USER GUIDE:

Cape Cod EIA Septic/Sewer Financial Model and Town/State Planning Tool

This tool was completed in December 2024 by John Stinehour of Sustainable Finance Partners, LLC under contract with The Nature Conservancy. For additional questions, please contact Emma Gildesgame at emma.gildesgame@tnc.org.

Financial Model General Description

Financial models are tools used by individuals and organizations to represent the financial performance of a business, project, investment, or any financial asset. They are used to make decisions about valuations, business strategies, risk management, and investment analysis, among other financial analyses.

Following this section, there is a general description of what financial models are good at, what they are not good at, and how to use them.

Purpose of This Model and Planning Tool

This model provides stakeholders with financial insights to guide preliminary decisions and scenario analyses to improve water quality infrastructure in Cape Cod. Specifically, the model aims to:

1. **Assess Costs and Potential Savings** over time.
2. **Explore Funding and Financing Options** available.
3. **Evaluate Economic Impacts** of sewer and septic system upgrades.

This tool aggregates critical financial data previously unavailable, enabling town, state, and federal stakeholders to make informed budget and financing decisions for both short-term and 20-year project timelines.

Financial Model Use Summary

This Cape Cod EIA Septic/Sewer user guide is intended to serve as a quick use guideline to accompany the excel file **2025 Cape Cod Septic and Sewer Financial Planning Tool**-- for the stakeholders involved in building solutions to the nitrogen effluent problem across the Cape. This section will summarize this financial model's key output, what the model is and is not intended to do well, and then how to use the inputs to evaluate various scenarios.

Benefits of this Financial Model

1. **Scenario Exploration**: Helps staff analyze financial and nitrogen reduction impacts of different combinations of sewer and septic improvement projects.
2. **Comprehensive Cash Flow Analysis**:
    - Analyzes **Sources of Cash/Revenues** based on various payors.
    - Assesses **Uses of Cash/Expenditures** involving different stakeholders.
3. **Dynamic Updates**: Adjusting any variable efficiently updates the entire model.
4. **Cost Representation**: Includes costs associated with both sewer and EIA septic projects.
5. **Big-Picture Financials**: Aggregates total costs to meet nitrogen reduction targets at the scale of individual towns or the full Cape.

6. **Cost of Capital**: Incorporates interest and debt repayment over project timelines.
7. **Inflation Impact**: Accounts for inflationary effects on project costs.

Limits of Financial Model

1. **Some of the variables** may **need future updates based on new or corrected information,** despite the diligence process (total number of households needing work, timeline assumptions, interest rate assumptions, etc.).
2. This model **does not provide answers to how to assist the homeowners** to pay/finance their project.
3. This model is **not able to provide answers to policy questions related to how to *specifically* fund sewer projects or EIA septic projects at the Town or State or Federal level.**
    a. The model incorporates stakeholder insights gathered during the diligence process — including homeowners, towns, states, and the federal government — to inform potential funding approaches. However, it is not designed to provide specific funding solutions or identify definitive financing mechanisms. Weighted averages around homeowner willingness to pay/ability to pay were analyzed based on housing inventory. Homeowner interest rate or other variables may need to be revised.

Using the Financial Model: Basic Workflow

Follow these steps for effective use of the model – additional details on how to use each tab are below.

1. **Start with the Assumptions Tab** (skip ahead to more detail)
2. **Proceed Through These Tabs**:
    - **Town Demographics**
    - **Town Cost Calc**
    - **#Projects Cost Calc**
    - **WWTP Worksheet**
3. **Finalize with return to the Summary Output Tab**

Navigating the Model

- **Interactive Cells**:
    - **Highlighted Cells with Blue Text**: Indicate variables to adjust. Hover over these cells for additional notes.
    - **On the "Town Demogr." Tab,** cells C2:C16 are highlighted with Red Text indicating that these numbers are reported from an outside source (red) but should be updated for accuracy by the user (highlighted fields).
    - **Green/Blue Text**: Reflects referenced data; ***do not modify*** to avoid breaking the model.

Summary Output Tab

This Tab, while first in the series of tabs, is the user's last stop in utilizing the model. This tab organizes key output summary based on the figures entered throughout the exercise. Please begin analysis by working first with the assumptions tab and work your way to the final tab – "WWTP Worksheet." When complete, return to this first tab in the worksheet for key figures.

There are two key output areas on this tab: Town Cost Calculations and Custom #Projects Cost Calculations. Under these two headers you will find summary data based on the inputs provided on other tabs. Both sections will contain a nitrogen load removal target and the amount removed based on user inputs, including figures related to sewer, EIA septic, and the total projected costs associated with the scope of the project.

Key Features:

- Displays nitrogen load reduction targets, sewer and septic costs, and total projected costs.
- **Cell B17/B20/B21**: Linked to the **Town Cost Calc** tab.
- **Cell B40/B41/B42**: Linked to the **#Projects Cost Calc** tab.

Quick notes on the Summary Output Tab:

- *Key financial figures can be found in Cells B17, B20, and B21 which are directly related to sheet "Town Cost Calc" and Cell B40 – B42 which are directly related to tab "#Projects Cost Calc." Please work through the workbook as described and return to this tab for key figures.*
- *The town cost calculations represent projected costs of doing 1/20th of the work each year for twenty years with a steady inflation and cost of capital built in. It should not be assumed that actual workflow will follow such a cadence. This section provides total funding amount needed for the project scenarios described by the user in the input tabs. However, implementation variables will impact total project costs. For example, if early phases of work do not complete sewer/EIA septic connections fast enough, costs will increase over the lifetime to complete the projects. In this instance, a sense of urgency will save millions of dollars.*
- *The updated model aggregates project costs and presents key figures in the **Summary Output** tab:*
    - ***Total Project Costs** not discounted (B20 and B41) and discounted to present value (B21 and B42)*
    - ***Aggregate Costs** that incorporate inflation and financing expenses over the project's timeline (B17 and B40)*

  *While these figures are included, this model is designed as a **project finance tool** rather than a traditional **Discounted Cash Flow (DCF) model**. Unlike a pure DCF approach, this model focuses on illustrating how inflation and financing pressures affect overall costs over time. Since there is no mechanism in place to raise and hold capital in escrow, the model does not fully discount all future cash flows to a single present value as a traditional DCF model would. The present values (PV) of projects based on input is to be interpreted as cost not including financing costs over time*

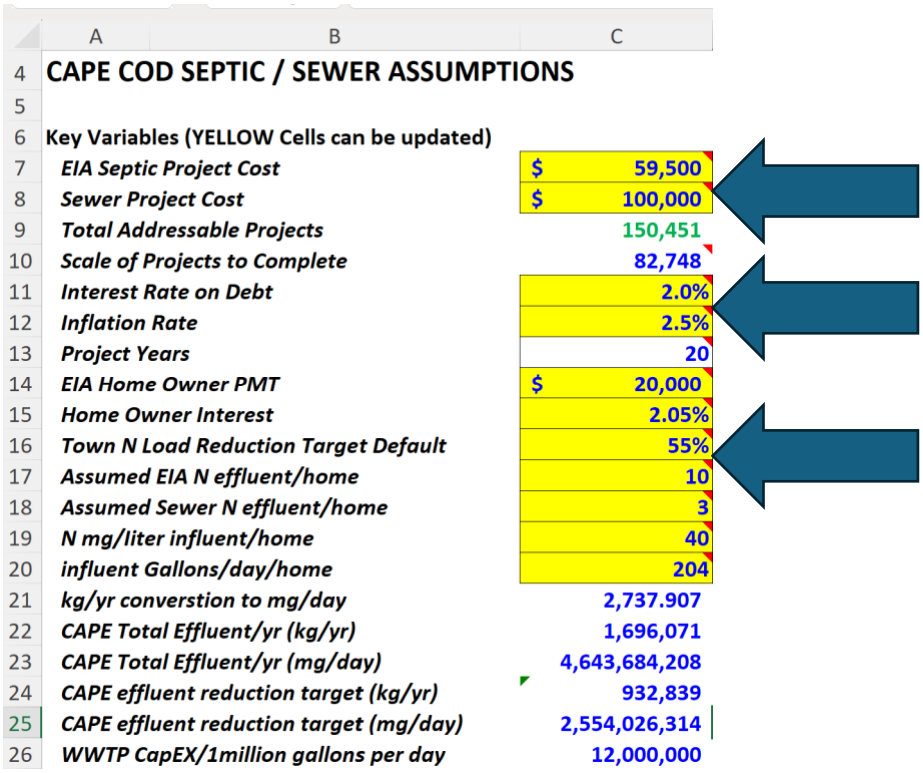
discounted to present. The PV figures that are calculated reflect todays cost if all projects could be initiated and completed "today" based on the variables the user has input. The PV is useful for stakeholders to understand an upfront cost and find ways to pay for completion -or- to present to industry the size of the market while seeking business partners. The model is useful therefore in different ways according to the audience.

- *The figures under the Custom #Projects Cost Calculations section are meant to allow a user to complete sewer/EIA septic projects at a specified phasing. Based on the input variables of the user can look at how the pace of completing sewer/EIA septic projects correlates to final cost figures.*

Assumptions Tab

- **Purpose**: Baseline financial and project assumptions.
- **Editable Cells**: B7, B8, B11, B12, and B14:B20.

This tab contains baseline financial and project assumptions used in calculations that once updated will flow and update all other corresponding tabs that are affected. Users should input their own preferred scenario assumptions and data in the yellow- highlighted cells. (B7, B8, B11, B12, and B14:B20.) Cells with red triangles in the upper right corner have additional information to assist in determining input values.



	A	B	C
4	**CAPE COD SEPTIC / SEWER ASSUMPTIONS**		
5			
6	**Key Variables (YELLOW Cells can be updated)**		
7	***EIA Septic Project Cost***		$ 59,500
8	***Sewer Project Cost***		$ 100,000
9	***Total Addressable Projects***		150,451
10	***Scale of Projects to Complete***		82,748
11	***Interest Rate on Debt***		2.0%
12	***Inflation Rate***		2.5%
13	***Project Years***		20
14	***EIA Home Owner PMT***		$ 20,000
15	***Home Owner Interest***		2.05%
16	***Town N Load Reduction Target Default***		55%
17	***Assumed EIA N effluent/home***		10
18	***Assumed Sewer N effluent/home***		3
19	***N mg/liter influent/home***		40
20	***influent Gallons/day/home***		204
21	***kg/yr converstion to mg/day***		2,737.907
22	***CAPE Total Effluent/yr (kg/yr)***		1,696,071
23	***CAPE Total Effluent/yr (mg/day)***		4,643,684,208
24	***CAPE effluent reduction target (kg/yr)***		932,839
25	***CAPE effluent reduction target (mg/day)***		2,554,026,314
26	***WWTP CapEX/1million gallons per day***		12,000,000

- **C7:** EIA Septic Project Cost: cost per EIA septic system installed
- **C8:** Sewer Project Cost: cost per home connected to sewer. Does not include wastewater treatment plant capital expenditures.
- **C11:** Interest rate on debt accrued by the town, county, or other borrowing entity.
- **C12:** Inflation rate (default is the assumed rate of inflation)
- **C13:** Project years – this tab assumes a 20 year project period. If you'd like to use a different project period, please use the #Projects Cost Calc Tab.
- **C14:** EIA Homeowner Payment: This amount assessed as the total cost to homeowners. The default amount does not reflect any assistance that may be provided by Municipal/State/Federal funds.
- **C15:** Homeowner interest rate: default is based on a weighted average of income distributions across the Cape and assuming that SRF homeowner interest rates would be extended.
- **C16:** Town N Load Reduction Target Default: based on town commitments under TMDLs, watershed permits, and other plans and documents.
- **C17:** Assumed EIA N effluent per home: update based on selected/targeted EIA system performance.
- **C18:** Assumed Sewer N effluent per home: update based on expected performance of sewer system and wastewater treatment plant.
- **C19 & C20:** N mg/liter influent and daily gallons per home: assumed nitrogen influent **into** the wastewater system from homes in the project area, based on nitrogen concentration in wastewater (C19) and total wastewater volume (C20).

Town Demogr. Tab

- **Purpose**: Town-specific housing data.
- **Action**: Update Single Family Home figures in **Column C** (C2:C16) using current data from reliable sources.

This tab's housing data was pulled from https://datacapecod.org/pf/housing-typology/. The source may not be current, and the user is encouraged to find their town and adjust the Single-Family Home figure in Column C to reflect town assumptions.

Town Cost Calc Tab

- **Purpose**: Estimate total costs and the optimal ratio of sewer to septic projects.

1. **Review WWTP Investment (Y/N)**: Indicate if WWTP costs apply.

This tab is meant to help the user find total cost, total number of homes that need to be addressed, and the ideal ratio of sewer:EIA septic projects to meet town goals. This tab is good for attempting to find a total cost figure but has a limit in that the cadence of the work being completed is held constant at 1/20th per year until complete. There are four inputs:

Step 1 Enter the Town Code

- *Find Town Code in **Column E**, type the number corresponding to your town in **Cell B2.** This code will help tailor the calculations to your specific location.*

Step 2 Input the % of Sewer Projects

Cell B3 represents the allocation of projects to be identified as SEWER. This Number has a LARGE impact on the resulting figures. Allocate between sewer and EIA septic projects. Enter only one value here for "% Sewer. DO NOT modify D3 as it updates automatically. *This step allows you to allocate the proportion of work between **Sewer Projects** and **EIA Septic Projects**.*

- *If your town has estimates for sewer connections or EIA septic installations, enter those values here.*
- *If these values are unknown, try different allocations until you achieve a balanced and realistic output.*

Step 3 Enter the % of the Town Remediated

Adjust until nitrogen reduction targets are met. Cells C10 & C11 will turn green when the nitrogen reduction target is met. Adjust Cell B4 and/or B3 incrementally to find the lowest possible % remediation and % sewer that still meet reduction targets.

- *After setting the allocation in Step 2, use this step to determine what percentage of homes in the town need remediation.*
- *Adjust this value through trial and error to identify the optimal percentage for meeting nitrogen (N) load reduction targets.*
- *Cells C10 and C11 provide a color-coded output to help you gauge progress:*
    - ***Green: Target Achieved!** The total number of homes involved in the project meets the nitrogen (N) reduction target.*
    - ***Red**: The remediation or sewer connection effort is insufficient to meet the target.*
        - *If the output is red, increase the value in **Cell B3** (Sewer allocation) and/or the percentage of homes remediated in **Cell B4**.*

Step 4-- Review WWTP Investment (Y/N)

- *Indicate whether there will be **Wastewater Treatment Plant (WWTP) costs** associated with sewer projects:*
    - ***Yes**: Select if sewer projects will incur WWTP-related costs. (Ex. Construction of a new WWTP or expansion of an existing one)*
    - ***No**: Select if no additional WWTP costs are expected.*

Tips for Effective Use

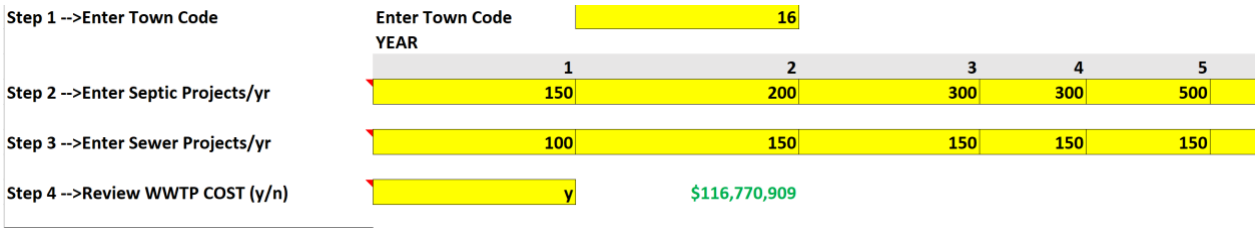
- *Resource Planning: Steps 2 and 3 are easier if you have a clear understanding of the current and potential resources allocated to sewer projects.*
- *Adjustable Strategy: Use Step 3 to fine-tune the number of homes involved, balancing project scope and nitrogen reduction goals.*
- *Cost-Benefit Tradeoff: More Sewer Projects reduce the number of homes needed to achieve the nitrogen reduction target but increase overall project costs.*
- *EIA Septic Projects: Can be more cost-effective but may require remediating more homes.*
- *This tab helps assess the trade-offs between sewer and septic projects, enabling you to allocate resources efficiently and achieve nitrogen load reduction targets effectively.*

#Projects Cost Calc Tab

- **Purpose**: Flexible cost analysis for customized project phasing.
- **Steps**:
    - Input yearly figures for EIA septic systems and sewer connections.
    - Adjust inputs to observe cost impacts.

This tab is meant to provide much more flexibility in looking at cost figures by allowing the user to manually input each year's sewer/EIA septic projects. The user can therefore look at any number of projects over the course of the project timeline and when/if the number of projects entered hits the N load reduction target. It could also be applied to pilot program design. It can also be used to look at watershed specific areas to identify costs and nitrogen reduction figures.

For this tab, Step 1 and Step 4 are the same as the Town Cost Calc tab. In Step 2 and Step 3, input the number of EIA septic systems and the number of homes projected to be connected to the sewer system over the course of the next 20 years.



Step 1 -->Enter Town Code	Enter Town Code	16				
	YEAR					
		1	2	3	4	5
Step 2 -->Enter Septic Projects/yr		150	200	300	300	500
Step 3 -->Enter Sewer Projects/yr		100	150	150	150	150
Step 4 -->Review WWTP COST (y/n)		y	$116,770,909			

Tips for Effective Use

- The input on this tab allows the user to quickly see how the allocation between sewer and EIA septic affects costs.
- This tab is also designed to show the user the importance of being mindful of the cadence of work being performed,

- The faster the projects get completed the lower the overall cost. Trial and error is encouraged to adjust project pacing.

WWTP Worksheet Tab

- **Purpose**: Estimate WWTP-related costs.
- **Inputs**:
    - **CapEx**: Construction costs.
    - **OpEx**: Operational costs.

Not all towns will have to devote resources to enhancing or building Waste Water Treatment Plants (WWTP). In that instance, the input cells on this sheet are not necessary. For towns where this is necessary there are two sections for input. One is associated with the "Town Cost Calc" and the other is associated with the "#Projects Cost Calc."

The user will also notice two areas where they can change variables. CapEx items are costs associated with either new build or construction. OpEx are the costs associated with operating WWTP. The user is able modify highlighted cells wherever possible.

FOR TOWN COST CALC TAB	
Town	16
WWTP Estimated Cost	$ 105,797,921
CapEx (non-recurring)	
Design+Construction	$ 98,921,056
Capital Replacement Reserve (1.5%)	$ 1,586,969
Long-term Upgrades	
Contingency Fund (5%)	$ 5,289,896
CapEX Total	$ 105,797,921
OpEx (per year)	
Total Personnel Cost	$ -
Energy Costs	
Chemicals/Consumables	
Monitoring/Testing	
Waste Disposal (incld PFAS)	
Routine Maintenance	
Emergency Repairs	
Travel/Vehicle Costs	
Permits/Inspections	
Fines/Penalties	
Billing System Management	
Customer Support	
OpEx Total	$ -

FOR #PROJECTS COST CALC	
Town	16
WWTP Estimated Cost	$ 116,770,909
CapEx (non-recurring)	
Design+Construction	$ 109,180,800
Capital Replacement Reserve (1.5%)	$ 1,751,564
Long-term Upgrades	
Contingency Fund (5%)	$ 5,838,545
Total	$ 116,770,909
OpEx (per year)	
Total Personnel Cost	
Energy Costs	
Chemicals/Consumables	
Monitoring/Testing	
Waste Disposal (incld PFAS)	
Routine Maintenance	
Emergency Repairs	
Travel/Vehicle Costs	
Permits/Inspections	
Fines/Penalties	
Billing System Management	
Customer Support	
OpEx Total	$ -

Tips for Effective Use

- The User must only change or type responses in highlighted cells and cells can be left blank or unchanged.

- This calculation will affect the costs associated with sewer in this model. Even if a town's entire population is paying this cost, we wanted to show the user that WWTP's are a cost born from the need to build sewer.
- These inputs are to encourage thought around WWTP costs. The cost of capital, inflation, and time to complete build have not been accounted for.
- ***ONCE COMPLETE Return to the SUMMARY OUTPUT TAB to view key figures.***

General Guidelines Regarding Financial Models

What Financial Models Are Good At:

1. **Forecasting and Planning**: Financial models excel at projecting future financial performance based on historical data and assumptions. This helps with budgeting, financial planning, and setting expectations for future financial health.
2. **Decision Making**: They provide a quantitative basis for making informed business decisions, such as whether to proceed with a new project, investment, or acquisition.
3. **Valuation**: Models are crucial for determining the value of businesses, stocks, or any other assets, helping investors and companies in merger and acquisition activities, or in assessing investment opportunities.
4. **Risk Analysis**: They can quantify potential risks by simulating different scenarios and their impacts on financial performance, aiding risk management and contingency planning.

What Financial Models Are Not Good At:

1. **Predicting Uncertainty**: While financial models can account for some degree of variability, they cannot predict unforeseen events or disruptions (like global pandemics or sudden market crashes) with high accuracy.
2. **Capturing Qualitative Factors**: Models primarily deal with quantitative data and may overlook qualitative aspects such as management quality, brand value, or market trends, which can significantly influence financial outcomes.
3. **Adapting to Rapid Changes**: Financial models are based on assumptions that may become outdated quickly due to rapid market or economic changes, requiring constant updates and revisions.

Disclosure

Use with Caution: Always remember the limitations of your model and use it as one of several tools in decision-making processes. Financial models should complement, not replace, other forms of analysis and intuition.

In summary, financial models are powerful tools for financial analysis and decision-making but come with limitations, particularly regarding unpredictability and qualitative factors. Effective use of financial models involves understanding these limitations, continuous refinement, and combining model insights with broader business acumen.