- Invasive species identified in the soil placement area will be eradicated in accordance with The CVRD strategy for invasive plant management (CVRD, 2019b).

6 Groundwater Impact Assessment

The application area is within 100 m of Aquifer 203 and approximately 100 m from Aquifer 208, both high vulnerability. As requested by the CVRD, a Ground Water Impact Assessment was prepared by a Registered Professional. The assessment is provided in Appendix 4. The assessment concluded that the soil deposit activity would not pose a threat to the local aquifer quality or quantity.

7 Site Remediation

The following subsections describe the remediation plans that will occur subsequent to completion of the soil deposit activities.

7.1 Landscaping

Consistent with the proposed equestrian use, the following landscaping measures are planned:

1. Level grades will be finished with a layer of crushed rock and/or a layer of mulch. These are porous materials that will promote diffuse drainage, and will cover deposited soils to mitigate erosion. Some areas will also be strategically landscaped with vegetation to promote soil stabilization and aesthetic interest.
2. Slopes will be vegetated with a combination of seed (e.g. native grasses, wildflowers), trees, and/or shrubs. This will promote slope stabilization, and erosion protection. Appropriate native seed/plant/tree species will be used where practical for re-vegetation and landscaping.

7.2 Stormwater Management

Stormwater will be managed using the following principles, so as not to create erosion or other adverse effects of the landscape:

- Natural drainage patterns on the property will be retained where feasible.
- Land areas will be sloped to collection ditches/swales, settling ponds, and natural vegetated areas to minimize sediment transport and turbidity.
- The majority of land surface will be landscaped with permeable materials to allow for diffuse infiltration into the ground.
- Bare soils on sloped surfaces will be vegetated to slow runoff and mitigate erosion.

7.3 Noxious Weeds and Invasive Species

Site remediation will be completed in a manner that will minimize colonization and spread of noxious weeds. As stated in Section 5.7, the most significant invasive plant species documented in the CVRD include Scotch broom, Canada Thistle, Himalayan Blackberry, St. Johns' Wort. Oxeye Daisy, Bull Thistle, Common Tansy, Japanese knotweed, Yellow Iris, Tansey Ragwort and Curled Dock (Cowichan Valley

LHC Lowen Hydrogeology Consulting Ltd.

March 19, 2020
LHC File: 2004

Great Pacific Consulting Ltd.
202 - 2780 Veterans Memorial Parkway
Victoria, BC
V9B 3S6

Attention: Jason Clarke, P. Eng.

Re: Groundwater Impact of Soil Filling at PID 027-514-382, 670 Stebbings Road, Shawnigan Lake, B.C.

Following our e-mails January 2020 and follow-up communications we have assessed the potential impacts from soil deposition on the above described property. Our findings are presented in the following sections.

The Cowichan Valley Regional District (CVRD) has developed a bylaw to manage the deposit of soils within the region. The Bylaw (No. 4236) has established a permitting process for the deposit of soil and is intended to protect streams, groundwater resources and other sensitive features. The bylaw guards against the unauthorized importation of contaminated soils. Sites receiving more than 1000 m^3/year require a Type "C" permit.

This report is designed to assess the risk to the groundwater resource from the deposit of soils on the subject property. The report will form part of the application package for the Type "C" permit. See a property location Plan in Figure 1.

1.0 PHYSICAL SETTING

1.1 Climate

The Shawnigan Lake region is within the West Coast Temperature Zone, with an average annual precipitation of 1,247.6 mm, of which 75.5 cm falls as snow. The rainy season is generally between October to March, where precipitation averages greater than 100 mm per month. The coldest months are typically from December to February where daytime highs are lower than 5 degrees C. From June to September daytime temperatures are typically in the 15 degrees C range.

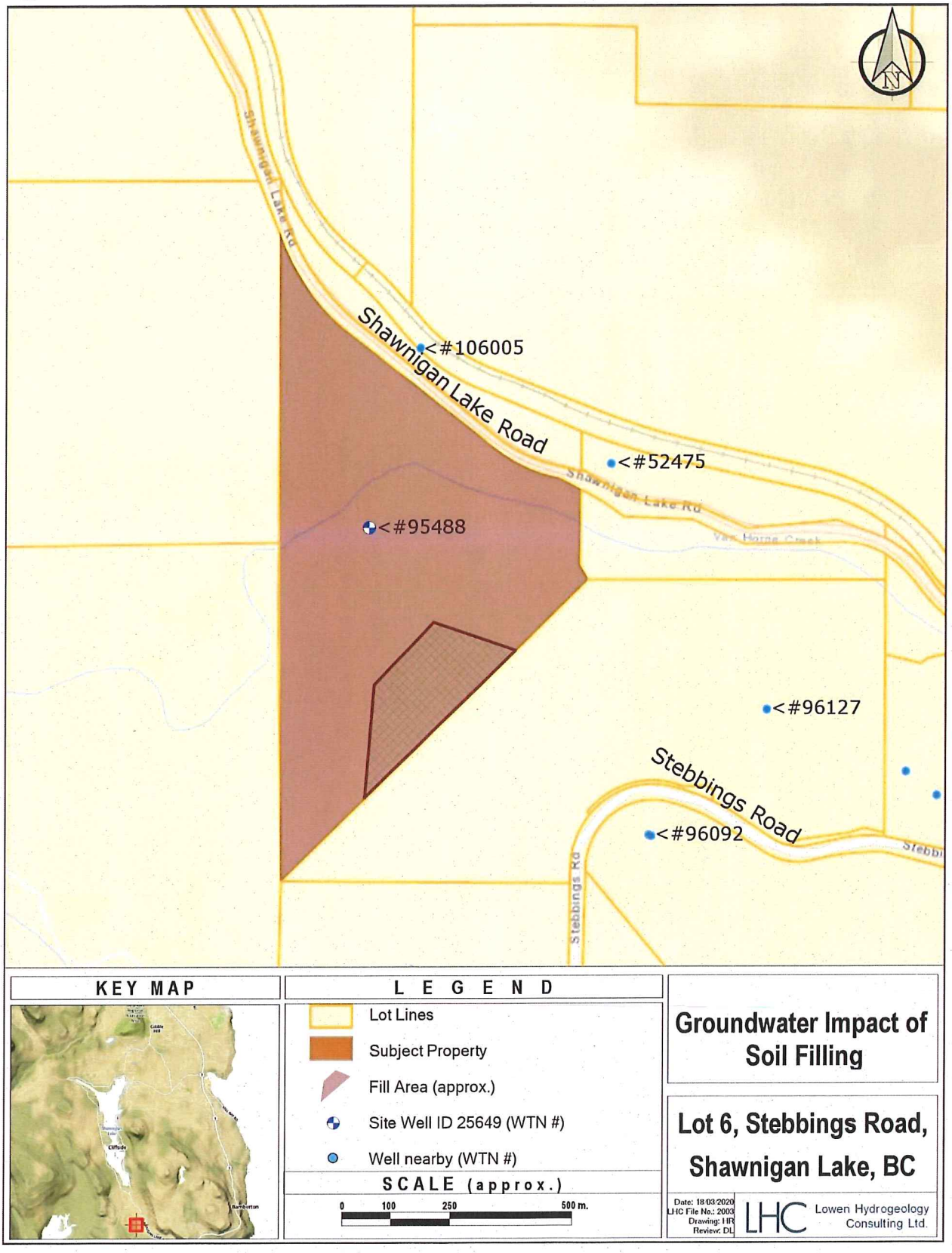
1.2 Topography and Surface Water Drainage

The subject property is located on moderately to steeply sloping terrains, with slopes ranging from 9 - 30%. The topography is complex, with multiple direction slopes and irregular surfaces. The topography slopes down to the North or toward Van Horne Creek. Surface and sub-surface drainage follow this direction.

1.3 Soils

The main native soils found on the subject property are the Shawnigan Moraine and the Rosewall Colluvium soil units, consisting of gravelly sandy loam, which is well drained. The Shawnigan unit is derivated from glacial deposition and the Rosewall unit from weathering of bedrock. Considering the nature of the soils, a horizontal hydraulic conductivity Kh of 2 - 5 m/day can be estimated. Soil layer thickness or bedrock depth is variable in the region, with depths up to 37.5 m.

Figure 1 - Location Plan



1.4 Geology

The study area is blanketed by glacial drift and colluvium deposits. Drilling records indicate permeable sand and gravel layers (colluvium soils) overly till which in-turn overlies bedrock. The Geological Survey of Canada Map 1553A by J.E.Muller (1980) shows the area of study is underlain by the Wark Gneiss rock unit. The rock unit is extensively folded and faulted. There are major faults to the north in this unit but none in the immediate vicinity of the subject property. This rock unit consists of metamorphosed volcanics and is generally favourable for domestic or community water supply development. Moderate yields can be obtained from these rocks (1 to 50 USgpm).

1.5 Hydrogeology

The on-site well record (Well ID #25649) indicates an unconsolidated sand/gravel type aquifer can be found beneath the area of soil filling. This aquifer is small and localized, and it is not mapped. However, the sand/gravel layer here extends down to 10.67 m (35 feet) and is capable of suppling 0.63 L/s (10 USgpm). The site well plus nearby well records are attached as Attachment #1. The sand and gravel aquifer overlies a till layer. Beneath the till layer lies bedrock. The sand gravel aquifer has an estimated hydraulic conductivity of 2-5 m^2/d.

Principally due to fractures, in addition to probable bedding plane and geologic contact zones, the bedrock is saturated at depth and the water bearing zones (aquifers) are replenished through the vertical infiltration of precipitation and/or by lateral flow from up-slope recharge zones. The local bedrock wells are generally greater than 30 m deep and completed in the Wark Gneiss bedrock unit.

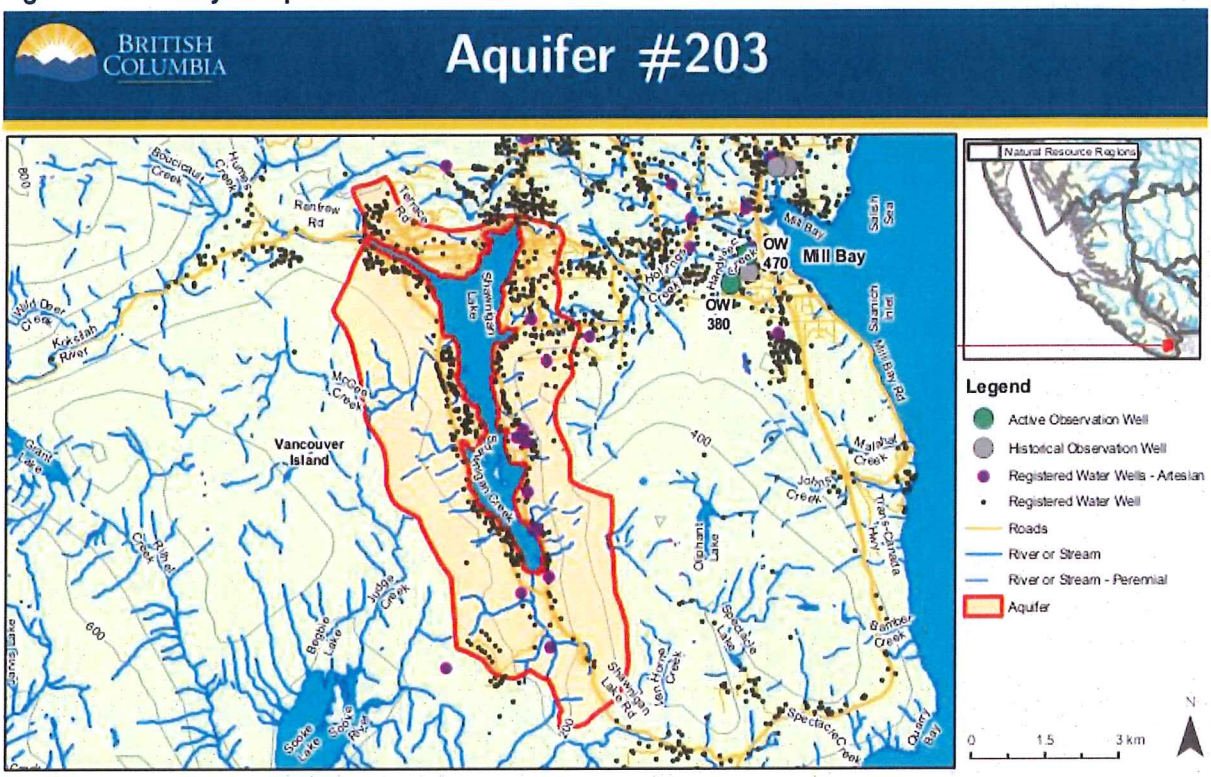
The regional topography indicates the groundwater flow direction to be toward the north in the surficial and bedrock aquifers. The bedrock aquifer has a hydraulic conductivity ranging from 0.00001 to 0.10 m/d. (Domenico & Schwartz, 1990). A recharge rate to the bedrock aquifer of 10 percent of precipitation, or 0.10 x 1,247 mm/year = 125 mm/year, has been estimated by LHC based on these rock conductivities and the characteristics of the overlying soils. The mapped bedrock aquifer beneath the site is Aquifer No. 203. See a Summary of Aquifer data in Figure 2.

2.0 IMPACT OF SOIL DEPOSITION ON AQUIFER #203

A portion (about 1/8) of the subject property will be subject to soil filling. The purpose of the soil and rock fill being placed on the subject property is to re-shape the landscape making the site usable as a horse-riding facility. This filling plan will not negatively impact the underlying aquifers. The following reasons can be cited for this conclusion:

- Only clean fill soil is being deposited at the site. All soil suppliers must fill-in and sign a "Soil/Material Acceptance Agreement". This ensures that only clean (uncontaminated) soils are received. See Attachment #2.
- Soils being deposited are primarily from Victoria region residential and commercial developments. Soils are mainly native soil that has been excavated to facilitate construction.
- A small amount of rock and concrete is received and is being used for on-site road construction or stabilization.
- Original site drainage features are being maintained and silt traps and ponds are used to ensure clean/clear runoff from active areas.
- All creeks and ponds, inspected on March 4, 2020, exhibited clean/clear water. The Van Horne Creek appears pristine.
- A minimum 30 m buffer is maintained around the natural water features on the property.

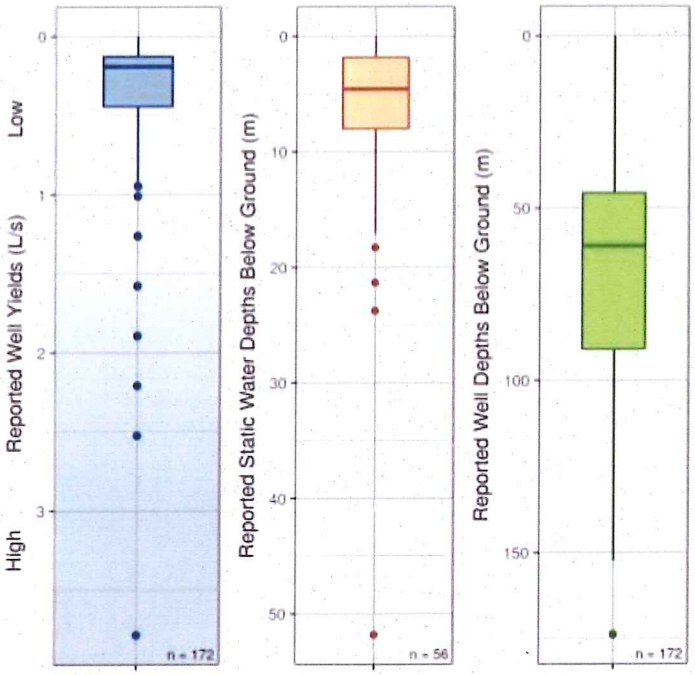
Figure 2 - Summary of Aquifer



Aquifer Description (Mapping Report): Fractured crystalline (igneous intrusive or metamorphic, meta-sedimentary, meta-volcanic, volcanic) rock aquifer (subtype = 6b).

Aquifer Details	
Region	West Coast
Water District	Victoria
Aquifer Area	31 km^2
No. Wells Correlated to Aquifer	172
Vulnerability to Contamination	High
Productivity	Low
Aquifer Classification	IIA
Hydraulic Connectivity[1]	Not Likely
Aquifer Stress Index	Less stressed
No. Water Licences Issued to Wells	0
Observation Wells (**Active**, Inactive)	None

[1] Based on broad regional assessment



Detailed methods for all figures are described in the companion document (Aquifer Factsheet - Companion Document.pdf).

Factsheet generated: 2019-03-06. Available from: https://s3.ca-central-1.amazonaws.com/aquifer-docs/00000/00203_Aquifer_Factsheet.pdf.

- The underlying bedrock aquifer #203 is protected by overlying sand/gravel and till layers.
- All equipment on-site is maintained in good order and leaks (hydraulic fluids) are fixed and cleaned up immediately.
- In general Aquifer #203 is classified as Highly Vulnerable, however, a site-specific assessment using local well data (Attachment #1 - Well Records) indicates Aquifer #203 has a low vulnerability at this site. See Attachment #3 for the vulnerability calculation.
- Overall, the site is well managed, clean and neat. Best management practices are being employed.
- In general filling soil over a rock aquifer is beneficial to recharge. The soil acts as a "sponge" soaking up wet season precipitation and slowly releasing it to the underlying rock fractures. Filled soil with about 30% porosity can store much more water than fractured rocks with less than 10% porosity.

3.0 CONCLUSION

1. Assuming current operating plans and procedures are maintained we do not consider the soil deposition on the subject property a threat to local aquifer water quality or quantity.
2. The subject site (PID 027-514-382) can be granted a Type "C" Soil Deposit Permit from the CVRD.

4.0 CLOSURE / DISCLAIMER

This report has been prepared in accordance with generally accepted groundwater engineering practices. The opinions expressed herein are considered valid at the time of writing. Changes in site conditions can occur, however, whether due to natural events (e.g. climate change, earthquakes) or to human activities (e.g. recharge area modification or blasting on this or adjacent properties). In addition, changes in regulations and standards may occur, whether they result from legislation or the broadening of knowledge. This report is therefore subject to review and revision as changed conditions are identified.

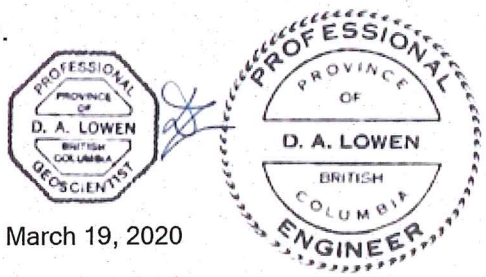
In formulating our analysis, we have relied on information provided by others; well drillers, surveyors and hydrogeology reports/aquifer mapping. The information provided by others is believed to be accurate but cannot be guaranteed by Lowen Hydrogeology Consulting Ltd.

Furthermore, if the recommendations in this report are not implemented, the undersigned assumes no responsibility for any adverse consequences that may occur.

Respectfully submitted,

Yours very truly,

LOWEN HYDROGEOLOGY CONSULTING LTD.



March 19, 2020

Dennis Lowen, P. Eng., P. Geo.

DL/hr

References

1. Cowichan Valley Regional District (CVRD) The Bylaw (No. 4236)
2. Domenico & Schwartz, 1990; *Physical and Chemical Hydrogeology*
3. J. E. Muller, 1980, *The Geological Survey of Canada Map 1553A*
4. Lawrence, R. W., Feb. 2018; *Admirals-Mackenzie Interchange Project - Evaluation of Geotechnical Characteristics of Aggregates for Roadbed Construction*. Tech-Mem. 18-05

Well Log Report WTN 95488

BRITISH COLUMBIA Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 95488
Well Identification Plate Number: 25649
Owner Name: ISLAND TIMBERLANDS GROUP LTD
Intended Water Use: Private Domestic

Well Status: New
Well Class: Water Supply
Well Subclass: Domestic
Aquifer Number: 1143

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

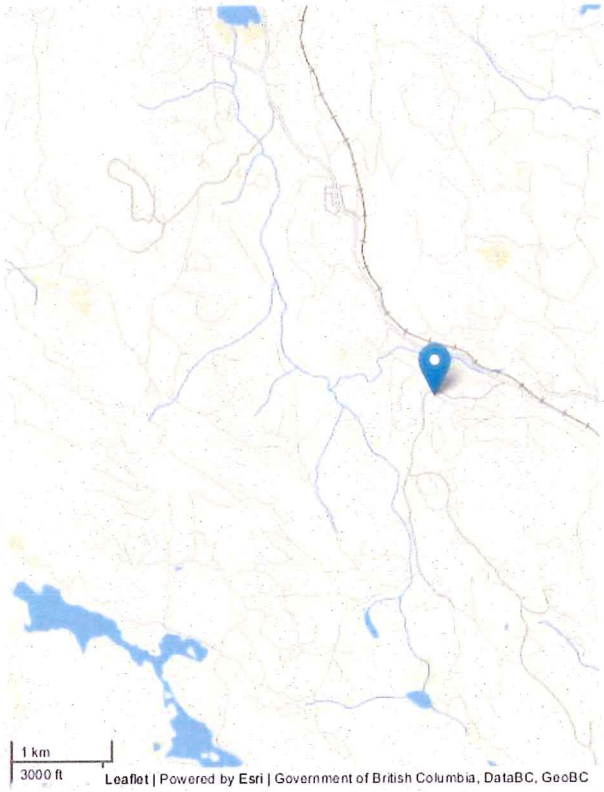
Location Information

Street Address: STEBBINGS ROAD
Town/City: MALAHAT

Legal Description:

Lot	6
Plan	
District Lot	50
Block	
Section	
Township	
Range	
Land District	29
Property Identification Description (PID)	009355600

Description of Well Location: PROPOSED SUBDIVISION



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.562874
Longitude: -123.599659
UTM Easting: 455757
UTM Northing: 5379038
Zone: 10
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered

There has been no activity related to this well.

https://apps.nrs.gov.bc.ca/gwells/well/95488

Comments

No comments submitted

Alternative Specs Submitted: No

Documents

No additional documentation available for this well.

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2008-03-10	2008-03-11				

Well Completion Data

Total Depth Drilled: 36.00 feet
Finished Well Depth: 34.00 feet
Final Casing Stick Up: 30.000 inches
Depth to Bedrock:
Ground elevation: 905.00

Static Water Level (BTOC): 5.00 feet
Estimated Well Yield: 10.000 USGPM
Artesian Flow:
Artesian Pressure:
Method of determining elevation: GPS

Well Cap: STEEL
Well Disinfected Status: Disinfected
Drilling Method:
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0.00	35.00		coarse		brown	Loose	SOME SAND	10.0000
35.00	36.00		silty		brown	Hard	FINE, DENSE. SEALED WATER OFF.	

Casing Details

From (ft)	To (ft)	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0.00	18.00	Steel Removed		9.000		Not Installed
0.00	34.00		Steel	6.000	0.219	Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Surface Seal Installation Method: Poured
Surface Seal Thickness: 1.50
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From	To

There are no records to show

Screen Details

Intake Method: Open Bottom
Type:
Material:
Opening:
Bottom:

Installed Screens

From	To	Diameter	Assembly Type	Slot Size

There are no records to show

Well Development

Developed by:

Development Total Duration: 1.00 hours

Well Yield

Estimation Method: AIR_LIFT
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate: 10.00
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration: 1.00

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Disclaimer

Well Log Report WTN 106005

BRITISH COLUMBIA Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 106005
Well Identification Plate Number: 35854
Owner Name: DON MANN EXCAVATION
Intended Water Use: Private Domestic

Well Status: New
Well Class: Water Supply
Well Subclass: Domestic
Aquifer Number: 203

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

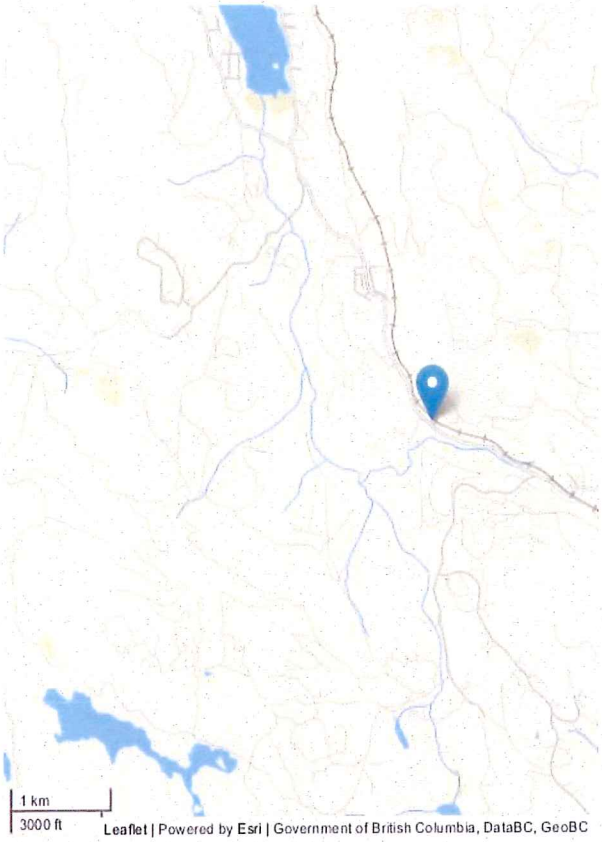
Location Information

Street Address:
Town/City:

Legal Description:

Lot	6(A)
Plan	VIP85007
District Lot	50
Block	
Section	
Township	
Range	
Land District	29
Property Identification Description (PID)	

Description of Well Location: NONE PROVIDED



Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 48.568547
Longitude: -123.603847
UTM Easting: 455453
UTM Northing: 5379671
Zone: 10
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered

There has been no activity related to this well.

Disclaimer

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2011-04-14	2011-04-18				

Well Completion Data

Total Depth Drilled: 280.00 feet
Finished Well Depth: 200.00 feet
Final Casing Stick Up: 30.000 inches
Depth to Bedrock: 25.00 feet
Ground elevation: 787.00

Static Water Level (BTOC):
Estimated Well Yield:
Artesian Flow:
Artesian Pressure:
Method of determining elevation: Unknown

Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Air Rotary
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0.00	20.00							
20.00	25.00	HARD PAN CASING SET BEDROCK						
25.00	100.00					Soft		
100.00	200.00	SOME QUARTZ						
200.00	280.00					Soft	FRACTURE 260' 3 GAL	

Casing Details

From (ft)	To (ft)	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0.00	25.00		Steel	6.630	0.219	Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material: PVC
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From	To
50.00 ft	90.00 ft

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From	To	Diameter	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:

Development Total Duration: 2.00 hours

Well Yield

Estimation Method: AIR_LIFT
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate: 3.00
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration: 2.00

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Comments

No comments submitted
Alternative Specs Submitted: No

Documents

- WTN 106005_Well Construction.pdf

Well Log Report WTN 52475

BRITISH COLUMBIA Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 52475
Well Identification Plate Number:
Owner Name: FRED KING
Intended Water Use: Private Domestic

Well Status: New
Well Class: Unknown
Well Subclass:
Aquifer Number: 203

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

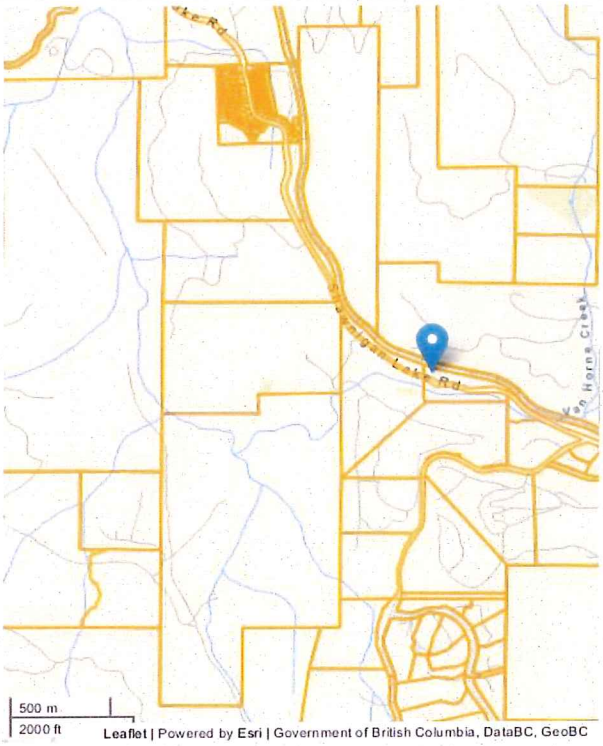
Location Information

Street Address: SHAWNIGAN LK RD
Town/City:

Legal Description:

Lot	A
Plan	28099
District Lot	50
Block	
Section	
Township	
Range	
Land District	29
Property Identification Description (PID)	

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.567198
Longitude: -123.600361
UTM Easting: 455709
UTM Northing: 5379519
Zone: 10
Coordinate Acquisition Code: (50 m accuracy) Digitized from 1:20,000 mapping

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1983-07-16		A. D. Baker Drilling	August 13th 2003 at 3:46 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1983-07-16					

Comments

RATE: 1.5 GPM. METHOD OF DRILLING = DRILLED
Alternative Specs Submitted: No

Documents

No additional documentation available for this well.

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 300.00 feet
Final Casing Stick Up:
Depth to Bedrock: 7.00 feet
Ground elevation:

Static Water Level (BTOC):
Estimated Well Yield: 1.500 USGPM
Artesian Flow:
Artesian Pressure:
Method of determining elevation: Unknown

Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Other
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0.00	0.00	Casing set (through large boulder) 2'						
0.00	0.00	into rock						
0.00	3.00	Gravel						
3.00	6.00	Boulder						
6.00	7.00	Gravel						
7.00	198.00	Granite						
198.00	0.00	1.5 GPM						
198.00	300.00	Granite						

Casing Details

From (ft)	To (ft)	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe

There are no records to show

Surface Seal and Backfill Details

Surface Seal Material: Other
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From	To

There are no records to show

Screen Details

Intake Method:
Type:
Material: Other
Opening:
Bottom:

Installed Screens

From	To	Diameter	Assembly Type	Slot Size

There are no records to show

Well Development

Developed by:

Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Well Log Report WTN 96127

BRITISH COLUMBIA Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 96127
Well Identification Plate Number: 25650
Owner Name: ISLAND TIMBERLANDS GP LTD
Intended Water Use: Private Domestic

Well Status: New
Well Class: Water Supply
Well Subclass: Domestic
Aquifer Number: 203

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

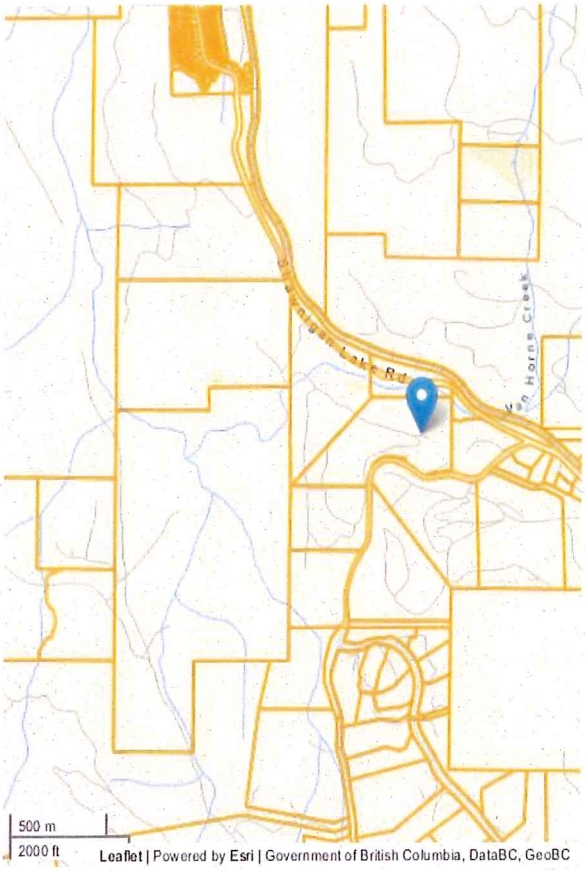
Location Information

Street Address: STEBBINGS ROAD
Town/City: MALAHAT

Legal Description:

Lot	7
Plan	
District Lot	50
Block	
Section	
Township	
Range	
Land District	29
Property Identification Description (PID)	009355600

Description of Well Location: PROPOSED SUBDIVISION



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.564334
Longitude: -123.597521
UTM Easting: 455916
UTM Northing: 5379199
Zone: 10
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered

There has been no activity related to this well.

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2008-03-12	2008-03-13				

Well Completion Data

Total Depth Drilled: 205.00 feet
Finished Well Depth: 205.00 feet
Final Casing Stick Up: 30.000 inches
Depth to Bedrock: 70.00 feet
Ground elevation: 879.00

Static Water Level (BTOC): 45.00 feet
Estimated Well Yield: 5.000 USGPM
Artesian Flow:
Artesian Pressure:
Method of determining elevation: GPS

Well Cap: STEEL
Well Disinfected Status: Disinfected
Drilling Method: Air Rotary
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0.00	18.00	TILL BOULDERS			grey	Hard		
18.00	24.00				grey	Hard	VERY ROUGH	
24.00	32.00	BOULDER			green	Hard	DRILLED WITH ODEX	
32.00	37.00				grey	Hard		
37.00	70.00				brown	Hard		
70.00	80.00	WEATHERED BEDROCK			brown	Medium		
80.00	205.00				green	Medium	5.5 HOLE. 170' - 3 GPM; 205' - 5 GPM.	

Casing Details

From (ft)	To (ft)	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0.00	18.00	Steel Removed		9.000		Not Installed
0.00	80.00		Steel	6.000	0.219	Installed
80.00	205.00		Open hole	5.500		Not Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Surface Seal Installation Method: Poured
Surface Seal Thickness: 15.00
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From	To

There are no records to show

Screen Details

Intake Method: Open Bottom
Type:
Material:
Opening:
Bottom:

Installed Screens

From	To	Diameter	Assembly Type	Slot Size

There are no records to show

Well Development

Developed by:

Development Total Duration: 1.00 hours

Well Yield

Estimation Method: AIR_LIFT
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate: 5.00
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration: 1.00

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Comments

METHOD OF DRILLING AIR ROTARY & ODEX.
Alternative Specs Submitted: No

Well Log Report WTN 96092

BRITISH COLUMBIA Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 96092
Well Identification Plate Number: 25646
Owner Name: ISLAND TIMBERLANDS GP LTD
Intended Water Use: Private Domestic

Well Status: New
Well Class: Water Supply
Well Subclass: Domestic
Aquifer Number: 1143

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

Location Information

Street Address: STEBBINGS ROAD
Town/City: MALAHAT

Legal Description:

Lot	3
Plan	PROPOSED SUBDIVISION
District Lot	50
Block	
Section	
Township	
Range	
Land District	29
Property Identification Description (PID)	009355600

Description of Well Location: NOT PROVIDED

Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.562865
Longitude: -123.599618
UTM Easting: 455760
UTM Northing: 5379037
Zone: 10
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
There has been no activity related to this well.				

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2008-02-21	2008-02-27				

Well Completion Data

Total Depth Drilled: 147.00 feet
Finished Well Depth: 120.00 feet
Final Casing Stick Up: 36.000 inches
Depth to Bedrock:
Ground elevation: 1012.00

Static Water Level (BTOC): 99.00 feet
Estimated Well Yield: 3.000 USGPM
Artesian Flow:
Artesian Pressure:
Method of determining elevation: GPS

Well Cap: STEEL
Well Disinfected Status: Disinfected
Drilling Method: Air Rotary
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0.00	25.00	TILL COBBLES			brown	Hard		
25.00	50.00	TILL COBBLES BOULDERS			grey	Hard	VERY ROUGH	
50.00	70.00				brown	Medium		
70.00	78.00	TILL COBBLES			brown	Hard		
78.00	105.00				brown	Medium		
105.00	111.00				brown	Hard		
111.00	121.00		medium		brown	Loose	WET	
121.00	123.00	TILL CLAY			brown	Hard		
123.00	129.00				grey	Hard	CASING STOPPED	
129.00	147.00				grey	Hard		

Casing Details

From (ft)	To (ft)	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0.00	8.00	Steel Removed		9.000		Not Installed
0.00	115.00		Steel	6.000	0.219	Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Surface Seal Installation Method: Poured
Surface Seal Thickness: 1.50
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From	To

There are no records to show

Screen Details

Intake Method: Screen
Type: Pipe size
Material: Stainless Steel
Opening: Continuous Slot
Bottom: Other

Installed Screens

From	To	Diameter	Assembly Type	Slot Size
114.00 ft	116.00 ft	6.00	K_RISER	
116.00 ft	120.00 ft	6.00	SCREEN	15.00

Well Development

Developed by:

Development Total Duration: 3.00 hours

Well Yield

Estimation Method: BAILING
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate: 3.00
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration: 3.00

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Comments

SCREEN BOTTOM THREADED. CUTE SHOE BACKFILL. SET SCREEN AT 120 FEET.

Alternative Specs Submitted: No

Documents

- WTN 96092_Well Construction.pdf

Disclaimer

Soil/Material Acceptance Agreement

Soil/Material Acceptance Agreement

This Agreement must be executed before any soil/material can be accepted by Mike Ferguson's Affordable Services Inc. (DBA): ASI Contracting. The ASI Contracting Site located at 670 Stebbings Road, Shawnigan Lake, B.C. requires this Agreement to be executed by an authorized signatory of your Company.

By signing this Agreement, the Company represents and warrants to ASI that none of the soil/material delivered to ASI by the Company contains any contaminants at concentrations exceeding the limits listed in Column II of Schedule 7 of the Contaminated Sited Regulation (CSR), B.C. Reg 375/96 or contaminants listed under the Special Waste Regulation, B.C. Reg. 63/88 or any other criteria stipulated by ASI, and which may be amended by ASI from time to time at its sole discretion upon notice to the Company (soil material not exceeding such limits as may be amended is referred to herein as "Clean Soil")

ASI further reserves the right to inspect and sample and/or may require the Company to sample any and all soil/material before accepting the soil/material. The right of ASI to inspect or sample the material does not reduce, restrict or otherwise affect the Company's liability in relation to soil/material that is not Clean Soil. Any soil/material that is not Clean Soil may be rejected by ASI acting in its sole discretion and ASI may request the company to remove and dispose of such soil/material. Such removal and disposal being at the sole cost, risk and responsibility of the Company. If after acceptance by ASI, the soil/material is discovered not to be Clean Soil, ASI will notify the Company. If requested, the Company shall remove the soil/material within 24 hours of notification and dispose of the same in accordance with all applicable laws.

The Company agrees to defend , indemnify and hold ASI harmless from and against any and all claims, demands, orders, causes of action, damages, liabilities, losses, expenses, penalties, and all costs of defense relative thereto, including legal fees caused by or resulting from the Company's breach of this Agreement, including without limitation, any breach of the Company's obligation to deliver only Clean Soil.

This Agreement does not confer a right on the Company to deliver soil/material to the ASI Site. ASI reserves the right to reject for any reason, any and all deliveries of soil/material made by or desired to be made by, the Company.

This Agreement commences effective as of the first day on which the Company delivers soil/material to the ASI Site.

Any waiver of any provision of this Agreement must be in writing signed by ASI Contracting.

Name:	Title:
Company:	Company Address:
Site Name: ASI Contracting Fill Site	Site Address: 670 Stebbings Road, Shawnigan Lake B.C.
Signature:	Today's Date:

ASI Contracting. 670 Stebbings Road Shawnigan Lake, B.C. Office (250) 590-3867. Direct (250) 889-9353.

Attachment 3

Aquifer #203 - Vulnerability to Contamination from Surface Sources

AQUIFER VULNERABILITY INDEX CALCULATIONS*

PROJECT:	Stebbings Road Soil Fill Impact Assessment
PROJECT No.:	2004
DATE:	19/03/2020
WELL ID. PLATE No.:	25649
WELL TAG No.:	95488
LOCATION:	Stebbings Road , PID 027-514-384

Overlying layers

Layer	Thickness (m)	K value (m/d)	c** (years)
Sand/gravel	2.13	5	1.17E-03
Till, clay, silt	16.5	0.00001	4.52E+03
(average 4 wells)			

TOTAL **4,521** years

Low Vulnerability

* Van Stempvoort, D.,Ph.D., Ewart,L., and L.Wassener, 1992. AVI: A Method for Groundwater Protectior Mapping in the Prairie Provinces of Canada, Prairie Provinces Water Board, Regina, Sask.

** Hydraulic Resistence "c"
Hydraulic Resistance, c = Σdi / Ki , for layers 1 to i
The lower the hydraulic resistance (c) the higher the vulnerability:
c = Less than 10 years - extremely high vulnerability
c = 10 - 100 years - high vulnerability
c = 100 - 1000 years - moderate vulnerability
c = 1000 - 10,000 - low vulnerability
c = greater than 10,000 - extremely low vulnerability