Pemberton Agricultural Parks Master Plan

Phase 1: Soil Technical Report

Submitted by:
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Table of Contents

List of Tables

List of Figures

Executive Summary

The assessment of four sites totaling 27.5 hectares is being conducted for potential agricultural production as part of the *Pemberton Agricultural Parks Master Plan*. This *Soil Technical Report* is the main deliverable of Phase 1, site and soil assessment.

The methods used to develop this technical report included three approaches:
1. Desk-based research;
2. Site visits; and
3. Laboratory analysis.

The four parcels were assessed as three sites (Site A, Site BC, and Site D) and were visited on August 26th 2015 so that the parcels could be ground-truthed and soil samples could be collected. Soil samples were sent via courier to A & L Laboratories in London, ON, for analysis of the following parameters:

- Physio-Chemical: pH, CEC, organic matter, particle size analysis.
- Nutrients: Percent base saturation, available P, NO_3-N, available micronutrients.
- Trace metals: Comparison of potentially toxic elements (e.g. As, Hg, Pb) to published soil quality guidelines (OMRR and CEQG).

Results indicate that the sites are a combination of loams, silty clay loams, and clay loams with good to excellent agricultural capability. Main challenges to capability relate to seasonally high water tables, which could be managed through proper drainage and irrigation, and some degree of stoniness at Site D.

While organic matter, phosphorus, and nitrogen levels are relatively low, this is not uncommon for sites that have not been previously cultivated, or (as suspected in the case of Site A), may have had repeated crop production with little to minimal levels of fertilizers applied. All pH and micronutrient levels are generally favourable. None of the trace metal results (including Zn) indicated any levels of toxicity concern when compared to two published guidelines: OMRR Land Application Guidelines for Class A Compost and the CEQG soil quality guidelines for human health.

In summary, three sites were assessed for agricultural potential within the Pemberton area, and minimal constraints were found. It is expected that these constraints can be overcome through a combination of installing drainage and irrigation systems, and amending soil with organic matter and organic fertilizers. Continued soil testing and monitoring is recommended to provided detailed nutrient application recommendations if crop production is chosen at a future time.

Introduction

Stewardship Pemberton Society (SPS), in partnership with the Village of Pemberton (VoP), is creating an Agricultural Parks Master Plan. Four publicly-owned parcels of land totaling 27.5 hectares (approximately 67 acres) are being assessed regarding their suitability for community supported agricultural activities.

Upland Agricultural Consulting Ltd was retained to provide agrology services. Specifically, four phases of work are to be completed:

1) Analysis of sites and soils
2) Assessment of crop suitability and best management practices for the sites
3) Connections to the broader community
4) Agricultural assessment report

This *Soil Technical Report* is the main deliverable of Phase 1.

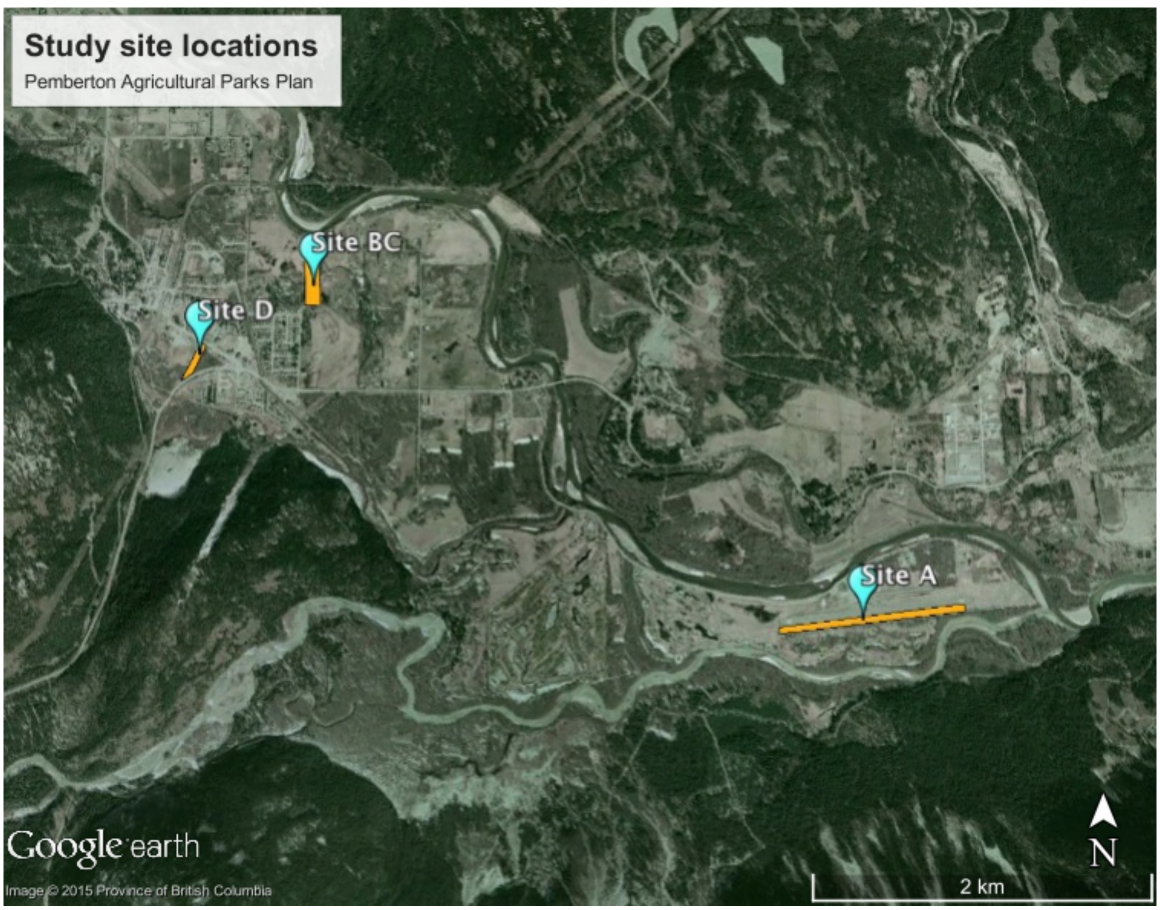

Figure 1. Study site locations within the vicinity of Pemberton, BC.

Methodology

The four parcels were assessed as three distinct sites:

- Site A: located adjacent to a low use landing strip at the Pemberton Airport;
- Site B&C: two adjacent parcels located in a rural-urban interface between the VoP and the Squamish Lillooet Regional District (SLRD); and
- Site D: located under BC Hydro powerlines immediately adjacent to Signal Hill Elementary School.

The methods used to develop this technical report included three approaches:

1. Desk-based research: reviewing maps (geological, soil series, agricultural capability, zoning, etc.), reading published soils reports, and accessing online tools such as Google Earth.
2. Site visits: The sites were toured by the consultant along with the client on August 26th 2015. The visit was used to ground-truth the sites, verify mapping accuracy, take photographs, and obtain soil samples.
3. Laboratory analysis: Soil samples obtained at each of the sites were collected during the August 26th, 2015 site visits and shipped to an external laboratory for analysis.

To obtain the soil samples, three soil pits were dug within the potentially agriculturally active portions of each site. The locations of the three pits were chosen based on their representation of the differing topography and varying agricultural capability limitations.

The following steps were taken while collecting the samples:

1. Sampling sites were pre-identified in the field visually.
2. Vegetation residue was removed from the top layer of the soil.
3. A shovel was used to dig a small soil pit to a depth of 20cm - 30cm. This depth represents the depth to which most soil is tilled and contains the majority of a crop's roots[1].
4. For each site, 3 pits were dug and soil from each pit was collected in a bucket. Lumps were broken up and stones and roots were removed, and the soil was mixed thoroughly.
5. From these 3 pits a composite soil sample was obtained and divided into two lab submissions (e.g. A1 and A2).
6. The plastic bags were stored on ice and were shipped to an external laboratory (A & L Laboratories Canada) for analysis.

[1] Bertrand, R.A., Hughes-Games, G.A., and Nikkel, D.C., 1991. Soil Management Handbook for the Lower Fraser Valley. 2nd Edition. BC Ministry of Agriculture, Fisheries, and Food.

Table 1. Location of soil tests at Site A.

Soil Pit ID	Elevation	Latitude	Longitude
Aa	206 m	50° 18’ 05”	122° 44’ 33”
Ab	204 m	50° 18’ 06”	122° 44’ 19”
Ac	204 m	50° 18’ 06”	122° 44’ 24”

Figure 2. Soil sampling locations at Site A.

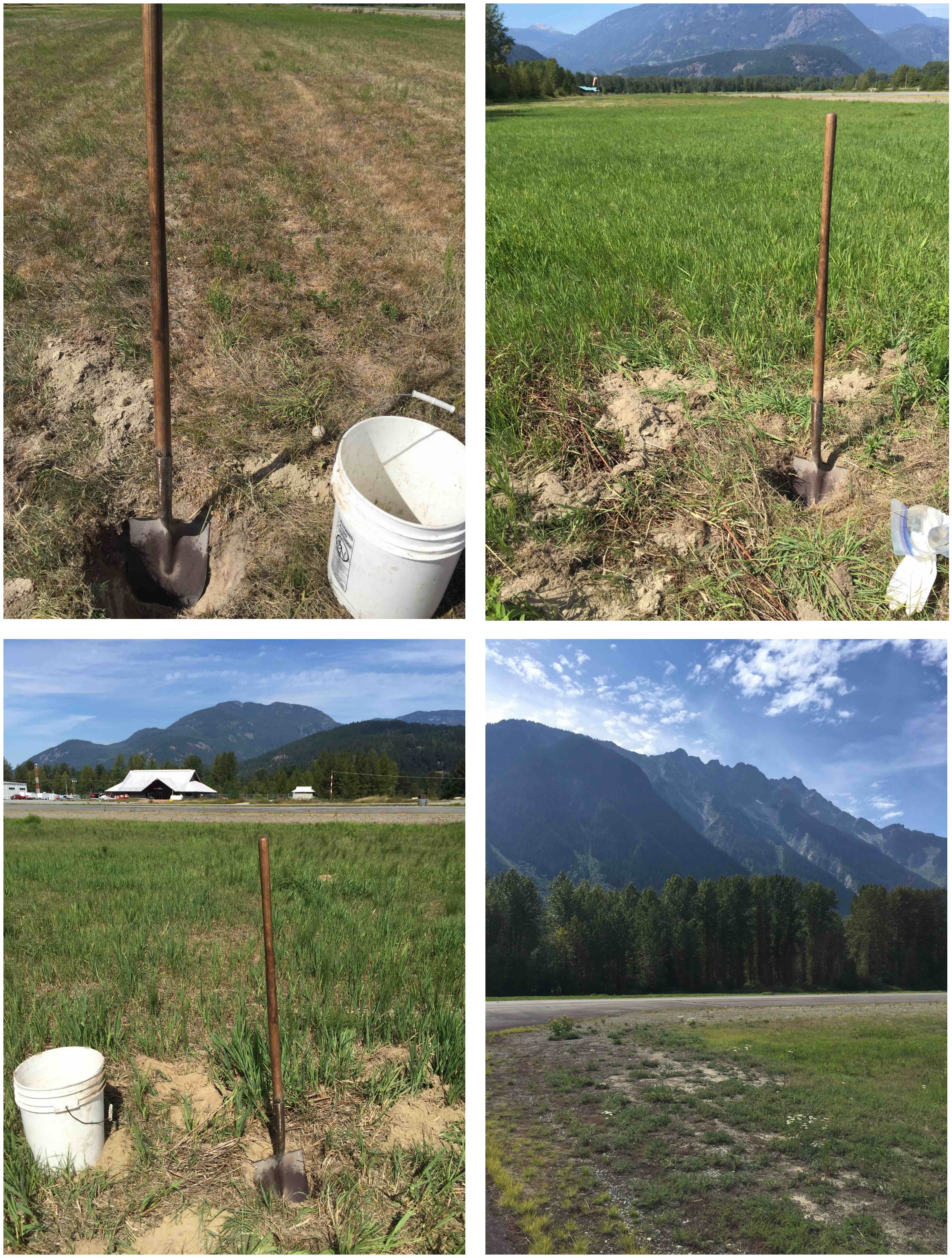

Figure 3. Scenes from soil sample collection at Site A.

Table 2. Location of soil tests at Site BC.

Soil Pit ID	Elevation	Latitude	Longitude
BCa	209 m	50° 19' 17"	122° 47' 29"
BCb	210 m	50° 19' 18"	122° 47' 31"
BCc	209 m	50° 19' 17"	122° 47' 31"

Figure 4. Soil sampling locations at Site BC.

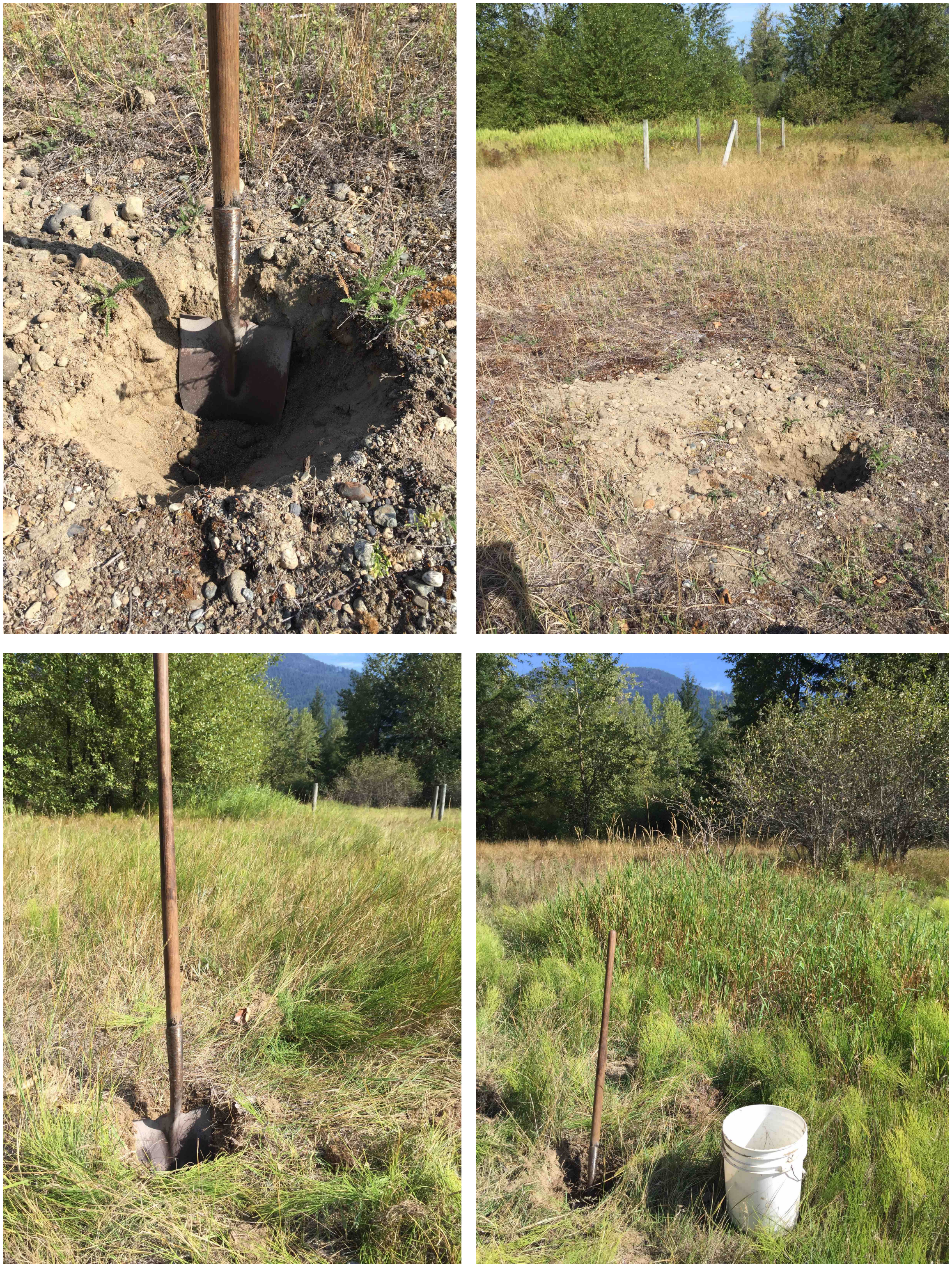

Figure 5. Scenes from soil sample collection at Site BC.

Table 3. Location of soil tests at Site D.

Soil Pit ID	Elevation	Latitude	Longitude
Da	211 m	50° 19’ 06”	122° 48’ 09”
Db	211 m	50° 19’ 04”	122° 48’ 10”
Dc	211 m	50° 19’ 03”	122° 48’ 11”

Figure 6. Soil sampling locations at Site D.

Figure 7. Scenes from soil sample collection at Site D.

Site Characteristics

General Site Descriptions

Table 4. Biophysical characteristics of the study sites.

Parameter	Site A	Site B & C	Site D
Location	This site is located adjacent to a small landing strip at the Pemberton Airport.	Located at the end of Harrow Rd at the rural-urban interface between VoP and SLRD.	Long thin piece of land running North to South adjacent to Signal Hill Elementary School.
Size (Ha)	20 hectares	5.95 hectares	1.5 hectares
Previous agricultural uses	The site has previously been used to cultivate hay and had been recently cut.	Unknown.	Not previously used for agriculture. Vegetation is regularly cut back under hydro lines.
Current land cover	Hay/grass, horsetails, clover.	Scrubby vegetation, some trees (older crab apple, alder).	Lots of weeds, secondary growth. Reeds, cattails, and wild roses in wetter areas.
Water and drainage	No active signs of irrigation were visible, however vegetation was green and vigorous suggesting that drainage is relatively good and water is readily available.	Soils appeared sandy and rapidly drained. No indication of irrigation. Potential water source exists adjacent to the site. Surface vegetation appeared dry.	Boggy and wet towards the south end of the site. Adjacent to a drained and irrigated playfield.
Terrain	Flat with some small pockets of undulating terrain.	Flat with slopes towards waterbodies along the west and north ends of the site.	Undulating and somewhat stony.
Zoning	Agricultural Land Reserve	Agricultural Land Reserve	Non-ALR
Agricultural Capability Class	2w (1) Class 2 due to excess water (seasonally high water tables). Improvable to Class 1 with proper drainage and/or irrigation.	2^8w – 4^2w (1^8 – 2^2w) A mix of Class 2 and 4 due to excess water (seasonally high water tables). Improvable to 80% Class 1 and 20% Class 2 with proper drainage and/or irrigation.	5^6m,p – 4^4w (4^6p,m – 2^4w) A mix of Class 4 and 5 due to moisture issues and stoniness. Improvable to a mix of Class 2 and 4 soils with drainage and/or irrigation.

Soils and Geology

Soil is a living mineral and organic matrix located at the surface of the earth's crust. Soil has been formed over thousands of years and can be described by morphological, physical, chemical, and biological characteristics. Most soil characteristics vary with depth and are the product of many factors including climate, geology, biology, and water.

Table 5. Geology and soil taxonomy of the study sites.

Parameter	Site A	Site B & C	Site D
Geology[2]	Silty and sandy fluvial deposits of the Lillooet River floodplain.	Silty and sandy fluvial deposits of the Lillooet River floodplain.	Mainly anthropogenic (man-made or modified materials) due to nearby land developments.
Soil Order[3]	Regosol (Gleyed and Orthic) and Gleysol (Rego)	Gleysol (Rego)	Gleysol (Rego)
Soil Series[4]	The majority of the site is comprised of Sankey (SA) soils, with smaller amounts of Gates Lake (GA), and Wolverine (WO) soils interspersed throughout.	The majority of the site is comprised of Wolverine (WO) soils with some Scobie (SC) soils interspersed throughout.	The majority of the site is comprised of Sankey (SA) soils with some Scobie (SC) soils interspersed throughout.
Soil Texture[5]	Loam and Clay Loam	Silty Clay Loam and Clay Loam	Loam and Silty Clay Loam

Soil Order Descriptions[6]

Regosols
Regosolic soils are weakly developed. They may lack development from any of a number of factors. In the case of Site A it is most likely attributed to youthfulness of the material, or recent alluvium deposits. Regosolic soils are generally rapidly to imperfectly drained and occur under a wide range of vegetation and climates.

Gleysols
Gleysolic soils are defined on the basis of color and mottling, which indicates the influence of periodic or sustained reducing conditions (wetness). Saturation with water may result from either high groundwater tables or temporary accumulation of water above a relatively impermeable layer, or both. In areas of subhumid climate, Gleysolic soils occur commonly in shallow depressions and on level lowlands that are saturated

[2] Soil Survey of the Pemberton Valley, BC. 1980. Roxanna L. Beale Kuurne, PAg. RAB Bulletin 16. BC Ministry of Environment.
[3] Agriculture and Agri-Food Canada (AAFC), 1998. The Canadian System of Soil Classification, 3rd Edition. http://sis.agr.gc.ca/cansis/taxa/cssc3/index.html
[4] Soil Survey of the Pemberton Valley, BC. 1980. Roxanna L. Beale Kuurne, PAg. RAB Bulletin 16. BC Ministry of Environment.
[5] Based on laboratory test results.
[6] Descriptions are adapted from: Agriculture and Agri-Food Canada (AAFC), 1998. The Canadian System of Soil Classification, 3rd Edition. http://sis.agr.gc.ca/cansis/taxa/cssc3/index.html

with water every spring. In more humid areas, they may also occur on slopes and on undulating terrain.

Soil Series Descriptions[7]

GA: Gates Lake soils
These Orthic Regosol soils are sandy fluvial deposits that have sandy loam, loam, or silt loams at the surface with few stones. The soils are well to moderately well drained, moderately pervious, and are located on level areas or very gentle slopes. Commonly found native species include cottonwood, red cedar, alder, willows, and horsetails.

SA: Sankey soils
These Rego Gleysol soils are found on silty fluvial deposits within the Lillooet River floodplain and are among the most common soils in the Lillooet River valley. They are nonstony silty clay loams or silt loams. Past flooding has left thin layers of organic material in some of these soils. These soils are slowly pervious with surface ponding occurring after heavy rainfall events or during snowmelt. They are poorly drained, often due to seasonally high groundwater levels. They occur on level to nearly level slopes. These soils are commonly used for agriculture. Where left in a natural state they are often vegetated with cottonwood, red cedar, alder, hazelnut, and grasses.

SC: Scobie soils
These soils are formed in sandy flooplain deposits, and are nonstony fine sandy loams or sandy loams. They are moderately to rapidly pervious, poorly drained due to seasonally high groundwater levels, and occur on level to nearly level slopes. When not being used for agriculture, Scobie soils support cottonwood, red cedar, birch, and willow.

WO: Wolverine soils
Wolverine soils are a form of Gleyed Regosols located in sandy fluvial deposits of the Lillooet River floodplain. They are nonstony loamy sand or sandy loam. They are moderately to rapidly pervious, imperfectly drained due to fluctuating ground water levels, and occur on level areas or gentle slopes. Vegetation assocated with Wolverine soils includes red cedar, Douglas fir, cottonwood, Sitka spruce, alder, willow, grasses, and mosses.

Soil Texture Descriptions[8]

Soil textural class is a description of the relative proportions of sand, silt, and clay within the soil. The decreasing order of the particle size is (bold indicates study site results fall within those categories of particle size:

Sand > loamy sand > sandy loam > **loam** > silt loam > silt > sandy clay loam > **clay loam** > **silty clay loam** > sandy clay > silty clay > clay.

The adsorption rates of water, nutrients, and gas as well as the attraction of particles to one another, are all surface phenomena and is directly related to the proportion of clay in the soil.

[7] Descriptions are adapted from: Soil Survey of the Pemberton Valley, BC. 1980. Roxanna L. Beale Kuurne, PAg. RAB Bulletin 16. BC Ministry of Environment.
[8] Descriptions are adapted from: The Nature and Properties of Soils. 11th Ed. 1996. Brady, N.C. and R.R. Weil. Prentice Hall, Upper Saddle River, NJ.

Soil Testing Results

The ability for soils to exchange nutrients (cations and anions) between soil particles and plant roots is a vital process in nature. This exchange takes place primarily on the surfaces of fine soil particles (such as clay) and organic matter. Therefore, understanding common properties (such as pH, amount of organic matter, cation exchange capacity, and nutrient levels) is critical in understanding a soil's potential to sustain agricultural production. The following describes the role of each of these properties along with an interpretation of the associated laboratory results for the soil sampless collected at Site A, Site BC, and Site D.

pH

The pH of a soil provides a measurement of the level of acidity or alkalinity. The pH scale extends from 1 to 14, with 7 being neutral. Less than 7 is considered acidic, while more than 7 is considered alkaline. The pH values for all sites sampled fell within 6.2 – 7.0, with the lower ranges found in Site D. None of these results would present any acidity (or alkalinity) problems for most crops.

Organic Matter (OM)

Generally speaking, ideal Organic Matter (OM) levels in loamy soils are 4-5%[9]. Soils with less than 3% OM may have challenges retaining water and nutrients. Creating additional OM is challenging but not impossible. Site BC has the lowest %OM, which is consistent with field observations: there was little to no vegetation associated with the upper soil layers at Site BC.

Methods to increase OM may include:

- Incorporating compost into the upper soil layers;
- Reducing tillage or managing soils using "no-till" techniques;
- Crop rotation; and
- Winter cover crops.

Table 6. Soil test results: pH and Organic Matter.

Sample #	pH	Organic Matter %
A1	6.9	2.0
A2	7.0	3.4
BC1	7.0	0.7
BC2	6.7	1.2
D1	6.2	2.2
D2	6.3	3.1
Target range	**5.5 to 7.0**	**4 – 5**

[9] Factsheet: Soil management: building a healthy soil. Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA). http://www.omafra.gov.on.ca/english/crops/pub811/8building.htm

Rating	Colour
Very Low	
Low	
Medium	
High	
Very High	

Table 7. Soil laboratory results: CEC, Percent Base Saturation, and exchangeable P.

		Percent Base Saturations						
Sample #	**CEC** meq/100g	**K %**	**Mg %**	**Ca %**	**Na %**	**H %**	**P (Bray-P1) ppm**	**Saturation P%**
A1	5.4	5.0	14.7	56.5	1.9	22.0	7	1
A2	7.1	5.0	14.7	66.4	1.0	12.8	20	3
BC1	4.7	6.0	14.3	63.1	3.8	12.9	26	8
BC2	3.9	7.3	14.0	46.6	1.2	30.9	29	8
D1	6.7	7.7	10.6	58.9	5.0	17.8	38	7
D2	4.9	4.9	11.1	58.4	1.2	24.4	14	2

Table 8. Soil laboratory results: Nitrate and micronutrients.

Sample #	**NO3-N** ppm	**K ppm**	**Ca ppm**	**Mg ppm**	**Cu ppm**	**Zn ppm**	**Fe ppm**	**Mn ppm**	**B ppm**
A1	1	105	610	95	3.0	1.9	132	31	0.1
A2	7	138	940	125	2.4	6.5	95	45	0.1
BC1	1	109	590	80	2.5	6.6	132	12	0.1
BC2	2	110	360	65	2.7	8.5	144	10	0.1
D1	2	202	790	85	3.3	5.5	126	8	0.2
D2	2	94	570	65	3.5	4.0	144	23	0.1

Cation Exchange Capacity (CEC) and Percent Saturation

The CEC is the sum total of exchangeable cations that a soil can adsorb. A cation is a positively charged ion (such as a nutrient or heavy metal), which is attracted to a negatively charged anion (such as a clay particle or organic matter particle). Therefore the CEC provides and indication as to the ability of the soil to readily release cations (such as H^+ , Na^+, Mg^{+2}, or Ca^{+2}) and adsorb others that are purposefully added (such as K^+). Sandy soils tend to have lower CECs than clay soils, because smaller clayparticles provide greater total surface area. The proportion of the CEC satisfied by a given cation is called the *percentage saturation* for that cation.[10] The related cation percentage is referred to as the *percentage base saturation* (PSB). The PSB for each element influences the uptake of these elements by growing plants.

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[10] The Nature and Properties of Soils. 11th Ed. 1996. Brady, N.C. and R.R. Weil. Prentice Hall, Upper Saddle River, NJ.

Generally speaking, target ranges for most agricultural soils are as follows:

- K: 1-5%
- Mg: 10-40%
- Ca: 60-80%

Most of the laboratory results fall within these ranges for the three sites, although % Ca measured a bit low in some of the samples (Table 7). This suggests that additions of Ca may be beneficial during future crop production, which is a common soil management practice. This can be done using organic sources such as bone meal.

Phosphorus

Phosphorus (P) is calculated differently than K, Mg, and Ca because it has opposite ionic properties (i.e. it is negatively charged rather than positively charged) and it is not related to the CEC. Available P is determined by the Bray-P1 test. Adequate levels of available phosphorus are usually between 22 and 33 PPM. The results for most of the samples tested indicate low levels for Site BC and Site D, and very low levels at Site A. This is not surprising considering that Site A may have lost P over time during hay cultivation (especially if a fertilizer has not been recently applied). Therefore, future crop production will necessitate a P fertilization program. This can be done using organic sources. The low Saturation P% levels in all soils suggests that P will not readily be lost from the soil.

Nitrate Nitrogen (NO_3- N)

Nitrogen is essential to nearly every aspect of plant growth. Nitrogen is absorbed by plants as nitrate (NO_3^-) and ammonium (NH_4^+). Soil NO_3^- and NH_4^+ levels can fluctuate widely with soil and weather conditions over very short periods of time. Nitrogen recommendations are based on crop needs with the assumption that very little available N remains in the soil after the growing season. Adjustments must be made based on %OM, if soils are recently amended with manure or compost, or if legumes (which fix nitrogen in the soil) are grown in the crop rotation.

In general, a soil NO_3-N concentration of 30 ppm or higher during the active growing season is sufficient for most plants. Therefore, when the concentration of soil NO_3-N is less than 30 ppm, additional fertilizer is likely required. All samples indicated low or very low levels of NO_3-N, indicating that a nitrogen fertilizer will be required for crop production at all sites.

Micronutrients (Cu, Zn, Fe, Mn, B)

Micronutrients (sometimes referred to as trace elements) play complex roles in plant nutrition. Most have roles within enzyme systems, photosynthesis, and other metabolic steps. Levels of micronutrients within soils and plants can be described as deficient, normal, or toxic. The main source of micronutrients is from rocks that undergo mineral decomposition over time. Organic sources such as organic matter, compost, and manure, are important secondary source of micronutrients. Soil pH has a lead role in the availability of micronutrients within the soil solution to plants[11].

Available micronutrient results varied between sites. In general, Cu, Zn, and Fe levels were high or very high. These are likely originating from a natural geologic source. Additional sources of Mn and B will be required, especially at Site BC. Although only required in small amounts, B is critical for healthy plant growth.

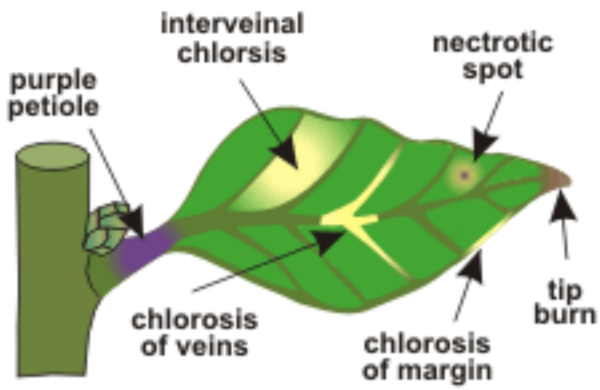

Figure 8. Common leaf abnormalities resulting from nutrient deficiencies[12].

[11] A note on soil testing methods for trace elements: Since micronutrients such as Cu can be both a benefit and potential toxin to plants, two test methods are used. The first provides a measurement of the "available" amount of that element determined by testing the soil solution resulting from an addition of acid. The second provides a deeper analysis by using Inductively-Coupled Plasma (ICP) or similar methods. This result will reflect the total amount of metal found in the soil sample, not just the readily available fraction.

[12] Growers Guide for Hydroponics, Coco, and Soil. Flairform Growing Media. http://www.flairform.com/index.php?option=com_content&view=article&id=3&Itemid=115

Trace Metals

There are many sources of metal contaminants that can accumulate in soils. These include the burning of fossil fuels, use of additives in gasoline, use of insecticides, metal plating, domestic sewage sludge, industrial waste, and air pollution. The greatest problems usually arise from Arsenic (As), Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Lead (Pb), and Zinc (Zn). Cd and As are extremely poisonous to humans; Hg, Pb, and Ni are moderately so; and Boron (B), Cu, Manganese (Mn), and Zn are relatively lower in mammalian toxicity[13].

The soil samples were analyzed in the lab for a suite of trace metals[14] and results were compared to two commonly-used health and safety guidelines: BC's Organic Matter Recycling Regulation (OMRR) Class A Compost[15] and the Canadian Council of Ministers for the Environment (CCME)'s Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for Human Health[16]. Results were favourable at all sites. No concerns were noted for any the elements tested. These results are summarized in Table 9 and a full set of results are provided in the Appendix.

Table 9. Soil laboratory results: trace metals.

		Site						Guidelines	
Parameter	**Detection Limit**	**Airport**		**Harrow Rd**		**Signal Hill**		**OMRR**	**CCME**
	(ug/g or ppm)	**A1**	**A2**	**BC1**	**BC2**	**D1**	**D2**	**Class A Compost**	**Soil Quality Guidelines for Human Health**
Arsenic	1	2.9	2.2	1.2	1.1	BDL	BDL	13	12 (inorg)
Barium	1	107.9	116.9	55.2	57.5	72.6	71.8		750
Beryllium	1	BDL	BDL	BDL	BDL	BDL	BDL		4
Cadmium	1	BDL	BDL	BDL	BDL	BDL	BDL	3	1.4
Cobalt	1	11.2	11.9	7.4	7.3	7.9	8.0	34	40
Chromium	1	14.1	14.8	12.7	15.6	7.0	9.0	100	64
Copper	1	31.8	33.3	18.0	18.7	21.7	26.8	400	63
Mercury	0.1	BDL	BDL	BDL	BDL	BDL	BDL	2	6.6 (inorg)
Molybdenum	1	1.6	1.9	1.3	1.1	BDL	BDL	5	5
Nickel	1	9.9	10.5	8.1	9.2	4.5	5.5	62	50
Lead	1	12.6	13.6	14.3	16.1	10.8	11.0	150	70
Selenium	1	BDL	BDL	BDL	BDL	BDL	BDL	2	1
Zinc	1	51.7	57.3	54.4	58.7	33.8	36.4	500	200

[13] The Nature and Properties of Soils. 11th Ed. 1996. Brady, N.C. and R.R. Weil. Prentice Hall, Upper Saddle River, NJ.
[14] The samples were tested for trace metals using the following techniques: Inductively Coupled Plasma (ICP) for the majority of elements, Hydride Generation Atomic Absorption Spectrometry (HGAAS) for As and Se, and Cold Vapour Atomic Absorption Spectrometry (CVAAS) for Hg.
[15] Land Application Guidelines for the Organic Matter Recycling Regulation and the Soil Amendment Code of Practice. Best Management Practices. March 2008. BC Ministry of Environment. http://www2.gov.bc.ca/assets/gov/environment/waste-management/recycling/landappguidelines.pdf
[16] CCME Canadian Environmental Quality Guidelines. Factsheets. http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/index.html

Conclusion

In summary, three sites were assessed for agricultural potential within the Pemberton area, and minimal constraints were found. Results indicate that the sites are a combination of loams on mainly flat terrain with good to excellent agricultural capability. Main challenges to capability relate to seasonally high water tables, which could be managed through proper drainage. Some level of stoniness was noted in Site D.

Many indicators of fertility, including organic matter, phosphorus, and nitrogen levels were measured to be relatively low. However this is not uncommon for sites that have not been previously cultivated, or that may have had repeated crop production with little to minimal levels of fertilizers applied. None of the trace metal results indicated any levels of toxicity concern when compared to two published guidelines: OMRR Land Application Guidelines for Class A Compost and the CEQG soil quality guidelines for human health.

Appendix

Soil Laboratory Test Results

A&L Canada Laboratories results sheets (PDFs).