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

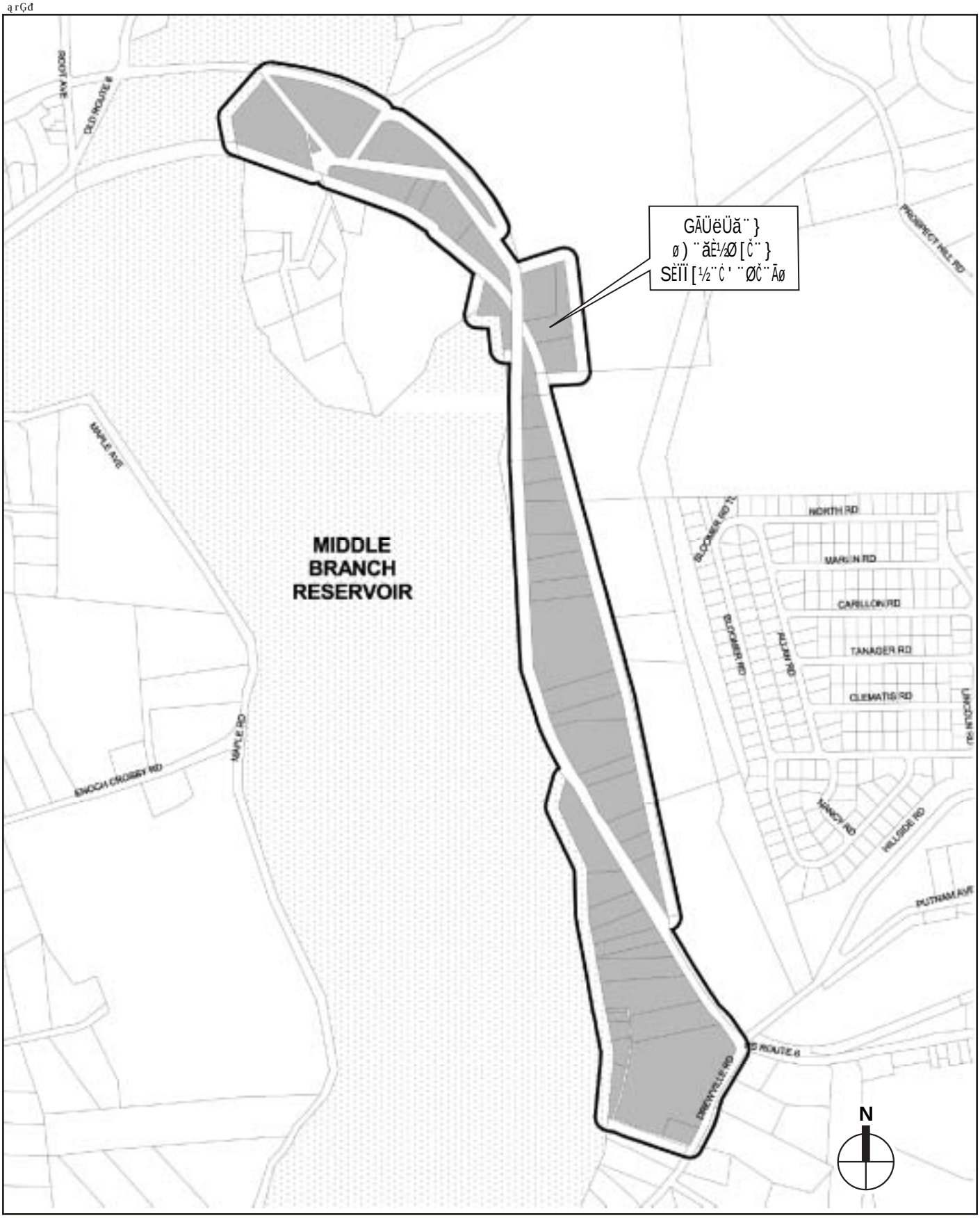
The Watershed Regulations define "Designated Village Center" as an area, "whether or not located in an incorporated village, designated by a local government in a Comprehensive Croton Water Quality Protection Plan...." (§18-16(a)(26)). This area "must be an existing center of commercial, residential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



Abpfdk^qba Sfii^db @bkqbo

Cfdrob 0+1.*

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. ×