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Allee King Rosen & Fleming, Inc.
Insite Engineering & Surveying, P.C.
O'Brien & Gere Engineers, Inc.

April 2002

Executive Summary

The "Rules and Regulations for the Protection from Contamination, Degradation and Pollution of New York City Water Supply and its Sources," more commonly referred to as the New York City Department of Environmental Protection (NYCDEP) Watershed Regulations, were implemented to protect the water quality of the New York City drinking water supply. These regulations could have a dramatic effect on local land use, community character, and economic activity in watershed municipalities. As part of the Memorandum of Agreement (MOA) between NYCDEP and the watershed communities, funding was allocated for creation of a "Comprehensive Croton System Water Quality Protection Plan" (or "Croton Plan") that would include three elements (Watershed Regulations, §18-82(c)):

(1) Identification of water quality problems and community character needs.

(2) Identification of investments to correct existing water quality problems in accordance with developed priorities.

(3) Strategies for prevention of future water quality problems and the consideration of future community character needs in conjunction with the water quality goals of the Croton Plan.

The Town of Southeast has worked with the Putnam County Division of Planning and Development to create the *Croton Plan*.

The *Croton Plan* contains the following Sections:

- Section 1 identifies community character and needs and was developed in coordination with the Town's updated *Comprehensive Plan*. The *Comprehensive Plan* incorporates the *Croton Plan* as a supporting report that identifies specific water quality and infrastructure considerations that affect the orderly growth and development of the Town consistent with the Town's stated vision to maintain the Town's picturesque rural character while allowing for appropriate commercial and residential development.
- Section 2 of the *Croton Plan* identifies water quality problem areas within the Town of Southeast and sources of contamination including both point sources and non-point sources.
- Section 3 of the *Croton Plan* discusses potential infrastructure solutions and specific recommendations to address water quality problem areas should funding become available.
- Section 4 of the *Croton Plan* identifies the recommendations contained within the *Comprehensive Plan*.
- Sections 5 and 6 of the *Croton Plan* describe existing and recommended local environmental laws and the existing Town of Southeast land use approval process. The Town of Southeast is committed to the protection of its community character and the natural environment through the application of local laws regulating growth and development in the site plan approval and subdivision review processes.

Public participation has been included in the development of the *Croton Plan*. In addition to meetings with the Town Board and the Town's Master Plan Steering Committee, a public information meeting on the *Croton Plan* was held on April 25, 2001 and a public hearing was held on May 15, 2001. Additional meetings and hearings were held on the *Comprehensive Plan*.

To comply with the State Environmental Quality Review Act (SEQRA), the Town identified the preparation of the *Croton Plan* as a Type I Action and prepared a Full Environmental Assessment Form (EAF) and circulated the EAF with a Notice of Intent to Declare Lead Agency on May 21, 2001. The Town Board declared itself Lead Agency on _____ and issued a Negative Declaration of Environmental Significance on _____.

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Section 1: Community Character and Needs

1.0 INTRODUCTION

The New York City Watershed Regulations (the "Rules and Regulations for the Protection from Contamination, Degradation and Pollution of New York City Water Supply and its Sources") could have a dramatic effect on local land use, community character, and economic activity in watershed municipalities. For the watershed municipalities to become full partners in watershed protection, they must be empowered to manage the growth and developmental changes anticipated as a result of the watershed Memorandum of Agreement (MOA), the Watershed Regulations, and the land acquisition and infrastructure improvement programs outlined in the MOA. The Croton Plan will establish a basis upon which the Town of Southeast can affirm its primacy in local land use planning and community development issues, as well as its contribution to water quality protection and watershed planning efforts.

The Croton Plan will address the question of how the Town of Southeast can guide development in a manner that balances community and economic development with water quality protection. This section of Southeast's contribution to the Croton Plan describes Southeast's existing community character, some of the demographic and development trends that have shaped the community in the last few decades, likely areas of new development, and possible effects of the Watershed Regulations on community character and economic development issues.

This Section, and Section 2.0 which identifies existing areas of concern with respect to water quality, accomplish the first two of three main objectives of the Croton Plan (see §18-82 of the Watershed Regulations):

1) Identification of factors important to community character

2) Identification of factors contributing to water quality

The third main objective of the Croton Plan is to integrate the land use planning and water quality protection measures into a comprehensive approach for:

3) Development of planning and infrastructure strategies to ensure balanced community development to protect community character and water quality.

Later sections of the Croton Plan will address how the third objective can be accomplished.

In addition to achieving the objectives of the Croton Plan, a comprehensive approach to land use and environmental planning will have direct benefits to residents and businesses of Southeast. The quality of drinking water drawn from wells and the quality of Southeast's lakes depend on how well land use is managed. Protecting the quality of Southeast's environment and its own drinking water quality is an underlying local objective of this document.

1.1 COMMUNITY CHARACTER ASSESSMENT

1.1.1 REGIONAL CONTEXT

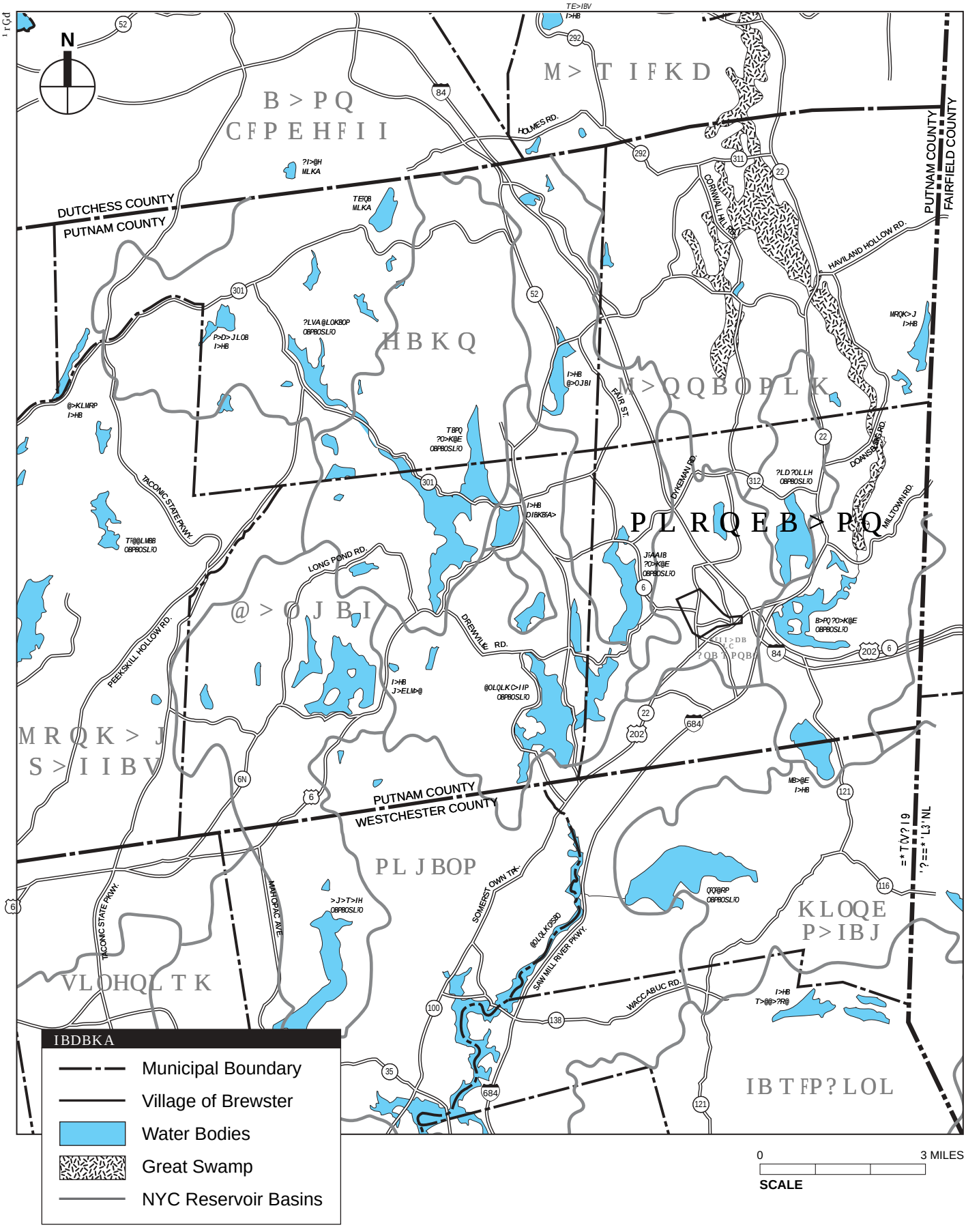
The Town of Southeast is a picturesque and peaceful community of nearly 33 square miles. Within that area is a diversity of landscapes and community patterns including: rolling hills, reservoirs, lakes, and streams, historic farm properties, and suburban housing developments as well as areas of commercial activity, both retail strips and office parks. The Village of Brewster, a separate political jurisdiction, is the historic center of the Town of Southeast and retains its identity as one of the centers of the Town (see Figure 1.1-1).

The Town of Southeast is the economic center of Putnam County. The Town's access to major transportation corridors, including the Metro-North Railroad and two interstate highways (I-684 and I-84), has made the Town an attractive location for new economic activity and a major exporter of workers to jobs in Westchester and Fairfield counties, and New York City. As more people are choosing to live in Putnam County, Southeast's community character is shifting from a rural to a more suburban community. However, the Town is committed to maintaining its overall rural quality in areas outside of the more developed commercial and residential districts.

The Town of Southeast is also at the center of the Croton Watershed, the source of 10 percent of New York City's drinking water supply during normal conditions and up to 30 percent during drought conditions. In all, 99 percent of the Town's land area lies within New York City's drinking water supply watershed. Five reservoirs are located in the Town—Bog Brook, East Branch, Middle Branch, Croton Falls, and Diverting Reservoir—and the drainage basin of a sixth, the Muscoot, occupies a portion of the southwest corner of the Town (see Figure 1.1-2). The drainage basins for these reservoirs extend beyond the Town's boundaries into neighboring communities in Putnam and Westchester Counties. Southeast shares New York City watershed basins with Patterson, Kent, and Carmel in Putnam County and with North Salem in Westchester County. (A portion of Fairfield County, Connecticut also drains into Southeast). The East Branch of the Croton River flows diagonally northeast to southwest through the Town. In addition, several large lakes and wetland areas are located in Southeast: Tonetta Lake and Peach Lake form the nucleus of several residential communities and the Great Swamp is a regionally significant wetland area that covers parts of Southeast and Patterson.

The attractiveness of Southeast as a place to live and to do business is a product of its proximity to major business centers in the tri-state metropolitan area and the numerous scenic views and neighborhood qualities. As these qualities have been discovered by the growing suburban market, the balance of different land uses in Southeast has shifted from a community of agricultural uses, larger estates and horse farms, seasonal homes, light manufacturing based on natural resources (e.g., timber and mining), and undeveloped open lands toward increased residential subdivision developments, commercial retail strips, and local and regional business offices. This change in the Town's land use pattern has resulted in impacts to the environmental character of the community and to the water quality of both groundwater aquifers and reservoirs that provide Southeast and New York City with drinking water.

Physically, the character of the Town is defined by the streams and reservoirs and the rugged topography of the many hills that surround them (see Figure 1.1-3). Historically, where the land flattened out from the hills and steep slopes, the rural landscape was dotted with farms, small hamlets, and low-density residential areas. This land use pattern was lost when the valleys were flooded for construction of New York City's reservoir system. Houses and farms were relocated to land above the reservoirs but the older centers were lost. Development and economic activity



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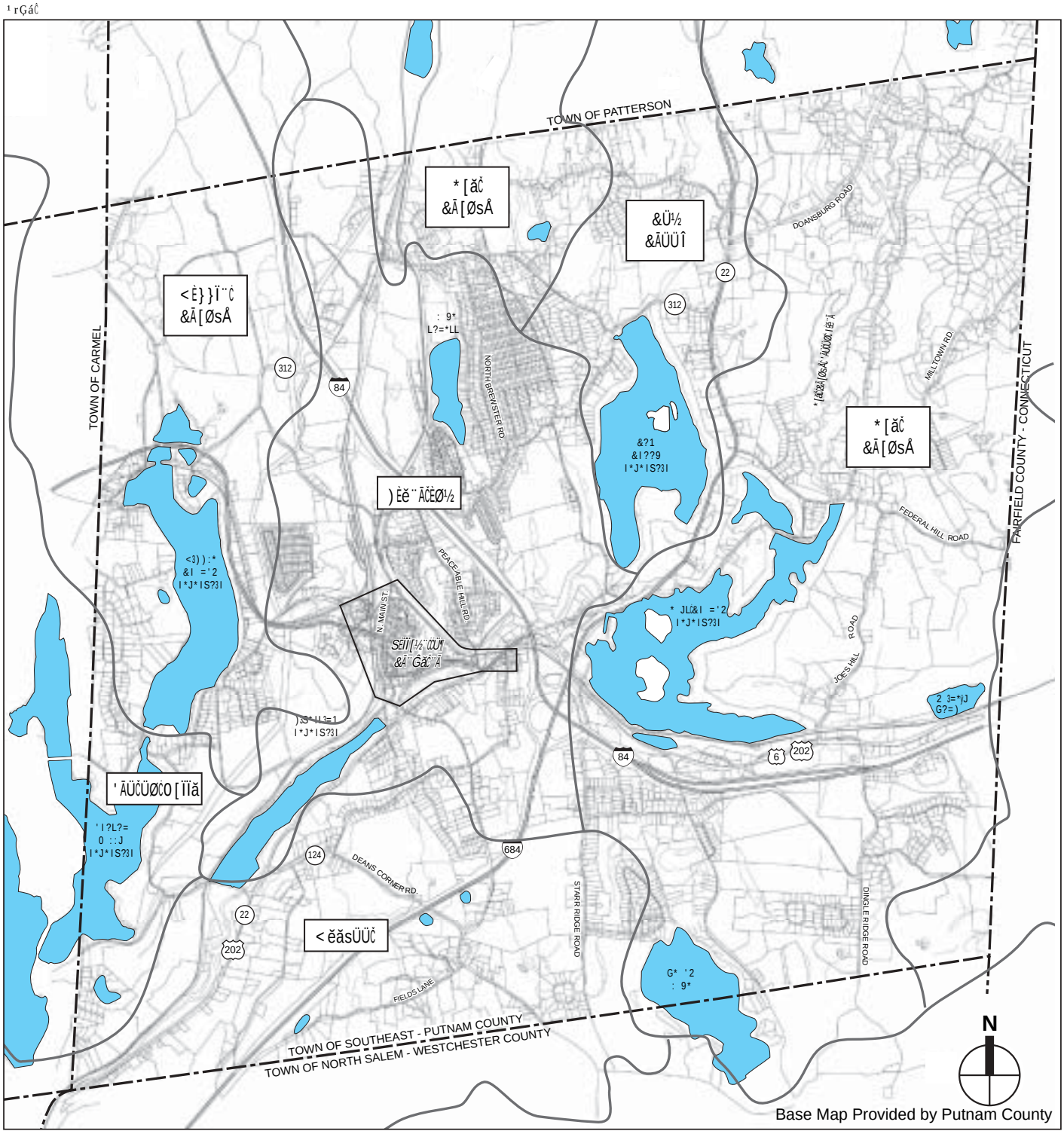

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- Village of Brewster
- Water Bodies
- NYC Reservoir Basins

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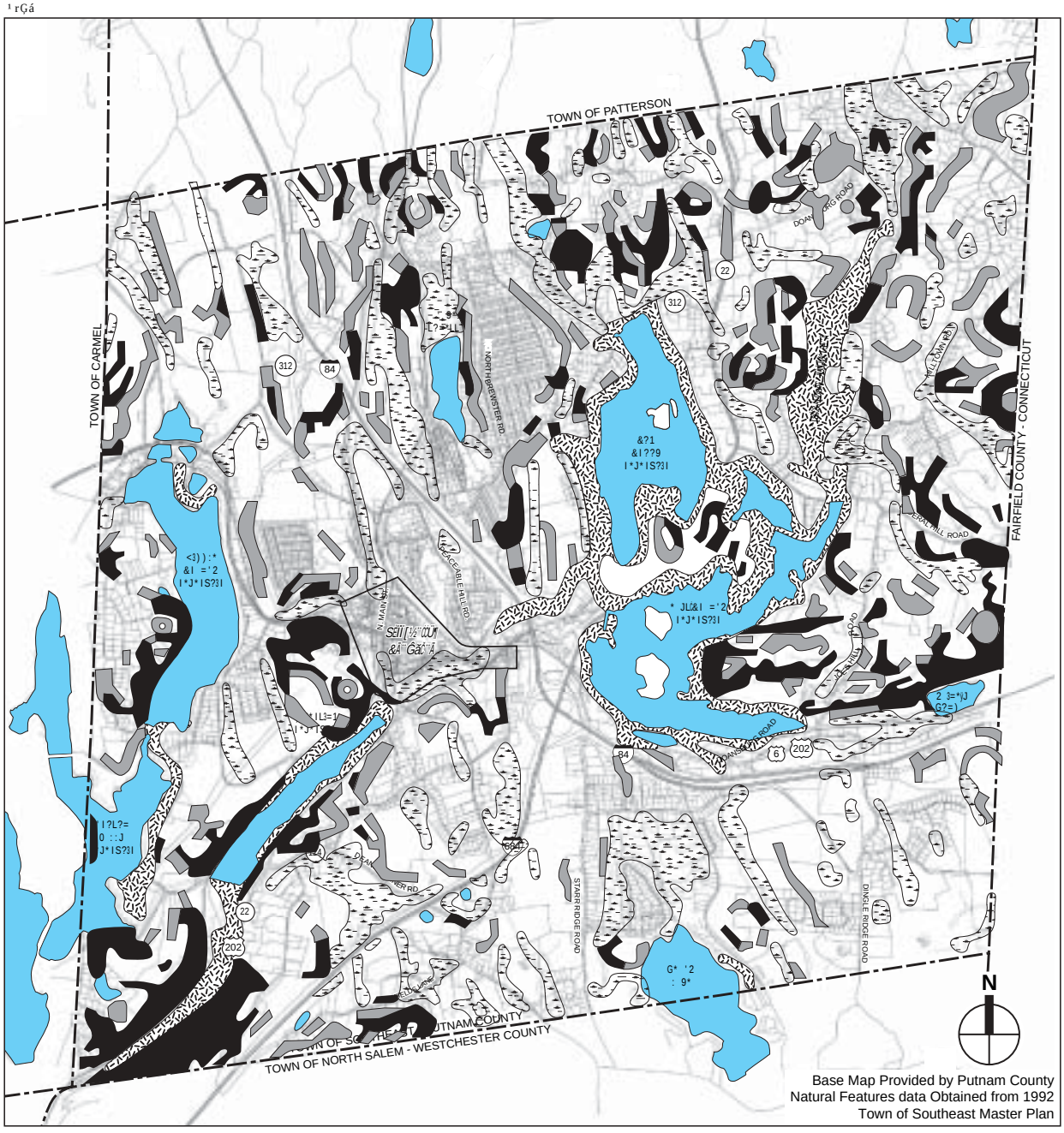

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- Municipal Boundary
- Village of Brewster
- Water Bodies
- NYCDEP Property
- Wetlands
- Slopes 15 - 25%
- Slopes 25% or Greater

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slowed until early in the 20th century when resorts were built to take advantage of the scenic qualities of the Town and its reservoirs. The post-World War II residential boom began to change the face of Southeast as existing residential neighborhoods matured. Growth over the last three decades has spread new residential development further and has changed the overall Town pattern to a more suburban character with nodes of commercial activity along the primary roads traversing through the Town.

Economically, the community continues to be shaped by its location within the larger New York City metropolitan area. Firms seeking to take advantage of the metropolitan market while providing quality of life for its employees will locate within Putnam County. The easy access to the Interstate highways within the Town of Southeast provides many of these firms, and the Town itself, with a competitive advantage.

1.1.2 LAND USE TRENDS IN SOUTHEAST AND PUTNAM COUNTY

The effects of development and the "suburbanization" of the rural landscape in Southeast can be observed through an examination of aerial surveys (prepared by Cornell University for Putnam County in 1968 and 1991), land use data compiled from NYCDEP studies by the Putnam County Department of Planning, and an evaluation of Town of Southeast Tax Parcel data from 2000. During this 33-year period, several trends are apparent:

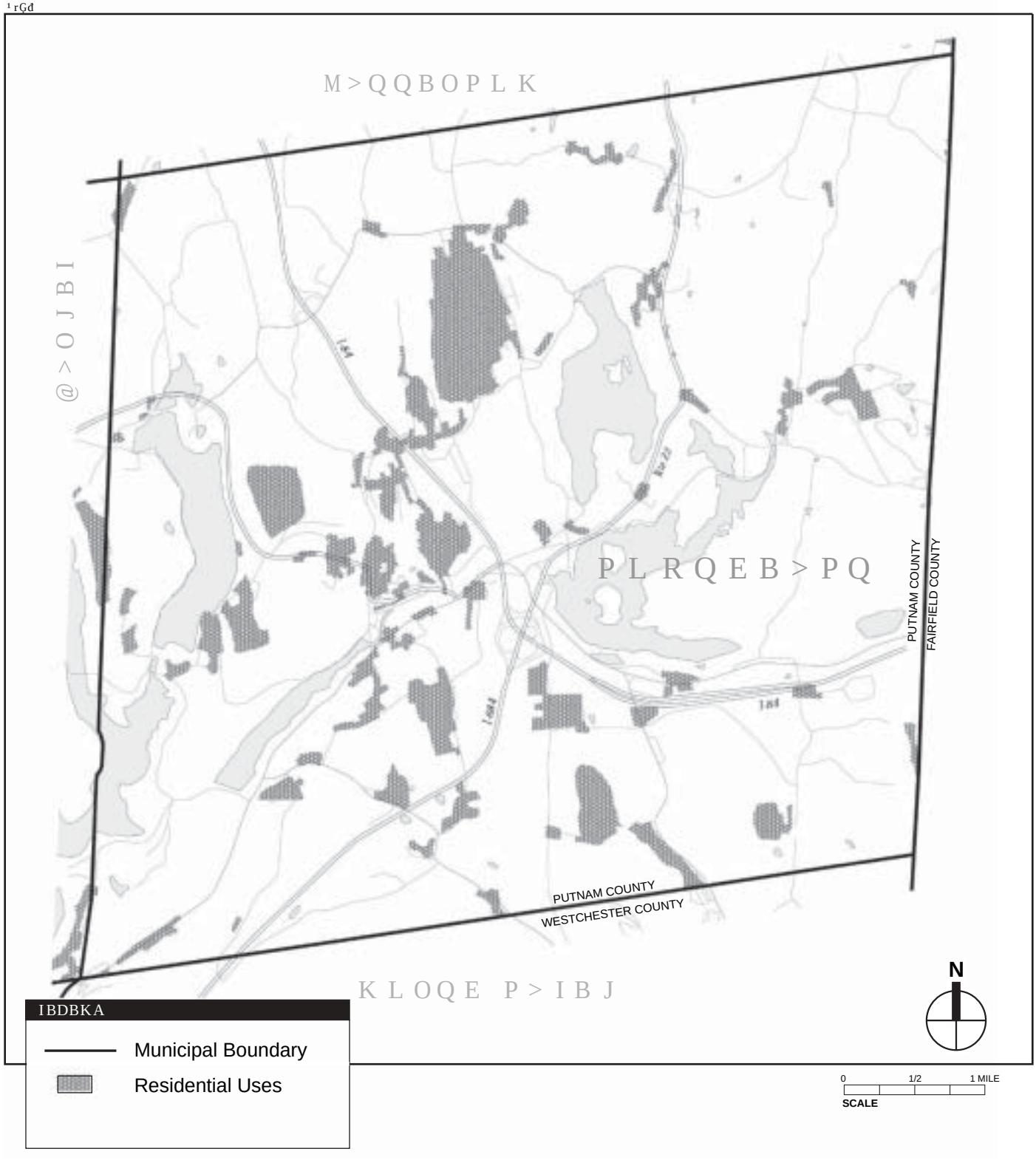
1. Expansion of residential development not only around older and denser neighborhoods like Tonetta Lake and Brewster Heights, but also in areas that historically have had fewer homes, like the Milltown Road area (see Figures 1.1-4a, 1.1-4b, and 1.1-6a).
2. Expansion of commercial districts along the major roads, especially Route 22 and Route 6. The interchange of Interstate 84 and Route 312 also developed as another node of commercial development—one that is continuing to expand today (see Figures 1.1-5a, 1.1-5b, and 1.1-6b).
3. Decreasing amounts of agricultural and forested land.

CORNELL SURVEYS: 1968 AND 1991

The Cornell Laboratory for Environmental Applications of Remote Sensing (CLEARS) conducted an analysis of changing land use patterns between 1968 and 1991 using aerial photography. This "Putnam County Land Use Dynamics Study" observed county-wide changes in land uses. Land uses were delineated and categorized based on manual interpretation of aerial photographs. Table 1.1-1 provides a general summary of some of the most relevant data from the Cornell surveys in 1968 and 1991.

Several figures in Table 1.1-1 are particularly relevant for the Town of Southeast. Residential acreage increased by 125 percent between 1968 and 1991, while the population increased by only 15 percent over a similar period. Much of that may have been attributable to the increased residential development of the 1980s, which tended to favor larger lots. This Town-wide growth in residential land development (125 percent) substantially exceeded the growth experienced throughout Putnam County as a whole (almost 87 percent).

For commercial land, the increase is even more dramatic. Between 1968 and 1991, commercial acreage in the Town of Southeast increased by almost 500 percent, whereas Putnam County's



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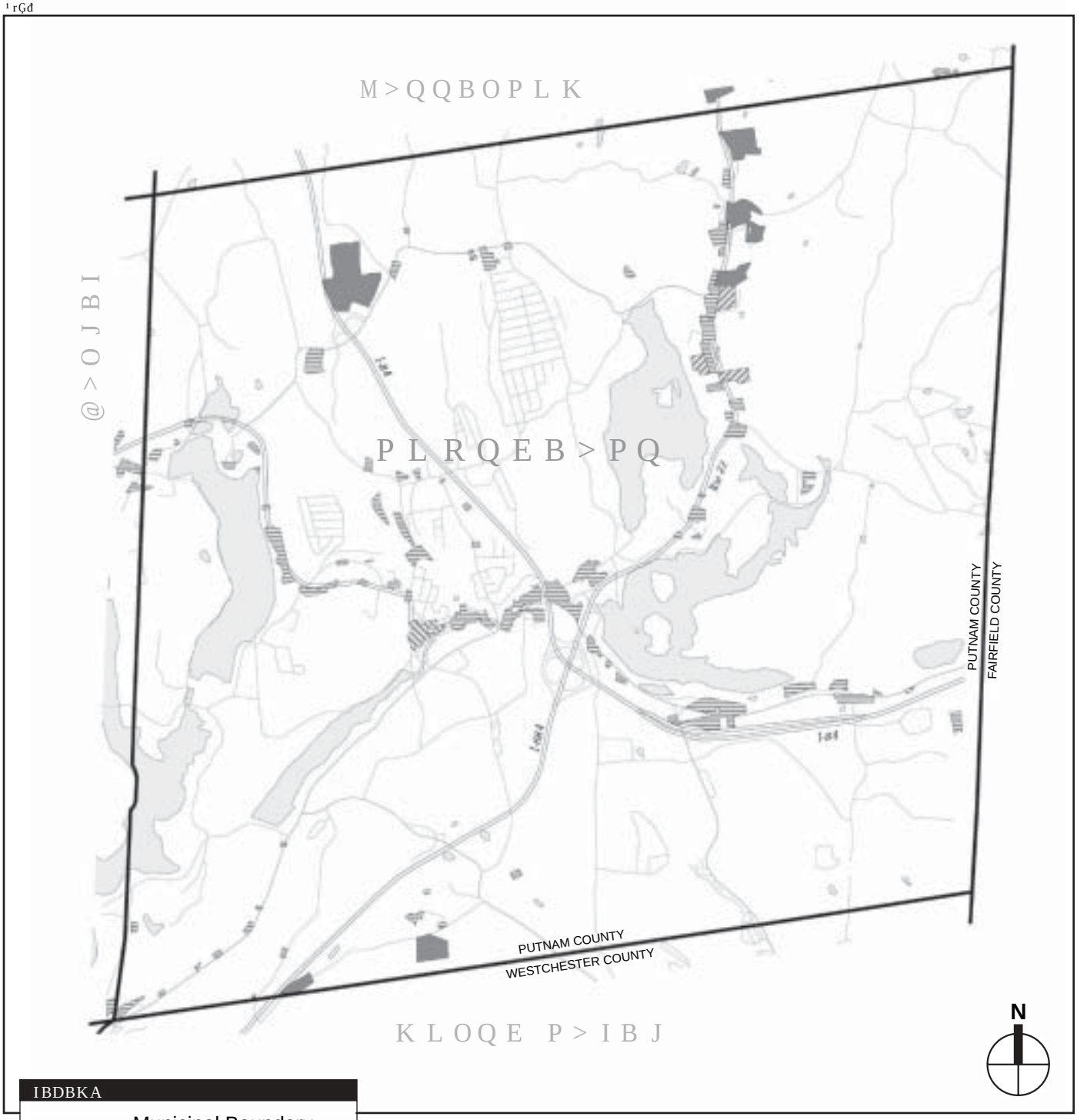

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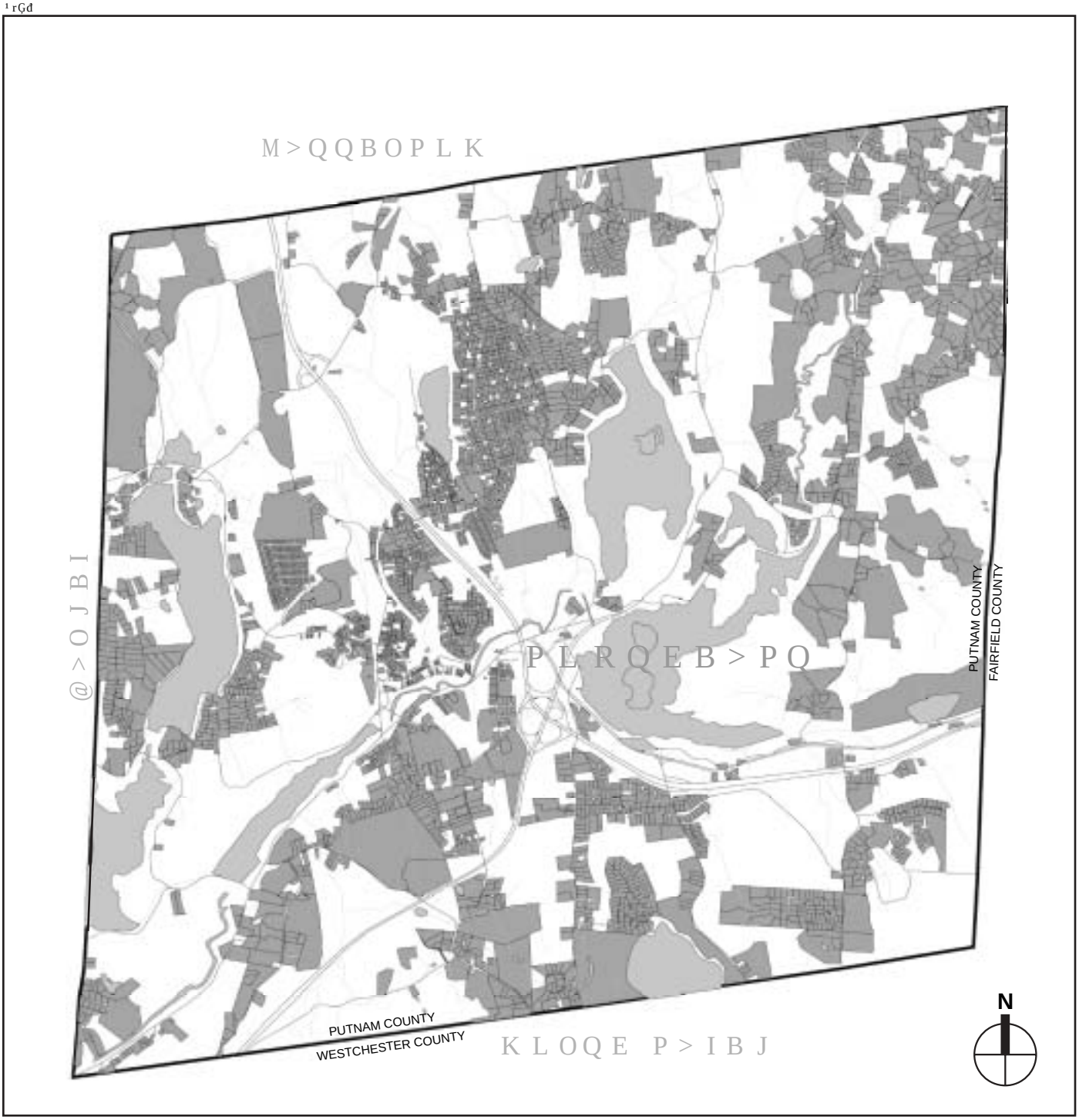

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- Municipal Boundary
- Water Bodies
- Residential Uses

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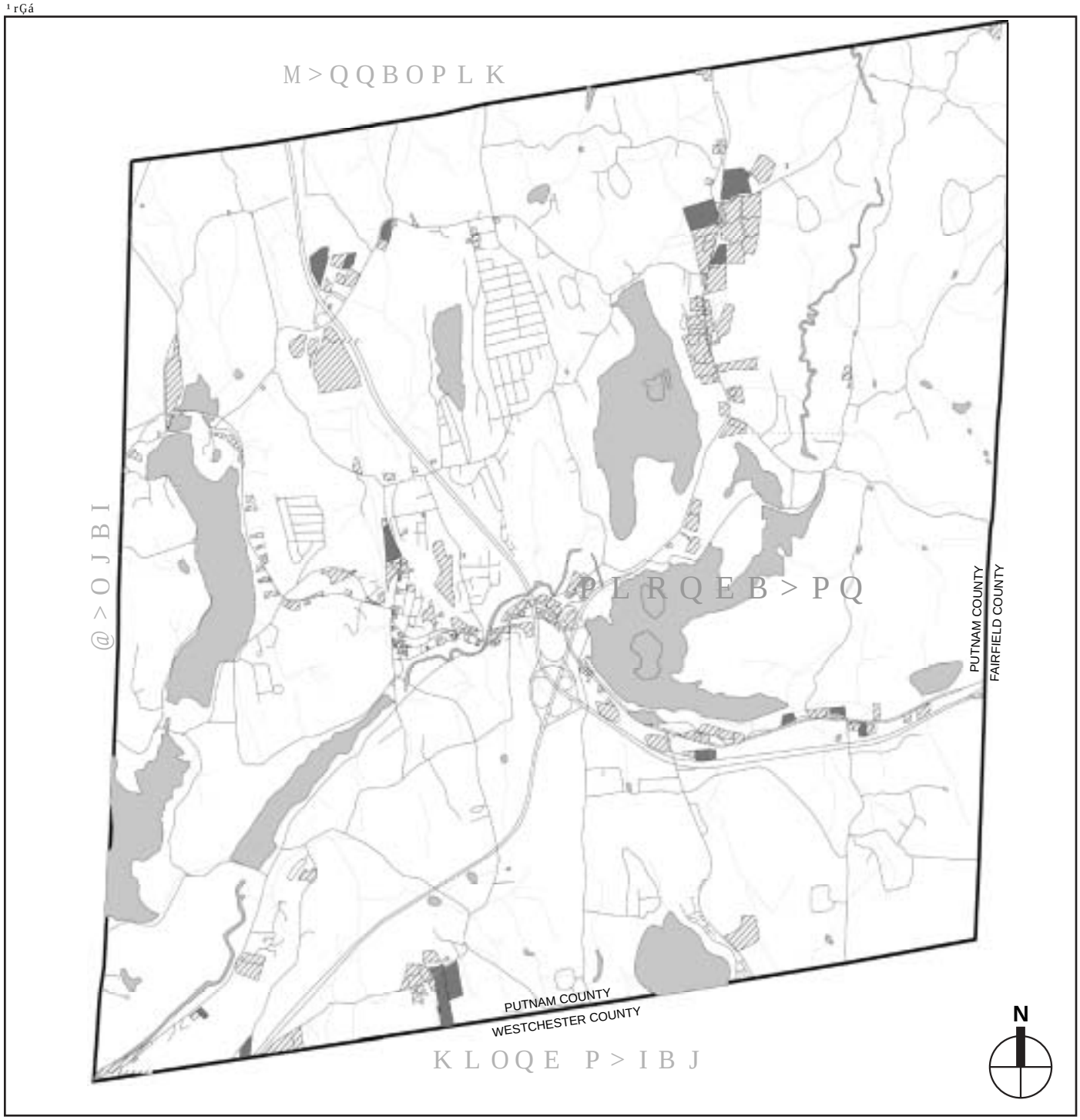

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- Municipal Boundary
- Water Bodies
- General Commercial
- Light Industrial

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Table 1.1-1

Generalized Land Use Trends: Town of Southeast and Putnam County

	Town of Southeast					Putnam County				
	1968		1991		1968-1991	1968		1991		1968-199
	Acres	Pct.	Acres	Pct.	Pct. Change	Acres	Pct.	Acres	Pct.	Pct. Change
Residential	1,707	7.7%	3,842	17.3%	125.1%	13,377	8.5%	24,967	15.9%	86.6%
Commercial	118	0.5%	700	3.2%	493.2%	911	0.6%	2,028	1.3%	122.6%
Ag/For/Und/Wet*	19,589	88.0%	16,114	73.0%	-17.7%	136,149	86.5%	124,189	78.9%	-8.8%

Notes: * "Ag/For/Und/Wet" = Agriculture, Forested, Undeveloped, and Wetland. Estimates for this category may not accurately reflect actual use of the land as the estimates were based on aerial reconnaissance and not ground surveys.
Total acreage exceeds total area in Town due to variables inherent to aerial surveys.

Source: Putnam County Land Use Dynamics Study, Cornell Laboratory for Environmental Applications of Remote Sensing, 1993.

increase was 123 percent. Much of the increase in commercial land was experienced along Route 22 where service-oriented retail establishments were built to serve the growing residential population and travelers along Route 22. In addition, as the competitive advantages of Southeast's access to interstate highways became apparent to the expanding metropolitan market, new office and light industrial development began to appear in areas such as Fields Lane, Route 6 east of the Village of Brewster, and at the interchange of Interstate 84 and Route 312.

The net result of the increase in residential and commercial development is a marked decrease in agricultural land, forests, wetland areas, and other undeveloped land. In Southeast, between 1968 and 1991, there was a loss of 18 percent of this undeveloped land, double the rate of loss in Putnam County as a whole. Since a significant amount of the acreage in this category includes New York City watershed lands and reservoirs, the effective acreage of undeveloped land lost is greater than this figure suggests.

LAND USE ESTIMATES: 1993 AND 2000

Two separate analyses of land uses within Southeast have been prepared using New York State Office of Real Property Services (RPS) tax parcel data. The 1993 data were obtained from the County's *Phase I Planning Analysis* for the Croton Plan which replicated data from the Final Generic Environmental Impact Statement on the Watershed Regulations prepared by NYCDEP. These data are aggregated into broad categories, but are not defined by specific RPS codes. Tax parcel data current to 2000 were obtained from the Town of Southeast's Tax Assessor specifically for use in this document. Once again, individual RPS classifications were aggregated into larger categories.

It is important to note that these two sets of data should not be directly compared to determine trends in land use because the data sources and analyses are likely different. For example, commercial and industrial land uses in 1993 occupy significantly more acreage than in 2000. This is likely the result of an uncorrected reporting of 1993 land uses which may show some vacant or residential (condominium ownership) land as commercial. The 2000 data were field checked for accuracy and corrected in some cases. (This does not imply that the underlying RPS

classification is in error; rather, that RPS classifications and land use classifications are not directly comparable.)

Estimates of land uses in the Town of Southeast for 1993 and 2000 are summarized in Table 1.1-2. The estimates are presented together in Table 1.1-2 in order to provide a *general* overview of land uses at two points in time. The current residential and commercial land uses are illustrated in Figures 1.1-6a and 1.1-6b, respectively.

While the data between 1993 and 2000 should not be directly compared, certain trends and the current land use pattern in 2000 are worth noting. Following the earlier land use trends identified between 1968 and 1991, residential development between 1993 and 2000 increased by approximately 2,085 acres and currently represents about 33 percent of the Town's overall land use inventory. A visual comparison of Figures 1.1-5b and 1.1-6b indicate significant growth in commercial and light industrial uses along the existing commercial corridors (Route 22 and Route 6) and in new areas such as Fields Lane and the interchange of I-84 and Route 312. Government and other institutional land uses have approximately doubled since 1993. Accordingly, agricultural and vacant lands have decreased substantially during the seven-year period.

Table 1.1-2

Land Use in Southeast, 1993 and 2000

Land Use	1993		2000	
	Acres	Percentage	Acres	Percentage
Agriculture	693	3.5%	283	1.5%
Residential*	3,513	21.3%	6,277	33.2%
Commercial/Industrial**	1,027	5.2%	702	3.7%
Government/Institution	500	2.5%	1,077	5.7%
Industrial***	299	1.5%	—	—
Vacant	11,729	59.7%	6,379	33.7%
Open Space	1,205	6.1%	1,237	6.5%
Water Supply****	—	—	2,950	15.6%
Total	**18,966**	**100.0%**	**18,905**	**100.0%**

Notes: * Approximately 5,960 acres (31.5 pct. of total land area) is single-family residential.
** The 1993 data represent commercial land use only.
*** Industrial land use data for 2000 are combined with commercial land uses, above.
**** The 1993 data do not include a classification for water supply land.
Sources: 1993—Putnam County, *Comprehensive Croton System Water Quality Protection Plan: Phase I Planning Analysis*. October 1998, Revised November, 2000.
2000—Town of Southeast Tax Assessor.

Driving the consumption of undeveloped land is the intense pressure placed on the Town by an increasing population (see Table 1.1-3). The populations of Southeast and surrounding communities in Putnam County have been growing quickly over the last few decades. In the post-war decades from 1940 to 1970 Southeast's population increases lagged behind several of the other communities—such as Kent, Carmel, and Patterson—where population increases averaged 67 percent over the three decades. Growth rates between 1970 and 1980 in Putnam County towns were lower than the initial post-war boom but were still exceptionally high averaging 44 percent. During the same period, the villages in the County averaged only 0.6

Table 1.1-3
Population Trends in Putnam County

Town	Population				Percentage Change		
	1970	1980	1990	2000	1970-80	1980-90	1990-2000
Putnam County	56,696	77,193	83,941	95,745	36.2%	8.7%	14.1%
Town of Southeast	9,901	11,416	14,927	17,316	15.3%	30.8%	16.0%
Town of Carmel	21,639	27,948	28,816	33,006	29.2%	3.1%	14.5%
Town of Kent	8,106	12,433	13,183	14,009	53.4%	6.0%	6.3%
Town of Patterson	4,124	7,247	8,679	11,306	75.7%	19.8%	30.3%

Source: Putnam County Division of Planning, U.S. Bureau of the Census.

percent growth, with the Village of Nelsonville losing 2.7 percent of its population. Between 1970 and 1980 the County as a whole increased in population by 36.2 percent. This trend reflects the suburbanization of the New York metropolitan region during this period and appears to have concentrated in Carmel, Kent, and Patterson more than in Southeast.

Between 1980 and 1990, however, Southeast's growth rate surpassed the surrounding communities and the County as a whole. The Town's population increased by nearly 31 percent, more than triple the rate of Putnam County and significantly greater than that of surrounding towns. This disparity is a result of the decreasing availability of land in other towns. After land consumption peaked in the other communities during the previous three decades, Southeast became more attractive for development during the 1980s.

Between 1990 and 2000, Southeast's population growth continued to exceed growth throughout Putnam County and that of other municipalities, with the exception of Patterson. Patterson led the growth in the County with a rate of 30.3 percent, similar to what Southeast had experienced during the 1980s. Meanwhile, Southeast's population increased by 16 percent while the County's population increased by about 14.1 percent. Putnam County's growth rate between 1990 and 2000 surpassed all counties in the lower and middle Hudson River valley, including Westchester (5.6 percent), Dutchess (8.0 percent), Rockland (8.0 percent), and Orange (11 percent) counties.

Employment in Southeast has also increased between 1980 and 2000. New commercial development is evident in locations such as Mt. Ebo Corporate Park, Route 22, Fields Lane, and the interchange of Route 84 and Route 312. These areas remain ripe for additional commercial development, as will be discussed in later sections. As shown in Table 1.1-4, below, employers in Southeast provided 3,924 jobs in 1997, representing 35 percent of the County's job base. The largest industry sectors in Southeast included manufacturing, retail trade, and health care/social services. The manufacturing industry in Southeast provided almost half of the County's manufacturing jobs. Wholesale trade in Southeast accounted for more than half of the County-wide supply of such jobs. Concentration of these types of industries in Southeast is probably due to the Town's accessible location near major transportation routes.

Table 1.1-4
1997 Employment by Industry

Industry	Putnam County		Town of Southeast	
	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees
Manufacturing	74	1,595	27	789
Wholesale Trade	126	729	52	391
Retail Trade	320	2,707	88	728
Real Estate, Rental & Leasing	107	251	38	76
Professional, Scientific, & Technical Services	248	853	73	388
Administrative, Support, Waste Management & Remediation Services	92	768	25	344
Educational Services	17	50	3	N.A.
Health Care & Social Services	189	1,999	50	517
Arts, Entertainment & Recreation	34	377	12	61
Accommodation & Food Services	144	1,207	44	431
Other Services (except Public Administration)	168	670	40	199
Total	**1,519**	**11,206**	**452**	**3,924**

Source: U.S. Census Bureau, 1997 Economic Census.
N.A. Not available since this sector employs under 20 employees.

1.1.3 PUTNAM COUNTY PHASE I PLANNING ANALYSIS

Putnam County has completed a planning analysis to assist towns in developing their portion of the Croton Plan. The *Phase I Planning Analysis* is intended to "help identify water quality problem areas and community needs, including areas for projected growth and development which are impacted by regulatory requirements under applicable federal, state, local and [New York City Department of Environmental Protection] regulations."[1] The *Phase I* report provides a baseline assessment of zoning and land use conditions within each municipality as well as a development build-out for areas zoned commercial, industrial, and high-density residential to determine "whether any adjustments are needed in [municipal] master plans and land use laws to meet community character needs and water quality goals."[2] The *Phase I* report did not address low-density (single-family) residential land, which currently makes up approximately 32 percent of Southeast's land area; in addition, a significant portion of Southeast's undeveloped or vacant land is zoned for low-density residential use.

The *Phase I Planning Analysis* states: "It is assumed for purposes of this Planning Analysis that these two terms ["community character" and "special needs"] refer to local needs, whatever they may be, recognized by the Watershed Regulations at 18-82 *as distinct from the City's need to improve and maintain the quality of its reservoirs and controlled lakes for purposes of Croton Planning*" (emphasis added).[3] Further guidance is then provided in the *Phase I* report for determining the character and special needs of a community:

- Maintaining community or Town centers, which are traditionally high-density mixed commercial, institutional, and residential development.

- Utilizing the three programs in the Watershed Regulations that address the long-term needs of community centers [referring to Designated Village Centers and Main Street areas where stormwater regulations may be relaxed].
- Maintaining a strong commercial and industrial tax base.
- Maintaining a strong commercial and industrial tax base to provide opportunities for local employment.
- Providing ample affordable housing so that demographics of the County are not forced to change as housing becomes increasingly confined to large expensive lots.
- Assuring that institutional facilities, such as schools, hospitals, government services, libraries and meeting halls, can be expanded or sited as needed by the community.

For the Town of Southeast, several of these "local needs" are less relevant than others. For instance, the first two factors listed above refer to development in existing centers. The Village of Brewster has historically served as a commercial center for Southeast, but it is a separate political jurisdiction. While Southeast's *Croton Plan*, and private commercial and residential land use decisions, will consider how the Village functions as a remaining commercial center, there are several factors that limit further development in the Village, including availability of land, zoning, and the Watershed Regulations, that suggest that the Village cannot serve all of the commercial needs of Southeast residents and businesses. Thus, new commercial development in the Town of Southeast will continue to occur in the Town outside of the Village.

The third and fourth factors listed above, regarding maintenance of a strong commercial and industrial tax base to balance residential taxes and to provide employment for residents of the Town and County, is an objective of most towns. The Town of Southeast is fortunate to have a healthy balance of commercial and residential uses, and the prospect of additional commercial uses in the short- and medium-term. The Town's *Comprehensive Plan* encourages commercial development in the Fields Lane and Route 312/I-84 interchange areas.

With respect to affordable housing, the Town's housing stock has traditionally been more affordable than other communities in Putnam County or to the south in Westchester County. As reported in the Town's *Comprehensive Plan*, Southeast provided over 31 percent of Putnam County's supply of attached housing units in 1990, but only 18 percent of the County's total housing stock. Within the Town, attached homes account for almost 37 percent of the Town's housing stock. Southeast's current housing mix provides a variety of housing types accessible to a range of household incomes. This mix, and the ability of existing residents to find housing within the Town that meets their needs, is an important element of Southeast's community character. The Village of Brewster also provides a supply of affordable housing. There has been an upward shift, however, in median household income and home sales price as Southeast has become more attractive to higher-income households seeking to move from Westchester and Fairfield counties.[4] It is possible that constraints on new residential development (see below) could put additional pressure on median prices of home sales.

Finally, the *Phase I Planning Analysis* indicates that institutional facilities and town uses must be allowed to continue to serve residents of the community. As Southeast experiences increased school enrollment from population increases and new residential development, the ability of the Town to provide adequate school space will be critical and must be maintained.

In order to assess how the Watershed Regulations may affect development in the watershed municipalities, Putnam County conducted a development build-out analysis for each of the

towns that provides a general measure of each town's growth potential (i.e., site-specific information was not used). This analysis is the central element of the *Phase I Planning Analysis* and is focused on commercial/industrial land and high-density residential land as these uses are more likely to have impacts on water quality than would low-density residential.

The development build-out analysis for Southeast notes that, of the 4,122 acres of land zoned for commercial and industrial uses in the Town, approximately 2,342 acres are considered vacant or underutilized. The *Phase I* report then determined how much of this vacant/underutilized land could actually be built upon after removing land that is constrained by regulatory restrictions including "regulatory buffers, wetlands, steep slopes, and poor soils that do not permit the use of sub-surface wastewater treatment systems."[5] Of the 2,342 acres, only 531 acres of commercial and industrial land are considered available for development. On these 531 acres, approximately 6.95 million square feet of building area could be constructed based on existing zoning. Most of this development could occur in three areas: the Fields Lane area (1.77 million square feet), an area south of Route 312 and west of Tonetta Lake (1.10 million square feet), and an area northwest of Route 312 along the I-84 corridor (1.36 million square feet). While there is still a large amount of development that could occur in the Town, the locations where development could occur have been limited by environmental constraints and the Watershed Regulations.

For multi-family residential areas the conclusions on actual amount of developable land are similar. The total acreage of multi-family zones in Southeast is 848 acres. Only 22 acres are considered buildable when constraints such as soil type, wetlands, wetland buffers, and steep slopes are considered. The *Phase I* report estimates that an additional 122 multi-family dwelling units could be built, all of which would be in the 'RMF' zone straddling Doansburg Road. These questions are addressed in later sections of this document.

For both commercial/industrial and high-density residential areas, limitations on wastewater disposal place severe constraints on potential development. The *Phase I* report suggests that the phosphorus offset program could be used to allow additional wastewater capacity or that the diversion program could remove sufficient phosphorus from the basins in Southeast to allow for more development of higher-density land uses.

The *Phase I* report concludes by noting that "the regulatory requirements, including federal, state, local and [New York City Department of Environmental Protection] regulations, in combination with existing natural conditions, significantly reduce the amount of development [county-wide] which can occur under existing zoning laws."[6] In Southeast, that reduction is considerable and the need for more detailed study of potential wastewater and stormwater infrastructure options is clear. Section 3.0 of the *Croton Plan* will address those issues.

The *Phase I* report does indicate several areas where the Town's current, or anticipated, development pattern may affect water quality protection. The report notes that continued development of commercial and light industrial uses in the Fields Lane area, as recommended in the Town's *Comprehensive Plan*, may be constrained by the prohibition on new surface-discharge wastewater treatment plants in the Muscoot basin. In addition, the *Phase I* report notes that the current phosphorus-restricted status of four of the five other reservoir basins in Southeast may limit the amount of additional commercial development in other areas of the Town. It should be noted that the *Phase I* report was generic and cannot be considered to provide enough site-specific detail to assume that certain development is not feasible in a particular location. Finally, the *Phase I* report notes the need for stormwater controls along the Route 22 corridor as well as possible sewer extensions to serve the Fields Lane, Route 22, and Route 312 areas. Each of these issues will be evaluated in Section 3.0 of the *Croton Plan*.

1.1.4 LAND USE TYPES IN THE TOWN OF SOUTHEAST

Given the trends in land use and population identified above, and the challenges in planning for watershed protection identified in the *Phase I Planning Analysis*, it is useful to examine how the different land use types found in Southeast contribute to community character and how they affect water quality. The next section outlines the various environmental and land use planning factors for the land use patterns existing in Southeast: residential (both low- and medium-density), commercial (highway retail and office park), and open space.

RESIDENTIAL USES

As Table 1.1-2 indicates, approximately 32 percent of the land area in Southeast is currently low-density (single-family) residential. In addition to this land is a significant portion of undeveloped or vacant land that is zoned for low-density residential use. Southeast is predominantly a bedroom community with a few concentrated areas of commercial activity. The expansion of residential uses shown in Figures 1.1-4a , 1.1-4b, and 1.1-6a was a combination of single-family and multi-family developments. Earlier periods of development directly after World War II saw an expansion of low- to medium-density housing development surrounding existing residential neighborhoods. Development around Tonetta Lake and Peach Lake, and the Brewster Heights neighborhood largely followed existing patterns of smaller houses on smaller lots. During the 1980s, however, the trend in housing development shifted toward medium- to high-density townhouse-style developments and larger lot single-family houses in the rural areas such as Milltown Road and Starr Ridge Road.

Each of the main types of residential development—denser neighborhoods of smaller homes and rural neighborhoods with larger homes—has a different impact with respect to community character and water quality and environmental planning.

Density of new residential housing is the primary determinant of its impact on community character. Where the rural character of residential areas can be maintained, even when new housing is developed, then community character is not threatened. When new housing is constructed without respect to existing patterns, then impacts on community character can result. Many of the Town's residential communities have large mature trees lining the roads with periodic broad vistas across a field or lake. The older neighborhoods with smaller homes also have tree-lined streets that are important to the overall character of the neighborhood. It should be noted that it is possible to develop high-density housing with fewer apparent impacts on character by incorporating strong design guidelines. Design guidelines for both residential and commercial areas are addressed in the Town's *Comprehensive Plan.*

One of the most useful indicators of potential environmental impact from residential development, especially with respect to water quality, is impervious surface area coverage. Impervious surfaces collect pollutants such as nutrients, oils, and particulates that get picked up in stormwater and carried to local water bodies. The traditional residential pattern of smaller lots served by a network of roads with convenient access to commercial shopping districts while covering a higher percentage of the land area with impervious surface may actually have less total square feet of impervious surfaces (counting all roads, driveways, and structures) than a lower-density pattern seen in newer subdivisions and housing in rural areas. However, these denser neighborhoods do not typically have enough land available for stormwater best management practices (or were never built with such controls to begin with).

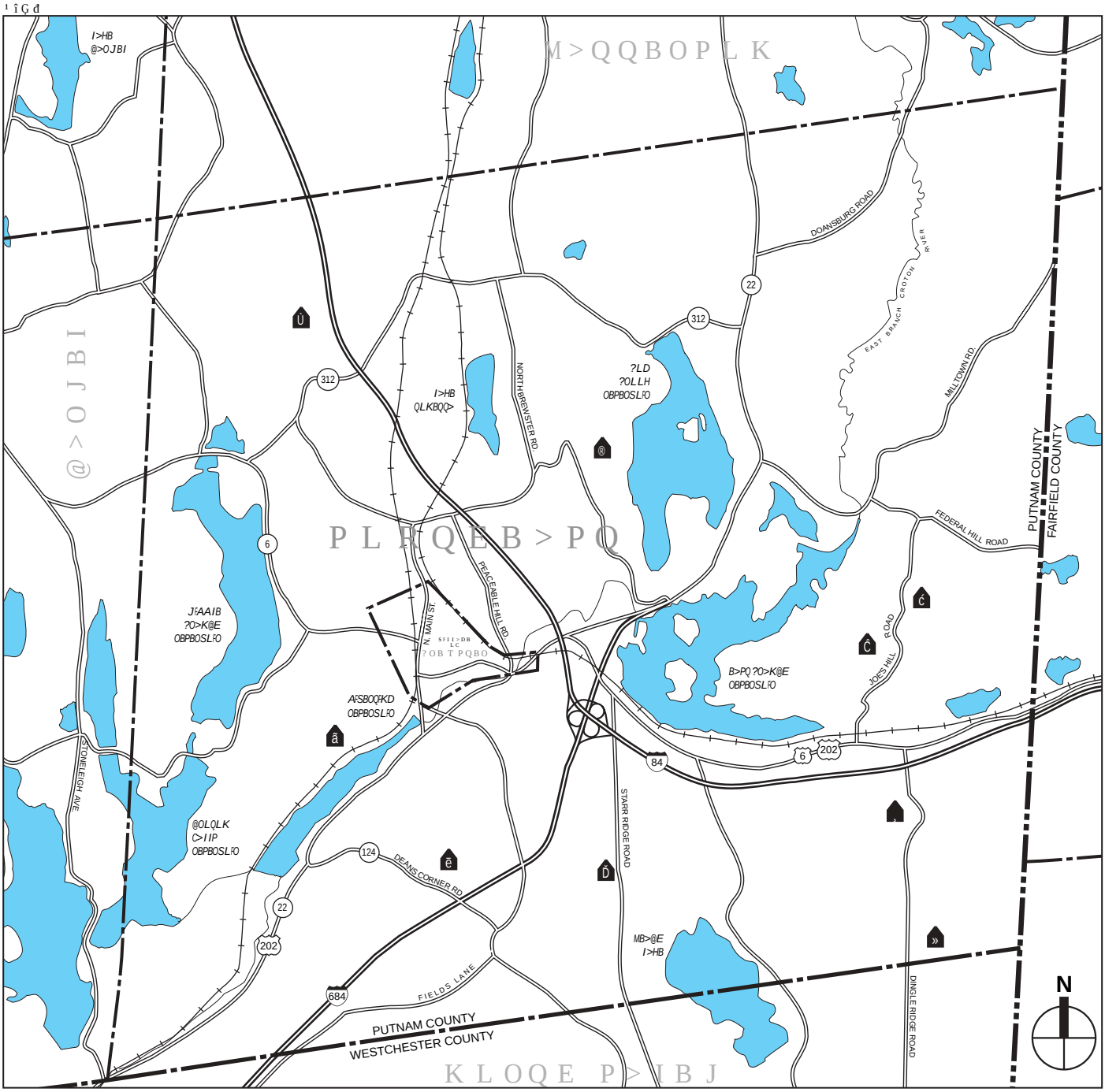
A second important component of a residential neighborhood's environmental impact is the manner in which wastewater is collected and treated. Older neighborhoods are more easily served by central collection of wastewater in sewers and treatment of wastewater at a wastewater treatment plant because of the economy of scale involved with laying out sewer lines. Lower-density areas, on the other hand, require a greater capital investment in sewer lines to reach each of the houses within the service area. However, where central wastewater collection and treatment does not exist, older residential neighborhoods are more likely to be served by septic systems on lots that are too small to adequately treat wastewater while newer residential construction either has more up-to-date septic systems installed or have larger land available to find suitable soils for a septic system. Generally speaking, individual septic systems on lots less than one acre in size are more difficult to site than septic systems on larger residential lots. Where individual groundwater wells are used for drinking water supply on the same site, sufficient separation distance must be observed to ensure the safety of the drinking water. A one-acre lot provides the bare minimum separation distance. Evaluation of water quality impacts would have to be handled on a neighborhood-by-neighborhood basis and would have to look at housing density, soil conditions, and availability/feasibility of central wastewater collection.

As the amount of available land diminishes within the Town, so to does the opportunity for large-scale residential subdivision. There are, however, a number of large parcels that have the potential for significant amounts of new residential development. Figure 1.1-7 locates some of the areas known by Town staff to have the potential for future residential use (based on previous or existing applications to the Town's Planning Board). A couple of these areas are in close proximity to reservoirs while others are notable for their rural character. How these areas are developed, then, may have impacts on community character, water quality, or both.

COMMERCIAL SHOPPING DISTRICTS

Commercial shopping uses are concentrated along the major arterial roads traversing the Town: Route 22 and Route 6. The Route 22 corridor, especially, has become the "town center" for commercial activity. Respondents to a survey question asking where the Town's center is identified both Main Street in the Village of Brewster and the Route 22 corridor. The businesses in the Village serve some standard consumer convenience-goods needs, including banks, florists, delis, and small grocery-type stores. However, the majority of consumer convenience-goods establishments are located in the shopping centers on Route 22 and Route 6 west of the Village of Brewster. This distribution of commercial opportunities is likely to continue, with the Village taking on a more specialized role in providing general shopping goods that may be considered non-essential, such as furniture (antiques) and miscellaneous goods. Even if the Village were to have more convenience-goods businesses, the pattern of using Route 22 as the primary source for convenience goods is likely to continue. Residents of Southeast will also continue to use shopping areas outside the Town in Carmel or Danbury, Connecticut to satisfy other needs such as clothing and speciality products.

As the Town's primary gateway from the north (and for travelers continuing on Route 22 from I-684 to the south), Route 22 plays an important role in Southeast's community character. If additional highway commercial development in this corridor is proposed, some guidelines should be established to ensure consistency of character with other uses and to properly control new traffic. The New York State Department of Transportation is currently preparing design analyses on widening of Route 22 from I-684 to Doansburg Road. This widening has the potential for significantly affecting existing businesses and shopping centers, but would improve traffic flow through the area. The Town of Southeast supports the proposed improvements and



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is considering design guidelines for businesses along the corridor so that physical and aesthetic improvements to existing or new properties along the corridor can be done in a coordinated fashion. The *Comprehensive Plan* includes a discussion of commercial design along Route 22.

From a water quality standpoint, the Route 22 corridor is a primary contributor of stormwater runoff to both the Bog Brook and East Branch Reservoirs. New development along Route 22 would have to comply with the new Watershed Regulations with respect to stormwater management and impervious surfaces. Constraints on development along Route 22 have been identified and it is currently uncertain how new commercial uses on Route 22 can be developed within the constraints of the Watershed Regulations.

Additional opportunities for commercial expansion lie on Route 6 both west and east of the Village of Brewster. New commercial businesses along the western portion toward Carmel could serve convenience-good demand for residents located in Brewster Heights and Turk Hill, but are limited due to the proximity of the Middle Branch Reservoir. Similarly, along Route 6 east of the Village, additional development is constrained by the topography on both the north and south sides of the road and the proximity of the East Branch Reservoir. Small light industrial or warehousing uses have been considered along this portion of Route 6. These uses would be consistent with the existing businesses, but would not serve to enhance the corridor as a gateway to the community. Figure 1.1-8 indicates the location of commercial areas and potential commercial development proposals.

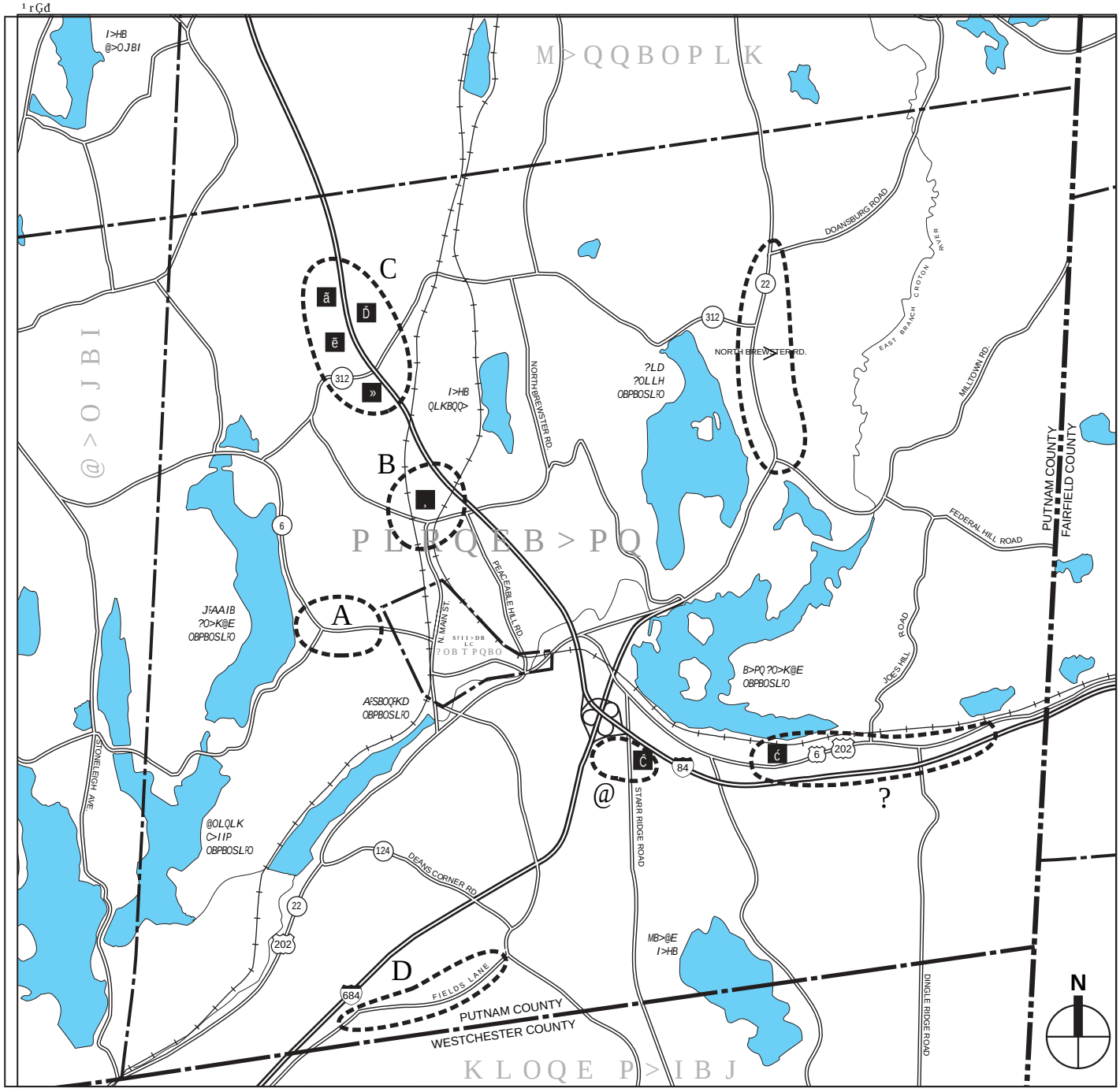
Larger development sites at the interchange of I-684 and Route 6 have been proposed and have met with considerable public opposition. Large-scale commercial development at this location could have an immediate impact on community character for people entering the Town from I-684 and from the historic district along Starr Ridge Road depending on how the development is configured and designed. A large-scale use, if well designed, could have a beneficial impact on community character.

New commercial development along Route 6 would be constrained by the Watershed Regulations with respect to wastewater and impervious setback restrictions. None of these areas are currently served by sewers.

Commercial shopping districts tend to have high percentages of impervious surface area from buildings and parking lots. These impervious surfaces collect pollutants. Local and state stormwater management regulations require that stormwater be treated using best management practices (BMPs). However, even with appropriate BMPs, high intensity commercial use areas pose a threat to surface water. Groundwater quantity is also affected as impervious surfaces prevent recharge of groundwater levels.

COMMERCIAL OFFICE AND INDUSTRIAL DISTRICTS

Southeast has also experienced an increase in office commercial and light industrial/warehouse development. Office parks such as the Mt. Ebo Corporate Park on Route 22 and Terravest Corporate Park on Route 312 have captured some of the early interest in Southeast as a commercial office and manufacturing center. Interest in similar development was slack in the 1990s following the economic decline, but recent improvements in economic conditions have resulted in a resurgence of demand for new commercial office and light industrial uses. As a result, plans for new commercial office or light industrial uses are being developed and are focused in several distinct areas of Southeast: Fields Lane and the Interchange of I-84 and Route 312. The impacts from these uses must be considered on a case-by-case basis. When properly designed and located, new commercial uses can contribute to community character. Adequate



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stormwater management and wastewater treatment must be available for these land uses to comply with water quality objectives. At the Interchange of I-84 and Route 312, the Town has adopted a Conditional Rezoning for certain commercial parcels that establishes strong design guidelines for new uses to ensure that the overall appearance and character of the area is not dominated by any one development. The guidelines address not only site coverage and building envelope conditions but also building design and materials, landscaping, and lighting.

OPEN SPACE AND AGRICULTURAL USES

The Town's supply of open spaces (both public and private lands) includes land surrounding the reservoirs and East Branch of the Croton River that is owned by the New York City Department of Environmental Protection (NYCDEP). Significant elements of the Town's open spaces are the New York State Department of Environmental Conservation managed Bog Brook Unique Area, the Great Swamp Critical Environmental Area (CEA), the Atlantic White Cedar swamps north of Lake Tonetta and Brewster Pond, and several aquifer areas including one that provides the Village of Brewster with drinking water. Other important parcels are owned by Putnam Land Trust/Save-Open-Spaces, a local land trust. A number of designated wetlands are also located throughout Southeast. Together these open spaces contribute to the community character and provide clean drinking water for residents of the Town and New York City.

Putnam County's Soil and Water Conservation District recently received a grant through the Water Resources Development Act to conduct an inventory and environmental assessment of agricultural uses in the County. The inventory used the New York State Real Property Tax classification to determine which properties were active agricultural uses. The County will assess the environmental profile of these uses as part of its study.

Within Southeast, twenty-four (24) agricultural parcels were identified totaling approximately 855 acres. These agricultural uses are divided between horse farms, dairy farms, orchards, nurseries and greenhouses, and some land currently used for educational purposes or as rural residential property. These properties contribute to the Town's mix of rural and suburban community character and several are located along scenic roads or entrances to the Town. Communities in the West-of-Hudson watershed district have found agricultural uses to be a "preferred land use" as they contribute economic activity, aesthetic qualities, and either are, or can be made to be through use of best-practices, environmentally beneficial.

COMMUNITY FACILITIES

The Town has a variety of municipal facilities, some of which need expansion to satisfy increased use of older buildings. A multi-year program of expansion lies ahead for the Town described below.

Town Administration

Central administration of Southeast is located in Town Hall on Main Street in the Village. The building cannot be expanded, but the need for expansion is clear. Certain Town offices are located two blocks away in the Old Southeast Town Hall basement. This building is also inadequate; court is held here in an overcrowded room. Use of the upstairs auditorium is restricted due to building and fire codes. The Town is interested in pursuing opportunities for a new Town Hall and Court complex. Consideration should be given to the appropriate reuse of the historic bank building that is now Town Hall, so that its architectural integrity is maintained.

Library

There is a public library in the Town of Southeast located in the Village of Brewster. The library needs physical expansion, but the current building affords restricted opportunity for this. As the Town continues to grow, it will be important to augment this significant resource. Some of the same considerations apply as with the Town hall: preservation of the architectural attractiveness of the building, through either its expansion or reuse, and preservation of a library location in the Village. There may come a time when the Town can support a branch library, with the main library at its current location.

Emergency Services

All ambulances are currently housed in the Town's original firehouse, located in the Village. A new firehouse is located on Route 312 at North Brewster Road which provides good response time to the developing northern areas of the Town. Future needs are anticipated to center around Fields Lane and the Milltown Road areas. Fields Lane is a developing commercial area of large mixed warehouse and office buildings. The Milltown Road area has a growing number of housing developments. While a separate sub-station may not be required here, specialized brush-fire equipment may be necessary to handle fire in this area.

Recreation and Parks

The Town owns a little over 200 acres of park land, with most of the acreage geared towards active recreation such as playing fields, swimming, tennis courts, baseball and basketball. This emphasis has tended to counter-balance the quieter recreation (nature study, birdwatching, walking trails) available at State and County parks or in the natural areas of the Town.

The Town's future need will remain primarily the provision of active recreation, but passive recreation needs to be included in the parks and recreation master plan. Open space preservation is one method of acquiring places for passive recreation. While some open space will need to be set aside for animal and vegetative habitat, some acreage can support human use. Therefore, decisions on open space acquisition and management should be made jointly by the Town's recreation department, the several conservation agencies and organizations, and the Planning Board.

Long-term plans call for a Town pool and a recreation center that would allow more programs, including summer camp space.

A parks master plan is currently being prepared for the Town. The following guidelines should be considered in this plan.

! Existing Sites

  Some of the small parcels and the larger, newly acquired properties should be left natural and undisturbed. Other parcels should be cleared for small, local neighborhood play area, with playground equipment, picnic tables, stakes for volleyball or badminton, and cleared areas for lawn games.

  Prolonging and increasing park usage might be attained through simple measures of night-time illumination or a park attendant.

  Old Southeast Town hall should be renovated to meet fire and building codes, to open up this building further to public use. The availability of the auditorium might then encourage local theatrical and musical groups.

! New Sites

If a suitable location is identified, a multi-purpose recreation complex should be constructed which would house sports, dances, play area, meeting area, and a pool. Networks of greenways, bike paths, and hiking horse riding and cross-country skiing trails that could be linked with Putnam County greenway and bikepath improvements should be evaluated. Toboggan and sledding hills should be designated and kept free from development.

Satellite parks should be created devoted to single sports uses, such as basketball courts or tennis courts or soccer fields.

All parks should encourage the use by elderly and handicapped Town residents, with appropriate kinds of recreation and parking. All parks should have some quiet areas, with benches and tables, and perhaps a garden.

SCHOOLS

The Brewster Central School District serves most of Southeast, part of Patterson, a smaller part of Carmel, and the entire Village of Brewster. Schoolchildren who live in Southeast but are outside the school district attend either North Salem or Carmel public schools. The Brewster Central school district has a 72-acre campus that houses Brewster High School (grades 9-12), Henry H. Wells Middle School (grades 6-8), C.B. Starr School (grades 4-5), and JFK Elementary School (grades K-3) as well as playing fields. The Garden Street Elementary School (grades K-3) is located in the Village.

The schools within the district are all operating at or above capacities established by the New York State Education Department. School District voters approved a $27.9 million bond referendum in December 1999 to renovate the High School and add 24 additional classrooms and an auditorium. These improvements were needed to accommodate a projected increase in enrollment from approximately 990 in the 2000-2001 school year to 1,160 in the 2005-2006 school year. The High School currently has a capacity of 732 students and will be expanding its facility.

The need for additional space within lower grade levels is anticipated as a result of revised State performance standards for curriculum and Regents testing. To meet the anticipated level of instruction for these new standards the School District envisions the need for full-day Kindergarten and new pre-Kindergarten instructional space. In addition, the Wells Middle School is currently well over its capacity of 623 students. Project enrollment at this school in 2002-2003 is 869.

To accommodate the need for physical space and any additional recreation facilities (which are currently shared with the Town of Southeast recreation programs), the School District is seeking opportunities to obtain additional land, preferably in the area of the current school campus.

1.1.5 TRANSPORTATION

The Town's road network is integrally tied to its land use pattern and its economic development. How well people move between home and work or home and shopping is an essential determinant of quality-of-life and the attractiveness of the Town as a place to live and do business. Roads also have a significant function within the scenic quality of the Town.

Southeast's location along major transportation routes such as I-684 and I-84, and the Metro-North Railroad provides access to jobs for its residents and provides access to employers seeking to do business in the Town. The Town of Southeast is committed to maintaining an efficient, uncongested, safe and well-maintained network of roadways to serve local and through-travelers, especially residents, businesses, and visitors. The Town is committed to maintaining the rural character of Southeast by protecting the character of many of its rural and scenic roadways. The Town is implementing a Transportation Improvement District (TID) in the northwestern section of the Town along the Route 312 corridor. The TID would be used to identify and finance necessary transportation improvements.

1.1.6 COMMUNITY CHARACTER SUMMARY

The Town's community character is a composite of the land use and population trends described above, the natural resources and topography of the Town, the transportation network, and the Town's vision as stated in its *Comprehensive Plan.* The following vision statement is replicated from the Town's *Comprehensive Plan*:

> "The Town of Southeast seeks to balance a healthy economic environment with quality residential and commercial character while protecting the integrity of its natural resources and infrastructure. This overarching vision is embodied in the goals and policies of this *Comprehensive Plan*:
>
> ***Protect the Town's community character***
>
> Maintain the Town's picturesque rural character, including historic and scenic resources, while allowing for appropriate commercial and residential development.
>
> ***Protect valuable natural resources***
>
> The Town of Southeast is committed to protecting its natural resources as a critical component of quality-of-life, the Town's character, the region's ecological functions, and water supply. Wetlands, watercourses, open space, woodlands, and agricultural lands contribute to the quality and character of Southeast, and their preservation, enhancement, and restoration must be considered in all actions that may affect them.
>
> ***Provide a diversity of housing opportunities***
>
> The Town of Southeast seeks a balanced diversity of housing opportunities and types to meet the needs of its current and future residents. The Town seeks to maintain its existing supply of housing, including its variety of price ranges, to accommodate residents of all income groups. New housing styles and types should reinforce the Town's rural qualities and predominately single-family detached housing patterns. New housing should also be sensitive to existing environmental constraints, including those related to the Croton watershed.
>
> ***Provide a healthy economic environment***
>
> The Town of Southeast seeks a diversified base of business and industry to strengthen the Town's tax base and to provide employment opportunities for area residents while preserving the Town's rural residential character and protecting the Town's portion of the regional drinking water supply. Future non-residential uses should be targeted to those areas where they will have minimal impact on water quality, traffic, and community character.

Provide necessary community services

The Town of Southeast is committed to providing its residents with adequate, accessible, and efficient community services and facilities.

Maintain the Town's transportation network

The Town of Southeast is committed to maintaining an efficient, uncongested, safe and well-maintained network of roadways to serve local and through-travelers, especially residents, businesses and visitors. The Town is committed to maintaining the rural flavor of Southeast by protecting the character of many of its rural and scenic roadways."

1.2 PLANNING FOR FUTURE DEVELOPMENT

1.2.1 COMPREHENSIVE PLAN

The Town has revised its *Comprehensive Plan* to consider how the watershed planning efforts need to be reflected in local land use laws and practices. In addition, the local laws themselves (e.g., zoning, subdivision, wetlands) will be reviewed for consistency with the *Comprehensive Plan*, the *Croton Plan*, and watershed planning efforts in general.

1.2.2 INTER-MUNICIPAL ISSUES

As part of the Croton Plan effort, the Town of Southeast will seek to coordinate planning with surrounding municipalities. Of particular concern is coordination with the Village of Brewster over land use development and infrastructure construction and use, and with the Town of North Salem in Westchester County over conditions affecting water quality in Peach Lake.

Areas where reservoir basins cross municipal borders will also be examined to ensure consistency in planning programs between municipalities.

1.2.3 TRANSPORTATION

The transportation network that serves commercial and residential uses throughout the Town should be assessed with respect to adequacy of the existing network and the potential for future improvements to the network where required. Proposed improvements to Route 22 are currently being considered to address existing capacity and safety issues. The roadway network within the northwest area of the Town is being evaluated as part of a Transportation Improvement District to address existing capacity and safety issues in that area. These potential improvements should be examined with respect to water quality impacts as many of the important roads lie adjacent to streams or reservoirs. It has come to the Town's attention that Metro-North Railroad is considering expansions of its service to include the Maybrook Line to Danbury and a potential use of the Beacon Line between Southeast and Beacon. If either of these new services were to occur, and development patterns were to shift to capture users of the new lines, community character and planning for the Town would have to be examined. ×

Section 2: Water Quality Problem Areas

2.0 INTRODUCTION

Existing data sources were used to identify and classify potential water quality problem areas in the Town of Southeast. Data and interpretation were sought from sources identified in Putnam County's Phase I Planning Analysis and Resource Manual, and from New York City Department of Environmental Protection (NYCDEP), Putnam County Department of Health, and New York State Department of Environmental Conservation (NYSDEC). These data were used to identify water quality problem areas, water quality trends, and sources of contamination.

2.1 WATER QUALITY PROBLEM AREAS

2.1.1 POLLUTANTS OF CONCERN

The pollutants of concern within the New York City watershed include phosphorus, coliform, and total suspended solids.

PHOSPHORUS

Phosphorus is essential for the growth of algae and other biological organisms. In reservoirs and lakes, phosphorus is usually the limiting nutrient. High phosphorus levels can lead to noxious algal blooms and low dissolved oxygen levels. These conditions affect the trophic state of water bodies and worsening conditions are detrimental to aquatic life and water quality and can lead to drinking water problems such as taste and odor that could require expensive treatment techniques to be implemented to meet drinking water quality standards. There is also a link between the amount of phosphorus and the amount of organic carbon in a water body. Chlorination of organic carbon compounds has been shown to create disinfection by-products that are of concern. The USEPA has proposed rules to control the amount of disinfectants and disinfection by-products in drinking water.

NYCDEP is developing a Total Maximum Daily Load (TMDL) for phosphorus in each watershed to determine phosphorus loading capacities and to control water quality in the reservoirs. Section 303(d) of the Clean Water Act (CWA) requires states to identify the water bodies in the state which, after application of the technology-based effluent limitations required by the CWA, do not meet water quality standards. These water bodies are identified as water quality-limited. NYSDEC is required under the CWA to develop and implement TMDLs for waterbodies listed on the State's 303(d) list. NYSDEC has identified the NYCDEP reservoirs as priority waters for TMDL development. The CWA requires the states to establish, and the USEPA to approve, TMDLs that, upon implementation, will achieve water quality standards. TMDLs account for point and non-point loads. NYCDEP agreed to assist the State in developing phosphorus TMDLs for the New York City watershed and to provide technical support that primarily consists of phosphorus modeling, data analysis, and preliminary TMDL calculations. NYCDEP completed the Phase I phosphorus TMDL calculations in June 1996. The Phase I

TMDLs are based on achieving a growing season average phosphorus concentration (guidance value) of 20 µg/l (micrograms/liter).

NYCDEP released technical reports on phosphorus levels in reservoirs in March 1999. NYCDEP does not believe the 20 µg/l phosphorus guidance value is stringent enough to protect the water supply. As a result, the Phase II TMDLs for source water reservoirs were calculated using a 15 µg/l guidance value. The official TMDLs were approved by the USEPA in October 2000.

COLIFORM

Pathogenic organisms found in wastewater may be discharged by human beings who are infected with disease or who are carriers of a particular disease. Because the numbers of pathogenic organisms present in wastes and polluted waters are few and difficult to isolate and identify, the coliform organism, which is more numerous and more easily tested for, is commonly used as an indicator organism. Each person discharges from 100 to 400 billion coliform organisms per day. Thus, the presence of fecal coliform organisms is taken as an indication that pathogenic organisms may also be present.

For drinking water supplies, the Total Coliform Rule was enacted on June 29, 1989. Total coliforms include both fecal coliforms and E-coli. The Maximum Contaminant Level Goal (MCLG) for total coliforms has been set at zero (0). The MCLG for systems analyzing at least 40 samples per month is to have no more than five percent of the monthly samples test positive for total coliform. For systems analyzing less than 40 samples per month, no more than one sample per month may test positive for total coliform. Compliance with the MCLG is based on the presence or absence of total coliforms in a sample. Requirements for monthly monitoring are based on the population served by the water supply system.

TOTAL SUSPENDED SOLIDS

Suspended and colloidal matter such as clay, silt, finely divided organic and inorganic matter, and microscopic organisms such as plankton contribute to turbidity in natural waters. Turbidity is monitored in drinking water supplies primarily as an indicator for the potential presence of pathogens or toxic substances including synthetic organic chemicals and metals. The Surface Water Treatment Rule requires water supplies to have turbidity levels of less than 5 NTU at all times at the entry point of the distribution system.

2.1.2 LAKES AND RESERVOIRS IN THE TOWN OF SOUTHEAST

Current water quality conditions in each of the reservoirs and major water bodies within the Town of Southeast are described below. The information was obtained from NYSDEC's *The 1996 Priority Waterbodies List for The Lower Hudson River Basin* (NYSDEC PWL) and from NYSDEC Water Quality Regulations. The NYSDEC PWL identifies use impairments, type of pollutants, and pollution sources for waterbodies in the Lower Hudson River Basin. A water body is considered "water quality limited" when technology-based effluent limitations are not enough to achieve water quality standards. Under the Watershed Regulations, a reservoir is considered "Phosphorus Restricted" if its mean phosphorus concentration exceeds 20 µg/l (15 µg/l for source water reservoirs). NYCDEP conducts an annual review of reservoir basins to determine if water quality meets established standards.

Additional information was obtained from NYCDEP's *Water Quality and Surveillance Monitoring* report (November 1997), *Proposed Phase I Phosphorus TMDL* dated June 1996

("Phase I Report"), and the *Proposed Phase II Phosphorus TMDL* report submitted in March 1999 to the NYSDEC ("Phase II Report"). The official Phase II TMDLs were submitted by the NYSDEC to the USEPA in June 2000 and were approved in October 2000.

BOG BROOK RESERVOIR

Bog Brook Reservoir is a NYSDEC Priority Water body that measures 390 acres. The reservoir is a class A water body whose best uses are water supply, culinary or food processing purposes, primary or secondary contact recreation, fishing, fish propagation and survival, and aesthetics.

According to the NYSDEC PWL, the Bog Brook Reservoir is use impaired as a water supply, and for fishing, fish propagation, fish survival and aesthetics. The primary use of this reservoir as a drinking water supply source is stressed by high levels of nutrients resulting from urban runoff. Types of pollution include nutrients and silt. Sources of pollution include urban runoff, construction (residential and commercial developments), failing on-site septic systems, and storm sewers.

Phosphorus

Using a phosphorus guidance value of 20 µg/l, the Phase II TMDL for the Bog Brook Reservoir is 827 lbs/yr. Based on this phosphorus guidance value, the Bog Brook Reservoir would not be water quality limited and would not require non-point phosphorus load reductions.

The tunnel connection between the Bog Brook and East Branch Reservoirs may influence water quality in the Bog Brook Reservoir. Phosphorus loadings are two percent from point sources and 98 percent from non-point sources. The mean annual phosphorus levels from 1988 to 1998 ranged from 16 µg/l to 25 µg/l. The mean annual chlorophyll A levels from 1988 to 1998 ranged from 2.1 µg/l to 10 µg/l. The total phytoplankton alert level of 2,000 SAU/ml and the single genus alert level of 1,000 SAU/ml, established by the NYCDEP Division of Drinking Water Quality Control, have been exceeded at times.

Fecal Coliform

Data from the NYCDEP for the years 1988 to 1998 ranged from less than 2 Colony Forming Units (CFU)/100 ml to about 13 CFU/100 ml.

Total Suspended Solids

Available data from 1988 to 1992 show a range of mean annual total suspended solids in the water column of 1.5 mg/l to 2.7 mg/l.

BREWSTER POND

This pond is located in the Bog Brook drainage basin. Water quality information for this water body is not available.

CROTON FALLS RESERVOIR

The Croton Falls Reservoir is a NYSDEC Priority Water Body that measures 1024 acres in area. This reservoir is a class AA(T) waterbody and as such, its best uses are: water supply for drinking, culinary or food processing purposes, primary or secondary contact recreation, fishing, and fish propagation and survival.

According to the NYSDEC PWL, the Croton Falls Reservoir is use impaired as a water supply, and for fishing, fish propagation, fish survival and aesthetics. The primary use of this reservoir

as a drinking water supply source is threatened by nutrients and silt. The reservoir is managed for brown trout but low dissolved oxygen levels in deep water stress the ability of the reservoir to support a brown trout population. The primary nutrient source in the basin is WWTP effluent. Other pollution sources include urban runoff, construction (residential and commercial developments), failing on-site septic systems, and storm sewers.

Phosphorus

The Phase II TMDL for the Croton Falls Reservoir, using the source water 15 µg/l phosphorus guidance value, is 7,861 lbs/yr. Based on this guidance value, the Croton Falls Reservoir would be water quality limited and would require non-point phosphorus load reductions of 1,299 lbs/yr. The necessary non-point phosphorus load reduction was calculated assuming the WWTPs in the reservoir basin would be upgraded as required by the Watershed Rules and Regulations, and that upstream reservoir basins would meet their phosphorus guidance values.

The phosphorus loading from upstream reservoirs affect water quality in the Croton Falls Reservoir. Phosphorus loadings are 52 percent from point sources, 28 percent from upstream reservoirs and 20 percent from non-point sources. The mean annual phosphorus levels from 1988 to 1998 ranged from 19 µg/l to 44 µg/l. The mean annual chlorophyll A levels from 1988 to 1998 ranged from 7.8 µg/l to 28 µg/l. The total phytoplankton alert level of 2,000 SAU/ml and the single genus alert level of 1,000 SAU/ml established by the NYCDEP Division of Drinking Water Quality Control have been exceeded at times.

Fecal Coliform

Data from the NYCDEP for the years 1988 to 1998 ranged from less than 2 CFU/100ml to about 22 CFU/100 ml.

Total Suspended Solids

Available data from 1988 to 1992 shows a mean annual total suspended solids range in the water column of 1.9 mg/l to 3.8 mg/l.

DIVERTING RESERVOIR

The Diverting Reservoir is a NYSDEC Priority waterbody that measures 518 acres in area. This reservoir is a class A waterbody the best uses of which are water supply for drinking, culinary or food processing purposes, primary or secondary contact recreation, fishing, and fish propagation and survival.

According to the NYSDEC PWL, the Diverting Reservoir is use impaired as a water supply, and for fishing, fish propagation, fish survival and aesthetics. The primary use of this reservoir as a drinking water supply source, is threatened by high levels of nutrients resulting from urban runoff. Types of pollution include nutrients and silt. Sources of pollution include urban runoff, construction (residential and commercial developments), WWTPs, failing on-site septic systems, and storm sewers.

Phosphorus

Using a phosphorus guidance value of 20 µg/l, the Phase II TMDL for the Diverting Reservoir is 6,170 lbs/yr. Based on this phosphorus guidance value, this reservoir would be water quality limited and would require non-point phosphorus load reductions of 2,168 lbs/yr. The necessary non-point phosphorus load reduction was calculated assuming the WWTPs in the reservoir basin

would be upgraded as required by the Watershed Rules and Regulations and that upstream reservoir basins would meet their phosphorus guidance values.

The phosphorus loading from upstream reservoirs affects water quality in the Diverting Reservoir. Phosphorus loadings are 10 percent from point sources, 73 percent from upstream reservoirs, and 17 percent from non-point sources. The mean annual phosphorus levels from 1988 to 1998 ranged from 19 µg/l to 34 µg/l. The mean annual chlorophyll A levels from 1988 to 1998 ranged from 6.0 µg/l to 30 µg/l. The total phytoplankton alert level of 2,000 SAU/ml and the single genus alert level of 1,000 SAU/ml, established by the NYCDEP Division of Drinking Water Quality Control, have been exceeded at times.

Fecal Coliform

Data from NYCDEP for the years 1988 to 1998 ranged from less than 2 CFU/100ml to about 75 CFU/100 ml.

Total Suspended Solids

Available data from 1988 to 1992 shows a mean annual total suspended solids range in the water column of 2.7 mg/l to 6.2 mg/l.

EAST BRANCH RESERVOIR

The East Branch Reservoir is a NYSDEC Priority waterbody that measures 512 acres in area. This reservoir is a class A waterbody and as such, its best uses are water supply for drinking, culinary or food processing purposes, primary or secondary contact recreation, fishing, and fish propagation and survival.

According to the NYSDEC PWL, the East Branch Reservoir is use impaired as a water supply, and for fishing, fish propagation, fish survival and aesthetics. The primary use of this reservoir as a drinking water supply source is stressed by high levels of nutrients resulting from urban runoff. Types of pollution include nutrients and silt. Sources of pollution include urban runoff, construction (residential and commercial developments), WWTPs, failing on-site septic systems, and storm sewers.

Phosphorus

Using a phosphorus guidance value of 20 µg/l, the Phase II TMDL for the East Branch Reservoir is 6,223 lbs/yr. Based on this phosphorus guidance value, this reservoir would be water quality limited and would require non-point phosphorus load reductions of 2,190 lbs/yr. The necessary non-point phosphorus load reduction was calculated assuming the WWTPs in the reservoir basin would be upgraded as required by the Watershed Rules and Regulations, and that upstream reservoir basins would meet their phosphorus guidance values.

Phosphorus loadings are 10 percent from point sources, and 90 percent from non-point sources. The mean annual phosphorus levels from 1988 to 1998 ranged from 15 µg/l to 31 µg/l. The mean annual chlorophyll A levels from 1988 to 1998 ranged from 4.4 µg/l to 31 µg/l. The total phytoplankton alert level of 2,000 SAU/ml and the single genus alert level of 1,000 SAU/ml, established by the NYCDEP Division of Drinking Water Quality Control have been exceeded at times

Fecal Coliform

Data from the NYCDEP for the years 1988 to 1998 ranged from less than 2 CFU/100ml to about 25 CFU/100 ml.

Total Suspended Solids

Available data form 1988 to 1992 show a mean annual total suspended solids range in the water column of 1.9 mg/l to 4.4 mg/l.

HAINES POND

This pond is located in the East Branch drainage basin. Water quality information for this water body is not available.

LAKE TONETTA

Lake Tonetta is a NYSDEC Priority waterbody that measures 74 acres in area. This lake is a class B waterbody and as such, its best uses are primary or secondary contact recreation, fishing, and fish propagation and survival.

This lake is located in the Diverting Reservoir drainage basin. Weed growth, blue/green algae, and high coliform counts force occasional beach closings stressing use of lake for bathing. Weeds also stress boating, fishing, and aesthetics. About one quarter of the lake is covered with weeds. The main concerns are high phosphorus levels, low bottom dissolved oxygen levels, and high coliform counts. Other concerns are failing septic systems (according to the Putnam County Department of Health) and runoff from heavily fertilized lawns. Pollution types include nutrients, silt, oxygen demand, and pathogens. Pollution sources include failing on-site septic systems, urban runoff, storm sewers, and construction (residential and commercial developments).

MIDDLE BRANCH RESERVOIR

The Middle Branch Reservoir is a NYSDEC Priority waterbody that measures 400 acres in area. This reservoir is a class A waterbody and as such, its best uses are water supply for drinking, culinary or food processing purposes, primary or secondary contact recreation, fishing, and fish propagation and survival.

According to the NYSDEC PWL, the Middle Branch Reservoir is use impaired as a water supply, and for fishing, fish propagation, fish survival and aesthetics. The primary use of this reservoir as a drinking water supply source, is threatened by high levels of nutrients resulting from on-site septic systems. Types of pollution include nutrients, silt (sediment), oxygen demand, and pathogens. Sources of pollution include urban runoff, construction (residential and commercial developments), failing on-site septic systems, storm sewers, and WWTPs. Low dissolved oxygen levels in the deeper portion of the reservoir is stressing trout survival. These low oxygen levels are being caused by the die off and decay of algae. The primary pollutant is phosphate. Inflows from Lake Carmel may also be feeding nutrients into the reservoir.

Phosphorus

Using a phosphorus guidance value of 20 µg/l, the Phase II TMDL for the Middle Branch Reservoir is 2,093 lbs/yr. Based on this phosphorus guidance value, this reservoir would be water quality limited and would require non-point phosphorus load reductions of 450 lbs/yr. The

necessary non-point phosphorus load reduction was calculated assuming the WWTPs in the reservoir basin would be upgraded as required by the Watershed Rules and Regulations.

The phosphorus loading from upstream waterbodies affects water quality in the Middle Branch Reservoir. Phosphorus loadings are 11 percent from point sources, 52 percent from Lake Carmel, and 37 percent from non-point sources. The mean annual phosphorus levels from 1988 to 1998 ranged from 14 µg/l to 35 µg/l. The mean annual chlorophyll A levels from 1988 to 1998 ranged from 3.5 µg/l to 20 µg/l. The total phytoplankton alert level of 2,000 SAU/ml and the single genus alert level of 1,000 SAU/ml, established by the NYCDEP Division of Drinking Water Quality Control, have been exceeded at times.

Fecal Coliform

Data from the NYCDEP for the years 1988 to 1998 ranged from less than 2 CFU/100ml to about 135 CFU/100 ml.

Total Suspended Solids

Available data from 1988 to 1992 shows a mean annual total suspended solids range in the water column of 2.6 mg/l to 4.8 mg/l.

MUSCOOT RESERVOIR

There are no lakes or reservoirs in the Town of Southeast that lie within the Muscoot Reservoir drainage basin.

The Muscoot Reservoir is a NYSDEC Priority waterbody that measures 1011 acres in area. This reservoir is a class A waterbody and as such, its best uses are water supply for drinking, culinary or food processing purposes, primary or secondary contact recreation, fishing, and fish propagation and survival.

According to the NYSDEC PWL, the Muscoot Reservoir is use impaired as a water supply, and for fishing, fish propagation, fish survival and aesthetics. The primary use of this reservoir as a drinking water supply source is threatened by high levels of nutrients resulting from urban runoff. Types of pollution include nutrients and silt. Sources of pollution include urban runoff, construction (residential and commercial developments), failing on-site septic systems, storm sewers, and WWTPs.

Phosphorus

Using a phosphorus guidance value of 20 µg/l, the Phase II TMDL for the Muscoot Reservoir is 20,720 lbs/yr. Based on this phosphorus guidance value, this reservoir would be water quality limited and would require non-point phosphorus load reductions of 4,690 lbs/yr. The necessary non-point phosphorus load reduction was calculated assuming the WWTPs in the reservoir basin would be upgraded as required by the Watershed Rules and Regulations, and that upstream reservoir basins would meet the phosphorus guidance value.

The phosphorus loading from upstream reservoirs affects water quality in the Muscoot Reservoir. Phosphorus loadings are 16 percent from point sources, 47 percent from upstream reservoirs and 37 percent from non-point sources. The mean annual phosphorus levels from 1988 to 1998 ranged from 22 µg/l to 37 µg/l. The mean annual chlorophyll A levels from 1988 to 1998 ranged from 6.3 µg/l to 20 µg/l.

Fecal Coliform

Data from the NYCDEP for the years 1988 to 1998 ranged from 3 CFU/100ml to about 248 CFU/100 ml.

Total Suspended Solids

Available data from 1988 to 1992 shows a mean annual total suspended solids range in the water column of 4.5 mg/l to 6.9 mg/l.

PEACH LAKE

Peach Lake is a NYSDEC Priority waterbody that measures 125 acres in area. This lake is a class B waterbody and as such, its best uses are primary or secondary contact recreation, fishing, and fish propagation and survival.

This lake is located in the East Branch drainage basin. High coliform counts force beach closings each summer impairing the lake for bathing. Heavy weed growth particularly at the northern end of the lake impairs boating and fishing. The lake is also use-impaired for fish propagation, fish survival, and aesthetics. The lake is located half in Putnam County and half in Westchester County. According to the Putnam County Department of Health, many on-site septic systems surrounding Peach Lake are inadequate due to small lot sizes, inadequate soils, and undersized systems. These conditions result in nutrients, pathogens, floatables, and oxygen demanding substances entering Peach Lake. Pollution types include nutrients, silt, oxygen demand, and pathogens. Sources of pollution include construction, urban runoff, on-site septic systems, and waterfowl.

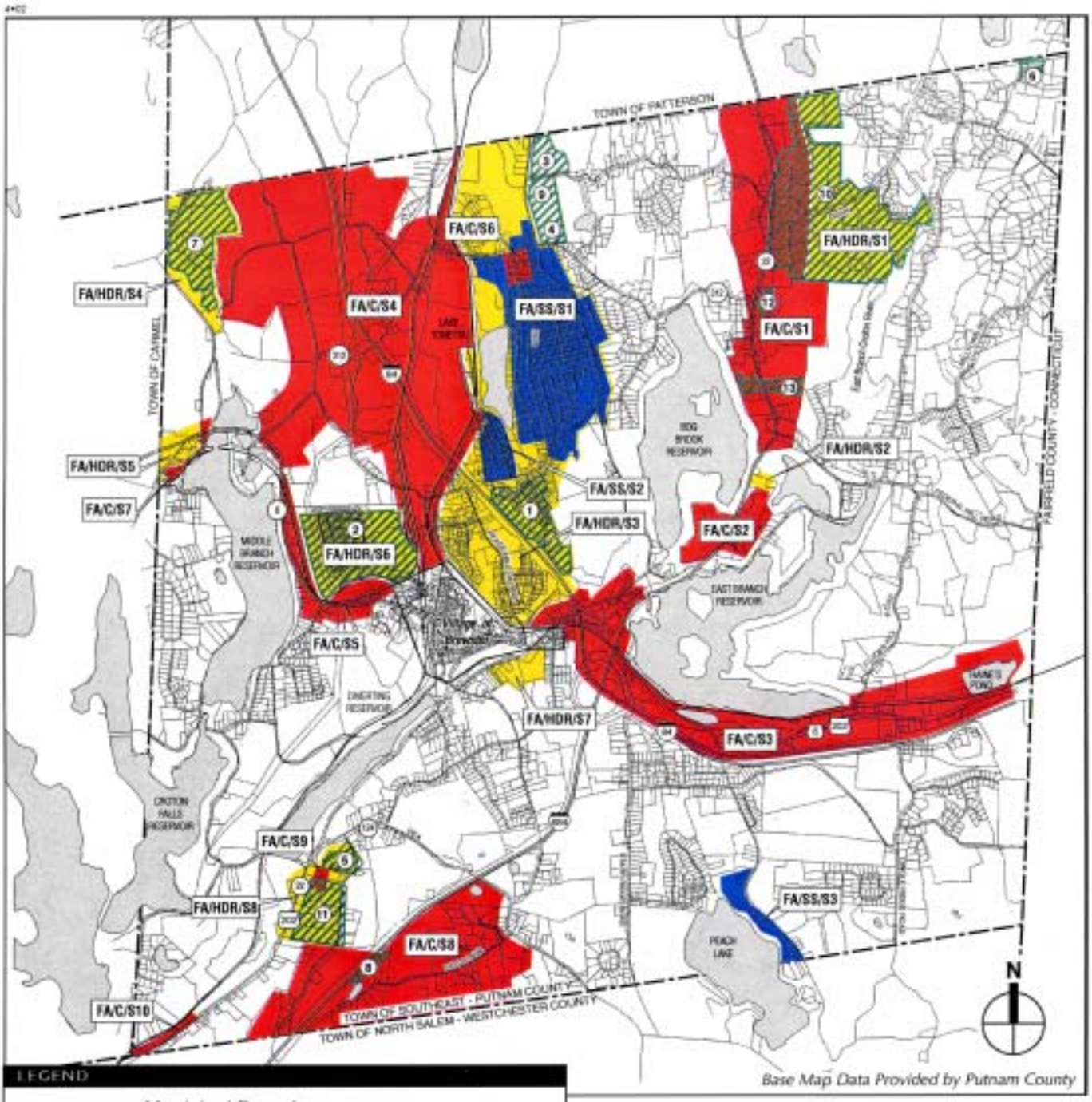
2.2 WATER QUALITY TRENDS

NYCDEP provided water quality data for the period of 1988 to 1998. However, these data were scattered and non-continuous and did not provide conclusive evidence of any trends. In order to examine trends in water quality and to try to compare them with long term trends in land use change, longer term water quality data are needed. According to NYCDEP, reliable data going back several decades is not available. Therefore, it is not possible to provide accurate comment on the effects of development and growth on water quality or to identify long term trends in water quality.

2.3 SOURCES OF CONTAMINATION

2.3.0 FOCUS AREAS

The *Putnam County Croton Watershed Diversion Feasibility Study—Phase 1* (the "Diversion Report") identifies areas of known or potential sources of water quality contamination. The Diversion Report identified both "point sources"—those that can be easily identified by a particular discharge pipe or discharge permit, and "non-point sources"—general runoff from both developed and undeveloped land. The non-point sources were further identified as "Focus Areas" by type of development or area of concern and include: areas of known or potential septic system failure, high-density residential zoned areas, commercial zoned areas, and industrial zoned areas. Within Southeast there are three Septic System Focus Areas, nine High Density Residential Focus Areas, and ten Commercial Focus Areas. (The Diversion Report also identified Industrial Zoned areas, but there are none in Southeast). Figure 2.3-1 identifies the location of each Focus Area and each wastewater treatment plant (WWTP) and its service area.



LEGEND

- Municipal Boundary
- Village of Brewster
- Water Bodies
- High Density Residential Focus Area
- Commercial Focus Area
- Septic System Focus Area
- WWTP Service Area
- (8) Wastewater Treatment Plant (See Table 2.3-2)

Source: Putnam County Croton Watershed Diversion Feasibility Study, Planning Composite & Piping Schematic, Plate P-1

Focus Area

Figure 2.3-1

This section summarizes the findings of the Diversion Report with respect to phosphorus loading from each of the point- and non-point-sources of water quality contamination.

2.3.1 SEPTIC SYSTEM FOCUS AREAS

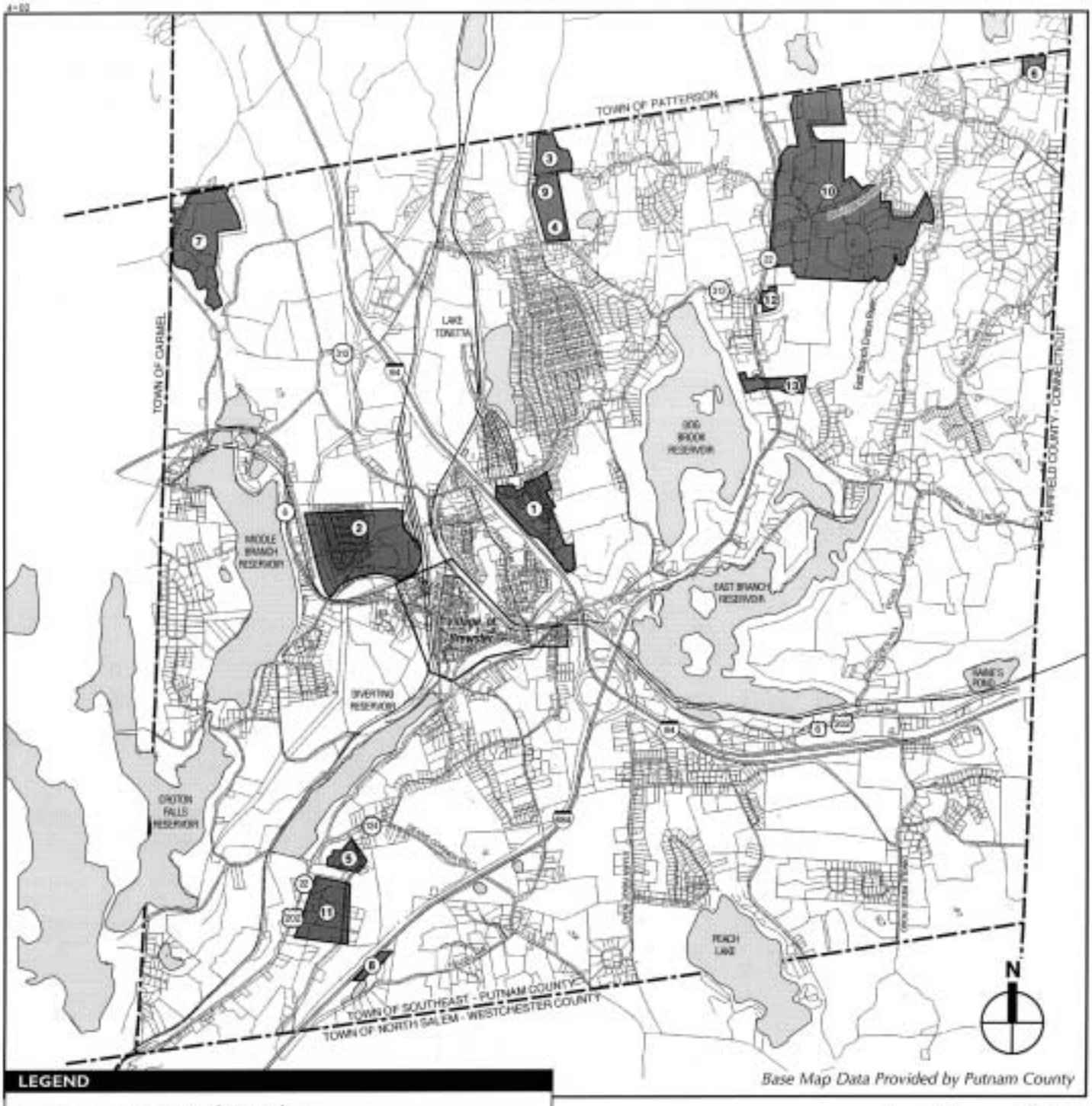
The majority of the Town of Southeast utilizes subsurface sewage treatment systems (SSTSs)—septic systems—to accommodate sewer needs. According to US Census Bureau data for 1990, 74 percent of all housing units in the Town of Southeast rely on SSTSs. Older areas of dense development, which are served by SSTSs, have high potential for septic failure due to the small lot size and the concentration of sub-surface systems. The Putnam County Department of Health (PCDOH) administers an SSTS repair permit program that tracks and reviews SSTS failures and repairs. The PCDOH has identified three areas of existing or potential SSTS failure in the Town of Southeast: 1) the North Brewster Road residential area, 2) the residential area southwest of Lake Tonetta, and 3) the residential area on the east side of Peach Lake (see Figure 2-3.1).

Table 2.3-1 summarizes the phosphorus loading from each of the Septic System Focus Areas attributed to sewage flow and surface runoff from developed and undeveloped areas within the Focus Area. Septic systems that fail can discharge partially treated wastewater to the surface and thus can contribute phosphorus loading to the watershed. In estimating the phosphorus load from failing septic, it was assumed that 30 percent of the septic systems in these areas fail during wet periods, which were assumed to occur 25 percent of the time. Based on journal articles, phosphorus removal from overland flow was estimated at 13 percent. Functioning septic systems discharge wastewater to the soil's subsurface. Based on journal articles, phosphorus removal through soil percolation was estimated at 85 percent. The calculated phosphorus loads presented in Table 2.3-1 are based on the above information.

2.3.2 POINT SOURCE DISCHARGES

The primary type of point source discharge is wastewater treatment plants. There are thirteen surface discharging WWTPs in the Town of Southeast. Table 2.3-2 identifies the name, the State Pollutant Discharge Elimination System (SPDES) Permit number, the measured flow (in millions of gallons per day), and the permitted flow for each WWTP. Figure 2.3-2 identifies each WWTP and its service area. Point source discharges from these WWTPs are permitted by the NYSDEC through the issuance of SPDES permits. Under the Memorandum of Agreement, NYCDEP will fund improvements to all WWTPs in the watershed to advanced treatment at each plant.

Table 2.3-3 summarizes the current sanitary phosphorus loading from each of the WWTPs.



LEGEND

- *Municipal Boundary*
- *Village of Brewster*
- *Water Bodies*
- *WWTP Service Area*
- (8) *Wastewater Treatment Plant (See Table 2.3-2)*

Source: Putnam County Croton Watershed Diversion Feasibility Study, Planning Composite & Piping Schematic, Plate P-1

0 2000 5000 FEET
SCALE

Wastewater Treatment Plants and Service Areas

Figure 2.3-2

Table 2.3-1
Current Phosphorus Loading from Septic System Focus Areas

Focus Area	Location	Reservoir Basin	Estimated Flow (mgd)	P Load from Sanitary Flow (lbs/day)	P Load of Runoff from Developed Portions of Service Area (lbs/day)	P Load of Runoff from Undeveloped Portions of Service Area (lbs/day)
FA/SS/S1	North Brewster Road	Diverting	0.2601	1.74	—	—
FA/SS/S2	Lake Tonetta	Diverting	0.0517	0.35	—	—
FA/SS/S3	Peach Lake	East Branch	0.0408	0.27	—	—
		Total P Daily Load	**3.49**	**2.36**	**1.08**	**0.05**
		Total P Annual Load	**1273.85**	**861.40**	**394.20**	**18.25**

Source: Diversion Report, Tables 3-10 and 7-14, using Phase II phosphorus export coefficients.

Table 2.3-2
Wastewater Treatment Plants

No.	WWTP Name	Ownership	SPDES Permit No.	Reservoir Basin	Measured Flow (mgd)	SPDES Permitted Flow (mgd)
1	Blackberry Hill Sanitary S.D.	Public	62570	Diverting	0.0520	0.0747
2	Brewster Heights S.D. No. 1	Public	110353	Diverting	0.1250	0.1500
3	Brewster High School	Public	29521	East Branch	0.0033	0.0150
4	Henry H. Wells Middle School	Public	29530	East Branch	0.0040	0.0210
5	Holly Stream Condominiums	Private	35254	Muscoot	0.0120	0.0190
6	Hostel No. 1228 Welfare Road	Public	208108	East Branch	0.0007	0.0021
7	Hunters Glen	Private	165531	Middle Branch	0.0550	0.0685
8	I-684 Rest Area No. 45	Public	35955	Muscoot	0.0031	0.0120
9	John F. Kennedy Elementary School	Public	29548	East Branch	0.0050	0.0110
10	Mount Ebo Corporate Center	Private	148946	East Branch	0.0670	0.1600
11	Reed Farms Condominiums	Private	145858	Muscoot	0.0213	0.0500
12	Towne Centre	Private	219045	Bog Brook	0.0190	0.0200
13	Tracy Tertiary (Clock Tower)	Private	214418	East Branch	0.0097	0.0200

Source: Diversion Report, Tables 3-1 and 3-4.

Table 2.3-3

Current Phosphorus Loading from Wastewater Treatment Plants and Service Areas

No.	WWTP Name	Reservoir Basin	Measured Flow (mgd)	P Load from Sanitary Flow (lbs/day)	P Load of Runoff from Developed Portions of Service Area (lbs/day)	P Load of Runoff from Undeveloped Portions of Service Area (lbs/day)
1	Blackberry Hill Sanitary S.D.	Diverting	0.0520	0.35	0.10	0.02
2	Brewster Heights S.D. No. 1	Diverting	0.1250	0.31	0.18	0.05
3	Brewster High School	East Branch	0.0033	0.11	0.06	0.00
4	Henry H. Wells Middle School	East Branch	0.0040	0.13	0.05	0.00
5	Holly Stream Condominiums	Muscoot	0.0120	0.40	0.04	0.00
6	Hostel No. 1228 Welfare Road	East Branch	0.0007	0.02	0.00	0.00
7	Hunters Glen	Middle Branch	0.0550	0.18	0.12	0.04
8	I-684 Rest Area No. 45	Muscoot	0.0031	0.10	0.02	0.00
9	John F. Kennedy Elementary School	East Branch	0.0050	0.17	0.05	0.00
10	Mount Ebo Corporate Center	East Branch	0.0670	0.39	0.35	0.11
11	Reed Farms Condominiums	Muscoot	0.0213	0.05	0.09	0.02
12	Towne Centre	Bog Brook	0.0190	0.05	0.02	0.00
13	Tracy Tertiary (Clock Tower)	East Branch	0.0097	0.02	0.02	0.01
		Total P Daily Load (lbs)	**3.63**	**2.28**	**1.10**	**0.25**
		Total P Annual Load (lbs)	**1324.95**	**832.20**	**401.50**	**91.25**

Source: Diversion Report, Tables 7-1 and 7-5, using Phase II phosphorus export coefficients.

2.3.3 NON-POINT SOURCE DISCHARGES

The Diversion Report identified High Density Residential Focus Areas and Commercial Focus Areas where more intense development has historically occurred or where new development could occur. Each of these Focus Areas contribute phosphorus from both sanitary (septic) sources and from surface runoff from developed and undeveloped areas. Land outside of these Focus Areas are generally rural residential and are not considered to pose as significant a threat to water quality. However, rural residential areas do contribute phosphorus and other contaminants to water bodies but it is presumed that these areas have sufficient land area to create suitable septic disposal fields. Following the discussion of the Focus Areas is a brief description of general considerations with respect to non-point sources.

WASTEWATER TREATMENT PLANT SERVICE AREAS

In addition to point source phosphorus loads, phosphorus load due to surface runoff is another component of the total phosphorus load from WWTP service areas. Table 2.3-3 summarizes the runoff phosphorus loads for both developed and undeveloped land within the WWTP service areas. These estimates were calculated using standard wastewater phosphorus concentrations and Phase II runoff export coefficients.

HIGH DENSITY RESIDENTIAL FOCUS AREAS

The High Density Residential Focus Areas include some of the older residential communities in Southeast such as Brewster Heights, North Brewster Road, and Peaceable Hill Road. They also include some of the newer condominium or townhouse development such as Fieldstone Pond, Virginia Woods, Twin Brook Manor, Reed Farm, and Eagle Ridge (see Figure 2-3.1). These areas of single-family homes on smaller lots or planned developments contribute phosphorus from sewage flow and from surface runoff.

Table 2.3-4 summarizes the phosphorus loading from each of the High Density Residential Focus Areas attributed to sewage flow and surface runoff from developed and undeveloped areas within the Focus Area. These estimates were calculated using standard wastewater phosphorus concentrations and Phase II runoff export coefficients.

COMMERCIAL FOCUS AREAS

The Commercial Focus Areas include any land currently zoned for commercial purposes. These Focus Areas are located along Routes 6 and 22, in the Fields Lane area, and at the interchange of I-84 and NYS Route 312 (see Figure 2-3.1).

Table 2.3-5 summarizes the phosphorus loading from each of the Commercial Focus Areas attributed to sewage flow and surface runoff from developed and undeveloped areas within the Focus Area. These estimates were calculated using standard wastewater phosphorus concentrations and Phase II runoff export coefficients.

OTHER NON-POINT SOURCES

Most areas of development within the Town include some level of stormwater facilities. The systems vary in extent, complexity, condition, and effectiveness. Concentration of stormwater from pipes or ditches can be considered point discharges where a stormwater collection system has a defined discharge point. However, stormwater discharges can also occur throughout a watershed and are most often considered non-point source discharges.

Table 2.3-4
Current Phosphorus Loading from High Density Residential Focus Areas

Focus Area	Location	Reservoir Basin	Sewage Flow (mgd)	P Load from Sewage Flow (lbs/day)	P Load of Runoff from Developed Portions of Service Area (lbs/day)	P Load of Runoff from Undeveloped Portions of Service Area (lbs/day)
FA/HDR/S1	Fieldstone Pond	East Branch	.*			
FA/HDR/S2	Virginia Woods	East Branch	0.0058	0.03	0.02	0.00
FA/HDR/S3	Lake Tonetta/Brewster Hill Road	East Branch, Bog Brook, Diverting	0.1350	0.67	0.59	0.18
FA/HDR/S4	Twin Brook Manor	Middle Branch	0.0003	0.00	0.04	0.01
FA/HDR/S5	Route 6/Tilly Foster	Middle Branch	0.0088	0.04	0.02	0.01
FA/HDR/S6	Brewster Heights/Eagle Ridge	East Branch, Diverting	.**			
FA/HDR/S7	Route 22/Allview Avenue	Diverting	0.0044	0.02	0.02	0.01
FA/HDR/S8	Reed Farm/Holly Stream	Muscoot	0.0017	0.01	0.02	0.01
		Total P Daily Load (lbs)	**1.68**	**0.77**	**0.69**	**0.23**
		Total P Annual Load (lbs)	**613.20**	**281.05**	**251.85**	**80.30**

Notes: * - Entirely within Mount Ebo WWTP Service Area
** - Entirely within Brewster Heights S.D. No. 1 Service Area
Source: Diversion Report, Tables 3-10 and 7-14, using Phase II phosphorus export coefficients.

Table 2.3-5

Current Phosphorus Loading from Commercial Focus Areas

Focus Area	Location	Reservoir Basin	Sewage Flow (mgd)	P Load from Sewage Flow (lbs/day)	P Load of Runoff from Developed Portions of Service Area (lbs/day)	P Load of Runoff from Undeveloped Portions of Service Area (lbs/day)
FA/C/S1	Route 22: Patterson to Milltown	Bog Brook, East Branch	0.0810	0.41	0.09	0.18
FA/C/S2	Route 22: Heidi's/Kisawana	Bog Brook, East Branch	0.0200	0.10	0.02	0.04
FA/C/S3	Route 6: East of Village	East Branch	0.0742	0.37	0.08	0.18
FA/C/S4	Route 312/I-84, Brewster North	Middle Branch, Diverting, East Branch	0.2176	1.09	0.24	0.53
FA/C/S5	Route 6: West of Village	Middle Branch, Diverting	0.0116	0.06	0.01	0.03
FA/C/S6	Route 312/North Brewster Road	East Branch, Diverting	.*			
FA/C/S7	Brewster Road at Route 6	Middle Branch	0.0018	0.01	0.00	0.01
FA/C/S8	Fields Lane	Muscoot	0.1008	0.50	0.11	0.19
FA/C/S9	Lower Mine Road NB-1 District	Muscoot	0.0008	0.00	0.00	0.00
FA/C/S10	Route 22/Croton Falls	Muscoot	0.0004	0.00	0.00	0.01
		Total P Daily Load (lbs)	**4.26**	**2.54**	**0.56**	**1.16**
		Total P Annual Load (lbs)	**1554.90**	**927.10**	**200.75**	**427.05**

Notes: * - Entirely within Brewster Heights S.D. No. 1 Service Area
Source: Diversion Report, Tables 3-10 and 7-14, using Phase II phosphorus export coefficients.

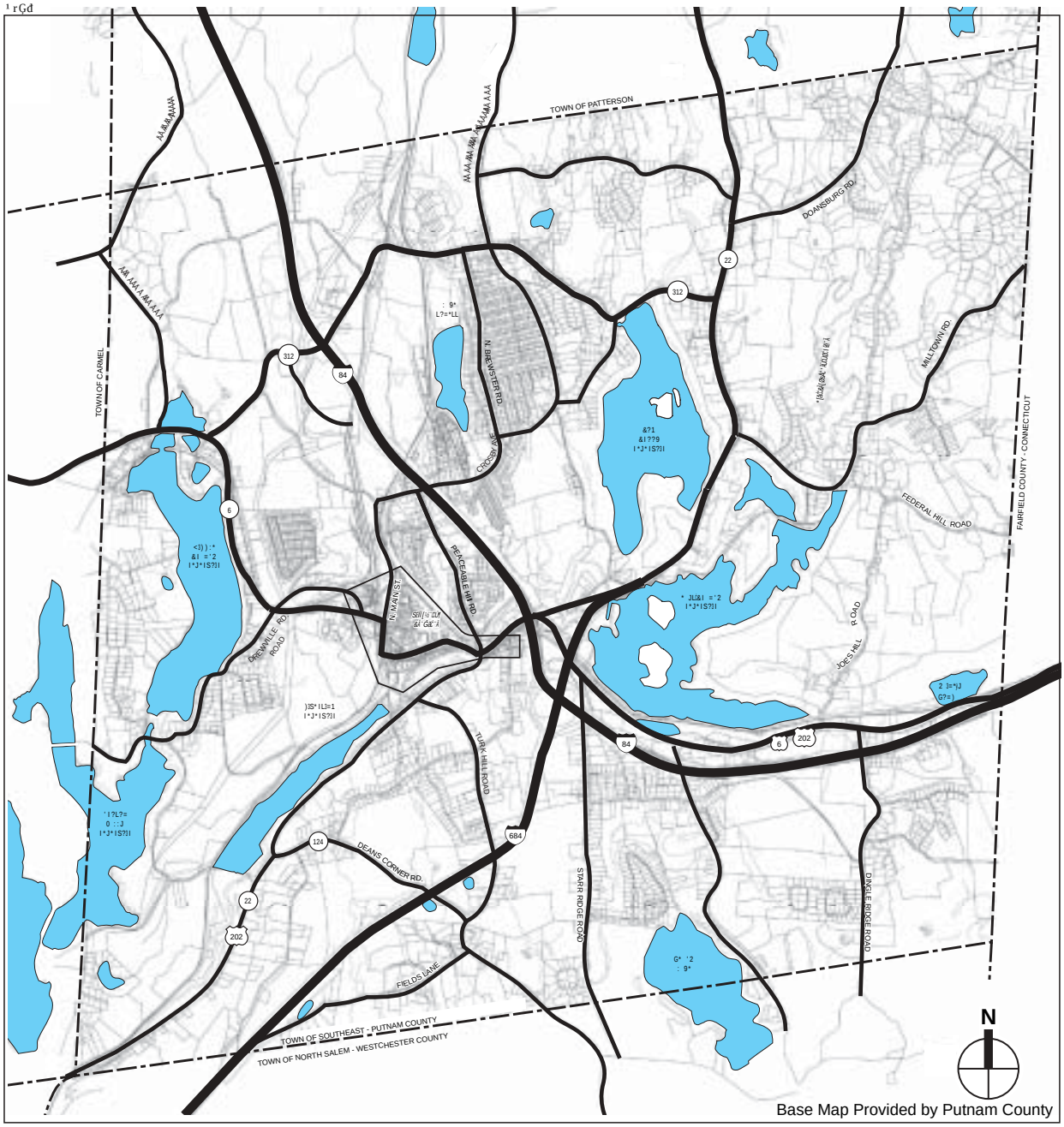
Roads and Other Impervious Surfaces

Impervious surfaces created by development, require particular attention to stormwater management. Areas that include significant impervious surfaces include highways, commercial/industrial areas, and high-density residential areas.

Table 2.3-6 lists the major interstate, state, county, and Town roads located in the Town (see Figure 2.3-3). In addition to these roads, the Town of Southeast Highway Department maintains approximately 80 miles of local roads. These local roads contain approximately 1,300 catch basins and related piping. The Highway Department has initiated a program to collect data on these systems for a future digital database. The Highway Department has purchased a "vac-all" truck for cleaning catch basins and drainage structures. Catch basins are inspected weekly and cleaned on an as-needed basis.

Table 2.3-6
Major Roads

Interstate Highways
I-84
I-684
New York State Highways
US Route 6/202
NYS Route 22
NYS Route 124
NYS Route 312
Putnam County Highways
CR 36 — Drewville Road
CR 51 — Turk Hill Road
CR 53 — Peaceable Hill Road
CR 54 — Milltown Road
CR 57 — John Simpson Road
CR 58 — North Brewster Road
CR 59 — Crosby Avenue
CR 60 — Fair Street
CR 62 — Farm to Market Road
CR 65 — Doansburg Road (Putnam Lake Road)
Town of Southeast Roads
Foggintown Road
Brewster Hill Road
Dingle Ridge Road
Starr Ridge Road
Peach Lake Road
Fields Lane
Minor Road
Prospect Hill Road



IBDBKA

- Highway
- Arterial
- Collector
- Local Street

0 2000 5000 FEET

SCALE

@OLQLK MI>K Ql t k lc Pl rqeb^pq

J ^glo Ol ^ap

Cfdrob /+0*0

Agriculture

Agricultural uses can contribute to non-point discharge of pollutants through application or storage of manure, application of fertilizers or pesticides, or soil erosion. The Putnam County Soil & Water Conservation District has received a grant to conduct an inventory and environmental assessment of agricultural operations within the NYC watershed in Putnam County. Approximately 24 parcels totaling 855 acres have been identified in the County's preliminary inventory. The Phase II TMDLs include specific data for phosphorus loading from agricultural land.

Golf Courses

There are three golf courses in the Town of Southeast: Centennial Golf Club is located in the northwest corner of Town on John Simpson Road; Vail's Grove Golf Course is located in the southeastern portion of the Town on Peach Lake Road; and Milltown Golf Course on Milltown Road. These golf courses are private property and implement their own Best Management Practices (BMPs) for turf and pest management, subject to the Watershed Regulations.

Concentrated Areas of Lawn Near Reservoirs/Reservoir Stems

NYCDEP owns land surrounding most of their reservoirs and reservoir stems in the Town of Southeast. This land serves as a buffer strip to prohibit development directly adjacent to the reservoirs and reservoir stems. The NYCDEP ownership buffer is narrowest surrounding the Middle Branch Reservoir. Some development along US Route 6, on the east side of the reservoir, has lawn areas in close proximity to the reservoir.

Fuel Storage

Fuel storage tanks in excess of 1,100 gallons require registration with NYSDEC pursuant to 6 NYCRR, Part 612, "Registration of Petroleum Storage Facilities." Such facilities are also regulated by the Watershed Regulations (§18-32). A list of registered tanks, and a list of any reported spills associated with these tanks, is available from NYSDEC.

Sand/Salt Storage

Table 2-3.7 identifies the sand/salt storage facilities in the Town of Southeast. The Town currently stores all sand/salt products at its Highway Department facility on Palmer Road. The Town recently constructed a sand/salt storage building at this location. The New York State DOT facility on Route 22 would likely be relocated and redesigned as part of the Route 22 improvements. Storage and use of sand and salt is regulated by the Watershed Regulations (§18-45).

Table 2-3.7
Sand/Salt Storage Facilities

Facility	Location
New York State Department of Transportation	NYS Route 22 south of Milltown Road
Putnam County Department of Highways & Facilities	Old Sodom Road
Town of Southeast Highway Department	Palmer Road

Junk Yards

Table 2-3.8 identifies the existing junk yard facilities in the Town of Southeast. The Simon Auto Wreckers location is directly adjacent to the Middle Branch Reservoir.

Table 2-3.8
Existing Junk Yards

Facility	Location
Brewster Auto Wrecking & Parts	NYS Route 312 east of Metro-North Railroad line
Simon Auto Wreckers	Old Mine Road

2.3.4 STREAMBANK STABILIZATION

Changes to the landscape inherent in land development can alter drainage patterns over land and within stream channels. Increased impervious surface area may increase the rate of runoff such that the rate of water flow in a stream is also increased, leading to potential streambank erosion. Sedimentation from suburban construction areas and other disturbances to the land may be carried to streams altering stream energy and leading to alterations in streambank stability.

Neither NYCDEP, Putnam County, nor the Town of Southeast maintains data regarding locations requiring stream bank stabilization. Town and State stormwater management regulations require that new development manage stormwater on-site so that there is no net increase in the peak flow rate of water leaving the site. On-site detention basins provide both attenuation functions (holding water to lower the storm peak) and water quality functions (settling of sediment carried in the storm water). These measures help to protect streams from new development but do not address potential effects from existing development patterns. NYCDEP should fund a program to assist private land owners to implement streambank stabilization measures where appropriate. The Town of Southeast will identify and correct areas of streambank weakness on Town-owned property.

2.3.5 SUMMARY OF EXISTING PHOSPHORUS LOADS

Table 2.3-9 summarizes the total phosphorus loads from the primary sources identified in the Diversion Report.

2.4 ASSESS FUTURE PHOSPHORUS LOADS

2.4.1 SUMMARY OF TOWN-WIDE DIVERSION REPORT CALCULATIONS

New developments in the watershed could result in an increase in point- and non-point-source phosphorus loads. Areas in the Town of Southeast where new development could occur according to the analysis conducted in the *Putnam County Croton Watershed Diversion Feasibility Study, Phase 1* (the "Diversion Report") include WWTP service areas and Commercial and High Density Residential Focus Areas.

Table 2.3-9
Total Current Phosphorus Loads in Southeast

Source	Total P Load (lbs/day)	P Load of Sewage Flow (lbs/day)	P Load of Runoff from Developed Portions of Service Area (lbs/day)	P Load of Runoff from Undeveloped Portions of Service Area (lbs/day)
Septic System Focus Areas	3.49	2.36	1.08	0.05
High Density Residential Focus Areas	1.69	0.77	0.69	0.23
Commercial Focus Areas	4.26	2.54	0.56	1.16
WWTPs and Service Areas	3.63	2.28	1.10	0.25
Total Daily Load (lbs)	**13.07**	**7.95**	**3.43**	**1.69**
Total Annual Load (lbs)	**4770.55**	**2901.75**	**1251.95**	**616.85**

Current sanitary phosphorus loading from point sources (WWTPs) was calculated using actual plant data for effluent flow and phosphorus concentrations in the *Diversion Report*. Where actual data on effluent phosphorus concentrations was not available, an industry standard value of 4 mg/l was assumed. The total sanitary point phosphorus load to the watershed from these plants was calculated as 832.20 lbs/yr (see Table 2.4-1).

Projected (to year 2030) sanitary phosphorus loads for the WWTPs in the Town of Southeast, as stated in the Diversion Report, were calculated assuming each plant would be discharging at its maximum SPDES permitted flow and assuming the phosphorus effluent limits set forth in the New York City Watershed Rules and Regulations were being met. Two exceptions were the Brewster Heights Sewer District No. 1 and the Towne Centre WWTPs. For these plants, projections indicated that flows could exceed their respective current SPDES permitted capacities, and it was assumed these plants could be expanded, if needed, under the 2 to 1 phosphorus offset variance provision for surface discharging plants in the Watershed Regulations. The total estimated projected sanitary phosphorus load to the Croton Watershed from these plants, as calculated in the Diversion Report, is 1,120.55 lbs/yr. Table 2.4-1 summarizes the estimates of projected sanitary phosphorus loads. The estimated increase in phosphorus point source load as a result of growth in the areas served by these WWTPs would therefore be 288.35 lbs/yr (1120.55 minus 832.20).

Current sanitary phosphorus loads from Focus Area sewage discharges were calculated in the Diversion Report assuming all the areas use septic systems for their wastewater treatment. For these septic systems, it was assumed that septic tank effluent contains a phosphorus concentration of 4 mg/l and 85 percent of the phosphorus in the effluent is removed through soil percolation. Projected loads were determined assuming each Focus Area would eventually construct a subsurface discharging WWTP with effluent phosphorus limits as required by the Watershed Rules and Regulations. The Focus Area sanitary phosphorus loads shown in Table 2.4-1 are for all the Focus Areas in the Town of Southeast.

Phosphorus loads coming from surface runoff were calculated in the Diversion Report by multiplying land areas by an appropriate total phosphorus (TP) export coefficient. Land use is the main factor involved in determining the values of these export coefficients. For Putnam County, it was assumed that all undeveloped lands are a combination of agricultural, forest, and water areas. Developed areas were classified as urban regardless of the level of development.

The TP export coefficients, used for calculating the surface runoff TP loads, were obtained from the NYCDEP *Proposed Phase II Phosphorus TMDL Calculations* Report ("Phase II TMDL Report"). The TP loads to the Croton Watershed from surface runoff were determined by first estimating the amount of developed and undeveloped land for each focus area and WWTP service area. Next, the appropriate export coefficient was applied to the developed and undeveloped areas. This was done for current and projected levels of development. Table 2.4-1 tabulates the current and projected phosphorus runoff loads for the WWTP service areas and Focus Areas in Southeast. The developed area export coefficient used is equal to the urban export coefficient from the Phase II TMDL Report. The undeveloped export coefficient used is an average of the agricultural, forest, and water (atmospheric) export coefficients from the Phase II TMDL Report.

Table 2.4-1

Current and Projected Phosphorus Loads WWTPs and Focus Areas

Source	Sewage Phosphorus Load (lbs/yr)			Surface Runoff Phosphorus Load (lbs/yr)	
	Current	Projected		Current	Projected
		*Without Diversion**	*With Diversion*		
WWTPs & Service Areas	832.20	1120.55	0	492.75	547.50
Focus Areas	2069.55	919.80	288.35	1376.05	1741.05
Totals	**2901.75**	**2040.35**	**288.35**	**1868.80**	**2,288.55 ******
Total Sewage + Surface Runoff					
Total Current	**4770.55 lbs/yr**				
Total Projected without Diversion	**4328.90 lbs/yr*****				
Total Projected with Diversion	**2576.90 lbs/yr********				

Notes: All current and projected (year 2030) phosphorus loading estimates are as calculated in the *Diversion Report*, using Phase II phosphorus export coefficients.

* - Assumes surface discharing WWTPs are built for Septic Focus Areas and subsurface discharging WWTPs are built for Commercial and High Density Residential Focus Areas, and existing WWTPs are upgraded according to the Watershed Regulations.

** - Total increase in phosphorus runoff load as a result of projected development is approximately 419.75lbs/yr (2288.55 minus 1868.80).

*** - Upgrading existing WWTPs and constructing new WWTPs for the Focus Areas would decrease the phosphorus load by approximately 441.65 lbs/yr (4770.55 minus 4328.90) from current levels. This reduction takes into account the increase in non-point source loading due to projected development in Southeast.

**** - A flow diversion system would decrease the phosphorus load to the Croton Watershed by approximately 2193.65 lbs/yr (4770.55 minus 2576.90) from current levels. This reduction takes into account the increase in non-point source loading due to projected development in Southeast. The phosphorus load reduction presented in the Diversion Report assumed the diversion of all the focus area flows. The reduction shown in this report assumes that only the flows from WWTP service areas and failing septic areas would be diverted.

Upgrading existing WWTPs and constructing new WWTPs for the Focus Areas would decrease the phosphorus load by approximately 441.65 lbs/yr (4770.55 minus 4328.90) from current levels. This reduction takes into account the increase in non-point source loading due to projected development in Southeast. A flow diversion system that would remove sanitary flows from both existing WWTPs and failing septic areas would decrease the phosphorus load to the Croton Watershed by approximately 2193.65 lbs/yr (4770.55 minus 2576.90) from current levels.

2.4.2 PHOSPHORUS LOADING WITH RESPECT TO GROWTH CONSISTENT WITH THE TOWN'S COMPREHENSIVE PLAN

The estimates of phosphorus loads projected in the future for the Town of Southeast just presented assume that development could occur in each of the Focus Areas identified in the Diversion Report. However, the Town of Southeast does not believe that growth will, or should, occur in all Focus Areas identified in the Diversion Report. Table 2.4-2 identifies the "Growth Focus Areas" compatible with the Town of Southeast's Comprehensive Plan.

Table 2.4-2
Growth Focus Areas

Focus Area	Location	Type of Growth
FA/HDR/S7	Route 22/Allview Avenue	Possible limited residential growth
FA/C/S1	Route 22: Patterson to Milltown Road	General commercial growth
FA/C/S2	Route 22: Heidi's/Kisawana	Commercial/Campus growth
FA/C/S3	Route 6: East of Village	Commercial/Warehouse growth
FA/C/S4	Route 312/I-84, Brewster North	Commercial office park
FA/C/S5	Route 6: West of Village	Limited in-fill growth
FA/C/S7	Brewster Road at Route 6	Limited in-fill growth
FA/C/S8	Fields Lane	Commercial/Warehouse growth
FA/C/S9	Lower Mine Road NB-1 District	Limited in-fill growth
FA/C/S10	Route 22/Croton Falls	Limited in-fill growth

For these Growth Focus Areas, the current and projected sanitary phosphorus loads to the Croton Watershed, as calculated in the Diversion Report, are 934.40 lbs/yr and 233.60 lbs/yr, respectively. The projected load is lower than the estimated current load due to the increased treatment of sanitary waste from improvements to existing WWTPs as required by the Watershed Regulations. With subsurface discharging plants, instead of septic systems, the sanitary phosphorus load from sewage from the growth focus areas, would decrease by 700.80 lbs/yr (from 934.40 lbs/yr to 233.60 lbs/yr). Subsurface discharging plants, however, may not be a feasible option for all of the Growth Focus Areas due to environmental constraints such as soils, slopes, and setback restrictions.

The *current* calculated surface runoff phosphorus load from WWTP service areas and Growth Focus Areas is 1131.50 lbs/yr. The *projected* calculated surface runoff phosphorus load from WWTP service areas and Growth Focus Areas is 1441.75 lbs/yr. Table 2.4-3 summarizes point- and non-point-source, current and projected phosphorus loads from WWTP service areas, and Growth Focus Areas.

Table 2.4-3

Current and Projected Phosphorus Loads from WWTPs and Growth Focus Areas

Phosphorus Source	Current (lbs/yr)	Projected (lbs/yr)
WWTP Service Areas — Sewage	832.20	1120.55
Growth Focus Areas — Sewage	934.40	233.60
Surface Runoff—Growth Focus Areas and WWTP Service Areas	1131.50	1441.75
Total	**2898.10**	**2795.90**

As indicated in Table 2.4-3, the total projected phosphorus load from the WWTP service areas and Growth Focus Areas in the Town of Southeast would be about 102.20 lbs/yr less than the total current estimated load. The increased load from the WWTP service areas and surface runoff would be balanced by providing subsurface discharging treatment plants for the commercial and high density residential areas. As previously mentioned, subsurface discharging plants may not be possible for all of the Growth Focus Areas in Southeast. ×

Section 3: Recommended Investments to Address Water Quality Problems

3.0 INTRODUCTION

Under the Watershed Regulations, in lieu of diversion, existing wastewater treatment plants must be upgraded to achieve higher levels of treatment. Each plant would be required to implement sand filtration with redundant capacity, back-up chlorination with automatic start-up, phosphorus removal, and microfiltration. Each plant would also need to have stand-by emergency power, a flow meter with a recording device, and an alarm system with a signal to a control monitoring station with around the clock monitoring. Dechlorination is not directly called for, however, the Watershed Rules and Regulations require facilities to follow New York State requirements for pollution control. Dechlorination is likely to be mandated in order to meet certain stream/fish/wildlife criteria. For A, A-S, AA, AA-S, B, and C waters, the New York State Department of Environmental Conservation (NYSDEC) has established a Total Residual Chlorine (TRC) standard of 5 µg/l for the protection of aquatic organisms.

In the *Putnam County Croton Watershed Diversion Feasibility Study, Phase 1* (the "Diversion Report"), the projected population growth during the planning period of 30 years, based on U.S. Census data, is 30 percent. It was assumed that this 30 percent growth in population would result in an increase in wastewater generation of 30 percent over currently measured levels. With the exception of the Brewster Heights S.D. No.1, Hunters Glen, and Towne Centre WWTPs, the WWTPs in the Town of Southeast have enough SPDES permitted capacity to be able to accommodate this extra flow. For the Hunters Glen WWTP, it was decided that the current SPDES permitted flow would be sufficient because the area the plant serves is not likely to expand. The Brewster Heights S.D. No.1 and Towne Centre WWTPs, however, may need to be expanded in the future.

This Section identifies possible infrastructure investments that need to be made to address water quality problem areas in response to anticipated growth. The analyses described in this section assume that the required upgrades to WWTPs would be made.

New wastewater treatment capacity is essential for new growth of any kind to occur in the Town of Southeast. While the Town intends to reduce overall residential density in certain sections of the Town, which would generally rely on individual septic systems, new commercial growth would require wastewater treatment infrastructure. Wastewater capacity would help to ensure a balance of commercial growth to help the Town achieve the vision set forth in its Comprehensive Plan.

3.1 DIVERSION OF WASTEWATER

In reservoirs and lakes, phosphorus is usually the limiting nutrient, as is the case in the Croton Watershed. Because of the concerns regarding the effect of phosphorus on the eutrophic state of many of the New York City reservoirs and potable water quality, there is a section in the Diversion Report that is dedicated to estimating current and projected phosphorus loads to the Croton Watershed from WWTPs, failing septic, high density residential, commercial, and

industrial focus areas, and surface runoff. Data from this section of the Diversion Report were utilized to determine the benefits of flow diversion.

3.1.1 BENEFITS OF DIVERSION TO COMMUNITY CHARACTER

The Diversion Report presents an engineering feasibility analysis for total diversion of wastewater flows from the Croton Watershed. The concept of flow diversion is to take the effluent from existing, and possible future wastewater treatment plants, and convey the effluent flow to a drainage basin outside the Croton Watershed. This concept is a possible alternative to the current NYCDEP wastewater treatment plant upgrade program.

To determine the overall need for diversion of wastewater flows, the Diversion Report identifies "Focus Areas" where known point and non-point sources of pollution occur or are likely to occur. Of particular interest to community character are the High Density Residential and Commercial Focus Areas within the Town of Southeast. These zoning districts have the greatest potential to affect community character as the land uses associated with them are of a higher intensity, and most different from, the predominant single-family residential pattern of the Town. These areas also affect community character because of their locations along major travel corridors, such as Route 22 and Route 6.

As indicated previously, the Town of Southeast envisions new commercial growth in most Focus Areas, but of a limited extent in several. Table 3.1-1 identifies the "Growth Focus Areas" where the Town envisions growth to occur.

Table 3.1-1
Growth Focus Areas

Focus Area	Location	Type of Growth
FA/HDR/S7	Route 22/Allview Avenue	Possible limited residential growth
FA/C/S1	Route 22: Patterson to Milltown Road	General commercial growth
FA/C/S2	Route 22: Heidi's/Kisawana	Commercial/Campus growth
FA/C/S3	Route 6: East of Village	Commercial/Warehouse growth
FA/C/S4	Route 312/I-84, Brewster North	Commercial office park
FA/C/S5	Route 6: West of Village	Limited in-fill growth
FA/C/S7	Brewster Road at Route 6	Limited in-fill growth
FA/C/S8	Fields Lane	Commercial/Warehouse growth
FA/C/S9	Lower Mine Road NB-1 District	Limited in-fill growth
FA/C/S10	Route 22/Croton Falls	Limited in-fill growth

Allowing growth to occur in these Growth Focus Areas would allow the Town of Southeast to achieve the vision it set for itself in its revised Comprehensive Plan. Section 1.1.6 of this document summarizes the major elements of the Town's vision with respect to community character, natural resource protection, housing, and economic development. Diversion of wastewater from either the existing WWTPs and Septic Focus Areas or from the Growth Focus Areas would be consistent with the Town's Comprehensive Plan. In either case, community character would not be adversely affected and phosphorus loads can be reduced. New opportunities for residential and commercial development as a result of diversion would allow new development in a manner consistent with the Town's Comprehensive Plan.

3.1.2 DIVERSION AND POINT-SOURCE DISCHARGES

Current sanitary phosphorus loading from point sources (WWTPs) was calculated using actual plant data for effluent flow and phosphorus concentrations in the *Diversion Report*. Where actual data on effluent phosphorus concentrations was not available, an industry standard value of 4 mg/l was assumed. The total current sanitary point phosphorus load to the watershed from these plants was calculated as 832.20 lbs/yr (see Table 2.4-1).

Projected (to 2030) sanitary phosphorus loads for the WWTPs in the Town of Southeast, as stated in the Diversion Report, were calculated assuming each plant would be discharging at its maximum SPDES permitted flow and assuming the phosphorus effluent limits set forth in the New York City Watershed Rules and Regulations were being met. Two exceptions were the Brewster Heights Sewer District No. 1 and the Towne Centre WWTPs. For these plants, projections indicated that flows could exceed their respective current SPDES permitted capacities, and it was assumed these plants could be expanded, if needed, under the 2 to 1 phosphorus offset variance provision for surface discharging plants in the Watershed Regulations. The total estimated projected sanitary phosphorus load to the Croton Watershed from these plants, as calculated in the Diversion Report, is 1120.55 lbs/yr. This phosphorus loading to the watershed assumes all the existing WWTPs are upgraded for phosphorus removal. With diversion, the entire phosphorus loading from these plants would be removed from the Croton Watershed. Therefore, including the WWTPs in the Town of Southeast in a diversion system would remove 1120.55 lbs/yr more phosphorus from the watershed than if the treatment plants were upgraded for phosphorus removal.

3.1.3 DIVERSION AND SEPTIC SYSTEM FOCUS AREAS

Failing septic system focus areas are defined as densely developed areas that have had problems with septic failures in the past or may have septic problems in the future. The areas identified within the Town of Southeast as failing septic Focus Areas are: 1) the North Brewster Road residential area, 2) the residential area southwest of Lake Tonetta, and 3) the residential area on the east side of Peach Lake.

The Diversion Report presents calculations of current and projected phosphorus loads to the Croton Watershed for each of these areas. To calculate current phosphorus loads for failing septic focus areas, it was assumed that during wet periods (25 percent of the time) 30 percent of the septic systems fail. A septic system failure occurs when septic tank effluent is discharged to the surface. In the Diversion Report, a 13 percent phosphorus removal for overland flow and an 85 percent phosphorus removal for soil percolation were assumed. It was also assumed that the amount of phosphorus discharged from septic tanks is equal to 1.2 lbs/year per capita. Following these parameters, the current sanitary phosphorus load from Septic Focus Areas in the Town of Southeast was calculated as 861.40 lbs/yr.

The Septic Focus Areas in the Town of Southeast are not within a 60-day restricted basin. In the Diversion Report it was therefore assumed it would be possible to construct a new surface treatment plant for each of the three Septic Focus Areas within the town. Under a variance, the Watershed Rules and Regulations allow for the construction of new surface-discharging plants for areas not within a 60-day restricted basin where existing conditions result in the release or discharge of inadequately treated sewage into the water supply. The projected loads for these areas were calculated assuming each new plant would have a phosphorus effluent limit as set forth in the Watershed Rules and Regulations. The Septic Focus Areas are currently almost fully built out; only minor residential in-fill development could occur in some locations. As a result,

the estimated projected flows are only slightly larger than the estimated current flows. The calculated projected sanitary phosphorus load from Septic Focus Areas in the Town of Southeast is 631.45 lbs/yr (assuming new surface discharging WWTPs are constructed for these areas) (see Table 3.1-2).

This phosphorus loading to the watershed assumed new treatment plants with phosphorus removal facilities would be constructed for Septic Focus Areas. With diversion, the entire sanitary phosphorus loading from failing septic areas would be removed from the Croton Watershed. Therefore, including the Septic Focus Areas in the Town of Southeast in a diversion system would remove either 861.40 lbs/yr more compared to current conditions or 631.45 lbs/yr more if new surface-discharing WWTPs were constructed.

3.1.4 DIVERSION RECOMMENDATION

The total phosphorus load to the Croton Watershed from focus areas and WWTP service areas in the Town of Southeast consists of sanitary loads and surface runoff loads. Table 3.1-3 summarizes current and projected surface runoff and sanitary phosphorus loads. The portion of the total phosphorus load that would be removed with flow diversion is the sanitary load from existing WWTP service areas and failing septic focus areas. As can be seen in Table 3.1-3, taking planned growth into account, sewage diversion would reduce the phosphorus load from the Town of Southeast to the Croton Watershed from 4770.55 lbs/yr to 2576.90 lbs/yr. Without diversion, the projected load to the Croton Watershed would be 4328.90 lbs/yr. In summary, diversion would reduce the phosphorus load from the Town of Southeast by 46 percent. In comparison, upgrading existing WWTPs and providing new WWTPs for the Focus Areas would reduce the phosphorus load by 9 percent.

NYCDEP has calculated Total Maximum Daily Loads (TMDLs) for phosphorus for each of the reservoirs in the Croton Watershed. The Phase II TMDLs were calculated using 920 µg/l phosphorus guidance value (15 µg/l for source water reservoirs). Table 3.1-4 shows the necessary non-point source phosphorus reductions needed to meet TMDLs for each reservoir assuming all existing WWTPs in Putnam County are upgraded as per the Watershed Regulations. Table 3.1-5 shows the necessary non-point source phosphorus reductions needed to meet TMDLs for each reservoir if a Putnam County flow diversion scheme was implemented. This table assumes that only the flow from WWTPs would be diverted.

The calculations in both tables assume that, of the four land use types used to calculate TMDLs (urban, agricultural, forest, and water), non-point phosphorus reductions would only be implemented in urban and agricultural areas (the "Affected Area"). The Phase I TMDL Report provided acreage estimations for the Affected Area. The final column in both tables shows the percentage of the existing non-point (surface runoff) phosphorus load from urban and agricultural areas that must be removed from the reservoir basin in order for the reservoir to meet its Phase II TMDL. These values were calculated by dividing the required non-point reductions by the non-point phosphorus load from urban and agricultural areas.

The calculations in Table 3.1-5 assume that the flow from each of the existing surface discharging WWTPs in Putnam County was diverted out of the Croton Watershed and that each WWTP would be discharging at its SPDES permitted flow at the phosphorus effluent limitations set forth in the Watershed Regulations. Two exceptions are the Brewster Heights S.D. No. 1 and

Table 3.1-2
Projected Phosphorus Loading from Septic System Focus Areas

FA	Area	Basin	Projected Flow (mgd)	P Load from New WWTP† (lbs/day)	P Load of Runoff from Developed Portions of Service Area (lbs/day)	P Load of Runoff from Undeveloped Portions of Service Area (lbs/day)
FA/SS/S1	North Brewster Road	Diverting	0.2744	1.14	0.93	0.03
FA/SS/S2	Lake Tonetta	Diverting	0.0592	0.25	0.10	0.01
FA/SS/S3	Peach Lake	East Branch	0.0411	0.34	0.09	0.00
		Total P Daily Load (lbs)	**2.89**	**1.73**	**1.12**	**0.04**
		Total P Annual Load (lbs)	**1054.85**	**631.45**	**408.80**	**14.60**

Note: †- Assumes new WWTPs in Septic Focus Areas within basins that are not 60-day restricted are surface discharging.

Table 3.1-3

Current and Projected Phosphorus Loads WWTPs and Focus Areas

Source	Sanitary Phosphorus Load (lbs/yr)			Surface Runoff Phosphorus Load (lbs/yr)	
	Current	Projected		Current	Projected
		*Without Diversion**	*With Diversion*		
WWTPs & Service Areas	832.20	1120.55	0	492.75	547.50
Focus Areas	2069.55	919.80	288.35	1376.05	1741.05
Totals	**2901.75**	**2040.35**	**288.35**	**1868.80**	**2288.55 ******
Total Sanitary + Surface Runoff					
Total Current	**4770.55**				
Total Projected without Diversion	**4328.90*****				
Total Projected with Diversion	**2576.90******				

Notes: All current and projected (year 2030) phosphorus loading estimates are as calculated in the *Diversion Report*.

* - Assumes surface discharging WWTPs are built for Septic Focus Areas and subsurface discharging WWTPs are built for Commercial and High Density Residential Focus Areas, and existing WWTPs are upgraded according to the Watershed Regulations.

** - Total increase in phosphorus runoff load as a result of projected development is approximately 419.75 lbs/yr (2288.55 minus 1868.80).

*** - Upgrading existing WWTPs and constructing new WWTPs for the Focus Areas would decrease the phosphorus load by approximately 441.65 lbs/yr (4770.55 minus 4328.90) from current levels. This reduction takes into account the increase in non-point source loading due to projected development in Southeast.

**** - A flow diversion system would decrease the phosphorus load to the Croton Watershed by approximately 2193.65 lbs/yr (4770.55 minus 2576.90) from current levels. This reduction takes into account the increase in non-point source loading due to projected development in Southeast. The phosphorus load reduction presented in the Diversion Report assumed the diversion of all focus area flows. The reduction shown in this report assumes that only the flows from the WWTP service areas and failing septic areas would be diverted.

Table 3.1-4

Necessary Non-Point Phosphorus Reductions Assuming WWTP Upgrades

Reservoir	Phase II Basin Area (acres)	Phase II TMDL (lbs/yr)	Water Quality Limited for Phase II TMDL?	Non-Point Reductions Necessary to Meet Phase II TMDL (lbs/yr)	Affected Area † (acres)	Surface Runoff Load from Affected Area (lbs/yr) §	Pct. Runoff Load Reduction Necessary ‡
20 µg/l Phosphorus Guidance Value							
Middle Branch	13,640	2,093	Yes	450	2,007	1,225	37%
Bog Brook	2,350	827	No	None	N/A	N/A	N/A
East Branch	49,025	6,223	Yes	2,190	9,402	4,505	49%
Diverting	4,670	6,170	Yes	2,168*	1,510	1,125	100%**
Muscoot	47,864	20,720	Yes	4,690	N/A***	N/A***	N/A***
15 µg/l Phosphorus Guidance Value							
Croton Falls	10,823	7,861	Yes	1,299	1,839	1,194	100%**

Notes: †- Of the four land use types used to calculate TMDLs (urban, agricultural, forest, and water), it is assumed that non-point phosphorus reductions would only be implemented in urban and agricultural areas (the "Affected Area"). This column shows the total urban and agricultural areas in each reservoir basin according to the *Phase I TMDL Report*.

‡- This column shows the percentage of the existing non-point (surface runoff) phosphorus load from urban and agricultural areas that must be removed from the reservoir basin in order for the reservoir to meet its Phase II TMDL. These values were calculated by dividing the required non-point reductions (column 5 of this table) by the non-point phosphorus load from urban and agricultural areas (column 7 of this table).

§-Surface runoff loads calculated using Phase II phosphorus export coefficients.

*- The total phosphorus runoff load to the Diverting Reservoir Basin is less than this value.

**- Controlling surface runoff from urban and agricultural areas would not reduce phosphorus enough to meet the TMDL. Other controls are needed.

***- Data not available.

Table 3.1-5

Necessary Non-Point Phosphorus Reductions Assuming Flow Diversion

Reservoir	Phase II Basin Area (acres)	Phase II TMDL (lbs/yr)	Water Quality Limited for Phase II TMDL?	Non-Point Reductions Necessary to Meet Phase II TMDL (lbs/yr)	Point Source * Load Removed by Diversion (lbs/yr)	Net Non-Point Reductions Necessary (lbs/yr)	Affected Area † (acres)	Surface Runoff Load from Affected Area (lbs/yr) §	Pct. Runoff Load Reduction Necessary ‡
20 µg/l Phosphorus Guidance Value									
Middle Branch	13,640	2,093	Yes	450	336	114	2,007	1,225	9%
Bog Brook	2,350	827	No	None	77	N/A	N/A	N/A	N/A
East Branch	49,025	6,223	Yes	2,190	880	1,310	9,402	4,505	29%
Diverting	4,670	6,170	Yes	2,168**	818	1,350**	1,510	1,125	100%***
Muscoot	47,864	20,720	Yes	4,690	376	4,314	N/A****	N/A****	N/A****
15 µg/l Phosphorus Guidance Value									
Croton Falls	10,823	7,861	Yes	1,299	1,285	14	1,839	1,194	1%

Notes: †- Of the four land use types used to calculate TMDLs (urban, agricultural, forest, and water), it is assumed that non-point phosphorus reductions would only be implemented in urban and agricultural areas (the "Affected Area"). This column shows the total urban and agricultural areas in each reservoir basin according to the *Phase I TMDL Report*.

‡- This column shows the percentage of the existing non-point (surface runoff) phosphorus load from urban and agricultural areas that must be removed from the reservoir basin in order for the reservoir to meet its Phase II TMDL. These values were calculated by dividing the required non-point reductions (column 7 of this table) by the non-point phosphorus load from urban and agricultural areas (column 9 of this table).

§- Surface runoff loads calculated using Phase II phosphorus export coefficients.

*- Load removed assuming only the diversion of WWTPs.

**-The total phosphorus runoff load to the Diverting Reservoir Basin is less than this value.

***- Controlling surface runoff from urban and agricultural areas would not reduce phosphorus enough to meet the TMDL. Other controls are needed.

****- Data not available.

Towne Centre WWTPs. For these plants, the projected flows in the Diversion Report were greater than the current

SPDES permitted flows, and it was assumed that the plants could be expanded to a capacity of 30 percent above current measured flows.

These results indicate that the Croton Falls reservoir would be water quality limited based on the 15 µg/l phosphorus guidance value. These same tables show that the other reservoirs, with the exception of Bog Brook, would also be water quality limited if the TMDLs were based on the 20 µg/l guidance value. The tables also show the amount of non-point phosphorus reductions that would be necessary to meet the TMDLs for each reservoir basin with and without flow diversion.Table 3.1-6 provides detailed breakdowns of the current surface runoff (non-point) phosphorus loads in each reservoir basin as they are shown in Tables 3.1-4 and 3.1-5, above.

Table 3.1-7 summarizes the necessary non-point source load reductions within the entire reservoir basins (not just the portion within Southeast) that would be required to meet phosphorus TMDLs for each of the reservoir basins in Southeast if: 1) existing Putnam County surface discharging WWTPs were upgraded to higher treatment standards, or 2) existing Putnam County surface discharging WWTP flows were diverted out of the Croton Watershed.

For the Diverting Reservoir using the 20 µg/l guidance value and the Croton Falls Reservoir using the 15 µg/l guidance value, reducing the surface runoff phosphorus loads from urban and agricultural areas to zero and upgrading the existing WWTPS would still not reduce the phosphorus load enough to meet the TMDLs. The non-point reductions with diversion were calculated assuming all Putnam County WWTPs in these basins where diverted. This was done because the land use data from the NYCDEP is based on reservoir basin, and not defined by town. The implementation of surface runoff phosphorus load reductions would be difficult and only partially effective. As these data indicate, diversion of WWTPs would significantly reduce the area of urban and agricultural uses that would need to be controlled for surface runoff. Even with diversion, however, some of the reservoir basins would still require other phosphorus reduction programs in addition to surface runoff controls to meet their TMDLs.

Thus, results of the Diversion Report prepared by Putnam County indicate that significant reductions in phosphorus load would result from diverting wastewater out of the watershed. Since the Diversion Report was completed, a modified plan, put forth by the Putnam County Executive, proposes to divert only the existing WWTPs and Septic Focus Areas. Wastewater from any existing or new uses in the Commercial or High Density Residential Focus Areas would not be diverted.

The Town of Southeast supports the diversion program of existing WWTPs and Septic Focus Areas and would also support a diversion program including the Commercial and High Density Residential Focus Areas. The Town has identified those Focus Areas where it is most important to allow for new growth (the “Growth Focus Areas”). Diversion of wastewater from existing WWTPs, Septic Focus Areas, and the Growth Focus Areas would support community character goals as set forth in the Town of Southeast Comprehensive Plan. In specific, the Town envisions new commercial growth to occur in the following areas not currently served by centralized sewage collection or treatment:

- I-84/Route 312 interchange (FA/C/S4)
- Fields Lane (FA/C/S8 — east of I-684 only)
- Route 22 north of I-684 (FA/C/S1 and FA/C/S2)
- Route 6 east and west of the Village of Brewster (FA/C/S3 and FA/C/S5)

Certain of the Focus Areas, however, are contrary to current planning efforts in the Town. Little or no additional growth is envisioned in the following areas:

- Route 22 south of the Village of Brewster (FA/C/S10)
- Guinea Road (FA/C/S8 — west of I-684)
- Route 22 NB-1 Zoning District at Lower Mine Road (FA/C/S9)
- Route 22/Allview Avenue multi-family residential district (FA/HDR/S7)
- Route 6 at Brewster Avenue (Old Route 6) (FA/C/S7 and FA/HDR/S5)
- NB-1 Zoning District on Route 312 at North Brewster Road (FA/C/S6)

Table 3.1-6

Surface Runoff Phosphorus Loads

Land Use	Area (ac)	Export Coefficient (lbs/ac/yr)	Load (lbs/yr)	Urban + Agriculture Component	
Bog Brook Reservoir					
Forest	1,488	0.045	67		
Urban	321	0.803	258		
Agriculture	156	0.268	42		
Water	393	0.089	35	**Urban + Agriculture Area (ac)**	**477**
Total	**2,358**		**402**	**Urban + Agriculture Load (lbs/yr)**	**300**
Croton Falls Reservoir					
Forest	7,218	0.045	325		
Urban	1,310	0.803	1,052		
Agriculture	529	0.268	142		
Water	1,169	0.089	104	**Urban + Agriculture Area (ac)**	**1,839**
Total	**10,226**		**1,623**	**Urban + Agriculture Load (lbs/yr)**	**1,194**
Diverting Reservoir					
Forest	3,049	0.045	137		
Urban	1,347	0.803	1,082		
Agriculture	163	0.268	44		
Water	242	0.089	22	**Urban + Agriculture Area (ac)**	**1,510**
Total	**4,801**		**1,284**	**Urban + Agriculture Load (lbs/yr)**	**1,125**
East Branch Reservoir					
Forest	36,659	0.045	1,650		
Urban	3,711	0.803	2,980		
Agriculture	5,691	0.268	1,525		
Water	1,730	0.089	154	**Urban + Agriculture Area (ac)**	**9,402**
Total	**47,791**		**6,309**	**Urban + Agriculture Load (lbs/yr)**	**4,505**
Middle Branch Reservoir					
Forest	10,465	0.045	471		
Urban	1,285	0.803	1,032		
Agriculture	722	0.268	193		
Water	870	0.089	77	**Urban + Agriculture Area (ac)**	**2,007**
Total	**13,342**		**1,774**	**Urban + Agriculture Load (lbs/yr)**	**1,225**

Table 3.1-7
Required Non-Point Source Reductions

Reservoir Basin	Upgrade WWTPs	Divert WWTPs
20 µg/l Phosphorus Guidance Value		
Middle Branch	37%	9%
Bog Brook	None	None
East Branch	49%	29%
Diverting	> 100%	> 100%
Muscoot*	N/A	N/A
15 µg/l Phosphorus Guidance Value		
Croton Falls	> 100%	1%
Notes: *- Data not available for Muscoot Reservoir basin.		

3.2 NEW OR EXPANDED WASTE WATER TREATMENT PLANTS

In the Town of Southeast, new surface discharging WWTPs may be constructed or existing surface discharging WWTPs may be expanded under the Phosphorus Offset variance or Diversion Credit provision in the Watershed Rules and Regulations.

For Septic Focus Areas not within a 60-day restricted basin, it is possible, under a variance in the Watershed Regulations, to construct new surface discharging WWTPs as long as the plants are sized to provide treatment for only the problem area. As the Septic Focus Areas in Southeast are not located within a 60-day restricted basin, surface dishcarging WWTPs can possibly be constructed for these areas.

The benefits of sewering areas of failed or likely to fail septic systems has been addressed previously (see Section 3.1.3). The current sanitary phosphorus load from sewage from Septic Focus Areas in the Town of Southeast was calculated as 861.40 lbs/yr. The calculated projected sanitary phosphorus load to the Croton Watershed from Septic Focus Areas in the Town of Southeast is 631.45 lbs/yr. (The projected phosphorus loading to the watershed assumes a limited amount of growth and that new surface discharging WWTPs with phosphorus removal facilities would be constructed for the Septic Focus Areas.) The projected sanitary phosphorus load from these Septic Focus Areas would be similar if sewage from these areas were to be treated at an existing wastewater treatment plant. Therefore, sewering and treating waste from Septic Focus Areas would result in a decrease of 229.95 lbs/yr (861.40 minus 631.45) of phosphorus to the Croton Watershed. The Town recommends consideration of WWTPs for Septic System Focus Areas should funding become available for the design, construction, and on-going operation and maintenance of WWTPs serving the Septic System Focus Areas.

The Towne Centre WWTP service area, and Focus Areas FA/HDR/S2, FA/C/S1, and FA/C/S2 are partially or totally located within the Bog Brook Basin, which at the current time is not listed as phosphorus or 60-day restricted. These areas therefore should be able to construct new surface discharging WWTPs or be connected to the existing Towne Centre WWTP, which could be allowed to expand, and would therefore not need to be included in the Phosphorus Offset or Diversion Credit Programs.

3.2.1 PHOSPHORUS OFFSETS

The Watershed Regulations include a provision for a pilot phosphorus offset program (§18-82(g)) that would allow a new surface discharging WWTP in a phosphorus-restricted basin provided that a three to one offset of phosphorus could be achieved through non-point or point source reductions elsewhere in the watershed. The pilot program would evaluate the effectiveness of phosphorus offsets in constructing new surface discharging WWTPs in phosphorus restricted basins. Under this pilot program, up to three surface discharging WWTPs could be constructed in Putnam County. The total capacity for the three plants can not exceed 150,000 gallons per day (gpd) and the plants must meet a three to one phosphorus offset. This pilot program is limited to a term of 5 years. At the end of this term NYCDEP would decide on whether or not to establish a permanent offset program for the construction of new surface discharging treatment plants.

The load reduction benefits of using phosphorus offsets should be quite clear. For every kilogram of phosphorus introduced to the watershed from a new WWTP, three kilograms of phosphorus must be removed from the watershed. As has been indicated previously, non-point source pollution constitutes a significant portion of total phosphorus loading throughout the watershed. Allowing a new WWTP by requiring removal of phosphorus from non-point sources would allow for productive economic activity to occur without increasing the phosphorus load to the watershed.

The soils in the Town of Southeast are characterized by shallow depth to rock and high groundwater, thereby making subsurface disposal of wastewater effluent difficult to achieve. Phosphorus offsets, if feasible, would allow the Town to expand its surface discharging wastewater treatment capacity and in turn accommodate planned growth. The phosphorus offset programs would also be beneficial from a load reduction standpoint in that more phosphorus would be taken out of the Croton Watershed than would be introduced by new developments.

Currently, two out of the three possible sites for the phosphorus offset pilot program have been selected. Both of these sites are in the Town of Southeast. The approved projects are the Emgee Highlands retail center located at Route 312 and Independent Way near the I-84 interchange and Campus at Fields Corners mixed-use commercial and residential development located off Pugsley Road on the north side of Route 312 near the I-84 interchange. The two projects have received a total allocation of 80,000 gpd. A third project has not yet been selected for inclusion in the pilot phosphorus offset program. That project could receive up to 70,000 gpd. The only location where the third plant would not be eligible within the Town of Southeast would be anywhere in the Bog Brook Reservoir basin as that basin is not, currently, designated as phosphorus-restricted.

An existing surface discharging WWTP in the Town of Southeast can be expanded under the phosphorus variance provision of the Watershed Regulations if the plant is not within a 60-day restricted basin and by demonstrating that a two to one phosphorus offset can be met. That is, the expanded treatment capacity would have to remove two kilograms of phosphorus for each kilogram of phosphorus that is introduced to the watershed as a result of the expansion. With the exception of the WWTPs for the Holly Stream, Reed Farm condominiums and I-684 Rest Area No. 45, all of the surface discharging WWTPs in the Town of Southeast would be able to expand under this provision of the Watershed Regulations. Table 3.1-8 lists the surface discharging WWTPs in the Town of Southeast that could expand utilizing a two to one phosphorus offset.

Table 3.1-9 identifies the opportunities for wastewater treatment expansion for each of the Focus Areas evaluated in the Diversion Report.

3.2.2 DIVERSION CREDIT PROGRAM

The construction of new surface discharging WWTPs or expansion of existing WWTPs is allowed under the Diversion Credit Program (§18-82(e)) of the Watershed Rules and Regulations. Under this plan, the surface discharging wastewater treatment capacity in Putnam County can be increased by up to 10 percent of the total SPDES permitted flow from existing surface discharging WWTPs in the county that is diverted out of the Croton Watershed. This, in turn, can be assumed to mean that surface discharging wastewater treatment capacity in the Town of Southeast can be increased by up to 10 percent of the total SPDES permitted flow that is diverted from existing surface discharging WWTPs within the Town of Southeast. The total SPDES permitted capacity of surface discharging WWTPs in Southeast is 623,300 gpd. It is reasonable to conclude that the Town of Southeast would be allowed to expand it's surface discharging wastewater treatment capacity by 62,330 gpd, if all of the surface discharging WWTPs in the Town were included in a flow diversion system.

The additional surface discharging wastewater treatment capacity under the Diversion Credit Program could be used to expand any existing surface discharging WWTP and/or to construct new surface discharging WWTPs. Focus areas FA/HDR/S8, FA/C/S8, FA/C/S9, FA/C/S10, and the WWTP service areas for the Holly Stream condominiums, Reed Farm condominiums, and I-684 Rest Area completely or partially lie within a 60-day restricted basin. For these areas, the ten percent diversion credit would be the only option for expanding surface discharging wastewater treatment. The diversion credit cannot be used for new or existing WWTPs within coliform restricted basins; however, at this time no basins have been designated as being Coliform Restricted.

Some residents living in communities served by subsurface treatment systems have expressed concern regarding the impact that centralized sewage collection and surface discharging WWTPs might have on ground water quantity. It should be noted that when such communities decide to examine alternatives to subsurface treatment systems, that site specific impacts such as ground water recharge be examined during the facility planning stages of the investigation of alternate wastewater disposal options.

Under a diversion credit program, additional capacity for new surface discharging WWTPs may be allocated within the Town of Southeast. It is not known at this time the amount of capacity that would be allocated within Southeast.

Table 3.1-8
Wastewater Treatment Expansion Options for WWTPs

No.	Name	SPDES Permitted Flow (mgd)	Basin	Basin Restriction†	Expansion Options for Surface Discharging Plant
1	Blackberry Hill Sanitary S.D.	0.0747	Diverting	Phosphorus	May be allowed if a 2:1 phosphorus offset is achieved by the expansion or as part of the 10% flow diversion credit.
2	Brewster Heights S.D. No. 1	0.1500	Diverting	Phosphorus	
3	Brewster High School	0.0150	East Branch	Phosphorus	
4	Henry H. Wells Middle School	0.0210	East Branch	Phosphorus	
5	Holly Stream Condominiums	0.0190	Muscoot	60-d and P*	May be allowed as part of the 10% flow diversion credit.
6	Hostel No. 1228 Welfare Road	0.0021	East Branch	Phosphorus	May be allowed if a 2:1 phosphorus offset is achieved by the expansion or as part of the 10% flow diversion credit.
7	Hunters Glen	0.0685	Middle Branch	Phosphorus	
8	I-684 Rest Area No. 45	0.0120	Muscoot	60-d and P*	May be allowed as part of the 10% flow diversion credit.
9	John F. Kennedy Elementary School	0.0110	East Branch	Phosphorus	May be allowed if a 2:1 phosphorus offset is achieved by the expansion or as part of the 10% flow diversion credit.
10	Mount Ebo Corporate Center	0.1600	East Branch	Phosphorus	
11	Reed Farms Condominiums	0.0500	Muscoot	60-d and P*	May be allowed as part of the 10% flow diversion credit.
12	Towne Centre	0.0200	Bog Brook	None**	May be allowed at this time.
13	Tracy Tertiary (Clock Tower)	0.0200	East Branch	Phosphorus	May be allowed if a 2:1 phosphorus offset is achieved by the expansion or as part of the 10% flow diversion credit.

Notes: †- Based on Phase II TMDLs using a 20µg/l (15mg for source water) reservoir phosphorus concentration guidance value.
*- 60-day and phosphorus restricted
**- Based on the Phase II TMDLs, using the 20µg/l phosphorus guidance value for the Bog Brook Reservoir, the Towne Centre WWTP is in a basin that *would not be* water quality limited for phosphorus.

Table 3.1-9
Wastewater Treatment Expansion Options for Focus Areas

Focus Area	Projected Flow † (mgd)	Basin	Basin Restriction ‡	Options for Constructing a New Surface Discharging WWTP
Septic Focus Areas				
FA/SS/S1	0.2744	East Branch	Phosphorus	May be allowed, but plant capacity must be sized only for the problem area.
FA/SS/S2	0.0592	Diverting	Phosphorus	
FA/SS/S3	0.1652	East Branch	Phosphorus	
High Density Residential Focus Areas				
FA/HDR/S2	0.0061	Bog Brook	None**	May be allowed at this time.
FA/HDR/S3	0.1499	East Branch	Phosphorus	May be allowed if a 3:1 phosphorus offset is achieved by the expansion*** or as part of the 10% flow diversion credit.
FA/HDR/S4	0.0173	Middle Branch	Phosphorus	
FA/HDR/S5	0.0095	Middle Branch	Phosphorus	
FA/HDR/S7	0.0248	Diverting	Phosphorus	
FA/HDR/S8	0.0085	Muscoot	60-d and P*	May be allowed as part of the 10% flow diversion credit.
Commercial Focus Areas				
FA/C/S1	0.2025	Bog Brook, East Branch	None**, Phosphorus	May be allowed at this time for section in Bog Brook basin. 3:1 phosphorus offset needed for section in East Branch basin.
FA/C/S2	0.0500	Bog Brook	None***	May be allowed at this time.
FA/C/S3	0.1855	East Branch	Phosphorus	May be allowed if a 3:1 phosphorus offset is achieved by the expansion*** or as part of the 10% flow diversion credit.
FA/C/S4	0.5440	Middle Branch	Phosphorus	
FA/C/S5	0.0290	Middle Branch	Phosphorus	
FA/C/S7	0.0045	Middle Branch	Phosphorus	
FA/C/S8	0.2520	Muscoot	60-d and P	May be allowed as part of the 10% flow diversion credit.
FA/C/S9	0.0020	Muscoot	60-d and P	
FA/C/S10	0.0010	Muscoot	60-d and P	

Notes: †- Based on the Putnam County Diversion Report planning year of 2030.
‡- Based on Phase II TMDLs using a 20µg/l (15µg for source water) reservoir phosphorus concentration guidance value.
*- 60-day and phosphorus restricted
**- Based on the Phase II TMDLs, using the 20µg/l phosphorus guidance value for the Bog Brook Reservoir, this Focus Area is in a basin that *would not be* water quality limited for phosphorus.
***- Under the phosphorus pilot program no more than three new WWTPs are to be constructed in Putnam County. The total maximum capacity for the three plants is 150,000 gpd.

The Town would support new WWTPs under the Diversion Credit program for commercial uses only in the following areas where new growth is consistent with the Town's Comprehensive Plan:

- I-84/Route 312 interchange
- Fields Lane
- Route 22 north of I-684
- Route 6 east and west of the Village of Brewster

3.3 STORMWATER MANAGEMENT DISTRICTS

3.3.0 STORMWATER IMPACTS ON WATER QUALITY

Stormwater runoff can be a significant source of non-point source pollution possibly containing nutrients, heavy metals, and oils and grease. Unabated, stormwater can have serious negative effects on water bodies. Within the Town of Southeast, the NYCDEP has information that indicates stormwater may pose a threat to maintaining or meeting water quality goals and standards. New residential and commercial construction is required by State, Town, and NYCDEP regulations to manage stormwater runoff on-site. Areas of existing development are not subject to these same regulations. Creation of new stormwater management districts could allow for creation of new infrastructure (detention basins, water quality basins) to improve the quality of stormwater runoff from these existing neighborhoods.

Table 3.1-7, above, summarizes the non-point source loading reductions required to meet phosphorus TMDLs in reservoirs in Southeast given WWTP improvements or flow diversion. In most cases, the necessary reductions are significant. In two cases, reducing the phosphorus load of surface runoff from urban and agricultural areas to zero would still not reduce the phosphorus load enough to meet the TMDLs. Retrofitting existing residential neighborhoods with new stormwater best management practices, however, is challenging without outside funding given the fragmented land ownership and need to coordinate shared infrastructure or improvements across multiple properties. Stormwater management in the Town's older neighborhoods, especially, would present design and engineering challenges because most residential lots have already been built upon and most vacant land has environmental constraints such as steep slopes or shallow soils.

The Town has identified a number of stormwater projects that would provide water quality benefits and would benefit community character and the operations of the Town. These are discussed below.

3.3.1 STORMWATER MANAGEMENT AREAS

Creation of stormwater management districts in existing developed areas, implementation of stormwater best management practices (BMPs) or other infrastructure, and the ongoing operations and maintenance of these systems requires extensive commitments of financial resources that the Town of Southeast is not prepared to undertake on its own. The Memorandum of Agreement (MOA) allows for funds not used for diversion of wastewater to be used for certain water quality improvements, including stormwater management. Where outside funding would be available for creation and ongoing maintenance, the Town would support creation of districts to improve stormwater management. However, it is the understanding of the Town of Southeast that any funds that may be made available through the MOA would only be used for

capital costs, not for operations and maintenance. Thus, the Town expresses its concern that the Town can not be held responsible for fiscal or physical management of either the districts or the stormwater improvements. The Town does not have, at this time, sufficient resources to properly manage new stormwater infrastructure on other than its own property.

Nevertheless, the Town has implemented a policy of creating "Drainage Districts" in residential subdivisions and assessing a tax to homeowners within the districts to fund the maintenance of the stormwater infrastructure (catch basins, pipes, detention basins) installed by private developers. As of April 2002, five districts have been completed (infrastructure installed) and accepted by the Town. It is expected that six more districts will be accepted once construction is complete. This policy allows the Town to ensure that the drainage infrastructure is functioning properly in a way that does not obligate the Town beyond what it can reasonably fund.

The Lake Tonetta and Peach Lake residential areas as well as Route 22 north of I-684 and Route 6 east and west of the Village of Brewster could benefit from stormwater management districts. Surface runoff from the developed and undeveloped portions of the Lake Tonetta/Brewster Hill Road and Peach Lake Septic Focus Areas (FA/SS/S1, FA/SS/S2, and FA/SS/S3) contributes approximately 412.45 lbs/yr of phosphorus according to the Diversion Report (using Phase II export coefficients). The Diversion Report did not provide a further breakdown between these areas. Surface runoff from the developed and undeveloped portions of the Route 22 area north of I-684 (FA/C/S1 and FA/C/S2) is approximately 120.45 lbs/yr. Surface runoff (using Phase II export coefficients) from Route 6 east of the Village (FA/C/S3) is approximately 94.90 lbs/yr. Surface runoff from Route 6 west of the Village (FA/C/S5) is approximately 14.60 lbs/yr.

It is the Town's understanding that the East-of-Hudson watershed may be declared a Municipal Separate Storm Sewer System (MS4) under USEPA's "Stormwater Phase II Final Rule." The Town received a grant from the New York State Department of State for implementation of Phase II programs. The Town will complete a GIS inventory and assessment of sources of non-point source pollution and Town stormwater infrastructure. The Town will then develop materials needed to comply with the six program elements defined by the USEPA: public education and outreach, public participation, illicit discharge detection and elimination, construction site runoff control, post-construction runoff control, and pollution prevention/good housekeeping.

Should funding become available for the design and construction of new stormwater infrastructure or Best Management Practices, the Town of Southeast would recommend the following projects to address existing water quality problem areas:

- Improve stormwater drainage controls at the Town highway garage adjacent to the Croton River.
- Replace the floor-drain and dry-well at the Town highway garage with an oil-water separator and holding tank to control discharge of pollutants into the Croton River.
- Design of stormwater BMPs for the Brewster Heights neighborhood off Bloomer Road. Implementation of BMPs to correct un-controlled stormwater flow and gully erosion at this location.
- Implement streambank stabilization where erosion has occurred on Town property.
- Development of a program to educate private property owners in streambank stabilization methods.

- Improvements, on an as-needed basis, to stormwater catch basins and related drainage infrastructure along Town roads and within Town Drainage Districts.
- Design and construction of stormwater improvements at Tonetta Lake including the previously proposed Lake Tonetta Biofilter and constructed wetland to capture and treat drainage from the Lake Tonetta residential area.

3.4 DESIGNATED VILLAGE CENTER

3.4.1 VILLAGE CENTER DELINEATION

The Watershed Regulations allow for designation of a Village Center area in which certain limiting distances between impervious surfaces and wetlands, watercourses, and waterbodies are relaxed provided that a Stormwater Pollution Prevention Plan is prepared and approved by NYCDEP.

The existing commercial area along Route 6 west of the Village of Brewster should be considered for designation as a Village Center. This existing commercial area provides important community services such as banks, doctors and lawyers offices, and other personal and professional services. Since these properties are within the 300-foot setback distance to a reservoir and reservoir-stem expansion of existing impervious surfaces (buildings, driveways, parking areas) and modifications or expansions of the businesses are prohibited. By designating this area as a Village Center the Town could ensure the continued use or expansion of these commercial uses. Figure 3.4-1 identifies the proposed boundaries for the Designated Village Center based on the Town's tax parcel map. Specific metes and bounds for this area will be provided to NYCDEP as part of the implementation efforts of this plan.

3.4.2 VILLAGE CENTER DEFINITION

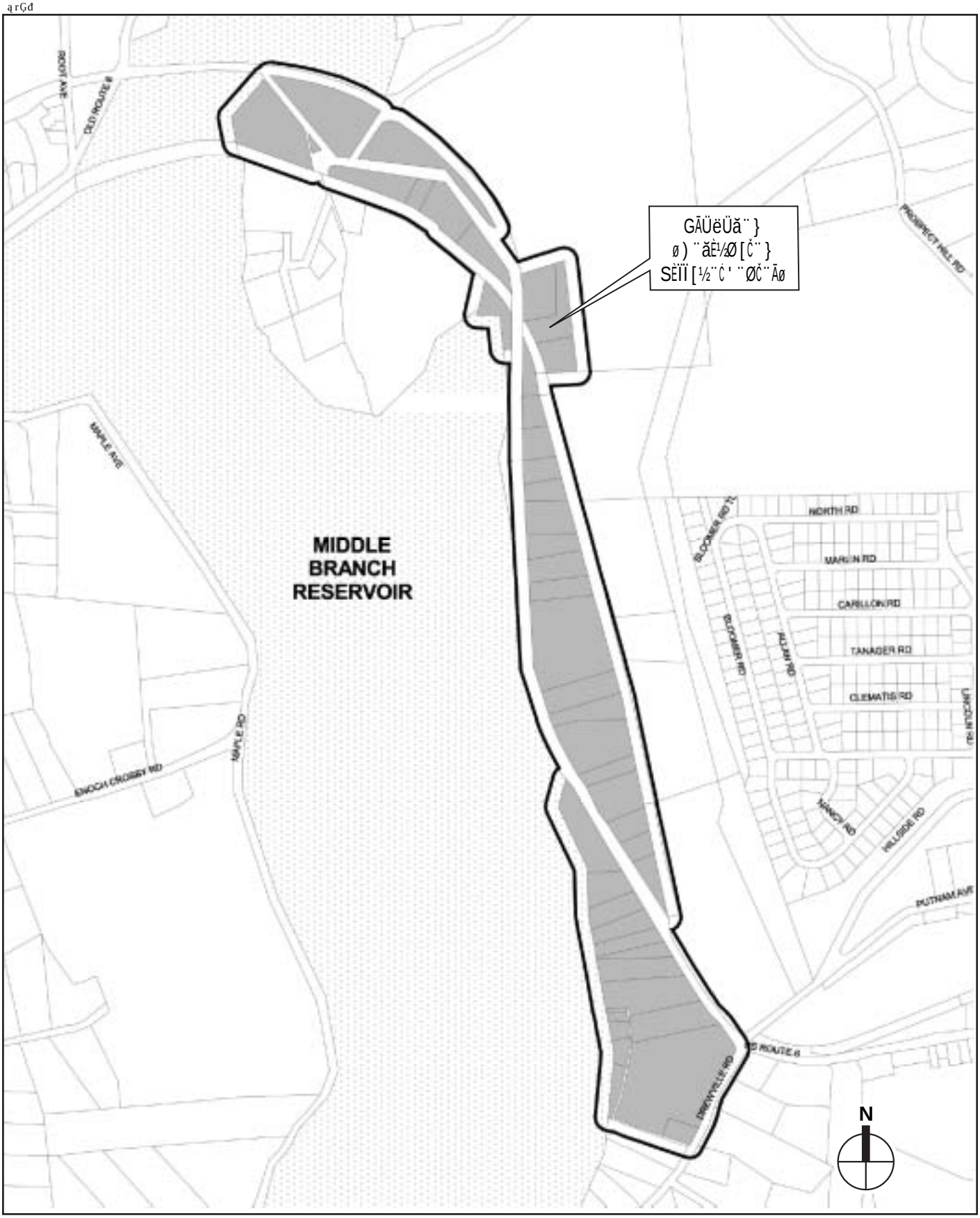
The Watershed Regulations define "Designated Village Center" as an area, "whether or not located in an incorporated village, designated by a local government in a Comprehensive Croton Water Quality Protection Plan...." (§18-16(a)(26)). This area "must be an existing center of commercial, residential or mixed uses."

The Route 6 area west of the Village of Brewster contains existing commercial, residential, and mixed uses. Many of these uses are located directly adjacent to either the Middle Branch Reservoir or contain streams that lead directly into the reservoir ("reservoir stems"). Designation as a Village Center would allow uses in this area to expand impervious surfaces within regulated distances pursuant to the review of NYCDEP.

3.5 COMMUNITY SEPTIC SYSTEMS

Section 3.1.3 of this document discussed the potential benefits of providing new wastewater treatment plants for Septic Focus Areas. The Watershed Regulations allow new surface-discharging WWTPs in Septic Focus Areas in basins that are outside the 60-day travel time restriction. The Septic Focus Areas in the Town of Southeast are not within a 60-day restricted basin. In the Diversion Report it was therefore assumed it would be possible to construct a new surface treatment plant for each of the three Septic Focus Areas within the town.

The current sanitary phosphorus load from sewage from Septic Focus Areas in the Town of Southeast was calculated as 861.40 lbs/yr. The calculated projected sanitary phosphorus load to the Croton Watershed from Septic Focus Areas in the Town of Southeast is 631.45 lbs/yr. (The



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projected phosphorus loading to the watershed assumes a limited amount of growth and that new surface discharging WWTPs with phosphorus removal facilities would be constructed for the Septic Focus Areas.) The projected sanitary phosphorus load from these Septic Focus Areas would be similar if sewage from these areas were to be treated at an existing wastewater treatment plant. Therefore, sewering and treating waste from Septic Focus Areas would result in a decrease of 229.95 lbs/yr of phosphorus to the Croton Watershed.

If diversion of Septic Focus Areas is not implemented and new WWTPs to serve these areas are not constructed, then community septic systems may be examined as a means to provide better treatment of domestic wastewater flows. In general, community septic systems are difficult to design and construct in Southeast due to the limiting soil conditions, steep slopes, and shallow depth to bedrock in many areas of the Town. In addition, the requirement to have a 100 percent reserve area available should the original system fail further constrains potential locations. Thus, while some water quality improvements may be attained through community septic systems, these improvements are not likely to be equivalent to the improvements from creating new surface-discharging WWTPs.

The Lake Tonetta and Peach Lake neighborhoods would be likely locations of new community septic systems; however, sub-surface soil and bedrock conditions in each of these areas might constrain the ability of a community system to function properly. In addition, available land for disposal fields and reserve areas are limited in these already built-out areas.

If funding should become available for design and construction of community septic systems, the Town would suggest that the Septic Focus Areas be considered.

3.6 SEWER EXTENSIONS

3.6.1 BENEFITS OF SEWERING SEPTIC FOCUS AREAS

The current sanitary phosphorus load from sewage from Septic Focus Areas in the Town of Southeast was calculated as 861.40 lbs/yr. The calculated projected sanitary phosphorus load to the Croton Watershed from Septic Focus Areas in the Town of Southeast is 631.45 lbs/yr. (The projected phosphorus loading to the watershed assumes a limited amount of growth and that new surface discharging WWTPs with phosphorus removal facilities would be constructed for the failing septic areas.) The projected sanitary phosphorus load from these failing septic areas would be similar if sewage from these areas were to be treated at existing WWTPs instead of at new plants. Therefore, sewering and treating waste from failing septic areas would result in a decrease of 229.95 lbs/yr of phosphorus to the Croton Watershed.

3.6.2 SEWER EXTENSIONS AND COMMUNITY CHARACTER

The Route 22 corridor north of I-684 has several privately-owned WWTPs. Wastewater in those service areas and areas in between could be collected through a new collection system and excess capacity within the existing WWTPs could be used to enhance this Town Center area. The Town of Southeast envisions the Route 22 corridor as the main commercial shopping district for the Town and any improvements to wastewater and stormwater collection and treatment systems within this corridor would be seen as an enhancement of the Town's community character. Creation of a new sewage district would require the participation of individual plant owners and a large degree of involvement by the Town and/or County.

The existing Village of Brewster WWTP is owned by New York City and serves certain properties within the Village of Brewster. The plant is being redesigned to handle flows for the

entire Village area. There is an agreement between the Village and the City to transfer ownership of the WWTP following the design, reconstruction, and upgrade of the plant. It is feasible to extend this service area to certain portions of the Town of Southeast that lie within this sewage drainage area including the Brewster North area and the commercial area on Route 6 just outside the eastern border of the Village. The current designs would have to be adjusted to accommodate any new flows from these areas. The Town of Southeast would be interested in pursuing an extension of the Brewster WWTP district to include the Brewster North and Route 6 areas.

3.7 ACQUISITION OF OPEN SPACE

An alternative approach to protecting water quality beyond the infrastructure options discussed above is the acquisition of undeveloped for the purpose of limiting development. The Town of Southeast community character is defined, in part, by its remaining open lands. The lands that remain undeveloped are typically those that would be most disturbed by development as they contain steep slopes, wetlands, or shallow soils. Acquisition of such properties using funding available from NYCDEP, beyond any funding already committed to the geographically limited Land Acquisition Program, would yield positive results in the joint goals of this Plan: protecting water quality and community character.

The Town of Southeast recommends that NYCDEP funding be used for acquisition of undeveloped land within the watershed. ×

Section 4: Comprehensive Plan and Zoning

4.0 INTRODUCTION

The Town of Southeast revised its *Comprehensive Plan* concurrent with the planning and engineering efforts undertaken as part of the *Croton Plan*. Ultimately, this Croton Plan will become a document agreed to and administered by each municipality, Putnam County, NYCDEP, and NYSDOH. The Town's *Comprehensive Plan*, on the other hand, is approved by the Town of Southeast and will be used to guide the community toward its stated vision. Because the two documents were prepared concurrently, the same planning and analysis led to mutually consistent findings and recommendations.

This Section identifies the recommendations contained within the Town's *Comprehensive Plan* but does not reiterate the analysis leading to those recommendations. The reader is referred directly to the *Comprehensive Plan* for that information. Thus, this *Croton Plan* document becomes, by reference, an appendix to the Town's *Comprehensive Plan*.

The discussion of community character and development trends presented in Section 1, "Community Character and Needs," of this document is replicated almost in its entirety in the *Comprehensive Plan*. Section 1 of this document also includes, verbatim, the vision statement of the *Comprehensive Plan*.

4.1 COMMUNITY CHARACTER AND WATER QUALITY IMPACTS FROM DIRECTING GROWTH AWAY FROM AREAS WHERE NEW WWTPs ARE PROHIBITED

Currently, new surface-discharging WWTPs would be specifically permitted in only a few instances within the Town of Southeast:

- New WWTPs in Septic Focus Areas to handle existing septic flows;
- New surface-discharging plants under the pilot phosphorus offset program; and
- New surface-discharging plants within the Bog Brook Reservoir basin.

Section 3 of this document describes the water quality benefits related to each of these instances. The Town of Southeast currently has two of the three possible WWTPs under the pilot phosphorus offset program. One is under construction, the second is undergoing the Town's approval process.

Other areas where sub-surface discharging plants would, theoretically, be permitted are typically constrained by natural features such as steep slopes, poorly percolating soils, or streams and wetlands. Unfortunately, many of these areas are where existing residential and commercial development activity is located. While the Town of Southeast seeks to balance new development with its rural character, the Town would like to see new commercial development occur where new WWTPs are prohibited.

The Town identified certain Growth Focus Areas (see Section 2.4.2) in which new development would be consistent with the *Comprehensive Plan*. Section 3 of this document identifies various infrastructure improvements that can be implemented to allow additional growth to occur in these areas. If these infrastructure improvements were not made, the Town's economic and community character would likely experience negative impacts. The water quality benefits from these infrastructure improvements are presented in Section 3.

4.2 UPDATED COMPREHENSIVE PLAN

The Town of Southeast, as previously noted, has prepared an updated *Comprehensive Plan* concurrently with this document. It was the intent of the Town, in preparing the updated *Comprehensive Plan*, to make that document consistent with the *Croton Plan*. This *Croton Plan* is considered an appendix to the Town's *Comprehensive Plan*.

Listed below are the major goals and implementation actions of the *Comprehensive Plan* by subject area. Many of these implementation actions are broad recommendations that would need specific definition before they could be acted upon. While it is important that a comprehensive plan provide specificity within its recommendations, it is not the point or purpose of a comprehensive plan to provide specific language or maps detailing exactly how or where a policy recommendation would be implemented. The comprehensive plan is intended to provide the general policy which is implemented through adoption of local laws such as the zoning and subdivision regulations.

4.2.1 NATURAL RESOURCES

GOAL AND POLICY

The Town of Southeast is committed to protecting its natural resources as a critical component of the Town's quality-of-life, rural and scenic character, and the region's water supply. Wetlands, watercourses, open space, woodlands, and agricultural lands contribute to the quality and character of Southeast, and their preservation, enhancement, and restoration must be considered in all actions that may affect them.

IMPLEMENTATION ACTIONS

- Revise the Town wetland law to better protect local wetlands and synchronize local, New York State, and federal wetland regulations. Among the revisions to be considered are increasing buffers from 50 feet to 100 feet on both sides of a wetland or watercourse and redefining "wetlands" to make smaller wetlands subject to protection measures.
- Establish a zoning overlay district to provide additional protection to the Great Swamp Critical Environmental Area. The overlay district should, for example, require decreased allowable development coverage (impervious surfaces) and on-site stormwater management.
- Continue to rigorously enforce environmental protection regulations in the Town Code, especially wetland and steep slope protections.
- Create a natural resource inventory (NRI) and adopt an open space master plan to identify and prioritize sites, parcels, and features to be protected, preserved and/or acquired. The inventory and plan should be incorporated into the site plan approval process.
- Increase the recreation fee for residential subdivisions to give the Town the option to pursue acquisition of additional park land or capital improvements to existing Town parks.

- Consider designation of new Critical Environmental Areas (CEAs), including:
  - The Village of Brewster wellfield and wetland system;
  - The aquifer area in the vicinity of Haine's Pond;
  - The Atlantic White Cedar swamps just north of Lake Tonetta and Brewster Pond;
  - The scenic area between the Diverting and Croton Falls Reservoirs with historic importance as the location of old mines and habitat importance as the home of a large bat community; and
  - Bog Brook Wildlife Management Area.
- Take measures to improve the water quality in Tonetta Lake to improve this important recreational resource.
- Examine ways to assist the Peach Lake community through infrastructure improvements or inter-municipal agreements with North Salem.
- Consider additional designations of scenic roads.
- Adopt a local law to enable the Town to designate local historic districts, sites (Tilly Foster mine, cemeteries), and/or structures. Such a law could provide protection measures and/or incentives to preserve historic structures.
- Create a tree protection ordinance to ensure protection of significant trees.
- Consider a ridgeline protection ordinance to protect notable view sheds within the Town.
- Consider a stonewall protection ordinance to maintain stonewalls as important elements of the Town's visual character.

4.2.2 LAND USE AND COMMUNITY CHARACTER

LAND USE

GOAL AND POLICY

The Town of Southeast seeks to balance a healthy economic environment with quality residential and commercial character while protecting the integrity of its natural resources and infrastructure.

IMPLEMENTATION ACTIONS

To accomplish these goals, the Town of Southeast intends to:

- Ensure that all local laws, including the zoning code and subdivision regulations, are consistent with the recommendations contained in this *Comprehensive Plan* and consistent with the review of water quality conditions and potential infrastructure improvements described in the *Croton Plan*.

COMMUNITY CHARACTER

GOAL AND POLICY

Maintain the Town's picturesque rural character while allowing for appropriate commercial development.

IMPLEMENTATION ACTIONS

To accomplish these goals, the Town of Southeast intends to:

- Take efforts to have highway signs changed to direct travelers to "Southeast" instead of "Brewster."
- Develop and adopt residential and commercial architectural design controls to encourage compatible architectural styles. Empower the newly created Architectural Review Board to apply these controls to new development.
- Revise the zoning code to strengthen design controls for signs. Include graphic examples of appropriate sign design.
- Implement a noise ordinance defining acceptable levels of noise during both day-time and night-time. Define what new noise levels constitute an impact on community character.
- Protect scenic stone walls. Amend the Subdivision Regulations to state that new parcel boundaries should, as much as possible, following existing stone walls.
- Update inventory of local historic resources and establish a program to protect the resources.

ZONING

- Create new "Rural Commercial" zoning district
- Reduce density of single-family residential districts surrounding reservoirs by creating a new "Rural Residential" (4-acre minimum lot size) zoning district.
- Create new Historic District overlay to provide protection for the Tilly Foster Iron Mine, cemeteries, and other local historic resources.
- Create a new "Parks and Open Space" zoning district to protect Town parks and open spaces.

4.2.3 HOUSING

GOAL AND POLICY

The Town of Southeast seeks a balanced diversity of housing opportunities and types to meet the needs of its current and future residents. The Town seeks to maintain its existing supply of housing, including its variety of price ranges, to accommodate residents of all income groups. New housing should reinforce the Town's rural qualities and predominantly single-family detached housing character.

IMPLEMENTATION ACTIONS

To accomplish these goals, the Town of Southeast intends to:

- Amend Resource Protection Plan provision (§138-21) and site plan review criteria (§138-46) of the zoning code to indicate that resource protection areas, such as steep slopes and wetlands, can not be built upon.
- Reduce allowable density (down-zone) in residentially-zoned areas adjacent to reservoirs and their tributary streams. Low-density residential districts would be created around the reservoirs and major streams with a minimum lot size of 4 acres (see Figure 6-4).

- Change dimensional standards for single-family residential development in the OP-3 zoning district to R-40 and adjust RMF standards within the OP-3 district to be more consistent with the overall recommendation of the *Comprehensive Plan* to decrease residential density throughout the Town.
- Encourage provision of senior housing in appropriate locations in either residential or commercial zoning districts. Specifically define "senior housing" to ensure that the needs of seniors are met while minimizing the potential for senior housing to revert to standard market-rate multi-family units.
- Encourage the establishment of conservation easements for open-space set-asides in existing and future residential developments to ensure long-term preservation of that land.
- Increase buffer zones between residential and commercial uses to protect the rural residential character of the community.
- Strengthen existing subdivision regulations to enhance open-space protection provisions within conservation design subdivisions.
- Enforce architectural design standards and review procedures for new residential development in coordination with the newly established Architectural Review Board.

4.2.4 ECONOMIC DEVELOPMENT

GOAL AND POLICY

The Town of Southeast seeks a diversified base of business and industry to strengthen the Town's tax base and to provide employment opportunities for area residents while preserving the Town's rural residential character and protecting the Town's portion of the regional drinking water supply. Future non-residential uses should be targeted to those areas where they will have minimal impact on water quality, traffic, and community character.

The Town envisions commercial growth continuing in the following areas:

- Route 22 north of Milltown Road—New commercial uses here would promote this area as the main shopping district within the Town. Design guidelines should be established to ensure the visual appeal of this gateway area.
- Route 6 east and west of the Village of Brewster—New development would be limited in scale due to watershed constraints. Design guidelines should be established to ensure the visual appeal of this gateway area.
- The I-84/Route 312 interchange—This area is envisioned as a node of commercial activity. Continued development within the Terravest Corporate Park, the new Highlands Center, and any potential development in the "Campus at Fields Corner" along Pugsley Road would be compatible with this vision. (Route 312 west of Pugsley Road contains parcels with significant visual appeal and an alternative zoning and development approach is envisioned here, see below.)
- Fields Lane—This area is an appropriate location for continued light-industrial/flex use or private recreation uses.
- Neighborhood Business Districts—Very limited new development within these districts to be compatible with adjoining residential neighborhoods. The list of allowed uses should be

changed to encourage compatible development. Automobile-related uses and strip malls should be discouraged.

IMPLEMENTATION ACTIONS

To accomplish these goals, the Town of Southeast intends to:

- Adjust the distribution of allowed uses within existing zoning districts to more clearly define areas of commercial development that are consistent with community character.
- Change uses in NB-1 districts to encourage compatible development near residential zones. Encouraged uses could include "specialty retail" or bed-and-breakfast type uses. Special permit criteria should be developed to ensure that new commercial uses would not negatively affect residential uses. Strip malls and automobile related uses are not seen as encouraged uses.
- Evaluate the allowed uses and location of Office Park (OP) zoning districts. Specifically, consider rezoning the OP-2, R-60, and HC-1 zoning districts on Route 312 west of Pugsley Road and the OP-1 district on Guinea Road to a new "Rural Commercial" zoning district to allow lower-intensity, but still high-value, land uses such as, but not limited to, bed and breakfast or inn, conference center/retreat, horse farms.
- Revise the allowed uses in the Fields Lane area to recognize the existing development pattern of warehouse facilities and outdoor storage. Encourage uses that do not require large wastewater flows.
- Update the zoning code to include design standards to ensure that larger retail facilities ("big box retail") do not dominate the surrounding character of commercial or residential districts. Include site design and landscaping standards to lessen the visual impact of these types of uses.
- Clarify the allowed uses and lot dimension standards within the commercial zoning districts along Route 22 and Route 6 to define areas of appropriate commercial development.
- Clarify Special Permit criteria for commercial uses to ensure that the Town's objectives with respect to design and buffering of neighboring uses are met. Clarify process by which Special Permit applications are reviewed.
- Consider a Route 22 overlay district to control new commercial development. Create access management guidelines to manage traffic flow in and out of commercial properties. Create design guidelines for future commercial development along Route 22 to emphasize the function of this area as the Town's main commercial center. Discourage out-parcel development on parcels fronting on Route 22. Building design and landscaping standards should be created to modify this area's suburban-strip appearance to a more focused town-center aesthetic.
- Create design guidelines for future commercial development along Route 6 to enhance this corridor's function as a gateway into the community.
- Develop more descriptive, or graphic, design guidelines within the existing sign ordinance to encourage a more coordinated and attractive community.
- Attract "clean" businesses and industries that are appropriate for location in a drinking water supply watershed. Clean businesses would have minimum impervious surface area coverage,

and use or generate minimum quantities of waste- or process-water and require little or no use, storage, or transport of hazardous materials.

- Encourage businesses that market the scenic qualities of the Town such as tourism and lodging provided that strong design and siting criteria are established to prevent unwanted impacts on residential neighborhoods.
- Work with communication providers to provide technological advancements (such as fiber optic and high-speed internet access) within the constraints of the local law on wireless towers to attract high-value home- and/or technology-based industries.

4.2.5 TRAFFIC AND TRANSPORTATION

GOAL AND POLICY

The Town of Southeast is committed to maintaining an efficient, uncongested, safe and well-maintained network of roadways to serve local and through-travelers, especially residents, businesses, and visitors. In addition, the Town is committed to maintaining the rural flavor of Southeast by protecting the character of many of its rural and scenic roadways.

IMPLEMENTATION ACTIONS

To accomplish these goals, the Town of Southeast intends to:

- Create an Official Map of all roads within the Town. The Official Map would identify the classification of each road (arterial, collector, local street, etc.) and would identify any "paper streets" or planned roadway improvements. The Official Map would also identify designated scenic roads.
- Create traffic impact criteria that calls for maintaining the Town's classification system on its roadways with respect to traffic volumes.
- Implement the Transportation Improvement District in the area of the I-84/Route 312 interchange.
- Enforce standards with respect to grade and width for private roadways to ensure safe and efficient flow of automobiles and emergency vehicles. Clarify standards within the Subdivision Regulations pertaining to responsibility for maintenance of roadway margins.
- Continue to enforce provisions for shared driveways and cul-de-sacs to provide better clarity with respect to allowed length (1,000 feet), width (18 feet), grade (10 percent maximum), and materials. Evaluate measures to ensure routine and long-term maintenance of private roadways or shared driveways by home-owner associations.
- Evaluate where new road connections between development areas could be created to alleviate congestion along collector roads.
- Continue to coordinate with Putnam County and New York State Department of Transportation on roadway improvements within Southeast.
- Encourage residents and businesses to comply with the Emergency-911 address changes. These changes would improve public safety for all residents and businesses.
- Scenic roads should be recognized as important community assets during the review of any development application. Where possible, all attempts should be made to maintain the functional classification of these roads.

- Amend the Town's Subdivision Regulation to encourage creation of loop roads instead of multiple cul-de-sacs within new residential subdivisions where a loop road would not result in extensive impacts.
- Evaluate any proposals for new train service between Danbury and Brewster along the old railroad line paralleling Route 6.

4.2.6 COMMUNITY FACILITIES AND SERVICES

GOAL AND POLICY

The Town of Southeast is committed to providing its residents with adequate, accessible, and efficient community facilities and services.

IMPLEMENTATION ACTIONS

To accomplish these goals, the Town of Southeast intends to:

- Continue to cooperate with Putnam County in the development of a *Croton Watershed Plan* and any plans for diversion of wastewater outside of the New York City watershed.
- Continue to cooperate with the Village of Brewster to provide shared services and facilities, and to eliminate overlapping or duplicate services.
- Explore opportunities for creating "Rails to Trails" pathways to encourage bicycle and pedestrian mobility within the Town. Coordinate with Putnam County on bikeways and greenways.
- Provide new Town Hall complex to consolidate Town offices and accommodate court space.
- Adopt a master plan for Town recreation needs.
- Increase the recreation fee for residential subdivisions to give the Town the option to pursue acquisition of additional park land or capital improvements to existing Town parks.
- Continue to work with the school districts to improve provision of educational services and to expand physical facilities.

4.3 REVISE COMPREHENSIVE PLAN AND ZONING LAWS

Please refer to Section 4.2, above, for recommendations contained in the Town of Southeast's updated *Comprehensive Plan*. These recommendations were developed to be consistent with the *Croton Plan* and the changes in development effected by the NYCDEP Watershed Rules and Regulations. ×

Section 5: Local Environmental Laws

5.0 INTRODUCTION

As indicated in Section 4, "Comprehensive Plan and Zoning," the Town has updated its *Comprehensive Plan* to be consistent with watershed planning efforts.

Included in the recommendations are proposed changes to zoning that will change residential density in large portions of the Town, adjust allowed uses within commercial districts to minimize the impact from intensive commercial development, and protect natural features during the development review process. The Town's Zoning Code already has a number of provisions that offer protection to steep slopes, wetlands, streams, and vegetation. These provisions are proposed to be updated to be consistent with water quality protection efforts.

5.1 STEEP SLOPES

The Town intends to amend its Resource Protection Plan provision (§138-21) of the Zoning Code and provisions regarding site plan review criteria (§138-46) to indicate that resource protection areas, such as steep slopes and wetlands, can not be built upon. The Resource Protection Plan already includes provisions for adjusting development density based on presence of natural features on a site.

5.2 WETLANDS

The Town has already drafted a revised wetlands protection law to make identification and protection of wetlands consistent with the evolving Federal regulations and with New York State regulations. This draft law was compared with several model regulations for wetland protection and found to be consistent with model provisions. The Town intends to pursue adoption of the wetlands protection law as an implementation action of its *Comprehensive Plan*.

In addition, the Town intends to establish a zoning overlay district to provide additional protection to the Great Swamp Critical Environmental Area. The overlay district would, for example, require decreased allowable development coverage (impervious surfaces) and on-site stormwater management.

5.3 LOCAL ENVIRONMENTAL LAWS

The Town's Subdivision Regulations provide a comprehensive set of requirements that include erosion and sediment control, stormwater drainage, and preservation of natural features. These provisions, in conjunction with the NYCDEP review of subdivision applications, ensure that new residential subdivisions are constructed in an environmentally-sensitive fashion and are in accordance with watershed protection efforts.

The Town does intend to strengthen existing subdivision provisions to enhance open-space protection set-asides within conservation design subdivisions. ×

Section 6: Local Land Use Approval Process

6.0 INTRODUCTION

The Town of Southeast currently has a Zoning Code and Subdivision Regulation. These local laws set forth the required procedure for reviewing development applications and provide guidance to the Planning Board and Town Board with respect to the conditions and criteria for judging the appropriateness of an application.

6.1 SUBDIVISION REGULATION

The Town's Subdivision Regulation sets forth specific processes for submission and review of subdivision applications. These regulations include comprehensive provisions that instruct both the applicant and the reviewing board (Planning Board) in what measures must be followed in developing the subdivision plat. The Regulations include references to pertinent Local Laws for zoning, wetlands protection, flood damage prevention, and tree protection.

The Planning Board understands the importance of water quality protection and insists that applicants consult with NYCDEP early in the review process to ensure that NYCDEP's comments and concerns are incorporated into the review process. The Planning Board will not provide final subdivision approval without documentation that NYCDEP has approved all stormwater management and wastewater treatment elements of the proposed subdivision. The Planning Board will grant preliminary subdivision approval to allow the project sponsor to make application to the Putnam County Department of Health for review of the proposed wastewater treatment systems.

6.2 ZONING CODE/SITE PLAN REVIEW

The Town's Zoning Code includes specific guidance for processing site plan applications. This section of the Code (§138-41 *et seq*.) includes direct references to other local laws for environmental review and protection of natural features. The Code also includes "General criteria and standards" (§138-46) that includes provisions on community character, conformance with the Comprehensive Plan, vehicular access, drainage, landscaping, and "ecological considerations" such as protection of critical areas (streams, wetlands, slopes, vegetation, etc.), erosion and sedimentation, and scenic and historic resources.

The Planning Board understands the importance of water quality protection and insists that applicants consult with NYCDEP early in the review process to ensure that NYCDEP's comments and concerns are incorporated into the review process. The Planning Board will not provide final site plan approval without documentation that NYCDEP has approved all stormwater management and wastewater treatment elements of the proposed plan. ×

Endnotes

1: Community Character and Needs

[1] Putnam County. *Comprehensive Croton System Water Quality Protection Plan Phase I Planning Analysis*. October 1998, Revised November, 2000, page 2.

[2] *Ibid*., page 3.

[3] *Ibid*., page 13.

[4] Reporter-Dispatch, April 12, 1999.

[5] *Phase I Planning Analysis*, page 22.

[6] *Ibid*., page 86.