

REPORT

Groundwater Impact Assessment

in support of a Type C soil deposit
permit

1815 Sooke Lake Road,
Shawnigan Lake,
Cowichan Valley Regional District

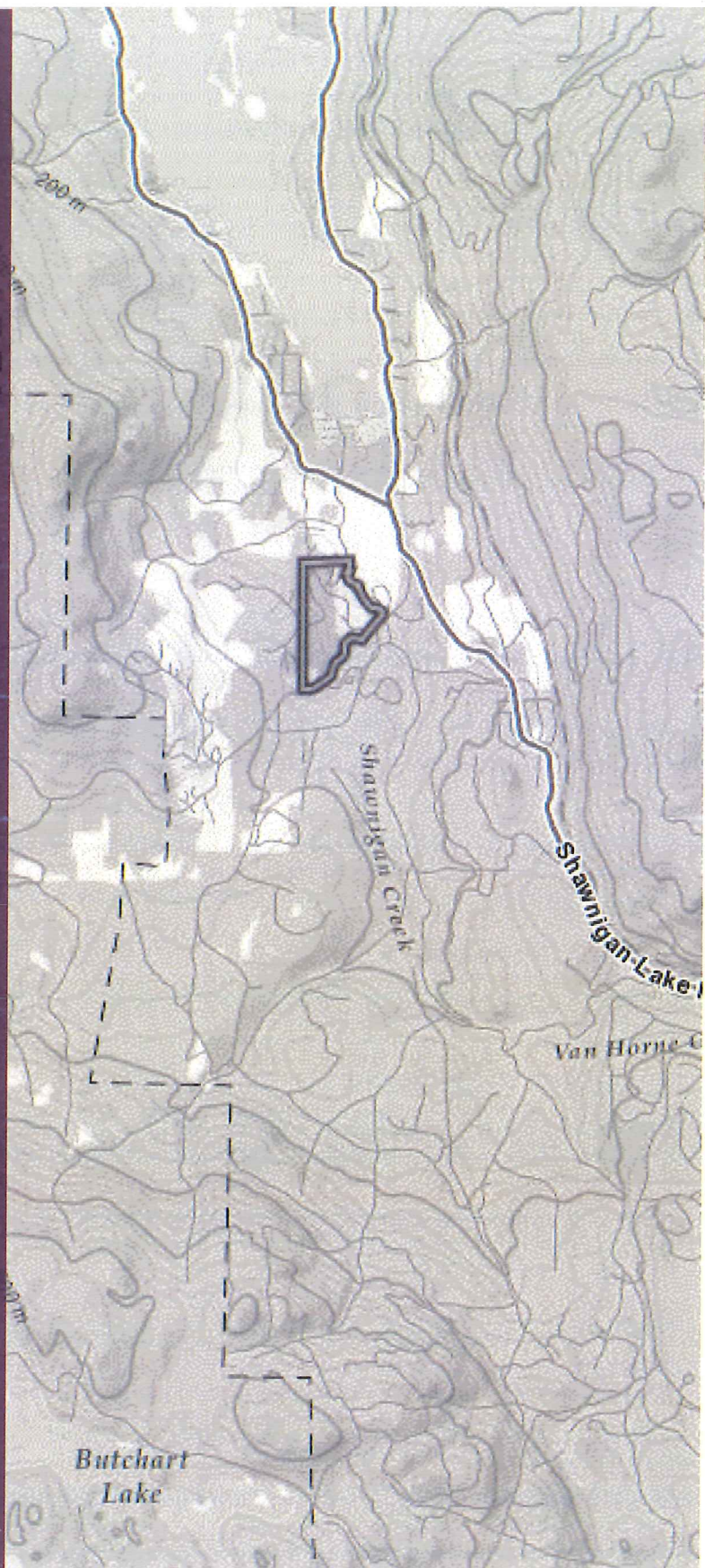
Prepared for:

Allterra Construction Ltd.



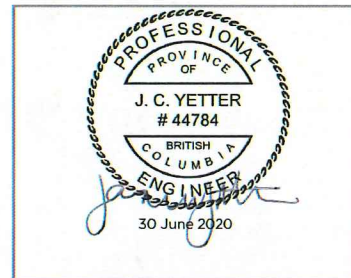
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Project no. 20005



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TABLE OF CONTENTS

Introduction	4
Approach	7
Context	8
Local Geology and Hydrogeology	8
<i>Bedrock</i>	8
<i>Unconsolidated Surficial Material</i>	13
Local Well Records & Water Uses	15
Topography	18
Site-Specific Soil Management & Deposition	18
Analysis & Opinion	19
<i>Potential Risk of Soils Relocation from Certain Worksites</i>	19
Recommendations	20
References	22

LIST OF TABLES

TABLE 1 - VARIANCE OF ENVIRONMENTAL SOIL QUALITY STANDARDS FOR CADMIUM ON LOW-DENSITY RESIDENTIAL LAND BY SOIL PH AND GROUNDWATER USES

LIST OF FIGURES

FIGURE 1 – SITE LOCATION

FIGURE 2 – LOCATION OF PROPERTY IN LOCAL CONTEXT WITH APPROXIMATE AREA OF SOIL DEPOSIT.

FIGURE 3 – LOCATION OF THE WESTCOAST CRYSTALLINE COMPLEX ON VANCOUVER ISLAND

FIGURE 4 – WESTCOAST CRYSTALLINE COMPLEX IN RELATION TO SHAWNIGAN LAKE AND THE SOUTHEAST TIP OF VANCOUVER ISLAND

FIGURE 5 – STRUCTURAL GEOLOGY SHOWING KEY MAPPED FAULTS

FIGURE 6 – MAPPED AREA OF FRACTURED CRYSTALLINE ROCK (BEDROCK) AQUIFER NO. 203

FIGURE 7 – SURFICIAL GEOLOGY IN THE VICINITY OF THE SITE

FIGURE 8 – MAPPED EXTENT OF SURFICIAL AQUIFER NO. 205

FIGURE 9 - WATER WELLS WITHIN 500 M OF PROPERTY BOUNDARY

FIGURE 10 – LICENSED WATER DIVERSION WITHIN 500 M OF THE SITE

LIST OF APPENDICES

APPENDIX A – CVRD BYLAW 4236 – SOIL DEPOSIT BYLAW, 2018

APPENDIX B – DESCRIPTION OF AQUIFER 203 (BEDROCK) FROM BC WATER RESOURCES ATLAS

APPENDIX C - DESCRIPTION OF AQUIFER 205 (SAND AND GRAVEL) FROM BC WATER RESOURCES ATLAS

APPENDIX D - SUPPORTING DOCUMENTS FROM BRITISH COLUMBIA'S CONTAMINATED SITES REGULATION

INTRODUCTION

Allterra Construction Ltd. (Allterra) retained Spoke Environmental Advisory Ltd (Spoke) to conduct a groundwater impact assessment in support of a Type C soil deposit permit application for 1815 Sooke Lake Road (the Site) (Figures 1 and 2) within the Cowichan Valley Regional District (CVRD) of British Columbia (BC).

Technical & Regulatory Context

In April 2019, the local government passed CVRD Bylaw 4236 – Soil Deposit Bylaw, 2018 (the Bylaw) requiring a permit for deposition of soil within the boundaries of the CVRD. Dale Erb, the landowner, has granted exclusive permission for Allterra to deposit soil from its construction operations at his property at 1815 Sooke Lake Road. Under the Bylaw, Mr. Erb and Allterra require a Type C permit for deposition of more than 1000 m³ of soil within a calendar year. It is understood that the permit application is for deposition of soil at the west side of the Site, as illustrated in Figure 2.

Per Section 12.2 (c) of the Bylaw (Appendix A), the CVRD has required a groundwater impact assessment for this permit application. Spoke understands that the rationale for a groundwater impact assessment is to have a registered professional:

- evaluate whether a proposed soil deposit activity poses a risk to water quality in the local aquifer(s), and
- recommend groundwater protection measures if, in the opinion of the professional, there may be risks to groundwater resources.

Roughly 1 million BC residents, or 25%, rely on groundwater for daily use (OAGBC 2010). Locally, reliance on groundwater is higher, as about 50% of the water use in the South Cowichan area within the CVRD comes from groundwater (WorleyParsons, 2009).

Human activity can affect the quality of groundwater and its suitability for use, especially in industrial or highly populated areas. Shallow aquifers are most vulnerable to land use activities that may contaminate groundwater. To manage and protect groundwater resources the BC government has assessed aquifer vulnerability to surface contamination. This information is used by local governments, such as the CVRD, for land use planning and permitting.

Soil deposition can pose a risk to groundwater resources if the stored soils originate from industrial sites or other potentially contaminated areas. The risk is higher if, at the location where the soil is deposited, there are underlying aquifers that are vulnerable to surface contamination. The consequences from groundwater contamination include risks to human health and downgradient aquatic environments, short- or long-term loss of the groundwater resource, and legal and financial liability to the party causing the contamination for assessment and remediation costs of the polluted aquifer.

Scope of Work

The scope of work was limited to a desktop study. The scope did not include a site visit or intrusive investigations of any kind to gather site-specific data. The groundwater impact assessment was focused on the potential for negative effects to groundwater quality from Allterra's soil deposition activities at 1815 Sooke Lake Road, near Shawnigan Lake, CVRD (as illustrated in Figure 2).



Figure 1. Site Location (Source: BC Water Resources Atlas)

Property boundary outlined in yellow



Figure 2. Location of property in local context showing approximate area of soil deposit.

(Image source: BC Water Resources Atlas.)

Property boundary outlined in yellow. Footprint of soil deposit is shown for context only and does not represent the actual dimensions of the soil footprint at the Site.

APPROACH

An assessment of impacts to groundwater resources from soil deposition requires an understanding of:

- the hydrogeologic context and potential aquifer vulnerability from surface contamination, as well as
- an understanding of the potential for the deposited soil and activity related to the deposition of soil to have a detrimental impact to groundwater quality.

Publicly available information on regional bedrock and surficial geology, aquifer vulnerability, mapped aquifer characteristics and locations, groundwater users, and water well records was reviewed to understand the hydrogeologic context. The main sources of information were as follows:

- BC Water Resources Atlas (GIS based, online information tool);
- Detailed Aquifer Mapping Study: Shawnigan Lake Area, Vancouver Island, B.C. (Hammond and others, 2019);
- South Cowichan Water Plan Study (WorleyParsons, 2009); and
- Preliminary groundwater budgets, Cobble Hill / Mill Bay area, Vancouver Island, B.C. (Harris and Usher, 2017).

The online BC Water Resources Atlas was used to search for water well records and active licensed water diversions (for groundwater and surface water) within 500 m of the Site. A radial buffer of 750 m centering on the soil pile was used to extend the search area approximately 500 m beyond the property boundary. The online BC Water License Search Tool was used to obtain details regarding water diversion licenses identified with the Water Resources Atlas.

Information regarding sources of soil materials, specifically land uses and locations of accepted soils (in general) and how soils are screened for quality, was obtained from several discussions with Allterra's General Manager, Raymond Lam. Allterra also provided several third party documents on environmental assessments conducted at their worksites so Spoke could review the approach for soil quality assessment used when on rare occasion historical land use indicated the potential for contamination.

'Contamination' for this report means: as a result of human activity there are concentrations of substances in soils that exceed the environmental quality standards applicable to the current land use and site conditions under the Contaminated Sites Regulation as part of BC's Environmental Management Act Exceptions are parameters that exceed the environmental quality standards but are less than natural, regional background conditions (*e.g.* natural concentrations of metals derived from soil minerals).

Using the information on hydrogeology, aquifer vulnerability, and quality and selection of source soils for deposit, a professional opinion was formed regarding a qualitative level of risk to groundwater resources from Allterra's deposition of off-site soils at the Site.

CONTEXT

Local Geology and Hydrogeology

Bedrock

Bedrock geology surrounding the Site is comprised of metamorphosed intrusive rocks, primarily gneiss, from the Westcoast Crystalline Complex (WCC) (Harris & Usher, 2017). The WCC is a northwest trending belt of locally foliated plutons (Harris & Usher, 2017) that extends along much of the west coast of Vancouver Island (Figure 3). Just north of Port Renfrew, the WCC bends east, (inland), and then returns to its northwest-southeast trend, passing under Sooke Lake and much of the south end of Shawnigan Lake (Figure 4) through to Esquimalt, Saanich, and Victoria on the southeast coast. Rocks within the WCC include quartz diorite, tonalite, hornblende-plagioclase gneiss, quartz-feldspar gneiss, amphibolite, diorite, agmatite, gabbro, marble, and metasediments (Hammond and others, 2019).

Structural geology in the region is complex and reflects the varied tectonic history (Harris & Usher, 2017). Rocks in this region of BC underwent extensive folding and faulting along a northwest axis when the Cascade and Olympic Mountains were formed in Washington State (Harris and Usher, 2017; Hammond and others, 2019). This deformation period created a series of major, low-angle, northwest-trending compressional thrust faults and fold axes, which are locally offset by minor, northeast trending extensional faults (Harris and Usher, 2017; Hammond and others, 2019). The Shawnigan Fault is a northeast-trending high-angle structure that crosses near the south end of Shawnigan Lake (Figure 5) (Harris and Usher, 2017; Hammond and others, 2019).

Bedrock aquifer no. 203 underlies the Site and much of the Shawnigan Lake watershed basin (Hammond and others, 2019) (Figure 6). The south end of the aquifer, which surrounds the Site, consists of fractured rock from the WCC, described above (Hammond and others, 2019; BC Water Atlas).

Generally, rocks within the WCC are poor aquifers, meaning they have low water yield, due to their low matrix porosity. Groundwater is stored and transmitted within fractures in the rock, and while still relatively low, production rates are expected to be highest where there are intersecting water-bearing fractures. Reported groundwater yield from aquifer no. 203 is low, between 0.01 and 4.42 L/s (Hammond and others, 2019). Within roughly 1 km of the Site, recorded estimates of well yields from water well records are typically less than 1 litre per second (roughly 15 gallons per minute) (BC Water Atlas). Estimates of higher-end well yields claimed on some well records were based on short-duration aquifer tests (e.g. 1-2 hrs) without technical analysis or consideration for drawdown and it is doubtful they reflect actual long-term well yields.

Within the South Cowichan areas, the thickness of unconsolidated material overlying bedrock generally increases from southwest (in the vicinity of the Site) to northeast (near Duncan) (WorleyParsons 2009). In the area surrounding the Site, surface material overlying bedrock is typically less than 5 m thick, with isolated areas of greater thickness ranging from 10 to 50 m of material (Hammond and others, 2019).



Figure 3. Location of the Westcoast Crystalline Complex on Vancouver Island (image source: BC Water Resources Atlas)

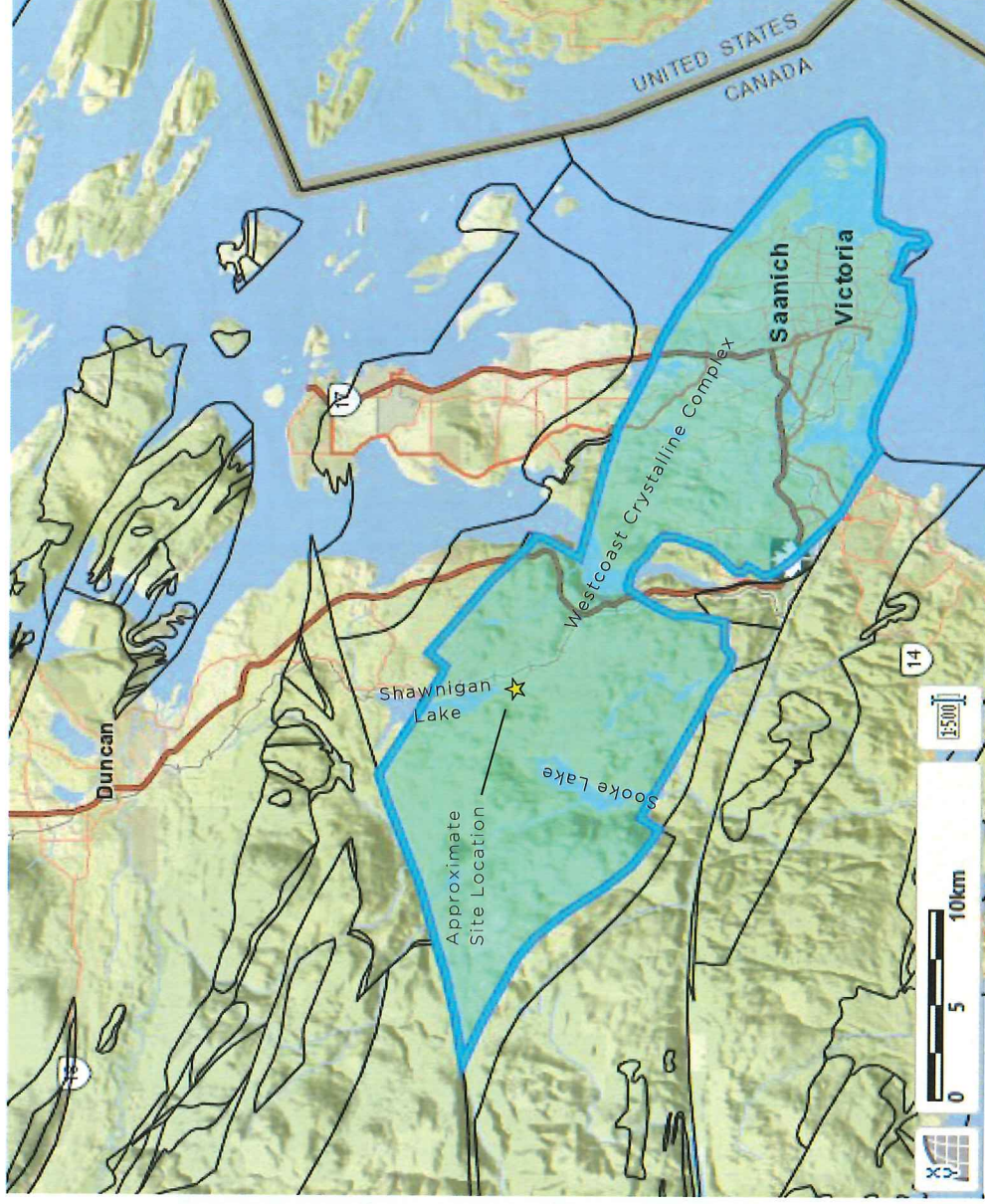


Figure 4. Westcoast Crystalline Complex in relation to Shawnigan Lake and the southeast tip of Vancouver Island (base image source: BC Water Resources Atlas).

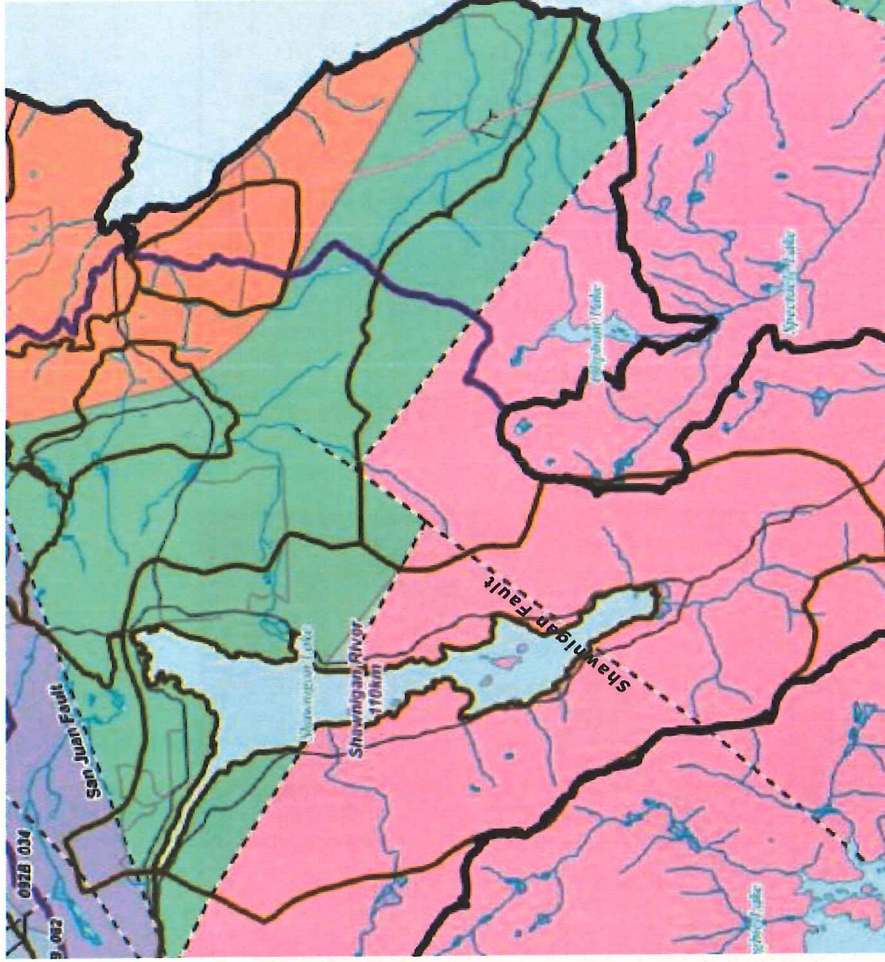


Figure 5. Structural geology showing key mapped faults

(base image source: Harris and Usher, 2017)

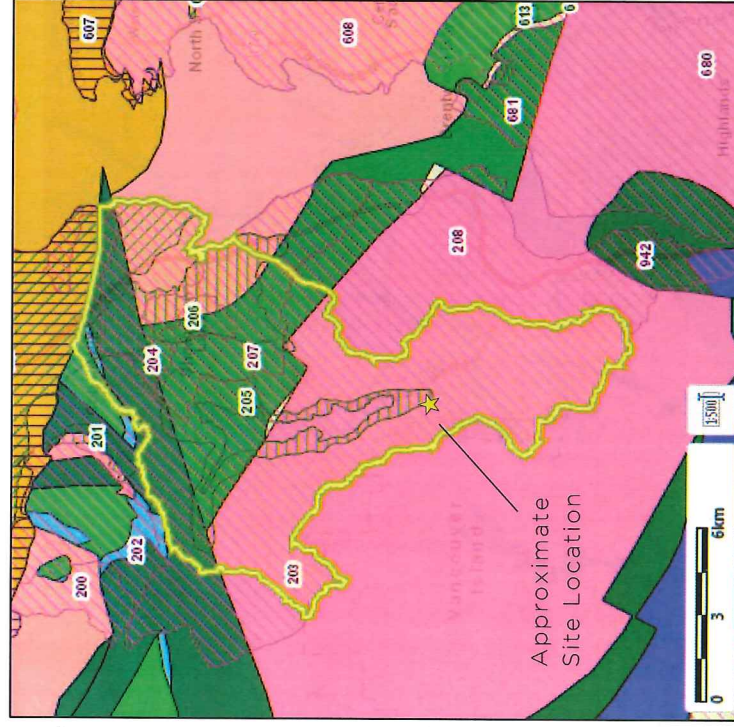


Figure 6. Mapped area of fractured crystalline rock (bedrock) aquifer no. 203, shown by yellow outlines.

Image at left shows the aquifer in the context of bedrock geology, shown by the coloured polygons. The Westcoast Crystalline Complex (WCC) is shown in pink (note: the salmon colour in the upper part of the image is NOT part of the WCC). Image at right shows the aquifer in context of physiographic features, municipalities, and highways. (Source of images: BC Water Resources Atlas)

Aquifer no. 203 has been given an overall vulnerability rating of moderate (Appendix B). This rating was based on the following (BC Water Resource Atlas):

- A confining layer with average thickness of 5m, but ranging from absent to 10 m thick;
- Water bearing fractures are typically 80 m below ground surface based on the median depth noted in existing well records; and,
- Hydraulic conductivity was assumed to be low, and flow controlled by fractures.

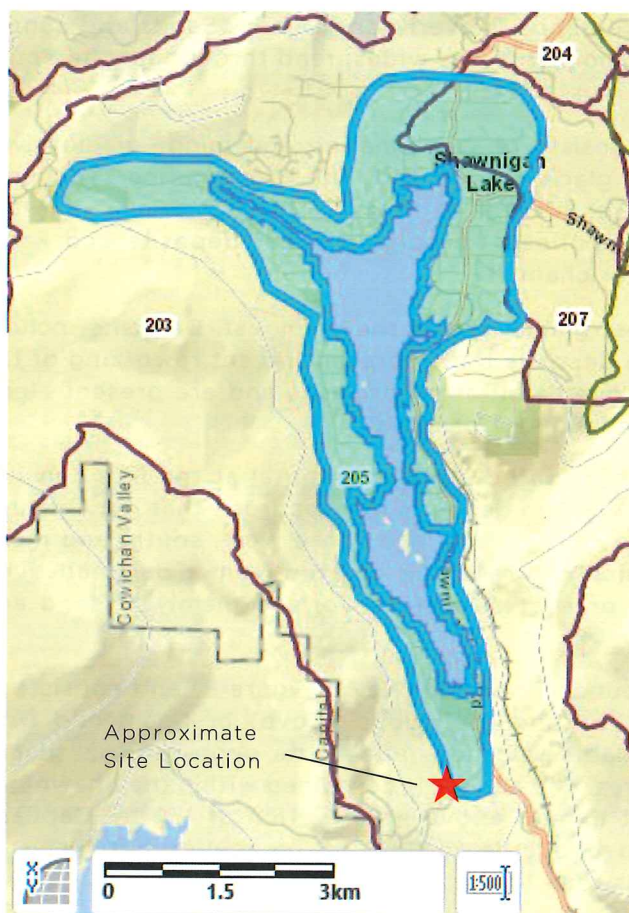
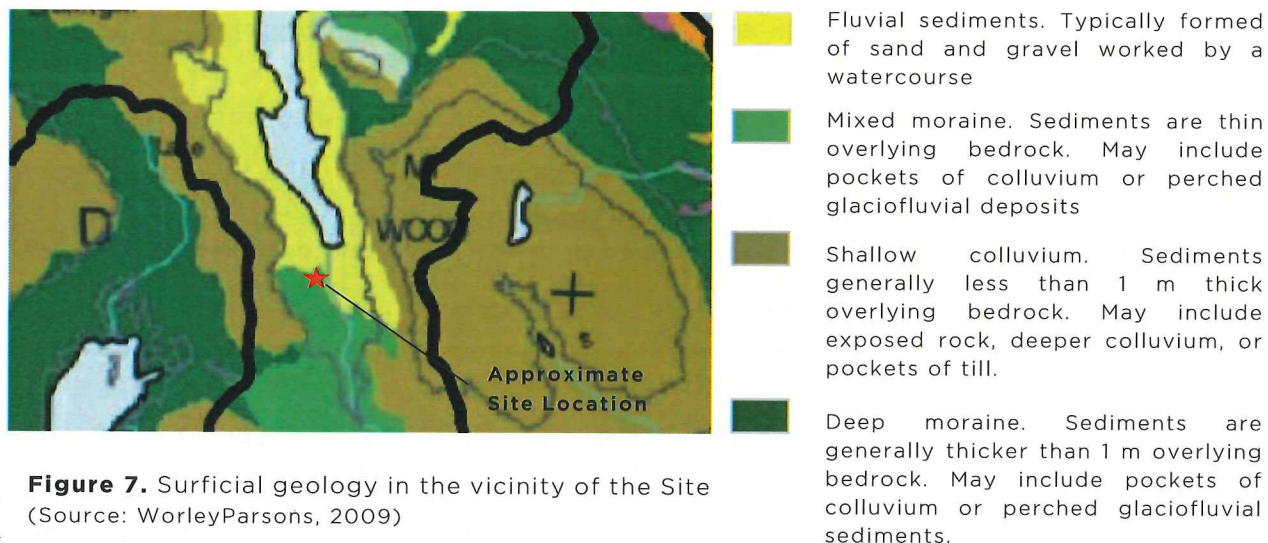
Unconsolidated Surficial Material

There are four laterally extensive, mappable stratigraphic units of surficial geology present within the South Cowichan Valley (WorleyParsons 2009):

- Quadra Sands – The oldest surficial materials in the area, consisting of glacial outwash materials that are primarily sands and gravels. Quadra Sands are not exposed at surface in South Cowichan. They have been found at depths of 50 m bgs and at elevations of 80 m above sea level, mostly in the Cowichan Bay / Cherry Point area. Quadra Sands likely occur in elongated lenses or beds with thicknesses in the range of 15-20 m.
- Vashon Drift – This unit consists of till and glaciogenic debris flows with some minor interbedded sand and gravel. These deposits overlie the Quadra Sands and can be up to 60 m thick. Deposition of Vashon Drift was widespread throughout the South Cowichan area, at all elevations in most areas.
- Capilano Sediments – This unit consists of glaciomarine and minor glaciofluvial sediments, deposited as tidewater glaciers retreated. The glaciomarine sediments occur as draping veneers and thicker blanket deposits up to 15 m thick, while the minor glaciofluvial sediments are confined to isolated linear deposits and kame deltas that occupy glacial meltwater channels.
- Salish Sediments – This unit is post-glacial and is the youngest. Deposits include fluvial, alluvial, deltaic, and marine deposits that represent recent reworking of the earlier deposits. Salish Sediments overlie all other deposits and are present along most watercourses, in estuaries, and along shorelines.

Regional mapping (Figure 7) shows unconsolidated surficial material at the Site consists primarily of mixed moraine (Vashon Drift) in thin deposits over bedrock that may include pockets of colluvium or perched glaciofluvial deposits. Along the west, south, and much of the east sides of Shawnigan Lake, which is a reservoir created from a dammed river, fluvial sediments (Salish Sediments) are present at surface, formed mainly of sand and gravel.

An unconsolidated aquifer, no. 205, surrounds Shawnigan Lake (Figure 8) and consists of sand and gravel considered to be Quadra Sand (described above) or Dashwood Drift (Hammond and others, 2019). It has variable thickness due to its deposition as glacial sediments within erosional bedrock features. The aquifer is contained within the Shawnigan Creek watershed and generally does not extend above an elevation of 150 m. Capilano Sediments and Vashon Till, described above, overlie portions of the aquifer, between 0 m (absent) and 45 m thick, but typically less than 10 m thick.



The overall vulnerability rating for aquifer no. 205 is high (Appendix C). Factors considered in this rating were (BC Water Resource Atlas):

- A confining layer overlies the aquifer, ranging in thickness from 3 to 45 m, by typically about 10 m thick. The confining layer may be thin or absent, which increases the vulnerability of the aquifer in those areas.
- Depth to the water table is shallow (< 15 m) based on the median water level, creating a small unsaturated zone for natural attenuation of contaminants before groundwater is reached.
- Hydraulic conductivity is expected to be high, considering the texture of the aquifer deposits is coarse, which allows for rapid transmission of surface contamination.

Local Well Records & Water Uses

There were 10 records of wells within 500 m of the property boundary for 1815 Sooke Lake Road (Figure 9).

Nine of the ten wells were completed in fractured bedrock, assumed to be aquifer no. 203, ranging in depth from 44 to 137 m. There were two wells with flowing artesian conditions (well tag numbers 105722 and 109058). The wells at those two locations were completed across a series of water-bearing fractures at different depths. Depths of the water-bearing fractures below surface ranged from 27 to 137 m bgs at one well, and between 90 and 103 m bgs at the other. Where noted, depths of water-bearing fractures at the other 7 wells ranged from 35 to 142 m, and the noted static water depths ranged from 2 to 31 m bgs.

Unconsolidated material overlying the bedrock at the 10 wells ranged in thickness from 0.3 m to 13 m. Most wells had 4 m or less of material overlying bedrock at locations on sloped terrain. Thicker deposits ranging from 12-13 m were noted at 3 of the wells and tended to occur in the floodplain for Shawnigan Creek.

One of the ten wells, owned by a local firehall, was completed in silty sand and gravel (well tag no. 111446), which was assumed to correlate with aquifer no. 205. The sand and gravel were present at surface with no noted confining unit. Static depth to groundwater was noted in the well record as 7 mbgs. The well is in the topographically flat valley that runs along Shawnigan Creek.

Seven of the 10 wells fell within the mapped boundary of sand and gravel aquifer no. 205, but only one well targeted surficial sand and gravel for groundwater. Lithology and saturation noted in the well records showed the extent of saturated sand and gravel was more limited than what has been mapped for aquifer no. 205. Only the one well completed within the sand and gravel noted saturated conditions in sand and gravel. Sand and gravel were absent at the other well locations, or the deposits were unsaturated for the majority or entirety of their thickness.

There were two licensed water diversions found within 500 m of the Site. Licensed water diversions and associated works are present on the property immediately northeast of the Site (PID 04753682), and at a property to the east of the Site (PID 029476968) (Figure 10).

- At PID 029476968, there is a conditional water license for groundwater diversion and use at the local fire hall (Well tag no. 111446, noted above).
- At PID 004753682, there is one active water license for diversion of surface water from Shawnigan Creek for domestic purposes. There was also a water license, now expired, for diversion of water to create a pond for the purposes of land improvement (water ski pond).

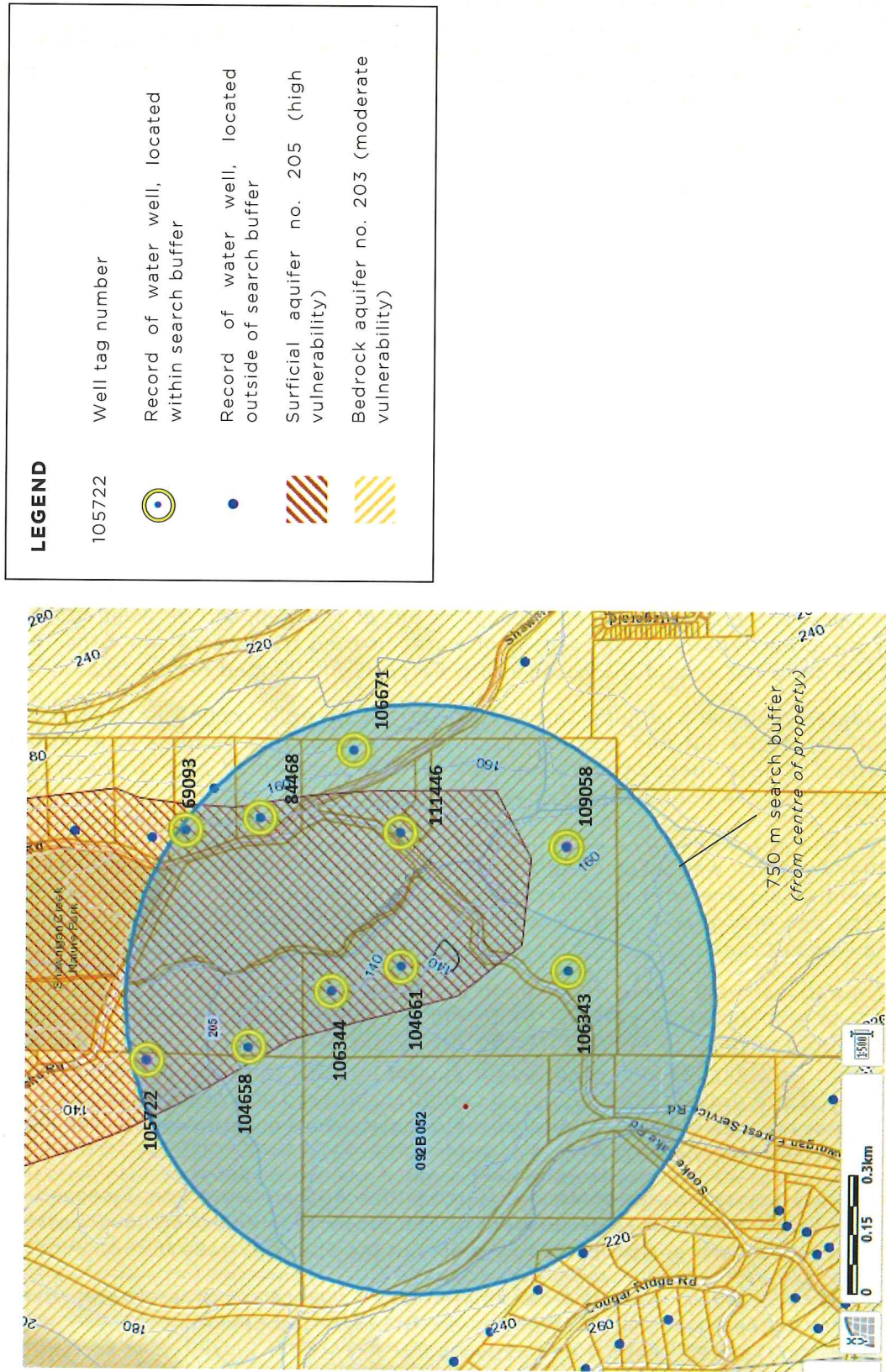


Figure 9. Water wells within 500 m of property boundary (Image source: BC Water Resources Atlas)

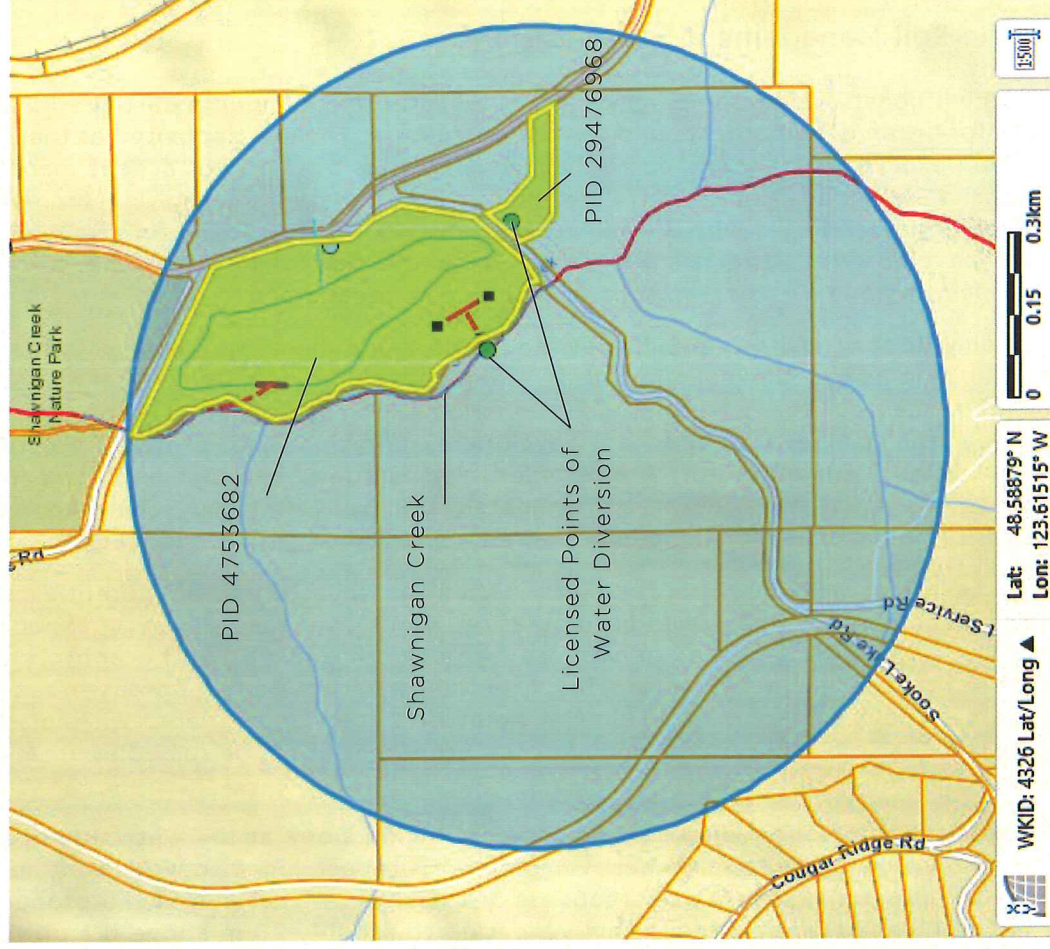


Figure 10. Licensed Water Diversion within 500 m of the Site

(Image source: BC Water Resources Atlas)

There were no records of groundwater or surface water uses for agricultural purposes within 500 m of the Site.

Topography

Ground slopes downward toward local watercourses and waterbodies, specifically Shawnigan Lake and Shawnigan Creek to the south of the lake.

Generally, ground surface at the Site slopes to the northeast, toward Shawnigan Creek. The natural surface topography at the Site varies in grade from gentle (5-7%) at the south end to steep (30%) at maximum slope near the north end of the soil deposit.

Site-Specific Soil Management & Deposition

Allterra is a civil construction company based in Victoria that conducts earthworks and construction for urban developments and civil infrastructure. The soil deposited at the Site originates from excavations conducted at their worksites, as they do not accept material from third parties for deposition. Allterra's worksites are primarily housing developments zoned for residential land uses with a small amount of work at sites zoned for commercial or industrial development. Allterra's worksites are in the Capital Regional District and Cowichan Valley Regional District, so soils originate from local areas.

Allterra will only deposit soil at the Site that they understand meets regulatory standards for residential land uses. Spoke understands from discussion with Allterra that these worksites are assessed for potential soil contamination by qualified professionals contracted by the property owner or developer, following the protocol in BC's Contaminated Sites Regulation for Site Profiles, and Stage 1 and 2 Preliminary Site Investigations. Any soils identified as contaminated are excavated and separated from other soils for proper disposal or remediation at an approved or regulated location.

If during excavation work Allterra workers notice obvious signs of potential soil contamination such as odours, soil discolouration, fluid seepage, or an unexpected underground storage tank or other debris, they stop work and notify the appropriate professional or manager at the worksite. The potential contamination is then assessed by qualified professionals. Contaminated soils are excavated onto, and covered with, plastic sheeting, tested for soil quality, and removed for proper disposal or remediation at an approved or regulated location, as required.

The location of soil deposition is against a northeast facing slope at the west side of the property at 1815 Sooke Lake Road, in part to complete site leveling with work continuing concurrently to reduce the severity or steepness of the slope at that end of the property. The depth of soil placed ranges from a thin veneer up to roughly 20 m above the original grade. Detail regarding the geometry of soil deposition at the Site was not available to Spoke for this assessment; however, has been included as Appendix A of the permit application (Allterra 2020).

Soil that has been accepted by Allterra for deposit at the Site is predominantly fine-grained in texture. Allterra noted that there is little coarse material in the soil deposit at the Site.

Upon introduction of the Bylaw, Allterra began keeping logbooks of the soil they deposited at the Site in compliance with the Bylaw requirements. Before the Bylaw, Allterra tracked the soil load counts, type of material hauled for deposit, and the origin of the soils deposited.

ANALYSIS & OPINION

The two local aquifers, no. 203 (bedrock) and no. 205 (sand and gravel) are considered by the province to have moderate and high vulnerability, respectively, to surface contamination. This leaves the aquifers potentially vulnerable to contamination if the soils placed at the Site from off-site sources contained substances of concern in concentrations high enough to leach into or migrate into groundwater.

The placement of soil at the Site increases the depth of surficial cover overlying the vulnerable aquifers, offering greater localized protection to groundwater from surface contamination if spills or releases were to occur at the Site in future.

The reduction in slope created by soil placement at the Site may help promote localized groundwater recharge and replenish groundwater storage; however, the positive impact, in isolation, is expected to be negligible on a regional scale.

All the worksites that Allterra uses to source material for deposit at the project Site come from Vancouver Island and are almost exclusively from the CVRD or Capital Regional District. Therefore, soils are sourced from within the region and are unlikely to have markedly different mineralogy that may pose a risk to groundwater quality from leaching of natural metals.

Most of Allterra's worksites have had no past land uses with the potential to contaminate the soil. Negative impacts to groundwater are not expected from relocation of soils from these worksites.

While not common, Allterra has some worksites with a history of land use(s) that had potential to contaminate soil. Allterra has procedures in place to screen whether soils from these worksites are suitable for relocation to this Site. In general, while these procedures are considered prudent, they could be improved.

Potential Risk of Soils Relocation from Certain Worksites

The BC Contaminated Sites Regulation (CSR) (Schedule 3.1 Numerical Soil Standards) assigns different soil quality standards according to land uses and site conditions.

Condominium developments, which are most of Allterra's worksites, are considered high-density residential land use. The receiving Site (1815 Sooke Lake Road) is a large parcel of rural land zoned for a combination of primary forestry (F-1) and agriculture (A01). Since there is no active agricultural activity, but it does have a residence, it would have low-density residential land use.

In general, soil standards for groundwater protection are also selected based on the site conditions. These site conditions include protection of groundwater for a variety of water uses: groundwater used for drinking water, groundwater flow to surface water used by freshwater or marine aquatic life, groundwater used for irrigation (at agricultural or residential land uses), and groundwater used for livestock watering.

Groundwater uses that apply to this Site include:

- Groundwater for drinking water, based on the importance of local aquifers for domestic-use water wells;
- Groundwater use for residential irrigation; and,
- Groundwater flow to surface water for protection of freshwater aquatic habitat, based on the proximity of Shawnigan Creek to the northeast of the property.

Groundwater uses for agricultural irrigation or livestock watering are not considered applicable for this Site (per Protocol 21, BC CSR) (Appendix D). There are no active water licenses for diversion of groundwater or surface water for the purposes of intensive livestock watering or irrigation within 500 m of the Site. Reported well yields from local water wells are also not high enough to support the water requirements for intensive irrigation or livestock operations.

Soil quality standards for the protection of groundwater for the above uses are based on soil pH for many metals. To Spoke's knowledge, the pH of soils at Mr. Erb's property has not been determined. The following table provides an example of the importance of pH in selecting the applicable soil standards for metals. This example is hypothetical, where land use at the site receiving soil is low-density residential and the contaminant of concern is cadmium. The example demonstrates that a small difference in soil pH can have a significant effect on acceptable concentrations of certain metals in soils.

Table 1: Variance of Environmental Soil Quality Standards for Cadmium on Low-Density Residential Land by Soil pH and Groundwater Uses (source: BC Contaminated Sites Regulation, Schedule 3.1)

Groundwater Use	Soil pH	Soil Standard for Cadmium (mg/kg)
Groundwater used for drinking water	< 7	1
	7.0 - 7.5	4.5
	7.5 to 8	30
	≥ 8	70
Groundwater flow to surface water for protection of freshwater aquatic habitat	<7	1
	7.0 - 7.5	3
	7.5 to 8	20
	≥ 8	50
Groundwater used for irrigation	< 7	1
	7.0 - 7.5	4.5
	7.5 to 8	30
	≥ 8	70

Recommendations

Allterra should amend its screening procedure for acceptance of soils from worksites that have had a history of commercial or industrial land use(s) with the potential to contaminate soil.

Before accepting soil for deposit at this Site (1815 Sooke Lake Road), the soil quality from such worksites should be screened against standards for low-density residential land uses, and for groundwater uses that include drinking water, irrigation, and groundwater flow to surface water for the protection of freshwater aquatic habitat.

A survey of the receiving site's soil pH should be conducted according to Technical Guidance 5 from the BC Contaminates Sites Regulation (Appendix D) to assist with selecting appropriate soil quality standards where metals are a contaminant of concern.

The owner or developer for these worksites hires an environmental consultant to assess soil quality at the worksite. Allterra should request that the environmental consultant also

review the worksite's soil quality results in the context of the potential receiving site's conditions and prepare a memorandum advising whether the soils are suitable for relocation. As conditions related to groundwater uses or land uses at this Site may change in future, the environmental consultant should use his or her judgment regarding land uses and applicable groundwater uses at the time of assessment. For example, while site and neighbouring land use did not include agricultural and associated potential groundwater uses at the time of this groundwater impact assessment, there are lands zoned for agriculture within 500 m of the Site.

Alternatively, Allterra could choose not to accept soils for relocation from any worksites that have had a history of land use(s) with the potential to contaminate soil, *i.e.* those listed on Schedule 2 of the BC CSR (Appendix D).

Conclusion

Allterra's current procedures to screen soils from worksites for deposit at 1815 Sooke Lake Road have been prudent. As a result, placement of soils at the Site to the present time has not raised concerns for risk to groundwater quality.

To reduce the risk of potential liability and future risks to groundwater, Allterra should amend its screening procedures as recommended.

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APPENDIX A - CVRD BYLAW 4236 - SOIL DEPOSIT BYLAW, 2018



COWICHAN VALLEY REGIONAL DISTRICT

BYLAW No. 4236

A Bylaw to Regulate the Deposit of Soil on Lands Within CVRD Electoral Areas

WHEREAS the Board of the Cowichan Valley Regional District established the service of Removal and Deposit of Soil under the provisions of Bylaw No. 3947, cited as "CVRD Bylaw No. 3947 – Removal and Deposit of Soil Service Establishment Bylaw, 2015";

AND WHEREAS Section 327 of the *Local Government Act* authorizes a Regional District to regulate or prohibit the removal of soil, including sand, gravel, and rock, and the deposit of soil and other materials on any land within the electoral areas, to make different regulations and prohibitions for different areas, and to require permits and impose fees;

AND WHEREAS the Board of the Cowichan Valley Regional District wishes to regulate the deposit of soil and other materials within its Electoral Areas;

NOW THEREFORE the Board of Directors of the Cowichan Valley Regional District, in open meeting assembled, enacts as follows:

1.0 CITATION

This bylaw may be cited as "**CVRD Bylaw No. 4236 – Soil Deposit Bylaw, 2018**".

2.0 DEFINITIONS

In this bylaw, the following definitions apply:

"active floodplain" means an area of land that supports floodplain plant species and is:

- i. adjacent to a stream that may be subject to temporary, frequent or seasonal inundation;
or
- ii. within a boundary that is indicated by the visible high-water mark.

"agent" means a person who has been authorized in writing by a property owner to apply for a permit on the owner's behalf;

"aggregate" means rock, sand, gravel or other similar material, or a combination of one or more of the foregoing, that is extracted from a mine and is not mixed with any other material;

"applicant" means a property owner, or their agent, who has completed the permit application and has paid the prescribed fee;

"application" means a written request by an applicant for a permit in the form prescribed by the General Manager in accordance with Sections 10, 11 or 12 of this bylaw, as applicable;

"Authorized Person" has the same meaning as under the Province of British Columbia *Sewerage System Regulation*, B.C. Reg. 326/2004, as amended or replaced from time to time;

"Board" means the Cowichan Valley Regional District Board;

"Building Official" means a Registered Building Official employed by the Cowichan Valley Regional District to administer and enforce *CVRD Bylaw No. 3422 – Building Regulation Bylaw, 2011*, as amended or replaced from time to time;

"Building Permit" means a permit issued under the authority of *CVRD Bylaw No. 3422 – Building Regulation Bylaw, 2011*, as amended or replaced from time to time;

"Bylaw Enforcement Officer" means a person designated by the Board to administer and enforce bylaws within the Cowichan Valley Regional District;

"compost" means a product which is:

- i. a stabilized earthy matter having the properties and structure of humus;
- ii. beneficial to plant growth when used as a soil amendment;
- iii. produced by composting; and
- iv. primarily derived from organic matter.

"Contaminated Sites Regulation" means the Province of British Columbia's *Contaminated Sites Regulation*, B.C. Reg. 375/96, as amended or replaced from time to time;

"contaminated soil" means any material that has one or more contaminant concentrations above the land use standard applicable to the property where the material is to be deposited, as per the standards specified in the *Contaminated Sites Regulation*;

"deposit" means the placement, storage, filling, spilling or releasing, directly or indirectly, of soil or other material on a parcel in an Electoral Area where the soil or other material was not previously located;

"CVRD" means the Cowichan Valley Regional District;

"Electoral Areas" means Electoral Areas A, B, C, D, E, F, G, H and I of the Cowichan Valley Regional District, either singularly or in any combination, as the context requires;

"Electoral Area Services Committee" means the standing committee of the CVRD Board of that name;

"General Manager" means the General Manager, Land Use Services Department, Cowichan Valley Regional District, or his or her designate;

"high water mark" means the visible high water mark of a stream where the presence and action of the water are so common and usual, and so long continued in all ordinary years, as to mark on the soil of the bed of the stream a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself, and includes the active floodplain;

"holiday" means:

- i. Sunday;
- ii. Christmas Day, Good Friday and Easter Monday;
- iii. Canada Day, Victoria Day, British Columbia Day, Labour Day, Thanksgiving Day, Remembrance Day, Family Day and New Year's Day;
- iv. December 26; and
- v. a day set by the Parliament of Canada or by the Legislature, or appointed by proclamation of the Governor General or the Lieutenant Governor, to be observed as a

day of general prayer or mourning, a day of public rejoicing or thanksgiving, a day for celebrating the birthday of the reigning Sovereign, or as a public holiday.

"landscape material" means gravel, rock, stone, sand, bark mulch, topsoil, compost, and similar materials used for landscaping purposes, which are free from invasive species and obtained from a commercial landscape supplier;

"mine" means a mine operating under the authorization of a permit issued under the *Mines Act* (British Columbia);

"natural boundary" means the visible high-water mark of a watercourse or ocean where the presence and action of the water are so common and usual, and so long continued in all ordinary years, as to mark upon the soil of the bed of the body of water a character distinct from that of the banks thereof, in respect to vegetation, as well as in respect to the nature of the soil itself;

"other material" includes, but is not limited to:

- i. construction, reconstruction, renovation, building, demolition and road works wastes of any nature;
- ii. hog fuel, edgings, or other wood waste which results from the manufacturing process of lumber or other wood products;
- iii. land clearing wood waste, consisting of stumps, brush, and logs or any other material derived from land clearing activity;
- iv. waste material derived from any commercial or industrial activity;
- v. yard and garden waste; and
- vi. topsoil, gravel, sand, rock, silt, clay, peat, sediment and other natural substances containing any invasive species.

"parcel" means a lot, block or other area in which real property is held or into which real property is subdivided, and without limitation includes a strata lot created under the Province of British Columbia *Bare Land Strata Regulations*, B.C. Reg. 75/78, as amended or replaced from time to time;

"permit" means the written authority issued by the General Manager under this Bylaw for the deposit of soil on a parcel in an Electoral Area;

"permit area" means the area of land over which the soil deposit occurs, or is proposed to occur, within the subject parcel;

"Professional Agrologist" means an agrologist registered and in good standing with the British Columbia Institute of Agrologists;

"Province" means the Province of British Columbia;

"Qualified Environmental Professional" has the same meaning as under the *Riparian Areas Regulation*, B.C. Reg. 376, 2004, as amended or replaced from time to time;

"Registered Professional" means an engineer, geoscientist, agrologist, environmental consultant, soil scientist, biologist or land surveyor who is registered with a professional association that is regulated by a statute, appointed and qualified to act in the capacities described in the sections of this bylaw requiring a report, certification or estimate of a registered professional;

"riparian assessment area" means:

- i. for a stream, the 30 metre strip on both sides of the stream, measured from the high water mark;
- ii. for a ravine less than 60 metres wide, a strip on both sides of the stream measured from the high water mark to a point that is 30 metres beyond the top of the ravine bank; and
- iii. for a ravine 60 metres wide or greater, a strip on both sides of the stream measured from the high water mark to a point that is 10 metres beyond the top of the ravine bank.

"security deposit" means a cash deposit or irrevocable letter of credit provided by the applicant to ensure all soil deposit will be carried out in compliance with the conditions of this bylaw and a permit issued under this bylaw;

"soil" means clay, silt, sand, gravel, rock, peat or other substances of which land is naturally composed, but does not include other material;

"stockpile" means an artificial accumulation of soil or other material held in reserve for future use, distribution or removal;

"stream" includes any of the following that provides fish habitat:

- i. a watercourse, whether it usually contains water or not;
- ii. a pond, lake, river, creek or brook; and
- iii. a ditch, spring or wetland that is connected by surface flow to something referred to in paragraph (i) or (ii).

"Type 'A' Soil Deposit Permit" means a permit authorizing the deposit of Soil on a Parcel where the volume of soil is less than 100 m³ per calendar year;

"Type 'B' Soil Deposit Permit" means a permit authorizing the deposit of Soil on a Parcel where the volume of soil is between 100 m³ and 1000 m³ per calendar year;

"Type 'C' Soil Deposit Permit" means a permit authorizing the deposit of Soil on a Parcel where the volume of soil exceeds 1000 m³ per calendar year;

"unsuitable material" means any rubbish, derelict vehicle, metals, demolition wastes, garbage or waste materials, including containers, packages, bottles, cans or parts thereof; or any abandoned or discarded article, product or goods of manufacture;

"watercourse" means a permanent or non-permanent (containing water at least six months of the year) source of water supply that is natural or man-made, including a pond, lake, river, creek, brook, ditch, spring or wetland that is integral to a stream, with well-defined banks and a bed of 0.6 m or more below the surrounding land serving to give direction to or containing a current of water but does not include a man-made pond that does not connect to a stream; and

"wood waste" means wood residue in mechanically shredded form and includes sawdust, hog fuel, bark, chips, slabs, shavings, trimmings, edgings, or other such waste which is the result of any manufacturing process involved in the production of lumber or other wood products.

3.0 PURPOSE

- 3.1 This bylaw has been enacted for the purpose of regulating the deposit of soil within all Electoral Areas of the Cowichan Valley Regional District in the general public interest.
- 3.2 The purpose of this bylaw does not extend:
- a) to the protection of owners, occupiers or persons involved in the deposit of soil from economic loss;
 - b) to the assumption of the Cowichan Valley Regional District or any officer or employee of the Cowichan Valley Regional District of any responsibility for ensuring compliance by a person involved in the deposit of soil on land, his or her representatives, or any employees, contractors, or agents with this bylaw, or any other enactments applicable to the deposit of soil or the development of land;
 - c) to providing any person with a warranty that any deposit of soil will not violate this bylaw, any other enactment or create any nuisance of any type; and
 - d) to relieve any person of the responsibility for removing any soil that has been deposited contrary to this bylaw or a permit issued under this bylaw.

4.0 APPLICATION

This bylaw applies within Electoral Areas A, B, C, D, E, F, G, H and I of the Cowichan Valley Regional District.

5.0 SEVERABILITY

If any section, subsection, sentence, paragraph, or schedule forming part of this bylaw is for any reason held to be invalid by the decision of any Court of competent jurisdiction, the section, subsection, paragraph, or schedule may be severed from the bylaw without affecting the validity of the bylaw or any portion of the bylaw or remaining schedules.

6.0 INCORPORATION OF SCHEDULES

Schedule "A" attached hereto is hereby made a part of this bylaw.

7.0 PROHIBITIONS

- 7.1 No person shall deposit soil on any parcel within an Electoral Area until a permit authorizing the soil deposit has been issued, unless the soil deposit activity is exempt from the permit requirement under Section 8 of this Bylaw.
- 7.2 No person shall cause or permit the deposit of unsuitable material on any parcel within an Electoral Area.
- 7.3 No person shall cause or permit the deposit of other material on any parcel within an Electoral Area, except as permitted under a Facility Licence issued in accordance with *CVRD Bylaw No, 2570, Waste Stream Management Licensing Bylaw, 2004*.

7.4 No person shall deposit soil within a riparian assessment area, within 15 metres of the natural boundary of the ocean, or within an area designated as an environmentally sensitive area under an Official Community Plan unless the deposit is:

- a) where required under the *Local Government Act*, authorized under a development permit issued by the Cowichan Valley Regional District;
- b) where required by the laws of British Columbia, authorized under the terms of a permit or approval issued by the Province; and
- c) authorized under a permit issued pursuant to this bylaw.

8.0 PERMIT EXEMPTIONS

8.1 A person may deposit soil onto a parcel without a permit provided that at least one of the following applies:

- a) all of the soil to be deposited is necessary for the construction of basements, footings and foundations, or for the installation of works and services including septic fields and driveways, in conjunction with a construction project for which a building permit has been issued and remains in force;
- b) all of the soil to be deposited is, in the written opinion of an Authorized Person, required for the maintenance, repair or replacement of a sewerage system and associated works;
- c) the deposit is required for the construction or repair of works, roads, highways or services by or on behalf of the Cowichan Valley Regional District, its member municipalities or the Ministry of Transportation and Infrastructure, and the deposit is onto a parcel owned or leased by one of those authorities;
- d) the deposit is to a parcel owned or leased by the Government of Canada or the Province, excluding in all cases the deposit onto a parcel that is leased or licensed by the Province to a third party;
- e) the soil is being relocated within the boundaries of the parcel from which it originates, provided the requirements of all other applicable statutes and regulations are adhered to;
- f) the deposit of the soil is designated as a farm use under Section 2 of the *Agricultural Land Reserve Use, Subdivision and Procedure Regulation* and is carried out on land located within the Agricultural Land Reserve;
- g) the soil is deposited on land used for a commercial landscape supply, horticultural or nursery operation, or a mine producing landscape and construction products, where the use is permitted under the applicable Cowichan Valley District Zoning Bylaw, and for land that is within the Agricultural Land Reserve the use is also designated as a farm use under the *Agricultural Land Reserve Use, Subdivision and Procedure Regulation*, and such deposit is to create a stockpile for re-sale or is otherwise necessary as part of the routine business operations of a landscape supply, horticultural or nursery operation;
- h) the soil is being deposited as part of the reclamation of a mine, as authorized under the *Mines Act* (British Columbia);

- i) the deposit or importation of aggregate that is sourced from a mine in connection with the operation of a farm, golf course, horse stable, or other agricultural use, and where the land is within the Agricultural Land Reserve the deposit or importation is also designated as a farm use under the *Agricultural Land Reserve Use, Subdivision and Procedure Regulation*;
- j) the deposit of landscape material, for the sole purpose of landscaping the parcel, where the amount is less than 100 m³ in any calendar year;
- k) the deposit of soil for any purpose on the parcel other than those specified in sub-Sections 8.1(a) to (j) where the amount deposited is less than 20 m³ in any calendar year.

8.2 Where the Building Official is of the opinion that soil being deposited, or to be deposited, under Section 8.1(a) of this bylaw is not necessary for the construction of basements, footings and foundations, or for the installation of works and services including septic fields and driveways, the Building Official, Bylaw Enforcement Officer or General Manager may order the immediate cessation of soil deposit until a permit has been applied for and issued under this bylaw.

8.3 The person undertaking the deposit of soil in reliance on an exemption under Section 8.1 must provide to the General Manager, on request, sufficient documentation to confirm that the person meets the conditions for the exemption.

9.0 PERMIT APPLICATION BY OWNER

9.1 Every application for a Permit must be made by the owner of the parcel on which the soil is to be deposited, or by the agent of the owner.

10.0 TYPE "A" SOIL DEPOSIT PERMIT APPLICATION REQUIREMENTS

10.1 Unless exempted by Section 8.1 of this bylaw, any person intending to deposit less than 100 m³ of soil on a parcel of land in a calendar year must first obtain a Type "A" Soil Deposit Permit.

10.2 Every application for a Type "A" Soil Deposit Permit must include the following:

- a) a completed Type "A" Soil Deposit Permit application form, including all required signatures and authorizations;
- b) a title search obtained no more than thirty calendar days prior to submission of the application, together with copies of all registered covenants, statutory rights of way, and easements;
- c) a completed Riparian Areas Regulation Property Declaration;
- d) a scaled and dimensioned site plan of the property where the soil is to be deposited showing:
 - i. property boundaries, driveway accesses, internal roadways, buildings and structures located on the property, the location of wells and septic fields;
 - ii. the location of any stream, lake, ocean, wetland or drainage course on the subject property or within 30 metres of the subject property's boundary;
 - iii. the specific location on the property where the soil is to be deposited.

11.0 TYPE "B" SOIL DEPOSIT PERMIT APPLICATION REQUIREMENTS

- 11.1 Unless exempted by Section 8.1 of this bylaw, any person intending to deposit between 100 m³ and 1000 m³ of soil on a parcel of land in a calendar year must first obtain a Type "B" Soil Deposit Permit. Every application for a Type "B" Soil Deposit Permit must include the following:
- a) a completed Type "B" Soil Deposit Permit application form, including all required signatures and authorizations;
 - b) a title search obtained no more than thirty calendar days prior to the application, together with copies of all registered covenants, statutory rights of way and easements;
 - c) a scaled and dimensioned site plan of the parcel where the soil is to be deposited showing:
 - i. property boundaries, driveway accesses, internal roadways, buildings and structures located on the property, the location of wells and septic fields;
 - ii. the location of any stream, watercourse, lake, ocean, wetland or drainage course on the subject property or within 30 metres of the subject property's boundary; and
 - iii. the specific location on the property where the soil is to be deposited;
 - d) a detailed written description of:
 - i. how sediment and erosion from the deposited fill will be controlled and managed;
 - ii. how slopes will be stabilized;
 - iii. measures to control dust and prevent the tracking of soil and other materials onto roads and highways;
 - iv. measures to manage drainage from the site so that watercourses and adjacent properties are not impacted;
 - e) a completed Riparian Areas Regulation Property Declaration;
 - f) payment of applicable application fees and security.
- 11.2 In addition to Type "B" Soil Deposit Permit application requirements under subsections 11.1(a) to (f), the General Manager may require the following additional information prior to considering issuance of the permit:
- a) a drainage and sediment and erosion plan prepared by a Registered Professional;
 - b) notwithstanding Section 11.1(e), and at the sole discretion of the CVRD, written confirmation from a Qualified Environmental Professional confirming that the proposed soil deposit location is not within a Riparian Assessment Area;
 - c) a report prepared by a Registered Professional which certifies that, if carried out in conformance with the application, the proposed soil deposit will not create a danger from flooding, erosion, or landslide;
 - d) a Site Profile of the site from which the soil originated, prepared in accordance with Schedule 1 of the *Contaminated Sites Regulation*;

- e) where the General Manager has reason to believe that soil to be deposited is contaminated soil, satisfactory evidence that the deposit will be in accordance with an authorization, order or exemption under the *Environmental Management Act*.

12.0 TYPE “C” SOIL DEPOSIT PERMIT APPLICATION REQUIREMENTS:

12.1 Unless exempted by Section 8.1 of this bylaw, any person intending to deposit more than 1000 m³ of soil on a parcel of land in a calendar year must first obtain a Type “C” Soil Deposit Permit. Every application for a Type “C” Soil Deposit Permit must include the following:

- a) a completed Type “C” Soil Deposit Permit application form, including all required signatures and authorizations;
- b) a title search obtained no more than thirty calendar days prior to the application, together with copies of all registered covenants, statutory rights of way, and easements;
- c) a survey of the parcel prepared by a British Columbia Land Surveyor, including:
 - i. legal boundaries of the parcel, the proposed soil deposit area boundaries, and any easements, rights of way and covenant areas;
 - ii. location of all structures and private infrastructure on the property;
 - iii. location of all public infrastructure within 20 metres of the property;
 - iv. location of all streams, watercourses, wetlands, drainage courses, septic systems and wells on the parcel and within 30 metres of the proposed fill site;
 - v. topographic survey with 0.5 metre intervals showing the pre-deposit topography of the parcel and within 20 metres of the parcel; and
 - vi. all existing and proposed accesses to the parcel and soil deposit site;
- d) a Soil Assessment and Deposit Plan prepared by a Registered Professional, including:
 - i. proposed location and final contours (0.5 metres) of the soil deposit site;
 - ii. proposed volume of soil to be deposited, including calculations, cross-sections and other pertinent information used in calculating soil deposit volumes;
 - iii. estimated schedule and phasing of the soil deposit activity;
 - iv. description of procedures for controlling access to the site;
 - v. description of procedures for documenting the origins and composition of soil to be deposited, including preliminary fill source assessments, soil source site profiles and declarations, and truck tracking receipts;
 - vi. description of process for monitoring soil placement so that the approximate location of deposited soil can be matched with truck tracking receipts; and
 - vii. certification that the proposed soil deposit will not create a danger from flooding, erosion, or landslide;
- e) an Environmental Protection Plan prepared by a Registered Professional, including:
 - i. measures for controlling erosion and sedimentation and for maintaining erosion and sediment control infrastructure;
 - ii. measures for protecting riparian assessment areas, watercourses and sensitive environmental features;
 - iii. measures for minimizing the tracking of soil onto public road ways and for cleaning roads;

- iv. measures for minimizing dust;
 - v. measures for managing on-site drainage for the duration of the soil deposit activity and for ensuring that watercourses and adjacent properties will not be negatively impacted from storm water run-off from the soil deposit site; and
 - vi. measures for controlling noxious weeds and invasive species; and
- f) a Site Remediation Plan prepared by a Registered Professional, including:
- i. reclamation measures to stabilize, landscape and restore the land upon completion of the soil deposit activity;
 - ii. measures for permanent drainage and storm water management; and
 - iii. measures for managing noxious weeds and invasive species on an on-going basis.

12.2 In addition to the Type "C" Soil Deposit Permit application requirements of Section 12.1, the General Manager may require the following additional information, as applicable, prior to considering issuance of the permit:

- a) for land that is agriculturally zoned, an Agricultural Capability Report, prepared by a Professional Agrologist, including:
- i. the soil characteristics and agricultural capability of the proposed soil deposit site;
 - ii. the benefits that the proposed soil deposit will provide for agricultural productivity and use;
 - iii. any limitations, conditions or recommendations to ensure agricultural capability is maintained or improved;
 - iv. recommended measures for protecting the agricultural capability of adjacent agricultural land;
- b) for land that, in the opinion of the General Manager, may be susceptible to flooding, a Hydrology Report prepared by a Registered Professional certifying that adjacent property and infrastructure will not be subject to increased flooding and hydraulic impacts caused by the reduced absorptive capacity of the Land, reduced flood capacity, or the blockage or re-direction of flood water flows;
- c) for lands within 100 metres of a provincially designated vulnerable aquifer, a Ground Water Impact Assessment, prepared by a Registered Professional, analyzing the potential impact of proposed soil deposit activity on ground water and recommended ground water protection measures;
- d) a Site Profile of the site from which the soil originated, prepared in accordance with Schedule 1 of the *Contaminated Sites Regulation*;
- e) where the General Manager has reason to believe that soil to be deposited is contaminated soil, satisfactory evidence that the deposit will be in accordance with an authorization, order or exemption under the *Environmental Management Act*.

13.0 SOIL DEPOSIT PERMIT EXPIRY AND RENEWALS

13.1 Every permit issued under this bylaw expires upon the earlier of:

- a) the deposit of the total amount of soil authorized to be deposited by the permit has occurred;
- b) the expiry date expressly stated in the permit;
- c) for Type "A" and "B" Soil Deposit Permits, one (1) year after the date of permit issuance; or
- d) for Type "C" Soil Deposit Permits, five (5) years after date of permit issuance.

13.2 If the deposit authorized in a permit is not completed before the permit expires under Section 13.1, the General Manager, in the case of a Type "A" or Type "B" Soil Deposit Permit, or Board, in the case of a Type "C" Soil Deposit Permit, may renew the permit provided that:

- a) the applicant makes a written request to the General Manager for a renewal or extension a minimum of two (2) months prior to the expiry date;
- b) the applicant has paid the required renewal fee and provided the required security deposit;
- c) the soil deposit has been carried out in compliance with the terms and conditions of the original permit, including any conditions of a Registered Professional's report which may apply; and
- d) there is no change in scope from the original application.

13.3 No soil deposit permit will be renewed unless:

- a) an application renewal fee is paid in accordance with the renewal fees specified in Schedule "A" of this bylaw;
- b) reports are submitted from all Registered Professionals involved in the soil deposit, providing an update on site conditions and confirming permit compliance;
- c) all required soil deposit records are up to date and complete; and
- d) any violations of this bylaw and associated permit have been remedied to the satisfaction of the General Manager.

13.4 There is no limit to the number of times a person may apply for renewal of a permit, but no person has a vested right to the renewal of a permit.

13.5 The General Manager may vary, alter or add to the permit terms and conditions that apply during the renewal period of a permit, as are necessary to ensure compliance with this bylaw or to mitigate any harm to the environment or to adjoining properties, and a permit holder is not entitled to the issuance of a renewal permit on the same terms and conditions that applied under the expiring permit.

- 13.6 An application for renewal of a permit which includes a material change in the scope of proposed soil deposit from that under the original application may be refused, and in that case a new permit application, with applicable permit fee and security deposit, must be submitted.

14.0 AUTHORITY TO ISSUE THE PERMIT

- 14.1 The Board hereby delegates to the General Manager the authority to issue:
- a) Type "A" Soil Deposit Permits; and
 - b) Type "B" Soil Deposit Permits.
- 14.2 At the discretion of the General Manager, an application for a Type "B" Soil Deposit Permit may be referred to the Electoral Area Services Committee and Board for consideration and decision.
- 14.3 Applications for Type "C" Soil Deposit Permits will be considered and issued by the Board.
- 14.4 The General Manager or the Board, as applicable, may refuse to issue a permit where the applicant has not provided to the Cowichan Valley Regional District sufficient evidence that the deposit of soil can be carried out in compliance with this bylaw and without creating a hazard to persons or property, damage to the environment, or irreparable damage to highways or other public property.
- 14.5 A permit shall not be issued if the Board or General Manager, as applicable, considers that such deposit would conflict with the policies and guidelines established in the Official Community Plan or the permitted uses allowed on the parcel as established by the applicable CVRD Zoning Bylaw.
- 14.6 A permit shall not be issued if the Board or General Manager, as applicable, considers that such deposit would conflict with the regulations, policies and guidelines established under CVRD solid waste management bylaws, including but not limited to *CVRD Bylaw No, 2570, Waste Stream Management Licensing Bylaw, 2004*.
- 14.7 A person who has been refused a permit by the General Manager may submit an application for reconsideration by the Board, by giving notice in writing to the CVRD's Corporate Secretary within fifteen (15) business days of the refusal.

15.0 COMMUNITY CONSULTATION

- 15.1 The Board may call for and receive public comment about any Type "C" Soil Deposit Permit application or application to renew a Type "C" Soil Deposit Permit prior to consideration of the permit or renewal application. If the Board decides that the community should have an opportunity to comment, it may:
- a) require that a public meeting be held with respect to the proposed soil deposit;
 - b) publish notice of the time and place where the public meeting is to be held in two consecutive newspaper publications, paid for at the applicant's expense; and
 - c) notify owners and occupiers of land within 60 metres of the soil deposit parcel.

16.0 SOIL DEPOSIT REQUIREMENTS

16.1 Any deposit of soil in an Electoral Area, including deposits exempt from permit requirements, must comply with the following requirements:

- a) the slope of any exposed face of deposited soil must not be greater than the angle of repose necessary for stability of the deposited material. For any slope face within 10 metres of a property boundary or a riparian assessment area boundary, the maximum slope grade will be 4:1 (4 horizontal to 1 vertical);
- b) the deposited soil must be graded so that positive gravity drainage is assured, and a drainage system of sufficient capacity and extent must be installed to ensure that runoff onto adjacent lands will be no greater than prior to commencement of the soil deposit;
- c) soil must not be deposited over any statutory right-of-way area without first obtaining written approval of the authority having jurisdiction over the statutory right of way;
- d) soil must not be deposited over wells or sewage disposal systems;
- e) all streams, watercourses, wetlands and drainage facilities must be kept free of silt, clay, sand, debris and other material attributable to the soil deposit activity, which could obstruct, impair or impede drainage facilities and watercourses;
- f) all dirt, mud or debris tracked onto public roads or deposited into road-side ditches from the soil deposit activity must be removed daily;
- g) deposited soil and related activities must not encroach upon, undermine, damage or endanger any adjacent property; and
- h) no person shall engage in the deposit of soil on a Sunday or Holiday, or before 7:00 a.m. or after 7:00 p.m. on any other day.

17.0 PERMIT CONDITIONS

17.1 A permit may include one or more conditions pertaining to the regulations under this bylaw.

17.2 Every permit holder shall keep a daily record Soil Deposit Log Book of all soil deposited on the permit site. The Soil Deposit Log Book record must contain the following information:

- a) the date, time and origin of each delivery of soil;
- b) the contact information (name and phone number) for each project site or property where the soil originated from;
- c) the total quantity of soil deposited;
- d) the company that delivered the soil and the name of the truck driver;
- e) the licence plate numbers of the truck that delivered the soil to the property; and
- f) the name of the person entering the Log Book information.

- 17.3 Every permit holder shall, no later than forty-eight hours after a request to review the Soil Deposit Log Book, submit it to the General Manager for review and inspection.
- 17.4 Where information in the submitted Soil Deposit Log Book is incomplete or determined to be false, the permit may be suspended and the permit holder or owner shall undertake one or more of the following measures, as determined by the General Manager, to renew work under the permit:
- a) submit a soil quality assessment, including laboratory analysis of contamination for a specified soil deposit footprint, completed by a Registered Professional;
 - b) complete the Soil Deposit Log Book;
 - c) correct any false Soil Deposit Log Book records; and
 - d) agree to submit monthly Soil Deposit Log Book records for all subsequent Soil deposits under the permit.
- 17.5 The issuance of a permit does not relieve the permit holder from compliance with any other statute or regulation, including but not limited to a requirement under the *Local Government Act* for a development permit in a designated CVRD Development Permit Area, CVRD bylaws regulating noise and nuisance, the *Water Sustainability Act*, the *Riparian Areas Regulation*, the *Fisheries Act* (Canada), and the *Environmental Management Act*.
- 17.6 A permit constitutes written authority under this bylaw to conduct only those activities described in the permit.
- 17.7 All plans, specifications and Registered Professional's reports forming part of an application in respect of which a permit is issued shall form part of and be incorporated in the permit unless otherwise specified by the General Manager and, without limiting the foregoing, a permit issued shall specify the maximum volume of soil that is to be deposited.
- 17.8 Prior to the deposit of any soil, the holder of any Type 'C' Soil Deposit Permit shall post a clear and legible sign, in English, indicating the duration and extent of the soil deposit authorized by the permit, at the point of entry to the parcel from the main road, before any soil deposit commences. The sign is to be, at a minimum, 1 metre x 1 metre square and must include the permit number on it, and must be maintained in place until the expiry of the permit.
- 17.9 The holder of the permit shall be responsible to contact the Ministry of Transportation and Infrastructure and to comply with that Ministry's requirements for road maintenance and clean up during and after the period of time when soil deposit occurs.
- 17.10 The holder of the permit shall be responsible to contact the Ministry of Environment, Ministry of Forest, Lands, Natural Resource Operations and Rural Development, Ministry of Mines, the Agricultural Land Commission and the Department of Fisheries and Oceans Canada in order to determine the requirements of those agencies in relation to any soil deposit undertaken under the authority of a permit issued under this bylaw, and the permit holder shall be responsible to comply with those requirements.
- 17.11 The General Manager may require a post-deposit report prepared by a Registered Professional confirming that the soil was deposited in compliance with the permit conditions.
- 17.12 Where the General Manager has reason to believe that soil being deposited under this

bylaw is contaminated soil, the General Manager may order the immediate cessation of soil deposit until the person depositing the soil provides satisfactory evidence that the deposit is subject to and is in accordance with an authorization, order or exemption under the *Environmental Management Act*.

18.0 PERMIT SUSPENSION, CANCELLATION AND AMENDMENT

18.1 If there is a contravention of any term or condition of the Permit, or the Permit was issued on the basis of statements made in an application for a permit, report, declaration or record required under this bylaw that were false or misleading with respect to a material fact, or that omitted to state a material fact, the omission of which made the statement false or misleading, the General Manager may:

- a) suspend in whole or in part the rights of the applicant under the permit;
- b) revoke the permit;
- c) amend the permit;
- d) attach new conditions to a permit, without the consent of the applicant; or
- e) order that the permit holder carry out remedial work to correct the contravention.

18.2 The General Manager may authorize an amendment to a permit, where requested by the permit holder. For any proposed material changes to the permit, the General Manager may require:

- a) the submission of further, amended, or new information referred to in Sections 10, 11 or 12;
- b) further community consultation in accordance with Section 15; and
- c) the submission of a new permit application, along with applicable permit fees and security deposit.

19.0 PERMIT CLOSURE

19.1 For Type "B" Soil Deposit Permits, within 60 calendar days of completion of the soil deposition activity, or expiration of the permit, the permit holder must:

- a) submit a final copy of the Soil Deposit Log Book to the General Manager;
- b) leave all surfaces of the soil deposit area with a slope no greater than the grades specified in the permit;
- c) cover all surfaces of the deposit area with an established growth of grass or other suitable and approved erosion control ground cover, or otherwise complete restoration of the Soil Deposit Site as specified in the permit;
- d) provide the General Manager with confirmation that all required drainage and storm water management infrastructure has been appropriately installed and is functioning.

19.2 For Type "C" Soil Deposit Permits, within 90 calendar days of completion of the soil deposition activity, or expiration of the permit, the permit holder must:

- a) submit a final copy of the Soil Deposit Log Book to the General Manager;
- b) submit a topographical survey prepared by a British Columbia Land Surveyor showing the location of the deposited soil relative to parcel and stream or watercourse boundaries, the finished grades for the soil deposit site and the estimated volume of soil that has been deposited;
- c) submit a report from a Registered Professional confirming that all soil deposit activity has occurred in compliance with the bylaw and permit and that all restoration works specified in the permit have been completed.

19.3 If the General Manager has reason to believe the soil deposit activity on the parcel is not compliant with applicable bylaw and permit conditions, the General Manager may require the permit holder to provide written confirmation from a Registered Professional that the soil deposit had been conducted in accordance with the terms and conditions of this bylaw and the permit.

20.0 FEES AND SECURITY DEPOSITS

21.1 The applicant for a permit or permit renewal must pay the permit fee prescribed under Schedule "A" at the time the application is submitted.

21.2 For Type "B" Soil Deposit Permit applications the volumetric fee prescribed under Schedule "A" shall be determined based on the volume of soil that is proposed to be deposited, and must be paid at the time the application is submitted. There shall be no refund of any portion of the permit fee where the volume of soil deposited is less than that proposed under the permit application.

21.3 For Type "C" Soil Deposit Permit applications, the volumetric fee prescribed under Schedule "A" shall be calculated by a Registered Professional based on the Soil Deposit Log Book record and submitted no less frequently than every 6 months after permit issuance, or as otherwise specified in the permit. The holder of a Type "C" Soil Deposit Permit who remits a volumetric fee more than 30 days past the due date shall pay a late payment levy equivalent to 20% of the volumetric fee. If volumetric fees are not remitted within 120 days of the due date, the General Manager may suspend or cancel the permit.

21.4 Without limiting the enforcement steps the CVRD may take to enforce this bylaw, a person who deposits soil without a permit and in breach of this bylaw shall pay a fee in the sum of \$5 for each and every cubic metre of soil deposited, whether or not a permit is subsequently issued. This fee is in addition to all other applicable permit fees.

21.5 As security for the due and proper compliance with all requirements and conditions of this bylaw, the applicant for a permit shall, before receiving a permit for the deposit of soil, provide a cash deposit or auto-renewing irrevocable letter of credit drawn upon a chartered bank or credit union, in the amount specified in Schedule "A". If security is provided in the form of a letter of credit, it must be in a form acceptable to the CVRD and fully accessible to the CVRD for no less than twelve (12) months after the expiration date of the permit. If full compliance with the bylaw and permit are not confirmed within 90 calendar days of following expiration of the permit, the CVRD may draw on the letter of credit and hold the proceeds of security until compliance is achieved, or use the proceeds of security to achieve compliance.

21.6 Should the holder of a permit not comply with the conditions of a permit, the CVRD may undertake any necessary remedial action within the permit area at the cost of the permit holder, and may utilize the security deposit for that purpose.

22.0 ADMINISTRATION

- 22.1 The General Manager may establish the form of application and permit to be used under this bylaw.
- 22.2 The General Manager, Bylaw Enforcement Officer and Building Official have the right at all reasonable hours to enter upon and inspect any parcel to determine if the provisions and requirements of this bylaw are being met.
- 22.3 The General Manager or Bylaw Enforcement Officer may request records of soil deposit volumes maintained by the permit holder in accordance with Section 17 of this bylaw.
- 22.4 Where soil or other material has been deposited on a parcel without a valid permit and is not exempt by Section 8 of this bylaw, or where a permit condition has been contravened, the General Manager or Bylaw Enforcement Officer may place a "stop work" order on the property. Within 14 calendar days of the placement of a stop work order, the owner must:
- a) remove the soil or other material from the parcel to a permitted facility or property; or
 - b) apply for a permit authorizing the soil deposit.

23.0 VIOLATIONS AND PENALTIES

- 23.1 Any soil deposited without a permit or contrary to the terms and conditions of a permit shall be removed from the parcel by the owner of the parcel at the owner's cost. Failure to remove the soil within the time period given by the General Manager for the removal shall constitute an offence under this bylaw.
- 23.2 Any person who contravenes any provision in this bylaw, or who suffers or permits any act or thing to be done in contravention of this bylaw, or who refuses, omits or neglects to fulfil, observe, carry out or perform any duty or obligation imposed in this bylaw is guilty of an offence and on summary conviction is liable to a fine of not more than \$2,000 per offence.
- 23.3 A separate offence shall be deemed to be committed upon each day during and in which the contravention occurs or continues.
- 23.4 The penalties imposed under this bylaw shall be in addition to and not in substitution for any other penalty or remedy imposed by this bylaw or any other statute, law or regulation including but not limited to an application to the Supreme Court of British Columbia by the CVRD to a court, for a mandatory injunction for the enforcement of this bylaw, including an order for the removal of any soil, contaminated soil, other material or unsuitable material deposited contrary to the provisions of this bylaw.

24.0 INDEMNIFICATION

- 24.1 The holder of the permit is at all times responsible for compliance with the provisions of this bylaw and any other applicable enactment and for any claim, demand, damage, loss, costs, expense, fees or fine that may arise from a deposit of soil.
- 24.2 The holder of a permit shall save harmless, indemnify and keep indemnified the Cowichan Valley Regional District, its officers, employees, contractors and elected officials from any and all claims, demands, damages, losses, costs, expenses, fees, fines, actions, proceedings whatsoever brought by any person arising from the issuance of a permit under this bylaw with respect to the deposit of soil authorized under a permit.

25.0 COMMENCEMENT

- 25.1 Except as provided in Sections 25.2 and 25.3, this bylaw comes into force on the date of its adoption
- 25.2 Sections 10 and 11 of this bylaw, and the prohibition under Section 7.1 against depositing soil without a Type "A" Soil Deposit Permit or a Type "B" Soil Deposit Permit, where such a permit is required under sections 10 or 11, shall come into force on June 1, 2020.
- 25.3 Section 12 of this bylaw, and the prohibition under Section 7.1 against depositing soil without a Type "C" Soil Deposit Permit, where such a permit is required under Section 12, shall come into force on June 3, 2019.

READ A FIRST TIME this 26th day of September, 2018.

READ A SECOND TIME this 26th day of September, 2018.

READ A THIRD TIME this 14th day of November, 2018.

I hereby certify this to be a true and correct copy of Bylaw No. 4236 as given Third Reading on the 14th day of November, 2018.


Deputy Corporate Secretary


November 28, 2018
Date

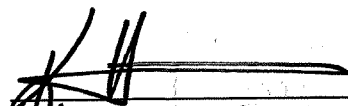
APPROVED BY THE MINISTER OF ENVIRONMENT this _____ day
of _____, 2018, in accordance with *Community Charter Section 9(3)(c)*. **N/A**

THIRD READING RESCINDED this 24th day of April, 2019.

READ A THIRD TIME AS AMENDED this 24th day of April, 2019.

ADOPTED this 24th day of April, 2019.


Chairperson


Deputy Corporate Secretary

SCHEDULE "A"**Permit Fees and Security Deposits**

SOIL QUANTITY (m³ per year)	PERMIT TYPE	PERMIT FEE¹	SECURITY DEPOSIT²	RENEWAL FEE
Less than 100	Type "A" Soil Deposit Permit	N/A	N/A	N/A
100 – 1000	Type "B" Soil Deposit Permit	\$300 application fee plus \$4 per 10 m ³ of deposited soil	\$3,000	\$200
More than 1000	Type "C" Soil Deposit Permit	\$2,000 application fee plus \$6 per 10 m ³ of deposited soil	\$20,000 per hectare	\$2,000

1. Prior to issuance of a Type 'B' Soil Deposit Permit, payment of the application fee, volumetric fee based on the estimated volume of soil to be deposited, and security deposit is required.

Prior to issuance of a Type 'C' Soil Deposit Permit, payment of the application fee and security deposit is required. The amount of the security deposit shall be \$20,000 for the first hectare plus an additional \$20,000 on a pro rated basis for each additional hectare of land to be used as a soil deposit area. The volumetric fee is to be paid bi-annually, based on actual volumes deposited as reported by the Registered Professional.

2. The Security Deposit will be held for a minimum of six (6) months after the permit has expired and will be released after all restoration works and permit conditions have been completed and confirmed.

APPENDIX B - DESCRIPTION OF AQUIFER 203 (BEDROCK) FROM BC WATER RESOURCES ATLAS

1. AQUIFER DESCRIPTION FOR AQUIFER 203

Aquifer Name: Shawnigan Lake/ Cobble Hill/ Mill Bay

Date of Mapping: November 2018

1.1 Conceptual Understanding of Hydrostratigraphy

1.1.1 *Aquifer Extents*

The majority of the aquifer extents follow the Shawnigan Creek watershed (Freshwater Atlas). The northeast extent aligns with the mapped geologic boundary between Wrangellian rocks and Nanaimo Group sedimentary rocks (Cui et al. 2017). Mapped limestone units (limited extent) have been grouped with Wrangellian rocks to facilitate groundwater management efforts. A portion of the northeast aquifer boundary also follows the coastline of Saanich Inlet. Bedrock aquifer extents assume near-surface flow within the bedrock to justify the use of topographical features.

1.1.2 *Geologic Formation (Overlying Materials)*

Overlying material varies from a veneer of colluvium to 60 m thick glacial sediments from the Dashwood Drift, Quadra Sands, Vashon t, and Capilano Sediments. Bedrock outcrops or where bedrock is overlain by a veneer of surficial material have been mapped to the east and west of Shawnigan Lake. Thicker deposits are typically found within the inferred bedrock valley along the eastern extents of the aquifer.

1.1.3 *Geologic Formation (Aquifer) – 6b Fractured Crystalline*

Bedrock consists of granitic rocks of the Westcoast Crystalline Complex, basaltic volcanic rocks of the Bonanza Group, sedimentary rocks from the Sicker Group, and intrusive igneous rock from the Island Plutonic Suite (Cui et. al. 2017).

A small portion of the aquifer also includes sedimentary rocks from the Buttle Lake Group (Mount Mark Formation) and Vancouver Group (Quatsino Formation) including massive crinoidal limestone, bedded calcirudite and calcerenite, chert, cherty argillite and siltstone, and marble.

There are several faults, including the San Juan fault, within the aquifer boundary.

1.1.4 *Vulnerability - Moderate*

The DRASTIC method was used to complete intrinsic groundwater vulnerability mapping as part of the Vancouver Island Water Resources Vulnerability Mapping Project (Newton and Gilchrist, 2010). The intrinsic vulnerability for the majority of the area was classified as low to moderate. Areas classified as high vulnerability are associated with potential aquifers in surficial deposits and do not apply to the bedrock aquifer.

Well lithology records indicate a confining layer of low permeability material (till, clay) exists, ranging from approximately 1 to 60 m thick but typically 5 m thick. However, the confining layer may be thin or absent in some areas. Water-bearing fracture zones are typically 80 m deep based on the median depth of existing wells. The hydraulic conductivity of the aquifer material is assumed to be relatively low (i.e. fracture dominated flow in the aquifer). Based on this description, the vulnerability of the aquifer to surface contamination is moderate.

3.2 Conceptual Understanding of Flow Dynamics

3.2.1 Groundwater Levels and Flow Direction

Water levels are considered shallow based on a geometric mean depth to water of 7.1 m with a range of 0.3 to 121.9 m. The wells are predominantly located in the lowland areas near surface water features. Deeper water levels likely occur for wells in the upland areas. Artesian conditions were noted in several wells.

Groundwater is inferred to flow east towards the coastline, with local contributions towards Shawnigan Lake, predominantly through bedrock deformities (e.g. fractures). A saltwater-freshwater interface is expected to exist along the coastline. Groundwater flow may also occur at depth and across adjacent surface watersheds.

Mapped faults are inferred as enhanced permeability areas; however, they could potentially reduce permeability and create barriers to groundwater flow or act as combined conduit-barrier systems. Additional studies are required to confirm fault zone hydrogeology.

3.3 Recharge

Regional recharge is likely to occur within the mountainous terrain where precipitation infiltrates through bedrock deformities, such as fractures. Mountain block recharge along the bedrock contact with Quaternary deposits may contribute to some recharge. Leakage from overlying unconsolidated deposits may also occur. Recharge from surface water features may occur where the thickness of surficial materials is thin (e.g. Shawnigan Creek, Handysen Creek and Hollings Creek).

3.3.1 Potential for Hydraulic Connection

Shawnigan Creek is a significant watershed in the area (MOE 2006). Additional studies are required to confirm/determine surface water/groundwater interactions with Shawnigan Lake and drainage features in the area. The extent of hydraulic connections with seawater along the coastline, mapped faults, and the overlying unconsolidated aquifers are unknown.

3.4 Additional Information on Water Use and Management

Based on regional land-use, all groundwater use is expected to be conjunctive (drinking water, commercial/industrial and agricultural). Water quality remarks in a few well records identified odour, iron, and sulphur issues. Deepening of a few wells was also noted.

Mapping of local water systems for the region is available from the Cowichan Valley Regional District (cprdnewnormalcowichan.ca). Additional water use in the area includes licensed diversion of water from local creeks and springs.

There are three active Provincial observation wells (OW# 380, 439, and 470).

3.5 Additional Assessments or Management Actions

The following groundwater characterization studies have been completed based on analytical methods:

- Carmichael, V., March 2014. Compendium of Re-evaluated Pumping Tests in the Cowichan Valley Regional District, Vancouver Island, British Columbia. Environmental Sustainability Division, Ministry of Environment.
- Harris, M. & S. Usher, October 2017. Preliminary Groundwater Budgets, Cobble Hill/Mill Bay Area, Vancouver Island, BC.

- Kwong, J., January 1987. Summary of field sampling in September 1985 to assess residents ongoing concerns of saltwater intrusion of groundwater sources, Mill Bay Area, Shawnigan Land District. Groundwater Section, 29 pages, NTS Map 092B12.
- Ministry of Environment (MOE), February 2006. Shawnigan-Goldstream Water Allocation Plan.
- Ministry of Environment and Parks, September 1986. Cowichan-Koksilah Water Management Plan.
- Newton, P. & A. Gilchrist, April 2010. Technical Summary of Intrinsic Vulnerability Mapping Methods for Vancouver Island.
- van der Gulik, T., Neilsen, D., Fretwell, R. and Tam, S. June 2013. Agricultural Water Demand Model, Report for the Cowichan Valley Regional District. Victoria, BC: BC Ministry of Agriculture and Agri-Food Canada.
- WorleyParsons, February 2009. South Cowichan Water Plan Study: A Preliminary Assessment of Water Supply & Needs within the South Cowichan Region.

Chloride concentrations ranged from 14 to 209 mg/L in groundwater from bedrock wells in the Mill Bay area based on sampling conducted in 1985 (Kwong 1987). The report concluded saltwater movement occurs in the bedrock aquifers but the source of saltwater was unknown.

3.6 Aquifer References

Blyth, H. E., N.W. Rutter, & L.M. Sankeralli, 1993. Surficial geology of the Shawnigan Lake Area. Victoria, BC: BC Ministry of Energy and Mines.

Cowichan Valley Regional District <http://cvrdenormalcowichan.ca/water-systems/> - accessed March 2019.

Cui, Y., D. Miller, P. Schiarizza, & L.J. Diakow, 2017. British Columbia digital geology. British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Geological Survey Open File 2017-8, 9p.

Geographic datasets from the BC Data Catalogue, accessed February 2017 <https://data.gov.bc.ca/>

Hammond, Z.M., A.C. Hinnell, J.J. Clague. 2018. Stage II Detailed Aquifer Mapping Study: Shawnigan Lake Area, Vancouver Island, B.C. Water Science Series, WSS2019-02. Prov. B.C., Victoria B.C.

APPENDIX C - DESCRIPTION OF AQUIFER 205 (SAND AND GRAVEL) FROM BC WATER RESOURCES ATLAS

1. AQUIFER DESCRIPTION FOR AQUIFER 205

Aquifer Name: Shawnigan Lake

Date of Mapping: November 2018

1.1 Conceptual Understanding of Hydrostratigraphy

1.1.1 *Aquifer Extents*

The aquifer boundary is contained within the Shawnigan Creek watershed and generally does not extend above an elevation of 150 m based on existing well extents.

1.1.2 *Geologic Formation (Overlying Materials)*

Marine Capilano Sediments and Vashon till overlies portions of the aquifer but this confining material is typically less than 10 m thick or inferred to be absent in some areas. Marine Capilano Sediments are not expected above an elevation of 150 m which is inferred to be the maximum relative elevation reached by the sea after glacial retreat. However, deltaic or fluvial sands and gravels of the Capilano Sediments may be present.

1.1.3 *Geologic Formation (Aquifer) – 4a/b Semi-confined glacio-fluvial sand and gravel*

Aquifer material consists of sand and gravel of the Quadra Sand or Dashwood Drift. The aquifer material is of variable thickness due to deposition of glacial sediments within erosional bedrock features.

1.1.4 *Vulnerability - High*

The DRASTIC method was used to complete intrinsic groundwater vulnerability mapping as part of the Vancouver Island Water Resources Vulnerability Mapping Project (Newton and Gilchrist, 2010). A medium intrinsic vulnerability was calculated for a majority of the aquifer.

Well lithology records indicate a confining layer of low permeability material (till, clay) exists, ranging from approximately 3 to 45 m thick but typically 10 m thick. However, the confining layer may be thin or absent in some areas of the aquifer. The depth to water is shallow (< 15 m) based on median water level values. The hydraulic conductivity of the aquifer is assumed to be relatively high. Based on this description, the vulnerability of the aquifer to surface contamination is high.

8.2 Conceptual Understanding of Flow Dynamics

8.2.1 *Groundwater Levels and Flow Direction*

Water levels are considered shallow based on a geometric mean depth to water of 14.3 m with a range of 1.5 to 71 m. No artesian conditions were noted.

Groundwater flow is inferred to follow surface and/or bedrock topography and drain from areas of higher elevation to areas of lower elevation, with flow ultimately discharging into Shawnigan Lake.

8.3 Recharge

Infiltration from precipitation and mountain block recharge (runoff from the mountainous terrane that infiltrates along the contact with unconsolidated materials) are expected to be the primary mechanisms for recharge. The presence of an overlying confining layer may limit the infiltration of precipitation or may result in leakage into the aquifer if saturated conditions develop above the confining layer.

8.3.1 Potential for Hydraulic Connection

Key surface water features include Shawnigan Lake, Shawnigan Creek, and McGee Creek. Additional studies are required to confirm/determine surface-ground water interactions.

8.4 Additional Information on Water Use and Management

Based on regional land-use, all groundwater use is expected to be conjunctive (drinking water, commercial/industrial and agricultural). Water quality remarks include high iron and deepening of well at a few locations.

Mapping of local water systems for the region is available from the Cowichan Valley Regional District (cvrldnewnormalcowichan.ca). Additional water use in the area includes licensed diversion of water from local creeks and springs.

8.5 Additional Assessments or Management Actions:

The following groundwater characterization studies have been completed based on analytical methods:

- Harris, M. & S. Usher, October 2017. Preliminary Groundwater Budgets, Cobble Hill/Mill Bay Area, Vancouver Island, BC.
- Ministry of Environment (MOE), February 2006. Shawnigan-Goldstream Water Allocation Plan.
- Ministry of Environment and Parks, September 1986. Cowichan-Koksilah Water Management Plan.
- Newton, P. & A. Gilchrist, April 2010. Technical Summary of Intrinsic Vulnerability Mapping Methods for Vancouver Island.
- van der Gulik, T., Neilsen, D., Fretwell, R. and Tam, S. June 2013. Agricultural Water Demand Model, Report for the Cowichan Valley Regional District. Victoria, BC: BC Ministry of Agriculture and Agri-Food Canada.
- WorleyParsons, February 2009. South Cowichan Water Plan Study: A Preliminary Assessment of Water Supply & Needs within the South Cowichan Region.

8.6 Aquifer References

Blyth, H. E., N.W. Rutter, & L.M. Sankeralli, 1993. Surficial geology of the Shawnigan Lake Area. Victoria, BC: BC Ministry of Energy and Mines.

Cowichan Valley Regional District <http://cvrldnewnormalcowichan.ca/water-systems/> - accessed March 2019.

Cui, Y., D. Miller, P. Schiarizza, & L.J. Diakow, 2017. British Columbia digital geology. British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Geological Survey Open File 2017-8, 9p.

Geographic datasets from the BC Data Catalogue, accessed February 2017 <https://data.gov.bc.ca/>

Hammond, Z.H., A.C. Hinnell, J.J. Clague. 2018. Stage II Detailed Aquifer Mapping Study: Shawnigan Lake Area, Vancouver Island, B.C. Water Science Series, WSS2019-02. Prov. B.C., Victoria B.C.

APPENDIX D – SUPPORTING DOCUMENTS FROM BRITISH COLUMBIA’S CONTAMINATED SITES REGULATION

- TECHNICAL GUIDANCE 5
- PROTOCOL 21
- SCHEDULE 2

Sampling and Determining Soil pH at Soil Relocation Receiving Sites

Introduction

A key section in the *Environmental Management Act* enables a Director of Waste Management to enter into Contaminated Soil Relocation Agreements.

This technical guidance document provides a process for ministry staff and site owners to characterize a receiving site to ensure that soil relocation does not result in unacceptable impacts. The process relies on the principle that the mass load deposited at a receiving site can be attenuated by near surface soil (depending on the area), soil pH, depth of deposition, and other factors.

Two sampling method approaches

The following procedures are to be used for site identification, location of sampling points, and soil sampling.

- Method 1 is to be used if the total volume of soil being relocated is less than the receiving site area \times 0.1 m.
- Method 2 is to be used if the total volume of soil being relocated is greater than the receiving site area \times 0.1 m.

Method 1

If the total volume (m^3) of soil being relocated is less than the receiving site area \times 0.1 m, then:

- a minimum of one sampling site is required for small sites and two sampling sites for large sites, where a small site has an area

less than or equal to 12,000 m^2 and a large site has an area greater than 12,000 m^2 ;

- one additional sampling site is required per terrain¹ unit present at the site; and
- standard sampling depths should be adopted:
 - 0 m–0.1 m, and
 - 0.9 m–1.0 m.

One duplicate is recommended for each site. This should be created by splitting one of the samples.

As shown in Figure 1, for each sampling site, this procedure will result in:

- 4 surface samples,
- 4 subsurface samples, and
- 1 duplicate sample.

Method 2

If the total volume (m^3) of soil being relocated is greater than the receiving site area \times 0.1 m, then;

- a minimum of one sampling site is required for small sites and two sampling sites for large sites;
- one additional sampling site is required per terrain unit;
- standard sampling depths should be adopted:
 - 0 m–0.1m
 - 0.5 m–0.6 m

¹ B.C. Ministry of Environment and Ministry of Crown Lands. 1997. *Terrain Classification System for British Columbia* (Version 2). Manual 10, Victoria, B.C.

- 0.9 m–1.0 m
- 1.9 m–2.0 m
- 2.9 m–3.0 m

One duplicate is recommended for each site. This should be created by splitting one of the samples.

As shown in Figure 2, for each sampling site, this procedure will result in:

- 4 surface samples,
- 16 subsurface samples, and
- 1 duplicate sample.

Guidance for characterizing a site

For guidance on classifying, identifying, and sampling sites, see Attachment 1. Guideline A is for small sites and Guideline B is for large sites.

Sample packaging and handling

- Place the sample in new polyethylene bag or other sample container specified by the laboratory.
- Write an identifying number on the bag with a waterproof marker.
- Close the sample bag with a tie and attach a tag that has the site number, sample location, depth, date, and sampler's initials written on it.
- Take or send the bag to a laboratory.
- Have the soil pH determined using the Canadian Society of Soil Science soil:water method².
- Calculate the median pH value from the laboratory results.

For more information, contact the Environmental Management Branch at site@gov.bc.ca

² British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Air Samples, 2005 edition.

ATTACHMENT 1

Guideline A

For small ($\leq 12,000 \text{ m}^2$) sites

Step 1. Site Classification

- Check soil, terrain, or surficial geology maps to determine the type of surficial (genetic) material at the receiving site.
- A site centre will be required for *each* terrain type (i.e., fluvial, lacustrine, moraine, organic, etc.) present at the receiving site.

Step 2. Site Identification

Identify and record:

- the name and address of the property owner;
- the current and surrounding land uses;
- the soil/terrain type(s) present at the site; and
- the latitude and longitude.

Step 3. Locating Sampling Points

As a minimum, one sampling site is required for small-sized sites. Additionally, one sampling site is required for each terrain type to which soil will be relocated. Establish quadrants for each sampling site:

- Divide the site or terrain units into quadrants.
- Select a random sampling point in each quadrant.

Step 4. Soil Sampling

Once sampling points have been located within each quadrant, soil samples may be taken.

- Use a clean trowel or coring tools for collecting samples.
- Take standard depth samples as prescribed in the relevant method used.
- Clean sampling equipment between uses.

Guideline B

For large ($> 12,000 \text{ m}^2$) sites

Step 1. Site Classification

- Check available soil, terrain, or surficial geology maps to determine the type of surficial (genetic) material at the receiving site.
- A site centre will be required for *each* terrain type (i.e., fluvial, lacustrine, moraine, organic, etc.) present at the receiving site.
- If information on soils/terrain type is not available for the site, consider collecting this information by conducting a survey of the site.

Step 2. Site Identification

Identify and record:

- the name and address of the property owner;
- the current and surrounding land uses;
- the soil/terrain type(s) present at the site; and
- the latitude and longitude.

Step 3. Locating Sampling Points

As a minimum, two sampling sites are required for large sites, regardless of terrain type.

Additionally, one sampling site is required for each terrain type to which soil will be relocated.

For each sampling site:

a) Establish Quadrants

- Choose a sampling site of a minimum $80 \text{ m} \times 80 \text{ m}$ and approximate the centre.
- Bisect the site through the centre point into two halves. The orientation of the division line is arbitrary.
- Draw a line perpendicular to the division line through the centre to cut the site into four quadrants.

b) **Select a random sampling point in each of the 40 m x 40 m quadrants.**

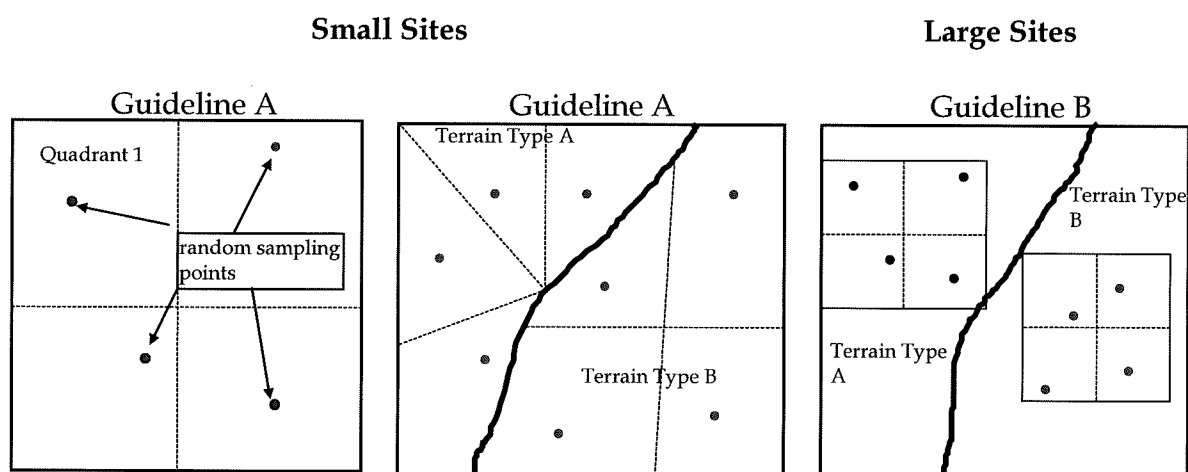
- Using a 1–40 random number table, randomly select the first number. Read the second number off the table in the approximate direction of the second hand on a watch. The first number is the number of metres perpendicular to the division line. The second number is the number of metres the sampling site is located to the right or left of the perpendicular, depending on the quadrant you are working in. In this manner, locate one random sampling location in each of the four 40 m x 40 m quadrants.
- Other randomization methods may also be used.

Step 4. Soil Sampling

Once sampling points have been located within each quadrant, soil samples may be taken.

- Use a clean trowel or coring tools for collecting samples.
- Take standard depth samples as prescribed in the relevant method used.
- Clean sampling equipment between uses.
- If groundwater is encountered before 3 m, sample the nearest depth category above the groundwater table

Figure 1. Method 1 for locating sampling points.



Method 1 sampling depths for Guideline A and B

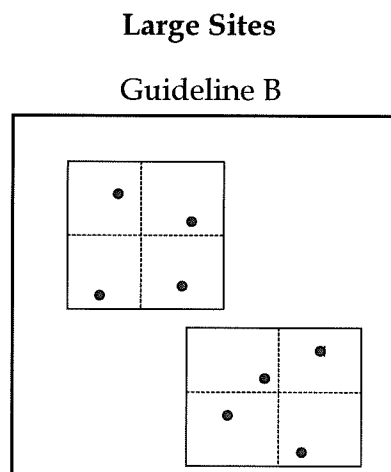
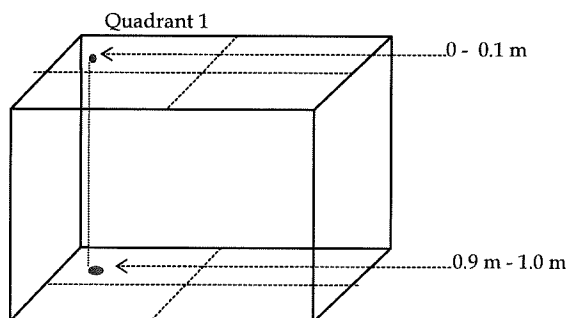
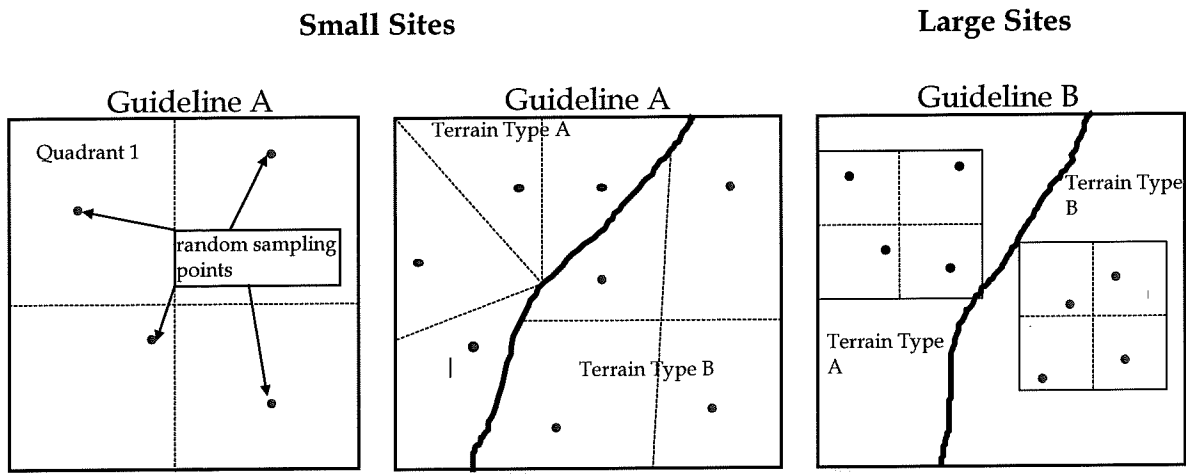
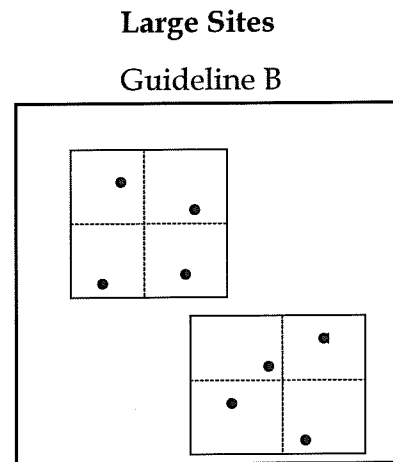
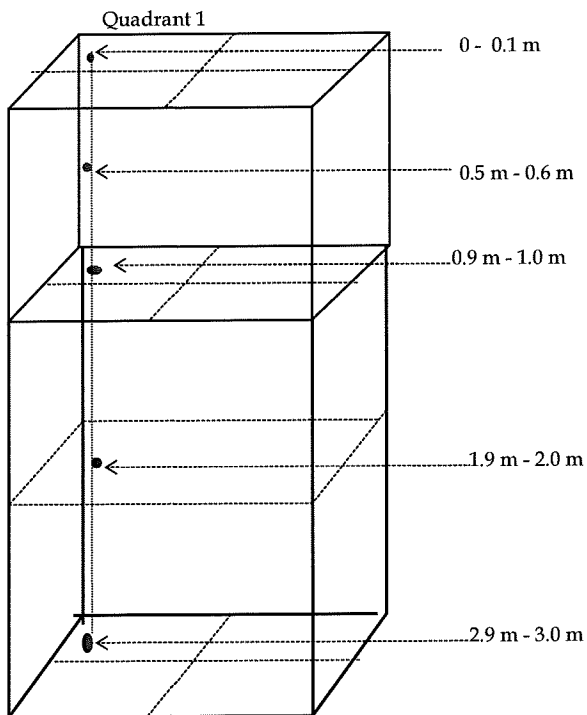


Figure 2. Method 2 for locating sampling points.



Method 2 sampling depths for Guideline A and B





Ministry of
Environment and
Climate Change Strategy

PROTOCOL 21 ***FOR CONTAMINATED SITES***

Water Use Determination

Version 2.0

Prepared pursuant to Section 64 of the
Environmental Management Act

Approved:

Cameron Lewis
Director of Waste Management

October 31, 2017

Date

Effective Date: November 1, 2017

1.0 Definitions

The following words, acronyms and expressions used in this document are defined in ministry [Procedure 8, "Definitions and Acronyms for Contaminated Sites"](#):

aquatic receiving environment
dense nonaqueous phase liquid
drinking water use
groundwater contamination source
muskeg
natural confining barrier

numerical water standards
organic soil
preferential flow pathway
qualified professional
receiving environment
Regulation

2.0 Introduction

This protocol provides criteria for determining groundwater uses at a site.

Section 12 (4) of the Contaminated Sites Regulation (the Regulation) specifies that groundwater may be used for drinking, aquatic life, irrigation and livestock watering. The Regulation contains requirements to ensure that groundwater at a site is suitable for current and future uses and is of adequate quality to protect adjacent water uses. Relevant provisions in the Regulation include sections 12 (2) and (5).

This document supersedes former Technical Guidance 6 "Water Use Determination" dated July 2010. Technical guidance supporting the application of this protocol is provided in revised [Technical Guidance 6, "Assessment of Hydraulic Properties for Water Use Determinations"](#) and [Technical Guidance 8, "Groundwater Investigation and Characterization"](#).

3.0 Drinking water use

Site-specific information is required to determine the applicability of current and future drinking water use at a site. In some circumstances, site-specific information may be augmented by adjacent site data (see [Technical Guidance 6](#) for further information).

The flowchart in Figure 1 is provided to assist with navigation of the drinking water use evaluation process.

3.1 Current drinking water use

Drinking water use applies where the groundwater or surface water at or near a site is currently used for drinking water. For site investigation purposes, nearby drinking

water wells or surface water intakes are those located within a radial distance of 500 metres from the site property boundary or, where the groundwater contamination source extends beyond the property boundary, a radial distance of 500 metres from the groundwater contamination source. If the groundwater flow direction has been reliably determined using approved methods (see [Technical Guidance 8](#)), nearby current uses may be limited to include drinking water wells or surface water intakes located 100 metres upgradient and 500 metres cross-gradient and downgradient of the site property boundary or outer extent of the groundwater contamination source where it extends beyond the property boundary.

The presence of current drinking water wells or surface water intakes can be determined using the following methods:

- (a) A search of the Ministry of Environment's [WELLS Database](#).
- (b) Performing a door to door survey.
- (c) A search of B.C.'s Water License Database.
- (d) Contacting local municipalities, water utility owners, Medical Health Officers and local Drinking Water Officers.

The use of all the search methods listed above may not be required in every circumstance, provided the locations of current drinking water wells and surface water intakes can be demonstrated to be accurate.

At some sites, there may be potential for adverse impacts on current drinking water uses located greater than 500 metres, or 100 metres upgradient of a site property boundary or groundwater contamination source. This could include sites where preferential flow pathways are present, where there are high volume groundwater extraction wells or where contaminant plumes are large and expanding. At such sites, additional evaluation of the groundwater flow pathway may be required to rule out current drinking water use.

If current drinking water wells are limited to a deeper aquifer that is protected from shallow groundwater contamination sources by a natural confining barrier, current drinking water use does not apply to geological units above the confining barrier. Section 7.0 of this protocol describes procedures for assessing the presence of natural confining barriers.

Where applicable and scientifically defensible, well capture zone analysis may be carried out by a qualified professional on drinking water wells located within 500 metres or 100 metres upgradient of the site property boundary or groundwater contamination source. Where it can be shown that site groundwater will not enter the capture zone of all nearby drinking water wells, current drinking water use does not apply.

If it is determined that groundwater and surface water at or nearby a site are not currently used for drinking water purposes, future drinking water use may apply and must also be evaluated.

3.2 Future drinking water use

Future drinking water use applies to all drinking water aquifers below a site whether or not current drinking water use applies. Drinking water aquifers are saturated geological units that have suitable hydraulic properties and natural water quality to support a single family domestic water supply. Where information is unavailable or inadequate to demonstrate an absence of drinking water aquifers below a site, drinking water aquifers are considered to exist.

Where drinking water aquifers below a site are protected from shallow groundwater contamination sources by a natural confining barrier and no shallow drinking water aquifers exist, future drinking water use does not apply to geological units above the confining barrier. Where drinking water aquifers are not protected by a natural confining barrier, future drinking water use will apply to all geological units below the site.

3.2.1 Aquifer hydraulic properties

Saturated geological units with yields greater than or equal to 1.3 L/min are capable of supporting a single family domestic water supply (B.C. provincial allocation for domestic surface water licenses) and are considered drinking water aquifers. Future drinking water use applies to these aquifers.

Unconsolidated geological units with aquifer yields greater than or equal to 1.3 L/min typically have bulk hydraulic conductivities greater than 1×10^{-6} m/s. Therefore, saturated unconsolidated geological units with hydraulic conductivities greater than or equal to 1×10^{-6} m/s are considered drinking water aquifers, unless aquifer yield has been measured and is found to be less than 1.3 L/min. Future drinking water use does not apply to saturated unconsolidated geological units with hydraulic conductivities less than 1×10^{-6} m/s. Guidance for assessing aquifer yield for purposes of determining water use can be found in [Technical Guidance 6](#).

Bedrock units show a poorer correlation between yield and hydraulic conductivity. Therefore, hydraulic conductivity alone cannot be used to rule out drinking water use in bedrock. Section 6.0 of this protocol describes procedures for assessing bedrock aquifers.

Site-specific measurements of hydraulic conductivity and calculation of bulk hydraulic

conductivity as described below are required to evaluate whether a geological unit below a site qualifies as a drinking water use aquifer. Bulk hydraulic conductivity is calculated as follows:

- the geometric mean of hydraulic conductivity measurements obtained from six or more wells, spatially distributed across a site and located within the same geological unit; or
- the maximum hydraulic conductivity where measurements are obtained from five or fewer wells.

Confined aquifers that:

- have an average saturated thickness of 1 metre or less; and
- are situated within a predominantly confined unit;

are not considered sustainable sources of domestic water supply. Future drinking water use does not apply to these aquifers.

Unconfined aquifers that:

- are present only seasonally or have an average saturated thickness of 2 metres or less; or
- are comprised only of imported fill;

are not considered sustainable sources of domestic water supply. Future drinking water use does not apply to these aquifers.

3.2.2 Aquifer natural water quality

Saturated geological units containing naturally occurring total dissolved solids concentrations of 4,000 mg/L or greater or groundwater flow systems contained within organic soils or muskeg (see [Procedure 8, "Definitions and Acronyms for Contaminated Sites"](#)) are considered to have unsuitable water quality for domestic water supply. Therefore, future drinking water use does not apply to these units.

Saturated geological units that:

- are located within and below filled former marine and estuarine foreshore; or
- are located within 500 metres of a marine and estuarine foreshore; and
- contain naturally occurring chloride and sodium concentrations greater than the drinking water standards measured in wells spatially distributed across the site and located within the same geological unit;

are considered to have unsuitable water quality for domestic water supply. Future drinking water use does not apply to these geological units.

4.0 Irrigation and livestock water use

Irrigation or livestock water use applies where the groundwater or surface water at or nearby a site is currently used for irrigation or livestock watering. Nearby irrigation or livestock watering wells or surface water intakes are those located within a radial distance of 500 metres from the site property boundary or, where the groundwater contamination source extends beyond the property boundary, a radial distance of 500 metres from the groundwater contamination source. If the groundwater flow direction has been reliably determined using approved methods (see [Technical Guidance 8](#)), nearby current uses may be limited to include irrigation and livestock watering wells or surface water intakes located within 100 metres upgradient and 500 metres cross gradient or downgradient of the site property boundary or outer extent of the groundwater contamination source where it extends beyond the property boundary.

If current irrigation or livestock watering wells are limited to a deeper aquifer that is protected from shallow groundwater contamination sources by a natural confining barrier, current irrigation or livestock water uses do not apply to geological units above the confining barrier.

Well capture zone analysis may be carried out on current irrigation or livestock watering wells within 500 metres distance or 100 metres upgradient of the site property boundary or groundwater contamination source. Where it can be shown that site groundwater will not enter the capture zone of any nearby irrigation or livestock watering wells, current irrigation or livestock water uses do not apply.

The flowchart in Figure 2 is provided to assist with navigation of the irrigation and livestock water use evaluation.

5.0 Aquatic life water use

Aquatic life water use applies to all groundwater located within 500 metres of an aquatic receiving environment unless it can be demonstrated that the groundwater does not flow to that receiving environment (e.g., groundwater in confined aquifers below shallow ponds or creeks).

Aquatic life water use applies to groundwater located beyond 500 metres of an aquatic receiving environment if the groundwater contains substances with concentrations above the aquatic life water use standards and has the potential to migrate within 500 metres of the aquatic receiving environment. Examples include groundwater plumes that cross or continue to migrate towards the 500 metre setback boundary or plumes

that are conveyed along preferential flow pathways such as buried creek channels or underground utility corridors.

The flowchart in Figure 3 is provided to assist with navigation of the aquatic life water use evaluation.

6.0 Bedrock aquifers

The assessment of bedrock aquifers for current drinking water, irrigation or livestock water use should be evaluated as described under Section 3.1 and 4.0. If current drinking water, irrigation or livestock watering wells are located in a bedrock aquifer below or nearby a site, the corresponding water use applies to the bedrock aquifer and to overlying geological units. If current drinking water, irrigation or livestock watering wells are limited to a bedrock aquifer that is protected from shallow groundwater contamination sources by a natural confining barrier as defined under Section 7.0 below, current drinking, irrigation or livestock water uses do not apply to geological units above the confining barrier.

Future drinking water use applies to bedrock aquifers mapped in the [BC Water Resource Atlas](#). Where bedrock investigations indicate that part of the bedrock unit at a site would operate as a natural confining barrier protecting a deeper more permeable bedrock unit, site owners may seek a site-specific decision of water use from the Director under Section 9.0 of this protocol.

Bedrock aquifers must be assessed for future drinking water use when:

- no bedrock aquifers are mapped in the BC Water Resource Atlas and;
- soil or groundwater containing substances at concentrations above standards protective of drinking water extend to the bedrock surface.

Where bedrock assessment is required, hydraulic properties and yield must be assessed on the basis of *in situ* field investigations conducted at the site or within a 500 metre radial distance of the site property boundary where the bedrock can be shown to be of the same geological formation.

The flowchart in Figure 4 is provided to assist with navigation of the current and future drinking water use evaluation in bedrock.

The assessment of bedrock aquifers for aquatic life water use should be evaluated as described under Section 5, "Aquatic life water use", above.

7.0 Natural confining barriers

Natural confining barriers are unconsolidated geological units that protect underlying aquifers from shallow groundwater contamination. For a geological unit or part of a geological unit to qualify as a natural confining barrier, it must satisfy the criteria for either Type A or Type B listed below.

Type A

A Type A natural confining barrier is a geological unit or part of geological unit that:

- has a bulk hydraulic conductivity less than 1×10^{-7} m/s;
- has a minimum thickness of 5 metres;
- is reasonably uniform in composition and is unfractured;
- is continuous across the extent and predicted migration pathway of contaminant plumes; and
- is demonstrated free of contamination based on substance concentrations in soil or water that are:
 - less than or equal to the commercial land use soil standards listed in Schedule 3.1 Part 2 and 3 of the Regulation;
 - less than or equal to the commercial land use soil standards for the site-specific factor of groundwater used for drinking water, irrigation water or livestock water listed in Schedule 3.1 Part 1 of the Regulation, depending on the applicable water use of the deeper aquifer; or
 - less than or equal to the drinking, irrigation or livestock water standards in Schedule 3.2 of the Regulation, depending on the applicable water use of the deeper aquifer, where no soil standards protective of the applicable water use are listed in Schedule 3.1 Part 1.

Type B

A Type B natural confining barrier is a geological unit or part of geological unit that:

- has a bulk hydraulic conductivity between 1×10^{-7} m/s and 1×10^{-6} m/s;
- has a ratio of thickness to hydraulic conductivity greater than 5×10^7 s;
- is reasonably uniform in composition and is unfractured;
- is continuous across the extent and predicted migration pathway of contaminant plumes; and
- is demonstrated free of contamination based on substance concentrations in soil and water that are less than or equal to the applicable regulatory standards.

Where dense nonaqueous phase liquids are present, contamination of natural confining barriers for both Type A and Type B must be determined on the basis of substance concentrations in both soil and groundwater.

Site-specific measurements of hydraulic conductivity are required to evaluate whether a geological unit below a site qualifies as a natural confining barrier. Bulk hydraulic conductivity is calculated as follows:

- the 90th percentile of hydraulic conductivity measurements obtained from six or more wells, spatially distributed across a site and located within the same geological unit; or
- the maximum hydraulic conductivity obtained from five or fewer wells.

8.0 Applicable water use standards

Numerical water standards for investigating the presence of contamination in surface water (non-aquatic life receiving environment) and groundwater at sites in BC are provided in Schedule 3.2 of the Regulation. The numerical standards are provided for each of the water uses described in this protocol. Where multiple water uses apply at a site, the presence of contamination must be determined using the most stringent of all of the applicable numerical water standards. Different water uses might apply to different sections of a site.

9.0 Requesting a Director's decision of water use

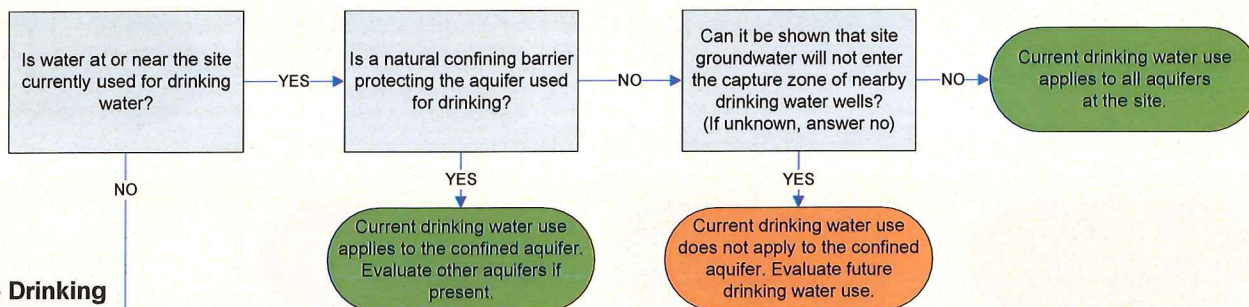
Where water uses determined to apply at a site under this protocol are considered unlikely or unreasonable, site owners and operators may request a Director to make a site-specific decision of water use. Such requests must be accompanied by a completed [Contaminated Sites Services Application form](#) and a supporting technical report prepared by a qualified professional. For applications requesting a decision of no drinking water use, Appendix 1 provides the Director's decision framework for making such decisions.

For more information, please direct inquiries to site@gov.bc.ca.

Revision history

Approved Date	Effective Date	Document Version	Notes
December 15, 2015	February 1, 2016	1.0	
August, 2017	November 1, 2017	2.0	Updated to reflect CSR Stage 10 amendments

Current Drinking Water Use



Future Drinking Water Use

Evaluate all aquifers; commence with deepest

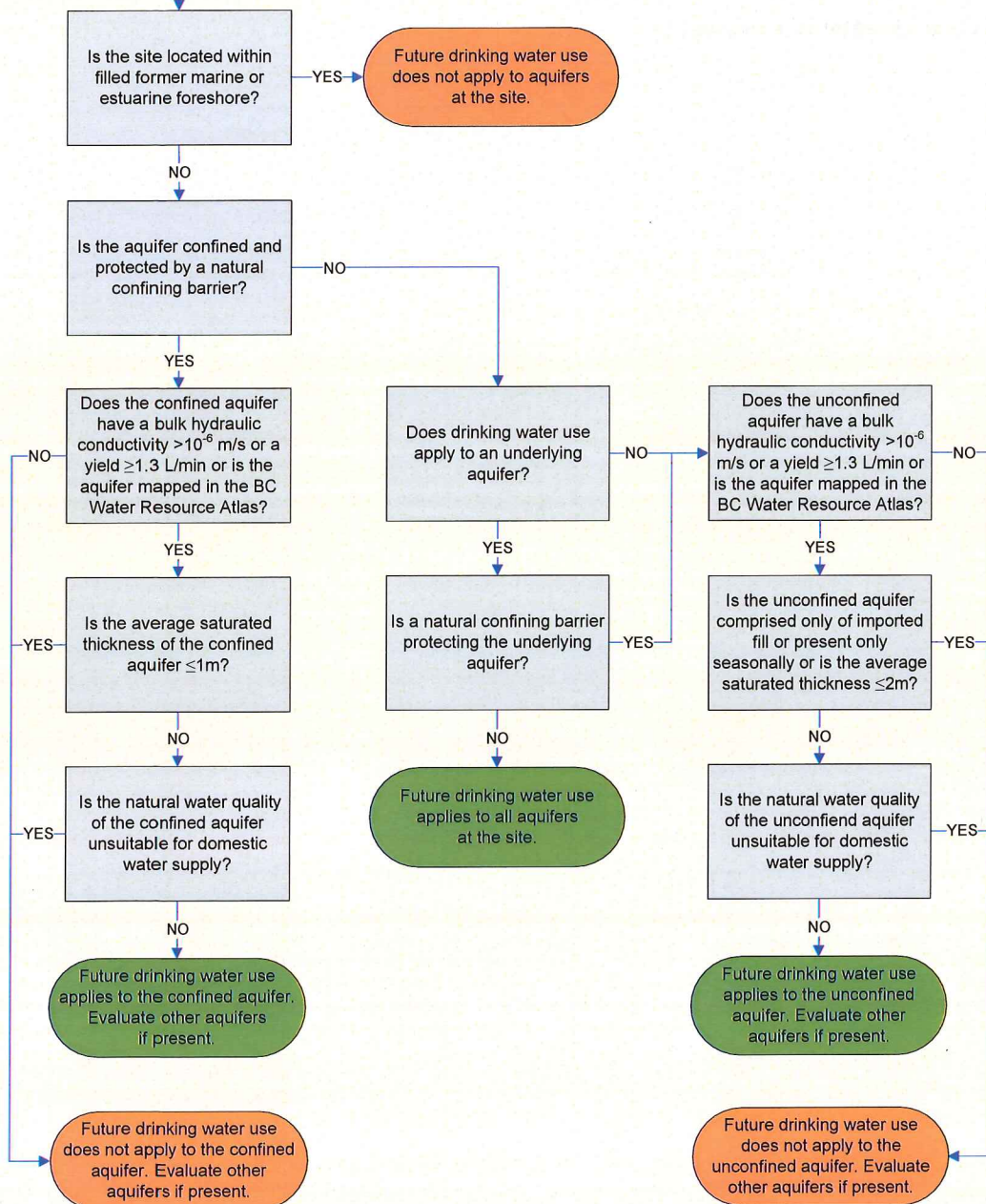


Figure 1. Current and future drinking water use evaluation for unconsolidated aquifers.

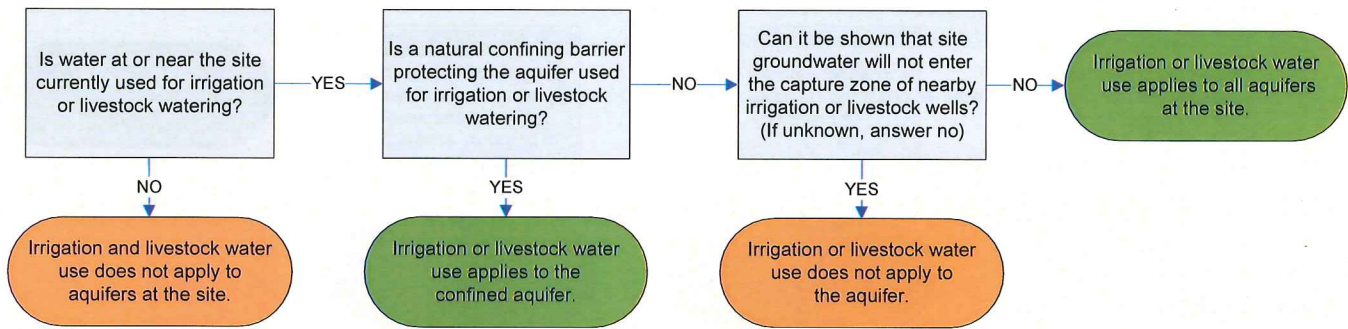


Figure 2. Irrigation and livestock water use evaluation.

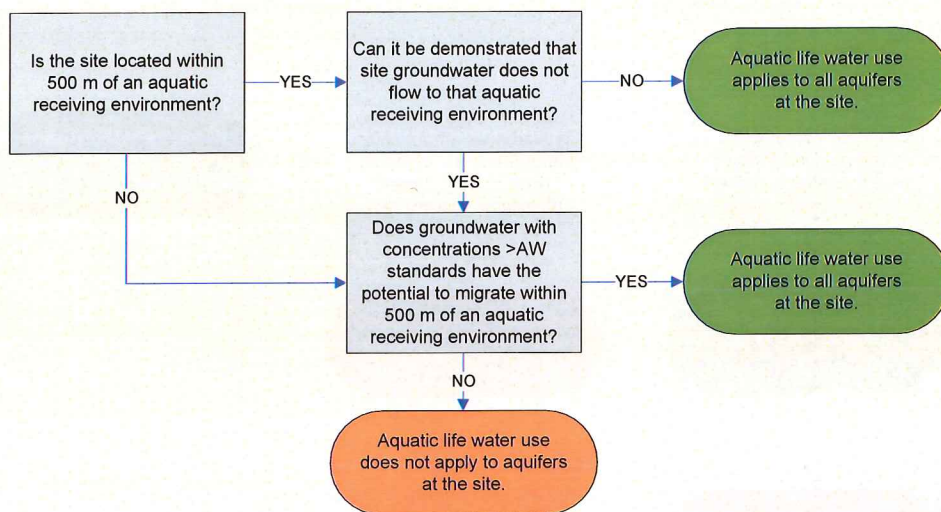
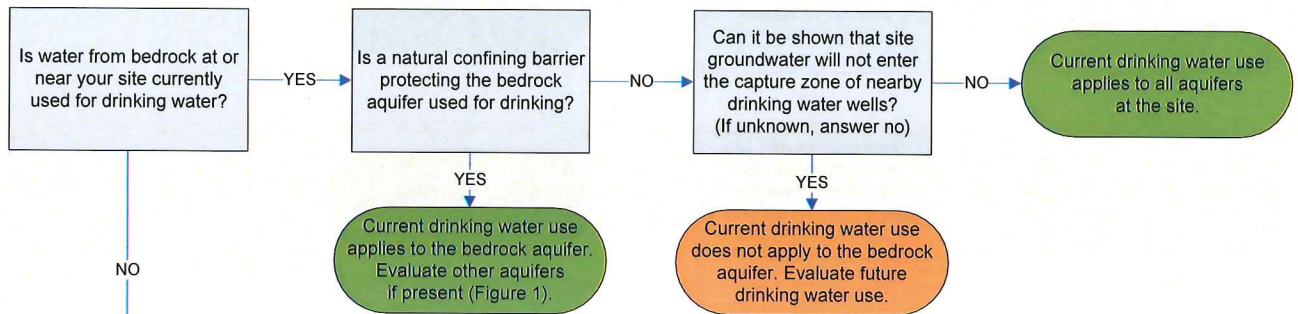


Figure 3. Aquatic water use evaluation.

Current Drinking Water Use



Future Drinking Water Use

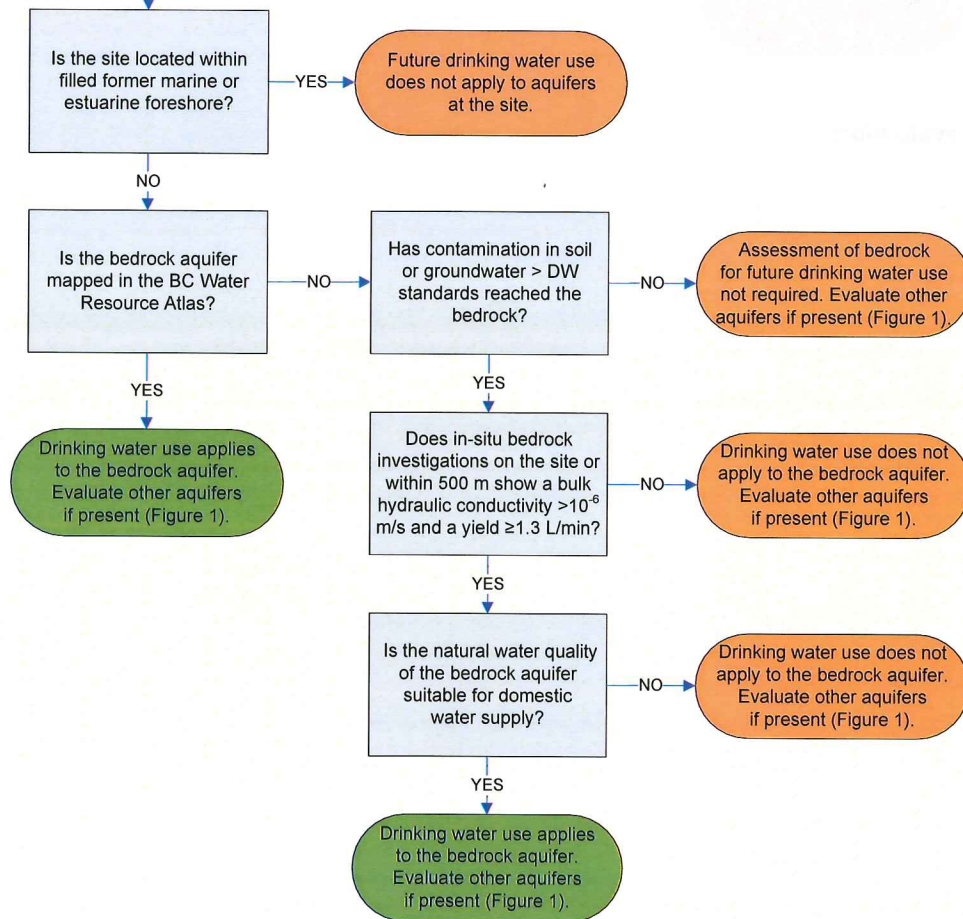


Figure 4. Current and future drinking water use evaluation for bedrock aquifers.

Appendix 1

Director's Decision Framework for Site-Specific Decisions of Water Use

Where drinking water use has been determined to apply at a site under Protocol 21 and site circumstances indicate that it is unlikely or unreasonable to anticipate that water from the site or nearby the site would be used for drinking, site owners and operators may apply to the Director for a site-specific decision of no drinking water use. Applications for a decision of no drinking water use must be accompanied by a completed [Contaminated Sites Services Application form](#) and a supporting technical report prepared by a qualified professional.

This decision framework describes a multiple-lines-of-evidence approach for demonstrating that water use for drinking water purposes would be unlikely or unreasonable to anticipate at a site.

Site-specific conditions considered valid lines of evidence for supporting a decision of no drinking water use are listed below. The conditions listed are not exhaustive and may be augmented by other relevant information on a site-by-site basis. However, multiple site-specific conditions should be demonstrated to apply. Satisfying a single listed condition or two or more conditions that fall under a single category (e.g., groundwater demand) is unlikely to provide sufficient justification for a decision of no drinking water use. In addition, some of the listed conditions are relevant to shallow aquifers only and may, in combination with other demonstrated conditions, be sufficient to support a determination of no drinking water use in a shallow aquifer but not be sufficient for a decision of no drinking water use in a deeper aquifer. Where deep drinking water aquifers are present below a site, applications for a Director's decision of no drinking water use in a shallow aquifer must be accompanied by evidence of a natural confining barrier above the drinking water aquifer.

Water quality

- The site is located in an area of long industrial use with multiple landowners, multiple sources, and widespread contamination which has not been attributed to particular responsible person(s).
- The site is located adjacent to the marine receiving environment and groundwater pumping for drinking water use would result in seawater intrusion. Under this condition groundwater flow and contaminant migration must be toward the marine environment and not to neighbouring parcels.

Aquifer productivity

- The sustainable yield in the shallow aquifer cannot support a single family dwelling at 1.3 L/min for more than a limited number of years.

Groundwater demand

- A municipal water supply is in place that does not rely on groundwater.
- The aquifer underlying the site is not classified as a high demand aquifer according to the Ministry of Environment's Aquifer Classification System
- The site is not located in an area of known limited water resources.
- Groundwater at the site is not restricted for drinking water use under a Local Government Water Management Plan.
- The future use of the site and surrounding area is industrial.

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B.C. Reg. 375/96
O.C. 1480/96

Deposited December 16, 1996
effective April 1, 1997

This consolidation is current to June 23, 2020.
See the [Cumulative B.C. Regulations Bulletin 2020](#)
for amendments effective after June 23, 2020.

[Link to consolidated regulation \(PDF\)](#)

[Link to Point in Time](#)

Environmental Management Act

CONTAMINATED SITES REGULATION

[includes amendments up to B.C. Reg. 13/2019, January 24, 2019]

Schedule 2

[am. B.C. Regs. 17/2002, s. 16; 239/2007, s. 5; 343/2008, s. 12; 62/2013, s. 1;
253/2016, s. 16.]

Industrial and Commercial Purposes and Activities

COLUMN 1 Item	COLUMN 2 Purpose or Activity
A	Chemical industries and activities <ol style="list-style-type: none">1. adhesives manufacturing or wholesale bulk storage2. chemical manufacturing or wholesale bulk storage3. explosives or ammunition manufacturing or wholesale bulk storage4. fire retardant manufacturing or wholesale bulk storage5. fertilizer manufacturing or wholesale bulk storage6. ink or dye manufacturing or wholesale bulk storage7. leather or hides tanning8. paint, lacquer or varnish manufacturing, formulation, recycling or wholesale bulk storage9. pharmaceutical products, or controlled substances as defined in the <i>Controlled Drugs and Substances Act</i> (Canada), manufacturing or operations10. plastic products (foam or expanded plastic products) manufacturing11. textile dying12. pesticide manufacturing, formulation or wholesale bulk storage

	13. resin or plastic monomer manufacturing, formulation or wholesale bulk storage
B	Electrical equipment and activities <ol style="list-style-type: none"> 1. battery (lead acid or other) manufacturing or wholesale bulk storage 2. communications stations using or storing equipment that contains PCBs 3. electrical equipment manufacturing, refurbishing or wholesale bulk storage 4. electrical transmission or distribution substations 5. electronic equipment manufacturing 6. transformer oil manufacture, processing or wholesale bulk storage 7. electrical power generating operations fuelled by coal or petroleum hydrocarbons and supplying electricity to a community or commercial or industrial operation
C	Metal smelting, processing or finishing industries and activities <ol style="list-style-type: none"> 1. foundries or scrap metal smelting 2. galvanizing 3. metal plating or finishing 4. metal salvage operations 5. nonferrous metal smelting or refining 6. welding or machine shops (repair or fabrication)
D	Mining, milling or related industries and activities <ol style="list-style-type: none"> 1. asbestos mining, milling, wholesale bulk storage or shipping 2. coal coke manufacture, wholesale bulk storage or shipping 3. coal or lignite mining, milling, wholesale bulk storage or shipping 4. milling reagent manufacture, wholesale bulk storage or shipping 5. nonferrous metal concentrate wholesale bulk storage or shipping 6. nonferrous metal mining or milling
E	Miscellaneous industries, operations or activities <ol style="list-style-type: none"> 1. appliance, equipment or engine repair, reconditioning, cleaning or salvage 2. ash deposit from boilers, incinerators, or other thermal facilities 3. asphalt tar manufacture, wholesale storage and distribution 4. coal gasification (manufactured gas production) 5. medical, chemical, radiological or biological laboratories 6. rifle or pistol firing ranges 7. road salt storage facilities 8. measuring instruments (containing mercury) manufacture, repair or wholesale bulk storage 9. dry cleaning facilities or operations and dry cleaning chemical storage 10. sites which have been or likely have been contaminated by substances migrating from other properties

	<ol style="list-style-type: none"> controlled substances, as defined in the <i>Controlled Drugs and Substances Act</i> (Canada), manufacturing or operations
F	<p>Petroleum and natural gas drilling, production, processing, retailing, distribution and storage other than the storage of residential heating fuel in tanks</p> <ol style="list-style-type: none"> petroleum or natural gas drilling petroleum or natural gas production facilities natural gas processing petroleum coke manufacture, wholesale bulk storage or shipping petroleum product, other than compressed gas, dispensing facilities, including service stations and card locks petroleum, natural gas or sulphur pipeline rights of way excluding rights of way for pipelines used to distribute natural gas to consumers in a community petroleum product, other than compressed gas, or produced water storage in above ground or underground tanks petroleum product, other than compressed gas, wholesale bulk storage or distribution petroleum refining wholesale bulk storage or shipping solvent manufacturing or wholesale bulk storage sulphur handling, processing or wholesale bulk storage and distribution
G	<p>Transportation industries, operations and related activities</p> <ol style="list-style-type: none"> aircraft maintenance, cleaning or salvage automotive, truck, bus, subway or other motor vehicle repair, salvage or wrecking bulk commodity storage or shipping (e.g. coal) dry docks, ship building or boat repair and maintenance, including paint removal from hulls marine equipment salvage rail car or locomotive maintenance, cleaning, salvage or related uses, including railyards truck, rail or marine bulk freight handling
H	<p>Waste disposal and recycling operations and activities</p> <ol style="list-style-type: none"> antifreeze bulk storage or recycling barrel, drum or tank reconditioning or salvage battery (lead acid or other) recycling biomedical waste disposal bulk manure stockpiling and high rate land application or disposal (nonfarm applications only) construction demolition material, including without limitation asphalt and concrete, landfilling contaminated soil storage, treatment or disposal dredged waste disposal drycleaning waste disposal

	<ol style="list-style-type: none"> 10. electrical equipment recycling 11. industrial waste lagoons or impoundments 12. industrial waste storage, recycling or landfilling 13. industrial woodwaste (log yard waste, hogfuel) disposal 14. mine tailings waste disposal 15. municipal waste storage, recycling, composting or landfilling 16. organic or petroleum material landspreading (landfarming) 17. sandblasting waste disposal 18. septic tank pumpage storage or disposal 19. sewage lagoons or impoundments 20. hazardous waste storage, treatment or disposal 21. sludge drying or composting 22. street or yard snow removal dumping 23. waste oil reprocessing, recycling or bulk storage 24. wire reclaiming operations
I	<p>Wood, pulp and paper products and related industries and activities</p> <ol style="list-style-type: none"> 1. particle board manufacturing 2. pulp mill operations 3. pulp and paper manufacturing 4. treated wood storage at the site of treatment 5. veneer or plywood manufacturing 6. wafer board manufacturing 7. wood treatment (antisapstain or preservation) 8. wood treatment chemical manufacturing, wholesale bulk storage 9. sawmills

**Contents | Parts 1 to 20 | Schedule 1 | Schedule 1.1 | Schedule 2 | Schedule 2.1
 | Schedule 3 | Schedule 3.1 | Schedule 3.2 | Schedule 3.3 | Schedule 3.4 |
 Schedules 4 to 7 | Schedule 8 | Schedules 9 to 11**