APPENDIX C

Infrastructure

- H2M Wastewater Flow Analysis
- Peconic Estuary Program Nitrogen Study
- Storm Water Drainage Inventory
- Water Consumption Estimate
- Waterflow Test Results

H2M Wastewater Flow Analysis

TOWN OF RIVERHEAD / RIVERHEAD SEWER DISTRICT

DOWNTOWN REDEVELOPMENT WASTEWATER FLOW ANALYSIS

NOVEMBER 6, 2006 (DRAFT 2)
H2M FILE NO.: RDSD 06-05

H2M

TOWN OF RIVERHEAD/RIVERHEAD SEWER DISTRICT
DOWNTOWN REDEVELOPMENT WASTEWATER FLOW ANALYSIS

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TOWN OF RIVERHEAD/RIVERHEAD SEWER DISTRICT
DOWNTOWN REDEVELOPMENT WASTEWATER FLOW ANALYSIS

1 PURPOSE, GENERAL INFORMATION, AND EXECUTIVE SUMMARY

This report provides flow information relevant to wastewater treatment capacity pertaining to the development of in-district vacant properties and the planned redevelopment of downtown Riverhead. This flow analysis is prepared pursuant to H2M's proposal dated April 21, 2006, as authorized via Town Purchase Order # 064398 dated May 1, 2006.

The analysis was conducted by compiling water use records for all of the properties located within the boundaries of the Riverhead Sewer District. The collected data, which was provided by the Town and the Suffolk County Water Authority, was sorted based upon the various zoning categories comprising the District. The sorted data was then analyzed to project future sewage flows to establish the total build-out flow when the district is fully developed.

To conduct this study, water use records for the past two (2) years were obtained from the Riverhead Water District and the Suffolk County Water Authority (SCWA) for all of the Sewer District properties. The information was sorted based upon season and property zoning boundaries. Except for the Tanger II property that has an independent irrigation system and also has peak flows in the summer/fall seasons, winter season water usage is used since lawn irrigation is not used during the colder winter months and therefore the water consumption is representative of the amount of water actually returned to the sewer system as sewage. The resulting information was merged with Geographical Information System (GIS) data thereby associating actual water usage to the appropriate lot size and zoning categories during winter months. Properties without any associated water consumption records were assumed to be vacant parcels.

Sewer District flow records from the Advanced Wastewater Treatment Facility (AWTF) were logged to a spreadsheet and sorted for the same climatic periods as the water use records. Also, the wet weather flows were factored out and tabulated and analyzed separately.

The analysis of the data shows that at full build-out and incorporating existing zoning/land use, the Riverhead Advanced Wastewater Treatment Facility has excess flow capacity of approximately 95,000 gpd, <u>if New York State Department of Environmental Conservation grants a SPDES permit modification to increase the permitted flow of the facility</u>. If the

NYSDEC denies the permit modification, then the plant has a deficit in flow capacity of approximately 105,000 gpd.

The SPDES permit limit for flow is currently 1.3 mgd (1,300,000 gpd). This flow is proportioned to the Sewer District and Scavenger Waste District. The Sewer District allocated flow is currently 1.2 mgd (1,200,000 gpd). The Scavenger Waste District allocated flow is currently 0.1 mgd (100,000 gpd).

However, the sequencing batch reactor (SBR) portion of the upgraded plant (and all units downstream of it) was designed to hydraulically handle 1.4 mgd. The ultraviolet disinfection system was designed to handle 1.5 mgd since the disinfection system treats the discharge from the Scavenger Waste Plant (0.1 mgd) and the Sewer District plant (1.4 mgd). Therefore, if the NYSDEC grants a SPDES permit modification for flow, then adequate capacity exists to handle full Sewer District build-out including the redevelopment of downtown Riverhead as currently contemplated. This "excess capacity" is equal to approximately 95,000 gpd (1.4 mgd – 1.305 mgd from Table 5 = 0.95 mgd).

A District Map is included as Exhibit I of this report. In general, the Riverhead Sewer District is located within the area bounded by the terminus of the Long Island Expressway, East Main Street, the Peconic River and Middle Road; without incorporating all of the properties located therein. As per the Suffolk County Real Property Tax Map for Riverhead (Exhibit II), there are nearly 1,900 properties covering an area of approximately 2,000 acres. Eight (8) zoning categories of properties are included within the district boundaries as indicated on the attached Town of Riverhead Zoning Map (Exhibit III). They are: Agricultural, Residential, Commercial, Recreation/Entertainment, Community Services, Public Services, Parks/Conservation and Vacant. The largest number of properties is in the residential category and the largest acreage (with a corresponding greatest water usage volume) is in the commercial category. There are 12 tributary collection areas within the district boundaries and one (1) out-of-district (Suffolk County Offices/Courts/Jail facilities) collection area. Each area has a wastewater pumping station for transmission of flows either directly to the treatment facility or through other collection area pumping stations.

2 SEWER DISTRICT FLOWS

The Daily Monitoring Reports (DMRs), as filed by the Sewer District to the NYSDEC for the past two (2) year period, were reviewed for only the Sewer District portion of metered flow information. Data for the winter months was logged to a spreadsheet for review and analysis. Weather information was obtained for precipitation events and was compared to the flow data. Two new spreadsheets were then created to establish both average dry weather and average wet weather flow estimates. The average winter dry weather flow is estimated to be 0.747 million gallons per day (mgd) and the average winter wet weather flow is estimated at 0.800 mgd. Therefore, a crude approximation of the amount of extraneous water entering the system is 55,000 gpd as inflow (rainwater). **Appendix D** contains the flow summary spreadsheets.

3 WATER USE RECORDS AND PROJECTED FLOWS

3.1 Water Use Records for Existing Sewer Connections

Water use records for all individual properties contributing flows to the wastewater treatment system were obtained from the Town and the SCWA and are included in **Appendix A**. This water usage information was transferred to spreadsheets for analysis and sorting to establish flow factors for developing wastewater flow estimates for undeveloped areas of each of the eight categories of properties. The information was sorted based upon season and property zoning boundaries. We then merged this data with Geographical Information System (GIS) data. The water use summary spreadsheets are included in **Appendix B**. The results are shown in Table 1 below.

Table 1 - Water Use Summary by Zone

ZONE NUMBER	CATEGORY	FLOW FACTOR FOR WATER USAGE (GPD/ACRE)	TOTAL ACREAGE	TOTAL WATER USED (MGD)
100	Agricultural	2.27	52.88	0.0
200	Residential	628.71	436.67	0.275
300	Vacant	N/A	N/A	N/A
400	Commercial	556.56	573.49	0.319
500	Recreation & Entertainment	405.77	69.61	0.028
600	Community Service	473.20	167.70	0.079
800	Public Service	73.16	26.25	0.002
900	Wild/Forested/Conservation	N/A	N/A	N/A
		TOTAL	**1,326.60**	**0.703**

Using this information, the average daily water consumption for the Riverhead Sewer District properties was calculated at 0.703 mgd. In addition to this in-district consumption, the Suffolk County Office Complex, Jail and Courts, located at 100 Center Drive, is connected to the Sewer District. A review of their consumption records from the Suffolk County Water Authority confirms the approximate average usage volume of 0.200 mgd. Adding this quantity to the in-district daily consumption yields a total consumption of 0.903 mgd. Stated differently, the total daily amount of water consumed by the Riverhead Sewer District and Suffolk County Center, when lawn irrigation is not used, is approximately 903,000 gpd.

3.2 Projected Sewage Flows

The flow factor information for each category contained in Table 1 was then applied to the vacant lots to estimate the additional future consumption when the Sewer District is fully developed and is at build-out. Table 2 below summarizes the additional water usage associated with each category of vacant land.

Table 2 - Projected Additional Water Usage for Full Development by Zone

ZONE NUMBER	CATEGORY	WATER USAGE (GPD/ACRE)	VACANT ACREAGE	WATER USAGE (MGD)
100	Agricultural	2.27	N/A	N/A
200's & 310"s	Residential	628.71	161.93	0.102
320's	Rural/ Residential	628.71	4.49	0.003
330's, 340's &	Commercial	556.56	162.00	0.090
500	Recreation & Entertainment	405.77	N/A	N/A
600	Community Service	473.20	10.41	0.005
800	Public Service	73.16	25.58	0.002
900	Wild/Forested/Conservation	N/A	25.73	0.000
			TOTAL PROJECTED ADDITIONAL USAGE	**0.202**

There are Rt. 58 businesses that have large land areas that proportionately use very little water; i.e. Home Depot, car dealerships, Suffolk Life, etc. Consequently, the method used in Table 2 was re-evaluated for calculating the flow generated for the commercial properties located along Rt. 58. To correct for this anomaly, the commercial category was sub-divided into high density commercial and low density commercial classes. By eliminating the low density properties from the data analysis, the commercial flow estimate was increased from 556.56 gpd/acre, as shown in Table 1, to 615.80 gpd/acre. This is a 10.6% water usage increase. When applied to the information in Table 2, the projected flow of the "Commercial" category is increased by 10,000 gpd (0.01 mgd). Consequently, when the existing vacant lots are developed, they will add approximately 212,000 gpd based on existing zoning/land use (202,000 gpd from Table 2 + 10,000 gpd = 212,000) .

As a matter of interest and for future planning purposes, the Defriest Pump Station drainage zone commercial properties (downtown Riverhead) was separated from the database. The result is that each acre of downtown has a water consumption rate of approximately 1,235 gpd / acre.

In addition to the above projected flows, there are three (3) Commercial Sewer Extension area development projects in various stages of progress. They are: Best Western Hotel, Rt. 58 Hotel Plaza, and the Palace Laundry. These projects are unusual as they have high water consumption estimates associated with their connection to the Sewer District facilities and therefore need to be individually addressed in flow projection estimates. The estimated average daily flows are:

- Best Western – 40,900 gpd
- Rt. 58 – 41,910 gpd
- Palace Laundry – 21,000 gpd

Their combined wastewater flow is estimated at 103,810 gpd (say 104,000 gpd).

The total estimated additional flow contribution for full development of the Sewer District properties (<u>excluding</u> ***Downtown Redevelopment***) is therefore estimated to be 0.316 MGD (212,000 gpd + 104,000 gpd = 316,000 gpd).

As per the Malcolm Pirnie February 26, 1996 letter report (**Appendix E**) that addressed the impacts of the Tanger I and Tanger II connections to the existing sewer system, the peak design flows from the Tanger facilities is 250 gpm utilizing a peaking factor of 9.6. Using a more realistic peak factor of 4.78, the peak flow is 125 gpm. Based on other information contained in that report, the average daily flow from Tanger I & Tanger II is 13,000 gpd and 24,000 gpd respectively.

At this time, except for the Reebok Shoe Store, the Tanger I development utilizes on-site sanitary waste disposal systems and is not connected to the Sewer District. Analyzing the Tanger II property water use records for the past two (2) summer/fall seasons (highest occupancy seasons), the average daily usage plus one (1) standard deviation is 35,000 gpd. This is 11,000 gpd (146%) higher than presented by the Malcolm Pirnie report. A recent wastewater pump station flow meter calibration by the Sewer District indicated a peak holiday wastewater flow of 80,000. The flow meter information is summarized in **Appendix C**. The flow for Tanger II is approximately 56,000 gpd (333%) higher than presented by the Malcolm Pirnie report and represents the flows during a peak holiday weekend. To account for the future connection of Tanger I property, an estimated additional flow of 19,000 gpd (13,000 x 1.46) was used. This increases the total estimated additional flow contribution for full development of the Sewer District properties (excluding ***Downtown Redevelopment***) to 335,000 gpd (316,000 gpd at full build-out + 19,000 gpd for Tanger I = 335,000 gpd).

3.3 Build-Out Flow Derivation

Table 3 summarizes the derivation of the build-out flow for the Riverhead Sewer District:

Table 3 – Riverhead Sewer District Build-Out Flow Summary

REF.	Flow Description	Flow (gpd)
1	Existing District At Build-Out (Table 2)	202,000
2	Commercial Flow Adjustment	10,000
3	Current Commercial Sewer Extension Projects	104,000
4	Tanger I Future Connection	19,000
Total Build-Out Flow (excluding Downtown Redevelopment)		**335,000**

As shown, the total build-out flow is 335,000 gpd excluding the Downtown redevelopment project.

4 DOWNTOWN REDEVELOPMENT

The business district properties of the Town are currently close to full zone development. Revitalization plans for this area requires analysis of the proposed changes in the character of the area to evaluate such usage as apartments, condominiums and entertainment zones. (The proposed use changes will have an impact on the existing estimated 1,235 gpd/acre usage as mentioned above.)

According to the Town Planning Department, there are currently five (5) zones identified for downtown redevelopment. Exhibit IV includes copies of the Zoning Use District Maps for the "Downtown Center" development zones. These zones are listed below:

- Downtown Center 1 – Main Street (DC-1)
- Downtown Center 2 – Waterfront (DC-2)
- Downtown Center 3 – Office (DC-3)
- Downtown Center 4 – Office/Residential Transition (DC-4)
- Downtown Center 5 – Residential (DC-5)

Within these zones, the following projects are under consideration at this time:

- DC-1:
  1. Five hundred (500) apartments with average size of 800 square feet
  2. Apollo Project:
     - 76,000 square feet retail space
     - 75,000 square feet theatre
     - 100 room hotel
  3. 108 room Atlantis Marine World Hotel
- DC-4: Fifty (50) townhouses with an average size of 1,000 square feet to replace existing single family homes on approximately 12.5 acres
- DC-5: Twelve (12) townhouses on existing vacant (Fire District property)

The wastewater flow contributions for each of these areas are calculated as follows:

- DC-1:

  1. The 500 apartments are planned to be constructed above mixed-use business 500 units x 225 gpd/unit = 112,500 gpd

  2. Apollo Project:

     - New Retail: *assume* 10% wet use = 7,600 s.f. x 0.15 gpd/s.f. = 1,140 gpd, *assume* 5% eating = 50 seats x 30 gpd/seat = 4,500 gpd, *assume* 3 bars x 15 gpd/occupant x 100 occupants = 4,500 gpd, *assume* 65% dry stores = 49,400 s.f. x 0.03 gpd/s.f. = 1,500 gpd. Total Flow = 11,640 gpd for new retail space
     - Theatre: 5,000 seats x 3 gpd/seat = 15,000 gpd
     - Hotel: 100 rooms x 125 gpd/room = 12,500 gpd

  3. Atlantis Marine Hotel: 108 rooms x 125 gpd/room = 14,000 gpd

- DC-4: No change in flow is estimated as the unit density will be the same as the existing.

- DC-5: These 12 townhouses will generate additional flows: 12 units x 300 gpd/unit = 3,600 gpd

Table 4 summarizes the derivation of the flow for the redevelopment of downtown Riverhead:

Table 4 – Redeveloped Downtown Riverhead Flow Summary

REF.	Description	Flow (gpd)
1	DC-1: 500 Apts.	112,500
2	DC-1: Apollo Project	39,140
3	DC-1: Atlantis	14,000
4	DC-5: 12 Townhouses	3,600
Total Projected Flow for Redeveloped Downtown . . .		169,240
	Say:	***170,000***

The total additional flow contributions, as outlined above for redeveloped downtown Riverhead, is 169,240 gallons per day. For ease of use, the downtown area once redeveloped as currently planned as of the writing of this report, is 170,000 gpd (.170 mgd).

Consequently, when the Riverhead Sewer District is fully developed, including the redevelopment of downtown as pending at the time of the preparation of this report, the additional flow that will be generated is approximately 505,000 gpd (0.335 mgd from Table 3 + 0.170 mgd = 0.505 mgd). Stated differently, the Riverhead Sewer District will generate approximately 505,000 gpd of additional flow when build-out occurs assuming downtown is developed as discussed herein.

5 WASTEWATER TREATMENT FACILITY EXCESS CAPACITY

The design capacity for the Riverhead Advanced Wastewater Treatment Facility (AWTF) is 1.20 MGD. The analysis of the flow meter records for the past two (2) years from the AWTF indicates that the current average winter dry weather flow is 0.747 MGD and the current average winter wet weather flow is 0.800 MGD. These analyses and comparisons of flow information allow for the development of the excess treatment capacity as presented below:

5.1 Extraneous Water Entering the System

- Infiltration is defined as ground water entering the sewer system from defects located below current ground water elevations. Inflow is defined as water entering the system during precipitation events from openings in manhole covers, building basement sump pumps, roof drains connected to the sanitary sewers, temporarily high water tables (delayed infiltration) and structural defects. By subtracting the dry weather flow value from the wet weather flow value, the amount of extraneous water entering during rainfall can be grossly approximated as follows: 0.800 mgd (average winter wet weather flow) – 0.747 mgd (average winter dry weather flow) = 0.55 mgd. Therefore, approximately 55,000 gpd of extraneous water currently enters the system on the average. The volume that peaks during rain events varies with the intensity and duration of the storm. There have been occasions where the wet weather flow exceeded the design flow of the facility for days at a time. During sustained periods groundwater levels are above the top of the sewer pipe and the infiltration can be substantial.

Inflow/Infiltration robs the system of capacity that could otherwise be used for wastewater treatment. There is lost revenue due to loss of capacity from extraneous flow entering the system.

5.2 Current Unused Flow Capacity

The current unused flow capacity is defined as the NYSDEC SPDES permitted flow less the average wet weather flow as follows: 1.20 mgd – 0.800 mgd = 0.400 mgd (Say 400,000 gpd).

5.3 Capacity at Full Sewer District Build-Out with Redeveloped Downtown Riverhead

The capacity at full district build-out is obtained by subtracting the current wet weather flow plus the flow difference contributed at build-out from the SPDES permitted flow. This is shown below in Table 5:

Table 5 – Capacity at Full Sewer District Build-Out with Redeveloped Downtown Riverhead

REF.	Description	Flow (gpd)	Cumulative Flow (gpd)
1	SPDES Permitted Flow	1,200,000	
2	Less Current Wet Weather Flow	(800,000)	(1,305,000)
3	Less Existing District At Build-Out (Table 2)	(202,000)	
4	Less Commercial Flow Adjustment	(10,000)	
5	Less Current Commercial Sewer Extension Projects	(104,000)	
6	Less Tanger I Future Connection	(19,000)	
7	Less Redeveloped Downtown Riverhead	(170,000)	
	Capacity...	***-105,000 gpd***	

Therefore, without successfully obtaining a SPDES permit modification for flow, the current facility is not permitted by NYSDEC to hydraulically handle the Sewer District at full build-out assuming that the downtown redevelopment progresses. There currently stands a projected *deficit* of approximately 105,000 gpd.

The SPDES permit limit for flow is currently 1.3 mgd (1,300,000 gpd). This flow is proportioned to the Sewer District and Scavenger Waste District. The Sewer District allocated flow is currently 1.2 mgd (1,200,000 gpd). The Scavenger Waste District allocated flow is currently 0.1 mgd (100,000 gpd).

However, the sequencing batch reactor (SBR) portion of the upgraded plant (and all units downstream of it) was designed to hydraulically handle 1.4 mgd. The ultraviolet disinfection system was designed to handle 1.5 mgd since the disinfection system treats the discharge from the Scavenger Waste Plant (0.1 mgd) and the Sewer District plant (1.4 mgd). Therefore, if the NYSDEC grants a SPDES permit modification for flow, then adequate capacity exists to handle full Sewer District build-out including the redevelopment of downtown Riverhead as currently contemplated.

This "excess capacity" is equal to approximately 95,000 gpd (1.4 mgd – 1.305 mgd from Table 5 = 0.95 mgd). [1]

6 SUMMARY AND CONCLUSIONS

The SPDES Permit capacity for the Riverhead Advanced Wastewater Treatment Facility (AWTF) is 1.20 MGD. Based upon the expected build-out of vacant properties within the District and to allow for the planned redevelopment of the downtown, an additional 505,000 gpd of flow is estimated for the Sewer District. Full development of the District may take many years. With the downtown area requiring only an additional 170,000 gpd of the current 400,000 gpd of unused capacity, 230,000 gpd of capacity is available for other development. Because the AWTF was designed for an average daily flow of 1.4 mgd, an additional capacity 200,000 gpd can become available when necessary by obtaining a SPDES Permit modification from the NYSDEC. This will provide for sufficient expansion capacity for all planned development with 95,000 gpd excess capacity in the future.

This report does not address the organic capacity of the facility, which is as limiting as the flow capacity. Also, the sewage flow generated by the downtown area currently is handled by the Defriest Pump Station and existing gravity sewers and force mains. The analysis of the existing collection and conveyance system was beyond the scope of this flow analysis

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[1] Pursuant to 6NYCRR Part 750, Subpart 750-2.9(c), the permittee must submit a flow management plan when the flow value for a calendar year to the plant has reached or exceeded 95% of the permitted flow. Therefore, under the current permit the Riverhead Sewer District flow must not exceed 1,140,000 gpd (1,200,000 x .95) without submission of the flow management plan to NYSDEC.

report. A separate Map & Plan will be necessary to determine the organic impact to the treatment plant and the impacts to the collection and conveyance network.

Appendix A

Water Use Records from Riverhead Town and Suffolk County Water Authority

(ONE SHEET SAMPLE DOCUMENT)

Water Use Records from Riverhead Town and Suffolk County Water Records
(Sample)

Tax Map #	Billed Consumption	Billing Date	Prop Cls	SBL	Highest RPS S/D Code	RPS Consumption	Property Loc
82.-1-13.1	51	20041215	220	08200000010130010000	SE302	0	748 Middle
82.-1-13.1	149	20040917	220	08200000010130010000	SE302	0	748 Middle
82.-1-13.1	7	20040609	220	08200000010130010000	SE302	0	748 Middle
82.-1-13.1	85	20040309	220	08200000010130010000	SE302	0	748 Middle
82.-1-13.2	60	20041215	210	08200000010130020000	SE302	0	756 Middle
82.-1-13.2	105	20040917	210	08200000010130020000	SE302	0	756 Middle
82.-1-13.2	74	20040609	210	08200000010130020000	SE302	0	756 Middle
82.-1-13.2	46	20040309	210	08200000010130020000	SE302	0	756 Middle
82.-1-14.1	11	20041215	280	08200000010140010000	SE302	0	726&730 Middle
82.-1-14.1	28	20040917	280	08200000010140010000	SE302	0	726&730 Middle
82.-1-14.1	29	20040609	280	08200000010140010000	SE302	0	726&730 Middle
82.-1-14.1	28	20040309	280	08200000010140010000	SE302	0	726&730 Middle
82.-1-14.2	0	0	311	08200000010140020000	SE302	0	726&730 Middle
82.-1-14.3	0	0	311	08200000010140030000	SE302	0	726&730 Middle
82.-1-15.1	0	0	311	08200000010150010000	SE302	0	726&730 Middle
82.-1-15.2	0	0	311	08200000010150020000	SE302	0	726&730 Middle
82.-1-16	18	20041215	210	08200000010160000000	SE302	0	700 Middle
82.-1-16	25	20040917	210	08200000010160000000	SE302	0	700 Middle
82.-1-16	19	20040609	210	08200000010160000000	SE302	0	700 Middle
82.-1-16	11	20040309	210	08200000010160000000	SE302	0	700 Middle
82.-1-17	5	20041215	210	08200000010170000000	SE302	0	1475 Roanoke
82.-1-17	6	20040917	210	08200000010170000000	SE302	0	1475 Roanoke
82.-1-17	5	20040609	210	08200000010170000000	SE302	0	1475 Roanoke
82.-1-17	3	20040309	210	08200000010170000000	SE302	0	1475 Roanoke
82.-1-18	15	20041215	210	08200000010180000000	SE302	0	1465 Roanoke
82.-1-18	34	20040917	210	08200000010180000000	SE302	0	1465 Roanoke
82.-1-18	21	20040609	210	08200000010180000000	SE302	0	1465 Roanoke
82.-1-18	19	20040309	210	08200000010180000000	SE302	0	1465 Roanoke
82.-1-19	33	20041215	210	08200000010190000000	SE302	0	1459 Roanoke
82.-1-19	108	20040917	210	08200000010190000000	SE302	0	1459 Roanoke
82.-1-19	26	20040609	210	08200000010190000000	SE302	0	1459 Roanoke
82.-1-19	10	20040309	210	08200000010190000000	SE302	0	1459 Roanoke
82.-1-20	5	20041215	210	08200000010200000000	SE302	0	1453 Roanoke
82.-1-20	39	20040917	210	08200000010200000000	SE302	0	1453 Roanoke
82.-1-20	9	20040609	210	08200000010200000000	SE302	0	1453 Roanoke
82.-1-20	7	20040309	210	08200000010200000000	SE302	0	1453 Roanoke
82.-1-21	14	20041215	210	08200000010210000000	SE302	0	1447 Roanoke
82.-1-21	45	20040917	210	08200000010210000000	SE302	0	1447 Roanoke
82.-1-21	13	20040609	210	08200000010210000000	SE302	0	1447 Roanoke
82.-1-21	9	20040309	210	08200000010210000000	SE302	0	1447 Roanoke
82.-1-22	11	20041215	210	08200000010220000000	SE302	0	1439 Roanoke
82.-1-22	34	20040917	210	08200000010220000000	SE302	0	1439 Roanoke
82.-1-22	4	20040609	210	08200000010220000000	SE302	0	1439 Roanoke
82.-1-22	4	20040309	210	08200000010220000000	SE302	0	1439 Roanoke
82.-1-24	37	20041215	210	08200000010240000000	SE306	94	690 Middle
82.-1-24	30	20040917	210	08200000010240000000	SE306	94	690 Middle
82.-1-24	20	20040609	210	08200000010240000000	SE306	94	690 Middle
82.-1-24	21	20040309	210	08200000010240000000	SE306	94	690 Middle
82.-1-25.2	0	0	210	08200000010250020000	SE302	0	690 Middle
82.-1-25.3	0	0	311	08200000010250030000	SE301	0	690 Middle
82.-2-4.6	258	20041215	411	08200000020040060000	SE306	5168	588 Middle
82.-2-4.6	563	20040917	411	08200000020040060000	SE306	5168	588 Middle
82.-2-4.6	131	20040609	411	08200000020040060000	SE306	5168	588 Middle
82.-2-4.6	51	20040309	411	08200000020040060000	SE306	5168	588 Middle
82.-2-4.8	0	0	330	08200000020040080000	SE301	0	588 Middle
82.-2-4.9	0	0	312	08200000020040090000	SE301	0	588 Middle
82.-2-4.10	34	20041215	210	08200000020040100000	SE306	30	596 Middle
82.-2-4.10	50	20040917	210	08200000020040100000	SE306	30	596 Middle
82.-2-4.10	3	20040609	210	08200000020040100000	SE306	30	596 Middle
82.-2-4.10	1	20040309	210	08200000020040100000	SE306	30	596 Middle
82.-2-4.11	23	20041215	210	08200000020040110000	SE306	100	600 Middle
82.-2-4.11	42	20040917	210	08200000020040110000	SE306	100	600 Middle
82.-2-4.11	25	20040609	210	08200000020040110000	SE306	100	600 Middle
82.-2-4.11	22	20040309	210	08200000020040110000	SE306	100	600 Middle
82.-2-4.12	0	20041215	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	136	20041215	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	0	20040917	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	230	20040917	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	1	20040609	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	133	20040609	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	15	20040309	411	08200000020040120000	SE306	5918	Middle
82.-2-4.12	113	20040309	411	08200000020040120000	SE306	5918	Middle
82.-2-4.13	0	0	411	08200000020040130000	SE301	0	Middle
82.-2-5	21	20041215	210	08200000020050000000	SE302	0	576 Middle
82.-2-5	64	20040917	210	08200000020050000000	SE302	0	576 Middle

Appendix B

Water Use Records Summary Spreadsheets

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE REPORT
WINTER WATERUSE

All **totals** based on total winter water use for winter months 2004 and 2005. All **averages** based on 450 total combined days in winter months.

Occupied lots		Category	Water Use Based on Water Records: Number of Lots	Water Use Based on Water Records: Total (1000 gal.)	Water Use Adjusted for Number of Lots: Number of Lots	Water Use Adjusted for Number of Lots: Total (1000 gal.)	Water Use Adjusted for Number of Lots: Total acreage	Water Use Adjusted for Number of Lots: Total usage per acre (1000 gal./acre)	Calculated Average Daily Flow (1000 gal/day)	Average Water Usage gpd/Acre
	Zone 100	Agricultural	2	36	3	54	52.88	1.02	0.12	2.27
	Zone 200	Residential	1441	121,767	1462	123,542	436.67	282.92	274.54	628.71
	Zone 400	Commercial	342	141,155	348	143,631	573.49	250.45	319.18	556.56
	Zone 500	Recreation & Entertainment	11	13,981	10	12,710	69.61	182.60	28.24	405.78
	Zone 600	Community Services	41	27,113	54	35,710	167.70	212.94	79.36	473.19
	Zone 800	Public services	1	108	8	864	26.25	32.92	1.92	73.15
Total			**1838**	**304,160**	**1885**	**316,511**	**1326.59**	**238.59**	**703.36**	**530.20**

Vacant Lots		Category	Number of Lots (based on water records)	Number of lots with known acreage	Acreage of lots with known acreage	Estimated acreage of lots	Total projected water use (1000 gal.)	Calculated Average Added Daily Flow (1000 gal/day)
200's and 310's		Residential	364	232	103.21	161.93	45,813.12	101.81
320's		Rural	4	4	4.49	4.49	1,270.29	2.82
400's, 330's and 340's		Commercial	95	48	81.85	162.00	40,573.47	90.16
600's		Community Services	12	7	6.07	10.41	2,216.42	4.93
800's		Public services	5	7	25.58	25.58	841.91	1.87
900's		Wild, Forested, Conservation Land, Public Parks	7	6	22.05	25.73	0.00	0.00
Total			**487**	**304**	**243.26**	**390.14**	**90,715.21**	**201.59**

Current Average Winter Dry Weather Flow at Treatment plant: 0.747 MGD
Current Average Winter Wet Weather Flow at Treatment plant: 0.801 MGD

	Dry Weather WWTP Flow	Wet Weather WWTP Flow	Water Use
Design Capacity	1.400 MGD	1.400 MGD	1.400 MGD
Existing Excess WWTP Capacity	0.653 MGD	0.599 MGD	0.697 MGD
Predicted Build-out Flow per day	0.948 MGD	1.003 MGD	0.905 MGD
Excess after Build out	0.452 MGD	0.397 MGD	0.495 MGD

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
WEST MAIN STREET DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	**105**		
Total Winter Water U	8,871	**8,871,000**	**gallons**
Winter Average:	1774.20	**19,713**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	1003.44		
Total plus Std. Dv.	9874.44	**21,943**	**gallons/day**
Total Acerage:	29.40043		
Average Acerage:	0.280004		
Water per Acre:	301.7303	**746**	**gpd/acre**

200

Number of Lots:	**97**		
Total Winter Water U	7,398	**7,398,000**	**gallons**
Winter Average:	1479.60	**16,440**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	850.27		
Total plus Std. Dv.	8248.27	**18,329**	**gallons/day**
Total Acerage:	22.70718		
Average Acerage:	0.234095		
Water per Acre:	325.8	**807**	**gpd/acre**

400

Number of Lots:	**8**		
Total Winter Water U	1,473	**1,473,000**	**gallons**
Winter Average:	294.60	**3,273**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	200.46		
Total plus Std. Dv.	1673.46	**3,719**	**gallons/day**
Total Acerage:	6.693246		
Average Acerage:	0.836656		
Water per Acre:	220.0726	**556**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
CRANBERRY DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	310		
Total Winter Water U	50,045	50,045,000	gallons
Winter Average (per	23.00	111,211	gpd(based on 450 day 2-year winter)
Standard Deviation:	4.90		
Total plus Std. Dv.	50049.90	111,222	gallons/day
Total Acerage:	166.19744		
Average Acerage:	0.536120774		
Water per Acre:	301.1177549	669	gpd/acre

200

Number of Lots:	262		
Total Winter Water U	24,931	24,931,000	gallons
Winter Average:	4986.20	55,402	gpd(based on 450 day 2-year winter)
Standard Deviation:	3156.76		
Total plus Std. Dv.	28087.76	62,417	gallons/day
Total Acerage:	80.49912098		
Average Acerage:	0.307248553		
Water per Acre:	309.7052452	775	gpd/acre

300

Number of Lots:	1		
Total Winter Water U	48	48,000	gallons
Winter Average:	9.60	107	gpd(based on 450 day 2-year winter)
Standard Deviation:	6.19		
Total plus Std. Dv.	54.19	120	gallons/day
Total Acerage:	0.124812958		
Average Acerage:	0.124812958		
Water per Acre:	384.5754551	965	gpd/acre

400

Number of Lots:	39		
Total Winter Water U	12,806	12,806,000	gallons
Winter Average:	3310.60	28,458	gpd(based on 450 day 2-year winter)
Standard Deviation:	2166.62		
Total plus Std. Dv.	14972.62	33,272	gallons/day
Total Acerage:	43.59743074		
Average Acerage:	1.11788284		
Water per Acre:	293.7329054	763	gpd/acre

500

Number of Lots:	1		
Total Winter Water U	10	10,000	gallons
Winter Average:	2.00	22	gpd(based on 450 day 2-year winter)
Standard Deviation:	1.22		
Total plus Std. Dv.	11.22	25	gallons/day
Total Acerage:	1.050444379		
Average Acerage:	1.050444379		
Water per Acre:	9.51978058	24	gpd/acre

600

Number of Lots:	7		
Total Winter Water U	12,250	12,250,000	gallons
Winter Average:	2450.00	27,222	gpd(based on 450 day 2-year winter)
Standard Deviation:	1521.45		
Total plus Std. Dv.	13771.45	30,603	gallons
Total Acerage:	40.92563096		
Average Acerage:	5.846518709		
Water per Acre:	299.3234243	748	gpd/acre

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
DEFRIEST DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	463		
Total Winter Water U	64,258	64,258,000	gallons
Winter Average:	12851.60	142,796	gpd(based on 450 day 2-year winter)
Standard Deviation:	5663.94		
Total plus Std. Dv.	69921.94	155,382	gallons/day
Total Acerage:	132.71343		
Average Acerage:	0.2866381		
Water per Acre:	484.1861	1,171	gpd/acre

200

Number of Lots:	276		
Total Winter Water U	24,196	24,196,000	gallons
Winter Average:	4839.20	53,769	gpd(based on 450 day 2-year winter)
Standard Deviation:	1708.33		
Total plus Std. Dv.	25904.33	57,565	gallons/day
Total Acerage:	58.019793		
Average Acerage:	0.2102166		
Water per Acre:	417.0301	992	gpd/acre

300

Number of Lots:	3		
Total Winter Water U	209	209,000	gallons
Winter Average:	43.20	464	gpd(based on 450 day 2-year winter)
Standard Deviation:	27.61		
Total plus Std. Dv.	236.61	526	gallons/day
Total Acerage:	1.0881995		
Average Acerage:	0.3627332		
Water per Acre:	192.06037	483	gpd/acre

400

Number of Lots:	168		
Total Winter Water U	39,853	39,853,000	gallons
Winter Average:	7970.60	88,562	gpd(based on 450 day 2-year winter)
Standard Deviation:	4099.13		
Total plus Std. Dv.	43952.13	97,671	gallons/day
Total Acerage:	73.605441		
Average Acerage:	0.4000296		
Water per Acre:	541.44095	1,327	gpd/acre

500

Number of Lots:	3		
Total Winter Water U	406	406,000	gallons
Winter Average:	81.20	902	gpd(based on 450 day 2-year winter)
Standard Deviation:	82.08		
Total plus Std. Dv.	488.08	1,085	gallons/day
Total Acerage:	2.6168294		
Average Acerage:	0.8722765		
Water per Acre:	155.14959	414	gpd/acre

600

Number of Lots:	12		
Total Winter Water U	5,503	5,503,000	gallons
Winter Average:	1100.60	12,229	gpd(based on 450 day 2-year winter)
Standard Deviation:	303.64		
Total plus Std. Dv.	5806.64	12,904	gallons/day
Total Acerage:	9.3774189		
Average Acerage:	0.7814516		
Water per Acre:	586.83525	1,376	gpd/acre

800

Number of Lots:	1		
Total Winter Water U	108	108,000	gallons
Winter Average:	27.00	240	gpd(based on 450 day 2-year winter)
Standard Deviation:	54.00		
Total plus Std. Dv.	162.00	360	gallons/day
Total Acerage:	0.6711347		
Average Acerage:	0.6711347		
Water per Acre:	160.92149	536	gpd/acre

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
EAST MAIN STREET DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	7		
Total Winter Water U	359	**359,000**	**gallons**
Winter Average:	71.80	**798**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	50.62		
Total plus Std. Dv.	409.62	**910**	**gallons/day**
Total Acerage:	3.17904		
Average Acerage:	0.454149		
Water per Acre:	112.9272	**286**	**gpd/acre**

200

Number of Lots:	5		
Total Winter Water U	236	**236,000**	**gallons**
Winter Average:	47.20	**524**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	32.23		
Total plus Std. Dv.	268.23	**596**	**gallons/day**
Total Acerage:	2.690106		
Average Acerage:	0.538021		
Water per Acre:	87.72889	**222**	**gpd/acre**

400

Number of Lots:	2		
Total Winter Water U	123	**123,000**	**gallons**
Winter Average:	24.60	**273**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	22.79		
Total plus Std. Dv.	145.79	**324**	**gallons/day**
Total Acerage:	0.488934		
Average Acerage:	0.244467		
Water per Acre:	251.5677	**663**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
ELTON DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	9		
Total Winter Water U	1,739	**1,739,000**	**gallons**
Winter Average:	347.80	**3,864**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	276.52		
Total plus Std. Dv.	2015.52	**4,479**	**gallons/day**
Total Acerage:	13.94625		
Average Acerage:	1.549584		
Water per Acre:	124.693	**321**	**gpd/acre**

200

Number of Lots:	5		
Total Winter Water U	266	**266,000**	**gallons**
Winter Average:	53.20	**591**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	33.72		
Total plus Std. Dv.	299.72	**666**	**gallons/day**
Total Acerage:	0.87994		
Average Acerage:	0.175988		
Water per Acre:	302.2933	**757**	**gpd/acre**

400

Number of Lots:	3		
Total Winter Water U	1,444	**1,444,000**	**gallons**
Winter Average:	288.80	**3,209**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	248.44		
Total plus Std. Dv.	1692.44	**3,761**	**gallons/day**
Total Acerage:	12.25348		
Average Acerage:	4.084495		
Water per Acre:	117.844	**307**	**gpd/acre**

500

Number of Lots:	1		
Total Winter Water U	29	**29,000**	**gallons**
Winter Average:	5.80	**64**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	12.97		
Total plus Std. Dv.	41.97	**93**	**gallons/day**
Total Acerage:	0.812828		
Average Acerage:	0.812828		
Water per Acre:	35.67792	**115**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
HOWELL DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	342		
Total Winter Water U	32,802	32,802,000	gallons
Winter Average:	6560.40	72,893	gpd(based on 450 day 2-year winter)
Standard Deviation:	1420.24		
Total plus Std. Dv.	34222.24	76,049	gallons/day
Total Acerage:	96.333616		
Average Acerage:	0.2816772		
Water per Acre:	340.50419	789	gpd/acre

200

Number of Lots:	317		
Total Winter Water U	27,233	27,233,000	gallons
Winter Average:	10522.80	60,518	gpd(based on 450 day 2-year winter)
Standard Deviation:	12623.64		
Total plus Std. Dv.	39856.64	88,570	gallons/day
Total Acerage:	80.24041		
Average Acerage:	0.2531243		
Water per Acre:	339.39258	1,104	gpd/acre

300

Number of Lots:	1		
Total Winter Water U	195	195,000	gallons
Winter Average:	39.00	433	gpd(based on 450 day 2-year winter)
Standard Deviation:	29.21		
Total plus Std. Dv.	224.21	498	gallons/day
Total Acerage:	0.232208		
Average Acerage:	0.232208		
Water per Acre:	839.76448	2,146	gpd/acre

400

Number of Lots:	39		
Total Winter Water U	3,155	3,155,000	gallons
Winter Average:	631.00	7,011	gpd(based on 450 day 2-year winter)
Standard Deviation:	212.99		
Total plus Std. Dv.	3367.99	7,484	gallons/day
Total Acerage:	12.256125		
Average Acerage:	0.3142596		
Water per Acre:	257.42231	611	gpd/acre

500

Number of Lots:	1		
Total Winter Water U	125	125,000	gallons
Winter Average:	25.00	278	gpd(based on 450 day 2-year winter)
Standard Deviation:	16.09		
Total plus Std. Dv.	141.09	314	gallons/day
Total Acerage:	0.2386405		
Average Acerage:	0.2386405		
Water per Acre:	523.8004	1,314	gpd/acre

600

Number of Lots:	7		
Total Winter Water U	809	809,000	gallons
Winter Average:	161.80	1,798	gpd(based on 450 day 2-year winter)
Standard Deviation:	116.85		
Total plus Std. Dv.	925.85	2,057	gallons/day
Total Acerage:	0.7479967		
Average Acerage:	0.1068567		
Water per Acre:	1081.5556	2,751	gpd/acre

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
MIDDLE DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	88		
Total Winter Water U	21,768	21,768,000	gallons
Winter Average:	4353.60	48,373	gpd(based on 450 day 2-year winter)
Standard Deviation:	3019.45		
Total plus Std. Dv.	24787.45	55,083	gallons/day
Total Acerage:	76.417771		
Average Acerage:	0.8683838		
Water per Acre:	284.85521	721	gpd/acre

100

Number of Lots:	1		
Total Winter Water U	36	36,000	gallons
Winter Average:	7.20	80	gpd(based on 450 day 2-year winter)
Standard Deviation:	7.36		
Total plus Std. Dv.	43.36	96	gallons/day
Total Acerage:	13.40178		
Average Acerage:	13.40178		
Water per Acre:	2.6862102	7	gpd/acre

200

Number of Lots:	83		
Total Winter Water U	6,878	6,878,000	gallons
Winter Average:	1375.60	15,284	gpd(based on 450 day 2-year winter)
Standard Deviation:	970.41		
Total plus Std. Dv.	7848.41	17,441	gallons/day
Total Acerage:	30.228613		
Average Acerage:	0.3642002		
Water per Acre:	227.53277	577	gpd/acre

400

Number of Lots:	3		
Total Winter Water U	13,074	13,074,000	gallons
Winter Average:	2783.80	29,053	gpd(based on 450 day 2-year winter)
Standard Deviation:	1830.06		
Total plus Std. Dv.	14904.06	33,120	gallons/day
Total Acerage:	9.5264059		
Average Acerage:	3.1754686		
Water per Acre:	1372.3959	3,477	gpd/acre

600

Number of Lots:	1		
Total Winter Water U	1,780	1,780,000	gallons
Winter Average:	356.00	3,956	gpd(based on 450 day 2-year winter)
Standard Deviation:	355.92		
Total plus Std. Dv.	2135.92	4,746	gallons/day
Total Acerage:	23.260971		
Average Acerage:	23.260971		
Water per Acre:	76.52303	204	gpd/acre

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
OSTRANDER DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	**78**		
Total Winter Water U	5,598	**5,598,000**	**gallons**
Winter Average:	1119.60	**12,440**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	748.99		
Total plus Std. Dv.	6346.99	**14,104**	**gallons/day**
Total Acerage:	38.95853		
Average Acerage:	0.499468		
Water per Acre:	143.6913	**362**	**gpd/acre**

200

Number of Lots:	**72**		
Total Winter Water U	5,070	**5,070,000**	**gallons**
Winter Average:	1014.00	**11,267**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	752.68		
Total plus Std. Dv.	5822.68	**12,939**	**gallons/day**
Total Acerage:	35.598		
Average Acerage:	0.494417		
Water per Acre:	142.4237	**363**	**gpd/acre**

400

Number of Lots:	**5**		
Total Winter Water U	506	**506,000**	**gallons**
Winter Average:	101.20	**1,124**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	64.77		
Total plus Std. Dv.	570.77	**1,268**	**gallons/day**
Total Acerage:	2.2585		
Average Acerage:	0.4517		
Water per Acre:	224.0425	**562**	**gpd/acre**

600

Number of Lots:	**1**		
Total Winter Water U	22	**22,000**	**gallons**
Winter Average:	4.40	**49**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	4.04		
Total plus Std. Dv.	26.04	**58**	**gallons/day**
Total Acerage:	1.102027		
Average Acerage:	1.102027		
Water per Acre:	19.96322	**53**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
RAYNOR DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	**59**		
Total Winter Water U	4,427	**4,427,000**	**gallons**
Winter Average:	885.40	**9,838**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	338.07		
Total plus Std. Dv.	4765.07	**10,589**	**gallons/day**
Total Acerage:	20.95266		
Average Acerage:	0.35513		
Water per Acre:	211.2858	**505**	**gpd/acre**

200

Number of Lots:	**56**		
Total Winter Water U	4,192	**4,192,000**	**gallons**
Winter Average:	838.40	**9,316**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	327.61		
Total plus Std. Dv.	4519.61	**10,044**	**gallons/day**
Total Acerage:	19.25472		
Average Acerage:	0.343834		
Water per Acre:	217.7128	**522**	**gpd/acre**

400

Number of Lots:	**1**		
Total Winter Water U	25	**25,000**	**gallons**
Winter Average:	5.00	**56**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	2.92		
Total plus Std. Dv.	27.92	**62**	**gallons/day**
Total Acerage:	1.037442		
Average Acerage:	1.037442		
Water per Acre:	24.09774	**60**	**gpd/acre**

600

Number of Lots:	**2**		
Total Winter Water U	210	**210,000**	**gallons**
Winter Average:	42.00	**467**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	20.29		
Total plus Std. Dv.	230.29	**512**	**gallons/day**
Total Acerage:	0.660494		
Average Acerage:	0.330247		
Water per Acre:	317.9438	**775**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
RIVERSIDE DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	**71**		
Total Winter Water U	4,860	**4,860,000**	**gallons**
Winter Average:	972.00	**10,800**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	582.08		
Total plus Std. Dv.	5442.08	**12,094**	**gallons/day**
Total Acerage:	25.62243		
Average Acerage:	0.360879		
Water per Acre:	189.6776	**472**	**gpd/acre**

200

Number of Lots:	**71**		
Total Winter Water U	4,860	**4,860,000**	**gallons**
Winter Average:	972.00	**10,800**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	582.08		
Total plus Std. Dv.	5442.08	**12,094**	**gallons/day**
Total Acerage:	25.62243		
Average Acerage:	0.360879		
Water per Acre:	189.6776	**472**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
RTE. 58 DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	**69**		
Total Winter Water U	10,892	**10,892,000**	**gallons**
Winter Average:	2178.40	**24,204**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	883.58		
Total plus Std. Dv.	11775.58	**26,168**	**gallons/day**
Total Acerage:	640.4482		
Average Acerage:	9.281858		
Water per Acre:	17.00684	**41**	**gpd/acre**

330's and vacant 400's,500's

Number of Lots:	**29**		
Total Winter Water U	0	**0**	**gallons**
Winter Average:	0.00	**0**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	0.00		
Total plus Std. Dv.	0.00	**0**	**gallons/day**
Total Acerage:	163.1921		
Average Acerage:	5.627312		
Water per Acre:	0	**0**	**gpd/acre**

400

Number of Lots:	**26**		
Total Winter Water U	10,310	**10,310,000**	**gallons**
Winter Average:	2062.00	**22,911**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	885.73		
Total plus Std. Dv.	11195.73	**24,879**	**gallons/day**
Total Acerage:	163.1055		
Average Acerage:	6.27329		
Water per Acre:	63.2106	**153**	**gpd/acre**

500

Number of Lots:	**2**		
Total Winter Water U	582	**582,000**	**gallons**
Winter Average:	116.40	**1,293**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	106.62		
Total plus Std. Dv.	688.62	**1,530**	**gallons/day**
Total Acerage:	27.88061		
Average Acerage:	13.94031		
Water per Acre:	20.87472	**55**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
RTE. 58 DRAINAGE AREA P.S. SUMMARY

(continued)

100 (vacant)

Number of Lots:	**1**		
Total Winter Water U	0	**0**	**gallons**
Winter Average:	0.00	**0**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	0.00		
Total plus Std. Dv.	0.00	**0**	**gallons/day**
Total Acerage:	30.80783		
Average Acerage:	30.80783		
Water per Acre:	0	**0**	**gpd/acre**

200 (vacant)

Number of Lots:	**2**		
Total Winter Water U	0	**0**	**gallons**
Winter Average:	0.00	**0**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	0.00		
Total plus Std. Dv.	0.00	**0**	**gallons/day**
Total Acerage:	2.237922		
Average Acerage:	1.118961		
Water per Acre:	0	**0**	**gpd/acre**

600 (vacant)

Number of Lots:	**3**		
Total Winter Water U	0	**0**	**gallons**
Winter Average:	0.00	**0**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	0.00		
Total plus Std. Dv.	0.00	**0**	**gallons/day**
Total Acerage:	19.56627		
Average Acerage:	6.522091		
Water per Acre:	0	**0**	**gpd/acre**

800 (vacant)

Number of Lots:	**4**		
Total Winter Water U	0	**0**	**gallons**
Winter Average:	0.00	**0**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	0.00		
Total plus Std. Dv.	0.00	**0**	**gallons/day**
Total Acerage:	16.5297		
Average Acerage:	4.132424		
Water per Acre:	0	**0**	**gpd/acre**

0 (vacant)

Number of Lots:	**2**		
Total Winter Water U	0	**0**	**gallons**
Winter Average:	0.00	**0**	**gpd(based on 450 day 2-year winter)**
Standard Deviation:	0.00		
Total plus Std. Dv.	0.00	**0**	**gallons/day**
Total Acerage:	217.1282		
Average Acerage:	108.5641		
Water per Acre:	0	**0**	**gpd/acre**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
TANGER DRAINAGE AREA P.S. SUMMARY

All Lots

Number of Lots:	**13**		
Total Seasonal Wate	18,005		
Seasonal Average:	3000.83		
Standard Deviation:	800.76		
Total plus Std.dv.	18805.76	**34,825**	**gpd (based on 540 days of peak season)**
Total Acerage:	180.8712426		
Average Acerage:	13.91317251		
Water per Acre:	99.54595179	**193**	**gpd/acre (includes vacant and occupied lots)**

400, 340's with records

Number of Lots:	**3**		
Total Seasonal Wate	18,005		
Seasonal Average:	3000.83		
Standard Deviation:	800.76		
Total plus Std.dv.	18805.76	**34,825**	**gpd (based on 540 days of peak season)**
Total Acerage:	44.59230929		
Average Acerage:	14.8641031		
Water per Acre:	403.7691765	**781**	**gpd/acre**

Vacant and non-connected lots, excluding hotel

Number of Lots:	**9**		
Total Seasonal Wate	0		
Seasonal Average:	0.00		
Standard Deviation:	0.00		
Total plus Std.dv.	0.00	**0**	**gpd (based on 540 days of peak season)**
Total Acerage:	128.6537428		
Average Acerage:	14.29486031		
Water per Acre:	0	**100,475**	**gpd. Projected added flow from currently vacant lots.**

****(1) Hotel's current flows are not included in this calculation.

****(2) Tanger I's flows are not included in this calculation. Reebok is the only store in the complex currently connected to the sewer system.

Middle Road Pump Station
Riverhead Sewer Distcrict
October 2006

Actual Flowmeter Readings After Calibration at Middle Rd. Pumpstation

DATE	GALLONS
10/14/2006	159000
10/15/2006	151000
10/16/2006	135000
10/17/2006	140000
10/18/2006	136000
10/19/2006	144000
10/20/2006	144000
Average:	144142.9
Standard Dev.:	8513.295
Average plus St. Dev.	152656.2

Information received from Riverhead Sewer District

Cranberry Street Pump Station
Riverhead Sewer Distcrict
October 2006

Actual Flowmeter Readings After Calibration at Cranberry St. Pumpstation

DATE	GALLONS
10/14/2006	302000
10/15/2006	350000
10/16/2006	no data
10/17/2006	318000
10/18/2006	322000
10/19/2006	339000
10/20/2006	333000
Average:	327333.33
Standard Dev.:	16966.634
Average plus St. Dev.	344299.97

Information received from Riverhead Sewer District.

Tanger Pump Station
Riverhead Sewer District
October 2006

Actual Flowmeter Readings After Calibration at Tanger Pumpstation

DATE	METER READING	OLD GPD	ADJ. GPD
10/4/2006	129,285		
10/5/2006	194,795	65,510	65,510
10/6/2006	265,469	70,674	70,674
10/7/2006	334,860	69,391	69,391
10/8/2006	414,660	79,800	79,800
10/9/2006	497,442	82,782	82,782
10/10/2006	527,911	30,469	
10/11/2006	634,350	106,439	
10/12/2006	695,461	61,111	61,111

AVERAGE:	70,772	**71,545**
STANDARD DEVIATON:	21531.21	**8307.865**
AVG. PLUS ST. DEV.:	92,303	**79,853**

Adjusted GPD averages and standard deviation found after removing high and low flows.
Information received from Riverhead Sewer District.

Appendix C

Weather Records Summary Spreadsheets

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: WET WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated (day of/ day after rain event) Daily Average MGD
Off Season	1/1/2005	0	
Off Season	1/2/2005	0	
Off Season	1/3/2005	0.16	0.6264
Off Season	1/4/2005	0.14	0.742
Off Season	1/5/2005	0.26	0.5902
Off Season	1/6/2005	0.61	0.5963
Off Season	1/7/2005	0	0.6576
Off Season	1/8/2005	0.61	0.5984
Off Season	1/9/2005	0	0.6348
Off Season	1/11/2005	0.23	0.659
Off Season	1/12/2005	0.24	0.6606
Off Season	1/13/2005	0.01	0.6793
Off Season	1/14/2005	0.9	0.6563
Off Season	1/15/2005	0	0.7016
Off Season	1/20/2005	0.09	0.6239
Off Season	1/21/2005	0	0.6081
Off Season	1/22/2005	0.01	0.6645
Off Season	1/23/2005	0	0.5862
Off Season	1/26/2005	0.17	0.7154
Off Season	1/27/2005	0	0.6686
Off Season	1/29/2005	0.3	0.6041
Off Season	1/30/2005	0.09	0.6416
Off Season	1/31/2005	0	0.6776
Off Season	2/3/2005	0.37	0.6457
Off Season	2/4/2005	0.53	0.6496
Off Season	2/5/2005	0	0.7101
Off Season	2/9/2005	0.02	0.693
Off Season	2/10/2005	0.22	0.6143
Off Season	2/11/2005	0	0.6848
Off Season	2/14/2005	0.38	0.6271
Off Season	2/15/2005	0.25	0.7064
Off Season	2/16/2005	0.17	0.683
Off Season	2/17/2005	0	0.6044
Off Season	2/21/2005	0.34	0.6261
Off Season	2/22/2005	0.01	0.5891
Off Season	2/23/2005	0.04	0.6811
Off Season	2/24/2005	0	0.6525
Off Season	2/25/2005	0.24	0.619
Off Season	2/26/2005	0	0.6205
Off Season	2/28/2005	0.01	0.6713
Off Season	3/1/2005	0.26	0.6577
Off Season	3/2/2005	0.01	0.6378
Off Season	3/3/2005	0	0.5961
Off Season	3/8/2005	0.83	0.7038
Off Season	3/9/2005	0.01	0.6539
Off Season	3/10/2005	0	0.6322

Average Flow: **0.8014824**

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: WET WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated (day of/ day after rain event) Daily Average MGD
Off Season	3/11/2005	0.02	0.7068
Off Season	3/12/2005	0.18	0.7037
Off Season	3/13/2005	0	0.6379
Off Season	3/20/2005	0.01	0.654
Off Season	3/21/2005	0	0.6567
Off Season	3/23/2005	0.72	0.6658
Off Season	3/24/2005	0.24	0.6945
Off Season	3/25/2005	0	0.736
Off Season	3/28/2005	1.16	0.6259
Off Season	3/29/2005	0.05	0.797
Off Season	3/30/2005	0	0.7339
Off Season	10/3/2005	0.01	0.6867
Off Season	10/4/2005	0.01	0.7411
Off Season	10/5/2005	0.01	0.7654
Off Season	10/6/2005	0	0.7442
Off Season	10/7/2005	0.17	0.7912
Off Season	10/8/2005	0.84	0.767
Off Season	10/9/2005	0.13	0.837
Off Season	10/10/2005	0.15	0.7126
Off Season	10/11/2005	3.01	0.7637
Off Season	10/12/2005	2.16	1.44
Off Season	10/13/2005	1.75	1.439
Off Season	10/14/2005	5.73	1.4096
Off Season	10/15/2005	0.93	1.3887
Off Season	10/16/2005	0	1.4021
Off Season	10/18/2005	0.01	1.4027
Off Season	10/19/2005	0	1.4296
Off Season	10/22/2005	0.54	1.4437
Off Season	10/23/2005	0.1	1.4715
Off Season	10/24/2005	0.31	1.1935
Off Season	10/25/2005	2.06	1.8826
Off Season	10/26/2005	0.04	1.8997
Off Season	10/27/2005	0	1.2768
Off Season	10/29/2005	0.01	1.2671
Off Season	10/30/2005	0.01	1.1333
Off Season	10/31/2005	0	0.9884
Off Season	11/6/2005	0.01	0.8935
Off Season	11/7/2005	0	0.9073
Off Season	11/9/2005	0.44	0.7799
Off Season	11/10/2005	0.31	0.7466
Off Season	11/11/2005	0	0.8004
Off Season	11/15/2005	0.01	0.7391
Off Season	11/16/2005	0.19	0.7684
Off Season	11/17/2005	0.14	0.7748
Off Season	11/18/2005	0	0.7226
Off Season	11/21/2005	0.43	0.738

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: WET WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated (day of/ day after rain event) Daily Average MGD
Off Season	11/22/2005	1.5	0.8251
Off Season	11/23/2005	0	0.7698
Off Season	11/24/2005	0.39	0.7679
Off Season	11/25/2005	0	0.6949
Off Season	11/30/2005	0.6	0.8095
Off Season	12/1/2005	0	0.7897
Off Season	12/4/2005	0.16	0.7481
Off Season	12/5/2005	0.07	0.732
Off Season	12/6/2005	0.16	0.7693
Off Season	12/7/2005	0	0.7302
Off Season	12/9/2005	0.85	0.7451
Off Season	12/10/2005	0	0.8218
Off Season	12/15/2005	0.02	0.7304
Off Season	12/16/2005	1.16	0.8278
Off Season	12/17/2005	0	0.7802
Off Season	12/25/2005	0.21	0.5973
Off Season	12/26/2005	0.08	0.6382
Off Season	12/27/2005	0	0.7675
Off Season	12/29/2005	0.36	0.7034
Off Season	12/30/2005	0	0.6981
Off Season	12/31/2005	0.22	0.7327
Off Season	1/1/2006	0.01	0.6835
Off Season	1/2/2006	0.62	0.6902
Off Season	1/3/2006	1.14	0.7866
Off Season	1/4/2006	0	0.7923
Off Season	1/5/2006	0.01	0.795
Off Season	1/6/2006	0	0.8328
Off Season	1/11/2006	0.2	0.7946
Off Season	1/12/2006	0	0.7276
Off Season	1/13/2006	0.01	0.7871
Off Season	1/14/2006	0.64	0.7885
Off Season	1/15/2006	0.07	0.6922
Off Season	1/16/2006	0	1.3674
Off Season	1/18/2006	1.11	0.8475
Off Season	1/19/2006	0	0.7962
Off Season	1/23/2006	0.8	0.8016
Off Season	1/24/2006	0	0.7573
Off Season	1/29/2006	0.22	0.708
Off Season	1/30/2006	0.01	0.7876
Off Season	1/31/2006	0.09	0.7739
Off Season	2/1/2006	0	0.7748
Off Season	2/3/2006	0.62	0.8086
Off Season	2/4/2006	0.67	0.8086
Off Season	2/5/2006	0.29	0.8144
Off Season	2/6/2006	0	0.9268
Off Season	2/11/2006	0.05	0.8157

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: WET WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated (day of/ day after rain event)
			Daily Average MGD
Off Seasor	2/12/2006	0.4	0.75
Off Seasor	2/13/2006	0	0.7721
Off Seasor	2/17/2006	0.04	0.8354
Off Seasor	2/18/2006	0	0.8092
Off Seasor	2/23/2006	0.1	0.8991
Off Seasor	2/24/2006	0	0.7806
Off Seasor	3/2/2006	0.51	0.7801
Off Seasor	3/3/2006	0	0.8148
Off Seasor	3/12/2006	0.26	0.7541
Off Seasor	3/13/2006	0.01	0.7646
Off Seasor	3/14/2006	0.04	0.7442
Off Seasor	3/15/2006	0	0.7654

MGD

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: DRY WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated Daily Average GPD
Off Season	1/1/2005	0	585000
Off Season	1/2/2005	0	572600
Off Season	1/10/2005	0	662500
Off Season	1/16/2005	0	621600
Off Season	1/17/2005	0	592000
Off Season	1/18/2005	0	651300
Off Season	1/19/2005	0	737900
Off Season	1/24/2005	0	536400
Off Season	1/25/2005	0	698100
Off Season	1/28/2005	0	633700
Off Season	2/1/2005	0	663900
Off Season	2/2/2005	0	620600
Off Season	2/6/2005	0	643500
Off Season	2/7/2005	0	657900
Off Season	2/8/2005	0	636900
Off Season	2/12/2005	0	626200
Off Season	2/13/2005	0	622300
Off Season	2/18/2005	0	607800
Off Season	2/19/2005	0	672800
Off Season	2/20/2005	0	635400
Off Season	2/27/2005	0	647300
Off Season	3/4/2005	0	736500
Off Season	3/5/2005	0	542400
Off Season	3/6/2005	0	659800
Off Season	3/7/2005	0	671300
Off Season	3/14/2005	0	637750
Off Season	3/15/2005	0	622850
Off Season	3/16/2005	0	671100
Off Season	3/17/2005	0	724700
Off Season	3/18/2005	0	646800
Off Season	3/19/2005	0	689300
Off Season	3/22/2005	0	674400
Off Season	3/26/2005	0	629200
Off Season	3/27/2005	0	631400
Off Season	3/31/2005	0	636400
Off Season	10/1/2005	0	706000
Off Season	10/2/2005	0	711200
Off Season	10/17/2005	0	1405600
Off Season	10/20/2005	0	1428500
Off Season	10/21/2005	0	1435100
Off Season	11/1/2005	0	961900
Off Season	11/2/2005	0	934300
Off Season	11/3/2005	0	912900
Off Season	11/4/2005	0	888400
Off Season	11/5/2005	0	928700
Off Season	11/8/2005	0	869900

Average Flow: 0.746712 MGD

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: DRY WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated Daily Average GPD
Off Season	11/12/2005	0	790300
Off Season	11/13/2005	0	806100
Off Season	11/14/2005	0	753600
Off Season	11/19/2005	0	724600
Off Season	11/20/2005	0	780200
Off Season	11/26/2005	0	746100
Off Season	11/27/2005	0	748600
Off Season	11/28/2005	0	747000
Off Season	11/29/2005	0	833500
Off Season	12/2/2005	0	875000
Off Season	12/3/2005	0	745900
Off Season	12/8/2005	0	690200
Off Season	12/11/2005	0	786600
Off Season	12/12/2005	0	834500
Off Season	12/13/2005	0	752200
Off Season	12/14/2005	0	611400
Off Season	12/18/2005	0	743300
Off Season	12/19/2005	0	726100
Off Season	12/20/2005	0	776900
Off Season	12/21/2005	0	748500
Off Season	12/22/2005	0	737200
Off Season	12/23/2005	0	762100
Off Season	12/24/2005	0	725500
Off Season	12/28/2005	0	730200
Off Season	1/7/2006	0	805700
Off Season	1/8/2006	0	731700
Off Season	1/9/2006	0	727000
Off Season	1/10/2006	0	793400
Off Season	1/17/2006	0	746800
Off Season	1/20/2006	0	839400
Off Season	1/21/2006	0	774000
Off Season	1/22/2006	0	737300
Off Season	1/25/2006	0	723200
Off Season	1/26/2006	0	772600
Off Season	1/27/2006	0	750600
Off Season	1/28/2006	0	782100
Off Season	2/2/2006	0	749000
Off Season	2/7/2006	0	855600
Off Season	2/8/2006	0	858100
Off Season	2/9/2006	0	876300
Off Season	2/10/2006	0	870700
Off Season	2/14/2006	0	785500
Off Season	2/15/2006	0	811700
Off Season	2/16/2006	0	858200
Off Season	2/19/2006	0	701500

TOWN OF RIVERHEAD
RIVERHEAD SEWER DISTRICT
SEWER CONNECTION FEE
FLOW SUMMARY: DRY WEATHER, WINTER

Season/ Off Season	Date	Precipitation in/day	Volume of Sewage Treated Daily Average GPD
Off Season	2/20/2006	0	754500
Off Season	2/21/2006	0	416000
Off Season	2/22/2006	0	764900
Off Season	2/25/2006	0	828100
Off Season	2/26/2006	0	712200
Off Season	2/27/2006	0	662700
Off Season	2/28/2006	0	767300
Off Season	3/1/2006	0	743100
Off Season	3/4/2006	0	674900
Off Season	3/5/2006	0	715900
Off Season	3/6/2006	0	767700
Off Season	3/7/2006	0	747500
Off Season	3/8/2006	0	792300
Off Season	3/9/2006	0	729900
Off Season	3/10/2006	0	800300
Off Season	3/11/2006	0	781000
Off Season	3/16/2006	0	698800
Off Season	3/17/2006	0	722100
Off Season	3/18/2006	0	734800
Off Season	3/19/2006	0	649800
Off Season	3/20/2006	0	722400
Off Season	3/21/2006	0	772800
Off Season	3/22/2006	0	752100
Off Season	3/23/2006	0	722400
Off Season	3/24/2006	0	750300
Off Season	3/25/2006	0	745800
Off Season	3/26/2006	0	687800
Off Season	3/27/2006	0	752800
Off Season	3/28/2006	0	749900
Off Season	3/29/2006	0	727500
Off Season	3/30/2006	0	747800
Off Season	3/31/2006	0	842100

Date	Precipitation (in) sum	Events
January 2005		
1	0	
2	0	
3	0.16	Rain
4	0.14	Rain
5	0.26	Fog , Rain , Snow
6	0.61	Rain , Snow
7	0	Fog
8	0.61	Rain
9	0	
10	0	
11	0.23	Rain , Snow
12	0.24	Fog , Rain
13	0.01	Fog
14	0.9	Rain
15	0	
16	0	
17	0	Snow
18	0	
19	0	Fog , Snow
20	0.09	Snow
21	0	
22	0.01	Fog , Snow
23	0	Fog , Snow
24	0	Snow
25	0	
26	0.17	Rain , Snow
27	0	Snow
28	0	
29	0.3	Rain
30	0.09	Snow
31	0	

Date	Precipitation (in) sum	Events
February 2005		
1	0	
2	0	
3	0.37	Rain
4	0.53	Rain , Snow
5	0	
6	0	
7	0	
8	0	Fog
9	0.02	Rain
10	0.22	Fog , Rain
11	0	
12	0	
13	0	
14	0.38	Rain
15	0.25	Rain
16	0.17	Fog , Rain
17	0	
18	0	
19	0	
20	0	Snow
21	0.34	Fog , Rain , Snow
22	0.01	Rain
23	0.04	
24	0	Fog , Snow
25	0.24	Snow
26	0	
27	0	
28	0.01	Fog , Snow

Date	Precipitation (in) sum	Events
March 2005		
1	0.26	Snow
2	0.01	Fog , Snow
3	0	
4	0	
5	0	
6	0	
7	0	
8	0.83	Fog , Rain , Snow
9	0.01	
10	0	
11	0.02	Fog , Snow
12	0.18	Fog , Rain , Snow
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0.01	Rain
21	0	Rain
22	0	
23	0.72	Rain , Snow
24	0.24	Rain , Snow
25	0	
26	0	
27	0	Rain
28	1.16	Fog , Rain
29	0.05	Rain
30	0	
31	0	

Date	Precipitation (in) sum	Events
April 2005		
1	0.01	Rain
2	1.46	Fog , Rain
3	0	Rain
4	0.01	Rain
5	0	
6	0	
7	0	
8	0.98	Rain
9	0	
10	0	
11	0	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	
21	0.01	
22	0.03	Rain
23	0.84	Fog , Rain
24	0.11	Rain
25	0.07	Rain
26	0	
27	0.47	Fog , Rain
28	0	Rain
29	0	
30	1.44	Fog , Rain

Date	Precipitation (in) sum	Events
May 2005		
1	0.26	Fog , Rain
2	0.09	Rain
3	0	Fog
4	0	
5	0	
6	0.34	Rain
7	0.38	Rain
8	0.12	Rain
9	0	
10	0	
11	0	
12	0	
13	0	
14	0	
15	0.03	Rain
16	0.03	Fog
17	0	Fog
18	0	
19	0	Fog
20	0	
21	0	
22	0.08	Rain
23	0	
24	0.2	Rain
25	1.12	Rain
26	0.16	Rain
27	0.08	Rain
28	0	Fog
29	0.02	Rain
30	0.01	
31	0	

Date	Precipitation (in) sum	Events
June 2005		
1	0	
2	0	
3	0.06	Rain
4	0.24	Rain
5	0	
6	0	Fog
7	0	Fog , Rain
8	0	
9	0	Fog
10	0.01	Fog
11	0	Rain
12	0	
13	0	
14	0	
15	0	
16	0.17	Fog , Rain
17	0	
18	0	
19	0	
20	0	Fog
21	0	
22	0	Rain
23	0	Fog
24	0	
25	0	
26	0	Fog
27	0.04	Fog , Rain
28	0.02	Fog , Rain
29	0.04	Rain
30	0.79	Fog , Rain

Date	Precipitation (in) sum	Events
July 2005		
1	0.15	Fog , Rain
2	0	
3	0	
4	0	
5	0	Fog
6	0.06	Rain
7	0	Rain
8	0.81	Rain
9	0.02	Rain
10	0	
11	0	
12	0	
13	0.04	Rain
14	0	Fog
15	0.01	Fog
16	0	Fog , Rain
17	0.01	Fog
18	0	Fog , Rain
19	0.01	Fog
20	0	
21	0	
22	0	Fog
23	0	
24	0	
25	0	
26	0	Fog
27	0.08	Fog , Rain
28	0	
29	0	
30	0.09	Rain
31	0.01	Fog

Date	Precipitation (in) sum	Events
August 2006		
1	0	Fog
2	0	
3	0.01	Fog , Rain
4	0.01	Fog
5	0	Fog
6	0	
7	0	
8	0	Fog , Rain
9	0.01	Fog , Rain
10	0.01	Rain
11	0	
12	0.31	Rain
13	0	
14	0.03	Rain
15	0.29	Fog , Rain
16	0	
17	0	
18	0	
19	0	Rain
20	0	
21	0	Fog
22	0	
23	0	
24	0	
25	0	
26	0	
27	0	
28	0	
29	0.33	Fog , Rain
30	1.09	Rain
31	0.01	Rain

Date	Precipitation (in) sum	Events
September 2005		
1	0	
2	0	Fog
3	0	
4	0	
5	0	
6	0	
7	0	
8	0.01	
9	0	
10	0	
11	0	
12	0	
13	0	Fog
14	0.01	Fog
15	0.01	Rain
16	1.11	Fog , Rain
17	0.14	Rain
18	0	Fog
19	0.01	
20	0.01	
21	0	Fog
22	0.01	Fog
23	0	
24	0	
25	0	
26	0.49	Rain
27	0.06	Rain
28	0	
29	0.05	Rain
30	0	

Date	Precipitation (in) sum	Events
October 2005		
1	0	
2	0	
3	0.01	Fog
4	0.01	Fog
5	0.01	Fog
6	0	Fog
7	0.17	Rain
8	0.84	Rain
9	0.13	Rain
10	0.15	Rain
11	3.01	Rain
12	2.16	Rain
13	1.75	Rain
14	5.73	Rain
15	0.93	Rain
16	0	
17	0	
18	0.01	
19	0	
20	0	
21	0	
22	0.54	Rain
23	0.1	Rain
24	0.31	Rain
25	2.06	Rain
26	0.04	Rain
27	0	
28	0	
29	0.01	Rain
30	0.01	
31	0	Fog

Date	Precipitation (in) sum	Events
November 2005		
1	0	Fog
2	0	
3	0	
4	0	
5	0	
6	0.01	Fog , Rain
7	0	
8	0	
9	0.44	Rain
10	0.31	Rain
11	0	
12	0	
13	0	
14	0	Rain
15	0.01	Rain
16	0.19	Rain
17	0.14	Rain
18	0	
19	0	
20	0	
21	0.43	Rain
22	1.5	Rain
23	0	
24	0.39	Rain , Snow
25	0	
26	0	
27	0	
28	0	
29	0	
30	0.6	Rain

Date	Precipitation (in) sum	Events
December 2005		
1	0	
2	0	
3	0	
4	0.16	Rain , Snow
5	0.07	Snow
6	0.16	Snow
7	0	
8	0	
9	0.85	Rain
10	0	
11	0	
12	0	
13	0	
14	0	
15	0.02	Rain
16	1.16	Rain
17	0	
18	0	
19	0	
20	0	
21	0	
22	0	
23	0	
24	0	
25	0.21	Fog , Rain
26	0.08	Fog , Rain
27	0	
28	0	
29	0.36	Fog , Rain
30	0	
31	0.22	Rain

Date	Precipitation (in) sum	Events
January 2006		
1	0.01	Rain
2	0.62	Rain
3	1.14	Rain
4	0	
5	0.01	Fog , Rain
6	0	
7	0	
8	0	
9	0	
10	0	
11	0.2	Fog , Rain
12	0	Fog
13	0.01	Fog , Rain
14	0.64	Rain , Snow
15	0.07	Snow
16	0	
17	0	
18	1.11	Fog , Rain
19	0	
20	0	
21	0	
22	0	
23	0.8	Rain
24	0	
25	0	Rain
26	0	
27	0	
28	0	
29	0.22	Rain
30	0.01	Fog
31	0.09	Rain

Date	Precipitation (in) sum	Events
February 2006		
1	0	
2	0	
3	0.62	Fog , Rain
4	0.67	Rain
5	0.29	Rain
6	0	
7	0	
8	0	
9	0	
10	0	
11	0.05	Snow
12	0.4	Fog , Snow
13	0	
14	0	
15	0	Fog
16	0	Fog
17	0.04	Rain
18	0	Snow
19	0	
20	0	
21	0	
22	0	
23	0.1	Rain
24	0	Rain
25	0	
26	0	
27	0	
28	0	

Date	Precipitation (in) sum	Events
March 2006		
1	0	
2	0.51	Fog , Rain , Snow
3	0	
4	0	
5	0	
6	0	
7	0	
8	0	
9	0	
10	0	
11	0	
12	0.26	Fog , Rain
13	0.01	Fog
14	0.04	Rain
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	
21	0	
22	0	
23	0	
24	0	
25	0	Rain
26	0	
27	0	
28	0	
29	0	Fog
30	0	
31	0	

Date	Precipitation (in) sum	Events
April 2006		
1	0.02	Rain
2	0	
3	0.25	Rain
4	0.07	Rain
5	0.15	Rain
6	0	
7	0.01	Fog , Rain
8	0.83	Rain
9	0	
10	0	
11	0	
12	0	
13	0	Rain
14	0.24	Rain
15	0	Fog
16	0	
17	0	
18	0	
19	0	
20	0	
21	0	
22	0.07	Rain
23	2.43	Fog , Rain
24	0.03	Fog , Rain
25	0.02	Fog , Rain
26	0	
27	0	Fog
28	0	
29	0	
30	0	

Date	Precipitation (in) sum	Events
May 2006		
1	0	
2	0.25	Rain
3	0.28	Rain
4	0	
5	0	
6	0	
7	0	
8	0	
9	0.27	Rain
10	0.12	Rain
11	0.03	Rain
12	2.12	Fog , Rain
13	0.01	Fog
14	0.01	Rain
15	0.67	Fog , Rain , Thunderstorm
16	0.46	Rain , Thunderstorm
17	0	
18	0	
19	0.59	Rain
20	0	
21	0.06	Rain , Thunderstorm
22	0	
23	0	
24	0	
25	0.07	Rain
26	0.08	Fog , Rain
27	0.01	Fog , Rain
28	0	
29	0	Fog
30	0	
31	0	Fog

Date	Precipitation (in) sum	Events
June 2006		
1	0.03	Fog , Rain
2	0.09	Fog , Rain
3	1.17	Fog , Rain
4	0	
5	0	
6	0.15	Rain
7	2.37	Rain
8	0.02	Rain
9	0.01	Fog , Rain
10	0.04	Rain
11	0	
12	0	
13	0	
14	0	
15	0.1	Rain , Thunderstorm
16	0	
17	0	Rain
18	0	
19	0	
20	0	
21	0	
22	0	Fog
23	0.57	Fog , Rain
24	1.05	Fog , Rain , Thunderstorm
25	0.35	Fog , Rain
26	0	
27	0.01	
28	0.05	Fog , Rain
29	0.01	Fog , Rain
30	0	

Date	Precipitation (in) sum	Events
July 2006		
1	0	
2	0	
3	0	
4	0	
5	1.29	Fog , Rain
6	1.28	Rain
7	0	
8	0	
9	0	
10	0	
11	0	
12	0.3	Rain
13	0.81	Rain
14	0	Fog
15	0	Fog
16	0	
17	0	
18	0.35	Fog , Rain
19	0.8	Rain
20	0.45	Rain
21	0.03	Rain , Thunderstorm
22	0.13	Rain
23	0.02	Rain
24	0	Fog
25	0	
26	0	
27	0	
28	0.01	Rain
29	0	
30	0	
31	0	

Appendix D

AWTF Daily Monitoring Record Flow Summary Spreadsheets

H2M

Month: January,2005

RIVERHEAD SEWER DISTRICT
ADVANCED WASTEWATER TREATMENT FACILITY
PROCESS LOG SHEET

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Sat			585,000																	
2	Sun	11"	508	576,600																	
3	Mon	11"	508	683,200	7.13	13.9		164		31.50	160				2692				2813	4470	123
4	Tue	11"	508	780,600	7.34	13.9	414	175	62.5	30.00					2723				2883	4180	123
5	Wed	11"	508	653,300	7.24	13.4		146		28.50					2695				2998	4280	123
6	Thu	11"	508	624,900	7.19	13.2		156		29.75					2726				2740	4320	123
7	Fri			693,600	7.13	12.9		180		31.50					2574				2897	3910	123
8	Sat			624,300																	
9	Sun	11"	508	644,300																	
10	Mon	11"	508	703,200	7.19	13.8		137		26.50					2691				2673	4510	123
11	Tue	11"	508	687,800	7.06	13.4	310	159	54.7	30.25					2817				2723	4690	123
12	Wed	11"	508	718,400	7.14	12.9		176		33.50					2543				2815	4350	123
13	Thu	11"	508	725,700	7.31	13.7		150		29.75					2425				2825	4800	123
14	Fri			695,300	7.42	12.0		164		26.91					2650				2360	4660	
15	Sat			718,800																	
16	Sun	11"	508	625,100																	
17	Mon	11"	508	633,600	H	O	L	I	D	A	Y										
18	Tue	11"	508	679,800	7.26	12.4	210	181	64.2	30.5					2395				2500	4950	123
19	Wed	11"	508	760,200	7.09	12.0		134		29.75					2380				2347	4900	123
20	Thu	11"	508	658,000	7.31	11.4		166		27.50					2321				2522	4320	123
21	Fri			627,800	7.50	11.6		191		34.75					2381				2620	4850	123
22	Sat			681,300																	
23	Sun	11"	508	586,200																	
24	Mon	11"	508	538,400																	
25	Tue	11"	508	719,700	6.96	11.8	305	146	70.8	31.75					2244				2409	4810	123
26	Wed	11"	508	741,400	7.09	11.5		163		34.25					2260				2262	4980	123
27	Thu	11"	508	683,200	7.33	11.1		139		30.50					2177				2455	5340	123
28	Fri			649,500	7.41	10.9		201		33.25					2202				2341	4980	123
29	Sat			621,900																	
30	Sun	11"	508	645,100																	
31	Mon	11"	508	688,400	7.09	11.5		187		35.75					2449				2719	4530	123
Average				666,277	7.22	12.5	310	164	63.05	30.85	160				2492				2626	4623	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

H2M

Month: January,2005

RIVERHEAD SEWER DISTRICT
ADVANCED WASTEWATER TREATMENT FACILITY
PROCESS LOG SHEET

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/L)	Alkalinity (mg/L)	Nitrogen Nitrates (mg/L)	Nitrogen Nitrites (mg/l)	Nitrogen Ammonia (mg/l)	Nitrogen Total N[5] (mg/l)	Process Parameters System F / M Ratio[6] (mg/l)	System Sludge Age (SRT)[7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations Day	Notes / Comments / Observations Night	Operator's Initials Day	Operator's Initials Night
1	Sat																	
2	Sun																	
3	Mon	7.24		3	80	4.4	0.100	1.84	6.34	0.080	16			6				ML
4	Tue	7.19	4	11		4.3		1.34	5.64	0.079	19			29				
5	Wed	6.9		5		4.1		1.36	5.46	0.078	18			8				
6	Thu	7.23		6		4.5		0.99	5.49	0.081	17			10				
7	Fri	6.97		9		4.5		10.25	14.75	0.081	17			15				
8	Sat																	
9	Sun																	
10	Mon	7.24		5		4.1		12.25	16.35	0.083	15			9				
11	Tue	6.96	7	6		4.4	0.3	11.00	15.72	0.080	15			11				
12	Wed	7.19		4		4.6		10.25	14.85	0.083	15			8				
13	Thu	7.26		7		5.1		11.75	16.85	0.083	14			13				
14	Fri	7.1		6		3.9		10.67	14.57	0.081				11				
15	Sat																	
16	Sun																	
17	Mon																	
18	Tue	7.14	12	4		4.4	0.4	7.25	12.04	0.091	12			9				
19	Wed	7.20		6		4.1		6.00	10.10	0.094	15			6				
20	Thu	7.19		8		4.6		6.75	11.35					13				
21	Fri	6.99		15		5.4		10.25	15.65	0.088	16			21				
22	Sat																	
23	Sun																	
24	Mon														SNOW REMOVAL			
25	Tue	7.16	11	8		4.9	0.5	7.5	12.93	0.095	15			13				
26	Wed	7.29		9		5.1		6.25	11.35	0.098	15			11				
27	Thu	7.41		6		5.5		5.50	11.00	0.095	15			9				
28	Fri	7.36		7		5.3		6.00	11.30	0.097	16			10				
29	Sat																	
30	Sun																	
31	Mon	7.16		11		4.9		6.75	11.65	0.085	20			17				
Av		7.17	9	7.16	80	4.6	0.3	7.05	11.757	0.086	16			12				

[1] D.O. conce

[3] D.O. concen [7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

February,2005

Riverhead Sewer District Daily Samples

Day	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate
		(in.)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Tue	11"	508	693,300	7.31	11.3	250	210	64.2	35.00					2497				2717	5050	123
2	Wed	11"	508	651,600	7.26	11.4		181		33.50					2254				2497	5820	123
3	Thu	11"	508	678,900	7.19	11.1		194		29.25					2307				2662	5640	123
4	Fri	11"	508	693,000	7.41	11.4		163		31.75					2333				2572	4730	123
5	Sat			727,900																	123
6	Sun			645,500																	123
7	Mon	11"	508	707,000	7.49	12.3		219		36.50											123
8	Tue	11"	508	669,000	7.29	12.1	230	161	93.8	34.00					2401				2836	5500	123
9	Wed	11"	508	723,000	7.45	12.5		206		37.25					2455				2741	5140	123
10	Thu	11"	508	638,900	7.36	12		173		31.50					2401				2749	5180	123
11	Fri	11"	508	699,700	H	O	L	I	D	A	Y										123
12	Sat			648,300																	123
13	Sun			626,800																	123
14	Mon	11"	508	663,600	7.23	11.7		140		27.50					2400				2698	5170	123
15	Tue	11"	508	721,000	7.27	12.5	263	163	51.9	26.75					2392				2788	5500	123
16	Wed	11"	508	700,000	7.19	12.3		171		29.50					2432				2737	5530	123
17	Thu	11"	508	634,500	7.35	11.2		192		31.25					2305				2596	4980	123
18	Fri	11"	508	647,200	7.19	12.2		160		29.50					2274				2594	5180	123
19	Sat			706,500																	123
20	Sun			635,400																	123
21	Mon	11"	508	633,400	H	O	L	I	D	A	Y										123
22	Tue	11"	508	615,600	7.33	12.1	325	143	38.1	26.00					2229				2612	5230	123
23	Wed	11"	508	703,100	7.41	12.3		163		29.50					2326				2578	4780	123
24	Thu	11"	508	687,800	7.13	11.8		187		31.75					2106				2530	4760	123
25	Fri	11"	508	638,600	7.24	12.2		172		29.61					1970				2227	4280	123
26	Sat			633,200																	123
27	Sun			649,300																	123
28	Mon	11"	508	697,600	6.96	11.3		131		31.00					2271				2563	5870	123
29																					
30																					
31																					
Average				**670,346**	**7.28**	**11.9**	**267**	**174**	**62.00**	**31.17**					**2320**				**2628**	**5221**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

February,2005

Riverhead Sewer District Daily Samples

Day	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrites (mg/l)	Ammonia (mg/l)	Total N [5] (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
1	Tue	7.01	12	11		6.2	0.42	13.00	19.62	0.085	17	35%	56%	13	Samplers Froze.(Grab Samples)			ML
2	Wed	7.06		9		6.4		11.75	18.15	0.093	13	35%	51%	14	Samplers Froze.(Grab Samples)			ML
3	Thu	7.11		6		6.0		12.25	18.25	0.089	14			10				ML
4	Fri	7.21		14		6.3		13.25	19.55	0.090	18		45%	34				ML
5	Sat																	
6	Sun																	
7	Mon	7.24		11		5.9		13.50	19.40	0.084	16			19				ML
8	Tue	6.80	10	15		6.3	1.48	15.50	23.28	0.085	16			25				ML
9	Wed	7.57		14		6.6		14.75	21.35	0.085	16			22				ML
10	Thu	7.19		10		6.6		15.00	21.60	0.088	14			19				ML
11	Fri	H	O	L	I	D	A	Y										
12	Sat																	
13	Sun																	
14	Mon	7.14		7		6.3		14.25	20.55	0.086	16					Grab Samples.		ML
15	Tue	7.16	12	4		7.0	2.18	10.50	19.68	0.085	15			8				ML
16	Wed	7.09		9		7.1		9.00	16.10	0.085	15			15				ML
17	Thu	7.15		5		6.8		9.75	16.55	0.091	15			10				ML
18	Fri	7.13		13		10.9		7.50	18.40	0.091	15			25				ML
19	Sat																	
20	Sun																	
21	Mon	H	O	L	I	D	A	Y										
22	Tue	7.24	11	9		9.6	1.85	9.50	20.95	0.092	15			14		Grab Samples.		ML
23	Wed	7.16		7		9.9		10.25	20.15	0.091	17			11				ML
24	Thu	7.26		11		8.8		9.75	18.55	0.096	16			19				ML
25	Fri	7.15		8		7.2		9.46	16.66					10				JA
26	Sat																	
27	Sun																	
28	Mon	7.04		10		7.6		8.75	16.35	0.092	14	35%	62%	14				ML
29																		
30																		
31																		
Av		7.15	11	9.61		7.3	1.48	11.54	19.17	0.089	15	35.0%	53.5%	17	* O.R. = Over Range on test meter.			

[1] D.O. concen

[6] F= (Q) (BOD$_5$) (8.34).

[3] D.O. concent

[7] SRT = M / (S$_{eff}$ + S$_w$); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S$_{eff}$ = (Flow) (TSS$_{eff}$) (8.34) - - - - See pg. 20 of Field Guide

March, 2005

Riverhead Sewer District Daily Sample Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. 1[1]	D.O. 2[2]	D.O. 3[3]	MLSS at LWL	D.O. 1[1]	D.O. 2[2]	D.O. 3[3]	MLSS at LWL	WAS MLSS	Flow Rate[4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Tue	11"	508	672,700	7.29	11.7	340	153	59.3	30.50	180				2371				2410	5830	123
2	Wed	11"	508	669,800	7.16	11.4		131		28.25					2358				2492	5410	123
3	Thu	11"	508	627,100	6.96	10.6		195		31.75					2336				2743	5100	123
4	Fri	11"	508	787,900	7.13	10.4		201		33.25					2256				2542	4660	123
5	Sat			557,900																	123
6	Sun			659,800																	123
7	Mon	11"	508	727,400	6.96	14.3		166		20.50					2243				2350	4160	123
8	Tue	11"	508	731,800	7.08	11.3	230	143	51.5	29.50					2537				2753	5240	123
9	Wed	11"	508	678,700																	123
10	Thu	11"	508	660,600	7.11	11.9		151		28.75	240				2717				2763	5690	123
11	Fri	11"	508	731,100	7.06	11.6		131		31.50											123
12	Sat			713,200																	123
13	Sun			637,900																	123
14	Mon	11"	508	667,750	6.99	12.5		169		27.25					2663				2587	4980	123
15	Tue	11"	508	657,750	7.26	12.6		133		29.50					2520				2470	5230	123
16	Wed	11"	508	682,600	7.03	12.5		170		32.75					2597				2680	5390	123
17	Thu	11"	508	744,300	7.16	12.3	393	181	54.7	33.5					2517				2297	4750	123
18	Fri	11"	508	699,400	6.96	12.9		213		36.50											123
19	Sat			716,100																	123
20	Sun			654,000																	123
21	Mon	11"	508	705,600	7.07	13.3		229		39.50					2803				2550	5030	123
22	Tue	11"	508	704,800	7.00	13.5	280	172	61.6	47.00					2803				2500	5490	123
23	Wed	11"	508	708,500	6.93	11		204		59.25					2807				2520	5810	123
24	Thu	11"	508	721,800	7.64	13.2		172		40.00					2720				2483	4940	123
25	Fri	11"	508	778,100	H	O	L	I	D	A	Y										123
26	Sat			668,000																	123
27	Sun			634,900																	123
28	Mon	11"	508	668,200	7.3	15		189		37.00					2590				2407	4,930	123
29	Tue	11"	508	856,300	6.9	13.9	270	193	57.9	38.25					2707				2633	5080	123
30	Wed	11"	508	779,200	7.3	14.3		166		34.75	280				2643				2580	5510	123
31	Thu	11"	508	694,300	6.96	14.1		186		36.50					2723				2670	5530	123
Average				**696,694**	**7.11**	**12.6**	**303**	**174**	**57.00**	**34.56**	**233**				**2574**				**2549**	**5198**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of a "blowers on" aeration period during *React Phase* (range 2 - 4 mg/l).

[3] D.O. concentration at the end of a "blowers off "aeration period during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

March, 2005

Riverhead Sewer District Daily Sample Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD5 (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrogen: Nitrites (mg/l)	Nitrogen: Ammonia (mg/l)	Nitrogen: Total N [5] (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations: Day	Notes / Comments / Observations: Night	Operator's Initials
1	Tue	6.9	15	27	100	10.5	2.84	4.00	17.34	0.093	15	31%	45%	45		Grab Samples.	ML
2	Wed	7.13		13		12.5		3.25	15.75	0.092	16			21			ML
3	Thu	7.09		16		13.7		3.00	16.70	0.087	18			19			ML
4	Fri	7.23		19		13.1		2.60	15.70	0.092	19			24			ML
5	Sat																
6	Sun																
7	Mon	6.27		18		7.4		1.12	8.52	0.090	19		46%	20			JA
8	Tue	6.4	20	12		10.6	2.62	2.15	15.37	0.084	19			16		Grab Samples.	ML
9	Wed								0.00							Attending Seminar.	
10	Thu	6.91		17	100	10.1		2.31	12.41	0.081	18			29			ML
11	Fri	7.11		15		10.3		2.11	12.41								
12	Sat																
13	Sun																
14	Mon	7.06		19		9.4		3.00	12.40	0.169	20			26		Grab samples.	ML
15	Tue	7.11		12		10.2		1.85	12.05	0.178	17			19			ML
16	Wed	7.14		16		9.9		1.93	11.83	0.169	18	61%	38%	21			ML
17	Thu	7.29	19	14		10.1	2.70	1.86	14.66	0.185	18			19			ML
18	Fri	6.23		9		14.5		2.44	16.94	0.158	18	49%	39%	11			JA
19	Sat																
20	Sun																
21	Mon	6.43		19		12.5		1.62	14.12	0.166	18	51%	39%	33			JA
22	Tue	6.35	13	11		11.9	2.54	1.46	15.90	0.168	16	45%	35%	23			JA
23	Wed	6.97		10		13.7		1.95	15.65	0.167	16	45%	37%	13			JA
24	Thu	7.39		21		13.3		1.57	14.87	0.158	18	40%	36%	35			JA
25	Fri	H	O	L	I	D	A	Y	0.00								
26	Sat																
27	Sun																
28	Mon	6.31		18		8.7		1.85	10.55	0.177	18		45%	37			JA
29	Tue	6.76	9	21		9.3	2.13	0.98	12.41	0.166	19	34%	35%	32			ML
30	Wed	6.91		18	100	11		1.97	12.97	0.17	17			28			ML
31	Thu	7.03		15		10.6		2.03	12.63	0.165	19			19			ML
A		**6.86**	**15**	**16.19**	**100**	**11.1**	**2.57**	**2.15**	**12.66**	**0.141**	**18**	**44.5%**	**39.5%**	**25**			

[1] D.O. concent

*O. R. = Over Range on Test Meter.

[3] D.O. concentr [7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

April, 2005

Riverhead Sewer District Daily Samples.

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head (in)	Weir Flow (GPM)	Total Flow (GPD)	pH (SU)	Temp. (°C)	BOD_5 (mg/l)	TSS (mg/l)	TKN (mg/l)	Ammonia (mg/l)	Alkalinity (mg/l)	D.O.[1] (mg/l)	D.O.[2] (mg/L)	D.O.[3] (mg/L)	MLSS at LWL (mg/l)	D.O.[1] (mg/l)	D.O.[2] (mg/L)	D.O.[3] (mg/L)	MLSS at LWL (mg/l)	WAS MLSS (mg/l)	Flow Rate[4] (gpm)
1	Fri	11"	508	758,500	7.43	14.3		210		38.25					2683				2667	6200	123
2	Sat			672,400																	123
3	Sun			800,800																	123
4	Mon	11"	508	938,900	7.16	14.5		166		36.50					2823				2790	5700	123
5	Tue	11"	508	872,300	7.10	15.0	357	190	51.4	34.00					2,623				2,667	5,885	123
6	Wed	11"	508	780,600	7.24	16.7		217		59.25					2457				2683	6170	123
7	Thu	11"	508	706,200	7.36	15.5		191		36.75					2887				2810	6220	123
8	Fri	11"	508	841,800	7.02	15.2		176		32.00					2837				2700	6100	123
9	Sat			756,100																	123
10	Sun			721,100																	123
11	Mon	11"	508	747,200	6.96	14.9		203		38.75					3037				2937	5950	123
12	Tue	11"	508	735,900	7.18	15.2	328	191	59.3	36.50					2987				2857	5670	123
13	Wed	11"	508	805,500	7.05	15.1		211		39.75					2950				2833	5780	123
14	Thu	11"	508	732,400	7.26	15.3		167		34.25	200				2997				2897	5970	123
15	Fri	11"	508	777,100	7.09	14.9		183		31.75					3080				2843	6000	123
16	Sat			761,300																	123
17	Sun			690,500																	123
18	Mon	11"	508	752,900	7.10	15.2		166		30.16					3110				3120	5960	123
19	Tue	11"	508	773,300	7.28	15.2	258	148	0.1	26.14					3127				2968	6090	123
20	Wed	11"	508	779,400	7.15	14.6		171		27.24					3207				4780	5730	123
21	Thu	11"	508	726,100	7.19	15.6		189		33.50					3193				2920	5840	123
22	Fri	11"	508	753,300	7.21	15.7		163		31.75					3000				2883	5870	123
23	Sat			807,500																	123
24	Sun			760,600																	123
25	Mon	11"	508	814,500	6.94	16.8		255		52.25					3297				3057	6340	123
26	Tue	11"	508	837,700	7.00	18.0	224	184	43.6	32.00					3287				3097	5930	123
27	Wed	11"	508	838,600	7.09	16.3		193		34.50					3230				3027	5970	123
28	Thu	11"	508	791,900	7.16	16.7		163		32.75					3277				3207	5780	123
29	Fri	11"	508	784,700	6.91	16.5		180		30.50					3457				3273	5780	123
30	Sat			733,900																	123
31																					
Average				**775,100**	**7.14**	**13.5**	**292**	**187**	**38.60**	**35.64**	**200**				**3026**				**3001**	**5949**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of a" blowers on" aeration period during *React Phase* (range 2 - 4 mg/l)

Riverhead Sewer District Daily Samples.

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrites (mg/l)	Ammonia (mg/l)	Total N [5] (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	30 Min. Settle Test: SBR No. 1 (%)	SBR No. 2 (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
1	Fri	7.38		15		11.1		1.49	12.590	0.166	19			14				ML
2	Sat																	
3	Sun																	
4	Mon	7.13		24		10.8		1.97	12.77	0.158	21			31		Grab Samples.		ML
5	Tue	6.69	11	24		10.3	1.71	1.34	11.63			33%	35%	42				JA
6	Wed	6.47		20		9.8		1.27	11.07		17		37%	35				JA
7	Thu	7.19		17		10.1		1.19	11.29	0.155	19			25				ML
8	Fri	6.94		24		8.9		1.55	10.45	0.160	21			27				ML
9	Sat																	
10	Sun																	
11	Mon	7.03		13		9.4		1.41	10.81	0.148	22			17		Grab samples.		ML
12	Tue	7.02	11	19		10.3	2.08	0.94	11.24	0.152	22			19	Grab samples. (Sampler Malfunction.)			ML
13	Wed	6.98		14		9.8		0.99	10.79	0.154	22			18				ML
14	Thu	7.13		11	80	8.6		1.05	9.65	0.151	21			13				ML
15	Fri	6.99		13		8.9		0.96	9.86	0.150	21	37%	32%	16				ML
16	Sat																	
17	Sun																	
18	Mon	7.02		15		8.0		1.02	9.02					15		grab samples		JA
19	Tue	6.65	5	12		5.1	0.10	1.06	6.16	0.063	21	44%	36%	12				JA
20	Wed	7.05		14		6.4		1.11	7.51	0.111	21	42%	36%	16				JA
21	Thu	7.24		26		8.4		1.80	10.20	0.145	22			33		Grab samples.		ML
22	Fri	7.14		18		7.7		1.15	8.85	0.15	20		39%	14				ML
23	Sat																	
24	Sun																	
25	Mon	6.63		16		4.8		5.50	10.30	0.139	20			23				JA
26	Tue	6.65	15	7		5.9	36.00	0.64	6.54	0.139	21	50%	46%	15				JA
27	Wed	7.09		21		4.1		1.05	5.15	0.142	21			24				ML
28	Thu	6.96		15		4.4		0.96	5.36	0.137	20			20				ML
29	Fri	7.03		11		4.0		1.11	5.11	0.132	21			16				ML
30	Sat																	
31																		
A		6.97	11	17	80	7.9	9.97	1.41	9.35	0.142	21	41.2%	37.3%	21				

[1] D.O. concen

[6] F= (Q) (BOD_5) (8.34).

May, 2005

Riverhead Sewer District
Daily Samples

Date	Day Of Week	Flow Rate at Gray Box Weir: Approx. Head (in.)	Flow Rate at Gray Box Weir: Weir Flow (GPM)	Total Flow (GPD)	GRAY BOX (SBR Influent): pH (SU)	Temp. (°C)	BOD_5 (mg/l)	TSS (mg/l)	TKN (mg/l)	Ammonia (mg/l)	Alkalinity (mg/l)	Reactor Contents: SBR No. 1: D.O.[1] (mg/l)	D.O.[2] (mg/L)	D.O.[3] (mg/L)	MLSS at LWL (mg/l)	SBR No. 2: DO[1] (mg/l)	DO[2] (mg/L)	D.O.[3] (mg/L)	MLSS at LWL (mg/l)	WAS MLSS (mg/l)	Flow Rate (gpm)
1	Sun			731,500																	
2	Mon	11"	508	805,800																	
3	Tue	11"	508	799,900	7.07	15.6	273	127	65.1	53.25					3137				3003	5940	123
4	Wed	11"	508	861,200	7.04	15.6		183		57.75					3193				3207	6000	123
5	Thu	11"	508	757,900	7.01	17.8		170		68.00					3523				3320	6380	123
6	Fri	11"	508	746,500	7.02	18.2		148		59.24					3,453				3,370	6,750	123
7	Sat			808,700																	
8	Sun			758,400																	
9	Mon	11"	508	797,400	6.96	17.5		166		44.50					3747				3680	6760	123
10	Tue	11"	508	776,800	7.08	18.2	362	98	59.8	41.50					3753				3563	6290	123
11	Wed	11"	508	865,400	7.14	18.1		174		36.50					3620				3520	6090	123
12	Thu	11"	508	806,200	6.98	18.4		141		33.75	200				3110				3323	6240	123
13	Fri	11"	508	787,400	7.24	18		190		40.50					3207				3340	6680	123
14	Sat			800,500																	
15	Sun			759,000																	
16	Mon	11"	508	781,000	7.13	19.1		215		42.25					3153				3337	6870	123
17	Tue	11"	508	803,100	7.06	19.4	200	156	59.7	36.75					3183				3347	6880	123
18	Wed	11"	508	785,600																	
19	Thu	11"	508	814,100	7.03	19.7		194		41.75					2883				3053	6750	123
20	Fri	11"	508	765,800	7.06	19.2		140		34.25					3010				3363	7330	123
21	Sat			765,800																	
22	Sun			763,100																	
23	Mon	11"	508	813,700	6.96	19.3		189		38.50					3267				3290	7050	123
24	Tue	11"	508	827,300	6.63	18.9	515	241	81.7	50.25					2953				3140	6710	123
25	Wed	11"	508	825,700	7.42	13.2		36		40.50					3,043				3,410	7,100	123
26	Thu	11"	508	835,500	7.26	18.1		123		34.75	180				3117				3450	7150	123
27	Fri	11"	508	820,800	7.20	18		132		30.16					3,003				3,420	4,410	123
28	Sat			813,500																	
29	Sun			819,000																	
30	Mon	11"	508	751,100	H	O	L	I	D	A	Y										
31	Tue	11"	508	729,700	6.9	20.3	265	138	47.4	50.50					3037				3590	7210	123
Average				**792,819**	**7.06**	**18.0**	**323**	**156**	**62.74**	**43.93**	**190**				**3231**				**3354**	**6557**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

May, 2005

Riverhead Sewer District
Daily Samples

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen: Nitrates	Nitrites	Ammonia	Total N[5]	Process Parameters: System F / M Ratio[6]	System Sludge Age (SRT)[7]	30 Min. Settle Test: SBR No. 1	SBR No. 2	Effluent Turbitity	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)				
1	Sun																	
2	Mon																	
3	Tue	6.94	11	5		6.1	0.38	1.16	7.26	0.144	19	45%	42%	6				JA
4	Wed	6.89		5		6.1		0.57	6.67	0.138	19			7				JA
5	Thu	6.77		11		6.2		1.31	7.51	0.130	20			23				JA
6	Fri	6.68		8		6.0		1.25	7.25	0.130	20	39%	44%	15				JA
7	Sat																	
8	Sun																	
9	Mon	7.13		13		4.9		1.43	6.33	0.119	20			19		Grab samples.		ML
10	Tue	7.5	8	4		4.8	0.60	0.76	6.16	0.121	21			11				JA
11	Wed	7.23		10		5.1		0.81	5.91	0.124	21			16				ML
12	Thu	7.03		8	100	4.6		1.05	5.65	0.138	19			15				ML
13	Fri	7.19		7		5.3		0.88	6.18	0.135	18			9				ML
14	Sat																	
15	Sun																	
16	Mon	7.20		21		4.3		12.75	17.05	0.137	17			32		Grab samples.		ML
17	Tue	7.19	7	13		4.9	0.58	10.25	15.15	0.136	17			19				ML
18	Wed														No Samples Today; Operators @ Seminar.			
19	Thu	7.23		9		5.1		8.50	13.60	0.150	16			14		Grab Samples.		ML
20	Fri	7.14		6		6.0		4.75	10.75	0.140	18			12				ML
21	Sat																	
22	Sun																	
23	Mon	6.69		7		5.4		1.56	6.96	0.135	19			13		Grab samples.		ML
24	Tue	7.01	8	9		5.9	0.23	1.14	7.27	0.146	19			15		Press Running.		ML
25	Wed	6.96		6		4.3		0.95	5.25	0.138	19	32%	35%	9				JA
26	Thu	7.09		11	80	4.8		1.09	5.89	0.135	19			17				ML
27	Fri	7.08		10		5.0		0.98	5.98			31%	41%	15				JA
28	Sat																	
29	Sun																	
30	Mon	H	O	L	I	D	A	Y										
31	Tue	6.3	7	4		3.9	0.24	0.43	4.33	0.134	17			4				JA
Av		**7.01**	**8**	**8.79**	**90**	**5.2**	**0.41**	**2.72**	**7.96**	**0.135**	**19**	**36.8%**	**40.5%**	**14**				

[1] D.O. concent

[6] F= (Q) (BOD_5) (8.34).

[3] D.O. concentr.

[7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

JUNE; 2005

SBR Daily Samples

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Wed	11"	508	901,900	7.05	20.5		151		41.75					3053				3490	7170	123
2	Thu	11"	508	813,100	6.89	20.7		244		54.25					3167				3437	7080	123
3	Fri	11"	508	781,800	7.10	20.6		189		44.00					3393				3797	6610	123
4	Sat			827,600																	
5	Sun			742,500																	
6	Mon	11"	508	796,400	6.95	22.8		173		44.25					3387				3697	6600	123
7	Tue	11"	508	848,700	7.06	22.7	370	226	73.1	50.75					3270				3810	6320	123
8	Wed	11"	508	845,400	7.11	23.6		183		41.25					3363				3840	6380	123
9	Thu	11"	508	796,800	7.15	23.3		147		36.50	200				3320				3340	6570	123
10	Fri	11"	508	816,600	7.10	23.1		155		38.19					3,117					6,960	123
11	Sat			809,000																	
12	Sun			757,900																	
13	Mon	11"	508	700,000	6.96	23.5		169		35.25					3497				3600	6330	123
14	Tue	11"	508	853,200	7.16	29.1	415	32	86.1	50.05					3423				3563	6420	123
15	Wed	11"	508	821,500	6.84	23.2		87		50.00					3473				3567	6760	123
16	Thu	11"	508	817,500	6.79	23.5		206		52.75					3493				3583	6420	123
17	Fri	11"	508	720,300	6.94	24.7		184		46.50					3517				3620	6810	123
18	Sat			793,000																	
19	Sun			721,200																	
20	Mon	11"	508	749,400	6.67	22.4		156		41.25					3370				3397	6120	123
21	Tue	11"	508	778,600	6.84	23.3	350	209	70	48.00					2127				3160	6170	123
22	Wed	11"	508	762,200	6.73	24.9		211		50.25					3487				3993	6730	123
23	Thu	11"	508	778,400	7.03	25.4		188		42.50					3347				3400	6580	123
24	Fri	11"	508	910,300	7.14	25.8		163		36.75					3403				3443	6690	123
25	Sat			604,200																	
26	Sun			805,000																	
27	Mon	11"	508	758,900	6.75	24.6		210		51.50					3700				3637	6350	123
28	Tue	11"	508	861,900	6.80	25.6	258	36	57.6	45.50					3847				3760	7110	123
29	Wed	11"	508	843,200	6.71	24.5		120		44.24					3917				3583	4130	123
30	Thu	11"	508	823,900																	123
31																					
Average				**794,680**	**6.94**	**23.7**	**348**	**164**	**71.70**	**45.02**	**200**				**3365**				**3586**	**6491**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

JUNE; 2005

SBR Daily Samples

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD₅	TSS	Alkalinity	Nitrogen: Nitrates	Nitrites	Ammonia	Total N [5]	Process Parameters: System F / M Ratio [6]	System Sludge Age (SRT) [7]	SBR No. 1 30 Min. Settle Test	SBR No. 2 30 Min. Settle Test	Effluent Turbitity	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	Day	Night	Day	Night
1	Wed	6.96		7		4.4		0.86	5.26	0.136	17			13				ML
2	Thu	6.75		5		3.9	0.231	0.59	4.72	0.135	18			9				ML
3	Fri	7.17		6		3.5		2.70	6.20	0.124	21			9				ML
4	Sat																	
5	Sun																	
6	Mon	7.14		8		3.4		2.09	5.49	0.125	20			11				JA
7	Tue	6.94	34	5		3.7	0.34	2.75	6.79	0.126	21			9		Press Running.		ML
8	Wed	7.25		5		4.1		2.15	6.25	0.124	21			10				ML
9	Thu	7.11		9	80	4.4		2.35	6.75	0.134	19			11				ML
10	Fri	7.04		8		4.1		1.98	6.08					8				JA
11	Sat																	
12	Sun																	
13	Mon	7.03		10		4.3		1.54	5.84	0.125	21			14		Grab Samples.		ML
14	Tue	6.76	8	3		2.7	0.18	2.65	5.53	0.127	21			6				JA
15	Wed	6.44		7		2.9		1.41	4.31	0.125	20			10				JA
16	Thu	7.03		5		3.4		2.09	5.49	0.125	21			11		Press Running.		ML
17	Fri	7.07		8		3.8		1.73	5.53	0.124	20			12				ML
18	Sat																	
19	Sun																	
20	Mon	6.73		4		2.7		0.71	3.41	0.131	21			6		Grab Samples.		ML
21	Tue	7.06	10	7		3.4	0.21	1.46	5.07	0.168	16			12		Press Running.		ML
22	Wed	6.93		10		3.6		1.77	5.37	0.118	21			15		Press Running during day.		ML
23	Thu	7.1		6		3.1		1.93	5.03	0.131	19			11				ML
24	Fri	6.98		8		3.9		2.75	6.65	0.129	19			9				ML
25	Sat																	
26	Sun																	
27	Mon	6.96		13		4.2		5.75	9.95	0.120	21			17	Grab Samples. / Press running In AM.			ML
28	Tue	7.03	17	9		3.0	0.12	5.75	8.87	0.116	20			16	Press Running AM.			JA
29	Wed	6.98		10		3.2		3.86	7.06					12	press running PM			JA
30	Thu								0.00									
31																		
Av		6.97	17	7.29	80	3.6	0.216	2.33	5.71	0.129	20			11				

[1] D.O. concentr

[6] F= (Q) (BOD_5) (8.34).

July; 2005

Riverhead Sewer District
Daily Sampe Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents								[illegible]	
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Fri	11"	508	814,700																	123
2	Sat			816,100																	
3	Sun			731,400																	
4	Mon	11"	508	693,700	H	O	L	I	D	A	Y										123
5	Tue	11"	508	749,900			275		46.7												123
6	Wed	11"	508	828,300	6.70	24.4		140		40.20					2563				359	7820	123
7	Thu	11"	508	898,700	6.90	25.2		171		38.50					3417				3595	7400	123
8	Fri	11"	508	780,100	6.80	21.7		84		45.25									5480	6560	123
9	Sat			813,100																	
10	Sun			745,200																	
11	Mon	11"	508	773,900	6.9	24.4		146		37.25					3553				3427	6690	123
12	Tue	11"	508	858,200	7.00	25.2	320	142	54.2	40.50			0.50		3803		3.25		3513	6030	123
13	Wed	11"	508	835,000	6.85	25.5		75		46.75					3747				3553	6210	123
14	Thu	11"	508	787,700	6.95	25.5		101		47.25					3443				3280	5570	123
15	Fri	11"	508	817,900																	123
16	Sat			832,800																	
17	Sun			715,800																	
18	Mon	11"	508	843,400	7.03	25.9		147		41.50					3745				3630	3390	123
19	Tue	11"	508	838,100	6.93	25.6	248	170	43.8	43.75					4000				3760	5960	123
20	Wed	11"	508	833,700	6.76	25.5		163		36.50			0.48	1.03	3635		0.45	0.53	3525	6600	123
21	Thu	11"	508	805,000	6.89	25.8		206		46.75					3750				3440	5680	123
22	Fri	11"	508	759,800	7.03	26.2		184		41.25					3447				3377	6530	123
23	Sat			747,000																	
24	Sun			711,500																	
25	Mon	11"	508	753,400	7.13	25.6		153		33.50					3517				3450	6340	123
26	Tue	11"	508	825,200	7.09	26.3	280	136	55	31.75					3833				3500	6900	123
27	Wed	11"	508	827,500																	123
28	Thu	11"	508	716,300	7.08	25.3		226		51.25	180				3667				3550	6360	123
29	Fri	11"	508	776,300	6.98	26.2		166		42.75					3930				3743	7140	123
30	Sat			795,300																	
31	Sun			717,500																	
Average				**788,468**	**6.94**	**25.3**	**281**	**151**	**49.93**	**41.54**	**180**		**0.49**	**1.03**	**3603**		**1.9**	**0.53**	**3449**	**6324**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Fill Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "on") during *React Phase (2 - 4 mg/l)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

July; 2005

Riverhead Sewer District
Daily Sampe Sheet

Date	Day Of Week	BLUE BOX (SBR Decant Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrogen: Nitrites (mg/l)	Nitrogen: Ammonia (mg/l)	Nitrogen: Total N [5] (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	Process Parameters: System Sludge Age (SRT) [7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbidity (FAU)	Notes / Comments / Observations: Day	Notes / Comments / Observations: Night	Operator's Initials: Day	Operator's Initials: Night
1	Fri																	
2	Sat																	
3	Sun																	
4	Mon	H	O	L	I	D	A	Y										
5	Tue		9				0.21											
6	Wed	6.8		15		3.6		3.05	3.65									JA
7	Thu	7.02		9		3.9		2.75	6.65	0.128	16			13		Grab samples.		ML
8	Fri	6.35		5		2.8		1.77	4.57					8				JA
9	Sat																	
10	Sun																	
11	Mon	7.12		11		2.9		1.06	3.96	0.129	18			14		Grab Samples.		ML
12	Tue	6.72	12	7		2.8	0.20	2.46	5.26	0.123	20			13				JA
13	Wed	6.62		9		2.4		6.25	8.65	0.123	20			15				JA
14	Thu	6.69		2		3.1		8.05	11.15					11				JA
15	Fri																	
16	Sat																	
17	Sun																	
18	Mon	6.96		5		2.8		4.25	7.05	0.122	18			10		Grab samples.		ML
19	Tue	7.03	22	3		3.6	0.10	8.75	12.45	0.116	20			9				ML
20	Wed	7.09		5		3.9		7.75	11.65	0.126	17			11				ML
21	Thu	7.11		7		3.4		8.75	12.15	0.125	20			13		Belt Press Running.		ML
22	Fri	7.06		6		3.5		7.25	10.75	0.132	17			10				ML
23	Sat																	
24	Sun																	
25	Mon	7.09		10		4.1		8.75	12.85	0.129	19			13		Grab samples.		ML
26	Tue	7.14	13	4		3.4	0.28	6.25	9.93	0.123	18			9				ML
27	Wed														Unable to do samples. (Generator Running in Lab.)			
28	Thu	7.11		8	80	4.2		10.75	14.95	0.125	19			11		Press Running.		ML
29	Fri	6.89		6		4.4		9.25	13.65	0.117	18			10				ML
30	Sat																	
31	Sun																	
Av		6.93	14	7.00	80	3.4	0.20	6.07	9.33	0.124	18			11				

[1] D.O. concentra

[6] F= (Q) (BOD_5) (8.34).

[3] D.O. concentrat

[7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

Month : *August, 2005*

Riverhead Sewer District
SBR Monthly Process

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents								[redacted]	
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Mon	11"	508	751,000	6.91	25.8		209		49.75					4063				3890	6730	123
2	Tue	11"	508	817,000	7.06	26.1	260	170	75.1	41.50					3933				3827	6390	123
3	Wed	11"	508	825,200	7.13	26.4		156		36.25					4217				4193	6850	123
4	Thu	11"	508	765,800	6.86	26.5		215		51.50					4230				3540	6920	123
5	Fri	11"	508	738,500	6.93	26.3		166		42.00	120				3967				3853	7040	123
6	Sat			794,000																	
7	Sun			698,700																	
8	Mon	11"	508	772,900	7.03	25.6		131		34.00					3923				4137	7840	123
9	Tue	11"	508	757,400	7.13	25.5	260	168	58.4	32.75					3760				3410	5930	123
10	Wed	11"	508	811,400	6.94	25.9		184		35.50					3303				3457	6120	123
11	Thu	11"	508	81,100	7.04	25.8		220		49.50					3263				3103	6050	123
12	Fri	11"	508	810,400																	123
13	Sat			789,000																	
14	Sun			1,751,000																	
15	Mon	11"	508	797,000	7.10	26.1		133		31.75					3440				3107	6740	123
16	Tue	11"	508	857,500	6.91	25.9	290	231	64.3	47.50					3333				2901	7070	123
17	Wed	11"	508	841,800	6.94	26.0		160		34.25					3227				2827	6610	123
18	Thu	11"	508	804,500	6.63	25.8		218		50.25					3577				3287	7630	123
19	Fri	11"	508	824,200	6.94	25.9		187		43.50					3460				3567	7560	123
20	Sat			816,100																	
21	Sun			804,600																	
22	Mon	11"	508	829,700	7.03	26.1		146		32.00					3060				2857	7070	123
23	Tue	11"	508	827,200	6.96	25.8		193	56	41.25					3280				3083	7180	123
24	Wed	11"	508	822,800	6.74	25.6		210		46.50					3393				2953	7000	123
25	Thu	11"	508	830,900	6.93	25.4	230	171	56	37.75					3513				3030	7940	123
26	Fri	11"	508	1,008,500	6.81	25.6		208		50.00					3460				3020	7250	123
27	Sat			636,700																	
28	Sun			748,300																	
29	Mon	11"	508	752,400	6.93	26		161		34.50					3630				2963	8600	123
30	Tue	11"	508	870,500	7.13	26.1	300	137	60	32.75					3763				3010	8360	123
31	Wed	11"	508	886,200																	123
Average				**810,397**	**6.96**	**25.9**	**268**	**180**	**61.63**	**40.70**	**120**				**3609**				**3334**	**7090**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

Month : *August, 2005*

Riverhead Sewer District
SBR Monthly Process Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen: Nitrates	Nitrites	Ammonia	Total N[5]	Process Parameters: System F / M Ratio[6]	System Sludge Age (SRT)[7]	30 Min. Settle Test: SBR No. 1	SBR No. 2	Effluent Turbitity	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	Day	Night	Day	Night
1	Mon	7.03		10		4.5		9.75	14.25	0.113	19			15	Grab Samples. / Press running until 12:30.			ML
2	Tue	7.11	11	6		4.8	0.13	7.50	12.43	0.116	19	52%	54%	11				ML
3	Wed	6.96		7		5.1		6.25	11.35	0.107	19			13				ML
4	Thu	7.05		5		4.4		8.50	12.90	0.116	17			9		Press Running Today.		ML
5	Fri	7.16		9	100	3.5		11.25	14.75	0.115	17			14				ML
6	Sat																	
7	Sun																	
8	Mon	7.11		10		3.7		12.50	16.20	0.111	16	51%	49%	16		Grab samples.		ML
9	Tue	7.19	7	7		4.1	0.24	10.75	15.09	0.125	19	46%	40%	12				ML
10	Wed	7.06		3		3.6		11.25	14.85	0.133	17	47%	46%	6				ML
11	Thu	7.34		3		3.3		13.75	17.05	0.141	18	38%	35%	4		Press Running.		ML
12	Fri								0.00									
13	Sat																	
14	Sun																	
15	Mon	7.26		12		4.1		10.50	14.60	0.138	18			16		Grab Samples.		ML
16	Tue	7.09	12	5		3.6	0.33	11.75	15.68	0.144	16			9		Press Running.		ML
17	Wed	7.25		2		4.9		13.75	18.65	0.149	17			4				ML
18	Thu	7.06		4		5.1		15.50	20.60	0.131	18			6		Press Running.		ML
19	Fri	7.16		3		4.8		16.75	21.55	0.128	18			6				ML
20	Sat																	
21	Sun																	
22	Mon	7.15		5		4.3		12.50	16.80	0.152	17			9		Grab Samples.		ML
23	Tue	7.03		4		3.6		15.25	18.85	0.142	17			6				ML
24	Wed	7.05		6		3.4		17.00	20.40	0.142	18			8		Press Running.		ML
25	Thu	7.10	12	3		3.4	0.64	15.50	19.54	0.138	16			6				ML
26	Fri	6.96		5		3.6		17.75	21.35	0.142	18			8		Press Running.		ML
27	Sat																	
28	Sun																	
29	Mon	7.04		6		3.9		14.25	18.15	0.137	16			9		Grab Samples.		ML
30	Tue	7.16	12	4		3.9	0.3	15.00	19.20	0.133	17			6				ML
31	Wed																	
Av		7.11	11	5.67	100	4.1		12.71	16.10	0.131	17	46.8%	44.8%	9				

[1] D.O. concent

[6] F= (Q) (BOD$_5$) (8.34).

Month: September, 2005

Riverhead Sewer District
Process Log Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents								[redacted]	
												SBR No. 1				SBR No. 2					
		Approx. Head (in.)	Weir Flow (GPM)	Total Flow (GPD)	pH (SU)	Temp. (°C)	BOD_5 (mg/l)	TSS (mg/l)	TKN (mg/l)	Ammonia (mg/l)	Alkalinity (mg/l)	D.O. [1] (mg/l)	D.O. [2] (mg/L)	D.O. [3] (mg/L)	MLSS at LWL (mg/l)	DO [1] (mg/l)	DO [2] (mg/L)	D.O. [3] (mg/L)	MLSS at LWL (mg/l)	WAS MLSS (mg/l)	Flow Rate [4] (gpm)
1	Thu	11"	508	821,600																	123
2	Fri	11"	508	719,700																	123
3	Sat	11"	508	754,700																	123
4	Sun			679,400																	
5	Mon			703,300	H	O	L	I	D	A	Y										
6	Tue	11"	508	748,700	6.94	24.6	140	144	85.8	33.00											123
7	Wed	11"	508	788,400	6.96	24.8		163		36.25					3443				2730	7130	123
8	Thu	11"	508	786,100											3533				2697	7250	123
9	Fri	11"	508	804,300																	123
10	Sat	11"	508	736,600																	
11	Sun			730,100																	
12	Mon			789,100	7.03	25.1		133		32.50					3480				3020	7560	123
13	Tue	11"	508	829,300			350		45												123
14	Wed	11"	508	830,800	6.86	25.4		216		51.50					3543				3286	7180	123
15	Thu	11"	508	806,400	7.09	25.5		180		40.25					3300				3127	6853	123
16	Fri	11"	508	767,100	6.99	25.4		219		52.25					3177				3203	7800	123
17	Sat	11"	508	752,000																	
18	Sun			728,100																	
19	Mon			804,300	7.13	25.3		146		39.50					3353				3120	6610	123
20	Tue	11"	508	781,392	6.96	25.2	320	161	61.3	32.75					3073				3117	8090	123
21	Wed	11"	508	774,000																	123
22	Thu	11"	508	774,200	7.09	24.9		150		33.25					3033				2820	7510	123
23	Fri	11"	508	708,700	7.13	25.2		136		31.50					2860				2903	8230	123
24	Sat	11"	508	772,200																	
25	Sun			764,800																	
26	Mon			80,000	7.19	24.9		161		34.50					2977				2947	7750	123
27	Tue	11"	508	793,800	7.11	23.8	365	210	63.5	34.00					2783				2760	8410	123
28	Wed	11"	508	760,200	7.23	23.6		189		36.25					2887				2887	7200	123
29	Thu	11"	508		7.08	23.4		157		33.25					3047				3027	8800	123
30	Fri	11"	508																		123
31																					
Average				**742,475**	**7.06**	**24.8**	**294**	**169**	**63.90**	**37.20**					**3178**				**2975**	**7598**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

Month: September, 2005

Riverhead Sewer District
Process Log Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen: Nitrates	Nitrites	Ammonia	Total N[5]	Process Parameters: System F / M Ratio[6]	System Sludge Age (SRT)[7]	SBR No. 1 30 Min. Settle Test	SBR No. 2 30 Min. Settle Test	Effluent Turbitity	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	Day	Night	Day	Night
1	Thu																	
2	Fri																	
3	Sat																	
4	Sun																	
5	Mon																	
6	Tue	7.15	7	3	0.54	2.9	15.50		18.40									
7	Wed	7.09		5		3.2		15.75	18.95	0.146	18			5		Grab samples.		ML
8	Thu								0.00	0.145	17			6				ML
9	Fri								0.00									
10	Sat																	
11	Sun																	
12	Mon	7.41		3		3.9		12.50	16.40	0.144	17			5				
13	Tue		5		0.58				0.00							Grab Samples.		ML
14	Wed	7.08		5		4.2		16.75	20.95	0.133	19			9	No Samples. Operators at Seminar.			
15	Thu	7.13		3		4.2		15.00	19.20	0.141	19			7				ML
16	Fri	7.04		6		3.8		17.25	21.05	0.142	17			10				ML
17	Sat															Press Running.		ML
18	Sun																	
19	Mon	7.03		9		4.1		16.50	20.60	0.140	19			16		Grab Samples.		ML
20	Tue	6.90	4	3	0.73	4.5		10.25	14.75	0.146	14			6	Surfactant: .173			ML
21	Wed								0.00									
22	Thu	7.13		4		4.6		9.00	13.60	0.155	14			5	Sampler Malfunction. Grab Samples.			ML
23	Fri	6.63		3		6.3		5.75	12.05	0.157	13			5				ML
24	Sat								0.00									
25	Sun																	
26	Mon	7.14		5		5.8		4.25	10.05	0.153	15			7		Grab Samples.		ML
27	Tue	7.10	12	3	0.36	6.6		2.75	9.35	0.164	14			8				ML
28	Wed	7.19		2		6.6		1.96	8.56	0.157	17			5				ML
29	Thu	7.06		3		6.3		2.05	8.35	0.149	14			4				ML
30	Fri								0.00									
31									0.00									
	Ave	7.08	7	4.07	0.55	4.8		9.98	10.11	0.148	16			7				

[1] D.O. concentra

[6] F= (Q) (BOD_5) (8.34).

October, 2005

Riverhead Sewer District
Process Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head (in)	Weir Flow (GPM)	Total Flow (GPD)	pH (SU)	Temp. (°C)	BOD_5 (mg/l)	TSS (mg/l)	TKN (mg/l)	Ammonia (mg/l)	Alkalinity (mg/l)	D.O. [1] (mg/l)	D.O. [2] (mg/L)	D.O. [3] (mg/L)	MLSS at LWL (mg/l)	DO [1] (mg/l)	DO [2] (mg/L)	D.O. [3] (mg/L)	MLSS at LWL (mg/l)	WAS MLSS (mg/l)	Flow Rate [4] (gpm)
1	Sat			735,400																	
2	Sun			717,000																	
3	Mon	11"	508	725,600	6.96	23.1		133		31.50					3013				3203	8680	123
4	Tue	11"	508	775,400	7.18	24.0	350	156	62.6	33.75					2623				2647	8650	123
5	Wed	11"	508	800,900	7.09	23.7		194		47.75					2733				3030	8990	123
6	Thu	11"	508	781,100	7.34	23.4		136		40.25	160				2727				2737	8610	123
7	Fri	11"	508	816,200	7.20	23.1		221		51.50					2800				2247	9080	123
8	Sat			783,800																	
9	Sun			837,000																	
10	Mon	11"	508	749,000	H	O	L	I	D	A	Y										123
11	Tue	11"	508	803,800	7.06	22.2	325	144	59.8	33.25					2363				2823	9970	123
12	Wed	11"	508	1,475,000	6.96	21.4		193		35.00									3147	7920	123
13	Thu	13	1337	1,475,000	7.01	21.2		131		29.75					2833				2927	8120	123
14	Fri	13	1337	1,475,000																	123
15	Sat	13	1337	1,475,000																	
16	Sun	13	1337	1,475,000																	
17	Mon	13	1337	1,475,000																	123
18	Tue	13	1337	1,475,000	6.77	19.6		104		26.25					1937				2010	9930	123
19	Wed	13	1337	1,475,000	7.06	19.4		110		24.50					1983				2287	7870	123
20	Thu	13	1337	1,475,000	7.03	19.4	325	123	59.8	29.75					2097				2260	8930	123
21	Fri	13	1337	1,475,000	7.02	19.5		149		31.00					2450				2597	7940	123
22	Sat	13	1337	1,475,000																	
23	Sun	13	1337	1,475,000																	
24	Mon	13	1337	1,239,900	6.95	19.1		115		25.50					2450				2597	7940	123
25	Tue	13	1337	1,925,800	6.64	17.7	300	131	30.2	23.75	80				2490				2620	8040	123
26	Wed	13	1337	1,925,800	6.76	17.5		140		25.00					2275				2530	6940	123
27	Thu	13	1337	1,323,200	7.01	17.1		149		28.75					2673				2563	7360	123
28	Fri	13	1337	1,612,500																	123
29	Sat	13	1337	1,294,400																	
30	Sun	13	1337	1,138,800																	
31	Mon	11"	508	1,037,000	6.96	16.8		120		24.50					2980				2990	8210	123
Average				**1,216,858**	**7.00**	**20.5**	**325**	**144**	**53.10**	**31.87**	**120**				**2527**				**2660**	**8422**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

October, 2005

Riverhead Sewer District
Process Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrogen: Nitrites (mg/l)	Nitrogen: Ammonia (mg/l)	Nitrogen: Total N [5] (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations: Day	Notes / Comments / Observations: Night	Operator's Initials: Day	Operator's Initials: Night
1	Sat																	
2	Sun																	
3	Mon	7.04		4		5.9		3.25	9.15	0.145	15			7		Grab Samples.		ML
4	Tue	7.13	8	2		6.5	0.72	1.85	8.35	0.172	13			4				ML
5	Wed	7.10		3		6.8		1.16	7.96	0.157	13			5	Press Run Today.			ML
6	Thu	7.26		2	80	6.9		1.10	8.00	0.166	13			5				ML
7	Fri	7.16		4		6.6		1.14	7.74	0.179	12			6	Press Run Today.			ML
8	Sat																	
9	Sun																	
10	Mon	H	O	L	I	D	A	Y										
11	Tue	7.14	8	5		6.3	0.34	1.56	8.20	0.175	11			8		Grab Samples.		ML
12	Wed	7.06		9		6.7		1.63	8.33	0.134	16			13				ML
13	Thu	7.10		10		6.5		2.14	8.64	0.157	16			15				ML
14	Fri														Working on High flow / Storm condition in plant, heavy rains. No Samples collected.			
15	Sat																	
16	Sun																	
17	Mon																	
18	Tue	6.66		10		7.9		1.36	9.26	0.227	18			17		Grab Samples.		ML
19	Wed	6.69		10		8.6		1.09	9.69	0.215	25			14				ML
20	Thu	6.83	6	8		8.4	0.19	1.21	9.80	0.211	28			13				ML
21	Fri	7.02		6		7.3		0.94	8.24					8				ML
22	Sat																	
23	Sun																	
24	Mon	7.01		10		6.8		1.84	8.64	0.154	36			15		Grab Samples.		ML
25	Tue	7.02	9	6	80	4.5	0.24	2.91	7.41	0.183	36			8				ML
26	Wed	6.98		5		4.3		3.15	7.45	0.195	32			8				ML
27	Thu	7.04		6		4.1		3.65	7.75	0.178	32			10				ML
28	Fri																	
29	Sat																	
30	Sun																	
31	Mon	7.03		6		3.9		4.50	8.40	0.153	28			11		Grab Samples.		ML
Av		**7.02**	**8**	**6.24**	**80**	**6.4**	**0.37**	**2.03**	**8.41**	**0.175**	**22**			**10**				

[1] D.O. concen

[6] F= (Q) (BOD$_5$) (8.34).

November, 2005

Riverhead Sewer District
Process Sample Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir: Approx. Head (in)	Weir Flow (GPM)	Total Flow (GPD)	GRAY BOX (SBR Influent): pH (SU)	Temp. (°C)	BOD_5 (mg/l)	TSS (mg/l)	TKN (mg/l)	Ammonia (mg/l)	Alkalinity (mg/l)	Reactor Contents — SBR No. 1: D.O. [1] (mg/l)	D.O. [2] (mg/L)	D.O. [3] (mg/L)	MLSS at LWL (mg/l)	SBR No. 2: DO [1] (mg/l)	DO [2] (mg/L)	D.O. [3] (mg/L)	MLSS at LWL (mg/l)	WAS MLSS (mg/l)	Flow Rate [4] (gpm)
1	Tue	11"	508	1,025,400	6.97	17.9		189		35.00					3087				2737	7760	123
2	Wed	11"	508	975,500	7.01	18.0		160		33.25					2797				2627	6530	123
3	Thu	11"	508	945,200	7.13	17.6		143		29.50					2827				2777	6840	123
4	Fri	11"	508	939,200	6.98	18.1		121		27.25					3133				3043	6450	123
5	Sat			960,500																	
6	Sun			897,500																	
7	Mon	11"	508	946,400	7.03	18.4		176		31.75					3283				3007	9160	123
8	Tue	11"	508	869,900	H	O	L	I	D	A	Y										123
9	Wed	11"	508	879,900	6.98	18.1	178	144	47.6	29.50					3597				3050	6880	123
10	Thu	11"	508	764,600	7.05	17.8		136		26.25					3447				3050	6990	123
11	Fri	11"	508	851,700	H	O	L	I	D	A	Y										123
12	Sat			819,600																	
13	Sun			806,100																	
14	Mon	11"	508	817,700																	123
15	Tue	11"	508	779,600	6.96	18	360	153	56.6	29.25					3350				2727	7810	123
16	Wed	11"	508	812,100	7.09	18.2		134		26.25					3223				2583	5810	123
17	Thu	11"	508	811,400	6.93	17.6		193		38.50					3250				2697	7160	123
18	Fri	11"	508	760,200	7.26	17.9		204		45.25					3620				3030	7740	123
19	Sat			742,400																	
20	Sun			780,200																	
21	Mon	11"	508	782,900	7.11	17.6		141		32.50					3543				2817	7600	123
22	Tue	11"	508	868,200	7.01	16.8	275	123	53.2	28.75		6.18			3637	4.91			2903	7280	123
23	Wed	11"	508	814,300	7.23	15.5		130		29.50		4.92			3637	5.97			2907	5400	123
24	Thu	11"	508	767,900	H	O	L	I	D	A	Y										123
25	Fri	11"	508	749,400	6.88	14.9		151		31.25					3320				2817	5040	123
26	Sat			780,800																	
27	Sun			751,100																	
28	Mon	11"	508	802,400	6.94	15.2		137		30.50					2920				3047	6820	123
29	Tue	11"	508	877,600	7.22	15.6	350	153	43.8	32.25					3410				2820	4760	123
30	Wed	11"	508	854,600	7.07	16.2		194		45.75					3577				2957	4740	123
31																					
Average				**841,143**	**7.05**	**17.2**	**291**	**155**	**50.30**	**32.35**		**5.55**			**3314**	**5.44**			**2866**	**6709**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at rown ox)

November, 2005

Riverhead Sewer District
Process Sample Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen: Nitrates	Nitrites	Ammonia	Total N [5]	Process Parameters: System F / M Ratio [6]	System Sludge Age (SRT) [7]	SBR No. 1 30 Min. Settle Test	SBR No. 2 30 Min. Settle Test	Effluent Turbitity	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)				
1	Tue	6.86		4		4.3		4.25	8.55	0.158	23			5				ML
2	Wed	6.94		5		4.1		4.50	8.60	0.170	25			7				ML
3	Thu	7.09		3		4.5		3.25	7.75	0.164	25			7				ML
4	Fri	6.97		3		4.3		1.85	6.15	0.149	29			4				ML
5	Sat																	
6	Sun																	
7	Mon	6.85		4		4.0		5.25	9.25	0.146	17			10		Grab Samples.		ML
8	Tue	H	O	L	I	D	A	Y										
9	Wed	7.03	4	6		4.1	0.10	6.50	10.70	0.139	24			13		Grab Samples.		ML
10	Thu	6.99		4		4.4		5.00	9.40	0.142	22			10				ML
11	Fri	H	O	L	I	D	A	Y										
12	Sat																	
13	Sun																	
14	Mon								0.00									
15	Tue	7.01	2	5		4.0	0.10	7.50	11.60	0.151	18			11		Grab Samples.		ML
16	Wed	7.06		3		4.5		5.25	9.75	0.159	23			7				ML
17	Thu	7.04		4		4.7		8.50	13.20	0.155	19			9				ML
18	Fri	7.06		6		5.6		6.00	11.60	0.139	20			7				ML
19	Sat																	
20	Sun																	
21	Mon	7.04		8		5.9		4.25	10.15	0.145	20			14		Grab Samples.		ML
22	Tue	6.98	2	9		4.8	0.10	2.25	7.15	0.141	20			14				ML
23	Wed	7.00		6		4.5		1.79	6.29	0.141	25			11				ML
24	Thu	H	O	L	I	D	A	Y										
25	Fri	6.56		10		4.7		1.05	5.75	0.15	25			17		Grab Samples.		ML
26	Sat																	
27	Sun																	
28	Mon	7.04		13		5.1		0.95	6.05	0.155	16			21		Grab Samples.		ML
29	Tue	7.04	2	5		5.5	0.10	1.88	7.48	0.148	26	86%	30%	10				ML
30	Wed	7.01		6		5.6		2.25	7.85	0.141	27		32%	12				ML
31																		
Av		**6.98**	**3**	**5.78**	**######**	**4.7**	**0.10**	**4.02**	**8.28**	**0.150**	**22**	**86.0%**	**31.0%**	**11**				

[1] D.O. concent

[3] D.O. concent

[6] F= (Q) (BOD$_5$) (8.34).

[7] SRT = M / (S [illegible] + S [illegible]); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S [illegible] = (Flow) (TSS [illegible]) (8.34) - - - - See pg. 20 of Field Guide

December, 2005

Riverhead Sewer District
Weekly Sample Sheet

Date	Day of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD$_5$	TSS	TKN	Ammonia	Alkalinity	D.O.[1]		D.O.[3]	MLSS at LWL	DO[1]	DO[2]	D.O.[3]	MLSS at LWL	WAS MLSS	Flow Rate[4]
		(in.)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Thu	11"	508	819,200	6.97	15.6		172		38.75					3617				3007	6120	123
2	Fri	11"	508	904,400	7.46	15.1		149		29.25					3057				3007	4840	123
3	Sat			790,000																	
4	Sun			748,700																	
5	Mon	11"	508	793,800	6.94	14.8		131		26.50					2990				3010	7900	123
6	Tue	11"	508	794,900	6.75	14.4	315	215	73.5	41.25					3063				3053	5140	123
7	Wed	11"	508	768,200	7.02	14.2		156		33.25					2990				2967	4800	123
8	Thu	11"	508	722,000	6.96	14.0		149		29.50					2993				2943	4849	123
9	Fri	11"	508	777,000	6.71	13.8		215		42.25	80				3023				3017	5840	123
10	Sat			850,600																	
11	Sun			786,600																	
12	Mon	11"	508	834,500	7.03	13.7		163		33.75					4023				3323	4567	123
13	Tue	11"	508	752,200	7.13	13.4	410	115	95.5	29.75					3257				3217	5330	123
14	Wed	11"	508	781,400	7.23	12.9		146		28.50					3013				3030	5190	123
15	Thu	11"	508	737,900	6.86	12.7		226		46.25					2953				3173	6670	123
16	Fri	11"	508	844,300	7.24	13.3		184		35.00					3153				3240	6840	123
17	Sat			807,600																	
18	Sun			750,800																	
19	Mon	11"	508	771,400	6.69	13.8		186		36.50					4190				3723	4850	123
20	Tue	11"	508	809,000	7.21	13.9	300	163	89.9	31.75					3197				3437	5300	123
21	Wed	11"	508	782,500	6.94	13.6		141		29.50											123
22	Thu	11"	508	771,300																	123
23	Fri	11"	508	793,600																	123
24	Sat			737,000																	
25	Sun			597,300																	
26	Mon	11"	508	686,300	H	O	L	I	D	A	Y										123
27	Tue	11"	508	800,000	7.05	14.1	340	135	65.7	26.75					2927				3013	4310	123
28	Wed	11"	508	758,800	6.93	13.9		160		29.50					3143				3130	6380	123
29	Thu	11"	508	729,900	7.04	14.3		109		24.00					3053				3010	4640	123
30	Fri	11"	508	738,900	7.01	14.4		115		26.25											123
31	Sat			756,200																	
Average				774,074	7.01	14.0	341	159	81.15	32.54	80				3214				3135	5504	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

December, 2005

Riverhead Sewer District
Weekly Sample Sheet

Date	Day of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen Nitrates	Nitrites	Ammonia	Total N [5]	Process Parameters System F / M Ratio [6]	System Sludge Age (SRT) [7]	SBR No. 1 30 Min. Settle Test	SBR No. 2	Effluent Turbitity	Notes / Comments / Observations Day	Night	Operator's Initials Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	Day	Night	Day	Night
1	Thu	7.03		6		5.1		2.75	7.85	0.141	21	69%	29%	11				ML
2	Fri	7.26		3		4.6		1.93	6.53	0.152	25			6				ML
3	Sat																	
4	Sun																	
5	Mon	7.04		5		4.7		1.03	5.73	0.154	15	72%		10		Grab Samples.		ML
6	Tue	6.96	2	6		5.0	0.10	0.94	6.04	0.151	24		30%	13		Press Running.		ML
7	Wed	7.03		4		5.1		0.92	6.02	0.155	25	76%	32%	9				ML
8	Thu	6.96		5		5.3		0.91	6.21	0.155	24	78%	29%	8				ML
9	Fri	6.84		3	60	5.0		1.01	6.01	0.153	21			11		Press Running.		ML
10	Sat																	
11	Sun																	
12	Mon	7.11		5		4.7		1.36	6.06	0.125	32			9		Grab Samples.		ML
13	Tue	6.96	2	3		5.1	0.10	1.14	6.34	0.142	24			5				ML
14	Wed	6.75		4		5.9		0.91	6.81					10				ML
15	Thu	6.94		5		6.2		0.90	7.10	0.150	17			12		Press Running.		ML
16	Fri	6.96		7		5.8		0.76	6.56	0.144	17			11				ML
17	Sat																	
18	Sun																	
19	Mon	6.94		12		5.3		1.94	7.24	0.116	26			16		Grab Samples.		ML
20	Tue	6.91	8	9		4.4	0.12	3.50	8.02	0.139	16			9				ML
21	Wed	7.03		6		4.0		4.75	8.75					11				ML
22	Thu								0.00									
23	Fri								0.00									
24	Sat																	
25	Sun																	
26	Mon	H	O	L	I	D	A	Y										
27	Tue	6.97	5	7		4.3		5.25	9.55	0.153	21			13		Grab Samples		ML
28	Wed	7.04		5		4.0		5.75	9.75	0.147	15			10				ML
29	Thu	7.11		9		4.6		6.25	10.85	0.152	18			14				ML
30	Fri	6.99		6		4.8		5.75	10.55					11				ML
31	Sat																	
Av		6.99	4	6	60	4.9		2.51	6.76	0.146	21	73.8%	30.0%	10				

[1] D.O. concent

[6] F= (Q) (BOD$_5$) (8.34).

[3] D.O. concentr [7] SRT = M / (S$_{eff}$ + S$_w$); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S$_{eff}$ = (Flow) (TSS$_{eff}$) (8.34) - - - - See pg. 20 of Field Guide

H2M
Month: January,2006

RIVERHEAD SEWER DISTRICT
ADVANCED WASTEWATER TREATMENT FACILITY
PROCESS LOG SHEET

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in.)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Sun			683,500																	
2	Mon	11"	508	700,200	H	O	L	I	D	A	Y										123
3	Tue	11"	508	835,200	6.97	13.7	280	149	40.5	30.25	100				2830				2923	6680	123
4	Wed	11"	508	845,200	7.06	13.3		156		31.75					3230				2827	4793	123
5	Thu	11"	508	834,000	6.94	13.6		221		46.75					2973				2940	5400	123
6	Fri	11"	508	862,500	7.05	13.4		164		32.50											123
7	Sat			827,500																	
8	Sun			735,700																	
9	Mon	11"	508	777,400	7.10	13.7		130		24.50					2833				2700	7620	123
10	Tue	11"	508	818,400	6.93	13.5	345	206	45.3	42.25					2853				2633	6560	123
11	Wed	11"	508	808,100	7.05	13.5		153		34.00					2890				2593	5000	123
12	Thu	11"	508	776,200	6.95	13.7		126		28.25					2767				2543	5260	123
13	Fri	11"	508	826,300	7.36	13.7		147		30.50					2800				2263	5950	123
14	Sat			804,800																	
15	Sun			696,200																	
16	Mon	11"	508	1,390,900	H	O	L	I	D	A	Y										123
17	Tue	11"	508	772,600	7.03	13.1	92	195	57	39.75					2873				2307	5620	123
18	Wed	11"	508	861,100	6.86	13.4		211		46.50					2850				2297	7350	123
19	Thu	11"	508	822,700	6.94	12.9		160		38.25					2847				2323	5710	123
20	Fri	11"	508	860,900	7.03	13.2		133		32.50					2897				3340	5650	123
21	Sat			793,100																	
22	Sun			737,300																	
23	Mon	11"	508	818,900	7.14	13.1		146		27.25					3457				2970	6790	123
24	Tue	11"	508	804,800	6.98	12.6	209	209	50.7	41.75					4397				2973	5440	123
25	Wed	11"	508	762,500	7.03	11.4		218		48.00					2997				3023	5307	123
26	Thu	11"	508	793,700	6.91	11.1		167		34.25					2997				2837	5490	123
27	Fri	11"	508	790,100																	123
28	Sat			796,900																	
29	Sun			712,000																	
30	Mon	11"	508	819,100	6.75	12.3		131		28.25					3527				3010	6070	123
31	Tue	11"	508	798,200	7.04	12.6		190		35.50					3473				3277	6010	123
Average				**811,806**	**7.01**	**13.0**	**232**	**169**	**48.38**	**35.41**	**100**				**3083**				**2766**	**5928**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

H2M

Month: January,2006

RIVERHEAD SEWER DISTRICT
ADVANCED WASTEWATER TREATMENT FACILITY
PROCESS LOG SHEET

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen Nitrates	Nitrites	Ammonia	Total N [5]	TKN	Process Parameters System F / M Ratio [6]	System Sludge Age (SRT) [7]	SBR No. 1 30 Min. Settle Test	SBR No. 2	Effluent Turbitity	Notes / Comments / Observations Day	Night	Oper Init Day
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	Day	Night	Day
1	Sun																	
2	Mon																	
3	Tue	7.03	4	6	60	5.9	0.150	5.50	11.40	3.01	0.160	12			10		Grab Samples.	
4	Wed	6.83		7		6.4		6.40	12.80		0.152	17			9			
5	Thu	6.94		9		6.6		4.00	10.60		0.156	15			11	Pressing		
6	Fri	7.00		8		6.3		4.50	10.80						10			
7	Sat																	
8	Sun																	
9	Mon	6.8		8		5.7		2.50	8.20		0.167	11			8		Grab Samples.	
10	Tue	6.96	2	6		5.9	0.38	2.00	8.28	2.36	0.168	13			9		Press Running.	
11	Wed	7.01		3		6.1		1.56	7.66		0.169	17			6			
12	Thu	6.86		3		5.8		1.55	7.35		0.174	15			5			
13	Fri	7.09		4		5.9		1.01	6.91		0.183	13			6			
14	Sat																	
15	Sun																	
16	Mon																	
17	Tue	6.95	5	3		5.3	0.1	1.46	6.86	2.67	0.178	15			5		Grab Samples.	
18	Wed	7.03		5		5.6		1.19	6.79		0.18	11			7		Press Running.	
19	Thu	6.96		4		5.4		1.06	6.46		0.179	16			6			
20	Fri	7.01		6		5.0		1.09	6.09		0.148	20			7			
21	Sat																	
22	Sun																	
23	Mon	6.93		7		5.5		0.93	6.43		0.144	17			11			
24	Tue	7.06	46	5		5.8	0.37	0.91	7.08	4.58	0.125	21			10		Press Running Today.	
25	Wed	6.93		6		5.3		1.15	6.45		0.154	18			13		Press Running Today.	
26	Thu	7.05		10		4.9		1.69	6.59		0.159	18			15		Press Running Today.	
27	Fri								0.00									
28	Sat																	
29	Sun																	
30	Mon	6.96		4		4.6		2.25	6.85		0.142	18			7		Grab Samples.	
31	Tue	7.11		5		5.1		1.96	7.06		0.137	19			6			
A		6.97	14	5.74	60	5.6	0.3	2.25	7.533	3.155	0.160	16	#DIV/0!	#DIV/0!	8			

[1] D.O. conce

[3] D.O. concen [7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

February; 2006

Riverhead Sewer District Daily Samples

Day	Day Of Week	Flow Rate at Gray Box Weir		Total Flow	GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Wed	11"	508	803,900	6.83	13.3	275	119	50.7	26.50	80				3247				2923	5450	123
2	Thu	11"	508	772,500	6.79	13.1		194		39.75					3327				2987	5570	123
3	Fri	11"	508	843,100	7.09	13.5		125		29.50					3770				3267	5860	123
4	Sat			832,400																	
5	Sun			818,400																	
6	Mon	11"	508	969,900	6.96	12.4		112		24.50					3163				2910	5520	123
7	Tue	11"	508	915,800	7.04	12.1	285	187	55.6	37.25					3103				2843	5360	123
8	Wed	11"	508	891,500	6.99	12.6		210		44.75					3043				2827	5400	123
9	Thu	11"	508	898,400	7.10	12.2		163		36.25					3087				2900	4960	123
10	Fri	11"	508	895,200	6.89	12.6		129		31.00					3037				3053	5550	123
11	Sat			851,300																	
12	Sun			750,000																	
13	Mon	11"	508	783,700	H	O	L	I	D	A	Y										123
14	Tue	11"	508	807,000	6.93	12.9	197	112	71.1	24.50					3243				2677	4990	123
15	Wed	11"	508	824,700	7.04	12.8		179		36.75					3250				3053	5680	123
16	Thu	11"	508	889,300	6.99	13.0		163		32.50					3297				3060	5660	123
17	Fri	11"	508	854,300	7.11	13.1		209		45.75					3240				3143	5910	123
18	Sat			824,700																	
19	Sun			707,500																	
20	Mon	11"	508	782,500	H	O	L	I	D	A	Y										123
21	Tue	11"	508	452,800	6.86	12.3	313	124	47.4	29.25					3080				2853	4050	123
22	Wed	11"	508	798,700	7.03	12.5		136		31.25					3027				2527	4730	123
23	Thu	11"	508	919,400	6.95	12.2		109		25.00					3060				2223	3370	123
24	Fri	11"	508	801,000	7.06	11.7		123		26.25					2923				2040	5380	123
25	Sat			835,100																	
26	Sun			714,200																	
27	Mon	11"	508	695,700	6.93	10.9		131		28.25					3273				2030	5500	123
28	Tue	11"	508	786,300	7.05	10.6	219	206	69.8	41.75					2787				1807	5310	123
29																					
30																					
31																					
Average				811,404	6.98	12.4	258	152	58.92	32.82					3164				2729	5236	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

February; 2006

Riverhead Sewer District Daily Samples

Day	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD_5 (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrites (mg/l)	Ammonia (mg/l)	Total N [5] (mg/l)	TKN (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	30 Min. Settle Test: SBR No. 1 (%)	SBR No. 2 (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations: Day	Night	Ope In: Day
1	Wed	6.69	24	6	60	3.9	0.34	5.75	9.99	6.58	0.150	17			11			
2	Thu	6.93		5		3.3		6.00	9.30		0.147	17			10		Press Running.	
3	Fri	7.01		7		4.8		6.50	11.30		0.131	18			8			
4	Sat																	
5	Sun																	
6	Mon	6.99		5		3.6		7.25	10.85		0.152	16			11		Grab Samples.	
7	Tue	7.11	20	3		3.9	0.30	6.00	10.20	6.41	0.155	16			10			
8	Wed	6.87		2		4.3		4.75	9.05		0.158	16			8			
9	Thu	7.04		3		3.9		5.5	9.40		0.155	18			7			
10	Fri	6.94		5		4.3		4.25	8.55		0.152	16			11			
11	Sat																	
12	Sun																	
13	Mon																	
14	Tue	7.03	17	5		4.7	0.28	5.25	10.23	2.09	0.157	19			10		Grab Samples.	
15	Wed	6.96		3		4.4		5.00	9.40		0.147	17			9			
16	Thu	6.93		5		4.6		4.25	8.85		0.146	18			11			
17	Fri	6.98		8		5.3		2.75	8.05		0.145	17			7		Press Running.	
18	Sat																	
19	Sun																	
20	Mon																	
21	Tue	7.01		6		5.5		1.09	6.59		0.157	23			10		Grab Samples.	
22	Wed	6.93	37	11		5.9	0.17	0.96	7.03	4.56	0.167	19			15			
23	Thu	7.10		9		5.2		1.08	6.28		0.176	15			13			
24	Fri	7.00		6		4.5		0.85	5.35		0.187	16			11			
25	Sat																	
26	Sun																	
27	Mon	7.04		8		4.3		1.03	5.33		0.176	19			13		Grab Samples.	
28	Tue	6.93	14	6		4.1	0.56	1.96	6.62	8.07	0.202	17			15		Press Running.	
29																		
30																		
31																		
A		6.97	22	5.72		4.5	0.33	3.90	8.47	5.54	0.159	17	#DIV/0!	#DIV/0!	11	* O.R. = Over Range on test meter.		

[1] D.O. concen

[6] F= (Q) (BOD_5) (8.34).

[3] D.O. concent [7] SRT = M / $(S_{eff} + S_w)$; where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

March, 2006

Riverhead Sewer District Daily Sample Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. 1	D.O. 2	D.O. 3	MLSS at LWL	D.O. 1	D.O. 2	D.O. 3	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Wed	11.5"	568	754,100	7.14	11.4		163		30.25	100				2793				1830	5160	123
2	Thu	11.5"	568	802,400	6.94	11.2		200		40.75					2830				1907	4170	123
3	Fri	11.5"	568	832,300	7.09	11.3		209		42.00					2867				1903	3610	123
4	Sat			680,900																	
5	Sun			718,400																	
6	Mon	11.5"	568	792,800	6.93	11.9		121		29.25					3290				2463	5560	123
7	Tue	11.5"	568	775,200	7.08	12.5	250	196	69	39.50					3287				2420	4250	123
8	Wed	11.5"	568	814,200	7.14	12.3		135		28.00					3213				2643	5150	123
9	Thu	11.5"	568	756,300	7.09	12.5		193		42.75					3133				2783	4930	123
10	Fri	11.5"	568	832,400	7.03	13.4		140		32.50					3237				2697	4450	123
11	Sat			813,900																	
12	Sun			754,100																	
13	Mon	11.5"	568	798,700	6.86	13.7		119		26.50					2990				2913	4880	123
14	Tue	11.5"	568	793,600	7.06	13.9		203		39.25					2790				2787	5350	123
15	Wed	11.5"	568	788,200	6.91	13.4		140		32.75	120				2793				2857	6030	123
16	Thu	11.5"	568	734,700	7.09	13.2		191		43.50					3067				3023	5010	123
17	Fri	11.5"	568	735,100																	123
18	Sat			754,800																	
19	Sun			649,800																	
20	Mon	11.5"	568	761,900	7.11	13.6		133		30.25					2977				2827	4980	123
21	Tue	11.5"	568	792,000	6.89	13.4		165		32.00					2930				2923	4590	123
22	Wed	11.5"	568	777,500	7.06	12.9		176		34.75					3107				3123	5830	123
23	Thu	11.5"	568	753,300	6.93	13.4		130		29.50					3137				2950	3250	123
24	Fri	11.5"	568	775,600	7.12	13.9		173		45.50					3097				3060	5510	123
25	Sat			794,800																	
26	Sun			687,800																	
27	Mon	11.5"	568	796,800	6.94	13.8		160		32.75					3323				3230	5700	123
28	Tue	11.5"	568	773,000	7.04	14.1		113		27.75					3343				3093	8,000	123
29	Wed	11.5"	568	769,100	7.15	14.5		196		41.75					3077				2973	4660	123
30	Thu	11.5"	568	777,100	7.06	14.7		204		44.50					2920				2913	5280	123
31	Fri	11.5"	568	880,700	6.95	14.6		136		31.50											123
Average				771,661	7.03	13.2	250	163	69.00	35.33	110				3057				2729	5064	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of a "blowers on" aeration period during *React Phase* (range 2 - 4 mg/l).

[3] D.O. concentration at the end of a "blowers off "aeration period during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

March, 2006

Riverhead Sewer District Daily Sample Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrogen: Nitrites (mg/l)	Nitrogen: Ammonia (mg/l)	Nitrogen: Total N [5] (mg/l)	Nitrogen: TKN (mg/l)	Process Parameters: System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations: Day	Notes / Comments / Observations: Night	Operator's Initials
1	Wed	6.91		10	60	6.0		2.58	8.58		0.201	17			15			ML
2	Thu	6.93		9		6.3		2.67	8.97		0.196	22			13		Press Running.	ML
3	Fri	7.06		6		5.9		2.81	8.71		0.195	27			10		Press Running.	ML
4	Sat																	
5	Sun																	
6	Mon	7.03		6		5.1		2.63	7.73		0.161	21			12		Grab Samples	ML
7	Tue	7.11	31	9		5.3	0.34	2.49	8.13	9.60					15			ML
8	Wed	7.09		4		5.6		2.03	7.63		0.159	22			10			ML
9	Thu	6.93		10		5.6		3.75	9.35		0.157	22			15		Press Running.	ML
10	Fri	6.99		5		4.9		5.25	10.15		0.156	24			11			ML
11	Sat																	
12	Sun																	
13	Mon	7.03		8		4.6		6.00	10.60		0.157	22			14			ML
14	Tue	6.96		9		4.8		5.58	10.38		0.166	19			12		Press Running today.	ML
15	Wed	6.98		7	100	4.5		6.25	10.75		0.164	15			13			ML
16	Thu	6.93		5		4.9		5.00	9.90		0.152	19			14		Press Running today.	ML
17	Fri								0.00									
18	Sat																	
19	Sun																	
20	Mon	6.86		19		7.7		2.75	10.45		0.160	16			31		Grab Samples.	ML
21	Tue	6.91		9		6.5		3.25	9.75		0.159	18			16		Pressing / dayshift.	ML
22	Wed	7.03		5		6.7		2.15	8.85		0.149	15			10		Pressing / nightshift.	ML
23	Thu	6.96		6		6.3		1.96	8.26		0.152	26			10			ML
24	Fri	6.65		10		6.5		3.00	9.50		0.151	16			12		Pressing / Dayshift.	ML
25	Sat																	
26	Sun																	
27	Mon	6.96		6		6.9		4.50	11.40		0.141	15			15		Grab samples.	ML
28	Tue	7.06		7		7.1		5.25	12.35		0.144	10			13			ML
29	Wed	7.08		10		6.0		3.75	9.75		0.153	16			16		Pressing / Dayshift.	ML
30	Thu	7.01		5		5.6		3.25	8.85		0.159	14			11			ML
31	Fri	6.96		5		5.3		2.96	8.26						10			ML
		6.97	31	7.73	80	5.8	0.34	3.63	9.06		0.162	19	#DIV/0!	#DIV/0!	14			

[1] D.O. concen

*O. R. = Over Range on Test Meter.

[3] D.O. concent

[7] SRT = M / (S$_{eff}$ + S$_w$); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S$_{eff}$ = (Flow) (TSS$_{eff}$) (8.34) - - - - See pg. 20 of Field Guide

April, 2006

Riverhead Sewer District Daily Samples.

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR influent)							Reactor Contents								[illegible]	
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Sat			770,400																	
2	Sun			778,400																	
3	Mon	11.5"	568	803,200	6.95	14.5		123		26.50					3270				3100	5130	123
4	Tue	11.5"	568	817,100	7.03	14.1		191		41.50	140				3137				3097	5710	123
5	Wed	11.5"	568	768,800	7.10	14.3		140		30.50					3157				3200	5140	123
6	Thu	11.5"	568	820,100	6.94	14.2		110		25.75					3223				3117	5810	123
7	Fri	11.5"	568	788,000	7.05	13.9		125		27.75					3223				3117	5810	123
8	Sat			767,400																	
9	Sun			758,700																	
10	Mon	11.5"	568	804,500	6.91	14.5		113		25.00					3393				3433	5730	123
11	Tue	11.5"	568	800,000	6.94	16.1		266		37.50					3270				3003	5160	123
12	Wed	11.5"	568	752,200											3080				2967	5190	123
13	Thu	11.5"	568	792,300	7.03	16.3		159		31.50					3110				2933	5500	123
14	Fri	11.5"	568	776,500																	123
15	Sat			777,000																	
16	Sun			752,100																	
17	Mon	11.5"	568	772,800	6.93	16.6		141		29.75					2937				2803	5380	123
18	Tue	11.5"	568	841,400	6.96	17.5		248		38.75					2947				3053	4960	123
19	Wed	11.5"	568	813,700	7.28	18.0		329		51.75					3197				3360	5430	123
20	Thu	11.5"	568	751,100	7.08	19.7		358		57.25					3397				3320	5260	123
21	Fri	11.5"	568	788,500																	123
22	Sat			788,500																	
23	Sun			810,200																	
24	Mon	11.5"	568	861,700	7.16	17.4		227		35.75					3220				3280	4240	123
25	Tue	11.5"	568	822,100	6.57	15.8		206		35.75					3163				3123	5210	123
26	Wed	11.5"	568	775,600																	123
27	Thu	11.5"	568	805,200																	123
28	Fri	11.5"	568	791,000	6.96	17.1		193		37.50					3320				3220	5330	123
29	Sat			791,000																	
30	Sun			791,000																	
31																					
Average				791,017	6.99	16.0	#DIV/0!	195	#DIV/0!	35.50	140				3190				3133	5312	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of a" blowers on" aeration period during *React Phase* (range 2 - 4 mg/l)

[3] D.O. concentration at the end of a" Blowers off " aeration period during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

April, 2006

Riverhead Sewer District Daily Samples.

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD_5 (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen Nitrates (mg/l)	Nitrites (mg/l)	Ammonia (mg/l)	Total N [5] (mg/l)	TKN	Process Parameters System F / M Ratio [6] (mg/l)	System Sludge Age (SRT) [7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 (%)	Effluent Turbitity (FAU)	Notes / Comments / Observations Day	Night	Operator's Initials Day	Night
1	Sat																		
2	Sun																		
3	Mon	7.03		4		5.5		3.25	8.75		0.145	16			10		Grab Samples.		ML
4	Tue	7.11		3	100	4.9		2.86	7.76		0.149	15			8		Press Running Today.		ML
5	Wed	6.98		5		5.1		3.00	8.10		0.146	17			11				ML
6	Thu	6.96		3		4.8		2.15	6.95		0.147	15			9				ML
7	Fri	7.10		3		4.9		2.25	7.15		0.147	15			10				ML
8	Sat																		
9	Sun																		
10	Mon	7.03		6		5.3		3.25	8.55		0.136	16			9		Grab Samples.		ML
11	Tue	7.00		3		4.8		5.00	9.80						8				ML
12	Wed								0.00										
13	Thu	6.96		4		5.6		4.25	9.85						8				ML
14	Fri								0.00										
15	Sat																		
16	Sun																		
17	Mon	7.06		6		4.4		5.75	10.15		0.162	14			11		Grab Samples.		ML
18	Tue	6.88		4		3.1		0.75	3.85		0.155	17			7				BH/ML
19	Wed	6.98		4		3.5		2.42	5.92		0.142	17			7				BH/ML
20	Thu	7.12		5		4.3		2.40	6.70		0.138	17			10				BH/ML
21	Fri								0.00										
22	Sat																		
23	Sun																		
24	Mon	7.02		6		2.6		1.55	4.15						12				BH
25	Tue	7.01		3		3.4		1.94	5.34						7				BH
26	Wed								0.00										
27	Thu								0.00										
28	Fri	7.1		5		3.9		2.25	6.15		0.142	16			9		Grab Samples.		ML
29	Sat																		
30	Sun																		
31									0.00										
A		7.02	#DIV/0!	4	100	4.4	#DIV/0!	2.87	5.20	#DIV/0!	0.146	16	#DIV/0!	#DIV/0!	9				

[1] D.O. concen

[6] F= (Q) (BOD_5) (8.34).

[3] D.O. concent

[7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

May, 2006

Riverhead Sewer District
Daily Samples

Date	Day Of Week	Flow Rate at Gray Box Weir: Approx. Head (In)	Flow Rate at Gray Box Weir: Weir Flow (GPM)	Total Flow (GPD)	GRAY BOX (SBR Influent): pH (SU)	GRAY BOX (SBR Influent): Temp. (°C)	GRAY BOX (SBR Influent): BOD_5 (mg/l)	GRAY BOX (SBR Influent): TSS (mg/l)	GRAY BOX (SBR Influent): TKN (mg/l)	GRAY BOX (SBR Influent): Ammonia (mg/l)	GRAY BOX (SBR Influent): Alkalinity (mg/l)	Reactor Contents SBR No. 1: D.O. [1] (mg/l)	SBR No. 1: D.O. [2] (mg/L)	SBR No. 1: D.O. [3] (mg/L)	SBR No. 1: MLSS at LWL (mg/l)	Reactor Contents SBR No. 2: DO [1] (mg/l)	SBR No. 2: DO [2] (mg/L)	SBR No. 2: D.O. [3] (mg/L)	SBR No. 2: MLSS at LWL (mg/l)	WAS MLSS (mg/L)	Flow Rate [4] (gpm)
1	Mon	11"	508	743,500	6.93	16.7		204		38.50					4090				2963	3720	123
2	Tue	11"	508	847,400	7.04	17.0		224		41.75					2920				2843	5050	123
3	Wed	11"	508	846,900	7.16	18.1		273		53.75					3270				3213	5220	123
4	Thu	11"	508	812,000	7.11	17.6		195		40.25					3063				3213	5140	123
5	Fri	11"	508	827,100	7.05	18.4		286		48.00					3120				3200	5640	123
6	Sat			882,700																	
7	Sun			745,300																	
8	Mon	11"	508	817,500	6.94	17.9		241		41.25					3213				3287	5440	123
9	Tue	11"	508	796,600	7.00	18.0		263		55.00					3607				3693	5500	123
10	Wed	11"	508	826,500	6.93	17.6		230		51.75					3630				3653	5750	123
11	Thu	11"	508	830,900	7.10	17.9		246		53.25					3337				3630	5680	123
12	Fri	11"	508	827,600	7.08	18.2		168		38.75					3407				3670	6140	123
13	Sat			881,000																	
14	Sun			828,200																	
15	Mon	12"	632	904,100	6.93	18.3		203		41.50					2770				2963	5230	123
16	Tue	12"	632	996,800	7.19	18.2		224		44.50					3023				3463	5430	123
17	Wed	12"	632	889,100	7.14	18.4		246		54.50					3107				3513	5760	123
18	Thu	11"	508	882,300	7.06	18.4		272		50.00					3240				3593	6380	123
19	Fri	11"	508	948,100	7.21	18.5		209		43.25					2950				3253	5360	123
20	Sat			944,100																	123
21	Sun			822,900																	
22	Mon	11.5"	568	819,400	7.12	19.2		220		55.50					3090				3272	5560	123
23	Tue	11.5"	568	834,900	7.09	19.4		251		57.00					3413				3390	6180	123
24	Wed	11.5"	568	906,200	7.03	19.2		203		48.75					3413				3217	5670	123
25	Thu	11.5"	568	910,400	6.96	19.0		184		41.00					2787				3107	5,540	123
26	Fri	11.5"	568	938,900	6.84	19.4		206		32.00					3063				3347	6680	123
27	Sat			949,600																	
28	Sun			843,100																	
29	Mon	11.5"	568	861,800																	
30	Tue	11.5"	568	863,500	6.96	21.1		221		35.75					3363				3323	6440	123
31	Wed	11.5"	568	957,700	7.24	20.6		236		45.25					3557				3143	4970	123
Average				864,068	7.05	18.5	#DIV/0!	228	#DIV/0!	45.97	#DIV/0!				3247				3316	5567	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

May, 2006

Riverhead Sewer District
Daily Samples

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH (SU)	BOD$_5$ (mg/l)	TSS (mg/l)	Alkalinity (mg/l)	Nitrogen: Nitrates (mg/l)	Nitrites (mg/l)	Ammonia (mg/l)	Total N[5] (mg/l)	TKN (mg/l)	Process Parameters: System F / M Ratio[6] (mg/l)	System Sludge Age (SRT)[7] (days)	SBR No. 1 30 Min. Settle Test (%)	SBR No. 2 30 Min. Settle Test (%)	Effluent Turbidity (FAU)	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
1	Mon	7.01		6		4.1		2.05	6.15		0.132	24			12		Grab Samples.		ML
2	Tue	7.04		3		4.8		3.50	8.30		0.162	14			4				ML
3	Wed	7.17		6		3.8		2.47	6.27		0.143	17			7				BH
4	Thu	7.03		4		3.0		9.00	12.00						9				ML
5	Fri	7.10		7		4.5		8.50	13.00						8				
6	Sat																		
7	Sun																		
8	Mon	7.04		12		4.1		8.75	12.85		0.143	16			16		Grab Samples.		ML
9	Tue	6.99		6		5.8		5.75	11.55		0.128	18			9				BH
10	Wed	7.03		10		5.1		6.50	11.60		0.128	16			13				ML
11	Thu	7.07		5		5.0		5.00	10.00		0.134	15			11				ML
12	Fri	7.04		6		5.6		4.00	9.60		0.132	14			8				BH
13	Sat																		
14	Sun																		
15	Mon	6.83		27		5.6		7.25	12.85		0.162	14			36		Grab Samples.		ML
16	Tue	6.97		5		4.8		6.25	11.05		0.144	15			10				BH
17	Wed	6.98		8		5.3		3.50	8.80		0.141	15			10		Press Running Today.		ML
18	Thu	6.97		2		5.5		2.25	7.75		0.136	14			9		Press Running Today.		BH
19	Fri	7.21		4		5.1		1.50	6.60						7				ML
20	Sat																		
21	Sun																		
22	Mon	6.91		8		4.3		7.25	11.55		0.146	15			20				BH
23	Tue	7.03		9		4.9		5.25	10.15		0.136	15			17		Press Running Today.		ML
24	Wed	6.86		7		6.7		4.00	10.70		0.142	15			13				BH
25	Thu	6.93		8		5.6		4.75	10.35		0.159	13			15				ML
26	Fri	6.91		6		5.8		4.50	10.30		0.146	12			11				
27	Sat																		
28	Sun																		
29	Mon																		
30	Tue	6.83		8		3.4		6.50	9.90		0.140	15			17		Grab Samples.		BH
31	Wed	6.93		8		5.3		2.75	8.05		0.140	19			8		Press Running Today.		ML
Av		**6.99**	**#DIV/0!**	**7.50**	**#DIV/0!**	**4.9**	**#DIV/0!**	**5.06**	**9.97**	**#DIV/0!**	**0.142**	**16**	**#DIV/0!**	**#DIV/0!**	**12**				

[1] D.O. concent

[6] F= (Q) (BOD_5) (8.34).

[3] D.O. concentr

[7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

JUNE; 2006

SBR Daily Samples

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents									
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(gpm)
1	Thu	11.5"	568	874,700	6.98	21.2		244		50.00					4337				3630	5740	123
2	Fri	11.5"	568	938,300	7.00	21.5		267		55.75					3340				3357	5730	123
3	Sat			885,800																	123
4	Sun			849,900																	123
5	Mon	11.5"	568	954,700	6.85	20.1		191		58.25					2800				3557	5030	123
6	Tue	11.5"	568	978,500	6.84	21.0		211		36.00					2780				3173	6080	123
7	Wed	11.5"	568	1,152,700	7.07	19.5		179		29.00					2533				3037	5220	123
8	Thu	11.5"	568	1,067,000	7.09	20.1		187		49.25					2870				3130	6150	123
9	Fri	11.5"	568	1,115,200	7.16	22.1		171		33.25					3070				2850	5640	123
10	Sat			1,057,700																	123
11	Sun			922,600																	
12	Mon	11.5"	568	948,300	6.91	20.7		146		33.50					2473				2667	5680	
13	Tue	11.5"	568	966,800	7.01	21.0		172		48.75					2690				2890	4670	123
14	Wed	11.5"	568	986,700	7.14	21.4		193		51.25					2497				2303	6980	123
15	Thu	11.5"	568	1,000,900	6.95	22.3		215		54.75					2447				2627	5770	123
16	Fri	11.5"	568	1,005,000	6.75	22.2		166		40.50					2843				2850	5760	123
17	Sat			992,300																	123
18	Sun			847,600																	
19	Mon	11.5"	568	942,800	7.03	23.0		232		22.50					2630				2840	5650	
20	Tue	11.5"	568	920,200	7.09	22.4		193		42.50					2470				2780	5860	123
21	Wed	11.5"	568	957,900	7.04	23.0		269		41.75					2387				2553	5370	123
22	Thu	11.5"	568	939,200	6.93	23.1		215		45.25					2567				2697	6620	123
23	Fri	11.5"	568	981,600	6.98	23.0		170		47.00					3007				3133	5750	123
24	Sat			1,125,700																	123
25	Sun			1,090,000																	
26	Mon	11.5"	568	1,105,000	6.88	22.8		141		31.50					2743				2650	5910	123
27	Tue	11.5"	568	1,060,600	6.93	23.1		207		45.50					2727				2687	5900	123
28	Wed	11.5"	568	1,034,000	7.02	22.9		226		51.75					2523				2700	6350	123
29	Thu	11.5"	568		7.03	22.2		203		50.00					2803				2753	5990	123
30	Fri	11.5"	568																		123
31																					
Average				989,346	6.98	21.8	#DIV/0!	200	#DIV/0!	43.71	#DIV/0!				2787				2898	5802	123

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "off") during *React Phase (near zero)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

JUNE; 2006

SBR Daily Samples

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD$_5$	TSS	Alkalinity	Nitrogen: Nitrates	Nitrites	Ammonia	Total N[5]	TKN	Process Parameters: System F / M Ratio[6]	System Sludge Age (SRT)[7]	30 Min. Settle Test: SBR No. 1	SBR No. 2	Effluent Turbidity	Notes / Comments / Observations: Day	Night	Operator's Initials: Day	Night
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	Day	Night	Day	Night
1	Thu	6.87		7		6.1		8.00	14.10		0.117	19			11	Press Running Today.			BH
2	Fri	6.53		9		4.9		2.50	7.40		0.139	16			7	Press Running today.			ML
3	Sat								0.00										
4	Sun								0.00										
5	Mon	6.81		7		5.3		3.25	8.55						11				BH
6	Tue	7.01		4		5.5		3.00	8.50						7				BH
7	Wed	6.92		4		4.4		1.75	6.15		0.167	15			8				BH
8	Thu	6.95		3		6.6		3.75	10.35		0.168	14			4				BH
9	Fri	6.94		3		5.6		2.75	8.35		0.158	16			7				BH
10	Sat								0.00										
11	Sun								0.00										
12	Mon	6.70		8		4.8		0.52	5.32		0.182	14			13		Grab Samples.		ML
13	Tue	7.04		4		5.0		3.25	8.25		0.167	19			6				BH
14	Wed	6.94		3		4.6		1.93	6.53		0.195	11			7		Press Running Today.		ML
15	Thu	7.03		3		5.1		1.06	6.16		0.184	14			5		Press Running Today.		ML
16	Fri	6.75		1		4.3		0.93	5.23		0.164	15			5				ML
17	Sat								0.00										
18	Sun								0.00										
19	Mon	6.82		6		5.8		0.83	6.63		0.171	14			12		Grab Samples.		BH
20	Tue	7.06		4		4.5		1.15	5.65		0.178	13			6				ML
21	Wed	6.94		3		6.2		1.65	7.85						5		Press Ran Today.		BH
22	Thu	6.86		4		6.7		1.52	8.22		0.177	12			7		Press Ran Today.		ML
23	Fri	6.92		5		5.2		1.90	7.10		0.152	17			2				ML
24	Sat								0.00										
25	Sun								0.00										
26	Mon	6.62		5		4.5		0.80	5.30		0.173	15			13		Grab Samples.		ML
27	Tue	6.85		4		5.1		1.13	6.23		0.173	27			12				ML
28	Wed	6.81		1		5.6		1.30	6.90		0.180	13			2				ML
29	Thu	7.01		1		6.3		2.41	8.71		0.169	15			4		Press Run Today.		BH
30	Fri								0.00										
31									0.0										
A		**6.88**	**#DIV/0!**	**4.24**	**#DIV/0!**	**5.3**	**#DIV/0!**	**2.16**	**5.08**		**0.167**	**16**	**#DIV/0!**	**#DIV/0!**	**7**				

[1] D.O. concentr

[3] D.O. concentr

[6] F= (Q) (BOD_5) (8.34).

[7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

July; 2006

Riverhead Sewer District
Daily Sampe Sheet

Date	Day Of Week	Flow Rate at Gray Box Weir			GRAY BOX (SBR Influent)							Reactor Contents								[redacted]	
												SBR No. 1				SBR No. 2					
		Approx. Head	Weir Flow	Total Flow	pH	Temp.	BOD_5	TSS	TKN	Ammonia	Alkalinity	D.O. [1]	D.O. [2]	D.O. [3]	MLSS at LWL	DO [1]	DO [2]	D.O. [3]	MLSS at LWL	WAS MLSS	Flow Rate [4]
		(in)	(GPM)	(GPD)	(SU)	(°C)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/l)	(mg/L)	(gpm)
1	Sat			985,900																	123
2	Sun			920,900																	
3	Mon	11.5"	568	1,015,400	7.01	23.9		231		35.25					2600				2750	2885	
4	Tue	11.5"	568	878,800	H	O	L	I	D	A	Y										123
5	Wed	11.5"	568	969,200	6.90	23.3		181		54.25					2473				2670	2870	123
6	Thu	11.5"	568	1,105,900	6.89	22.3		182		51.00					2423				2710	2665	123
7	Fri	11.5"	568	1,069,300	7.00	23.4		173		44.75					2430				2637	3045	123
8	Sat			1,010,400																	123
9	Sun			969,900																	
10	Mon	11.5"	568	978,500	6.86	23.4		201		49.50					2337				2570	3155	
11	Tue	11.5"	568	896,800	6.8	23.2		201		38.25					2277				2633	2560	123
12	Wed	11.5"	568	997,800	6.93	23.9		230		34.50					2390				2743		123
13	Thu	11.5"	568	1,218,100	6.96	23.2		194		36.75					2607				2587	3150	123
14	Fri	11.5"	568	1,218,100	7.10	24.1		182		51.50					2490				2900	3020	123
15	Sat			1,218,100																	123
16	Sun			1,218,100																	
17	Mon	11.5"	568	1,218,100	6.91	24.7		194		33.00											
18	Tue	11.5"	568	1,218,100											2903				3323	5910	123
19	Wed	11.5"	568	1,218,100	7.04	25.1		183		28.50					2827				3017	5120	123
20	Thu	11.5"	568	823,300	6.92	24.6		190		53.75					3140				3313	6310	123
21	Fri	11.5"	568	988,200	7.08	24.9		194		49.50					3160				3147	5820	123
22	Sat			946,100																	123
23	Sun			900,700																	
24	Mon	11.5"	568	972,500											3200				3273	5770	
25	Tue	11.5"	568	942,800	7.08	24.1		240		59.25					2797				3267	6340	123
26	Wed	11.5"	568	947,600	7.02	24.9		226		51.50					2903				3497	6320	123
27	Thu	11.5"	568	851,500	7.11	24.6		186		33.50					3310				3533	6290	123
28	Fri	11.5"	568	886,700	7.12	25.2		141		29.75					3323				2840	5040	123
29	Sat			929,700																	123
30	Sun			814,900																	
31	Mon	11.5"	568		6.96	26.6		215		48.50					3087				3163	5240	123
Average				**1,010,983**	**6.98**	**24.2**	**#DIV/0!**	**197**	**#DIV/0!**	**43.50**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**2772**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**2978**	**4528**	**123**

[1] D.O. concentration 5 min. into the start of the *Mix Fill Phase* (Range = .5 to 1.5 mg/l)

[2] D.O. concentration at the end of an aeration period during *React Fill Phase* (blowers "on") (range 2 - 4 mg/l)

[3] D.O. concentration at the end of an aeration period (blowers "on") during *React Phase (2 - 4 mg/l)*

[4] Flow =123 gpm default wasting rate (weir at Brown Box)

July; 2006

Riverhead Sewer District
Daily Sampe Sheet

Date	Day Of Week	BLUE BOX (SBR Decanted Effluent) pH	BOD5	TSS	Alkalinity	Nitrogen: Nitrates	Nitrogen: Nitrites	Nitrogen: Ammonia	Nitrogen: Total N [5]	Nitrogen: TKN	Process Parameters: System F / M Ratio [6]	Process Parameters: System Sludge Age (SRT) [7]	Process Parameters: SBR No. 1 30 Min. Settle Test	Process Parameters: SBR No. 2 30 Min. Settle Test	Effluent Turbitity	Notes / Comments / Observations		Operator's Initials	
		(SU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(days)	(%)	(%)	(FAU)	*Day*	*Night*	*Day*	*Night*
1	Sat																		
2	Sun																		
3	Mon	6.82		6		3.6		0.84	4.44						6		GRAB SAMPLE		BH
4	Tue	H	O	L	I	D	A	Y											
5	Wed	6.78		3		6.3		0.78	7.08						7	PRESS RUNNING	GRAB SAMPLE		BH
6	Thu	6.93		1		4.4		0.78	5.18						3	PRESS RUN NOT ALL DAY			BH
7	Fri	6.93		3		5.5		0.66	6.16						7	GBT			BH
8	Sat																		
9	Sun																		
10	Mon	6.85		7		4.8		2.36	7.16						11	gbt	GRAB SAMPLE		BH
11	Tue	6.83		4		4.6		1.4	6.00						6	press running			
12	Wed	6.95		2		5.7		9.00	14.70						6	gbt running all day			BH
13	Thu	6.89		3		5.7		1.85	7.55						7				BH
14	Fri	6.99		6		4.6		0.6	5.20						9	press running			BH
15	Sat																		
16	Sun																		
17	Mon	7.05		7		3.7		11.75	15.45		0.174	20					grab sample		BH
18	Tue								0.00		0.152	24				No Samples; Unable to use Lab Room.			ML
19	Wed	7.20		3		4.1		7.00	11.10		0.162	25			15				ML
20	Thu	7.18		3		4.0		8.25	12.25		0.147	21			5				BH
21	Fri	7.00		1		3.9		4.50	8.40		0.150	18			2				ML
22	Sat																		
23	Sun																		
24	Mon								0.00		0.147	18							
25	Tue	7.18		9		3.9		8.50	12.40						6	press running			BH
26	Wed	7.23		5		4.2		6.50	10.70		0.207	16			5				ML
27	Thu	7.23		4		3.6		11.00	14.60		0.193	18			9	Press Running.			BH
28	Fri	7.19		5		4.0		6.25	10.25						10				ML
29	Sat																		
30	Sun																		
31	Mon	7.06		7		3.7		7.75	11.45		0.212	19			14		Grab Samples.		ML
Av		**7.02**	**#DIV/0!**	**4.39**	**#DIV/0!**	**4.5**	**#DIV/0!**	**4.99**	**8.50**	**#DIV/0!**	**0.172**	**20**	**#DIV/0!**	**#DIV/0!**	**8**				

[1] D.O. concentra

[6] F= (Q) (BOD_5) (8.34).

[3] D.O. concentrat

[7] SRT = M / (S_{eff} + S_w); where M = (Volume) (MLSS) (8.34) and Volume is at 16.8 ft (low water level) = 0.561 MG; S_{eff} = (Flow) (TSS_{eff}) (8.34) - - - - See pg. 20 of Field Guide

Appendix E

***Impacts of Future Connections to District's Sewer System*, Malcolm Pirnie, February 26, 1996**

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

February 26, 1996

Mr. James Stark
Supervisor
Town of Riverhead
200 Howell Avenue
Riverhead, NY 11901

Re: Impacts of Future Connections to District's Sewer System

Dear Mr. Stark:

We have completed the Map and Plan assessing the impacts to the District related to the proposed connection of Tanger II. The existing gravity sewer system and pump stations should handle the additional flows from Tanger Outlet II without incident, as stated in the Map and Plan for that project. However, many parts of the system may be operating at or near their capacity. For this reason, there are a number of tasks which should be considered in light of this and future petitions to connect to the District.

1. Further Flow Measurement and Verification

Our calculations for preparing the Map and Plan for Tanger Outlet II were based on a limited amount of data. The capacities of the gravity sewers are rough estimates largely based on a 1969 map of the Sewer District. The existing flow measurements are calculated from daily pump run times and pump pressure readings. More accurate information about the peak flows and capacities in the affected areas could be obtained through the installation of flow meters and measurement of manhole invert elevations.

2. System Maintenance

Overall the gravity sewers and pump stations are maintained in excellent condition. However, in order to provide the optimum flow conditions, it is recommended that several manholes and sewer lines be flushed out prior to connection of the force main. The Osborne Avenue sewer lines currently have a very low flow. Because this area will see the greatest increase in flow due to the Tanger II connection, it is recommended that all manholes and lines from Manhole #340 to Manhole #336 be cleaned. If possible, additional cleaning should be done for Manholes 428, 320, and 319.

2. System Improvements

As shown in the attached sheets, the Tanger II flows will cause additional cycling of the pumps at both the Cranberry Street and Howell Avenue pump stations. This additional cycling of the pumps will contribute to shortening their useful life. Therefore, the

104 CORPORATE PARK DRIVE BOX 751 WHITE PLAINS, NY 10602-0751 914-694-2100 FAX 914-694-9286

installation of variable speed drives, allowing the pumps to run constantly and increasing their lifespan, should be investigated.

The installation of variable speed drives will also lessen the chances of the gravity sewer system from becoming surcharged. The current pump cycling of the Cranberry Street pump station causes surges in the gravity sewer system along Elton Street approximately every 5 minutes. The longer pump run times which could be achieved with variable speed drives will reduce the magnitude and frequency of these surges.

If future flows projected for out-of-District connections exceed the capacity of the current pumps, it may be necessary to install additional pumps and/or wet wells. Sections of the gravity sewer system also may need to be replaced or relined.

I have included our calculations on pump station flows, pump cycle times, and capacities of the gravity sewers. As you can see, Tanger Outlet I and any future additions may exceed the systems' capacity.

As a final note, the force main will be designed for both Tanger I & II flows and some additional capacity. However, we do not have any information on flow projections from other petitioners or potential petitioners along the new sewer extension. When these petitions and flow information are received, impacts on the Sewer District, including this new extension, will then be revaluated.

We anticipate that this report meets your needs. If you have any questions or require additional information please feel free to contact us.

Very truly yours,

MALCOLM PIRNIE, INC.

Miles V. Moffatt

Miles Moffatt, P.E.
Project Manager

attachments

c: D. Goodfriend
P. Lundberg
M. Reichel
K. Testa

MALCOLM PIRNIE

Impacts of Tanger I & II Proposed Flows on Existing Gravity Sewer System

Flow Length From Manhole	Flow Length To Manhole	Existing Peak Flow (mgd)	Existing & Tanger II Peak Flow (mgd)	Existing & Tanger I & II Peak Flow (mgd)	Capacity of Flow Length (mgd)	Existing & Tanger II Percent of Capacity	Existing & Tanger I & II Percent of Capacity
340	339						
339	338	0.04	0.27	0.40	0.54	49%	74%
338	337	0.04	0.27	0.40	0.38	70%	106%
337	336	0.04	0.27	0.40	0.69	38%	58%
336	428	0.07	0.30	0.43	1.06	28%	41%
428	320	0.07	0.30	0.43	0.38	78%	114%
320	319	0.14	0.37	0.50	0.54	68%	92%
319	318	0.14	0.37	0.50	0.60	62%	84%
318	453	0.21	0.44	0.57	0.82	53%	70%
453	452	0.21	0.44	0.57	0.84	52%	68%
452	451	0.21	0.44	0.57	3.20	14%	18%
451	450	0.21	0.44	0.57	0.83	53%	69%
450	449	0.21	0.44	0.57	0.83	52%	69%
449	448	0.21	0.44	0.57	0.82	53%	69%
448	Cran	0.21	0.44	0.57	3.72	12%	15%
Cran	183	0.42	0.65	0.78	Force Main		
183	274	0.445	0.67	0.81	0.91	74%	89%
274	273	0.445	0.67	0.81	0.90	75%	90%
273	272	0.445	0.67	0.81	0.90	75%	90%
272	271	0.445	0.67	0.81	1.71	39%	47%
271	270	0.445	0.67	0.81	0.97	69%	83%
270	269	0.445	0.67	0.81	1.10	61%	73%
269	268	0.445	0.67	0.81	1.71	39%	47%
268	267	0.545	0.77	0.91	1.13	68%	80%
267	266	0.545	0.77	0.91	1.13	68%	80%
266	265	0.545	0.77	0.91	1.17	66%	77%
265	264	0.57	0.80	0.93	1.19	67%	78%
264	263	0.57	0.80	0.93	1.15	69%	81%
263	262	0.595	0.82	0.96	1.22	67%	78%
262	Howell	0.595	0.82	0.96	1.11	74%	86%
					Average	57%	72%
					Highest	78%	114%
					Lowest	12%	15%

Proposed Tanger peak flows are based on a 10 hr day and a peaking factor of 4.
A peaking factor of 2 is applied to the existing flows in the sewer system.
(As explained in Attachment B.1 of the Tanger Map and Plan)

The distribution of the existing flows through the sewer sytem are based on the length of the subsection and approximations of the population density.

It is assummed that all flow for a given subsection is input at the beginning of the flow length.

Shaded numbers indicate exceedances of the gravity collection system. These specific lines should be field investigated.

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Tanger Outlet II Flow Impact on Pump Stations

Cranberry Street Pump Station

Pump Capacity :	3 pumps each designed for 415 gpm at 37 ft TH		
Wet Well Volume :	Lead On/Off : 583 gal	Lag On-Lead/LagOff :	898 gal
Average Flow for Jan '96 :	0.21 mgd	Highest Flow for Jan '96 :	0.27 mgd

Howell Avenue Pump Station

Pump Capacity :	3 pumps each designed for 500 gpm at 39 ft TH		
Wet Well Volume :	Lead On/Off : 763 gal	Lag On-Lead/LagOff :	1190 gal
Average Flow for Jan '96 :	0.31 mgd	Highest Flow for Jan '96 :	0.39 mgd

Tanger Outlet Center II

Pump Capacity :	3 pumps each designed for 125 gpm		
24 hr Average Flow :	0.024 mgd	Peak Flow :	0.227 mgd
Note :	Peak flow is based on 10 hr day and peaking factor of 4		

Average Flow Impacts

Station	Condition	Flow (gpm)	# of Pumps Running	Cycle Time (min)	Cycles per hour
Cranberry	Present	146	1	6.16	9.74
	Proposed	162	1	5.90	10.16
Howell	Present	215	1	6.23	9.64
	Proposed	231	1	6.14	9.77

Peak Flow Impacts

Station	Peaking Factor	Condition	Flow (gpm)	# of Pumps Running	Cycle Time (min)	Cycles per hour
Cranberry	2	Present	292	1	6.74	8.91
		Proposed	450	2	4.36	13.77
	3	Present	438	2	4.34	13.82
		Proposed	596	2	5.34	11.23
	4	Present	584	2	5.19	11.56
		Proposed	742	2	11.41	5.26
Howell	2	Present	430	1	12.67	4.73
		Proposed	588	2	4.91	12.21
	3	Present	645	2	5.20	11.54
		Proposed	803	2	7.52	7.98
	4	Present	860	2	9.88	6.07
		Proposed	1018	2	-64.94	-0.92

Note: Negative cycle times indicate inflow is greater than the capacity of the 2 pumps. These are the cases where additional wet well space may be necessary.

Peaking factors of 2, 3, or 4 are only applied to existing average flows

Cycle Time Formula

$$CT = \frac{V}{D - Q} + \frac{V}{Q}$$

V = Wet Well Volume (gal)
D = Design Pump Capacity (gpm)
Q = Wet Well Inflow (gpm)
CT = Cycle Time (min)

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Cranberry Street Pump Station - January 1996 Flows

Pump	#1	#2	#3
Pressure (psi)	18	21	19
Total Head (ft)	41.58	48.51	43.89
Average Flow (gpm)	335	425	395

Pump Run Times (hours)

Date	Pump #1 Cum	Pump #1 Daily	Pump #2 Cum	Pump #2 Daily	Pump #3 Cum	Pump #3 Daily	Total Flow (mgd)	Comments
1-Jan	313.19		669.12		705.38		0	
2-Jan	316.44	3.25	673.21	4.09	705.38	0.00	0.170	#3 - Off
3-Jan	319.09	2.65	676.48	3.27	707.96	2.58	0.198	
4-Jan	321.31	2.22	679.37	2.89	711.05	3.09	0.192	
5-Jan	323.86	2.55	682.09	2.72	714.22	3.17	0.196	
6-Jan	326.11	2.25	685.11	3.02	717.75	3.53	0.206	
7-Jan	328.39	2.28	688	2.89	721.11	3.36	0.199	
8-Jan	330.48	2.09	690.65	2.65	724.19	3.08	0.183	
9-Jan	332.32	1.84	692.4	1.75	726.22	2.03	0.130	
10-Jan	334.55	2.23	694.96	2.56	728.74	2.52	0.170	
11-Jan	337.14	2.59	698	3.04	731.97	3.23	0.206	
12-Jan	339.7	2.56	700.89	2.89	734.96	2.99	0.196	
13-Jan	342.75	3.05	704.13	3.24	738.52	3.56	0.228	
14-Jan	345.09	2.34	706.92	2.79	741.56	3.04	0.190	
15-Jan	347.5	2.41	709.66	2.74	744.5	2.94	0.188	
16-Jan	349.71	2.21	714.4	4.74	747.62	3.12	0.239	
17-Jan	352.03	2.32	718.39	3.99	751.09	3.47	0.231	
18-Jan	354.38	2.35	722.5	4.11	754.24	3.15	0.227	
19-Jan	356.65	2.27	726.88	4.38	757.28	3.04	0.229	
20-Jan	359.22	2.57	732.3	5.42	760.79	3.51	0.273	
21-Jan	361.65	2.43	737.96	5.66	763.9	3.11	0.267	
22-Jan	364.23	2.58	742.67	4.71	766.99	3.09	0.245	
23-Jan	366.95	2.72	746.38	3.71	770.18	3.19	0.225	
24-Jan	369.78	2.83	749.9	3.52	773.04	2.86	0.214	
25-Jan	372.54	2.76	753.1	3.20	776.72	3.68	0.224	
26-Jan	375.39	2.85	756.81	3.71	779.9	3.18	0.227	
27-Jan	377.95	2.56	760.1	3.29	783.04	3.14	0.210	
28-Jan	380.93	2.98	764.06	3.96	786.73	3.69	0.248	
29-Jan	383.3	2.37	767.14	3.08	790.11	3.38	0.206	
30-Jan	386.2	2.90	770.75	3.61	794	3.89	0.243	
31-Jan	388.92	2.72	774.39	3.64	797.18	3.18	0.223	
Monthly Average		2.52		3.51		3.06	0.21	
Monthly High		3.25		5.66		3.89	0.27	

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Cranberry Street Pump Station - February 1996 Flows

Pump	#1	#2	#3
Pressure (psi)	18	21	19
Total Head (ft)	41.58	48.51	43.89
Average Flow (gpm)	335	425	395

Pump Run Times (hours)

Date	Pump #1 Cum	Pump #1 Daily	Pump #2 Cum	Pump #2 Daily	Pump #3 Cum	Pump #3 Daily	Total Flow (mgd)	Comments
1-Feb	391.71	2.79	778.01	3.62	800.61	3.43	0.230	
2-Feb	394.17	2.46	781.99	3.98	803.54	2.93	0.220	
3-Feb	396.94	2.77	785.59	3.60	806.91	3.37	0.227	
4-Feb	399.58	2.64	788.61	3.02	810.21	3.30	0.208	
5-Feb	402.02	2.44	791.62	3.01	813.1	2.89	0.194	
6-Feb	404.95	2.93	794.91	3.29	816.78	3.68	0.230	
7-Feb	408.03	3.08	798.35	3.44	820.49	3.71	0.238	
8-Feb	410.72	2.69	801.75	3.40	823.97	3.48	0.223	
9-Feb	413.62	2.90	805.03	3.28	827.51	3.54	0.226	
Monthly Average		2.74		3.40		3.37	0.22	
Monthly High		3.08		3.98		3.71	0.24	

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Howell Avenue Pump Station - January 1996 Flows

Pump	#1	#2	#3
Pressure (psi)	15	14	14
Total Head (ft)	34.65	32.34	32.34
Average Flow (gpm)	550	520	520

Pump Run Times (hours)

Date	Pump #1 Cum.	Pump #1 Daily	Pump #2 Cum	Pump #2 Daily	Pump #3 Cum	Pump #3 Daily	Total Flow (mgd)	Comments
1-Jan	484.02		493.48		519.45			Pump #2 Seal Fail
2-Jan	489.57	5.55	493.48	0.00	522.38	2.93	0.275	Pump #2 Seal Fail
3-Jan	492.76	3.19	496.69	3.21	525.87	3.49	0.314	
4-Jan	495.67	2.91	499.24	2.55	529.61	3.74	0.292	Pump #2 Seal Fail
5-Jan	498.98	3.31	502.48	3.24	532.51	2.90	0.301	#2,#3 Starter Fail
6-Jan	505.52	6.54	505.61	3.13	532.53	0.02	0.314	#2,#3 Starter Fail
7-Jan	511.77	6.25	505.76	0.15	535.89	3.36	0.316	#2,#3 Starter Fail
8-Jan							0.000	
9-Jan	522.19		505.76		541.07		0.000	Pump #2 Seal Fail
10-Jan	528.03	5.84	505.87	0.11	544.03	2.96	0.289	Pump #2 Seal Fail
11-Jan	534.68	6.65	505.99	0.12	547.24	3.21	0.323	Pump #2 Seal Fail
12-Jan	540.82	6.14	505.99	0.00	550.55	3.31	0.306	#2 Seal, #3 Starter
13-Jan	544.19	3.37	510.69	4.70	554.07	3.52	0.368	#1 Seal
14-Jan	546.29	2.1	513.92	3.23	558.24	4.17	0.300	
15-Jan	549.27	2.98	517.21	3.29	561.24	3.00	0.295	
16-Jan	552.5	3.23	520.81	3.60	564.66	3.42	0.326	
17-Jan	555.94	3.44	524.17	3.36	567.93	3.27	0.320	
18-Jan	559.05	3.11	527.57	3.40	571.28	3.35	0.313	
19-Jan	562.27	3.22	531.06	3.49	574.67	3.39	0.321	
20-Jan	568.4	6.13	532.57	1.51	578.7	4.03	0.375	#2 Starter Failure
21-Jan	572.18	3.78	536.21	3.64	582.45	3.75	0.355	
22-Jan	575.65	3.47	540.14	3.93	585.76	3.31	0.340	
23-Jan	579.04	3.39	543.94	3.80	589.24	3.48	0.339	
24-Jan	582.41	3.37	547.65	3.71	592.74	3.50	0.336	
25-Jan	585.97	3.56	551.38	3.73	596.4	3.66	0.348	
26-Jan	589.56	3.59	555.24	3.86	600.02	3.62	0.352	
27-Jan	592.7	3.14	558.93	3.69	603.18	3.16	0.317	
28-Jan	596.77	4.07	563.09	4.16	607.36	4.18	0.395	
29-Jan	600.09	3.32	566.52	3.43	610.88	3.52	0.326	
30-Jan	603.78	3.69	570.63	4.11	614.96	4.08	0.377	
31-Jan	607.44	3.66	574.41	3.78	618.59	3.63	0.352	
Monthly Average		4.04		2.89		3.36	0.31	
Monthly High		6.65		4.70		4.18	0.39	

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Howell Avenue Pump Station - February 1996 Flows

Pump	#1	#2	#3
Pressure (psi)	15	14	14
Total Head (ft)	34.65	32.34	32.34
Average Flow (gpm)	550	520	520

Pump Run Times (hours)

Date	Pump #1 Cum.	Pump #1 Daily	Pump #2 Cum	Pump #2 Daily	Pump #3 Cum	Pump #3 Daily	Total Flow (mgd)	Comments
1-Feb	610.95	3.51	578.26	3.85	622.29	3.70	0.351	
2-Feb	614.5	3.55	581.73	3.47	626.18	3.89	0.347	
3-Feb								
4-Feb	621.48		589.06		633.68			
5-Feb	624.49	3.01	592.58	3.52	636.75	3.07	0.305	
6-Feb	627.97	3.48	596.61	4.03	640.56	3.81	0.359	
7-Feb	631.46	3.49	600.34	3.73	644.44	3.88	0.353	
8-Feb	635.03	3.57	604.11	3.77	648.2	3.76	0.353	
9-Feb	638.74	3.71	607.88	3.77	651.88	3.68	0.355	
Monthly Average		3.47		3.73		3.68	0.35	
Monthly High		3.71		4.03		3.89	0.36	

Peconic Estuary Program Nitrogen Study

PEP Program Office, SCDHS – Office of Ecology, 360 Yaphank Avenue, Suite 2B, Yaphank, NY 11980

July 23, 2007

Barbara Blass, Councilwoman, Town of Riverhead
210 Howell Avenue
Riverhead, NY 11901

Dear Councilwoman Blass:

The enclosed Draft Peconic Estuary Nitrogen Total Maximum Daily Load (TMDL) is now available for comment and an informational meeting has been scheduled.

Informational Meeting:
When: Thursday August 2, 2007 at 1pm
Where: Cornell Cooperative Extension Education Center
First Floor Conference Room
423 Griffing Ave, Suite 100
Riverhead, NY 11901-3071
*Directions can be found at http://counties.cce.cornell.edu/suffolk/General /Sites.htm

Public comment on this document will be accepted for thirty (30) days; through August 17, 2007. Comments received by COB August 17, 2007 will be considered prior to submitting the final TMDL to the USEPA for approval. Comments may be forwarded, written or via email, to Laura Stephenson at the address noted below:

Laura Stephenson
Peconic Estuary Program Coordinator
NYSDEC, Bureau of Marine Resources
205 N Belle Meade Rd, Suite 1
East Setauket, NY 11733
631.444.0971
lbstephe@gw.dec.state.ny.us

Background:
The Peconic Estuary Program and United States Environmental Protection Agency (USEPA) worked with the New York State Department of Environmental Conservation (NYSDEC) to prepare this DRAFT Total Maximum Daily Load (TMDL). The DRAFT

TMDL document proposed by NYSDEC (announced in the NYSDEC Environmental Notice Bulletin 7.18.2007-http://www.dec.ny.gov/enb/20070718_not1.html) addresses waters in the Peconic Estuary impaired by nitrogen:

1. Lower Peconic River and Tidal Tributaries (NYS Priority Waterbodies List Segment #1701-0259)
2. Western Flanders Bay and Lower Sawmill Creek (NYS Priority Waterbodies List Segment #1701-0254)
3. Meetinghouse Creek, Terrys Creek and Tributaries (NYS Priority Waterbodies List Segment #1701-0256)

States are required by Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) implementing regulations (40CFR Part 130) to develop TMDL plans for waterbodies and pollutants where water quality standards are not being met. By definition, a TMDL specifies the allowable pollutant loading from all contributing sources (e.g., point sources, nonpoint sources, and natural background) at a level necessary to attain the applicable water quality standards with seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between the sources of the pollutant and water quality. In essence, a TMDL defines the assimilative capacity of the waterbody to absorb a pollutant and still meet water quality standards.

The proposed TMDL for nitrogen sets waste load allocations that will be used to set discharge limits for wastewater treatment plants, and reduction requirements for municipal stormwater permits. The proposed TMDL also relies on current and ongoing stormwater and other nonpoint source reduction efforts such as the Peconic Estuary Program Management Conference and Comprehensive Conservation and Management Plan process to address existing water quality impairments and preserve water quality in the remaining waters of the Peconic Estuary.

Please contact Laura Stephenson at 631-444-0871 with any further questions or for more information.

Sincerely,

Vito A Minei

Vito Minei, P.E.
Program Manager

NEW YORK STATE
DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

ENB - Region 1 Notices

Public Notice

Statewide and Region 1

Availability for Comment on Draft TMDL

This notice announces the availability of a DRAFT Total Maximum Daily Load (TMDL) document proposed by New York State Department of Environmental Conservation to address impaired waters in the Peconic Estuary, Suffolk County, specifically:

1. Lower Peconic River and Tidal Tributaries (NYS Priority Waterbodies List Segment #1701-0259)

2. Western Flanders Bay and Lower Sawmill Creek (NYS Priority Waterbodies List Segment #1701-0254)

3. Meetinghouse Creek, Terrys Creek and Tributaries (NYS Priority Waterbodies List Segment #1701-0256)

These are waterbodies that are impaired by nitrogen. Public comment on this document will be accepted for 30 days, through August 17, 2007. A public meeting to explain the draft TMDL will be scheduled during the comment period.

BACKGROUND: States are required by Section 303(d) of the Clean Water Act and the U. S. Environmental Protection Agency's (EPA's) implementing regulations (40CFR Part 130) to develop TMDL plans for waterbodies and pollutants where water quality standards are not being met. By definition, a TMDL specifies the allowable pollutant loading from all contributing sources (e.g., point sources, nonpoint sources, and natural background) at a level necessary to attain the applicable water quality standards with seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between the sources of the pollutant and water quality. In essence, a TMDL defines the assimilative capacity of the waterbody to absorb a pollutant and still meet water quality standards.

The proposed TMDL for nitrogen sets waste load allocations that will be used to set discharge limits for wastewater treatment plants, and reduction requirements for municipal stormwater permits. The proposed TMDL also relies on current and ongoing stormwater and other nonpoint source reduction efforts such as the Peconic Estuary Program Management Conference and Comprehensive Conservation and Management Plan process to address existing water quality impairments and preserve water quality in the remaining waters of the Peconic Estuary.

INFORMATION: Copies of the proposed draft plan or information on the public meeting can be obtained by contacting Laura Stephenson, Peconic Estuary Program Coordinator, NYSDEC, Bureau of Marine Resources, 205 N Belle Meade Road, Suite 1, East Setauket, NY 11733, r by phone at 631-444-0871, or via email at lbstephe@gw.dec.state.ny.us. Comments should be sent, written or via email, to the same addresses. Comments received by close of business August 17, 2007 will be considered prior to submitting the final TMDLs to the EPA for approval.

Executive Summary

Pursuant to Section 303(d) of the Federal Clean Water Act (CWA), this document contains proposed nitrogen discharge loads for three sewage treatment plants (STPs), one other wastewater treatment plant, and for municipal stormwater facilities in the Peconic Estuary System. These loads will form the basis for regulatory permit requirements. It also contains proposed target loads for other sources of nitrogen to the Estuary, including atmospheric deposition, groundwater, and tributaries.

The CWA creates a process where States establish meaningful uses and appropriate standards for waterbodies. States must also periodically assess waters to see if these standards and uses are being attained. If standards are not being met, States must determine what must be done to achieve standards. This includes considering pollution from point sources discharges (such as outfall pipes) and pollution sources that are diffuse (termed "nonpoint sources"). The combined pollutant load from both the point and nonpoint sources cannot exceed that amount required to achieve or maintain water quality standards. This combined pollutant load (called a Total Maximum Daily Load or TMDL) needs to also include a margin of safety to account for uncertainties, and consider seasonal variation, future development and growth.

Estuaries are areas where fresh water from the land and salt water from the oceans mix. They are among the most important ecosystems on the earth, serving as important nursery and spawning areas for finfish and shellfish. These coastal areas are also highly valued by humans. The Peconic Estuary System of eastern Suffolk County, NY has been designated an "Estuary of National Significance" under the Clean Water Act. In order to address both problems and threats facing the Peconic Estuary and its watershed, a Comprehensive Conservation and Management Plan has been prepared.

Like many other estuaries, nutrient over-enrichment (in the form of excess nitrogen loadings) is a priority management topic for the Peconic Estuary. Nitrogen comes from many sources, both natural and as a result of human activities. Sources include wet and dry atmospheric deposition, sewage treatment plants, stormwater runoff, and ground water that becomes enriched as a result of excess fertilizer being applied to lawns, landscaping, and agricultural crops, as well from on-site waste water disposal systems ("septic systems").

While nitrogen is an important nutrient for a healthy ecosystem, excess nitrogen can lead to problems. Too much nitrogen can cause too much algae to grow. When algae blooms and then dies, the decomposition process consumes oxygen. Aquatic plants, including algae, also use oxygen at night through respiration. The combined effect of plant decomposition and respiration can cause dissolved oxygen to drop to low levels, especially in the early morning hours and during the warm weather months. Aquatic animals need dissolved oxygen to live. When conditions become stressful due to low dissolved oxygen levels, some organisms may suffocate and die, while others may flee the area.

Based upon data that has been submitted by the Suffolk County Department of Health Services (SCDHS), the New York State Department of Environmental Conservation has determined that three waterbodies of the Peconic Estuary System are not meeting dissolved oxygen standards. They are: the Lower Peconic River and Tidal Tributaries; Western Flanders Bay and Lower Sawmill Creek; and Meetinghouse Creek, Terrys Creek and Tributaries. It is important to note that in order to achieve dissolved oxygen standards in these waters both now and in the future, it is necessary to look at the nitrogen contributions from not only their contributing watersheds, but nitrogen loads from the entire Peconic Estuary Watershed.

A sophisticated water quality model has been developed through the efforts of the Peconic Estuary Program which can accurately predict water quality conditions based on current conditions and nitrogen loadings as well as changes that can be expected as nitrogen loadings change in the future. An important consideration was the nonpoint source loads from various land uses. Loads from any individual land parcel can be estimated to increase, decrease or stay the same, depending on land preservation efforts or residential or commercial development, as well as the effectiveness of implementing applicable management practices such as at agricultural operations, existing development, and new development. Factored into this analysis is the nationwide and local implementation of controls under Clean Air Act laws, which are projected to have an important positive impact on water quality. Limitations on point source discharges (including sewage treatment plants and regulated stormwater areas) are important locally in improving water quality.

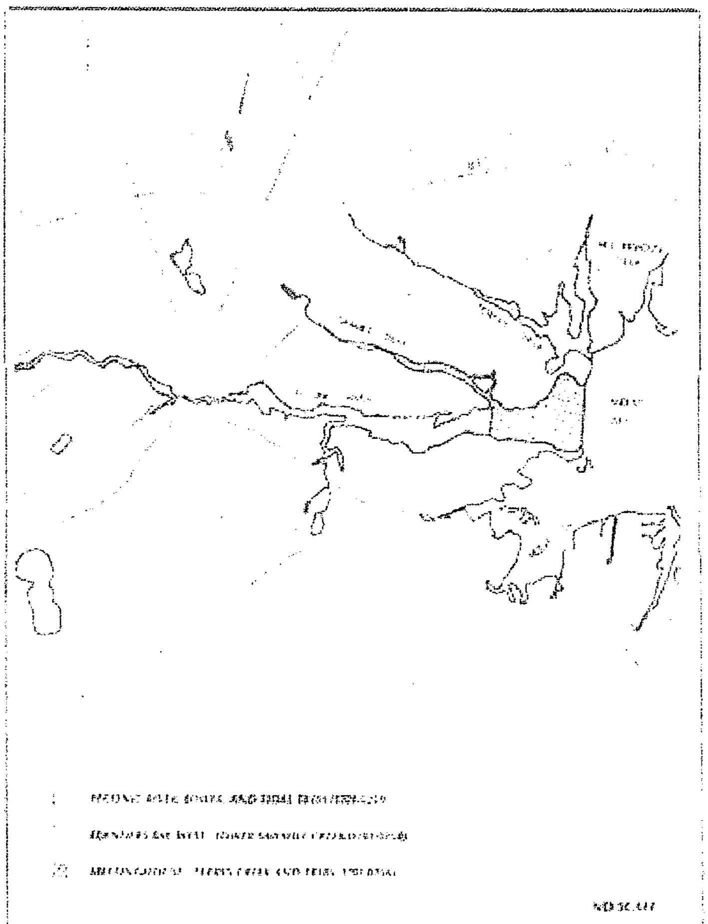
This TMDL effort has resulted in the identification of a "practical load reduction scenario" which includes a reasonable cumulative full build-out scenario for the watershed, addressing farmland preservation, preservation of open space and developed but further subdividable land parcels, and future residential and commercial development both inside and outside of sewer districts. It also establishes achievable nitrogen loading rates to groundwater from agricultural operations, golf courses, and existing and new development, including the need for greater management in watersheds of currently impaired waterbodies. Reductions in the nitrogen loading from atmospheric deposition are also taken into account. Finally, this TMDL establishes nitrogen wasteload allocations for point sources discharges from the Riverhead, Sag Harbor and Shelter Island Heights STPs, and Atlantis Marine World. Discharges from STPs at Brookhaven National Laboratory, the Naval Weapon Industrial Reserve Plant and Plum Island are also discussed. Wasteload Allocations for stormwater loads are included, which will affect entities subject to the Phase II Stormwater Permits (including Suffolk County, the Town of Brookhaven, Riverhead and Southampton, and the Villages of Sag Harbor and North Haven). Other areas may become subject to municipal stormwater permits in the future.

Even the aggressive wasteload allocations for point sources and management goals in the form of load allocations for nonpoint sources will not be enough to meet existing or proposed water quality standard for dissolved oxygen. Mechanical aeration has been added to the scenario to specific locations in the impaired waters to bring the dissolved oxygen levels into compliance with the both existing and proposed New York water quality standards.

The Peconic Estuary Program seeks to have these TMDLs fully implemented within 15 years from approval, based upon current expectations for full build-out and land acquisition programs, development and implementation of education and outreach programs, full participation in the agricultural environmental management program, and other necessary efforts. The SCDHS also will continue its monitoring efforts in the Peconic Estuary to further document water quality conditions and trends. The Peconic Estuary Program plans to track and report on progress in implementing and achieving these TMDLs at five-year intervals. Full implementation of these TMDLs is expected to result in water quality standards for dissolved oxygen being met where they are not currently attained and ensure continued compliance where these standards are presently achieved.

Total Maximum Daily Loads for Nitrogen in the Peconic Estuary Program Study Area, Including Waterbodies Currently Impaired Due to Low Dissolved Oxygen: the Lower Peconic River and Tidal Tributaries; Western Flanders Bay and Lower Sawmill Creek; and Meetinghouse Creek, Terrys Creek and Tributaries

July 18, 2007



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Acknowledgements
The preparation of this report was possible due to the collaborative efforts of many committed organizations and individuals. The Peconic Estuary Program would like to thank the following for their contributions and guidance:

Program Director
Vito Minei, P.E., Suffolk Department of Health Services

Deputy Program Director
Walter Dawydiak, P.E., J.D., Suffolk Department of Health Services

U.S. Environmental Protection Agency: Felix Locicero, Rosella O'Connor and Rick Balla

Suffolk County Department of Health Services: Martin Trent, Kim Paulsen and Laura Bavaro

New York State Department of Environmental Conservation: Ron Entringer, Aslam Mirza, Tony Leung, Karen Chytalo, and Laura Stephenson

Tetra Tech, Inc.: Mike Morton

The preparation of this document was supported in part by the United States Environmental Protection Agency, with funding provided to the Peconic Estuary Program, under assistance agreements nos. CE992002 and CE992066, to the Suffolk County Department of Health Services, the and New York State Department of Environmental Conservation, respectively.

Contractor support was provided by Tetra Tech Inc., Contract No. 68-C-02-108, Task Order 120.

The Peconic Estuary Program (PEP) is a partnership of governments, environmental groups, businesses, industries, academic institutions, and citizens. The PEP's mission is to protect and restore the Peconic Estuary system. Learn more at www.peconicestuary.org.

Peconic Estuary Program, Suffolk County Department of Health Services, Office of Ecology, 360 Yaphank Avenue, Suite 2B, Yaphank, NY 11980, 631-852-5750

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July 18, 2007

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Executive Summary

Pursuant to Section 303(d) of the Federal Clean Water Act (CWA), this document contains proposed nitrogen discharge loads for three sewage treatment plants (STPs), one other wastewater treatment plant, and for municipal stormwater facilities in the Peconic Estuary System. These loads will form the basis for regulatory permit requirements. It also contains proposed target loads for other sources of nitrogen to the Estuary, including atmospheric deposition, groundwater, and tributaries.

The CWA creates a process where States establish meaningful uses and appropriate standards for waterbodies. States must also periodically assess waters to see if these standards and uses are being attained. If standards are not being met, States must determine what must be done to achieve standards. This includes considering pollution from point sources discharges (such as outfall pipes) and pollution sources that are diffuse (termed "nonpoint sources"). The combined pollutant load from both the point and nonpoint sources cannot exceed that amount required to achieve or maintain water quality standards. This combined pollutant load (called a Total Maximum Daily Load or TMDL) needs to also include a margin of safety to account for uncertainties, and consider seasonal variation, future development and growth.

Estuaries are areas where fresh water from the land and salt water from the oceans mix. They are among the most important ecosystems on the earth, serving as important nursery and spawning areas for finfish and shellfish. These coastal areas are also highly valued by humans. The Peconic Estuary System of eastern Suffolk County, NY has been designated an "Estuary of National Significance" under the Clean Water Act. In order to address both problems and threats facing the Peconic Estuary and its watershed, a Comprehensive Conservation and Management Plan has been prepared.

Like many other estuaries, nutrient over-enrichment (in the form of excess nitrogen loadings) is a priority management topic for the Peconic Estuary. Nitrogen comes from many sources, both natural and as a result of human activities. Sources include wet and dry atmospheric deposition, sewage treatment plants, stormwater runoff, and ground water that becomes enriched as a result of excess fertilizer being applied to lawns, landscaping, and agricultural crops, as well from on-site waste water disposal systems ("septic systems").

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This TMDL effort has resulted in the identification of a "practical load reduction scenario" which includes a reasonable cumulative full build-out scenario for the watershed, addressing farmland preservation, preservation of open space and developed but further subdividable land parcels, and future residential and commercial development both inside and outside of sewer districts. It also establishes achievable nitrogen loading rates to groundwater from agricultural operations, golf courses, and existing and new development, including the need for greater management in watersheds of currently impaired waterbodies. Reductions in the nitrogen loading from atmospheric deposition are also taken into account. Finally, this TMDL establishes nitrogen wasteload allocations for point sources discharges from the Riverhead, Sag Harbor and Shelter Island Heights STPs, and Atlantis Marine World. Discharges from STPs at Brookhaven National Laboratory, the Naval Weapon Industrial Reserve Plant and Plum Island are also discussed. Wasteload Allocations for stormwater loads are included, which will affect entities subject to the Phase II Stormwater Permits (including Suffolk County, the Town of Brookhaven, Riverhead and Southampton, and the Villages of Sag Harbor and North Haven). Other areas may become subject to municipal stormwater permits in the future.

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Total Maximum Daily Loads for Nitrogen in the Peconic Estuary Program Study Area, Including Waterbodies Currently Impaired Due to Low Dissolved Oxygen: the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries

I. Introduction

This section provides an overall introduction, including an overview of the Peconic Estuary and the Peconic Estuary Program, the problems associated with low dissolved oxygen and how and why it occurs and the impact it has on aquatic life, and a regulatory process ("303(d)") for identifying problems and developing plans to restore impaired waters.

A. The Peconic Estuary and the Peconic Estuary Program

The Peconic Estuary is one of 28 estuaries in the country designated by U.S. Environmental Protection Agency (EPA) as an "estuary of national significance" under Section 320 of the Federal Clean Water Act (CWA). The National Estuary Program (NEP) was established to protect and restore nationally significant estuaries threatened or impaired by pollution, development, and overuse. The Peconic Estuary was formally accepted as part of the NEP in 1992. Officially commenced in 1993, the Peconic Estuary Program (PEP) includes numerous stakeholders, representing citizen and environmental groups, businesses and industries, academic institutions, and local, county, state, and federal governments. The EPA, New York State Department of Environmental Conservation (DEC) and the Suffolk County Department of Health Services (SCDHS) are the sponsoring government agencies for the program.

The PEP Comprehensive Conservation and Management Plan (CCMP) was approved by the EPA Administrator on November 15, 2001, with the concurrence of the New York State Governor. The CCMP promotes a holistic approach to protecting, enhancing and restoring the estuary and its watershed. Priority management topics for the Peconic Estuary are Brown Tide (a type of harmful algal bloom), nutrients, habitat and living resources, pathogens, toxic pollutants, and critical lands protection. These six priority topics, together with public education and outreach, financing, and post-CCMP management, form the basis for the CCMP action plans.

The PEP Management Conference has identified nutrient over enrichment and the resultant low dissolved oxygen levels in the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries as a priority problem needing attention. The PEP is fortunate to have an extensive water quality monitoring database, a three-dimensional water quality model with a predictive sediment submodel, as well as many related studies available on land use, groundwater quality and other topics in order to understand the mechanistic nature/behavior of the Peconic Estuary system.

B. Low Dissolved Oxygen Levels (Hypoxia)

The data collected by the PEP reveal periods of low dissolved oxygen (DO) levels during the warm weather months (generally May through September). Figure I.1 depicts the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries, where low DO levels have been and continue to be observed. These low levels of dissolved oxygen are linked to areas of limited flushing and high nutrient loadings.

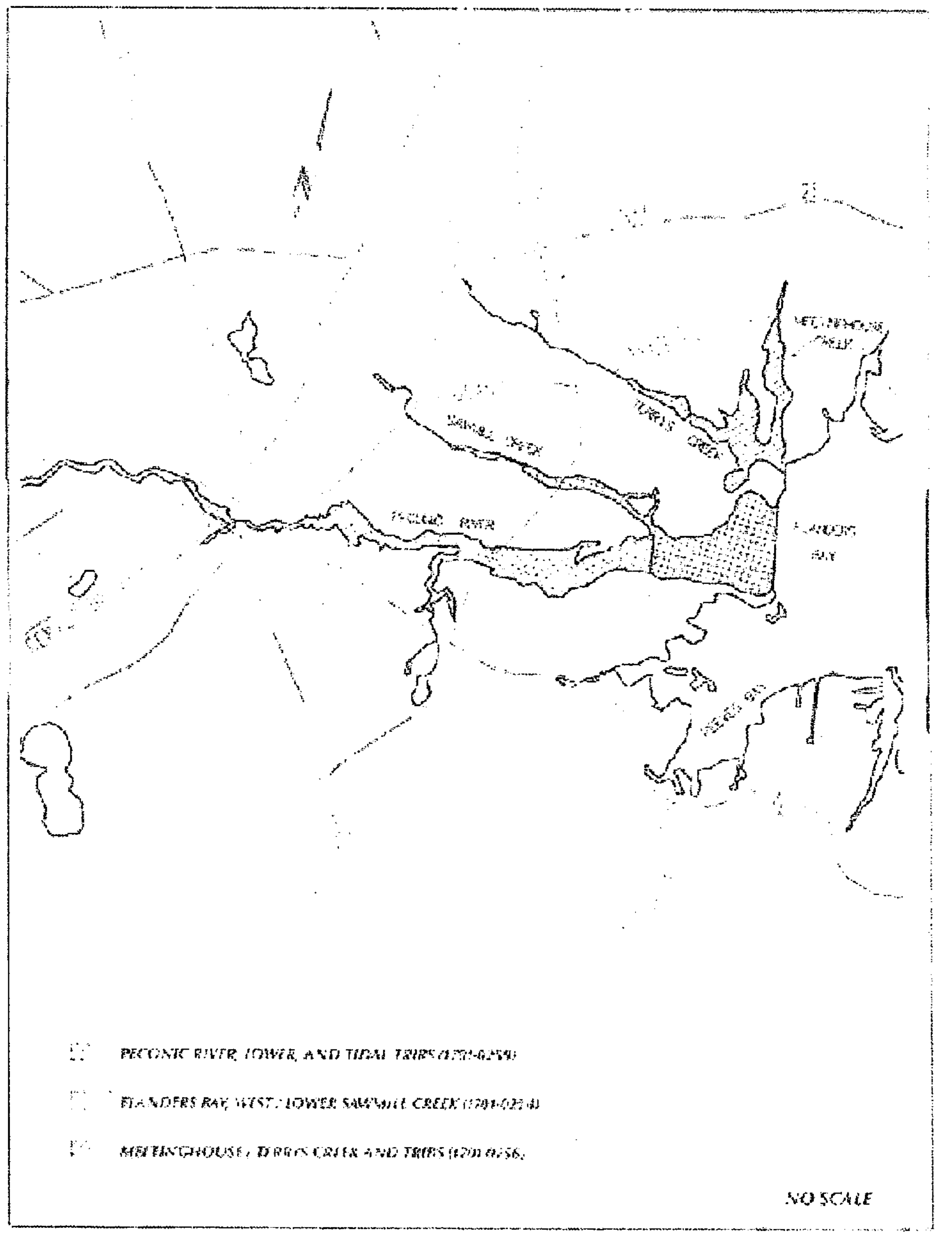


Figure I.1: Peconic Estuary waterbodies impaired due low dissolved oxygen

The chief regulators of DO concentrations in the Estuary are related to biological activity. While nitrogen is essential to a productive ecosystem, too much nitrogen fuels the excessive growth of aquatic plants, including phytoplankton and macroalgae that may, through night-time respiration, result in low dissolved oxygen levels in the water column. Night-time respiration of plants results in DO demand and can cause short-term DO depressions in the early morning hours; this is known as "diurnal" dissolved oxygen variation.

Bacterial decomposition of organic matter, including dead and dying vegetation, also results in dissolved oxygen being consumed. Most decomposition occurs in the sediments; this process is termed "sediment oxygen demand". Sedimentary decomposition also results in the recycling of nutrients, including nitrogen, back into the water column ("sediment nutrient flux"), which can further exacerbate water quality problems. Excessive oxygen demand results in dissolved oxygen concentrations being reduced to levels that are deleterious to aquatic organisms over relatively short periods of time.

The overproduction of algal biomass (and nighttime respiration), along with sediment oxygen demand, and sediment nutrient flux, accompanied by poor flushing, limited

Image I.1: Measuring low levels of dissolved oxygen on a warm summer morning is not unusual in the western Peconic Estuary (Image Credit: Rick Balla, EPA, September 2005)

atmospheric exchange, and possibly naturally occurring density stratification of the water column in deeper areas, have caused DO concentrations to dip to hypoxic (DO less than 3.0 mg/L) and anoxic (that is, no dissolved oxygen) conditions in the Lower Peconic River and Meetinghouse Creek. Water temperature also contributes to the likelihood of stressful water quality conditions, as warmer water holds less dissolved oxygen. While strong winds can act to infuse and mix atmospheric oxygen into surface waters, periods of relative calmness can exacerbate low dissolved oxygen conditions. When conditions become stressful due to low DO levels, some organisms may suffocate and die, while others may flee the area.

Excessive microscopic algal growth can also discolor the water, and decrease water clarity and sunlight penetration. Reduced sunlight penetration can negatively impact submerged aquatic vegetation (SAV), especially eelgrass. Because SAV beds are important spawning and nursery habitat and serve as a refuge from predators for finfish and shellfish, factors that degrade them can have repercussions throughout the aquatic ecosystem and on commercial and recreational fisheries which humans highly value.

Excessive nitrogen inputs have impaired the function and health of the Lower Peconic River, Meetinghouse Creek/Terrys Creek and to some degree western Flanders Bay (Lower Sawmill Creek). The PEP has estimated that the load of nitrogen delivered to Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries has increased 200% since the 1950s due to increasing residential populations served by on-site disposal systems (septic systems) and a more pervasive use of highly soluble fertilizers in agricultural operations and on turf (lawns and golf courses). Point source discharges to the estuary include sewage treatment plants (STPs) in Riverhead, Sag Harbor and Shelter Island Heights, Atlantis Marine World (the Riverhead Aquarium)and stormwater runoff covered by Municipal Separate Storm Sewer Systems (MS4) Phase II Stormwater Permits. Nonpoint sources of nitrogen to the estuary include groundwater influx, atmospheric deposition, and stormwater runoff not covered by a permit.

C. Requirements of Section 303(d)

Section 303(d)(1)(C) of the CWA and the EPA implementing regulations (40 CFR Part 130) require states to identify those waterbodies that do not meet water quality standards after application of the technology-based effluent limitations required by the CWA and to establish total maximum daily loads (TMDLs) for such waters for the pollutant of concern. The TMDL establishes the allowable pollutant loading from all contributing sources at a level necessary to achieve the applicable water quality standards. TMDLs must account for seasonal variability and include a margin of safety that accounts for uncertainty of how pollutant loadings may impact the receiving water. Once the public has had an opportunity to review and comment on the TMDL and any necessary revisions are made, it is submitted to the EPA by the state for review and approval. Upon approval, the TMDL is incorporated into the state water quality management plan and it becomes a basis for water quality permit decisionmaking and watershed management.

D. Fulfillment of Section 303(d)

To address the recognized low dissolved oxygen (hypoxia) problem, the PEP proceeded with a phased approach to nitrogen reduction and management, allowing the program to move forward in stages as more information is obtained to support more aggressive steps.

The first formal action to address hypoxia took place in 1994 with the release of the PEP Action Plan. The report announced that the nitrogen load from the Riverhead STP would not be allowed to increase beyond the amount being discharged at that time. Subsequently, DEC issued a State Pollutant Discharge Elimination System (SPDES) permit in 1996 establishing a nitrogen discharge loading limit from the Riverhead STP. The Town of Riverhead agreed to upgrade the plant to ensure continued compliance with the nitrogen limit should the plant reach its design flow capacity. The treatment upgrade, which cost $8.1 million and included the construction of sequencing batch reactors, took place from August 1999 to May 2001. The Riverhead STP began full denitrification treatment in May 2001. This constitutes what is known as Phase I of the hypoxia management program. Descriptions of other ongoing and potential actions and programs the PEP has identified to reduce and better manage nitrogen are discussed under Implementation in this report.

The Peconic Estuary Program's CCMP contains 85 actions which are further broken down into steps; Actions N-1, N-3, N-4, and N-5 in the Nutrients Chapter directly relate to the development of a TMDL for western portions of the estuary. The CCMP recommends that a TMDL analysis be conducted based upon the listing of impaired waters on the 303(d) list (Action N-3). Accordingly, DEC evaluated these waters from a water quality point of view, and placed these waters on the 2002 303(d) list, as candidates for developing TMDLs.

These TMDLs are being prepared to fulfill the recommendations of the CCMP and the requirements of Section 303(d).

II. Waterbody Location and Description

This section provides waterbody and pollutant descriptions, including the Peconic Estuary and three waterbody segments that are impaired based on not attaining state dissolved oxygen standards, and the pollutant loadings affecting the impaired waterbodies.

A. The Peconic Estuary

The Peconic Estuary is situated between the north and south forks of eastern Long Island, New York, and consists of more than 100 distinct bays, harbors, and tributaries. The Peconic watershed includes those areas that contribute groundwater, surface water, and stormwater runoff to the river and estuary. The watershed has an area of 196 square miles. The Peconic Estuary Program study area includes 246 square miles of estuarine surface waters. The watershed is nearly 100 miles long from west to east and 20 miles from north to south at its widest point. The western boundary of the study area is at the headwaters of the Peconic River, just west of the William Floyd Parkway. The eastern end is an imaginary line through Block Island Sound between Plum Island and Montauk Point, beyond which lies the open sea (Figures II.1 and II.2).

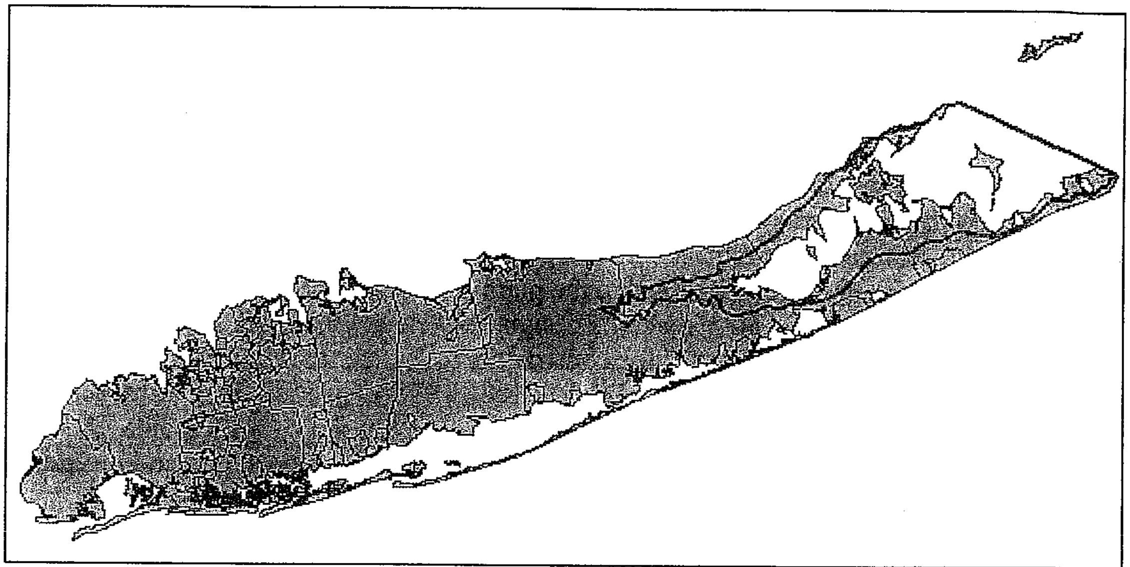


Figure II.1: Long Island and the Peconic Estuary Program Study Area (boundary outlined)

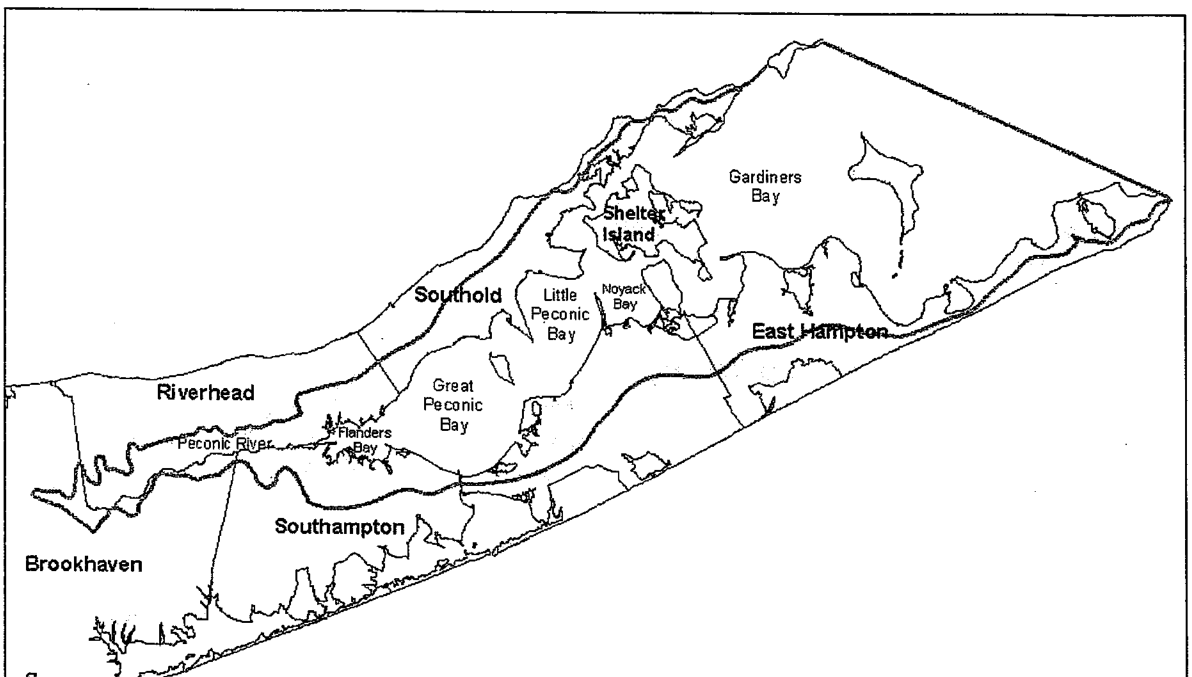


Figure II.2: Peconic Estuary Program Study Area (boundary outlined)

The study area includes the following municipalities: all of the Town of Shelter Island; significant portions of the Towns of Riverhead, Southold, East Hampton, and Southampton; a small portion of the Town of Brookhaven; a significant portion of the

Village of Greenport, and all of the Villages of Dering Harbor, Sag Harbor, and North Haven. The entire Peconic watershed is located within Suffolk County.

Of eastern Long Island's mean annual precipitation, 50% is recharged to groundwater while 1-2% results in stormwater runoff. The remainder is taken up by plants and evapotranspires. The Peconic River, the major river discharging freshwater to the estuary, is groundwater fed and contributes approximately 13% of the freshwater to the Peconic Estuary. The largest source of freshwater input to the estuary (aside from direct precipitation on the estuary surface) is from groundwater seepage (or underflow) directly into the estuary. Stormwater runoff accounts for less than 4% of the total freshwater budget entering the estuary.

The Peconic Estuary is a relatively shallow, well-mixed waterbody. The deepest areas of the estuary are at the "races" (the relatively narrow straits that run between the north and south forks of the mainland and Shelter Island), ranging from approximately 5.5 m to 29 m [18 to 95 ft]. Flanders Bay is the most shallow of the bays, having a maximum depth of about 4.3 m (14 ft). The other bays that make up the Peconic Estuary range between 6 and 12 m (20 to 40 ft) deep at their centers with deeper pockets located east of Robins Island in Little Peconic Bay and southeast of Cedar Point Beach in Gardiners Bay. Water depths increase to greater than 28 m (91 ft) east of Gardiners Island.

The estuary is not well flushed as evidenced by the salinity gradient along the main stem of the estuary. Average salinity increases rapidly from less than 24 practical salinity units (psu) at the Peconic River to approximately 27 psu in Flanders Bay, and then increases more gradually toward the east to approximately 29 psu.

B. Impaired Waterbodies on the 303(d) List

In order to fulfill certain requirements of the Federal Clean Water Act, the DEC must provide regular, periodic assessments of the quality of the water resources of the state. These assessments reflect monitoring and water quality information drawn from a number of programs and sources, both within and outside the DEC. This information has been compiled by the DEC into an inventory database of all waterbodies in the state used to record current water quality information, characterize all known and/or suspected water quality problems and issues, and track progress toward their resolution. This inventory of water quality information is the Waterbody Inventory/Priority Waterbodies List.

These nitrogen TMDLs address the Peconic Estuary and its impaired waters (due to low dissolved oxygen): Lower Peconic River and Tidal Tributaries; Western Flanders Bay and Lower Sawmill Creek; and Meetinghouse Creek, Terrys Creek and Tributaries of the Peconic Estuary (Figure 1-1). Previously, in 2006, the State prepared and EPA approved 20 TMDLs for 25 Peconic Estuary waterbodies impaired due to pathogen contamination and impacts to shellfishing waters. Descriptions of the three DO impaired waterbodies from the New York State Priority Waterbodies List follow.

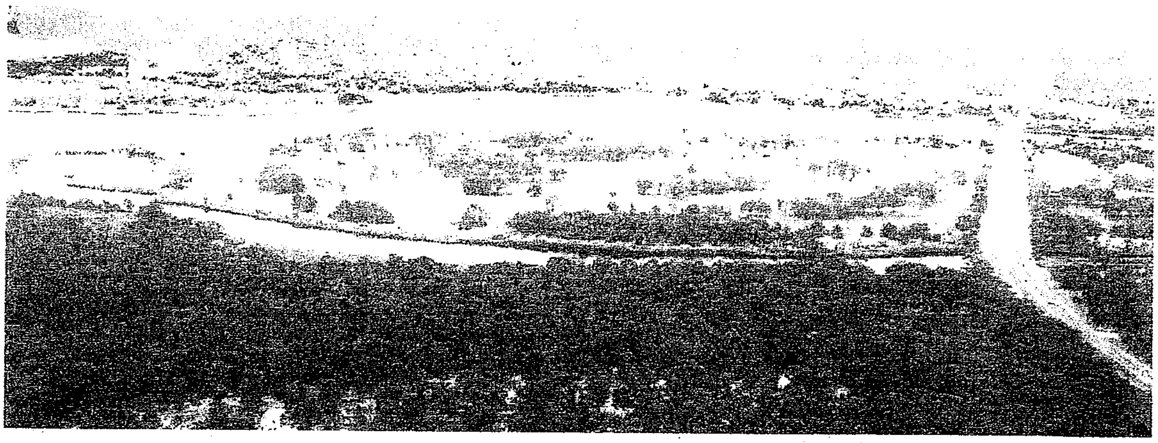
1. Lower Peconic River and Tidal Tributaries (NYS Priority Waterbodies List Segment #1701-0259)

According to the New York State Priority Waterbodies List, this segment includes the tidal portion of the Peconic River and its tributaries, spanning from the dam near Peconic Avenue to a line due south of the mouth of Sawmill Creek (see Figure I-1 and Image II.1). The entire waterbody segment spans approximately 200 acres. The boundaries of the lower Peconic River and its tidal tributaries are shared between the Hamlet of Riverside in the Town of Southampton and the Hamlet of Riverhead in the Town of Riverhead.

Image II.1: The Tidal Peconic River, looking west. The County Route 105 bridge is in the foreground. (Image credit: Rick Balla, EPA, August 29, 2006)

2. Western Flanders Bay and Lower Sawmill Creek (NYS Priority Waterbodies List Segment #1701-0254)

According to the New York State Priority Waterbodies List, this segment includes the estuarine waters between a line due south of the mouth of Sawmill Creek and a line from Indian Island to the northwest boundary of Reeves Bay (Iron Point), including the tidal portion of Sawmill Creek (see Figure I-1 and Images II.2A and II.2.B). The entire waterbody segment spans approximately 100 acres. The boundary of western Flanders Bay is shared by the Hamlet of Riverside in the Town of Southampton and the Hamlet of Riverhead in the Town of Riverhead. Sawmill Creek is situated in the Hamlet of Riverhead in the Town of Riverhead.



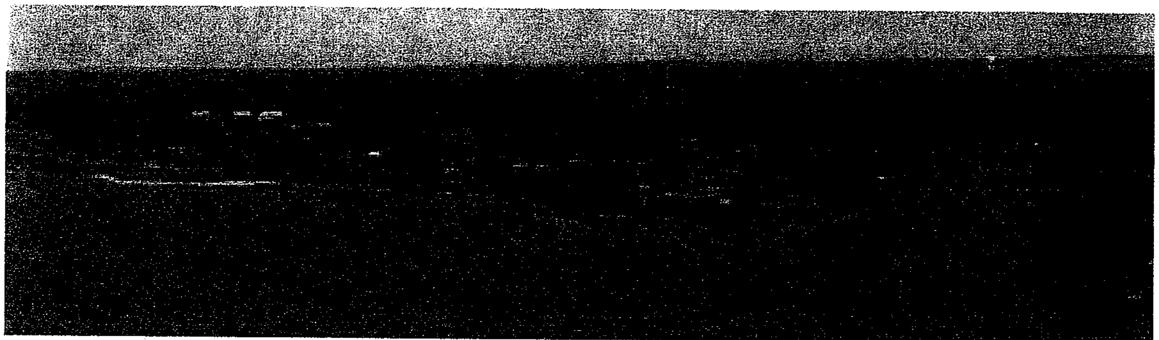


Image II.2A and II.2B: Sawmill Creek. Top image II.2A – Sawmill Creek looking south. Indian Island County Park is in the foreground. Sawmill Creek separates the Park from the Indian Island Golf Course. County Route 105 appears on the right. (image credit: Helen Grebe, EPA, August 29, 2006). Bottom image II.2B – Sawmill Creek (on the right) and western Flanders Bay (in the foreground and to the left) looking east. (Image credit: Rick Balla, EPA, August 26, 2004)

3. Meetinghouse Creek, Terrys Creek and Tributaries (NYS Priority Waterbodies List Segment #1701-0256)

According to the New York State Priority Waterbodies List, this segment includes the tidal portions of Meetinghouse Creek and Terrys Creek as well as their tributaries (see Figure I-1 and Image II.3). The entire waterbody segment spans approximately 200 acres. Meetinghouse Creek is situated entirely within the Hamlet of Aquebogue in the Town of Riverhead while the boundaries of Terrys Creek are shared by the Hamlets of Aquebogue and Riverhead in the Town of Riverhead.

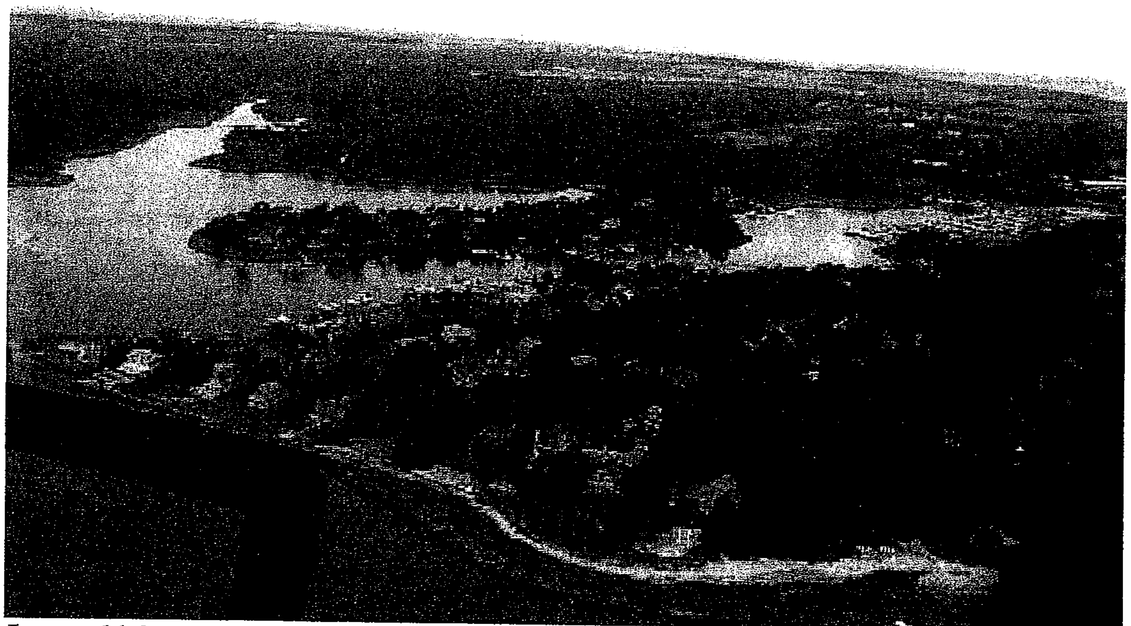


Image 11.3: Meetinghouse Creek (on the right) and Terrys Creek (on the left). (Image credit: Helen Grebe, EPA, August 29, 2006)

C. Pollutant Loads Affecting Impaired Waterbodies

Because the Peconic Estuary is a tidal system, the quality of water outside of the impaired waters can both positively and negatively affect the quality of impaired waters. For this reason, these TMDLs address loads from waters and watersheds outside the impaired waterbodies. Addressing waters and loads outside of the impaired waters is necessary to ensure that water quality standards are met throughout the Peconic Estuary System.

Sources of pollution resulting in impairments due to nitrogen enrichment include atmospheric deposition, on-site wastewater disposal systems, agricultural operations, turf and landscape maintenance, point sources including sewage treatment plants, and stormwater. These sources are discussed further detail in sections IV.C (Pollution Sources to Impaired Waters) and V.B (Nutrient Loading Data).

III. Applicable Water Quality Standards

This section provides an overview of nutrient issues and related standards and criteria, including a description of nutrient enrichment and its impacts, and New York State water quality standards and criteria for dissolved oxygen levels to support aquatic life uses.

A. Nutrient Enrichment and Impacts on Dissolved Oxygen
In the Peconic Estuary, nitrogen is the primary limiting nutrient for algal growth that leads to low DO levels and the subsequent non-attainment of designated uses. Nitrogen=s relationship to impaired designated uses is indirect and complex, with intermediate steps of algal blooms and decomposition, low DO, poor water clarity, inhibited SAV (primarily eelgrass) growth, and stress on marine fauna. The relationship between nitrogen loading, ambient nitrogen concentration, and DO conditions is complex, often nonlinear, and typically requires calibrated and verified mathematical models to account for the controlling hydrologic, physical, chemical, and biological interactions. The PEP, based on water quality data and model runs, derived a maximum allowable water column nitrogen concentration from the relationship between nitrogen values, algal biomass, and dissolved oxygen.

Based on monitoring and modeling, the PEP has determined that reducing nitrogen loads necessary to achieve the water quality standards for DO will protect and maintain designated uses in the Peconic Estuary, especially for the 303(d) listed waterbodies. While TMDLs for nitrogen are translated from DO standards, other eutrophication-related impairments resulting from the intermediate steps of algal blooms and decomposition, poor water clarity, inhibited submerged aquatic plant growth, and stress to marine organisms have been considered, and would benefit from the proposed nitrogen load reduction.

B. New York State Water Quality Standards for Class SC waters
New York State's marine and fresh water classifications, designated best uses, and floating substances standards are contained in NYCRR, Title 6, Chapter X, Parts 701 and 703. Below are the pertinent applicable water classifications, designated best uses, and dissolved oxygen standard for the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries and other marine waters of the Peconic Estuary system.

Designated Best Usage

Class SC The best use of Class SC waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Dissolved Oxygen Standard

Class SC Dissolved oxygen shall not be less than 5.0 mg/L at any time.

C. Proposed Revisions to New York's State's DO Standard for Class SC Waters
On December 13, 2006 a public hearing was announced in the New York State Environmental Notice Bulletin, in order to give the public an opportunity to provide oral or written comment on the Department's proposal to amend portions of Parts 700 - 704 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR). The proposed revisions are necessary to amend water quality standards based upon the most current scientific information. The marine dissolved

oxygen standard was among the items proposed for revision. As of the date of these TMDLs, the proposed revisions have not yet been adopted. The proposed standard follows:

Acute: Acute: Shall not be less than 3.0 mg/L at any time.

Chronic: Shall not be less than a daily average of 4.8 mg/L at any time, except that the daily average dissolved oxygen concentration may fall below 4.8 mg/L for a limited number of days, as defined by the formula:

$$DO_i = \frac{13.0}{2.80 + 1.84e^{-0.1t_i}}$$

where DO_i = DO concentration in mg/L between 3.0 - 4.8 mg/L and t_i = time in days. This equation is applied by dividing the DO range of 3.0 - 4.8 mg/L into a number of equal intervals. DO_i is the lower bound of each interval (i) and t_i is the allowable number of days that the DO concentration can be within that interval. The actual number of days that the measured DO concentration falls within each interval (i) is divided by the allowable number of days that the DO can fall within interval (t_i). The sum of the quotients of all intervals (i ...n) cannot exceed 1.0; i.e.,

$$\sum_{i=1}^{n} = \frac{t_i(actual)}{t_i(allowed)} < 1.0$$

The DO shall not fall below the acute standard of 3.0 mg/L at any time.

In preparing these TMDLs, we have considered, calculated and modeled the loads necessary to achieve both the existing and proposed water quality standards for dissolved oxygen. The analyses, loads, and load reductions necessary to achieve both the existing and proposed water quality standards are presented in this document.

IV. CWA 303(d) Listing

This section describes the impaired waters and pollutants, including the monitoring data documenting low dissolved oxygen levels in three waterbody segments, the pollutants of concern, and a brief overview of the pollution sources to the impaired waters.
There are other impaired waterbodies in the Peconic Estuary System, identified for reasons other than low dissolved oxygen and excess nitrogen. Twenty five waterbodies have been identified as impaired due to pathogen contamination. In September 2006, TMDLs were adopted and approved for twenty of these waterbody segments.

A. Use Impairments

1. Lower Peconic River and Tidal Tributaries

Monitoring data collected from 1995 to 2000 show that the water quality standard of 5 mg/L was not attained during the summer months (June 1st – September 30th) in the

Lower Peconic River (see Figure IV.I for monitoring station locations). The low dissolved oxygen levels are in the range of 2.0 - 4.9 mg/L. Three percent of the dissolved oxygen values are below 3.0 mg/L and twenty five percent of the dissolved oxygen levels are below 5.0 mg/L. In summary, state water quality standards for dissolved oxygen are frequently not attained in the Lower Peconic River.

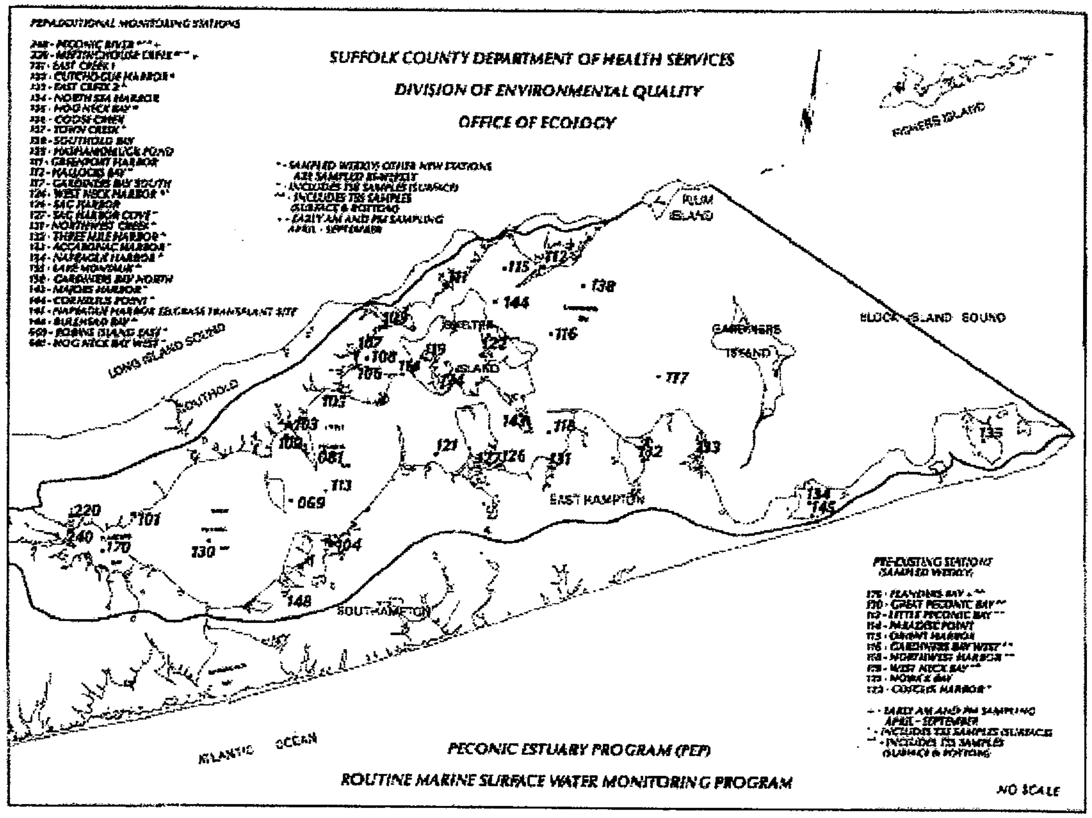


Figure IV.1: Peconic Estuary Program Routine Marine Monitoring Stations

2. Western Flanders Bay and Lower Sawmill Creek

Monitoring data collected from 1990 to 2000 show that the water quality standard of 5 mg/L was not attained during summer months in the western Flanders Bay area (see Figure IV.1 for monitoring station locations). The low dissolved oxygen levels are in the range of 4.2 – 4.9 mg/L. The ambient data show that four percent of the DO values are below 5.0 mg/L. In summary, state water quality standards for dissolved oxygen are infrequently not attained in the western Flanders Bay and Lower Sawmill Creek segment

3. Meetinghouse Creek, Terrys Creek and Tributaries

Monitoring data collected from 1995 to 2000 show that the water quality standard of 5 mg/L was not attained to a greater degree than the waterbodies named above during summer months in Meetinghouse Creek (see Figure IV.1 for monitoring station locations). The low dissolved oxygen levels are in the range of 0.2 - 4.9 mg/L. The ambient data show that twenty four percent of the dissolved oxygen values are below 3.0 mg/L and fifty three percent of the DO values are below 5.0 mg/L. In summary, the lack of attainment of state water quality standards for dissolved oxygen in Meetinghouse Creek is frequent and severe.

4. Commonalities among the Impaired Waterbodies

The low dissolved oxygen levels in these three waterbody segments are attributed to the excess loadings of the nutrient nitrogen in these waterbodies in combination with other factors. The high levels of nitrogen loadings leads to the proliferation of uncontrolled algae growth resulting in the abundance of readily oxidizable organic matter during algae senescence and death, and accumulation in sediments. The organic matter then oxidizes to carbon and consumes available dissolved oxygen in the water column causing violations of the dissolved oxygen standard. Night-time respiration of aquatic plants also results in DO demand and can cause short-term DO depressions in the early morning hours ("diurnal" dissolved oxygen variation).

Based on the documented and recurring violations of the applicable dissolved oxygen standard, best usages of these waterbodies are not being attained and these waters described above are impaired. Impacts and uses that are impacted include but are not be limited to: decreased fish propagation, increased mortality of sensitive organisms, poor water clarity, reduction in commercial and sport fisheries values, reduction in wildlife habitat value, degradation of seagrass beds, impact on tourism and real estate values, and poorer aesthetics. All these uses would benefit from improved water quality resulting from nitrogen load reductions.

Based upon the impaired conditions of the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries, DEC has included these waterbodies on the 2002 Clean Water Act Section 303(d) list. These waterbodies have been listed as impaired on the State's Priority Waterbodies List (PWL) and have been identified as not meeting the dissolved oxygen quality standard at all times and as priorities for TMDL development.

B. Pollutants of Concern

The primary pollutant contributing to low dissolved oxygen levels in the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries is nitrogen. Excess nitrogen promotes the uncontrolled growth of algae leading to the production of organic biomass. The decay of this organic matter and its accumulation in bottom sediments exerts a demand for dissolved oxygen in the water column and along with night time algal respiration results in the lowering of the DO levels and violations of the applicable water quality standard. This process is the dominant mechanism for causing low oxygen levels in Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries. The principal pollutant for these TMDL analyses, therefore, is nitrogen.

Organic carbon is also a key element in the process leading to low dissolved oxygen levels but is not a pollutant targeted for reduction in this analysis as reduction of organic carbon loadings has very little beneficial effect in improving DO levels when compared with the reduction of nitrogen.

C. Pollutant Sources to Impaired Waters

There are a number of significant sources of nitrogen that contribute to low DO in the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries. Other point sources are described later in this document:

1. One municipal wastewater treatment facility (the Riverhead STP) currently discharging less than one million gallons of treated effluent per day to the surface waters of the tidal Peconic River just west of the County Route 105 Bridge. Atlantis Marine World (the Riverhead Aquarium) also discharges a small flow and contributes a nutrient load to the tidal Peconic River)

2. Stormwater from the towns of Riverhead and Southampton is both regulated under the EPA's Phase II Stormwater Program, as are the New York State Department of Transportation and Suffolk County stormwater facilities within these towns. As of March 2003, the municipal separate storm sewer systems (MS4s) that serve these two towns were required to have a NPDES permit and a management plan that prevents polluted stormwater from being discharged into nearby water bodies and impacting water quality. The outfalls from these MS4s are considered point sources to the Peconic Estuary. The Town of Brookhaven is also regulated under the Phase II Stormwater Program, though stormwater from the Town of Brookhaven enters and contributes only to non-tidal Peconic River upstream of the impaired segments and is included in tributary loads.

3. Nonpoint sources contribute to groundwater loads that eventually recharge surface waters, including: fertilizer losses from agricultural operations and turf grass maintenance (at residences and other developed properties, and golf courses); and onsite wastewater disposal systems from properties not connected to sewage treatment plants. Other unregulated stormwater sources also contribute to the nonpoint nutrient load.

4. Sediment nutrient flux attributed to highly organic substrates found in the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries.

5. Wet and dry atmospheric deposition directly to water surfaces and to the landscape.

6. Boundary conditions, that is, the quality of the water flushing other waters, will influence the quality and response of impaired waterbodies.

D. Other Point Sources Outside of Impaired Waters

In addition to sources described in the above section, there are additional sewage treatment plants in the Peconic Study Area that discharge to estuarine waters outside of the impaired waters: the Sag Harbor Sewage Treatment Plant and the Shelter Island Heights Sewage Treatment Plant. As noted previously, the Villages of Sag Harbor and North Haven, the Towns of Brookhaven, Riverhead, and Southampton, the New York State Department of Transportation, and Suffolk County stormwater facilities are currently regulated under the EPA's Phase II Stormwater Program. While other municipalities within the Peconic study area (the Towns of Shelter Island, Southold, and East Hampton) are not currently covered by the Phase II regulations, they may be designated by the New York State Department of Environmental Conservation for such coverage during the second Phase II permit cycle (2008-2013). In addition, the Brookhaven National Laboratory STP, which discharges to the freshwater Peconic River is addressed as a boundary/tributary load, as is the Plum Island STP which discharges to Gardiners Bay. While the former Naval Weapon Industrial Reserve Plant (previously operated by the Grumman Corporation) in Calverton, NY also has an STP that discharges to a branch of the freshwater Peconic River, the operators have submitted engineering reports to upgrade and build a new facility discharging to groundwater outside of the Peconic Estuary study area.

V. TMDL Development

This section provides a description of the data inputs to the modeling process and ultimately the TMDLs, including ambient data, nutrient loading data, and uncertainties associated with current and projected future nutrient loads.

A. Available Ambient Data

Data from the SCDHS's water quality monitoring efforts as well as data from PEP funded studies and reports were used to calibrate and validate the Peconic Estuary EFDC (Environmental Fluid Dynamics Code) three-dimensional hydrodynamic and water quality model by Tetra-Tech, Inc. The SCDHS, in part through the Peconic Estuary Program, conducts an extensive water quality sampling program in the Peconic Estuary and its watershed.

1. Routine Water Quality Monitoring Program

While the SCDHS began limited surface water quality sampling in 1976, the number of stations and samples taken in the Peconics increased through the years. Currently, monitoring is conducted every other week at 32 stations throughout the year; two surface water quality monitoring stations are located in the waters for which the nitrogen these TMDLs are being developed. Water samples are tested for a suite of nitrogen components (NH3, NO2+NO3, Urea, TN, TDN), phosphorus components (TP, TDP, ortho-phosphate), carbon components (TOC, DOC), silicate (SiO3), total suspended solids (TSS), chlorophyll-a (Total and $< 10\ \mu m$), coliform bacteria (Total and Fecal), and Brown Tide (*Aureococcus*). At each station, secchi depth, temperature, dissolved oxygen, salinity, and the extinction of photosynthetically active radiation at incremental depths are measured. See Figure IV.1 and Figure V.1 for additional information on the SCDHS surface water quality monitoring program sampling locations.

2. Peconic Estuary Stream and Point Source Sampling Program

The SCDHS monitors 28 Peconic Estuary stream and point source stations on a monthly to quarterly basis, as time permits. Eight monitoring stations are located in the waters for which the nitrogen TMDLs are being developed, including sites at the Peconic River, Meetinghouse Creek, Sawmill Creek, Terrys Creek, the Crescent Duck Farm in the Meetinghouse Creek Watershed, and the Riverhead Sewage Treatment Plant. These stations are sampled for a suite of metals and organic compounds.

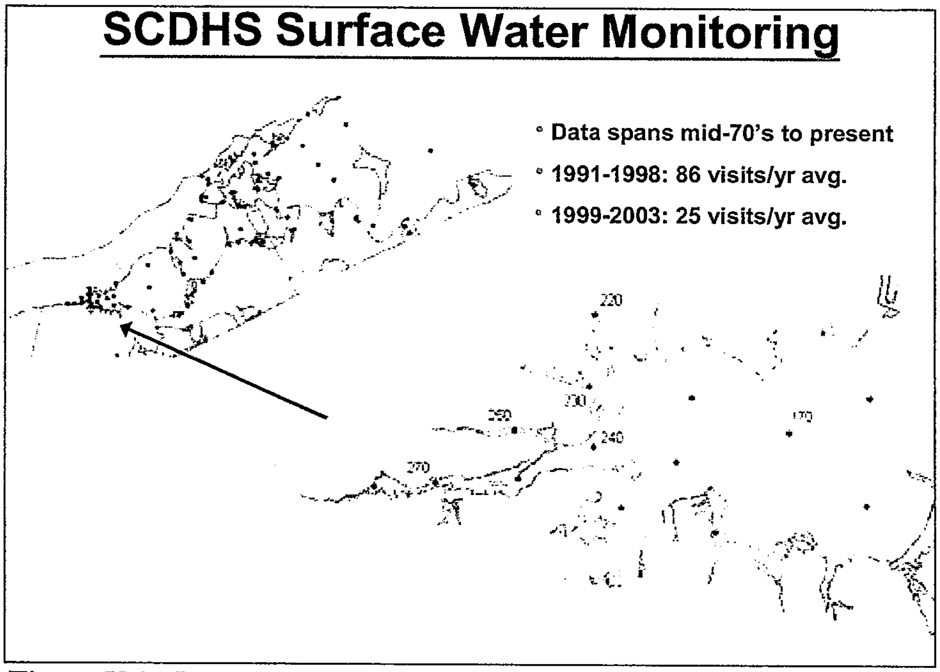


Figure V.1: Peconic Estuary Program Routine Marine Monitoring Stations

3. Continuous Water Quality Monitoring

For the summer and fall of 2002, continuous monitoring devices (Yellow Springs Instruments (YSI)) were deployed in the tidal portion of the Peconic River (at the Route 105 Bridge), western Flanders Bay (southwest of Buoy G"9"), and eastern Flanders Bay (approximately mid-way between SCDHS station 170 at Buoy R "9" and Red Cedar Point) by the SCDHS. The devices measure and record dissolved oxygen levels, temperature, and conductivity (to calculate salinity) every 15 minutes.

4. Groundwater Quality Monitoring Program

The SCDHS maintains a network of wells throughout the county to monitor the quality and quantity of the groundwater supply, and conduct studies and investigations of the county's hydrology. Groundwater measurement reports are periodically produced. The focus of groundwater monitoring has been on human induced loadings such as: fertilizers and pesticides use at agricultural operations, golf courses and residences; septic systems;

and chemicals (petroleum, solvents, and degreasers). In eastern Suffolk County, agricultural chemicals are the primary contaminant of concern.

B. Nutrient Loading Data

1. Overview

Nutrient loads are classified into several categories, based on geographic origin, source type, and whether it is of natural or human origin.

With regard to geographic origin, in-basin nutrient load contributions for these TMDLs originating within the northwest portion of the Peconic watershed include: stormwater runoff, the Riverhead Sewage Treatment Plant and Atlantis Marine World discharges, nutrient flux from the sediments, groundwater enriched by agricultural and non-agricultural sources, and wet and dry atmospheric deposition. Although the origin of atmospheric nitrogen may be many hundreds of miles away, it is presently included in the geographic category where it is deposited. Nutrient loads from all other sources, i.e., beyond the in-basin boundaries, are considered imported loads or out-of-basin loads, and include the loadings from the freshwater portion of the Peconic River and estuarine transport from outside the Peconic Estuary System.

Nitrogen loads by source type are categorized as nonpoint and point. While the Peconic Estuary, on a regional basis, is dominated by nonpoint source impacts, there are point source discharges, including the Riverhead Sewage Treatment Plant and Atlantis Marine World which discharge to an impaired water (the Lower Peconic River), and the Sag Harbor and Shelter Island Heights STPs. The towns of Riverhead and Southampton are both regulated under the EPA's Phase II Stormwater Program, as are the New York State Department of Transportation and the Suffolk County stormwater facilities within these towns, along with the Villages of Sag Harbor and North Haven. Further, the Town of Brookhaven is also regulated under the Phase II Stormwater Program, though stormwater from the Town of Brookhaven enters and contributes only to non-tidal Peconic River upstream of the impaired segments and is included in tributary loads. Other stormwater inputs are not currently regulated as point sources and are considered nonpoint sources. Nonpoint sources also include diffuse sources (*e.g.*, nitrogen-enriched groundwater resulting from septic systems and residual fertilizers, sediment flux) and wet and dry atmospheric deposition.

Nitrogen sources can be further subdivided into a pre- and post-colonial (*i.e.*, enriched) load. The pre-colonial or pastoral load is an estimate of the amount of nitrogen that was delivered to the estuary before European settlers colonized the area. The pre-colonial condition estimates what the natural load might have been. Human-caused loads include wastewater treatment facility outflows and nonpoint source groundwater flows from residential septic systems and residual fertilizers.

Nitrogen loads are presented as daily loads estimated for an average flow year. These loads, therefore, differ somewhat from the time variable nitrogen loads specific to the time period used in the Peconic Estuary EFDC Model employed to develop these TMDLs.

Oxidizable carbon loads were also estimated for the water segments using the same categories and approach that was used for nitrogen. Carbon is of interest because it contributes to low dissolved oxygen levels in the Peconic Estuary. While nitrogen plays the dominant role in causing hypoxia, the oxidation of carbon loads is also responsible for oxygen consumption. Because source management to remove nitrogen will also remove some of the total organic carbon (TOC) load, both nitrogen and carbon reductions are considered in quantifying the potential dissolved oxygen improvements. Since the carbon reductions are incidental to the management of nitrogen, no targets for TOC reduction have been established.

2. Development of Nutrient Loading Factors

These TMDLs and the nutrient loading factors that support them are based on both the extensive and detailed data bases on land uses and groundwater quality, and on the relationship between them. This involved looking at existing land uses, trends and build-out potential based on the zoning for the over 58,000 parcels of land in the Peconic Estuary Program Study Area. Special attention and consideration was given to farmland because of farmland preservation programs and also to open space acquisition because of the very significant funding that the five east end towns, the county and state along with private land trust organizations (The Nature Conservancy and the Peconic Land Trust) have assembled to acquire open space. Golf courses were addressed separately, as was developable land within the boundaries of the sewer districts. Recent work to estimate environmental implications associated with vegetative preservation requirements (i.e., clearing restrictions) and clustering requirements also factored into this analysis.

a. Existing Land Use Data

Existing land uses were categorized at the individual tax map parcel level using a standardized methodology showing 13 general land use category attributes based on assessor code data and residential density criteria. This data was then verified via field inspection, aerial photo interpretation, Real Property Tax Service Agency property data and owners list files, etc. and also manual corrections as necessary. This effort involved resolving complications such as:

- When more than one land use was found to occur on a single parcel, the primary use was determined and assigned to that parcel. Primary use was based on the relative intensity of use in comparison with the other use(s) in question. Consideration was also given to the areal extent of the use on the parcel.
- Dedicated common areas on tax map parcels in condominium/townhouse projects were classified as recreation and open space, since such areas are not available for development in the future.
- Agricultural lands that had reverted to old field habitat due to non-agricultural use were classified as vacant. Actively cultivated lands and those recently left fallow were classified as agriculture.
- All publicly owned parks and conservation lands, whether actively or passively used, were classified as recreation and open space

- The existing zoning designation of a parcel was not a factor in how that parcel was classified as to existing land use.

Given the extensive level of effort devoted to the PEP land use inventory, the Suffolk County Planning Department that prepared the inventory is confident that the incidence of errors (either judgment error (i.e., assigning the wrong classification category to a particular parcel or attribute error (i.e., the wrong classification is assigned a parcel in the GIS data base)) is very low. This work does, however, represent a static or "snapshot" view of land and does not reflect incremental changes that have occurred as a result of more recent development and open space acquisition activities. This work is documented in "Peconic Estuary Program Existing Land Use Inventory" (Suffolk County Department of Planning, January 1997).

b. Land Use Change Trends

A subsequent and related report is entitled "Peconic Estuary Program Land Use Change Analysis" (Suffolk County Department of Planning March 1998). The findings of this report included that nearly 10,500 acres of land and over 9,850 parcels in the PEP study area were converted to developed uses in the 19 period of record studied (1976 to 1995). This amounts to a conversion rate of about 550 acres per year. By far, the greatest amount of change involved conversion to residential uses. The over 9,400 acres of additional residential development accounted for 89.9% of the total acreage change and the vast majority of the parcels (98.6%) undergoing a change in use. The report also documented 46,112 acres of residential zoned land, 650 acres of commercial zoned land and 5,136 acres of industrial zoned land available for development in the PEP watershed, for a total of 51,898 acres. This report also cited the key environmental issue for the Peconic Estuary and its watershed is how and when this available land will be utilized in the future.

c. Projections Associated with Land Available for Development

A third related report, the "Peconic Estuary Program Land Available for Development" (Suffolk County Department of Planning, April 1998), was prepared to help answer the first of two related questions of special significance to the PEP:

1) How *can* the PEP watershed be developed in the future
2) How *will* the PEP watershed be developed in the future?

The answer to the first question is a function of how land has been used in the past, what proportion of the land is available for development in the future, and the uses that are allowed on this available land as dictated by existing zoning regulations. The report answered the question of how the study area could be used in the future given the constraints of existing zoning and various assumptions. The data and information gathered anticipated the future use of assisting in quantifying pollutant loadings and the modeling of nitrogen management alternatives by the PEP, as well as the evaluation of potential land use, zoning, pollution abatement and habitat protection recommendations impacting the Peconic Estuary.

The methodology employed in the report was used to identify, map and quantify the land available for development in the PEP land use study area at the tax map scale using the PEP Existing land use maps, municipal zoning maps and GIS coverages of zoning data, farmland preservation data, easement information, etc. Land available for development is defined in this report as vacant land or land that has not yet been developed to the maximum extent as permitted by municipal zoning law. Vacant parcels, agriculturally used property with intact development rights, residentially developed property capable of further residential subdivision according to zoning and a select group of "special case" properties that are not included in any of the above categories were considered as land available for development. The methodology used for land available for development assumes that every parcel so designated will be residentially, commercially or industrially developed to the fullest extent according to town or village zoning regulations. In all cases, the projected use of a parcel available for development was determined by the existing zoning classification for that particular parcel. Designating a parcel of land available for development does not connote that the parcel should necessarily be developed. It simply states that under current zoning regulations that the parcel can be developed or the existing use occurring on the parcel can be intensified. Current zoning serves as a blueprint for the type and intensity of future development one can expect within a municipality and it is used as a planning tool to assist in the identification, mapping and quantification of the land available for development within the study area.

Land available for residential, commercial and industrial development was inventoried. The acreage and potential number of dwelling units were calculated and special consideration was given in the case of the re-development of large parcels of developed property where changes in use are likely to occur over the near term. This report documented nearly 52,000 acres (40%) of the upland acreage in the PEP study area are still available for development, and that development of residentially zoned available land under current zoning conditions has the potential for the creation of over 27,000 new dwelling units. In 1990 over 39,000 dwelling units existed in the PEP study area. Maximization of residential development according to existing zoning could result in a total of more than 66,000 dwelling units – a 69% increase in the number of dwelling units than existed in the study area in 1990. Findings were also presented for commercial and industrially zoned lands.

d. Critical Lands Protection

The "Peconic Estuary Program Critical Lands Protection Plan" (2004) identified and prioritized land available for development in the Peconic Watershed's five eastern towns for protection. As of 2001, a little more than 22% of the land is still available for development (including both vacant land as well as land that is developed but could still be subdivided under current zoning). Agricultural lands were not included in the critical lands analysis as they are being dealt with in a separate forum. The most widely used land protection tool is full fee acquisition from willing sellers. While the Community Preservation Fund (CPF), utilizing a real estate transfer fee assessed upon the buyer, is the most successful land protection program on Long Island, raising over $169 million through January 2004, it is not sufficient to keep up with the rate of development and the loss of critical landscapes, let alone the overall inventory of land that could be developed.

Future CPF revenues, while still significant, could purchase less than 10% of these lands, perhaps 1800 acres. Fortunately, other programs, primary at the county and state (and potentially Federal) level can help to bridge some of the gap, together with programs of private land trust organizations and private citizens to reach perhaps a 15% acquisition threshold of available land.

The PEP Critical Lands Protection Strategy work group also recommended an expansion of the existing land use restrictions in the Towns of Southampton and East Hampton and encouraged the adoption of similar land use regulations in other towns. Large amounts of land can be effectively protected without having to expend funds to actually acquire the properties, through clearing restrictions, clustering requirements, rezoning, overlay districts, easements, purchase of development rights, and overall better land use practices. It is estimated that the implementation of vegetation preservation requirements (i.e., clearing restrictions) alone would protect an additional 3,183 acres in the five east end towns; acquiring an equivalent amount of land would cost an estimated $382 million. Vegetation preservation requirements can help to significantly reduce the amount of property that will be planted in turf grass at both the time of development and in the future, significantly reducing likely fertilizer inputs, among other benefits. These figures were calculated using the land available for development, assuming CPF purchase of some lands, and not considering lands already in a town overlay district already requiring vegetation preservation.

e. Land Use Trends Projections for Future Loads

Because so much of the watershed could be developed and there is corresponding likelihood for nitrogen loads (and especially nonpoint source loads) to increase, TMDLs that do not take into account future development are likely to be unsuccessful in achieving water quality standards in the short-term or ensuring that they will continue to be attained in the long-term. For this reason, it was necessary to specify a likely reasonable build-out scenario. Based on the above narratives and for the purpose of developing TMDLs, the main elements of this reasonable cumulative full build-out scenario, which will also be referred to in the practical load reduction scenario, are as follows:

- 50% of the remaining farmland is preserved
- 15% of the vacant land is protected, increased to 30% in the watersheds of the impaired waters
- 15% of subdividable land is protected, increased to 30% in the watersheds of the impaired waters
- The rest of agricultural, vacant and further subdividable land is developed with clustering and vegetation preservation requirements, with even more aggressive land use controls in the watersheds of the impaired waters

f. Groundwater Quality Assumptions for Calculating Loads

Groundwater inputs are especially significant for modeling the Peconic Estuary for the current baseline condition as well as projecting what may happen in the future in response to changing land uses. Once existing or future land uses were determined or projected, associated nutrient loadings also needed to be determined or projected. For the purpose of these TMDLs, average nitrogen concentrations in the groundwater management zones ranged from 0.65 mg/L in the high quality freshwater Peconic River corridor (where there is significant protected open space and vacant land, relatively little agriculture and some sewering) to 9 mg/L in north fork zones where is a significant amount of agriculture.

- Nitrogen levels in groundwater in agricultural areas were estimated at a concentration of 13 mg/L; best management practices were estimated to be able to reduce the concentration in groundwater by 25% to 9.75 mg/L, or if aggressively managed in the watersheds of the impaired waters, by 50%.

- Nitrogen levels in groundwater in non-agricultural existing developed areas were estimated at a concentration of 6 mg/L; best management practices were estimated to be able to reduce the concentration in groundwater by 25% to 4.5 mg/L, or if aggressively managed in the watersheds of the impaired waters, by 33%.

- Nitrogen levels in groundwater in golf courses areas were estimated at a concentration of 3.58 mg/L; best management practices were estimated to be able to reduce the concentration in groundwater by 25% to 2.69 mg/L, or if aggressively managed in the watersheds of the impaired waters, by 50%.

- Nitrogen levels in groundwater from vacant and subdividable lands that are developed residentially with vegetation preservation requirements and other land use controls and best management practices were estimated at 3.75 mg/L; additional best management practices in the watersheds of the impaired waters were estimated to be able to reduce the concentration in groundwater to 3 mg/L.

- Nitrogen levels in groundwater in areas of open space and vacant lands were estimated at 1 mg/L.

- Nitrogen levels in groundwater in developed areas of sewer districts were estimated at 2 mg/L. This includes a portion of the land area in the Village of Greenport which is sewered, though the Greenport STP discharges outside of the Peconic Estuary (to the Long Island Sound).

- The above nitrogen levels in groundwater were assumed to be further reduced by 0.2 mg/L in response to the implementation of Federal Clean Air Act requirements (i.e., less nitrogen being deposited on the watershed landscape will lead to improved groundwater quality).

g. Tributary Inflows

In the western estuary, there are 8 tributary inflows included in the model as distinct loads. These 8 tributaries (along with the location of the Riverhead Sewage Treatment Plant outfall) are depicted in Figure V.4

Table V.1 Summary of Relevant Permit Requirements, Limitations and Discharge Monitoring Data for the Sag Harbor, Shelter Island Heights and Riverhead Sewage Treatment Plants

Riverhead STP / Parameter	Permit Conditions	Discharge Monitoring Data		
		Summer Average (06/-05 to 09/-05)	1 Yr Average (03/-05 to 02/-06)	4 Yr Average (04/-02 to 02/-06)
Flow (MGD)	1.3	0.79 (min=0.766; max=0.808) 0.79 (winter average, 11/05 to 01/06)	0.81 (min=0.697; max=1.146)	0.79 (min=0.66; max=1.044)
Total Nitrogen (lbs/day)	170	71. (min=43.; max=133)	61. (min=43.; max=133)	70. (min=23.; max=141.)
Total Nitrogen concentration (mg/L) (back-calculated)	no reporting requirement	10.8	9.0	10.7

Sag Harbor STP / Parameter	Permit Conditions	Discharge Monitoring Data		
		Summer Average (06/-05 to 09/-05)	1 Yr Average (03/-05 to 02/-06)	4 Yr Average (04/-02 to 02/-06)
Flow (MGD)	0.25	0.13 (min=0.11; max=0.14) 0.06 (winter average, 11/05 to 01/06)	0.094 (min=0.06; max=0.138)	0.094 (min=0.059; max=0.14)
Total Nitrogen (mg/L) (back-calculated)	no reporting requirement	5.5 lbs/day	4.4 lbs/day	4.8 lbs/day
Total Nitrogen concentration	8	2.5 (min.=2, max-3.1), 5.2 (2003) 6.6 (winter average, 11/05 to 01/06)	5.6 (min.=2, max=9.3)	6.17 (min=1.8, max=18.6)

Shelter Island Heights STP / Parameter	Permit Conditions	Discharge Monitoring Data		
		Summer Average (06/-05 to 09/-05)	1 Yr Average (03/-05 to 02/-06)	4 Yr Average (04/-02 to 02/-06)
Flow (MGD)	0.053	0.032 (min=0.025, max=0.038) 0.014 (winter average, 11/05 to 01/06)	0.021 (min=0.011; max=0.038)	0.021 (min=0.008; max=0.042)
Total Nitrogen (mg/L) (back-calculated)	no reporting requirement	5.2	2.1	1.7
Total Nitrogen concentration	reporting only	19.5 mg/l, (min=5.2, max=27.4) 11.3 (winter average, 11/05 to 01/06)	12.2 mg/l (min.=5.1 max=27.4)	10.2 mg/l (min=3.8, max=27.4)

h. Point Sources/Sewage Treatment Plants
See table V.1 for a summary of relevant permit requirements, limitations and discharge monitoring data for the Sag Harbor, Shelter Island Heights and Riverhead Sewage Treatment Plants. A discussion of the Atlantis Marine World (the Riverhead Aquarium) follows.

***i.* The Sag Harbor and Shelter Island Heights STPs**
For the baseline scenario, the nitrogen loads from the Sag Harbor and Shelter Island Heights sewage treatment plants were determined by extending the existing effluent quality (i.e., 6.2 mg/L and 10.2 mg/L, respectively) for their permitted flows (0.25 and 0.053 MGD, respectively) or 13. lbs TN/day and 4.5 lbs. TN/day. The nitrogen load assigned to the Sag Harbor STP treatment plant was determined using the current permit effluent discharge concentration (8 mg/L) and the permitted flow (0.25 MGD), resulting in a calculated load of 17 lbs. TN/day. Similarly, the nitrogen load assigned to the Shelter Island Heights STP was determined by extending the existing effluent quality (10.2 mg/L) to the permitted flow (0.053 MGD), resulting in a calculated load of 5.0 lbs. TN/day.

***ii.* Riverhead Sewage Treatment Plant - Overview**
At the Riverhead Sewage Treatment Plant, the current nitrogen load being discharged, based on existing effluent quality and flows, is 70 lbs. of TN/day. For baseline model runs however, the load is 130 lbs./day which was statistically related to the estimated daily average daily loading associated with a monthly average of 170 lbs. per day for a 24-hr composite sample at a sampling frequency of one sample per week). For loads in the future, the assigned load is 40 lbs. TN/day from May 1 to September 30 and 130 lbs. TN/day rest of year. From October 1 to April 30, the load is based on the permitted flow and existing treatment. From May-September, the flow is reduced based on a beneficial effluent reuse project that will divert a portion of the flow from discharge to the nutrient sensitive Tidal Peconic River, with the balance of the flow receiving optimization of existing treatment. This is described in additional detail in the section that follows.

***iii.* Riverhead Sewage Treatment Plant – Expanded Discussion**
The Riverhead Sewage Treatment Plant presented some special challenges in this analysis due to the location of its outfall in the poorly flushed and already nutrient enriched Tidal Peconic River. State water quality standards for dissolved oxygen are not currently achieved in the area in the proximity of the outfall. The DO sag occurs in spite of the fact that there is already an advanced wastewater treatment system in place for nutrient removal and that the facility is discharging well below its permitted maximum flow and permitted nitrogen load. Numerous modeling scenarios investigating a variety of point and nonpoint source load reductions demonstrated that it is necessary to reduce this particular point source load, particularly during the critical warm weather months, in order to achieve water quality standards for dissolved oxygen.

The SPDES permit for this facility authorizes a permitted flow of up to 1.3 million gallons per day and a maximum nitrogen loading of 170 lbs. TN/day (expressed as a monthly average based on a 24 hour composite sample and a sampling frequency of once per week. The permit does not specify concentration limits for nitrogen. If the maximum nitrogen load was discharged at the maximum permitted flow, it would translate to 15.7 mg/L.

At the present time, the Riverhead STP flow is 0.79 MGD and discharges at an average of 10.7 mg/L; this translates to a daily loading of 70 lbs. of TN/day. The discharge load and effluent quality data are based on actual STP monitoring data from April 2002 through February 2006. If the Riverhead STP was to maintain this existing effluent quality at its permitted flow of 1.3 MGD, the nitrogen load would be 116 lbs. TN/day. Advanced treatment technology in the form of sequencing batch reactors could achieve an effluent quality of 5 mg/L; this will be referred to as the "practical load reduction" for the STP. Effluent at this practical load reduction would discharge 33 lbs. TN/day at the current flow or 54 lbs. TN/day at the permitted flow.

There is currently a funded project in place through which a portion of the Riverhead STP effluent flow will be beneficially reused to irrigate the adjacent county golf course during the warm weather months (May through September), thereby lessening the impact from the direct discharge to the stressed Tidal Peconic River. Both the current and maximum permitted flows from the STP exceed the projected irrigation needs at the golf course, which has been calculated to be 0.35 MGD. This project, when implemented will use the reclaimed water and reduce the direct loading of a portion of the discharged nitrogen load during the critical warm weather months.

At the permitted flow, with the existing effluent quality, and effluent diversion for beneficial reuse, the calculated load during the warm weather months would be 86 lbs. TN/day. At the current flow with the existing effluent quality, and effluent diversion for beneficial reuse, the calculated load during the warm weather months would be 40 lbs. TN/day.

If the effluent quality is improved to the practical load reduction (5 mg/L), at the permitted flow and with effluent diversion for beneficial reuse, the calculated load would be 40 lbs. TN/day. At the practical load reduction, the current flow and effluent diversion for beneficial reuse, the calculated load would be 18 lbs. TN/day.

The baseline scenario in the analysis that follows is based on a year-round load from the Riverhead STP of 130 lbs. TN/day. Based upon the various modeling scenarios designed to achieve state water quality standards for dissolved oxygen now and in the future (in combination with other point and nonpoint source load reductions) these TMDLs are based on a discharge of 130 lbs. TN/day during the cold weather months and 40 lbs. TN/day during the warm weather months. These loads are achievable at the existing flow, continuing existing effluent quality and effluent diversion for beneficial reuse. It can alternatively be achieved for the permitted flow, at the practical load reduction treatment and effluent diversion for beneficial reuse.

The information in the preceding paragraphs for the Riverhead Sewage Treatment Plant is summarized in Table V.2.

Table V.2 Riverhead STP Flows, Effluent Concentrations and Nitrogen Loads Associated with Various Discharge Scenarios

Scenario Summary Description	Average Daily STP Flow (MGD)	Average Daily Effluent Concentration (mg/L)	Average Daily Nitrogen Loading (lbs./day)
Current flow at existing effluent quality	0.79	10.7	70
Permitted flow at existing effluent quality	1.3	10.7	116
Permitted flow at existing effluent quality with effluent diversion for reuse	0.95	10.7	86
Permitted flow with practical load reduction effluent quality	1.3	5.0	54
Permitted flow with practical load reduction effluent quality and effluent diversion for reuse	0.95	5.0	40
Current flow at existing effluent quality and effluent diversion for reuse	0.44	10.7	40
Current flow with practical load reduction effluent quality	0.79	5.0	33
Current flow with practical load reduction effluent quality and effluent diversion for reuse	0.44	5.0	18

Notes to Table V.2

(1) The current 4 year average from April 2002 through February 2006 flow, discharge load and effluent quality are 0.79 MGD; 70. lbs. TN/day; and 10.7 mg TN/L, respectively. All other values in this table are calculated values.

(2) Anticipated diversion for beneficial effluent reuse, irrigating the adjacent Indian Island County Golf Course, is 0.35 MGD from May 1 through September 30.

(3) The current permit allows a discharge of 1.3 MGD and 170 lbs. TN/day; there is no expressed concentration limit for nitrogen.

iv. Atlantis Marine World (the Riverhead Aquarium)

The Atlantis Marine World facility discharges to the tidal Peconic River, just west of the Riverhead STP. The permitted flow is 0.0081 MGD; there is no nitrogen loading or concentration limit in the current permit. The load assigned to this facility is 4 lb. TN/day; while this assignment is based on a limited data set from discharge monitoring reports, a limit is necessary due to the location of the discharge in the nutrient sensitive tidal Peconic River,

i. Wet and Dry Atmospheric Deposition

Wet and dry atmospheric deposition loads are estimated to be reduced by 31.3% in response to the implementation of the Clean Air Act. This results in a direct reduction to the surface waters loads; groundwater TN contributions are projected to be reduced by 0.2 mg/L in response to the improved atmospheric deposition quality (also described/included above under "Groundwater Quality Assumptions for Calculating Loads"

j. Stormwater Runoff

Stormwater runoff loading is treated as a point source in the model. In response to mitigation, a 15% reduction in stormwater N load is attributed to Peconic River and Flanders Bay and a 10% reduction to east of Flanders Bay. Note that current stormwater TN loading estimates for the Peconic River and Flanders Bay is 30 lb TN/day and east of

Flanders Bay is 100 lb TN/day. The stormwater loading is apportioned to each shoreline model grid cell.

Stormwater discharges from the separate storm sewer systems operated by the villages of Sag Harbor and North Haven, the towns of Riverhead, Southampton and Brookhaven, the New York State Department of Transportation, and Suffolk County stormwater facilities are regulated under the EPA's Phase II Stormwater Program. As of March 2003, these municipal entities were required to obtain NPDES permit coverage and to begin implementing comprehensive stormwater management programs designed to reduce and prevent the impacts of their discharges of contaminated stormwater on surface waters. Complete implementation of first permit cycle (2003-2008) municipal Phase II stormwater management programs is mandated by January 2008, at which time the second Phase II permit cycle (2008-2013) will begin. The points of discharge, or outfalls, from regulated municipal separate storm sewer systems are considered point sources to the Peconic Estuary. Other stormwater inputs are not currently regulated as point sources and are managed as nonpoint sources, but this will be reviewed in the future and may result in additional areas subject to municipal stormwater permits.

The stated stormwater load originates from municipal separate stormwater systems as well as from flows from rural and developed areas, including stormwater that directly and indirectly enters watercourses. The stated reductions of 10 % and 15% percent were determined (based upon best professional judgment) to be maximum that could be reasonably achieved.

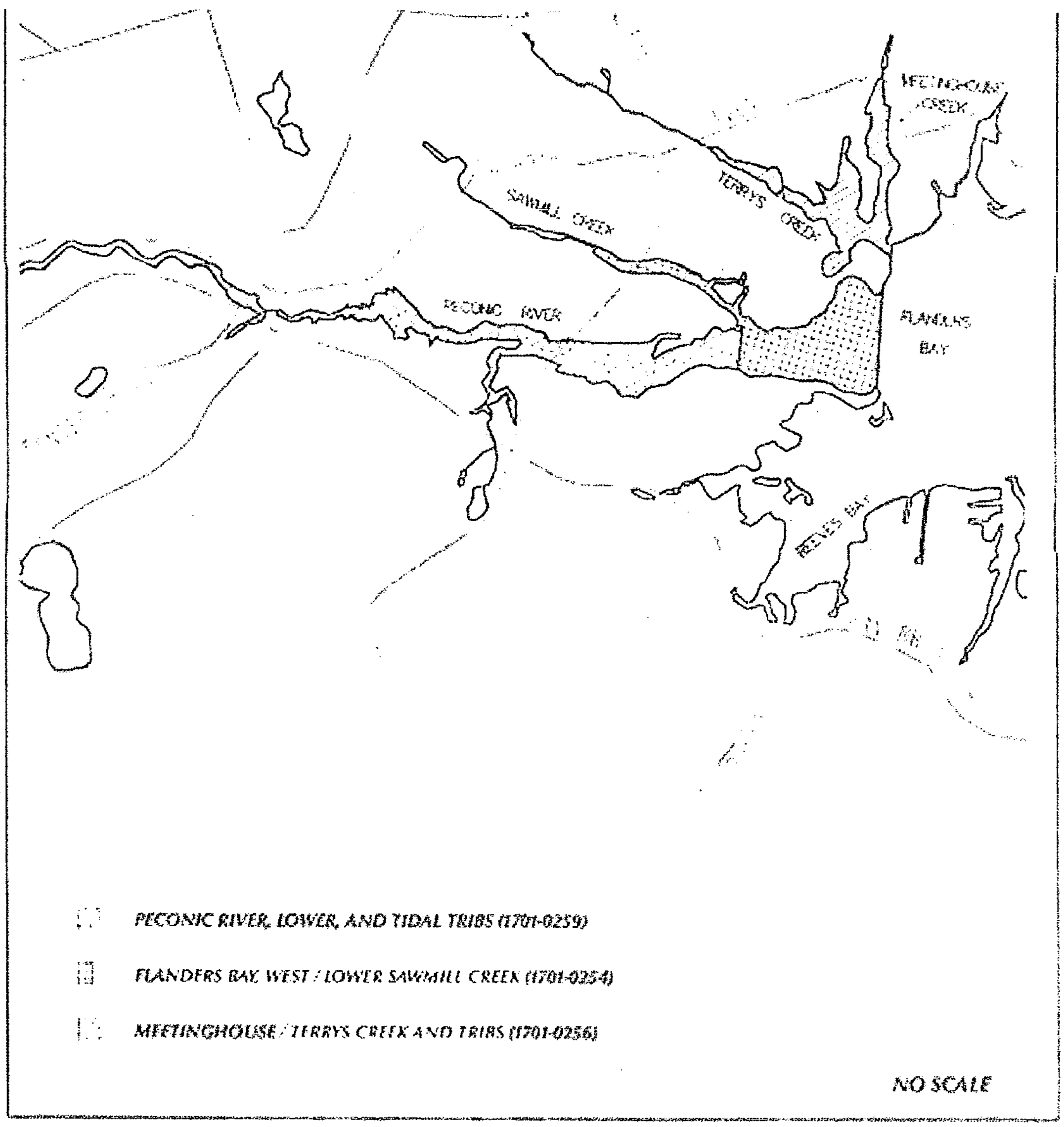
k. Other Point Sources

In addition to the point sources described above, there are other point sources within the Peconic Estuary watershed: the Brookhaven National Laboratory, the former Naval Weapon Industrial Reserve Plant, and Plum Island STPs. The PEP model accounts for the Brookhaven National Laboratory STP discharge as a boundary load in the tributary load attributed to the Peconic River, which is expressed as a loading allocation (LA) within these TMDLs. The BNL discharge does not discharge to estuarine waters or directly to an impaired segment. The Plum Island STP discharges to an extremely well mixed area at the eastern boundary of the system and its impact on the Peconic Estuary System is considered de minimus due to its location. While the former Naval Weapon Industrial Reserve Plant (previously operated by the Grumman Corporation) in Calverton, NY has an STP that discharges to a branch of the Peconic River, the operators have submitted engineering reports to upgrade and build a new facility discharging outside of the Peconic Estuary study area. Additional discussion of these discharges is provided in the implementation section of this report.

3. Summary of Baseline Nutrient Loads and Uncertainties

An the average estimated baseline year, 5,357,364 pounds of nitrogen enters the Peconic Estuary, consisting of: 3,015,041 pounds (56%) from atmospheric deposition; 2,175,031 pounds (41%) from groundwater, 66,242 pounds (1%) from the Peconic River and seven western tidal creeks, 53,689 pounds (1%) from three sewage treatment plants, and 47,361pounds (1%) from stormwater . It should also be noted that the model integrates stormwater into river flows. Actual loadings will vary from year to year depending on the amount and intensity of rainfall and meteorological conditions that affect water circulation and fluxes. Land development trends in the future and how humans contribute nitrogen to the landscape and to groundwater (principally from on-site disposal systems, agricultural operations, and lawn care and landscaping) will also affect nitrogen load increases or decreases. Future work may improve estimates of land based contributions and atmospheric deposition rates.

The tables and pie charts that follow depict nitrogen sources for the three impaired waterbody segments and for the other waters in the Peconic Estuary System, as well as a summary of the entire system by waterbody and by nitrogen source.



FigureV.2: Peconic Estuary waterbodies impaired due low dissolved oxygen

Table V.3: Baseline Nitrogen Load Summary for Segment 1701-259, Lower Peconic River and Tidal Tributaries

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	2,590.
Groundwater	115,672.
Little River	2,181.
Peconic River	40,146.
Stormwater	3,140.
Riverhead STP	47,353.
Total*	211,072.

*May not add due to rounding

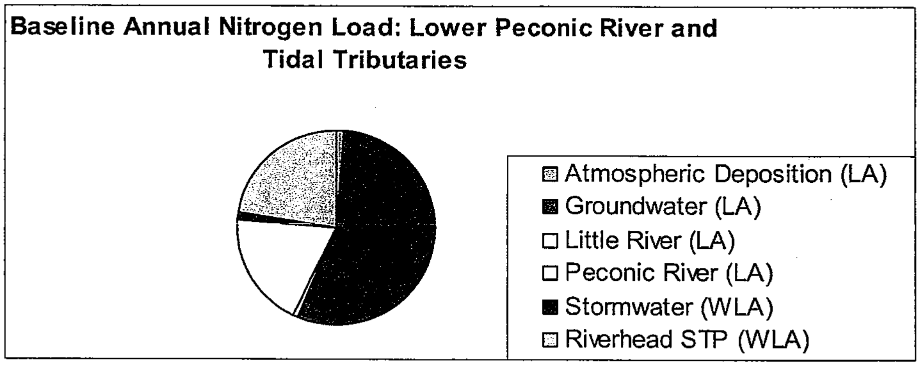


Table V.4 Baseline Nitrogen Load Summary for Segment 1701-254, Western Flanders Bay and Lower Sawmill Creek

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	2,724.
Groundwater	26,539.
Sawmill Creek	2,181.
Stormwater	1,919.
Total*	33,363.

*May not add due to rounding

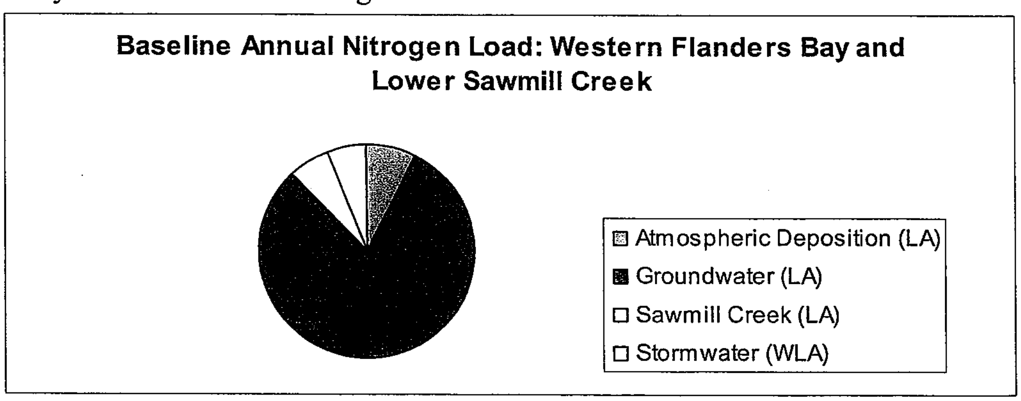


Table V.5 Baseline Nitrogen Load Summary for Segment 1701-256, Meetinghouse Creek and Terrys Creeks and Tributaries

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	1,508.
Groundwater	77,387.
Terrys Creek	1,589.
Meetinghouse Creek	17,021.
Stormwater	2,328.
Total*	99,838.

* May not add due to rounding

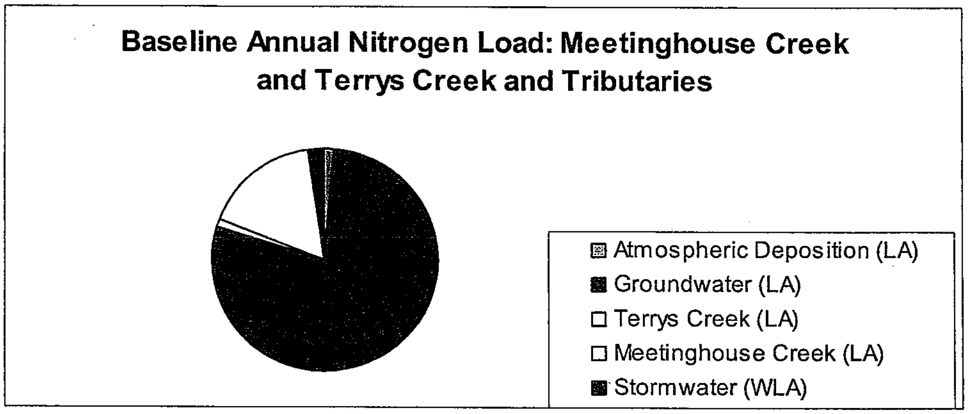


Table V.6 Baseline Nitrogen Load Summary for Flanders Bay

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	46,490.
Groundwater	176,811.
Hubbard Creek	1,733.
Mill Creek	940.
Birch Creek	452.
Stormwater	3,541.
Total*	229,966.

*May not add due to rounding

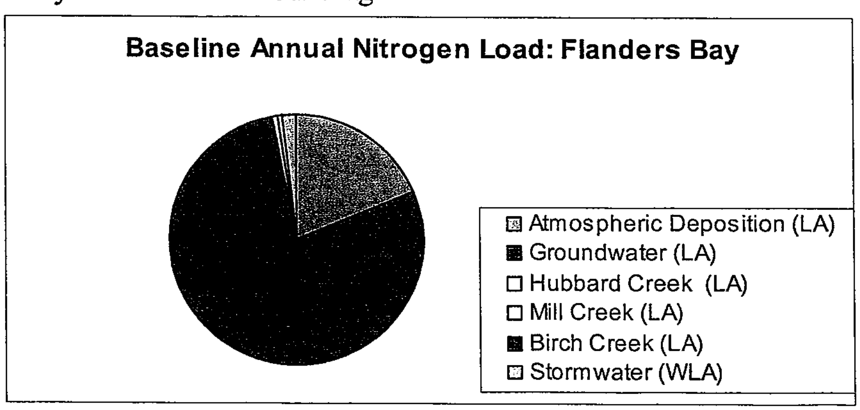


Table V.7 Baseline Nitrogen Load Summary for Great Peconic Bay

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	379,951.
Groundwater	309,881.
Stormwater	3,252.
Total*	693,081.

*May not add due to rounding

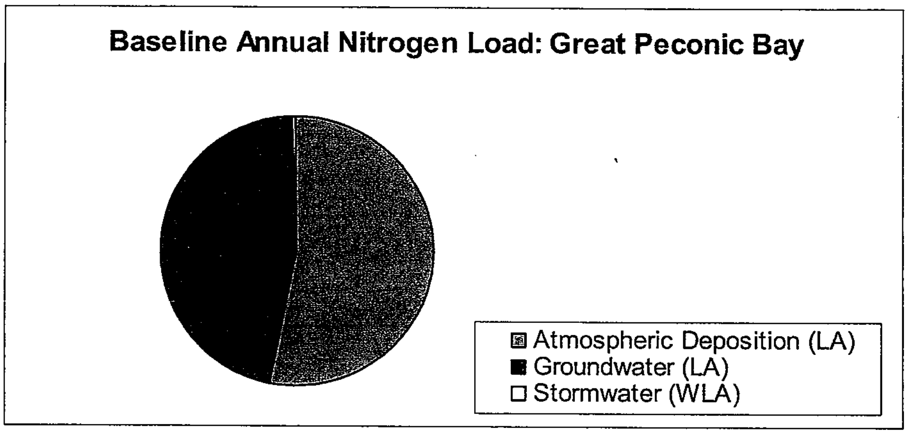


Table V.8 Baseline Nitrogen Load Summary for Little Peconic Bay

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	251,440.
Groundwater	327,139.
Stormwater	5,990.
Total*	584,565.

* May not add due to rounding

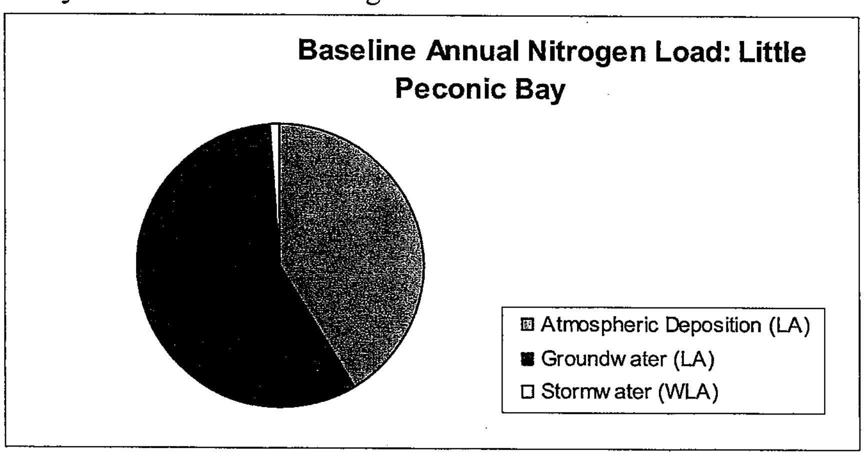


Table V.11 Baseline Systemwide Summary

Nitrogen Source	Total Annual Load TN (lbs)
Lower Peconic River and tidal tributaries	211,072.
Western Flanders Bay and Sawmill Creek	33,363.
Meetinghouse and Terrys Creeks and Tributaries	99,838.
Flanders Bay	229,966.
Great Peconic Bay	693,081.
Little Peconic Bay	584,565.
Shelter Island Sound	1,108,888.
Gardiners Bay	2,396,587.
Total*	5,357,359.

*May not add due to rounding

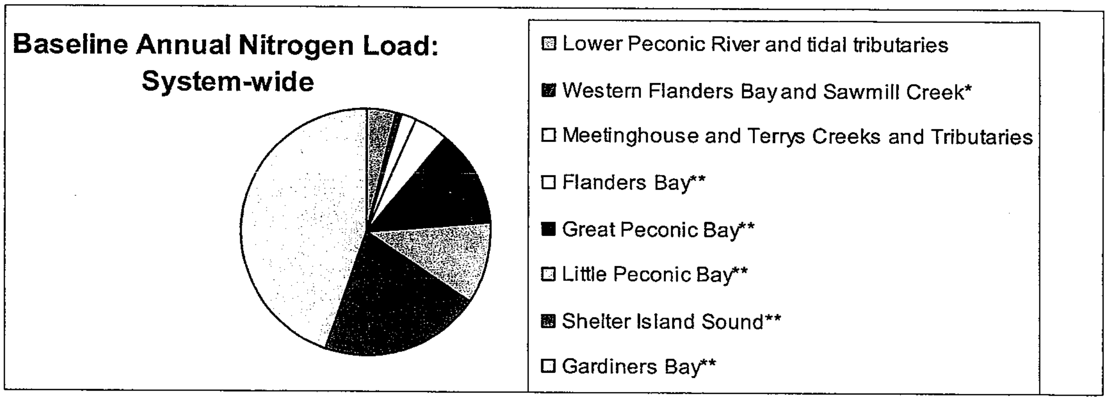


Table V.12 Baseline Systemwide Summary by Source

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	3,015,041.
Groundwater	2,175,031.
Creeks & Rivers	66,242.
STPs	53,689.
Stormwater	47,361.
Total*	5,357,364.

*May not add due to rounding

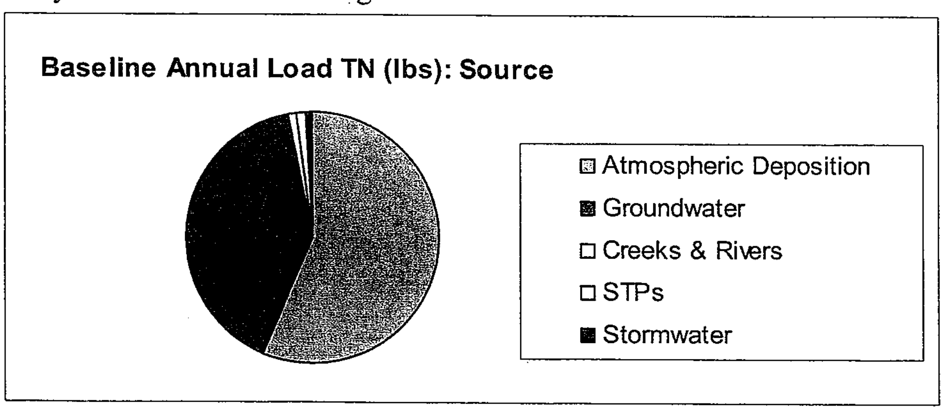


Table V.9 Baseline Nitrogen Load Summary for Shelter Island Sound

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	438,292.
Groundwater	645,275.
Sag Harbor STP	4,690.
Shelter Island Heights STP	1,646.
Stormwater	18,983.
Total*	1,108,888.

*May not add due to rounding

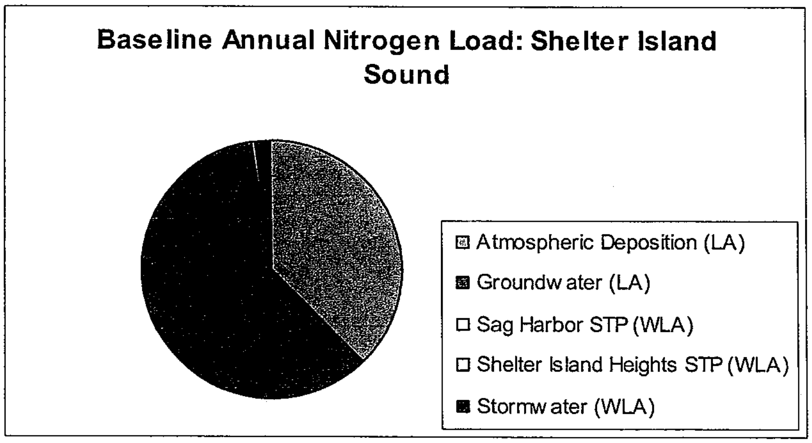
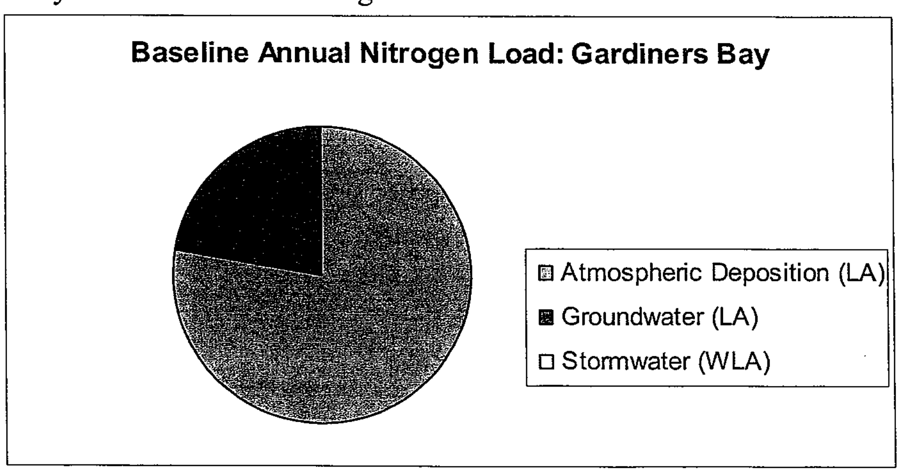


Table V.10 Baseline Nitrogen Load Summary for Gardiners Bay

Nitrogen Source	Total Annual Load TN (lbs)
Atmospheric Deposition	1,892,048.
Groundwater	496,327.
Stormwater	8,207.
Total*	2,396,587

*May not add due to rounding



C. Water Quality Model

Under the Peconic Estuary Program, the SCDHS, EPA, and the DEC sponsored the development of a three-dimensional, time-variable hydrodynamic and water quality model called the Environmental Fluid Dynamics Code or EFDC (Hamrick, 1992). EFDC is a public domain, open source, surface water modeling system, which includes hydrodynamic, sediment and contaminant, and water quality modules fully integrated in a single source code implementation. The kinetic processes included in the EFDC water quality model are derived from the CE-QUAL-ICM water quality model (Cerco and Cole, 1993, 1994) as described in Park et al. (1995). The water quality model also included a sediment flux processes submodel. The model incorporated advanced physical, biological, and chemical kinetics that relate nutrients to phytoplankton dynamics and DO. The model was used to help understand nutrient and oxygen dynamics in the Peconic Estuary System and to evaluate alternative nutrient management options for improving water quality.

The model used for the Peconic Nitrogen TMDLs built upon the PEP model by including a much more detailed grid in the western bays in order to provide adequate resolution for resolving water quality issues in the three listed waterbodies (i.e., the Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries). The vertical resolution of the model was increased from two layers in the PEP study to four layers in the TMDL effort. Also, kinetic rates in the sediment flux submodel were updated based on information from a sediment accretion study funded under PEP (Cochran et al., 2000) as well as from published data (DiToro, 2001).

The EFDC model was calibrated using an eight-year period from October 1, 1988 to September 30, 1996. The model was verified using a six-year period from October 1, 1996 to September 30, 2002. Details of the calibration and verification are documented in the hydrodynamic and water quality model reports (Tetra Tech, 2000, 2005). The 14-year period covered by the calibration and verification included all seasons of the year as well as extreme wet and dry years. Tributary loadings were determined using time-variable river flow measured at the Peconic River USGS gauge (01304500) and observed water quality data. Meteorological, hydrological, and tidal forcing conditions that influence external boundary conditions and internal circulation within the bay have been considered and are included in the model. The EFDC model reproduced both the temporal and spatial trends in observed data and successfully simulated the 1988-2002 conditions.

Although data records indicate that the occurrence of low DO takes place from May through September, nitrogen loadings throughout the year contribute to the pool of nitrogen available for uptake by phytoplankton and for distribution to bottom sediments. The model indicated that the Riverhead STP warranted special attention to seasonal management of nitrogen due to the location of its outfall in relation to the critical DO sag point in tidal Peconic River.

A review of the biweekly monitoring data collected by SCDHS indicated that the October 2000 to September 2002 time frame was the most severe period in terms of the number of DO observations below the New York State water quality standard of 5 mg/L. Based on this review, the period October 1, 2000 to September 30, 2002 was selected as the critical period for the TMDL model runs. Because 2000-2002 was a severe period, average year conditions would predict better water quality conditions. Thus, by using the severe conditions of 2000-2002 as the TMDL modeling period, a conservative level of nitrogen reduction is identified, thereby providing a margin of safety (MOS) for average years.

1. Water Quality Model Projections

The EFDC model was run under a range of alternative nutrient management loading scenarios to simulate the effect on DO concentrations in the listed waterbodies. Of particular importance were simulations of "baseline" and "pastoral" conditions. The baseline condition consisted of existing nutrient loadings corresponding to the 2000-2002 modeling period, and provided important information on the dynamics of oxygen in western Peconic estuary and the causes for its depression. The pastoral condition included loadings of nutrients estimated for a pristine, forested watershed that presumably existed before colonial settlement of the region. This condition provided insight into what oxygen levels may have been before intensive human uses in the Peconic watershed.

One of the advanced features of the EFDC model is the sediment processes submodel, which provides dynamic simulation of benthic nutrient fluxes and sediment oxygen demand in response to variations in external loading of organic material to the system. Model tests indicated that the sediment requires about six years to reach a new dynamic equilibrium in response to a reduction in nutrient loading to the model. Therefore, each of the alternative model simulations, including the baseline and pastoral scenarios, was run for a total of six years. In other words, the two-year simulation period (October 1, 2000 to September 30, 2002) was repeated three times with the water column and sediment conditions at the end of each run being input as initial conditions for the beginning of the next two-year run. It is important to remember that the model predicts that there will be a six-year lag time between the implementation of nutrient controls and the corresponding full response of improvements to water quality in the estuary.

Interpretation of the monitoring data as well as the results of the water quality model led to the following conclusions:

- The monitoring data and modeling results both indicate that nitrogen, not phosphorus, is the limiting nutrient for phytoplankton growth in the western Peconic estuary.
- The model reproduced the principal interactions among density-driven circulation, nutrient inputs, sediment nutrient flux processes, and phytoplankton abundance on an annual cycle. The spatial and temporal distributions of

dissolved oxygen were also reproduced on both an annual cycle and a daily cycle in the critical western region of Peconic Estuary.

- Sediment fluxes of nutrients and sediment oxygen demand are especially important in the shallow waters of the western estuary. The model adequately reproduced the temporal and spatial distribution of sediment flux rates that were measured in the estuary.

- Hypoxia is defined as a reduced oxygen concentration in a water body that may lead to stressful or fatal conditions for aquatic organisms. Hypoxic conditions for the TMDLs are considered as DO concentrations less than 3.0 mg/L, which is the acute DO criterion in the proposed New York water quality standard. The extent of hypoxia was estimated by using the model results to calculate a volume-day unit of measure (acre-feet-days) for each of the three impaired waters (see Table V.3).

- The chief regulators of DO concentrations in the Estuary are related to biological activity. While nitrogen is essential to a productive ecosystem, too much nitrogen fuels the excessive growth of aquatic plants, including phytoplankton and macroalgae that may, through night-time respiration and ultimate decomposition (including accumulations in bottom sediments), result in low dissolved oxygen levels in the water column. Night-time respiration of plants in combination with other routes of oxygen demand (especially sediment oxygen demand) can cause short-term DO depressions in the early morning hours (diurnal dissolved oxygen variation).

- In Table V.3, the column labeled "Worst Case Scenario" shows the hypoxic volume-days assuming DO is less than 3.0 mg/L at all locations and all times. The hypoxic volume-days total for baseline conditions is about 2% of the worst-case scenario total. However, this is somewhat misleading because hypoxic conditions may only need to exist for a short period of time (e.g., one or two hours) to be fatal to some aquatic organisms.

- For pastoral conditions, the DO concentration in all waters is greater than the 3.0 mg/L hypoxic threshold at all times.

The pastoral scenario is sensitive to the methods used to estimate loadings to the Peconic Estuary. The elimination of point source loads from sewage treatment plants in the Peconic Estuary is straightforward. However, pastoral estimates are not as easily made for nutrient loads from natural forested areas in the watershed and groundwater underflow loads. For this TMDL analysis, atmospheric deposition during pastoral times was estimated to be 31.3% less than present day levels, which only represents the projected improvement that will occur with implementation of Clean Air Act pollution controls. The rationale behind this assumption is that air quality in pastoral times should have been at least as good as the projected quality due to Clean Air Act improvements.

Ultimately, the full achievement of designated uses and water quality standards will be the result of actions on several fronts, including the preservation of open space and ensuring that where future development does occur, it results in lower loading rates of nitrogen to groundwater than current existing development practices. Existing sources of nitrogen need to be reduced, including from wet and dry atmospheric deposition, agricultural operations, stormwater (both regulated/permitted flows and flows not currently subject to regulation/permitting), residential lawn care and gardens, golf courses and turf in other commercial and institutional settings. Loadings from sewage treatment plants and other point sources must also be managed. Based on the modeling effort, implementation of these TMDLs (including mechanical aeration where and if necessary) will achieve New York State Water Quality Standards for dissolved oxygen, including the diurnal DO variation that has been discussed previously.

Table V.3 Hypoxic Volume-Days in 303(d) Impaired Waters of Western Peconic Estuary

Waterbody ID	Waterbody Name	Hypoxic Volume-Days (ac-ft-days)				
		Worst Case Scenario	Baseline Condition	Practical Load Reduction Scenario	PLR plus Mechanical Aeration	Pastoral Condition
1701-0259	Tidal Peconic River and tributaries	313,697.	12,036.	192.	0.00	0.00
1701-0254	Sawmill Creek and Western Flanders Bay	303,510	1,891	1.50	0.00	0.00
1701-0256	Meetinghouse Creek and Terrys Creek	130,039	1,175.	5.09	0.00	0.00
	Total	747,246	15,102	199.	0.00	0.00
		Percent Reduction from Baseline Condition				
1701-0259	Tidal Peconic River and tributaries	-	0.00%	98.40%	100.00%	100.00%
1701-0254	Sawmill Creek and Western Flanders Bay	-	0.00%	99.92%	100.00%	100.00%
1701-0256	Meetinghouse Creek and Terrys Creek	-	0.00%	99.57%	100.00%	100.00%
	Total	-	0.00%	98.68%	100.00%	100.00%

2. Development of Nitrogen Reduction Plans

The EFDC model of Peconic Bay was used to simulate the effects of reducing nitrogen loading on DO concentrations in the estuary. Of particular interest were the "practical load reduction (PLR) scenario and the "PLR plus mechanical aeration" scenario. The PLR scenario included nutrient loading at projected growth and reductions described above in V. B. 2, Nutrient Loading Factors, for controllable sources within the Peconic Bay watershed. In the western portion of Peconic Estuary, aside from the regulated MS4s, there is one STP (Riverhead) and eight tributary inflows included in the model (see Figure V.4 and Tables V.4 and V.5). The small Atlantis Marine World facility also discharges to the Tidal Peconic River. There are a number of groundwater management zones for which nitrogen concentrations were estimated (see Figures V.3 and V.5 and Table V.6). Monthly-varying groundwater flows into the Peconic Estuary were estimated from a study by the USGS (Schubert, 1998). Estimated reductions in groundwater nitrogen loads were based on management measures placed on land uses within the groundwater management zones.

Table V.4 SPDES Permit Limits for Peconic Estuary Sewage Treatment Plants

Facility SPDES ID	Baseline Condition		Practical Load Reduction Scenario (Oct-Apr)		Practical Load Reduction Scenario (May-Sep)	
	Flow (mgd)	TN (lb/day)	Flow (mgd)	TN lb/day)	Flow (mgd)	TN (lb/day)
Riverhead NY0020061	1.300	130	1.300	130	0.950	40
Sag Harbor NY0028908	0.250	13	0.250	17	0.250	17
Shelter Island NY0021814	0.053	4.5	0.053	5	0.053	5

Note: there were no STP discharges in the pastoral scenario

Table V.5 Tributary TN concentrations for the baseline, pastoral, and practical load reduction scenarios

Tributary	Flow ratio to Peconic River USGS gage	TN Concentration (mg/L)		
		Baseline Condition	Pastoral Scenario	Practical Load Reduction Scenario
Peconic River	1.0160	0.65	0.3	0.38
Meetinghouse Creek	0.0957	7.00	0.3	4.19
Hubbard Creek	0.0439	0.65	0.3	0.38
Mill Creek	0.0238	0.65	0.3	0.38
Birch Creek	0.0114	0.65	0.3	0.38
Terrys Creek	0.0290	0.65	0.3	0.38
Sawmill Creek	0.0402	0.65	0.3	0.38
Little River	0.0552	0.65	0.3	0.38

Table V.6 Groundwater TN concentrations for the baseline, pastoral, and practical load reduction scenarios

Groundwater Management Zone	Area (acres)	Baseline Condition (mg/L)	Pastoral Scenario (mg/L)	Practical Load Reduction Scenario (mg/L)
Montauk (MONT)	8,515	4.00	0.3	3.06
Gardiners Bay South (GB-S)	15,998	4.00	0.3	3.04
Little Peconic South (LP-S)	15,090	4.00	0.3	2.89
Great Peconic South (GP-S)	10,001	4.00	0.3	3.11
South Fork Inland (SF-I)	3,177	3.00	0.3	2.54
South Fork Central (SF-C)	1,777	3.00	0.3	2.27
North Fork Central (NF-C)	1,798	8.00	0.3	4.37
North Fork Inland (NF-I)	1,409	8.00	0.3	3.89
Peconic River East (PR-E)	6,884	5.00	0.3	2.95
Great Peconic North (GP-N)	7,011	9.00	0.3	5.23
Little Peconic North (LP-N)	9,357	9.00	0.3	5.91
Gardiners Bay North (GB-N)	3,202	9.00	0.3	5.21
Shelter Island (SHE)	7,173	3.00	0.3	2.26
Meetinghouse Creek (MC)	1,236	9.00	0.3	4.19

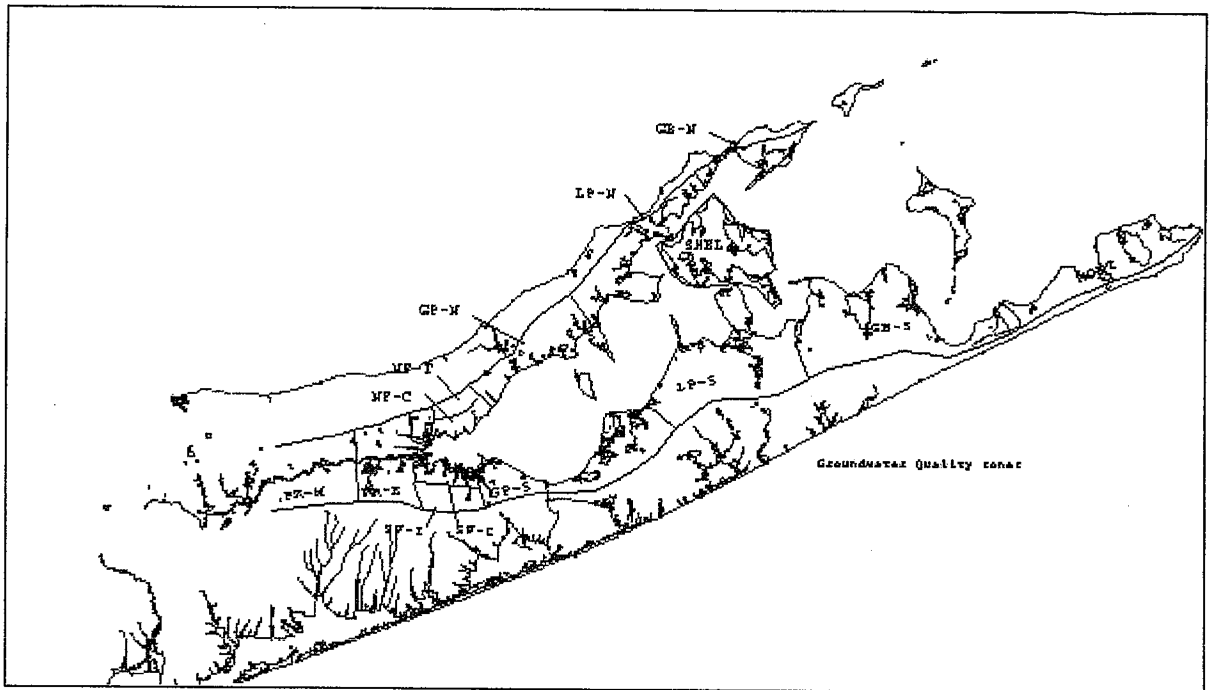


Figure V.3 Peconic Estuary Study Area Groundwater Management Zones

The practical load reduction scenario includes the reasonable cumulative full build-out scenario [50% of remaining farmland is preserved; 15% of vacant land is protected (30% in MC and PR-E groundwater management zones); 15% of subdividable land is protected (30% in MC and PR-E); rest of agricultural, vacant and further subdividable land is developed with clustering and vegetation preservation requirements (i.e., clearing restrictions)]. This scenario also includes:

1) A 25% total nitrogen (TN) reduction from all protected agricultural parcels (50% reduction in the MC and PR-E groundwater management zones)
2) A 25% TN reduction from golf course parcels (50% reduction in MC and PR-E)
3) A 25% TN reduction from existing development (non-agricultural) parcels (33% reduction in MC and PR-E)
4) A 37.5% TN reduction from the existing agricultural land, vacant land, and further subdividable land that is then developed with clustering and vegetation preservation requirements (50% reduction in MC and PR-E)
5) A 31.3% TN reduction in atmospheric deposition and groundwater TN contributions reduced by 0.2 mg/L in response to the improved atmospheric deposition quality
6) Currently permitted effluent quality extended to permitted flow for Sag Harbor Sewage Treatment Plant (*i.e.*, 8 mg TN/liter) permitted flow of 0.25 million gallons per day (MGD))
7) Existing effluent quality extended to permitted flow for Shelter Island Heights Sewage Treatment Plant (*i.e.*, 10.2 mg TN/liter based on 4-yr average of DEC discharge monitoring records from April 2002 to February 2006 and permitted flow of 0.053 MGD)

8) At Riverhead Sewage Treatment Plant, 40 lb TN/day from May 1 to September 30 and 130 lb TN/day rest of year. From May-September, a flow of 0.95 MGD will be employed to reflect permitted flow conditions (1.3 MGD) less the effluent projected to be used irrigating the adjacent golf course (0.35 MGD). From October 1 to April 30, a flow of 1.3 MGD will be employed.
9) At Atlantis Marine World, this 0.0081 MGD design flow facility is assigned a load of 4 lbs. TN/day.
10) Stormwater runoff loading is treated as a point source in the model. In response to mitigation, a 15% reduction in stormwater N load is attributed to Peconic River and Flanders Bay and a 10% reduction to east of Flanders Bay. Note that current stormwater TN loading for the Peconic River and Flanders Bay is 30 lb TN/day and east of Flanders Bay is 100 lb TN/day. The stormwater loading is apportioned to each shoreline model grid cell.

The practical load reduction plus mechanical aeration scenario is identical to the practical load reduction scenario described above except that mechanical aeration is added to specific locations in the impaired waters to bring the dissolved oxygen levels into compliance with the both existing and proposed New York water quality standards. Model results indicated that about 7,180 lb/day of oxygen will need to be added to the impaired waters during critical summer months (May 1 to September 30) to attain the existing DO standard of 5.0 mg/L. The estimated cost of mechanical aeration to attain the existing DO standard is up to $2,300,000 for initial capital expenses and up to $189,000 for annual operating costs. To attain the proposed DO standard, 980 lb/day of DO will need to be added during the summer period. The estimated cost of mechanical aeration to attain the proposed DO standard is up to $330,000 for initial capital expenses and up to $27,000 for annual operating costs.

Using the EFDC model simulations, the following improvements to water quality in the 303(d) impaired waters were projected for the practical load reduction scenario and practical load reduction plus mechanical aeration scenario:

- For the practical load reduction scenario, the total hypoxia measured in volume-days is reduced by more than 98% from the baseline condition (see Table V.1).

- For the practical load reduction scenario with mechanical aeration, the DO concentrations in all waters are above the hypoxic threshold at all times, therefore hypoxia is reduced by 100% from the baseline condition.

As a result of these analyses, these TMDLs propose overall nitrogen reduction targets of 34.3% for the winter period (October 1 to April 30) and 43.4% for the summer period (May 1 to September 30) from loads associated with the cumulative full build-out scenario without load reductions. Even greater reductions would be required in a worst case cumulative full build-out scenario (i.e., less vacant and further subdividable land is protected, vacant and further subdividable land that is developed is developed without clustering requirements or vegetation preservation requirements (clearing restrictions).

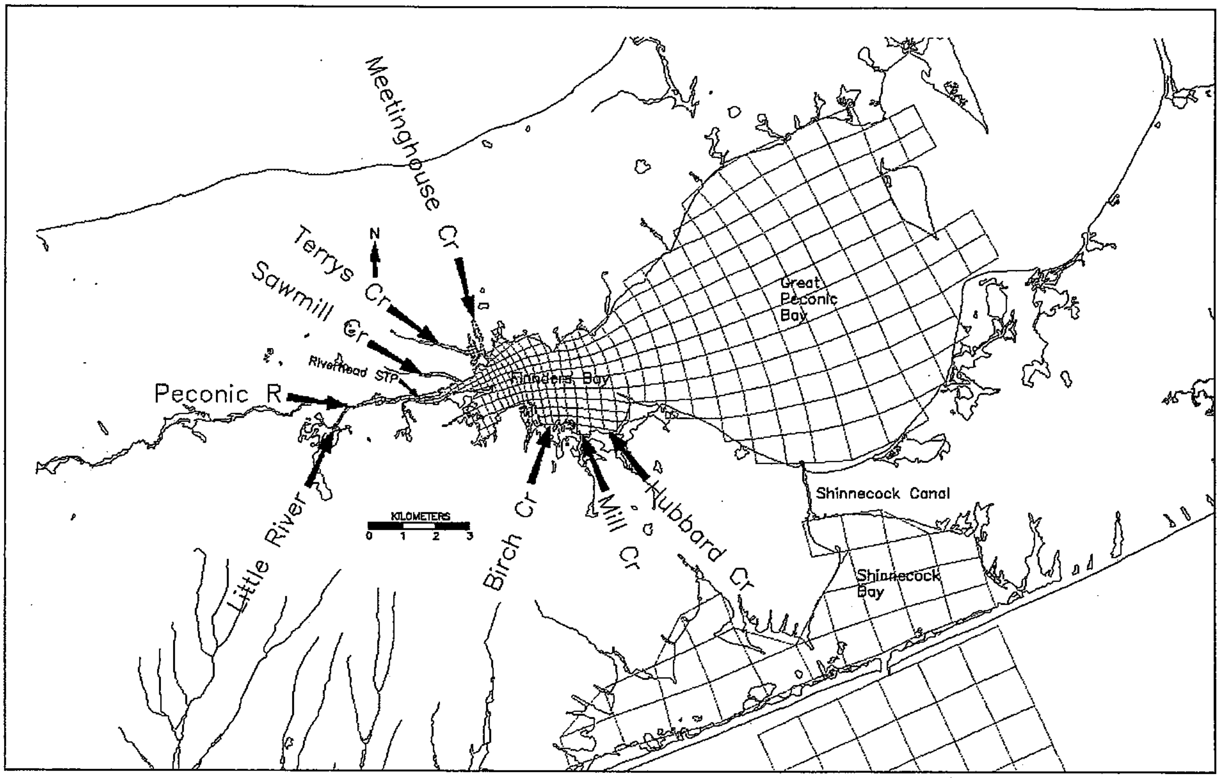


Figure V.4 Locations of tributary and STP inflows in western Peconic Estuary

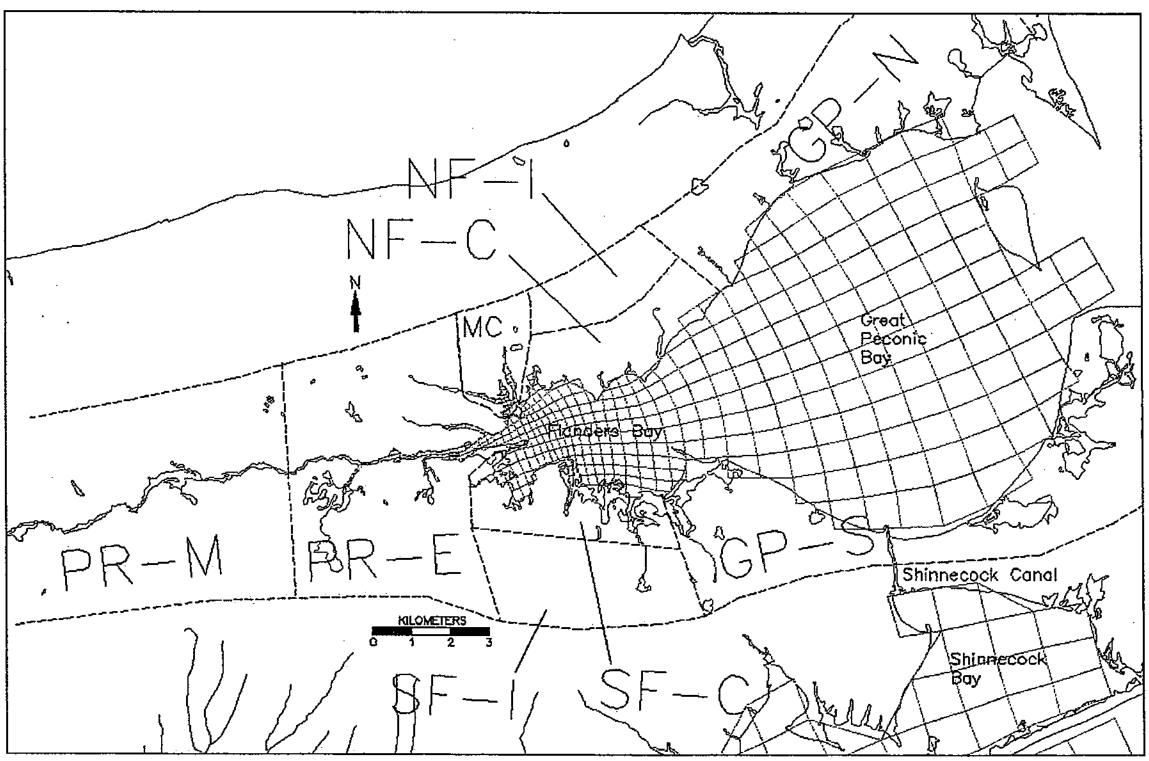


Figure V.5 Locations of groundwater management zones in western Peconic Estuary

VI. TMDLs/WLAs/LAs for Nitrogen

This section describes the total maximum daily loads, wasteload allocations and loading allocations for the Peconic Estuary to address impairments due to non-attainment of the state water quality standards for dissolved oxygen, discussion and details on the allocation of loads, mechanical aeration, margin of safety, critical conditions, seasonal variations, and an overall summary.

Section 303(d) of the Clean Water Act requires the establishment of TMDLs that will result in attainment of water quality standards. As the term implies, TMDLs are typically expressed as maximum daily loads. However, as specified in 40 CFR 130.2(I), TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. As discussed in Section V.C. of this document, nitrogen loadings throughout the year contribute to the pool of nitrogen available in Peconic Estuary for uptake by phytoplankton. Also, the magnitude of the range of daily dissolved oxygen concentration is dependent on the abundance of phytoplankton as well as the strength of sediment oxygen demand, which leads to depressed DO levels in the pre-dawn and early morning hours. The hypoxia resulting from the decay of phytoplankton is due to both long-term nitrogen loadings and daily or short-term nitrogen-oxygen dynamics. Therefore, these Peconic nitrogen TMDLs are expressed in terms of both a daily average nitrogen load and a daily maximum nitrogen load based on model simulations of the October 2000 to September 2002 period. In addition, these TMDLs are further categorized into seasonal loads for a summer period (May 1 to September 30), which is the critical season for hypoxia, and a winter period (October 1 to April 30).

For the three 303(d) listed impaired waters, the practical-load-reduction (PLR) scenario targets a nitrogen reduction of 37.5% for the winter period (October 1 to April 30) and 42.3% for the summer period (May 1 to September 30). Although the PLR scenario is predicted to greatly reduce hypoxia and minimize impacts on aquatic life, there were some areas of western Peconic Bay that continued to experience DO concentrations below both the existing and proposed water quality standards for a short period of time, though the PLR scenario meets the proposed DO standard in one of the two model years. It is however necessary for these TMDLs to identify additional actions for achieving water quality standards, namely, the use of mechanical aeration in those areas experiencing contraventions of the DO standards. These TMDLs are expressed as the sum of the PLR nitrogen targets, the addition of oxygen via mechanical aeration, and an implicit margin of safety. Model predictions indicated that mechanical aeration was not necessary to achieve DO water quality standards during the winter period.

TMDL (winter) = 37.5% nitrogen reduction from all sources + margin of safety

TMDL (summer) = 42.3% nitrogen reduction from all sources + oxygen from mechanical aeration + margin of safety

The pollutant reductions and resultant DO improvements from each of these components are identified in sections A through C that follow. Implementation of management actions, measures, practices and controls lead to the specified loads not being exceeded are predicted to result in attainment of water quality standards in each of the three impaired waters of western the Peconic Estuary. The water quality model was used to assess the degree to which mechanical aeration could provide the remaining improvement in DO needed to achieve water quality standards. The margin of safety provided in the analysis is discussed in Section C.

A. Allocation of Sources

Seasonal nitrogen loads categorized by source for the three impaired 303(d) waterbodies (see Figure VI.1), as well as Flanders Bay, Great Peconic Bay, Little Peconic Bay, Shelter Island Sound and Gardiners Bay for the baseline and TMDL scenarios, are summarized in Tables VI.1 through VI.8. The summer daily average load was calculated during the May 1 to September 30 periods of the 2-year model simulation. The summer maximum daily load is the largest of the daily loads during the May 1 to September 30 periods of the 2-year simulation. The winter daily average load was calculated during the October 1 to April 30 periods of the 2-year model simulation.

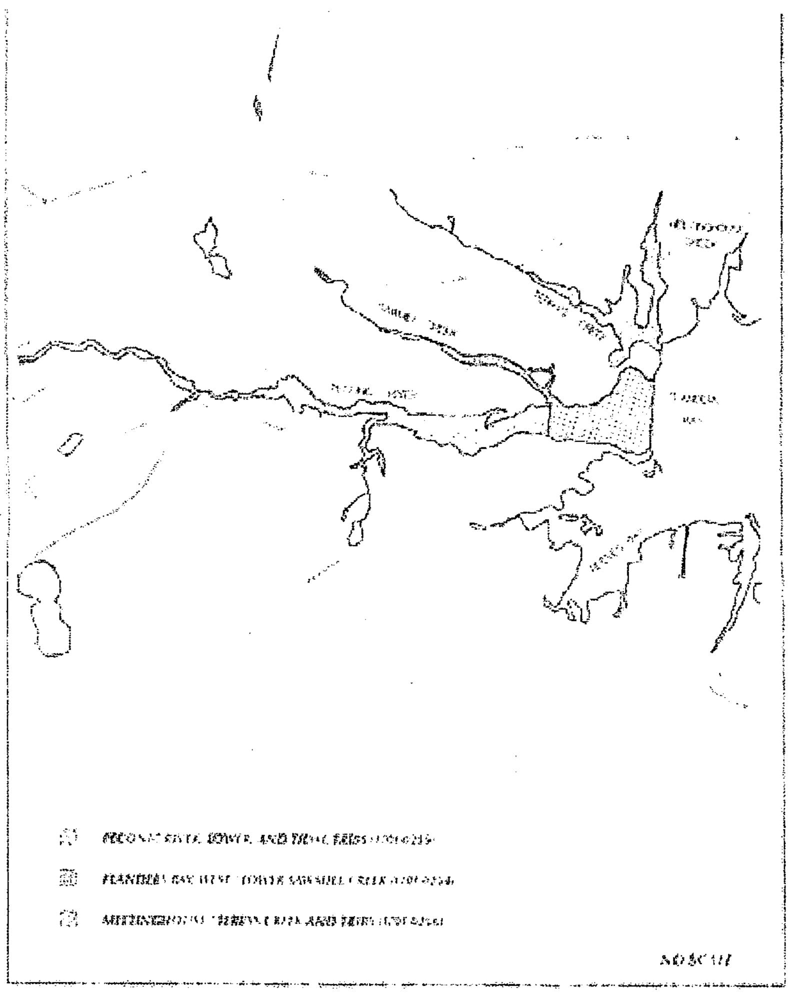


Figure VI.1 Locations of waterbodies on 303(d) list impaired for nitrogen and low DO

The winter maximum daily load is the largest of the daily values during the October 1 to April 30 periods of the two-year simulation. The locations of the tributary inflows to the water quality model were shown previously in Figure V.4. The groundwater management zones used to develop nitrogen loads for the water quality model were shown in Figures V.3 and V.5. A description of the practical-load-reduction (PLR) scenario was provided in Section V.C.2.

River loads include some regulated stormwater discharge from MS4s, and the requirement for 15 % reduction applies to the MS4s discharging to these rivers. Also, the stormwater load estimates includes some unregulated stormwater from private property to surface water that were not separated out in the model analysis. Both the MS4 loads to the rivers and the overestimation in the stormwater (WLA) are minimal and tend to balance each other out.

Consistent with the recommendations in EPA's November 15, 2006 memo, "Establishing TMDL "Daily" Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015, (April 25, 2006) and Implications, for NPDES Permits," the TMDLs/WLAs/LAs have also been expressed as daily loads. As noted in the guidance, "EPA does not believe that the Friends of the Earth decision requires any changes to EPA's existing policy and guidance describing how a TMDL's wasteload allocations are implemented in NPDES permits." Water quality-based effluent limits (WQBELs) in NPDES permits that implement wasteload allocations in approved TMDLs must be "consistent with the assumptions and requirements of any available wasteload allocation for the discharge" 122.44(d)(1)(vii)(B). These provisions do not require that effluent limits in NPDES permits be expressed in a form that is identical to the form in which the wasteload allocation for the discharge is expressed in a TMDL. The permit writer has the flexibility to express the effluent limitation using a time frame appropriate to the water body, pollutant, and the applicable water quality standard. In addition, allocations based on monthly, seasonal or annual timeframes may be used to guide management measures and implementation plans because they are related to the overall loading capacity of the waterbody, while the daily expressions represent day to day snapshots of the total loading capacity based on ambient conditions.

In presenting the daily average and maximum daily stormwater loads, the baseline and TMDL values as presented in Tables V1.1 through V1.8 are the same. This simplification is reflective of the way stormwater nitrogen loads are provided as an input to the model (the stormwater loading is apportioned to each shoreline model grid cell), that stormwater presents a relatively small contribution in relation to the sources (especially groundwater, and particularly to co-occurring wet weather inputs associated with groundwater and wet atmospheric deposition), and the relatively even and diffuse distribution of stormwater inputs (either as discrete conveyances or as diffuse overland flow) across the estuary and its shoreline. Future efforts could potentially result in more refined apportionments and precision regarding daily average and maximum daily stormwater loads than can presently be derived and appear as part of these TMDLs.

Similarly, the model runs were simplified by using constant seasonal loadings for point sources. The model runs have shown that the dissolved oxygen response integrates nitrogen loading over a period of days. The hypoxia resulting from night time respiration and the decay of phytoplankton is due to both long-term nitrogen loadings and daily or short-term nitrogen-oxygen dynamics. Thus imposition of a daily maximum load for the Riverhead STP is not critical, and the 40 lbs/day limit for the Riverhead STP may be incorporated into the SPDES permit as a monthly average.

Table VI.1 Nitrogen load summary for segment 1701-259, Lower Peconic River and Tidal Tributaries

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	6.47	97.68	4.44	67.1	31.3%	31.3%
Groundwater (LA)	318.	331.	184	191.	42.2%	42.3%
Little River (LA)	5.87	18.92	3.43	11.07	41.5%	41.5%
Peconic River (LA)	108.	348.	63.16	204.	41.5%	41.5%
Stormwater (WLA)	9	9	7	7	15.0%	15.0%
Riverhead STP (WLA)	130.	130.	130.	130**.	0.0%	0.0%
Atlantis Marine World (WLA)	***	***	4	4		
Total*	577.	934.	396.	614.	31.4%	34.3%
Sum of October 1 to April 30 WLAs*	1396	139	141	141		
	May 1 to September 30					
Atmospheric Deposition (LA)	7.96	152.	5.48	104.	31.3%	31.3%
Groundwater (LA)	315.	331.	182.	191.	42.2%	42.3%
Little River (LA)	6.12	13.90	3.59	8.14	41.5%	41.5%
Peconic River (LA)	113.	256.	65.89	150.	41.5%	41.5%
Stormwater (WLA)	9	9	7	7	15.0%	15.0%
Riverhead STP (WLA)	130.	130.	40.	40**.	69.5%	69.5%
Atlantis Marine World (WLA)	***	***	4	4		
Total*	580.	891.	308.	504.	47.0%	43.4%
Sum of May 1 to September 30 WLAs*	139	139	51	51		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding
** As noted in the text, this daily maximum will not be used as the basis for permit limits.
*** The discharge from Atlantis Marine World was not included in the baseline analysis

Table VI.2 Nitrogen load summary for segment 1701-254, Western Flanders Bay and Lower Sawmill Creek

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	6.80	103.	4.66	70.62	31.3%	31.3%
Groundwater (LA)	72.82	75.77	42.72	44.46	41.3%	41.3%
Sawmill Creek (LA)	5.87	18.92	3.43	11.07	41.5%	41.5%
Stormwater (WLA)	5.26	5.26	4.47	4.47	15.0%	15.0%
Total*	90.75	203.	55.29	131.	39.1%	35.6%
Sum of October 1 to April 30 WLAs*	5.26	5.26	4.47	4.47		
	May 1 to September 30					
Atmospheric Deposition (LA)	8.38	160.	5.76	110.	31.3%	31.3%
Groundwater (LA)	72.56	75.77	42.55	44.46	41.3%	41.3%
Sawmill Creek (LA)	6.12	13.90	3.59	8.14	41.5%	41.5%
Stormwater (WLA)	5.26	5.26	4.47	4.47	15.0%	15.0%
Total*	92.31	255.	56.36	167.	38.9%	34.5%
Sum of May 1 to September 30 WLAs*	5.26	5.26	4.47	4.47		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding

Table VI.3 Nitrogen load summary for segment 1701-256, Meetinghouse Creek and Terrys Creek and Tributaries

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	3.76	56.96	2.60	39.14	31.3%	31.3%
Groundwater (LA)	213.	221.	99.40	103.	53.3%	53.3%
Terrys Creek (LA)	3.08	9.94	1.80	5.81	41.6%	41.5%
Meetinghouse Creek (LA)	45.80	148.	27.41	88.42	40.2%	40.1%
Stormwater (WLA)	6.38	6.38	5.41	5.41	15.0%	15.0%
Total*	272.	442.	137.	242.	49.7%	45.2%
Sum of October 1 to April 30 WLAs*	6.38	6.38	5.41	5.41		
	May 1 to September 30					
Atmospheric Deposition (LA)	4.64	88.61	3.19	60.87	31.3%	31.3%
Groundwater (LA)	211.	221.	98.56	103.	53.3%	53.3%
Terrys Creek (LA)	6.12	13.90	3.59	8.14	41.5%	41.5%
Meetinghouse Creek (LA)	47.78	109.	28.6	64.97	40.1%	40.1%
Stormwater (WLA)	6.38	6.38	5.41	5.41	15.0%	15.0%
Total*	228.	330.	139.	243.	51.5%	46.1%
Sum of May 1 to September 30 WLAs*	6.38	6.38	5.41	5.41		

Note: LA denotes load allocation; WLA denotes wasteload allocation
* May not add up due to rounding

Table VI.4 Nitrogen load summary for Flanders Bay**

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	116.	1755.	79.75	1206.	31.3%	31.3%
Groundwater (LA)	486.	506.	297.	309.	38.9%	38.9%
Hubbard Creek (LA)	4.66	15.05	2.73	8.8	41.6%	41.5%
Mill Creek (LA)	2.53	8.16	1.47	4.77	41.6%	41.5%
Birch Creek (LA)	1.21	3.91	0.70	2.29	41.6%	41.5%
Stormwater (WLA)	9.70	9.70	8.25	8.25	15.0%	15.0%
Total*	620.	2298.	390.	1539.	37.2%	33.0%
Sum of October 1 to April 30 WLAs*	9.70	9.70	8.25	8.25		
	May 1 to September 30					
Atmospheric Deposition (LA)	143.	2730.	98.25	1876.	31.3%	31.3%
Groundwater (LA)	482.	505.	294.	307.	38.9%	38.9%
Hubbard Creek (LA)	4.86	11.07	2.84	6.47	41.5%	41.5%
Mill Creek (LA)	2.64	6.01	1.54	3.50	41.6%	41.6%
Birch Creek (LA)	1.28	2.88	0.75	1.67	41.6%	41.5%
Stormwater (WLA)	9.70	9.70	8.25	8.25	15.0%	15.0%
Total*	644.	3265.	406.	2204.	36.9%	32.5%
Sum of May 1 to September 30 WLAs*	9.70	9.70	8.25	8.25		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding
** While this is not a 303(d) listed waterbody due to non-attainment of the state DO WQS, these TMDLs are required to achieve DO WQS in the impaired listed waterbodies and preserve water quality in this waterbody.

Table VI.5 Nitrogen load summary for Great Peconic Bay**

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	949	14342.	652.	9853.	31.3%	31.3%
Groundwater (LA)	833.	1098.	531.	689.	36.3%	37.3%
Stormwater (WLA)	9	9	8	8	10.0%	10.0%
Total*	1791.	15449.	1191.	10550	33.5%	31.7%
Sum of October 1 to April 30 WLAs*	9	8.9	8	8		
	May 1 to September 30					
Atmospheric Deposition (LA)	1169.	22313.	803.	15329.	31.3%	31.3%
Groundwater (LA)	871.	1088.	554.	684.	36.4%	37.1%
Stormwater (WLA)	9	9	8	8	10.0%	10.0%
Total*	2049.	23410.	1365.	16021.	33.4%	31.6%
Sum of May 1 to September 30 WLAs*	9	9	8	8		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding
** While this is not a 303(d) listed waterbody due to non-attainment of the state DO WQS, these TMDLs are required to achieve DO WQS in the impaired listed waterbodies and preserve water quality in this waterbody.

Table VI.6 Nitrogen load summary for Little Peconic Bay**

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	628.	9491.	431.	6520.	31.3%	31.3%
Groundwater (LA)	873.	1191.	589.	793.	32.5%	33.4%
Stormwater (WLA)	16.41	16.41	14.76	14.76	10.0%	10.0%
Total*	1517.	10698.	1035.	7328.	31.8%	31.5%
Sum of October 1 to April 30 WLAs*	16	16	15	15		
	May 1 to September 30					
Atmospheric Deposition (LA)	774.	14766.	531.	10144.	31.3%	31.3%
Groundwater (LA)	929.	1188.	626.	793.	32.6%	33.2%
Stormwater (WLA)	16	16	15	15	10.0%	10.0%
Total*	1719.	15971.	1172.	10952.	31.8%	31.4%
Sum of May 1 to September 30 WLAs*	16	16	15	15.76		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding
** While this is not a 303(d) listed waterbody due to non-attainment of the state DO WQS, these TMDLs are required to achieve DO WQS in the impaired listed waterbodies and preserve water quality in this waterbody.

Table VI.7 Nitrogen load summary for Shelter Island Sound**

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	1094.	16544.	752.	11366.	31.3%	31.3%
Groundwater (LA)	1733.	2276.	1205.	1567	30.2%	30.9%
Sag Harbor STP (WLA)	13	13.	17	17***	0.0%****	0.0%****
Shelter Island Heights STP (WLA)	4.5	4.5	5	5***	0.0%****	0.0%****
Stormwater (WLA)	52	52	46	46	10.0%	10.0%
Total*	2897.	18890.	2026.	13002.	30.1%	31.2%
Sum of October 1 to April 30 WLAs*	69	69	69	69		
	May 1 to September 30					
Atmospheric Deposition (LA)	1348.	25740.	926.	17683.	31.3%	31.3%
Groundwater (LA)	1816.	2267.	1260	1562.	30.3%	30.9%
Sag Harbor STP (WLA)	13	13	17	17***	0.0%****	0.0%****
Shelter Island Heights STP (WLA)	4.5	4.5	5	5***	0.0%****	0.0%****
Stormwater (WLA)	52	52	47	472	10.0%	10.0%
Total*	3234.	28076.	2255.	19314.	30.2%	31.2%
Sum of May 1 to September 30 WLAs*	69	69	69	69		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding
** While this is not a 303(d) listed waterbody due to non-attainment of the state DO WQS, these TMDLs are required to achieve DO WQS in the impaired listed waterbodies and preserve water quality in this waterbody.
*** As noted in the text, this daily maximum will not be used as the basis for permit limits.
**** The TMDL reflects current or proposed permit requirements; the baseline represents current discharge characteristics for these facilities.

Table VI.8 Nitrogen load summary for Gardiners Bay**

Source	Baseline		TMDL		Percent Reduction	
	Daily Avg.	Max. Daily	Daily Avg.	Max. Daily		
	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	TN (lbs./day)	Daily Avg.	Max. Daily
	October 1 to April 30					
Atmospheric Deposition (LA)	4724.	71420.	3245.	49066.	31.3%	31.3%
Groundwater (LA)	1330.	1607.	958.	1141.	28.0%	29.0%
Stormwater (WLA)	22	22	20	20	10.0%	10.0%
Total*	6076.	73050.	4223.	50227.	30.5%	31.2%
Sum of October 1 to April 30 WLAs*	22.	22	20	20.		
	May 1 to September 30					
Atmospheric Deposition (LA)	5821.	111113.	3999.	76335.	31.3%	31.3%
Groundwater (LA)	1401.	1636.	1009.	1165.	28.0%	28.8%
Stormwater (WLA)	22	22	20	204	10.0%	10.0%
Total*	7244.	112772.	5028.	77521.	30.6%	31.3%
Sum of May 1 to September 30 WLAs*	22	22	20	20		

Note: LA denotes load allocation; WLA denotes wasteload allocation.
* May not add up due to rounding
** While this is not a 303(d) listed waterbody due to non-attainment of the state DO WQS, these TMDLs are required to achieve DO WQS in the impaired listed waterbodies and preserve water quality in this waterbody.

B. Mechanical Aeration

The use of non-treatment alternatives may be considered as a method of achieving water quality standards when technology-based treatments are not sufficient to achieve standards [40 CFR 125.3(f)]. Such techniques must be the preferred environmental and economic method of achieving standards after consideration of alternatives such as advanced waste treatment and other technologies.

As demonstrated by these TMDLs, the practical load reductions and technology-based treatment requirements are not sufficient to *fully* achieve DO standards in all locations of western Peconic Bay. Therefore, these TMDLs identify the use of a non-treatment alternative (mechanical aeration) to achieve the DO water quality standards. In order to achieve the existing DO water quality standard of 5.0 mg/L, a total of 3,280 kg/day (7,181 lb/day) of oxygen was distributed to the bottom layer at various grid cells in the water quality model (see Table VI.9). To attain the proposed DO standard, 445 kg/day (980 lb/day) of oxygen was added by mechanical aeration to the grid cells listed in Table VI.10. For the modeling simulation, oxygen was added at a continuous rate from May 1 to September 30, and was turned off for the remainder of the year. Note that the aeration was not needed for one of the two modeled years to meet the proposed standard.

Table VI.9 Location and magnitude of DO added to achieve the existing water quality standard

1701-0259		1701-0254		1701-0256		(not on 303(d) list)	
Tidal Peconic River and tributaries		Sawmill Creek and Flanders Bay West		Terrys Creek and Meetinghouse Creek		Western Flanders Bay	
Grid Cell	DO (kg/day)	Grid Cell	DO (kg/day)	Grid Cell	DO (kg/day)	Grid Cell	DO (kg/day)
[12,17]	70	[27,20]	40	[26,27]	10	[32,19]	30
[12,18]	60	[27,21]	60	[27,27]	20	[32,20]	30
[12,19]	20	[27,22]	30	[28,27]	20	[32,21]	30
[12,23]	50	[27,23]	20	[29,24]	10	[33,16]	80
[13,23]	50	[27,24]	30	[29,27]	10	[33,17]	70
[14,23]	40	[27,25]	20	[30,24]	10	[33,18]	60
[15,22]	20	[28,20]	40	[30,25]	30	[33,19]	30
[15,23]	30	[28,21]	60	[30,26]	20	[33,20]	30
[15,24]	30	[29,19]	40	[30,27]	30	[33,21]	40
[16,23]	20	[29,20]	40	[30,28]	10	[33,22]	30
[17,23]	50	[29,21]	40	[31,25]		[33,23]	30
[18,23]	70	[30,19]	10	[31,26]	30	[34,18]	30
[19,22]	50	[30,20]	40	[31,27]	30	[34,19]	30
[19,23]	30	[30,21]	40	[31,28]	20	[34,20]	20
[20,22]	40	[30,22]	30	[31,29]	10	[35,18]	20
[20,23]	30	[31,19]	10	[31,30]	30	[35,19]	30
[21,21]	40	[31,20]	30	[32,26]	30	[35,20]	20
[21,22]	40	[31,21]	30	[33,24]	40	[36,17]	20
[21,23]	30	[31,22]	40	[33,25]	40	[36,18]	30
[22,21]	40			[33,26]	30	[36,19]	20
[22,23]	40			[33,27]	30	[37,18]	30
[23,21]	40			[33,28]	40	[38,18]	30
[23,22]	30			[33,29]	70	[39,18]	20
[23,23]	40			[33,30]	20		
[24,21]	30						
[24,22]	50						
[25,21]	40						
[25,22]	50						
[26,20]	40						
[26,21]	40						
[26,22]	50						
Subtotal	1,260	Subtotal	650	Subtotal	590	Subtotal	760
Total	3,260						

Table VI.10 Location and magnitude of DO added to attain the proposed water quality standard

1701-0259	
Tidal Peconic River and tributaries	
Grid Cell	DO (kg/day)
[12,17]	55
[12,18]	55
[12,19]	15
[12,23]	25
[13,23]	30
[14,23]	15
[15,22]	10
[15,23]	5
[15,24]	10
[16,23]	10
[17,23]	10
[18,23]	25
[19,22]	15
[19,23]	10
[20,22]	10
[20,23]	10
[21,21]	10
[21,22]	10
[21,23]	10
[22,21]	10
[22,23]	10
[23,21]	10
[23,22]	10
[23,23]	5
[24,21]	5
[24,22]	
[25,21]	
[25,22]	
[26,20]	
[26,21]	
[26,22]	
Subtotal	390
Total	445

1701-0254	
Sawmill Creek and Flanders Bay West	
Grid Cell	DO (kg/day)
[27,20]	
[27,21]	
[27,22]	
[27,23]	
[27,24]	5
[27,25]	
[28,20]	
[28,21]	
[29,19]	
[29,20]	
[29,21]	
[30,19]	
[30,20]	
[30,21]	
[30,22]	
[31,19]	
[31,20]	
[31,21]	
[31,22]	
Subtotal	5

1701-0256	
Terrys Creek and Meetinghouse Creek	
Grid Cell	DO (kg/day)
[26,27]	
[27,27]	
[28,27]	5
[29,24]	
[29,27]	
[30,24]	
[30,25]	
[30,26]	
[30,27]	
[30,28]	
[31,25]	
[31,26]	
[31,27]	
[31,28]	
[31,29]	5
[31,30]	15
[32,26]	
[33,24]	
[33,25]	
[33,26]	
[33,27]	
[33,28]	10
[33,29]	10
[33,30]	5
Subtotal	50

(not on 303(d) list)	
Western Flanders Bay	
Grid Cell	DO (kg/day)
[32,19]	
[32,20]	
[32,21]	
[33,16]	
[33,17]	
[33,18]	
[33,19]	
[33,20]	
[33,21]	
[33,22]	
[33,23]	
[34,18]	
[34,19]	
[34,20]	
[35,18]	
[35,19]	
[35,20]	
[36,17]	
[36,18]	
[36,19]	
[37,18]	
[38,18]	
[39,18]	
Subtotal	0

C. Margin of Safety

A TMDL must include a margin of safety (MOS) to account for lack of knowledge concerning the relationship between pollutant loads and water quality. EPA guidance explains that the MOS may be incorporated into the conservative assumptions used in the analysis (an implicit MOS) or it may be expressed in loading set aside as a separate component of the TMDLs (an explicit MOS). An implicit MOS is used in these TMDLs through conservative assumptions in the analysis such as using the critical 2000 - 2002 period as the baseline condition and assuming the Riverhead STP continuously discharges both flow and load at fully permitted levels for the baseline condition.

An important component in the implicit MOS assumption was the use of 2000-2002 as the baseline period. This time period was the most severe period of hypoxia on record based on analysis of monitoring data from 1988 to 2002. Model simulations of reduced nitrogen predicted water quality conditions that would result from the same physical conditions that existed during the 2000-2002 period. Thus, it can be expected that average year conditions would see even better improvements in water quality conditions given the same nitrogen reductions. In other words, since the baseline period used the severe conditions that existed in 2000-2002, a margin of safety (MOS) is provided for average years.

Another implicit MOS assumption was the use of continuous flow and load discharges for the Riverhead STP throughout the baseline simulation period. It is unlikely this facility would discharge at its maximum allowable load continuously for the entire two-year baseline period. The water quality model simulations predicted the amount of nitrogen that would need to be reduced from the Riverhead STP discharging continuously at maximum permitted load. This provides a margin of safety for the more typical condition where the Riverhead STP discharges at less than maximum permitted load.

D. Critical Conditions

Hypoxia in western Peconic Bay typically occurs from mid-May through September. Minimum hourly DO concentrations simulated by the EFDC water quality model during the summer hypoxic period were used in these TMDLs as the basis to assess actions necessary to attain water quality standards. The alternative management scenarios were run for a 24-month period beginning on 10/1/2000 and ending on 9/30/2002, which corresponds to hydrologic water years 2001 and 2002. This critical period was chosen based on the number of water quality samples within the three listed waterbodies having dissolved oxygen concentrations less than the existing 5.0 mg/L water quality standard. This two-year period had more DO measurements below 5.0 mg/L than any other period in the monitoring database (see Table VI.11).

E. Seasonal Variations

Accounting for seasonal variations in pollutant loading and water quality is an important factor in the TMDL analyses. This requires including seasonal variations in the modeling analysis, identifying a critical period for achieving water quality standards, and basing the TMDLs on the critical conditions. As discussed in Section V.C, the water quality model was calibrated and validated using ambient monitoring data over a 14-year period from

Table VI.11 Inventory of DO samples below water quality criteria in 303(d) waters of Peconic Bay

Year	Number of DO samples less than 5.0 mg/L
1989	14
1995	51
1996	136
1997	100
1998	40
1999	29
2000	19
2001	21
2002	9,057*

* Includes results from continuous monitoring devices documenting water quality conditions every 15 minutes that were deployed in the tidal Peconic River during the summer and fall of 2002

October 1988 to September 2002. This period covers all seasons of the year as well as actual extreme hydrological and meteorological conditions. Tributary loads, groundwater loads, and sewage treatment plant loads were included in based on available time-variable data. Water year 2001 was relatively wet followed by a relatively dry water year 2002, which is important to satisfy the seasonality aspect of the Peconic Nitrogen TMDLs. The hydrograph of freshwater inflow from the Peconic River during the 24-month simulation period is shown in Figure VI.2.

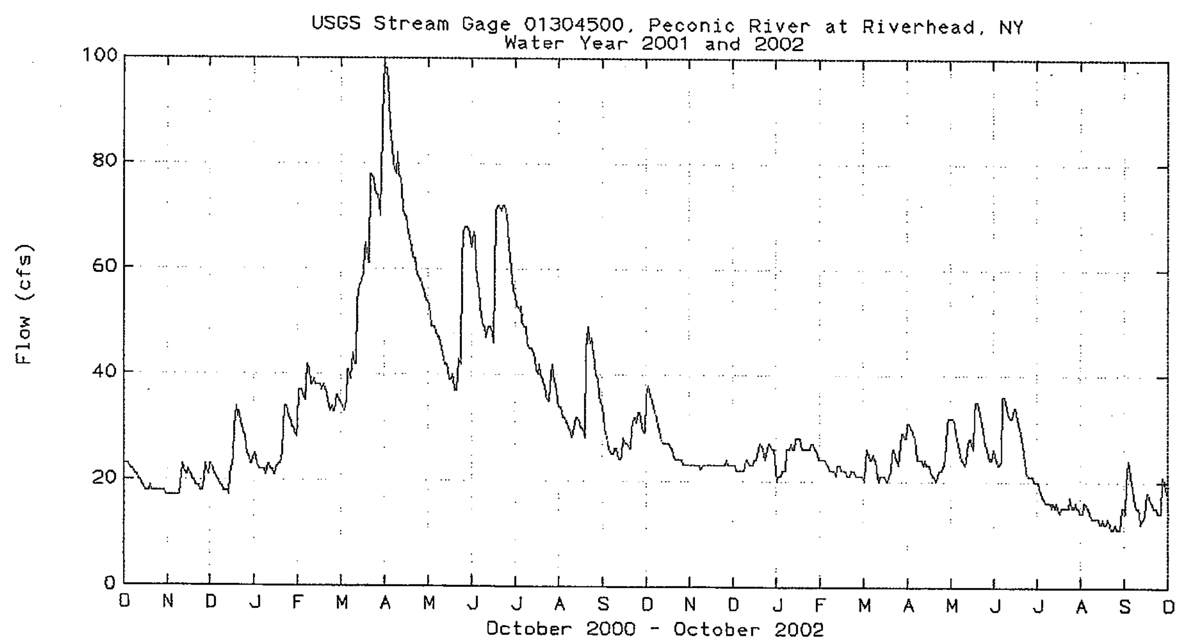


Figure VI.2 Streamflow at Peconic River USGS gage for model simulation period

F. Summary

Based on the modeling results, the New York State DO water quality standards in western Peconic Bay would be attained through implementation of the nutrient reduction and mechanical aeration actions outlined in these TMDLs. Improvements in the hourly minimum DO from nitrogen management would result in an addition of 2.36 mg/L of DO above the baseline condition at the critical grid cell in tidal Peconic River. Mechanical aeration would improve the hourly minimum DO at the critical grid cell by an additional 2.64 mg/L. The critical grid cell [18,23] is located about 0.23 miles west of the Riverhead STP discharge. The incremental improvement in DO at the critical grid cell for the cumulative impact of each of five management alternatives is shown in Table VI.12. The two largest incremental improvements in DO among the nitrogen management alternatives result from implementation of land use management measures, actions, practices and controls to reduce groundwater nitrogen loads and from practical-load-reduction controls on the Riverhead STP. Despite significant gains due to applying the PLR controls, mechanical aeration is still required to attain the existing water quality standard for DO of 5.0 mg/L as well as the proposed water quality standards.

Table VI.12 Incremental improvements in DO at critical grid cell [18,23] in tidal Peconic River

Run ID	Cumulative Management Action for Reducing Nitrogen	Lowest Daily Average DO		Lowest Hourly Minimum DO	
		DO (mg/L)	Incremental Improvement In DO (mg/L)	DO (mg/L)	Incremental Improvement In DO (mg/L)
01g	Baseline condition	1.496	-	0.003	-
15h1	Atmospheric deposition reduced by 31.3%	1.649	0.153	0.034	0.031
15h2	Groundwater loads improved to PLR	2.575	0.926	1.156	1.122
15h3	Stormwater and Tributaries improved to PLR	2.787	0.212	1.586	0.043
15h	Riverhead STP improved to PLR	3.423	0.636	2.363	0.777
15i	Mechanical aeration	6.175	2.752	5.005	2.642

VII. Implementation

This section describes programs and actions that are in place that directly or indirectly impact nitrogen loads or the impacts nitrogen has on the Peconic Estuary, including those waters impaired due to low dissolved oxygen. Further, it describes enhancements to those programs and other new or related initiatives that could be put in place to further reduce the nitrogen load or otherwise reduce that impact that excess nitrogen has on the Peconic System. The Peconic Estuary Program seeks to have these TMDLs fully implemented within 15 years from approval, based upon current expectations for full build-out and land acquisition programs, development and implementation of education and outreach programs, full participation in the agricultural environmental management program, and other necessary efforts. Full implementation of these TMDLs is expected to result in water quality standards for dissolved oxygen being met where they are not currently attained and ensure continued compliance where these standards are presently achieved.

A. Summary of Nutrient Load or Impact Reduction Mechanisms for the Peconic Nitrogen TMDLs

1. Atmospheric Deposition

Atmospheric deposition represents a significant load and through existing Federal Clean Air Act (CAA) authorities, a significant load reduction (31.3%) is scheduled through the implementation of controls over the next decade and beyond. The loads and reductions are important locally and regionally. There are several New York State initiatives, which will probably result in further reductions in nitrogen emissions:

$ Adoption of low-emission-vehicle standards for NOx and CO_2
$ Adoption of the Regional Greenhouse Gas Initiative
$ Initiation of the collaborative Renewable Energy Portfolio

Reductions in air emissions beyond those currently called for in the CAA has not yet been evaluated by the PEP in terms of the cost, impact, or benefit/feasibility. Monitoring reductions is possible through the National Atmospheric Deposition Monitoring (there is a wet deposition monitoring station in the Peconic Watershed).

2. Open Space Preservation/Critical Lands Protection

Open space acquisition is critically important in reducing future loads. There are Town (Community Preservation Fund (CPF)), County and State open space acquisition programs, described in detail in the PEP CCMP. Open space acquisition programs with an emphasis on parcels in nitrogen impaired/stressed sub-watersheds could strengthen efforts to protect the overall system and individual waterbody segments that are impaired or threatened. A related effort would be to emphasize the use of transfer of development rights (TDR) credits in a manner that reduces nitrogen loadings, particularly in nitrogen stressed areas. The PEP, with The Nature Conservancy (TNC) has identified priority parcels in nitrogen stressed waters; while this information is known to be used by the Towns, county and state in making acquisition decisions and potentially TDR decisions, government agencies could formally adopt nitrogen stress considerations into acquisition program and TDR program considerations. The TNC (through PEP-funded critical lands protection tracking effort) tracks acquisitions at the various levels of government.

3. Agricultural Nutrient Management

The Long Island Agricultural Stewardship Program, based on the Agricultural Environmental Management Program, should be fully implemented to reduce nutrient losses to groundwater and runoff. The Long Island Agricultural Stewardship has begun to develop and implement a voluntary management plan that addresses groundwater and surface water protection based on appropriately using nitrogen fertilizers (and pesticides registered for use on Long Island). The Agricultural Stewardship Program developed thirteen environmental risk assessment worksheets for Long Island growers modeled after the New York State Agricultural Environmental Management (AEM) Program. Worksheet topics include nutrients, pesticides, soil, irrigation, water, and well management. These worksheets are part of the AEM five-step program. Other important aspects of the stewardship program include providing information on Best Management

Practices and conducting various pilot projects to evaluate practices to reduce nitrogen and pesticide loading into the groundwater. It is also necessary to conduct research and demonstration projects in support of this effort. The Agricultural Stewardship Program tracks local demonstration projects and research, and (confidentially) grower participation. See also Appendix C of this document that includes an implementation highlight discussion and other information (Agricultural Demonstration Projects and Research Summary).

Because the agricultural load of nitrogen is estimated to be an important source of the loads in the Peconic Estuary watershed, achieving the target loads specified in the TMDLs depends on significant reductions from agricultural operations. Reductions would be attempted by a voluntary, incentive-based approach to adopting management practices that reduce nitrogen losses. The level of reduction necessary to achieve the targeted loads, particularly in the currently impaired waterbodies, approaches what could be reasonably anticipated from adopting practices. Achieving the target reduction can also be achieved by converting to crops or cropping practices that result in less nitrogen losses. The Suffolk County Soil and Water Conservation Districts should be encouraged to implement the AEM program on farms in the watershed that will lead to identification and implementation of management practices to reduce nitrogen loads. These practices would be eligible for state or federal funding and because they address a water quality impairment associated with these TMDLs, should score well. Appendix H of the PEP CCMP (see: http://www.peconicestuary.org/CCMP_PDF/AppendixH.pdf) includes the Peconic Estuary Program's detailed Agricultural Environmental Management Strategy. This report goes beyond the traditional approach of describing best management practices to also discuss farm and crop insurance and other innovations that also reduce nitrogen loads. A subsequent report based on that effort is contained in "A Strategy to Develop and Implement the Suffolk County Agricultural Stewardship Program - A Report of the Agricultural Environmental Management Task Force for Nitrogen and Pesticide Load Reduction - Final Report" (May 26, 2004) (see: http://peconicestuary.org/AgForceRpt.pdf)

4. Sewage Treatment Plants/Surface Water Discharges under SPDES

An important milestone in the efforts to manage nitrogen and improve water quality has been the installation of advanced treatment (nutrient removal) at the Riverhead and Sag Harbor STPs. The current advanced treatment at the Riverhead STP has reduced the TN concentration in the effluent. Nutrient limits will be imposed in STP permits (beyond initial "no net increase" based requirements) at the Riverhead, Sag Harbor and Shelter Island Heights STPs, potentially expressed in lbs/day as a monthly average of 24-hr composite samples at a sampling frequency of one sample per week; currently, the Riverhead STP is the only facility with a daily nitrogen limit (expressed in lbs/day, as a monthly average). Further reducing the impact from the Riverhead STP will be achieved by using a portion of the Riverhead STP effluent flow to seasonally irrigate the adjacent the County-owned Indian Island Golf Course. New York State Bond Act money has been allocated for full scale implementation of this beneficial reuse project.

It might also be worthwhile to investigate additional Riverhead STP land application options, including parkland and agricultural operations (particularly plants grown for ornamental horticultural purposes).

The Atlantis Marine World discharge is a small flow (0.0081 MGD) to the nutrient sensitive tidal Peconic River. The permit for the Atlantis Marine World will be reviewed upon renewal to set discharge limits.

5. Requirements for New Development
The proposed implementation initiatives for new development include: revising zoning to reduce development densities; imposing vegetation preservation requirements (i.e., clearing restrictions) to maintain existing vegetation and reduce potential lawn areas; requiring the establishment of a suitable soil base (perhaps up to 12 inches) where lawn areas are to be established; encouraging cluster development to reduce lawn areas; and evaluating the potential for centralized on-site disposal systems (OSDSs) with nitrogen removal.

6. Turf and Landscape Management (for Existing and New Development)
The Peconic Estuary Program implementation plan for this source includes: developing turf/landscaping recommendations for homeowners to eliminate or minimize fertilizer loses to groundwater or to stormwater. At a development density of one dwelling unit per acre, studies have shown that approximately 50% of the TN loading to groundwater comes from fertilizer applications. The PEP will pursue the implementation of an aggressive education and outreach program regarding residential fertilizer use. Immediate plans include determining residential yard care practices that have beneficial environmental impacts or minimize pollution of ground and surface water resources based on nitrogen loadings, as well as developing incentives, including ones to: eliminate fertilizer application to frozen ground, and establishing labeling or signage requirements at retail establishments to inform consumers of the appropriateness of the range of fertilizer application practices. Some materials have already been prepared and are being distributed. The PEP plans to develop a recommended turf/landscaping protocol for homeowners using commercial landscapers. The PEP also plans to implement targeted programs for commercial and industrial properties; for governmental and quasi-governmental properties (schools, libraries, etc., and for all other properties (places of worship, not-for-profits, etc.). Finally, with local governments, the PEP will investigate creating real property tax incentives for eliminating/reducing turf coverage or eliminating/reducing fertilizer use.

7. Individual On-site Wastewater Disposal Systems (OSDS)
The primary focus here is to ensure existing systems work properly (which may perhaps include regular pumping/removal of solids), that there are no illegal or illicit interconnections, there is no discharges to surface waters) and that new systems are properly sited and work properly. Potential enhancements include ensuring systems operate properly upon property transfer and to investigate new OSDS nutrient removal technologies. Finally, as an alternative, it may be necessary in the future to investigate

needs for traditional sewering, and microsewering. Traditional OSDS achieve roughly a 51% reduction in TN from ~75mg/L to 38.2 mg/L (from LI 208 Study).

8. Stormwater

Municipal separate storm sewer systems (MS4s) regulated under the Phase II Stormwater Program will be required to meet the waste load reductions as described below in the section on Reasonable Assurances. Other stormwater inputs are not currently regulated as point sources and are considered nonpoint sources. There are numerous programs, plans and initiatives in place across the east end town to address and mitigate stormwater flow and impacts on surface waters.

9. Golf Courses

There is a program and plan in place to reduce nutrient losses from golf course operations. There is also the opportunity for further enhancements to that effort, including using "fertigation" and improved compost management, etc. The "fertigation" opportunity associated with the beneficial reuse of a portion of the Riverhead STP effluent at the County owned Indian Island Golf Course needs to be evaluated/pursued to potentially reduce if not eliminate fertilizer applications at the Indian Island Golf Course.

B. Other Implementation Considerations

1. Other STPs

While the former Naval Weapon Industrial Reserve Plant (previously operated by the Grumman Corporation) in Calverton, NY has an STP that discharges to a branch of the freshwater Peconic River, the operators have submitted engineering reports to upgrade and build a new facility discharging to groundwater outside of the Peconic Estuary study area. New York State Bond Act funding has been allocated for a portion of this relocation project (which also includes advanced wastewater treatment for the 0.150 MGD flow). Confirmation of the Calverton STP relocation outside of the Peconic Estuary Study Area is needed to implement this TMDL.

There is advanced treatment for nutrient removal at the Brookhaven National Laboratory Sewage Treatment Plant (BNL STP) that discharges to the freshwater Peconic River. The PEP model accounts for the BNL STP discharge essentially included within the boundary load in the tributary load attributed to the Peconic River, which is expressed as a loading allocation (LA) within these TMDLs. The BNL STP does not discharge to estuarine waters or directly to an impaired segment. The BNL STP discharge is to the free flowing (though previously channelized) freshwater Peconic River on U.S. Department of Energy owned property. Downstream of the BNL STP discharge, the River widens into essentially a wetland ecosystem, before returning once again to a channelized watercourse. At the Laboratory boundary, this branch of the Peconic River is not a perennial watercourse, particularly during periods with little or no precipitation. The groundwater-fed Peconic River emerges again downstream, joins up with other branches, becoming a perennial watercourse. After intermediary impoundments and four dams, the River is tidal, approximately 11 miles from the BNL STP discharge (and 8 miles from the Laboratory boundary).

Presently, the average flow from the BNL STP is 0.37 MGD and the average total nitrogen concentration is 7 mg/L, which translates to a load of 20 lbs./day of nitrogen. This reflects advanced treatment for nutrient removal that is in place at the facility. It is likely that environmental fate, transport and attenuation mechanisms result is a significantly smaller nitrogen load actually being delivered to what ultimately enters the tidal Peconic River, though this calculation has not been made. This evidenced by the observed good water quality and relatively small nitrogen load associated with the freshwater Peconic River. The permitted flow for the BNL STP discharge is 2.3 MGD with a total nitrogen limit of 10mg/L; if the facility was to discharge at it the maximum flow and nitrogen limit it would discharge 191 1bs./day of nitrogen. Because of the intermittent nature of the steam, the permit also includes an ammonia limit of 2.0 mg/l. At the present time, there are no known plans in place to increase the flow or load from the BNL STP from the current effluent quality conditions. The modeling scenarios, including the baseline scenario, for these TMDLs did not include any load greater than that which is currently discharged from the BNL STP (20 lbs./day. When this permit is next renewed, treatment performance and permit limits will be reviewed. Such a review could consider environmental fate, transport and attenuation mechanisms associated with the current or increased BNL STP load and mechanisms to keep the load from increasing, including additional treatment, beneficial reuse (i.e., irrigation), and discharge to groundwater outside of the groundwater contributing area of the Peconic Estuary.

2. Groundwater Discharges (under SPDES)

Regulatory agencies should continue to evaluate the performance of the Crescent Duck Farm treatment plant that discharges to groundwater in the Meetinghouse Creek watershed. The PEP could investigate needs for nutrient removal technologies for certain (i.e., flow based) SPDES-permitted groundwater discharges.

3. In-place Highly Enriched Bay Bottom Sediments

Through the PEP there is a plan to investigate the remediation, through removal or other means, nutrient enriched bay bottom sediments. Meetinghouse Creek is a priority remediation area for consideration.

4. Shellfish & Habitat Restoration

Efforts under this heading include the proposed evaluation of shellfish restoration efforts, the restoration of eelgrass beds, and macroalgae harvesting as a means of sequestering or removing nitrogen. The state of science for these measures is unknown for applicability to TMDLs.

5. Boundary Conditions

This includes at least maintaining and ultimately improving water quality at the Long Island Sound interface. Similarly, the manipulation of the Shinnecock Locks to introduce additional flushing was previously determined not feasible, but a re-evaluation may be appropriate.

6. Other Sources/Mechanisms

Other initiatives that address nitrogen load reductions include the established Vessel Waste No Discharge Area, and existing programs preserving and protecting wetlands and buffers to mitigate direct stormwater runoff. There is also the potential for improving domestic and wild animal and livestock waste management, and local or larger scale groundwater remediation efforts.

VIII. Reasonable Assurances

This section describes and explains the reasonable assurances for achieving wasteload allocations for point sources and load allocations for nonpoint sources, with an expanded discussion of Phase II stormwater regulations and current and continuing nonpoint source management programs/efforts.

A. Overview/Discussion

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs EPA Regional Offices to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that load allocations (LAs) will be achieved, because such a showing is not required by current regulations.

B. Point Sources

Point source loads will be addressed consistent with the WLAs and TMDLs contained in this report and the accompanying text, including the discussion in the implementation section. Additional information regarding the implementation of Phase II Stormwater Regulations is contained in the section below.

C. Implementation of Phase II Stormwater Regulations

NYSDEC has expanded its permitting program to include a new federally mandated program to control stormwater runoff and protect waterways.

According to the federal law, commonly known as Stormwater Phase II, permits will be required for stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas and for construction activities disturbing one or more acres. To implement the law, the NYSDEC has developed two general SPDES permits, one for MS4s in urbanized areas and one for construction activities. Operators of regulated small MS4s seeking authorization to discharge stormwater in compliance with the federal Clean Water Act are required to apply for and secure coverage under the SPDES General Permit for Municipal Separate Storm Sewer Systems. Operators of regulated MS4s and construction activities must obtained either a SPDES or a general permit no later than March 10, 2003 or prior to the commencement of construction.

The MS4 municipalities are required to develop, implement and enforce a stormwater management program (SWMP). The SWMP must describe the Best Management Practices (BMPs) for each of the minimum control measures:
1. Public education and outreach program to inform the public about the impacts of the stormwater on the receiving water quality.
2. Public involvement and participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control program for sites disturbing one or more acres.
5. Post-construction runoff control program for new development and redevelopment sites disturbing one or more acres.
6. Pollution prevention and good housekeeping operation and maintenance program.

Operators must have developed the initial SWMP prior to March 10, 2003 and have provided adequate resources to fully implement the SWMP no later than five years from the issuance date of the MS4 permit. Each of the regulated MS4s in this TMDL (see table below) has developed an initial SWMP and has coverage under the general permit (GP-02-02). An MS4 may modify its SWMP at any time, although any changes to a SWMP shall be reported to the NYSDEC in the MS4's annual report. MS4s are required to make steady progress toward full implementation.

Table V111.1 Stormwater Permits in the Peconic Estuary

Permittee	SPDES #	Date Notice of Intent (NOI) Submitted
Town of Riverhead	NYR20A020	03/04/2003
Town of Southampton	NYR20A454	03/04/2003
Village of Sag Harbor	NYR20A095	02/27/2003
Village of North Haven	NYR20A500	12/15/2003
Suffolk County	NYR20A180	3/25/2003
NYSDOT	NYR20A288	3/10/2003
Town of Brookhaven		

A SWMP is designed to reduce the discharge of pollutants to the maximum extent practicable (MEP) to protect water quality and to satisfy the appropriate water quality requirements of the Environmental Conservation Law and the Clean Water Act. MEP is a technology-based standard established by Congress in the Clean Water Act. Since no precise definition of MEP exists, it allows for maximum flexibility on the part of MS4 operators as they develop their programs. If stormwater is being discharged to a 303(d)-listed segment of a water body, the SWMP must ensure there is no resulting increase in the pollutant of concern to the, receiving waters. Where required to meet water quality standards NYSDEC enforces additional requirements based on WLAs determined through a TMDL. The MS4 must review the applicable TMDL to see if it includes requirements for control of stormwater discharges. If an MS4 is not meeting the TMDL stormwater allocations, it must, within six (6) months of the TMDL's approval, modify its SWMP to ensure that reduction of the pollutant of concern specified in the TMDL is achieved. Modifications must be considered for each of the six minimum measures. The revised management program must include an updated schedule for implementation.

The MS4s that discharge to the Peconic Estuary System are owned and operated by the municipalities located around this waterbodies. Accordingly, all municipalities identified in the TMDL have submitted an application to gain coverage under New York's SPDES General Permit for Municipal Separate Storm Sewer Systems.

NYSDEC will continue to work with these municipalities to identify funding sources and to evaluate locations and designs for stormwater control BMPs throughout the watershed. Under the State's Environmental Protection Fund (EPF), $10.8 million were made available in 2005 (update) through an application process to assist communities in implementing the Stormwater Phase II regulations and for non-agricultural nonpoint source abatement and control projects.

Currently, the Towns of East Hampton, Southold and Shelter Island are not part of an MS4 area. In order to implement pathogen TMDLs, the Towns of the East Hampton and Southold would be designated as regulated MS4s after approval of TMDLs by EPA.

This TMDL does not invoke additional requirements set forth in the SPDES General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-02-01, applicable to facilities satisfying Condition A of Part III.A.1.b.(1) for construction sites discharging to these waterbodies.

D. Information Regarding Nonpoint Source Management Programs/Efforts

As discussed in the Implementation Plan associated with this document, the east end towns, Suffolk County, and New York State along with the Peconic Estuary Program and its many stakeholders have made and continue to make significant strides in developing and implementing programs and projects to reduce point and nonpoint source loads of nitrogen. These include:

- Supporting open space acquisition programs at all levels of government, and recommending that parcels of land in nitrogen stressed sub watersheds be priorities for acquisition.
- Supporting existing and proposed local government initiatives to preserving existing vegetation of parcels being developed, subdivided or re-developed, which among other

ecological benefits can serve to limit the size of intensively managed landscapes now and in the future.

- Supporting using the effluent from the Riverhead Sewage Treatment Plan to irrigate and "fertigate" the adjoining County owned Indian Island Golf Course and supporting the allocation of funding to pilot test and fully implement this project.
- Working cooperatively with the 34 golf courses east of the William Floyd Parkway to reduce the amount of nitrogen that makes its way into groundwater and surface waters through improved management practices, and providing funding to develop plans for individual courses.
- Supporting the construction of a groundwater discharging treatment plant at the Corwin Duck Farm on Meetinghouse Creek to treat processing waters from that operation.
- Working with the Association of Marine Industries to secure a Vessel Waste No Discharge Zone designation for the entire Peconic Estuary to eliminate this pollution source, and working with marine engine retailers to encourage boaters to purchase low emission/clean marine engines that are now on the market.
- Working with the agricultural community to reduce the nitrogen load from agriculture, including funding a county agricultural stewardship coordinator and staff to work to secure funding to develop and implement the necessary farm plans to achieve that goal.
- Developing recommendations and regulatory elements for reducing impacts associated with landscaping practices on residential, commercial, and public properties (i.e., eliminating or reducing fertilizer inputs); securing funding to develop and carry out education and outreach program aimed at working with property owners/managers and commercial landscapers.
- Working with governments at all levels to implement projects to reduce direct and indirect stormwater inputs from road and highway drainage systems.
- Investigating opportunities to reduce nutrient loadings from on-site wastewater disposal systems ("septic systems" or "cesspools"), such as advanced treatment and micro-sewering, and pursuing feasible innovations and alternatives.
- Providing funding to investigate the feasibility for removing in-place and highly nutrient enriched bottom sediments.
- Supporting and funding efforts to reestablish eelgrass beds and the reverse trends responsible for the decline of existing beds.
- The allocation of significant funding for projects aimed at restoring commercially important shellfish (scallops and hard clams) through seeding and the establishment of spawner sanctuaries.
- Plans to further investigate other opportunities to reduce, manage or otherwise understand other nutrient inputs (i.e., wet and dry atmospheric deposition)

E. Monitoring and Reporting

The SCDHS also will continue its monitoring effort in the Peconic Estuary to continue to document water quality conditions and trends.

The Peconic Estuary Program seeks to have these TMDLs fully implemented within 15 years from approval, based upon current expectations for full build-out and land acquisition programs, development and implementation of education and outreach programs, full participation in the agricultural environmental management program, and other necessary efforts. The Peconic Estuary Program plans to track and report on progress in implementing and achieving these TMDLs at five-year intervals. Full implementation of these TMDLs is expected to result in water quality standards for dissolved oxygen being met where they are not currently attained and ensure continued compliance where these standards are presently achieved.

IX. Public Participation

EPA, DEC and SCDHS have worked together to prepare these TMDLs to meet the requirements of Section 303(d) of the Clean Water Act. NYSDEC will make this document available to the public, local agencies, and stakeholders for their review and feedback. The stakeholders will include, but are not limited to the Towns of Riverhead, Southampton, East Hampton, Southold, Shelter Island and Brookhaven; the Villages of Sag Harbor, North Haven Dering Harbor, and Greenport; Brookhaven National Laboratory, Riverhead, Sag Harbor, and Shelter Island Heights STPs; other stakeholders involved in the Peconic Estuary Program and its committees and members.

A notice will be published in the Environmental Notice Bulletin concerning the availability of these TMDLs, specifying where interested parties can obtain a copy of the document in electronic or printed form. The public will be given 30 days to submit comments to the DEC.

X. References for Section V

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Hamrick, J.M., 1992. A Three-dimensional Environmental and Fluid Dynamics Computer Code: Theoretical and Computational Aspects. The College of William and Mary, Virginia Institute of Marine Science. Special Report 317. 63 pp.

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Tetra Tech. 2000. Three-dimensional Hydrodynamic and Water Quality Model of Peconic Estuary, Draft Final Report. Prepared for Peconic Estuary Program, County of Suffolk, Department of Health Services, Office of Ecology, Riverhead, NY. Prepared by Tetra Tech, Inc., Fairfax, VA. June 2000.

Tetra Tech. 2005. Refinements to the Three-dimensional Hydrodynamic and Water Quality Model of Peconic Estuary, Draft Report. Prepared for Peconic Estuary Program, County of Suffolk, Department of Health Services, Office of Ecology, Riverhead, NY. Prepared by Tetra Tech, Inc., Fairfax, VA. March 2005.

XI. Glossary

Algae: Any organisms of a group of chiefly aquatic microscopic nonvascular plants; most algae have chlorophyll as the primary pigment for carbon fixation. As primary producers, algae serve as the base of the aquatic food web, providing food for zooplankton and fish resources. An overabundance of algae in natural waters is known as eutrophication.

Anoxic: Aquatic environmental conditions containing zero or little dissolved oxygen. See also anaerobic.

Assimilative capacity: The amount of contaminant load (expressed as mass per unit time) that can be discharged to a specific stream or river without exceeding water quality standards or criteria. Assimilative capacity is used to define the ability of a water body to naturally absorb and use waste matter and organic materials without impairing water quality or harming aquatic life.

Bacterial decomposition: Breakdown by oxidation, or decay, of organic matter by heterotrophic bacteria. Bacteria use the organic carbon in organic matter as the energy source for cell synthesis.

Best management practices (BMPs): Methods, measures, or practices that are determined to be reasonable and cost-effective means to meet certain generally nonpoint source, pollution control needs. BMPs include structural and nonstructural controls and operation and maintenance procedures.

Biochemical oxygen demand (BOD): The amount of oxygen per unit volume of water required to bacterially or chemically oxidize (stabilize) the oxidizable matter in water. Biochemical oxygen demand measurements are usually conducted over specific time intervals (5, 10, 20, 30 days). The term BOD generally refers to the standard 5-day BOD test.

Brown Tide: A harmful algal bloom of the microscopic alga Aureococcus anophagefferens. In 1985, severe brown tides were first reported in the Peconic Bays of eastern Long Island, New York, in Narragansett Bay, Rhode Island and possibly in Barnegat Bay, New Jersey. Since then, brown tide has intermittently occurred with variable intensity in Barnegat Bay and in the bays of Long Island.

Calibration: Testing and tuning of a model to a set of field data not used in the development of the model; also includes minimization of deviations between measured field conditions and output of a model by selecting appropriate model coefficients.

Designated use: Uses specified in water quality standards for each waterbody of segment regardless of actual attainment

Discharge permit (NPDES): A permit by the U.S. EPA or a state regulatory agency that sets specific limits on the type and amount of pollutants that a municipality or industry can discharge to a receiving water; it also includes a compliance schedule for achieving those limits. The permit process was established under the National Pollutant Discharge Elimination System (NPDES), under provisions of the Federal Clean Water Act

Dissolved oxygen (DO): The amount of oxygen that is dissolved in water. It also refers to a measure of the amount of oxygen available for biochemical activity in a waterbody and as indicator of the quality of that water.

Drainage basin: A part of the land area enclosed by a topographic divides from which direct surface runoff from precipitation normally drains by gravity into a receiving water. Also referred to as watershed, river basin, or hydrologic unit.

Effluent: Municipal sewage or industrial liquid waste (untreated, partially treated, or completely treated) that flows out of a treatment plant, septic system, pipe or other conduit.

Estuary: Brackish-water area influenced by the tides where the mouth of the river meets the sea.

Eutrophication: Enrichment of an aquatic ecosystem with nutrients (nitrates, phosphates) that accelerate biological productivity (growth of algae and weeds) and an undesirable accumulation of algal biomass.

Eutrophication model: Mathematical formulation that describes the advection, dispersion, and biological, chemical and geo-chemical reactions that influence the growth and accumulation of algae in aquatic ecosystems. Models of eutrophication typically include one or more species groups of algae, inorganic and organic nutrients (N, P), organic carbon, and dissolved oxygen.

Hydrodynamic model: Mathematical formulation used in describing circulation, transport, and deposition processes in receiving water.

Hypoxia: The aquatic environmental conditions of reduced oxygen concentration in a water body that may lead to stressful or fatal conditions for aquatic organisms.

Loading, load, loading rate: The total amount of material (pollutants) entering the system from one source or multiple sources; measured as a rate in weight per unit time.

Load allocation (LA): The portion of receiving water's total maximum daily load that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources.

Margin of safety (MOS): A required component of the TMDL that accounts for the uncertainty about the relationship between the pollutant load and the quality of the receiving waterbody. This uncertainty can be caused by insufficient or poor-quality data or a lack of knowledge about the water resource and pollution effects.

Mathematical model: A system of mathematical expressions that describes the spatial and temporal distribution of water quality constituents resulting from fluid transport and the one, or more, individual processes and interactions within some prototype\aquatic ecosystem. A mathematical water quality model is used as the basis for TMDL evaluations.

Nonpoint source pollution: Pollution that is typically not released through pipes but rather originates from multiple sources over a relatively large area. Nonpoint sources can be attributed to activities or land or water uses including: onsite disposal systems (septic systems), agricultural and forestry operations, lawn care, boating, and wet and dry atmospheric deposition. Nonpoint source pollution may reach surface waters via ground water.

Nutrient: A primary element necessary for the growth of living organisms. Nitrogen, and phosphorus, for example, are nutrients required for phytoplankton growth.

Nutrient limitation: Deficit of nutrient (e.g., nitrogen and phosphorus) required by microorganisms in order to metabolize organic substrates.

Point source: Pollutant loads discharged at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants or industrial waste treatment facilities.

Three-dimensional (3-D) model: Mathematical model defined along three spatial coordinates (length, width, and depth) where the water quality constituents are considered to vary over all three spatial coordinates.

Waste load allocation (WLA): The portion of a receiving water's total maximum daily load that is allocated to one of its existing or future point sources of pollution.

Water quality: The biological, chemical, and physical conditions of a waterbody; a measure of the ability of a waterbody to support beneficial uses.

Water quality criteria (WQC): Water quality criteria are composed of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or states for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

Water quality standard (WQS): A law or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

Watershed: The area of land from which rainfall (and/or snowmelt) drains into a stream or other waterbody. Watersheds are also sometimes referred to as drainage basins. Ridges of higher ground generally form the boundaries between watersheds.

XII. Acronyms

ac-ft-days – acre-feet-days
BMP – best management practice
BNL – Brookhaven National Laboratory
CCMP - Comprehensive Conservation and Management Plan
CFR – Code of Federal Regulations
CPF – Community Preservation Fund
CPF - Community Preservation Fund
CWA - Federal Clean Water Act
DEC - New York State Department of Environmental Conservation
DO - dissolved oxygen
EFDC - Environmental Fluid Dynamics Code
EPA - U.S. Environmental Protection Agency
EPF – Environmental Protection Fund
ft - feet
GIS - geographic information system
lb (or lbs.) - pounds
LA - load allocation
L-O-T or LOT – limit of technology
m - meters
MEP – maximum extent practicable
mg/L - milligrams per liter
MGD or mgd – million gallons per day
MOS - margin of safety
MS4 – Municipal Separate Storm Sewer System

N - nitrogen
NOI – Notice of Intent
NEP - National Estuary Program
NYSCRR New York State Codes, Rules and Regulations
NYSDOT – New York State Department of Transportation
PEP - Peconic Estuary Program
PLR – practical load reduction
psu - practical salinity units
PWL - Priority Waterbodies List
SAV - submerged aquatic vegetation
SCDHS - Suffolk County Department of Health Services
SPDES - State Pollutant Discharge Elimination System
STP - sewage treatment plant
SWMP – stormwater management plan
TMDL – total maximum daily load
TN – total nitrogen
TOC - total organic carbon
USGS – U.S. Geological Survey
WLA – wasteload allocation
WQBELs - water quality-based effluent limits)
YSI - Yellowbird Springs Instruments

XIII. Links to Relevant Documents and Web Sites

A Strategy to Develop and Implement the Suffolk County Agricultural Stewardship Program - A Report of the Agricultural Environmental Management Task Force for Nitrogen and Pesticide Load Reduction - Final Report (May 26, 2004)
http://peconicestuary.org/AgForceRpt.pdf

Peconic Estuary Program Comprehensive Conservation and Management Plan (November 2001)
http://www.peconicestuary.org/CCMP.html

Appendix H (Agricultural Environmental Management Strategy) of the Peconic Estuary Program Comprehensive Conservation and Management Plan (November 2001)
http://www.peconicestuary.org/CCMP_PDF/AppendixH.pdf

FINAL REPORT for Peconic Bay Pathogens TMDL (September 2006)
http://www.epa.gov/waters/tmdldocs/NY-2006-Pathogens-Peconic_Bay-TMDLDoc.pdf

Appendix A: Cumulative Impacts Graphics

Peconic Estuary Nitrogen TMDLs
January 5, 2007

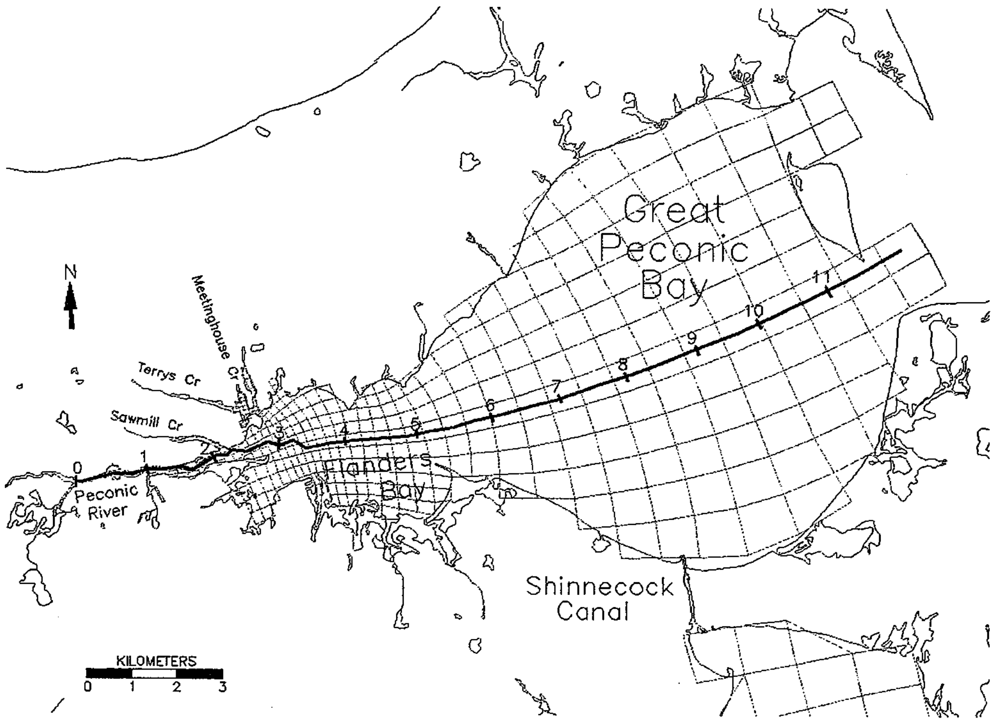
Cumulative Impacts

- The following graphics show the cumulative impacts of various management alternatives on total nitrogen and dissolved oxygen along 4 transects in western Peconic Estuary. Model results for 6 runs are shown on each graphic:
  - 01g: Baseline run (i.e., existing conditions)
  - 15h1: atmospheric deposition of nitrogen reduced by 31.3%
  - 15h2: groundwater nitrogen concentration reduced by 0.2 mg/L
  - 15h3: tributary and stormwater nitrogen reduced by 0.2 mg/L
  - 15h: STP loads reduced to current limit-of-technology with spray irrigation used during summer months (May 1 – Sep 30)
  - 15i: same as 15h except mechanical aeration was used to add oxygen to achieve existing 5.0 mg/L DO water quality standard
- These runs are summarized in the following table

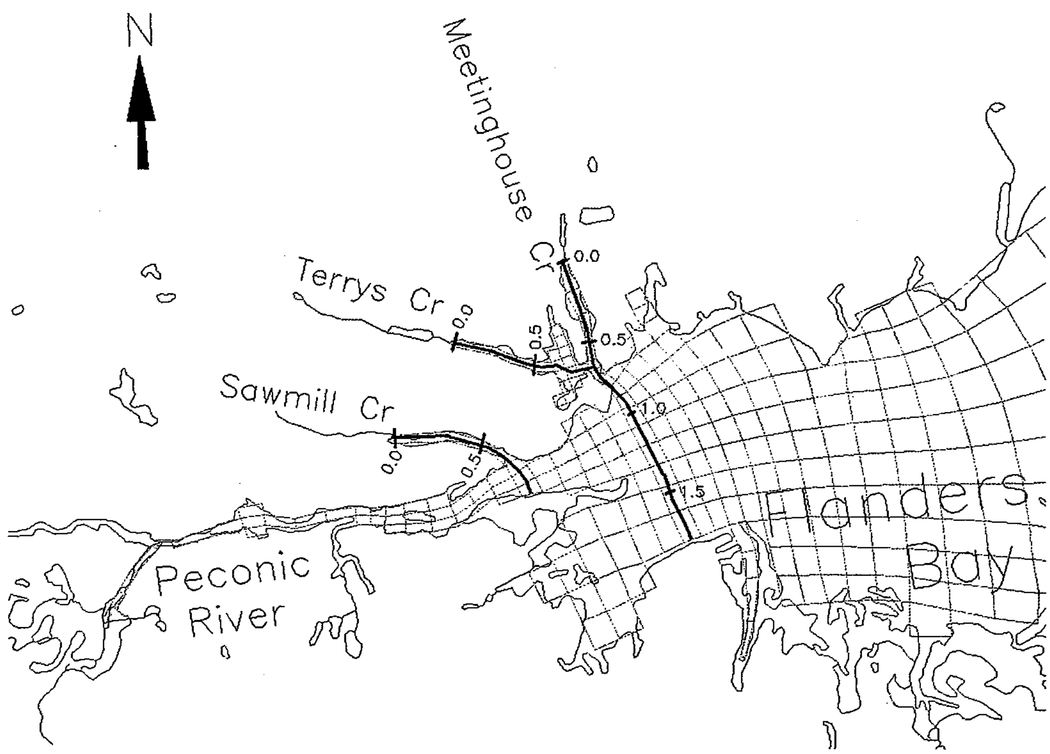
Summary of Alternative Management Scenarios

Scenario	WWTPs	Atmospheric Deposition	Groundwater	Peconic River and Tributaries	Stormwater Runoff
01g	Flow and load at existing permit limits (Riverhead STP TN =130 lb/day)	Nitrogen from atmospheric deposition at existing levels	Nitrogen at existing concentrations	Nitrogen loads at existing levels	Nitrogen from stormwater loads at existing levels
15h1	Flow and load at existing permit limits (Riverhead STP TN =130 lb/day)	Nitrogen from atmospheric deposition reduced by 31.3%	Nitrogen at existing concentrations	Nitrogen loads at existing levels	Nitrogen from stormwater loads at existing levels
15h2	Flow and load at existing permit limits (Riverhead STP TN =130 lb/day)	Nitrogen from atmospheric deposition reduced by 31.3%	Nitrogen at limit-of-technology concentrations	Nitrogen loads at existing concentrations	Nitrogen from stormwater loads at existing levels
15h3	Flow and load at existing permit limits (Riverhead STP TN =130 lb/day)	Nitrogen from atmospheric deposition reduced by 31.3%	Nitrogen at limit-of-technology concentrations	Nitrogen loads at limit-of-technology concentrations	Nitrogen from stormwater loads reduced by 15% in Peconic River and Flanders Bay; reduced by 10% east of Flanders Bay
15h	Flow and load at limit-of-technology with spray irrigation (Riverhead STP TN=40 lb/day)	Nitrogen from atmospheric deposition reduced by 31.3%	Nitrogen at limit-of-technology concentrations	Nitrogen loads at limit-of-technology concentrations	Nitrogen from stormwater loads reduced by 15% in Peconic River and Flanders Bay; reduced by 10% east of Flanders Bay

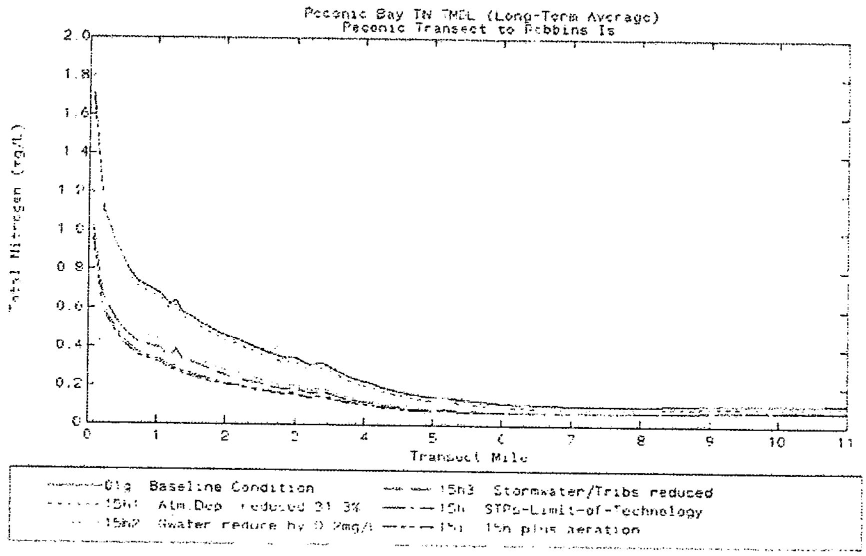
Note: Scenario 15i is the same as 15h except mechanical aeration was used to add oxygen to achieve the existing 5.0 mg/L DO water quality standard.



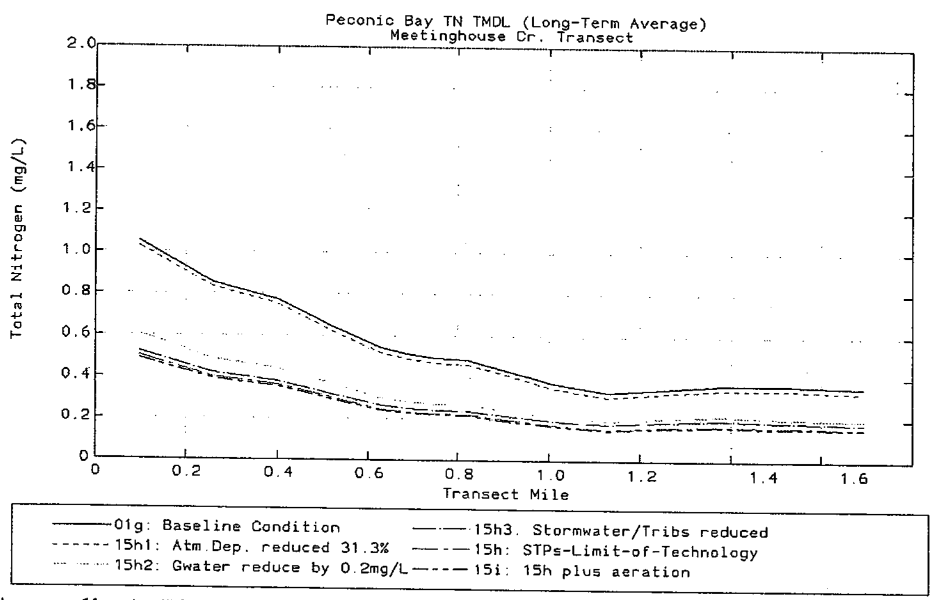
Appendix A, Figure A.1: location and river miles for Peconic River to Robbins Island transect



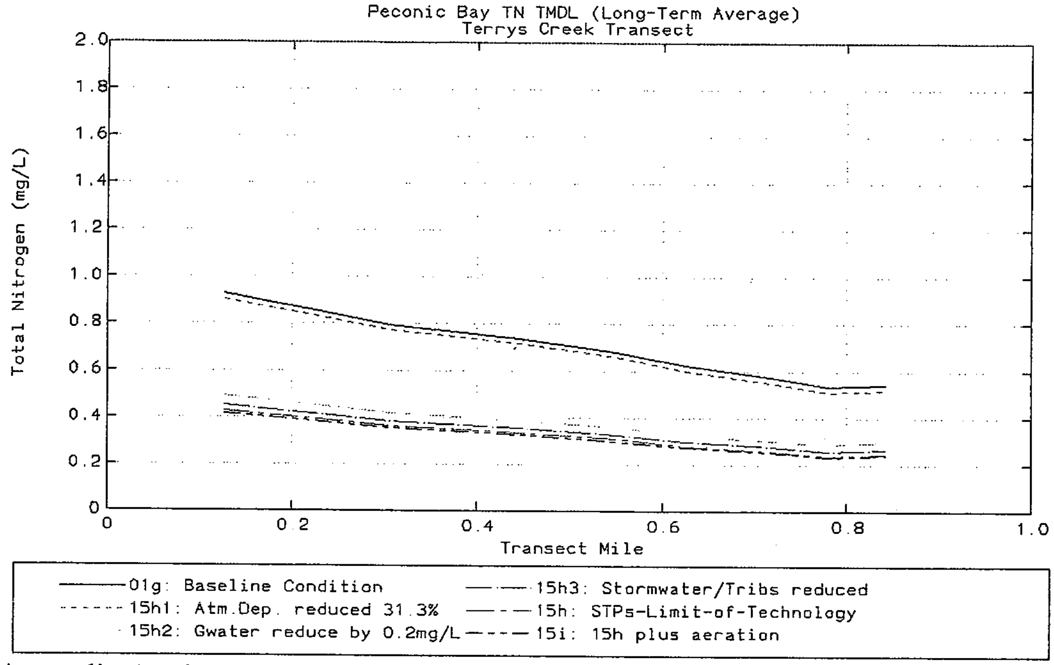
Appendix A, Figure A.2: locations and river miles for Meetinghouse Creek, Terrys Creek, and Sawmill Creek transects



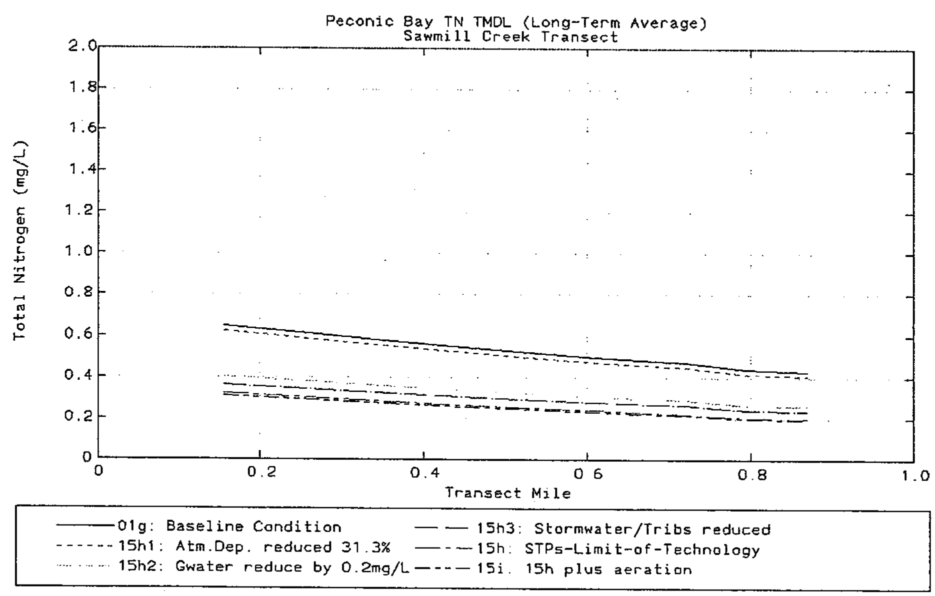
Appendix A, Figure A.3: Peconic River to Robbins Island Transect - Long-term average TN; this represents the mean of all 730 daily-average TN concentration values from the 2-year model run, averaged over the 4 vertical layers at each grid cell along the Peconic River to Robbins Island transect.



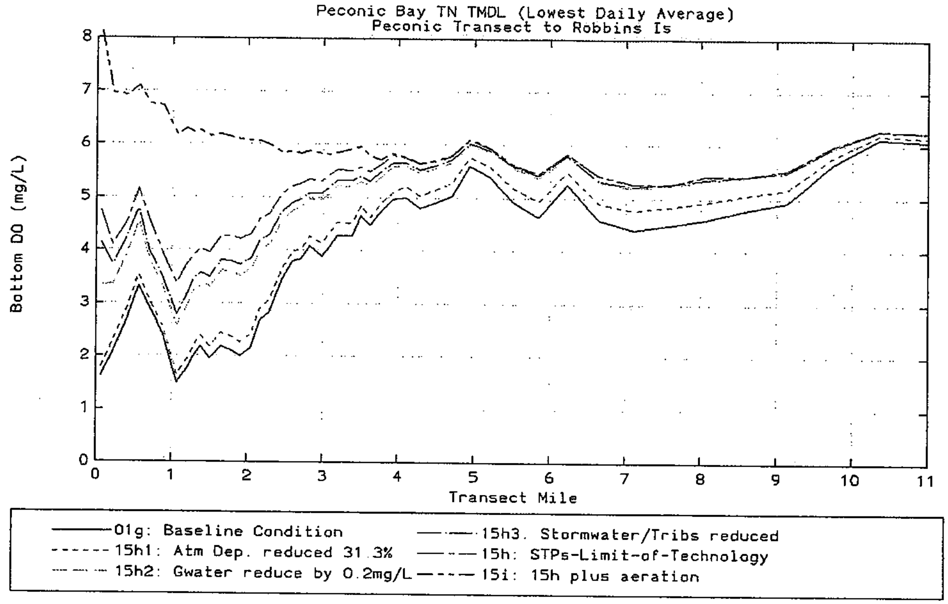
Appendix A, Figure 4: Meetinghouse Creek Transect - Long-term average TN; this represents the mean of all 730 daily-average TN concentration values from the 2-year model run, averaged over the 4 vertical layers at each grid cell along the Meetinghouse Creek transect.



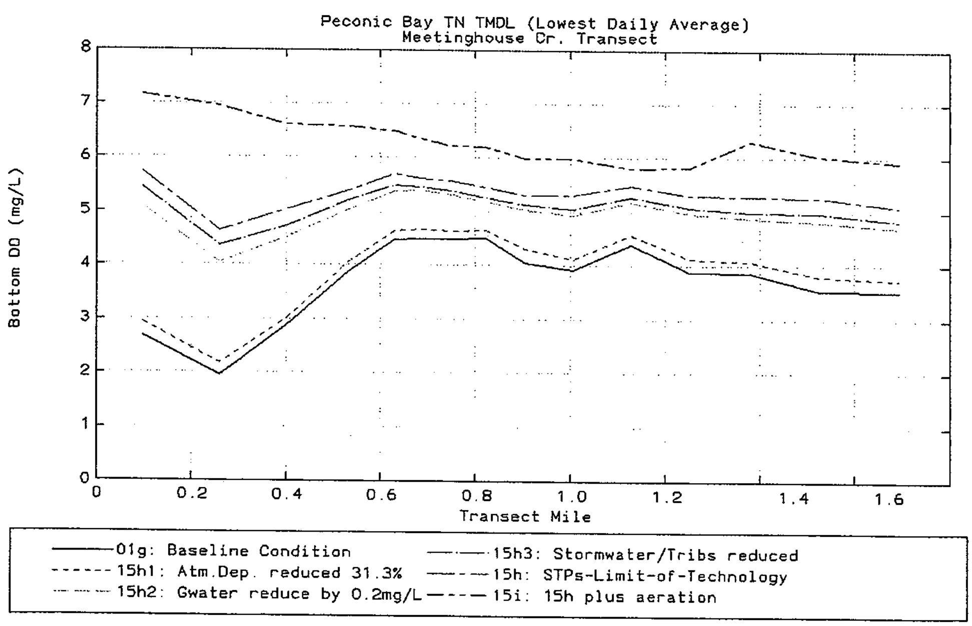
Appendix A, Figure A.5: Terrys Creek Transect - Long-term average TN; this represents the mean of all 730 daily-average TN concentration values from the 2-year model run, averaged over the 4 vertical layers at each grid cell along the Terrys Creek transect.



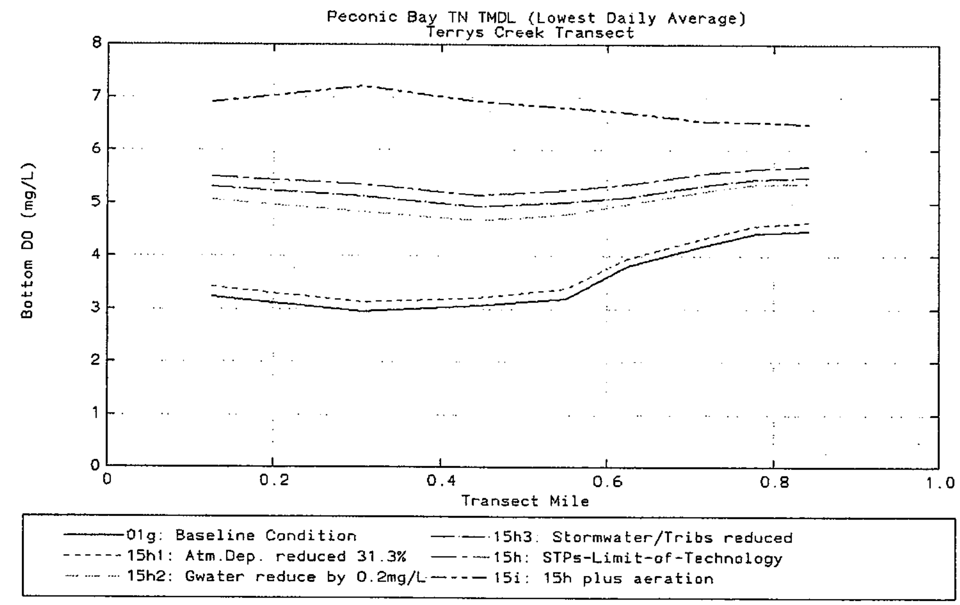
Appendix A Figure 6: Sawmill Creek Transect- Long-term average TN; this represents the mean of all 730 daily-average TN concentration values from the 2-year model run, averaged over the 4 vertical layers at each grid cell along the Sawmill Creek transect.



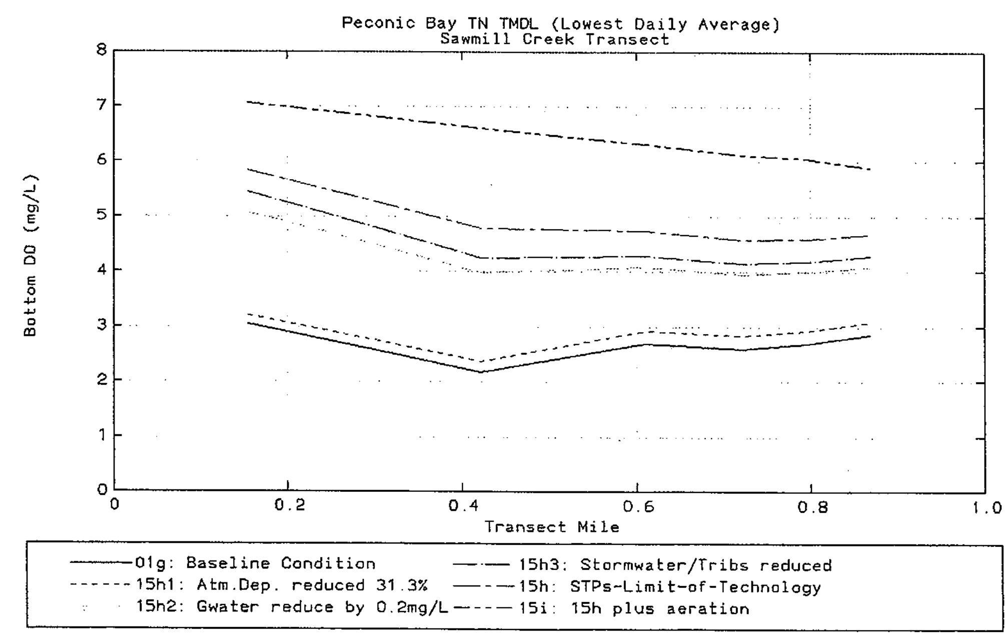
Appendix A, Figure A.7: Peconic River to Robbins Island Transect - Lowest daily-average bottom DO, this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the bottom layer at each grid cell along the Peconic River to Robbins Island Transect.



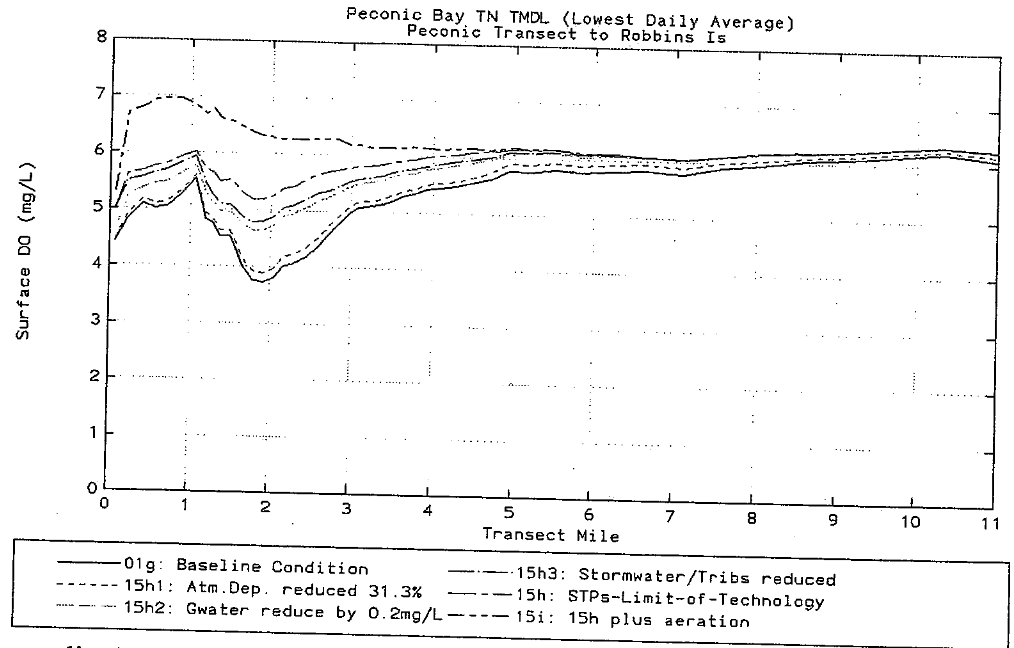
Appendix A, Figure A-8: Meetinghouse Creek Transect - Lowest daily-average bottom DO, this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the bottom layer at each grid cell along the Meetinghouse Creek Transect.



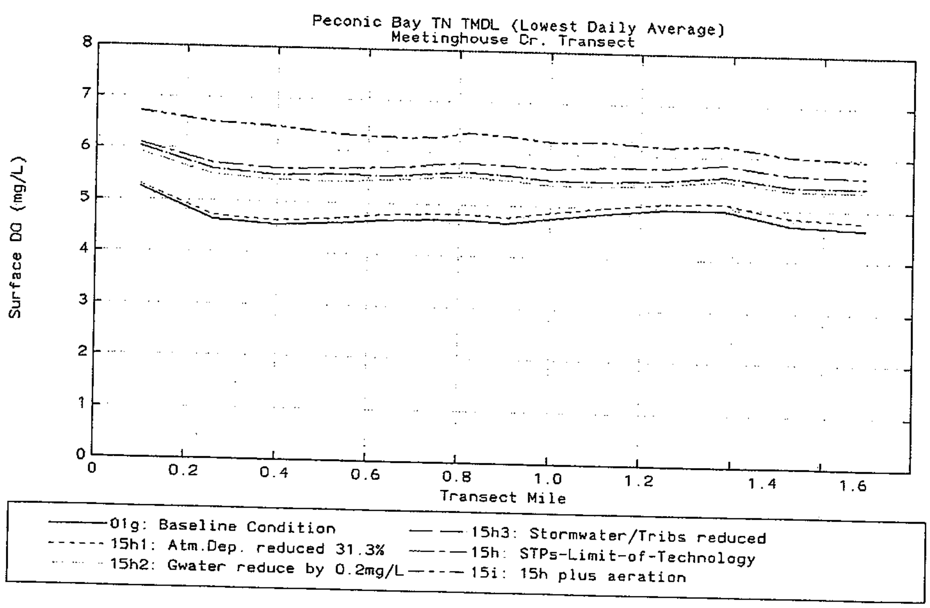
Appendix A, Figure A.9 Terrys Creek Transect - Lowest daily-average bottom DO, this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the bottom layer at each grid cell along the Terrys Creek Transect.



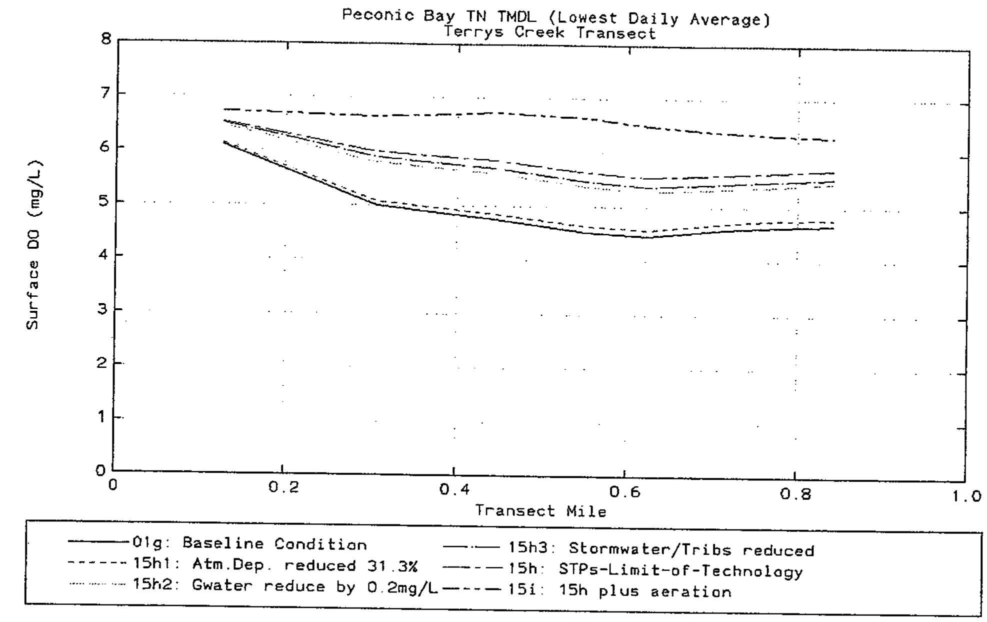
Appendix A, Figure A.10: Sawmill Creek Transect - Lowest daily-average bottom DO, this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the bottom layer at each grid cell along the Sawmill Creek Transect.



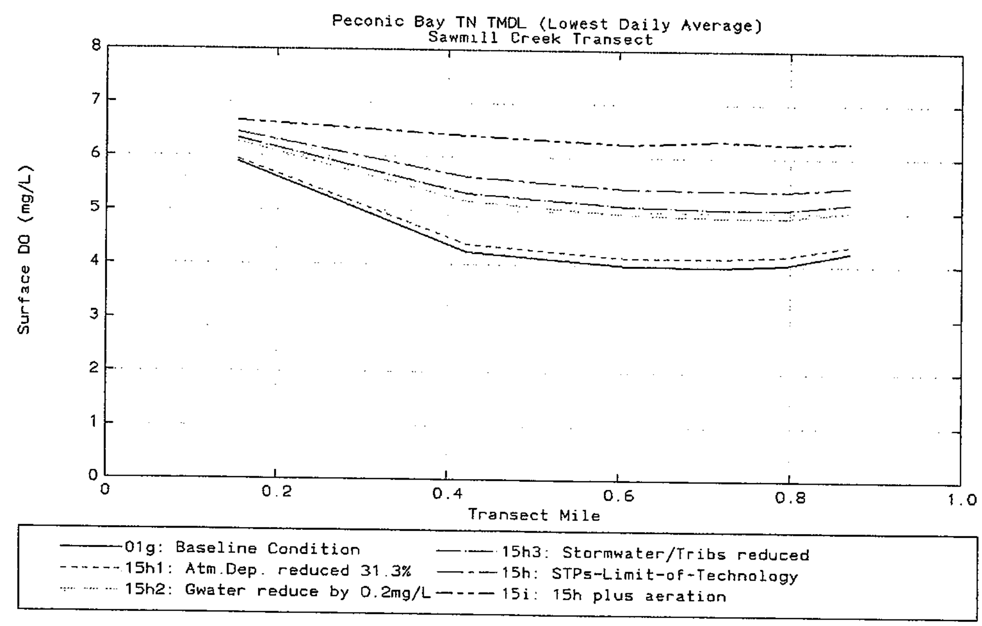
Appendix A, Figure A.11 Peconic River to Robbins Island Transect - Lowest daily-average surface DO; this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the surface layer at each grid cell along the Peconic River to Robbins Island Transect.



Appendix A, Figure A.12: Meetinghouse Creek Transect - Lowest daily-average surface DO; this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the surface layer at each grid cell along the Meetinghouse Creek Transect.



Appendix A, Figure A.13 Terrys Creek Transect - Lowest daily-average surface DO; this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the surface layer at each grid cell along the Terrys Creek Transect.



Appendix A, Figure A.14: Sawmill Creek Transect - Lowest daily-average surface DO; this is the lowest of the 730 daily-average DO concentrations from the 2-year model run for the surface layer at each grid cell along the Sawmill Creek Transect.

Appendix B: NYS DEC 303 listing

(MW6.1e) GB..FB,FB-111	* Flanders Bay, West/Lower Sawmill Cr (1701-0254)	Suffolk	Estuary	SC	D.O./Oxygen Demand	Urb/Storm Runoff	2002
(MW6.1e) GB..FB-110	* Meetinghouse/Terrys Creeks and tribs (1701-0256)	Suffolk	Estuary	SC	D.O./Oxygen Demand	Agric (sediment beds)	2002
(MW6.2) GB..FB-112 (portion 1)	* Peconic River, Lower, and tidal tribs (1701-0259)	Suffolk	Estuary	SC	D.O./Oxygen Demand	Urb/Storm Runoff	2002

Appendix C: Agricultural Environmental Management/Agricultural Stewardship

Implementation Plan Highlight: Agricultural Environmental Management/ Agricultural Stewardship

Introduction

The Suffolk County Agricultural Stewardship Program was established in response to growing concerns about nitrate levels and pesticide residues in Long Island ground and surface waters. Cornell Cooperative Extension, the coordinating agency of the Stewardship Program, works together with Suffolk County Soil and Water Conservation District and USDA Natural Resource Conservation Service to protect the Long Island's water resources while at the same time preserving the region's viable and sustainable agricultural industry. This program is funded by the Suffolk County Water Quality Protection and Restoration Program.

Background

The Long Island Agricultural Stewardship Committee was formed in 1999 to address environmental concerns with the intent of preserving farmland while protecting groundwater. The goals of the stewardship committee are to promote the use of agricultural inputs in a responsible and environmentally sound manner while maintaining a strong, viable agricultural industry. The committee has begun to develop and implement a voluntary management plan that addresses groundwater and surface water protection by appropriately using nitrogen (fertilizer) and pesticides registered for use on Long Island.

The stewardship committee originally developed thirteen environmental risk assessment worksheets for Long Island growers modeled after the NYS Agricultural Environmental Management (AEM) Program. Worksheet topics include pesticides, nutrients, soil, irrigation, water, and well management. These worksheets are part of the AEM five-step program, which allows growers to address environmental concerns on their farms, while maintaining a healthy agricultural economy. Other important aspects of the stewardship program include providing information on Best Management Practices and conducting various pilot projects to evaluate practices to reduce nitrogen and pesticide loading into the groundwater.

What is AEM?

Agricultural Environmental Management (AEM) is a voluntary, incentive-based program that helps farmers operate environmentally sound and economically viable businesses. The AEM program coordinates agricultural and environmental conservation agencies and programs, as well as private sector consultants, to provide one-stop shopping for services. The AEM program benefits both farmers and the environment by helping to manage fertilizer nutrients, protect drinking water, conserve soil, improve neighbor and community relations, and comply with environmental regulations.

How does AEM work?

Using AEM's 5-tiered approach, farmers work with the Agricultural Stewardship Program, including Suffolk County's Soil and Water Conservation District (SWCD) and National Resource Conservation Service (NRCS) staff, to develop and implement comprehensive, site-specific farm plans.

Tier 1: A short questionnaire identifies current farm activities, future plans and potential environmental concerns.

Tier 2: AEM worksheets document current environmental stewardship while identifying and prioritizing environmental concerns. The Stewardship Program has focused the worksheets on nutrient and pest management, highlighting the agricultural practices that have the greatest impact on Long Island's ground and surface waters.

Tier 3: A plan is developed providing solutions to environmental concerns identified in Tiers 1 and 2. Plans are designed with a farm's mission, goals, and objectives in mind.

Tier 4: SWCD, NRCS, the Stewardship Program staff and consultants provide farms with technical and educational assistance to implement best management practices (BMPs).

Tier 5: Ongoing evaluations ensure that AEM helps protect both the environment and the viability of farm businesses.

What Assistance Does AEM Provide?

Technical Assistance and Information:
- Environmental farm plan development
- Best Management Practice design and installation
- Education programs to help farmers operate viable and environmentally sound farms

Financial Assistance:
Sources of cost-share funds for environmental farm plans and BMP implementation on Long Island include:
- NYS Agricultural Non-point Source Abatement and Control Grant Program
- USDA Farm Bill Programs such as the Environmental Quality Incentive Program (EQIP) and the Wildlife Habitat Incentives Program (WHIP)
- Agrichemical Mixing Facility

Components of the Stewardship Program
There is always room for improvement in every farm operation when it comes to best management practices. Participation in the Stewardship Program is voluntary and confidential.

Confidential Nutrient and Pest Management worksheets (AEM Tier II Worksheets) help growers evaluate farm management practices and address issues such as:
- Fertilizer/pesticide storage, mixing and loading practices, calibration, nitrogen management, pesticide use, and integrated crop management practices.
- Growers receive recommendations, technical assistance and conservation management plans tailored to meet specific stewardship needs.
- Cost-Share opportunities are available to assist growers in implementing changes in management practices to improve stewardship.

- Educational programs, On-farm demonstration projects, and DEC credits are available to growers who chose to participate.

Farm Site Evaluation

The Agricultural Stewardship Program has developed a list to help growers determine if they are using Best Management Practices (BMPs) which help protect ground water and surface water. The grower is first asked to review the conditions within the growing areas on their farm. If they check NO to any of the questions, they are then asked to determine Best Management Practices designed to address the particular point made in the question. Cornell Cooperative Extension of Suffolk County, Suffolk County Soil and Water Conservation District, or Natural Resources Conservation Service may be contacted for information on practices they should be following. If the grower uses a custom applicator or dealer who offers a full service program, he or she can inform the grower of steps they can take to protect the water resources on and near their property. Growers may contact the NYS Department of Environmental Conservation or their local agricultural chemical representative for more information.

Agricultural Demonstration Projects and Research Summary

Suffolk County agricultural growers and farmers participate in voluntary on-farm demonstration projects, and a growing number of others are requesting information on becoming involved. Commodity groups participating in these programs include vegetable crops, nursery, greenhouse, sod farms and vineyard. In addition research experiments continue to be conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead.

Several of these project reports are included as an attachment to this document (see Appendix C). Reports included summarize work to evaluate fertilizer and pesticide application rates as related to crop yield and quality, show the effect of slow release nitrogen fertilizers in nursery stock and vegetable crops, evaluate the reduced rates of fertilizer application on growth of ornamental plants, and reducing nitrogen groundwater contamination from sod production.

<u>Agricultural Demonstration Projects and Research Summary</u>

Suffolk County agricultural growers and farmers participate in voluntary on-farm demonstration projects, and a growing number of others are requesting information on becoming involved. Commodity groups participating in these programs include vegetable crops, nursery, greenhouse, sod farms and vineyard. In addition research experiments continue to be conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead.

VEGETABLE / POTATO PRODUCTION

EVALUATION OF CONTROLLED RELEASE NITROGEN FERTILIZER IN SWEET CORN PRODUCTION

Investigators: S. Menasha, D. Moyer, K. Sanwald

Location: Long Island Horticultural Research and Extension Center

'Providence' sweet corn was grown to evaluate the performance of three controlled release nitrogen fertilizers in sweet corn production compared to a standard water-soluble nitrogen fertilizer by assessing yields and plant nitrogen content at two nitrogen (N) rates, 100 and 150 lbs per acre. The controlled release fertilizer treatments included granular products from Georgia Pacific, GP-43G (43-0-0) a methylene urea polymer; ESN® (44-0-0), a polymer, coated urea from Agrium; and Agrocote® (38-0-0), a polymer, sulfur-coated urea from Scotts. All of the controlled release nitrogen fertilizer treatments were compared to ammonium nitrate (34-0-0), a standard water-soluble nitrogen fertilizer. The experiment was grouped as a 4x2 factorial arranged in a randomized complete block design with 4 replications. Plots were 20' long by 4 rows wide spaced on 34" centers. Seeds were planted 8.8" apart on July 3rd with a Mater Macc precision vacuum planter. At planting, all treatments received 300 lbs per acre 13-13-13, equivalent to 39 lbs N per acre, banded slightly below and to the side of the seed. Nitrogen was in the form of monoammonium phosphate (11-52-0) and ammonium sulphate (20-0-0). On July 12th, when plants were 2-4" tall, all treatments were sidedressed with either 60 lbs or 110 lbs N per acre with N source and rate determined by the treatment. Corn was irrigated throughout the season as needed, worm pests were managed with Warrior, and weeds were controlled with Prowl H_2O and Aatrex 4L. The center 2 rows from each plot were harvested on September 22nd and data on number of dozen ears per acre and weight were recorded. To further evaluate the performance of the N fertilizer programs examined, leaf and stalk samples were taken as a means of monitoring nitrogen sufficiency levels in the plant. Ear leaf samples were taken on Sept 8th, about 2 weeks before harvest. Stalk samples were taken 3 days after harvest on Sept 25th.

Results from the study indicate that although numerically the number of marketable ears per acre was greatest in the ammonium nitrate treatment of 150 lbs N per acre, there were no significant differences between this treatment and three of the controlled release nitrogen treatments; ESN® at 150 lbs and both Agrocote® treatments at 100 and 150 lbs. Furthermore, all the controlled release nitrogen fertilizer treatments produced marketable ear counts statistically similar to the ammonium nitrate treatment at 100 lbs N per acre except the GP-43G at 150 lbs N per acre treatment. The low yields in the GP-43G at 150 lbs N per acre treatment is believed to be a result of possible ammonia toxicity to plant roots. Multiple plants had lodged in these plots shortly after sidedressing due to a minimal to non-existent root system. Looking at the effect N source alone had on marketable dozen ears/A and ignoring all other effects, we see that N source did not significantly impact ear counts per acre. So, in this study, controlled release nitrogen fertilizers were able to perform as well as ammonium nitrate and although there were numeric differences, the number of marketable ears per acre was not statistically influenced by N source.

Percent foliar N levels tested within the adequate range for all treatments and did not statistically differ. Stalk N tests indicate nitrogen levels at harvest to be either deficient or marginal possibly due to the release rate of the products. Looking solely at the effect N source had on stalk N levels, we see that stalk N levels from Agrocote® treatments were significantly lower than all other N fertilizer treatments. This suggests that N release may have been too slow or too fast to match crop demands. When looking at the effects N rate had on stalk N levels and ignoring all other effects, the lower N rate of 100 lbs N produced stalk N levels significantly lower than the high N rate of 150 lbs N. Moreover, high rainfall amounts that occurred during the trial could have contributed to deficient or marginal stalk N levels regardless of N source or N rate.

In conclusion, marketable yields of controlled release nitrogen fertilizer treatments, except GP-43G at 150 lbs N per acre, were comparable to marketable yields obtained when using ammonium nitrate at 100 lbs or 150 lbs N per acre. Therefore, controlled release fertilizers have shown the promising ability to supply sufficient nitrogen for growth in order to obtain statistically similar marketable dozen ears/A as with ammonium nitrate in sweet corn production.

ON-FARM EVALUATION OF CONTROLLED RELEASE NITROGEN FERTILIZER IN SWEET CORN PRODUCTION; ANDERSON'S FARM, RIVERHEAD

Investigators: S. Menasha, D. Moyer, K. Sanwald
Cooperators: Anderson's Farm, Agricultural Stewardship Program
Location: Riverhead, NY

An experiment was conducted to evaluate the use of controlled release nitrogen fertilizer in sweet corn production by assessing impacts on yield and plant nitrogen (N) content. The study took place at Anderson's Farm in Riverhead, NY. The controlled release nitrogen fertilizer treatments included GP-43G (43-0-0), composed of methylene urea polymers by Georgia Pacific and ESN® (44-0-0), a polymer, coated urea by Agrium. These treatments were compared to ammonium nitrate (34-0-0) a standard, soluble nitrogen fertilizer source. The experiment was arranged in a randomized complete block design with four replications. Plots were 40' long by four rows wide, and rows were spaced on 34" centers. At planting, 500 lbs per acre 10-10-10 fertilizer was applied. On July 20th, when plants were 6-8" tall, treatments were sidedressed with 70 lbs N per acre with N source at sidedress determined by treatment. Fertilizer was applied 2-4" to one side of the plant and then cultivated in. Corn was irrigated throughout the season as needed. Ears were harvested on September 18th from two, 20 foot sections from the center two rows of each plot. Ear numbers and weights were recorded. In order to further evaluate the different N fertility programs, leaf samples were taken at mid-silk on September 5th to determine plant tissue nitrogen content. Stalk samples were collected on September 18th to identify the nitrogen status of the corn crop at harvest. Non replicated data was collected from the grower's standard fertility program for comparison.

Results indicate that there were no significant differences in the number of marketable ears produced per acre among the nitrogen fertility programs analyzed. When compared to the grower standard, the controlled release fertilizer treatments produced similar or a greater number of marketable ears per acre. Marketable ear weights also did not statistically differ among the treatments analyzed and were comparable to the grower's standard treatment. Numerically, the GP-43G treatment yielded the lowest for both ear weight and the number of ears per acre. Tip fill was statistically similar among the treatments analyzed and was comparable to the grower standard treatment. Percent foliar N content did not statistically differ among the analyzed treatments or to the grower's standard treatment and all N levels were within the adequate range. Percent stalk N levels fell in the marginal range for the GP-43G treatment and the grower standard treatment while the ammonium nitrate and ESN® treatment values were within the optimal range. Although these differences were not significant, N release in controlled release fertilizers can be sufficient for crop production and indicates the potential use for controlled release nitrogen fertilizers in sweet corn production as a means of increasing fertilizer use efficiency by the crop and reducing nitrate contamination in groundwater.

ON-FARM NITROGEN DEMONSTRATIONS: USING THE "END-OF-SEASON CORNSTALK TEST" TO EVALUATE SWEET CORN NITROGEN FERTILITY PROGRAMS
Investigators: S. Menasha, D. Moyer, K. Sanwald
Cooperators: Cornell Cooperative Extension Agricultural Stewardship Program
Location: Long Island Horticultural Research and Extension Center and the North and South Forks, Long Island, NY

The end-of-season cornstalk test is a diagnostic tool useful for determining the nitrogen (N) status of a corn crop at the end of the growing season. The test is based on studies that determined corn plants will accumulate excess N in the basal stalk tissue when abundant amounts of N are available in the soil. This information in turn can be used to evaluate grower sweet corn fertility programs and to adjust N rates accordingly for economic and environmental benefits. Although, the test does not directly indicate how much nitrogen rates should be increased or decreased, it does allow growers to make adjustments toward optimal N rates when conducted over several years. In 2006, the same eight growers from 2005 participated in this experiment and 5 of the 8 in 2004.

At harvest, approximately twenty, 8" stalk samples were cut beginning at the 6" mark above the ground. Any leaves and leaf sheaths were removed from the stalks before drying. Samples were dried at 70° C for twenty-four hours prior to analysis. Samples were sent to Brookside Laboratories Inc., Ohio and were analyzed using the Total Nitrogen by Combustion Test. Sampling procedures were the same for all years.

When interpreting test results, it is important to consider weather conditions that occurred during the growing season as dry years may minimize N leaching potential and wet years may increase it. For that reason, N rates most profitable over many years can be expected to test deficient in some years and excessive in other years. So, after multiple years of testing, trends become apparent and N rates can be increased or decreased depending on whether those N rates usually test deficient or excessive.

During the 2006 growing season, precipitation was above the 20 year average and resulted in 6 of the 9 sample sites testing in the marginal range possibly due to increased nitrogen leaching. So, in drier years, the latter 6 sample sites may test in the optimal or excessive range. For example, Grower 8 applied 120 lbs N per acre and tested in the marginal range this season and tested optimal in 2005, which was a very dry year (driest in 25 years). Therefore, although data isn't sufficient to make recommendations yet, an N rate of 120 lbs/A may be optimal over time for this particular site.

EVALUATION OF CONTROLLED RELEASE NITROGEN FERTILIZERS IN POTATO PRODUCTION

Investigators: S. Menasha, D. Moyer, K. Sanwald
Location: Long Island Horticultural Research and Extension Center

Three granular and one liquid controlled release nitrogen fertilizer were evaluated against two soluble nitrogen fertilizers to determine effects on yield, tuber quality, and plant tissue nitrogen content of 'Reba' potatoes. Two rates of nitrogen (N), 150 and 200 lbs per acre, were applied either as a split application or all at planting. Fertilizer treatments included: Agrocote®, a polymer, sulfur-coated urea produced by Scott's (38-0-0); Scott's Potato Blen (13-15-15-2(Mg)) containing 80% controlled release N in the form of Agrocote® and the other 20% as soluble N in the form of diammonium phosphate; a granular product by Georgia Pacific, GP-43G (43-0-0); a liquid product, Nitamin® 30L, (30-0-0) also from Georgia Pacific; and two water soluble nitrogen fertilizers: urea (46-0-0) and ammonium nitrate (34-0-0) as the standard nitrogen fertilizer. The experiment was grouped as a 2x7 factorial arranged in a randomized complete block design with 4 replications. Plots were 20 feet long by 4 rows wide spaced on 34" centers. Potatoes were planted 9.3" apart within the rows on April 17th and 18th. At planting, fertilizer was applied using a two-row planter designed for fertilizer experiments, in furrows 2" to the side and slightly below the seed piece. Liquid fertilizer treatments received 30 lbs N per acre soluble fertilizer at planting in the form of ammonium nitrate (34-0-0). Also at planting, 200 lbs/A of both Triple Super Phosphate (0-46-0) and Muriate of Potash (0-0-60) were applied to all treatments except the Potato Blen treatments which received 173 lbs/A, both phosphorus (P) and potassium (K), in the low N rate treatment and 230 lbs/A, both P and K, in the high N rate treatment. On May 23rd, when plants were 1-2" tall, liquid fertilizer treatments were sidedressed with Nitamin® 30L. Liquid fertilizer was knifed in about 6" to each side of the plant. On May 31st granular sidedress treatments were fertilized by hand 2" to the side of the plant and then cultivated in. Plants were 4" to 8" tall. Sidedress N for the granular treatments was from the same N source as was applied at planting.

Leaf samples were collected on June 6th, June 30th, and July 27th to determine plant tissue nitrogen content throughout the growing season as a means of evaluating nitrogen release and plant uptake. Plant vigor and maturity ratings were recorded. The experiment was irrigated 7 times with approximately 1" of water per week to supplement rainfall. Pests were managed according to Cornell Guidelines. Plants were vine-killed on September 5th with Gramoxone Max (paraquat) at a rate of 1 pt/A. Potatoes were harvested on September 19th from the center two rows of each plot and then graded. Data collected included yield, specific gravity, and tuber quality.

Results show that Agrocote® at 150 and 200 lbs, Potato Blen at 200 lbs, and Nitamin® 30L at 200 lbs produced significantly greater marketable yields than the standard (ammonium nitrate at 200 lbs N per acre). All controlled release fertilizer treatments produced statistically similar or greater marketable yields than both ammonium nitrate treatments, except for the high rate of GP-

43G applied all at planting which produced significantly lower yields than the standard. However, the lower yields associated with the at-planting, GP-43G treatments is believed to be a result of possible ammonia toxicity to plant roots. Plants from these treatments were stunted and light green during most of the growing season. Furthermore, when looking at the effect N source had on marketable yields, ignoring all other effects, it is again confirmed that controlled release N fertilizers Potato Blen®, Agrocote®, and Nitamin® 30L produced significantly greater yields than the standard ammonium nitrate. Total and marketable yields between the high and low rates of water soluble fertilizer treatments were not significant. Additionally, within each controlled release nitrogen fertilizer treatment, marketable yields were not significantly increased when a higher rate of nitrogen was applied except in the Nitamin® 30L treatment where a higher rate of N per acre (200 lbs) produced significantly greater marketable yields than Nitamin® 30L at a lower rate of 150 lbs N per acre. This is further backed by the fact that when looking at the effect N rate had on marketable yields, ignoring all other effects, the results show there was no significant difference between the high, 200 lbs/A, or the low rate, 150 lbs/A of nitrogen among the N sources evaluated.

Tuber size distribution was similar in most treatments except the percentage of small tubers was greatest in the at-planting, GP-43G treatments which most likely is a result of the assumed ammonia toxicity to plant roots to plants in this treatment. A greater percentage of misshapen tubers occurred in the Agrocote® treatments and the high rate, at-planting, GP-43G treatment. Internal defects were greatest in GP-43G at 200 lbs, split application; Nitamin® 30L at 200 lbs; and ammonium nitrate at 150 lbs. Foliar nitrogen content on all three dates showed N levels to be within the adequate range or above for all treatments illustrating that nitrogen release of the controlled release nitrogen fertilizers met the demands of the crop.

In summary, controlled release fertilizers were capable of maintaining or significantly increasing marketable yields over the standard, 200 lbs N per acre of ammonium nitrate. Further, nitrogen rates reduced to 150 lbs N per acre using controlled release fertilizers maintained or increased marketable yields over the standard. Therefore, it may be possible to even further reduce N rates with controlled release fertilizers in potato production without decreasing yields over the standard with the use of controlled release nitrogen fertilizers. Reduced N rates and greater yields with controlled release fertilizers suggest improved nitrogen use efficiency by the crop and thus reduce nitrate leaching potential into groundwater.

ON-FARM EVALUATION OF CONTROLLED NITROGEN RELEASE-FERTILIZER IN POTATO PRODUCTION; FOSTER FARMS, SAGAPONACK

Investigators: S. Menasha, D. Moyer, K. Sanwald
Location: Foster Farms, Sagaponack, NY

An on-farm demonstration was conducted to compare a controlled release nitrogen fertilizer source to a soluble nitrogen fertilizer source, each at two nitrogen (N) rates. Effects on yield, specific gravity, and plant tissue nitrogen content of 'Reba' potatoes were evaluated. Four fertilizer programs were assessed. All plots received 3.5 lbs N/acre liquid fertilizer (9-18-9) at planting which is represented in the total N rates for each treatment. The fertilizer programs included the grower's standard fertilization program at a total of 198.5 lbs N per acre where 165 lbs N/acre (11-14-16-4(Mg)) was applied at planting and 30 lbs N/acre liquid (30-0-0) was sidesressed; the grower program at a reduced rate of 168.5 lbs total N per acre (11-14-16-4(Mg)); Scotts controlled release fertilizer Potato Blen (13-15-15-2(Mg)) at a high rate of 198.5 lbs total N per acre; and Scotts controlled release fertilizer Potato Blen (13-15-15-2(Mg)) at a low rate of 159.5 lbs total N per acre. Scotts Potato Blen contains 80% controlled release N in the form of Agrocote® (38-0-0) and 20% N in the form of diammonium phosphate (18-46-0). Potatoes were planted at the end of April.

Leaf samples were collected on June 8th, June 27th, and July 27th to determine plant tissue nitrogen content through the growing season as a means of evaluating nitrogen release and plant uptake. All foliar N levels fell above the adequate range for growth and production. Within each treatment, foliar N levels decreased gradually throughout the growing season. While, on June 27th, foliar N levels in the controlled release nitrogen treatments were clearly greater than the foliar N levels in the grower's programs and maintained above adequate foliar N levels on the last sampling date signifying the likelihood of greater nitrogen use efficiency by the crop with controlled release nitrogen fertilizers.

Potatoes were hand-dug and graded on September 27th and 28th, respectively. Yield results from hand-dug sampling indicate that the controlled release nitrogen fertilizer produced higher yields than the grower's fertilizer programs. The high rate of the controlled release nitrogen fertilizer produced the greatest yield, followed by the reduced rate of the controlled release fertilizer. The low N rate of 159.5 lbs N/A with controlled release nitrogen fertilizer increased marketable yields by 65 cwt per acre over the grower's standard program of 198.5 lbs N/A. Therefore, controlled release nitrogen fertilizers increased marketable yields over soluble N fertilizers and were able to outperform with a reduced rate of nitrogen over the grower's standard program. This suggests greater nitrogen use efficiency and uptake by the crop with controlled release nitrogen fertilizers and the ability to reduce N leaching potential.

SOD PRODUCTION

REDUCING NITROGEN GROUNDWATER CONTAMINATION FROM SOD PRODUCTION ON LONG ISLAND, NY

Sponsor: Cooperative Extension of Suffolk County, Agricultural Stewardship Program
Duration: March 15, 2005 – December 31, 2007
Investigators: A. Martin Petrovic, Dept. of Horticulture, Cornell University, D. Moyer,
K. Sanwald, L. Loizos, L. Mickaliger
Participating Grower: DeLea Sod Farms, Millerplace NY

Introduction

Many of the surface waters in the US, including New York State and the New York City watershed, as well as most of the northeastern US are at risk from the negative impacts of nitrogen and phosphorus runoff and leaching into groundwater. As example, fertilization during sod production on Long Island resulted in groundwater consistently above drinking water standard (nitrate concentration averaged 18.6 mg/L in 2001 and 24.8 mg/L in 2002). The Peconic Estuary Program recommends a 25% reduction in nitrogen loading from sod production with the implementation of best management practices (PEP CCMP, Appendix H, August 2000). Sod production, accounting for about 3,000 acres on Long Island, is constantly in the establishment phase where the potential for nitrogen leaching is the greatest. During spring and fall, leaching losses of nitrogen and phosphorus can be significant. Furthermore, the application of soluble nutrients needed to establish a dense stand of turf has the potential to contaminate ground and surface water. The need to develop sound best management practices for nitrogen management for sod production is imperative.

Objectives

The goal of the research and outreach project is to develop a sod production fertilization program that will minimize the contribution of nitrogen fertilization to groundwater quality degradation. A great deal of work has been done on nutrient losses from agricultural crops, however, due to the nature of turfgrass systems (i.e. perennial ground cover, no tillage) application of crop research to turfgrass can lead to erroneous conclusions. Our hypothesis is that BMPs (nitrogen rate and sources) can be developed to minimize the contamination of groundwater from managed turfgrass areas like sod production while maintaining a rapid sod production rate.

Materials and Methods

The study was initiated in the early fall 2005 and will continue thru 2007 on an actual sod production field in eastern Long Island (Delea Sod Farms). Following the normal establishment practices and seeding, two 30 cm dia. by 30 cm long polyvinalchloride (PVC) lysimeters were installed in each plot. An ion exchange resign bag will be placed at the bottom of each lysimeters to capture nitrate and ammonium leaching passed the root zone. Plots will be 3 m X 3 m, with 4 replication of each fertilizer treatment and plots arrange in a completely random design. Plots were seeded on Sept 15, 2005 with 75%-25% Midnight Moon Kentucky bluegras-Fescue mix at a rate of 100-120 lbs/acre.

Nine treatments included: the conventional establishment fertilization practice at full rate and half nitrogen rate that the sod farm uses, three nitrogen sources (quick, moderate and slow release sources) applied at 3 and 6 lbs N/1000 sq.ft. /yr (6 lbs. N/1000 sq. ft./yr is standard rate for sod production on Long Island, PEP CCMP, Appendix H, August 2000), and an unfertilized control plot to determine the amount of residue N in the soil and the amount of N that was mineralized during the study. Plots were fertilized on Oct. 20, 2005, May 2, 2006 and July 25, 2006. Sod strength measurements Sod strength testing was done on July 25, 2006, Aug 24, 2006, Sept. 18, 2006, Oct. 25, 2006. Sod was cut with a 18" wide sod cutter at a length of 4' by ¾-1" thick. Each plot had two tensile measurements per date taken. Once the sod strength reaches the value for commercially harvestable sod (as determined from sod samples sod by this sod grower), the resign bags were removed on Oct. 25, 2006 from all plots. The bags were frozen and are being analyzed for the amount of nitrate and ammonium that was leached.

Results to Date

Sod is determined to be harvestable if it is dense, dark green foliage and will not fall apart when handled. In the first year of this study we record sod strength measurements over time as seen in Table 1. (In the second year of this study we will record sod strength measurements, as well as visual ratings based on color using the National Turfgrass Evaluation Guidelines (NETP). Generally, the source or rate of fertilizers applied had little affect on sod strength during the first year of the study. Commercially available sod (Briarcliff Sod Farm) was determined to have an average sod strength measurement of 99 lbs by the way we tested it. Based on the sod strength measurements from the first year of the study, almost all fertilizer sources and rates had acceptable sod strength by Oct 25, 2006, 13 months after seeding. Only on the August 24, 2006 sampling date were there any treatment differences, the slow release sources of Nitroform (1X rate), half the amount of the growers program was statistically higher than the regular growers program.

Table 1. Impact of fertilizer sources and rates on sod strength for 2006.

Treatment	7/25/2006	8/24/2006	9/18/2006	10/25/2006
	------------------------------	lbs	------------------------------	
IBDU at 1X	60a*	65ab	90a	108a
IBDU at 0.5X	58a	67ab	85a	109a
Nitroform at 0.5X	52a	72ab	87a	110a
Nitroform at 1X	52a	80a	90a	112a
IBDU at 1.5X	52a	72ab	87a	101a
Nitroform at 1.5X	51a	76ab	86a	114a
Control (unfertilized)	49a	70ab	87a	105a
IBDU at 2X	49a	65ab	82a	100a
Urea at 1.5X	49a	68ab	78a	96a
Urea at 1X	48a	73ab	87a	96a
BMP	48a	65ab	77a	95a
Grower Program at 0.5X	48a	82a	83a	99a
Grower Program at 1X	46a	53b	74a	93a
Nitroform at 2X	46a	70ab	85a	101a
Urea at 0.5X	45a	70ab	93a	110a
Urea at 2X	42a	57ab	73a	95a

*Lbs of sod tensile strength, average of 2 samples per plot and 4 replicates. Values in the same column not connected by same letter are significantly different.

Plans for 2007

The study was repeated in the fall of 2006, two new sites were established and treated as down in 2005-2006. The sod strength will be determined as done previously. In addition, turfgrass quality measurement will be made to help determine when the sod is harvestable, must have good quality and high tensile strength.

Storm Water Drainage Inventory

Louis K. McLean Associates, P.C. CONSULTING ENGINEERS

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GEORGE J. KAIGH, P.E., L.S.
JOHN I. JOHNSEN, P.E.
EUGENE F. DALY, P.E.

April 12, 1989

Town Board
Town of Riverhead
200 Howell Avenue
Riverhead, NY 11901

RE: Storm Water Drainage Inventory

Dear Board Members:

Delivered herewith are copies of our storm water drainage inventory which has been prepared in accordance with your resolution. Please review this report, keeping in mind that its purpose is to provide the Highway Superintendent with a working inventory that will be used to periodically schedule cleaning and maintenance.

To be effective, this inventory must be periodically updated to reflect installation of additional drainage as it is installed. We intend to follow up with a second phase of this report that will identify specifically those streets which drain towards the Peconic River/Bay system and which our inventory indicates no drainage facilities exist.

The scope of the report was limited to the southerly tributary drainage area of the Town. It can be expanded to include the entire Town for similar use. As you will note, the Suffolk Country Tax Maps have been used for base purposes. Final approval from the Suffolk County Real Property Tax Service Agency must be obtained before the maps are officially used.

After you have had the opportunity to review this inventory, we will meet with your Board and the Superintendent of Highways to discuss its implementation.

Respectfully submitted,

John I. Johnsen, P.E.

JIJ:eaf
Enc.
cc: Charles Bloss, Supt. of Hwys. ✓

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

MARCH 1989

Prepared By:

Louis K. McLean Associates

Brookhaven, New York

TABLE OF CONTENTS

INTRODUCTION

The purpose of this report is to summarize a field inventory of drainage structures in the Town of Riverhead, conducted in 1988. The inventoried structures include those systems which discharge into creeks flowing into the Peconic Bay, into the Peconic River, and into the Bay itself. Identification of these systems is particularly important due to increasing concerns with stormwater run-off pollution in the Peconic Bay. The inventory was conducted in an area generally south of County Road 58 and State Route 25, from the Town of Brookhaven in the west to the Town of Southold in the east.

This inventory is the first phase of a two-part study to determine the extent of drainage systems in the southerly part of the Town, and to identify priority areas for installation of new drainage systems. Identification of priority drainage areas has begun and will be summarized in a subsequent report.

The inventory was a survey of existing drainage facilities to obtain their location, and determine the extent of existing drainage systems. The inventory was conducted with the cooperation of personnel from the Town Highway Department, whose assistance we gratefully acknowledge.

The field data is presented as follows:

- On reproductions of Suffolk County Tax Maps
- In tabular form, both by tax map number and by street name

It is intended that this report be up-dated periodically, preferably on a quarterly basis, with additions and modifications to individual structures and systems as these changes occur. Information on structure and pipe sizes, problem areas, and other data can be added in the "remarks" column of the tables. When the remaining areas of the Town are surveyed, the information can be added by inserting additional tax maps and entering additional data onto the tables.

DATA PRESENTATION

The tables contain the following information for each drainage structure:

- o Structure I.D. Number
- o Roadway
- o Type
- o Connection
- o Outfall
- o Remarks

o Structure I.D. Number

The structure identification numbers have been developed in the following format: 610.01 - 2

The first three digits (610) represent the tax map number on which the structure is located. The second two digits (.01) refer to the system number on that tax map. System numbers have been assigned to each group of basins which are connected by pipe. Isolated basins not connected to other basins have been assigned a system number of .00.

The number following the dash (2) refers to the structure number within a particular system. Beginning with the structure closest to the outlet of the system, structures have been numbered consecutively. If a system is extended in the future, new structure numbers can then be assigned in numerical order. On each tax map, those basins not included in a system (System No. 00) have also been numbered consecutively.

Thus, for the example above (610.01-2), the structure is the second structure in the first system on the map tile.

o Roadway

The street name of the roadway on which each structure is located is given.

o Type

The structure type (e.g. catch basin, leaching basin) is indicated.

o Connection

In this column, the structure number to which each basin is connected is shown.

o Outfall

This column indicates the ultimate outfall for the system to which each individual structure belongs. Common entries in this column are recharge basin ("RB") or the name of a particular stream or body of water such as the Peconic River or Merritt's Pond. Individual leaching basins have "LB" shown for their outfall.

A recharge area ("RA") is an isolated low area to which a system drains. It can be thought of as a recharge basin without a formal boundary. A drainage area ("DA") defines a low area adjacent to other wetlands and/or bodies of water. Some of the water from the drainage area will leach into the ground, and some will flow into the adjacent wetlands.

In some instances, it was difficult to determine where systems emptied. Some systems required a second field trip to further investigate the outfall location. Positive location of outfalls was hindered by factors such as the presence of water in drainage basins and difficulties in defining pipe direction from the surface. The table indicates those outfall locations which could be determined, as well as those for which a reasonable degree of certainty exists. Those still in doubt are shown with a question mark.

o Remarks

This column is reserved for future use to indicate miscellaneous comments. Problem locations or dates of maintenance work are examples of data which can be listed in this column.

DATA ANALYSIS

A review of the data reveals that 455 structures were inventoried. Of the total, the overwhelming majority (397, or 87 percent) were included in a system of drainage structures. A total of 73 different systems were inventoried, with an average of 5.4 structures per system. The system outfalls can be described as follows:

System	Systems (73)		Structures (397)	
Outfall	No.	% of Total	No.	% of Total
Leaching Basin	23	31	106	27
Recharge Basin	15	21	94	24
Peconic River	10	14	38	10
Drainage Area	7	10	61	15
Recharge Area	6	8	20	5
Unknown	5	7	32	8
Other Bodies of Water	4	5	14	3
Merritt's Pond	3	4	32	8

From the table above, it can be seen that about half of the drainage systems have either leaching basins or recharge basins as their outlet. About 25 percent of the systems discharge directly into the Peconic River, Merritt's Pond or other bodies of water. The remaining systems, approximately 25 percent of the total, outfall into the recharge and drainage areas, or have unknown outlets.

INSTALLATION OF NEW DRAINAGE SYSTEMS

Completion of the drainage inventory will enable [illegible] to identify areas where drainage systems do not exist. Within these areas, a priority listing for drainage installation will be developed. A major factor in developing this listing will be the need to minimize storm water run-off pollution in the Peconic River and Peconic Bay. This prioritization for new drainage systems will be summarized in a subsequent report.

DATA ORGANIZATION

Following this page are these Appendices:

Appendix A - Structure Locations on Tax Maps

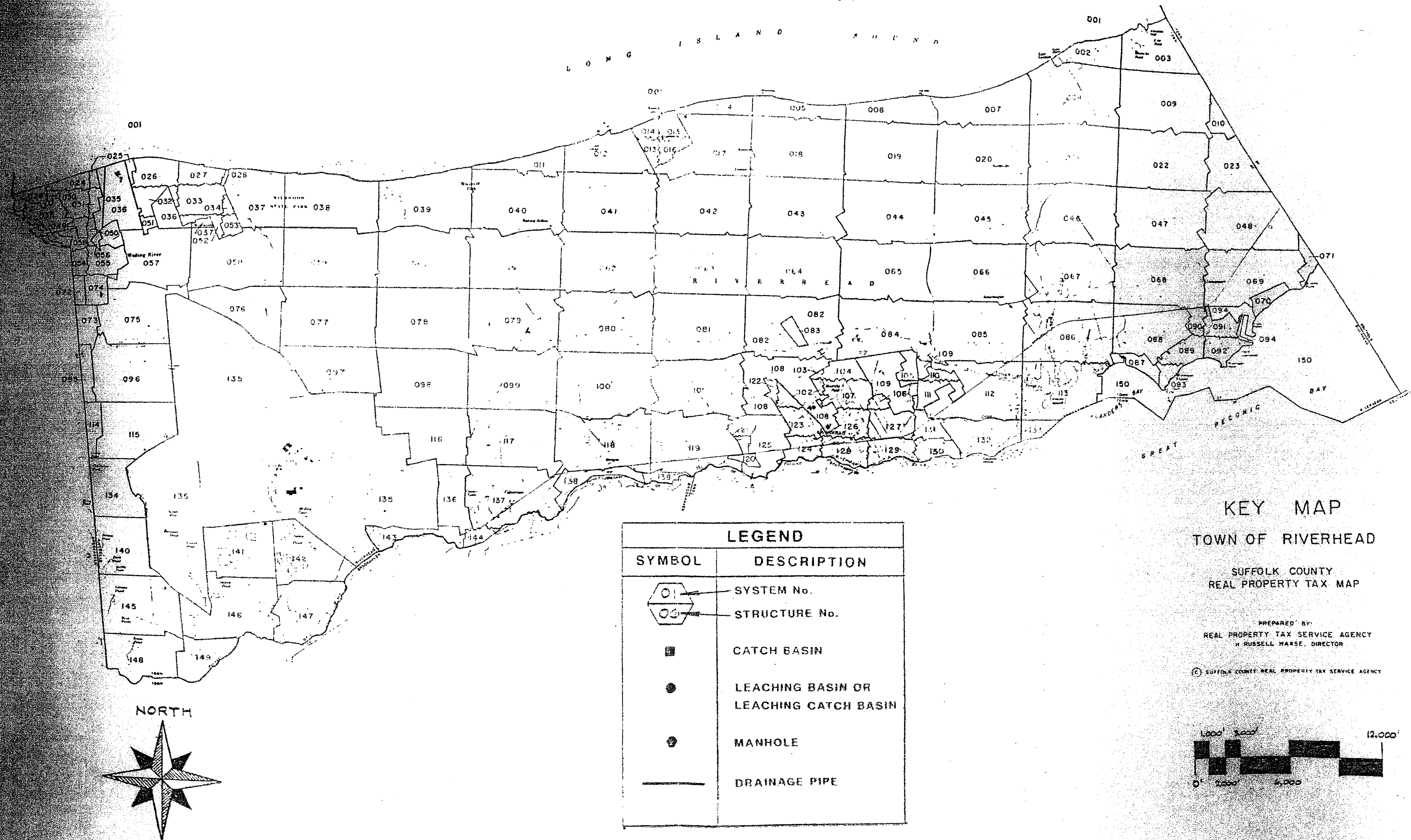
Appendix B - Table 1 - Structure Data by Tax Map Number

Appendix C - Table 2 - Structure Data by Street Name

APPENDIX A

STRUCTURE LOCATIONS

ON TAX MAPS



TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

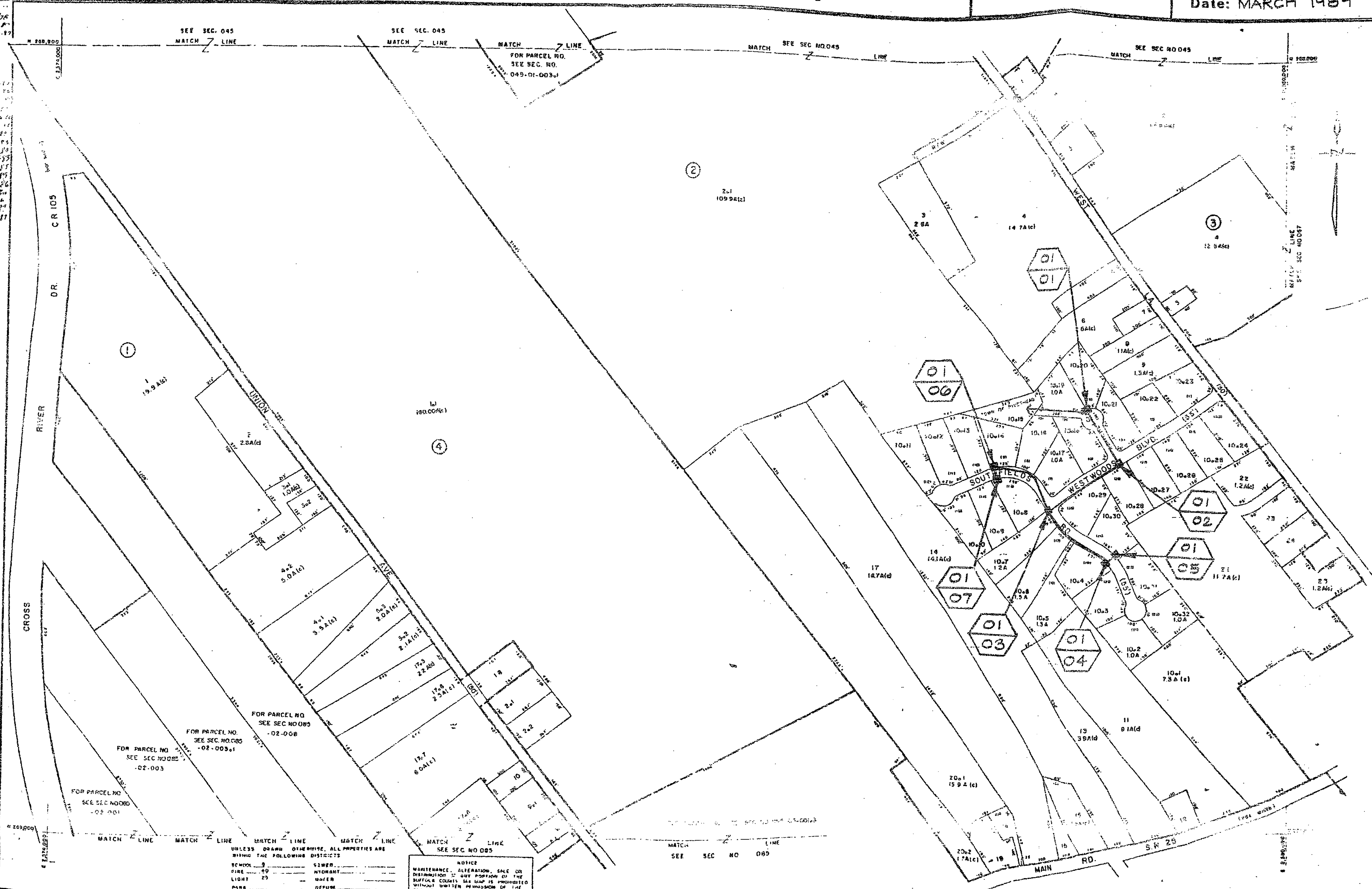
Project No. 60-000-05

Date: MARCH 1989

STORMWATER COLLECTION SYSTEM INVENTORY

Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Date: MARCH 1989



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County Center
Riverhead, L.I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 066

PROPERTY MAP

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

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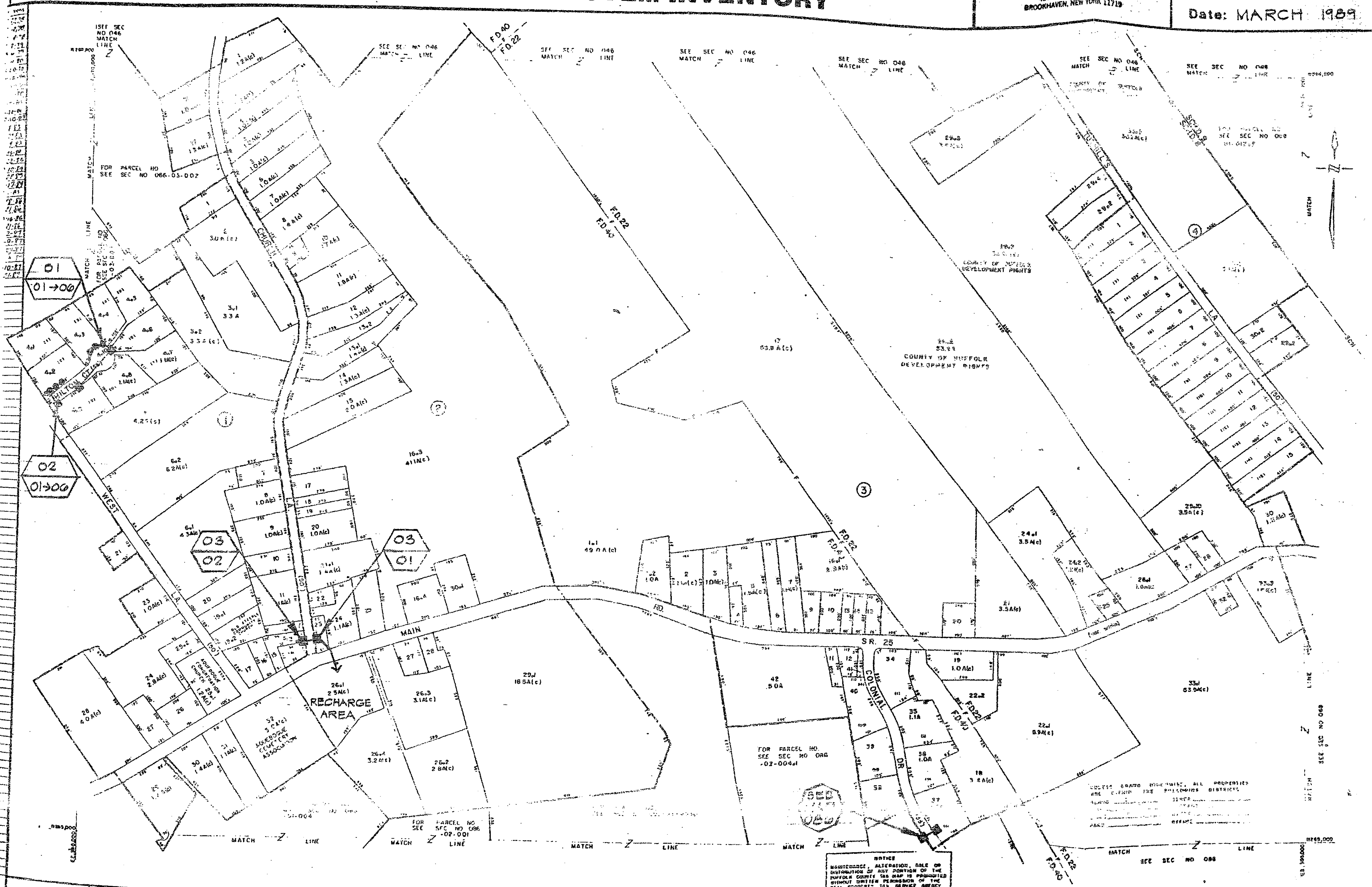

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MICHAEL BAKER, JR.
Consulting Engineers
Rochester, Pennsylvania

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SCALE IN FEET

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TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
SECTION NO. 067
PROPERTY MAP

TOWN OF RIVERHEAD

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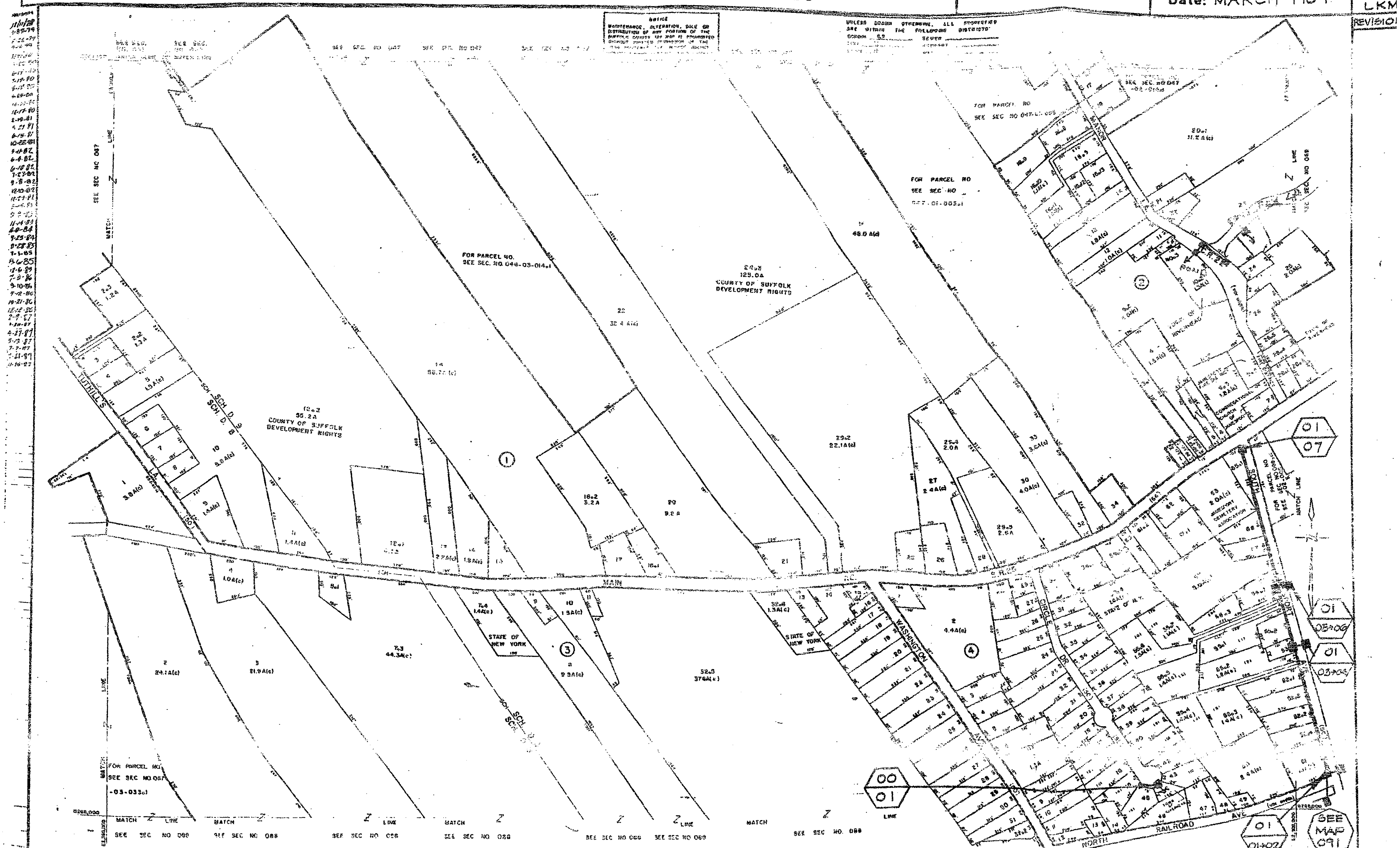

Prepared By RICHARD BAKER, JR. Consulting Engineer

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TOWN OF RIVERHEAD
VILLAGE OF
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SECTION NO. 068

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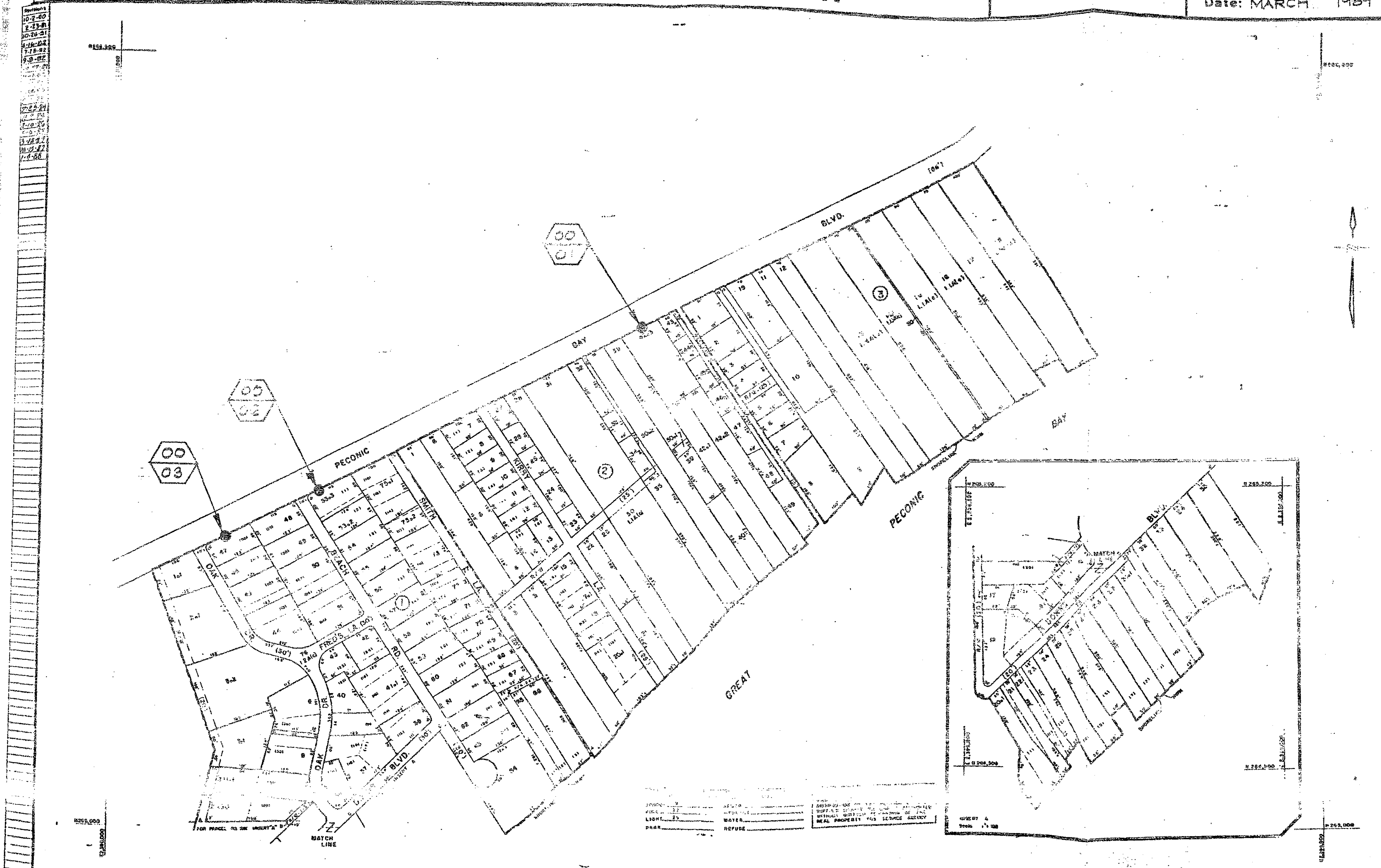

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TOWN OF RIVERHEAD

VILLAGE OF

DISTRICT NO. 0600

SECTION NO. 070

PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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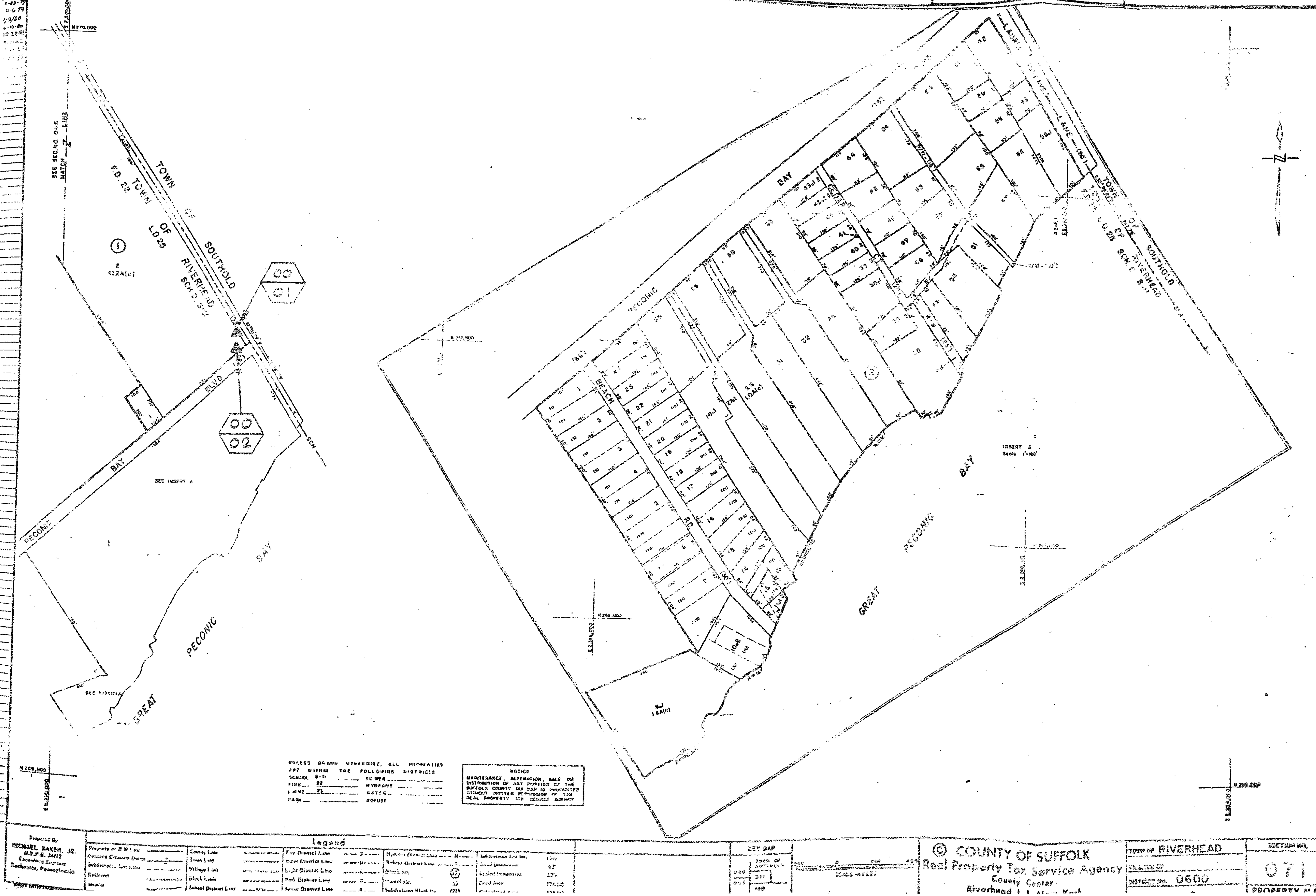

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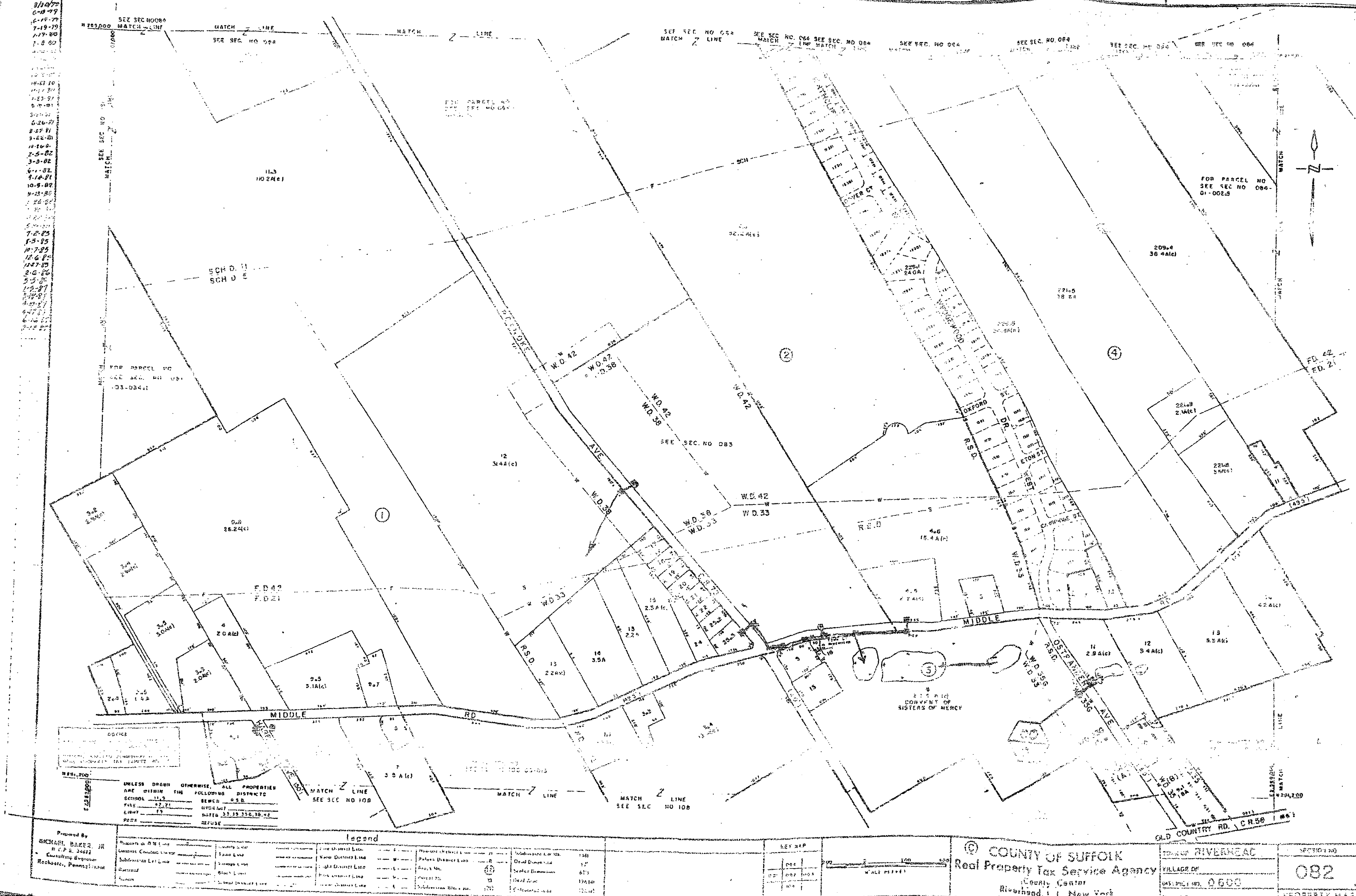

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STORMWATER COLLECTION SYSTEM INVENTORY

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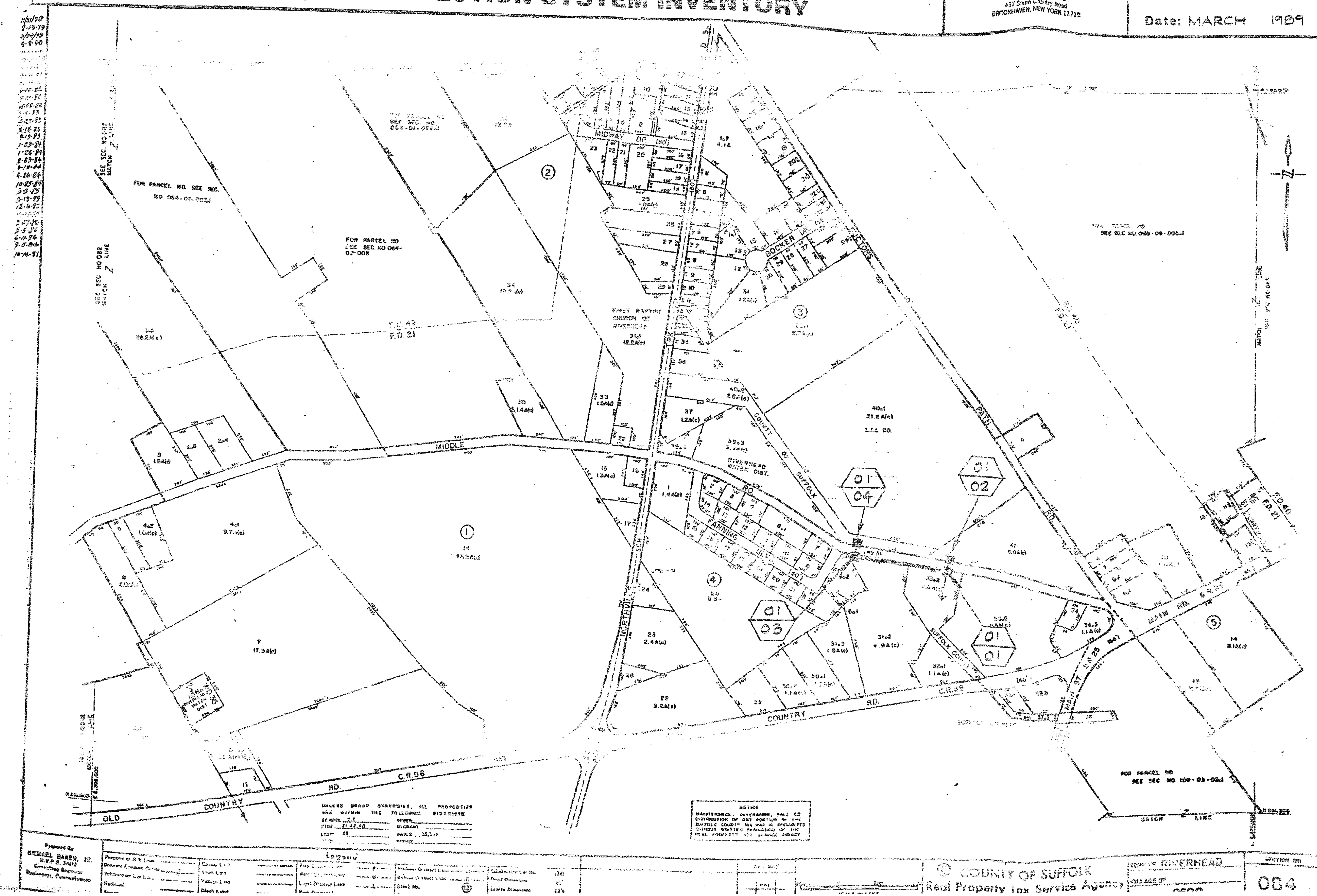

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

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STORMWATER COLLECTION SYSTEM INVENTORY

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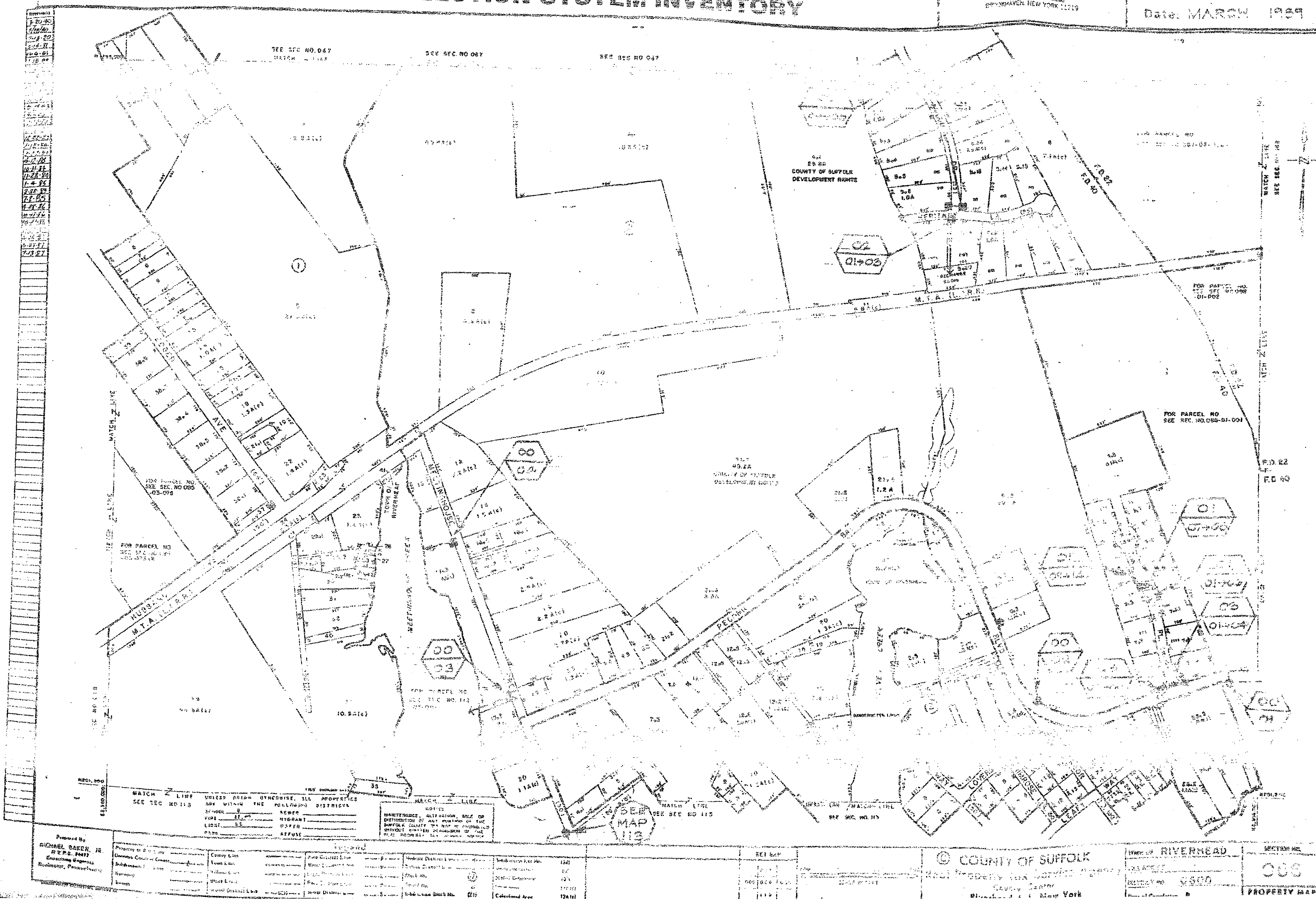

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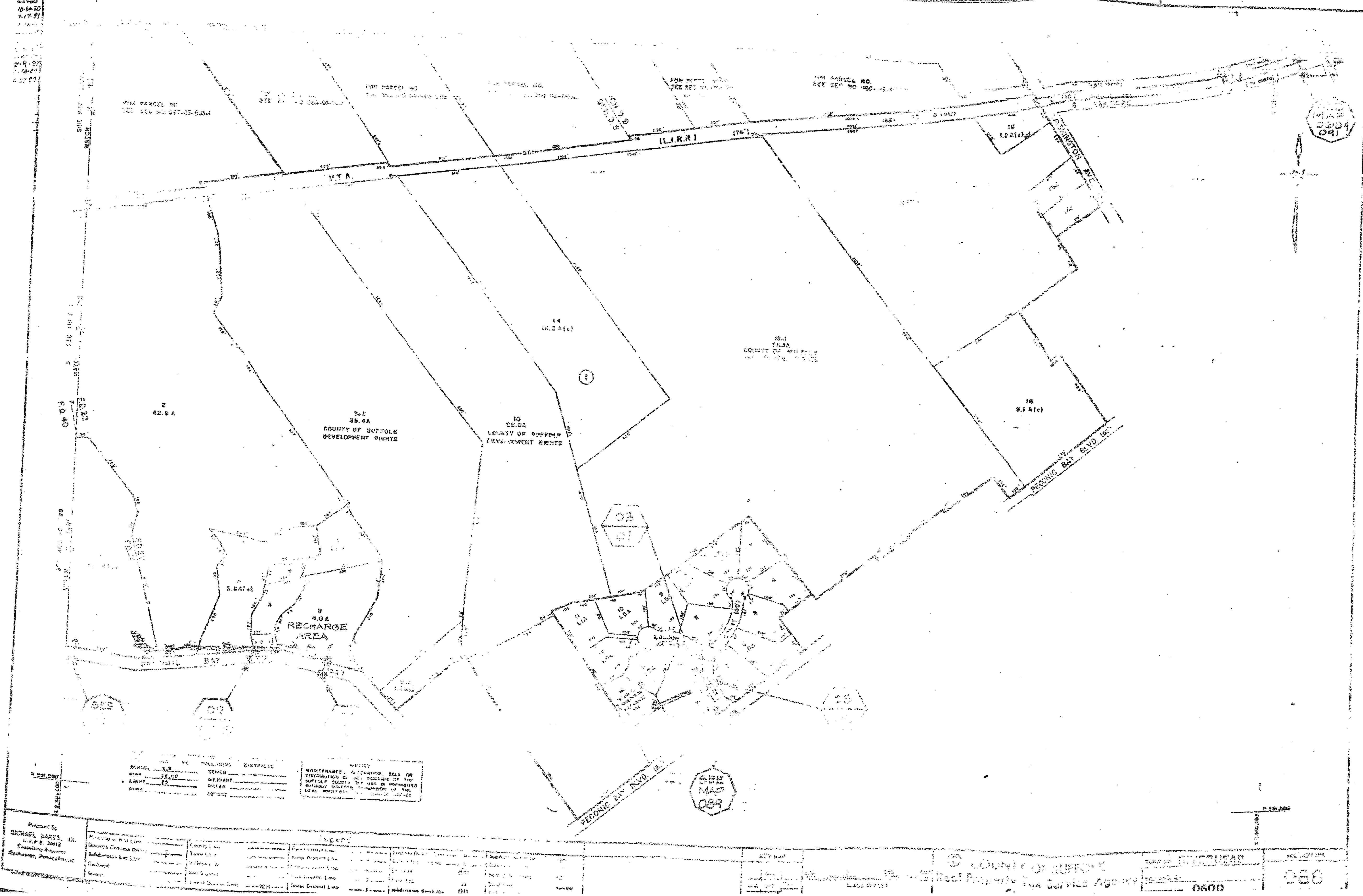

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

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Date: MARCH 1989

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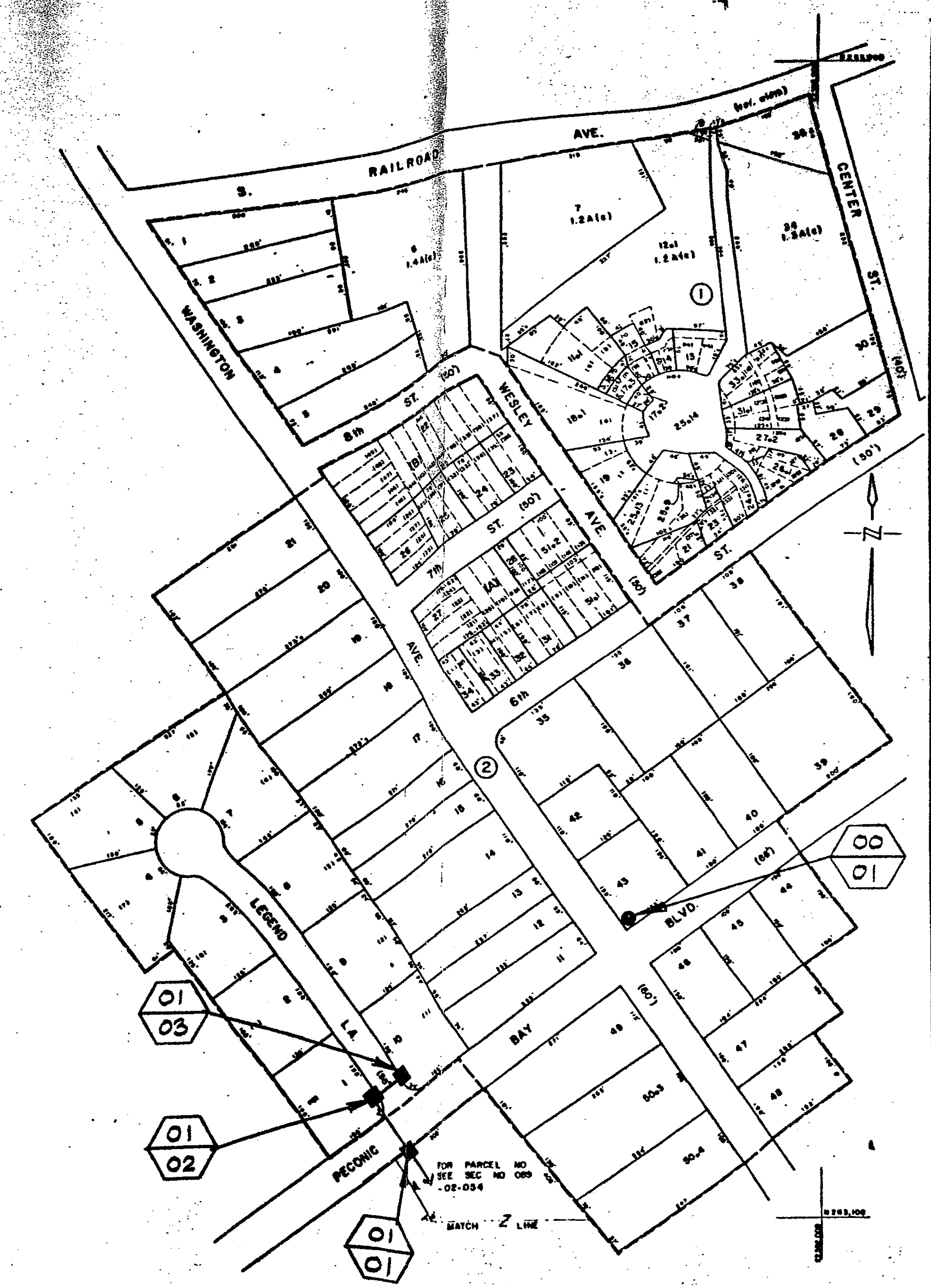
Real Property
RIVERHEAD

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



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TOWN OF RIVERHEAD

SECTION NO. 090

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
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Project No. 60-000-05

Date: MARCH 1989

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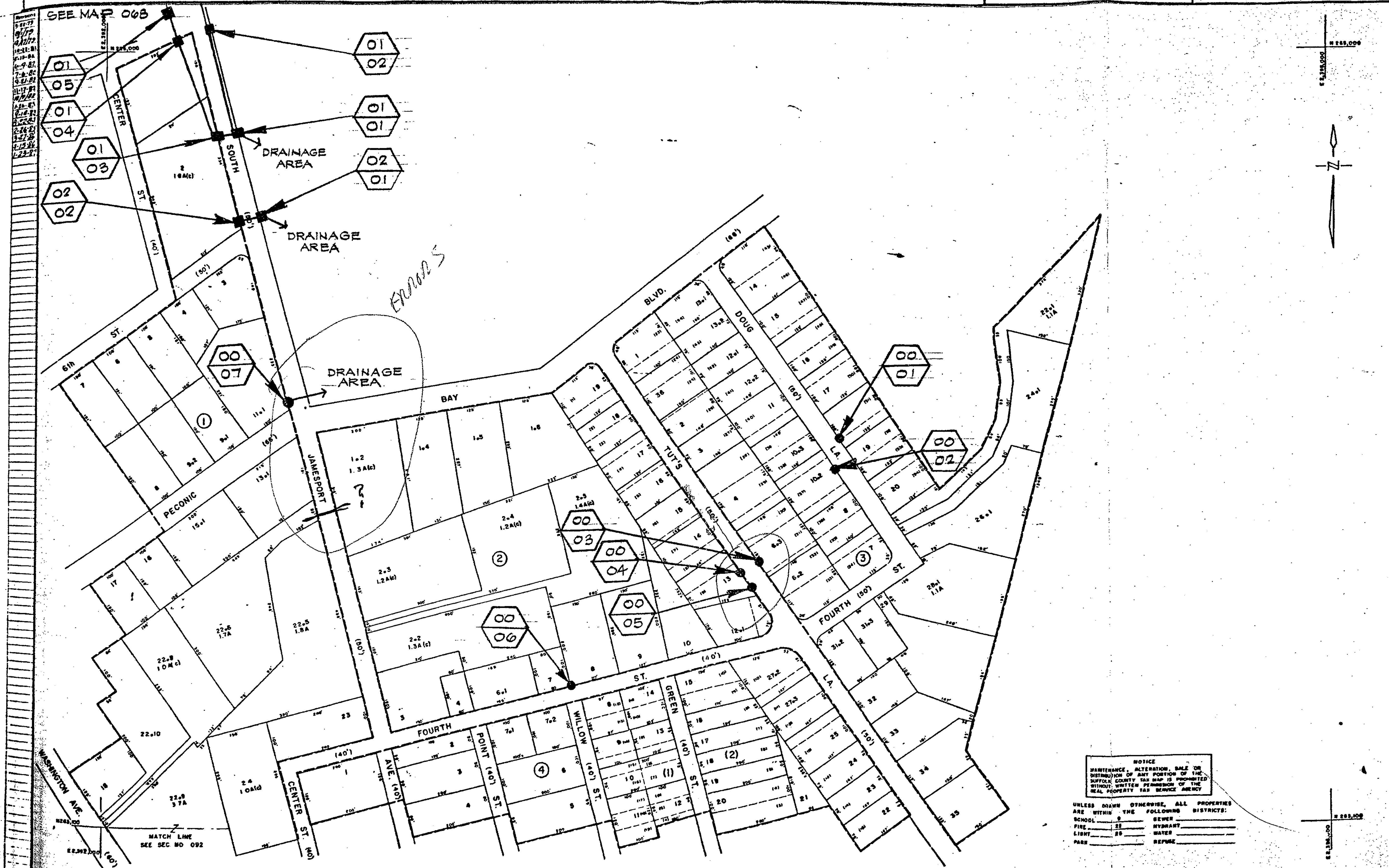

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SCHOOL / FIRE / LIGHT / PARK / SEWER / HYDRANT / WATER / REFUSE

Legend

KEY MAP

SCALE IN FEET

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Riverhead, L. I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO.
091

PROPERTY MAP

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

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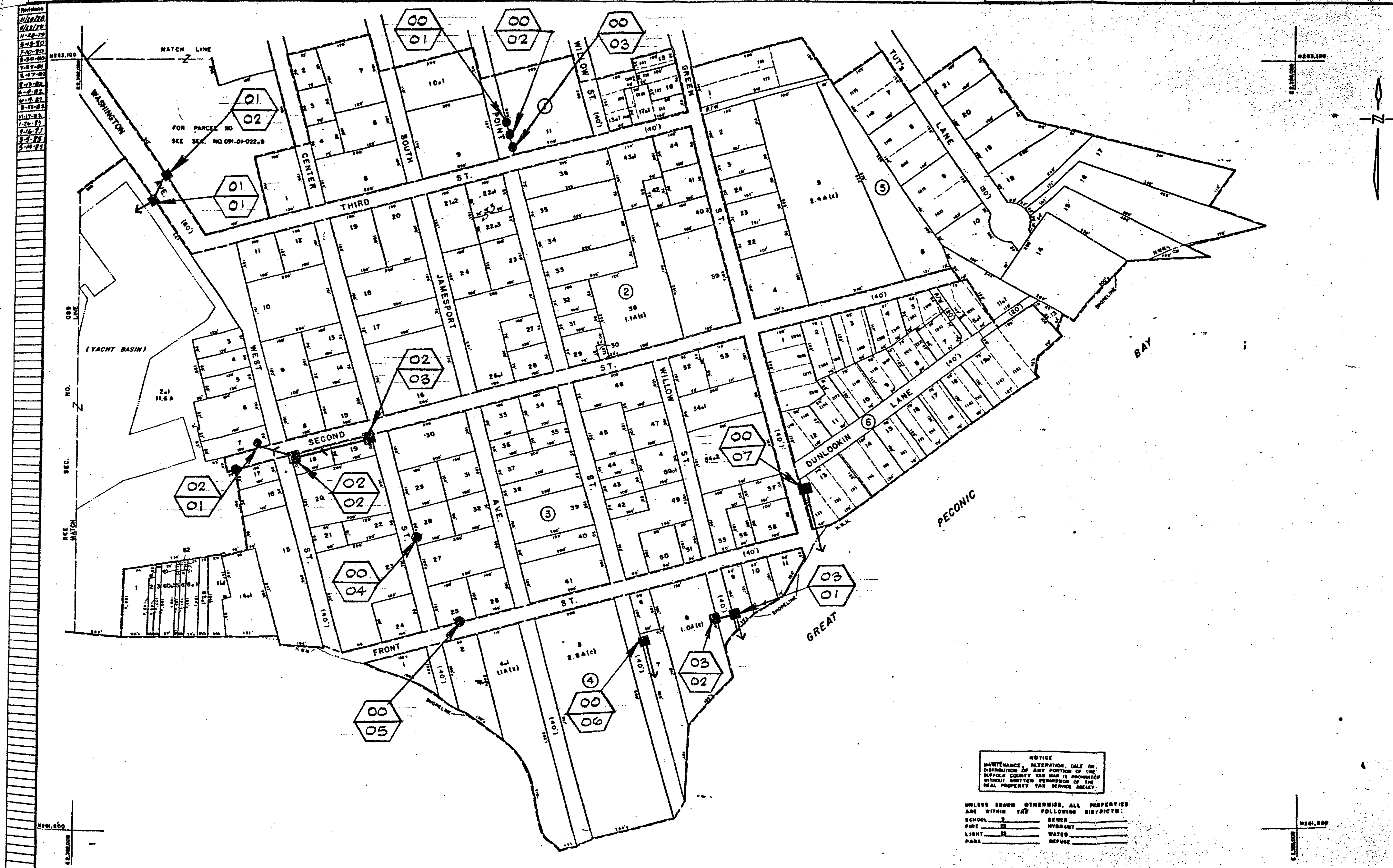

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Riverhead, L. I., New York

TOWN OF RIVERHEAD
DISTRICT NO. 0600
SECTION NO. 092
PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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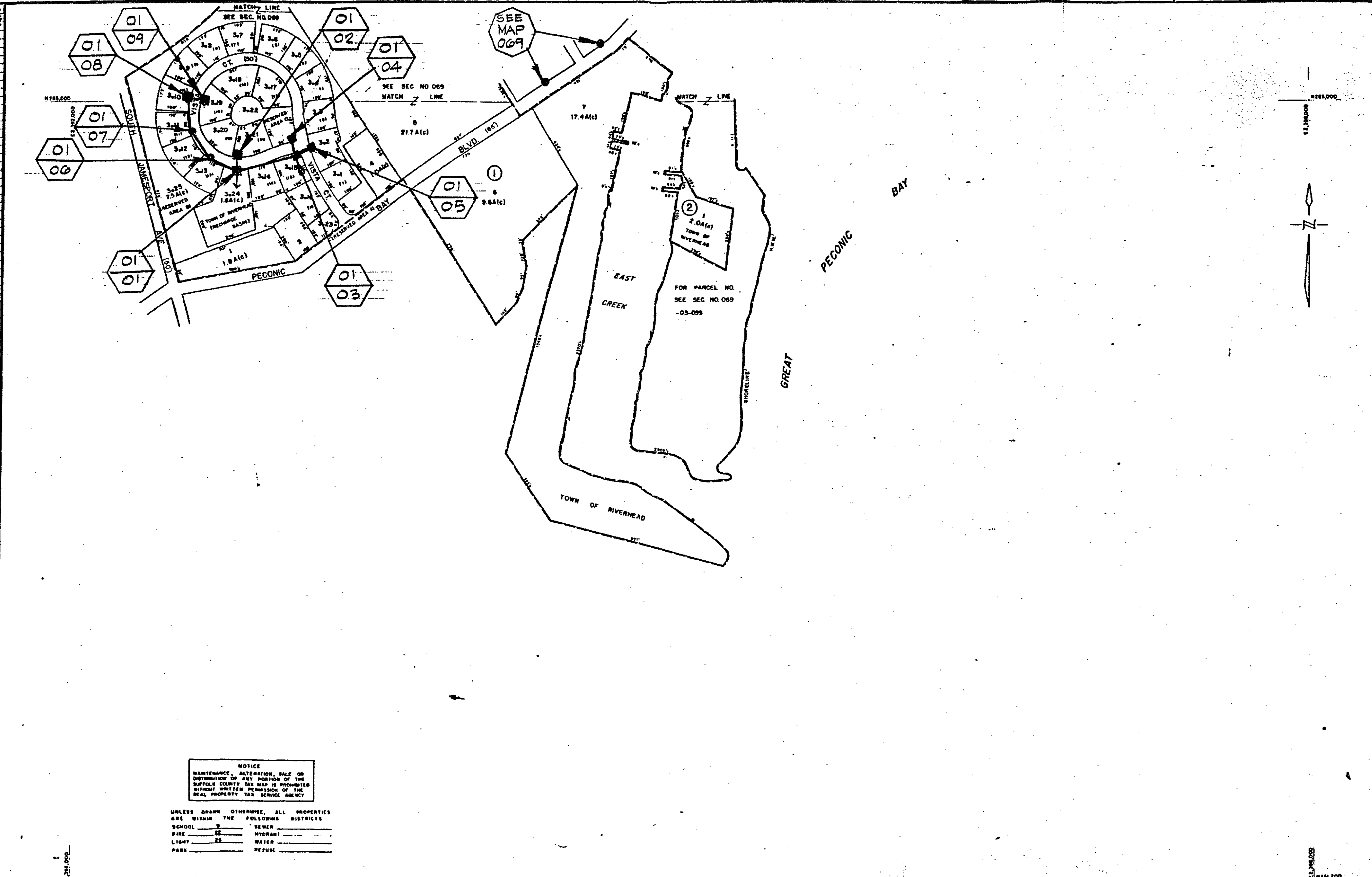
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Date: MARCH 1989



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MICHAEL BAKER, JR.
N.Y.P.E. 34612
Consulting Engineer
Rochester, Pennsylvania

Legend

Property or R W Line		County Line		Fire District Line	—F—	Hydrant District Line	—H—	Subdivision Lot No.	(34)
Denotes Common Owner	Z	Town Line		Water District Line	—W—	Refuse District Line	—R—	Deed Dimension	67'
Subdivision Lot Line		Village Line		Light District Line	—L—	Block No.	(12)	Scaled Dimension	63's
Railroad		Block Limit		Park District Line	—P—	Parcel No.	23	Deed Area	12A(d)
Stream		School District Line	—SCH—	Sewer District Line	—S—	Subdivision Block No.	(21)	Calculated Area	12A(c)

KEY MAP: 069, 071, 090, 094, 091, 150

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TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
Date of Completion

SECTION NO. 094
PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

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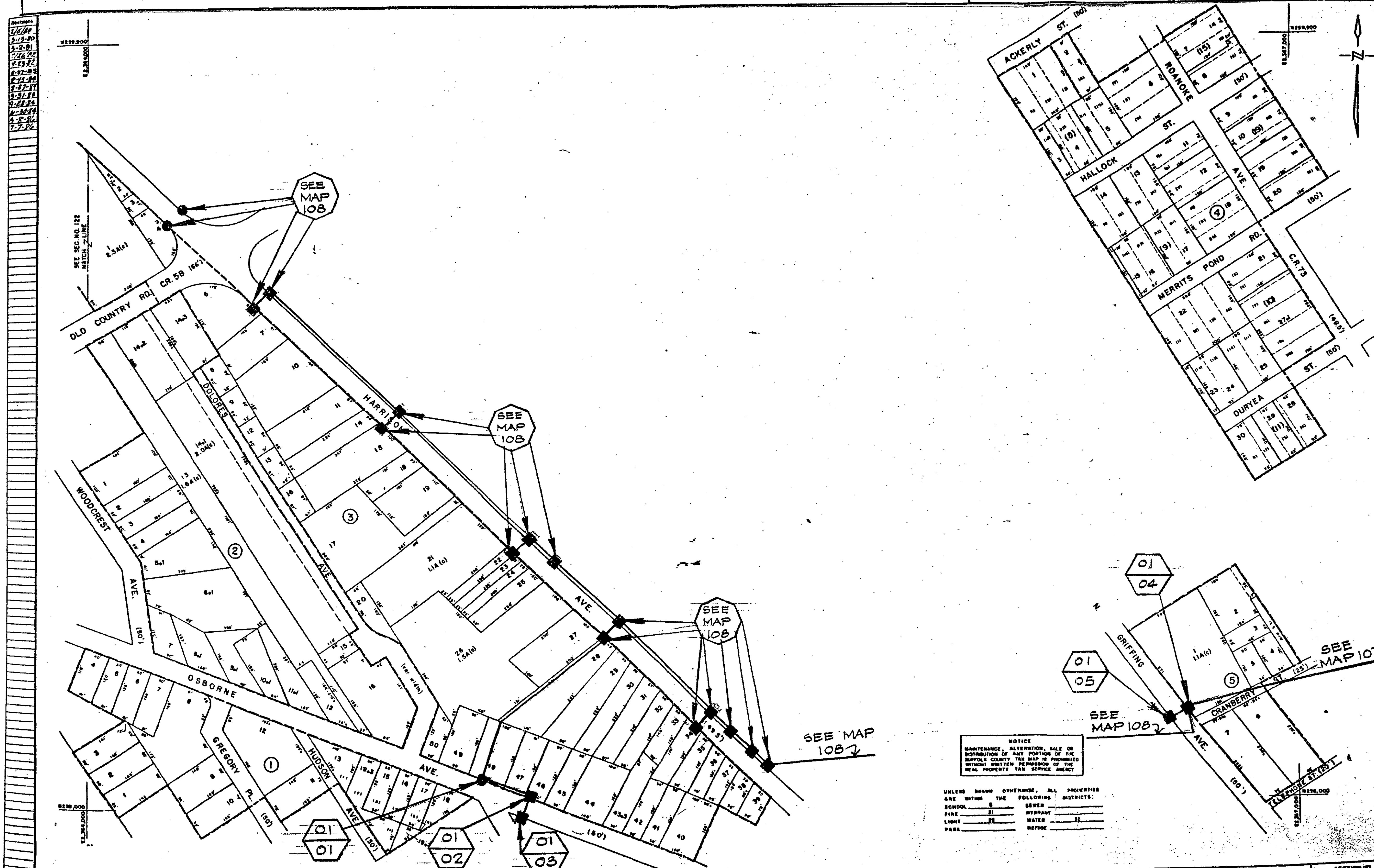

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TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 102

PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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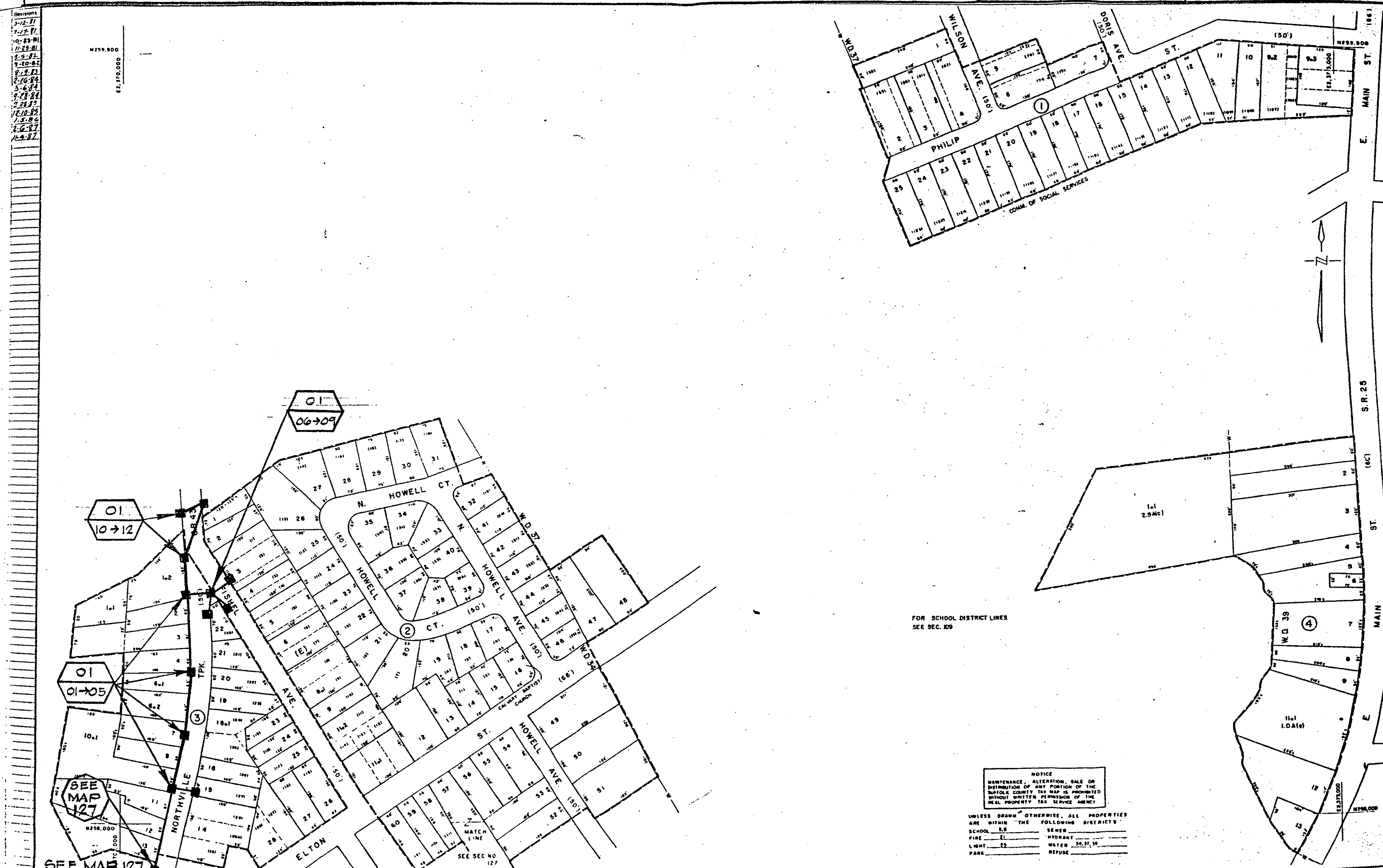
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



Prepared By
MICHAEL BAKER, JR.
Consulting Engineer
Rochester, Pennsylvania

Legend

Property or R/W Line		County Line		Fire District Line	F	Hydrant District Line	H	Subdivision Lot No.	(34)
Denotes Common Owner		Town Line		Water District Line	W	Refuse District Line	R	Deed Dimension	62'
Subdivision Lot Line		Village Line		Light District Line	L	Block No.	(12)	Scaled Dimension	62's
Railroad		Block Limit		Park District Line	P	Parcel No.	73	Deed Area	12A(d)
		School District Line		Sewer District Line	S	Subdivision Block No.	(21)	Calculated Area	12A(c)

KEY MAP

107 | 109 | 108 | 106 | 111 | 127

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Real Property Tax Service Agency
County Center
Riverhead, L.I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
SECTION NO. 106
PROPERTY MAP

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

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Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989

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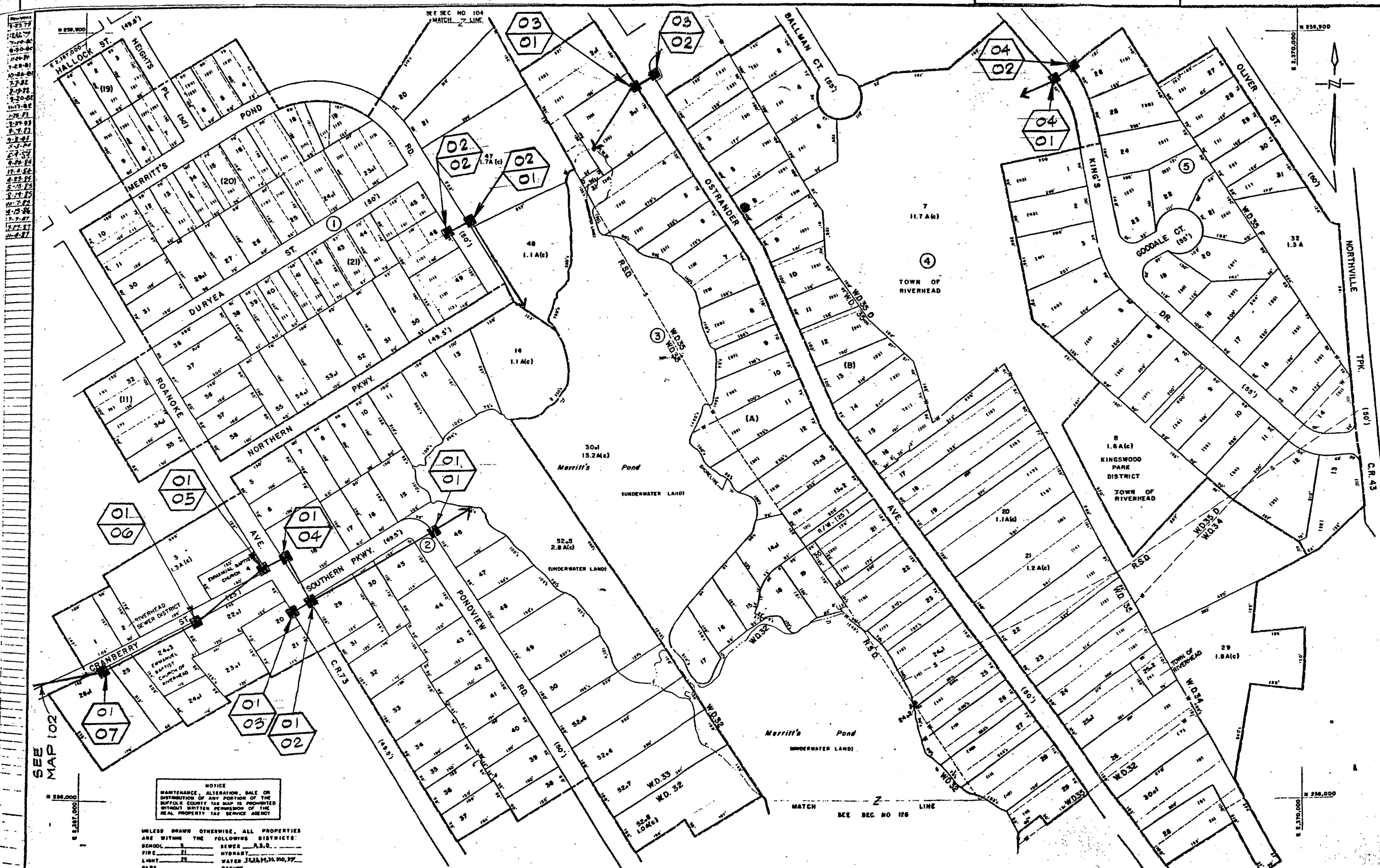

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SCHOOL 5 SEWER R.S.D.
FIRE 21 HYDRANT
LIGHT 29 WATER
PARK REFUSE

Prepared By
RICHAEL BAKER, JR.
Consulting Engineers
Rochester, Pennsylvania

Legend

Property or R/W Line	County Line	Fire District Line	Hydrant District Line	Subdivision Lot No.	(24)
Dimension Common Owner	Town Line	Water District Line	Refuse District Line	Deed Dimension	63'
Subdivision Lot Line	Village Line	Light District Line	Block No.	Scaled Dimension	62's
Railroad	Block Limit	Park District Line	Parcel No.	Deed Area	12A(d)
Stream	School District Line	Sewer District Line	Subdivision Block No.	Calculated Area	12A(c)

KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
County Center
Riverhead, L. I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
Date of Completion

SECTION NO. 107

PROPERTY MAP

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

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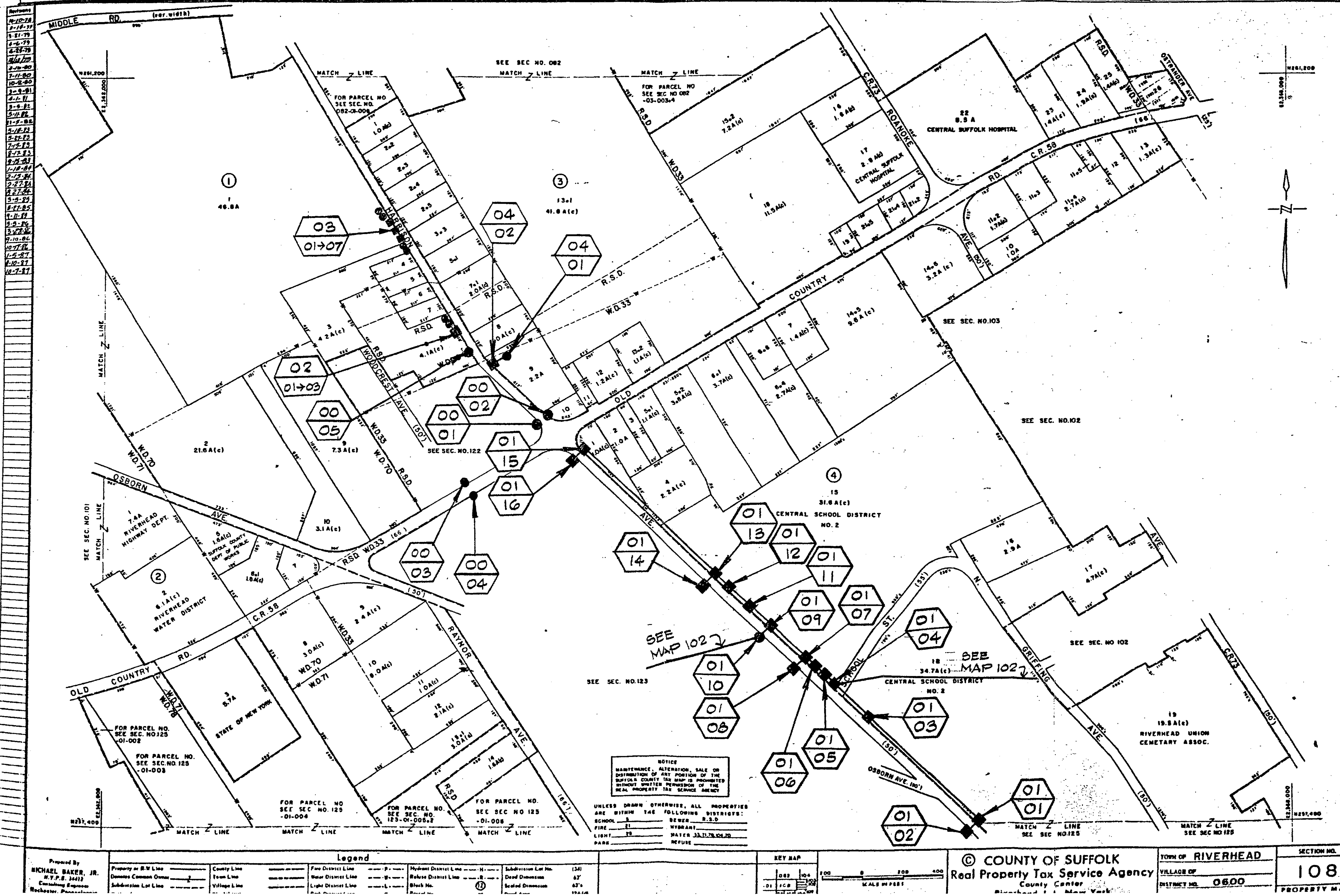
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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Project No. 60-000-05

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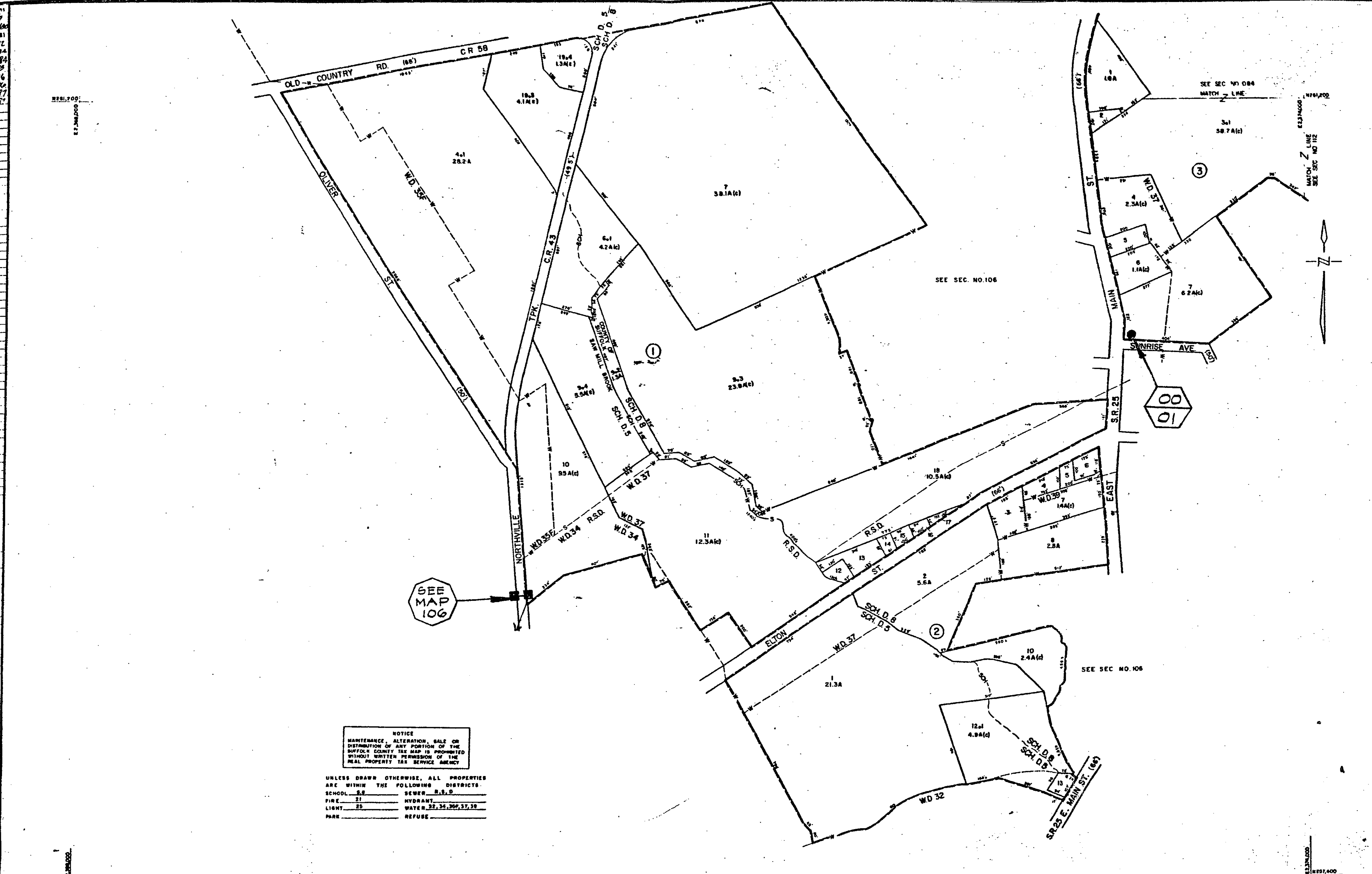

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SCHOOL	5,8	SEWER	R.S.D.
FIRE	21	HYDRANT	
LIGHT	25	WATER	32,34,35F,37,39
PARK		REFUSE	

Prepared By
MICHAEL BAKER, JR.
Consulting Engineer
Rochester, Pennsylvania

Legend

Property or R W Line	County Line	Fire District Line --F--	Hydrant District Line --H--	Subdivision Lot No. (34)
Denotes Common Owner	Town Line	Water District Line --W--	Refuse District Line --R--	Deed Dimension 67'
Subdivision Lot Line	Village Line	Light District Line --L--	Block No. (12)	Scaled Dimension 62's
Railroad	Block Line	Park District Line --P--	Parcel No. 23	Deed Area 12A(d)

KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
County Center
Riverhead, L.I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 109

PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

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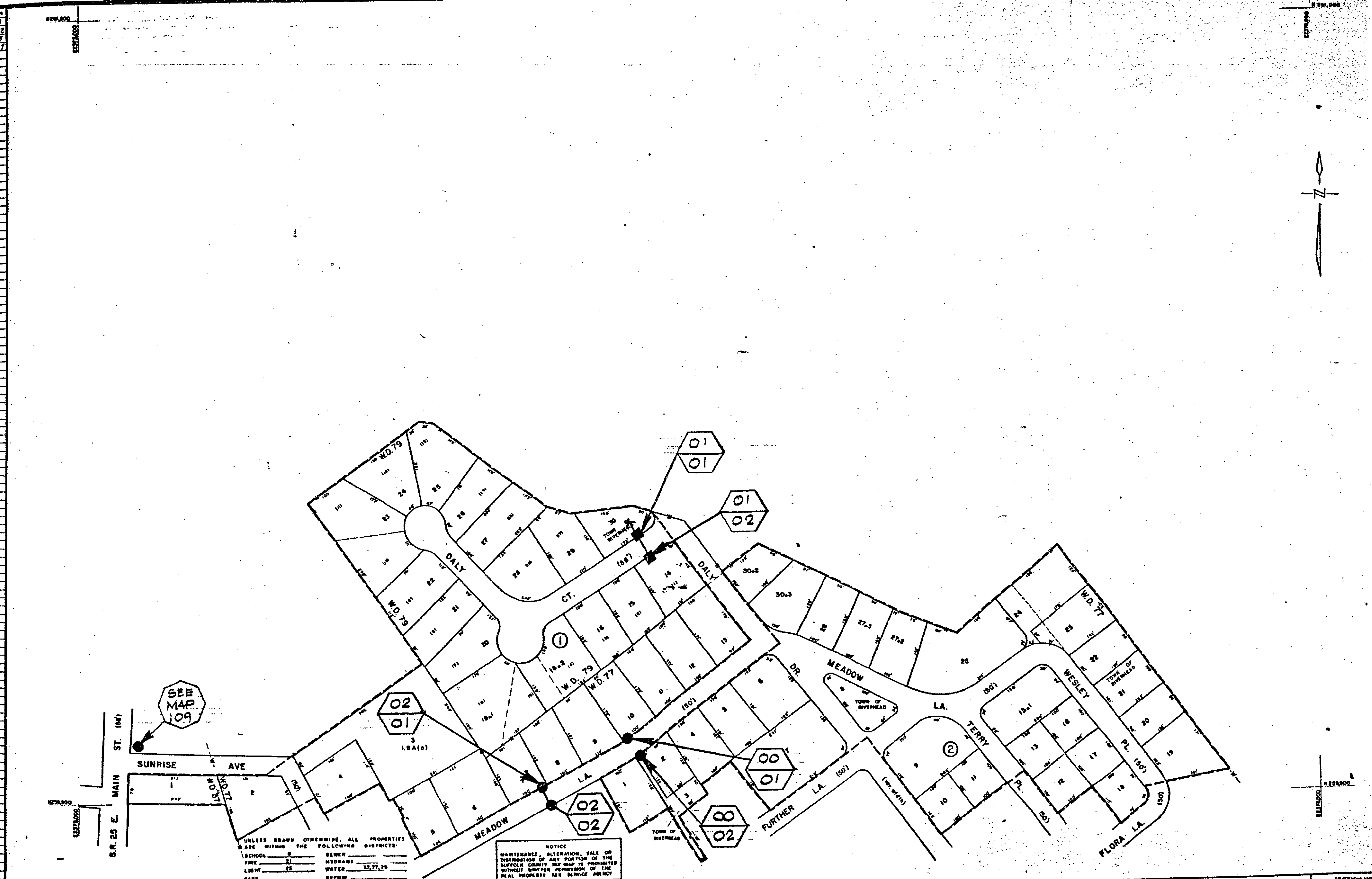

Prepared By
MICHAEL BAKER, JR.
N.Y.P.E. 34412
Consulting Engineer
Rochester, Pennsylvania

Legend

Property or R W Line		County Line		Fire District Line	—F—	Hydrant District Line	—H—	Subdivision Lot No.	(34)
Common Owner		Town Line		Water District Line	—W—	Refuse District Line	—R—	Deed Dimension	62'
Subdivision Lot Line		Village Line		Light District Line	—L—	Block No.	(17)	Scaled Dimension	62's
Railroad		Block Limit		Park District Line	—P—	Parcel No.	23	Deed Area	12A (d)
						Subdivision Block No.	(21)	Calculated Area	12A (c)

KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
County Center
Riverhead, L. I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
Date of Completion

SECTION NO.
110
PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Date: MARCH 1989

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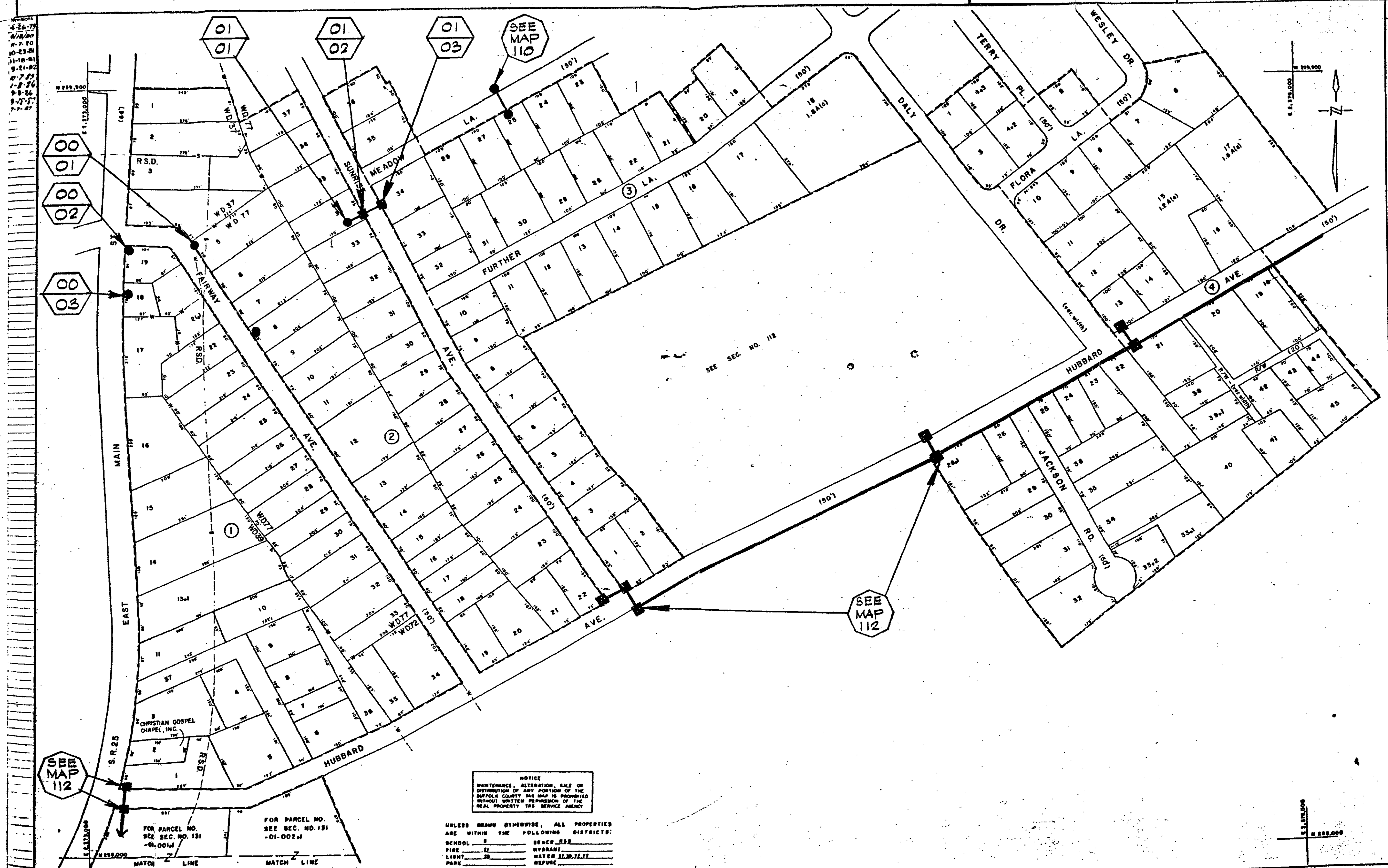

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Legend

KEY MAP

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TOWN OF RIVERHEAD

VILLAGE OF

DISTRICT NO. 0600

SECTION NO. 111

PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

437 South Country Road
BROOKHAVEN, NEW YORK 11719

Date: MARCH 1989

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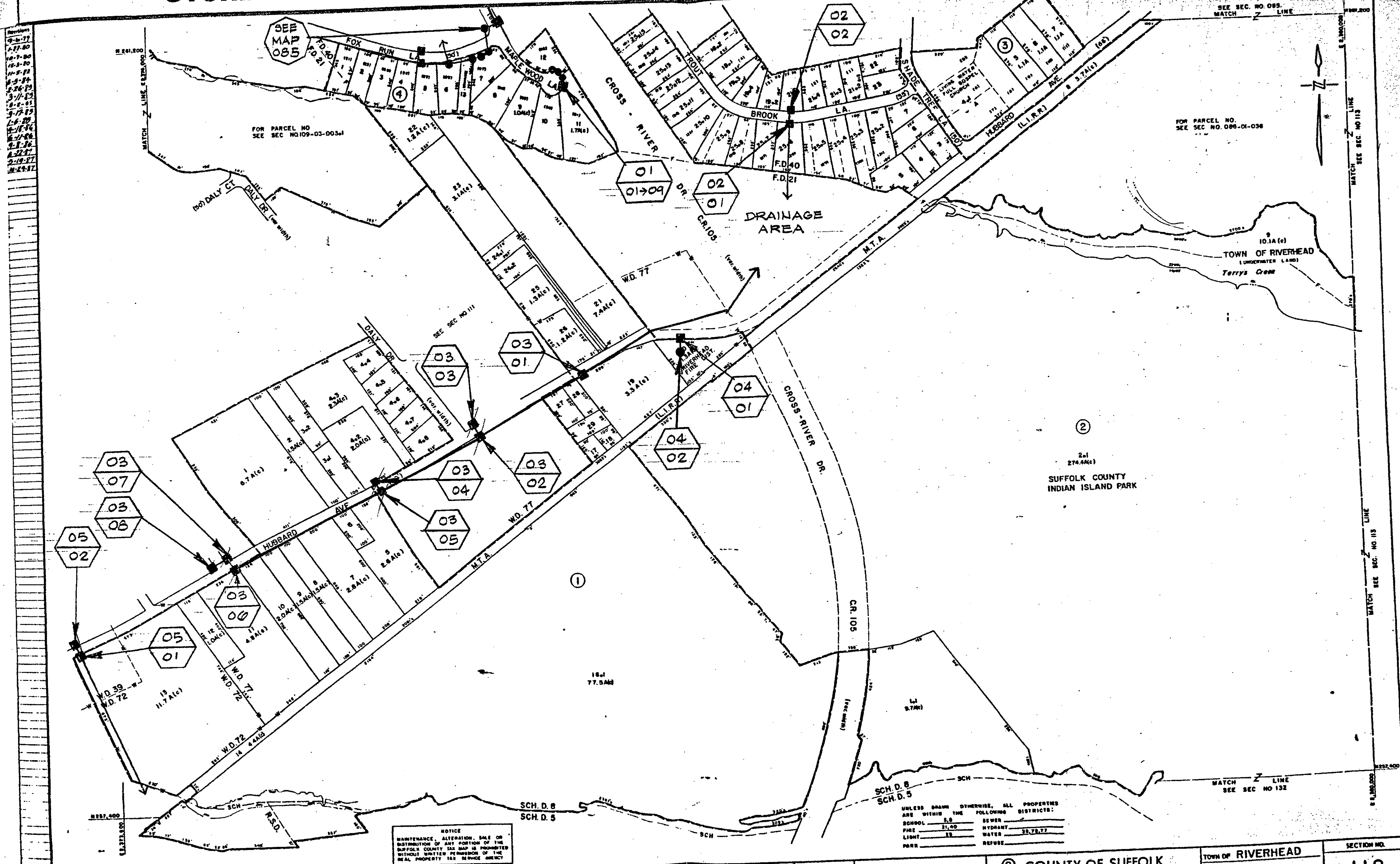

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UNLESS DRAWN OTHERWISE, ALL PROPERTIES ARE WITHIN THE FOLLOWING DISTRICTS:
SCHOOL 5,8 — SEWER
FIRE 21,40 — HYDRANT
LIGHT 22 — WATER 39,72,77
PARK — REFUSE

Prepared By
MICHAEL BAKER, JR.
N.Y.P.E. 34612
Consulting Engineer
Rochester, Pennsylvania

Legend

KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
County Center
Riverhead, L. I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
Date of Completion

SECTION NO. 112

PROPERTY MAP

TOWN OF RIVERHEAD

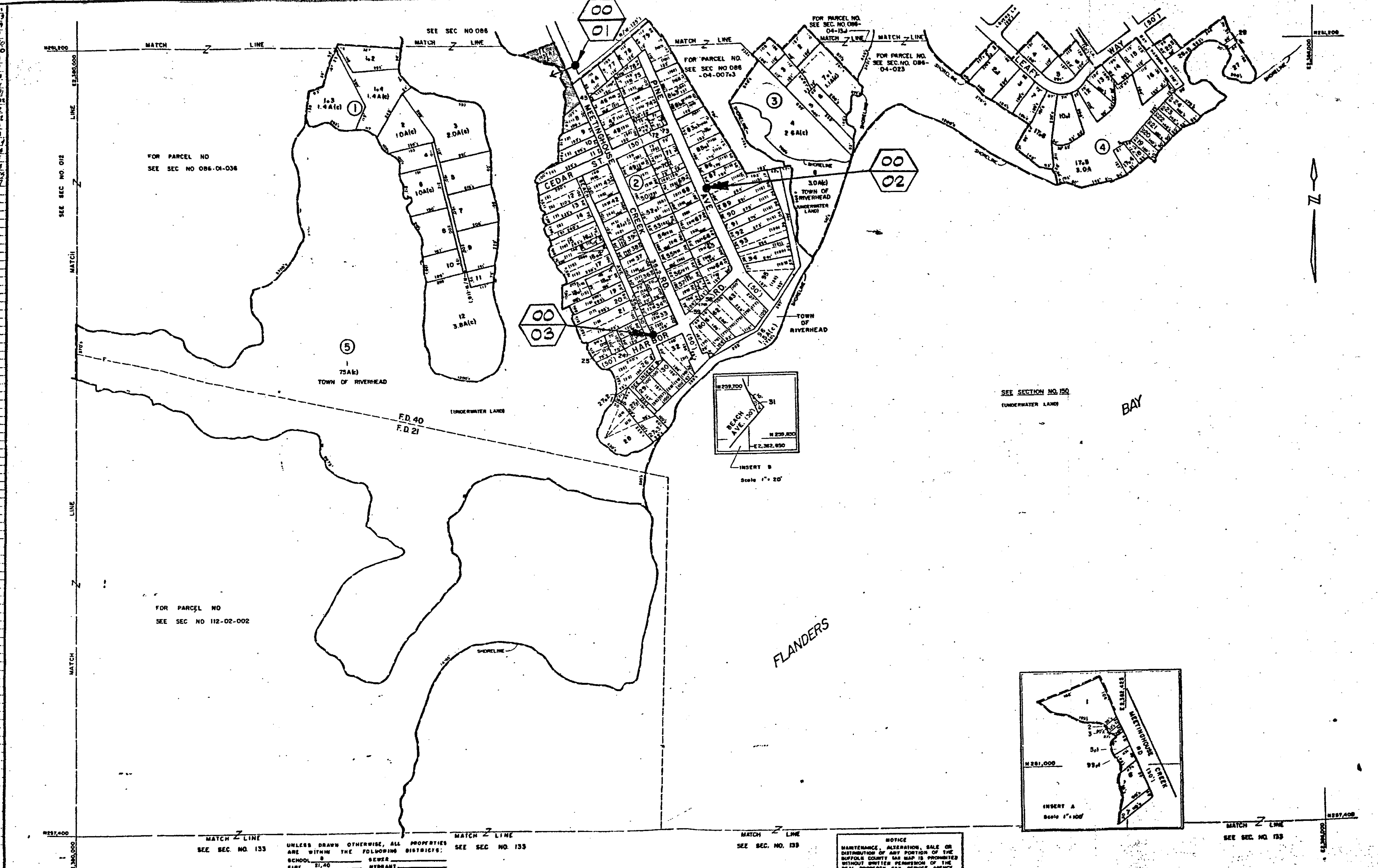
STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989

LKMA REVISION



UNLESS DRAWN OTHERWISE, ALL PROPERTIES ARE WITHIN THE FOLLOWING DISTRICTS:
SCHOOL 8 SEWER
FIRE 21, 40 HYDRANT
LIGHT 25 WATER
PARK REFUSE

NOTICE
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KEY MAP

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TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
SECTION NO. 113
PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989

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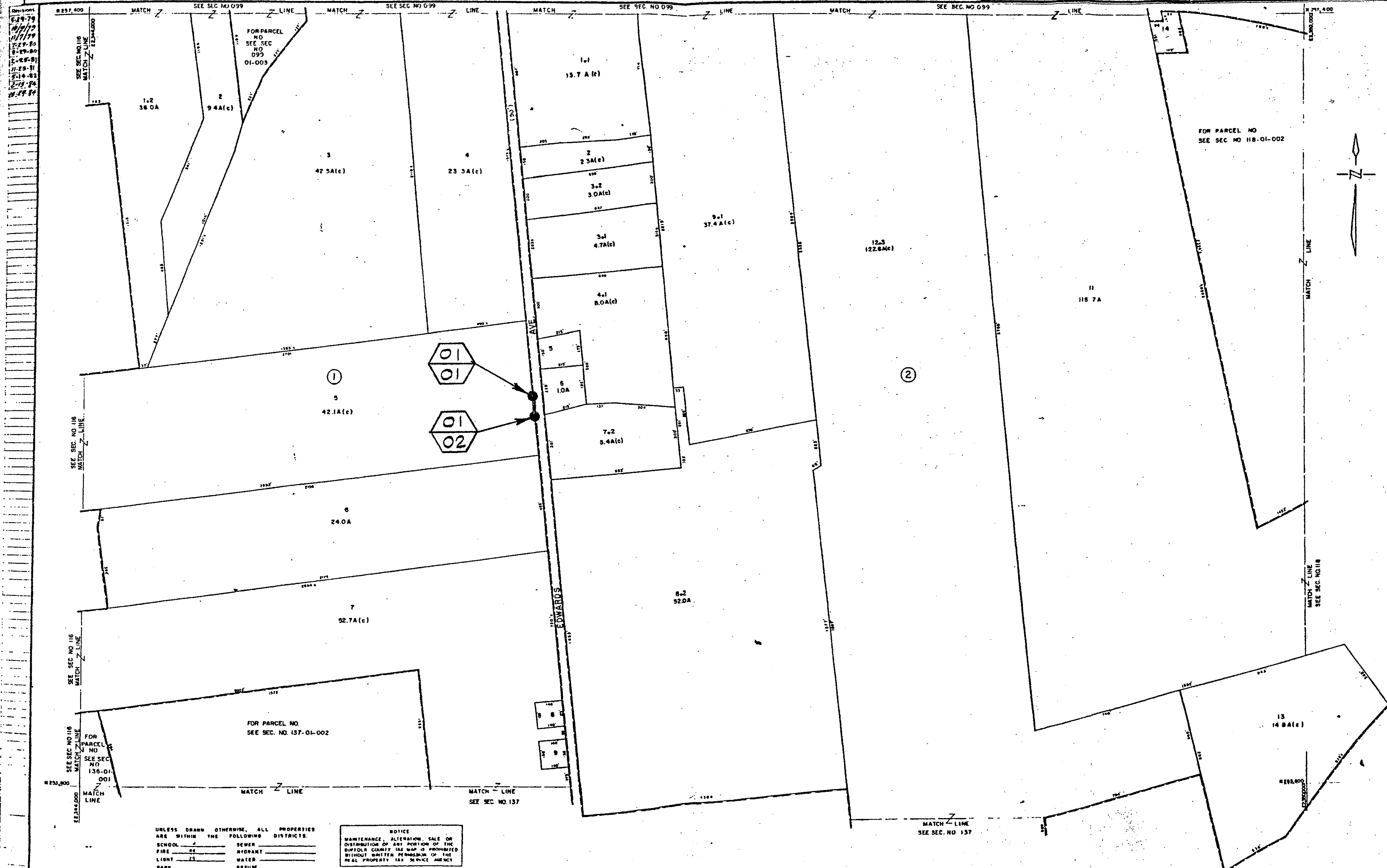

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MICHAEL BAKER, JR.
Consulting Engineer
Rochester, Pennsylvania

Legend

KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
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TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO.
117

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989

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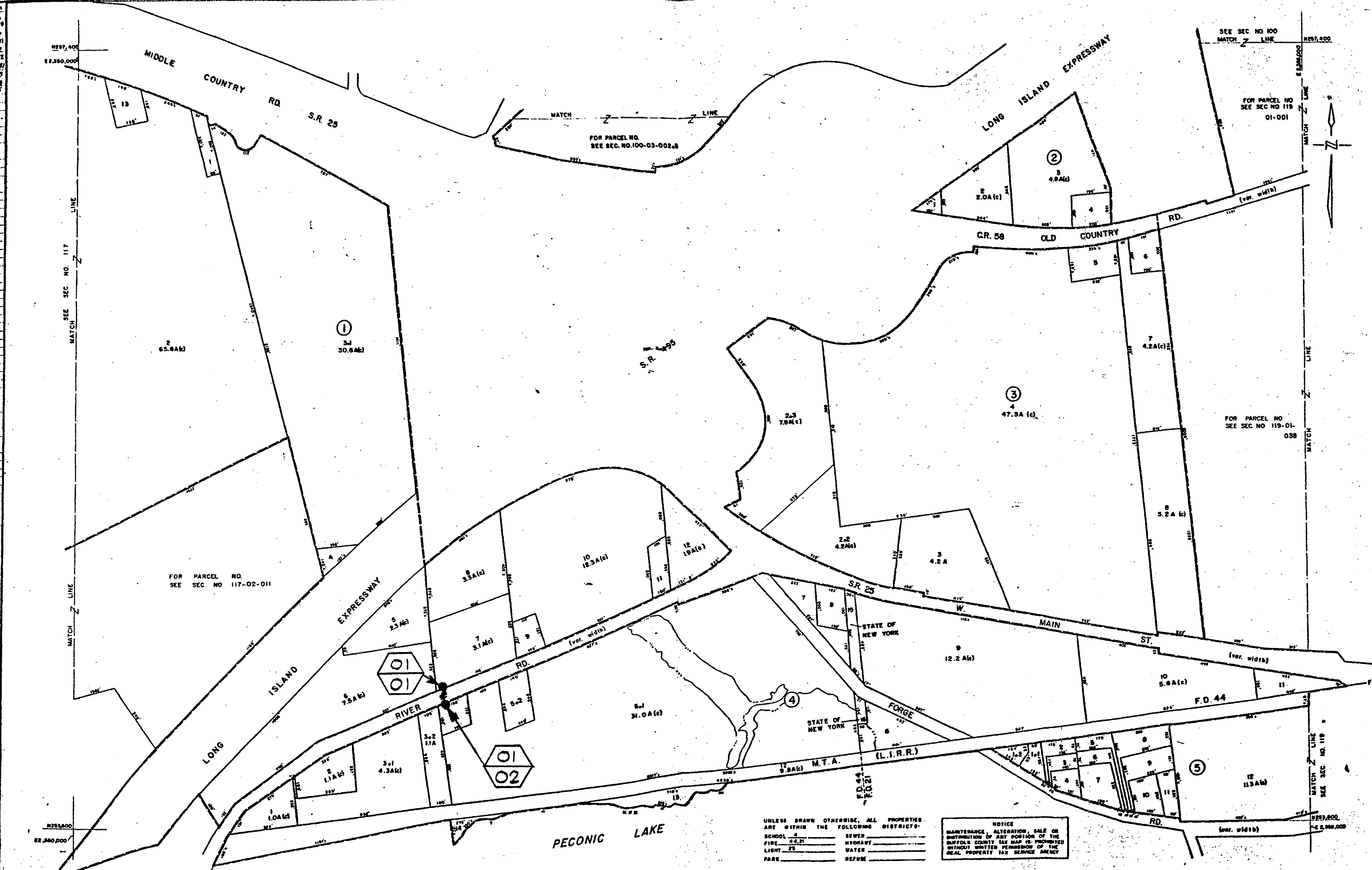

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Prepared By MICHAEL BAKER, JR.

KEY MAP

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County Center

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 118

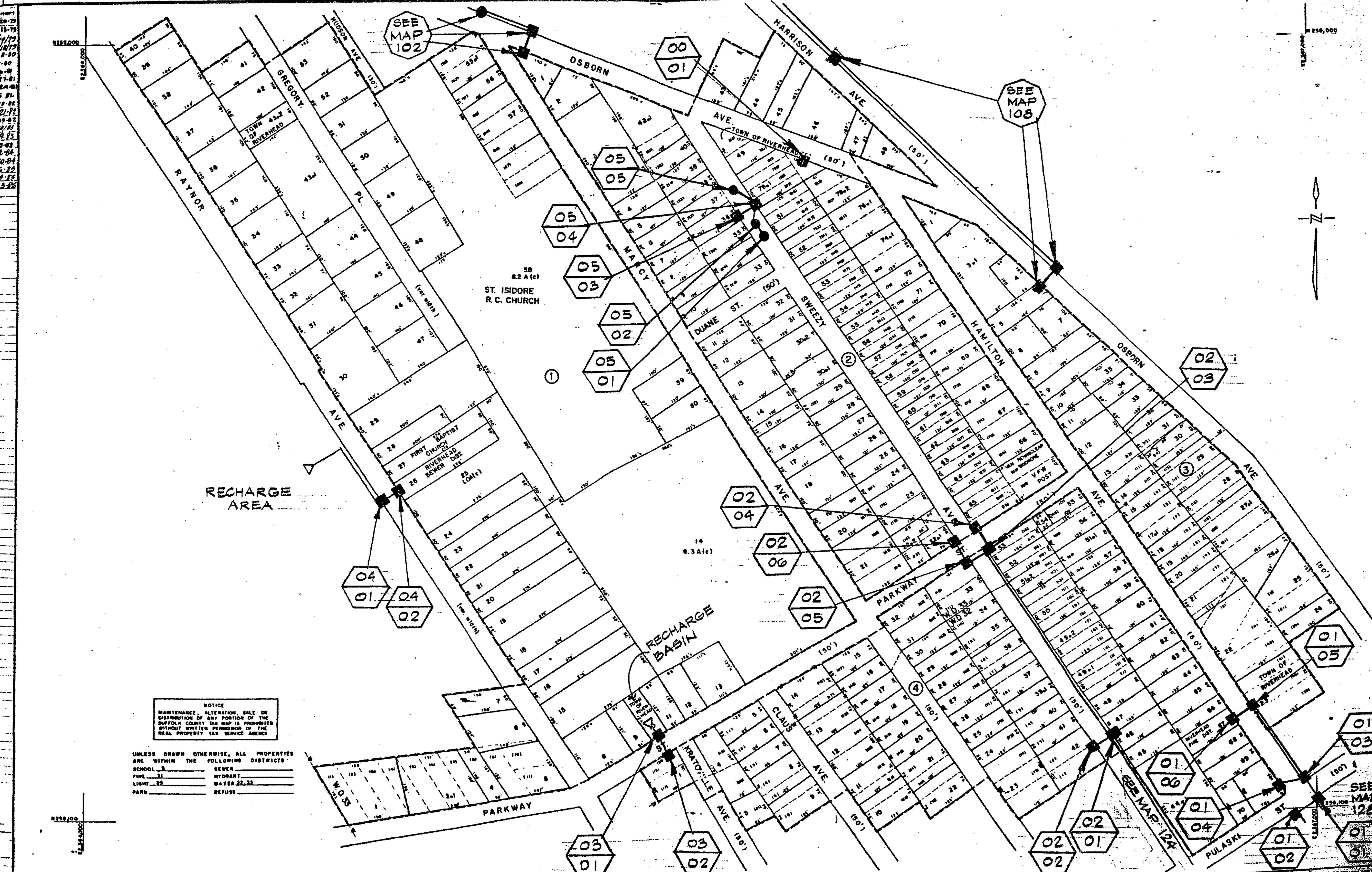
TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



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Real Property Tax Service Agency

TOWN OF RIVERHEAD

SECTION NO. 123

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

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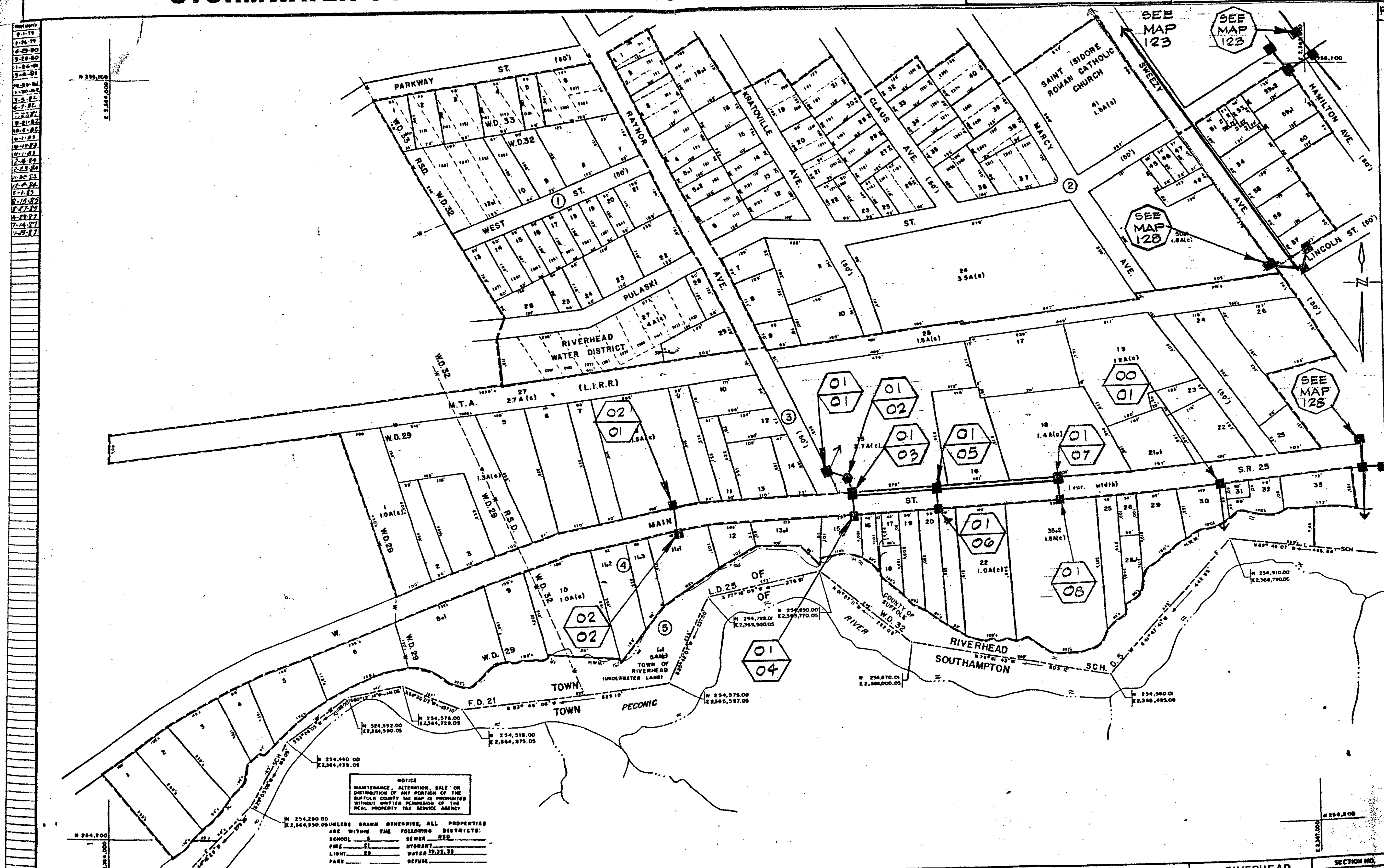
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



Legend

Prepared By MICHAEL BAKER, JR.

KEY MAP

SCALE IN FEET

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County Center

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 124
PROPERTY MAP

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989

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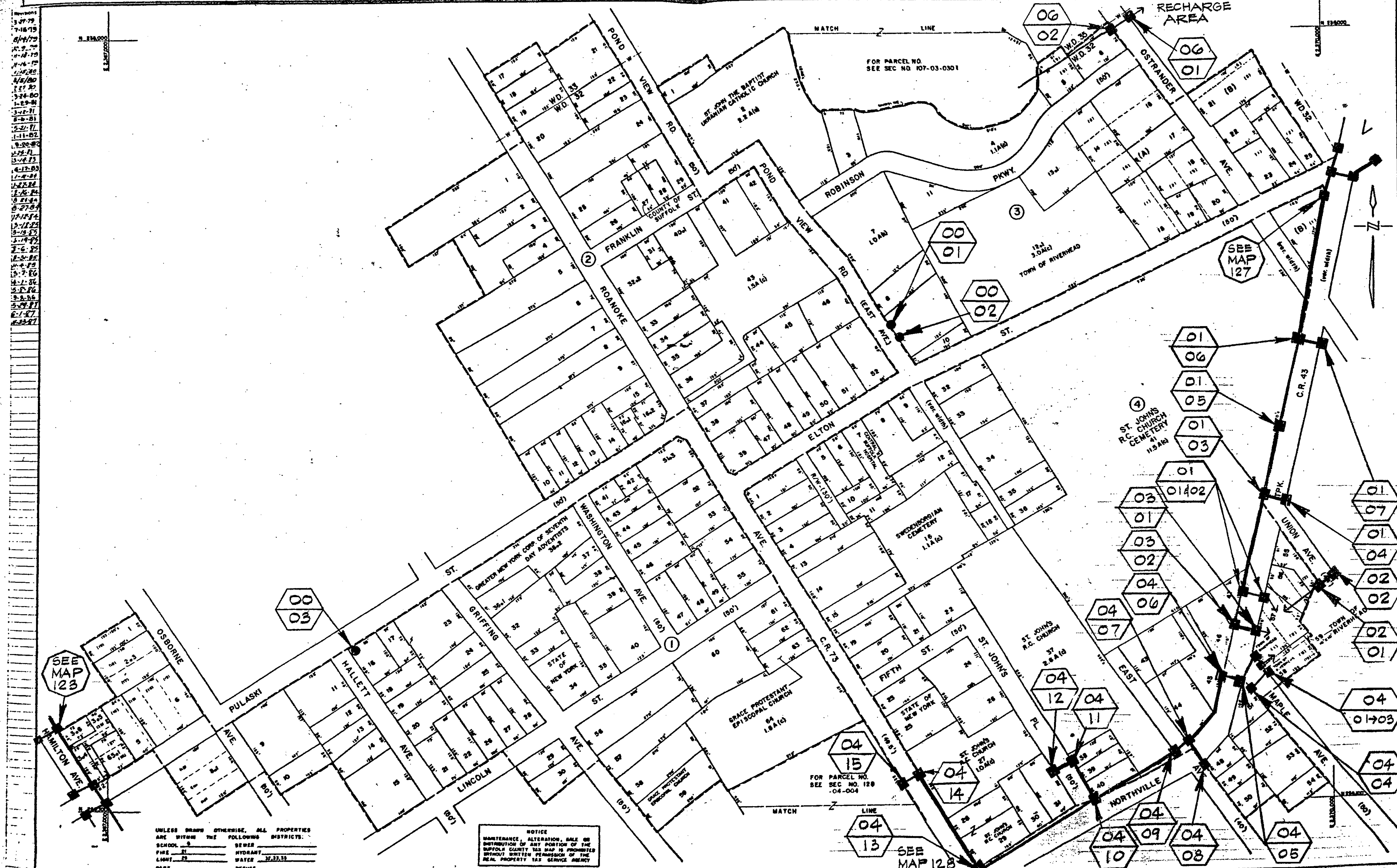

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Real Property Tax Service Agency
County Center
Riverhead, L. I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600
SECTION NO. 126
PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 80-000-05

Date: MARCH 1989

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Prepared By MICHAEL BAKER, JR. N.Y.P.E. 34412 Consulting Engineer Rochester, Pennsylvania

KEY MAP: 106, 126, 127, 131, 129

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TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 127
PROPERTY MAP

TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Date: MARCH 1989

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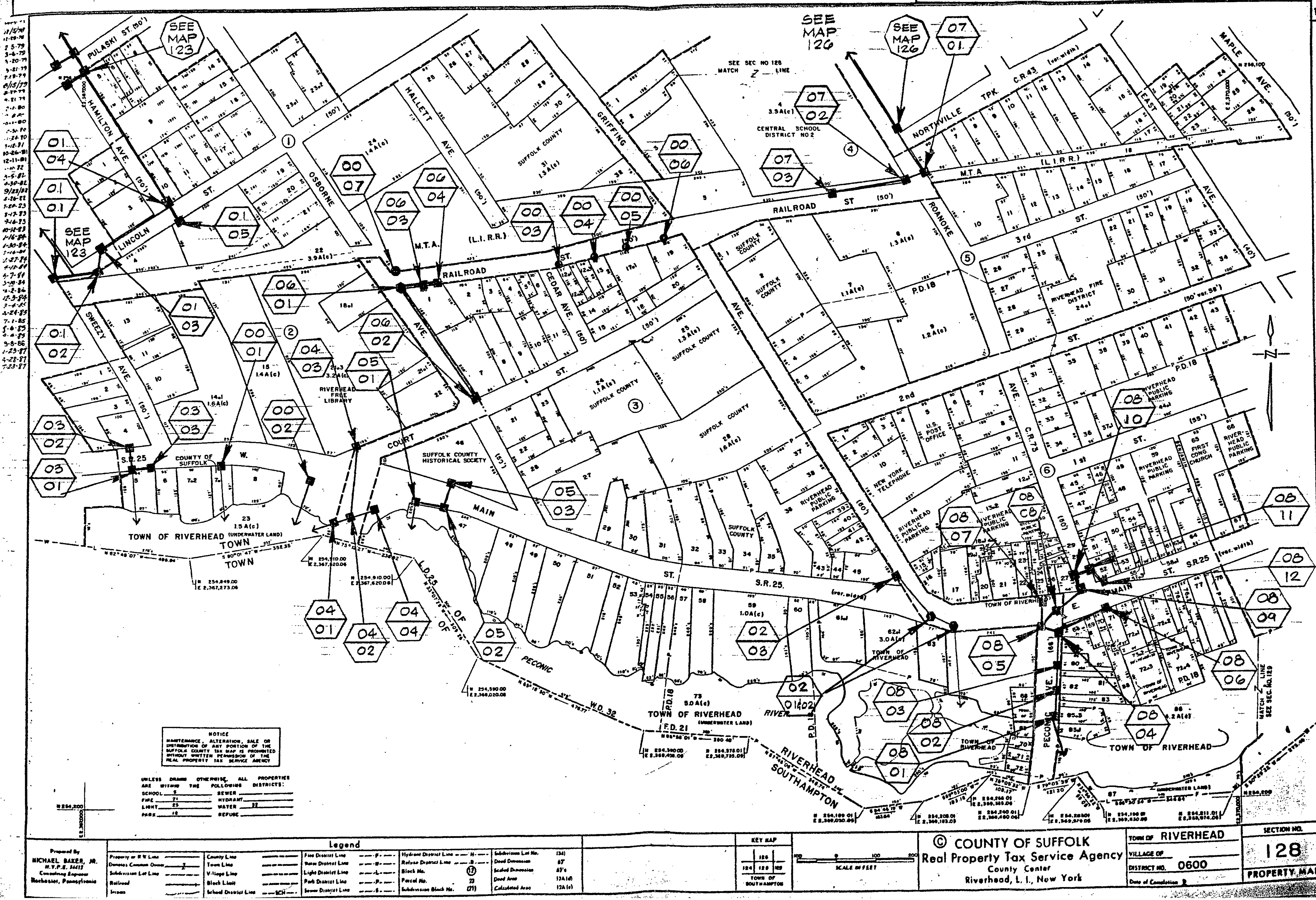
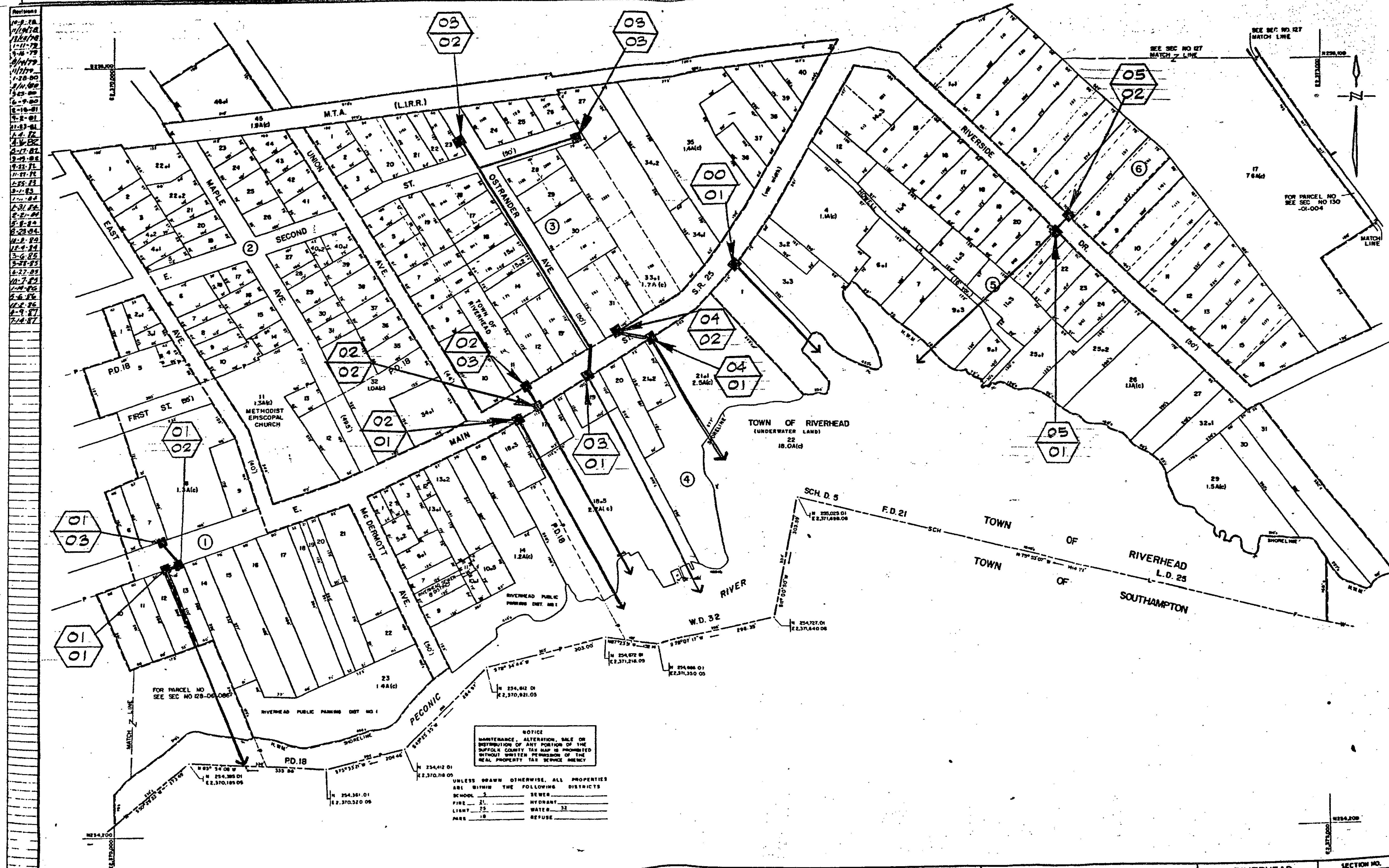


TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



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KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
County Center
Riverhead L.I., New York

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

SECTION NO. 129

PROPERTY MAP

TOWN OF RIVERHEAD
STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989

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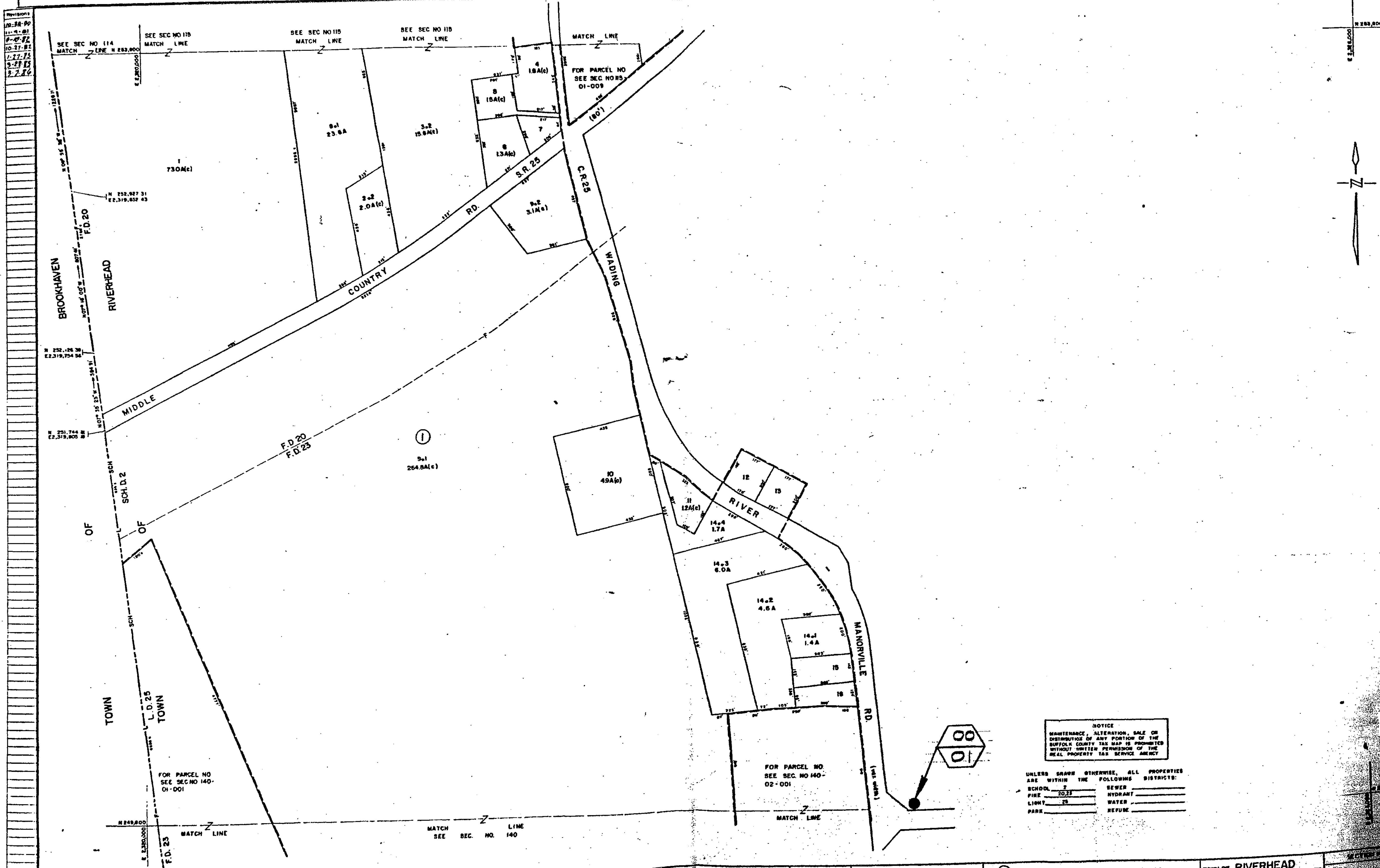

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Prepared By MICHAEL BAKER, JR. N.Y.P.E. 34412

KEY MAP

SCALE IN FEET

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Real Property Tax Service Agency
County Center

TOWN OF RIVERHEAD
VILLAGE OF
DISTRICT NO. 0600

134

PROPERTY MAP

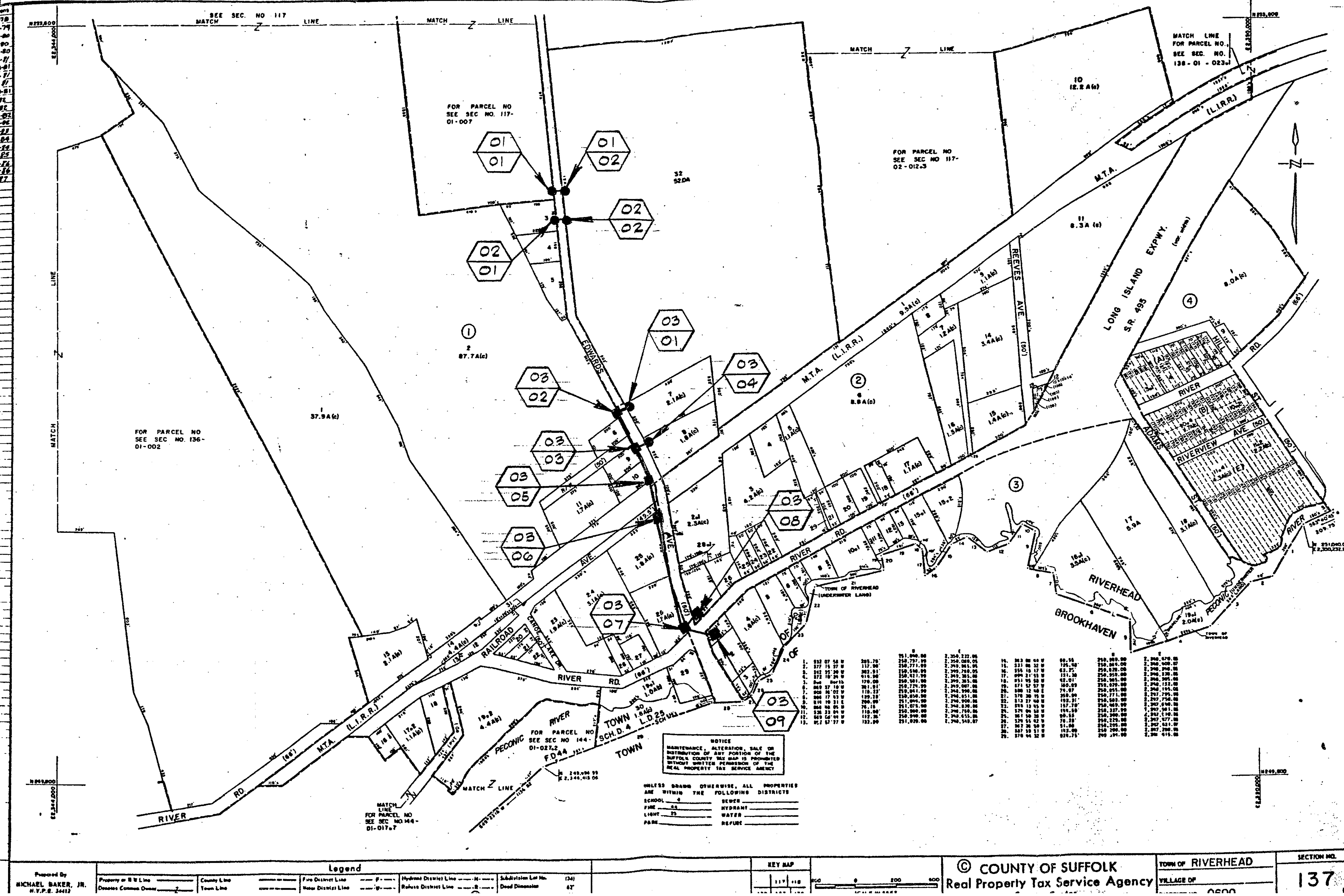
TOWN OF RIVERHEAD

STORMWATER COLLECTION SYSTEM INVENTORY

LOUIS K. McLEAN ASSOCIATES, P.C.
Consulting Engineers
437 South Country Road
BROOKHAVEN, NEW YORK 11719

Project No. 60-000-05

Date: MARCH 1989



TOWN OF RIVERHEAD

SECTION NO. 137

APPENDIX B

TABLE 1

STRUCTURE DATA BY

TAX MAP NUMBER

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

TAX MAP - SYS # - STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
66.01 - 1	Northive Court	CB	66.01-2	RB	
66.01 - 2	Westwoods Blvd.	CB	66.01-3	RB	
66.01 - 3	Southfields Rd.	CB	66.01-4,6	RB	
66.01 - 4	Southfields Rd.	CB	66.01-5	RB	
66.01 - 5	Southfields Rd.	CB	---	RB	
66.01 - 6	Southfields Rd.	CB	66.01-7	RB	
66.01 - 7	Southfields Rd.	CB	---	RB	
67.01 - 1	Hilton Court	CB	67.01-2	LB	
67.01 - 2	Hilton Court	CB	67.01-3	LB	
67.01 - 3	Hilton Court	LB	67.01-4	LB	
67.01 - 4	Hilton Court	LB	67.01-5	LB	
67.01 - 5	Hilton Court	LB	67.01-6	LB	
67.01 - 6	Hilton Court	LB	---	LB	
67.02 - 1	Hilton Court	CB	67.02-2	LB	
67.02 - 2	Hilton Court	CB	67.02-3	LB	
67.02 - 3	Hilton Court	LB	67.02-4	LB	
67.02 - 4	Hilton Court	LB	67.02-5	LB	
67.02 - 5	Hilton Court	LB	67.02-6	LB	
67.02 - 6	Hilton Court	LB	---	LB	
67.03 - 1	Church Lane	CB	67.03-2	RA	
67.03 - 2	Church Lane	CB	---	RA	
68.00 - 1	Circle Drive	CB	---	RB	
68.01 - 1	South Jamesport Avenue	CB	68.01-2,3	DA	
68.01 - 2	South Jamesport Avenue	CB	---	DA	
68.01 - 3	South Jamesport Avenue	CB	68.01-4,5	DA	
68.01 - 4	South Jamesport Avenue	CB	---	DA	
68.01 - 5	South Jamesport Avenue	CB	68.01-6,7	DA	
68.01 - 6	South Jamesport Avenue	CB	---	DA	
68.01 - 7	South Jamesport Avenue	CB	---	DA	
69.00 - 1	Peconic Bay Boulevard	LB	69.00-2	LB	
69.00 - 2	Peconic Bay Boulevard	LB	---	LB	
70.00 - 1	Peconic Bay Boulevard	LB	---	LB	
70.00 - 2	Peconic Bay Boulevard	LB	---	LB	
70.00 - 3	Peconic Bay Boulevard	LB	---	LB	
71.00 - 1	Peconic Bay Boulevard	DW	---	GD	
71.00 - 2	Peconic Bay Boulevard	DW	---	GD	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# (TAX MAP, SYS #, STR #)	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
84.01 - 4	Middle Road	CB	---	RB	
85.00 - 1	Shade Tree Lane	LB	---	LB	
85.00 - 2	Edgar Avenue	LB	---	LB	
85.00 - 3	Edgar Avenue	LB	---	LB	
85.01 - 1	Robert Street	CB	85.01-2	RA	
85.01 - 2	Robert Street	CB	---	RA	
85.02 - 1	Fox Run Lane	CB	85.02-2	DA	
85.02 - 2	Fox Run Lane	CB	85.02-3,16	DA	
85.02 - 3	Fox Run Lane	LB	85.02-4	DA	
85.02 - 4	Fox Run Lane	LB	85.02-5	DA	
85.02 - 5	Fox Run Lane	LB	85.02-6	DA	
85.02 - 6	Fox Run Lane	LB	85.02-7	DA	
85.02 - 7	Fox Run Lane	LB	85.02-8	DA	
85.02 - 8	Fox Run Lane	LB	85.02-9	DA	
85.02 - 9	Fox Run Lane	LB	85.02-10	DA	
85.02 -10	Maple Wood Lane	CB	85.02-11	DA	
85.02 -11	Maple Wood Lane	CB	85.02-12	DA	
85.02 -12	Maple Wood Lane	LB	85.02-13	DA	
85.02 -13	Maple Wood Lane	LB	85.02-14	DA	
85.02 -14	Maple Wood Lane	LB	85.02-15	DA	
85.02 -15	Maple Wood Lane	CB	---	DA	
85.02 -16	Fox Run Lane	LB	85.02-17	DA	
85.02 -17	Fox Run Lane	LB	85.02-18	DA	
85.02 -18	Fox Run Lane	LB	85.02-19	DA	
85.02 -19	Fox Run Lane	LB	85.02-20	DA	
85.02 -20	Fox Run Lane	LB	85.02-21,22,24	DA	
85.02 -21	Fox Run Lane	CB	---	DA	
85.02 -22	Fox Run Lane	CB	85.02-23	DA	
85.02 -23	Fox Run Lane	CB	---	DA	
85.02 -24	Forest Drive	LB	85.02-25	DA	
85.02 -25	Forest Drive	LB	85.02-26	DA	
85.02 -26	Forest Drive	LB	85.02-27	DA	
85.02 -27	Forest Drive	CB	85.02-28,29,30	DA	
85.02 -28	Forest Drive	CB	---	DA	
85.02 -29	Maple Wood Lane	CB	---	DA	
85.02 -30	Forest Drive	CB	85.02-31	DA	
		LB	85.02-32	DA	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# (TAX MAP - SYS # - STR #)	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
85.03 - 1	Trout Brook Lane	LB	85.03-2	LB	
85.03 - 2	Trout Brook Lane	LB	85.03-3,6	LB	
85.03 - 3	Trout Brook Lane	LB	85.03-4	LB	
85.03 - 4	Trout Brook Lane	LB	85.03-5	LB	
85.03 - 5	Trout Brook Lane	LB	---	LB	
85.03 - 6	Trout Brook Lane	LB	85.03-7	LB	
85.03 - 7	Trout Brook Lane	LB	85.03-8	LB	
85.03 - 8	Trout Brook Lane	CB	---	LB	
85.04 - 1	Broad Avenue	CB	85.04-2	RB	
85.04 - 2	Broad Avenue	CB	---	RB	
85.05 - 1	Linda Avenue	CB	85.05-2	RB	
85.05 - 2	Linda Avenue	CB	---	RB	
85.06 - 1	Jasica Drive	CB	85.06-2	RB	
85.06 - 2	Jasica Drive	CB	85.06-3,5	RB	
85.06 - 3	Jasica Drive	CB	85.06-4	RB	
85.06 - 4	Jasica Drive	CB	---	RB	
85.06 - 5	Jasica Drive	CB	85.06-6	RB	
85.06 - 6	Jasica Drive	CB	---	RB	
85.07 - 1	Shade Tree Lane	LB	85.07-2	LB	
85.07 - 2	Shade Tree Lane	LB	85.07-3	LB	
85.07 - 3	Shade Tree Lane	CB	---	LB	
85.08 - 1	Jasica Drive	LB	85.08-2	LB	
85.08 - 2	Jasica Drive	LB	85.08-3	LB	
85.08 - 3	Jasica Drive	CB	---	LB	
85.09 - 1	Jasica Drive	LB	85.09-2	LB	
85.09 - 2	Jasica Drive	LB	85.09-3	LB	
85.09 - 3	Jasica Drive	CB	---	LB	
86.00 - 1	Peconic Bay Boulevard	CB	---	RA	
86.00 - 2	Peconic Bay Boulevard	LB	---	LB	
86.00 - 3	Meeting House Creek Rd.	CB	---	Meeting Hse Crk	
86.00 - 4	Meeting House Creek Rd.	CB	---	Meeting Hse Crk	
86.01 - 1	Fox Chaser Place	LB	86.01-2	LB	
86.01 - 2	Fox Chaser Place	LB	86.01-3	LB	
86.01 - 3	Fox Chaser Place	LB	86.01-4	LB	
86.01 - 4	Fox Chaser Place	LB	86.01-5	LB	
86.01 - 5	Fox Chaser Place	LB	86.01-6	LB	
86.01 - 6	Fox Chaser Place	CB	86.01-7	LB	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY MARCH 1989

ABBREVIATIONS: LB-Leaching Basin, CB-Catch Basin, DA-Drainage Area, RB-Recharge Basin, GD-Gravel Dry Well, RA-Recharge Area, MH-Manhole

TAX MAP / SYS # / STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
86.01 -10	Fox Chaser Place	LB	86.01-11	LB	
86.01 -11	Fox Chaser Place	LB	86.01-12	LB	
86.01 -12	Fox Chaser Place	LB	86.01-13	LB	
86.01 -13	Fox Chaser Place	LB	86.01-14	LB	
86.01 -14	Fox Chaser Place	LB	---	LB	
86.02 - 1	Heritage Lane	CB	86.02-2	RB	
86.02 - 2	Heritage Lane	CB	86.02-3	RB	
86.02 - 3	Heritage Lane	CB	86.02-4	RB	
86.02 - 4	Colonial Drive	CB	86.02-5	RB	
86.02 - 5	Colonial Drive	CB	---	RB	
86.03 - 1	Fox Chaser Place	LB	86.03-2	LB	
86.03 - 2	Fox Chaser Place	LB	86.03-3	LB	
86.03 - 3	Fox Chaser Place	LB	86.03-4	LB	
86.03 - 4	Fox Chaser Place	LB	86.03-5	LB	
86.03 - 5	Fox Chaser Place	CB	86.03-6	LB	
86.03 - 6	Fox Chaser Place	CB	---	LB	
88.01 - 1	Peconic Bay Boulevard	LB	88.01-2	RA	
88.01 - 2	Peconic Bay Boulevard	CB	88.01-3	RA	
88.01 - 3	Peconic Bay Boulevard	CB	---	RA	
88.02 - 1	Peconic Bay Boulevard	CB	88.02-2	RA	
88.02 - 2	Peconic Bay Boulevard	CB	---	RA	
88.03 - 1	Lagoon Court	CB	88.03-2	RB	
88.03 - 2	Lagoon Court	CB	---	RB	
89.00 - 1	Peconic Bay Boulevard	CB	---	Miamogue Lagoon	
89.01 - 1	Seacove Lane	CB	89.01-2	DA-Gr. Pec. Bay	
89.01 - 2	Seacove Lane	CB	---	DA-Gr. Pec. Bay	
90.00 - 1	Peconic Bay Boulevard	LB	---	LB	
90.01 - 1	Peconic Bay Boulevard	CB	90.01-2	DA-Gr. Pec. Bay	
90.01 - 2	Legend Lane	CB	90.01-3	DA-Gr. Pec. Bay	
90.01 - 3	Legend Lane	CB	---	DA-Gr. Pec. Bay	
91.00 - 1	Doug Lane	LB	---	LB	
91.00 - 1	South Jamesport Avenue	CB	91.01-2,3	DA	
91.00 - 2	South Jamesport Avenue	CB	68.01-2	DA	
91.00 - 2	Doug Lane	LB	---	LB	
91.00 - 3	South Jamesport Avenue	CB	91.01-4	DA	
91.00 - 3	Tuts Lane	LB	---	LB	
91.00 - 4	Tuts Lane	LB	---	LB	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# TAX MAP - SYS # - STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
91.00 - 6	Fourth Street	LB	---	LB	
91.00 - 7	South Jamesport Avenue	LB	---	LB	
91.02 - 1	South Jamesport Avenue	CB	91.02-2	DA	
91.02 - 2	South Jamesport Avenue	CB	---	DA	
92.00 - 1	Point Street	LB	---	LB	
92.00 - 2	Point Street	LB	---	LB	
92.00 - 3	Point Street	LB	---	LB	
92.00 - 4	Center Street	LB	---	LB	
92.00 - 5	Front Street	LB	---	LB	
92.00 - 6	Point Street	CB	---	Grt Peconic Bay	
92.00 - 7	Green Street	CB	---	Grt Peconic Bay	
92.01 - 1	Washington Avenue	CB	92.01-2	Yacht Basin	
92.01 - 2	Washington Avenue	CB	---	Yacht Basin	
92.02 - 1	Second Street	LB	92.02-2	LB	
92.02 - 2	Second Street	CB	92.02-3	LB	
92.02 - 3	Second Street	CB	---	LB	
94.01 - 1	Vista Court	CB	94.01-2	RB	
94.01 - 2	Vista Court	CB	94.01-3,6	RB	
94.01 - 3	Vista Court	CB	94.01-4	RB	
94.01 - 4	Vista Court	CB	---	RB	
94.01 - 5	Vista Court	CB	94.01-6	RB	
94.01 - 6	Vista Court	LB	94.01-7	RB	
94.01 - 7	Vista Court	LB	94.01-8	RB	
94.01 - 8	Vista Court	CB	94.01-9	RB	
94.01 - 9	Vista Court	CB	---	RB	
102.01 - 1	Osborne Avenue	LB	102.01-2	Merritt's Pond	
102.01 - 2	Osborne Avenue	CB	102.01-3	Merritt's Pond	
102.01 - 3	Osborne Avenue	CB	---	Merritt's Pond	
102.01 - 4	Griffing Avenue	CB	102.01-5,108.01-4	Mert's Pnd	
102.01 - 5	Griffing Avenue	CB	---	Merritt's Pond	
106.01 - 1	Northville Turnpike	CB	106.01-2,3	RB	
106.01 - 2	Northville Turnpike	CB	---	RB	
106.01 - 3	Northville Turnpike	CB	106.01-4	RB	
106.01 - 4	Northville Turnpike	CB	106.01-5	RB	
106.01 - 5	Northville Turnpike	CB	106.01-6,10	RB	
106.01 - 6	Northville Turnpike	CB	106.01-7,8,9	RB	
[illegible]	[illegible]	CB	---	RB	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# TAX MAP - SYS # / STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
106.01 -11	Northville Turnpike	CB	106.01-12	RB	
106.01 -12	Northville Turnpike	CB	---	RB	
107.01 - 1	Pondview Road	CB	107.01-2,3	Merritt's Pond	
107.01 - 2	Southern Parkway	CB	107.01-4	Merritt's Pond	
107.01 - 3	Roanoke Avenue	CB	---	Merritt's Pond	
107.01 - 4	Roanoke Avenue	CB	107.01-5	Merritt's Pond	
107.01 - 5	Cranberry Street	CB	107.01-6	Merritt's Pond	
107.01 - 6	Cranberry Street	CB	107.01-7	Merritt's Pond	
107.01 - 7	Cranberry Street	CB	102.01-4	Merritt's Pond	
107.02 - 1	Merritt's Pond Road	CB	107.02-2	Merritt's Pond	
107.02 - 2	Merritt's Pond Road	CB	---	Merritt's Pond	
107.03 - 1	Ostrander Avenue	CB	107.03-2	Merritt's Pond	
107.03 - 2	Ostrander Avenue	CB	---	Merritt's Pond	
107.04 - 1	King's Drive	CB	107.04-2	RA	
107.04 - 2	King's Drive	CB	---	RA	
108.00 - 1	Harrison Avenue	LB	---	LB	
108.00 - 2	Harrison Avenue	LB	---	LB	
108.00 - 3	Old Country Road	LB	---	LB	
108.00 - 4	Old Country Road	LB	---	LB	
108.00 - 5	Harrison Avenue	CB	---	?	
108.01 - 1	Harrison Avenue	CB	108.01-2	Merritt's Pond	
108.01 - 2	Harrison Avenue	CB	---	Merritt's Pond	
108.01 - 3	Harrison Avenue	CB	108.01-1	Merritt's Pond	
108.01 - 4	Harrison Avenue	CB	108.01-5,3	Merritt's Pond	
108.01 - 5	Harrison Avenue	CB	108.01-6	Merritt's Pond	
108.01 - 6	Harrison Avenue	CB	108.01-7	Merritt's Pond	
108.01 - 7	Harrison Avenue	CB	108.01-8,9	Merritt's Pond	
108.01 - 8	Harrison Avenue	CB	---	Merritt's Pond	
108.01 - 9	Harrison Avenue	CB	108.01-10,11	Merritt's Pond	
108.01 -10	Harrison Avenue	LB	102.00-1	Merritt's Pond	
108.01 -11	Harrison Avenue	CB	108.01-12	Merritt's Pond	
108.01 -12	Harrison Avenue	CB	108.01-13	Merritt's Pond	
108.01 -13	Harrison Avenue	CB	108.01-14,15	Merritt's Pond	
108.01 -14	Harrison Avenue	CB	---	Merritt's Pond	
108.01 -15	Harrison Avenue	CB	108.01-16	Merritt's Pond	
108.01 -16	Harrison Avenue	CB	---	Merritt's Pond	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY MARCH 1989

ABBREVIATIONS: LB-Leaching Basin, CB-Catch Basin, RB-Recharge Basin, RA-Recharge Area, DA-Drainage Area, GD-Gravel Dry Well, MH-Manhole

TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
108.03	-	2	Harrison Avenue	LB	108.03-3	LB	
108.03	-	3	Harrison Avenue	CB	108.03-4	LB	
108.03	-	4	Harrison Avenue	CB	108.03-5	LB	
108.03	-	5	Harrison Avenue	CB	108.03-6	LB	
108.03	-	6	Harrison Avenue	LB	108.03-7	LB	
108.03	-	7	Harrison Avenue	LB	---	LB	
108.04	-	1	Harrison Avenue	LB	108.04-2	LB	
108.04	-	2	Harrison Avenue	CB	---	LB	
109.00	-	1	Sunrise Avenue	LB	---	LB	
110.00	-	1	Meadow Lane	LB	---	LB	
110.00	-	2	Meadow Lane	LB	---	LB	
110.01	-	1	Daly Court	CB	110.01-2	RB	
110.01	-	2	Daly Court	CB	---	RB	
110.02	-	1	Meadow Lane	LB	110.02-2	LB	
110.02	-	2	Meadow Lane	LB	---	LB	
111.00	-	1	Fairway Avenue	LB	---	LB	
111.00	-	2	East Main Street	LB	---	LB	
111.00	-	3	East Main Street	LB	---	LB	
111.01	-	1	Sunrise Avenue	LB	111.01-2	LB	
111.01	-	2	Sunrise Avenue	CB	111.01-3	LB	
111.01	-	3	Sunrise Avenue	CB	---	LB	
112.01	-	1	Maplewood Lane	CB	112.01-2	LB	
112.01	-	2	Maplewood Lane	LB	112.01-3	LB	
112.01	-	3	Maplewood Lane	LB	112.01-4	LB	
112.01	-	4	Maplewood Lane	LB	112.01-5	LB	
112.01	-	5	Maplewood Lane	LB	112.01-6	LB	
112.01	-	6	Maplewood Lane	LB	112.01-7	LB	
112.01	-	7	Maplewood Lane	LB	112.01-8	LB	
112.01	-	8	Maplewood Lane	LB	112.01-9	LB	
112.01	-	9	Maplewood Lane	LB	---	LB	
112.02	-	1	Trout Brook Lane	CB	112.02-2	Terry's Creek	
112.02	-	2	Trout Brook Lane	CB	---	Terry's Creek	
112.03	-	1	Hubbard Avenue	CB	112.03-2	Terry's Creek	
112.03	-	2	Hubbard Avenue	CB	112.03-3	Terry's Creek	
112.03	-	3	Hubbard Avenue	CB	112.03-4	Terry's Creek	
112.03	-	4	Hubbard Avenue	CB	112.03-5	Terry's Creek	
112.03	-	5	Hubbard Avenue	CB	---	Terry's Creek	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# (TAX MAP, SYS #, STR #)	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
112.04 - 1	Hubbard Avenue	CB	112.04-2	LB	
112.04 - 2	Hubbard Avenue	LB	---	LB	
112.05 - 1	Hubbard Avenue	CB	112.05-2	Sawmill Creek	
112.05 - 2	Hubbard Avenue	CB	---	Sawmill Creek	
117.01 - 1	Edwards Avenue	LB	---	LB	
117.01 - 2	Edwards Avenue	LB	---	LB	
118.01 - 1	River Road	LB	---	LB	
118.01 - 2	River Road	LB	---	LB	
123.00 - 1	Osborne Avenue	CB	---	?	
123.01 - 1	Hamilton Avenue	CB	123.01-2,3	?	
123.01 - 2	Hamilton Avenue	CB	---	?	
123.01 - 3	Hamilton Avenue	CB	123.01-4,5	?	
123.01 - 4	Hamilton Avenue	CB	---	?	
123.01 - 5	Hamilton Avenue	CB	123.01-6	?	
123.01 - 6	Hamilton Avenue	CB	---	?	
123.02 - 1	Sweezy Avenue	CB	123.02-2,3	?	
123.02 - 2	Sweezy Avenue	CB	---	?	
123.02 - 3	Sweezy Avenue	CB	123.02-4,5	?	
123.02 - 4	Sweezy Avenue	CB	---	?	
123.02 - 5	Sweezy Avenue	CB	123.02-6	?	
123.02 - 6	Sweezy Avenue	CB	---	?	
123.03 - 1	Parkway Street	CB	123.03-2	RB	
123.03 - 2	Parkway Street	CB	---	RB	
123.04 - 1	Raynor Avenue	CB	123.04-2	RA	
123.04 - 2	Raynor Avenue	CB	---	RA	
123.05 - 1	Sweezy Avenue	LB	123.05-2	LB	
123.05 - 2	Sweezy Avenue	LB	123.05-4	LB	
123.05 - 3	Sweezy Avenue	CB	123.05-4	LB	
123.05 - 4	Sweezy Avenue	CB	123.05-5	LB	
123.05 - 5	Sweezy Avenue	LB	---	LB	
124.00 - 1	West Main Street	CB	---	Peconic River	
124.01 - 1	Raynor Avenue	CB	124.01-2	?	
124.01 - 2	West Main Street	MH	124.01-3	?	
124.01 - 3	West Main Street	CB	124.01-4,5	?	
124.01 - 4	West Main Street	CB	---	?	
124.01 - 5	West Main Street	CB	124.01-6,7	?	
124.01 - 6	West Main Street	CB	---	?	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
- LB-Leaching Basin
- CB-Catch Basin
- DA-Drainage Area
- RB-Recharge Basin
- GD-Gravel Dry Well
- RA-Recharge Area
- MH-Manhole

TAX MAP SYS # - STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
124.02 - 2	West Main Street	CB	---	?	
126.00 - 1	Pondview Road	LB	---	LB	
126.00 - 2	Pondview Road	LB	---	LB	
126.00 - 3	Pulaski Street	LB	---	LB	
126.01 - 1	Northville Turnpike	CB	126.01-2	RB	
126.01 - 2	Northville Turnpike	CB	126.01-3	RB	
126.01 - 3	Northville Turnpike	CB	126.01-4,5	RB	
126.01 - 4	Northville Turnpike	CB	---	RB	
126.01 - 5	Northville Turnpike	CB	126.01-6	RB	
126.01 - 6	Northville Turnpike	CB	126.01-7,127.01-1	RB	
126.01 - 7	Northville Turnpike	CB	---	RB	
126.02 - 1	Union Avenue	CB	126.02-2	RB	
126.02 - 2	Union Avenue	CB	---	RB	
126.03 - 1	Northville Turnpike	CB	126.03-2	RB	
126.03 - 2	Northville Turnpike	CB	---	RB	
126.04 - 1	Northville Turnpike	CB	126.03-2,3	RB	
126.04 - 2	Northville Turnpike	CB	126.03-4	RB	
126.04 - 3	Northville Turnpike	LB	126.03-5	RB	
126.04 - 4	Northville Turnpike	LB	---	RB	
126.04 - 5	Northville Turnpike	CB	126.03-6	RB	
126.04 - 6	Northville Turnpike	CB	126.03-7	RB	
126.04 - 7	Northville Turnpike	CB	126.03-8,9	RB	
126.04 - 8	Northville Turnpike	CB	---	RB	
126.04 - 9	Northville Turnpike	CB	126.04-10	RB	
126.04 -10	Northville Turnpike	CB	126.04-11,13	RB	
126.04 -11	St. John's Place	CB	126.04-12	RB	
126.04 -12	St. John's Place	CB	---	RB	
126.04 -13	Roanoke Avenue	CB	126.04-14,128.07-1	RB	
126.04 -14	Roanoke Avenue	CB	126.04-15	RB	
126.04 -15	Roanoke Avenue	CB	---	RB	
127.00 - 1	Prospect Place	CB	---	DA	
127.01 - 1	Northville Turnpike	CB	127.01-2	RB	
127.01 - 2	Northville Turnpike	CB	127.01-3,5	RB	
127.01 - 3	Northville Turnpike	CB	127.01-4	RB	
127.01 - 4	Northville Turnpike	CB	---	RB	
127.01 - 5	Northville Turnpike	CB	127.01-6	RB	

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS: LB-Leaching Basin, CB-Catch Basin, DA-Drainage Area, RB-Recharge Basin, GD-Gravel Dry Well, RA-Recharge Area, MH-Manhole

STRUCTURE ID# TAX MAP SYS # STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
127.02 - 4	Ostrander Avenue	CB	127.02-5	?	
127.02 - 5	Ostrander Avenue	CB	---	?	
127.03 - 1	Howell Avenue	CB	127.03-2	DA	
127.03 - 2	Howell Avenue	CB	127.03-3	DA	
127.03 - 3	Fishel Avenue	CB	127.03-4	DA	
127.03 - 4	Fishel Avenue	CB	127.03-5	DA	
127.03 - 5	Newton Avenue	CB	127.03-6	DA	
127.03 - 6	Newton Avenue	CB	---	DA	
127.04 - 1	Howell Avenue	CB	127.04-2	DA	
127.04 - 2	Howell Avenue	CB	---	DA	
127.05 - 1	Corwin Street	CB	127.05-2,3,5	RB	
127.05 - 2	Corwin Street	CB	---	RB	
127.05 - 3	Fishel Avenue	CB	127.05-4	RB	
127.05 - 4	Fishel Avenue	CB	---	RB	
127.05 - 5	Corwin Street	CB	127.05-6,8	RB	
127.05 - 6	Corwin Street	CB	127.05-7	RB	
127.05 - 7	Corwin Street	CB	---	RB	
127.05 - 8	Corwin Street	CB	127.05-9,10,12	RB	
127.05 - 9	Corwin Street	CB	---	RB	
127.05 -10	Corwin Street	CB	127.05-11	RB	
127.05 -11	Corwin Street	CB	---	RB	
127.05 -12	Ostrander Avenue	CB	127.05-13	RB	
127.05 -13	Ostrander Avenue	CB	---	RB	
128.00 - 1	West Main Street	CB	---	Peconic River	
128.00 - 2	West Main Street	CB	---	Peconic River	
128.00 - 3	Railroad Street	LB	---	LB	
128.00 - 4	Railroad Street	LB	---	LB	
128.00 - 5	Railroad Street	LB	---	LB	
128.00 - 6	Railroad Street	LB	---	LB	
128.00 - 7	Railroad Street	LB	---	LB	
128.01 - 1	Sweezy Avenue	CB	123.02-1,128.01-2	?	
128.01 - 2	Lincoln Street	CB	128.01-3	?	
128.01 - 3	Lincoln Street	CB	128.01-4	?	
128.01 - 4	Hamilton Avenue	CB	128.01-5,123.02-1	?	
128.01 - 5	Lincoln Street	CB	---	?	
128.02 - 1	West Main Street	MH	128.02-2	Peconic River	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS: LB-Leaching Basin, CB-Catch Basin, DA-Drainage Area, RB-Recharge Basin, GD-Gravel Dry Well, RA-Recharge Area, MH-Manhole

STRUCTURE ID# (TAX MAP SYS # - STR #)	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
128.03 - 3	West Main Street	CB	---	Peconic River	
128.04 - 1	Court Street	CB	128.04-2	Peconic River	
128.04 - 2	Court Street	CB	128.04-3,4	Peconic River	
128.04 - 3	Court Street	CB	---	Peconic River	
128.04 - 4	Court Street	CB	---	Peconic River	
128.05 - 1	West Main Street	CB	128.05-2	Peconic River	
128.05 - 2	West Main Street	CB	128.05-3	Peconic River	
128.05 - 3	West Main Street	CB	---	Peconic River	
128.06 - 1	Osborne Avenue	MH	128.06-2,3	LB	
128.06 - 2	Osborne Avenue	CB	---	LB	
128.06 - 3	Railroad Street	CB	128.06-4	LB	
128.06 - 4	Railroad Street	CB	---	LB	
128.07 - 1	Roanoke Avenue	CB	128.07-2	RB	
128.07 - 2	Roanoke Avenue	CB	128.07-3	RB	
128.07 - 3	Railroad Street	CB	128.07-4	RB	
128.08 - 1	Peconic Avenue	CB	128.08-2	Peconic River	
128.08 - 2	Peconic Avenue	CB	128.08-3	Peconic River	
128.08 - 3	Peconic Avenue	CB	128.08-4	Peconic River	
128.08 - 4	Peconic Avenue	CB	128.08-5,6	Peconic River	
128.08 - 5	Peconic Avenue	CB	128.08-7,8	Peconic River	
128.08 - 6	East Main Street	CB	---	Peconic River	
128.08 - 7	East Main Street	CB	---	Peconic River	
128.08 - 8	East Main Street	CB	128.08-9	Peconic River	
128.08 - 9	East Main Street	CB	128.08-10	Peconic River	
128.08 -10	East Main Street	CB	128.08-11	Peconic River	
128.08 -11	East Main Street	CB	128.08-12	Peconic River	
128.08 -12	East Main Street	CB	---	Peconic River	
129.00 - 1	East Main Street	CB	---	Peconic River	
129.01 - 1	East Main Street	CB	129.01-2	Peconic River	
129.01 - 2	East Main Street	CB	129.01-3	Peconic River	
129.01 - 3	East Main Street	CB	---	Peconic River	
129.02 - 1	East Main Street	CB	129.02-2	Peconic River	
129.02 - 2	East Main Street	CB	129.02-3	Peconic River	
129.02 - 3	East Main Street	CB	---	Peconic River	
129.03 - 1	East Main Street	CB	129.03-2	Peconic River	
129.03 - 2	Ostrander Avenue	CB	129.03-3	Peconic River	
[illegible]	[illegible]	CB		Peconic River	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS: CB-Catch Basin, RB-Recharge Basin, RA-Recharge Area, LB-Leaching Basin, DA-Drainage Area, GD-Gravel Dry Well, MH-Manhole

TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
129.05	-	2	Riverside Drive	CB	---	Peconic River	
134.00	-	1	Wading River -Manorville Rd.	LB	---	LB	
137.01	-	1	Edwards Avenue	LB	137.01-2	LB	
137.01	-	2	Edwards Avenue	LB	---	LB	
137.02	-	1	Edwards Avenue	LB	137.02-2	LB	
137.02	-	2	Edwards Avenue	LB	---	LB	
137.03	-	1	Edwards Avenue	LB	137.03-2	LB	
137.03	-	2	Edwards Avenue	CB	137.03-3	LB	
137.03	-	3	Edwards Avenue	CB	137.03-4,5	LB	
137.03	-	4	Edwards Avenue	LB	---	LB	
137.03	-	5	Edwards Avenue	CB	137.03-6	LB	
137.03	-	6	Edwards Avenue	CB	137.03-7	LB	
137.03	-	7	Edwards Avenue	CB	137.03-8,9	LB	
137.03	-	8	Edwards Avenue	CB	---	LB	
137.03	-	9	Edwards Avenue	CB	---	LB	

APPENDIX C

TABLE 2

STRUCTURE DATA

BY STREET NAME

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# (TAX MAP - SYS # - STR #)	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
85.04 - 1	Broad Avenue	CB	85.04-2	RB	
85.04 - 2	Broad Avenue	CB	---	RB	
92.00 - 4	Center Street	LB	---	LB	
67.03 - 1	Church Lane	CB	67.03-2	RA	
67.03 - 2	Church Lane	CB	---	RA	
68.00 - 1	Circle Drive	CB	---	RB	
86.02 - 4	Colonial Drive	CB	86.02-5	RB	
86.02 - 5	Colonial Drive	CB	---	RB	
127.05 - 1	Corwin Street	CB	127.05-2,3,5	RB	
127.05 - 2	Corwin Street	CB	---	RB	
127.05 - 5	Corwin Street	CB	127.05-6,8	RB	
127.05 - 6	Corwin Street	CB	127.05-7	RB	
127.05 - 7	Corwin Street	CB	---	RB	
127.05 - 8	Corwin Street	CB	127.05-9,10,12	RB	
127.05 - 9	Corwin Street	CB	---	RB	
127.05 -10	Corwin Street	CB	127.05-11	RB	
127.05 -11	Corwin Street	CB	---	RB	
128.04 - 1	Court Street	CB	128.04-2	Peconic River	
128.04 - 2	Court Street	CB	128.04-3,4	Peconic River	
128.04 - 3	Court Street	CB	---	Peconic River	
128.04 - 4	Court Street	CB	---	Peconic River	
107.01 - 5	Cranberry Street	CB	107.01-6	Merritt's Pond	
107.01 - 6	Cranberry Street	CB	107.01-7	Merritt's Pond	
107.01 - 7	Cranberry Street	CB	102.01-4	Merritt's Pond	
110.01 - 1	Daly Court	CB	110.01-2	RB	
110.01 - 2	Daly Court	CB	---	RB	
91.00 - 1	Doug Lane	LB	---	LB	
91.00 - 2	Doug Lane	LB	---	LB	
111.00 - 2	East Main Street	LB	---	LB	
111.00 - 3	East Main Street	LB	---	LB	
128.08 - 6	East Main Street	CB	---	Peconic River	
128.08 - 7	East Main Street	CB	---	Peconic River	
128.08 - 8	East Main Street	CB	128.08-9	Peconic River	
128.08 - 9	East Main Street	CB	128.08-10	Peconic River	
128.08 -10	East Main Street	CB	128.08-11	Peconic River	
128.08 -11	East Main Street	CB	128.08-12	Peconic River	
[illegible]	East Main [illegible]	CB	---	Peconic River	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

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CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# TAX MAP - SYS # - STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
129.01 - 3	East Main Street	CB	---	Peconic River	
129.02 - 1	East Main Street	CB	129.02-2	Peconic River	
129.02 - 2	East Main Street	CB	129.02-3	Peconic River	
129.02 - 3	East Main Street	CB	---	Peconic River	
129.03 - 1	East Main Street	CB	129.03-2	Peconic River	
129.04 - 1	East Main Street	CB	129.04-2	Peconic River	
129.04 - 2	East Main Street	CB	---	Peconic River	
85.00 - 2	Edgar Avenue	LB	---	LB	
85.00 - 3	Edgar Avenue	LB	---	LB	
137.03 - 8	Edwards Avenue	CB	---	LB	
137.03 - 9	Edwards Avenue	CB	---	LB	
117.01 - 1	Edwards Avenue	LB	---	LB	
117.01 - 2	Edwards Avenue	LB	---	LB	
137.01 - 1	Edwards Avenue	LB	137.01-2	LB	
137.01 - 2	Edwards Avenue	LB	---	LB	
137.02 - 1	Edwards Avenue	LB	137.02-2	LB	
137.02 - 2	Edwards Avenue	LB	---	LB	
137.03 - 1	Edwards Avenue	LB	137.03-2	LB	
137.03 - 2	Edwards Avenue	CB	137.03-3	LB	
137.03 - 3	Edwards Avenue	CB	137.03-4,5	LB	
137.03 - 4	Edwards Avenue	LB	---	LB	
137.03 - 5	Edwards Avenue	CB	137.03-6	LB	
137.03 - 6	Edwards Avenue	CB	137.03-7	LB	
137.03 - 7	Edwards Avenue	CB	137.03-8,9	LB	
111.00 - 1	Fairway Avenue	LB	---	LB	
106.01 - 7	Fishel Avenue	CB	---	RB	
106.01 - 8	Fishel Avenue	CB	---	RB	
106.01 - 9	Fishel Avenue	CB	---	RB	
106.01 -10	Fishel Avenue	CB	106.01-11	RB	
127.03 - 3	Fishel Avenue	CB	127.03-4	DA	
127.03 - 4	Fishel Avenue	CB	127.03-5	DA	
127.05 - 3	Fishel Avenue	CB	127.05-4	RB	
127.05 - 4	Fishel Avenue	CB	---	RB	
85.02 -24	Forest Drive	LB	85.02-25	DA	
85.02 -25	Forest Drive	LB	85.02-26	DA	
85.02 -26	Forest Drive	LB	85.02-27	DA	
85.02 -27	Forest Drive	CB	85.02-28,29,30	DA	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS: CB-Catch Basin, RB-Recharge Basin, RA-Recharge Area, LB-Leaching Basin, DA-Drainage Area, GD-Gravel Dry Well, MH-Manhole

TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
85.02		-32	Forest Drive	LB	85.02-33	DA	
85.02		-33	Forest Drive	CB	85.02-34	DA	
85.02		-34	Forest Drive	CB	---	DA	
91.00		- 6	Fourth Street	LB	---	LB	
86.01		- 1	Fox Chaser Place	LB	86.01-2	LB	
86.01		- 2	Fox Chaser Place	LB	86.01-3	LB	
86.01		- 3	Fox Chaser Place	LB	86.01-4	LB	
86.01		- 4	Fox Chaser Place	LB	86.01-5	LB	
86.01		- 5	Fox Chaser Place	LB	86.01-6	LB	
86.01		- 6	Fox Chaser Place	CB	86.01-7	LB	
86.01		- 7	Fox Chaser Place	CB	86.01-8	LB	
86.01		- 8	Fox Chaser Place	LB	86.01-9	LB	
86.01		- 9	Fox Chaser Place	LB	86.01-10	LB	
86.01		-10	Fox Chaser Place	LB	86.01-11	LB	
86.01		-11	Fox Chaser Place	LB	86.01-12	LB	
86.01		-12	Fox Chaser Place	LB	86.01-13	LB	
86.01		-13	Fox Chaser Place	LB	86.01-14	LB	
86.01		-14	Fox Chaser Place	LB	---	LB	
86.03		- 1	Fox Chaser Place	LB	86.03-2	LB	
86.03		- 2	Fox Chaser Place	LB	86.03-3	LB	
86.03		- 3	Fox Chaser Place	LB	86.03-4	LB	
86.03		- 4	Fox Chaser Place	LB	86.03-5	LB	
86.03		- 5	Fox Chaser Place	CB	86.03-6	LB	
86.03		- 6	Fox Chaser Place	CB	---	LB	
85.02		- 1	Fox Run Lane	CB	85.02-2	DA	
85.02		- 2	Fox Run Lane	CB	85.02-3,16	DA	
85.02		- 3	Fox Run Lane	LB	85.02-4	DA	
85.02		- 4	Fox Run Lane	LB	85.02-5	DA	
85.02		- 5	Fox Run Lane	LB	85.02-6	DA	
85.02		- 6	Fox Run Lane	LB	85.02-7	DA	
85.02		- 7	Fox Run Lane	LB	85.02-8	DA	
85.02		- 8	Fox Run Lane	LB	85.02-9	DA	
85.02		- 9	Fox Run Lane	LB	85.02-10	DA	
85.02		-16	Fox Run Lane	LB	85.02-17	DA	
85.02		-17	Fox Run Lane	LB	85.02-18	DA	
85.02		-18	Fox Run Lane	LB	85.02-19	DA	
85.02		-19	Fox Run Lane	LB	85.02-20	DA	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

TAX MAP / SYS # / STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
85.02 -23	Fox Run Lane	CB	---	DA	
92.00 - 5	Front Street	LB	---	LB	
92.00 - 7	Green Street	CB	---	Grt Peconic Bay	
102.01 - 4	Griffing Avenue	CB	102.01-5,108.01-4	Mert's Pnd	
102.01 - 5	Griffing Avenue	CB	---	Merritt's Pond	
128.02 - 3	Griffing Avenue	CB	---	Peconic River	
123.01 - 1	Hamilton Avenue	CB	123.01-2,3	?	
123.01 - 2	Hamilton Avenue	CB	---	?	
123.01 - 3	Hamilton Avenue	CB	123.01-4,5	?	
123.01 - 4	Hamilton Avenue	CB	---	?	
123.01 - 5	Hamilton Avenue	CB	123.01-6	?	
123.01 - 6	Hamilton Avenue	CB	---	?	
128.01 - 4	Hamilton Avenue	CB	128.01-5,123.02-1	?	
108.00 - 1	Harrison Avenue	LB	---	LB	
108.00 - 2	Harrison Avenue	LB	---	LB	
108.00 - 5	Harrison Avenue	CB	---	?	
108.01 - 1	Harrison Avenue	CB	108.01-2	Merritt's Pond	
108.01 - 2	Harrison Avenue	CB	---	Merritt's Pond	
108.01 - 3	Harrison Avenue	CB	108.01-1	Merritt's Pond	
108.01 - 4	Harrison Avenue	CB	108.01-5,3	Merritt's Pond	
108.01 - 5	Harrison Avenue	CB	108.01-6	Merritt's Pond	
108.01 - 6	Harrison Avenue	CB	108.01-7	Merritt's Pond	
108.01 - 7	Harrison Avenue	CB	108.01-8,9	Merritt's Pond	
108.01 - 8	Harrison Avenue	CB	---	Merritt's Pond	
108.01 - 9	Harrison Avenue	CB	108.01-10,11	Merritt's Pond	
108.01 -10	Harrison Avenue	LB	102.00-1	Merritt's Pond	
108.01 -11	Harrison Avenue	CB	108.01-12	Merritt's Pond	
108.01 -12	Harrison Avenue	CB	108.01-13	Merritt's Pond	
108.01 -13	Harrison Avenue	CB	108.01-14,15	Merritt's Pond	
108.01 -14	Harrison Avenue	CB	---	Merritt's Pond	
108.01 -15	Harrison Avenue	CB	108.01-16	Merritt's Pond	
108.01 -16	Harrison Avenue	CB	---	Merritt's Pond	
108.02 - 1	Harrison Avenue	LB	108.02-2	LB	
108.02 - 2	Harrison Avenue	LB	108.02-3	LB	
108.02 - 3	Harrison Avenue	CB	---	LB	
108.03 - 1	Harrison Avenue	LB	108.03-2	LB	
108.03 - 2	Harrison Avenue	LB	108.03-3	LB	

ABBREVIATIONS: CB-Catch Basin, RB-Recharge Basin, RA-Recharge Area, LB-Leaching Basin, DA-Drainage Area, GD-Gravel Dry Well, MH-Manhole

STRUCTURE ID# TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
108.03	-	6	Harrison Avenue	LB	108.03-7	LB	
108.03	-	7	Harrison Avenue	LB	---	LB	
108.04	-	1	Harrison Avenue	LB	108.04-2	LB	
108.04	-	2	Harrison Avenue	CB	---	LB	
86.02	-	1	Heritage Lane	CB	86.02-2	RB	
86.02	-	2	Heritage Lane	CB	86.02-3	RB	
86.02	-	3	Heritage Lane	CB	86.02-4	RB	
67.01	-	1	Hilton Court	CB	67.01-2	LB	
67.01	-	2	Hilton Court	CB	67.01-3	LB	
67.01	-	3	Hilton Court	LB	67.01-4	LB	
67.01	-	4	Hilton Court	LB	67.01-5	LB	
67.01	-	5	Hilton Court	LB	67.01-6	LB	
67.01	-	6	Hilton Court	LB	---	LB	
67.02	-	1	Hilton Court	CB	67.02-2	LB	
67.02	-	2	Hilton Court	CB	67.02-3	LB	
67.02	-	3	Hilton Court	LB	67.02-4	LB	
67.02	-	4	Hilton Court	LB	67.02-5	LB	
67.02	-	5	Hilton Court	LB	67.02-6	LB	
67.02	-	6	Hilton Court	LB	---	LB	
127.03	-	1	Howell Avenue	CB	127.03-2	DA	
127.03	-	2	Howell Avenue	CB	127.03-3	DA	
127.04	-	1	Howell Avenue	CB	127.04-2	DA	
127.04	-	2	Howell Avenue	CB	---	DA	
112.03	-	1	Hubbard Avenue	CB	112.03-2	Terry's Creek	
112.03	-	2	Hubbard Avenue	CB	112.03-3	Terry's Creek	
112.03	-	3	Hubbard Avenue	CB	112.03-4	Terry's Creek	
112.03	-	4	Hubbard Avenue	CB	112.03-5	Terry's Creek	
112.03	-	5	Hubbard Avenue	CB	---	Terry's Creek	
112.03	-	6	Hubbard Avenue	CB	112.02-7	Terry's Creek	
112.03	-	7	Hubbard Avenue	CB	112.02-8	Terry's Creek	
112.03	-	8	Hubbard Avenue	CB	---	Terry's Creek	
112.04	-	1	Hubbard Avenue	CB	112.04-2	LB	
112.04	-	2	Hubbard Avenue	LB	---	LB	
112.05	-	1	Hubbard Avenue	CB	112.05-2	Sawmill Creek	
112.05	-	2	Hubbard Avenue	CB	---	Sawmill Creek	
85.06	-	1	Jasica Drive	CB	85.06-2	RB	
85.06	-	2	Jasica Drive	CB	85.06-3.5	RB	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# TAX MAP - SYS # - STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
85.06 - 6	Jasica Drive	CB	---	RB	
85.08 - 1	Jasica Drive	LB	85.08-2	LB	
85.08 - 2	Jasica Drive	LB	85.08-3	LB	
85.08 - 3	Jasica Drive	CB	---	LB	
85.09 - 1	Jasica Drive	LB	85.09-2	LB	
85.09 - 2	Jasica Drive	LB	85.09-3	LB	
85.09 - 3	Jasica Drive	CB	---	LB	
107.04 - 1	King's Drive	CB	107.04-2	RA	
107.04 - 2	King's Drive	CB	---	RA	
88.03 - 1	Lagoon Court	CB	88.03-2	RB	
88.03 - 2	Lagoon Court	CB	---	RB	
90.01 - 2	Legend Lane	CB	90.01-3	DA-Gr. Pec. Bay	
90.01 - 3	Legend Lane	CB	---	DA-Gr. Pec. Bay	
128.01 - 2	Lincoln Street	CB	128.01-3	?	
128.01 - 3	Lincoln Street	CB	128.01-4	?	
128.01 - 5	Lincoln Street	CB	---	?	
85.05 - 1	Linda Avenue	CB	85.05-2	RB	
85.05 - 2	Linda Avenue	CB	---	RB	
85.02 -10	Maple Wood Lane	CB	85.02-11	DA	
85.02 -11	Maple Wood Lane	CB	85.02-12	DA	
85.02 -12	Maple Wood Lane	LB	85.02-13	DA	
85.02 -13	Maple Wood Lane	LB	85.02-14	DA	
85.02 -14	Maple Wood Lane	LB	85.02-15	DA	
85.02 -15	Maple Wood Lane	CB	---	DA	
85.02 -29	Maple Wood Lane	CB	---	DA	
112.01 - 1	Maplewood Lane	CB	112.01-2	LB	
112.01 - 2	Maplewood Lane	LB	112.01-3	LB	
112.01 - 3	Maplewood Lane	LB	112.01-4	LB	
112.01 - 4	Maplewood Lane	LB	112.01-5	LB	
112.01 - 5	Maplewood Lane	LB	112.01-6	LB	
112.01 - 6	Maplewood Lane	LB	112.01-7	LB	
112.01 - 7	Maplewood Lane	LB	112.01-8	LB	
112.01 - 8	Maplewood Lane	LB	112.01-9	LB	
112.01 - 9	Maplewood Lane	LB	---	LB	
110.00 - 1	Meadow Lane	LB	---	LB	
110.00 - 2	Meadow Lane	LB	---	LB	
110.02 - 1	Meadow Lane	LB	110.02-2	LB	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
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STRUCTURE ID# (TAX MAP SYS # - STR #)	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
88.02 - 1	Peconic Bay Boulevard	CB	88.02-2	RA	
88.02 - 2	Peconic Bay Boulevard	CB	---	RA	
89.00 - 1	Peconic Bay Boulevard	CB	---	Miamogue Lagoon	
90.00 - 1	Peconic Bay Boulevard	LB	---	LB	
90.01 - 1	Peconic Bay Boulevard	CB	90.01-2	DA-Gr. Pec. Bay	
92.00 - 1	Point Street	LB	---	LB	
92.00 - 2	Point Street	LB	---	LB	
92.00 - 3	Point Street	LB	---	LB	
92.00 - 6	Point Street	CB	---	Grt Peconic Bay	
107.01 - 1	Pondview Road	CB	107.01-2,3	Merritt's Pond	
126.00 - 1	Pondview Road	LB	---	LB	
126.00 - 2	Pondview Road	LB	---	LB	
127.00 - 1	Prospect Place	CB	---	DA	
126.00 - 3	Pulaski Street	LB	---	LB	
128.00 - 3	Railroad Street	LB	---	LB	
128.00 - 4	Railroad Street	LB	---	LB	
128.00 - 5	Railroad Street	LB	---	LB	
128.00 - 6	Railroad Street	LB	---	LB	
128.00 - 7	Railroad Street	LB	---	LB	
128.06 - 3	Railroad Street	CB	128.06-4	LB	
128.06 - 4	Railroad Street	CB	---	LB	
128.07 - 3	Railroad Street	CB	128.07-4	RB	
123.04 - 1	Raynor Avenue	CB	123.04-2	RA	
123.04 - 2	Raynor Avenue	CB	---	RA	
124.01 - 1	Raynor Avenue	CB	124.01-2	?	
118.01 - 1	River Road	LB	---	LB	
118.01 - 2	River Road	LB	---	LB	
129.05 - 1	Riverside Drive	CB	129.05-2	Peconic River	
129.05 - 2	Riverside Drive	CB	---	Peconic River	
107.01 - 3	Roanoke Avenue	CB	---	Merritt's Pond	
107.01 - 4	Roanoke Avenue	CB	107.01-5	Merritt's Pond	
126.04 -13	Roanoke Avenue	CB	126.04-14,128.07-1	RB	
126.04 -14	Roanoke Avenue	CB	126.04-15	RB	
126.04 -15	Roanoke Avenue	CB	---	RB	
128.07 - 1	Roanoke Avenue	CB	128.07-2	RB	
128.07 - 2	Roanoke Avenue	CB	128.07-3	RB	
85.01 - 1	Robert Street	CB	85.01-2	RA	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY
MARCH 1989

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TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
107.02	-	1	Merritt's Pond Road	CB	107.02-2	Merritt's Pond	
107.02	-	2	Merritt's Pond Road	CB	---	Merritt's Pond	
84.01	-	1	Middle Road	CB	84.01-2,3	RB	
84.01	-	2	Middle Road	CB	---	RB	
84.01	-	3	Middle Road	CB	84.01-4	RB	
84.01	-	4	Middle Road	CB	---	RB	
127.03	-	5	Newton Avenue	CB	127.03-6	DA	
127.03	-	6	Newton Avenue	CB	---	DA	
66.01	-	1	Northive Court	CB	66.01-2	RB	
106.01	-	1	Northville Turnpike	CB	106.01-2,3	RB	
106.01	-	2	Northville Turnpike	CB	---	RB	
106.01	-	3	Northville Turnpike	CB	106.01-4	RB	
106.01	-	4	Northville Turnpike	CB	106.01-5	RB	
106.01	-	5	Northville Turnpike	CB	106.01-6,10	RB	
106.01	-	6	Northville Turnpike	CB	106.01-7,8,9	RB	
106.01	-	11	Northville Turnpike	CB	106.01-12	RB	
106.01	-	12	Northville Turnpike	CB	---	RB	
126.01	-	1	Northville Turnpike	CB	126.01-2	RB	
126.01	-	2	Northville Turnpike	CB	126.01-3	RB	
126.01	-	3	Northville Turnpike	CB	126.01-4,5	RB	
126.01	-	4	Northville Turnpike	CB	---	RB	
126.01	-	5	Northville Turnpike	CB	126.01-6	RB	
126.01	-	6	Northville Turnpike	CB	126.01-7,127.01-1	RB	
126.01	-	7	Northville Turnpike	CB	---	RB	
126.03	-	1	Northville Turnpike	CB	126.03-2	RB	
126.03	-	2	Northville Turnpike	CB	---	RB	
126.04	-	1	Northville Turnpike	CB	126.03-2,3	RB	
126.04	-	2	Northville Turnpike	CB	126.03-4	RB	
126.04	-	3	Northville Turnpike	LB	126.03-5	RB	
126.04	-	4	Northville Turnpike	LB	---	RB	
126.04	-	5	Northville Turnpike	CB	126.03-6	RB	
126.04	-	6	Northville Turnpike	CB	126.03-7	RB	
126.04	-	7	Northville Turnpike	CB	126.03-8,9	RB	
126.04	-	8	Northville Turnpike	CB	---	RB	
126.04	-	9	Northville Turnpike	CB	126.04-10	RB	
126.04	-	10	Northville Turnpike	CB	126.04-11,13	RB	
127.01	-	1	Northville Turnpike	CB	127.01-2	RB	

STRUCTURE ID#

TOWN OF RIVERHEAD STORMWATER COLLECTION SYSTEM INVENTORY
MARCH 1989

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TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
127.01	-	5	Northville Turnpike	CB	127.01-6	RB	
127.01	-	6	Northville Turnpike	CB	106.01-1	RB	
108.00	-	3	Old Country Road	LB	---	LB	
108.00	-	4	Old Country Road	LB	---	LB	
102.01	-	1	Osborne Avenue	LB	102.01-2	Merritt's Pond	
102.01	-	2	Osborne Avenue	CB	102.01-3	Merritt's Pond	
102.01	-	3	Osborne Avenue	CB	---	Merritt's Pond	
123.00	-	1	Osborne Avenue	CB	---	?	
128.06	-	1	Osborne Avenue	MH	128.06-2,3	LB	
128.06	-	2	Osborne Avenue	CB	---	LB	
82.00	-	1	Ostrander Avenue	CB	---	RA	
107.03	-	1	Ostrander Avenue	CB	107.03-2	Merritt's Pond	
107.03	-	2	Ostrander Avenue	CB	---	Merritt's Pond	
127.02	-	1	Ostrander Avenue	CB	127.02-2	?	
127.02	-	2	Ostrander Avenue	CB	127.02-3	?	
127.02	-	3	Ostrander Avenue	CB	127.02-4	?	
127.02	-	4	Ostrander Avenue	CB	127.02-5	?	
127.02	-	5	Ostrander Avenue	CB	---	?	
127.05	-	12	Ostrander Avenue	CB	127.05-13	RB	
127.05	-	13	Ostrander Avenue	CB	---	RB	
129.03	-	2	Ostrander Avenue	CB	129.03-3	Peconic River	
123.03	-	1	Parkway Street	CB	123.03-2	RB	
123.03	-	2	Parkway Street	CB	---	RB	
128.08	-	1	Peconic Avenue	CB	128.08-2	Peconic River	
128.08	-	2	Peconic Avenue	CB	128.08-3	Peconic River	
128.08	-	3	Peconic Avenue	CB	128.08-4	Peconic River	
128.08	-	4	Peconic Avenue	CB	128.08-5,6	Peconic River	
128.08	-	5	Peconic Avenue	CB	128.08-7,8	Peconic River	
69.00	-	1	Peconic Bay Boulevard	LB	69.00-2	LB	
69.00	-	2	Peconic Bay Boulevard	LB	---	LB	
70.00	-	1	Peconic Bay Boulevard	LB	---	LB	
70.00	-	2	Peconic Bay Boulevard	LB	---	LB	
70.00	-	3	Peconic Bay Boulevard	LB	---	LB	
71.00	-	1	Peconic Bay Boulevard	DW	---	GD	
71.00	-	2	Peconic Bay Boulevard	DW	---	GD	
86.00	-	1	Peconic Bay Boulevard	CB	---	RA	
86.00	-	2	Peconic Bay Boulevard	LB	---	LB	

STRUCTURE ID# TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS: LB-Leaching Basin, CB-Catch Basin, DA-Drainage Area, RB-Recharge Basin, GD-Gravel Dry Well, RA-Recharge Area, MH-Manhole

TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
92.02	-	1	Second Street	LB	92.02-2	LB	
92.02	-	2	Second Street	CB	92.02-3	LB	
92.02	-	3	Second Street	CB	---	LB	
129.03	-	3	Second Street	CB	---	Peconic River	
85.00	-	1	Shade Tree Lane	LB	---	LB	
85.07	-	1	Shade Tree Lane	LB	85.07-2	LB	
85.07	-	2	Shade Tree Lane	LB	85.07-3	LB	
85.07	-	3	Shade Tree Lane	CB	---	LB	
68.01	-	1	South Jamesport Avenue	CB	68.01-2,3	DA	
68.01	-	2	South Jamesport Avenue	CB	---	DA	
68.01	-	3	South Jamesport Avenue	CB	68.01-4,5	DA	
68.01	-	4	South Jamesport Avenue	CB	---	DA	
68.01	-	5	South Jamesport Avenue	CB	68.01-6,7	DA	
68.01	-	6	South Jamesport Avenue	CB	---	DA	
68.01	-	7	South Jamesport Avenue	CB	---	DA	
91.00	-	7	South Jamesport Avenue	LB	---	LB	
91.00	-	1	South Jamesport Avenue	CB	91.01-2,3	DA	
91.00	-	2	South Jamesport Avenue	CB	68.01-2	DA	
91.00	-	3	South Jamesport Avenue	CB	91.01-4	DA	
91.00	-	4	South Jamesport Avenue	CB	91.01-5	DA	
91.00	-	5	South Jamesport Avenue	CB	68.01-1	DA	
91.02	-	1	South Jamesport Avenue	CB	91.02-2	DA	
91.02	-	2	South Jamesport Avenue	CB	---	DA	
107.01	-	2	Southern Parkway	CB	107.01-4	Merritt's Pond	
126.04	-	11	St. John's Place	CB	126.04-12	RB	
126.04	-	12	St. John's Place	CB	---	RB	
109.00	-	1	Sunrise Avenue	LB	---	LB	
111.01	-	1	Sunrise Avenue	LB	111.01-2	LB	
111.01	-	2	Sunrise Avenue	CB	111.01-3	LB	
111.01	-	3	Sunrise Avenue	CB	---	LB	
123.02	-	1	Sweezy Avenue	CB	123.02-2,3	?	
123.02	-	2	Sweezy Avenue	CB	---	?	
123.02	-	3	Sweezy Avenue	CB	123.02-4,5	?	
123.02	-	4	Sweezy Avenue	CB	---	?	
123.02	-	5	Sweezy Avenue	CB	123.02-6	?	
123.02	-	6	Sweezy Avenue	CB	---	?	
123.05	-	1	Sweezy Avenue	LB	123.05-2	LB	

STRUCTURE ID#

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MARCH 1989

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TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
123.05	-	5	Sweezy Avenue	LB	---	LB	
128.01	-	1	Sweezy Avenue	CB	123.02-1,128.01-2	?	
85.03	-	1	Trout Brook Lane	LB	85.03-2	LB	
85.03	-	2	Trout Brook Lane	LB	85.03-3,6	LB	
85.03	-	3	Trout Brook Lane	LB	85.03-4	LB	
85.03	-	4	Trout Brook Lane	LB	85.03-5	LB	
85.03	-	5	Trout Brook Lane	LB	---	LB	
85.03	-	6	Trout Brook Lane	LB	85.03-7	LB	
85.03	-	7	Trout Brook Lane	LB	85.03-8	LB	
85.03	-	8	Trout Brook Lane	CB	---	LB	
112.02	-	1	Trout Brook Lane	CB	112.02-2	Terry's Creek	
112.02	-	2	Trout Brook Lane	CB	---	Terry's Creek	
91.00	-	3	Tuts Lane	LB	---	LB	
91.00	-	4	Tuts Lane	LB	---	LB	
91.00	-	5	Tuts Lane	LB	---	LB	
126.02	-	1	Union Avenue	CB	126.02-2	RB	
126.02	-	2	Union Avenue	CB	---	RB	
94.01	-	1	Vista Court	CB	94.01-2	RB	
94.01	-	2	Vista Court	CB	94.01-3,6	RB	
94.01	-	3	Vista Court	CB	94.01-4	RB	
94.01	-	4	Vista Court	CB	---	RB	
94.01	-	5	Vista Court	CB	94.01-6	RB	
94.01	-	6	Vista Court	LB	94.01-7	RB	
94.01	-	7	Vista Court	LB	94.01-8	RB	
94.01	-	8	Vista Court	CB	94.01-9	RB	
94.01	-	9	Vista Court	CB	---	RB	
92.01	-	1	Washington Avenue	CB	92.01-2	Yacht Basin	
92.01	-	2	Washington Avenue	CB	---	Yacht Basin	
124.00	-	1	West Main Street	CB	---	Peconic River	
124.01	-	2	West Main Street	MH	124.01-3	?	
124.01	-	3	West Main Street	CB	124.01-4,5	?	
124.01	-	4	West Main Street	CB	---	?	
124.01	-	5	West Main Street	CB	124.01-6,7	?	
124.01	-	6	West Main Street	CB	---	?	
124.01	-	7	West Main Street	CB	124.01-8	?	
124.01	-	8	West Main Street	CB	---	?	
124.02	-	1	West Main Street	CB	124.02-2	?	

TOWN OF RIVERHEAD STORMWATER COLLECTION
SYSTEM INVENTORY
MARCH 1989

ABBREVIATIONS:
CB-Catch Basin
RB-Recharge Basin
RA-Recharge Area
LB-Leaching Basin
DA-Drainage Area
GD-Gravel Dry Well
MH-Manhole

STRUCTURE ID# TAX MAP	SYS #	STR #	ROADWAY	TYPE	CONNECTION	OUTFALL	REMARKS
128.02	-	1	West Main Street	MH	128.02-2	Peconic River	
128.02	-	2	West Main Street	MH	128.02-3	Peconic River	
128.03	-	1	West Main Street	CB	128.03-2,3	Peconic River	
128.03	-	2	West Main Street	CB	---	Peconic River	
128.03	-	3	West Main Street	CB	---	Peconic River	
128.05	-	1	West Main Street	CB	128.05-2	Peconic River	
128.05	-	2	West Main Street	CB	128.05-3	Peconic River	
128.05	-	3	West Main Street	CB	---	Peconic River	
66.01	-	3	Southfields Rd.	CB	66.01-4,6	RB	
66.01	-	4	Southfields Rd.	CB	66.01-5	RB	
66.01	-	5	Southfields Rd.	CB	---	RB	
66.01	-	6	Southfields Rd.	CB	66.01-7	RB	
66.01	-	7	Southfields Rd.	CB	---	RB	
134.00	-	1	Wading River -Manorville Rd.	LB	---	LB	
66.01	-	2	Westwoods Blvd.	CB	66.01-3	RB	

Water Consumption Estimate

Land Use	Unit	Size	Multiplier	Design Flow Rate	Design Flow (gpd)
Commercial		1,536,568			
Wet Retail No Food	ksf GLA	153,657	-	0.10	15366
Wet Retail with food	ksf GLA	307,314	-	0.15	46097
Dry Retail	ksf GLA	921,941	-	0.06	55316
Office	SF	148,513	-	0.06	8911
Multiplex	seats	1,500	-	5.00	7500
Performing Arts Theater	seats	100	-	5.00	500
Hotel	room	209	-	125.00	26125
Restaurant / Caterer	occupant	350	-	10.00	3500
Residential	Units	500	-	300.00	150000
Total					313315
Add for irrigation, misc.uses and losses - SAY					350000

Total Long Term EMSURA Water Consumption

Waterflow Test Results

FLOW TEST SUMMARY REPORT page1

LOCATION: First St. & Roanoke Av
Riverhead, New York

DATE: 03-27-07
TIME: 1015

Static Hydrant Number: Roanoke
Elevation: -10

Flowing Hydrant Number: 1st
Elevation: 0

Dist. Between Hydrants: 500

Diameter of Main: 6

Outlet Diameter: 2.50 in

Number flowing: 1 Coeff.: 1.00

Static pressure: 75.00 psi

Residual pressure: 60.00 psi

Pitot Reading: N/A

Flow: 750.0 gpm

Flow at 20 psi: 1513.7 gpm

GRAPH:

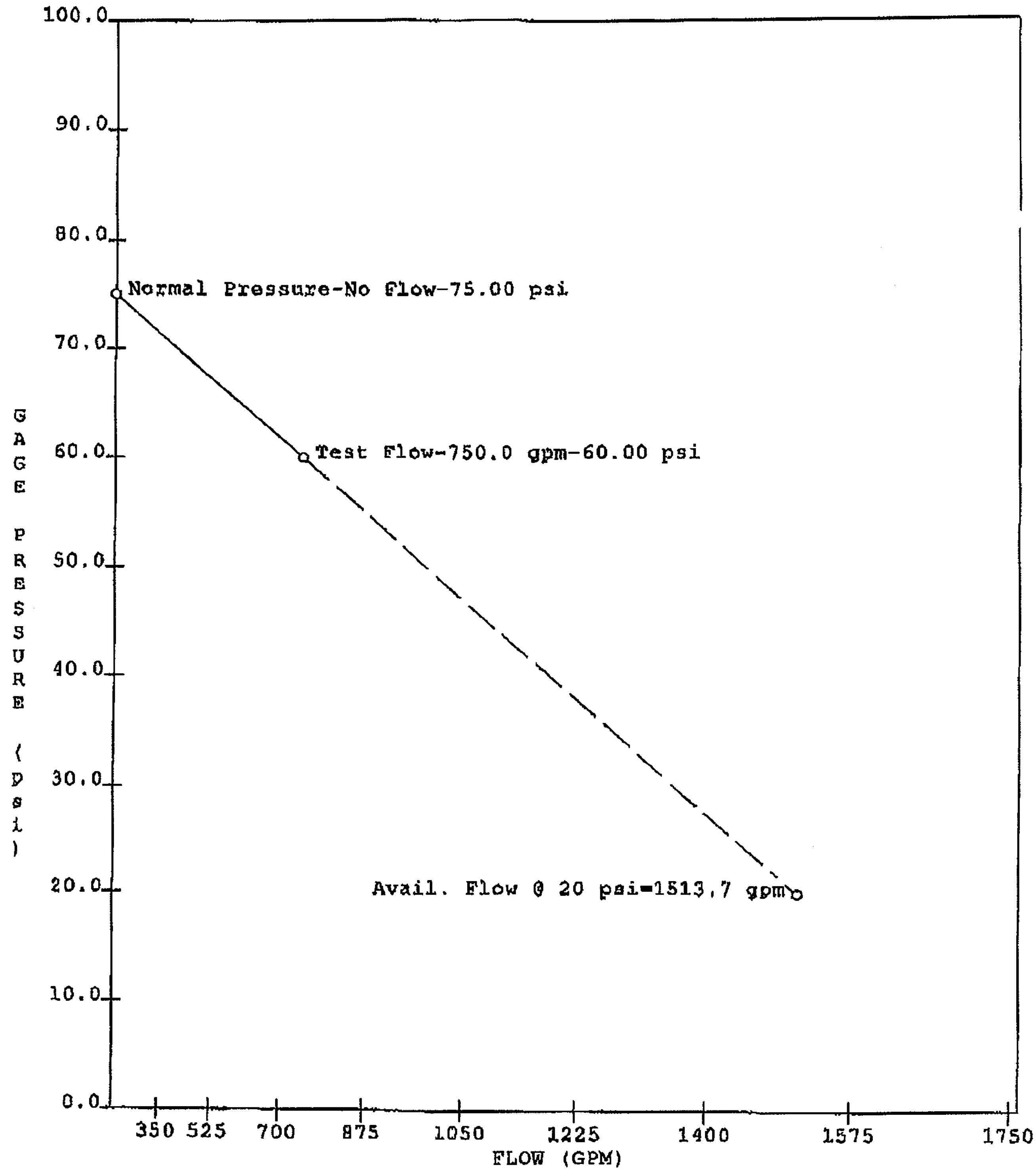
```
 PSI  -----------------------------------------------------------
      |                                                         |
 100  +                                                         |
      |                                                         |
  90  +                                                         |
      |                                                         |
  80  +/Normal Pressure-No Flow-75.00 psi                       |
      S\\                                                       |
  70  +  \\\\                                                   |
      |      \\\/Test Flow-750.0 gpm-60.00 psi                  |
  60  +         R...                                            |
      |             ...                                         |
  50  +                ....                                     |
      |                    ...                                  |
  40  +                       ....                              |
      |                           ...                           |
  30  +                              ....                       |
      |                                  ...                    |
  20  +     Avail. Flow @ 20 psi=1513.7 gpm *                   |
      |                                                         |
  10  +                                                         |
      |                                                         |
   0  +-+---+----+-----+------+--------+--------+---------+-----+
       400 600  800  1000   1200     1400     1600      1800  2000
                                FLOW (GPM)
```

NOTES:

(1) Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
(2) Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test flow.
(3) Distance between hydrants, elevations & main diameter are for information only.

RIVERHEAD WATER DISTRICT
1035 Pulaski Street
Riverhead, New York 11901

FLOW TEST SUMMARY REPORT page2



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