

EXECUTIVE SUMMARY

This design basis memorandum (DBM #3A) summarizes the design criteria for the on-lot Septic Tank Effluent Pumping (STEP) system on residential lots that discharge into a deep bury collection system. A separate DBM (DBM #3B) will be provided for shallow bury collection systems (applicable for Ma-Me-O Beach only). If a grinder system is selected or determined to be necessary for a pocket area of the project, on-lot requirements would be different again and have to be addressed separately as well. Finally, commercial and/or public service on-lot requirements are site-specific and therefore not covered in this DBM; these will be addressed on a case by case basis during the detailed design stage.

Currently, the majority of existing lots utilize one or two compartment holding tanks of various sizes, configurations and condition. In most cases, these existing tanks can be retrofitted for the proposed STEP system as long as they meet the design criteria and are in adequate condition as determined by a certified installer. If these conditions cannot be met, a new tank installation will be required. This DBM reviews the requirements for three installations scenarios (categories) for residential STEP systems:

- Category 1 (S1): Retrofit of an existing two-chamber septic tank; where the STEP pump unit is installed into the second chamber.
- Category 2 (S2): Retrofit of an existing single chamber holding tank; where the existing holding tank is used as the primary tank, and a new pump vault or pumping chamber is installed.
- Category 3 (S3): New installation; which includes a two chamber septic tank with the STEP pump unit in one of the chambers.

The installation requirements for residential STEP system are provided on Figures S1 to S4 (See Appendix A) for each of the installation categories. The installation drawings are based on the following design criteria and primary components for this type of system:

1. Septic Tank

- Tanks must be CSA certified; of adequate size; be in good structural condition; be water tight; at an adequate depth (or insulated) to prevent freezing; be located a minimum of 10 m away from a water course or well and 1 m from property lines or buildings; and be accessible for inspection and maintenance.
- A two compartment tank is required. The first compartment maintains a constant liquid level that provides primary treatment of the sewage. The second compartment is a pumping chamber.
- Tanks must be adequately sized to provide primary treatment, pumping and emergency storage (i.e. Min. of 4202 L, or 925 lgal). To meet these requirements, the following minimum tank sizes for each of the installation categories is required:
 - Category 1: Existing two chamber tank – 5455 L (1200 lgal).
 - Category 2: Existing one chamber holding tank.
 - 2A: Holding tanks \geq 4556 L (1000 lgal) preferred such that a PVC pump vault can be installed as the pumping chamber.
 - 2B: Holding tanks of 3405 L (750 lgal) size will be accepted; however, a 2270 L (500 lgal) concrete tank will be required as the pumping chamber.

- **Category 3: New installations – 5455 L (1200 lgal) two chamber septic tank.**
- **Both chambers must have a watertight access riser (600 mm diameter) and a securable insulated lid to allow easy access for cleaning, inspection and maintaining the pump unit.**
- **Inlet plumbing into the treatment chamber shall include a tee that penetrates 450 mm into the liquid level and allows for natural ventilation back through the building sewer and vent stack as per standard building code requirements.**
- **Tanks must have a minimum of 1.2 m of cover (depth from ground to top of tank) and/or be insulated such that freezing does not occur for units that are occupied permanently. For existing tanks that are shallow buried or where intermittent winter use is anticipated, various options to prevent freezing are available, and should be discussed with the certified installer. Some of these options include: insulated disks in the access risers; board insulation above the tank; spray foam insulation on the tanks; heat tracing the tanks; bypass piping for constant water circulation. Some of these measures are included on the standard drawings for the various installation categories, but others can be discussed with the certified installer for existing tank retrofit situations.**
- **If water table is within 1.2 m of surface, the 500 lgal tank for Category 2B may need an anti-float base to avoid uplift movement of the tank. Considering the cost of this, it may be more cost effective to use a Category 3 installation in this case. This should be discussed with the installer prior to selecting the installation.**

2. Effluent Pumping Package and Controls

- **The proposed effluent pumping package is based on one specific manufacturer (Orenco), which will be used for all users. This will ensure equipment/installation consistency, hydraulic performance, and cost efficiency.**
- **Orenco's system includes a universal biotube pump vault that houses the effluent pump, cartridge filter, mechanical switches, discharge piping, valves and fittings. The typical height of vault is 1727 mm (68") which can fit in standard septic or holding tank and sit at the bottom of the tank; however other heights are available to suit specific tank depths.**
- **The cartridge filter contains 3.2 mm mesh polypropylene tubes to screen out any remaining solids, to enable use of an effluent pump.**
- **The required effluent pump shall be a 1/2 HP Orenco PF Series constructed of stainless steel and engineered plastic, and comes complete with a check valve and a 3.2 mm orifice for bypass / pump cycle operation during high pressure conditions in the collection system to prevent pump burnout.**
- **The standard discharge piping will include a ball valve, check valve, flex hose and a flow regulator to prevent pump burnout during low system pressure conditions in the collection system.**
- **A float switch assembly will be provided for pump on/off control and low/high level alarms, as per the criteria provided on the standard installation drawings.**
- **The standard (basic) MVP control panel includes a built in LCD screen and programming keys to provide control functions and timing for panel operation; as well as an audible alarm and a red lens visible alarm. An upgraded control panel (VeriComm) is also available**

(~ \$1,000 additional cost) which allows remote web-based access and advanced alarm monitoring capabilities. Other customized features can also be added if desired.

- The control panels should be located outside the building, in a garage, or on a post or exterior wall. 120 VAC power supply is required.

3. Service connection to the Collection System

- The proposed effluent sewer shall be 40 mm diameter HDPE DR 11 municipal piping and connect to the collection system at the property line. The collection system connection will provide an isolation valve, typically located within the road ROW.
- Pipe shall be trenched or directionally drilled at a minimum 2.8 m depth. Shallower depths may be acceptable in some circumstances with adequate insulation measures.
- Service pipe alignment should be a minimum of 2 m away from structures to allow for future maintenance.
- Any on-lot service length that exceeds 75 metres may need to be upsized. In this situation, a case by case review by the SSWC Engineer is required.

It is recommended that SSWC short list one supplier and one or two “certified” installers and limit supply/installation to these contractors in order to ensure that equipment and design specifications are met; proper installation procedures are followed; and to gain volume cost efficiencies.

On-lot costs will vary somewhat depending on the installation category, length of service line required, landscaping considerations, location/accessibility of existing tank, ground conditions (soil type, depth of water table), etc. Actual costs will vary depending on existing tank and site conditions. A certified installer will review tank condition and specific installation requirements such as offset distances from wells, property lines, buildings; freezing protection measures; ground condition considerations; service line alignment considerations; etc. For budgeting purposes, the following order of magnitude range of costs for the three installation categories are provided below (2016 dollars). Reclamation costs have not been included and material supply is based on bulk supply rates (25% discount off of retail prices). A more detailed cost breakdown is provided in Appendix D, along with assumptions associated with the estimates. A retail material cost sheet from a supplier is also included.

Estimated Range of Cost

Category		Range
S1	Retrofit existing two compartment septic tank	\$6,500 - \$8,500
S2	Retrofit with existing Holding Tank	
	A. Exist. 4556 L holding tank c/w separate pump vault	\$8,500 - \$11,000
	B. Exist. 3405 L holding tank c/w concrete pump out tank	\$10,000 - \$12,500
S3	New two compartment septic tank	\$12,000 - \$15,500

Maintenance activities for the on-lot STEP systems are limited to inspection of the tank sludge and scum accumulation in the primary treatment compartment, and inspection of the filter, pump and controls. A

list of operation and maintenance requirements and activities will be provided by the contractor/supplier after the installation.