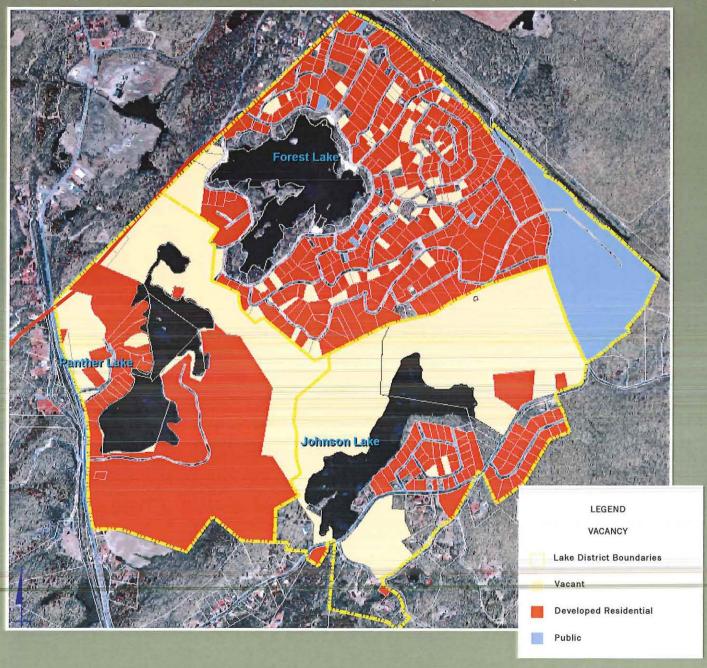
LEGEND FLOODPLAINS Lake District Boundaries Lakes

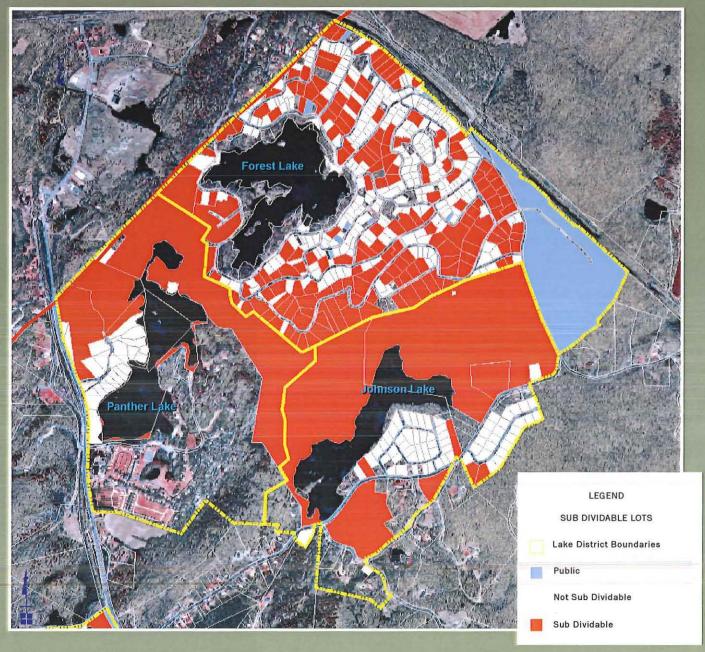
Floodplains

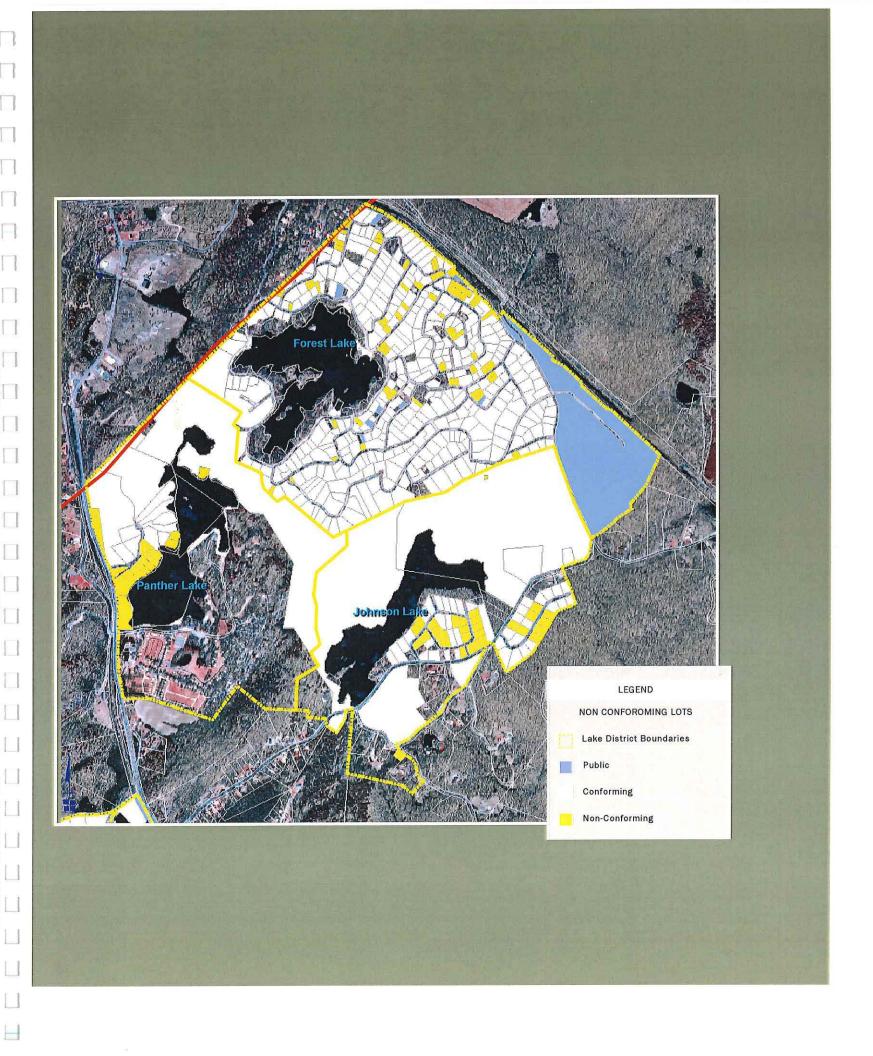
FOREST, PANTHER & JOHNSON LAKES- FLOODPLAINS



FOREST, PANTHER & JOHNSON LAKES- VACANCY, SUB DIVIDABLE, NON-CONFORMINING LOTS







Forest Lake District Planning Issues

Development and Septics

Forest Lakes houses the second largest population of any community in Byram Township and has the second largest number of housing units, all at a density of slightly more than 1 unit per acre, nearly 2 units per acre if you exclude Johnson Memorial Park and the areas held in common ownership. The septics are newer and of more recent design than some of the other lakes, but many are approaching 40 years of service and the existing limitations on septic suitability of the local soils is reason for concern. Septic systems installed on small lots with increased capacity create an increased risk of ground water contamination. Examining the data of the past ten years shows that Forest Lakes has had 18 new septic installations, 36 septic alterations and 26 repairs with 8 reported failures. It is presumed that many more failed septics go unreported.

Forest Lake enjoys a wooded buffer between the lake and residential development, removing the impacts of lakeside lawns, but Forest Lake Drive and the surrounding road network creates a different threat to water quality. NPS pollution associated with the roads and storm water events threatens surface water quality. New designs for conduits and rights-of-way to mitigate severe flooding problems are necessary. The effects of dense developments on the steep slopes surrounding Forest Lake are present in every aspect of development. Any disturbances on the severe slopes surrounding the lake increases the risk of contamination and siltation.



Johnson Lake District

The Johnson Lake District is less intensely developed than some of the other lake communities in the Township. Most of the residential structures were built in the 1950s and 1960s. The 87 housing units in this residential area are clustered and dispersed into site sub-areas of moderate and low densities. Along Colby Drive and north of Tamarack Road are subdivisions zoned for 20,000 square feet minimum lot area. To the south of Tamarack Road the existing zoning is 1-acre lots but the development is of lower densities with many undeveloped or substantially wooded parcels.

By examining the extent of developed and potentially developable parcels around the lake, the boundaries of the Johnson Lake District area define as:

- · The Forest Lake residential area to the North
- Roseville Road to the Northeast
- Panther Lake and its residential and commercial recreation area to the West
- The large undeveloped wooded area adjacent to residential development along Tamarack Road and Colby Drive to the East and South

Vital Statistics

- o Total Lake District Size 265 acres
- o Johnson Lake Size 36 acres
- o Net Residential Area Size 229 acres
- Number of Lots 104 lots
- o Number of Sub Dividable* Lots 9 lots
- o Number of Non Conforming* Lots 31 lots
- o Population 248
- o Households 85
- o Average Household Size 2.92
- o Housing Units 87
- o Gross Density 0.33 units per acre (87 units on 265 acres)
- o Net Density 0.38 units per acre (87 units on 229 acres)
- Zoning R-3 and R-2 zoning (20,000 & 40,000 sq. ft. minimum lot areas)
- Land Uses Johnson Lake provides a variety of recreational opportunities for area residents including fishing, boating and swimming.

*(Sub dividable in size only. No other attributes were examined such as frontage or access. Non-conforming lots in size only. Non-conforming lots are undersized per current zoning. This is an analysis tool to gain an understanding of the basic development pattern and possibility of further development.)

*(Maps for the Johnson Lake District can be found in the beginning of the Forest, Panther and Johson Lake Districts Section)

History

This residential area is set along Tamarack Road and Colby Drive, south of Johnson Lake in the north-central part of the township. The property was originally owned by the Colby family and developed in the 1960s. A dam created this lake, however the year of dam construction is not known. Unlike many of the other lake communities, Johnson Lake does not have a community organization and the lake remains in the private ownership of the Kellogg family. Residential development is on the eastern shore with the remainder of the shore remaining wooded in its natural state, effectively remaining open space. Along the periphery of the lake there is a natural, vegetated buffer like at Forest Lake.

Surface Water

Johnson Lake is not specifically listed in the NJDEP Surface Water Quality Standards classifications for the waters of the State of New Jersey, and is therefore to be considered FW2-NT, where FW2-TM waters are waters recognized as suitable for trout maintenance and FW2-NT are not recognized as suitable for trout maintenance. Johnson Lake has not been included in any of the lake studies, most likely due to its smaller size and lower density development. For this reason, it is assumed to have a lower trophic state and to suffer less from the effects of residential development. Visual inspection of the lake revealed what appeared to be extensive aquatic macrophytes and algae populations.

Non-Point Source pollution (NPS) studies have shown a direct relationship between water quality degradation and development within a watershed. When pollutants and sediments are transported off site in increasing quantities, both during and after development, to nearby surface water, turbidity increases and water quality decreases. It is recommended that adequate soil and erosion control plans be implemented to moderate such pollutants.

Forest, Panter and Johnson Lake BYRAM TOWNSHIP LAKE DISTRICTS 67

Potable Water

There is only one water supply company supplying drinking water to the Johnson Lake District. The Colby Water Company supplies 19 homes in the area, 18 on Colby Drive and one additional house on Tamarack Road. At present the supply is reported to not have any water quality or quantity issues and is tested weekly and monthly for bacteria, metals and VOCs.

Two additional homes share a well on Colby Drive and two homes share a well on Tamarack Road, leaving the assumption that there are an additional 64 units that rely on private wells for their potable water supply. This raises concerns about water quality, since development can load the surface water and ground water with nutrients, chemicals and bacteria.

Environmental Constraints

Soils

The soils occurring in Johnson Lake area can be generally described as being unsuitable for development. The soils underlying the majority of the existing development on the lakefront consists of Rockaway very stony loam 25-40% slopes, exhibits moderate limitations for foundations for dwellings with or without basements, for septic tank absorption fields and for roads due to a seasonal high water table perched over fragipan and a high stone content. Other soils in the District have severe limitations for development and have severe limitations for septic tank absorption fields. Soils with severe limitations are typified by unfavorable conditions for wastewater reclamation and are difficult to correct with engineering solutions, thus highly constrained in their use for septic systems. Recommendations for septic use in such areas include soil addition and reclamation, special engineering systems designs, and intensive septic management to reduce or prevent failure.

In addition, the New Jersey Standards for Subsurface Disposal Sewage Systems (chapter 199) state that soils types like those that exist in the Forest Lake area are unsuitable for septic disposal field installation and may necessitate either soil replacement or mound installation systems. This limitation of underlying soils contributes to Lake Lackawanna's unsuitability for continued development.

68 BYRAM TOWNSHIP LAKE DISTRICTS Forest, Panter and Johnson Lake

SOIL TYPES IN JOHNSON LAKE DISTRICT

RoB	Rockaway gravelly loam, 3-8% slopes	Slight limitations for foundations for dwellings w/ or w/out basements, trails and golf courses, etc. Moderate limitations for septic tank absorption fields, sewage lagoons and roads due to water table perched above fragipan. Deep ditches may be needed for septics. Severe limitations for sanitary landfills due to bedrock at depth of 4 feet or more.	
RoC	Rockaway gravelly loam, 8-15% slopes.	Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, roads, golf courses, etc. due to strong slopes. Deep ditches and special design may be needed for septics. Severe limitations for sewage lagoons and sanitary landfills due to strong slopes and depth to bedrock. Slight limitations for trails.	
RpD	Rockaway very stony loam, 5- 25% slopes	Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields and roads & trails due to seasonal high water table perched over fragipan and high stone content. Severe limitations for sewage lagoons, sanitary landfills, golf courses, etc. and all uses (see above) in steep (15-20%) slope areas due to steep slopes and stony soil.	
RrD	Rockaway - Rock outcrop association sloping & moderately steep.	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to steep slopes and stony soil.	
RvE	Severe limitations for foundations for dwellings w/ or w/out base absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf bedrock outcrops and stony soil.		
HnB	Hibernia very stony loam, 3-8% slopes	Moderate limitations for foundations for dwellings w/out basements and trails. Severe in, 3-8% limitations for foundations for dwellings w/ basements, septic tank absorption fields sewage lagoons, sanitary landfills, golf courses and roads due to seasonal high water table at depth of 0.5 to 1.5 feet.	
HnD	Hibernia very stony loam, 8-25% slopes.	Moderate limitations for foundations for dwellings w/out basements and trails. See	
Ca	Carlisle Muck	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface frequent flooding and severe subsidence.	
OtC	Otisville Gravelly Loamy Sand, 3-15% Slopes. Slight limitations for foundations for dwellings w/ or w/out basements, seption fields, trails and roads if slopes are 3-8%. Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, trails and roads are 8-15%. Sever limitations for sewage lagoons, sanitary landfills, golf courses, etc.		
Wo	Whitman, Extremely Stony Sandy Loam Severe limitations for foundations for dwellings w/ or w/out basements, se absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, escaponal high water table at surface.		

Geology

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The Johnson Lake District has two distinct bedrock geology formations. A Hornblende Granite/Mostly Hornblende Granite and Gneiss/Hornblende Granite and Gneiss formation and an Amphibolite formation underlie the entirety of the district.

Depth to bedrock is a crucial factor for septic suitability and thus for development in the watershed and lake area. Where soil depth to bedrock is shallow, sufficient area for wastewater treatment may not be present. In such soil conditions, water may not percolate vertically through the soil and instead may leach horizontally along bedrock and eventually reach the lake. It is noted that the majority of the Johnson Lake District has a depth to bedrock of less than five feet and thus faces issues of septic unsuitability and surface water quality.

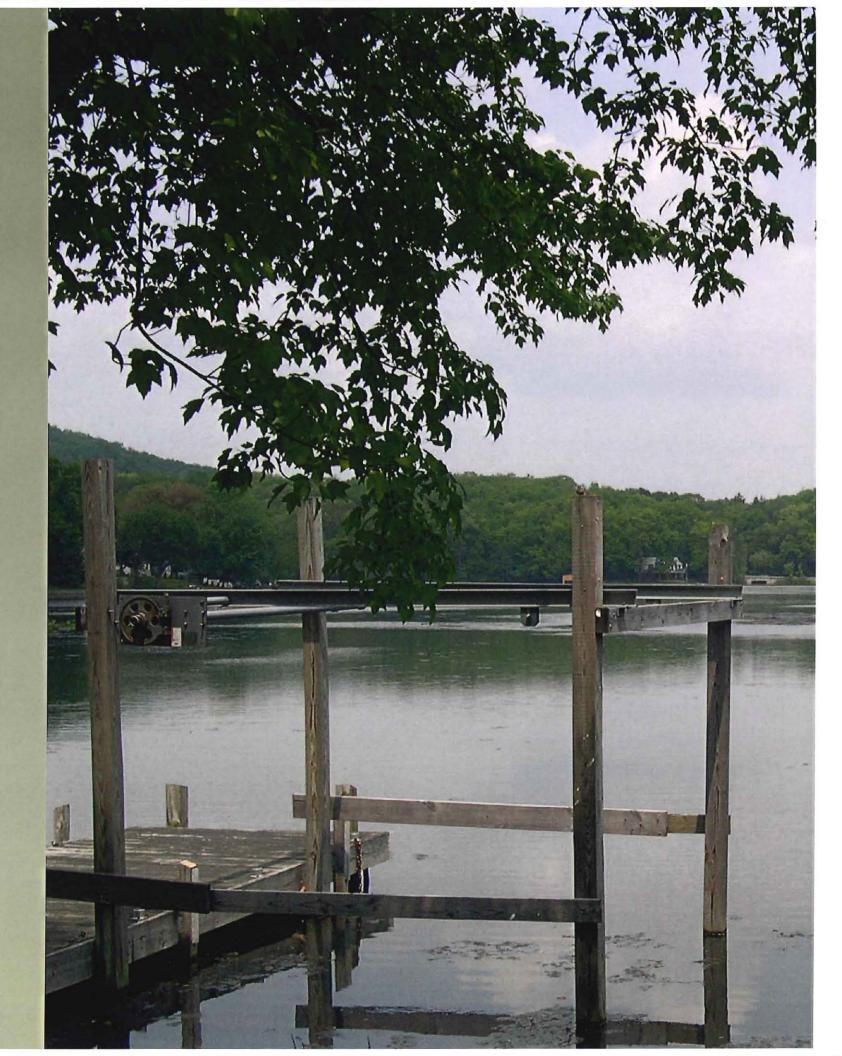
Steep Slopes

The Johnson Lake District has variable slopes, with the majority of the severe slope areas running north along the west side of the lake and running south from the southern half of the eastern shore. Most of the developed areas along the eastern shore of the lake and along Colby Drive as well as the remaining vacant lands in the northeast part of District are on slopes less than 8-10%.

Such sloped areas impose various limitations on development, including requirements for grading, the need for specially designed septic systems, and restrictions on construction. Erosion and sedimentation caused by site clearing and grading are highly problematic where stringent and well-designed controls on development are absent. Such constraints imposed by topography and slopes can be overcome by appropriate excavation, soil erosion control during and after on-site construction, and storm water management plans.

Seasonal High Water Table

The majority of the Johnson Lake District has soils that have a seasonal high water table depth of 2 to 4 feet. However there are areas of high slopes where the depth to water table is as low as 0.5 to 1.5 feet. The areas with depth of 2 to 4 feet are slightly more suitable for development as compared to those areas in the district with less. Such areas, where the water table is close to the surface, are constrained from development and are unsuitable for various types of foundation construction and septic systems. While depths of 2 to 4 feet are considered unsuitable or unfavorable for development, the depths of 0.5 to 1.5 feet are extremely unsuitable. Sufficient soil depth from the bottom of the septic system disposal bed to the top of the water table is necessary if septic inputs such as phosphorous, nitrogen and bacteria are to be prevented from leaching into the lake water.



Wetlands

Two large wetland areas have been identified in the Johnson Lake District by the NJDEP Freshwater wetlands maps. These wetland areas are around the two inlet streams on the northern end of the lake. There should be a site-by-site analysis for the determination of wetlands wherever development is considered. These wetlands act as storm water retention areas to reduce flooding and they improve water quality through deposition, filtration and uptake.

The state Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) regulates development within wetlands. Any construction activity within the wetlands and designated buffer areas is prohibited unless approved by the state. Wetland buffers or transition areas are areas of land adjacent to wetlands that minimize adverse impacts on wetlands and form an integral part of the wetlands ecosystem. The NJDEP establishes a minimum buffer of 150 feet for wetlands of exceptional value and 50 feet for wetlands of intermediate value.

These buffers serve a number of important environmental and ecological functions, function as linkages between habitat types and play an important role in maintaining the environmental quality of the Lubbers Run. These corridors stabilize soils to avoid erosion caused by overland runoff, storm surges and fluctuations in water depths.

Floodplains

There are no extensive areas of floodplains in the Johnson Lake District. The lake itself is the dammed portion of the probable original floodplain. Floodplains are subject to periodic flooding and provide flood storage capacity, physical and biochemical water filtering, and wildlife habitat. Development in these areas increases runoff, reduces flood storage capacity, and increases the size and frequency of downstream flooding, erosion of stream banks, deposition of sediments, and loss of wildlife habitat.

70 BYRAM TOWNSHIP LAKE DISTRICTS Forest, Panter and Johnson Lake

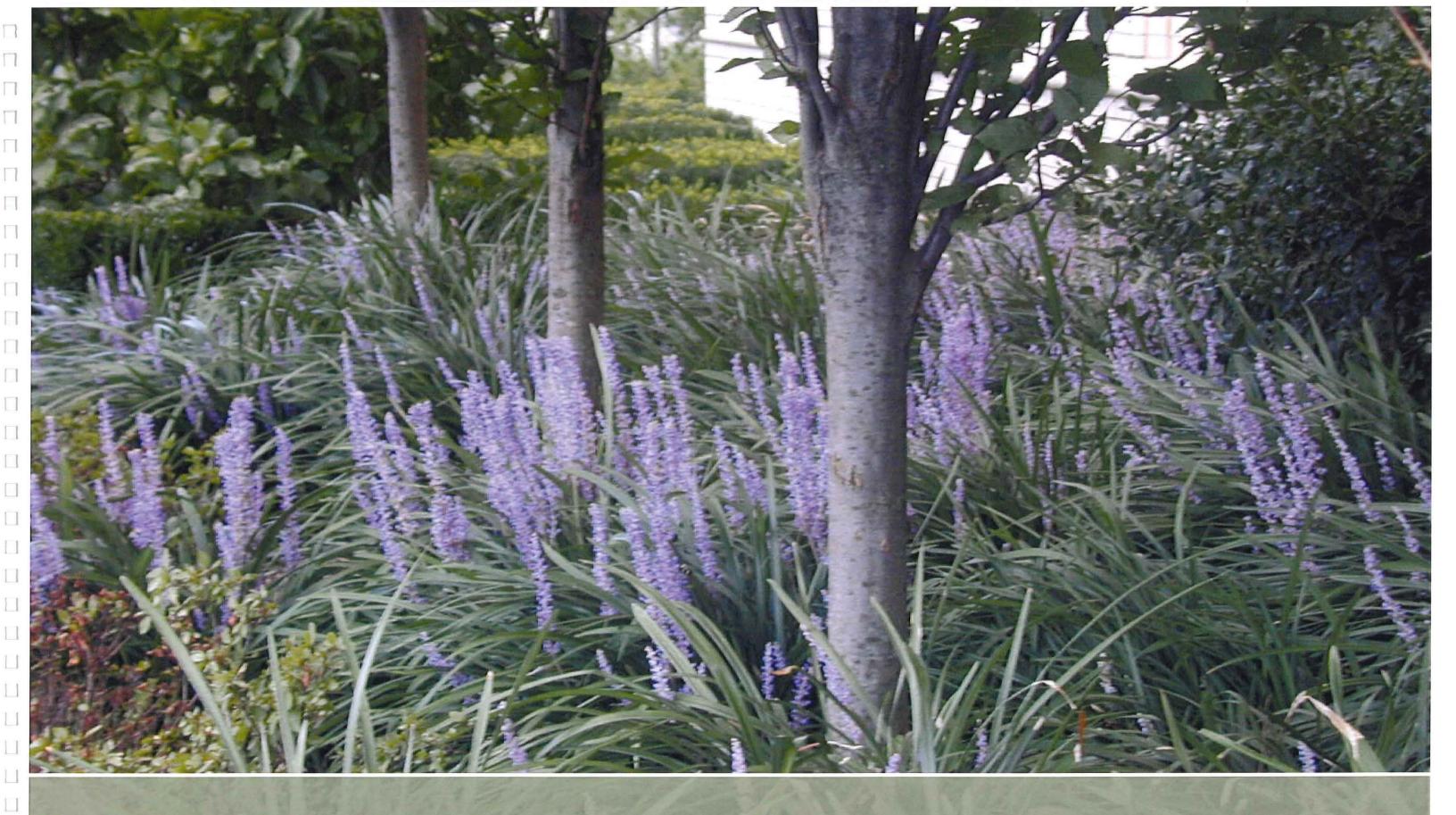
Johnson Lake District Planning Issues

Development and Septics

The Johnson Lake District is less intensely developed than most of the other lake communities in the Township. The majority of the lakefront remains undeveloped and the entire lakeshore is owned by the Kellogg Family, preventing extensive lawns that extend up to the waters edge. Half of the development in the District is south of Tamarack Road, providing much needed buffer areas between on-site septic systems and the lake. Since most of the residential structures were built in the 1950s and 1960s, it is assumed that most of the septics are newer and of more recent design than some of the other lakes, but many are approaching 40 or 50 years of service and the existing limitations on septic suitability of the local soils is reason for concern.

Septic systems installed on small lots with increased capacity create an increased risk of ground water contamination. Examining the data of the past ten years shows that Johnson Lake has had 9 new septic installations, 16 septic alterations, and 5 repairs, with no reported failures. It is presumed that many failed septics go unreported.

Maintaining water quality in Johnson Lake by careful site development planning for areas with steep slopes and woodlands is crucial. Johnson Lake has shown signs of eutrophication and may soon find itself in the same situation that the other, more developed lakes find themselves in. With so much undeveloped land surrounding Johnson Lake, it presents a unique opportunity to undertake efforts to move those lands into open space protection, preventing further development and removing the threat of increased nutrient and sediment loading. Johnson Lake can, with aggressive land use controls, changes in land ownership, and stringent application of septic management controls, slow its progression to eutrophication.



Panther Lake

The Panther Lake District is the least densely populated Lake District in the Township. The small residential area is clustered around a few winding roads on the western shore and some isolated home sites to the north. A recreational vehicle campground occupies the southern and eastern shores of Panther Lake.

By examining the extent of developed and potentially developable parcels around the lake, the boundaries of the Panther Lake District area define as:

- Forest Lake and Johnson Lake their residential area East and Northeast
- Route 206 and Andover Township to the West and Northwest
- Forested area the South of the Panther Lake Campground

Vital Statistics

- o Total Lake District Size 273 acres
- o Panther Lake Size 42 acres
- o Net Residential Area Size 231 acres
- o Number of Lots 40 lots
- Number of Sub Dividable* Lots 21 lots
- o Number of Non Conforming* Lots 15 lots
- o Population 56
- o Households 25
- o Average Household Size 2.24
- o Housing Units 28
- o Gross Density 0.10 units per acre (28 units on 273 acres)
- o Net Density 0.12 units per acre (28 units on 231 acres)
- o Zoning R-2, R-3 zoning (40,000 sq. ft. & 20,000 sq. ft. minimum lot areas) C-R and ICP zoning (Commercial recreation and industrial commercial park)
- Land Uses Panther Lake provides a variety of recreational opportunities for area residents including fishing, non-motorized boating and swimming. Recreational amenities include a boat launch and a campground.

*(Sub dividable in size only. No other attributes were examined such as frontage or access. Non-conforming lots in size only. Non-conforming lots are undersized per current zoning. This is an analysis tool to gain an understanding of the basic development pattern and possibility of further development.)

*(Maps for the Panther Lake District can be found in the beginning of the Forest, Panther and Johson Lake Districts Section)

72 BYRAM TOWNSHIP LAKE DISTRICTS Forest, Panter and Johnson Lake

History

Panther Lake is the least developed of the lakes in the study and lies in the central-western part of the Township. Panther Lake was dammed around the turn of the last century and was featured in picture postcards from the 1920s. Private home development exists along the lake's western shore and most of the housing stock appears to be cottages from the 1950s and 1960s. A campground occupies 114 acres on the eastern and southern shores. The north shore has remained naturally vegetated with a few scattered home sites.

Surface Water

Panther Lake is not specifically listed in the NJDEP Surface Water Quality Standards classifications for the waters of the State of New Jersey, and is therefore to be considered FW2-NT, where FW2-TM waters are waters recognized as suitable for trout maintenance and FW2-NT are not recognized as suitable for trout maintenance.

Panther Lake has not been included in any of the lake studies since Pytlar's thesis of 1976, most likely due to its smaller size and lower density development.

Pytlar notes that while all the lakes were eutrophic, Panther Lake was in slightly better condition than Cranberry Lake and Lake Lackawanna for example. For these reasons, it is assumed to have a lower trophic state and to suffer less from the effects of residential development. Visual inspection of the lake revealed what appeared to be extensive aquatic macrophytes and algae populations.

Non-Point Source pollution (NPS) studies have shown a direct relationship between water quality degradation and development within a watershed. When pollutants and sediments are transported off site in increasing quantities, both during and after development, to nearby surface water turbidity increases and water quality decreases. It is recommended that adequate soil and erosion control plans be implemented to moderate such pollutants.

Potable Water Supply

Panther Lake has no water supply company, and thus all units rely on private wells for their potable water supply. This raises concerns about water quality since the dense development is loading the surface water and ground water with nutrients, chemicals and bacteria.

Environmental Constraints

Soils

The soils occurring in the Panther Lake area can be generally described as being unsuitable for development. The soils series that underlies the majority of the existing development on the lakefront, Rockaway rock outcrop association, exhibits severe limitations for foundations for dwellings with or without basements, septic tank absorption fields, roads and trails due to steep slopes and stony soil. Other soils in the District have moderate or severe limitations on development and have severe limitations for septic tank absorption fields. Soils with severe limitations are typified by unfavorable conditions for wastewater reclamation and are difficult to correct with engineering solutions, thus highly constrained in their use for septic systems. Recommendations for septic use in such areas include, soil addition and reclamation, special engineering systems designs and intensive septic management to reduce or prevent failure.

In addition, the New Jersey Standards for Subsurface Disposal Sewage Systems (chapter 199) state that soils types like those that exist in the Forest Lake area are unsuitable for septic disposal field installation and may necessitate either soil replacement or mound installation systems. This limitation of underlying soils contributes to Lake Lackawanna's unsuitability for continued development.

SOIL TYPES IN PANTHER LAKE DISTRICT

HnB	Hibernia very stony loam, 3-8% slopes Hibernia very stony loam, 8-25%	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, golf courses and roads due to seasonal high water table at depth of 0.5 to 1.5 feet. Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank
HnD	slopes	absorption fields, sewage lagoons, sanitary landfills, roads, golf courses, etc. due to seasonal high water table perched at depth of 0.5 to 1.5 feet and excessive stone content.
RhB	Riverhead Sandy Loam, 3-8% Slope	Slight limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, roads & trails, golf courses, etc. but ground water pollution hazard is possible due to rapid permeability in substratum. Severe limitations for sewage lagoons and sanitary landfills due to rapid permeability in substratum and ground water pollution hazard.
RrD	Rockaway - Rock outcrop association sloping & moderately steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to steep slopes and stony soil.
RvE	Rock outcrop - rockaway association, steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to bedrock outcrops and stony soil.
PvA	Pompton Fine Sandy Loam, 0-3% Slopes	Moderate limitations for foundations for dwellings w/out basements, golf courses and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, and roads due to seasonal high water table at depth of 1 to 2 feet.
OtC	Otisville Gravelly Loamy Sand, 3- 15% Slopes.	Slight limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, trails and roads if slopes are 3-8%. Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, trails and roads if slopes are 8-15%. Sever limitations for sewage lagoons, sanitary landfills, golf courses, etc. due to rapid permeability of soil and surface texture.

Forest, Panter and Johnson Lake BYRAM TOWNSHIP LAKE DISTRICTS 73

Geology

The Panther Lake District has three distinct bedrock geology formations. A Hornblende Granite/Mostly Hornblende Granite and Gneiss/Hornblende Granite and Gneiss formation, a mixed Gneiss formation and an Amphibolite formation underlie the entirety of the district.

Depth to bedrock is a crucial factor for septic suitability and thus for development in the watershed and lake area. Where soil depth to bedrock is shallow, sufficient area for wastewater treatment may not be present. In such soil conditions, water may not percolate vertically through the soil, instead may leach horizontally along bedrock and eventually reach the lake. It is noted that majority of the Johnson Lake District has a depth to bedrock of less than five feet and thus faces issues of septic unsuitability and surface water quality.

Steep Slopes

The Panther Lake District has variable slopes, with the majority of the severe slope areas occurring in the undeveloped, forested tracks to the north and east of the lakes and along Route 206 and on the developed western shore of the lake. Most of the campground area along the eastern and southern shore of the lake is on slopes less than 8-10% as well as the remaining vacant lands in the northeast part of District.

Such sloped areas impose various limitations on development, including requirements for grading, need for specially designed septic systems and restrictions on construction. Erosion and sedimentation caused by site clearing and grading are highly problematic where stringent and well-designed controls on development are absent. Such constraints imposed by topography and slopes can be overcome by appropriate excavation, soil erosion control during and after on-site construction, and storm water management plans.

Seasonal High Water Table

The Panther Lake District has soils with a seasonal high water table depth of anywhere from 6 inches to 6 feet. The areas with depth greater than 6 feet, the Otisville and Riverhead series, are more suitable for development as compared to those areas in the district with less. While depths of 2 to 4 feet found in the Rockaway series are considered unsuitable or unfavorable for development, the depths of 0.5 to 2.0 feet in the Hibernia and Pompton series are extremely unsuitable. Such areas, where the water table is close to the surface, are constrained from development and are unsuitable for various types of foundation construction and septic systems. Sufficient soil depth from the bottom of the septic system disposal bed to the top of the water table is necessary if septic inputs such as phosphorous, nitrogen and bacteria are to be prevented from leaching into the lake water.

74 BYRAM TOWNSHIP LAKE DISTRICTS Forest, Panter and Johnson Lake

Wetlands

Several small and isolated wetland areas have been identified in the Panther Lake District by the NJDEP Freshwater wetlands maps. These wetland areas are scattered in the undeveloped forestlands. There should be a site-by-site analysis for the determination of wetlands wherever development is considered. These wetlands act as storm water retention areas to reduce flooding and they improve water quality through deposition, filtration and uptake.

The state Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) regulates development within wetlands. Any construction activity within the wetlands and designated buffer areas is prohibited unless approved by the state. Wetland buffers or transition areas are areas of land adjacent to wetlands that minimize adverse impacts on wetlands and form an integral part of the wetlands ecosystem. The NJDEP establishes a minimum buffer of 150 feet for wetlands of exceptional value and 50 feet for wetlands of intermediate value.

These buffers serve a number of important environmental and ecological functions, function as linkages between habitat types and play an important role in maintaining the environmental quality of the Lubbers Run. These corridors stabilize soils to avoid erosion caused by overland runoff, storm surges and fluctuations in water depths.

Floodplains

There are no extensive areas of floodplains in the Panther Lake District; the lake itself is the dammed portion of the probable original floodplain and there is a small isolated area on the eastern border, near Johnson Lake. Floodplains are subject to periodic flooding and provide flood storage capacity, physical and biochemical water filtering and wildlife habitat. Development in these areas increases runoff, reduced flood storage capacity, increased size and frequency of downstream flooding, erosion of stream banks, deposition of sediments and loss of wildlife habitat.



Panther Lake District Planning Issues

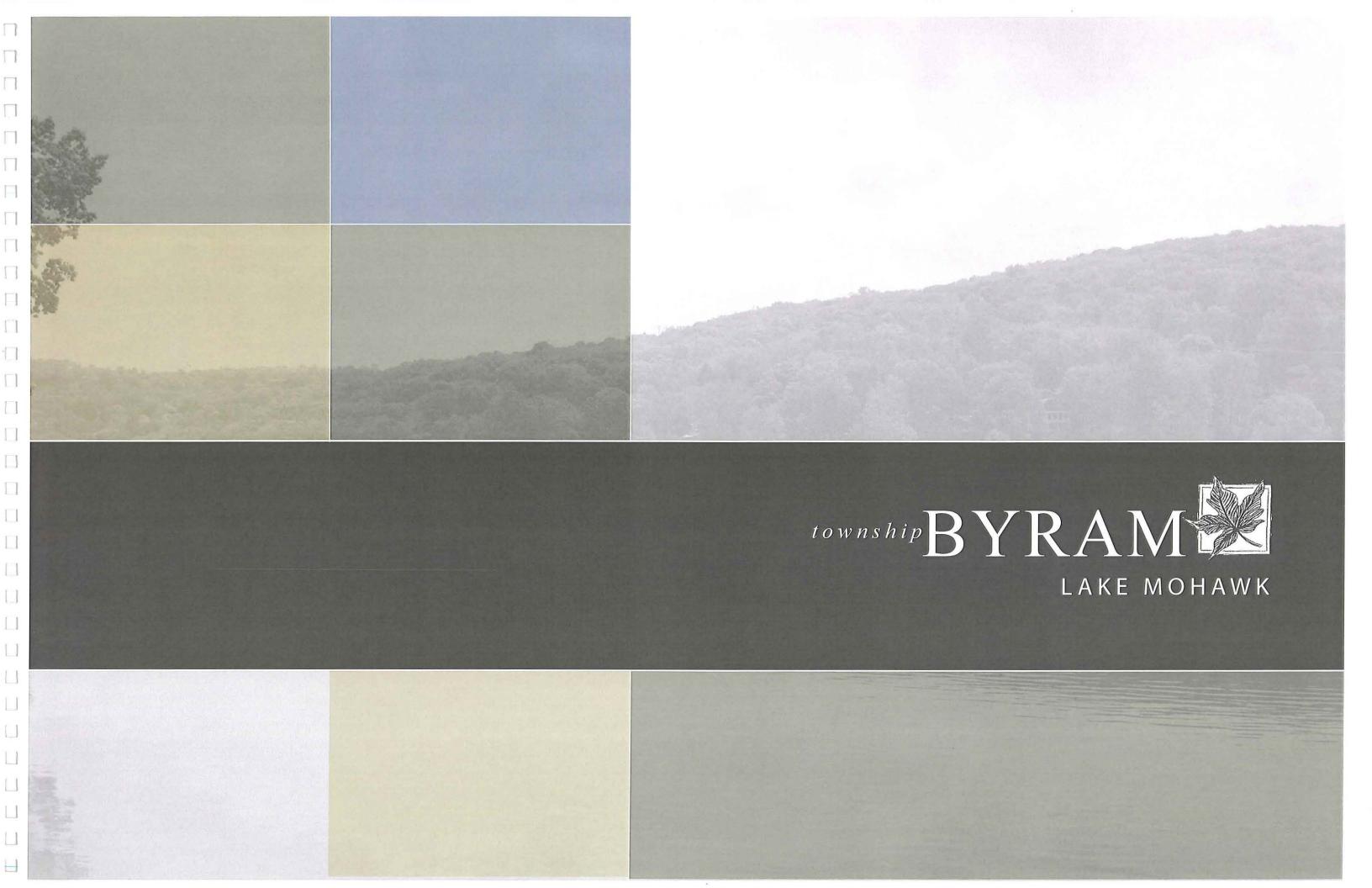
Development and Septics

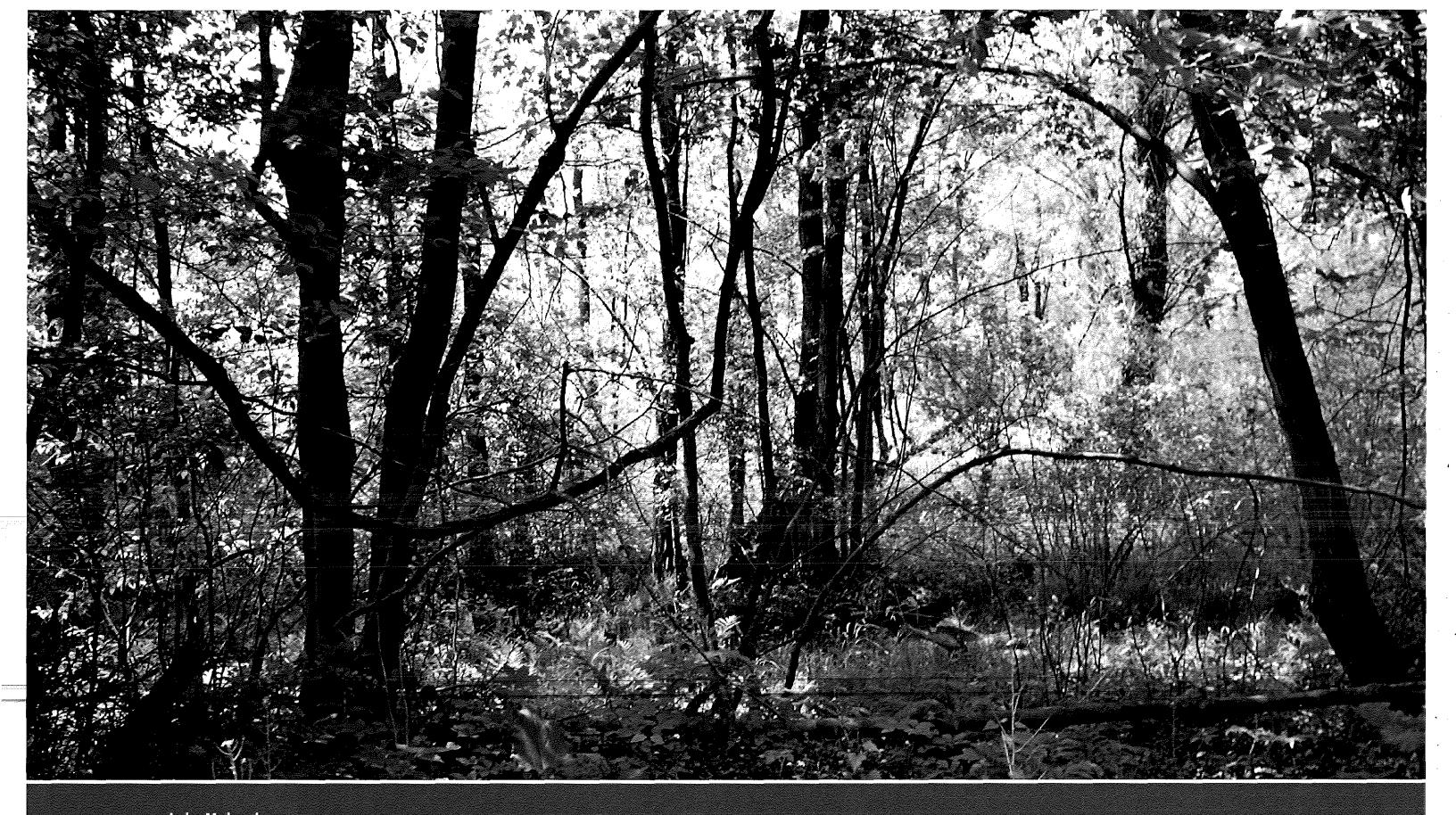
The Panther Lake District is the least intensely developed of all the lake communities in the Township. There are less than twenty home sites around the lakefront, while the majority of the lakeshore remains either undeveloped or utilized for recreation at the campground, preventing extensive lawns that extend up to the waters edge. Panther Lake hosts a campground featuring 458 campsites, eight bathrooms, three bathrooms with showers, one shower room and laundry, two dumping stations, a pool and hot tub. Each of these amenities has an impact on water quality and it is unknown what condition these facilities are in and in what configuration these facilities are linked.

It is assumed that most of the residential structures were built in the 1960s and 1970s, and that most of the septics are newer and of more recent design than some of the other lakes, but many are approaching 30 or 40 years of service and the existing limitations on septic suitability of the local soils is reason for concern. There was no data available in Township records on septic system installations or repairs. It is presumed that many failed septics go unreported.

Maintaining water quality in Panther Lake with careful site development planning in areas with steep slopes and extensive woodlands is crucial. Panther Lake has shown signs of eutrophication and may soon find itself in the same situation that the other, more developed lakes find themselves in. With so much undeveloped land surrounding Panther Lake, it presents a unique opportunity to undertake efforts to move those lands into open space protection, preventing further development and removing the threat of increased nutrient and sediment loading. Panther Lake can, with aggressive land use controls, changes in land ownership and stringent application of septic management controls, slow its progression to eutrophication. It is also imperative to monitor land use plans in neighboring Andover Township.

76 BYRAM TOWNSHIP LAKE DISTRICTS Forest, Panter and Johnson Lake





Lake Mohawk

The Mohawk Lake District is a smaller, sub-area of the much larger Lake Mohawk Reservation, with the majority of the Reservation in Sparta Township. The area within Byram is at the southern end of the lake. The majority of the development is on lots of a ¼ acre. The first house built in the reservation dates to 1927 and the road around the lake was completed in 1936. The majority of the housing is cottage style and dates from the 1930s, but development has continued through the present and larger homes occupy the steep slopes that rise above the lake

Based on the developed residential and potentially developable parcels around the lake, the boundaries that define this community/study area are;

- Sparta Township to the North
- · Wooded vacant land and scattered site residences to the Northwest
- · Amity Mohawk Road the southwest
- Wooded vacant land, scattered site residences and agricultural property to the southeast

Vital Statistics

- o Total Lake District Size 245 acres
- o Lake Mohawk Size (in Byram Township) 40 acres
- Net Residential Area Size 205 acres
- o Number of Lots 355 lots
- o Number of Sub Dividable* Lots 92 lots
- o Number of Non Conforming* Lots 73 lots
- o Population 595
- o Households 234
- o Average Household Size 2.54
- o Housing Units 264
- o Gross Density 1.08 units per acre (264 units on 245 acres)
- Net Density 1.29 units per acre (264 units on 205 acres)
- o Zoning R-2, R-4 zoning (40,000 sq. ft. & 10,000 sq. ft. minimum lot areas)
- Land Uses Lake Mohawk provides a variety of recreational opportunities for area residents including fishing, motorized boating, sailing and swimming. The Lake Mohawk Country Club includes varied recreational amenities such as boat launches, a marina, beaches, a boardwalk, shopping district and display gardens.

*(Sub dividable in size only, no other attributes were examined such as frontage or access. Non-conforming lots in size only. Non-conforming lots are undersized per current zoning. This is an analysis tool to gain an understanding of the basic development pattern and possibility of further development.)

History

The Arthur D. Crane Company created Lake Mohawk in 1926 under the direction of developer and designer Herbert L. Cross, resulting in the largest, private artificial lake in New Jersey on 2,300 acres of what is now known as the Lake Mohawk Reservation. Lake Mohawk was one of the first planned communities in the United States, pre-dating Radburn in Fair Lawn by two years, with the first house being built in 1927 and the road around the lake being completed in 1936. The Country Club building in Sparta was constructed from 1928 to 1933.

Lake Mohawk is divided between Byram and Sparta Townships; the majority of the lake itself, the homes around it, the country club and the boardwalk are located in Sparta Township. Many of these buildings and attractions were placed on the National Register of Historic Places in 1988 because of their unique architecture, known as "Lake Mohawk Tudor".



Lake Mohawk BYRAM TOWNSHIP LAKE DISTRICTS 79

Surface Water

Lake Mohawk is not specifically listed in the NJDEP Surface Water Quality Standards classifications for the waters of the State of New Jersey, and is therefore to be considered FW2-NT, where FW2-TM waters are waters recognized as suitable for trout maintenance and FW2-NT are not recognized as suitable for trout maintenance.

The 1982 lake study described Lake Mohawk as acting as a "sink" for phosphate and nitrate, as well as magnesium and calcium. Meaning that the aquatic vegetation was capturing these nutrients and the outflow was less alkaline and softer than the inflow. The dissolved oxygen rates and pH were normal and the chloride rates grew as the sampling approached the outflow, indicating a concentration of road salts.

The Lake Mohawk Country Club has an active lake management program and a Lake Master Plan. The master plan identified the primary cause of the lake's continuing eutrophication to be excessive phosphorous loading from storm water runoff, internal recycling of lake sediments and loading from septic systems. Palliative measures include an updated storm water control system, an in-lake alum dosing system, alum blanket applications, a destratification system in the deepest parts of the lake, public outreach and education program, voluntary restrictions on phosphorous products a septic management program.

The Country Club has also initiated a Lake Mohawk Monitoring Program and the 2002 report showed that despite the destratification system, the lake still suffers from some anoxic conditions near the lake bottom and the overall phytoplankton community dynamics of Lake Mohawk followed a pattern that is typical of eutrophic lakes. Overall water quality conditions were generally acceptable through the 2002 season. Water clarity was high and total phosphorous and Chlorophyll a concentrations were similar to those measured in 2000 and 2001. August water quality conditions were lower than 2000 and 2001, attributable to drought conditions and applications of copper sulfate.

Non-Point Source pollution (NPS) studies have shown a direct relationship between water quality degradation and development within a watershed. When pollutants and sediments are transported off site in increasing quantities, both during and after development, to nearby surface water turbidity increases and water quality decreases. It is recommended that adequate soil and erosion control plans be implemented to moderate such pollutants.

Potable Water Supply

The Sparta Water Company (?) serves the entire Lake Mohawk District. The company has 442 hookups in Byram Township, serving all the homes in the Reservation, as well as homes in adjacent developments. Nine different wells serve nine separate areas within the Sparta Water Companies total service area; two serve the Lake Mohawk District, the Lake Mohawk system and the Seneca Lake system. At present they are reported to not have any water quality or quantity issues and they test daily, weekly and monthly for bacteria, metals and VOCs.

80 BYRAM TOWNSHIP LAKE DISTRICTS Lake Mohawk

SOIL TYPES IN THE LAKE MOHAWK AREA

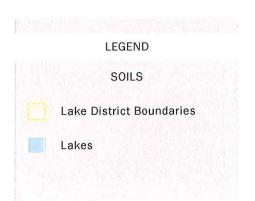
RrD	Rockaway - Rock outcrop association sloping & moderately steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to steep slopes and stony soil.
RpD	Rockaway very stony loam, 5-25% slopes	Moderate limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields and roads & trails due to seasonal high water table perched over fragipan and high stone content. Severe limitations for sewage lagoons, sanitary landfills, golf courses, etc. and all uses (see above) in steep (15-20%) slope areas due to steep slopes and stony soil.
RvE	Rock outcrop - rockaway association, steep	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to bedrock outcrops and stony soil.
RpE	Rockaway very stony loam, 25-40% slopes	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to very steep slopes
HmB	Hibernia gravelly loam, 3- 8% slopes	Moderate limitations for foundations for dwellings w/out basements, golf courses and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, and roads due to seasonal high water table perched at depth of 0.5 to 1.5 feet.
HnB	Hibernia Very Stony Loam, 3-8% Slope.	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, golf courses and roads due to seasonal high water table at depth of 0.5 to 1.5 feet.
HnD	Hibernia Very Stony Loam, 8-25% Slope	Moderate limitations for foundations for dwellings w/out basements and trails. Severe limitations for foundations for dwellings w/ basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads, golf courses, etc. due to seasonal high water table perched at depth of 0.5 to 1.5 feet and excessive stone content.
Wo	Whitman Extremely Stony Sandy Loam	Severe limitations for foundations for dwellings w/ or w/out basements, septic tank absorption fields, sewage lagoons, sanitary landfills, roads & trails, golf courses, etc. due to seasonal high water table at surface.

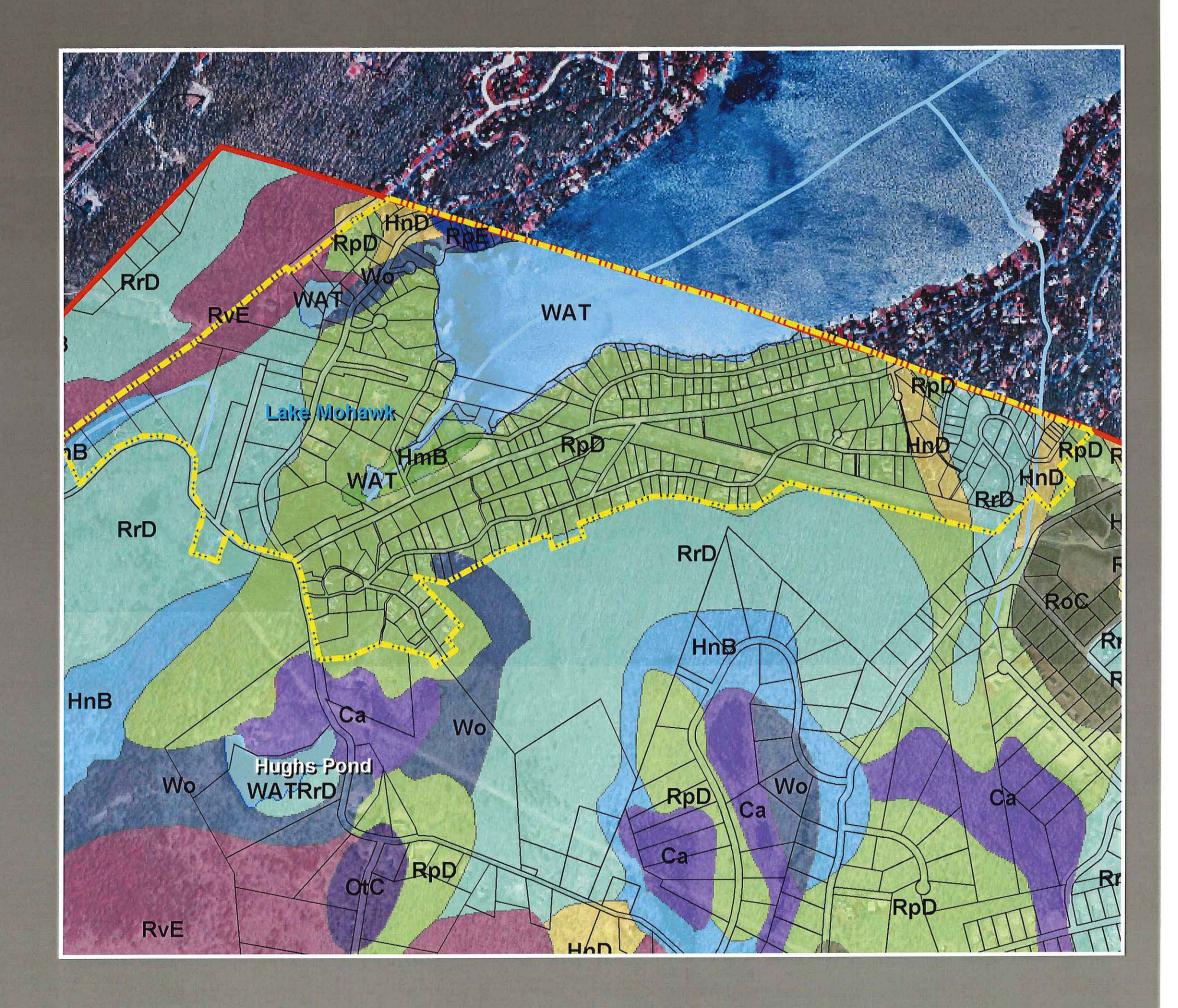
Environmental Constraints

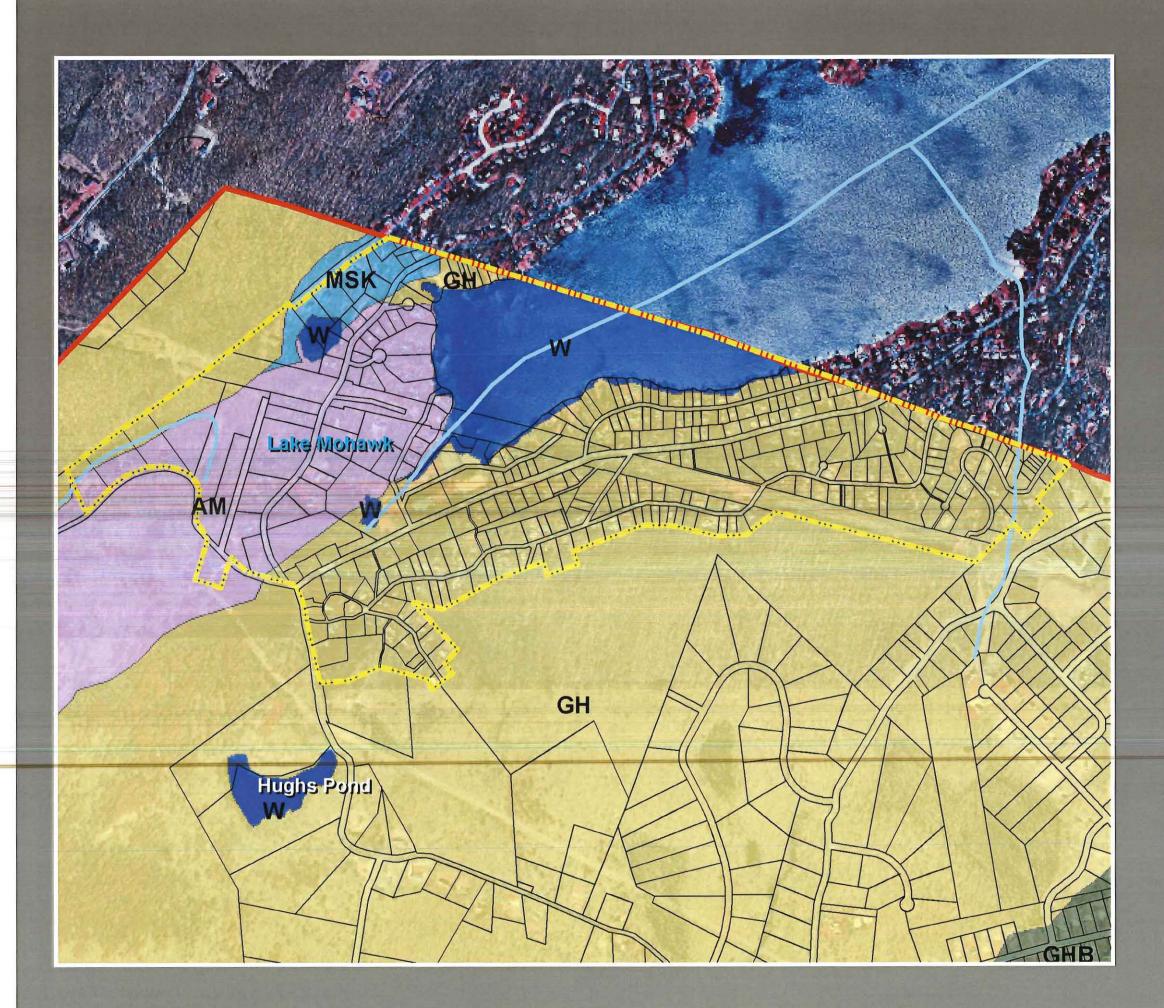
Soils

The soils occurring in the Lake Mohawk area can be generally described as being unsuitable for development. The soils series that underlies the majority of the existing development on the lakefront consists of Rockaway very stony loam with 5% to 25% slopes, exhibits moderate limitations for foundations for dwellings with or without basements, septic tank absorption fields, roads and trails due to steep slopes and stony soil. Other soils in the District have moderate or severe limitations on development and have severe limitations for septic tank absorption fields. Soils with severe limitations are typified by unfavorable conditions for wastewater reclamation and are difficult to correct with engineering solutions, thus highly constrained in their use for septic systems. Recommendations for septic use in such areas include, soil addition and reclamation, special engineering systems designs and intensive septic management to reduce or prevent failure.

In addition, the New Jersey Standards for Subsurface Disposal Sewage Systems (chapter 199) state that soils types like those that exist in the Lake Mohawk area are unsuitable for septic disposal field installation and may necessitate either soil replacement or mound installation systems. This limitation of underlying soils contributes to Lake Lackawanna's unsuitability for continued development.







Geology

The Lake Mohawk District has three distinct bedrock geology formations. A Hornblende Granite/Mostly Hornblende Granite and Gneiss/Hornblende Granite and Gneiss formation and an Amphibolite formation underlie the majority of the district. There is a small pocket of Marble and Skarn formation underlying a small area to the west of Lake Mohawk.

Depth to bedrock is a crucial factor for septic suitability and thus for development in the watershed and lake area. Where soil depth to bedrock is shallow, sufficient area for wastewater treatment may not be present. In such soil conditions, water may not percolate vertically through the soil, instead may leach horizontally along bedrock and eventually reach the lake. It is noted that the majority of Lake Mohawk has a depth to bedrock of less than five feet, with a small section that has a depth to bedrock of four to six feet, and thus faces issues of septic unsuitability and surface water quality.

Geology Type

SY MBOL	LABEL				
AM	AMPHIBOLITE				
BH	HARDYSTON FORMATION/HARDYSTON				
	QUARTIZITE/HARDY STON SANDSTONE				
且	LETHSVILLE FORMATION				
EOK	KITTATINNY GROUP/KITTATINNY FORMATION				
EOK	(UNDIFFERENTIATED)				
GH	HORNBLENDE GRANITE/MOSTLY HORNBLENDE				
	GRANITE & GNESS/HORBLENDE GRANITE & GNESS				
GHB	HORNBLENDE AND BIOTITE GNESS				
GNM	MIXED GNESS				
GPX	PY ROXENE GNESS				
GS	INDICATES SYENITE				
MSK	MARBLE AND SKARN				
QO	QUARTZ-OLIGOCLASE GNESS				
QOB	QUARTZ-OLIGOCLASE-BIOTITE GNESS				
W	WATER				

Steep Slopes

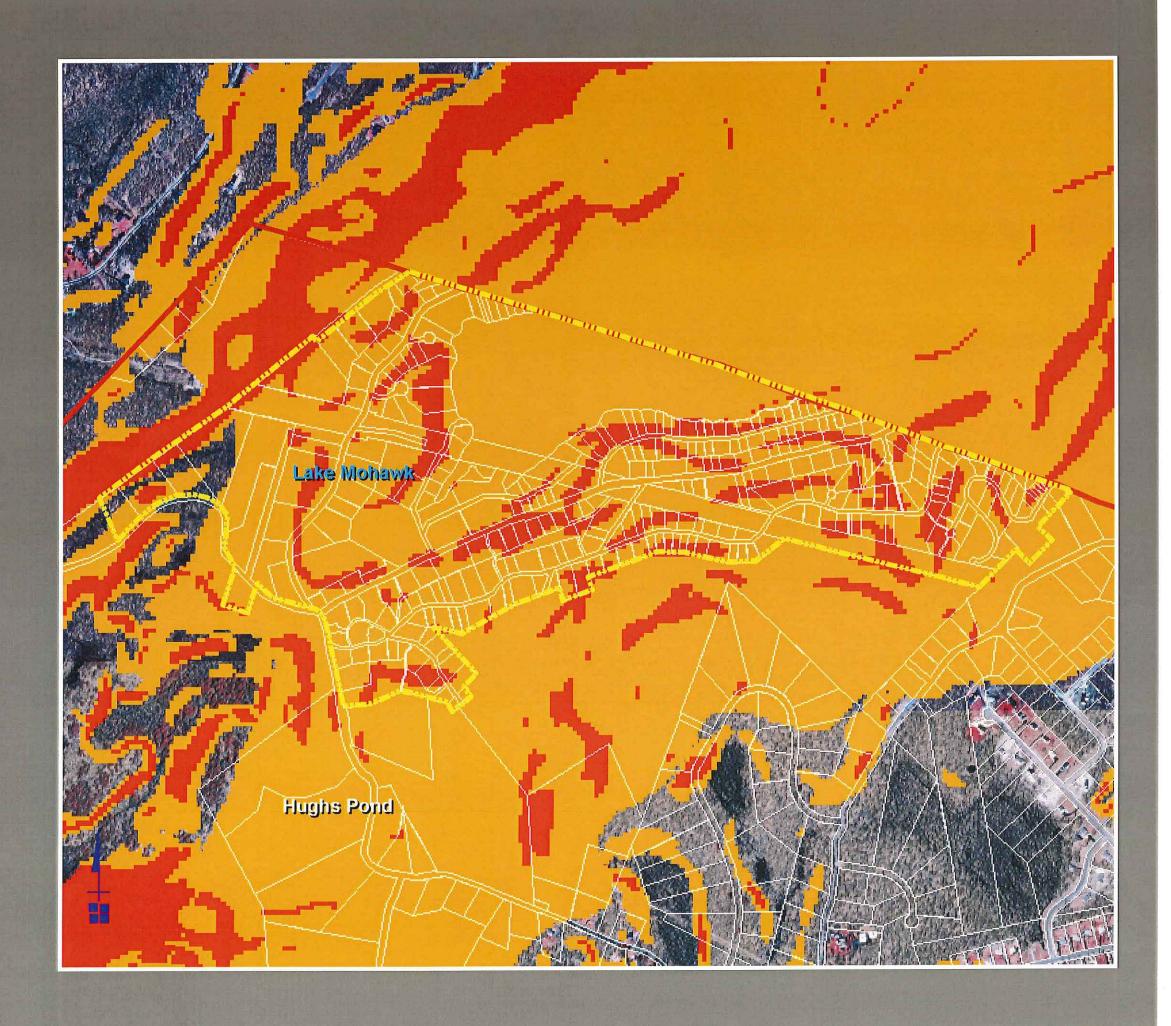
The Lake Mohawk District consists almost entirely of steep slopes, with vast areas of 15% to 25% slopes and smaller areas of slopes of 25% to 35%. Steep slopes in the Lake Mohawk District represent one the greatest limiting factors on development in the area.

Such sloped areas impose various limitations on development, including requirements for grading, need for specially designed septic systems and restrictions on construction. Erosion and sedimentation caused by site clearing and grading are highly problematic where stringent and well-designed controls on development are absent. Such constraints imposed by topography and slopes can be overcome by appropriate excavation, soil erosion control during and after on-site construction, and storm water management plans.

Seasonal High Water Table

The Lake Mohawk District has soils with a seasonal high water table depth of anywhere from six inches to four feet. The areas with a water table depth of two to four feet, the Rockaway series, are more suitable for development as compared to those areas in the district with less. While depths of two to four feet found in the Rockaway series are considered unsuitable or unfavorable for development, the depths of six inches to two feet in the Hibernia and Whitman series are extremely unsuitable. Such areas, where the water table







is close to the surface, are constrained from development and are unsuitable for various types of foundation construction and septic systems. Sufficient soil depth from the bottom of the septic system disposal bed to the top of the water table is necessary if septic inputs such as phosphorous, nitrogen and bacteria are to be prevented from leaching into the lake water.

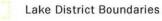
Wetlands

Two small wetland areas have been identified in the Lake Mohawk District by the NJDEP Freshwater wetlands maps. These wetland areas are found on the western border of the District and are centered on small tributaries. There are several large wetland areas south of the District in the surrounding watershed and alterations to these would have an impact on the Lake Mohawk system. There should be a site-by-site analysis for the determination of wetlands wherever development is considered. These wetlands act as storm water retention areas to reduce flooding and they improve water quality through deposition, filtration and uptake.

The state Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) regulates development within wetlands. Any construction activity within the wetlands and designated buffer areas is prohibited unless approved by the state. Wetland buffers or transition areas are areas of land adjacent to wetlands that minimize adverse impacts on wetlands and form an integral part of the wetlands ecosystem. The NJDEP establishes a minimum buffer of 150 feet for wetlands of exceptional value and 50 feet for wetlands of intermediate value.

LEGEND

WETLANDS - LAKE MOHAWK





Lakes



Wetlands

These buffers serve a number of important environmental and ecological functions, function as linkages between habitat types and play an important role in maintaining the environmental quality of the Lubbers Run. These corridors stabilize soils to avoid erosion caused by overland runoff, storm surges and fluctuations in water depths.

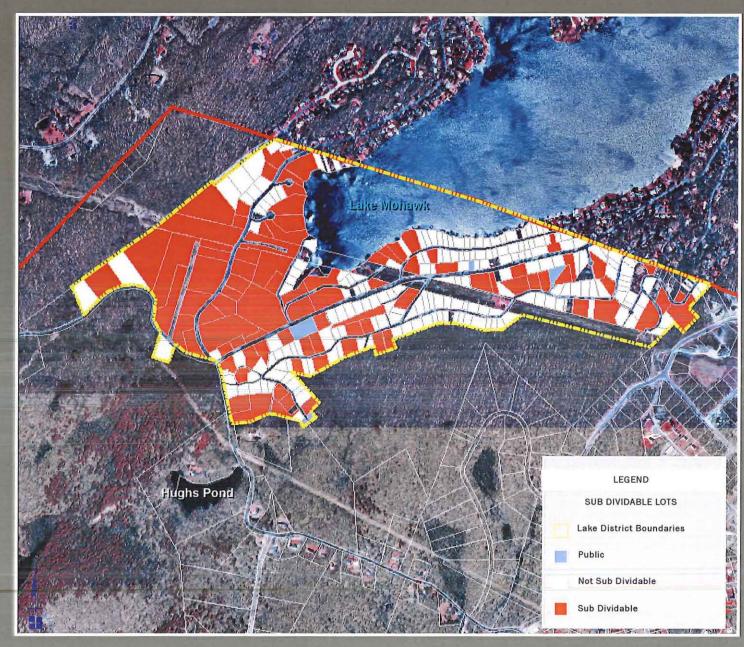
Floodplains

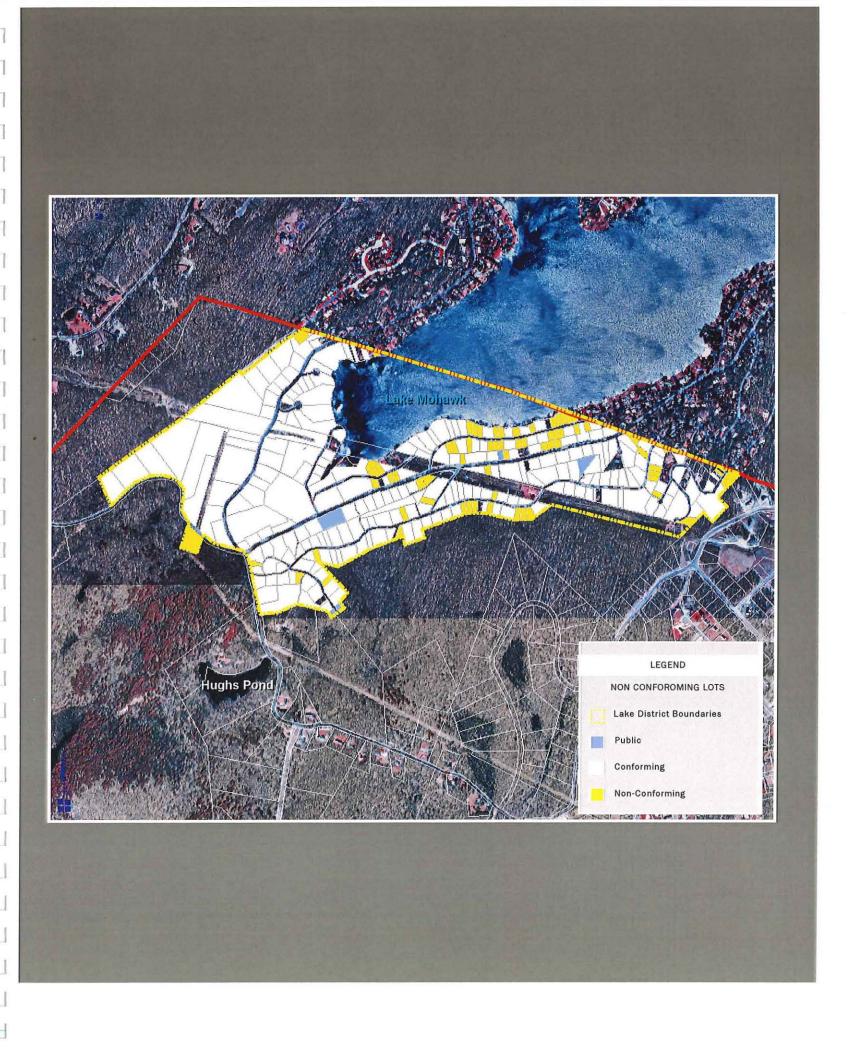
There are no extensive areas of floodplains in the Lake Mohawk District; the lake itself is the dammed portion of the probable original floodplain. There are several floodplain areas south of the District in the surrounding watershed and alterations to these would have an impact on the Lake Mohawk system. Floodplains are subject to periodic flooding and provide flood storage capacity, physical and biochemical water filtering and wildlife habitat. Development in these areas increases runoff, reduced flood storage capacity, increased size and frequency of downstream flooding, erosion of stream banks, deposition of sediments and loss of wildlife habitat.











Lake Mohawk District Planning Issues

Development and Septics

The Lake Mohawk is another of the large, densely populated lake communities in the Township; the Byram Township section hosts over 260 homes. Each one of the homes is serviced by a water supply company, but is on individual septic systems and this situation has proven detrimental to water quality in Lake Mohawk. Many of the septic systems are old, of outdated design and possibly failing. This fact, combined with existing limitations on septic suitability of local soils threatens water quality along with public health, property values and neighborhood cohesion. Additionally, the lake front properties have extensive lawns that extend up to the waters edge and this inevitably causes a higher flow of nutrients and fertilizer chemicals into the surface water of the lake. All of this is leading to the continued eutrophication of Lake Mohawk.

The Lake Mohawk Country Club has an active lake management program and a Lake Master Plan. The master plan identified the primary cause of the lake's continuing eutrophication to be excessive phosphorous loading from storm water runoff, internal recycling of lake sediments and loading from septic systems. Palliative measures include an updated storm water control system, an in-lake alum dosing system, alum blanket applications, a destratification system in the deepest parts of the lake, public outreach and education program, voluntary restrictions on phosphorous products and a septic management program.

Recent years have seen an increase in conversion of seasonal cabins to full-time residences. This is often followed by permit applications for expanding existing cabins or razing the original structure and replacing it with a much larger residential structure. This puts additional stresses on septic systems in soils with severe limitations and increases the impervious surface area in the watershed, reducing ground water recharge and groundwater inflow to the lake.

Examining the data of the past ten years shows that septic systems installations have increased with thirteen new septics systems being installed, thirty eight systems have been altered (possibly due to expansion of housing units), thirty have undergone repair and two failures

have been reported. It is presumed that many more failed septics go unreported. The small lots sizes in the District practically guarantee that the septic systems are not sufficient for the level of waste treatment required in the local soils before the effluent enters the ground water column.

A major concern in the District is proper site development planning for areas with steep slopes and woodlands. The steep slope areas surrounding the lake have experienced increase individual home site development on increasingly steep slopes. The subsequent forest clearing has increased sediment runoff and lake siltation. There are extensive areas of undeveloped steep slopes

surrounding the lake and if residential development continues to eat at away at these slopes, the future health of the lake will de doubtful.

Lake Mohawk, owned by the Lake Mohawk Reservation provides recreational activities to the residents along its shores. Beach areas, marinas and boat launches are available for limited access by club members. Gasoline powered watercraft can pose a threat to water quality. More intense recreational uses may contribute to the further eutrophication of the lake.

Also important for the District is the need to monitor development plans in the adjacent municipalities of Andover and Sparta. Since the majority of the Lake Mohawk Reservation lies in Sparta Township, it is necessary to work cooperatively on such things like septic management ordinances and zoning standards to ensure water quality for the entire lake.





The Byram Township Smart Growth Plan of 2002 presents a strategy to alter current development trends by directing growth to population centers while protecting rural resources and environmentally sensitive areas of the Township. By focusing development in a Village Center, the rural landscape will remain largely intact. The plan envisions that development in the environs will primarily take the form of hamlet scaled lake communities. The Smart Growth Plan will serve as a long-range guide for the Village Center and the Township as a whole. It is a policy document detailing the Township's official vision of the physical form and appearance of the Village Center and its environs.

The Village Center Core Planning Area encompasses lands immediately adjacent to Lackawanna Drive and Route 206. The Smart Growth Plan envisions the highest density of development adjacent to Route 206. Such development would consist of mixed-use retail with office and residential spaces on upper floors. The "interior" of the Center is intended for a community green with civic buildings having a high degree of pedestrian uses. Surrounding the green should be the highest intensity residential uses, e.g. townhouses and duplexes. The outlying ring of development is detached small lot single-family residential homes.

The State Development and Redevelopment Plan (SDRP) defines the Environs as areas outside Center Boundaries. Byram Township has petitioned the Office of State Planning for center designation in areas on and adjacent to Route 206. Therefore, the Smart Growth Plan considers the environs to include all lands, with the exception of the Village Center and the Lake Hamlets, as the environs. The SDRP envisions the environs as areas for the protection of large contiguous areas, which include farmland, open space and large forest tracts. The environs represent over 80% of the land area of Byram.

The Smart Growth Plan further describes the Lake Districts as originating as seasonal summer retreats that were utilized for recreation and enjoyment. Seasonal inhabitants relied upon the Lackawanna Cut Off and the Sussex Branch rail lines to reach Byram's lakes. Unbeknownst to visitors and townspeople of the time, the lake districts and their housing, surrounded by environmentally constrained lands, established a desirable land use pattern for the Township. Each Lake District serves as a hamlet or small village. From a land use planning perspective, such a layout and design reduces land consumption and reduces the cost of infrastructure improvements. The Smart Growth Plan recognizes Cranberry Lake, Lake Lackawanna, Lake Mohawk, Forest Lake, Johnson Lake, and Panther Lake as existing established residential lake communities and recognizes the interrelationships between the surrounding environs, lake districts and the Route 206 corridor. The Plan also addresses functional interconnection between land use, open space, environmental protection, circulation, economics, utilities and community facilities.

The Smart Growth Planning process recognized that the Township received a Smart Growth Assistance Grant from the Association of New Jersey Environmental Commissions (ANJEC). The grant was awarded to study, recommend and implement ordinances to better regulate development on lakes. During public meetings associated with the Smart Growth Plan, public input was sought regarding existing problems and solutions to negative environmental impacts associated with lake front development. The ANJEC study and its recommendations are this Lakefront Development Study and Plan. After the completion of the Lakefront Development Study and Plan as its Lake District element.

Lubbers Run Greenway Project

The Byram Township Environmental Commission commissioned the Lubber's Run Greenway Project in 1997, which was updated in 2000. The study documents the existing natural resources along the two-mile stretch of Lubbers Run that flows through Byram from Lake Lackawanna to the Musconetcong River. The greenway park plan then proposes to link local historic and cultural landmarks using the stream corridor and existing and proposed local trails. A stream corridor protection plan recommends preserving critical ecological areas identified in the study.

Siltation and surface water quality degradation were found to pose a threat to the integrity of the stream corridor. Existing and future development in the area are the greatest threats, including commercial development, Route 206 improvements and the proposed Village Center. Homes in the Lake Lackawanna District that front on Lubbers Run have extensive lawns that extend up to the water's edge and this inevitably causes a higher flow of nutrients and fertilizer chemicals into the surface water of the stream. In comparison, most homes in East Brookwood are wooded lots with a vegetative buffer near the stream and can serve as an example of how to maintain a residential lot in a stream corridor.

Historic resources include the old schoolhouse, the Lockwood Cemetery, the ruins of Lockwood Forge, Waterloo Village and the Sussex Branch Trail. An extensive and well-maintained trail system exists in Byram and can be expanded to complete several key linkages. The municipal complex, the school, the landscape nursery and certain residences near Lake Lackawanna disrupt visual and scenic continuity along Lubbers Run. Critical areas in the stream corridor were divided into three zones. Zone one captured the most critical areas, including identified wetlands, floodplains and forested slopes in excess of 15%. Zone two was a 150-foot stream buffer, considered critical; and zone three included a 500-foot stream buffer and remaining forested areas.

Recommendations included land acquisition and conservation easements in critical areas and the creation of an interpretive trail, including footbridges and pedestrian underpasses. Other recommendations include gateway maintenance and landscape buffering for incompatible uses and land development ordinances to control construction in sensitive areas. Limiting access to sensitive lands in public ownership is recommended. Finally, public education is seen as instrumental for the success of any of the recommendations.

The Lubber's Run Greenway Project included an extensive description of Best Management Practices (BMPs) or special methods to maintain or develop land to improve water quality in the stream corridor. Many of these recommendations were incorporated into this Lakefront Development Study and Plan. Key recommendations include native vegetation buffers and forest retention, strategic lawn placement and native vegetation plantings.



The Lubber's Run Greenway Project included an extensive description of Best Management Practices (BMPs) or special methods to maintain or develop land to improve water quality in the stream corridor. Many of these recommendations were incorporated into this Lakefront Development Study and Plan. Key recommendations include native vegetation buffers and forest retention, strategic lawn placement and native vegetation plantings.



The greenway plan includes an excellent native plant list to inform homeowners of the plants they should incorporate into landscaping and an exotic/invasive plant list to inform homeowners of the plants they should avoid. Storm water management with vegetated swales and filter strips is another BMP, as are wet ponds and detention basins. Salt reduction during de-icing in winter and increased street sweeping are roadway management practices that can improve water quality.
Suggested ordinances include measures for headwater protection, storm water management, forest preservation, natural resource inventories and development alternatives such as clustering, and Transfer of Development Rights (TDRs). Open space provisions are discussed, as well as the benefits of conservation easements; and potential cooperative partners for open space acquisition are listed.
The Lubbers Run Greenway Project is an excellent model for studying a particular issue and devising a comprehensive set of solutions to address the many aspects of the issue. The Lakefront Development Study and Plan not only follows this example, but also incorporates many of the recommendations designed to improve water quality in Lubbers Run and applies them to the much larger Lake District areas.
Byram Township Open Space Plan, completed in 2000, was a cooperative effort of the Morris Land Conservancy and the Byram Township Open Space Committee. The plan recognizes that 25% of the Township is currently permanently-preserved open space and that an additional 60% of the land within the Township has open space protection potential. While a large portion of the Township is in open space protection, the recreation needs of the community are still not being met. Byram only has six municipal parks and a struggling recreation department. Approximately 2,000 youngsters in the community utilize recreation activities on a limited amount of public athletic fields. ¹
(Footnotes) 1 (This plan, however was written before the Township hired its first full-time recreational director and began to actively
expand recreational facilities and programs, including a \$1.5 million expansion plan for the C.O. Johnson recreational area.)

The plan identifies the following goals; acquire land for active recreational field space, preserve the Lubbers Run greenway, enhance the existing trail system, connect protected state and municipal open space, protect the Township's drinking water supply, protect the Township's farmland, protect the Township's forests, protect the Township's steep slopes and adhere to the principles of the State Development and Redevelopment Plan. The plan recognizes the increased development pressure in the region and the role of open space protection in managing that growth.

The Open Space Plan catalogs the natural, built, historical and cultural resources of the Township. It continues with the planning rationale and the objectives of the latest Master Plan, as well as the objectives of other organizations, public and private, working in the region on open space preservation. The plan inventories the open space lands within the Township, by owner, including state, municipal, quasi-public, private, commercial and non-profit open space, as well as undeveloped lands in private ownership. The total amount of protected land is 3,264 acres, with 93% of the publicly held land in permanent protection. About 25% of the total land area of the Township is preserved, with 94% of that being state parkland. A total of 7,928 acres of land is still undeveloped; this includes undeveloped lands, farmland, Boy Scout and private campgrounds, NJDOT property and non-profit holdings. This represents another 60% of the Township available for open space protection. An outdoor recreation needs assessment for the Township highlights a need for more active recreation facilities, an expanded trail system and expanded protection of key historic resources. There is also a need to protect drinking water supplies for private well owners, protect the lake ecosystems from eutrophication, link current open space holdings and protect farmland. The open space plan also supports the findings and plan of the Lubbers Run Greenway Project. Numerous types of preservation tools are described, from direct acquisition and conservation easements, to leases and zoning changes, as well as funding sources for acquisition.

The document ends with a priority list for acquisition for several areas of the Township, including Allamuchy Mountain State Park, Lubbers Run, Dallis Pond, Camp Westby, Wolf Lake, Roseville Pond, Panther Lake, Roseville Pond to Koefferls Pond, and various farms. The Lakefront Development Study and Plan will suggest additions to this list for each of the Lake Districts, in support of many of the goals of the Open Space Plan, including preserving the Lubbers Run greenway, protecting the Township's drinking water supply, protecting the Township's forests, protecting the Township's steep slopes and adhering to the principles of the State Development and Redevelopment Plan.

Review of Selected State Regulations pertaining to Lake Districts

N.J.A.C. 7:9A Standards for Individual Subsurface Sewage Disposal Systems (Chapter 199)

The purpose of the regulations are stated as:

- 1. Prevent pollution of the waters of the State that results from improper location, design, construction, installation, alteration, operation or maintenance of individual subsurface sewage disposal systems.
- 2. Provide standards for the proper location, design, construction, installation, alteration, repair and operation of individual subsurface sewage disposal systems.
- 3. Protect the public health and safety and the environment.
- 4. Protect potable water supplies.
- 5. Safeguard fish and aquatic life and ecological values.

The regulations prescribe standards for the location, design, construction, installation, alteration, repair and operation of individual subsurface sewage disposal systems. These regulations constitute the rules of the NJDEP and are regarded as statewide standards for individual subsurface sewage disposal systems. Installation, constructions, alteration and repairs are prohibited without the necessary permits and approvals required in the regulations.

The use of septic systems for more than one property is prohibited unless a treatment works approval or a NJPDES permit has been issued by the NJDEP. Septic systems shall not be located, designed, constructed, installed, altered, repaired or operated in a manner that will allow the discharge of effluent onto the surface of the ground or into any watercourse. Septic system permits will not be issued where a sanitary sewer line is available within 100 feet of the property to be served. The discharge of sanitary sewage or effluent from septic systems into any abandoned well or any well constructed for that purpose is prohibited and no permits will be issued for such a use. Cesspool construction and installation is prohibited and alterations and repairs to existing cesspools are to include septic tank installation before the point of discharge into the cesspool. Seepage pit construction and installation is prohibited unless for a grey water system or as an alteration to an existing system. The discharge of industrial wastes into individual septic systems is prohibited, unless a treatment works approval or a NJPDES permit has been issued by the NJDEP; nor will any approvals be issued for construction, installation or alteration of any individual subsurface sewage disposal system used for discharge of industrial wastes.

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New systems must meet all aspects of the Chapter 199 requirements. Existing systems in existence prior to the regulations may continue without change if they comply with the previous standard, unless the systems are failing. When an expansion or change in use of a residential dwelling served by an existing system is proposed and the change will exceed 100 sq. ft. of habitable living space and will result in an increase in volume of sanitary sewage or will result in a change in type of discharge, the administrative authority shall not approve the expansion or change unless all aspects of the location, design, construction, installation, and operation of the existing system conform to the new requirements or are altered to be in conformance and the expansion or change does not increase the design flow in excess of the design capacity and it is demonstrated that the existing system is not failing.

Indications that an individual subsurface sewage disposal system is malfunctioning include: contamination of nearby wells or surface water bodies by sewage or effluent as indicated by the presence of fecal bacteria where the ratio of fecal coliform to fecal streptococci is four or greater, ponding or breakout of sewage or effluent on the surface of the ground, seepage of sewage or effluent into portions of buildings below ground, or back-up of sewage into the building served by the system not caused by physical blockage of internal plumbing.

Permits to construct or alter septic systems should include key maps and site plans, drawn to a scale adequate to depict clearly the following features within a 150-foot radius of the proposed system: location of all components of the proposed system, boundaries of lot, locations of existing and proposed buildings and roadways, subsurface drains, wells and disposal areas on the same lot and all adjacent lots, existing and finished grade topography, surface water bodies, springs and ground water seepage areas, surface water diversions, outcrops of bedrock, setback lines, stream encroachment boundaries and wetland areas and transition areas. Permits must also include soils logs, soil suitability classes, permeability tests, maximum expected daily volume of sanitary sewage, and all data used in design of the system.

Site evaluation and system location for each individual subsurface sewage disposal system shall be based on evaluation of all site characteristics that will affect the functioning of the system. Certain characteristics include minimum separation distances, slope, surface drainage and flood potential. The siting and location of a septic system must ensure proper system function, not create a nuisance and not adversely affect public health and safety, or the environment, nor affect the quality of surface water or groundwater. System location should avoid bedrock outcrops, sink-holes, steep slopes, eroded ground, disturbed ground, sand dunes, mine pits, dumps, landfills, tidal areas, wetlands and floodplains.

TABLE 4.3 MINIMUM REQUIRED SEPARATION DISTANCES (FEET) FROM N.J.A.C. 7:9A

Component	Reservoir, Well or Suction Line	Water Service Line, Pressure	Water Course	Occupied Building	Property Line	Disposal Field	Existing Seepage Pit or Cesspool	In-Ground Swimming Pool
Building Sewer	25	5	()	()	()	()	()	()
Septic Tank	50	10	25	10	5	()	()	10
Distribution Box	50	10	25	10	5	()	()	10
Disposal Field	100	10	50	25	10	50	50	20
Seepage Pit	150/100	25	100	50	20	50	50	30
Dry Well	50	()	()	()	()	50	50	()

Thorough and extensive soil suitability standards and soil permeability testing requirements are promulgated in the regulations. The general design and construction requirements require a state licensed engineer to design all individual subsurface sewage disposal systems and prohibit direct discharge of effluent onto the surface, into a subsurface drain or into any surface water.

Criteria for estimating the daily volume of sanitary sewage from residential sources for each bedroom or dwelling unit shall be:

Component	Volume in Gallons per Day		
First Bedroom	200		
Each additional bedroom	150		
Minimum volume per dwelling unit	350		
Minimum volume per apartment	350		

Criteria for estimating the daily volume of sanitary sewage from commercial sources for type of facility shall be:

Component	Volume in Gallons per user or per unit per day				
Bathhouse with shower	25/person				
Bathhouse without shower	10/person				
Beach Club	25/person				
Camp, Cottage	65/person				
Camp, Day camp	20/person				
Camp, Resort	100/site/day				
Camp, Trailer	100/site/day				
Camp, Trailer with toilets add	10/person/day				
Comfort Station/Picnic Grounds with toilets	10/person				
Comfort Station with toilets and showers	15/person				
Cottages	100/person				
Cottages	Minimum 350/dwelling unit/day				
Country Club	60/member/day				
Country Club	25/non-member/day				
Laundry, Self Service	50/wash				
Restaurant, sanitary waste only	5/patron				
Restaurant, kitchen waste add	5/patron				
Swimming Pool	10/person				

All individual subsurface sewage disposal systems shall consist of a septic tank which discharges effluent through a gravity flow, gravity dosing or pressure dosing network to a disposal field. Seepage pits shall not be approved for new installations except in the case of a grey water system. Tanks should be constructed of poured concrete, precast reinforced concrete, fiberglass, polyethylene, or other approved materials. Metal tanks are prohibited distribution boxes are required for all gravity flow systems and all gravity dosing systems where the effluent shall be distributed between two or more distribution laterals. Disposal fields will be required for all new systems and shall consist of one or more disposal trenches or a disposal bed designed per regulation. Disposal fields may be conventional installations, soil replacement, bottom-lined installations, soil replacement, fill enclosed installations, mounded installations, or mounded soil replacement installations. The soils suitability class on site will determine each type of installation.



N.J.A.C. 7:9B Surface Water Quality Standards

The components of the regulations are stated as:

- 1. Rules of NJDEP for protection and enhancement of surface water resources.
- 2. Class definitions and quality criteria for surface waters.
- 3. Use designations and quality criteria for the mainstem of the Delaware River, including Delaware Bay.
- 4. The classification of surface waters of the state.
- 5. Procedures for establishing water quality-based effluent limitations.
- 6. Modification for water quality-based effluent limitations.
- 7. Procedures for reclassifying specific segments for less restrictive uses.
- 8. Procedures for reclassifying specific segments for more restrictive uses.

The general policies of the regulations state that the Surface Water Quality Standards apply to all surface waters of the State. Water is vital to life and comprises an invaluable natural resource, which is not to be abused by any segment of the State's population or economy. It is the policy of the State to restore, maintain and enhance the chemical, physical and biological integrity of its waters, to protect the public health, to safeguard the aquatic biota, protect scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, agricultural and other reasonable uses of the State's waters. Toxic substances in waters of the State shall not be at levels that are toxic to humans or the aquatic biota or that bio-accumulate in the aquatic biota so as to render them unfit for human consumption.

Existing uses of waterways will be maintained and protected, and designated uses shall be attained wherever these uses are not precluded by natural conditions. No irreversible changes may be made to existing water quality that would impair or preclude attainment of the designated uses of a waterway. Except in cases due to natural conditions, nutrients shall not be allowed in concentrations that cause objectionable algal densities, nuisance aquatic vegetation, or otherwise render the waters unsuitable for the designated uses.

The surface waters of Byram Township have been designated FW2 per the regulation, and the designated uses include the maintenance, migration and propagation of natural and established biota, primary and secondary contact recreation (swimming, fishing, and boating), industrial and agricultural water supply, public potable water supply after conventional filtration treatment and disinfection, and any other reasonable uses. The Surface Water Quality criteria for FW2 are extensive.

All surface waters, unless specifically listed, are considered FW2-NT. In Byram, Cranberry lake is designated FW2-TM (C1) meaning it is a fresh water body that is not designated FW1, (which applies to freshwaters that are to be maintained in their natural state of quality and not subjected to any man-made wastewater discharges or increase in runoff from human activities), but is a Category 1 water body for the purposes of implementing anti-degradation policies for protection from changes in water quality characteristics because of its clarity, color, scenic setting, exceptional biological significance, exceptional recreation significance, exceptional water supply significance, or an exceptional fisheries resource. It is also designated as TM for a trout maintenance water body.

Lubbers Run has been designated FW2-TM meaning it is an FW2 water body, but is considered important for trout maintenance.

REVIEW OF SELECTED STATE REGULATIONS PERTAINING TO LAKE DISTRCITS 97

N.J.A.C. 7:9-6

Ground Water Quality Standards

The components of the regulations are stated as:

- 1. The rules of the NJDEP concerning ground water classification.
- 2. Designated uses of ground water.
- 3. Ground water quality criteria and constituent standards.

The regulation provides the basis for protection of ambient ground water quality, through the establishment of constituent standards for ground water pollutants. The constituent standards are applicable to the development of ground water protection standards pursuant to NJPDES, ground water cleanup standards and compliance levels beyond the boundaries of a contaminated site, and other requirements and regulatory actions applicable to discharges that cause or may cause pollutants to enter the ground waters of the state, including non-point and diffuse sources. The regulations shall be NJDEP's primary basis for setting numerical criteria for limits on discharges to ground water and standards for ground water cleanups.

The general policies of the regulation state that it is the policy of the State to restore, enhance and maintain the chemical, physical, and biological integrity of its waters to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial and other uses of water. Discharges to ground water that subsequently discharges into surface waters shall not be permitted if such discharges would cause a contravention of surface water standards applicable to those surface waters. When existing ground water quality does not meet the constituent standards due to human activities, the Department shall, after a review of relevant and available scientific and technical data, determine the management actions necessary to restore or enhance ground water quality.

Ground water is classified according to the hydrological characteristics of the ground water resource and the designated uses, which are to be maintained, restored and enhanced within the resource area. Classifications are regional in nature and do not reflect site-specific ground water conditions. There are three major classes of ground water, Class I is ground water of special ecological importance, Class II is ground water for potable water supply, and Class III is ground water with uses other potable water supply.

N.J.A.C. 7:20 Dam Safety Standards

The scope of the regulations are stated as:

- 1. Procedures for application to construct, repair or modify a dam, as defined in N.J.A.C. 7:20-1.2 and set standards for design and maintenance of dams. These rules also establish a dam inspection procedure.
- 2. Any dam which raises the waters of a stream five feet or less above its usual, mean, low water height falls under the jurisdiction of the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq.

The regulations prohibit construction, repair or modification of a dam without an NJDEP, permit and no permit will be forthcoming if the department feels the dam poses a threat to human health and safety or impacts cultural or natural resources or the environment. Dams constructed in any waterway that serves as a runway for migratory fish will require a fish ladder.

The NJDEP shall be notified by the owner or operator if any condition exists that may jeopardize the safety of the structure or if emergency repairs are necessary. The NJDEP shall also be notified of a change in ownership of any-dam. No dredging, without prior approval, may occur within 200 feet of a dam, and no dam shall be removed or breached without a permit issued by the department. A New Jersey licensed engineer must prepare any plans for construction, repair or modification of a dam and will supervise the inspection of the construction.

Dams are classified according to hazard. Probable development in the area downstream will be considered, and the department may change a dam's classification at any time. Class I dams have a high hazard potential; Class II dams have a significant hazard potential; Class III dams have a low significant hazard potential; and Class IV dams are small dams impounding less than 15 acre-feet of water. The regulation also specifies dam operating requirements and the dam inspection requirements and schedule.

N.J.A.C. 7:8

Storm Water Management

The regulation amends the Municipal Land Use Law, N.J.S.A. 40:55D-1 (MLUL) and the Water Pollution Control Act, N.J.S.A. 58:10A-1. The regulation establishes minimum requirements and controls to compensate for the differences in the hydrological response of the watershed from undeveloped to the developed condition. Nothing in the regulation changes the assigned duties of municipalities and counties responsible for approval of storm water management provisions, submitted as parts of site plans, and subdivisions, as established by the MLUL.

A storm water management plan and its implementing ordinance shall be designed to:

- 1. To reduce artificially induced flood damage to public health, life, and property:
- 2. To minimize increased storm water runoff from any new land development where such runoff will increase flood damage:
- 3. To maintain the adequacy of existing and proposed culverts and bridges, dams and other structures:
- 4. To induce water recharge where natural storage and geologically favorable conditions exist, where practical:
- 5. To prevent, to the greatest extent feasible, an increase in non-point source pollution:
- 6. To maintain the integrity of stream channels for their biological functions, as well for drainage and other purposes:
- 7. To reduce the impact of development on stream erosion:
- 8. To reduce erosion from any development or construction project:
- 9. To minimize the increase in runoff pollution due to land development, which otherwise would degrade the quality of water and may render it both unfit for human consumption and detrimental to biological life: and
- 10. To preserve and protect water supply facilities and water resources by means of controlling increased flood discharges, stream erosion, and runoff pollution.

The storm water management plan is designed to be adopted as part of the Township's Master Plan. Each municipality shall submit its storm water management plan to the county for review and comment. Once the ordinance is adopted and noticed to the county and state, no building permit shall be issued in contradiction of an adopted ordinance. Any such issuance shall be in violation of the MLUL. Storm water management plans should be re-examined along with the master plan in accordance to the schedule described in the MLUL.

Byram Township lacks a cohesive storm water management plan. While several different ordinances address the larger issue of storm water management from the standpoint of roads, right-of-way improvements and tract disturbance, there is no single cohesive plan for storm water management. Storm water runoff can have tremendous impact on lake systems, increasing sedimentation and NPS pollution. The Township should craft and adopt a storm water management plan in accordance with the standards outlined in N.J.A.C 7:8.

Other State Regulations

N.J.A.C. 7:13-1 Flood Hazard Area Control

N.J.A.C. 7:7A Freshwater Wetlands Protection Act Rules

These, and other state regulations, have an impact on development in the Lake Districts, but do not directly figure into the recommendations proposed in this study and plan.



n order to prevent continued degradation of the surface water and ground water resources in the Lakefront Districts, and to preserve the current character of the lakefront neighborhoods, it will be necessary to make changes to the current zoning regime and the associated bulk standards. The zoning changes will be specific to each Lake District and will take into account the current development patterns, existing undeveloped tracts and existing environmental constraints.

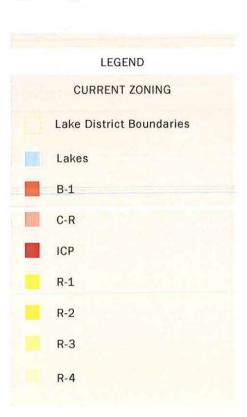
The first recommendation is to create an Open Space zoning district, to recognize those areas already in permanent open space protection. Those areas identified in the Open Space plan and in this Lakefront Plan as candidates for inclusion in the open space inventory would be added following acquisition.

The next recommendation is to create a Golf Course zoning district and include those areas already developed as golf courses. The final recommendation is to update the R-1A and R-1 zoning to reflect the recommendations in the Smart Growth Plan. The R-1A zone will change from one dwelling per 3.5 acres to one dwelling unit per five acres. The R-1 zone will change from one dwelling per five acres to one dwelling unit per ten acres. These zones will be useful for protecting adjacent undeveloped upland areas and the lake bottoms.

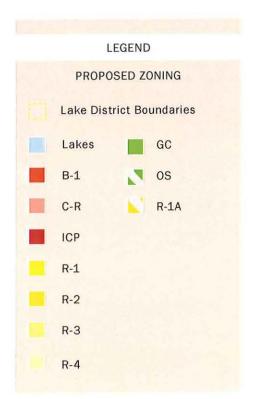


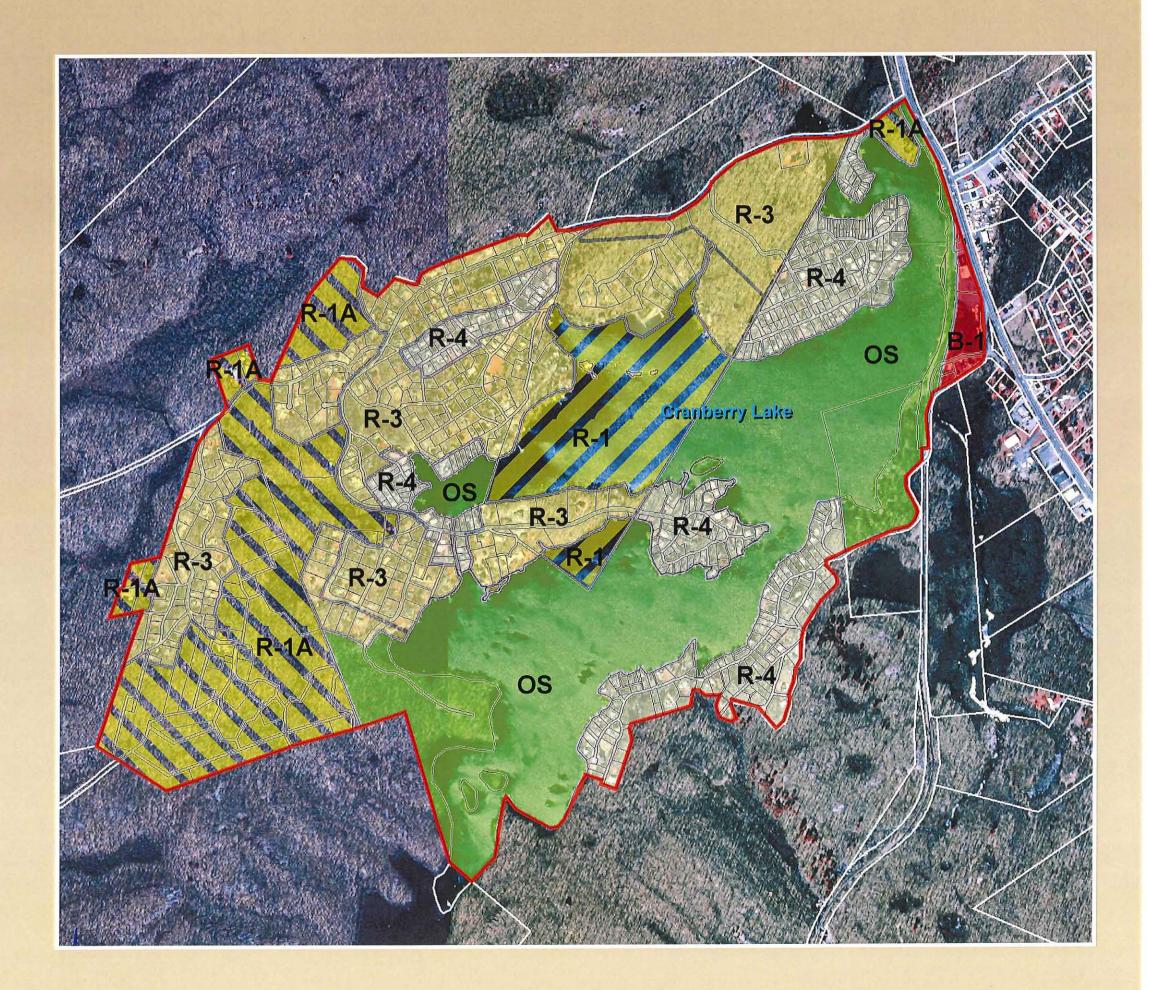
Zoning Changes at Cranberry Lake

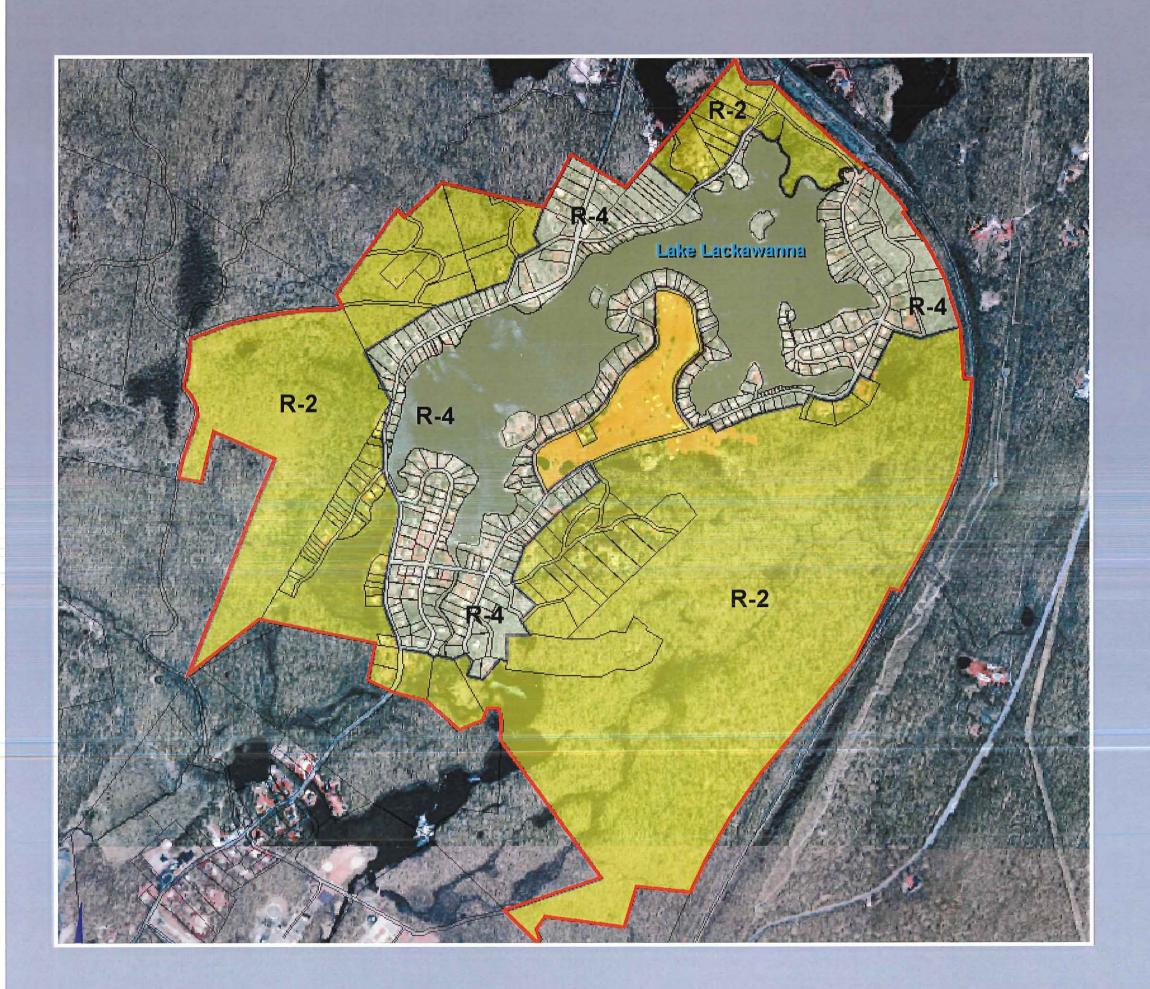
The majority of the Cranberry Lake District is presently zoned R-4 in the immediate vicinity of the lake and R-3 to the west of the North Shore and north of Frenches Grove. Smaller pockets of the district and the majority of the surrounding area are zoned R-1. The recommendation is to retain the R-4 for the established neighborhoods of Frenches Point, Briar Heights and Della Heights, Strawberry Point and portions of the North Shore where the existing road network and development pattern would only accommodate the smallest, 10,000 sq. ft., lot size.



The recommendation is to rezone the remainder of the North Shore, Cranberry Ledge and Strawberry Neck to R-3. This zone, which allows a minimum lot size of 20,000 sq. ft. would better meet the minimum standards for site design for septic systems in N.J.A.C. 7:9A, especially important in the Lake Districts. The remaining areas are to be zoned R-1A, which would allow a minimum lot size of 5 acres; this includes the area immediately adjacent to Route 206 and North Shore Road, and areas north and west of the North Shore. The recommendation is to rezone the lake bottom and uplands in public ownership to Open Space and to rezone the remainder of the lake bottom, like the environs, to R-1, which will now allow a minimum lot size of 10 acres.

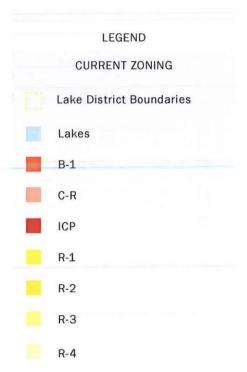






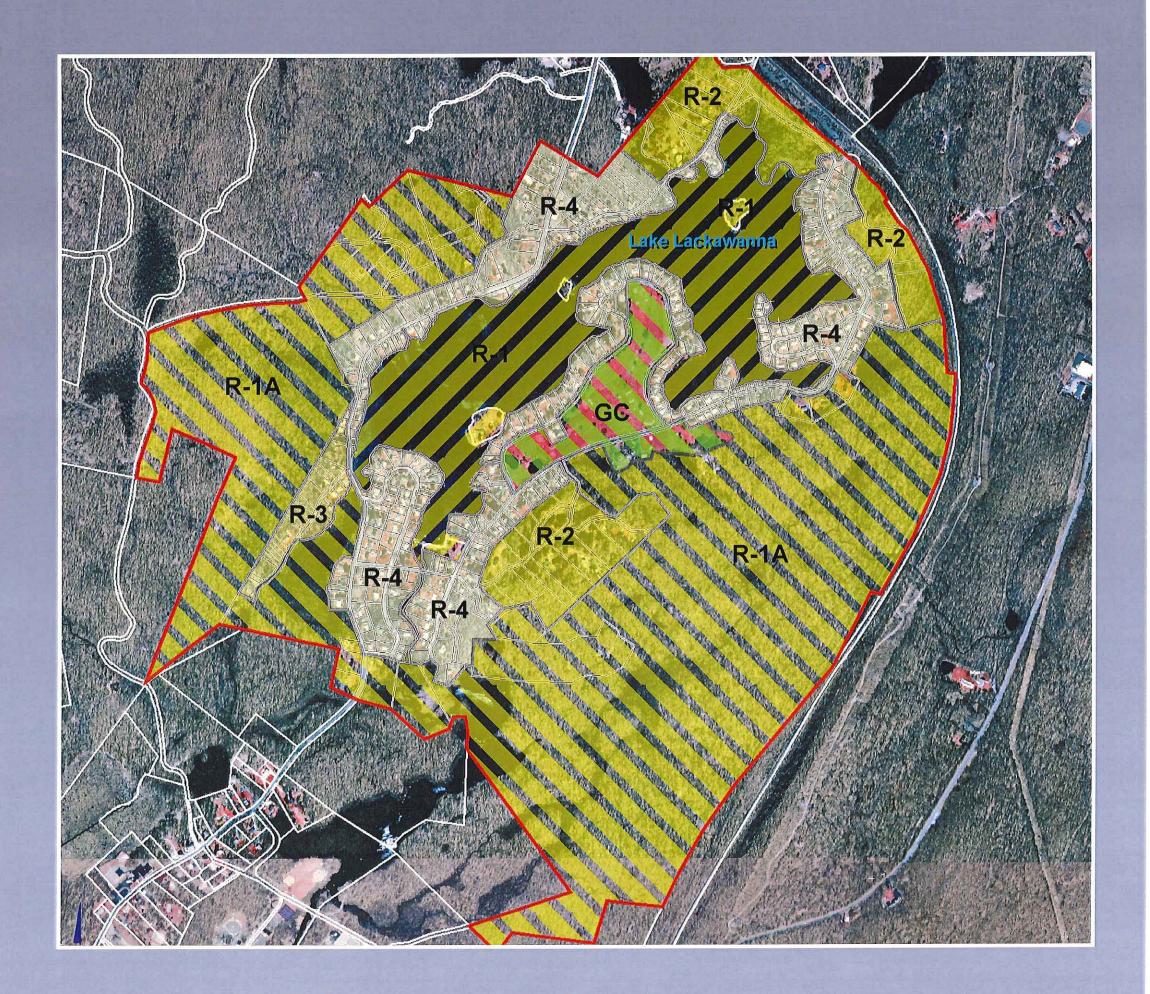
Lake Lackawanna

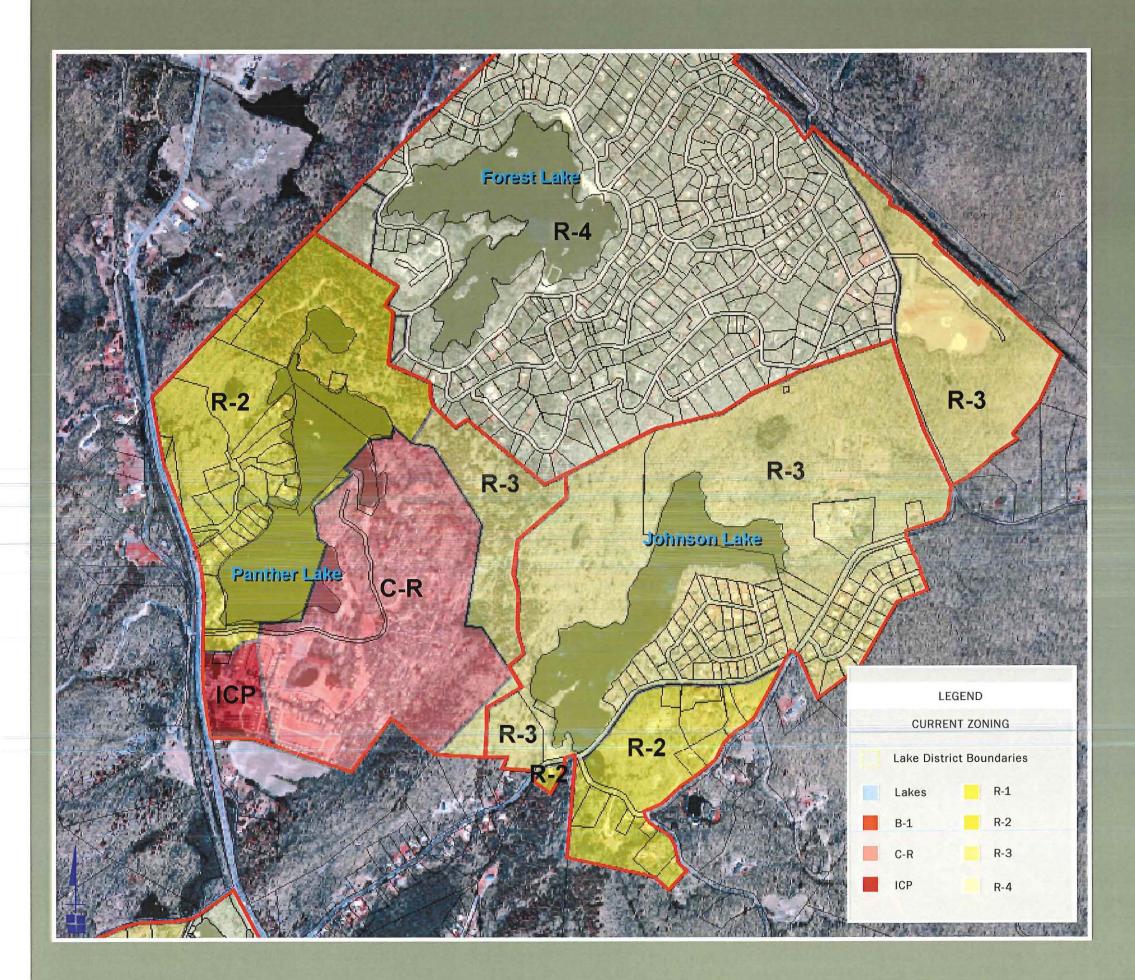
The Lake Lackawanna District is currently zoned R-4 in the developed areas in and around the vicinity of the lake, including the golf course, and the remainder of the district is zoned R-2 on the slopes above the lake area. The recommendation is to retain the R-4 zoning only in those areas that are immediately adjacent to the lake where the existing road network and development pattern would only accommodate the smallest, 10,000 sq. ft., lot size.



The recommendation is to rezone the area in the northwest corner of the district along the Erie Lackawanna Right Of Way to R-2, as well as the development on the slopes above the lake accessible by Carpenter Road. Rezone the Bank Street Corridor to R-3, to bring these already developed parcels closer to zoning compliance. These changes in zoning to R-2 and R-3 would better meet the minimum standards for site design for septic systems in N.J.A.C. 7:9A, especially important in the Lake Districts. Rezone the remainder of the largely undeveloped parcels to the southeast and west to R-1A, which would allow a minimum lot size of 5 acres, to protect these forested slopes from a density of development detrimental to Lake Lackawanna. Rezone the lake bottom like the environs to R-1, which would allow a minimum lot size of 10 acres and rezone the golf course to GC or golf course only zoning.







Forest Lake

The Forest Lake District is almost entirely zone R-4, except for Johnson Memorial Park, which is in the R-3 zone. While the majority of the lots are already developed, this does not preclude these lots from subdivision. The recommendation is to change the entire district from R-4 to a mix of R-3, R-2, R-1 and OS.

The recommendation is to rezone the majority of the Forest Lake District to R-3, where a majority of these lots would be sub-dividable under the current R-4 zoning. Rezone to R-2, the areas east of Forest Lakes Drive, and on the slopes south of Sleepy Hollow Road, where the lots are larger, preventing detrimental increases in density in these areas. Rezone the lake bottom and the current beaches and forested lakefront tracts that buffer the lake to R-1, which would allow a minimum lot size of 10 acres, and rezone Johnson Memorial Park for Open Space.

Johnson Lake

The Johnson Lake District is currently zoned R-3 north of Tamarack Road and along Colby Drive and is zoned R-2 south of Tamarack Road, west of Colby Drive. The majority of the development in the District is centered on Colby Avenue, Manu Trail and Hunters Lane. The recommendation is to retain the R-3 zoning in these developed areas and retain the R-2 zoning in the area south of Tamarack Road west of Colby Drive.

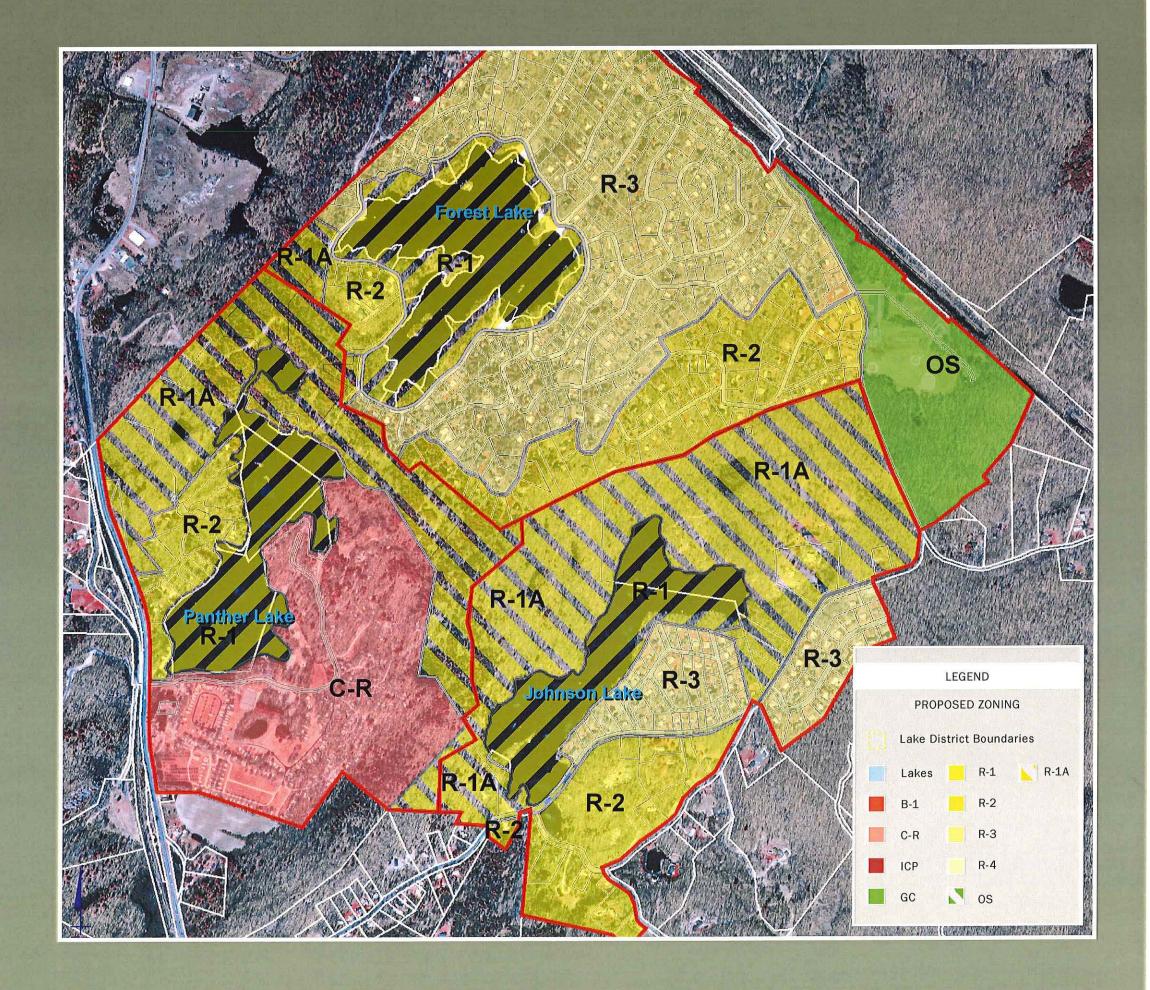
Rezone the remainder of the District to R-1A, which would allow minimum lot size of 5 acres, to preserve the lowest density in the forested areas that buffer the shoreline and uplands surrounding Johnson Lake.

Rezone the lake bottom and the forested areas immediately adjacent to the lakefront to R-1, which would allow a minimum lot size of 10 acres.

Panther Lake

The Panther Lake District currently has a mix of zoning, including R-2, R-3, R-4, CR and ICP. The south and east shores of Panther Lake are zoned CR and are home to a 114-acre, 458-site campground. To the west, between the CR and Route 206, is a portion of the ICP zone; and to the east of the CR zoning is a strip of R-3 zone. The majority of the lakebed and the northern and western shores are zoned R-2; and a small piece of R-4 zoning exists at the furthest northern extent of the district.

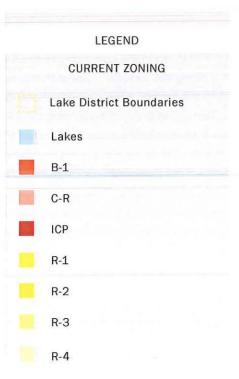
The recommendation is to retain the CR zoning at the current extent of the campground and rezone the portion of ICP that lies in the campground to CR. Retain the R-2 zone along the western shore of Panther Lake, but limited to the extent of the currently developed parcels. Rezone the remaining R-2 and R-3 upland areas to R-1A zoning, which would allow a minimum lot size of 5 acres, including the small portion of R-4 in the northern corner, to better protect the forested slopes around the lake from high or even moderate density development. Rezone the lake bottom and the forested areas immediately adjacent to the lakefront R-1, which would allow a minimum lot size of 10 acres.





Lake Mohawk

The Lake Mohawk District is predominantly zoned R-4, with sections on the periphery zoned R-2, these including the area to the west of the development along West Shore Trail, the area south of the development along Ranger Trail, the P.S.E.&G Right Of Way east of Glenside Trail and 2 parcels east of the development on Springbrook Trail.



The recommendation is to retain the R-4 zone in those areas that are immediately adjacent to the lake where the existing road network and development pattern would only accommodate the smallest, 10,000 sq. ft., lot size. Expand the R-2 zone west of the development along West Shore Trail to include those areas along West Shore Trail south of the P.S.E.&G Right Of Way and west of Meadowbrook Terrace. This area is where the majority of sub-dividable parcels remain. Rezone the lake bottom and the current beaches and forested lakefront tracts that buffer the lake to R-1, which would allow a minimum lot size of 10 acres.







Cranberry Lake/Jefferson Lake & Tributaries Sub Watershed

The Cranberry Lake/Jefferson Lake and Tributaries sub watershed is composed of the inlet streams draining into Cranberry Lake, whose outlet stream joins with the outlet stream of Johnson Lake to form the tributary that fills Jefferson Lake. Jefferson Lake then drains to Lubbers Run and then onto the Musconetcong River. The majority of the area surrounding Cranberry Lake is zoned R-1 and is state owned land. However, the areas surrounding Johnson Lake are R-3 and R-2 and the tributary connecting Johnson Lake and Cranberry Lake flows through B-1 and R-4 zones. R-2 and CR zones surround Jefferson Lake and the tributary connecting Jefferson Lake and Cranberry Lake flows through sections of the ICP zone. The large ICP zone in the center of Byram straddles the Cranberry Lake/Johnson Lake & tributaries sub watershed and the Lubbers Run (below Dallis Pond) sub watershed. High-density development in this zone would adversely effect both of these watersheds and the Lakes within them. Current minimum lot area is 100,000 sq. ft. (2.5 Acre) in the ICP. The recommendation is to limit the ICP to an area much closer to Route 206 and rezone most of the R-2 and R-3 zones to R-1A or R-1 to reduce development impacts on the Lake Districts.

New Wawayanda Lake/Andover Pond & Tributaries Sub Watershed

Forest Lake and Panther Lake form the headwaters of the New Wawayanda Lake/Andover Pond sub watershed that is part of the larger Pequest River watershed. This watershed essentially follows the western border of Byram Township. The only remaining areas of this watershed in the Township are presently zoned R-1. Making the changes to zoning previously outlined for these Lake Districts will reduce density appropriately.

Lubbers Run (below Dallis Pond) Sub Watershed

Lake Lackawanna is the only Lake District in the larger Lubber Run (below Dallis Pond) sub watershed, which also includes Stag Pond, Kofferls Pond, Roseville Pond, and Wolf Lake. This sub watershed encompasses nearly a third of the Township and drains in to Lubbers Run and eventually into the Musconetcong River. The hydrological system that is comprised of Stag Pond, Kofferls Pond, Roseville Pond, and Wolf Lake all combine to

form the headwaters of the inlet stream to Lake Lackawanna. The majority of this watershed north of Lubbers Run is already R-1 and R-1A, but portions of the sub watershed are also zoned R-2 and R-3. The health of the ground water and surface waters of the entire sub watershed would be better served if the entire area were zoned R-1 or R-1A. The large ICP zone in the center of Byram straddles the Cranberry Lake/Johnson Lake & tributaries sub watershed and the Lubbers Run (below Dallis Pond) sub watershed. High-density development in this zone would adversely effect both of these watersheds and the Lakes within them. Current minimum lot area is 100,000 sq. ft. (2.5 Acre) in the ICP The recommendation is to limit the ICP to an area much closer to Route 206 leaving none of the ICP zone in the Lubbers Run (below Dallis Pond) sub watershed.

Wallkill River/Lake Mohawk (above Sparta Station) Sub Watershed

The Lake Mohawk District, along with Hughes Pond, is contained within the Wallkill River/Lake Mohawk (above Sparta Station) sub watershed. This area drains north, eventually into the Wallkill River. This area is currently zoned R-4 throughout most of the Lake District, with the rest of the sub watershed area zoned R-2 or R-1. To better protect the water quality of Lake Mohawk, it would be best to change the remaining R-2 zones to R-1A.

BULK STANDARDS REVISIONS

These changes are specifically designed and intended to have the greatest effect on the Lake Districts. The changes are designed to reduce the impacts on lakes that will follow continued in-fill development. Many of these changes will be applicable to the same zones in other parts of the Township. These recommendations are based on state regulations and best management practices aimed at reducing impacts to surface and ground water in the Lake Districts and the Environs.

A major recommendation that affects many of the zones simultaneously is an effort to link lot size to infrastructure availability. Any new lot proposed to utilize an on-site well and on-site septic system shall be required to be a minimum of 40,000 square feet in size. Any new lots created or new home construction on lots less than 40,000 square feet in size are required to connect to a potable water supply.

Current R-4 zone space regulations:

Lot Area: 10,000 square feet Front Yard Setback: 35 feet Side Yard (each) Setback: 15 feet Rear Yard Setback: 20 feet

Height: 2.5 stories

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 40 feet, measured

from 100-year flood line

Minimum Lot Width (Frontage): 100 feet

Maximum Building Envelope Size (Lot Coverage): 40% of lot or 30,000 square feet, whichever is less

Maximum Lot Disturbance: 50% of lot or 20,000 square feet, whichever is greater

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract

disturbance area.

Proposed Changes to the R-4

The 10,000 square foot minimum lot area is an artifact of the original road and parcel designs of the 1950s that pre-dated state septic controls. Under the current Standards for Individual Subsurface Sewage Disposal Systems N.J.A.C. 7:9A (otherwise known as Chapter 199), this lot size is incongruous with the minimum required separation distances for septic components (see Table 4.3 in previous section).

It is virtually impossible to meet all of these requirements and incorporate an on-site septic and potable water well. It is appropriate to maintain this zoning and the already approved minimum lot area only for those areas already developed, with a majority of the developed lots following these standards. The current front, side and rear yard setbacks are to be retained, but the recommendation is to increase the minimum setback of building envelope from existing lakes, ponds, streams or wetlands to 50 feet, including a 10 foot wide vegetated buffer along at least 80% of the waters edge.

These vegetated buffers serve important bank stabilization functions, as well as serving as biological filters for surface runoff, NPS pollutants and dissolved organics resulting from failing septic systems. The next recommendation is to reduce the maximum building envelope size, or lot coverage, to 15% of the lot. The 2.5 story height limit will be retained, with the provision that a 30-foot maximum height from grade on any façade will be enforced. This would allow for a residence of approximately 3,000 square feet of living space and provide the maximum available area for septic disposal fields in areas with severe limitations on soil suitability for septic systems. The maximum lot disturbance standards, as published, in Township ordinances, seem to be in error. The current standards should read "50% of lot or 20,000 square feet, whichever is lesser", not greater. In summary, we recommend the following changes:

112 **RECOMMENDATIONS FOR TOWNSHIP ACTION** Land Use

Proposed R-4 zone space regulations:

Lot Area: 10,000 square feet Front Yard Setback: 35 feet Side Yard (each) Setback: 15 feet Rear Yard Setback: 20 feet

Height: 2.5 stories, with a 30-foot maximum height from grade on any façade

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of waters added.

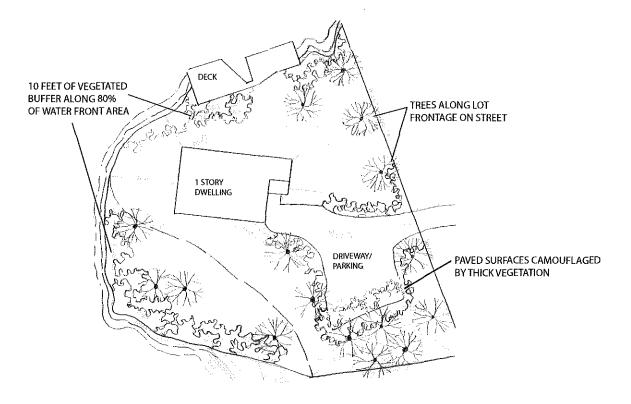
waters edge

Minimum Lot Width (Frontage): 100 feet

Maximum Building Envelope Size (Lot Coverage): 15% of lot

Maximum Lot Disturbance: 50% of lot or 20,000 square feet, whichever is less

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract disturbance area.



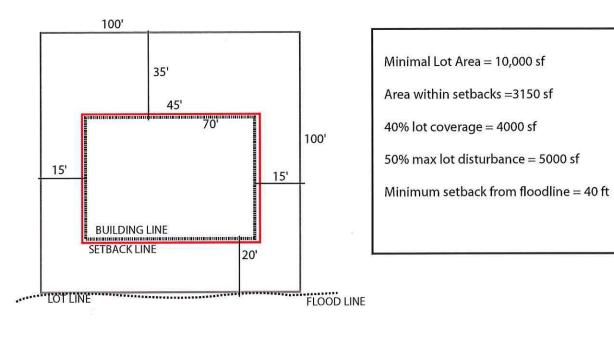
R-4 Existing Standards

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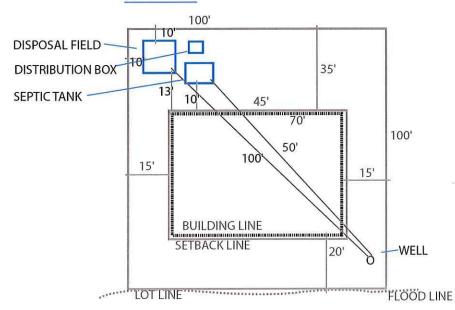
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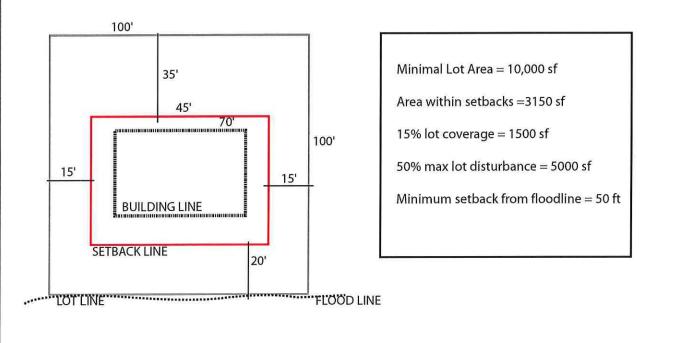


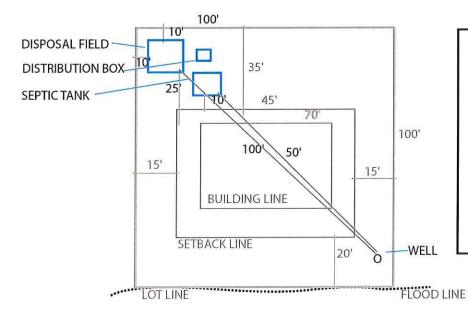
SERVICES



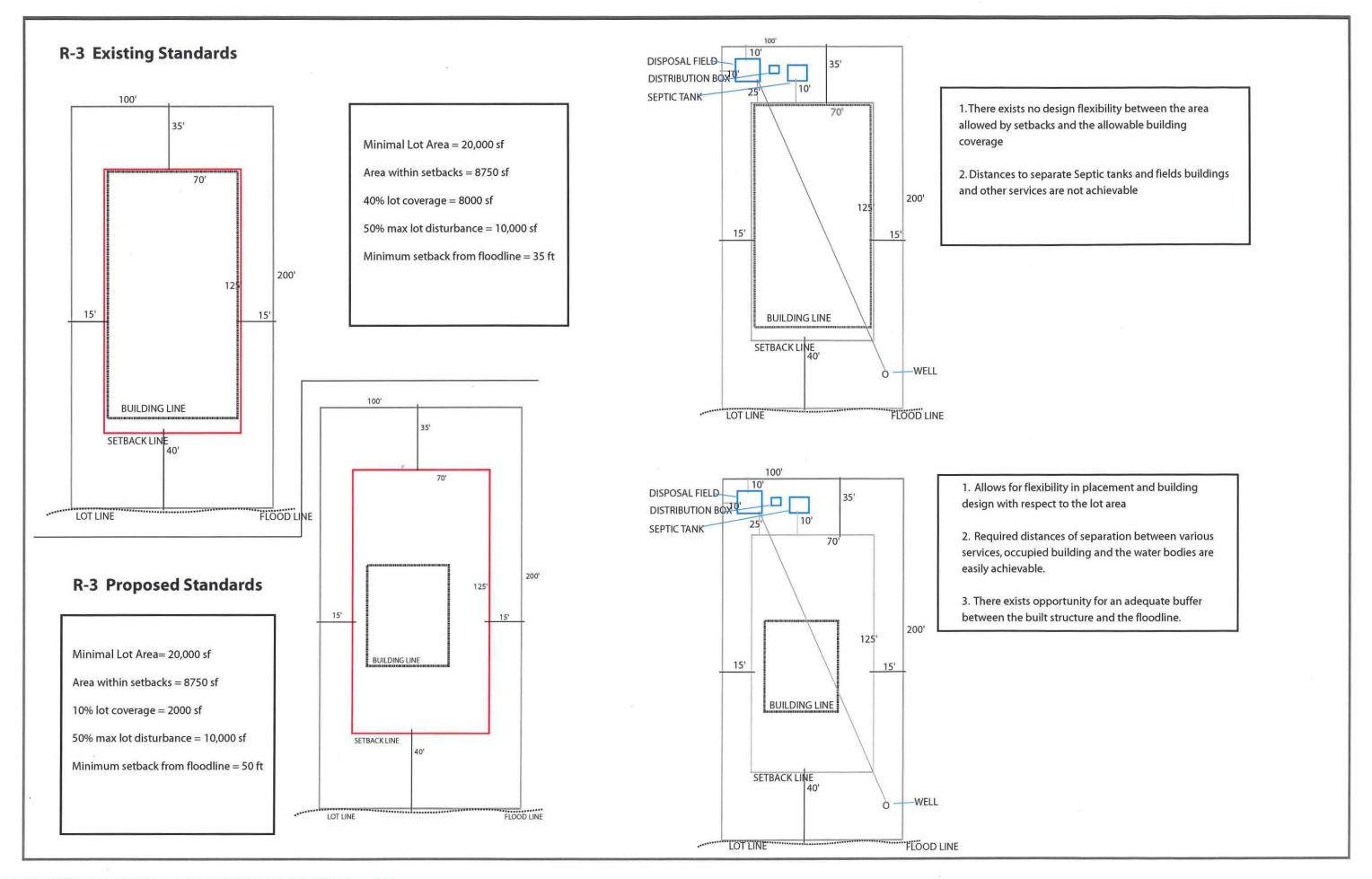
- 1. There exists no design flexibility between the area allowed by setbacks and the allowable building coverage
- 2. Distances to separate Septic tanks and fields buildings and other services are not achievable

R-4 Proposed Standards





- 1. Allows for flexibility in placement and building design with respect to the lot area
- 2. Required distances of separation between various services, occupied building and the water bodies are easily achievable.



Current R-3 zone space regulations:

Lot Area: 20,000 square feet Front Yard Setback: 35 feet Side Yard (each) Setback: 15 feet

Rear Yard Setback: 40 feet

Height: 2.5 stories

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 35 feet,

measured from 100-year flood line

Minimum Lot Width (Frontage): 100 feet

Maximum Building Envelope Size (Lot Coverage): 40% of lot or 30,000 square feet, whichever is less

Maximum Lot Disturbance: 50% of lot or 20,000 square feet, whichever is greater

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract

disturbance area.

Proposed Changes to the R-3

In the Lake Districts, in order to adequately protect potable water supplies and surface water quality, the 20,000 square foot minimum lot size is probably the densest level of development that will meet current state regulations. Under the current Standards for Individual Subsurface Sewage Disposal Systems N.J.A.C. 7:9A (otherwise known as Chapter 199), this lot size is the minimum lot size that can reasonably meet the required separation distances for septic components (Table 4.3 above).

It is appropriate to maintain this zoning and the already approved minimum lot area only for those areas that are already developed, but that have some remaining conforming vacant lots or larger vacant lots eligible for subdivision. The current front, side and rear yard setbacks are to be retained, but the recommendation is to increase the minimum setback of building envelope from existing lakes, ponds, streams or wetlands to 50 feet including a 10 foot wide vegetated buffer along at least 80% of the waters edge.

These vegetated buffers serve important bank stabilization functions, as well as serving as biological filters for surface runoff, NPS pollutants and dissolved organics resulting from failing septic systems. The next recommendation is to reduce the maximum building envelope size, or lot coverage, to 10% of the lot. The 2.5 story height limit will be retained, with the provision that a 30-foot maximum height from grade on any façade will be enforced. This would allow for a residence of approximately 4,000 square feet of living space and still provide the maximum available area for septic disposal fields in areas with severe limitations on soil suitability for septic systems. The maximum lot disturbance standards, as published, seem to be in error. The current standards should read "50% of lot or 20,000 square feet, whichever is lesser", not greater. In summary, we recommend the following changes:

Proposed R-3 zone space regulations:

Lot Area: 20,000 square feet Front Yard Setback: 35 feet Side Yard (each) Setback: 15 feet

Rear Yard Setback: 40 feet

Height: 2.5 stories, with a 30 foot maximum height from grade on any façade

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of

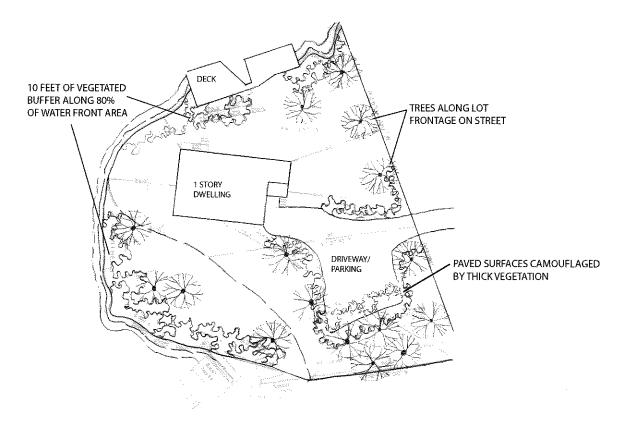
waters edge

Minimum Lot Width (Frontage): 100 feet

Maximum Building Envelope Size (Lot Coverage): 10% of lot

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross

tract disturbance area.



Current R-2 zone space regulations:

Lot Area: 40,000 square feet Front Yard Setback: 50 feet Side Yard (each) Setback: 20 feet

Rear Yard Setback: 50 feet

Height: 2.5

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line

Minimum Lot Width (Frontage): 150 feet

Maximum Building Envelope Size (Lot Coverage): 40% of lot or 30,000 square feet, whichever is less Maximum Lot Disturbance: 50% of lot or 20,000 square feet, whichever is greater

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract disturbance area.

Proposed Changes to the R-2

In the Lake Districts, those areas that already have larger lot development patterns should remain as R-2 or transition to the R-2 zone. 40,000 square feet or 1 acre zoning better accommodates sound septic system design, especially in areas with severe limitations on soil suitability for septic systems.

It is appropriate to maintain this zoning and the already approved minimum lot area only for those areas that are already developed at 1-acre density, but that have some remaining conforming vacant lots or larger vacant lots eligible for subdivision. The current front, side and rear yard setbacks are to be retained, and the recommendation is to maintain the current minimum setback of building envelope from existing lakes, ponds, streams or wetlands to 50 feet including a 10 foot wide vegetated buffer along at least 80% of the waters edge.

These vegetated buffers serve important bank stabilization functions, as well as serving as biological filters for surface runoff, NPS pollutants and dissolved organics resulting from failing septic systems. The next recommendation is to reduce the maximum building envelope size, or lot coverage, to 7% of the lot. The 2.5 story height limit will be retained, with the provision that a 30-foot maximum height from grade on any façade will be enforced. This would allow for a residence of approximately 5,600 square feet of living space and still provide the maximum available area for septic disposal fields in areas with severe limitations on soil suitability for septic systems. The maximum lot disturbance standards, as published, seem to be in error. The current standards should read "50% of lot or 20,000 square feet, whichever is lesser", not greater. In summary, we recommend the following changes:

116 RECOMMENDATIONS FOR TOWNSHIP ACTION Land Use

Proposed R-2 zone space regulations:

Lot Area: 40,000 square feet (1 acre)

Front Yard Setback: 50 feet Side Yard (each) Setback: 20 feet

Rear Yard Setback: 50 feet

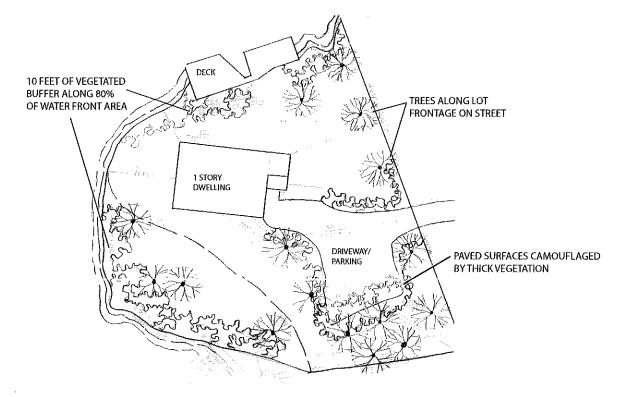
Height: 2.5 stories, with a 30 foot maximum height from grade on any façade

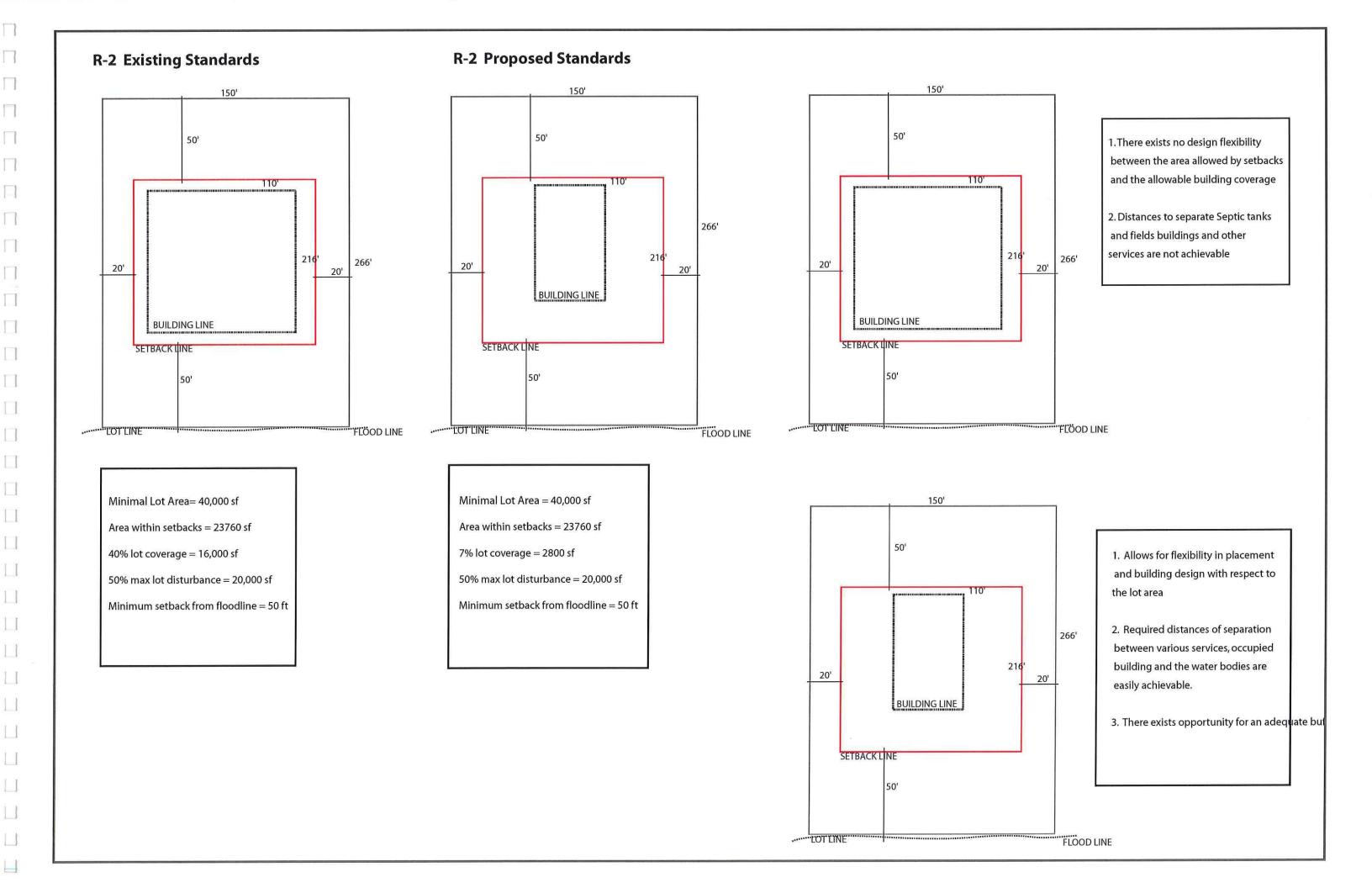
Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 50 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of waters edge

Minimum Lot Width (Frontage): 200 feet

Maximum Building Envelope Size (Lot Coverage): 7% of lot

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract disturbance area.





Current R-1A zone space regulations:

Lot Area: 3.5 acres

Front Yard Setback: 100 feet Side Yard (each) Setback: 50 feet

Rear Yard Setback: 75 feet

Height: 2.5

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 75 feet, measured from 100-year flood line

Minimum Lot Width (Frontage): 200 feet

Maximum Building Envelope Size (Lot Coverage): 40% of lot or 30,000 square feet, whichever is less Maximum Lot Disturbance: 50% of lot or 20,000 square feet, whichever is greater

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract disturbance area.

Proposed Changes to the R-1A

In the Lake Districts, undeveloped or underdeveloped properties on the lakefronts remain at some of the lakes and similar large parcels remain throughout the larger watershed areas. The Smart Growth Plan advocates directing growth to population centers while protecting rural resources and environmentally sensitive areas in the Environs. By focusing development in a Village Center, the rural landscape can remain largely intact. The plan envisions that development in the environs will primarily take the form of hamlet scaled lake communities surrounded by very low-density residential development. To accomplish this, the R-1A zone will change from one dwelling per 3.5 acres to one dwelling unit per five acres.

Changing the minimum lot area for this zoning for areas with remaining conforming vacant lots or larger vacant lots eligible for subdivision is appropriate. The current front, side and rear yard setbacks are to be retained, and the recommendation is to maintain the current minimum setback of building envelope from existing lakes, ponds, streams or wetlands of 75 feet including a 10 foot wide vegetated buffer along at least 80% of the waters edge.

These vegetated buffers serve important bank stabilization functions, and also serve as biological filters for surface runoff, NPS pollutants and dissolved organics resulting from failing septic systems. The next recommendation is to reduce the maximum building envelope size, or lot coverage, to 5% of the lot. The 2.5 story height limit will be retained, with the provision that a 30-foot maximum height from grade on any façade will be enforced. This would allow for a residence of approximately 22,000 square feet of living space and still provide the maximum available area for septic disposal fields in areas with severe limitations on soil suitability for septic systems. The maximum lot disturbance standards, as published, seem to be in error. The current standards should read "50% of lot or 20,000 square feet, whichever is lesser", not greater. In summary, we recommend the following changes:

Proposed R-1A zone space regulations:

Lot Area: 3.5 acres

Front Yard Setback: 100 feet Side Yard (each) Setback: 50 feet

Rear Yard Setback: 75 feet

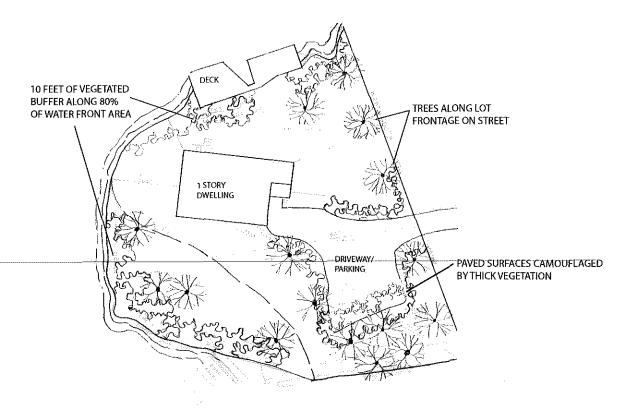
Height: 2.5 stories, with a 30-foot maximum height from grade on any façade

Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 75 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of waters edge

Minimum Lot Width (Frontage): 200 feet

Maximum Building Envelope Size (Lot Coverage): 5% of lot

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract disturbance area.



Current R-1 zone space regulations:

Lot Area: 5 acres

Front Yard Setback: 100 feet Side Yard (each) Setback: 50 feet Rear Yard Setback: 100 feet

Height: 2.5

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Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 100 feet, measured from 100-year flood line

Minimum Lot Width (Frontage): 200 feet

Maximum Building Envelope Size (Lot Coverage): 40% of lot or 30,000 square feet, whichever is less Maximum Lot Disturbance: 50% of lot or 20,000 square feet, whichever is greater

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross

tract disturbance area.

Proposed Changes to the R-1

In the Lake Districts, undeveloped or underdeveloped properties remain throughout the larger watershed areas. The Smart Growth Plan advocates directing growth to population centers while protecting rural resources and environmentally sensitive areas in the Environs. By focusing development in a Village Center, the rural landscape can remain largely intact. The plan envisions that development in the environs will primarily take the form of hamlet scaled lake communities surrounded by very low-density residential development. To accomplish this, the R-1 zone will change from one dwelling per five acres to one dwelling unit per ten acres.

Changing the minimum lot area for this zoning for areas with remaining conforming vacant lots or larger vacant lots eligible for subdivision is appropriate. The current front, side and rear yard setbacks are to be retained, and the recommendation is to maintain the current minimum setback of building envelope from existing lakes, ponds, streams or wetlands of 100 feet including a 10 foot wide vegetated buffer along at least 80% of the waters edge.

These vegetated buffers serve important bank stabilization functions, and also serve as biological filters for surface runoff, NPS pollutants and dissolved organics resulting from failing septic systems. The next recommendation is to reduce the maximum building envelope size, or lot coverage, to 3% of the lot. The 2.5 story height limit will be retained, with the provision that a 30-foot maximum height from grade on any façade will be enforced. This would allow for a residence of approximately 26,000 square feet of living space and still provide the maximum available area for septic disposal fields in areas with severe limitations on soil suitability for septic systems. The maximum lot disturbance standards, as published, seem to be in error. The current standards should read "50% of lot or 20,000 square feet, whichever is lesser", not greater. In summary, we recommend the following changes:

Proposed R-1 zone space regulations:

Lot Area: 10 acres

Front Yard Setback: 100 feet Side Yard (each) Setback: 50 feet Rear Yard Setback: 100 feet

Height: 2.5 stories, with a 30-foot maximum height from grade on any façade

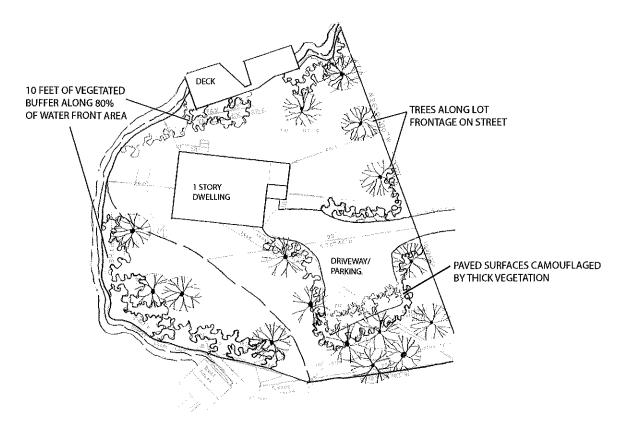
Minimum Setback of Building Envelope from existing Lakes, ponds, streams or wetlands: 100 feet, measured from 100-year flood line including a 10 foot wide vegetated buffer along at least 80% of

water's edge

Minimum Lot Width (Frontage): 200 feet

Maximum Building Envelope Size (Lot Coverage): 3% of lot

Maximum Total for Public Improvements (streets & storm water management facilities): 7% of gross tract disturbance area.



SEPTIC MANAGEMENT ORDINANCE

Cranberry Lake and Lake Mohawk presently participate in a Septic Management Area Programs enforced by Township ordinance. The purpose is to regulate individual subsurface sewage disposal systems in the lake area in such a way to protect public health, welfare and the environment. The program is a means of educating owners and operators of septic systems about system requirements and the proper procedures for altering, operating and maintaining septic systems. The program is also designed to develop a management program to maintain records of septic system maintenance and help prevent future malfunctioning of systems in the program area.

Each Septic Management Area is defined and its boundaries are mapped. Each homeowner in the area is issued a septic management certificate and a copy of NJDEP's Septic Operation and Maintenance Manual and other educational materials. The cost of the certificate is \$15.00 and the certificate is valid for three years. In order to renew the certificate the owner/operator must submit a map of the septic system components and private water sources, proof that the system has been pumped out or proof that that system is not in need of pumping on septic service company or certified engineer letterhead and \$15.00. Subsequent renewal occurs every three years. All systems must be pumped at least once every six years unless there is proof the home has been unoccupied during the period in question. Violation of the ordinance can result in fines or community service.

The recommendation is for the remaining Lake Districts to engage in similar programs enforceable by ordinance. The management program/database has seen limited success, with no database available for Cranberry Lake, but a comprehensive database being maintained at Lake Mohawk. Lake Mohawk has taken further measures towards septic management including a ban on home and garden products containing phosphates. Lake Lackawanna residents have expresses great interest in a similar septic a management program and have already collected signatures to do so. Forest Lake, Panther Lake and Johnson Lake may want to engage in the program cooperatively. The Township may want to create a new ordinance that includes all Lake Districts or may want to take the step of crafting an ordinance and database for the entire Township since the majority of the homes in the Byram are on individual subsurface sewage disposal systems and the entire Township suffers form soils with severe limitations on septic suitability.

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Additional Septic Management Measures

There are septic management measures that go beyond the basic steps prescribed in the existing Septic Management Area Programs. Other Townships and jurisdictions in New Jersey have more robust measures of septic certification that are triggered by applications for building permits or planning board approvals to enlarge existing homes or by home sales. Some Townships have more stringent reporting requirements that accompany each septic pump out and still others have adopted ordinances that require commercial applicators and homeowners to use low-phosphate.

Medford Township in Burlington County, which has many older lakefront communities, requires that septic records be examined whenever a building permit or planning board approval for enlarging an existing structure is filed to determine if the existing septic is adequate. If there are no septic system records on file, the applicant must submit certification from a septic engineer that the septic system is adequate.

The Burlington County Health Department requires that septic systems be tested at home resale and that the results of the tests conducted by the mortgage company be filed with the county. If the basic inspection by dye test fails, a septic engineer must uncover the system, inspect the components, effect repairs and submit new plans for the upgraded system. If a homeowner is seeking a building permit or planning board approval for enlarging an existing structure, a letter must be filed with the County Health Department, which replies with a letter stating whether or not the existing system is adequate. If the County has no records for the property in question, the homeowner can submit any plans he has on file; and, if no plans are available, a septic engineer must certify where the system is, the capacity of the tank and if the system is functioning properly. If the system is not functioning properly, repairs must be affected and the County sanitarian then follows up with an inspection of the system prior to back-filling.

The Hunterdon County Health Department has similar requirements. If a homeowner is seeking a building permit or planning board approval for additional bedrooms, the original septic plan must be submitted for review and the system must be enlarged if the capacity is insufficient to meet the increased demand. If a homeowner is enlarging an existing structure with living space that is not bedrooms, the homeowner must submit floor plans of all floors with new and existing rooms identified, plus a plot plan locating the septic system components to illustrate Chapter 199 compliance.

The Harding Township Health Department has a renovation and addition review and a permit that requires a \$50 fee to process. The review is to ensure that construction activities do not adversely affect wells and septic systems. The review requires applicants to supply project information such as the engineer, architect and contractor engaged to do the work, as well as existing well information and any changes, additions or deletions to the plumbing system. The review also requires a series of plot plans or surveys, including:

- Permanent improvements such as driveways, house foundations, pools outbuildings, decks, underground storage tanks, underground drainage lines and underground utilities.
- Lot boundaries and neighboring septic systems and wells.
- Specific location, as built, of the site's septic system components including septic tanks, lines, distribution boxes, laterals, curtain drains, etc.
- Specific location of the site's well.
- Specific location of roof drainage seepage pits.
- Architectural design plan for proposed work, renovation plans must include current conditions as well as proposed work.
- Proposed construction access.
- Streams, ponds, lakes and other surface waters.

The Lake Mohawk Septic Management Area Program, enforced by Spartā Township ordinance, requires septic system pumpers to complete a municipal Health Department form that captures important information on the septic system being serviced. The form features fields for:

- Septic system location.
- · Septic system owner.
- Date of service.
- Receptacle pumped.
- · Any treatments provided.
- Septic tank location.
- Liquid level in the septic tank.
- Type of septic tank.
- Condition of the septic tank.
- Disposal area design.
- Condition of the disposal area.
- · Reason for the pump out.

Sparta Township also has similar requirements for additions. If a homeowner is seeking a building permit or planning board approval for additional bedrooms, the original septic plan must be submitted for review and the system must be enlarged if the capacity is insufficient to meet the increased demand. If no quality plans exist for the system, an engineer must certify the system capacity and determine if it sufficient to meet the

increased demand. If a homeowner is enlarging an existing structure with living space that is not bedrooms, the homeowner must submit floor plans of all floors with new and existing rooms identified, plus a plot plan locating the septic system components to illustrate Chapter 199 compliance. Sparta also requires that homes be sold and advertised with the number of bedrooms that are certified for the septic system. Sparta has taken legal action against home sellers for advertising and selling homes listed as containing more bedrooms than listed certified, with a septic system not designed to accommodate the advertised number of bedrooms.

Denville Township in Morris County recently passed an ordinance requiring that only low-phosphate fertilizers be used on local lawns. The measure primarily targets commercial fertilizer applicators but also applies to private homeowners. The ordinance requires commercial applicators to register with the Township and pay a \$50 a year licensing fee. The ordinance limits fertilizer use to fertilizers with a maximum phosphorous content of five-tenths of one percent. Mountain Lakes and Randolph are other towns with similar restrictions on phosphate fertilizers. Lake Mohawk has voluntary restrictions on phosphorous fertilizers and household products and has had success getting local retailers to stock low-phosphate products.

All of these additional measures are aimed at protecting ground water, surface water and drinking water supplies from excess inputs of septic effluent and nutrients. The basic Septic Management Plans go a long way in ensuring proper septic system functioning, but these additional Health Department reviews and product restrictions can go even further. Byram Township can surely find a solution that will ensure better septic controls, while working with current municipal budget constraints and while working in partnership with the Sussex County Health Department. Basic elements of a Planning Board/Board of Health Septic Review Program should include, and all Planning

Board approvals should be subject to the following:

- Inspection of septic records for system adequacy for applications for additional bedrooms.
- If no records exist or if records are inadequate, an engineer's inspection and certification of septic system adequacy for applications for additional bedrooms.
- Floor plans plus a plot plan locating the septic system components to illustrate Chapter 199
 compliance for applications for enlarging an existing structure with living space that is not
 bedrooms.
- Septic systems testing at home resale, with results filed with the Township.
- If the system fails at resale, a septic engineer must uncover the system, inspect the components, effect repairs and submit new plans for the upgraded system.
- Septic system pumpers to complete a municipal Health Department form that captures important information on the septic system being serviced.
- Voluntary or statutory restrictions on phosphorous fertilizers and household products.



DESIGN GUIDELINES

The establishment of design guidelines is intended to maintain the rural character and a sense of identity in the Lake Districts, to preserve scenic views and the scenic quality of the lake areas, and to improve the water quality & quantity by improving septic tolerance by design. The following are recommended design standards to guide future development.

Recommended

 $\Pi 1$







Abundant vegetation and scenic corridors

Relatively small scale of development blending with the environment.

Habitat for wildlife

Not Recommended









Bulky, noncharacteristic development Deforestation during home site development

Large impervious surfaces

Development not coherent with environment

Site Development

Careful consideration should be given to the relationship of existing development to surrounding lots. Street and lakefront views are crucial in maintaining the character of the neighborhoods and must be kept, to the maximum extent possible, in their natural condition. The natural setting of the site should be the basis for design. Designs must respect the uniqueness of the site and its environment, with structures designed to blend into the terrain, following the contours of site.

Considerable landscaped or wooded area must be kept on the lakefront lots. Clustering future development can facilitate forest retention. Large portions of building lots should be allowed to remain wooded. Integrating tree plantings in small pockets as a part of the landscaping for each lot should accomplish reforestation. Septic tanks, distribution boxes & disposal fields are best placed at a considerable distance from the lake edge (given suitable site conditions). This allows for effective water filtration before entering the lake. The placement of wells with respect to septic systems must follow State standards to prevent potable water contamination.

Site Placement of Septic Systems and Wells

RECOMMENDED



- Well is appropriately placed close to surface water and away from the septic tank and field.
- Septic tank and leach field are appropriately distanced from the structure.
- Well and septic field are well represented graphically with relevant dimensions.

NOT RECOMMENDED



- Well and septic tank are incorrectly located in close proximity to the structure and to each other.
- Well and septic tank are not appropriately represented in terms of exact size and location.



- Septic tank and leach field are incorrectly represented.
- Septic tank & field are not of required size and configuration.



- Septic tank & field are not correctly distanced from the residential structure.
- Representation of the well is inaccurate and not indicated with exact dimensions.

Source: Building Permits, Township of Byram

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General Design

Building materials shall be compatible or native to the environment. This will help reduce the visual impact of development. Carefully chosen earth colors are recommended.

Where lots front the lake and a street, both fronts must be treated as main facades of the structure and relative scale must be maintained to blend into the existing landscape. Size, proportion & configuration of openings along facades must be carefully designed so as to reduce large areas of blank facades, thereby reducing the bulk appearance of a structure.

Principal buildings should be placed as close to the street connection as possible, requiring shorter driveways and less paved surface. Pervious materials, like stone or gravel instead of asphalt, should be used for paving within the site, reducing run-off from impervious surfaces. Consideration should be given to steep slope areas on a site-by-site basis.

Design Features Not Recommended

- Bulky, continuous roofs, dominating the structure should be avoided & should be treated with breaks to create visual interest.
- Large areas of blank facades should be avoided and treated with well proportioned window openings.
- A height to width proportion should not produce tower-like structures.
- Box like structures & openings on facades should be avoided.
- Large scale homes that dominate the site should be avoided and an overall, small scale structure should be created to blend into the surroundings.

Examples of Recommended Building Design



- Surface changes along with breaks and level differences in roofs help to reduce visual impact of development.
- Simple but effective landscaping helps to camouflage the structure.



- A proportionate configuration of mass and voids on the surface of a structure helps to reduce the bulk of a building.
- A slight curve to the roof or wall helps break the monotony of rigid structures.



Source: TND Development

A modest building design with appropriate building materials maintains a rural impression and blends with the environment.

Landscaping

Manicured lawns should be placed strategically where they will be most useful and should be eliminated where they are unnecessary. Alternatively, 'rough-cut' (5-7 inch) lawns, meadow plantings, or shrub beds should be used. Vegetated swales or buffers and filter strips, when placed appropriately, can increase filtration and remove pollutants.

Native plants should be used for all landscaping in or near environmentally sensitive areas, while exotic or invasive plants should not be used. Lots fronting on streets should be lined with trees, retaining the scenic quality of area and shorefronts should have 'edited buffers' to provide shore stabilization and to frame lake views.

Maximum natural vegetation should be retained on site during & after construction, and forest retention must be considered by clustering future development. In wooded areas, large portions of the lot should be allowed to remain wooded; and reforestation in small pockets should be done by integrating it as a part of site landscaping.



A Landscaped site surrounding residential structures along with retained natural vegetation helps maintain scenic and rural quality of the community.

There are many advantages to creating effective landscaping. When green areas are retained on site, run-off caused by lawns is reduced. Effective landscaping facilitates effective storm water treatment, removing nutrients and chemicals, and provides for an interesting and varied layout of the site by creating different surfaces of landscaped areas. Often, wildflower meadow plantings render the site colorful in spring and summer and require minimal maintenance, while native grasses and flowers provide wildlife habitat.

Rough-cut lawns, meadows and shrubs reduce need for lawn chemicals, further reducing NPS pollution; and native plants are often more tolerant to pests, thereby reducing the need to use chemicals. Native vegetation significantly assists in integrating the developed site into its natural setting, while exotic or invasive plants out-compete native vegetation and have no food value for wildlife.

Recommended Native Plant List *

Large Trees	
Common Name	Scientific Name
Red Oak	Quercus rubra
White Oak	Quercus alba
Black Oak	Quercus Velutina
Chestnut Oak	Quercus prinus
Scarlet Oak	Quercus coccinea
Hickories	Carya spp.
Red Maple	Acer rubrum
Sugar Maple	Acer saccharum
White Ash	Fraxinus americana
American Beech	Fagus grandiflora
Tulip Tree	Liriodendrun tulipifera
Black Cherry	Prunus serotina
Sweet Birch	Betula Lenta
Black Gum	Nyssa sylvatica

Small Trees & Large shrubs	
Common name	Scientific Name
Ironwood	Carpinus caroliniana
Flowering Dogwood	Cornus florida
Red Dogwood	Cornus Stolonifera
Gray Dogwood	Cornus racemosa
Witchhazel	Hamamelis virginiana
Spicebush	Lindera benzoin
Hop Hornbeam	Ostrya virginiana
Sassafras	Sassafras albidum
Maple-Leafed Viburnum	Viburnum acerifolium
Blackhaw Viburnum	Viburnum prunifolium
Arrowwood	Viburnum dentatum

Small Shrubs	
Common name	Scientific name
Blueberry	Vaccinium spp.
Huckleberry	Gaylussacia spp.
Pinxter flower Azalea	Rhododendron nudiflorum

Groundcovers	
Common name	Scientific name
Virginia Creeper	Parthenocissus quinquefolia
Wild Grape	Vitis labrusca
May Apple	Podophyllum peltatum
Violets	Viola spp.
Spring Beauty	Claytonia Virginica
Wood Anemone	Anemonella quinquefolia
Jewelweed	Impatiens pallida
Jack-in-the-pulpit	Arisema triphyllum
Solomon's seal	Polygonatum pubescens
Wild sarsaparilla	Aralia nudicaulis
False Lilly-of-the-valley	Malathemum canadense
Asters	Aster spp.
Goldenrod	Solidage spp.
Native Grasses	
Sedges	Carex spp.
Ferns	
Skunk cabbage	Symplocarpus foetidus

^{*} Lubbers Run Greenway Project

Exotic/Invasive Plant List *

Large Trees	
Common Name	Scientific Name
Norway Maple	Acer platanoides
Sycamore Maple	Acer psuedoplatanus
Tree-of-Heaven	Ailanthus altissima
Russian Olive	Eleagnus angustifolia
Autumn Olive	Eleagnus umbellatus
White Mulberry	Morus alba
Amur Cork Tree	Phellodendron amurense
White Cottonwood Sweet Cherry	Populus alba Prunus avium

Shrubs & Small Trees	
Common name	Scientific Name
Japanese Barberry	Berberis japonica
Russian Olive	Eleagnus angustifolium
Autumn Olive	Eleagnus umbellata
Winged Euonymus	Euonymus alatus
Privet	Ligustrum spp.
Bush Honeysuckles	Lonicera spp.
Common Buckthorn	Rhamnus cathartica
European Buckthorn	Rhamnus frangula
Multiflora rose	Rosa multiflora
Strawberry-Rasberry	Rubus illecebrosus
Wineberry	Rubus phoenicolasius
Japanese Spiraea	Spiraea japonica
Coralberry	Symphoricarpus orbiculatus

Vines	
Common name	Scientific name
Porcelain Berry	Ampelopsis brevipedunculata
Oriental Bitersweet	Celastrus orbiculata
Climbing Euonymus	Euonymus fortunei
English Ivy	Hedera helix
Japanese Honeysuckle	Lonicera japonica
Kudzu	Pueraria lobata
Periwinkle	Vinca minor
Japanese Wisteria	Wisteria floribunda, Wisteria sinensis

Herbaceous Plants	
Common name	Scientific name
Garlic Mustard	Alliara officinalis Arthraxon hispidus
Musk Thistle	Carduus nutans
Plumeless Thistle	Corduus acanthoides
Spotted Knapweed	Centuria maculosa
Bull Thistle	Cirsium vulgare
Canada Thistle	Cirsium arvense
Crown Vetch	Coronilla varia
Beefsteak Mint	Eulalia vimineus
Day Lily	Hemerocallis fulva
Purple Loosestrife	Lythrium salicaria
Moneywort	Lysimachia nummularia Myoston aquaticum
Wild Reed	Phragmites australis
Japanese Knotweed	Polygonum
Asian Tearthumb	Polygonum perfoliatum
Russian Thistle	Salsola iberica
Johnson Grass	Sorgum halipense

^{*} Lubbers Run Greenway Project

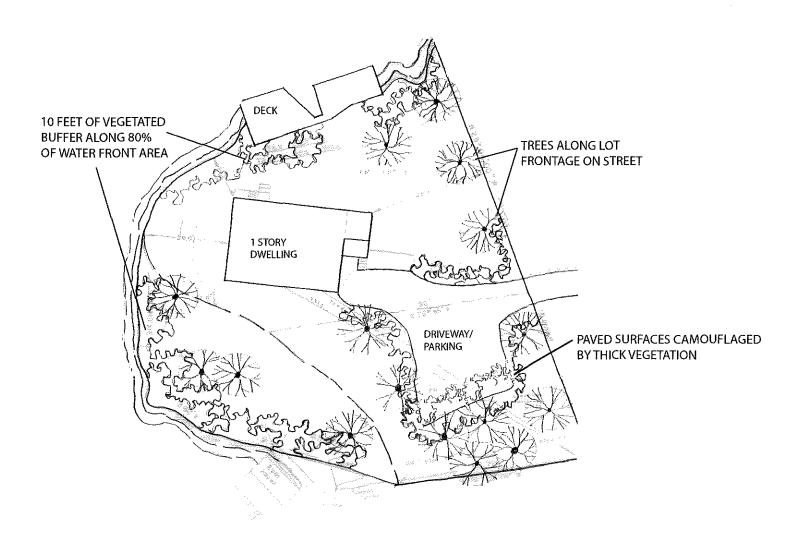
Scenic Views

Scenic views around the lakes should be identified and preserved throughout the Lake Districts. Preventing excessive disturbance to existing landscapes should also preserve lake views from private lots. The views of residents on adjacent lots need to be respected.

While installing decks and other accessory structures, careful consideration should be given to sight lines on surrounding lots. Decks should be installed in a way as to not create any undesirable views for adjacent properties. Scale should be strictly maintained so as to not overwhelm surrounding sites. Accessory buildings should be designed to be as inconspicuous as possible and be placed so as to not create undesirable views for adjacent lots.



 Relatively low decks camouflaged with natural vegetation help to integrate otherwise projecting structures into the landscape.







CONSERVATION EASEMENTS

onservation easements are conservation tools that limit the development rights of a property, while allowing the owner to retain possession and limited use of the property. Severing the development rights of a property lowers the assessable value of the property, thereby reducing the property tax burden. Conservation easements should be encouraged for undeveloped or underdeveloped lands in private ownership surrounding lakefront areas.

Conservation easements can be especially helpful at Panther Lake, Johnson Lake and Forest Lake to protect existing undeveloped lands along the lakeshore and to in protect surrounding upland areas. Conservation easements might also be used at Cranberry Lake, Lake Lackawanna and Lake Mohawk to protect upland areas that surround dense lakefront development to lessen accumulated impacts. Properties in private ownership that are appropriate for conservation easements should be listed as targets for acquisition in the Township's Open Space plan and should be zoned at the lowest practical residential densities.

Open Space Acquisition

The Township can go a step further and purchase private property in fee simple ownership. Fee simple ownership provides the Township greater control over the use of properties, including public access, than conservation easements; but direct acquisition is more expensive and completely removes the property from municipal tax rolls. Open space acquisition should be considered for undeveloped or underdeveloped lands in private ownership surrounding lakefront areas.

Open space acquisition can be especially helpful at Panther Lake, Johnson Lake and Forest Lake to protect existing undeveloped lands along the lakeshore and to protect surrounding upland areas. Open space acquisition can also be helpful at Cranberry Lake, Lake Lackawanna and Lake Mohawk to protect upland areas that surround dense lakefront development to lessen accumulated impacts. Properties in private ownership that are appropriate for open space acquisition should be listed as targets for acquisition in the Township's Open Space plan and should be zoned at the lowest practical residential densities.

Lake Bottom Consolidation

132 RECOMMENDATIONS FOR TOWNSHIP ACTION Land Ownership

Diverse ownership of the lake bottoms can cause confusion over who is responsible for engaging in lake management activities and often leads to a lack of a cohesive management regime. This creates a situation where no single entity is responsible for maintenance of the lake and drafting a lake management plan. When lake bottoms are held by a single entity the responsible party can draft management plans, monitor water quality and manage the lakes for a myriad of recreation activities.

Tax records indicate that the Cranberry Lake bottom is owned by three different owners; including the State of NJ and Byram Township. It would be beneficial for the continuing management of Cranberry Lake if one public entity took control of the lake bottom, most likely the State NJDEP. Tax records also indicate that three different owners own the Johnson Lake bottom and that two different owners own the Panther Lake bottom. If one owner were identified, these lakes could more easily draft lake management plans and engage professionals in lake monitoring and management regimes.

owns the Forest Lake bottom. These entities control access to the lake and provide recreational opportunities for the lake residents. The Lake Mohawk Country Club owns the Lake Mohawk bottom and has the most comprehensive lake management regime of all the Lake Districts.

The Lake Lackawanna Investment Company owns the Lake Lackawanna bottom and the Forest Lake Club

The Lake Mohawk Country Club has an active lake management program and a Lake Master Plan. The master plan identified the primary cause of the lake's continuing eutrophication to be excessive phosphorous loading from storm water runoff, internal recycling of lake sediments, and loading from septic systems. Palliative measures include an updated storm water control system, an in-lake alum dosing system, alum blanket applications, a destratification system in the deepest parts of the lake, public outreach and education program, voluntary restrictions on phosphorous products a septic management program. The Country Club has also initiated a Lake Mohawk Monitoring Program, and the 2002 report showed that overall water quality conditions were generally acceptable through the 2002 season.

Partial List of Candidates for Open Space Acquisitions

Cranberry Lake Block & Lots

71-1, 72-26, 76-71, 78-102, 78-113, 79-122, 79-126, 80-1.01-1.04, 85-216, 85-223, 86-226, 87-135, 87-136, 87-241, 87-243, 91-286, 91-290, 94-323, 94-323, 94-332, 94-377, 94-379, 98-352, 99-364, 104-17, 186-1, 319-18, 332-3, 332-3.11, 332-3.25, 333-1

Lake Lackawanna Block & Lots

234-1, 237-523, 238-508, 247-1, 247-2, 247-3, 256-585, 257-605, 257-616, 258-623, 259-1, 260-1, 261-695, 267-738, 268-740, 268-744, 268-746, 268-762, 268-763, 269-769, 271.01-771, 271.01-772, 363-2, 364-6, 364-8

Forest, Panther & Johnson Lakes Block & Lots

29001-851, 29001-851.01, 334-1, 334-2, 334-3, 334-4, 334-5, 334-6, 334-7, 334-8, 334-9, 334-10, 334-11, 334-12, 334-13, 334-14, 334-15, 334-16, 334-17, 334-18, 334-19, 334-20, 360-1, 360-3, 360-4, 360-5, 360-6, 360-8, 360-22, 360-23, 360-24, 360-39, 360-42, 361-3

Lake Mohawk Block & Lots
293-2197, 293-601, 293-602, 293-604, 293-606, 335-104, 335-2, 336-1, 336-302, 336-307, 337-2, 337-201, 337-9, 337-901



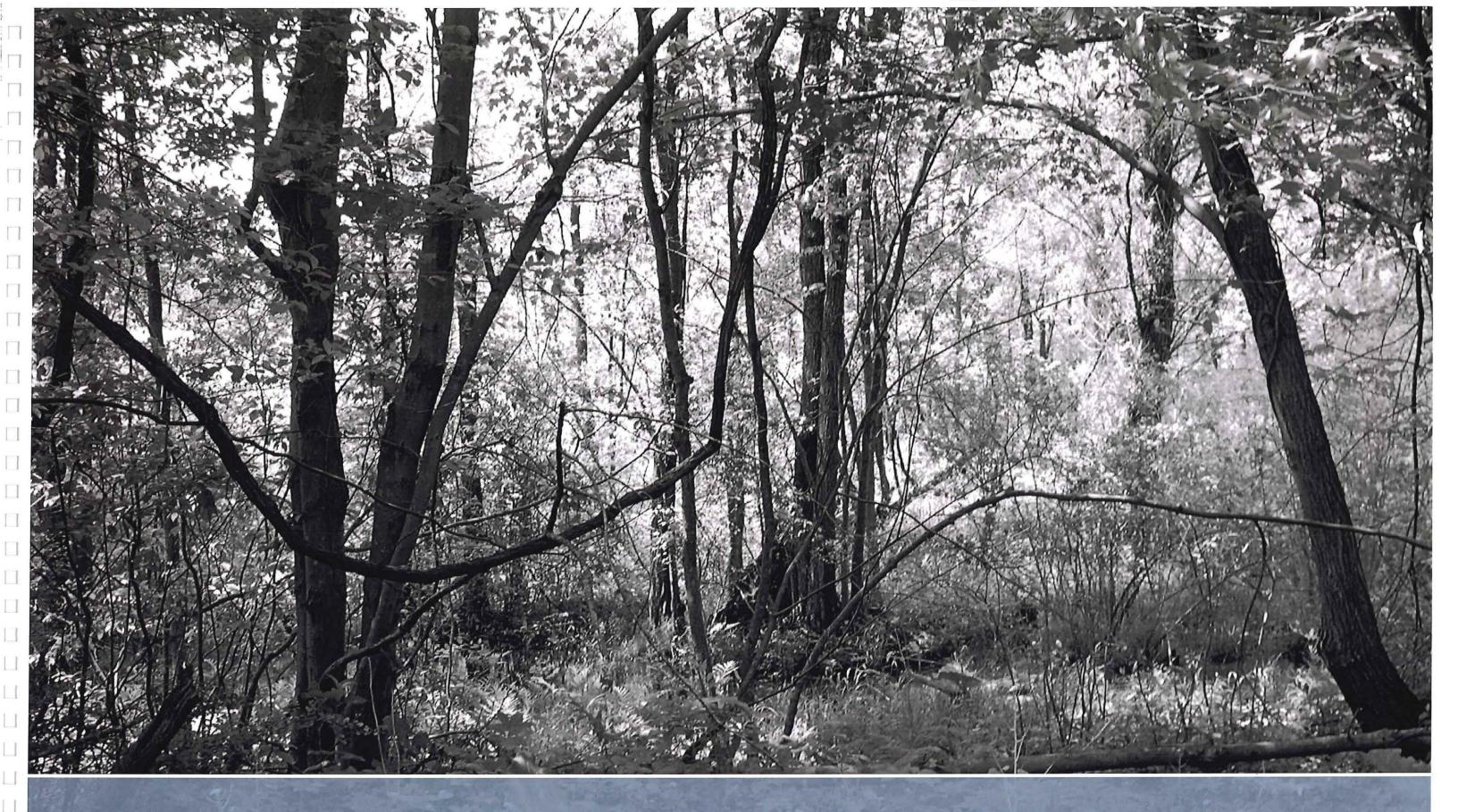
Land Ownership RECOMMENDATIONS FOR TOWNSHIP ACTION 133

SEPTIC FAILURE AND IMPROVEMENT MONITORING PROGRAM



either the county health department nor Byram Township keeps a comprehensive database to track the location, design, construction, installation, alteration, repair and failure of individual subsurface sewage disposal systems in the municipality. Creation of a database in the Township to monitor failed septics and septic system improvements is recommended, especially in the Lake Districts. This will allow Byram to identify areas in need of improvement and to inform the Township of possible water quality testing and monitoring needs.

The Septic Management Area Programs, enforced by Township ordinance, are designed to be a means of educating owners and operators of septic systems about system requirements and the proper procedures for altering, operating and maintaining septic systems. The programs are also designed to develop a management program to maintain records of septic system maintenance and help prevent future malfunctioning. This management program/database has seen limited implementation, (with no database available for Cranberry Lake), but a comprehensive database is being maintained at Lake Mohawk.



The Septic Management System at the Lake Mohawk Country Club is a Microsoft Access database, used to track compliance of lake residence with both state regulation and the Septic Management Area ordinance. The system maintains information on properties, owners, payments, and septic system maintenance events. The database also provides a mechanism for notifying residents of missing information, upcoming deadlines, and possible violations, as well as tracking the issuances of these notices. The Lake Mohawk Septic Management System is an excellent example of a simple, yet extremely useful database for tracking septic systems in a neighborhood and efforts need to be made to either expand this system or acquire a similar system for Township use.

Storm Water Management Plan

The Township lacks a cohesive storm water management plan. While several different ordinances address the larger issue of storm water management from the standpoint of roads, right of way improvements and tract disturbance, there is no single cohesive plan for storm water management. Storm water runoff can have significant impact on lake systems, increasing sedimentation and NPS pollution. The Township should craft and adopt a storm water management plan in accordance with the standards outlined in N.J.A.C 7:8.

The storm water management plan is meant to be adopted as part of the Township's Master Plan. Once the ordinance is adopted and noticed to the county and state, no building permit shall be issued in contradiction of this ordinance. Any such issuance shall be in violation of the MLUL. Storm water management plans should be re-examined along with the master plan, in accordance to the schedule described in the MLUL.

A storm water management plan and its implementing ordinance is designed to:

- 1. Reduce artificially induced flood damage to public health, life, and property:
- Minimize increased storm water runoff from any new land development where such runoff will increase flood damage:
- 3. Maintain the adequacy of existing and proposed culverts and bridges, dams and other structures:
- 4. Induce water recharge where natural storage and geologically favorable conditions exist, where practical:
- 5. Prevent, to the greatest extent feasible, an increase in non-point source pollution:
- 6. Maintain the integrity of stream channels for their biological functions, as well for drainage and other purposes:
- 7. Reduce the impact of development on stream erosion:
- 8. Reduce erosion from any development or construction project:
- 9. Minimize the increase in runoff pollution due to land development, which otherwise would degrade the quality of water and may render it both unfit for human consumption and detrimental to biological life:
- 10. Preserve and protect water supply facilities and water resources by means of controlling increased flood discharges, stream erosion, and runoff pollution.

One issue identified during the public meeting on the lakefront Development Plan that should be included in any storm water management plan is regular vacuuming of all wastewater storm drains in the Lake Districts. Of particular concern to the residents of Lake Lackawanna were the storm drains on Lackawanna Drive, Roseville Road and Lake Drive. Proper maintenance and regular scheduling of maintenance can alleviate many of the impacts presented by storm water events.

136 PLANNING DOCUMENTS AND PROGRAMS

Wastewater Management Plan Update

The Township has an adopted wastewater management plan. It is recommended that the findings of this report be incorporated into that plan, to better protect the water quality in the Lake Districts and throughout the Township.

The WMP planning area consists of the entire Township, and the plan envisions central sewage collection and conveyance service will be provided for a specific, limited portion of the Township with treatment at the Musconetcong Utility Authority sewage treatment plant. The rest of the Township will remain on individual subsurface sewage disposal systems.

Dam Safety Management Program

All of the lakes identified in this Plan were created and maintained by dams. With the exception of the state-owned dam at Cranberry Lake, these dams remain in private ownership and need to be monitored and maintained. The NJ Department of Environmental Protection

Dam Safety Section is responsible for this, but the office responsible for inspection is under funded and under staffed. This is not only an issue of lake maintenance, but public safety. A Byram Township Dam Safety Management Program should be implemented to assess the condition of each of the dams, identify improvements or repairs necessary as outlined in N.J.A.C 7:20, and investigate availability of funds for repairs under the Dam Safety Section Renewable Loan program and the Dam Restoration and Clean Water Trust Fund.

From the NJ Department of Environmental Protection Dam Safety Section Web Site:

(http://www.state.nj.us/dep/nhr/engineering/damsafety/)

"Existing dams are periodically inspected to assure that they are adequately maintained and owners are directed to correct any deficiencies found. The regulations require the owner to obtain a professional engineer to inspect their dams on a regular basis. These investigations include a comprehensive review of all pertinent material contained in the Department's files, a visual inspection, technical studies when necessary and the preparation of a comprehensive report.

Funding

The State of New Jersey takes an aggressive approach to enforcement of dam safety standards and recognizes the need to assist owners with funding for rehabilitations. In 1981, the Legislature passed the Natural Resources Bond Act that provided \$15 million in grant money for rehabilitation

of publicly owned dams. This money funded the rehabilitation of 23 high hazard dams. In 1992, a legislative act allocated an additional \$1.7 million for engineering studies and design of dam rehabilitations. This act funded engineering studies and designs for 30 high hazard, publicly owned dams. "

In order to address the need for additional funding, the State Dam Safety Section advocated the development of a renewable loan program. On November 3, 1992, the voters of New Jersey approved by referendum the Green Acres, Clean Water, Farmland and Historic Preservation Bond Act of 1992, P.L. 1992 c. 88. This Act authorized the issuance of New Jersey State bonds providing \$15,000,000 to finance State loans. The loans are to assist local government units, private lake associations and private dam owners in meeting the costs of dam restoration or inland water projects. Private owners must have a local government unit as a co-applicant. The money from the sale of the bonds is deposited into a revolving, non-lapsing fund, the 1992 Dam Restoration and Clean Water Trust Fund. This will provide a limited but stable funding source for dam restoration projects.

A dam restoration project involves the demolition, reconstruction, rehabilitation or restoration of a dam. An inland waters project involves pollution control, flood control, recreation or conservation projects.

Private dam owners obtaining a loan from the Department are required to have a municipal coborrower. Under the provisions of the law, the municipality can assess the properties that benefit from the project in order to pay off the loan. The loans are low interest, currently 2%, with a maturity period of 20 years.

The Department held two open application periods and funded 19 dam restoration projects from the priority-ranking list established from the eligible applicants.

At this time, all funds from the Dam Restoration and Clean Water Trust Fund have been allocated. As loans are repaid and when sufficient funds exist in the Trust Fund, the Department will offer additional application periods in which to distribute the funds.

On January 10, 2000, Governor Whitman signed legislation [P.L. 1999 c. 347], which provided \$6 million for the rehabilitation of high hazard dams and \$3.5 million for the rehabilitation of dams, which were affected by floodwaters caused by Tropical Storm Floyd. Funds were awarded to eligible local government units in the form of non-matching grants and to eligible private dam owners, as co-applicants with local government units, in the form of low interest loans. Ten percent of the flood damage funds were made available to the Department for an emergency repair fund.

Water Quality Monitoring Program

The Sussex County Health Department conducts regular tests for fecal coliform at Township lake beaches throughout the summer. Individual lake community groups also engage in some limited water quality monitoring, such as the Lake Mohawk monitoring program. These existing testing regimes need to be formalized as a Township function and expanded to more sites. The testing regime needs to occur at regular time intervals and be diverse in the types of tests administered.

During the public meeting seeking feedback on the Lakefront Development Plan, residents asked for water quality testing immediately downstream from the Columbia Valley Campground and downstream of North Jersey Auto Wreckers. Each site was identified as contributing to the Lake Lackawanna watershed. More resident input is necessary to create a comprehensive list of water testing sites. The results can then be made readily available to the public.

A request was made to conduct testing at Wolfe Lake, much like the testing done in the 1982 Lake Study. It is recommended that another Lake Study, much like the effort in 1982, be repeated with an expanded number of lakes included in the study. A review of findings from the original lakes and findings from additional lakes would present a clear picture of ongoing lake health issues.

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Lake Management Plans for Each Lake

Aside from the land use controls and Township planning documents, it is suggested that each lake adopt its own lake management plan. The lake management plan is a citizens' document, crafted by the Lake District residents themselves, with some assistance from the municipality and experts. It is an examination of each lake's current condition, current and future recreational uses, and a list of steps necessary to maintain the quality of the lake for its continued recreational use. The lake management plans should include:

- Ecological Inventories.
- · Goals And Objectives For the Lake.
- Problems And Issues Facing the Lake.
- · Water Quality Assessment.
- Action Agenda Based on Current Principles of Watershed Management.
- · Implementation Plan for the Action Agenda.
- Continued Monitoring of Water Quality Measurements.
- Reassessment of Actions Taken.

An excellent resource for any group beginning a lake management planning process is the publication "Managing Lakes and Reservoirs," prepared by the North American Lake Management Society of Madison, Wisconsin and the Terrene Institute of Alexandria, Virginia, in cooperation with US EPA, Office of Water, Assessment and Watershed Protection Division. A free copy of this resource is available for download from the New Jersey Environmental Digital Library Web Site: (http://njedl.rutgers.edu/njdlib/index.cfm).

The Lake Mohawk Country Club has an active lake management program and a Lake Master Plan. The master plan identified the primary cause of the lake's continuing eutrophication to be excessive phosphorous loading from storm water runoff, internal recycling of lake sediments, and loading from septic systems. Based on this planning effort, the Country Club made efforts to update the storm water control system around the lake. They also installed an in-lake alum dosing system, invested in alum blanket applications, and installed a destratification system in the deepest parts of the lake. The Country Club also began public outreach and education programs and promoted voluntary restrictions on phosphorous products and septic management program. The Country Club has also initiated an annual Lake Mohawk Monitoring Program. The 2002 report showed that overall water quality conditions were generally acceptable through the 2002 season.

Outreach and Public Education Program

The recommendations of this study should be made public by way of public meetings and informational materials. It should be communicated to Township residents that the preservation of lakes is a common interest of all concerned residents and is thus a common responsibility. Apart from programs organized by the Township to oversee the quality of the lakes and the surrounding area, each individual lot owner/developer is responsible for correcting or reducing the effects of development on the environment.

Newsletters, newspaper articles and letters to the editor are one way of getting the message across that proper lake management is important. Information booths and parade floats at Township events are another. Some towns have had great success with encouraging local students to have contests to name unnamed tributaries in their town and organize community clean-up days. Each Lake District can bestow an annual award to the property that has the most "Lake Friendly" landscaping, or the Township can bestow an award for the most original lake improvement project among the lake communities. Lake Mohawk even has an unofficial mascot, "The Phosphorous Monster"; to help educate residents about the effects excess phosphorous has on lake health.

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