

ALR

Non-ALR

# Provincial Agricultural Land Commission - Applicant Submission

**Application ID:** 61097

**Application Status:** Under LG Review

**Applicant:** Rosa Perretta

**Agent:** Kent-Macpherson

**Local Government:** City of Kelowna

**Local Government Date of Receipt:** 08/07/2020

**ALC Date of Receipt:** This application has not been submitted to ALC yet.

**Proposal Type:** Exclusion

**Proposal:** To exclude the existing 17.6 ha of land from the ALR.

## Agent Information

**Agent:** Kent-Macpherson

**Mailing Address:**

304-1708 Dolphin Ave

Kelowna, BC

V1Y 9S4

Canada

**Primary Phone:** (250) 763-2236

**Email:** jhettinga@kent-macpherson.com

## Parcel Information

### Parcel(s) Under Application

1. **Ownership Type:** Fee Simple

**Parcel Identifier:** 010-963-669

**Legal Description:** Parcel A of the Southeast 1/4 of Section 33 Township 23 ODYD

**Parcel Area:** 26.6 ha

**Civic Address:** 3755 Glenmore Road, Kelowna, BC

**Date of Purchase:** 01/01/2005

**Farm Classification:** No

**Owners**

1. **Name:** Rosa Perretta

**Address:**

2438 Mount Baldy Drive

Kelowna, BC

V1V 2J2

Canada

**Phone:** (250) 868-3323

**Email:** rg\_ogopogo@hotmail.com

This forms part of application

# A20-0010

place on the parcel(s).

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Initials

TC

City of  
**Kelowna**  
DEVELOPMENT PLANNING

## Current Use of Parcels Under Application

**1. Quantify and describe in detail all agriculture that currently takes place on the parcel(s).**  
*Not currently farmed.*

**2. Quantify and describe in detail all agricultural improvements made to the parcel(s).**  
*Property is fully fenced.*

**3. Quantify and describe all non-agricultural uses that currently take place on the parcel(s).**  
*Currently the property is vacant.*

## Adjacent Land Uses

### North

**Land Use Type:** Industrial  
**Specify Activity:** Gravel Extraction

### East

**Land Use Type:** Agricultural/Farm  
**Specify Activity:** Range Land

### South

**Land Use Type:** Residential  
**Specify Activity:** House on Acreage

### West

**Land Use Type:** Residential  
**Specify Activity:** Houses on Acreages

## Proposal

**1. How many hectares are you proposing to exclude?**  
*17.6 ha*

**2. Does any land under application share a common property line with land in another Local or First Nation Government?**

**3. What is the purpose of the proposal?**  
*To exclude the existing 17.6 ha of land from the ALR.*

**4. Explain why you believe that the parcel(s) should be excluded from the ALR.**  
*The subject property is 34% out of the ALR, 34% physically under water, and the remaining 32% of land fragmented with poor farming viability (due to topography limitation) with limited to no access.*

*The historical portion of land that was farmed in the 90's is the portion that is now permanently under water and cannot be used due to it being considered protected wetlands.*

*Of the current ALR designated land, ~46% is underwater and ~40% is limited by topography.*

**Applicant Attachments**

- Agent Agreement - Kent-Macpherson
- Proof of Signage - 61097
- Professional Report - Ag Capability Assessment
- Proof of Serving Notice - 61097
- Site Photo - Site Photos
- Proposal Sketch - 61097
- Proof of Advertising - 61097
- Certificate of Title - 010-963-669

**ALC Attachments**

None.

**Decisions**

None.



**ATTACHMENT** C

This forms part of application  
# A20-0010

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City of **Kelowna**  
DEVELOPMENT PLANNING

September 10, 2020

File No: A20-0010

City of Kelowna  
1435 Water Street  
Kelowna, BC V1Y 1J4  
Via E-mail: [planninginfo@kelowna.ca](mailto:planninginfo@kelowna.ca)

Dear City of Kelowna,

Re: 3755 Glenmore Road - A20-0010

Thank you for providing B.C. Ministry of Agriculture staff the opportunity to comment on the proposed Agricultural Land Reserve (ALR) exclusion application for the above noted property. We note that the subject property presents some significant physical challenges to farming with regard to excess water and topography in particular. There may also be economic challenges associated with making the improvements required to increase the agricultural capability of the parcel; however, it should be noted that economic circumstances may change over time and do not necessarily constitute a reason for exclusion of land from the ALR in the present.

The agrologist report does note that up to 35% of the property has an improved capability rating of up to Class 3 to Class 1, which could provide opportunity for a range of potential agriculture uses, including tree fruits. In addition, although topography is typically considered an unimprovable limitation in the Canada Land Inventory rating system, in this region some farmers are recontouring sites for high-value orchard production, particularly cherries. The agrologist report did suggest that improvements made to portions of the property currently rated as Class 6T may be improvable to Class \*3T which could be suitable for tree fruit, but that many of the improvable areas were fragmented. It is unclear from the information provided if recontouring of the 6T rated areas is feasible and whether or not this may address the issue of the fragmented improvable areas. The report suggests that a limited portion of the site may be available for non-soil based agriculture. .

The area proposed for exclusion is quite a large portion of the available ALR in the immediate area. A significant concern is that exclusion of this parcel may create speculation pressure on the remaining ALR parcels.

If you have any questions, please contact us directly by email or phone.

Sincerely,

- 2 -



Alison Fox, P.Ag.  
Land Use Agrologist  
BC Ministry of Agriculture  
Alison.Fox@gov.bc.ca  
(778) 666-0566



Christina Forbes, P.Ag.  
Regional Agrologist  
B.C. Ministry of Agriculture – Kelowna  
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Email copy: Sara Huber, Regional Planner, ALC [Sara.Huber@gov.bc.ca](mailto:Sara.Huber@gov.bc.ca)

**Agricultural Capability Assessment  
3755 Glenmore Rd.  
Kelowna BC**

**For: Rosa Perretta  
2438 Mt. Baldy Dr.  
Kelowna, B.C.  
V1V 2J2**

**File: 15E006**

**June 2015**

**ATTACHMENT**      **D**

This forms part of application

# A20-0010

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## Executive Summary

Valhalla Environmental Consulting Inc. (VEC) was retained by Rosa Perretta, owner of 3755 Glenmore Rd. Kelowna BC (subject Property) to perform an Agricultural Capability Assessment on a portion of the Property (17.6 ha) that is contained within the ALR. The Property is located in the City of Kelowna, BC. The Client requested this inspection to confirm the agricultural capability of the Subject Parcel with respect to potential exclusion from the Agricultural Land Reserve (ALR).

The 26.7 hectare (ha) Property is partially contained within the ALR. Approximately 17.6 ha of the property is within the ALR and the remainder, 9.1 ha is outside of the ALR. The owner wishes to exclude the 17.6 ha that remains in the ALR.

The findings of this assessment indicate that agricultural capability of the Subject Parcel is limited by a) topography, b) excess water, c) soil moisture deficiencies d) fertility; and d) stoniness.

- a) This assessment rated the **topography limitation** at Class 6T for 41% of the ALR portion of the Property. This area has steep and complex slopes. Of this area approximately half has slopes <30% which is considered Class \*3T. *The \* indicates improved capability with limitation classifications for tree fruits and grapes.* Topographic limitations are not considered improvable.
- b) This assessment rated the **excess water limitation** at Class 6W and Class 7W. A permanent groundwater supplied pond on the property lies in a topographic depression with significant near surface and surrounding bedrock. This area covers approximately 3.7 ha (22%) of the ALR portion of the Property. This area is not considered improvable under normal farm practice.
- c) This assessment rated the **soil moisture deficiencies** at Class 4A and 5A (unimproved) for 6.6 ha (38%) of the ALR lands on the Property. Of the 6.6 ha, improvements up to Classes 1 to 3 are feasible for 6.3 ha (35%) of the ALR portion of the property with irrigation. Variations in the improved soil moisture deficiency ratings across the Property were related to site-specific soil conditions (eg. soil texture) and anticipated responses to supplemental moisture. It should be noted that while improvements for soil moisture are feasible, the availability of water for irrigation may be an issue and may prove cost prohibitive for an agricultural operation, details below.
- d) This assessment found limitations for **soil fertility** due to alkalinity at Class 4F and 5F on 4.4 ha (25%) of the ALR portion of the property. While improvements are possible they may not be feasible without negatively impacting the protected pond on the property. Improvements would require acidifying soil amendments to raise the fertility Class to 2F and 3F respectively for these areas.



- e) This assessment rated the **stoniness limitation** at Class 4P (\*3P for tree fruits and grapes) for 0.35 ha (2%) of the ALR portion of the Property. Stoniness in this case is due in part to gravel <2.5cm to 5cm in size. Stoniness limitations are not considered improvable for small gravel 2.5cm or less in diameter.

Potential improvements on the Property included supplemental moisture (irrigation) during the dry months, and soil amendments for fertility. The results of this assessment suggest that these improvements would be feasible for 6.3 ha (35%) of the ALR portion of the property and the agricultural capability ratings are expected to improve from:

- Class 5 to Class 3 for 19% of the parcel,
- Class 4 to Class 2 for 6% of the parcel,
- Class 4 to Class 1 for 10% of the parcel, and

The remaining +/- 65% of the ALR land on the Property is not considered improvable.

The Property is located in a rural area of the City of Kelowna, BC. The Property has had pasture use for a small cattle herd (+/- 12 head annually).

With diverse topography, hydrology and soils characteristics this Property is highly variable demonstrating unimproved ratings from Class 4 to 7. Approximately 35% of the ALR lands on this property can be improved to Class 1 to 3. The remaining 65% of the ALR lands are not considered improvable and will remain class 5-7. Where there is potential for improvement (+/- 35% of the ALR lands) the ALR portion of the property exhibits areas of moderate to good agricultural capability. However in the areas that may not be improved (+/- 65% of the ALR lands) the property exhibits poor to very poor agricultural capability.

As a result of the topographical and hydrologic limitations, the areas suitable to agriculture are fragmented. As well, soil characteristics vary greatly over a relatively small area. Management and implementation of soils based agriculture at this location is expected to be complex. Availability of water for irrigation may be an issue. The ponds on the property are fed by near surface groundwater but are habitat features and are likely not a viable irrigation source. The City of Kelowna has zoning authority over this property but does not have foreseeable plans to service this area with water without a significant investment from the owner. The Glenmore-Ellison Improvement District is nearby but, reportedly has no plans to service this area (RP – pers.comm.). Drilling a well is possible in the area but nearby well data indicates significant bedrock and unpredictable flow for developed wells. The nearest well south of the property was initially drilled to 120 feet and deepened to 300 feet for a reported flow of 0.5 gallons per minute. All of the options for irrigation may prove cost prohibitive for an agricultural operation.

Habitat protection has made 4.672 ha (27%) of the ALR lands on the Property unavailable to Agriculture. This area is covered by an alkali pond and a designated 15 meter buffer area. The protected area coincides with areas of low capability (Class 6-7) and areas of with complex management needs due to fertility. Amendments for soil fertility in this area would require soil acidification which may have a deleterious effect on the protected alkali pond habitat.

As the property has exhibited limited historic pasture use, exclusion of this parcel from the ALR would represent a minor decrease in local agricultural capacity.

**TABLE 6: 3755 Glenmore Rd, BC- Site Inspection: Agricultural Capability Ratings**

Soil Unit	Ag Capability Unit	TP	Unimproved Ag Capability <sup>2</sup>	Improved Overall Ag Capability <sup>2</sup>	Area (ha)	% Total Area <sup>3</sup>
I	1	1	4A	1	0.786	4%
II	2	2&4	5A5F	3F	3.363	19%
III	3	3	5A4P	5A*3P	0.356	2%
IV	1	5	4A	1	1.116	6%
V	4	6	4A4F	2F	1.015	6%
VI	5	-	6T	5:6T 5*3T	7.188	41%
VII	6	-	6W	6W	1.328	8%
VIII	7	-	7W	7W	2.399	14%
Total					17.551	100%

<sup>1</sup> Ratings based on lab results & field investigation. See Table 7 for class descriptions

<sup>2</sup> See appendix C for Capability descriptions

<sup>3</sup> Estimates based on lab results, field investigations and aerial photography

\* Modified Land Capacity Classification for Tree Fruits and Grapes

Not available to Agriculture

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**APPENDICES**

**APPENDIX A: Maps & Figures**

**APPENDIX B: Site & Soil Pit Photos**

**APPENDIX C: Agricultural Capability Reference Documents (Excerpts)**

**APPENDIX D: Analytical Data**

**APPENDIX E: Resume**

## **1 Introduction**

### **1.1 Report Description**

Valhalla Environmental Consulting Inc. (VEC) was retained by Rosa Perretta, owner of 3755 Glenmore Rd. Kelowna BC (subject Property) to perform an Agricultural Capability Assessment on a portion of the Property (17.6 ha) that is contained within the ALR. The Property is located in the City of Kelowna, BC. The Client requested this inspection to confirm the agricultural capability of the Subject Parcel with respect to potential exclusion from the Agricultural Land Reserve (ALR).

### **1.2 Proposed Land Use & Agricultural Development Plan**

The 26.7 hectare (ha) Property is partially contained within the ALR. Approximately 17.6 ha of the property is within the ALR and the remainder, 9.1 ha is outside of the ALR. The owner wishes to exclude the 17.6 ha that remains in the ALR, see Figures 1 and 2 for the location. See Figure 3 for the size and shape of the assessment area.

### **1.3 Statement of Qualifications**

Matthew Davidson, P.Ag., Senior Environmental Scientist, **Assessor**

Matthew is an Environmental Scientist and consulting Professional Agrologist with 14 years experience in environmental assessments, impact assessments, soil surveys, land remediation, reclamation and ecological restoration. Matthew has been a registered Professional Agrologist (PAg) in British Columbia since 2008.

## 2 Site Conditions & Land Use

### 2.1 Site Conditions

The Property encompasses +/- 26.5 ha (66 acres). The Property is partially within the ALR and is comprised of a single lot. The Property legal description is below:

- Parcel A, Part SE ¼, PCL A (DD W18607F), PID 010-963-669

It is apparent that some amount of agricultural use has occurred on this Property with fencing and historic pen structures present on the northwest portion of the Property. At the time of inspection the property was unused for agricultural purposes. The central portion of the main field area is comprised of a permanent large groundwater supplied pond. The pond fluctuates in size annually and has flooded historically (2000). The pond including a 15 m buffer above the high water mark is a protected habitat feature in the City of Kelowna, making this area unavailable to agriculture. The current land owners have not farmed the property since purchasing it in 2005, finding the conditions too challenging. Of the 26.5 ha approximate 18 ha remain forested it is assumed this area has not been farmed due to steep and complex terrain, and areas of shallow and protruding bedrock. There are no structures on the property. The current land owners have started development of this property by constructing dirt roads and trails to access the eastern portion of the Property from Glenmore Road. Fill soils have been deposited to create dirt roads crossing the western fields and roads have been cut into the toe of the slope and constructed on the hillside leading to the east part of the property.

Figure 2 shows the current ALR footprint for this region.

### 2.2 Land Use: Subject Property and Surrounding Area

According to City of Kelowna Mapping, the properties in the Subject Parcel are zoned Agricultural "A1". A variety of land uses are found in the vicinity. The area is dominated by rural residential development. The adjacent property to the north has been developed to include a gravel extraction area. Properties to the east and west are primarily undeveloped forested land. The majority of surrounding land is outside of the ALR.

Table 1, below summarizes land uses, the surrounding property sizes and ALR status. Refer to Appendix A Figure 2 ALR map, for more detail.

<b>TABLE 1: 3755 Glenmore Rd. Kelowna BC - Surrounding Land Use</b>			
<b>Location</b>	<b>Land Use</b>	<b>ALR Status</b>	<b>Approximate Lot Size ha</b>
Subject Property	Former Pasture / Undeveloped	In	17.6
		Out	9.1
North	Hay / Gravel	Out	24
East	Range	In	14.6
		Out	149.4
South	Residential	In	10.1
		Out	3.3
East	Large Lot Residential Subdivision	Out	13 to 120

### **2.3 Historic Land Use**

The Perretta family purchased this property in 2005 and has not used the property for agricultural purposes. The previous owner was Cliff Serwa (owner for approximately 35 years) who reported using the property as a Cattle pasture for an average herd of 12 Cattle. Reportedly the upland portions of the property were used for pasture as suitable fodder did not grow on the lower alkaline and wetted soils. It is reported by both land owners that other agricultural uses have not been attempted by either land owner due to agricultural limitations of the property.

### 3 Soils Information

Soil conditions are a key factor in determining the overall agricultural capability and suitability of any given site. The soil conditions on the Subject Parcel are described in this section including; published government survey information and a description of the existing soil conditions, based on the lab data and observations made during the on-site inspection, conducted on March 26, 2015.

#### 3.1 Government of British Columbia – Soil survey

Baseline soils information was obtained from the BC Ministry of Environment (MOE) soil map titled Soils of the Okanagan Similkameen Valleys 1:20,000 scale mapping (MOE, 1983), mapsheet 82E.093. Mapping indicates a highly variable soil landscape including; Gammil (GM), Inkameep (IK), Parkill (PR), Postill (PL), Tanaka (TA) and Trout Creek (TC) soils. The study area soils map is found on Figure 4.

**TABLE 2: BC Soil Survey Mapping**

Site Map Polygon	Location	Landform	Description	Soil Profile Drainage	Stone Content	Agricultural Suitability	Soils
<b>Gammil (GM)</b>	Various north end of the lot	Very Gently to extremely sloping fluvioglacial deposits	10-25 cm of sandy loam or loamy sand over very gravelly loamy sand or very gravelly sand	Rapid	5-60%	Limited by stoniness, low water holding capacity and some topography	Eluvated Eutric Brunisol
<b>Inkameep (IK)</b>	Surrounding and north of the wetland on the property	Nearly level to moderately sloping fluvial fan deposits	100 cm or more of interbedded sandy loam, loam and silt loam	Dominantly imperfect, ranging to moderately well: fluctuating ground water table	0-20%	Generally well suited with artificial drainage measures	Gleyed Humic Regosol
<b>MLC</b>	North Central, east and southern portions of the lot and	Exposed Bedrock areas covered by less than 10 cm of mineral soil				None	
<b>Postill (PL)</b>	Eastern portion of the property	Coluvial veneer over moderately to extremely sloping bedrock	10 to 100 cm of stony, Gravelly loamy sand or gravelly sandy loam over bedrock	Well to rapid	0-55%	Poorly suited due to stoniness, topography and bedrock	Eluviated Eutric Brunisol: lithic phase
<b>Parkill (PR)</b>	Western and central portion of	Very Gently to Strongly	100 cm or more of loamy sand	Rapid	0-5%	Well suited with nutrient	Eluviated Eutric Brunisol



	the property	sloping fluvioglacial deposits	or sand			and water holding limitations	
<b>Tanaka (TA)</b>	Central West portion of the lot and southeast corner	Nearly level and very gently sloping fluvial fan deposits	20 to 100 cm of sandy loam, silt loam or silty clay loam over sandy loam or minor gravelly sandy loam	Poor to very poor, high water table, subject to flooding	0-2%	Limited due to high water table	Rego Humic Gleysol: calcareous phase
<b>Trout Creek (TC)</b>	Northwest portion of the property	Nearly level to extremely sloping fluvioglacial deposits	60 to 100 cm of sandy loam or loamy sand over gravelly loamy sand	Well to rapid	0-5%	Well suited for tree fruits and grapes	Eluviated Eutric Brunisol

Technical Report 18, "Soils of the Okanagan and Similkameen Valleys, 82E.093, MoE, (1986)

### 3.2 Soils on Site Inspection – Methods

Six soil test pits (TP1 to TP6) were excavated to depths of up to 130 cm by a tracked excavator on March 26 2015. All test pits were located at sites that represented variations in topography, vegetation, land use and, or mapped soil characteristics. The soil test pits and site features were mapped and photographed (Appendix A, Figure 6; and Appendix B). The soil profiles were examined and described according to conventions from the *Canadian System of Soil Classification, Third Edition* (Soil Classification Working Group, 1998). It was not within the scope of this assessment to examine the soils for the purposes of classification at the Series level. A total of 10 representative soil samples were taken from the test pits and submitted for laboratory analysis of one or more of the following parameters: various soil nutrients, pH, electrical conductivity, available water storage capacity, and soil particle sizes/textures. (Appendix D).

Eight soil units were identified on the Subject Parcel (as indicated by Roman numerals I - VIII) through the detailed soils assessment at a mapping scale intensity of +/- 1:3,000 (Appendix A, Figure 8; and Table 3, below). Information obtained during the site inspection was combined with the lab results to provide site-specific details that were used to refine the soils data presented in Technical Report 18, "Soils of the Okanagan and Similkameen Valleys", 82E.093, MoE, (1986), which was based on mapping at 1:20,000. The soil units were primarily defined by soil physical and morphological properties. The profiles at each test pit, within each unit shared a number of similarities including horizon properties, depths and sequences. Detailed test pit logs and photographs have been included with this report (Appendix B).

**TABLE 3: 3755 Glenmore Rd Kelowna BC - Site Inspection : Soil Unit Summary for ALR Lands**

Soil Unit	Test Pits	Top Soil Depth (cm) / Colour	Soil Profile Texture <sup>1</sup>	Stone Content <sup>2</sup>	Soil Profile Drainage	Topography	Land Use	Area (ha)	%Total Area	Notes
I	1	50/ Br	Loam	0%	Rapidly Drained	1%	Unused	0.786	4.5	Weak to moderate fine granular soils constrained in a narrow draw between bedrock outcrops
II	2 & 4	34 / Br /RBr	Loam / Silt Loam	0%	Poorly Drained	4%	Pasture / Unused recently	3.363	19.2	High water table encountered at 56cm
III	3	14 / Br	Loamy Sand / Sand / Sand Gravel	40%	Imperfectly Drained	3%	Pasture / Unused recently	0.356	2.0	Small sand and gravel deposition, gravel up to 40%
IV	5	36/Br	SiL/SiL/SL	0%	Rapidly Drained	<1%	Pasture / Unused recently	1.116	6.4	Silty Clay Loam with gravel to 76cm depth /soils are moderate, medium and subangular blocky
V	6	36/ Dk Br Dk Gr	Clay Loam/Silty Loam/Silty Loam	15% gravel	Moderately Well Drained	Variable up to 15%	Unused	1.015	5.8	Ap topsoil layer in currently unused area / Moderate, fine, grainy to subangular blocky soil.
VI	-	-	-	-	-	>30% Complex Slopes	Forested	7.188	41.0	Topographically limited with rock outcrops
VII	-	-	-	-	-	0%	Pond	1.328	7.6	This area is a wetland (upper perimeter)
VIII	-	-	-	-	-	0%	Pond	2.399	13.7	This area is a wetland (pond wetted perimeter)

<sup>1</sup> based by laboratory testing

<sup>2</sup> visual observation

<sup>1</sup> City of Kelowna contour mapping

Includes only areas on the Subject Parcel within the ALR

### 3.3 Comparison to BC Government Soil Survey & Mapping

The distribution of soil types as identified in the site inspection was generally consistent with the information presented in soil mapping. In general, the minor differences in soil mapping have been attributed to the different scale intensities as they applied to the site. The BC Soil Survey is based on generalized mapping at a scale of 1:20,000, which is too broad to capture all the subtle variations in site conditions that were identified during the site inspection which was conducted at a detailed mapping scale intensity of +/- 1:3,000.

## **4 Climatic Capability for Agriculture**

Climatic capability for agriculture is based on the limitations associated with the combined influence of the climate and soil moisture regimes as well as the thermal limitations for any given location. Climatic capability is a modifying component used in determining the overall agricultural capability and suitability of a given site. The climatic capability for agriculture of the Property is described in this section; beginning with published government information, followed by that obtained during the on-site inspection.

### **4.1 Government of British Columbia – Climatic Capability**

General reference information as well as baseline climatic data for the Kelowna area was found in Climatic Capability for Agriculture (BC Ministry of Environment, 1981), and Land Capability Classification for Agriculture in British Columbia, Manual 1 (BC Ministry of Agriculture and Food and Ministry of Environment, 1983).

It is important to note that the climatic capability ratings are based entirely on climatic conditions (primarily precipitation and temperature) at a given site. Soil characteristics and other site conditions are not considered in these ratings. The overall agricultural capability of the Subject Parcel is addressed in Section 5 of this report.

The MOE Technical Paper 4; Climate Capability Classification for Agriculture in British Columbia and accompanying mapping 82E/NW indicates the area of the Subject Parcel as Classes 5A(1cG), with an estimated annual climatic moisture deficit (CMD) of 350 mm (BC MOE, 1981, Table 1).

Areas in Class 1cG have freeze free periods between above 150 days, however they experience insufficient heat units during the growing season.

Climate normals for the nearest weather station (Winfield) indicate an average of 121.5 freeze free days from 1981 to 2010. This station sits at a similar elevation (510m) to the subject property is and the nearest Government of Canada Station at 4.88 km from the Property. In applying this local climate data to the site we find a climate Class of 1aG with fewer freeze free days than indicated by government reporting and insufficient heat units during the growing season.

### **4.2 Site Inspection**

Site-specific climatic capability for agriculture was determined using data from the test pits, which are located in, and representative of, different soil units throughout the Subject Parcel. Lab data obtained for the soil samples was used in conjunction with published regional data to calculate the available water storage capacity (AWSC) and soil moisture deficit (SMD) values for the upper 50 cm of the soil profiles. The results were used to determine site-specific climatic and soil capability ratings for agriculture on the Subject Parcel which have been summarized in Table 4,

below. A description of agricultural/climatic capability classifications is found in Appendix C.

**TABLE 4: 3755 Glenmore Rd., Kelowna BC - Soil Moisture Balance & Climatic Capability Ratings**

Site & Soil Horizon	Soil Moisture Balance							Climate Capability Rating				
	Total Depth	Matrix Texture	Matrix AWSC <sup>1</sup>	Matrix Fraction	CF Adjusted AWSC	Interval AWSC	Climate H <sub>2</sub> O Deficit <sup>2</sup>	Soil H <sub>2</sub> O Balance <sup>3</sup>	Unimproved H <sub>2</sub> O Subclass <sup>4</sup>	Improved H <sub>2</sub> O Subclass <sup>4</sup>	Thermal Rating <sup>2</sup>	Improved Overall Subclass
	cm	lab	mm/cm	lab	mm/cm	mm	mm	mm				
TP 1/ SU-I												
	50	L	1.91	0.997	1.90	95.21						
Interval	50					95.21	350	-254.79	4A	1	1aG	1
TP 2/ SU-II												
AP	17	L	2.21	0.75	1.67	28.33						
AB	17	SiL	2.39	0.82	1.96	33.28						
B	6	SL	1.02	0.81	0.83	4.96						
C	10	LS	0.63	0.96	0.60	6.04						
Interval	50					72.60	350	-277.40	5A	1	1aG	1
TP 3/ SU-III												
Ap	14	LS	0.66	0.96	0.63	8.87						
AB	29	S	0.33	0.88	0.29	8.45						
B	7	S	0.33	0.98	0.32	2.27						
Interval	50					19.59	350	-330.41	5A	5A	1aG	5A
TP 4 / SU-II												
AP	17	L	2.21	0.75	1.67	28.33						
AB	17	SiL	2.39	0.82	1.96	33.28						
B	6	SL	1.02	0.81	0.83	4.96						
C	10	LS	0.63	0.96	0.60	6.04						
Interval	16					72.60	350	-277.40	5A	1	1aG	1
TP 5/ SU-IV												
Ap	24	L	1.91	0.997	1.90	45.70						
AB	15	L	1.91	0.997	1.90	28.56						
B	11	SL	1.19	0.98	1.17	12.88						
Interval	50					87.15	350	-262.85	4A	1	1aG	1
TP 6/ SU-V												
Ap	21	CL	3.17	0.52	1.65	34.75						
AB	24	SiL	2.88	0.79	2.26	54.26						
B	5	SiL	2.88	0.79	2.26	11.30						
Interval	50					100.31	350	-249.69	4A	1	1aG	1

<sup>1</sup> From Lab Data

<sup>2</sup> Technical Paper 4, 1981, MoE Climatic Capability Classification for Agriculture in British Columbia

<sup>3</sup> (Interval AWSC) - (Climate H<sub>2</sub>O Deficit) = Deficit (negative) or Surplus (positive)

<sup>4</sup> Based on - MoE Manual 1 (BC Ministry of Environment, 1983)

### 4.3 Comparison of BC Government and On-Site Inspection Ratings for Climatic Capability

In general the site inspection findings and analysis show that the climatic capability for the Subject Parcel has the similar unimproved rating as the government mapping, class 4A and 5A across the parcel. In general greater improvements were noted during the site inspection than were indicated by government mapping.

Differences between the improved ratings for this assessment and the government mapping are due to site specific soil characteristics which indicate limited AWSC for portions of this property. The limitations are primarily due to water availability which is improved by irrigation. Generally speaking irrigation improvements for this property will raise the climatic capability from Class 4A and 5A to between Class 1. One area was deemed un-improvable (class 5A) as the soils were dominated by sand and gravel with very low holding capacity.

Climatic capability is one component of over all Agricultural Capability, which will be discussed in greater detail in section 5 of this report.

Please see Section 5.3 for a comparison between the regional agricultural capability mapping by MoE (including climatic capability) and the parcel specific agricultural capability as determined by this assessment.

## 5 Agricultural Capability

Agricultural capability ratings are site-specific and based primarily on the influence of soils and climate, as modified by topography for any given location. The Canada Land Inventory (CLI) rating system uses a variety of measurable parameters (some of which are listed below) to provide objective classifications of agricultural capability:

- Slope angle and complexity;
- Depth to bedrock;
- Soil moisture deficits;
- Excess soil moisture;
- Coarse fragment content (stoniness);
- Soil texture;
- Depth to groundwater;
- Soil fertility; and
- Soil salinity

This interpretive system groups soils into seven classes according to potential and limitations for agriculture (See Appendix C for capability class and limitation descriptions). Lands in Classes 1 to 4 inclusive are considered capable of sustained production of common cultivated field crops. Class 5 lands are capable of use only for producing perennial forage crops or specially adapted crops. Class 6 lands are capable of only providing sustained natural grazing for domestic livestock. Class 7 lands are incapable of use for either arable culture or grazing. (BC Ministry of Agriculture and Food, and Ministry of Environment, April 1983).

In most cases, both "unimproved" and "improved" agricultural capability ratings are determined for the area that is under consideration. The unimproved rating reflects the capability of the property in its natural or current state. The improved rating is theoretical and represents the anticipated agricultural capability of the property after improvements (eg. irrigation, enhanced drainage, soil amendments, fill placement, stone-picking, and/or subsoil decompaction) are made to mitigate the limitations. Some limitations, such as shallow bedrock, slope complexity and slope angle, are not considered to be improvable under "typical farming practices".

### 5.1 Government of British Columbia – Agricultural Capability

General reference information for agricultural capability was provided by Land Capability Classification for Agriculture in British Columbia, Manual 1 (BC Ministry of Agriculture and Food and Ministry of Environment, 1983; Appendix C). Site-specific agricultural capability mapping for the Subject Parcel was found on Mapsheet 82E/093 @1:20,000 (BC Ministry of Environment, 1981). (Appendix A, Figure 4).

The MOE agricultural capability polygons align with the soil polygons mapped in Soil Survey Technical Reports No. 18 and are summarized in Table 5, below.

**TABLE 5: 3755 Glenmore Rd., Kelowna BC, BC- MOE Agricultural Capability Mapping @ 20,000**

Location	Agricultural Capability Rating	
	Unimproved	Improved
Northwestern and northeastern	5A	*3A/*3AP
North and Central	5W / 4AW	3WF / 2W
North Central & South	6TR / 7R	6TR / 7R
Central	5A / 4A / 5RA	*3A / *2A / *3AT
Southwest	5A	3A

A - Soil Moisture Deficiency  
 D - Soil Structure  
 P - Stoniness  
 R - Bedrock or Rockiness  
 T - Topography  
 W - Excess Water

## 5.2 Soils on Site Inspection

The overall agricultural capability ratings for the Subject Parcel were mapped and then compared to the soil unit polygons as defined by the site inspection (Section 3.2, above). (Appendix A, Figures 8 and 9).

Information obtained from the field inspection was combined with published soils, topography and climate data (as described in Sections 3.0 and 4.0) then applied to the criteria presented in MOE Manual 1 to determine the site-specific agricultural capability ratings at a mapping scale intensity of +/-1:3,000. The agricultural capability ratings for the Subject Parcel, based on the site inspection are summarized in Table 6, below.

**TABLE 6: 3755 Glenmore Rd, BC- Site Inspection: Agricultural Capability Ratings**

Soil Unit	Ag Capability Unit	TP	Unimproved Ag Capability <sup>2</sup>	Improved Overall Ag Capability <sup>2</sup>	Area (ha)	% Total Area <sup>3</sup>
I	1	1	4A	1	0.786	4%
II	2	2&4	5A5F	3F	3.363	19%
III	3	3	5A4P	5A*3P	0.356	2%
IV	1	5	4A	1	1.116	6%
V	4	6	4A4F	2F	1.015	6%
VI	5	-	6T	5:6T 5*3T	7.188	41%
VII	6	-	6W	6W	1.328	8%
VIII	7	-	7W	7W	2.399	14%
Total					17.551	100%

<sup>1</sup> Ratings based on lab results & field investigation. See Table 7 for class descriptions

<sup>2</sup> See appendix C for Capability descriptions

<sup>3</sup> Estimates based on lab results, field investigations and aerial photography

\* Modified Land Capacity Classification for Tree Fruits and Grapes

Excess Water and Topography were the most severe limitations to agricultural capability on the Property. Soil moisture deficits during the growing season, soil Fertility and Stoniness were identified as the less severe limitations to agricultural capability on the Property.

AC Unit 1 (including Soil Unit I & IV), accounts for +/- 10% (1.902 ha) of the ALR land on the Property. This area was rated at Class 4 (unimproved) due to a soil moisture deficit ("A"). Irrigation is expected to raise the soil moisture deficit limitations throughout this agricultural capability unit to class 1.

AC Unit 2 (including Soil Unit II) accounts for +/- 19% (3.363 ha) of the ALR land on the Property. This area was rated at Class 5 (unimproved) due to a soil moisture deficit and Poor Fertility due to alkaline soils. This area is improvable to Class 3 with the addition of irrigation and acidifying soil amendments.

AC Unit 3 (including Soil Unit III) accounts for +/- 2% (0.356 ha) of the ALR land on the Property. This area was rated at Class 5 (unimproved) due to a soil moisture deficit and has a Class 4 limitation for stoniness. Due to very high sand and gravel content this area is not improvable by irrigation.

AC Unit 4 (including Soil Units V) accounts for +/- 6% (1.015 ha) of the ALR land on the Property. This area was rated at Class 4 (unimproved) due to a soil moisture deficit and soil fertility. This area is improvable to Class 2 with the addition of irrigation and soil amendments.

AC Unit 5 (including Soil Units VI) accounts for +/- 41% (7.188 ha) of the ALR land on the Property. This area was rated at Class 6 (unimproved) due to topography with steep and complex slopes. This area is not improvable. Approximately 50% of this area which has slightly lower slope angles would be classified as \*3T. *The \* indicates the modified classification for Tree Fruits and Grapes.*

AC Unit 6 (including Soil Units VII) accounts for +/- 8% (1.328 ha) of the ALR land on the Property. No test pits were excavated in this soil unit as it represents the upper region of fluctuating permanent pond. This area was rated at Class 6 (unimproved) due to excess water. This area is not considered improvable.

AC Unit 7 (including Soil Units VIII) accounts for +/-14% (2.399 ha) of the ALR land on the Property. No test pits were excavated in this soil unit as it represents the wetted region of a permanent pond. This area was rated at Class 7 (unimproved) due to excess water. This area is not considered improvable.

### **5.3 Comparison of BC Government and On-Site Inspection Ratings**

The unimproved and improved agricultural capability ratings applied to the ALR land on the Property, based on the on-site inspection were somewhat consistent with the



ratings ascribed by the MoE mapping, as summarized below (See also Tables 5 and 6; and Appendix A, Figures 5, 8 and 9).

While similar to the MoE mapping, the on-site agricultural capability ratings revealed greater limitations to Agricultural Capability due to Excess Water, and a greater area limited due to Topography. As well, a limitation for fertility was noted on the Property. The on-site assessment identified areas of soil moisture deficiencies with an unimproved rating of 4A and 5A across the assessed land. The improved agricultural capability ratings are:

- Class 7W for +/- 14% of the ALR land on the Property,
- Class 6W for +/- 8% of ALR land on the Property,
- Class 6T for +/- 21% of ALR land on the Property,
- Class 5A for +/- 2% of the ALR land on the Property,
- Class \*3T for +/- 20% of ALR land on the Property,
- Class 3F for +/- 19% of the ALR land on the Property
- Class 2F for +/- 6% of the ALR land on the Property, and
- Class 1 for +/- 10% of the ALR land on the Property.

In summary, the on-site inspection agricultural capability ratings were somewhat consistent with the overall MOE agricultural capability ratings. The limitations due to topography and Excess water were underrepresented on the MoE mapping both in area and severity. The fertility limitation was not included in the MoE mapping. The difference in site level details is likely primarily due to the differences in regional scale of the mapping detail between the 1:20,000 & 1:100,000 reference maps provided by MoE and our 1:3000 scale assessment mapping.

#### **5.4 Feasibility of Improvements**

All improvements provided are theoretical in nature and based on best management practices as outlined the MOE Manual 1.

Much of the Property is limited by topography and excess water. Topographic improvements are not considered practical for farming purposes. Ditching used for improvements to excess water is not considered feasible for this location as the excess water is in a localized depression with land rising in all directions. As well the land surrounding the pond is largely bedrock and it is apparent that the pond if a groundwater supplied feature.

The Property is further limited by available water. Irrigation is the primary improvement required to overcome this limitation. One small area in the NW corner is not deemed improvable by irrigation due to very high sand and gravel content in the soil. The availability of water for irrigation may be an issue. The ponds on the property are fed by near surface groundwater but are habitat feature and are likely not a viable irrigation source. The City of Kelowna has zoning authority over this property but does not have foreseeable plans to service this area with water without a significant investment from the owner. The Glenmore-Ellison Improvement District

is nearby but, reportedly has no plans to services this area (RP – pers.comm.). Drilling a well is possible in the area but nearby well data indicates significant bedrock and unpredictable flow for developed wells. The nearest well south of the property was initially drilled to 120 feet and deepened to 300 feet for a reported flow of 0.5 gallons per minute. All of the options for irrigation may be cost prohibitive for an agricultural operation.

Other agricultural capability limitations are due to soil fertility and stoniness. The alkaline soils at this location may be treated to acidify the soils and improve soil fertility. The application of acidifying amendments may be limited by the presence of the permanent pond which is a mapped habitat feature at this location. So while improvements are feasible in this regard they may be limited in application due to potential deleterious effects to a protected habitat.

Stoniness on this property is quite localized but is due in part to gravel from <2.5cm to 5cm in diameter. Improvements with small gravel are not considered practical for farming purposes.

## **6 Agricultural Suitability**

Agricultural suitability is related to agricultural capability, but involves the interpretation of a wider variety of factors as they relate to the potential for specific uses on a given property. While agricultural capability is based on physical features and measurable parameters, agricultural suitability assessments include a range of site conditions and external influences. The following factors were considered in assessing the agricultural suitability of the Subject Parcel:

- Feasibility of improvements;
- Availability of additional good quality topsoil;
- Overall size of the Subject Parcel;
- Location and context of the Subject Parcel (proximity to urban/suburban/rural land use and zoning);
- Land use on subject property – historical, current and future plans;
- Land use in surrounding area – historical, current and future plans;
- Diversifications, innovations and improvements to date;
- MoE agricultural capability ratings (at 1:20,000 mapping scale); and
- Agricultural capability ratings as determined by this assessment (at +/- 1:3,000 mapping scale).

In consideration of suitability of these lands the area subject to habitat protection by the City of Kelowna and the Province is noted. These areas represent 4.672 ha (27%) as this area is unavailable to agriculture.

The suitability of the Subject Parcel for various agricultural purposes has been evaluated In terms of the factors listed above and has been summarized in Table 7, below:

**TABLE 7: 3755 Glenmore Rd, Kelowna, BC – Site Inspection: Agricultural Suitability**

AC Unit	Area (ha)	% Total Area	Ag Capability Unimproved (Improved)	Suitability for Agriculture Activities
<b>Soil Bound Agriculture</b>				
1	1.902	10%	Class 4 (Class 1)	<p>This region is small, irregularly shaped and topographically fragmented. The shape and location of this area would make it a challenging location for soil bound agriculture. However with irrigation AC unit 1 may be improved to Class 1 area. The significant fragmentation combined with good likely yields demonstrates a moderate suitability for soil bound agriculture in this AC Unit.</p> <p>Development of irrigation may be cost prohibitive for this location as noted in the feasibility of improvements</p>
2	3.363	19%	Class 5 (Class 3)	<p>This area is limited by water availability and soil fertility due to alkaline soils. Irrigation and acidifying soil amendments will make this area moderately suitable for soil bound agriculture but this area does require special management and will have a restricted range of crops. Improvement options may be limited in this area due to potential impacts to nearby habitat. Acidifying amendments may have potential deleterious affects to nearby the nearby Alkali pond environment.</p> <p>Development of irrigation may be cost prohibitive for this location as noted in the feasibility of improvements</p> <p><b>A portion of this AC unit is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. This area is Unavailable to Agriculture.</b></p>
3	0.356	2%	Class 5 (Class 5)	<p>This area is limited by available water as the water holding capacity of the soils is very low. This location is not improvable with irrigation. Further a stoniness limitation in this area is not considered improvable by normal farming practice. This small localized area would require intensive management to grow a severely limited range of crops. Due to the small area and strong management considerations this area is not considered suitable for soil bound agriculture.</p>
4	1.015	6%	Class 4 (Class 2)	<p>This area is limited by water availability and soil fertility. Irrigation and acidifying soil amendments will make this area moderately suitable for soil bound agriculture but this area does require special management and will have a restricted range of crops. Improvement options may be limited in this area due to potential impacts to nearby habitat. Acidifying amendments may have potential deleterious affects to nearby the nearby Alkali pond environment.</p> <p>Development of irrigation may be cost prohibitive for this location as noted in the feasibility of improvements</p> <p><b>A portion of this AC unit is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. The protected area is Unavailable to Agriculture.</b></p>
5	7.188	41%	Class 6 (50% Class 6 / 50% Class*3)	<p>This largest AC unit is primarily limited by topography. Approximately half of this area has complex slopes steeper than 30% (Class 6) which is unsuitable for cultivation or farm machinery use. The remainder has irregular areas with slightly lower slope grades possibly suitable for Tree Fruits and Grapes (Class *3). These steep slopes are poorly suited for most soil base agriculture and while pockets of these hillsides may support Tree Fruits and Grapes they may prove challenging to implement in patches on steep slopes.</p>

				A portion of this AC unit is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. The protected area is Unavailable to Agriculture.
6	1.328	8%	Class 6 (Class 6)	This portion of the property is part of a permanent pond. No persistent surface flow to the pond is evident so it is expected to be primarily groundwater supplied. The pond is present year round and is considered a habitat feature. This area of the pond is the upper region which is seasonally inundated with water. As this pond is in a topographic depression and appears to be groundwater supplied, improvements are not considered feasible. This area is not suitable for soil based agriculture.  This area is designated as a protected wetland by the City of Kelowna and Province of BC and is Unavailable to agriculture.
7	2.399	14%	Class 7 (Class 7)	
<b>Intensive Soil Bound Livestock - Operations which depend, in whole, or in part, on growing their own feed for livestock production</b>				
(eg. Beef cattle (cow, calf or feeder), dairy cows, sheep, goats, and other livestock at a commercial scale)				
1	1.902	10%	Class 4 (Class 1)	The Property has very diverse soils and is topographically fragmented which may prove challenging for Soil Bound Livestock at a commercial scale. The property has a history of pasture uses for a small herd of 12 head. It is unlikely that an intensive soil bound livestock operation would be successful at this location. Due to management consideration and agricultural limitations this area of the Property is poorly suited to Intensive Soil Bound Livestock operations. Though a small pasture operation has been demonstrated as feasible.  A portion of these AC units is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. This area is Unavailable to Agriculture.
2	3.363	19%	Class 5 (Class 3)	
3	0.356	2%	Class 5 (Class 5)	
4	1.015	6%	Class 4 (Class 2)	
5	7.188	41%	Class 6 (50% Class 6 / 50% Class*3)	Portions of this area may be too steep to for Intensive Soil Bound Livestock. This area is poorly suited to intensive soil bound livestock operations.  A portion of this AC unit is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. This area is Unavailable to Agriculture.
6	1.328	8%	Class 6 (Class 6)	This area is designated as a protected wetland by the City of Kelowna and Province of BC and is unavailable to agriculture.
7	2.399	14%	Class 7 (Class 7)	
<b>Intensive Non-Soil Bound Livestock - Uses which do not rely on growing crops in soil to support the enterprise</b>				
(eg. Beef feedlots, hog production and poultry ie. Eggs and meat birds)				
1	1.902	10%	Class 4 (Class 1)	The ALR portion of this Property is topographically fragmented and inundated with water which may prove challenging for Intensive Non-Soil Bound Livestock at a commercial scale. Soft soils near the centre of the property may not support and overlying barn structure. Conflict with proposed nearby development may be a concern with an operation of this intensity. The groundwater fed pond and shallow groundwater will require special management considerations to ensure no impact from a feedlot scale operation on surface water or groundwater quality in the region.  A portion of these AC units is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. This protected area is Unavailable to Agriculture.  Due to water quality concerns and the potential for conflict this
2	3.363	19%	Class 5 (Class 3)	
3	0.356	2%	Class 5 (Class 5)	
4	1.015	6%	Class 4 (Class 2)	

5	7.188	41%	Class 6 (50% Class 6 / 50% Class*3)	location is poorly suited for Intensive Non-Soil Bound Livestock.
6	1.328	8%	Class 6 (Class 6)	
7	2.399	14%	Class 7 (Class 7)	
<b>Intensive Non-soil bound Horticultural Agriculture</b>				
<b>(eg. green houses and container nursery)</b>				
1	1.902	10%	Class 4 (Class 1)	Some soils in this area may be too soft to support some greenhouse structures. However generally, these areas of the Property would be suitable for greenhouse or container nursery operations.
2	3.363	19%	Class 5 (Class 3)	
3	0.356	2%	Class 5 (Class 5)	<b>A portion of these AC units is covered by a Habitat Protection Buffer and is protected by the City of Kelowna and the Province of BC. This protected area is Unavailable to Agriculture.</b>
4	1.015	6%	Class 4 (Class 2)	
5	7.188	41%	Class 6 (50% Class 6 / 50% Class*3)	This portion of the Subject Parcel would not be suitable for greenhouse or container nursery operations due to steep topography
6	1.328	8%	Class 6 (Class 6)	<b>This area is designated as a protected wetland by the City of Kelowna and Province of BC and is unavailable to agriculture.</b>
7	2.399	14%	Class 7 (Class 7)	

## 7 Impact Analysis

The potential impacts associated with the exclusion of the Subject Parcel from the ALR on the local and regional agricultural context have been summarized in Table 8, below.

<b>TABLE 8: 3755 Glenmore Rd., Kelowna BC – Potential Impacts of Inclusion</b>	
<b>Area of Concern</b>	<b>Anticipated Impacts from Proposed Exclusion</b>
Development of Subject Parcel on Surrounding Lands	<p>None of the directly adjacent properties are being used for intensive agricultural purposes. The property adjacent to the north has a sand and gravel operation and residential use. Nearby there are smaller residential lots and large undeveloped most of which remain forested likely due to complex and steep terrain. There is a small hobby farm south of the property with a residential use. Development of this property may increase traffic and the local population.</p> <p>The parcel has been used historically as cattle pasture for up to 12 yearlings</p>
Residential Development of Surrounding Lands on Subject Parcel	Residential development of the surrounding lands on the subject parcel as intensive agricultural uses are limited.
Regional and Local Agricultural Capacity	The Property has a low to moderate agricultural capability, and large areas that are non arable and very difficult to farm. As the property is not currently farmed it does not currently contribute to the local Agricultural Capacity. However a small decline to potential local agricultural capacity is expected should the subject parcel be developed.
Surrounding Agricultural Operations	There are no directly adjacent agricultural operations. Two nearby properties do have land in the ALR. A hay crop is apparent on a field to the southwest.
Precedent of Exclusion for Triggering Future Applications	<p>Adjacent properties to the south and southwest are partially contained in the ALR. The property to the south appears to be a hobby farm while the property to the southwest appears to be farmed for hay. These two properties do not appear to have the same topographic and excess water limitation of the subject Property. For these properties a precedent is not evident.</p> <p>Another property to the east has a small portion in the ALR and does appear to have similar characteristics to the subject Property. It is also apparent that this area has never been farmed. A precedent may exist for this location.</p>

## 8 Summary and Conclusions

### 8.1 Subject Property

The Property has a history of pasture use for a small cattle herd (12 head). Currently the Property is unused for Agriculture. The total property size is 26.7 hectare (ha). Of the 26.7 ha approximately 17.6 ha is within the ALR, and the remainder, 9.1 ha is outside of the ALR.

The ALR portion of the Property (17.6 ha) features numerous agricultural limitations including non improvable topographic limitations on ~7.2 ha (41%) of this area, and excess water on ~3.6 ha (22%) of this area. Irrigation improvements and soils amendments for alkalinity would be needed to farm the remaining ALR portions of the Property, approximately 6.3 ha (37%) of the ALR area. This remaining area is not contiguous and has highly variable soil and moisture conditions which will lead to a complex management regime.

In addition to the agricultural limitations approximately 4.672 ha (27%) of the property is a protected as a sensitive habitat feature by the City of Kelowna and Province of BC making this area unavailable to Agriculture. These areas overlap primarily with regions of low capability (the pond) and nearby areas with significant management requirements due to fertility.

### 8.2 Soils and Agricultural Capability

The findings of this assessment indicate that agricultural capability of the Subject Parcel is limited by a) topography, b) excess water, c) soil moisture deficiencies d) fertility; and e) stoniness.

- a) This assessment rated the topography limitation at Class 6T for 41% of the ALR portion of the Property. This area has steep and complex slopes. Of this area approximately half has slopes <30% which is considered Class \*3T. *The \* indicates improved capability with limitation classifications for tree fruits and grapes.* Topographic limitations are not considered improvable.
- b) This assessment rated the excess water limitation at Class 6W and Class 7W. A permanent, apparently groundwater supplied pond on the property lies in a topographic depression with significant near surface and surrounding bedrock. This area covers approximately 3.7 ha (22%) of the ALR portion of the Property. This area is not considered improvable under normal farm practice.
- c) This assessment rated the soil moisture deficiencies at Class 4A and 5A (unimproved) for 6.6 ha (38%) of the ALR lands on the Property. Of the 6.6 ha, improvements to up to Classes 1 to 3 are feasible for 6.3 ha (35%) of the ALR portion of the property with irrigation. Variations in the improved soil moisture deficiency ratings across the Property were related to site-specific

soil conditions (eg. soil texture) and anticipated responses to supplemental moisture.

- d) This assessment found limitations for soil fertility due to alkalinity at Class 4F and 5F on 4.4 ha (25%) of the ALR portion of the property. While improvements are possible they may not be feasible without negatively impacting the protected pond on the property. Improvements would require acidifying soil amendments to raise the fertility Class to 2F and 3F respectively for these areas.
- e) This assessment rated the stoniness limitation at Class 4P (\*3P for tree fruits and grapes) for 0.35 ha (2%) of the ALR portion of the Property. Stoniness in this case is due in part to gravel <2.5cm to 5cm in size. Stoniness limitations are not considered improvable for small gravel 2.5cm or less in diameter.

Potential improvements on the Property included supplemental moisture (irrigation) during the dry months, and soil amendments for fertility. The results of this assessment suggest that these improvements would be feasible for 6.3 ha (35%) of the ALR portion of the property and the agricultural capability ratings are expected to improve from:

- Class 5 to Class 3 for 19% of the parcel,
- Class 4 to Class 2 for 6% of the parcel,
- Class 4 to Class 1 for 10% of the parcel, and

The remaining +/- 65% of the ALR land on the Property is not considered improvable.

### **8.3 Conclusion**

The Property is located in a rural area of the City of Kelowna, BC. The Property has had pasture use for a small cattle herd (+/- 12 head annually).

With diverse topography, hydrology and soils characteristics this Property is highly variable demonstrating unimproved ratings from Class 4 to 7. Approximately 35% of the ALR lands on this property can be improved to Class 1 to 3. The remaining 65% of the ALR lands are not considered improvable and will remain class 5-7. Where there is potential for improvement (+/- 35% of the ALR lands) the ALR portion of the property exhibits areas of moderate to good agricultural capability. However in the areas that may not be improved (+/- 65% of the ALR lands) the property exhibits poor to very poor agricultural capability.

As a result of the topographical limitations, the areas suitable to agriculture are fragmented. As well, soil characteristics vary greatly over a relatively small area. Management and implementation of soils based agriculture at this location is expected to be complex. As well, the availability of water for irrigation may prove cost prohibitive for an agricultural operation.



Habitat protection has made 4.672 ha (27%) of the ALR lands on the Property unavailable to Agriculture. This area is covered by an alkali pond and designated 15 m buffer area. The unavailable, protected area coincides with areas of low capability (Class 6-7) and areas of with complex management needs due to fertility. Amendments for soil fertility for agricultural purposes in this area would require soil acidification which may have a deleterious effect on the alkali habitat which is protected.

As the property has exhibited limited historic pasture use, exclusion of this parcel from the ALR would represent a minor decrease in local agricultural capacity.

## 9 References

BC Ministry of Agriculture and Food and Ministry of Environment, April 1983. *Land Capability for Agriculture in British Columbia*. MOE Manual 1. Surveys and Resource Mapping Branch and Soils Branch: Kelowna, BC

BC Ministry of Environment, 1981. *Climatic Capability Classification for Agriculture in British Columbia*. Climatology Unit - Air Studies Branch; Victoria, BC

City of Kelowna, 2030 Official Community Plan, <http://www.kelowna.ca/CM/Page2616.aspx>

BC Ministry of the Environment, 1986, Technical Report 18, *Soils of the Okanagan and Similkameen Valleys*, Map 82E.093,

## 10 Limitations

I, Matthew Davidson certify that I supervised and carried out the work as described in this report. The report is based upon and limited by circumstances and conditions referred to throughout the report and upon information available at the time of the site investigation. I have exercised reasonable skill, care and diligence to assess the information acquired during the preparation of this report. I believe this information is accurate but cannot guarantee or warrant its accuracy or completeness. Information provided by others was believed to be accurate but cannot be guaranteed.

The information presented in this report was acquired, compiled and interpreted exclusively for the purposes described in this report. I do not accept any responsibility for the use of this report, in whole or in part, for any purpose other than intended or to any third party for any use whatsoever. This report is valid for one year only after the date of production.

Respectfully Submitted,



Matthew Davidson, P.Ag.  
Senior Environmental Scientist  
Valhalla Environmental Consulting Inc.

## Appendix A – Maps and Figures

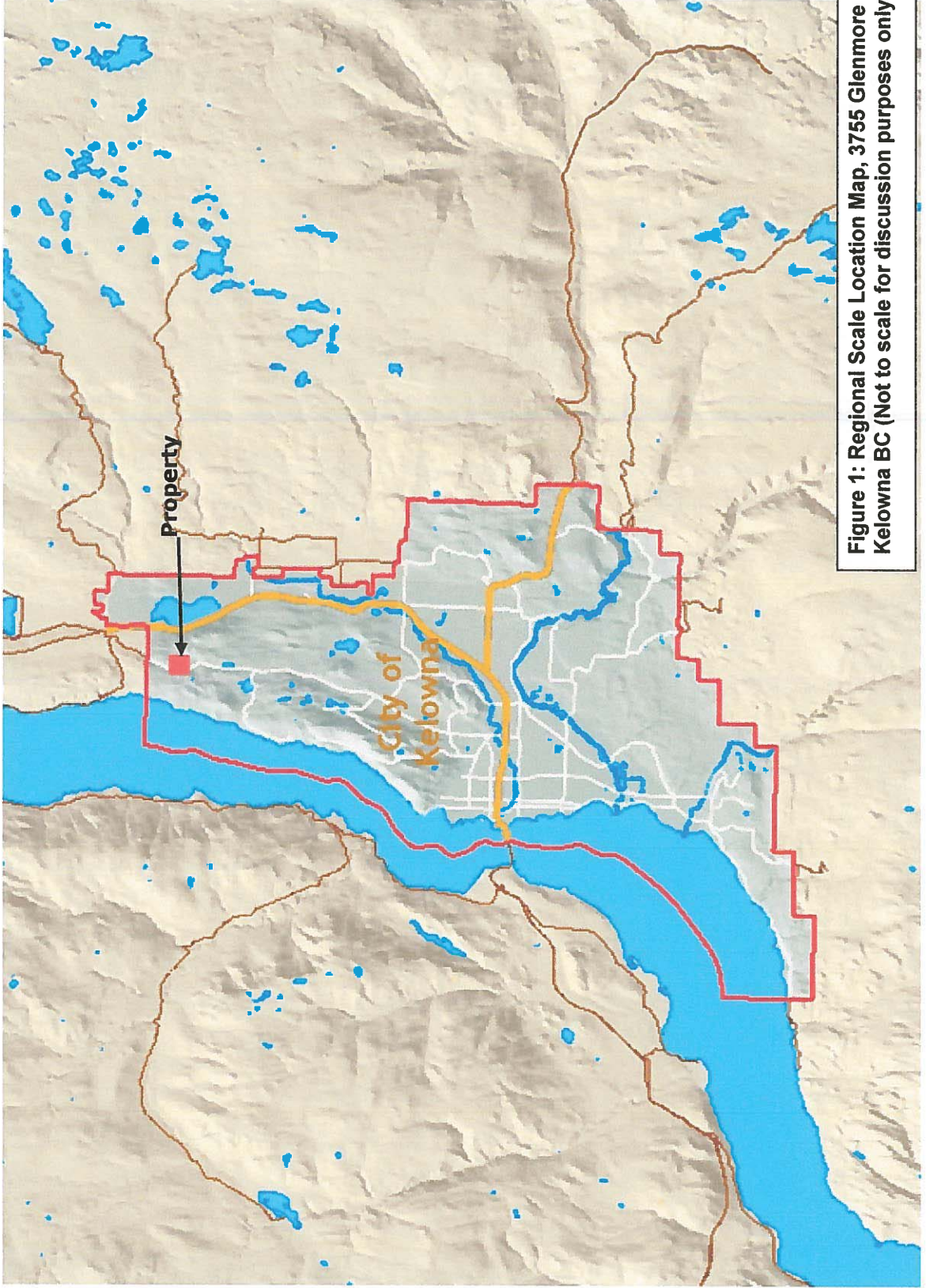


Figure 1: Regional Scale Location Map, 3755 Glenmore Rd. Kelowna BC (Not to scale for discussion purposes only)

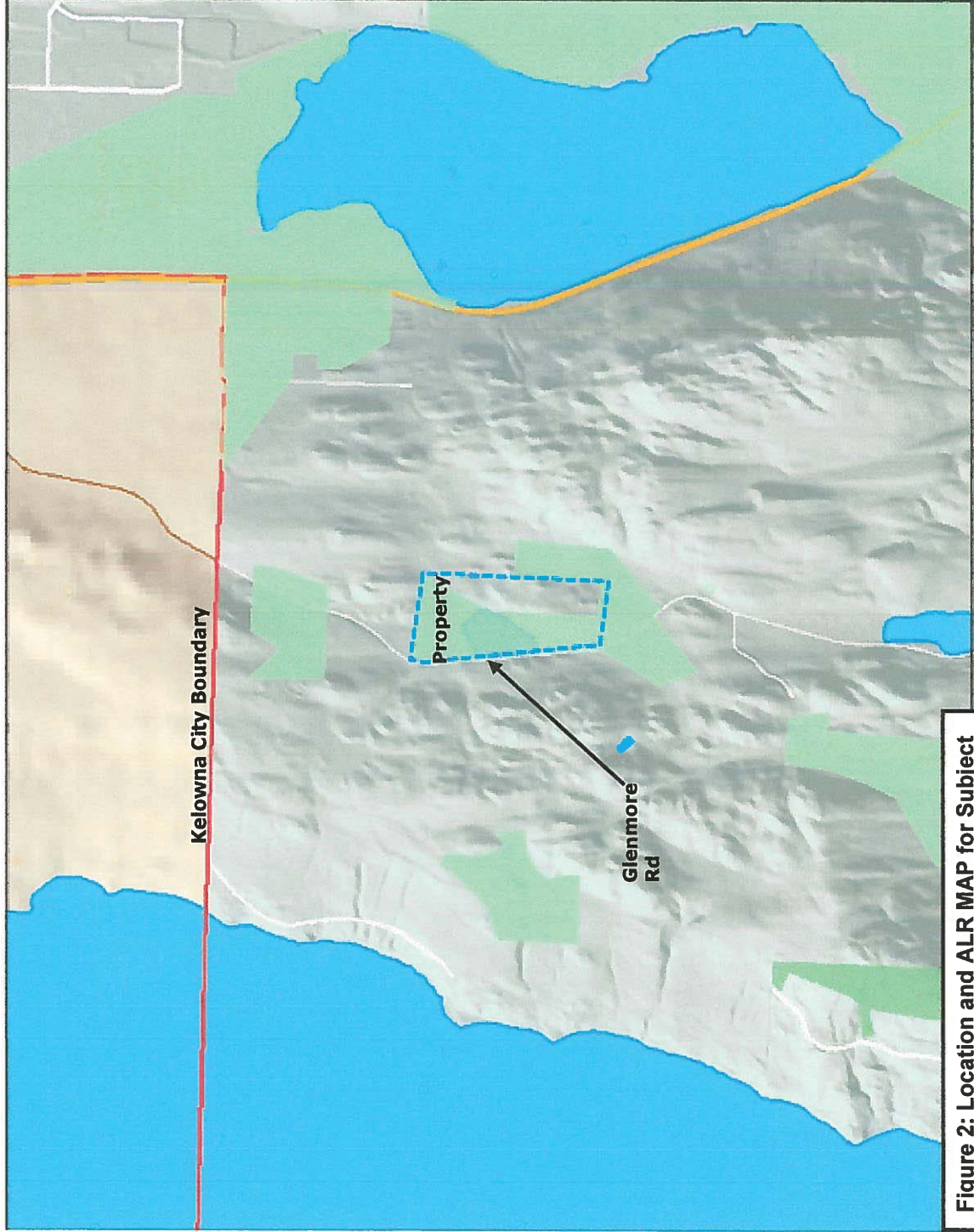
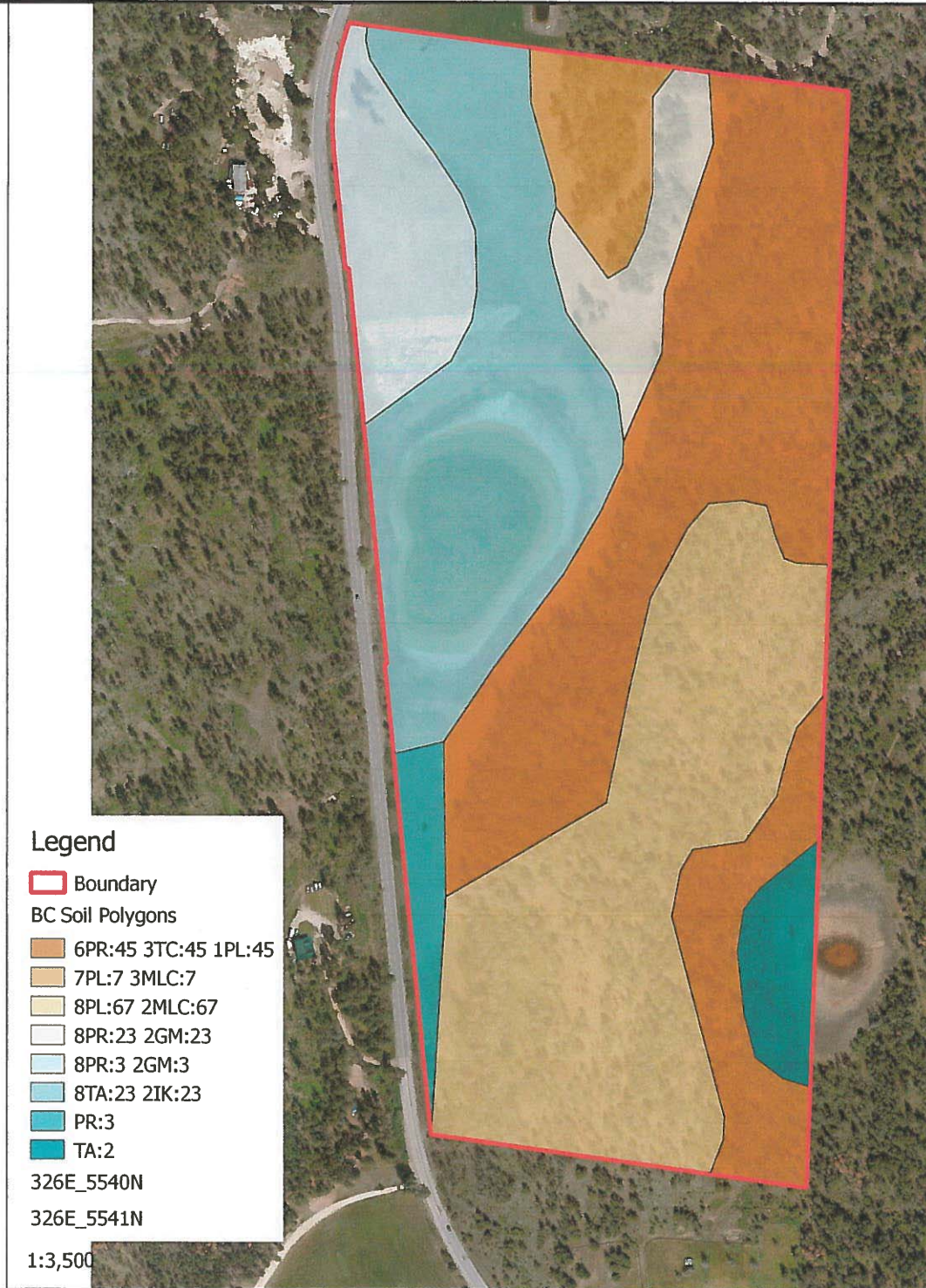


Figure 2: Location and ALR MAP for Subject Property, 3755 Glenmore Rd. Kelowna



**Figure 3: Property Boundary and Assessment Area, 3755 Glenmore Rd. Kelowna**

**Figure 4: BC Soils Mapping digitized from 1:20,000 map sheet, 3755 Glenmore Rd. Kelowna**  
Source Soils of the Okanagan and Similkameen Valleys Mapsheet 82E.093





**CAPABILITY CLASSIFICATIONS**

5AP - Unimproved Rating

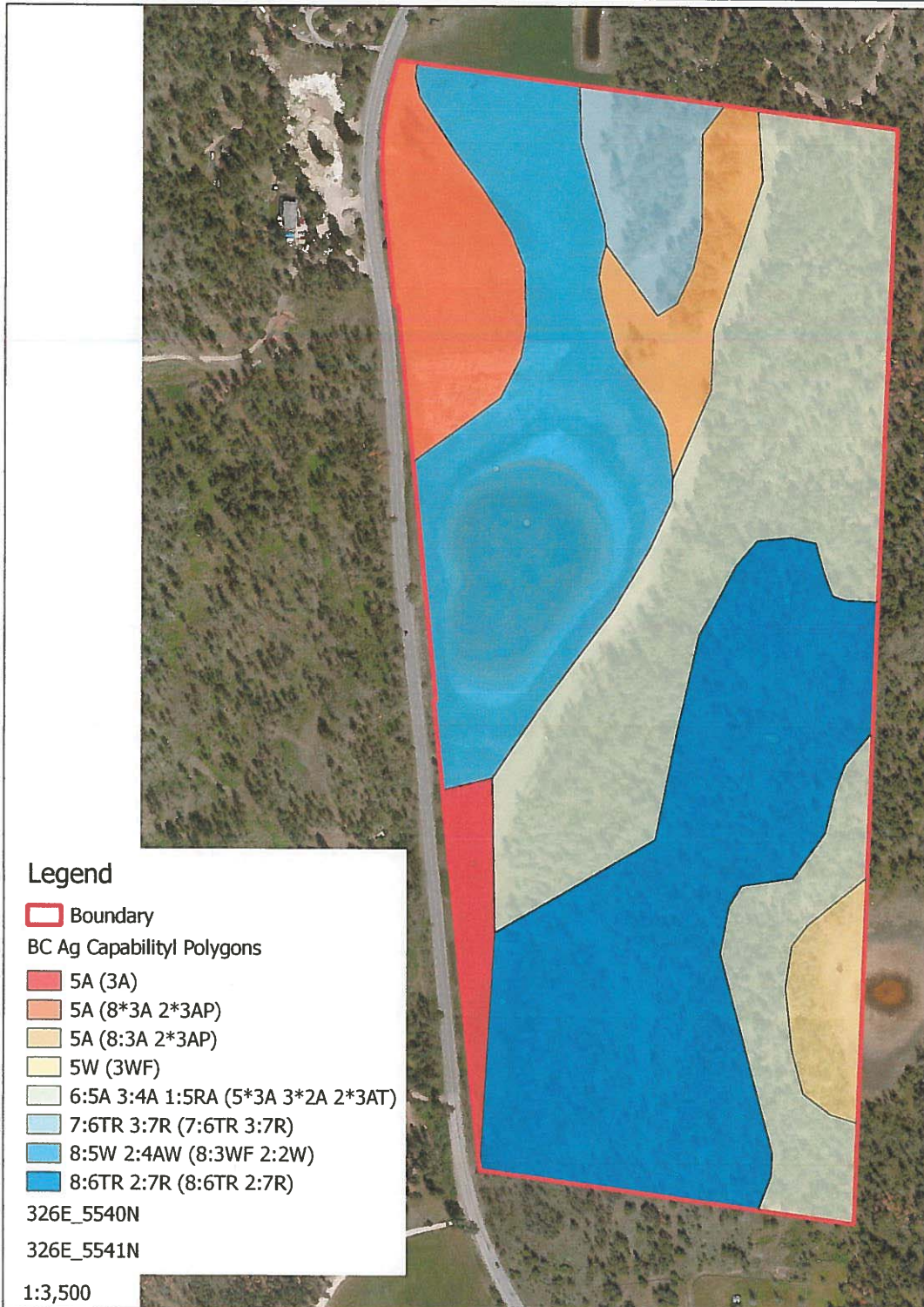
(3AP) - Improved Rating

\*The asterisk is used with the Modified Land Capability Classification for Tree Fruits and Grapes.

It indicates the modified topography and/or stoniness classes have been used.

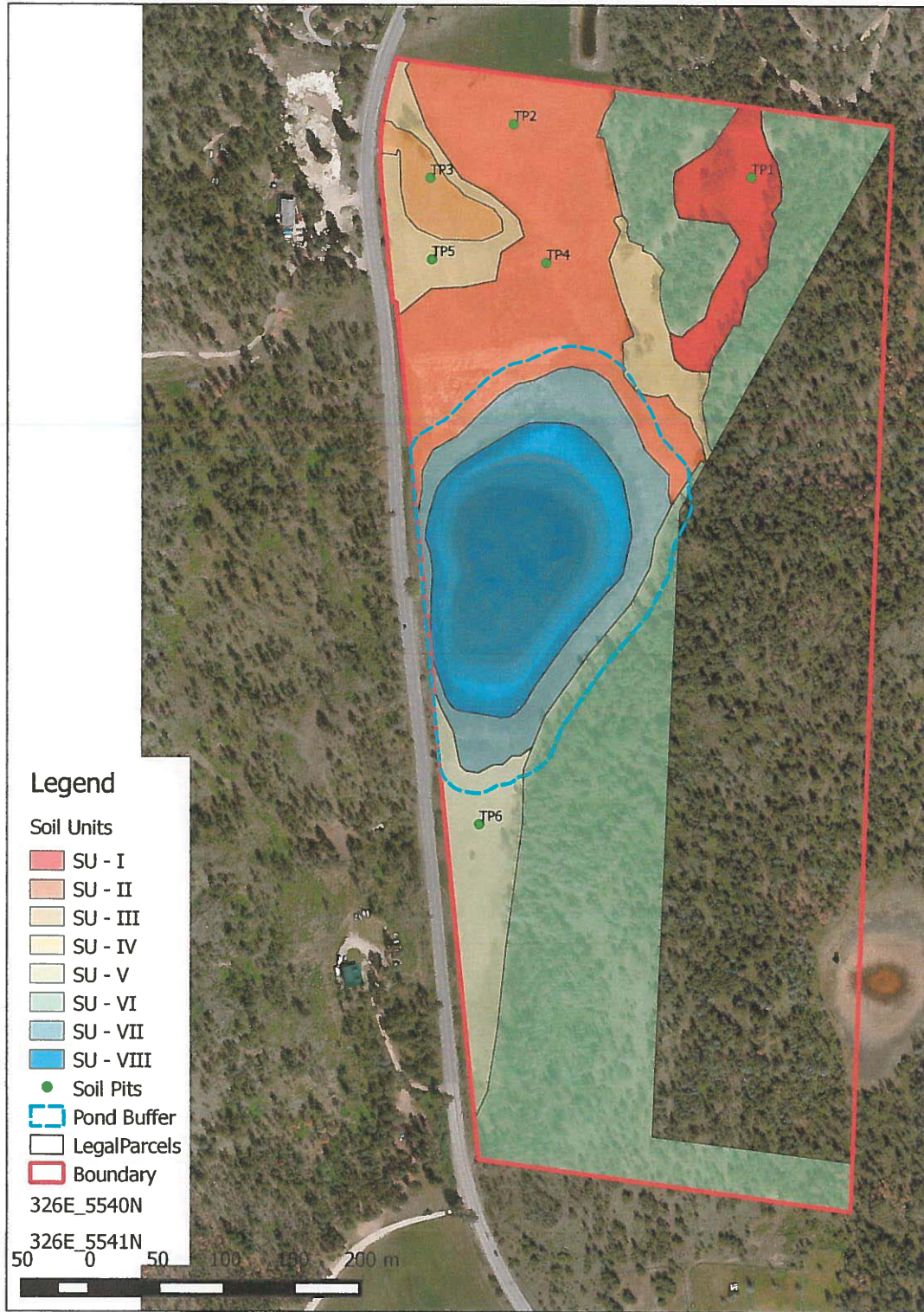
**CLASS RATINGS**

1. Land in this class either has no or only very slight limitations that restrict its use for the production of common agricultural crops.
2. Land in this class has minor limitations that require good ongoing management practices or slightly restrict the range of crops, or both.
3. Land in this class has limitations that require moderately intensive management practices or moderately restrict the range of crops, or both.
4. Land in this class has limitations that require special management practices or severely restrict the range of crops, or both.
5. Land in this class has limitations that restrict its capability to producing perennial forage crops or other specially adapted crops.
6. Land in this class is nonarable but is capable of producing native and/or uncultivated perennial forage crops.
7. Land in this class has no capability for arable culture or sustained natural grazing.

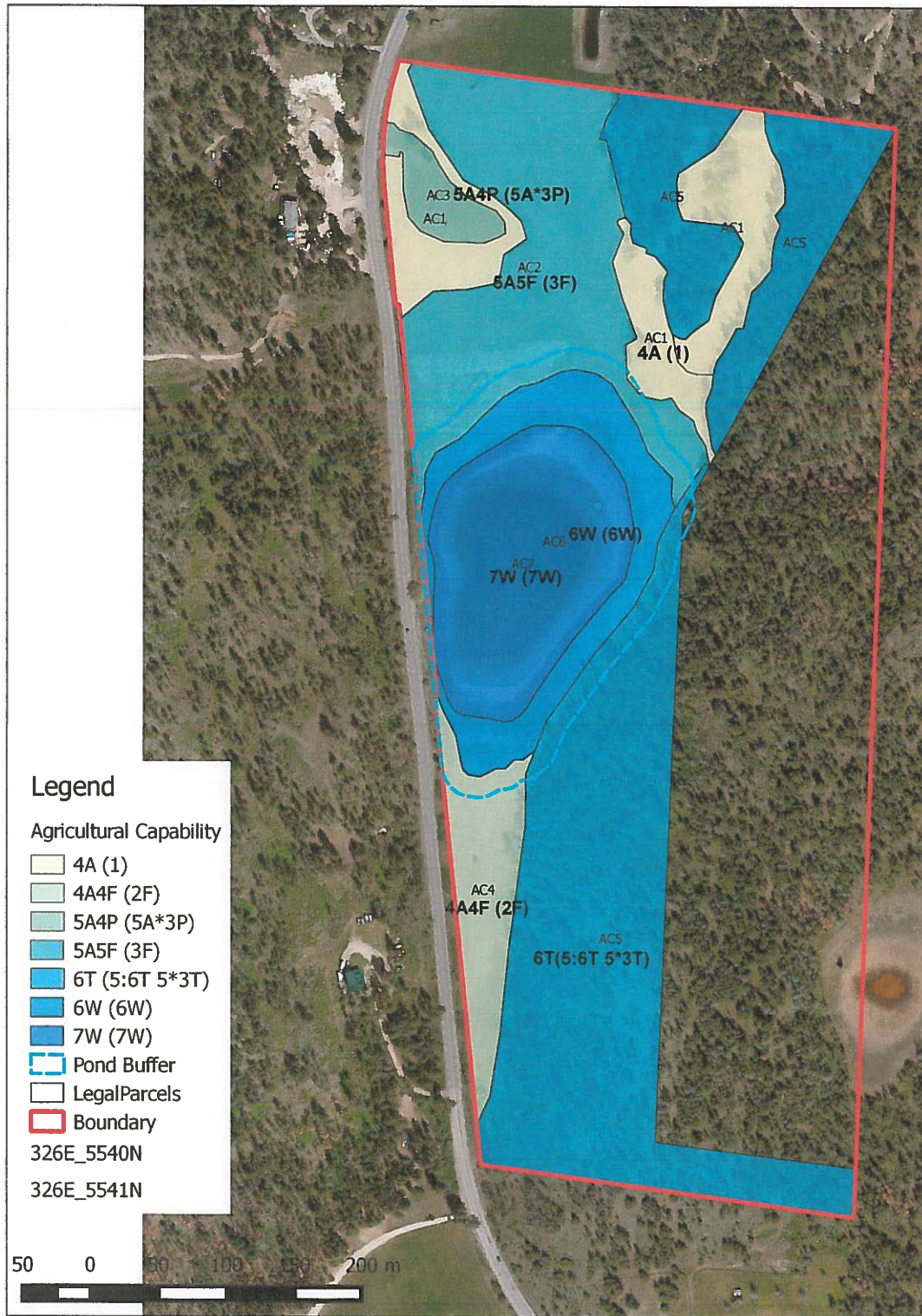


**Figure 5: BC Agricultural Capability Mapping digitized from 1:20,000 map sheet, 3755 Glenmore Rd. Kelowna,**

Source I and Capability for Agriculture of the Okanagan and Similkameen Valleys Mansheet 82F 093



**Figure 6: Soil Units determined during Agricultural Capability Assessment, Area within Pond Buffer is unavailable to Agriculture, 3755 Glenmore Rd. Kelowna BC**



**Figure 7: Agricultural Class Units and Agricultural Capability determined in Assessment, Area within Pond Buffer is unavailable to Agriculture, 3755 Glenmore Rd. Kelowna BC**

## Appendix B – Photo and Soil Pits



Photo 1: Upper Portion of the lot near test pit 1. Partially forested narrow grassland. Aspect northward



Photo 2: Lower Field near test pit 2. Aspect northward

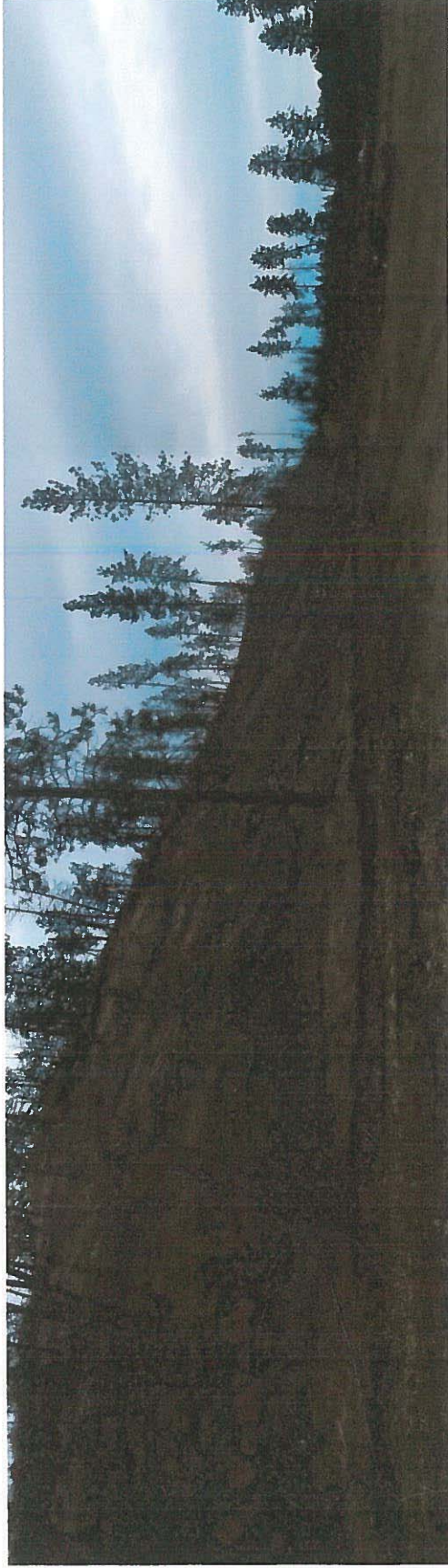


Photo 3: Steep slopes near the southern portion of the lot. Aspect southward

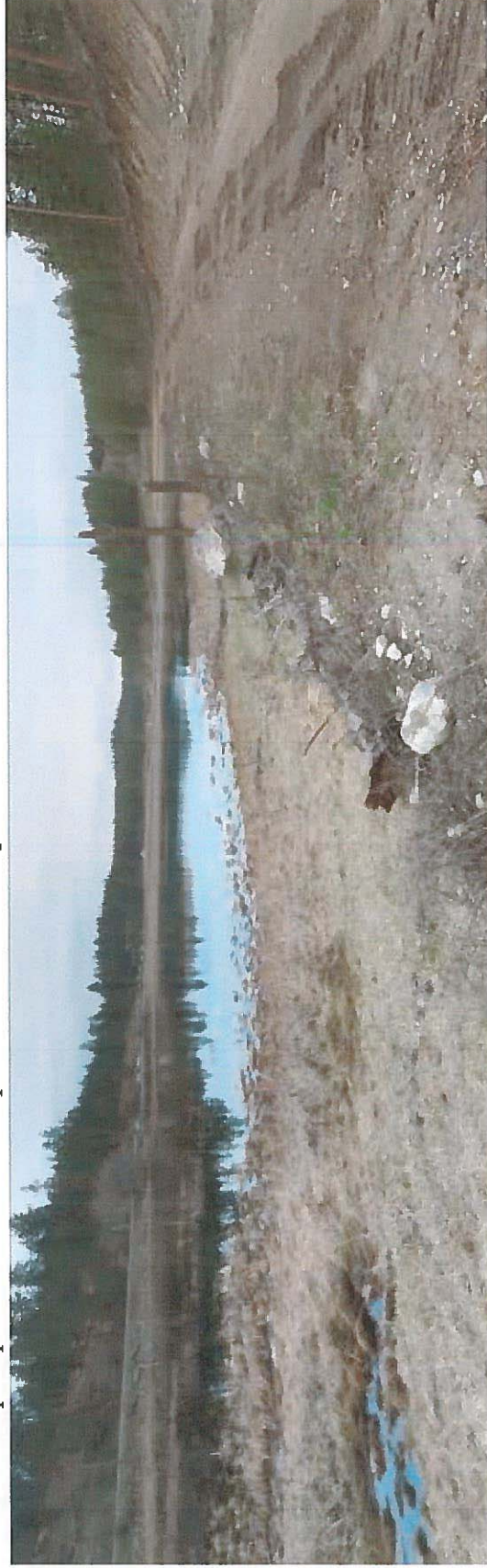


Photo 4: Pond and dirt road on southern portion of the property. Aspect northward

Project 15E006		TP #1	Slope S 1% (gentle)		26-Mar-15	Clear 5° C	
Depth	Horizon	Texture	Consistence	Colour	Mottles	Structure	Comments
3-0		-	-	-	-		grassland vegetation
0-60	A	L	Soft	Br	Few	wm.f.gr	very gentle, hummocky, mid slope
60-90	B	SiCL	Slightly Hard	LtBr	Fw/Fn	m.vff.ma	
90+	C	LS	Soft	LtBr	None	wm.f.gr	

Notes: Soil textures determined by laboratory testing, Colour (wet soils)

Land Use: Unused

\*Coarse fragments are estimated visually

Vegetation: Grassland

Rapidly Drained



Project 15E006		TP #2	Slope 0%		26-Mar-15	Clear 5° C	
Depth	Horizon	Texture	Consistence	Colour	Mottles	Structure	Comments
5-0		-		-			sedges and grasses
0-17	AP	L	Friable	DkBr	Fw/Fn	wm.fm.gr	moist
17-34	AB	SiL	Firm	Lt GrBr	Fw/Fn	wm.f.pl	moist
34-40	B	SL	Slightly Sticky	Gleyed	Fw/Fn	wm.fm.gr	wet
40+	C	LS		Y	none		
Water table at 56 cm BGS							

Notes: Soil textures determined by laboratory testing, Colour (wet soils)

Land Use: Pasture

\*Coarse fragments are estimated visually

Vegetation: Grasses and sedges

Poorly Drained





Project 15E006		TP #3	Slope 3%		26-Mar-15	Clear 5° C	
Depth	Horizon	Texture	Consistence	Colour	Mottles	Structure	Comments
3-0		-		-			grass and weeds
0-14	AP	LS	Loose	Br	-	w.f.gr	
14-43	AB	S	Loose	RBr	-	w.f.sgr	Medium sand
43+	B	S	Loose		-	w.fm.sgr	Coarse Sand. 40% Gravel

Notes: Soil textures determined by laboratory testing, Colour (wet soils)

Land Use: Pasture

\*Coarse fragments are estimated visually

Vegetation: Grasses and weeds

Rapidly Drained



Project 15E006		TP #4	Slope 0%		26-Mar-15	Clear 5° C	
Depth	Horizon	Texture	Consistence	Colour	Mottles	Structure	Comments
5-0		-		-			sedges and grasses
0-17	AP	L	Friable	DkBr	Fw/Fn	wm.fm.gr	moist
17-34	AB	SiL	Firm	Lt GrBr	Fw/Fn	wm.f.pl	moist
34-40	B	SL	Slightly Sticky	Gleved	Fw/Fn	wm.fm.gr	wet
40+	C	LS		Y	none		
Water table at 130 cm BGS							

Notes: Soil textures determined by laboratory testing, Colour (wet soils)

Land Use: Pasture

\*Coarse fragments are estimated visually

Vegetation: Grasses and sedges

Poorly Drained



Project 15E006		TP #5	Slope <1% E		26-Mar-15	Clear 5° C	
Depth	Horizon	Texture	Consistence	Colour	Mottles	Structure	Comments
5-0		-		-			grass/thatch
0-24	Ap	SiL	Soft	Br	Fw/Fn	wm.f.gr	Rooting to 30cm
24-39	AB	SiL	Loose	Lt Br	Fw/Fn	wm.f.gr	Moist
39-69	B	SL	Loose	Lt Br	Fw/Fn	wf.gr	Moist
69+	C	S	Loose	Y	-	wf.gr	Moist

Notes: Soil textures determined by laboratory testing, Colour (wet soils)

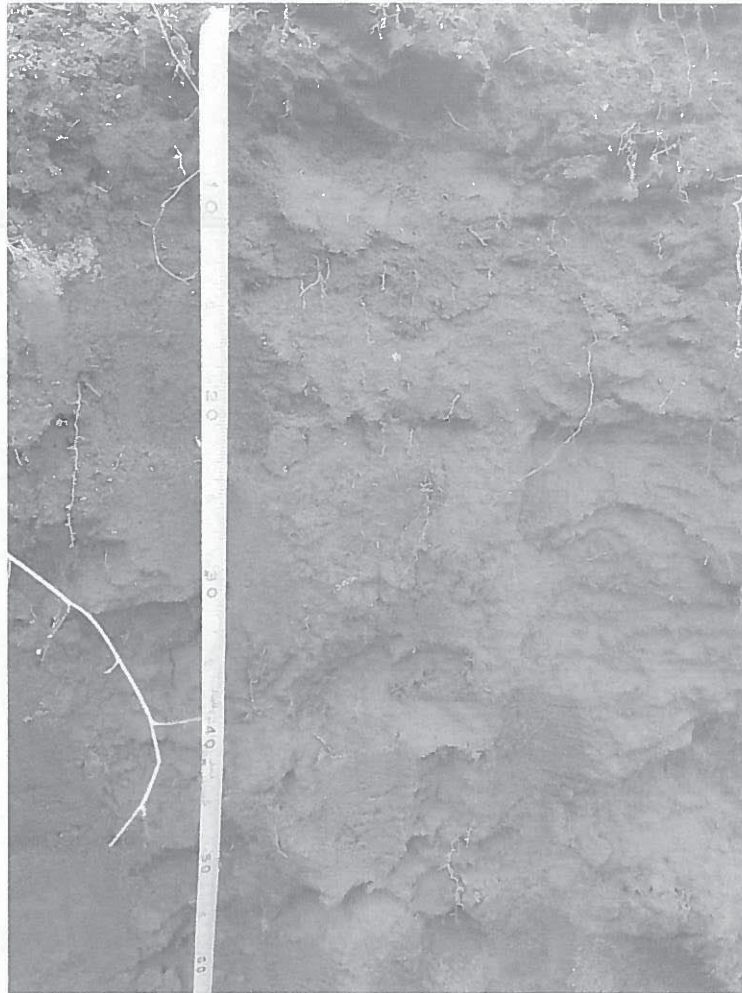
Land Use: Pasture

Gravel Portion <2.5 to 5 cm diameter

Vegetation: Grasses and weeds

\*Coarse fragments are estimated visually

Rapidly Drained



Project 15E006		TP #6	Slope 0		26-Mar-15	Clear 5° C	
Depth	Horizon	Texture	Consistence	Colour	Mottles	Structure	Comments
5-0		-		-			grass/thatch
0-21	Ap	CL	Firm	Dk Br	-	m.f.gr	Moist
21-36	AB	SiL	Firm	Dk Gr	C/Fn	m.vff.m	V. Moist
36-46	B	SiL	Firm	Lt Gr	C/Fn	m.vff.m	V. Moist
46-62	C	SiCL	Sticky	White	C/M	m.vff.m	Wet
Water Table at 62 cm BGS							

Notes: Soil textures determined by laboratory testing, Colour (wet soils)

Land Use: Pasture

Gravel Portion <2.5 to 5 cm diameter

Vegetation: Grasses and weeds

\*Coarse fragments are estimated visually

Very Poorly Drained



## **Appendix C – Agricultural and Climatic Capability Class Descriptions**

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## **LAND CAPABILITY CLASSES FOR MINERAL SOILS**

**CLASS 1:** LAND IN THIS CLASS EITHER HAS NO OR ONLY VERY SLIGHT LIMITATIONS THAT RESTRICT ITS USE FOR THE PRODUCTION OF COMMON AGRICULTURAL CROPS.

Land in Class 1 is level or nearly level. The soils are deep, well to imperfectly drained under natural conditions, or have good artificial water table control, and hold moisture well. They can be managed and cropped without difficulty. Productivity is easily maintained for a wide range of field crops.

**CLASS 2 :** LAND IN THIS CLASS HAS MINOR LIMITATIONS THAT REQUIRE GOOD ONGOING MANAGEMENT PRACTISES OR SLIGHTLY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in class 2 has limitations which constitute a continuous minor management problem or may cause lower crop yields compared to Class 1 land but which does not pose a threat of crop loss under good management. The soils in Class 2 are deep, hold moisture well and can be managed and cropped with little difficulty.

**CLASS 3:** LAND IN THIS CLASS HAS LIMITATIONS THAT REQUIRE MODERATELY INTENSIVE MANAGEMENT PRACTISES OR MODERATELY RESTRICT THE RANGE OF CROPS, OR BOTH.

The limitations are more severe than for Class 2 land and management practises are more difficult to apply and maintain. The limitations may restrict the choice of suitable crops or affect one or more of the following practises: timing and ease of tillage, planting and harvesting, and methods of soil conservation.

**CLASS 4:** LAND IN THIS CLASS HAS LIMITATIONS THAT REQUIRE SPECIAL MANAGEMENT PRACTISES OR SEVERELY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in Class 4 has limitations which make it suitable for only a few crops, or the yield for a wide range of crops is low, or the risk of crop failure is high, or soil conditions are such that special development and management practises are required. The limitations may seriously affect one or more of the following practises: timing and ease of tillage, planting and harvesting, and methods of soil conservation.

**CLASS 5:** LAND IN THIS CLASS HAS LIMITATIONS THAT RESTRICT ITS CAPABILITY TO PRODUCING PERENNIAL FORAGE CROPS OR OTHER SPECIALLY ADAPTED CROPS.

Land in Class 5 is generally limited to the production of perennial crops or other specially adapted crops. Productivity of these suited crops may be high. Class 5 lands can be cultivated and some may be used for cultivated field crops provided unusually intensive management is employed and/or the crop is particularly adapted to the conditions peculiar to these lands. Cultivated field crops may be grown on some Class 5 land where adverse climate is the main limitation, but crop failure can be expected under average conditions. Note that in areas which are climatically suitable for growing tree fruits and grapes the limitations of stoniness and/or topography on some Class 5 lands are not significant limitations to these crops.

**CLASS 6:** LAND IN THIS CLASS IS NONARABLE BUT IS CAPABLE OF PRODUCING NATIVE AND OR UNCULTIVATED PERENNIAL FORAGE CROPS.

Land in Class 6 provides sustained natural grazing for domestic livestock and is not arable in its present condition. Land is placed in this class because of severe climate, or the terrain is unsuitable for cultivation or use of farm machinery, or the soils do not respond to intensive improvement practises. Some unimproved Class 6 lands can be improved by draining and/or diking.

**CLASS 7:** LAND IN THIS CLASS HAS NO CAPABILITY FOR ARABLE OR SUSTAINED NATURAL GRAZING.

All classified areas not included in Classes 1 to 6 inclusive are placed in this class. Class 7 land may have limitations equivalent to Class 6 land but they do not provide natural sustained grazing by domestic livestock due to climate and resulting unsuitable natural vegetation. Also included are rockland, other nonsoil areas, and small water-bodies not shown on maps. Some unimproved Class 7 land can be improved by draining or diking.

Source: ALC [http://www.alc.gov.bc.ca/alr/ag\\_cap\\_details.htm](http://www.alc.gov.bc.ca/alr/ag_cap_details.htm)

## Appendix D – Analytical Data





**Analytical Report**

<b>Bill To:</b> Valhalla Environmental	<b>Project:</b>	<b>Lot ID:</b> <b>1071533</b>
<b>Report To:</b> Valhalla Environmental	<b>ID:</b> 15E006_Perrete	<b>Control Number:</b> 196-1001
2503 35th Avenue	<b>Name:</b> Ag. Cap	<b>Date Received:</b> May 25, 2015
Vernon, BC, Canada	<b>Location:</b> Kelowna	<b>Date Reported:</b> Jun 18, 2015
V1T 2S6	<b>LSD:</b>	<b>Report Number:</b> 2016791
<b>Attn:</b> Matt Davidson	<b>P.O.:</b>	
<b>Sampled By:</b> Matt Davidson	<b>Acct code:</b>	
<b>Company:</b> Valhalla		

	Reference Number	1071533-1	1071533-2	1071533-3	
	<b>Sample Date</b>	May 11, 2015	May 11, 2015	May 11, 2015	
	<b>Sample Time</b>	NA	NA	NA	
	<b>Sample Location</b>				
	<b>Sample Description</b>	TP 1 / TP 1-1 / 0-50 /	TP 2 / TP 2-1 / 0-17 /	TP 2 / TP 2-2 / 17-34	
	<b>Matrix</b>	cm Soil	cm Soil	/ cm Soil	
<b>Analyte</b>	<b>Units</b>	<b>Results</b>	<b>Results</b>	<b>Results</b>	<b>Nominal Detection Limit</b>
<b>Physical and Aggregate Properties</b>					
Moisture at 1/3 bar	%	31.3	41.8	34.4	0.1
Moisture at 15 bar	%	12.2	19.7	10.5	0.1
Texture		Loam	Loam	Silt Loam	
Sand	50 µm - 2 mm	% by weight	48.0	36.0	27.0
Silt	2 µm - 50 µm	% by weight	43.6	42.0	50.0
Clay	<2 µm	% by weight	8.4	22.0	23.0
<b>Particle Size Analysis - Dry Sieve</b>					
4.75 mm sieve	% Retained	% by weight	0.3	0.8	0.5
2.0 mm sieve	% Retained	% by weight		23.8	17.6



**Analytical Report**

<b>Bill To:</b> Valhalla Environmental	<b>Project:</b>	<b>Lot ID:</b> 1071533
<b>Report To:</b> Valhalla Environmental	<b>ID:</b> 15E006_Perrete	<b>Control Number:</b> 196-1001
2503 35th Avenue	<b>Name:</b> Ag. Cap	<b>Date Received:</b> May 25, 2015
Vernon, BC, Canada	<b>Location:</b> Kelowna	<b>Date Reported:</b> Jun 18, 2015
V1T 2S6	<b>LSD:</b>	<b>Report Number:</b> 2016791
<b>Attn:</b> Matt Davidson	<b>P.O.:</b>	
<b>Sampled By:</b> Matt Davidson	<b>Acct code:</b>	
<b>Company:</b> Valhalla		

Analyte	Matrix	Units	Reference Number	Sample Date	Sample Time	Sample Location	Results	Results	Nominal Detection Limit
			1071533-2	May 11, 2015	NA	TP 2 / TP 2-1 / 0-17 / TP 6 / TP 6-1 / 0-21 /			
<b>Aggregate Organic Constituents</b>									
Organic Matter		% by weight					4.1	6.2	0.1
<b>Available Nutrients</b>									
Nitrate - N	Farmsoil	ppm					9	8	2
Phosphorus	Farmsoil	ppm					15	15	5
Potassium	Farmsoil	ppm					>600	222	25
Sulfate-S	Farmsoil	ppm					14	113	1
Copper	FS Micro-nutrients	ppm					0.8	0.6	0.1
Iron	FS Micro-nutrients	ppm					10	10	2
Manganese	FS Micro-nutrients	ppm					3.1	1.9	0.1
Zinc	FS Micro-nutrients	ppm					<0.5	<0.5	0.5
Base saturation	FS Base Saturation	%					<100	100	
Calcium	FS Base Saturation	%					<60.0	69.8	
Magnesium	FS Base Saturation	%					<29.6	22.0	
Sodium	FS Base Saturation	%					<5.6	6.4	
Potassium	FS Base Saturation	%					>4.7	1.8	
TEC	FS Base Saturation	meq/100g					>33.0	31.9	
Calcium	FS Macro-nutrients	ppm					3970	4460	30
Magnesium	FS Macro-nutrients	ppm					1190	854	5
Sodium	FS Macro-nutrients	ppm					430	470	30
Boron	FS Micro-nutrients	ppm					0.3	<0.2	0.1
<b>Hot Water Soluble</b>									
Boron	FS Micro-nutrients	ppm					0.3	<0.2	0.1
<b>Soil Acidity</b>									
pH	1:2 Soil:Water	pH					9.0	8.5	
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m at 25 C					0.79	1.35	0.02
<b>Water Soluble Parameters</b>									
Chloride	Available	mg/kg					7.6	118	0.5
<b>Lime Requirement</b>									
pH	SMP	pH					Not Required	Not Required	
Lime		T/ac					0	0	



**Analytical Report**

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2503 35th Avenue	<b>Name:</b> Ag. Cap	<b>Date Received:</b> May 25, 2015
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<b>Attn:</b> Matt Davidson	<b>P.O.:</b>	
<b>Sampled By:</b> Matt Davidson	<b>Acct code:</b>	
<b>Company:</b> Valhalla		

	Reference Number	1071533-4	1071533-5	1071533-6	
	<b>Sample Date</b>	May 11, 2015	May 11, 2015	May 11, 2015	
	<b>Sample Time</b>	NA	NA	NA	
	<b>Sample Location</b>				
	<b>Sample Description</b>	TP 2 / TP 2-3 / 34-40	TP 2 / TP 2-4 / 40+ /	TP 3 / TP 3-1 / 0-14 /	
	<b>Matrix</b>	/ cm Soil	cm Soil	cm Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Physical and Aggregate Properties</b>					
Moisture at 1/3 bar	%	14.0	9.2	10.7	0.1
Moisture at 15 bar	%	3.8	2.9	4.1	0.1
Texture		Sandy Loam	Loamy Sand	Loamy Sand	
Sand	50 µm - 2 mm % by weight	61.0	81.0	77.0	0.1
Silt	2 µm - 50 µm % by weight	32.0	15.0	19.0	0.1
Clay	<2 µm % by weight	7.0	4.0	4.0	0.1
<b>Particle Size Analysis - Dry Sieve</b>					
4.75 mm sieve	% Retained	1.3	0.5	0.2	0.1
2.0 mm sieve	% Retained	17.6	3.7	3.8	0.1

**Analytical Report**

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V1T 2S6	<b>LSD:</b>	<b>Report Number:</b> 2016791
<b>Attn:</b> Matt Davidson	<b>P.O.:</b>	
<b>Sampled By:</b> Matt Davidson	<b>Acct code:</b>	
<b>Company:</b> Valhalla		

	Reference Number	1071533-7	1071533-8	1071533-9	
	<b>Sample Date</b>	May 11, 2015	May 11, 2015	May 11, 2015	
	<b>Sample Time</b>	NA	NA	NA	
	<b>Sample Location</b>				
	<b>Sample Description</b>	TP 3 / TP 3-2 / 14-43	TP 5 / TP 5-3 / 39-50	TP 6 / TP 6-1 / 0-21 /	
	<b>Matrix</b>	/ cm Soil	/ cm Soil	cm Soil	
<b>Analyte</b>	<b>Units</b>	<b>Results</b>	<b>Results</b>	<b>Results</b>	<b>Nominal Detection Limit</b>
<b>Physical and Aggregate Properties</b>					
Moisture at 1/3 bar	%	5.7	18.2	59.7	0.1
Moisture at 15 bar	%	2.4	6.3	28.0	0.1
Texture		Sand	Sandy Loam	Clay Loam	
Sand	50 µm - 2 mm % by weight	90.0	72.6	25.0	0.1
Silt	2 µm - 50 µm % by weight	8.0	23.4	46.6	0.1
Clay	<2 µm % by weight	2.0	4.0	28.4	0.1
<b>Particle Size Analysis - Dry Sieve</b>					
4.75 mm sieve	% Retained % by weight	1.6	0.3	<0.1	0.1
2.0 mm sieve	% Retained % by weight	10.1	1.3	47.8	0.1



**Analytical Report**

<b>Bill To:</b> Valhalla Environmental	<b>Project:</b>	<b>Lot ID:</b> <b>1071533</b>
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2503 35th Avenue	<b>Name:</b> Ag. Cap	<b>Date Received:</b> May 25, 2015
Vernon, BC, Canada	<b>Location:</b> Kelowna	<b>Date Reported:</b> Jun 18, 2015
V1T 2S6	<b>LSD:</b>	<b>Report Number:</b> 2016791
<b>Attn:</b> Matt Davidson	<b>P.O.:</b>	
<b>Sampled By:</b> Matt Davidson	<b>Acct code:</b>	
<b>Company:</b> Valhalla		

**Reference Number** 1071533-10  
**Sample Date** May 11, 2015  
**Sample Time** NA  
**Sample Location**  
**Sample Description** TP 6 / TP 6-2 / 21-46  
 / cm  
**Matrix** Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Physical and Aggregate Properties</b>					
Moisture at 1/3 bar	%	48.5			0.1
Moisture at 15 bar	%	19.7			0.1
Texture		Silt Loam			
Sand	50 µm - 2 mm	% by weight	26.0		0.1
Silt	2 µm - 50 µm	% by weight	50.0		0.1
Clay	<2 µm	% by weight	24.0		0.1
<b>Particle Size Analysis - Dry Sieve</b>					
4.75 mm sieve	% Retained	% by weight	<0.1		0.1
2.0 mm sieve	% Retained	% by weight	21.5		0.1

Approved by:   
 Anthony Neumann, MSc  
 Laboratory Operations Manager

## Methodology and Notes

<b>Bill To:</b> Valhalla Environmental	<b>Project:</b>	<b>Lot ID:</b> <b>1071533</b>
<b>Report To:</b> Valhalla Environmental	<b>ID:</b> 15E006_Perrete	<b>Control Number:</b> 196-1001
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V1T 2S6	<b>LSD:</b>	<b>Report Number:</b> 2016791
<b>Attn:</b> Matt Davidson	<b>P.O.:</b>	
<b>Sampled By:</b> Matt Davidson	<b>Acct code:</b>	
<b>Company:</b> Valhalla		

## Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Boron in farm soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	26-May-15	Exova Edmonton
Chloride in farmsoil	SSSA Book Series, no. 3	* Testing Soils for Sulfur, Boron, Molybdenum, and Chlorine, Chapter 10	26-May-15	Exova Edmonton
Macronutrients in Farm Soils	McKeague	* Ammonium Acetate Extractable Cations, 4.51	26-May-15	Exova Edmonton
Micronutrients in Farm Soil	McKeague	* DTPA-TEA Extractable Elements, 4.65	26-May-15	Exova Edmonton
Nutrients in Farm Soil	Comm. Soil Sci. Pl. Anal.	* Modified Kelowna Soil Test, Vol 26, 1995	26-May-15	Exova Edmonton
Organic Matter by Ignition	McKeague	* Loss on Ignition (LOI), 3.8	26-May-15	Exova Edmonton
Particle Size Analysis - GS	Carter	* Hydrometer Method, 55.3	26-May-15	Exova Edmonton
Particle Size Analysis - GS	McKeague	* pH in 0.01M Calcium Chloride, 3.11	26-May-15	Exova Edmonton
Particle Size by Dry Sieve	Carter	* Sieve Analysis (Mechanical Method), 55.4	26-May-15	Exova Edmonton
pH and Conductivity in farm soil	McKeague	* 1:2 Soil:Water Ratio, 4.12	26-May-15	Exova Edmonton
SMP Lime Requirements	Carter	* Shoemaker-Mclean-Pratt Single-Buffer Method, 12.2	26-May-15	Exova Edmonton
Sulfate in Farm Soil	McKeague	* Sulfate Extractable by 0.1M CaCl <sub>2</sub> , 4.47	26-May-15	Exova Edmonton
Water Retention Curves	Agronomy No 9, Part 1	* Water Retention: Laboratory Methods, 26-6	27-May-15	Exova Edmonton

\* Reference Method Modified

## References

Agronomy No 9, Part	Methods of Soil Analysis, Part 1
APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis.
Comm. Soil Sci. Pl.	Communications in Soil Science and Plant Analysis
McKeague	Manual on Soil Sampling and Methods of Analysis
SSSA Book Series,	Soil Testing and Plant Analysis

## Comments:

- Report was issued to include addition of 4.75mm sieve analysis on all samples requested by Matt Davidson of Valhalla Environmental. Previous report 2012707.

Exova  
7217 Roper Road NW  
Edmonton, Alberta  
T6B 3J4, Canada

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W: [www.exova.com](http://www.exova.com)



## Methodology and Notes

Bill To:	Valhalla Environmental	Project:		Lot ID:	<b>1071533</b>
Report To:	Valhalla Environmental	ID:	15E006_Perrete	Control Number:	196-1001
	2503 35th Avenue	Name:	Ag. Cap	Date Received:	May 25, 2015
	Vernon, BC, Canada	Location:	Kelowna	Date Reported:	Jun 18, 2015
	V1T 2S6	LSD:		Report Number:	2016791
Attn:	Matt Davidson	P.O.:			
Sampled By:	Matt Davidson	Acct code:			
Company:	Valhalla				

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Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

## Appendix E – Resume



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**Matthew Davidson BSc., P.Ag., EP., ASCT. – Environmental Scientist**


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Matthew Davidson is an Environmental Scientist with a background in environmental biology, environmental assessment, agricultural assessment and contaminated sites. With a diverse work history Matthew has worked for clients in various sectors including oil and gas, forestry, agriculture, land development, construction, recycling, and waste management industries. Project work has taken Matthew throughout British Columbia, into Alberta and the North West Territories. Matthew is a Partner at Valhalla Environmental Consulting Inc. in Coldstream, BC

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**Environmental Work Experience**


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<b>Partner / Environmental Scientist</b> Valhalla Environmental Consulting Ltd, Coldstream, BC	July 2011
<b>Owner / Environmental Scientist</b> Sage Environmental Consulting Ltd, Vernon, BC	January 2008
<b>Environmental Scientist</b> TerraWest Environmental Consultants Ltd., Victoria, BC	August 2005
<b>Field Foreman</b> Alpine Environmental Ltd. Fort St. John, BC	May 2001

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**Education**


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<b>BSc. Environmental Science</b> , Royal Roads University	2005
<b>Dipl.Tech. Environmental Science</b> , Camosun College	2002
<b>A.S. Biology</b> , Camosun College	1999

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**Professional Associations**


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**P.Ag.** - British Columbia Institute of Agrologists (BCIA)  
**ASCT.** - Applied Science Technologists and Technicians of British Columbia (ASTTBC)  
**E.P.** - Environmental Professional (Eco Canada)  
     A5 - Restoration & Reclamation  
     A7 - Environmental Protection Management  
**SER** - Member of the Society for Ecological Restoration

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**Environmental Work Summary**


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- Agricultural Land Capability Assessments (ALR)
- Unmanned Aerial Vehicle Pilot / Photogrammetry and GIS
- Habitat Assessment and Mapping
- Ecological Restoration Project Design and Management
- Environmental Impact Assessments
- Riparian Areas Assessments
- Stage 1 & 2 preliminary site investigations (PSI), Detailed Site Investigations (DSI) & Land Remediation
- Environmental Monitoring for Construction Projects and Instream Works
- Erosion and Sediment Control Design, Implementation and Monitoring
- Spill response, and remediation of terrestrial and aquatic spills
- Policy writing & application package preparation
- Facility audit design and implementation for environmental compliance and performance
- Environmental Sampling Program Design and Implementation
- Instructor for Malaspina College; WHMIS, TDG, Spill Response and Environmental Awareness courses
- Site assessments and inspections for pipelines right of way and oil and gas well sites
- Industrial waste management, for the upstream Oil & Gas Industry
- Groundwater / Water Quality Monitoring Design and Implementation

## Select Project Portfolio

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**Agricultural Land Capability Assessments (ALR Applications) – North and Central Okanagan, BC 2011-2015:** Scope of services includes; ALR soil mapping review, on site soil survey, review of agricultural operations analytical testing, agricultural capability assessment and reporting prepared for the Agricultural Land Commission

**Section 9 Application and Notification – Environmental Assessments for In-Stream Work – Multiple Sites 2010 to present**  
– Services include site assessment and preparation of and site specific environmental assessment for in-stream works on lakes and streams in the BC Interior

**Construction Environmental Monitoring – Regional District of Central Okanagan BC 2014** – Provided on site support for the construction of the RDCO Fire Boat House in Okanagan Lake. Duties included daily logging and summary reporting that were provided to the client and Ministry of Forests Lands and Natural Resource Operations. Habitat restoration measures were outlined to ensure a no-net loss outcome for this project.

**Construction Environmental Monitoring – Bridge Construction Two Sites BC 2012** – Services included environmental monitoring for two bridge construction projects over fish bearing streams in BC's southern interior. Daily logging and summary reporting were provided to the client and Ministry of Forests Lands and Natural Resource Operations.

**Environmentally Sensitive Areas Assessment and Terrestrial Habitat Mapping – Vernon BC 2011/2012** – Provided habitat mapping of the Foothills Neighbourhood in Vernon BC to inform the City of Vernon neighbourhood plan development. Services included review of existing TEM and SEI 1:20000 mapping, confirmation field visits to updated and correct existing mapping to current conditions, creation of site specific 1:3000 habitat mapping, invasive species survey, rare and endangered species survey, and reporting.

**Spill Remediation Confirmation Analysis – West Kootenay BC 2011/2012** – Scope of services induced; sampling plan design to meet MoE standards, sampling for laboratory analysis, contractor liaison regarding remediation measures, compliance analysis with BC CSR, and confirmation of remediation reporting

**Spill Remediation Confirmation Analysis – CSRD BC 2011** – Scope of services induced; sampling plan design to meet MoE standards, sampling for laboratory analysis, contractor liaison regarding remediation measures, compliance analysis with BC CSR, and confirmation of remediation reporting

**Contaminated Site Investigation and Remediation Various Clients, Multiple Locations BC 2005 to Present:** Stage 1 & 2 Preliminary Site Investigations (Phase 1&2 ESAs), Detailed Site Investigations, Land Remediation

**Spill Response/Remediation/Habitat Restoration – Cherryville, (Gagney Creek), BC – 2009 (Currently in Monitoring Phase):** Scope of services included; emergency spill response, installation of water treatment, land remediation, instream works, environmental monitoring, habitat reconstruction and ecological restoration, long term monitoring, regulatory liaison, environmental, freshwater invertebrate surveys

**Environmentally Sensitive Areas Assessments – Various Clients, Okanagan BC – 2010 / 2011:** Identify, classify, rate and map terrestrial ecosystems based on vulnerability and scarcity. Provide GIS mapping, interpretation and methods reporting including mitigation measures for proposed development projects.

**Environmental Impact Assessment - Environmental Assessment - Private Agricultural Land Owner Land, (Grandon Creek), Qualicum, BC 2006:** Developed and implemented a sampling program to determine the impact to soils and surface water on a farm that was subject to composted biosolid application. This project involved designing a sampling plan and method, laying out a representative predetermined sample plan with GIS before conducting sampling, GPS location and confirmation of sample point, collection of soil and surface water samples, soil profiling, determining appropriate laboratory analyses, interpretation of analytical results, and synthesis of a final report.

**Environmental Impact Assessment, Facility Design and Construction Monitoring - Composting Operation, Ladysmith BC 2007:** Designed and performed an Environmental Impact Assessment for a proposed composting facility to meet the requirements of the Organic Materials Recycling Regulation, assisted in facility design to ensure efficient operation and minimize environmental impacts, developed and implemented a long term surface and groundwater monitoring program.

**Groundwater Monitoring Cowichan, (Gordon River), BC 2005-2007:** Surface Water and Groundwater sampling, analysis and interpretation for impacts to groundwater and freshwater aquatic habitat due to numerous wood waste landfills

**Groundwater Monitoring, Chasm, BC 2005-2008:** West Fraser Mills - Conducted groundwater monitoring for on site woodwaste landfills at the Chasm Mill

**Spill Remediation - EnviroWest, Nanaimo BC 2006:** Spill response on a property bordering a salt water marsh, duties included supervision of response activities, sampling of impacted soils and nearby surface water, sample analysis prescription, delineating spill extent, manifested removal of impacted soils to approved treatment facility, reconstruction of the damaged site, analysis interpretation and final report synthesis.

**Riparian Areas Regulation QEP - Various Clients, Southern BC 2006 to Present:** Duties include habitat and site assessment, riparian habitat enhancement measures, impact mitigation management, regulatory liaison, reporting, environmental monitoring, variance applications.

**Environmental Impact Assessment - Land Lessee, Quaaout Reserve, (Little Shuswap Lake), BC - 2009:** Comprehensive EIA performed to review a riparian construction project on Quaaout Reserve. EIA for the project was approved by INAC and DFO.

**Environmental Impact Assessment - Land Owner, Central Okanagan, (Okanagan Lake,) BC - 2009:** Comprehensive EIA performed to review a riparian construction project on Okanagan Lake. EIA for the project was approved by RDCO and MoE.

**Construction Environmental Monitoring Vernon, BC with Naito Environmental, 2010:** Provided daily monitoring during the demolition of a bridge over Vernon Creek. Including on-site technical support, mitigation measure design and implementation, creek condition monitoring, regulatory liaison and reporting.

**Construction Environmental Monitoring Okanagan, (Kalamalka Lake) BC Parks with Naito Environmental, 2010:** Daily Monitoring during the installation of two wharf structures in Kalamalka Lake with bedrock drilled piers in an area of high quality fish habitat. Services included onsite technical support, environmental mitigation measures, reporting, and regulatory liaison.

**Construction Environmental Monitoring for – Katchmar Construction, (Sheridan Lake, Staley Lake, Staley Lake Ck) BC – March 2008 to April 2008:** Provided on-site environmental monitoring for a wetland crossing road construction project. Duties included: daily monitoring, daily log, reporting, regulatory liaison, onsite advice and restoration design

## Skills and Certifications

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### Fieldwork

- Stream surveys & Riparian Areas Assessment
- Freshwater, groundwater, and marine water sampling
- Monitoring well and drill sampling supervision
- Soil texturing, profiling and sampling
- Soil vapour sampling
- Sediment sampling
- Site assessment, descriptions and mapping
- Spill response, investigation, assessment and remediation
- Orienteering and survival knowledge

### Equipment

- Sensefly SwingeletCAM – (UAV)
- Field meters, multi meters, monitoring apparatus, high flow and low flow purging and sample pumps
- GPS field operator
- SCBA, and SCUBA
- ATV, snowmobile and helicopter awareness
- Small engine use and repair
- Boating 200+ hours (marine and freshwater)

### I.T.

- GIS, CAD
- Web page development
- Office suite competency
- Statistical analysis software
- Data base development
- Data analysis applications

### Courses and Certificates

- Contaminated Site Investigation
- Soil Bioengineering
- Soil Vapour Assessment
- Environmental Monitoring for Construction
- Erosion and Sediment Control
- Riparian Area Regulation Training
- Pleasure Craft Operator
- Streamkeeper Training
- Level 1 First Aid
- Radio telephone operator certificate
- P.A.D.I. advanced open water diver
- R.I.C. certified level 3 GPS field operator
- Class 5 drivers license
- Defensive driving course
- Ecological Control for Invasive Species

**ATTACHMENT** D

This forms part of application

# A20-0010

Planner  
Initials

TC



City of  
**Kelowna**  
DEVELOPMENT PLANNING