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**REPORT TO SALT SPRING ISLAND LOCAL COMMUNITY COMMISSION**
**MEETING OF THURSDAY, MARCH 20, 2025**

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**SUBJECT** **Burgoyne Bay – The use of Geotubes as an Alternative Liquid Waste Management Method**

## ISSUE SUMMARY

The Salt Spring Island (SSI) Local Community Commission (LCC) has requested the evaluation of geotubes as an alternative for liquid waste management at the Burgoyne Bay facility.

## BACKGROUND

The SSI Local Community Commission (LCC) passed the following motion on June 20th, 2024.

> *'That the Salt Spring Island Local Community Commission recommends to CRD Board: that the SSI Liquid Waste Disposal Service 2024 Capital Plan be amended to add a new project for evaluating alternatives to liquid waste disposal (24-03) for $60,000 budget, funded from the Capital Reserve Fund.*

The intention of this motion was to enable funding for evaluation of geotubes as an alternative method for liquid waste management on SSI at the Burgoyne Bay facility. The objective of using geotubes would be to reduce the volume of liquid waste that needs to be transported off the island with the ultimate objective of reducing the cost of operating the service.

A pilot project has been completed and a summary of the analysis are provided within. The pilot project has identified that if geotubes are used at Burgoyne Bay then additional facilities will need to be constructed and operated. The geotubes would effectively become step one of a three step process. The steps are explained in a condensed format and explained as the following:

1. Geotubes – The bulk sewage and septage liquid waste that is collected in the existing tanks at the Burgoyne Bay facility would be pumped into geotubes that would be located on a newly constructed concrete slab on the same property. The geotubes would be used to dewater the waste and there would be an output of solids and liquids.
2. Liquid Disposal - The liquid output from the geotubes would be collected and directed towards a new man-made septic field to further treat and dispose of the liquid waste. The ground conditions at Burgoyne are shallow to bedrock and do not allow for direct ground disposal. The output from the septic field would then be discharged directly to ground.
3. Solid Disposal - The solid residuals from the geotubes are forecast to be from 14% to 22% solids content (based on the pilot project). This would be similar to a wet soil consistency. The solids would be loaded onto a truck and hauled to Vancouver Island for disposal.

Geotubes are step one in the process outlined above and one of several options that are available to reduce the amount of residual waste that would be transported off Salt Spring Island. The Alternative Waste Stream Management Option Analysis report completed in August 2023 considered other dewatering methods in addition to geotubes that included: suspended air flotation (SAF), screw press and plate filter press. These methods would all require the purchase of equipment and require additional labour to operate a new facility. All of these methods would

also require treatment and disposal of the liquid and solid outputs.

The financial review of geotubes that has been completed as part of this report is considered preliminary and a more intensive third-party review of cost estimates is recommended prior to progressing any of the options.

## ALTERNATIVES

*Alternative 1*
The Salt Spring Island Local Community Commission recommends that staff does not pursue the option of using geotubes as a dewatering technique at Burgoyne Bay.

*Alternative 2*
The Salt Spring Island Local Community Commission recommends that staff does not pursue options of using alternate dewatering techniques at Burgoyne Bay if the costs of operating the current service cannot be reduced.

Alternative 3
The Salt Spring Island Local Community Commission recommends that staff retain a third party consultant to further investigate and analyze geotubes as an alternative dewatering technique at Burgoyne Bay with a budget of up to $50,000.

## IMPLICATIONS

*Alignment with Existing Plans & Strategies*

The LCC's Strategic Plan from 2024 to 2027 includes a Goal of *cost effective and environmentally responsible management of liquid waste and residuals*. This evaluation of geotubes directly addresses the Goal as well as the Objectives and Initiatives related to evaluating and reducing the volume of liquid waste transported off SSI, as well as proper liquid effluent and solid residuals disposal.

*Service Delivery Implications*

The use of geotubes would increase the complexity of the process on Salt Spring Island and require more capital investment and additional staff.

The process for geotubes that has been analyzed includes the following assumptions:

1. Geotubes
    a. A concrete pad about ¾ the size of a hockey rink would need to be constructed for the geotubes, designed and constructed to enable the solids to be mechanically loaded into as many as four large geotube bags per year. Each geotube would be about 20 metres in circumference and 2.3 metres high, and about 26 metres long.
    b. Equipment would need to be purchased and additional labour would be required to operate the facility.
    c. Pumping equipment would need to be installed to transfer the liquid and add floculant on its way from the existing receiving storage facility to the geotubes.

   d. The used geotube bags would be disposed of in a landfill.
   e. The concrete pad would have a berm and be designed and constructed with an integral collection sump and requisite piping to capture the liquid from the geotubes and direct it to the septic field.
2. Liquid Disposal
   a. A septic field would be constructed downslope on the existing property. The option of transferring the liquids to Ganges wastewater treatment plant was considered and would require new facilities in Ganges. This option was determined to be too costly and would not meet the objective of reducing operational costs. The proposed engineered septic field would need to be man-made with material brought onto the site, as the existing shallow bedrock site conditions are not adequate.
   b. The liquid output from the septic field would be disposed of directly to ground.
3. Solid Disposal
   a. The solid materials from the geotubes would be between 14% (result from pilot project) and 22% solids and loaded onto a truck and transported to Vancouver Island.
   b. This would likely involve about 45 to 62 truck loads depending on the percentage of moisture in the solids.
   c. A fee would be charged for the disposal of the solids at the facility.

*Financial Implications*

An initial financial analysis has been completed using expert input from the retained consultant and CRD engineers who are currently operating and maintaining the three CRD wastewater treatment plants at McLoughlin, Ganges and Saanich Peninsula. The initial financial analysis is attached in Appendix B. This analysis is considered high-level and does not meet the criteria for a Level D evaluation. A more detailed analysis is required prior to progressing with this proposal.

The estimated total capital expenditure is forecast to be about $3.5 million. Annual operating costs, including debt servicing, are assumed based on 50% of the capital expenditure being covered by a potential grant. The remainder would need to be recovered through the service being permitted to take out a loan.

The annual operating expenditure is estimated and includes semi-annual debt payments for the capital. A contribution to a capital reserve is required for repair and replacement of the new capital assets. The operation of a geotube dewatering process is forecast to have annual operating costs including debt servicing of about $740,000 however with debt servicing (for 20 years) the total will be about $875,000.

The current annual operating costs to dispose of the liquid waste off-island were about $745,000 in 2024.

*Intergovernmental and First Nations Implications*

The proposed activities would involve acquiring approvals from provincial agencies and engagement with the local community and First Nations prior to progressing. The Burgoyne facility borders Burgoyne Bay Provincial Park and is in close proximity to properties held by a First Nations Society and island residents.

## CONCLUSION

The initial evaluation of the use of geotubes at Burgoyne Bay have been considered. The initial analysis indicated this method of reducing the amount of liquid shipped off the island is feasible. To enable this to occur, additional infrastructure, equipment and staff would be required. Preliminary cost estimates suggest the use of geotubes would be more expensive than the current method in the first 20 years of operation. Once the capital is paid off the operation of geotubes should be comparable to the existing method.

The financial review that was completed as part of this report is considered preliminary and a more intensive review of cost estimates is recommended prior to progressing any of the options.

## RECOMMENDATION

The Salt Spring Island Local Community Commission recommends that staff does not pursue the option of using geotubes as a dewatering technique at Burgoyne Bay.

| | |
|---|---|
| Submitted by: | Stephen Henderson, BSc, MBA, Senior Manager of Real Estate, Southern Gulf Islands Electoral Area and Saltspring Island Local Community Commission |
| Concurrence | Dan Ovington, BBA Acting Senior Manager, Salt Spring Island Administration |

## APPENDIX

Appendix A – Conceptual Layout of Geotubes at Burgoyne Bay Facility
Appendix B – High-level Estimate of Capital and Operating Costs of Geotubes installed at Burgoyne Bay
Appendix C - Photos and Images of Pilot Project and Geotubes in Process

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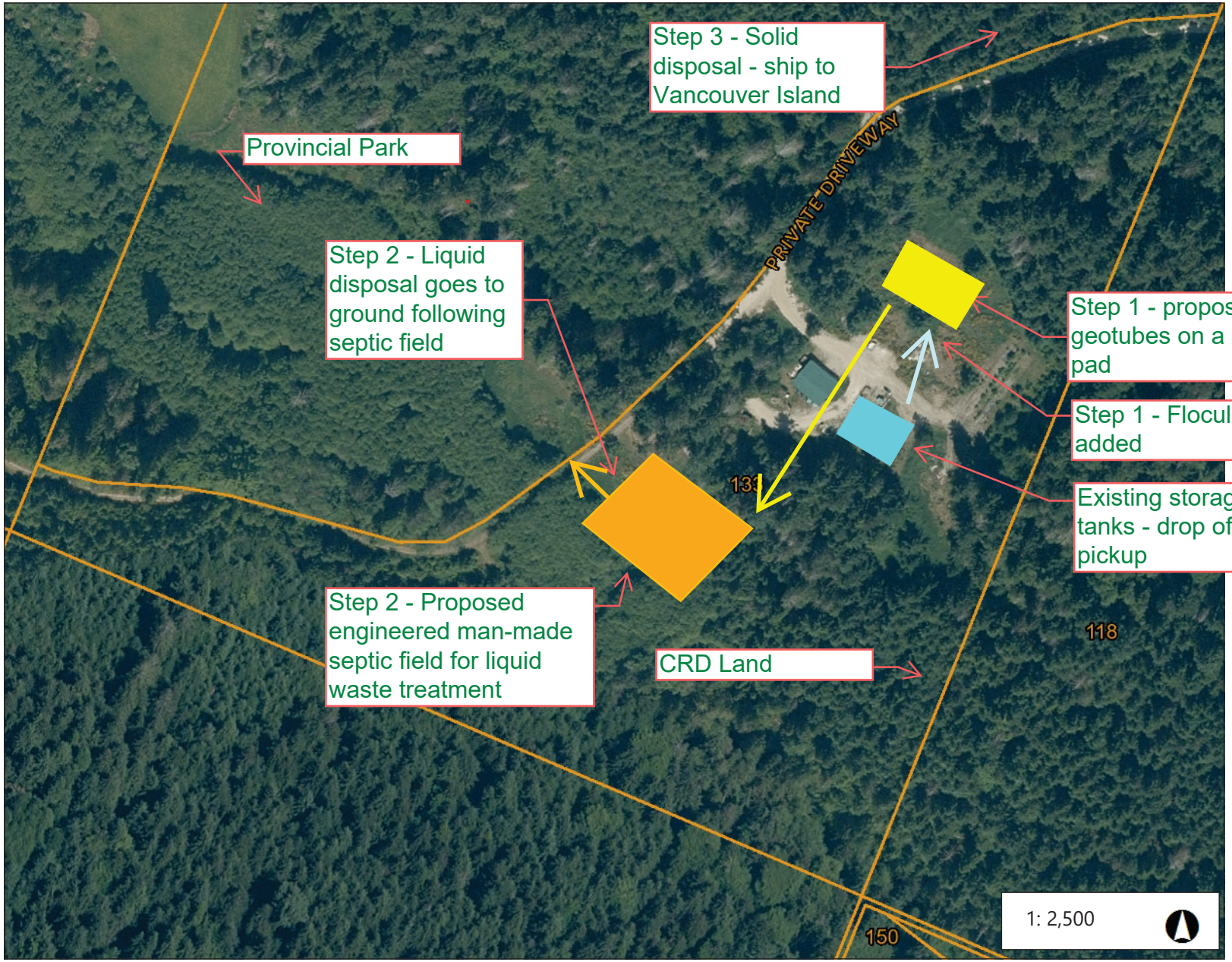
# Burgoyne Bay

## Appendix A




Legend

Notes

127.0 0 63.5 127.0 Meters

NAD_1983_UTM_Zone_10N

# SSI Burgoyne Bay - Liquid Disposal Options for Alternate Methods - Geotube Costs

*This is an initial cost estimate that does not qualify as a Level 'D' . Prior to progressing a 3rd Party should be retained to prepare a Class C or D estimate*

| $ ESTIMATE | CAPITAL COSTS ASSOCIATED WITH GEOTUBES | SOURCE OF COST ESTIMATE |
|---|---|---|
| **$133,786** | BISHOP - Geotube Capital Costs ($93,786 to $133,786) higher was selected with a more automated mixer of floculant | Bishops Engineering (consultant) |
| $500,000 | Construction Costs for concrete pad where Geotubes would go | Based on CRD's recent procurement results |
| $500,000 | Construction Costs for septic field | Eng Consultant quoted, high level est. |
| $100,000 | Cost of ground disposal (analysis, design, and installation of monitoring wells) | Internal estimate |
| $350,000 | OH&S requirements - proper staff facilities - wash water supply (tbd), washroom, floculant chemical mgmt, and for site maintenance | Estimate for site trailer or renovate existing building, based on recent tender experience |
| $150,000 | Costs to install on-site conveyance lines including piping modifications valves and pumps | internal estimate |
| $25,000 | Testing | Bishops Engineering (consultant) |
| $10,000 | Shipping Costs | Bishops Engineering (consultant) |
| **$1,768,786** | **Sum of Capital Elements** | |
| $353,757 | Engineering Design and Studies | 20% |
| $265,318 | CRD Project Mgmt and Administration | 15% |
| **$2,387,861** | **Sub-Total of Capital with Engineering and Project Management Costs** | |
| $75,000 | Engagement with local community and First Nations | Community Engagement |
| $35,000 | Alternative Approval Process to receive permission for the service to take on long term debt | Alternative Approval Process |
| **$2,497,861** | **Sub-Total of Capital with Engineering and Project Management Costs and Public Engagement** | Sub-Total |
| $999,144 | Contingency | 40% |
| **$3,497,006** | **TOTAL CAPITAL COST** | |
| | | |
| **$3,497,006** | **TOTAL CAPITAL COST - $2.5M to $3.5M** | |
| ***$1,748,503*** | ***50% Grant potential??*** | |
| ***$1,748,503*** | ***Long Term Debt required to be covered by the Service in Operating Costs*** | |

| $ ESTIMATE | OPERATING COSTS WITH GEOTUBES | SOURCE OF COST ESTIMATE |
|---|---|---|
| **$87,848** | Operating Costs for Geotubes from Bishop Engineering's presentation (bags, geosynthetics, polymer- with a price range $60,209 to $87,848) | Bishops Engineering |
| $24,000 | Cost of Operating Loader to dispose of solids | 96 hrs * $250/hr |
| | ***Cost to dispose of Solids*** | |
| *$181,250* | $250 per ton to receive Solids at a treatment facility | 725 x $250 - (middle range of forecast output volume in year 2026) |
| $74,880 | Hauling Solids to Vancouver Island | 52 loads x $1440/trip ($180/hr*8 hours/trip) |
| | ***Additional Labour*** | |
| $49,920 | Additional 0.2 FTE for filling Geotubes and maintaining pumps and mixer (supplies and machine costs) | $120/hr X 2080hrs X .2 FTE (from Bishops Eng.) |
| $37,440 | Additional 0.15 FTE for trades and maintaining equipment, dosing, OHS, plumbing, SCADA | $120/hr X 2080hrs X .15FTE (from Bishops Eng.) |
| | **New Costs** | |
| $10,000 | Testing of solid and liquid outputs | CRD - environmental department |
| $10,000 | Shipping Costs that Bishops did not included | Bishops Engineering (consultant) |
| $7,200 | Water supply fo site trailer for staff OH&S | $600 per load of water - 12 loads per yr |
| $5,000 | Geotube disposal | Landfill the geotube material |
| $30,000 | Cold Weather - Hauling of Liquids when we have to revert to current hauling methods and during maintenance | based on existing costs |
| $69,940 | Additional Capital Reserve contribution, based on CRD Asset Mgmt Policy | 2% |
| | **Existing Costs that would continue** | |
| $99,840 | Existing 830 hours of labour per year is in the budget | $120/hr X 2080hrs X .4 FTE |
| $50,000 | Current continuing direct operational costs (excluding labour) | |
| **$737,318** | **Total of Annual Operating Costs** | |
| not accounted for | Contingency | |
| **$139,000** | Annual Debt Servicing - Anticipating 50% Grant Funding is received - double cost if no Grant | $1,800,000 - 20 years @ 4% interest |
| **$876,318** | **Total Operating Costs including 20 years of Debt Servicing** | |

## Initial Summary of Geotubes Option Prior to Receiving 3rd Party Review

| | |
|---|---|
| $3,497,006 | TOTAL CAPITAL COST - $2.5M to $3.5M |
| $876,318 | Total Operating Costs including 20 years of Debt Servicing |
| | |
| $745,000 | Current CRD Liquid Waste Disposal Costs at Burgoyne (2024 Actual) |

**Appendix C: Photos and Images of Pilot Project and Geotube Facilities**

## Bench Testing - December 2024 Dewatering Trial


*Onsite jar testing (left), Geotube® Dewatering Test (GDT) (middle) and GDT After 2 months - 21% (right).*

## Bonnechere Valley Township Dewatering Project

Photos of Geotubes in Operation

Photos of Geotubes in a Greenhouse and Indoors in Cold Weather Environments

Photos of Equipment Required to Add Floculant Prior to Entering Geotubes

Proposed Process for Burgoyne Bay

# Dewatering System Process Flow Diagram