DISTRICT OF SECHELT SEPTAGE FACILITY LONG-TERM PLAN

Technical Memorandum No. 4:

Conceptual Plan

June 22, 2025

Submitted by: Sperling Hansen Associates

Revisions:

TABLE OF CONTENTS

Tables

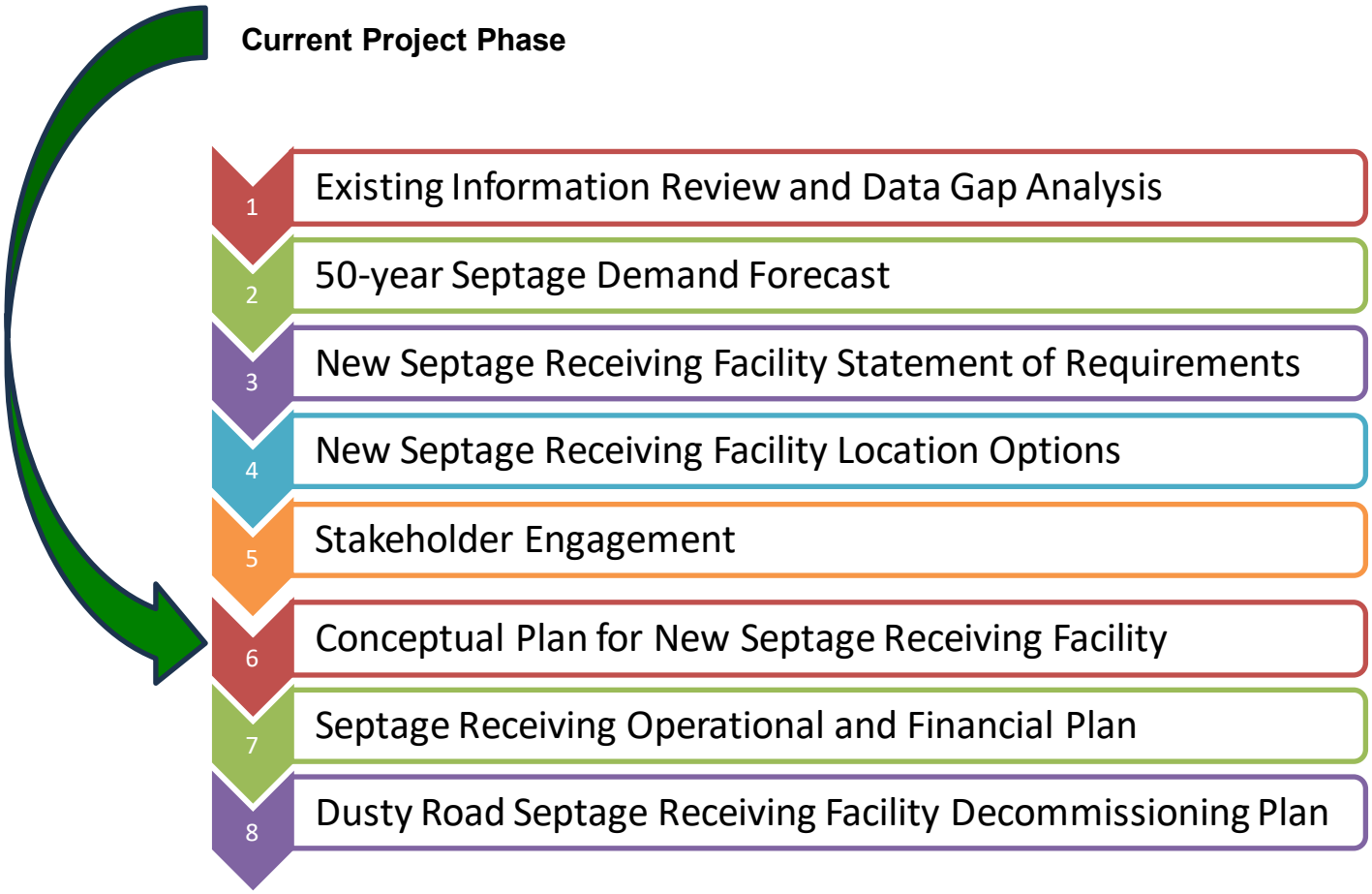
Photos

Figures

1. INTRODUCTION

The District of Sechelt (the District) is in the process of developing a Septage Receiving Facility Long-Term Plan (the Plan) to replace the Dusty Road Septage Receiving Facility (DRSRF). The Plan will guide the District in reviewing design options and locations for the new facility and servicing plans with project stakeholders.

Sperling Hansen Associates (SHA) was retained in February 2023 to develop the Plan. This Technical Memorandum (TM4) outlines the recommended conceptual design for a generic lot that is close to a District sewer main for connection to the Water Resource Centre (WRC). The sizing of the facility is based on the Demand Forecast and the New Septage Receiving Facility Statement of Requirements provided in TM 2 submitted in November 2023. The following figure shows that this TM is part of the sixth phase of the project.



2. CONTEXT AND SCOPE

This report outlines the facility requirements and layout as determined through discussions with the District. The following is a list of the critical considerations addressed in this report:

1. Buffer Zone and Odour Management
2. Neighbourhood and Site Traffic Flow
3. Solids Management
4. Optimum Compact Layout
5. Suitable Technologies
6. Received Septage Volumes and Quality
7. Connection to Water Resources Center
8. Environmental Controls and Climate
9. Site Servicing
10. Operations and Maintenance
11. Public Awareness and Perception

3. SEPTAGE VOLUME AND QUALITY

3.1 Current Estimated Septage Flow

SHA analyzed the types and quantity of waste received at the DRSRF in 2021 and 2022 and included this information in TM2. This data shows that septic tank waste is the largest stream, ranging from 74.8 to 82.9%.

Table 1: Types of Waste Received at Dusty Road Facility

Waste Type	2021		2022	
	Volume (m3)	Percentage	Volume (m3)	Percentage
Septic Tank	2,386	74.76%	3,434	82.92%
Porta-Potties	47	1.52%	175	4.44%
Septic/Grease Trap	19	0.60%	54	1.38%
Grease			1	0.02%
Brew stuff	112	3.57%	66	1.67%
Treatment	604	19.33%	368	9.35%
Other	7	0.20%	10	0.25%
	3,175	100%	4,107	100%

In recent years, septage loads have significantly lower liquid content than expected typical septage. The quantity of waste was calculated based on the service area population resulting in actual volume significantly lower than the theoretical volume. At 1.79 persons per dwelling, a typical tank size of 750 gallons (3.4 m3), and an average emptying/pumping frequency of 5 years (low but conservative). The theoretical annual estimated 2021 volume is 7,418 m3. The solids generation at this annual volume is estimated to be 1,484 m3 (20% accumulation). This estimate does not include non-residential waste volumes.

3.2 Predicted Septage Volume and Quality

The 50-year septage volume was projected using the 2021 residential population of 19,500 and the above-estimated volume of 7,418 m3. The District's 2% growth rate in population was used for this forecast. In the year 2071, the total population for the residential septic tanks servicing area is estimated to be 52,556, and the volume of septage is projected to be 19,996 m3.

Given that other private septage handling facilities have become available recently, directly applying population-based volume projections may be unreliable in sizing the facility.

In addition to volume, septage quality must be considered. Based on collected samples, the theoretical design values for the indicator parameters in the incoming source ratios are detailed in Table 2 (Alberta Environment, 2004). These come from the two main sources: septic tanks and holding tanks. The average 2021 and 2022 septic tank and

holding tank flow percentages are 79% and 14%, respectively, with the remaining 7% from other sources. Since data is not available for other sources, USEPA's mean values for the concentrations have been considered for the remaining flow. There is no USEPA value for alkalinity; hence, an average value of septic tank and holding tank has been used for alkalinity. This data informs the analysis of impacts to the WRC, which receives the effluent from septage dewatering, where septage effluent quality can have a significant impact.

Table 2: Septage Theoretical Design Values

Parameter	Septic Tank (mg/L)	Holding Tank/Typical Municipal Waster(mg/L)	EPA Mean (mg/L)	Suggested Design Value (mg/L)
Average Day Flow (%)	79%	14%	7%	
Total Solids (TS)	34,100	720	38,800	29,634
Total Volatile Solids (TVS)	23,100	365	25,300	19,990
Total Suspended Solids (TSS)	12,900	220	13,000	11,089
Volatile Solids (VSS)	9,000	100	8,700	7,703
BOD5	6,500	400	5,000	5,523
COD	31,900	1,500	42,800	28,284
TKN	600	100	700	535
Total Ammonia Nitrogen	100	5	160	90
Total Phosphorus	200	20	250	178
Alkalinity	1,000	500	750	911
Grease	5,600	200	9,100	5,064

3.3 Materials Acceptance and Restrictions

Based on the material currently accepted at the DRSRF, and best practices for protection of equipment and prevention of operational issues, the following table outlines materials that could be rejected and where they could be diverted should the District find necessary.

Table 3: Acceptance and Diversion of Materials

Material	Accept	Reject	Divert To
Dewatered septage below XX% solids (visual inspection)		X	Landfill
Uncontaminated water greater than 2.0 m^3/day		X	Storm drain
Prohibited waste (see Table 4)		X	Pre-screen off site
Storm water or ground water		X	Storm drain
Restaurant oil & grease – XX% per load		X	Processor
Holding tank waste	X		
Septic tank waste	X		
Porta-Pottie waste	X		
Brewery waste	X		
Treatment plant sludge	X		

The following waste restrictions are typically included in a septage receiving facility regulatory bylaw and could be considered for the District's future facility operation with the application of fines when observed or randomly tested.

Table 4: Typical Waste Restrictions

Prohibited	Restricted
Hazardous Waste	Contaminated Waste
Air Contaminant Waste	Acidic or Alkaline Waste
Flammable, Combustible, or Explosive Waste	Non-domestic Food Wste
Obstructive Waste	Dyes and Colouring Materials
Corrosive Waste	Seawater
High Temperature Waste	Rags
Biomedical Waste	Diapers
Special Risk Organic Waste	Sanitary Napkins
Radioactive Waste	
PCBs or Pesticides	
Pharmaceutical Waste	
Control Works Waste (e.g., grease trap waste)	
Odourous Waste	
Miscellaneous Waste	

4. CONCEPTUAL DESIGN ELEMENTS

The primary objective of the new facility is to receive and process raw septage from residential septic tanks, community wastewater systems, and portable toilets. The theoretical projected volume for the 50-year horizon for septage processing is 20,000 cubic metres. Given the uncertainty in this facility being the sole septage receiving option and the long planning horizon, it is recommended that a phased development approach is used to align infrastructure investments with actual demand growth.

4.1 Process Overview

The septage treatment process consists of several integrated components: a receiving station, inspection chamber, flow meter, equalization tank, dewatering containers, and associated infrastructure, including sanitary sewer connections and odour control systems. The metering and control system uses a flow meter to track septage and provide accurate billing data for the facility and a receipt for the hauler. The recommended layout for the facility is shown in Figure 1 attached to this report and described in Section 5.

4.1.1 Septage Receiving Station

The first stage is an automated septage receiving system. A compact, enclosed system utilizing a screw screen for the removal of solids such as rags, plastics, and grit, protecting downstream equipment. A nominal capacity of 400 gallons per minute (25.24 l/s) is recommended, enabling efficient truck unloading within 10 to 15 minutes.

As part of the detailed design, a further evaluation is recommended to assess annual maintenance needs, serviceability, parts availability, and customer support services for these compact systems.

4.1.2 Equalization Tank

Post-screening, the septage will flow into an inspection chamber and then into a concrete equalization tank. The conceptual design proposes a sulphur-resistant concrete tank, chosen for durability and longevity over alternatives like fiberglass-reinforced plastic. The tank should accommodate a 24-hour hydraulic retention time based on ultimate design flows, translating to a working volume of 82 cubic metres. Additional allowances for freeboard and sludge accumulation bring the total proposed volume to approximately 115 cubic metres. For practical construction, the tank volume is presented at 144 cubic metres (see Figure 1).

Mixing within the tank is critical to prevent solids from settling and to avoid anaerobic conditions. An aeration mixing system is being considered for this purpose. This system offers reliable mixing with low maintenance requirements and can be operated in an energy-efficient on/off mode. The installation would require two alternating blowers enclosed within a sound-insulated housing if the facility is built in a residential or

commercial area. Alternatively, mechanical mixing using pumps could be implemented to reduce odour control complexity.

Photo 1: Aeration Mixing System

4.1.3 Dewatering and Sludge Handling

Sludge dewatering would occur in a roll-off container equipped with internal filtration walls. These containers increase filter surface area and enhance dewatering performance, resulting in drier sludge cakes and reduced odour potential. The containers would be housed within an enclosed structure to manage Sechelt's high annual rainfall, to prevent stormwater contamination, maintain temperature control, and aid in odour control.

The dewatering process should be supported by polymer dosing to promote flocculation of fine solids in septage, thereby improving sedimentation, filtration efficiency, and overall solids capture. Preliminary assessments suggest that a minimum of three containers will be required to maintain operational flexibility—one in use, one being cleaned, and one either idle or in transit. An extra space is shown in the layout for contingency purposes and/or to accommodate future expansion.

Furthermore, the dewatered sludge should be evaluated to ensure that it meets compost requirements. Insufficient dewatering or excessive odour could result in rejection or additional processing demands.

4.1.4 Sanitary Sewer and Ancillary Infrastructure

Wastewater from the dewatering process will be discharged to the sanitary sewer system. Hoses, or if practical, hard piped discharge pipes, are preferred over floor drains to minimize risk to operators and maintain a cleaner facility.

5. CONCEPTUAL LOT LAYOUT

The District owns the property, Lot L, between Allen Rd and Dusty Road in East Porpoise Bay. The property functions as the Operations Facility and public works yard. This property has sufficient area available for the conceptualized septage facility and is within reasonable proximity to a sanitary sewer so was used to illustrate the concept instead of a generic lot. Figure 1 shows the concept on Lot L for illustration purposes in the northeast corner well away from the Operations Centre. This location avoids the exiting asphalt surfaces and stays at least 30 m from Irgens Creek in the northwest corner. Road access is shown off Allen Road which is less busy than Dusty Road.

This site has an ideal natural grade that slopes approximately seven metres from east to west, presenting opportunities to utilize gravity flow to reduce pumping requirements throughout the treatment process, improving energy efficiency and reducing operational costs.

The nearest sanitary connection point is located approximately 280 metres from the conceptual site. A new sewer or force main would need to be constructed to convey flows south to the Dusty Road sewer main. The existing 350 mm gravity sewer on Dusty Road leads to the Onni Lift Station and ultimately to the WRC. As part of the detailed design, a comprehensive capacity assessment of the receiving system is recommended to determine whether upgrades are necessary.

As shown in Figure 1, the entire facility is enclosed under a weather-protected structure, ensuring that all unloading, loading, and maintenance activities can be carried out in a sheltered environment. The building's external dimensions are approximately 30 meters by 30 meters. The site should be fully fenced and equipped with a gated entry system, allowing trucks to enter by using an access code to open the gate and for security.

Trucks would back into the unloading area, which accommodates two vehicles at a time. Driver information and measured flow rates should be tracked. Truck contents would be discharged through a tightly sealed cam-lock system into the automated receiving and screening equipment. This system is designed to remove grit and other solids, which would then be discharged into a 0.75-cubic-yard container for disposal.

From the receiving system, the septage would flow by gravity to a 144 cubic metre sulphate-resistant reinforced concrete equalization tank to aerate the septage and control the flow through to the dewatering system. Polymer would be injected into the pipe as the liquid flows to the sludge dewatering system from the equalization tank to thicken the septage. The next stage includes utilizing a series of 30 cubic yard containers that filter and settle the solids prior to delivery to a composting facility or to a landfill. The liquid would flow through the container into a discharge manhole before it connects to the sewer. The manhole would provide access for sampling the effluent prior to its discharge into the sewer line, which for this lot, connects to the main sewer system on Dusty Road.

In order to size and price components of the facility, specific suppliers were contacted. Their information is available should the District wish to use it for detailed design.

6. CONCLUSION AND RECOMMENDATIONS

As requested by the DoS and outlined in previous sections, the septage receiving facility concept has been designed to ensure the following:

1. A buffer is maintained.
2. Truck access is off a lower traffic road.
3. The layout is compact, providing construction and maintenance efficiencies.
4. Modern, compact and existing technologies and equipment are included.
5. An increase in septage flow over the next 50 years has been built in.
6. The type and quantity of septage flow has been considered.
7. Discharge is connected to the Water Resources Centre at an appropriate location.
8. Climate change and peak storms have been considered.
9. Required utilities are available.
10. There is sufficient space for operations and maintenance.
11. Solids can be efficiently managed.

The conceptual septage receiving facility is presented as a preliminary concept and would be refined in a detailed design process, including the development of a detailed cost estimate. It is expected that this type of facility will need to incorporate odour management if the facility is sited near developed properties. Containing the facility within a building with odour control systems would be the most effective way to manage odours.

Besides potential odour issues, if dewatered sludge is for some reason not accepted at the composting facility at some point, space for stockpiling the material may be needed, which could require stormwater management and odour control.

The conceptual design outlines a technically feasible and regionally significant septage receiving facility for the District of Sechelt. The proposed approach leverages gravity-fed processes, reliable screening and dewatering technologies, and robust odour and wastewater management systems. Key next steps include:

- Consultation with regional partners that rely on a septage receiving facility to determine how the service will be delivered regionally in the future
- Detailed hydraulic modelling and site-specific elevation analysis
- Evaluation of septage receiver system maintenance and support
- Compliance with composting requirements regarding sludge quality and logistics
- Sanitary sewer capacity assessment and infrastructure planning

- Further study required to assess the impacts of flow rate and effluent concentration on the overall treatment processes at the WRC. Acceptable ratio of septage effluent to wastewater flows should be determined.
- Acceptable waste types and quality for this facility should be determined and regulated and excluded waste types rejected and directed to other appropriate facilities.

Adopting a phased development strategy will allow the District to align capital expenditures with actual demand growth while maintaining flexibility to adapt to changing operational requirements over time.

7. REFERENCES

Alberta Environment. 2004. Septage Management Advisory Committee- Technical and Regulatory Literature Review.

Sperling Hansen Associates. Technical Memorandum No. 2: Demand Forecast and Statement of Requirements, July 2023

8. LIMITATIONS

This report has been prepared by Sperling Hansen Associates (SHA) on behalf of the District of Sechelt in accordance with generally accepted engineering practices to a level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions in British Columbia, subject to the time limits and financial and physical constraints applicable to the services.

The report, which specifically includes all tables and figures, is based on engineering analysis by SHA staff of data compiled during the course of the project. Except where specifically stated to the contrary, the information on which this study is based has been obtained from external sources. This external information has not been independently verified or otherwise examined by SHA to determine its accuracy and completeness. SHA has relied in good faith on this information and does not accept responsibility of any deficiency, misstatements or inaccuracies contained in the reports as a result of omissions, misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation.

The report is intended solely for the use of the District of Sechelt. Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. SHA does not accept any responsibility for other uses of the material contained herein nor for damages, if any, suffered by any third party because of decisions made or actions based on this report. Copying of this intellectual property for other purposes is not permitted.

The findings and conclusions of this report are valid only as of the date of this report. The interpretations presented in this report and the conclusions and recommendations that are drawn are based on information that was made available to SHA during the course of this project. Should additional new data become available in the future, Sperling Hansen Associates should be requested to re-evaluate the findings of this report and modify the conclusions and recommendations drawn, as required.

We appreciate the opportunity to work with the District of Sechelt on this project. Please do not hesitate to contact the undersigned if you have any questions.

Sincerely,

SPERLING HANSEN ASSOCIATES

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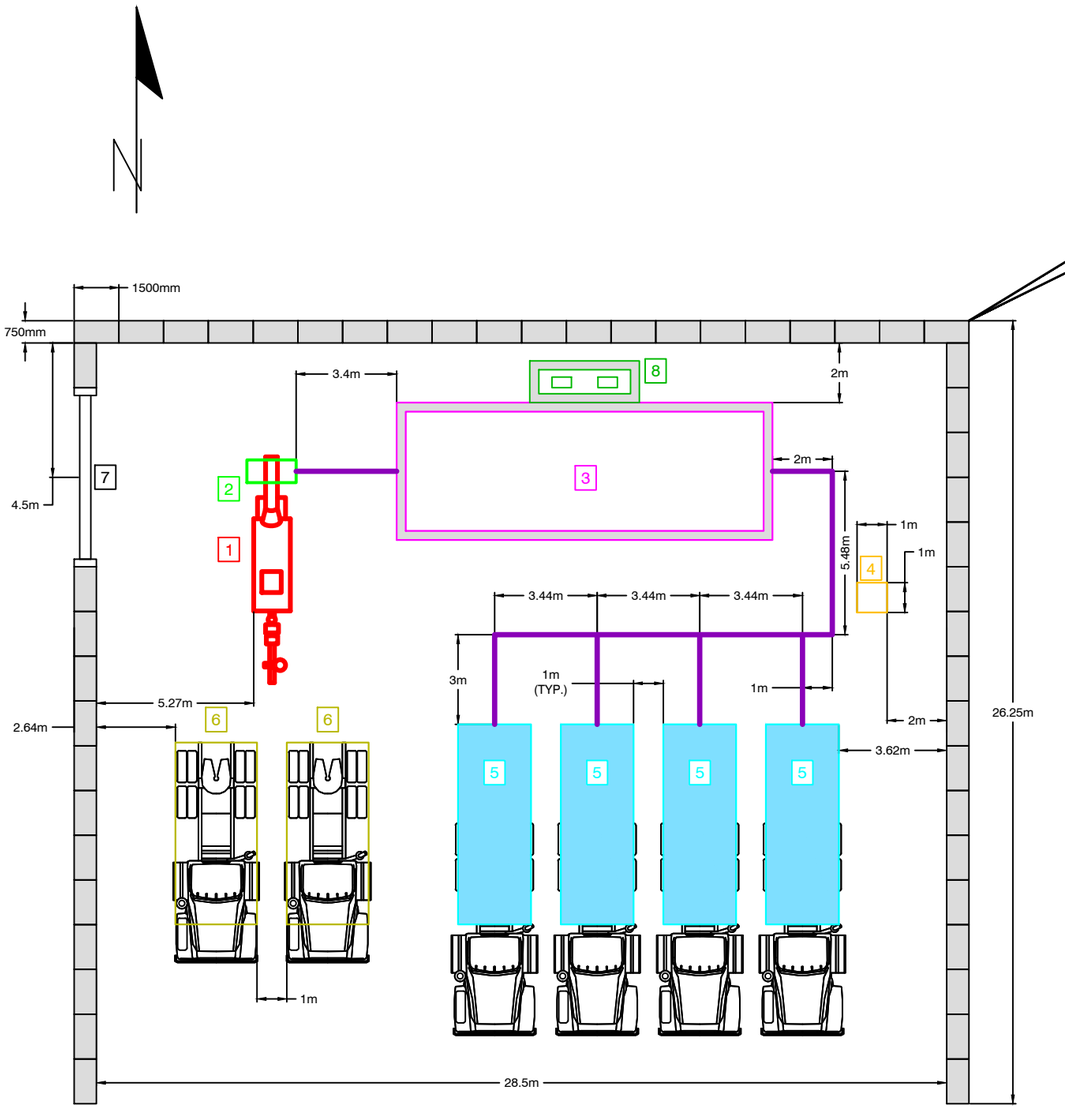
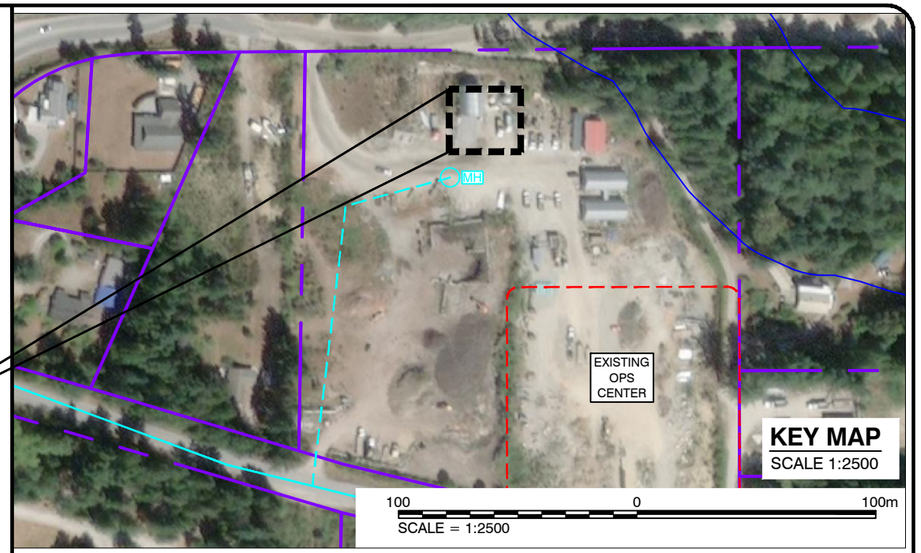


SEPTAGE RECEIVING FACILITY SITE PLAN

SCALE 1:200

10 0 10m

SCALE = 1:200




1: AUTOMATED RECEIVING AND SCREENING SYSTEM

5: 30 CU.YRD DEWATERING CONTAINER


30m WIDE HIGH PROFILE COVERALL ON CONCRETE LOCK BLOCK WALL

LEGEND

1: **AUTOMATED RECEIVING AND SCREENING SYSTEM**
DIMENSION: 7.57m (L) X 1.22m (W) X 3.36m (H)

2. **0.75 CU.YARD UTILITY TILT TRUCK**
DIMENSION: 1.65m (L) X 0.75m (W) X 0.97m (H)

3: **144 CU.M SULPHATE-RESISTANT REINFORCED CONCRETE EQUALIZATION TANK**
EXTERIOR DIMENSION: 12.6m (L) X 4.6m (W) X 3.6m (H)
INTERIOR DIMENSION: 12m (L) X 4m (W) X 3m (H)

4: **POLYMER INJECTION SYSTEM**

5: **30 CU.YRD DEWATERING CONTAINER**
DIMENSION: 6.71m (L) X 2.44m (W) X 1.83m (H)

6: **PARKING SPACE**
DIMENSION: 6.1m (L) X 2.74m (W)

7: **ROLL UP DOOR**
DIMENSION: 5.49m (L) X 4.89m (H)

8: **ENCLOSED BLOWERS**

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Landfill Services Group

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- Design & Operations Plans
- Landfill Closure
- Environmental Monitoring

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LEGEND:

- PROPERTY LINE
- EX RIPARIAN ZONE LIMIT
- EXISTING PRESSURE SEWER MAIN
- PROPOSED TIE INTO SEWER MAIN

CLIENT:
DISTRICT OF SECHELT

PROJECT:
DISTRICT OF SECHELT SEPTAGE RECEIVING FACILITY LONG-TERM PLAN

TITLE:
CONCEPTUAL SEPTAGE FACILITY DESIGN

SCALE:	DATE:	PROJECT NO:
AS SHOWN	2026/02/13 yyyy/mm/dd	PRJ 23024
DESIGNED	MC	DRAWING NO:
DRAWN	AT	FIGURE 01
CHECKED	MC	

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