

REPORT NUMBER: WW01

WASTEWATER SYSTEM ASSESSMENT - SCHOTT'S LAKE

PREPARED FOR:
SCHOTT'S LAKE RESORT AND RV PARK

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GENERAL

Schott's Lake RV and Guest Ranch currently owns and operates RV sites, motel, rustic cabins, and restaurant facilities around Schott's Lake. Schott's Lake is a multi-use resort located within Mountain View County, about 10km west of the Town of Sundre off secondary highway 584. It consists of approximately 160 acres of native trees, plants and shrubs, open fields adjacent to a lake.

Nestled inside this area is the Schott's Lake campground, motel, rustic cabins, restaurant facilities, staff accommodation, and owner accommodation consisting of:

- Serviced RV campsites
- Serviced Restaurant and dining facilities
- Serviced Motel
- Un-serviced cabins
- RV dumping station
- Serviced owner and staff accommodation

The remainder of the site is proposed to be developed with additional group RV campsites, larger motel/hotel, events center and some more cabins.

This assessment will provide direction on future wastewater serving for these new developments. At this time existing development will stay serviced as is.

EXISTING WASTEWATER SYSTEM

The restaurant and motel are serviced by a "Grandfathered" wastewater lagoon. The existing RV sites are serviced by pump out tanks, including the RV dumping station. The cabins are un-serviced. The owner accommodations are serviced with a septic field and the staff accommodations is serviced with a pump out tank.

SITE INVESTIGATION

WSP carried out a Geotechnical Investigation of the proposed development areas.

The Schott's Lake boreholes basically revealed the following:

- 0 to 150 mm layer of topsoil
- In a few areas 0 to 0.46 m of gravel fill
- 0.1 to 5.0 m of clay



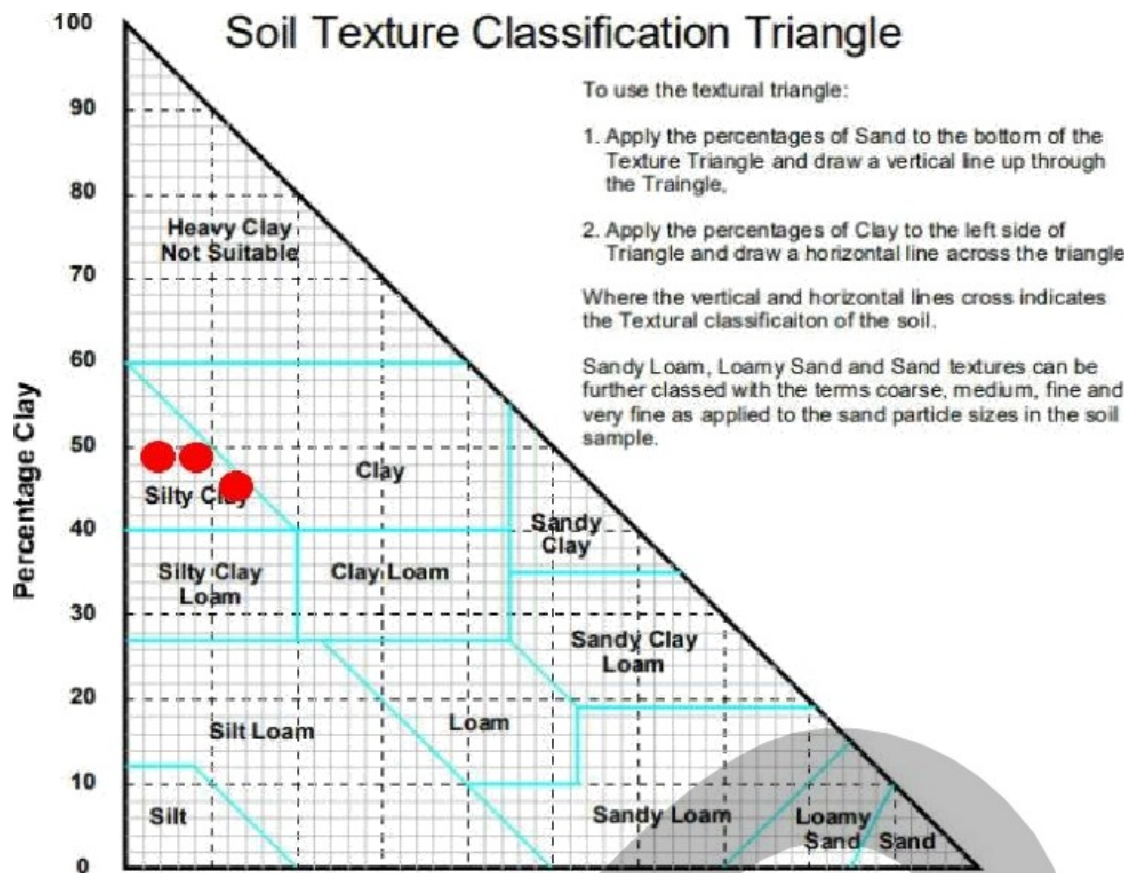
- 0.13 to 6.6 m of clay till
- No ground water observed other than one bore hole at 5.9m depth.

Soil samples, in the typical septic zone, were extracted and sent to the laboratory for analysis. For soils in the typical septic field zone (0.9 to 1.5m depth) the majority of the soil is the clay material. The additional laboratory testing on the clay is summarized in the following tables below.

Table 5 Laboratory Test Results – Clay

Borehole Number (BH21-*)	Sample Depth (mbgs)	Atterberg Limits			Sieve & Hydrometer				Soluble Sulfate%
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Symbol	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	
05	1.5	67	25	CH		4.4	46.6	49.0	
06	1.5					9.0	42	49.0	
13	1.5	67	24	CH		13.3	41.3	45.4	

Soil Texture Classification Triangle



Based on the Soil Texture Classification Triangle provided in Alberta Private Sewage Standard of Practice, the tested soil is classified as Silty Clay.

SUMMARY OF FINDINGS

As a result of our site investigation, including laboratory analysis of extracted soil samples, the following items are noted:

- The soils at the proposed Schott's Lake facility would be classified as Blocky "SIC" corresponding to an effluent load rate of **0.0 liters/day per square meters** for quality less than 30 mg/L and **0.0 liters/day per square meters** for quality between 30 to 150 mg/L.
- Ground water was not present in any of the test pit(s) and should not pose any concerns.

DESIGN POPULATION AND WASTEWATER FLOW GENERATION

The following Studies and Standards that have been referenced and used in the preparation and completion of this report:

- Guidelines for Municipal Waterworks, and Wastewater and Storm Drainage Systems by Alberta Government (2012 & 2013)
- Canada Wastewater Systems Effluent Regulations (SOR/2012-139)
- Alberta Environment Standards

Based on the above, we have found:

For the 80 room Motel:

- Peak daily volume is 90 l/day/bed, $90 \times 80 \times 1.5 = 10,800$ liters or 2,375 Imp Gallons

For the 250-person Event Centre:

- Peak daily volume is 32/day/seat, $32 \times 250 = 8,000$ liters or 1,760 Imp. Gallons

For the 30 total stalls Group RV Sites:

- Peak daily volume is 80 l/day/site, $30 \times 80 = 2,400$ liters or 528 Imp. Gallons

For the 8 Rustic Cabin Sites:

- Peak daily volume is 180 l/day/cabin, $180 \times 8 = 1,440$ liters or 317 Imp Gallons

RECOMMENDATIONS

In general, the soils are not suitable for on-site secondary treatment (standard fields) of sanitary sewer. Additional onsite testing may show areas of more suitable soils or other options as described below may be suitable.

Septic Field Mound System

- It may be possible to dispose of effluent by creating a sufficient layer of suitable material between the disposal point and the water table and



disposing of the water through both downward movement and evaporation. This is usually done through the construction of mounds.

- A mound is a seepage bed elevated by clean fill. The sand cap helps avoid undue soil compaction so that pore spaces within the underlying layers are maintained. A covering of 150mm of topsoil and vegetation helps draw moisture up for dispersal by evaporation. The minimum vertical separation between the bottom of the mound rock bed and restricting soil layer should be maintained. The location of a mound will depend upon the topography of the site. Refer to Section 8.4 of Alberta Private Sewage System Standard of Practice, 2015 for mound details.
- The design of the mound system is based on expected daily wastewater daily volume and natural soil characteristics. This information provided above is very general. An enhanced mounding system is required to provide treatment of the wastewater constituents before discharge from the mound percolating directly into the in-situ soil. Mound systems must be designed by a licensed professional engineer.

Sewage Pump Out Tanks

- Sewage pump out tanks could be used for seasonal small volume generators such as the rustic cabins or group RV sites. These tanks would need to be pumped out on a regular basis.

Advanced Treatment Systems

- Advanced on-site treatment systems such as AdvanTex can be considered. They are compact and efficient recirculating packed-bed filters. Packed-bed filters have proven to be a highly reliable, energy-efficient, and low-maintenance technology. The wastewater is treated so that less area is required for disposal fields or the treated wastewater could be used for non-potable uses such as irrigation, toilet flushing, etc.
- AdvanTex Treatment Systems were honored by the Water Environment Federation with a 2011 “Innovative Technology Award” and by the Federation of Canadian Municipalities with a 2011 “Sustainable Community Award.” Because they are such an environmentally sound product, AdvanTex Treatment Systems help developers earn LEED credits.
- The Advantex AX 1000 system can treat up to 18,000 l/day. Smaller units are available for treating less flows.

Greywater Options

- Greywater is wastewater from bathing, washing and laundry, but does not contain toilet wastes, food wastes, dirt or other contaminants (known as black water). It can be treated in a private septic system, and can be re-used for irrigation, but only on non-food plants. When it is separated from greywater, it reduces the storage capacity required for the black water which needs to be trucked to an approved facility for further treatment.

In general, any solution would have to be specific to the site and proposed development and be in full compliance with the Alberta Private Sewage Systems Standards of Practice, 2015.

In Alberta Private Sewage Systems Standards of Practice, 2015 identifies a number of considerations with respect to placement of a disposal field. With respect to offset distance requirements, these include:

- 1.5m from a property line,
- 90 m from a permanent body of water, such as a river, stream or creek,
- 15 m from a water source,
- 15 m from a water course,
- 10 m from a basement, cellar or crawl space,
- 5 m from a dwelling without a basement, cellar or crawl space.
- Additional restrictions and details are contained in the standards. The scope of this review did not extend to confirming the suitability of lot layout or specific septic field / mound locations or percolation rates.

ABBREVIATIONS AND CONVERSION FACTORS

The following abbreviations are used in this report:

ADDWF	Average Day Dry Weather Flow
HP	Horsepower
i/i	Inflow and Infiltration
km	Kilometre
kwh	Kilowatt hour
Lpcd	Litres per capita per day
L.P.S	Low Pressure Sewer System
L/day	Litre per Day
L/s	Litres per second
L/s/ha	Litres per second per hectare
Max	Maximum
Min	Minimum
mm	Millimeter



m ³	Cubic Meters
O&M	Operation and Maintenance
PVC	Polyvinyl Chloride
HDPE	High Density Polyethylene
NPC	Net Present Value
ADDWF	Average Day Dry Weather Flow
ADWWF	Average Day Wet Weather Flow
PDWWF	Peak Day Wet Weather Flow