SECTION 6

FORMULATION OF COMPOSITE WASTEWATER PLANS

Sections 5.2 through 5.6 review the elements of town-wide wastewater management plans and recommend those components that are most applicable to Orleans. Based on that review, many plans were formulated that utilize these components. Those plans were evaluated and three were selected for detailed evaluation.

6.1 INITIAL PLAN FORMULATION

Over the course of nine meetings, the WMSC discussed the advantages and disadvantages of options for each of the major components of a town-wide management plan, as summarized in Table 5-1. During that same period, the MEP released its technical report on Pleasant Bay, and members of the WMSC reviewed this document in detail and participated in workshops sponsored by the Pleasant Bay Alliance related to TMDL setting and compliance. Also during that period, the WMSC heard a presentation by senior DEP staff members on the DEP water reuse program, and participated in a search for wastewater treatment and disposal sites. As a result of all of these meetings and discussions, a number of broad principles emerged as important to the formulation of town-wide wastewater management plans in Orleans:

- Collection and treatment of wastewater from the Pleasant Bay watershed with disposal in another, less sensitive watershed would provide the highest level of protection of Pleasant Bay.
- The lack of large and publicly-owned vacant sites, remote from residential development, prompts the consideration of decentralized solutions that are compatible with a larger number of small dispersed sites.
- The significantly degraded nature of certain coastal waters, particularly the "headwaters" sub-embayments in the Pleasant Bay system, may warrant the implementation of focused early actions to remove wastewater nitrogen from their watersheds as the first priority in a phased plan.

- The Tri-Town site is already used for wastewater-related functions and has some significant undeveloped area that makes it the most likely candidate site for a centralized plan.
- There are many opportunities for reuse of wastewater effluent that allow the recycling of nutrients and water in a controlled fashion with significant protection of the public.
- The most viable reuse alternative at large scale, the irrigation of golf course fairways, is not possible in Orleans, where no golf courses exist. Golf course irrigation may be feasible in the neighboring towns of Brewster and Harwich.
- Regional solutions have the benefits of economies of scale and effectiveness of treatment, but site availability and embayment nutrient sensitivity may make such solutions difficult.

Given these findings, the WMSC and its consultant developed a set of nine town-wide wastewater management plans for more detailed review. The plans are described in Table 6-1, and include centralized and decentralized options and a range of effluent reuse and disposal methods.

As a starting point, it was agreed that each of these plans would be assumed to address all of the needs documented in the draft Needs Assessment (that is, needs in the categories of sanitary, water supply protection, surface water protection, aesthetics/convenience, and economic development). Each plan should also have those applicable non-structural and non-traditional measures that reduce flows and loads and to minimize environmental impact.

6.2 EVALUATIVE CRITERIA

Once the nine wastewater plans were formulated, the WMSC identified a wide range of criteria that should be used to compare and contrast the plans. These criteria are summarized in Table 6-2.

TABLE 6-1
INITIAL PLAN IDENTIFICATION

A. Tri-Town--Orleans Only. All of the collected wastewater would be transported to the Tri-Town site where it would be treated to the typical 10-mg/l level of effluent nitrogen. Effluent disposal would be at the Tri-Town site, and at other nearby sites.

B. Tri-Town--Regional. This plan is similar to Plan A, but would include the receipt of wastewater from Brewster and/or Eastham. More effluent disposal sites would probably be needed nearby, compared with Plan A.

C. Tri-Town--Reuse. The Tri-Town plant would receive all of Orleans wastewater flows and provide a very high degree of treatment so that effluent could be reused under DEP's Reclaimed Water Guidelines. This high degree of treatment allows effluent to be used to irrigate Town parks and cemeteries, and be used for toilet flushing in public buildings. Effluent reuse during the summer peak conditions would reduce the need for effluent disposal at other sites.

D. Decentralized Plan #1 (Pleasant Bay). This plan would use the Tri-Town site for wastewater treatment from the Nauset and Cape Cod Bay watersheds, and use two decentralized plants for treating wastewater collected in the Pleasant Bay watershed. One such plant would be located in East Orleans; the other would be located in South Orleans and would discharge to sites in the Areys Pond and Namequoit River sub-watersheds.

E. Decentralized Plan #2 (Nauset and Pleasant Bay). This plan is similar to Plan D, and also involves three plants. It includes a larger decentralized treatment plant in East Orleans, to treat both Pleasant Bay and Nauset wastewaters, with disposal in both the Pochet Neck and Nauset Harbor sub-watersheds. This plan goes further than Plan D in keeping wastewater local and reducing the demand on disposal sites at or near Tri-Town.

F. Decentralized Plan #3 (Sub-Watersheds). In this plan, small decentralized plants would be constructed in the "headwaters" sub-embayments (Meetinghouse Pond, Arey's Pond, Lonnie's Pond and Pah Wah Pond) to facilitate early progress in the most critical areas, with the remainder of the plan similar to Plan E. This plan would include five plants.

G. South Orleans--Orleans Only. In this plan, all Orleans wastewater would be transported to a site in South Orleans for treatment. Effluent disposal would occur on one or more golf courses in Brewster and/or Harwich, either by spray irrigation in the warm months or by subsurface leaching in the winter. This plan takes advantage of spray irrigation, both as a low-cost way to polish the effluent, and as a means to reduce fertilizer use at the golf courses.

H. South Orleans--Regional. This plan is an extension of Plan G that adds the treatment and disposal of wastewaters from portions of Brewster and Harwich.

I. Two Regional Plants. This plan combines Plan B with Plan H. There would be two moderately-sized plants, one at Tri-Town and one in South Orleans, and each would receive flow from neighboring towns.

TABLE 6-2
EVALUATIVE CRITERIA
USED IN RATING WASTEWATER PLANS

- Overall Cost
- Use of Proven Technology
- Regulatory Acceptability
- Environmental Impact
- Energy Consumption
- Ease of Operation
- Production of Residuals
- Overall Public Acceptability
- Need for Land Purchase and/or Easements
- Potential for Neighbor Impacts
- Benefits from Natural Attenuation
- Retention of Water in Water Supply Area
- Removal of Contaminants of Emerging Concern
- Nitrogen and Phosphorus Removal
- Expandability for Regionalization
- Extent of Collection System

Wright-Pierce scored each plan in these categories on a one-to-three scale, with the higher scores representing the most favorable. For example, the plans that require the most energy use were given a score of 1, and the most energy-efficient plans were given a score of 3. The scores for each plan and criterion are presented in the draft Alternatives Screening Report. Spreadsheets were prepared that allowed each member of the WMSC to individually rate the nine plans against these 16 criteria. Ratings were first prepared using each member's choice of weighting factors from one to four. That is, if an individual placed high priority on cost, he or she could use a weighting factor of 4, versus a weighting factor of 1 for a less important factor to him or her. Scores were aggregated and analyzed to determine which criteria contributed most significantly to the overall rating. Then the scoring was repeated using weighting factors of one to ten, and the aggregate scores were again analyzed for the most significantly contributing criteria. Conclusions of this exercise were:

- Plan A had broad support, but only by a small margin.
- The criteria that added most significantly to the high scores varied by committee member, but cost, public acceptability, need for land acquisition and environmental impact were often mentioned.
- An evaluation of the scoring revealed that the lack of a single clear favorite may have related to the large number of evaluative criteria, some of which overlap (for

example, "high energy consumption" contributes to "high cost", both of which detract from "public acceptability"). Although clear consensus was not gained for any one or two plans, there was support for regionalization (based in large part on economies of scale), decentralization (reduction of transport costs and suitability for small dispersed sites), and the Tri-Town options (no need for land acquisition and public acceptability for continuation of wastewater-related activities there).

6.3 OVERVIEW OF WASTEWATER PLANS RECOMMENDED FOR DETAILED EVALUATION

The initial set of nine plans was consolidated to three plans to be the subject of detailed evaluation. Those three plans are:

Plan 1. Decentralized Treatment and Disposal in All Major Watersheds

Plan 2. Centralized Treatment at the Tri-Town Site with Disposal in the Cape Cod Bay Watershed

Plan 3. Centralized Treatment in South Orleans with Disposal on Golf Courses in the Pleasant Bay Watershed.

Plan 1 is described in more detail in Table 6-3 and Figure 6-2 and 6-3. Similarly, Tables 6-4 and 6-5 summarize Plans 2 and 3, which are shown graphically in Figures 6-4 through 6-7. These figures show the number of properties served and the associated wastewater flow collected in each watershed. Also shown are the watershed locations and capacities of the treatment and disposal facilities. Figure 6-1 provides a legend to aid in interpretation of the wastewater plan schematics.

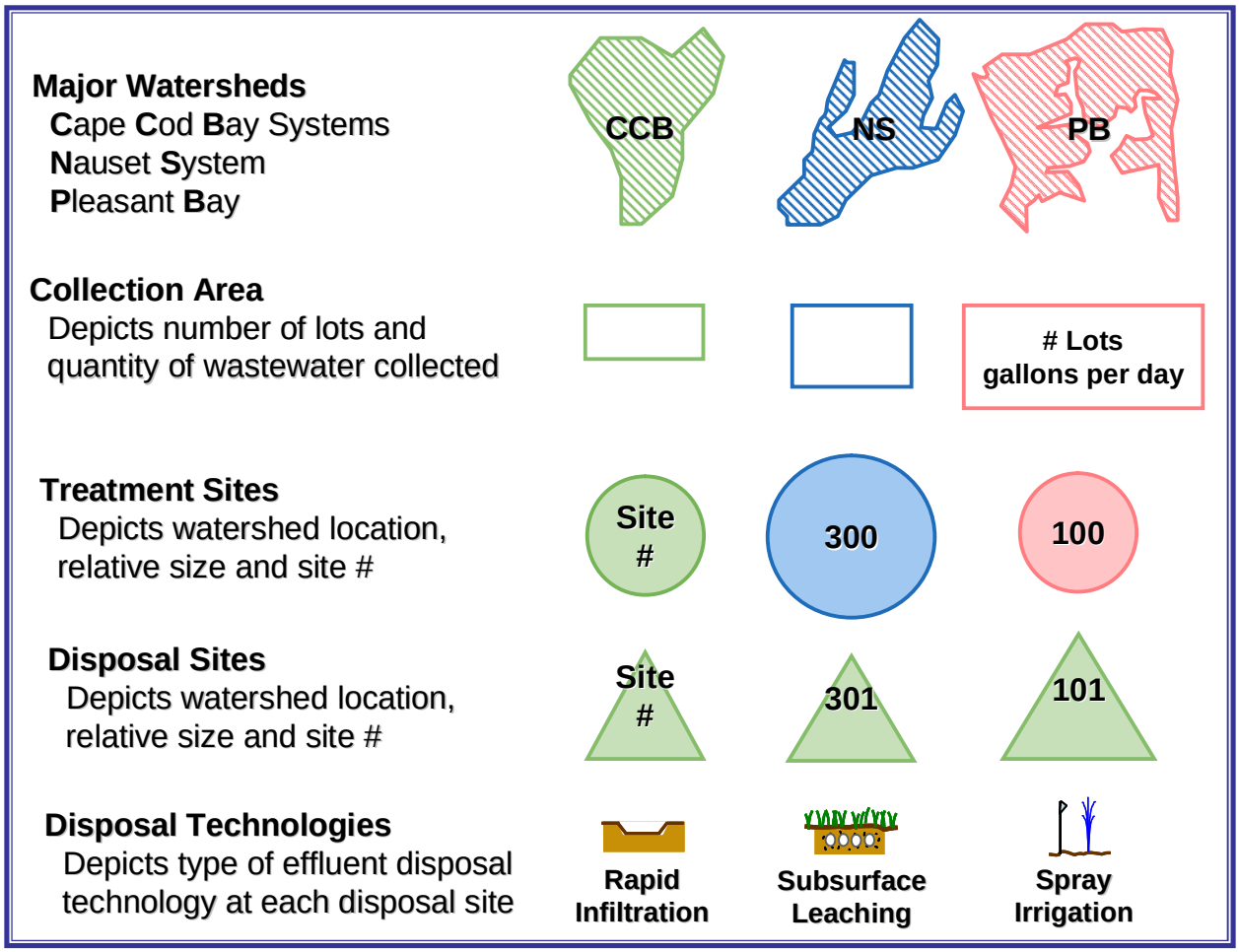
During the evaluation of the nine initial plans, it became clear that the WMSC places great importance on low-cost solutions. Perhaps the greatest potential for cost savings lies with regionalization. Therefore each of the three plans was evaluated as to its ability to accommodate wastewater flows from adjacent towns; that is, from Eastham and Brewster.

The environmental benefits of effluent reuse are also important factors in the WMSC deliberations, both for recycling water and nutrients and to open up the possibility of better nutrient and water management at local golf courses. The use of reclaimed water on golf courses is a fundamental element of Plan 3. Effluent reuse opportunities have been be investigated as adjuncts to Plans 1 and 2.

It is important to note that none of the original nine plans was "eliminated". The three plans, together with the parallel investigations of reuse and regionalization, represent all nine of the original plans.

The three wastewater plans are summarized and compared in Table 6-6.

FIGURE 6-1
WASTEWATER PLAN LEGEND



The common elements of all three plans are:

- Traditional gravity sewer systems supplemented by sections of low-pressure sewer and grinder pumps where necessary to overcome steep terrain and difficult-to-access properties;
- Collection system layouts intended to primarily address nitrogen control needs, with other needs met where convenient;
- Wastewater and effluent transport by conventional pump stations and force mains;
- A high level of nitrogen removal at treatment facilities using well-proven biological treatment methods, followed by ultraviolet disinfection;
- Liquid sludge processing at a central location to include dewatering and out-of-town disposal of dewatered solids;
- Septage handling facilities to receive and treat the liquid sludge pumped from septic tanks at those properties in Orleans that are not connected to the public sewer, as well as from unsewered homes and businesses in Eastham and Brewster (Orleans' partners in the Tri-Town district);
- A fertilizer control program to reduce non-wastewater nitrogen loads; and
- A cluster system at Baker's Pond to reduce phosphorus loading.

The principal differences among the three plans are:

- Two of the plans are based on the traditional municipal sewerage concept of a single centralized facility to meet all the Town's needs. By contrast, one of the plans can be characterized as "decentralized", using smaller modular treatment facilities located close to or in the areas where the wastewater is to be collected.
- Three types of effluent disposal are included in the plans: subsurface leaching (a larger version of the leaching trenches or fields that serve many individual homes); rapid infiltration (open sand beds that accept high rates of effluent application); and spray irrigation (recovery of the water and nutrients in the effluent by application on vegetated surfaces);

- Two of the plans involve fairly large treatment facilities sites in industrial areas with limited nearby residential development, while the decentralized plan includes sites in residential neighborhoods.
- Not all of the plans involve publicly-owned sites, and some purchase of private land for treatment and disposal is necessary in one or two of the plans.
- Two of the plans can be implemented by the Town of Orleans acting on its own, while one requires cooperation from a nearby town.

6.4 PLAN DESCRIPTIONS

Table 6-6 presents key statistics on each of the three wastewater management plans, which are described below:

Plan 1--Decentralized Wastewater Treatment and Disposal

Wastewater would be collected in all areas of Orleans that are tributary to nitrogen-sensitive embayments, in proportion to the nitrogen control needs determined by MEP studies. The distinguishing feature of this plan is four decentralized wastewater treatment facilities, located across all of the major watersheds in Orleans; see Figure 6-3. One of the facilities would be located at the site of the existing Tri-Town Septage Treatment Facility, where effluent would be disposed of by rapid infiltration. For the other three decentralized facilities, effluent disposal would be by subsurface leaching at nine sites at or near the treatment facilities. The other three facilities would be located near Meetinghouse Pond, near Areys Pond and in the Nauset watershed; more information on these sites is presented in Sections 5 and 7. This decentralized plan was formulated, in part, to allow early Town expenditures toward improving water quality in the "headwaters" sub-embayments of Pleasant Bay where the highest nitrogen control needs have been indentified.

In the aggregate, Plan 1 would serve areas of town that now generate an annual average wastewater flow of 395,000 gallons per day (gpd). The future peak flows handled at the four facilities would range from 110,000 gpd to 730,000 gpd, compared to about 1.2 to 1.3 million

gallons per day (mgd) in the centralized plans. These smaller plants can be located more easily than large plants, yet are still large enough to reliably provide a high level of nitrogen removal.

Each of the decentralized wastewater treatment facilities would generate a liquid sludge that would periodically be removed from the treatment process. For three of the facilities, this liquid would be trucked to the Tri-Town site for co-disposal with the liquid sludge produced by the new wastewater facility there, together with the septage (from Orleans and other communities) received by an upgraded Tri-Town septage facility.

Plan 2--Centralized Wastewater Treatment and Disposal at the Tri-Town Site

As in Plan 1, wastewater would be collected in all areas of Orleans that are tributary to nitrogen-sensitive embayments, in proportion to the nitrogen control needs determined by MEP studies. As shown in Figure 6-5, collected wastewater would be pumped to the site of the existing Tri-Town Septage Treatment Facility, near the intersection of Route 6 and Route 6A. This plan uses available land at a site near the downtown area where wastewater activities already take place. Effluent would be disposed of using rapid infiltration beds, similar to those now used for disposal of treated septage.

Plan 2 would serve areas of Orleans that now generate an annual average wastewater flow of 371,000 gpd. The facility would be designed for a future peak flow of 1.21 mgd. With the construction of a new centralized wastewater treatment facility at this site, the aging Tri-Town Septage Treatment Facility could be abandoned, and septage handling equipment could be incorporated into the wastewater facility.

Plan 3--Centralized Wastewater Treatment and Disposal in or near South Orleans

Plan 3 is illustrated in Figure 6-7. As in Plans 1 and 2, wastewater would be collected in all areas of Orleans that are tributary to nitrogen-sensitive embayments, in proportion to the nitrogen control needs determined by MEP studies. Collected wastewater would be transported south-ward through gravity and pressure pipes to a site near the boundary of Orleans and Brewster,

near the intersection of Route 39 and Freeman's Way. This plan would use vacant land near disturbed property where sand and gravel removal has occurred and where landscaping businesses now operate. Effluent would be disposed of in the cooler months using subsurface leaching systems that can be operated year-round. In the warmer months, effluent would be further treated to meet the DEP Reclaimed Water Guidelines, so it could be used to irrigate one or both of the Captains and Cape Cod National golf courses. This would reduce the golf courses' needs to pump groundwater for irrigation and use synthetic fertilizers.

Plan 3 would serve areas of Orleans that now generate an annual average wastewater flow of 386,000 gpd. The facility would be designed for a future peak flow of 1.28 mgd. While site investigations are preliminary, it may be possible for this plan to also serve the portions of Brewster tributary to Pleasant Bay.

The wastewater treatment plant would generate a liquid sludge that would be periodically removed from the treatment process. This liquid would be trucked to the Tri-Town site for co-disposal with the septage received at an upgraded Tri-Town septage facility.

6.5 NO ACTION PLAN

The three management plans selected for detailed evaluation all are intended to resolve identified wastewater needs in a comprehensive fashion. It is standard practice in wastewater management planning to also consider the alternative of taking no action to address needs, the so-called "No Action Plan". For Orleans, the No Action Plan entails the continued use of traditional on-site wastewater systems, within the purview of the state sanitary code, Title 5, and local supplemental regulations. This plan would not address the significant nutrient control needs faced by the town, and would allow continued degradation of freshwater ponds and coastal waters.

6.6 IMPORTANCE OF NITROGEN BALANCE

While the three plans provide a comparable degree of wastewater management to the town, there are subtle differences in the sewer service areas that are important to an understanding of the costs and benefits of the plans.

In Plan 2, wastewater would be collected from the watersheds of three nitrogen-sensitive embayments and transported to the Namskaket watershed where current watershed nitrogen loads are well below the nitrogen threshold for this marsh system. A high degree of wastewater treatment would be provided, converting most of the nitrogen to harmless nitrogen gas. Some nitrogen would remain in the facility effluent and would eventually find its way to the Namskaket and Little Namskaket marsh systems. The residual nitrogen load, together with the nitrogen load from other watershed activities, will still be well below the critical thresholds for those systems.

In contrast, Plans 1 and 3 involve recharge of effluent in the watersheds of sensitive embayments (both Nauset and Pleasant Bay for Plan 1 and Pleasant Bay alone for Plan 3). To account for the residual nitrogen in the recharged effluent that would remain in those watershed, the sewer service areas must be expanded over those in Plan 2 to eliminate more septic systems and offset the effluent nitrogen load. As a consequence, the sewer systems for Plans 1 and 3 must be more extensive than for Plan 2. There would be higher cost for collection, and the higher volumes collected would result in higher costs for treatment and disposal. In Plan 2 a total of 2,400 lots (47% of all developed properties in Orleans) would be connected to address current nitrogen control needs. By comparison, Plans 1 and 3 would connect 2,620 and 2,570 developed parcels respectively.

6.7 EXTENT OF SEWER SYSTEM

Figures 6-3, 6-5 and 6-7 depict, in green, preliminary sewer service areas. There are subtle differences in those areas that reflect the differing numbers of properties that would be connected

to the public sewer, as detailed in Table 6-6. In each figure, the green-shaded areas represent the sewer service areas that would exist at the end of the planning period (in the year 2030). As indicated in Table 6-6, only about 85% of the developed parcels in those areas would be sewered initially. As currently-developed parcels are redeveloped and as vacant lots are built upon, more properties must be sewered to offset the increased nitrogen loads that otherwise would occur through existing septic systems. The collected wastewater flow, and the nitrogen it contains, would gradually increase in response to growth in watersheds of sensitive embayments. That increased flow would come both from geographic expansion of the initial sewer service area and from "infill" (new connections within previously sewered neighborhoods). The geographic extent of the proposed sewer service areas, and the specific parcels to be initially connected, would be determined as part to the preliminary design work after selection of the recommended wastewater plan.

TABLE 6-3
SUMMARY OF WASTEWATER PLAN #1

Summary:

Collection of wastewater from all 3 major watersheds to satisfy all identified needs, transport to 3 new decentralized wastewater treatment plants, with the balance taken to a new plant at the Tri-Town site, with effluent disposal by rapid infiltration at the Tri-Town site and by subsurface leaching at seven sites at or near the decentralized plants.

Wastewater Collection:

Collection by conventional gravity sewers supplemented by grinder pumps

From Cape Cod Bay watershed	69,000 gpd (270 properties)
From Nauset watershed	204,000 gpd (1,030 properties)
From Pleasant Bay watershed	273,000 gpd (1,780 properties)
Overall	546,000 gpd (3,080 properties, 58% of all wastewater)

Wastewater Treatment: (Total of four wastewater treatment facilities)

Three decentralized treatment plants (with short-term peak capacities of 320,000 gpd, 240,000 gpd and 110,000 gpd) using

- Primary treatment
- Biological secondary treatment and nitrogen removal (SBRs or equivalent)
- Standard ultraviolet disinfection
- Filtration

One new plant at Site 241 (730,000 gpd) using:

- Primary treatment
- Biological secondary treatment and nitrogen removal (SBRs or equivalent)
- Ultraviolet disinfection
- Filtration

Wastewater Disposal:

Rapid infiltration Site 241

Subsurface leaching at:

Site 111	Site 162	Site 321
Site 112	Site 173	Site 322
Site 121	Site 181	Site 323

Disposition of effluent by watershed (annual average):

Cape Cod Bay	291,000 gpd	(53%)
Nauset system	125,000 gpd	(23%)
Pleasant Bay	130,000 gpd	(24%)

Septage and Sludge Handling:

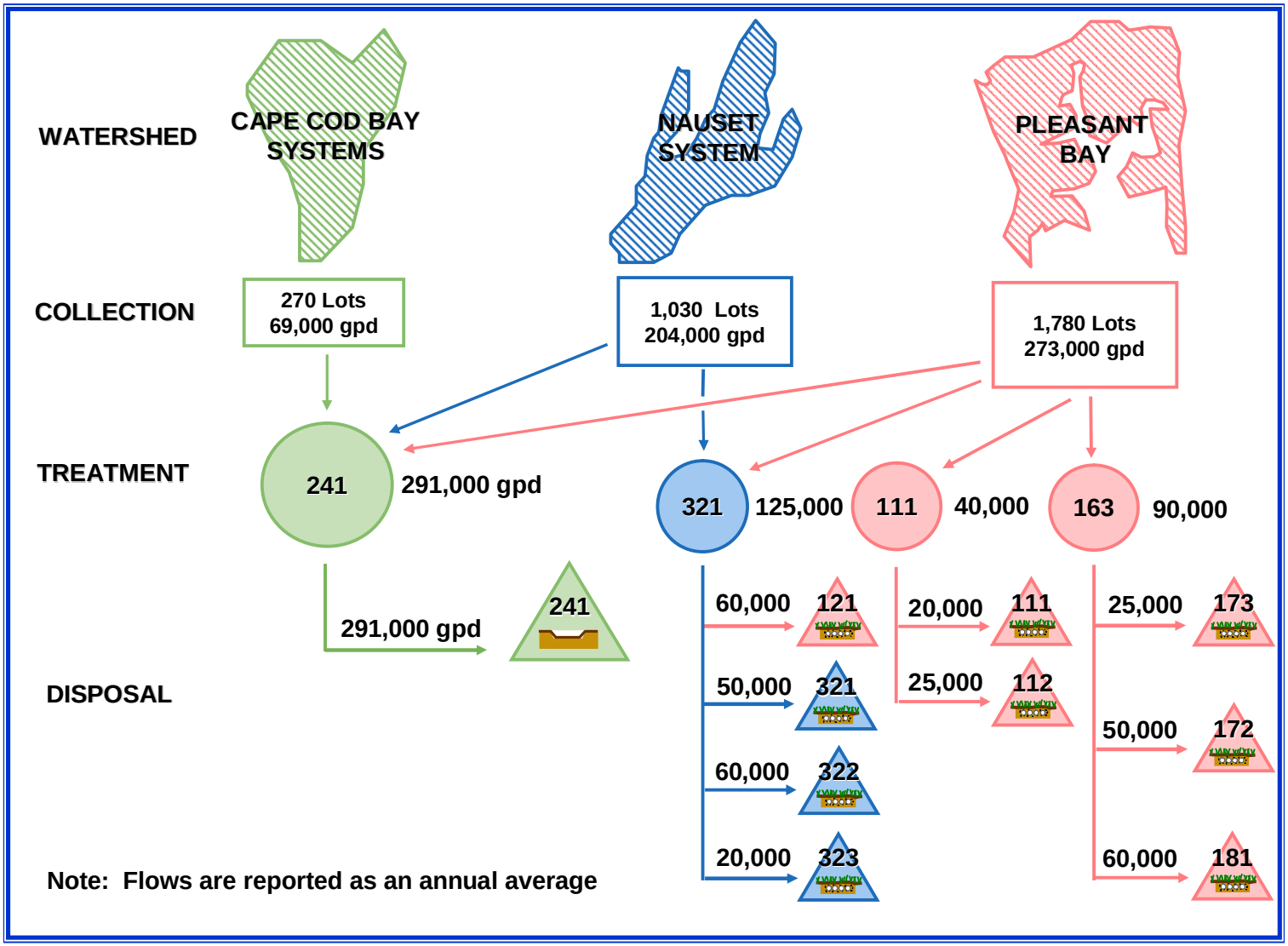
The treatment plant at the Tri-Town site would receive and dewater septage from all 3 District towns, as well as liquid sludge trucked from the 3 decentralized plants. Dewatered sludge would be trucked away for ultimate disposal out of town.

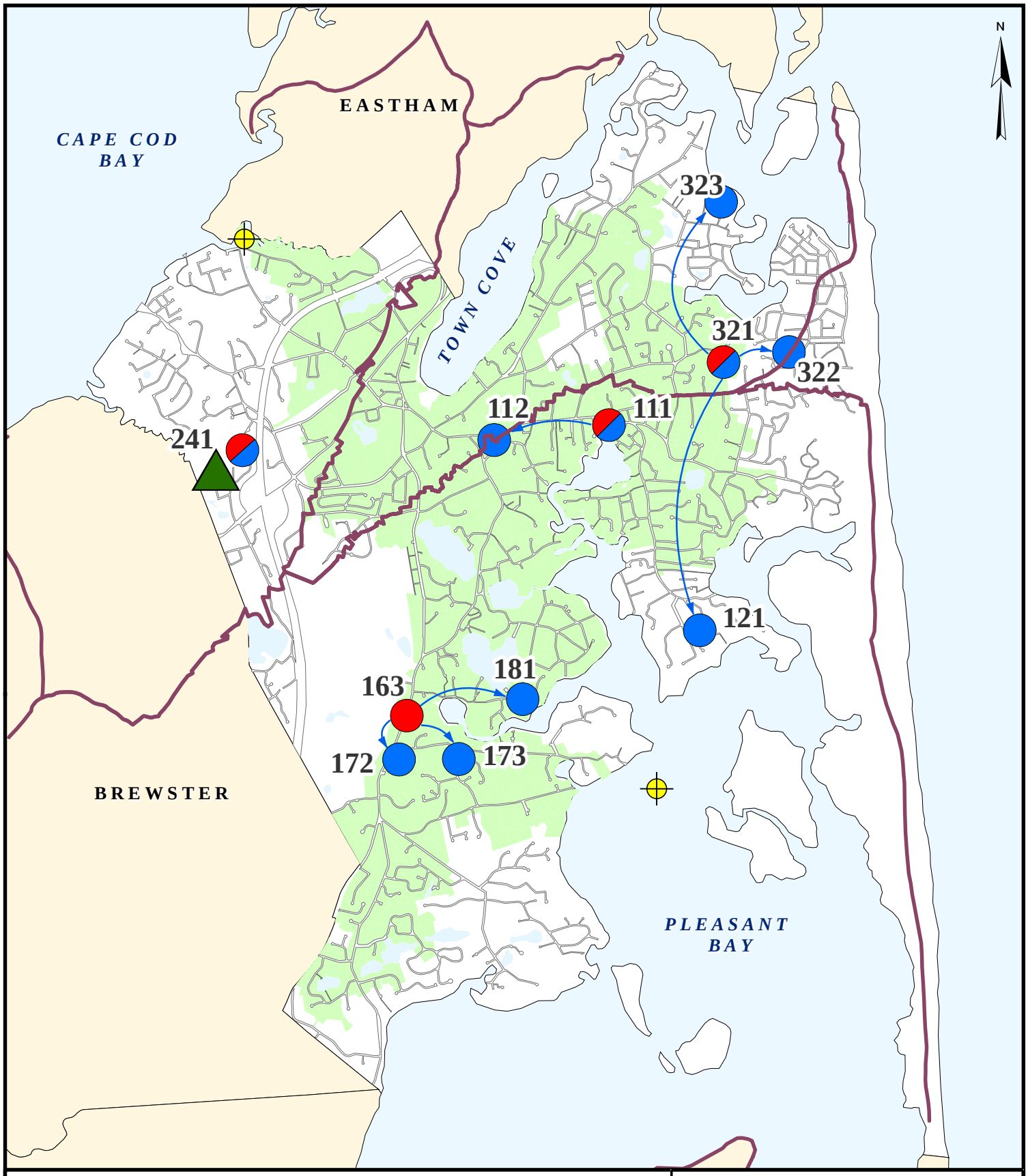
Land Acquisition Needs:

Purchase land at 3 treatment plant sites (all privately owned)

Purchase land or acquire easements at 9 sites for effluent disposal (8 privately owned)

FIGURE 6-2
WASTEWATER PLAN #1





Orleans CWMP

Wastewater Plan #1

PROJ NO:	DATE:	FIGURE:
10645D	Oct. 2008	6-3

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TABLE 6-4
SUMMARY OF WASTEWATER PLAN #2

Summary:

Collection of wastewater from all 3 major watersheds to satisfy all identified needs, transport to a new wastewater treatment plant at the Tri-Town site, with effluent disposal by rapid infiltration at the Tri-Town site and by subsurface leaching or rapid infiltration at one or two other nearby sites.

Wastewater Collection:

Collection by conventional gravity sewers supplemented by grinder pumps

From Cape Cod Bay watershed	69,000 gpd (270 properties)
From Nauset watershed	186,000 gpd (880 properties)
From Pleasant Bay watershed	249,000 gpd (1,680 properties)
Overall (current)	504,000 gpd (2,830 properties, 53% of all wastewater)

Wastewater Treatment:

A single treatment plant (with short-term peak capacity of 1.21 mgd) using:

- Primary treatment
- Biological secondary treatment and nitrogen removal (SBRs or equivalent)
- Standard ultraviolet disinfection
- Filtration

Wastewater Disposal:

Rapid infiltration Site 241 (the Tri-Town site), supplemented as necessary by

- subsurface leaching at Site 247 and
- rapid infiltration at Site 244

Disposition of effluent by watershed (annual average):

Cape Cod Bay	504,000 gpd	(100%)
Nauset system	0 gpd	(0%)
Pleasant Bay	0 gpd	(0%)

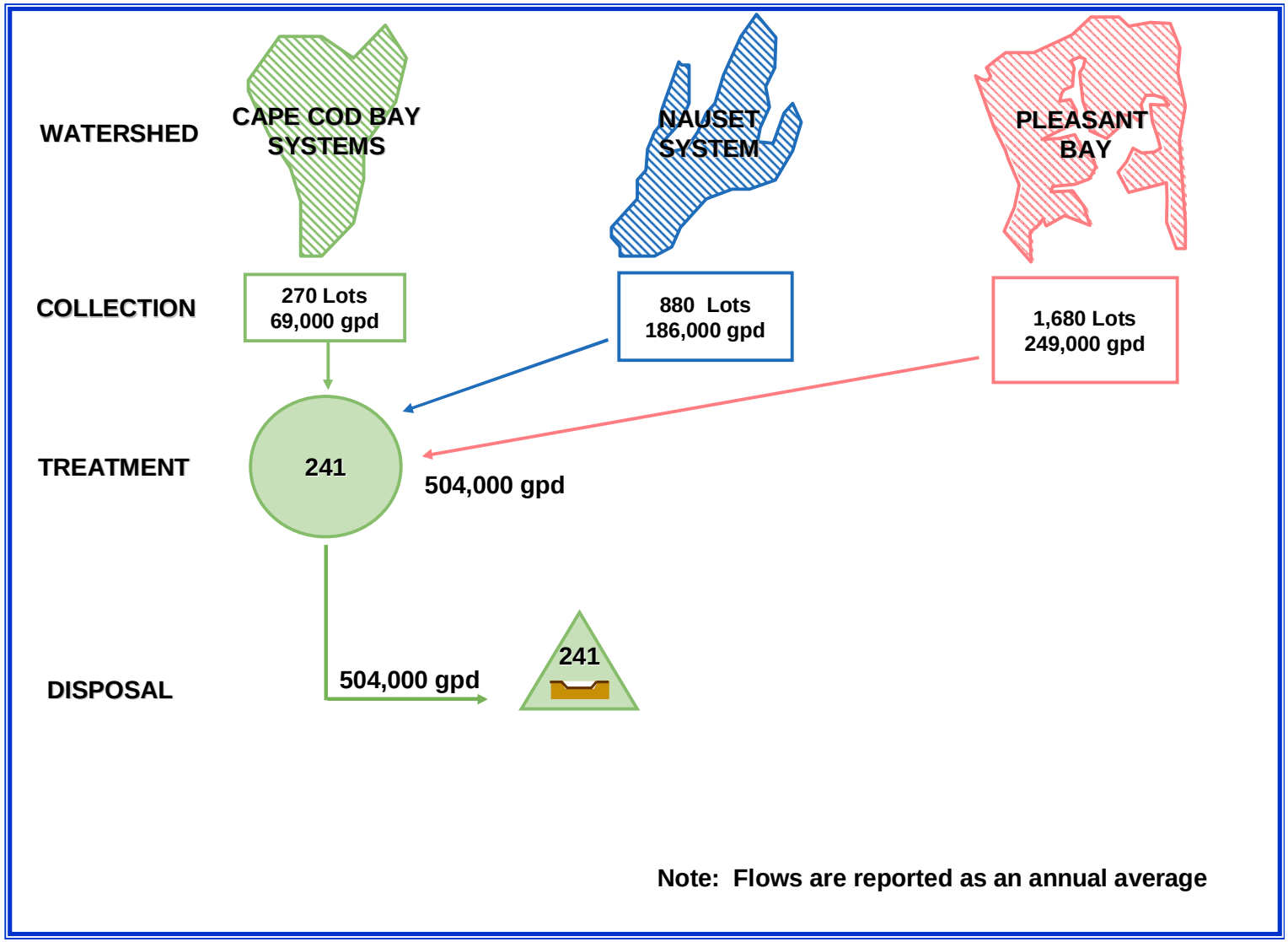
Septage and Sludge Handling:

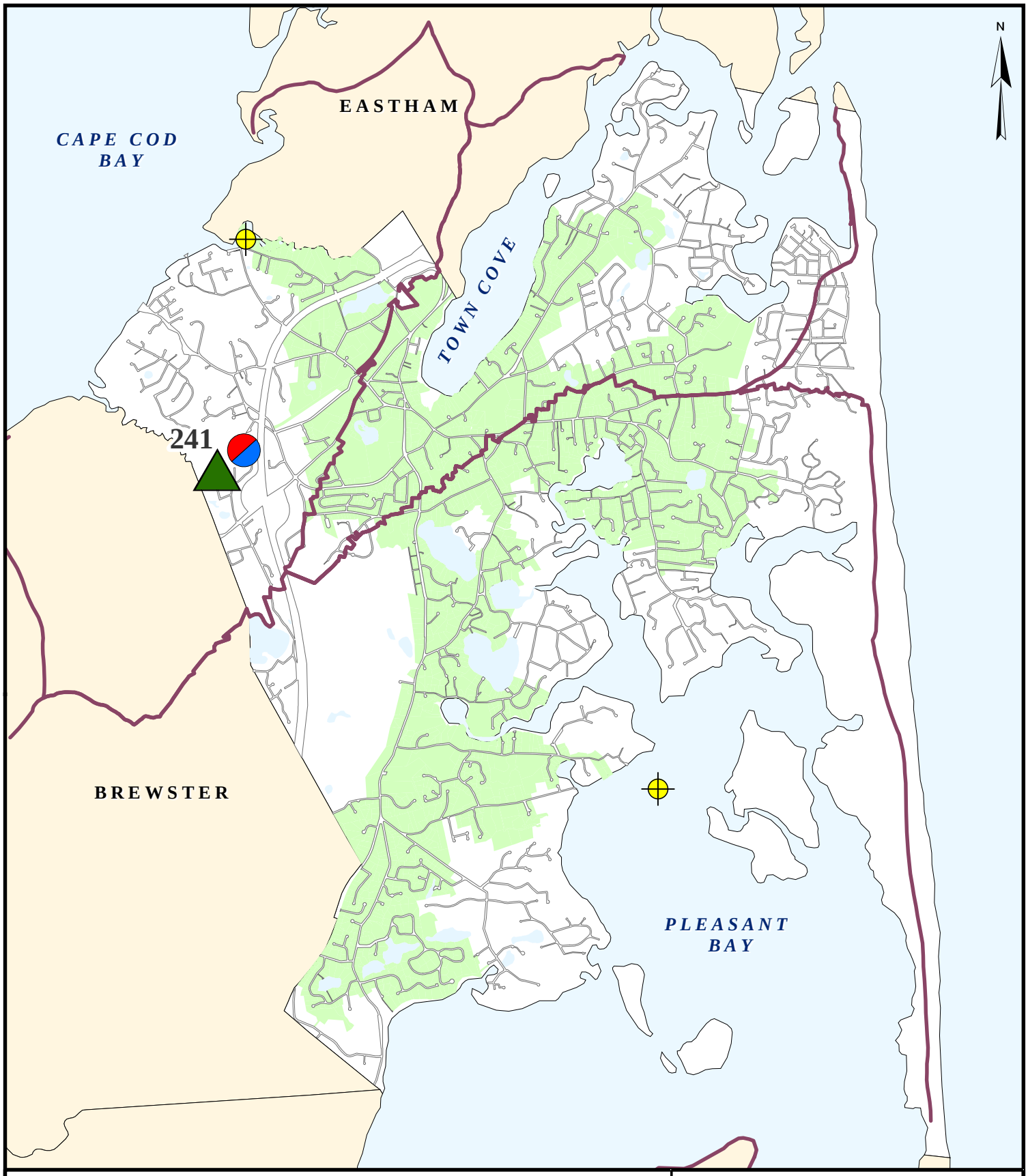
The treatment plant at the Tri-Town site would receive and dewater septage from all 3 District towns. Dewatered sludge would be trucked away for ultimate disposal out of town.

Land Acquisition Needs:

Purchase land or acquire easements at two sites for effluent disposal (1 privately owned)

FIGURE 6-4
WASTEWATER PLAN #2





Septage Treatment Facility

100 Site Number

Wastewater Treatment Site

Effluent Disposal Site

Sewer Service Area

Major Watershed Boundaries

Sentinel Stations

Source: Base data obtained from the Town of Orleans and MassGIS

0 4,000 8,000 Feet

Orleans CWMP

Wastewater Plan #2

PROJ NO: 10645D | DATE: Oct. 2008 | FIGURE: 6-5

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TABLE 6-5
SUMMARY OF WASTEWATER PLAN #3

Summary:

Collection of wastewater from all 3 major watersheds to satisfy all identified needs, transport to a new wastewater treatment plant in South Orleans, with effluent disposal at one or two golf courses in Brewster/Harwich (spray irrigation in warm months, subsurface leaching during remainder of year).

Wastewater Collection:

Collection by conventional gravity sewers supplemented by grinder pumps

From Cape Cod Bay watershed	69,000 gpd (270 properties)
From Nauset watershed	186,000 gpd (880 properties)
From Pleasant Bay watershed	280,000 gpd (1,900 properties)
Overall	535,000 gpd (3,050 properties, 56% of all wastewater)

Wastewater Treatment:

A single treatment plant (with short-term peak capacity of 1.28 mgd) using:

- Primary treatment
- Biological secondary treatment and nitrogen removal (MBRs or equivalent)
- Redundancy features necessary to meet Reclaimed Water Guidelines
- Filtration
- High-intensity ultraviolet disinfection
- Sludge thickening for transport to Tri-Town

Wastewater Disposal:

Spray irrigation at Site 194 and/or Site 195 during warm months

Subsurface leaching at Site 193 and/or Site 194 during cold months

Disposition of effluent by watershed (annual average):

Cape Cod Bay	0 gpd	(0%)
Nauset system	0 gpd	(0%)
Pleasant Bay	535,000 gpd	(100%)

Septage and Sludge Handling:

The upgraded Tri-Town Septage Treatment Facililty would receive and dewater septage from all 3 District towns, as well as liquid sludge trucked from the South Orleans centralized plant. Dewatered sludge would be trucked away for ultimate disposal out of town.

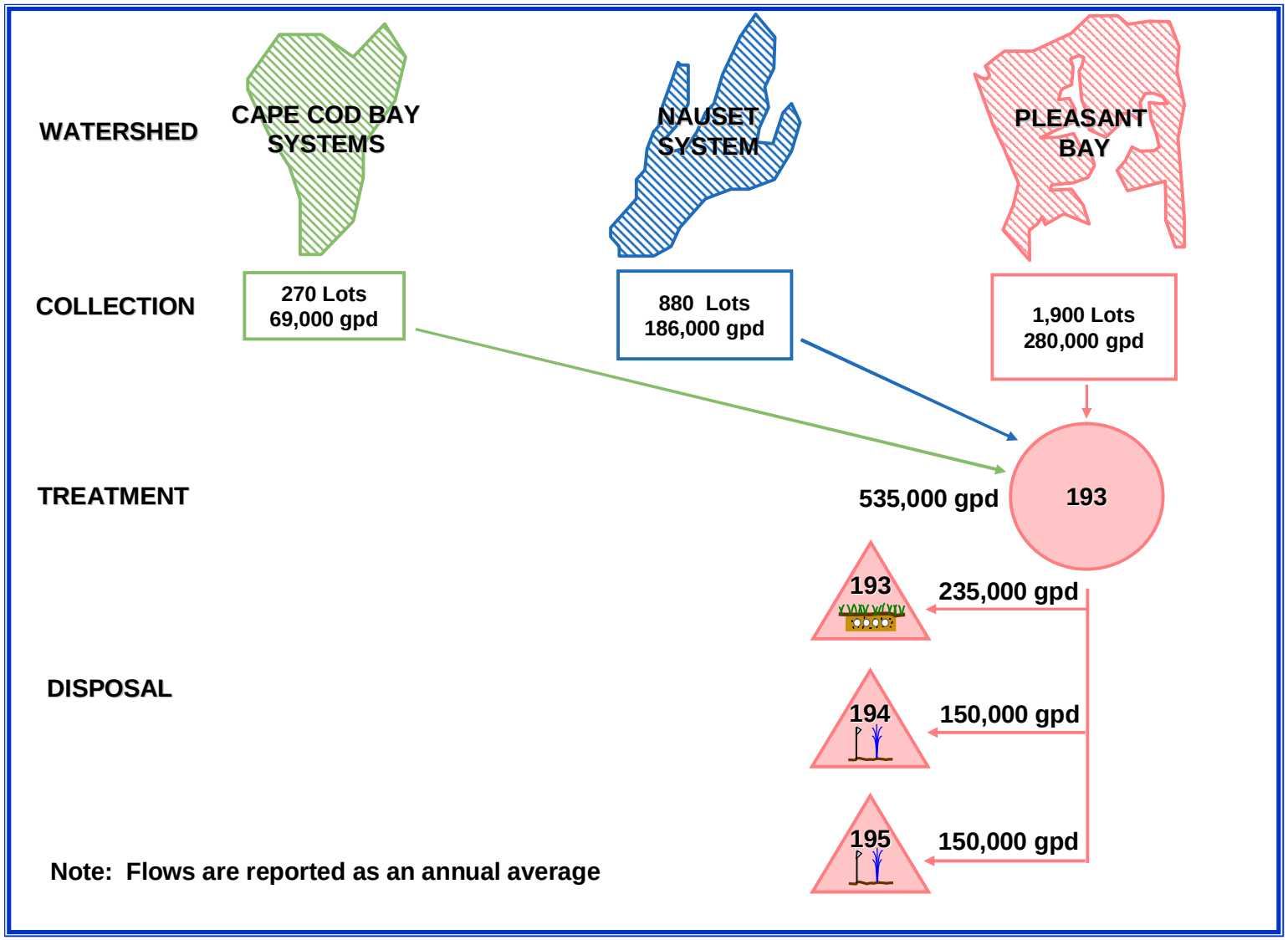
Land Acquisition Needs:

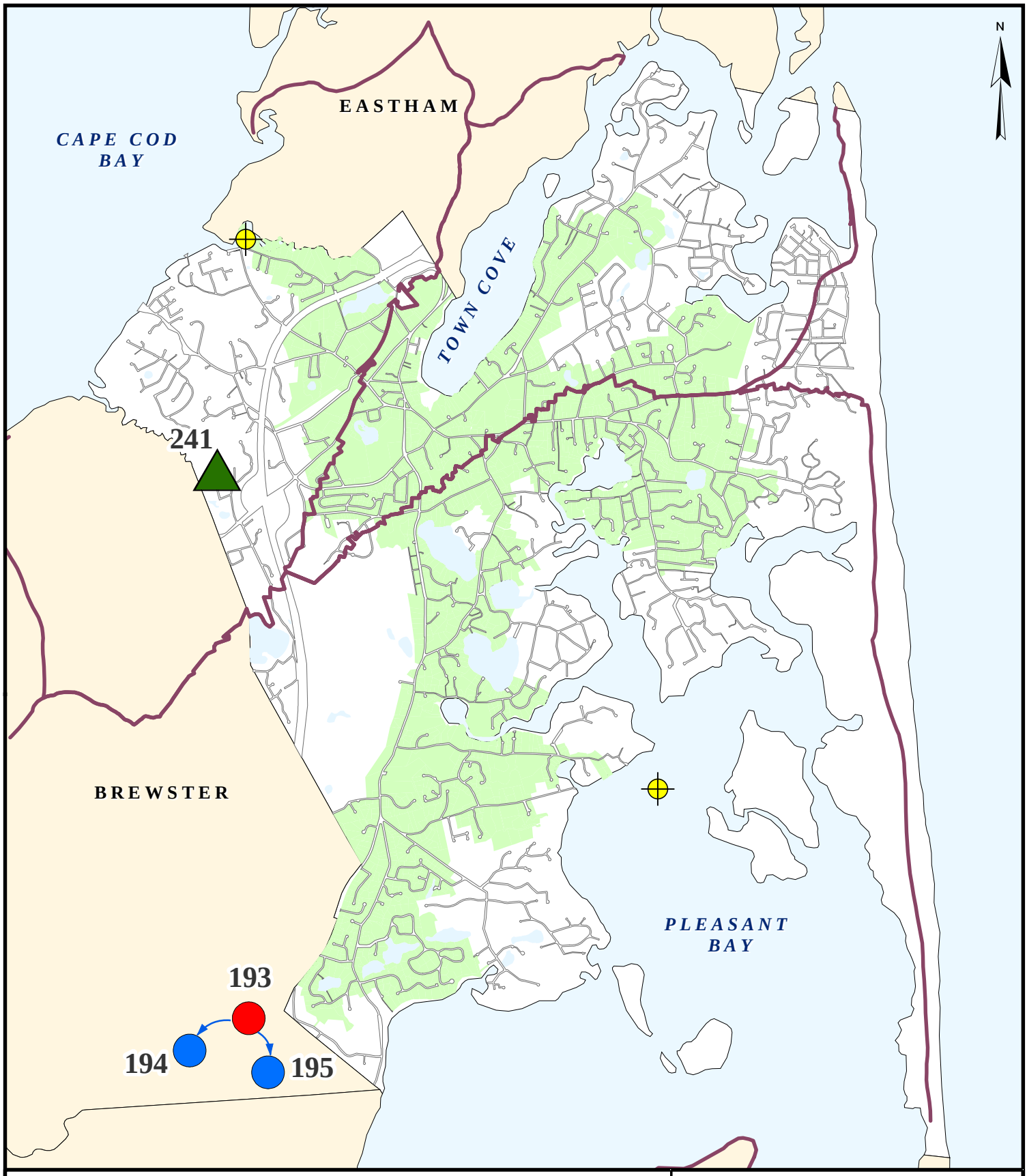
Purchase land for one treatment plant site (privately owned)

Purchase land or acquire easements at 2 sites for effluent disposal (1 public, 1 private)

Sign long-term contracts for golf course irrigation (1 public, 1 private)

FIGURE 6-6
WASTEWATER PLAN #3





Septage Treatment Facility

100 Site Number

Wastewater Treatment Site

Effluent Disposal Site

Sewer Service Area

Major Watershed Boundaries

Sentinel Stations

Source: Base data obtained from the Town of Orleans and MassGIS

0 4,000 8,000 Feet

Orleans CWMP

Wastewater Plan #3

PROJ NO: 10645D | DATE: Oct. 2008 | FIGURE: 6-7

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TABLE 6-6
COMPARISON OF WASTEWATER PLANS

	Plan 1 Decentralized (4 plants)	Plan 2 Centralized (Tri-Town)	Plan 3 Centralized (So. Orleans)
Wastewater Collection			
Properties served initially			
Cape Cod Bay watersheds	190	190	190
Nauset System watershed	920	780	780
Pleasant Bay watershed	1,510	1,430	1,600
Total	2,620	2,400	2,570
Initial annual avg wastewater flow, gpd	395,000	371,000	386,000
Percentage of properties served	48	44	47
Percentage of town-wide flow	51	48	50
Properties served at planning horizon			
Cape Cod Bay watersheds	270	270	270
Nauset System watershed	1,030	880	880
Pleasant Bay watershed	1,780	1,680	1,900
Total	3,080	2,830	3,050
Planning horizon annual avg wastewater flow, gpd	546,000	504,000	535,000
Percentage of properties served	57	52	56
Percentage of town-wide flow	58	53	56
Wastewater Treatment			
Number of plants	4	1	1
Location and capacity (mgd) of plants			
Cape Cod Bay watersheds	1 @ 0.73 mgd	1 @ 1.21 mgd	
Nauset System watershed	1 @ 0.32 mgd		
Pleasant Bay watershed	1 @ 0.24 mgd		1 @ 1.28 mgd
	1 @ 0.11 mgd		
Wastewater Disposal			
Number of sites			
Cape Cod Bay watersheds	1	1	0
Nauset System watershed	3	0	0
Pleasant Bay watershed	6	0	2
Total	10	1	2
Technology	rapid infiltration	rapid infiltration	spray irrigation
	subsurface leaching		subsurface leaching
Septage and Sludge Handling			
Septage receiving location	Tri-Town site	Tri-Town site	Tri-Town site
Liquid sludge dewatering	Tri-Town site	Tri-Town site	Tri-Town site
Dewatered sludge disposal	Out-of-town	Out-of-town	Out-of-town
Acquisition of Land or Easements			
Number of sites			
Treatment	3	0	1
Disposal	8	0	2
Total	11	0	3