

Cost Comparisons – EIAs to Sewering

Calculations Underlying NEWEA Innovation Pavilion Presentation

of 1/23/24

Table of Contents:

- Introduction – p.1
- Sewering Capital Costs – p.3
- Sewering O&M – p.5
- Sewering Subsidies – p.6
- EIA Capital Costs – p.7
- EIA OM&M – p.8
- Subsidize to Equalize – p.10
- Sample spreadsheet for calculating EIA relative costs - separate Excel document

Introduction

The single most consistent call from I/A OWTS Task Force members in 2023 was to establish basic, apples-to-apples costing data both for EIAs and for sewerage. This dovetailed with The Nature Conservancy's (TNC) effort to model EIA financing needs across the Cape in support of the state's newly published (7/2023) Title 5 and watershed regulations. The TNC analysis encompasses timing, inflation and financing costs; this analysis does not. Rather, it attempts to adjust costs to 2023 numbers but does not look forward. It was important that whatever we concluded be in accord with the MASSTC's views as they work to create a Responsible Management Entity (RME) to support the new regulations.

The effort started in July, 2023 with an analytical model (to determine the number of EIAs needed to remove X kg N by comparison to sewerage) provided by Scott Horsley and came to a conclusion in December with the calculations that are part of this document. A preliminary presentation of results was made to 40+ Cape interested water people at the home of Sara Molyneaux in Cotuit on 9/23/23. Data gathering continued into December, and results were presented at the NEWEA Annual Conference Innovation Pavilion on 1/23/24.

The data gathering process included conversations with key stakeholders in the arena and study of the Barnstable CWMP and more recent Barnstable website postings. The Town of Barnstable was used as an example because of its extensive and well done sewer-centric CWMP and because it had just finished its first sewerage sub-project (Strawberry Hill Road Project) which

abuts the writer's property. The calculations were reviewed with the Barnstable CFO, who had helpful inputs, with the mutual objective of creating apples-to-apples comparisons.

The approach was to identify full costs for sewerage with appropriate cost allocation logic to reduce those costs to a per home perspective. The basic logic may be useful to other towns. For EIAs, while being sensitive to protecting proprietary company information, discussions were held with Provisional Permit level vendors, MASSTC and consultants to the same market on Long Island, NY.

"Who pays for what" is a political discussion. Currently, sewerage costs are subsidized by the town while homeowners are expected to pay the full cost of EIAs. This document looks at current Barnstable subsidies for new sewer connections and proposes a way to think about subsidies for EIAs to equalize homeowner costs and still save the town both money and political challenges.

I have tried to be conservative in assumptions made, erring in favor of sewerage where appropriate, to make math simple and memorable (e.g. calculated sewerage cost @ \$101.2-\$105.3k/home; assume \$100k. And EIA capital cost at \$48.6k; assume \$50k).

It is worth noting that Barnstable's numbers fit comfortably within the ranges we have heard anecdotally. Capital costs appear to be right on average. The town is doing particularly well around O&M costs. That gives comfort re: using these numbers for planning purposes.

Many, many thanks go to the stakeholders who engaged on this exercise. It was a pleasure working with everyone.

To reiterate, this is a directional study, not a budgeting exercise, except at the highest levels. There are plenty of assumptions that could be polished or changed to measure impact of different variables. I would be glad to discuss omissions, corrections and updates.

Bruce H. Walton

I/A OWTS Task Force

2/1/2024

**Cost per Barnstable Sewer Connection
Capital, O&M and Homeowner Subsidies**

Strawberry Hill Road Project

Total Cost Perspective

BHW – November 10, 2023

This analysis initially does not look at “who pays for what”. Rather, it attempts to identify all the costs involved in the completed system project and allocate them on a “per home” basis.

Then it calculates homeowner subsidies based on “who pays for what”.

Capital Cost per Sewer Connection

Collection System – Sewer Line (a)

\$14.1m All-In Actual Cost. Project complete and below budget (\$16m?). Approximately 260 homes can connect (Mark Milne, Director of Finance (verbal, 9/2023). This sewer line is a trunk line that will eventually be extended and support up to 4000 homes. A proper cost allocation analysis is beyond our scope. An engineer on the task force suggests that \$50k per property is not an unusual assumption, so...

260 homes x \$50k / home = \$13m

Connection - Home to Sewer Line (b)

\$8-10k homeowner assumed average cost to connect home to the sewer pipe. May also include rerouting home plumbing to a new exit point from home.

Expected range was \$1-10k (Dan Santos, Director of Public Works, verbal, 2020).

260 homes x \$8k to \$10k / home = \$2.1m - \$2.6m

Centralized Treatment Plant Costs (c)

Phase 1 Treatment plant upgrade - \$94.4m in 2017 dollars. With inflation per ENR (Engineering News-Record), 2023 cost = 125% of 2017 cost = \$117.9m

260 homes in Strawberry Hill Road project and 4613 homes in Phase 1 (CWMP, Table 6-1).

260 homes / 4613 homes = 5.6% of Phase 1 project

.056 x \$117.9 = \$6.6m (or \$25.4k / home)

Soft Costs (d)

Soft Costs typically run 35-40% of construction costs and include Engineering and Design (generally about 65% of Soft Costs), Surveys, Permits, Insurance, Administrative Accounting & Finance, Public Relations, Project Management, etc.

.35 to .40 x \$13m construction cost = \$4.6m to \$5.2m (or \$17.7k to \$20k / home)

Total Average Capital Cost per Home

(a) + (b) + (c) + (d) = total project capital cost

- \$13m + \$2.1m + \$6.6m + \$4.6m = \$26.3m
- \$13m + \$2.6m + \$6.6m + \$5.2m = \$27.4m

\$26.3m to \$27.4m / 260 homes = \$101.2 to \$105.3k. Assume \$100k Capital Cost / Home

For context, the working number we have heard most frequently is \$100k / home with a range of \$80k - \$120k / home.

Sewering O&M FY 2024 (7/1/23-6/3024)

Total Direct (\$8,108.5k) and Indirect (\$605.9k) costs – \$8,714.7k for FY 2024.

- [CONSOLIDATED FY 2024 OPERATING BUDGET.pdf \(townofbarnstable.us\)](#) (Water Pollution Control Enterprise Fund Budget – p. 412)
- \$9,003.5k for FY 2023.

Allocation Logic

3,220 homes (12% of housing units) are currently attached to the sewer system (FY 2024 Budget, pp. 22 and 16). The rest are commercial units. First CWMP new connections scheduled for spring 2024.

Treatment plant annual average discharge is 1.6m MGD (CWMP, p. 5-124).

From home flow = 204 gal/day (per MEP Three Bays modeling where 10% irrigation is assumed)

- 204 gal/day x 3,220 homes = 656,880 gal/day flow from homes to treatment plant

656.9 gal/day / 1.6m gal/day average treatment plant flow = 41% of flow is attributable to homes.

Per Home Allocation: $.41 \times \$8,714.4k / 3220 = \underline{\$1,110 \text{ O\&M Cost / Home (FY 2024)}}$

For context the range we have heard is \$1200 - \$1500 / home.

Subsidies to Homeowners for Sewering

Capital Cost Subsidies

Homeowner Assessment is capped at \$10k to cover neighborhood sewer development.

Connection of Home to Sewer Line is borne by homeowner @ \$8k to 10k (page 1, item (b)).

Total homeowner capital (one-time) cost is thus \$18 to \$20k. Assume \$20k including landscaping.

Capital Cost per home = \$101.2k to \$105.3k

Subsidized amount = \$101.2k to \$105.3k - \$20k = \$81.2 to \$85.3k Capital Subsidy per Home

Assume \$80,000 capital cost subsidy per home.

O&M Subsidy for FY 2024

FY 2024 Projected sewer rate increase = 5% (source uncertain).

FY 2023 average sewer rate = \$435 (Barnstable Water Resources website, Property Owner Costs)

$\$435 \times 1.05 = \456.75 . Assume \$460 for FY 2024.

O&M allocation per home = \$1,110

Subsidized amount = \$1,110 - \$460 = **\$650 O&M Subsidy per Home (2024)**

Note – "...the Town has commissioned a sewer rate study, which will provide a roadmap for setting sewer utility rates at levels, which will allow for the continuous upgrade and maintenance of the Town's existing sewer treatment facilities." (FY 2024 Operating Budget, p.91, Clean Water)

EIA Capital Cost (\$) per Home

Sources: MASSTC, Water Industry and Provisional Permit Vendors

BHW - December 19, 2023

EIA costs are currently borne entirely by the homeowner. This analysis works to identify all the costs that would go into an installation.

Retrofit - Many installations can take advantage of components already installed at the home. At the Shubael Pond project, 60% of homes could still use the septic tank and/or the leach field, sometimes with modification. This had a material effect on total project costs and is basis for weighted average calculation.

For a 2-4 bedroom home we look at ranges and make a final assumption.

	<u>Full Installation</u>	<u>Retrofit</u>
Design (1)	5,000-7,000	5,000-7,000
Permitting (2)	400-600	400-600
N Removing Equipment (3)	20,000-35,000	20,000-35,000
Installation (4)	17,000-20,000	7,000-15,000
<u>RME Mgt Fee (5)</u>	<u>500-700</u>	<u>500-700</u>
Total Capital Cost (6)	42,900-63,300	32,900-58,300

Weighted Average (7) - Low 36,900, High 60,300. Average \$48,600. Assume \$50,000.

Notes

- (1) Soil evaluation included. Design costs should be subject to learning curve pricing as project goes into production mode.
- (2) Permitting costs should be consistent from town to town.
- (3) Remote sensors are expected to be limited at this point to indications of whether or not a blower or pump is operating and are assumed to be in the equipment cost.
- (4) Installation includes other components like piping, wiring and Title 5 level equipment. Includes pulling and/or decommissioning old tanks/cesspools. Includes water meter to monitor water use.
- (5) Assumes purchase and installation will be managed by RME, rather than the owner.
- (6) Main variable is balance between Equipment and Installation. When combined, vendor totals were reasonably comparable.
- (7) $(42.9k-63.3k @ 40\%)+(32.9k-58.3k @ 60\%) = \text{Range } \$36.9k-60.3k. \text{ Average } \$48.6.$

EIA OM&M

Cost (\$) / Year / Home

Primary Source: Wellfleet Horsley Calculations

BHW 1/29/2024

Provisional (yrs 1-2) General Permit (3-20)

OM&M

Operations (1)	1,000	250
Remote Monitoring (2)	-	40
Sampling (3)	468	250
Electricity	180	180
Pump-out (4)	167	167
RME Overhead (5)	-	100
Total OM&M	1,815	887
Weighted Avg OM&M (6)		980

MASSTC expects to further reduce OM&M with full RME implementation.

Replacement Costs

Annualized Replacements (7)	260
• Pumps, Media (Woodchips), Sensors	

Assume tanks and pipes have 80-year useful life, on par with sewers.

Total Weighted Average OM&M Including Replacement Costs = \$1,240/year

- $\$980 + \$260 = \$1,240$

For context the Barnstable sewer O&M calculation, excluding any depreciation funding, is \$1,110. We consider the \$130/year difference to be a wash. This would also be consistent with anecdotal range for sewer O&M cost at \$1,200-\$1,500/year.

EIA OM&M Notes – All figures are in 2023 dollars. This analysis assumes we are in the midst of year 1 of the 3-year KleantTu provisional period. The analysis thus starts with year 2.

- (1) Operational visits monthly for two years after general permit obtained, once per year thereafter coupled with remote monitoring.
- (2) Remote monitoring assumes 10% follow-up and trouble shooting visits, starting year 3.
- (3) Sampling quarterly during Provisional first year of General Permit (BOD, TSS, TN, NO3). Sampling 10% of install base monthly under General Permit. Based on Buzzards Bay Coalition report of quarterly sampling @\$468/year.
- (4) Assume \$500/pump-out every three years. $\$500/3 = \167 annualized.
- (5) Early in the roll-out, when there will be less than 1,000 installed systems (achieved in year 10), RME will not recover all costs through service fees. Assume 1 FTE would handle sampling, inspection and report writing. 1 FTE @ \$100k/year / 500 average installed systems = \$200/home/year. Over 20 years, that averages to \$100/home/year. During Provisional period assume that FTE is absorbed by operations and sampling costs, to avoid double counting. MASSTC calculates the number differently but came to about the same number.
- (6) Average of two years of Provisional expense and 18 years of General expense, excluding Replacement Costs.
- (7) Annualized Replacement Costs.

<u>Component</u>	<u>Cost</u>	<u>Freq. (yrs)</u>	<u>Annualized</u>
Woodchip Media	\$1,000	10	\$100
Pumps & Tubing	\$1,100	10	\$110
Remote Pump Sensor	\$500	10	\$50
		Total	\$260

What Could These Findings Enable?

Subsidize to Equalize

Sewer @ \$100k/home.

EIA @ \$50k/home.

Sewer O&M vs EIA OM&M a wash @ about \$1100-\$1200/year each.

If the town limits both EIA and sewer homeowners to \$20k capital cost, it could save \$50k/home in subsidies.

- EIA @ \$30k subsidy vs Sewer @ \$80k subsidy

I'm calling that **Subsidize to Equalize**

EIA OM&M could be similarly subsidized by charging a homeowner the same amount as is charged for sewer fees. In this case the average EIA subsidy, at a \$460/year homeowner charge, would be \$780 (including replacement costs) vs \$650 for sewerage. It appears the town is on track to make annual sewer fees more closely mirror actual costs, which would bring the subsidy levels down in both cases.

Bruce Walton, 1/2024