

**Tri-Town Septage Treatment
Facility Evaluation Cost
Estimate Update**

Final Report



Prepared for:
Orleans-Brewster-Eastham
Groundwater Protection District

Prepared by:
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Sign-off Sheet

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TRI-TOWN SEPTAGE TREATMENT
FACILITY EVALUATION COST ESTIMATE UPDATE

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TRI-TOWN SEPTAGE TREATMENT FACILITY EVALUATION COST ESTIMATE UPDATE

EXECUTIVE SUMMARY

Our report has focused on two major tasks as follows:

- Preparation an Opinion of Probable Cost along with a recommend appropriation to be made by each Town that would be available to make repairs and necessary improvements to the facility to ensure that proper and compliant plant operation through the end of 2016 when the existing discharge permit expires.
- Update cost estimates presented in the 2005 Tri-Town Facility Evaluation Report to upgrade the facility so it can function for an additional 20-yr period and so it can meet new lower total nitrogen limits anticipated in the upcoming groundwater discharge permit renewal (2016).

The following table summarizes this information:

DESCRIPTION	ESTIMATED COST
Total projected facility maintenance and repair cost to keep the Tri-Town Septage Treatment Facility operational through 2016.	\$500,000
Recommended appropriation required to keep the facility operational through 2016.	\$300,000
Projected facility upgrade cost to keep the plant operational for the next 20 yrs and to meet the lower total nitrogen limit anticipated after December 2016.	\$5,140,000

The \$300,000 recommended appropriation shown above assumes that within the next 3 years and with a Repair-Only-As- Needed approach, the probability is that only 60% of the \$500,000 total projected facility maintenance and repair costs estimated to keep the facility operational will actually be needed. This represents some risk but seems reasonable given the make-due-with-less record of maintenance and repairs demonstrated by the current staff at the Tri-Town Septage Treatment Facility.

Also, we would anticipate that whatever funds that are not utilized from either a \$300,000 or a \$500,000 appropriation upon eventual closure of the facility would be either returned to the communities or put towards the anticipated decommissioning costs for the facility.

We appreciate the opportunity to prepare this report and to continue our work with the Tri-Town Board. Please feel free to contact us with any questions and we are available to come to a Board meeting or joint Town meeting to discuss this report.



TRI-TOWN SEPTAGE TREATMENT FACILITY EVALUATION COST ESTIMATE UPDATE

Project Understanding and Scope of Work
February 5, 2014

1.0 Project Understanding and Scope of Work

1.1 PROJECT UNDERSTANDING

The Tri-Town Septage Treatment Facility is located on a 26 acre site on Overland Way in Orleans and is designed to treat up to 45,000 gallons per day of septage and grease. It was built over 25 years ago to serve the Towns of Orleans, Brewster and Eastham, but it also receives septage from the three Lower Cape towns of Provincetown, Truro and Wellfleet. The site is owned by the Town of Orleans yet the facility is owned and operated by the Orleans-Brewster-Eastham Groundwater Protection District (The Tri-Town District) which was formed by a special act of the Legislature in 1988.



The current agreement between the Towns expires on May 30 2015. The Massachusetts Groundwater Discharge Permit issued by the Department of Environmental Protection (DEP) for this facility expires in December 2016. One option under consideration is to decommission and demolish the facility prior to May 2015. Demolishing the facility will include removal of all existing foundations with final site restoration to an open green field. Two other options are:

1. Keep the plant open and operational until December 2016 with only the necessary repairs, equipment replacements and facility maintenance which are absolutely needed.
2. Keep the plant open and operation for the next 20 years which will require major upgrades and/or replacement of existing equipment plus a new process addition to meet the anticipated total nitrogen limit expected sometime after December 2016 as part of the existing permit renewal process.

The facility currently operates on a budget which is funded only by the revenue generated from haulers discharging septage. The facility has an account which is in essence a checking account where revenue is deposited into and expenses are paid out of. This account balance goes up in the summer months when septage revenues are high and goes down during the winter months when septage revenue drops off and when a major equipment repair is needed.

This situation presents a problem as the facility ages due to potentially expensive emergency repairs which become more probable as the plant ages. This situation was eloquently stated by the chief operator as follows: *We are potentially one major equipment failure away from closing the doors of our facility.*

TRI-TOWN SEPTAGE TREATMENT FACILITY EVALUATION COST ESTIMATE UPDATE

Project Understanding and Scope of Work
February 5, 2014

1.2 2005 TRI-TOWN SEPTAGE TREATMENT FACILITY EVALUATION

A report entitled: the Tri-Town Septage Treatment Facility Evaluation Report prepared by Wright-Pierce in August 2005. This report included an evaluation of the Facility and proposed two key upgrade scenarios as follows:

1. Upgrade of the existing facility considering its age and condition assuming an additional 20 yr life and current discharge permit limits (2005 Report Option 1).
2. Additional upgrade of the existing facility assuming that a new lower total nitrogen limit would apply to the facility in an upcoming permit cycle (2005 Report Option 2).

Cost estimates were presented for the two upgrade scenarios along with additional study work on plant flows and site disposal capacity; control of odor and noise; regulatory and permit issues; and implementation steps.

1.3 SCOPE OF SERVICES

The intent of this project is to review and update the costs presented in the 2005 Tri-Town Septage Treatment Facility Evaluation Report. Stantec's Scope of Services includes the following:

1. Review Tri-Town Septage Treatment Facility Evaluation Report dated August 2005 and review the proposed treatment improvements required to meet the anticipated nitrogen limits.
2. Conduct a one (1) day field visit to meet with the Chief Operator with the intention of assessing the condition of plant equipment and to establish priorities for equipment upgrades and/or replacement.
3. Prepare an opinion of a probable cost estimate to upgrade or replace equipment which will allow plant operations to continue through the end of 2016 when the existing discharge permit expires.
4. Update existing 2005 cost estimates from the evaluation document to upgrade the facility to meet anticipated nitrogen limits expected to be included in the pending groundwater discharge permit.
5. Prepare a report summarizing the findings detailed above and submit the Tri-Town Board of Managers for review and comment.

We understand this updated information will assist the Tri-Town Board of Managers and each of the three Towns in making decisions on the available options regarding future operations at the treatment facility.

TRI-TOWN SEPTAGE TREATMENT FACILITY EVALUATION COST ESTIMATE UPDATE

Upgrade Plan – thru 2016
February 5, 2014

2.0 Upgrade Plan – thru 2016

2.1 INTRODUCTION AND ASSUMPTIONS

Section 2 along with data in Appendix A and B of the Tri-Town Septage Treatment Facility Evaluation Report prepared by Wright-Pierce in August 2005 included an evaluation of current plant equipment, installation date and their opinion of condition at that time. For purposes of this report, some of the basic information in these sections have been utilized and expanded upon.

On January 8th, 2014 an engineer from Stantec visited the Tri-Town Septage Treatment Facility, viewed the key equipment and compared the current condition to the prior condition reported in the 2005 Tri-Town Facility Evaluation Report. Discussions with various plant staff and the chief operator were very helpful in understanding the overall condition of the process and equipment.

2.2 EQUIPMENT ASSESSMENT AND REPAIRS

Generally speaking, the facility is being kept in good condition with maintenance and repairs being done resourcefully, as time and funds allow. Table 2-1 has been prepared based on information in the 2005 Tri-Town Septage Treatment Facility Evaluation Report, the January 8th site visit and discussions with plant staff. This table includes a column titled: “Projected Status through 2016”. The information in this column along with the “Anticipated Expense through 2016” column data is Stantec’s opinion of probable work and related costs that may be required during the next three years in order to keep the plant operational. Looking at all of this information as a whole, we do not expect that all items will have to be completed but we do expect that some items will require attention. At this time, given the very prudent approach to equipment repairs and maintenance at the facility, we project that only 60% of the work listed in Table 2-1 will actually have to be done within the next 3 years assuming that a Repair Only as Needed approach is taken.

2.3 COST SUMMARY AND RECOMMENDATIONS

Table 2-1 includes a column titled: “Anticipated Expense Through 1016”. The anticipated Expenses listed are over and above what is included in the yearly maintenance budget line item and are estimates of the probable expenses that may be needed within the next three years. This does not mean that each and every cost shown will be spent over the next three years- some will, some will not and maybe one or two items that were not anticipated and marked “Ok for the next 3 yrs” will be required. Therefore, in order to have the sufficient funds to keep the plant operation for the next three years, we propose that a total of \$300,000 be appropriated by the three Towns (\$100,000 per Town). This value has been derived as follows:

\$500,000	times	60%	equals:	\$300,000
(Total Anticipated expense through 2016)		(Probability of all anticipated expense being needed)		(Total appropriation from the 3 Towns)



**TRI-TOWN SEPTAGE TREATMENT
FACILITY EVALUATION COST ESTIMATE UPDATE**

Upgrade Plan – thru 2016
February 5, 2014

One possible alternate approach would be to reduce the total appropriation from \$300,000 to \$150,000 from the three Towns (\$50,000 per Town) and agree that if a major failure occurs and exceeds available funds, then the treatment component of the facility will be shut down and the remaining funds will be used to convert the facility to a septage collection and staging site with bulk off-site septage disposal. This value has been derived as follows:

\$500,000	times	30%	equals:	\$150,000
(Total Anticipated expense through 2016)		(Probability of all anticipated expenses being needed)		(Total appropriation from the 3 Towns)

Reducing the probability of all anticipated expenses being needed from 60% to 30% increases the likely hood or risk that a major failure could occur which would exceed the available funds and force the facility to stop normal operations but it would be a buffer to allow the facility to be converted to a collection and staging site with bulk off-site septage disposal.

If this were to occur, we would anticipate that the per-gallon disposal fee would have to double or possibly triple in order to pay for all expenses including bulk off-site shipping and disposal costs.

TABLE 2-1
EVALUATION OF CURRENT PLANT CONDITIONS

Unit Process Structures and Equipment	Installation Date	Current Condition	Projected Status thru 2016	Anticipated Expense thru 2016
SEPTAGE & GREASE RECEIVING				
Septage Truck Scales	Original	Out of Service	Replace 1 of 2 scales	75,000
Mechanical Bar Screen	Original	Out of Service	Fabricate Temporary Screen	10,000
Grit Cyclone	Original	Corroded, mixed performance	Rebuild/replace	15,000
Grit Pump	Original	Good	Ok	0
Grit Wetwell	Original	Concrete spalling	Ok for next 3 yrs.	0
Grease Tank	1995	Good	Ok	0
Grease Grit Tank	1995	Good	Ok	0
Grease Grit Pump	1995	Good	Ok	0
Grease Storage Tank	Original	Out of service, full of hardened grease	Clean out	10,000
Grease Storage Blowers	1995	Very good	Ok	0
SEPTAGE EQUALIZATION				
Septage Tank	Original	Unknown	Clean out 1 tank	9,000
Septage Blowers	1995	Good	Ok	0
Septage Tank Mixers	Original	Fair/poor	Rebuild/replace 1 mixer	12,000
SEPTAGE THICKENING				
Grinders	Replaced	Very good	Ok	0
Septage Pumps	Original	Good	Ok	0
GBT's	1995	Very good	Ok	0
Thickened Sludge Pump	1995	Very good	Ok	0
SEPTAGE CONDITIONING				
Septage Conditioning Tanks	1995	Good	Ok	0
Lime System	Original	Fair, cracks in walls	Ok	0
Permanganate System	Original	Fair, not in use	Ok	0
Polymer System	1995	Good	Ok	0
Ferric Chloride System	Original	Unknown/not required	Ok	0
Acid Wash	Original	Unknown/not required	Ok	0
Mixers	1995	Good, currently not used	Ok	0
SEPTAGE DEWATERING				
Polymer System	1995	Good	Ok	0
Ram Press Pumps	Original	Good	Rebuild 1 of 3 pumps	5,000
Plate & Frame Filter Presses	Original	Fair	Ok for next 3 yrs	0

TABLE 2-1
EVALUATION OF CURRENT PLANT CONDITIONS

Unit Process Structures and Equipment	Installation Date	Current Condition	Projected Status thru 2016	Anticipated Expense thru 2016
FILTRATE EQUALIZATION				
Filtrate Tanks				
1 & 2	Original	Unknown	Ok for next 3 yrs	0
3	1995	Good	Ok	0
Filtrate Blowers	1995	Good	Ok	
Filtrate Pumps				
1 & 2	1995	Good	Ok	0
3 & 4	1995	Good	Ok	0
PRIMARY CLARIFICATION				
Primary Clarifiers	Original	Poor-Safety issues	Rebuild 1 unit & repairs to second unit	150,000
Sludge Pumps	Original	Good	Ok for next 3 yrs.	0
SECONDARY TREATMENT (RBCS)				
Drives	Original	Fair	Rebuild/replace	58,000
Media	Original, 2001	Fair to good	Ok for next 3 yrs.	0
Intermediate Pumps	1995	Good	Ok	0
Covers	Original	Fair	Ok for next 3 yrs.	0
SECONDARY CLARIFICATION				
Lamella Clarifiers	Original	Poor	Ok for next 3 yrs.	0
Secondary Clarifiers	1995	Good	Ok	0
Scum Pumps	1995	Good	Ok	0
Sludge Pumps	1995	Good	Ok	0
TERTIARY TREATMENT				
Sand Filters	1995	Good, not used in winter	Ok	0
Backwash Blowers	1995	Good	Ok	0
Mudwell Pumps	1995	Good	Ok	0
DISINFECTION	Newer Trogen UV Units	Good	Bulb replacements	5,000
PLANT WATER PUMPS	1995	Good	Ok for next 3 yrs.	0
EFFLUENT PUMPS	2000	Good	Ok	0
SPRAY WASH PUMPS	1995	Good	Ok	0
ODOR CONTROL				
Headworks Scrubber	Original	Fair	Ok for next 3 yrs.	0
Headworks Carbon	Original	Good	Carbon replacement	10,000
Thickening Area Scrubber	1995	Good	Ok for next 3 yrs.	0
Thickener Area Carbon	1995	Good	Carbon replacement	10,000

TABLE 2-1
EVALUATION OF CURRENT PLANT CONDITIONS

Unit Process Structures and Equipment	Installation Date	Current Condition	Projected Status thru 2016	Anticipated Expense thru 2016
INSTRUMENTATION	Original, 1995	Good	Ok for next 3 yrs.	0
COMPOSTING	Original	Fair, not used	Ok for next 3 yrs.	0
CHEMICAL BUILDING	Original	Poor, used for storage only	Ok for next 3 yrs.	0
MISCELLANEOUS				
Scum Pumps	Original	Fair	Ok for next 3 yrs.	0
Valves	Original	Poor	As-needed rebuild/replace	5,000
Compressor	Original	Fair	Ok for next 3 yrs.	0
Water System	Original	Fair	Ok for next 3 yrs.	0
SECURITY				
Perimeter Fence	Original	Poor	Significant amount of fence is down and will need to be replaced within the next 3 yrs.	50,000
ELECTRICAL SERVICE/ POWER DISTRIBUTION	Original	Fair	Ok for next 3 yrs. with repairs as needed.	3,000
ADMINISTRATION BUILDING				
Roof	Original	Fair	Some repairs will be needed within the next 3 yrs.	10,000
Boilers	Original	Fair	Ok for the next 3 yrs.	0
HVAC	Original	Fair	Ok for the next 3 yrs.	0
Exterior Siding/Gutters	Original	Fair	Some repair and painting will be needed within the next 3 yrs.	5,000
Pump Room Metal Stairs	Original	Poor	Safety Issue – repair or replacement will be needed within the next 3 yrs.	8,000
Engineering and construction assistance			On an as-needed basis	50,000
TOTAL ESTIMATE COST				\$ 500,000

TRI-TOWN SEPTAGE TREATMENT FACILITY EVALUATION COST ESTIMATE UPDATE

Upgrade Plan – thru 2034
February 5, 2014

3.0 Upgrade Plan – thru 2034

3.1 INTRODUCTION AND ASSUMPTIONS

Section 6 along with data in Appendix A, B and C of the Tri-Town Septage Treatment Facility Evaluation Report prepared by Wright-Pierce in August 2005 included an evaluation of upgrade alternatives and costs to keep the facility operational for the next 20 yrs to 2034. For purposes of this report, some of the basic information in these sections have been utilized and costs projected out to today's date. Our focus is on, Upgrade Option 2 in Section 6 of the 2005 report which is:

Option 2 — Extending the service life by 20 years and providing nitrogen removal to 10 mg/l, without increasing the capacity.

3.2 PROCESS ASSESSMENT AND UPGRADES

A review of the process assessment and upgrade requirements in the 2005 Tri-Town Septage Evaluation Report has been conducted. We generally agree with the equipment upgrade recommendations except that from 2005 to 2014, there are additional upgrade items that will need to be completed. Also, we generally agree with the process upgrade using denitrification Filters to meet a total nitrogen limit of 10 mg/l or less. We have confirmed that the current Rotating Biological Contactor (RBC) process can achieve full nitrification at current plant flows which is required prior to denitrification.

As previously mentioned, the facility is being kept in good condition with maintenance and repairs being done resourcefully as time and funds allow. Table 3-1 has been prepared based on information in the Tri-Town Septage Treatment Facility Evaluation Report, the January 8th site visit and discussions with the chief operator at the facility. This table lists the upgrades required to extend the facility service life by 20 yrs to 2034. We have included the upgrade cost prepared back in 2005 and an upgrade cost for 2014. Some values are higher simply due to escalation from 2005 to 2014 and some items are higher or new due to the increasingly worsened condition from 2005 to 2014.

3.3 COST SUMMARY AND RECOMMENDATIONS

Table 3-1 includes a summary of the costs to upgrade the existing Tri-Town Septage Treatment Facility to extend its useful live for 20 yrs. Back in 2005, the evaluation report estimated a total cost of: \$1,990,000 to upgrade the facility with Nitrogen removal (Option 2). The equivalent value is \$2,642,000, escalated from 2005 to 2014 based on today's ENR construction cost Index of 9689. With the changed conditions of the Facility from 2005 to 2014, the cost estimated to extend the useful life of the facility for 20 yrs. with nitrogen remove increases to: \$5,140,000.

A factor in deciding on whether or not to proceed with a 20-yr upgrade of the Tri-Town Septage Treatment Facility will be knowing how the Town of Orleans intends to proceed with municipal wastewater treatment for their community and how they intend to use the Tri-Town site. A 20 yr upgrade of the Tri-Town Septage Treatment Facility would require a significant appropriation by from the three Towns.



TABLE 3-1
SUMMARY OF 20 YEAR UPGRADE⁽¹⁾ COSTS
TRI-TOWN SEPTAGE TREATMENT FACILITY

Function	Upgrade Cost per 2005 Evaluation Report	Upgrade Cost per 2014 Evaluation Review
Septage & Grease Receiving	\$170,000	\$ 225,000
Grit Removal	\$125,000	\$ 165,000
Septage Equalization	\$ 10,000	\$ 20,000
Septage Thickening	\$ 30,000	\$ 50,000
Septage Conditioning	\$ 50,000	\$ 66,000
Septage Dewatering	\$435,000	\$575,000
Filtrate Equalization	0	\$0
Primary Clarification	\$150,000	\$250,000
Rotating Biol. Contactors	\$300,000	\$500,000
Secondary Clarification	\$ 20,000	\$ 26,000
Effluent De-nitrification Process for Total N <10 mg/l	\$175,000	\$250,000
Effluent Disinfection	0	\$0
Effluent Disposal Fields Upgrading	0	\$ 50,000
Odor Control	\$ 80,000	\$100,000
Plant Water System	0	\$ 90,000
Building Upgrades ⁽²⁾	0	\$275,000
Misc. Items ⁽³⁾	\$ 40,000	\$ 75,000
Electrical/Instrumentation	0	\$150,000
New Sludge Dump Truck	0	\$190,000
Contractor Allowance@ 25% (Mob/Demob/Insurance, Bonds, OH&P)	0	\$750,000
Subtotal -- Construction		\$ 3,807,000
Engineering & Contingency @ 35% (assumes 20% engineering & 15% contingency)	\$ 405,000	\$ 1,333,000
Option 2⁽¹⁾-TOTAL	\$1,990,000	\$5,140,000

- 1) Option 2 consists of an upgrade of the Tri-Town Septage Treatment Facility for 20-Year use plus nitrogen removal down to 10 mg/l.
- 2) Roofs, HVAC, Stairs, Elevator & Ext. Repairs
- 3) Valve Replacement, Copper Pipe Replacement, Miscellaneous Pumping Upgrades, Plant Air