User Manual for
Province of Newfoundland & Labrador
Department of Environment and Climate Change
Water Resources Management Division
Full Cost Accounting Assessment Tool (2026)

Purpose of this Manual

This manual is intended to serve as a guide to assist users as they complete the Cost Accounting Tool. Screen shots of the tool have been included to clarify how it should be filled out and to assist with interpreting the generated results.

Description of the Full Cost Accounting Assessment Tool

The purpose of the Full Cost Accounting Assessment Tool is to help owners of public drinking water systems in the Province of Newfoundland and Labrador to predict the costs of operating their systems to establish water taxes that will adequately fund proper operation. The second part of the Full Cost Accounting Assessment Tool is for communities that are considering upgrades to their treatment system. The third part of the Full Cost Accounting Assessment Tool is for communities who wish to calculate the cost of eventual replacement of discrete elements. The Full Cost Accounting Assessment Tool will generate a water tax based on predicted capital and annual operation and maintenance costs. The sole purpose of the Full Cost Accounting Assessment Tool is to provide information for establishing water taxes. It should not be used to estimate capital budgets. Non-Operating costs such as depreciation and debt servicing, which are typically costs included in full-cost accounting for water systems, have not been included in the calculations. Provincial or Federal sales or services taxes have also not been included. The Full Cost Accounting Assessment Tool is set-up to determine the amount of revenue that is needed to cover the operating costs by detailing the typical operating costs for a water system on a break even basis.

General Instructions

Complete the tool by filling out data in each of the relevant tabs. The tool includes three parts: Part 1 is an analysis of the existing operation and maintenance costs and water taxes, Part 2 is an analysis of future upgrade costs for communities that are considering upgrades to their water treatment system(s) and Part 3 is analysis of annual infrastructure replacement cost.

Buttons have been placed throughout the tool to assist with navigation from one tab to the next, as well as to access pages containing additional information.

Data entry cells have a white fill and a black outline. This tool also uses drop-down menus and selector buttons.

Where prompted, enter the most recent available information. For communities with more than one water supply system, the tool may be completed separately for each system, or it can be completed for all systems at once. However, if completing the tool for more than one system, make sure to add the values for all systems before entering in the data entry cells.

Limitations

A number of assumptions were used in developing this tool, which should be considered when evaluating and interpreting the results. Some of the assumptions are listed below.

This program relies on conceptual cost curves to predict capital and operation and maintenance costs based on user entered data. The cost data is based on 2025 costs and is inflated using 3% inflation rate for subsequent years.

The cost curves were developed based on data from water supply systems constructed in Newfoundland and Labrador and information supplied by various vendors. The curves were calculated based on many assumptions and allowances. The program is intended only to help communities establish water taxes. Cost predictions generated by the program do not include depreciation. The tool does not consider existing non-operating expenses such as debt servicing. All cost predictions are provided in Canadian dollars. Cost opinions DO NOT include applicable taxes.

The cost predictions generated through this tool do not include special costs for land acquisition, permit costs, legal fees, or site specific costs. Actual capital costs and operation and maintenance costs for system upgrades may vary substantially from those calculated by this program. It is recommended that a site specific engineering study should be completed to establish costs used for capital budgeting.

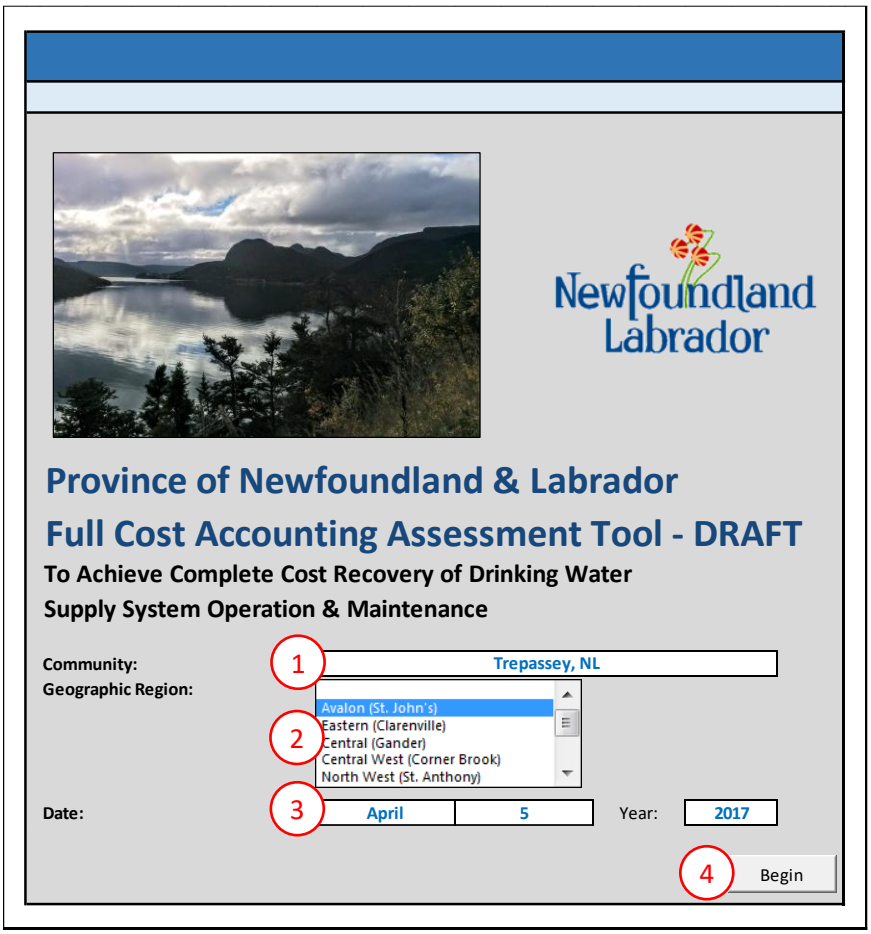
Step-by-Step Instructions

Title Page

The user must enter the community name, the region where the community is located, and the date. This information is required. The date is used as a benchmark for inflating costs and the geographic region is used to adjust capital and operation and maintenance costs, which vary depending on the location within the Province.

After entering the information, click “Begin”.

Figure 1 – Full Cost Accounting Tool Title Page



1	User enters community name.
2	User selects geographic region. If unsure, select based on the closest Town to your community.
3	User enters Month on the first box then date on the second. Then year on the third bx indicated with the text “Year:”
4	After entering all information, the user must select “Begin”.

Table of Contents

The Table of Contents page is provided for information to the user. Click “Next Page” to proceed to the Description of Tool page, or click “Previous Page” to return to the Title page.

Description of Tool

The Description of Tool page is provided for information to the user. Click “Next Page” to proceed to the Instructions page, or click “Previous Page” to return to the Table of Contents.

Instructions

The Instructions page is provided for information to the user. Click “Next Page” to proceed to the Assumptions page, or click “Previous Page” to return to the Description of Tool page.

Assumptions

The Assumptions page is provided for information to the user. Click “Next Page” to proceed to the Start page, or click “Previous Page” to return to the Instructions page.

Start Page

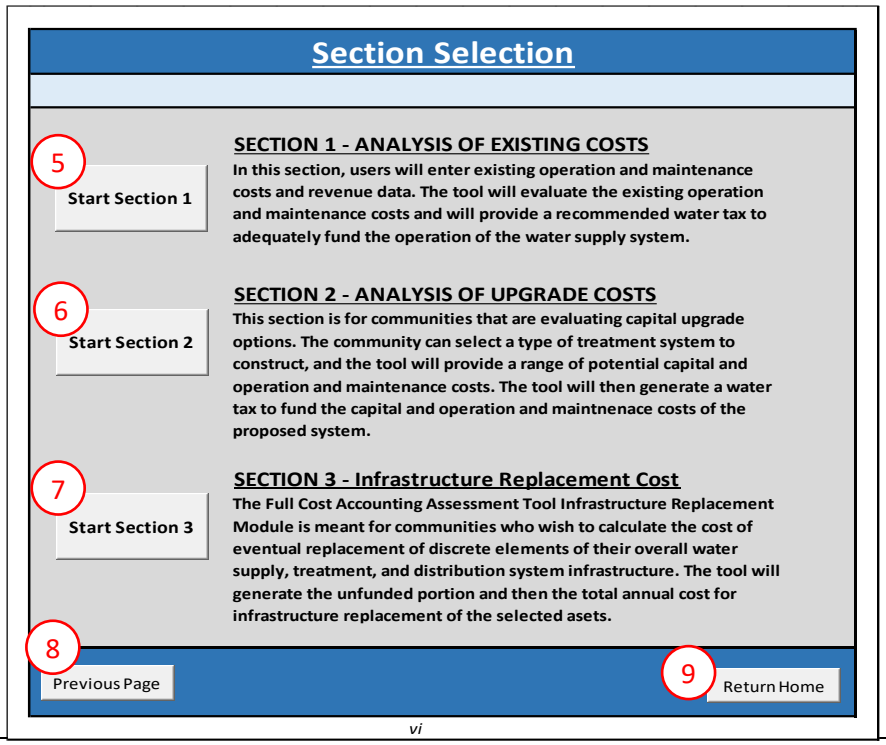
On this page, the user has the option of selecting whether to use Part 1 of the Tool or Part 2 of the Tool.

Part 1 is the analysis of existing costs and water rates. Under this section, users will enter existing operation and maintenance costs and revenue data. The tool will evaluate the existing costs and will provide a recommended water tax to fund the operation of the water supply system.

Part 2 is for communities that are evaluating capital upgrade options. The community can select a type of treatment system to construct, and the tool will provide a range of potential capital and operation and maintenance costs. The tool will then generate a water tax to fund the capital and operation and maintenance costs of the proposed system.

Part 3 is for communities that are evaluating annual cost of infrastructure replacement. The community can select a type of infrastructure asset to replace, and the tool will provide the age and price of the asset where annual cost can be calculated. The tool will generate the unfunded portion and then the total annual cost of the selected assets.

Figure 2 – Full Cost Accounting Tool Selection Section



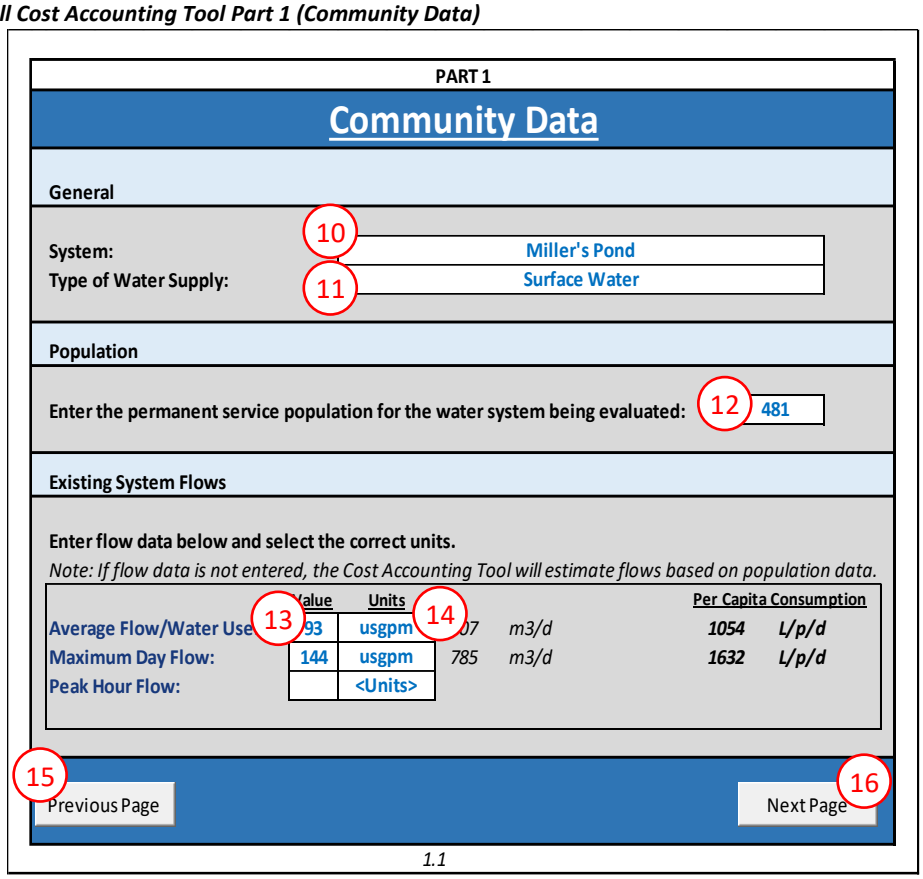
5	User presses the (Start Section 1) button to start Part 1 (Analysis of Existing Cost).
6	User presses the (Start Section 2) button to start Part 2 (Analysis of Upgraded Cost).
7	User presses the (Start Section 3) button to start Part 3 (Infrastructure Replacement Cost).
8	User may press the “Previous Page” button to return to Assumptions page.
9	User may press the “Home” button to return to the Title page.

Part 1 – Analysis of Existing Costs

Community Data

On this page, enter the name of the supply system, whether the source is a surface water or ground water, the community's population, and flow data, if it is available. If completing the tool for multiple systems that are operated by the community, enter the total population served by the water supplies.

Figure 3 – Full Cost Accounting Tool Part 1 (Community Data)

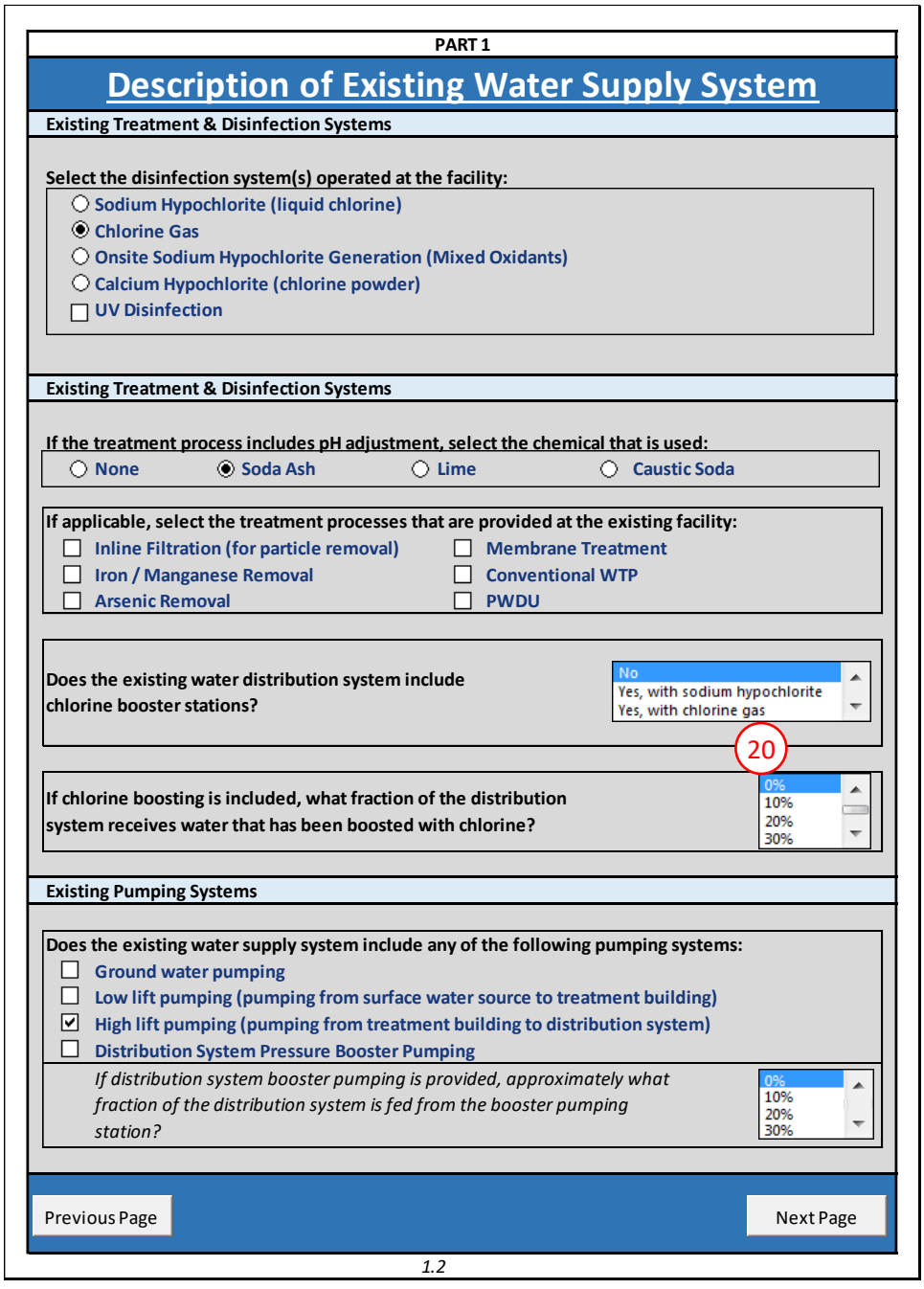


10	User enters the name of the system or water supply.
11	User selects whether the source water is groundwater or surface water.
12	Enter the population serviced by the water supply system(s).
13	User enters the data of flow records if they are available. Otherwise, the values will be assumed based on population. Description of terms: • Average Flow/Water Use represents the typical volume of water sent to the distribution system on a daily basis. • Maximum Day Flow represents the maximum amount of water sent to the distribution system in a 24 hour period during a calendar year. • Peak Hour Flow represents the maximum amount of water sent to the distribution system in a one hour period during the calendar year. **Note:** If the user does not know the value for average flow, maximum day flow, or peak hour flow, leave the field blank, and the cost accounting tool will estimate the unknown flow data based on the community population.
14	The user must select the type of flow units to use when entering the flow data. The options include US gallons per minute (USgpm), imperial gallons per minute (igpm), and cubic meters per day (m3/d). The cost accounting tool then converts the flows to cubic meters per day.
15	Press "Previous Page" button to return to previous page. In this case it returns the user to the start page.
16	Press "Next Page" button to proceed to the "Existing System" page.

Description of Existing System

On this page, the user will enter information about the water supply system. The cost accounting tool then uses this information along with the information entered on the Community Data page to calculate the recommended investments that the community should put towards the water system.

Figure 4 – Full Cost Accounting Tool Part 1 (Description of Existing Water Supply System)

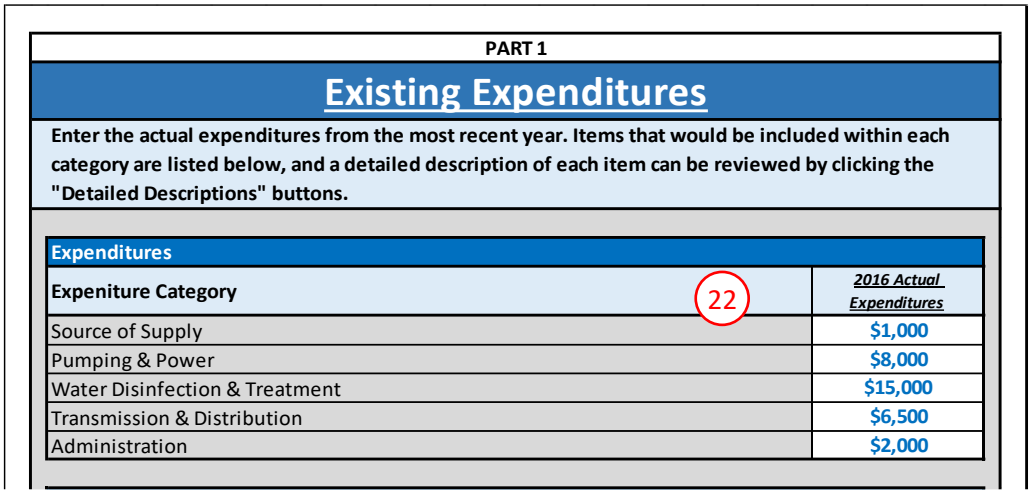


17	User selects the type of disinfection process(es) used at the water treatment facility, as well as if a UV disinfection system is operated.
18	For facilities that practice pH adjustment, the operator should select the type of chemical that is used. The options include Soda Ash, Lime, and Caustic Soda.
19	User selects the types of treatment processes that are operated at the treatment facility. Treatment systems could include inline filtration, membrane treatment, iron and/or manganese removal, conventional water treatment (coagulation, flocculation, clarification, and filtration), arsenic removal, and potable water dispensing units.
20	For communities that have chlorine booster stations within the distribution system, select the type of chlorine chemical that is used at the booster station, as well as the approximate fraction of the community that is downstream from the booster station. These are often found at locations downstream of treated water storage tanks.
21	Users should select any of the types of pumps that are included within their water supply system. If the community has booster pumps within the system, the user should enter the approximate fraction of the community that is downstream of the pumping station. **Note**: Groundwater pumping is only used in groundwater systems. Low lift pumping would be selected in surface water systems where water is pumped from the source to the treatment plant. High lift pumping is considered the pumping from the treatment facility to the distribution system. In many systems, pumping stations are located within the distribution system.

Existing Expenditures

On this page, the user will be entering information about the community's expenditures for operating the water supply system.

Figure 5 – Full Cost Accounting Tool Part 1 (Existing Expenditures)



PART 1

Existing Expenditures

Enter the actual expenditures from the most recent year. Items that would be included within each category are listed below, and a detailed description of each item can be reviewed by clicking the "Detailed Descriptions" buttons.

Expenditures		
Expeniture Category	22	***2016 Actual Expenditures***
Source of Supply		$1,000
Pumping & Power		$8,000
Water Disinfection & Treatment		$15,000
Transmission & Distribution		$6,500
Administration		$2,000

22	Enter the expenditures as they relate to the source of supply, pumping and power, disinfection and treatment, transmission and distribution, and administration. While many smaller communities do not break-down expenses into categories, the user should attempt to do this, in order to obtain the most accurate results from the Cost Accounting Tool.

Items that are covered in each of the categories are described in detail below.

Source of Supply:

Items covered under this category relate to the maintenance of the surface watershed for surface water supplies and the recharge area for groundwater supplies. These may include:

Wages and Benefits – This expense item is the estimated cost for staff to maintain the watershed or groundwater recharge area. Staff time could relate to cleaning of intake screens for surface water, tree cutting, garbage collection, placement and maintenance of signage, fencing and responding to public concerns to name a few items. Benefits relate to overheads including matching contributions for income tax, CPP, EI, health plans and vacations are included.

Maintenance of Source of Supply Surface Watersheds including Travel – This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the surface watershed. This item might include replacing intake screen, materials for maintenance of the intake screens, gravel, stone or concrete for dam and/or intake maintenance, signage, gravel for roads and travel to the undertake work to name a few.

Maintenance of Source of Supply Groundwater Recharge Areas including Travel - This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the groundwater recharge area. This item might include drilling new supply and/or monitoring wells, cleaning screens on existing wells, wellhead maintenance, signage, gravel for roads, fencing and travel to undertake work to name a few.

Professional Services – This expense item relates to the hiring of outside consultants to undertake works that require professional input relating to the Source of Supply.

Other – This category is included such that the Operator/Supervisor can add other items that are unique to the location.

Power and Pumping:
Items covered under this category relate to the operation and maintenance of all pumping equipment associated with the water system including supply pumps for surface water, supply/well pumps for groundwater and booster pumps to boost water pressure in the distribution network. These may include:

Wages and Benefits – This expense item is the estimated cost for staff to operate and maintain all the pumping equipment in the system. Staff time could relate to routine checking of pump operation, routine cleaning and lubrication, and pressure checks to ensure the pumps are operating as per the requirements of the system. Benefits relate to overheads including matching contributions for income tax, CPP, EI, health plans and vacations are included.

Maintenance of Pumps and Controls including Travel - This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the pumping equipment including pump controls. This item might include routine maintenance of pumps, monitoring of electrical power consumption, monitoring of pump outputs if flow meters are installed, inspection of pump control panels and travel to undertake work to name a few.

Electricity – This expense is to cover the cost of supplying electricity to the pumping equipment including electricity for space heating if required.

Fuel for Generators and Building Heat – This expense is to cover the cost of fuel for generators, diesel/gasoline powered backup pumps and heating oil/propane for building heat.

Professional Services – This expense item relates to the hiring of outside consultants to undertake works that require professional input relating to pumping requirements in the system.

Other – This category is included such that the Operator/Supervisor can add other items that are unique to the location.

Water Treatment:
Items covered under this category relate to the operation and maintenance of the water treatment equipment associated with water system including operation and maintenance of water treatment plants and chlorination systems. These may include:

Wages and Benefits – This expense item is the estimated cost for staff to operate and maintain the water treatment equipment. Staff time could relate to regular checking of treatment plant operation, adjustment of the treatment processes including chemical feed rates, routine testing to verify treatment requirements and performance, and routine chlorine residual testing as per the requirements of the regulators. Benefits relate to overheads including matching contributions for income tax, CPP, EI, health plans and vacations are included.

Maintenance of Pump Station Structures including Travel – This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the pump station structures. This item might include routine maintenance on the structures including repair of damage caused by vandalism and/or storms and travel to undertake required works to name a few.

Electricity and Fuel – This expense is to cover the cost of supplying electricity to the water treatment system including electricity and/or heating oil/propane for space heating if required.

Chemicals – This expense is to cover the cost of all chemicals used in the water treatment process.

Maintenance of Treatment Plant Equipment - This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the water treatment equipment. This item might include routine maintenance/replacement of chemical feed pumps, monitoring of electrical power consumption, monitoring of treatment plant production and backwash volumes, monitoring of turbidity and chlorine residual values to name a few.

Maintenance of Pump Station Structures – This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the water treatment plant structures. This item might include routine maintenance on the structures including repair of damage cause by vandalism and/or storms and travel to undertake work to name a few.

Maintenance of Computer Controls and SCADA– This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the computer systems in the water treatment plant including SCADA systems.

Materials and Supplies – This expense is to cover the cost of routine materials and supplies that are required for the operation of the Water Treatment Plant.

Sludge Handling and Disposal – This expense is to cover the cost of sludge handling at the Water Treatment Plant including short term storage, transportation (if required) and long term disposal.

Water Testing – This expense is to cover the cost of routine water testing as required for the operation by the Regulators of the Water Treatment Plant.

Vehicle Expense Including Vehicles and Operating Costs – This expense is to cover the cost of providing vehicles including operating costs that are required for the operation of the Water Treatment Plant. If dedicated vehicles are not required this expense item should be used for any travel expenses associated with the Water Treatment Plant.

Professional Services – This expense item relates to the hiring of outside consultants to undertake works that require professional input relating to pumping requirements in the system.

Other – This category is included such that the Operator/Supervisor can add other items that are unique to the location

Transmission and Distribution:
Items covered under this category relate to the operation and maintenance of all the water transmission and distribution system including the operation and maintenance of reservoirs/storage tanks, customer services/laterals and fire hydrants (if installed). These may include:

Wages and Benefits – This expense item is the estimated cost for staff to maintain and operate the water distribution network. Staff time could relate to locating and repairing leaks in distribution pipes including service laterals, routine maintenance of pressure reducing valves, maintenance and repair of reservoirs/storage tanks and any hydrants that may be installed in the water system. Benefits relate to overheads including matching contributions for income tax, CPP, EI, health plans and vacations are included.

Maintenance of Water Mains including Valves– This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining the water transmission and distribution pipes including valves. This item

might include routine maintenance such as valve exercising and watermain flushing, location and repair of leaks, any outside contractors who provide backhoes/excavators and/or other equipment to name a few.

Maintenance of Service Laterals to the Property Boundary – This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining and repairing service laterals to customer properties including location of shut off valves on water mains and curb shut off valves at the property boundary and any outside contractors who provide backhoes/excavators and/or other equipment.

Maintenance of Water Reservoirs and Storage Tanks – This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining and repairing all water reservoirs and storage tanks in the water distribution system. This item might include routine inspection for leaks, repairs to structures, and maintenance of altitude valves and any outside contractors who provide backhoes/excavators and/or other equipment to name a few.

Maintenance of Hydrants including Hydrant Valves – This expense item relates to expenses, other than Wages and Benefits, that pertain to maintaining hydrants (if installed) in the distribution system. This item might include routine maintenance such as painting, leak repairs, exercising hydrant valves and any outside contractors who provide backhoes/excavators and/or other equipment to name a few.

Cell Phones and Dedicated Communication Lines - This expense is to cover the cost of providing cell phones and any dedicated communication lines that may exist in the water distribution system.

Supplies/Materials/Tools and Equipment – This expense is to cover the cost of routine supplies, materials, tools and equipment that are required for the operation of the water distribution system.

Leak Detection – This expense is to cover the cost of leak detection services provided by outside service providers.

Vehicle Expense Including Vehicles and Operating Costs – This expense is to cover the cost of providing vehicles including operating costs that are required for the operation and maintenance of the distribution system. If dedicated vehicles are not required this expense item should be used for any travel expenses associated with the water distribution system.

Professional Services – This expense item relates to the hiring of outside consultants to undertake works that require professional input relating to pumping requirements in the system.

Other – This category is included such that the Operator/Supervisor can add other items that are unique to the location

Administration and General:
Items covered under this category relate the overall administration of the water system including customer service, billing, annual audits and the provision of insurance.

Wages and Benefits – This expense item is the estimated cost for staff to administer the water system. Staff time could relate to receiving and directing phone calls, preparation of bills for the water service, collection of bills, annual audit and provision of insurance. Benefits relate to overheads including matching contributions for income tax, CPP, EI, health plans and vacations are included.

Administrative Office/Phones/Billing/Supplies - This expense item relates to expenses, other than Wages and Benefits, that pertain to operating the administration office. This item might include office space, office

supplies, postage, computer allowance including software, phones, billing and miscellaneous office supplies to name a few.

Allowance for Doubtful Accounts – This expense is to cover the cost of doubtful accounts or bills that have been issued and payment is doubtful.

Rents/Building Operation/Maintenance – This expense is to cover the cost of any building, or part of a building that are provided for the operation of the water system.

Liability and Facility Insurance – This expense is to cover the cost of any insurance required for the operation of the water system.

Regulatory/Legal/Auditor – This expense is to cover the cost of any regulatory requirements such as water rights, legal advice and audit services required by the water system.

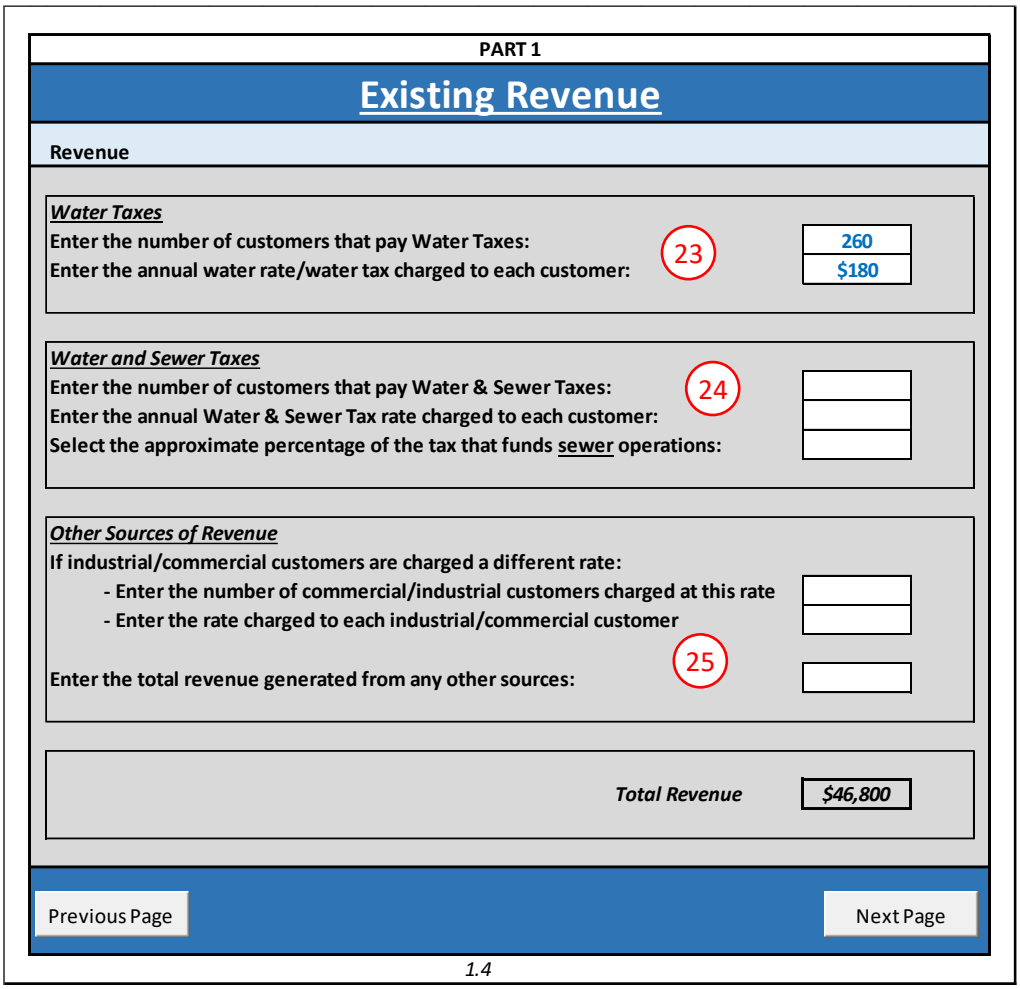
Professional Services – This expense item relates to the hiring of outside consultants to undertake works that require professional input relating to pumping requirements in the system.

Other – This category is included such that the Operator/Supervisor can add other items that are unique to the location.

Existing Revenue

On this page, enter all sources of revenue related to the water supply system. For communities that have Water and Sewer Taxes, the revenue generated that goes towards the sewer system should be removed from the amount. This can be approximated in the tool by selecting the approximate percentage of Water and Sewer taxes that is invested in sewer operation and maintenance.

Figure 6 – Full Cost Accounting Tool Part 1 (Existing Revenue)



23	Enter the number of customers that pay water taxes and amount of the water rate/water tax charged to each costumer.
24	Enter the number of customers that pay combined water and sewer taxes, the amount of the combined rate/ tax charged to each customer, along with an estimate of the portion used for sewer vs. water.
25	Enter commercial/industrial revenue sources, or other sources of revenue generated from the provision of drinking water.

Part 1 Results

This page displays the results of the analysis of the community's existing operation and maintenance budget. The page is divided into three sections. The first section examines the existing balance, comparing the current total revenue with total expenditures. For system achieving full cost recovery, the balance should be zero.

In the second section, the tool compares the actual expenditures entered by the user with a recommended value that is calculated by the Tool based on the user inputs. The recommended investment includes the costs for operating a preventive maintenance program and includes labour costs.

The third section compares the existing water tax rate with the amount that should be charged to customers to fund existing water supply system operation and maintenance. It also provides a recommended tax that would allow full cost recovery if the community were to increase water supply system related expenditures to the recommended investment level.

It should be noted that the Minimum Tax to Fund Recommended Investment may be substantially higher than the community's current tax. This does not meant that it should be disregarded because it is excessive, but instead is intended to indicate that the amount being spent on the system should be increased in order to provide a more reliable and safe water supply. Community representatives should evaluate where additional money could be spent to improve operations.

Figure 7– Full Cost Accounting Tool Part 1 (Results)

PART 1

Results

Current Balance

Total Revenue	$46,800
Total Expenditures	$32,500
Balance (26)	$14,300

Evaluation of Existing Costs

Item (27)	*Actual 2016*	*Recommended Annual Investment*[1]
Source of Supply	$1,000	$10,700
Pumping	$8,000	$12,300
Treatment & Disinfection	$15,000	$31,500
Transmission & Distribution	$6,500	$50,600
Administration	$2,000	$10,510
Total	$32,500	$115,610

This result indicates that the community should consider increasing the budget for operation and maintenance of the water supply system.

[1] *Recommended investments were estimated based on the size of the community and characteristics of the water supply system. These values were estimated assuming best practices are followed for items such as montoring, preventive maintenance, etc. While every water supply system is unique, large variations between actual and typical expenditures may indicate that actual budgets should be re-evaluated.*

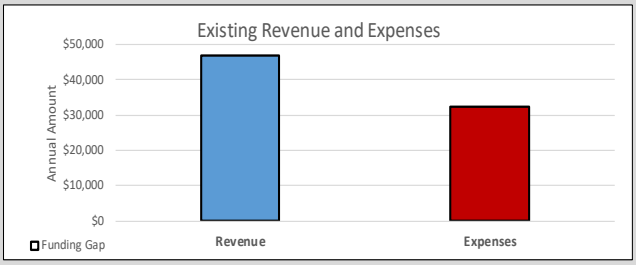
Gap Analysis

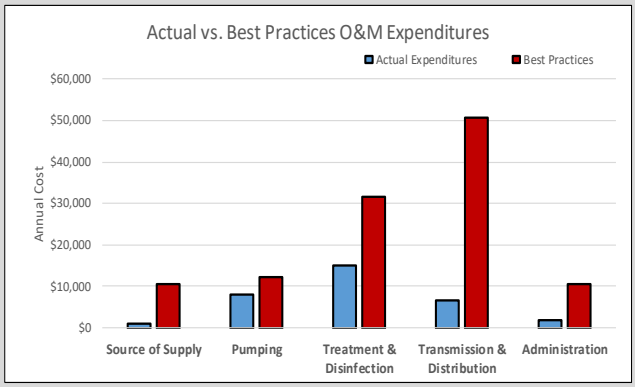
	Annual Water Tax per Customer	Gap From Current
Current (28)	$180	-
Minimum to Fund Existing Operations	$125	-$55
Minimum to Fund Recommended Investment (29)	$445	$265

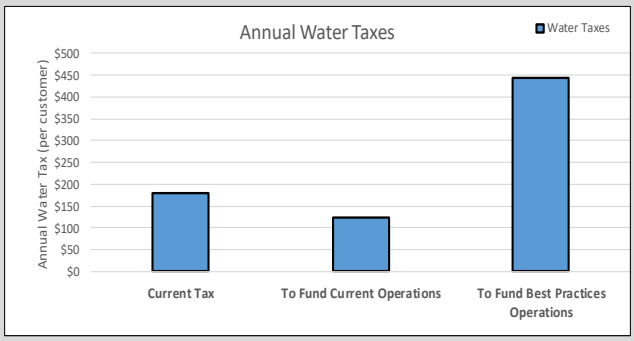
Water taxes are sufficient to fund existing operations. If operations costs are increased, the tax rate should be re-evaluated.

Previous Page | Home | Begin Part 2

1.5







26	This indicates that the community presently operates at a surplus depending on the total revenue and total expenditures.
27	The cost tool predicts the amount that should be spent annually to conform with best practices.
28	This is the minimum annual water tax required to fund existing operations.
29	This is the minimum water tax that would be required to fund the recommended investment.

Part 2 – Analysis of Upgrade Costs

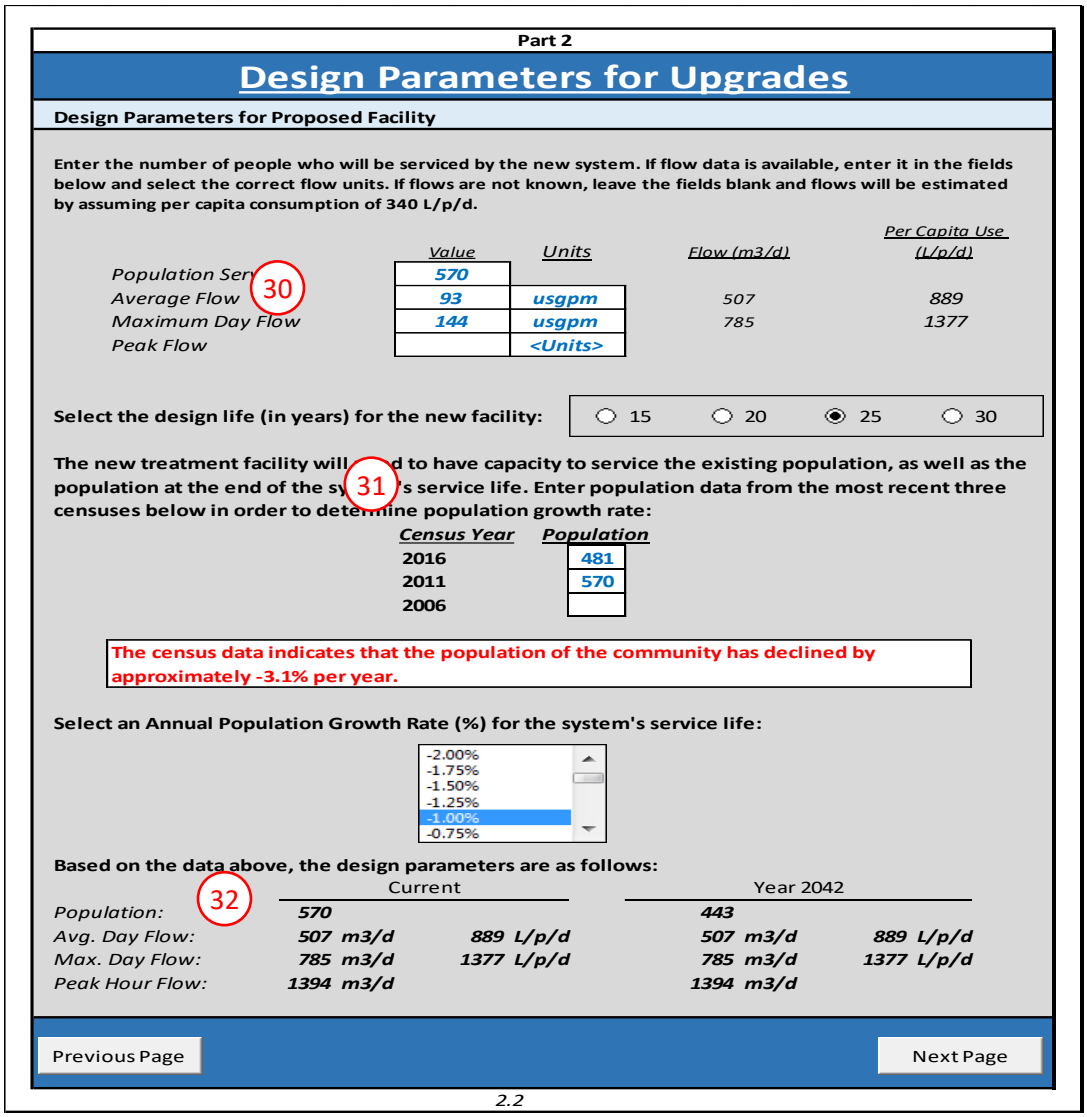
This section of the Full Cost Accounting Assessment Tool is for communities that are considering upgrades to their water supply system. The first part of this section Enter information to describe the proposed upgrades as well as the existing components that will remain in operation. From the information, the Tool will use cost ratings curves to generate an opinion of capital and operation and maintenance costs. The Full Cost Accounting Assessment Tool will then calculate a water tax that would allow the community to achieve full cost recovery.

If a cost estimate for an upgrade has already been developed by an engineer or other qualified professional, this value should be entered in the Upgrade Costs page, as such costs are considered to be more accurate than the costs predicted by the tool.

Costs predicted by the Full Cost Accounting Assessment Tool do not include: Provincial or Federal sales or service taxes, depreciation, or existing non-operating expenses such as debt servicing.
If a particular type of upgrade is not included in the tool, the user should enter the value manually on the upgrade costs page. Operation and maintenance costs for items entered manually will not be captured by the Full Cost Accounting Assessment Tool, and therefore, the user should keep this in mind when evaluating the recommended future water tax result.

Design Parameters

Figure 8 – Full Cost Accounting Tool Part 2 (Design Parameters for Update)



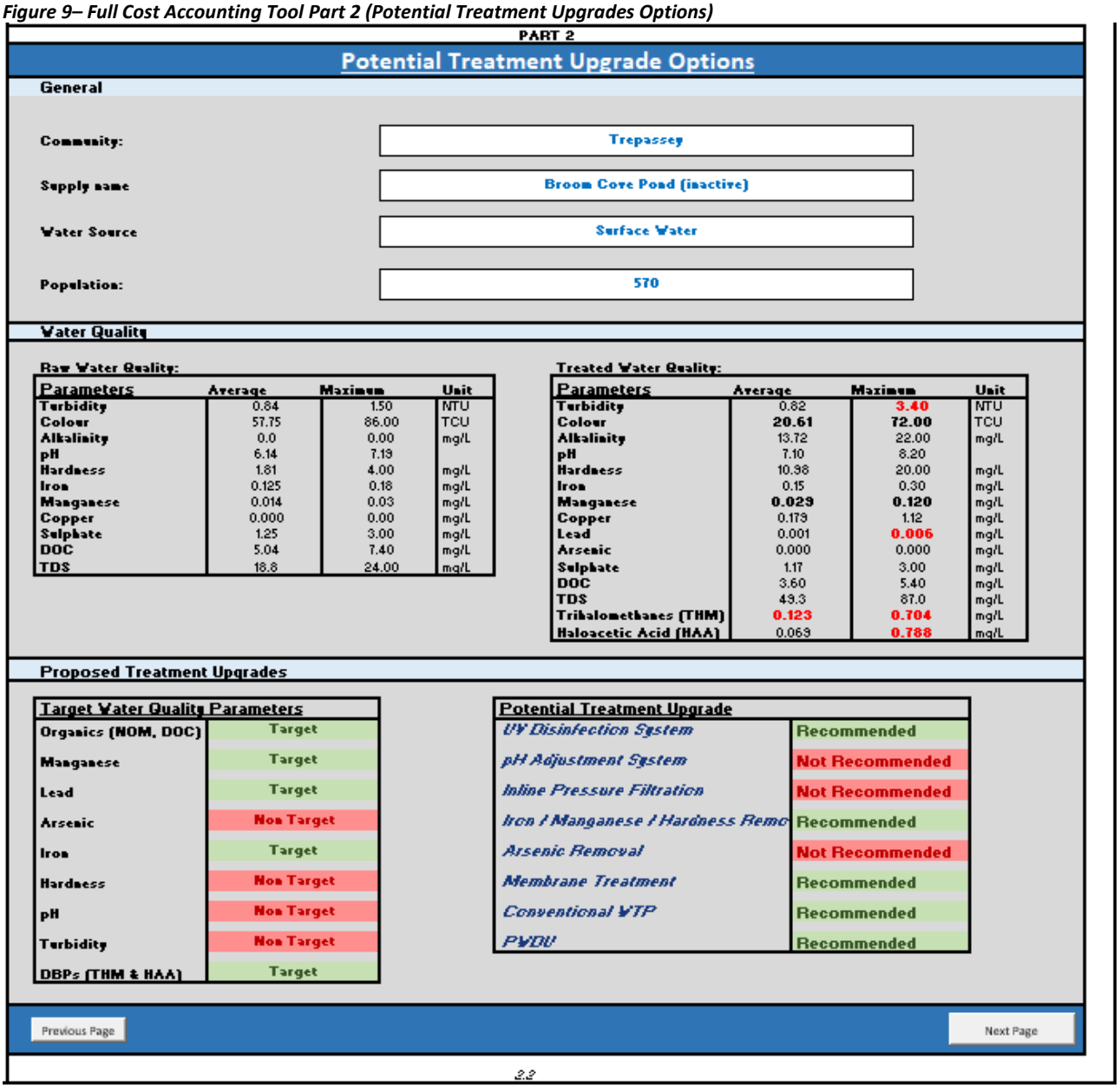
30	The user should enter information about the community size (population serviced) and the typical water consumption in the community. If flow data is not known, then the population data will be used by the Tool to estimate typical water flows.
31	The user is then prompted to enter the design life for the facility and select an annual population growth rate. These two parameters are used to predict a future population for which the treatment facility must be capable of servicing. The user has the option of entering recent census data into a table for the Tool to suggest a growth rate.
32	At the bottom of the page, the Tool lists the current and future design parameters, which include flows and population.

Because of leaks, industrial demands, and other unforeseen sources of consumption, actual flows may be significantly larger than those estimated by the Tool. Therefore, it is best to enter real flow data where it is available.

Potential Treatment Upgrade Options

This sheet can be used to screen potential treatment upgrades that may be feasible for the system, based on known raw and treated water quality which is automatically extracted from the publicly available data in the Newfoundland Water Resource Management Division Water Resources Portal. The user does not need to enter any information on this page. This page will generate potential treatment upgrades that may be suitable for the system, based on raw and treated water quality data automatically extracted from publicly available sources in the Newfoundland and Labrador Water Resources Portal.

Figure 9– Full Cost Accounting Tool Part 2 (Potential Treatment Upgrades Options)



PART 2

Potential Treatment Upgrade Options

General

Community:	Trepassey
Supply name	Broom Cove Pond (inactive)
Water Source	Surface Water
Population:	570

Water Quality

Raw Water Quality:

Parameters	Average	Maximum	Unit
Turbidity	0.84	1.50	NTU
Colour	57.75	86.00	TCU
Alkalinity	0.0	0.00	mg/L
pH	6.14	7.19	
Hardness	1.81	4.00	mg/L
Iron	0.125	0.18	mg/L
Manganese	0.014	0.03	mg/L
Copper	0.000	0.00	mg/L
Sulphate	1.25	3.00	mg/L
DOC	5.04	7.40	mg/L
TDS	18.8	24.00	mg/L

Treated Water Quality:

Parameters	Average	Maximum	Unit
Turbidity	0.82	3.40	NTU
Colour	20.61	72.00	TCU
Alkalinity	13.72	22.00	mg/L
pH	7.10	8.20	
Hardness	10.38	20.00	mg/L
Iron	0.15	0.30	mg/L
Manganese	0.029	0.120	mg/L
Copper	0.173	1.12	mg/L
Lead	0.001	0.006	mg/L
Arsenic	0.000	0.000	mg/L
Sulphate	1.17	3.00	mg/L
DOC	3.60	5.40	mg/L
TDS	49.3	87.0	mg/L
Trihalomethanes (THM)	0.123	0.704	mg/L
Haloacetic Acid (HAA)	0.069	0.788	mg/L

Proposed Treatment Upgrades

Target Water Quality Parameters	
Organics (NOM, DOC)	Target
Manganese	Target
Lead	Target
Arsenic	Non Target
Iron	Target
Hardness	Non Target
pH	Non Target
Turbidity	Non Target
DBPs (THM & HAA)	Target

Potential Treatment Upgrade	
UV Disinfection System	Recommended
pH Adjustment System	Not Recommended
Inline Pressure Filtration	Not Recommended
Iron / Manganese / Hardness Remo	Recommended
Arsenic Removal	Not Recommended
Membrane Treatment	Recommended
Conventional WTP	Recommended
PVDU	Recommended

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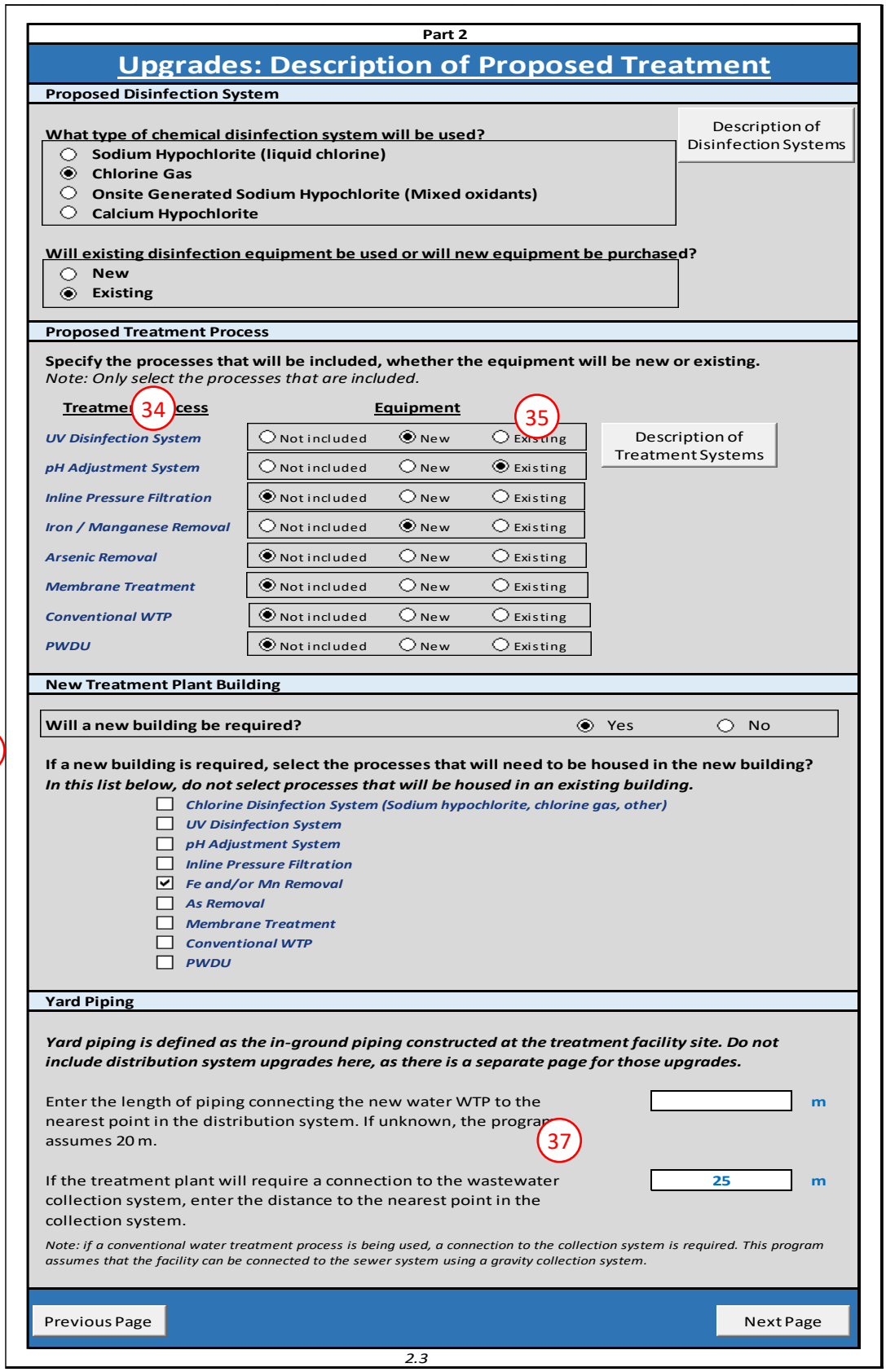
Proposed WTP

On this page, the user enters all information about the water treatment facility, including the existing equipment that will continue to be used after the upgrades, as well as the new components that will be added. The user must also select whether a new building will be required to hold any processes. In some cases a new building may be constructed for a new treatment process, and existing equipment may be moved into that building. In other cases, new equipment might

be installed within an existing space within the treatment building. It is up to the user to identify how the new system will be configured.

Figure 10– Full Cost Accounting Tool Part 2 (Upgrades: Description of Proposed Treatment)



33	The user must select the type of chlorine disinfection system that will be included after the community has completed the upgrades. The user must also select whether this will be a new disinfection system or an existing one.
34	The user will select treatment process one by one if they are: If it is not included, new or existing.
35	User presses "Description of treatment system" button to be directed to a detailed description of the treatment processes. Information is also listed below: • *pH Adjustment – Chemicals are added to increase pH in the distribution system for controlling corrosion.* • *Inline pressure filtration – Uses media in vessels to reduce turbidity and remove particles from the drinking water.* • *Iron or Manganese removal – For communities that have elevated concentrations of iron or manganese in their raw water. In Newfoundland and Labrador, the MAC for iron is 0.3 mg/L and the MAC for manganese is 0.05 mg/L.* • *Arsenic Removal – For communities that have elevated concentrations of arsenic in their raw water. In Newfoundland and Labrador, the MAC for arsenic is 0.01 mg/L.* • *Membrane Filtration – This is a physical treatment process that uses membranes to remove turbidity, particles, and organics. May reduce disinfection by-products and colour in the water.* • *Conventional WTP – Is a chemical based process for removing turbidity, particles and organics from the raw water. Can be used to reduce disinfection by-products and colour in the water.* • *Potable Water Dispensing Units (PWDUs) – suitable alternatives for smaller communities. The units include treatment, disinfection, and dispensing systems. Members of the community collect water for potable use from the units. Other non-potable uses are met through traditional distribution systems.*
36	The user can select if a new building is required and than which one is the process that requires a new building.
37	User enters information about yard piping at the treatment facility site.

Proposed Pumping

On this page, the user enters information about the types of pumps that will be included after the system has been upgraded. Pumping systems are defined below:

- *Well Pump – are submersible pumps installed within a well. Well pumps convey ground water to a well house, where water is disinfected and treated. This tool assumes that the flow remains pressurized through the well house and into the distribution system.*
- *Low Lift Pump – are pumps that are used to pump surface water from a surface water supply up to a treatment building.*
- *High Lift Pump – any pump that feeds water from a treatment building up to a distribution system.*

A selector button has also been provided to indicate if pumps are being installed within a new building or new addition to a building. This could include pumps that are being housed in a new building that is being constructed for other treatment processes or in a dedicated pump building.

Description of Distribution System Upgrades

On this page, the user will indicate if upgrades are being completed in the distribution. This could include the installation of new water main, new hydrants, valves, or a new treated water storage tank. This page may be skipped if the upgrades do not include any work in the distribution system.

For facilities adding a storage tank, the user must indicate whether or not a fire storage component is being provided. This is a decision that must be made by the community when planning their water supply system. Should the community require fire storage, this will need to be added by the user by selecting a fire flow rate and a fire flow duration. If the user is unaware of these values, then they may be left blank, and the Tool will assume these values.

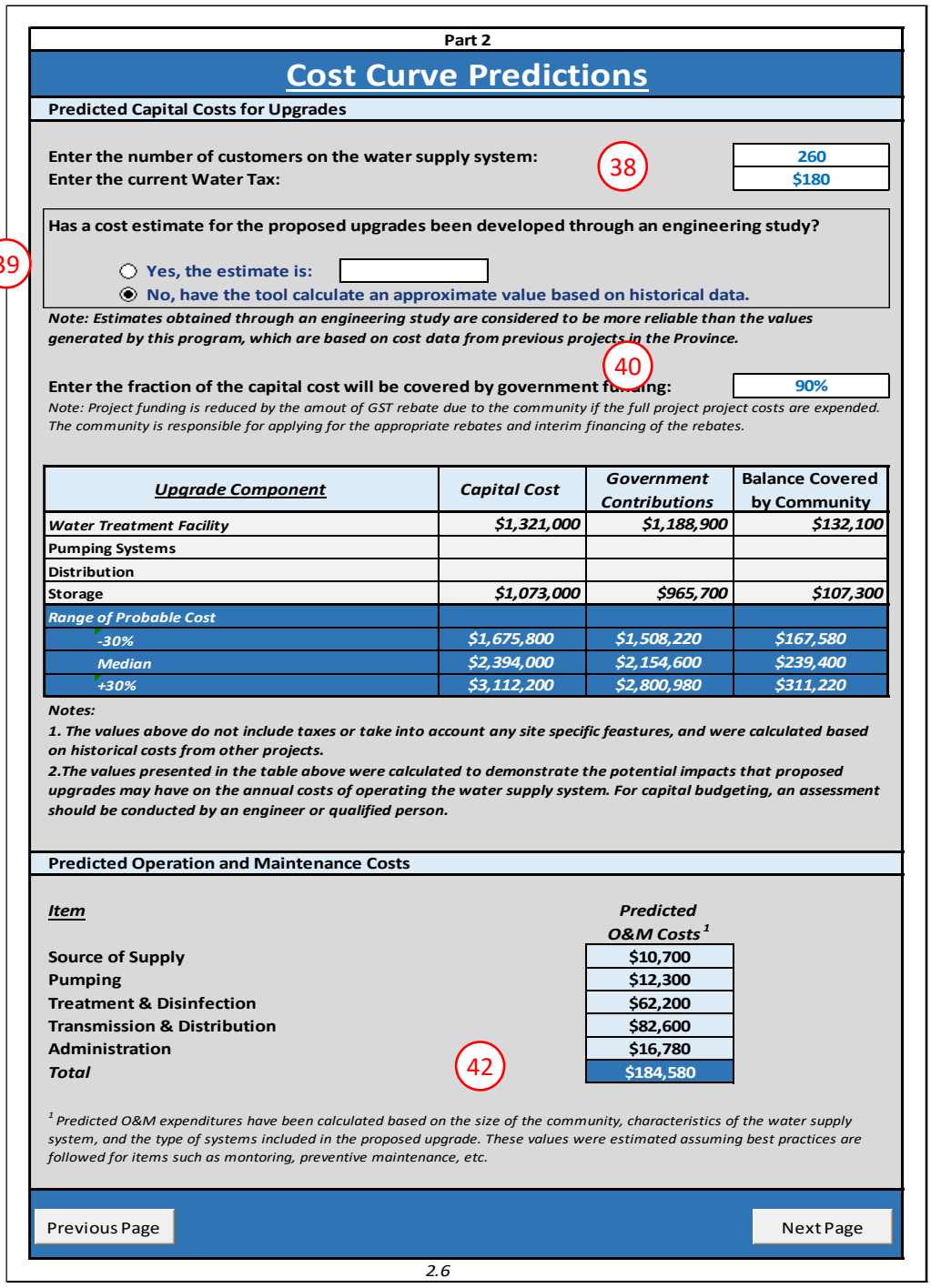
For communities that have elected to provide fire protection through their potable water supply system, fire flow requirements should be established through the appropriate Insurance Advisory Organization.

Upgrade Costs

The user should enter the number of customers that are presently connected the water supply system and the current annual water tax. The user must then select whether the capital costs used in the tool are calculated by the Tool, or entered manually based on a cost estimate that was provided by an engineer. If an assessment has been completed by an engineer, this data is considered to be more reliable than the value generated by the tool, and therefore it should be used. If an assessment has not yet been completed by an engineer, the Tool can estimate a value for the purposes of identifying potential water tax requirements to fund the operation of the upgrades.

If the community is likely to receive funding for the upgrades, the user may select the amount of funding that is likely to be provided. The tool then displays the approximate amount that could be covered by the community, as well as the operation and maintenance costs associated with the operation and maintenance.

Figure 11 – Full Cost Accounting Tool Part 2 (Cost Curve Predictions)



Part 2

Cost Curve Predictions

Predicted Capital Costs for Upgrades

38

Enter the number of customers on the water supply system: 260
Enter the current Water Tax: $180

39

Has a cost estimate for the proposed upgrades been developed through an engineering study?

- ○ Yes, the estimate is:
- ◉ No, have the tool calculate an approximate value based on historical data.

Note: Estimates obtained through an engineering study are considered to be more reliable than the values generated by this program, which are based on cost data from previous projects in the Province.

40

Enter the fraction of the capital cost will be covered by government funding: 90%

Note: Project funding is reduced by the amout of GST rebate due to the community if the full project project costs are expended. The community is responsible for applying for the appropriate rebates and interim financing of the rebates.

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Upgrade Component	*Capital Cost*	*Government Contributions*	Balance Covered by Community
Water Treatment Facility	*$1,321,000*	*$1,188,900*	*$132,100*
Pumping Systems			
Distribution			
Storage	*$1,073,000*	*$965,700*	*$107,300*
Range of Probable Cost			
-30%	*$1,675,800*	*$1,508,220*	*$167,580*
Median	*$2,394,000*	*$2,154,600*	*$239,400*
+30%	*$3,112,200*	*$2,800,980*	*$311,220*

Notes:
1. The values above do not include taxes or take into account any site specific feastures, and were calculated based on historical costs from other projects.
2.The values presented in the table above were calculated to demonstrate the potential impacts that proposed upgrades may have on the annual costs of operating the water supply system. For capital budgeting, an assessment should be conducted by an engineer or qualified person.

Predicted Operation and Maintenance Costs

42

Item	*Predicted O&M Costs*[1]
Source of Supply	$10,700
Pumping	$12,300
Treatment & Disinfection	$62,200
Transmission & Distribution	$82,600
Administration	$16,780
Total	$184,580

[1] *Predicted O&M expenditures have been calculated based on the size of the community, characteristics of the water supply system, and the type of systems included in the proposed upgrade. These values were estimated assuming best practices are followed for items such as montoring, preventive maintenance, etc.*

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38	The user enters the number of costumers on the water supply system and the current water tax.
39	If a site-specific cost estimate has been completed by an engineer or qualified person, the value should be entered in the box. If a site-specific cost estimate has not been completed, then the user may use the predicted cost generated by the tool by selecting “no, have the tool calculate an approximate value based on historical data.
40	User enters the % amount that will be covered by the government.
41	The tool will generate the predicted capital cost that should be covered by the community.
42	The tool will generate the operation and maintenance cost.

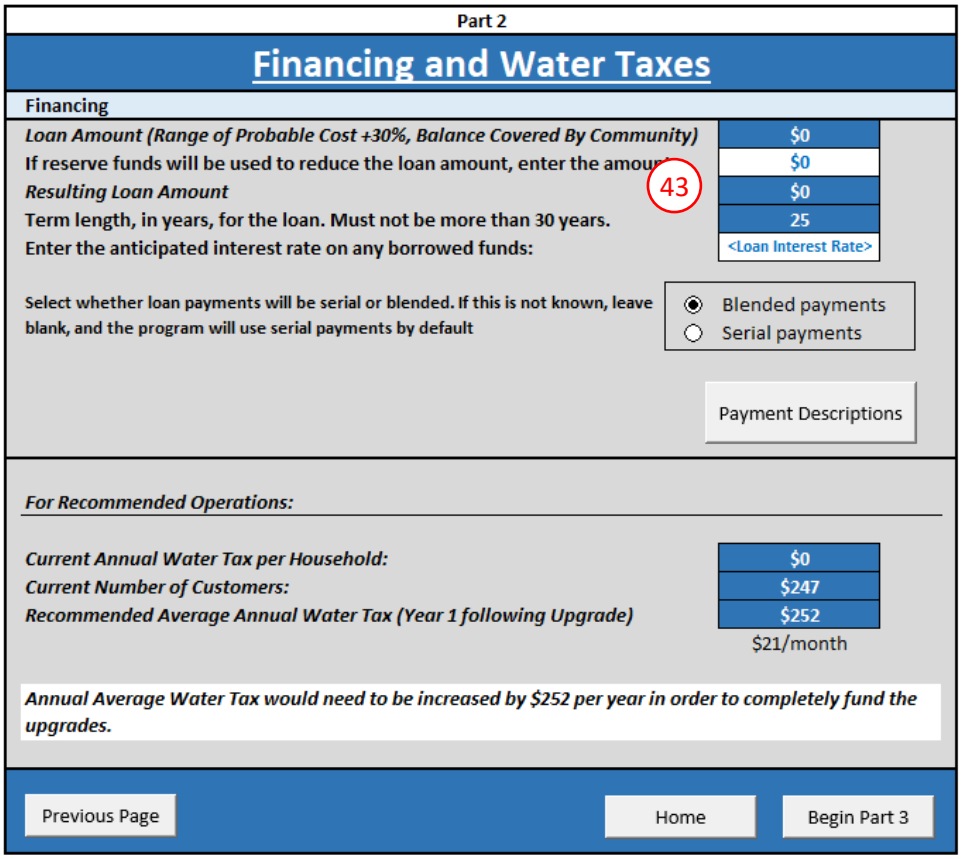
Financing

Enter the amount of funds that the community has reserved for the upgrades. The user will then enter terms of financing so the tool can calculate annual debt servicing costs. The user must specify the duration of a loan, the anticipated interest rate on any borrowed funds, and whether the loan will be paid through blended payments or serial payments. These are described below:

- *Blended payments is a loan repayment method where the loan is repaid in equal instalment amounts over the entire period of the loan*
- *Serial payments – is a loan repayment method where the principal is paid in equal amounts over the entire period of the loan. Interest payments decrease each period, meaning the highest annual payment is in the first year of the loan.*

The Tool generates several values and figures. It lists the current annual water tax per household and the number of customers. It then specifies the annual water tax that would need to be paid per household in the first year after the upgrades have been completed. The water tax was calculated to pay operation and maintenance costs of the system, and the loan repayment for the upgrades. The figures show the annual loan payments over the design period, as well as the total operation and maintenance costs and water taxes.

Figure 12 - Full Cost Accounting Tool Part 2 (Financing and Water Taxes)



43	The user enters the amount of reserve funds available and anticipated loan interest rate, as well as loan payment structure (blended vs. serial).

Part 3 – Analysis of Infrastructure Replacement Costs

The *Full Cost Accounting Assessment Tool Infrastructure Replacement Module* is meant for communities who wish to calculate the cost of eventual replacement of discrete elements of their overall water supply, treatment, and distribution system infrastructure. This cost is then totaled and annualized and can be combined with operation and maintenance costs from Part 1 to provide a complete annual cost for operation, maintenance, and savings for renewal of the existing system infrastructure.

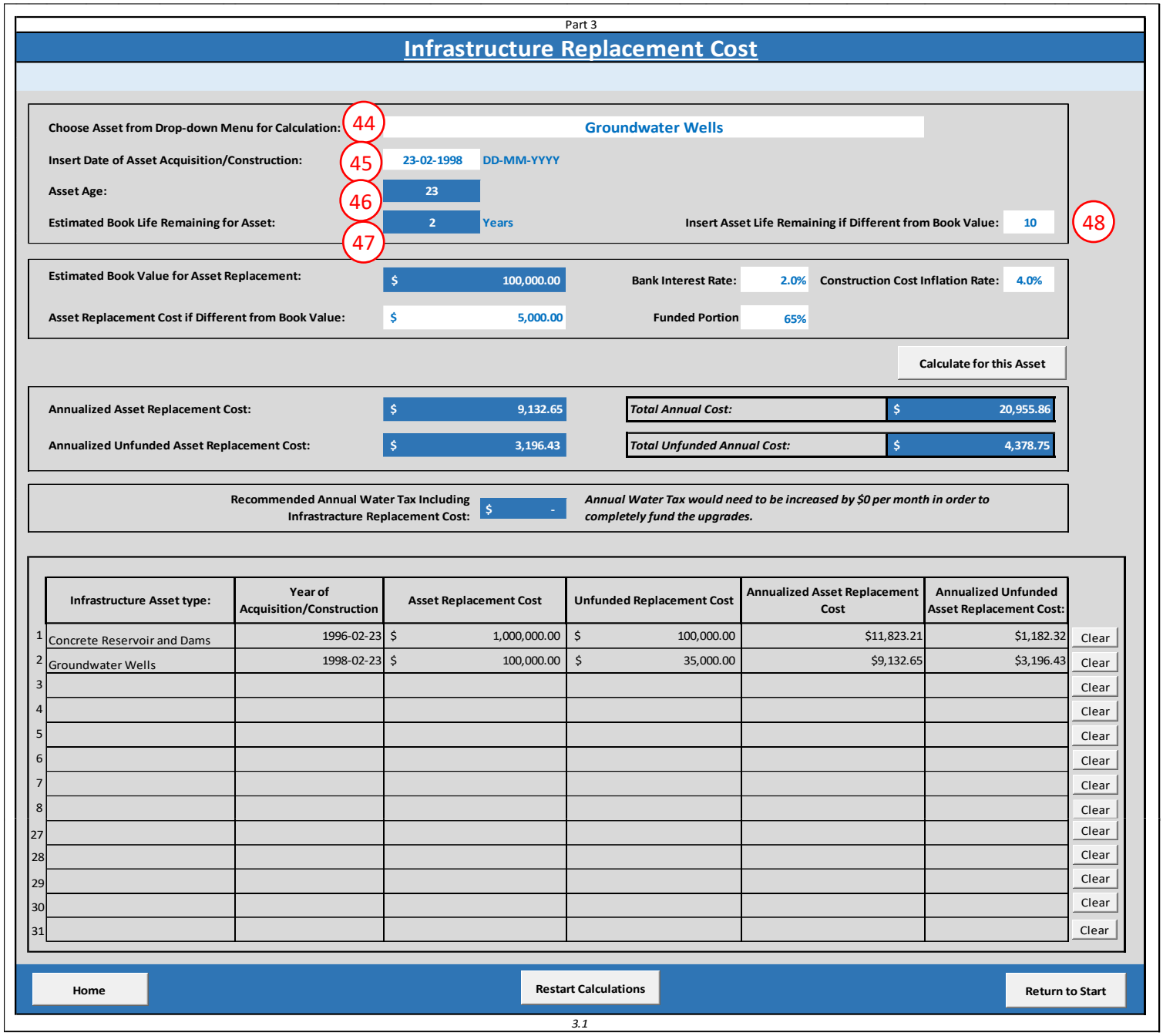
The relevant information for each infrastructure asset to be replaced is entered into the table below (*Figure 6*). The assessment tool will then calculate the annual cost for infrastructure replacement. In addition to the total cost, the infrastructure replacement module will give the user the option to assign a percentage of the total cost that will be funded externally and will then calculate the unfunded annual infrastructure replacement cost that will be the responsibility of the owner.

Figure 13 - Infrastructure Asset List and corresponding Life Range

Drinking Water Component	Years
Reservoirs and Dams	15-100
Concrete	50-100
Steel	30-80
Wood	15-30
Earthen	20-50
Intake (no impoundment)	20-50
Groundwater Wells	15-35
Water Treatment Plants- concrete structures	20-50
Water Treatment Plants- mechanical and electrical	15-25
Chlorination Equipment	10-15
Trunk mains and distribution mains	25-100
Cast Iron	25-100
Ductile Iron	75-100
Steel	50-100
Concrete	75-100
Asbestos Cement	60-100
PVC	25-100
HDPE	70-100
Water Pumping Stations- concrete structures	50-70
Water Pumping Stations- mechanical and electrical	10-25
Water Storage Tank	25-80
Concrete	50-80
Wood	25-50
Metal	50-80
Fiberglass	50-80
Electrical Systems	7-10
Valves and Backflow Prevention Devices	35-40
Meters	10-15
Hydrants	40-60
Lab and Monitoring Equipment	5-7
Buildings	30-60

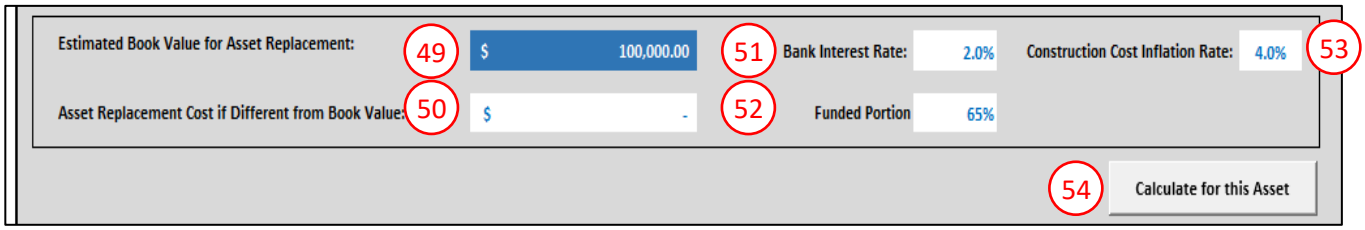
The figures below are provided for explanation on each input and output of the module.

Figure 14 - Infrastructure Module Page (Complete View)



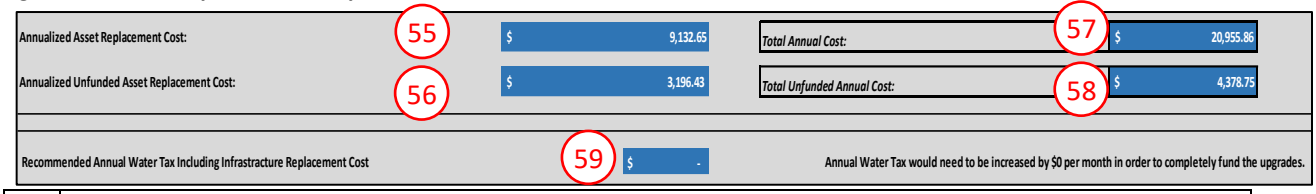
44	User selects the Infrastructure asset type to calculate annual replacement cost for, one at a time from the dropdown menu. If asset type option is not available on the drop-down menu, select Others and enter desired life of the asset, then proceed with step 2, 5 then step 7 to 11.
45	User enters asset year of acquisition/construction (i.e. asset age).
46	The module calculates and displays the age of the asset, based on the user input.
47	The module calculates and displays the “book” estimated remaining life of the asset, based on the user input and the average theoretical useful life of water system components in Newfoundland and Labrador.
48	The user may input an estimate of the expected remaining useful life (i.e. the estimated number of years before the asset is due to be replaced). If the user enters a value here, the “book” estimate will be disregarded by the module.

Figure 15 – Asset Replacement Cost Input and Future Cost Adjustment Factors



49	Depending on the asset type, the module provides an estimated cost for replacement of the asset. For some asset types, no asset replacement cost is provided (estimated book value output: Enter Cost in the Box Below) – the specific characteristics of the asset vary too much within one asset type to provide any book estimate. The user must supply a replacement cost instead (below).
50	User enters estimated asset replacement cost, in current year dollars. This value will ideally be based on an engineering estimate or estimate from a professional quantity surveyor; however, a vendor quotation, past replacement cost adjusted for inflation, etc. may be applied to generate a realistic estimate for the replacement cost of the asset.
51	User enters the interest rate that would apply to any monies kept in reserve for future asset replacement (e.g. savings for infrastructure replacement gained from utility taxes).
52	User may choose to apply a percentage of the asset replacement which is expected to be funded by others (e.g. provincial or federal infrastructure project funding). If left at 0%, the module will calculate the same values twice (total and unfunded amounts will be equal).
53	User enters the inflation rate for construction, which refers to the year over year increase in construction costs. The Bank of Canada provides year over year inflation data and targets an annual inflation of 1 – 3 %; actual inflation for construction may fall outside this range.
54	User presses the "Calculate for this Asset" button after the inputs for each asset type are complete. The tool then calculates the outputs above and stores the results for combination with all other assets. The information for each calculated asset is summarized in a table at the bottom of the module for user reference. ***Note: Check every input box before clicking Calculate, if the estimated remaining life of the asset and estimated price of the asset are filled for the previous asset, they will not be deleted automatically, and the user will have to delete them manually.***

Figure 16 – Asset Replacement Outputs



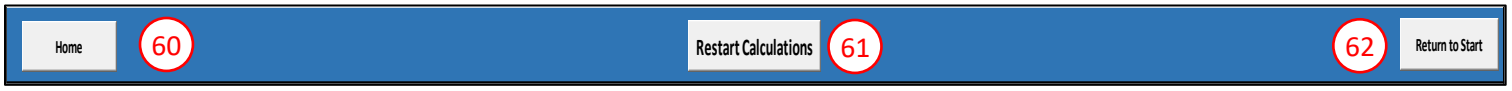
55	After the user presses the "Calculate for this Asset" button the module then calculates and records the annualized cost for the replacement of the chosen asset.
56	The tool separately calculates the unfunded portion (portion to be covered by the community) of the annualized cost for the replacement of the chosen asset – if no external funding is entered to the tool (see Step 9), the unfunded annualized cost will be equal to the full annualized replacement cost (Step 11 output).
57	The module records the annualized asset replacement cost for the chosen asset and adds this amount to the annualized asset replacement cost for all assets calculated using the module (by changing the selected asset type in Step 1, a new asset replacement may be calculated to add to the total infrastructure replacement annualized cost).
58	The module separately calculates the unfunded portion (portion to be covered by the community) of the annualized cost for the replacement of all assets entered to the module, incorporating various funding percentages for each asset as entered by the user. The module will add the total unfunded annualized asset replacement costs for all assets entered by the user.
59	The tool will combine the step 58 information with the population and utility tax information provided by the user in Module 1 and Module 2. This output incorporates the calculated tax per household required for the total annualized asset replacement cost and incorporates this separately with the annual water tax increase recommended in Module 2 for operations and maintenance tax funding.

Figure 17 – Asset Replacement Summary Table

	Infrastructure Asset type:	Year of Acquisition/Construction	Asset Replacement Cost	Unfunded Replacement Cost	Annualized Asset Replacement Cost	Annualized Unfunded Asset Replacement Cost:	
1	Concrete Reservoir and Dams	1996-02-23	$ 1,000,000.00	$ 100,000.00	$11,823.21	$1,182.32	Clear
2	Groundwater Wells	1998-02-23	$ 100,000.00	$ 35,000.00	$9,132.65	$3,196.43	Clear
3							Clear
4							Clear
5							Clear
6							Clear
7							Clear

When each asset replacement cost is calculated it is stored below (in the FCAA tool, see example in Figure 6) to allow the user to visually check the inputs that have already been entered, which factor into the total asset replacement cost, recommended tax for infrastructure replacement, and recommended tax increase outputs. The "Clear" button alongside each row can be used to remove any previously entered asset calculation from the tool calculation. To access the Infrastructure replacement cost command buttons the user will have to scroll down since they are located below the Summary Table.

Figure 18 – Infrastructure Replacement Cost Command Buttons



60	User may press the "Home" button to return to the Tittle page.
61	User may press the "Restart Calculations" button to remove all inserted and stored data and start the module over again. This does not remove any data entered in Module 1 and 2.
62	User may press the "Return to Start" button to return to Start page.