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ENVIRONMENTAL CONSULTING

AGRICULTURAL CAPABILITY ASSESSMENT

41069 North Nicomen Road
Deroche, BC

Project Number: 22-165
November 16, 2022

Client:
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EARTH WATER LAND

CONTENTS

1.0 INTRODUCTION

Statlu Environmental Consulting Ltd. (Statlu) completed an agricultural capability assessment for a property in Deroche, BC (the Property). It does not have a civic address, but a sign at the driveway identifies it as 41069 North Nicomen Road. The legal description is Plan Number NWP6766RX Lot A (PID: 000-819-743).

Part of the property is within the Agricultural Land Reserve (ALR). This report describes the current agricultural capability for a 2.6 ha part of the property that is currently outside the ALR, as shown on Figure 1. The area is being considered for inclusion into the ALR.

Eryne Croquet, M. Sc., P. Ag., P. Geo. conducted the fieldwork and prepared the report. The soil survey was conducted at a detailed survey intensity level (1:5000 scale or larger) and used soil description terms and methods found in the Canadian System of Soil Classification (1998) and the Field Manual for Describing Terrestrial Ecosystems (2010). Soil survey and agricultural capability assessments are within Ms. Croquet's area of expertise and she has assessed agricultural capability for a range of properties in the Fraser Valley since 2008.

2.0 SITE DESCRIPTION

The Property is located between Nicomen Slough and Nicomen Mountain, on the north side of Fraser River. It is 68.6 ha in extent and spans the floodplain adjacent to the slough and the lower flank of Nicomen Mountain.

Part of the property, as shown on Figure 1, lies within the ALR. The whole property is zoned Rural 1 (R-1) to Rural 2 (R-2), according the FVRD Zoning Bylaw and Limited Use (LU) in the Official Community Plan. Limited Use is given to areas with significant geological and flood hazards, limited road access, areas isolated from community services, and areas which are environmentally sensitive.

Figure 1: Property, ALR, and Assessment Area

41069 North Nicomen Road Deroche, BC

1:5,000

Legend

- 41069 North Nicomen Road
- Assessment
- ALR

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0 25 50 100
Meters

N

NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

2.1 Land Uses

The land uses on the Property are controlled by the landscape features. The part of the property that lies on the floodplain is generally flat and easily accessible. This area supports agricultural and residential land uses. Much of the remaining area of the property has steep slopes with difficult access. These areas remain mostly forested. A benchy area on the mountainside was cleared of trees and is currently a field.

One house and yard area are on the flat part of the property near Nicomen Road. A resource road crosses the steep, forested part of the property. A small area on the upper bench was excavated, maybe as a quarry or a rock source.

Adjacent lots are either undeveloped or are used for rural residential purposes or farming. Crown land borders the north and west sides of the Property.

2.2 Landscape and Topography

The assessed area of the Property has ridge and swale topography due to the influence of Fraser River. The surficial material consists of deposits of Fraser River sediment with relict channels that form the ridges and swales observed at the surface today. The sediments are mapped as 10 m thick sandy loam and loamy sand with minor organics (Armstrong, 1980).

The upland and mountainous areas of the Property, outside the assessment area, are mapped as pre-Tertiary bedrock that is mantled with till and colluvium and Sumas Drift (Armstrong, 1980). Sumas Drift sediment is ice-contact gravel and sand with till lenses and clasts of glaciomarine clay. The deposit is more than 5 m thick. These landforms were interpreted as kames.

The slope gradients on most of the assessed area range from flat to 10%. The slopes on the forested area on the north side of the field reach up to 50%.

2.3 Existing Agricultural Capability Ratings Maps

Soils in the lower Fraser Valley were surveyed in the 1980s and Land Capability for Agriculture (LCA) ratings were determined for the surveyed area (Luttmerding, 1986). The soil survey maps were developed from a reconnaissance level soil survey and air photo interpretation and represent a broad interpretation of soils and agricultural capability at the property. Section 3.0 contains a site-specific assessment of the agricultural capability of the property.

The 1981 soil survey map (Figure 2) indicates that the soils in the assessment area are a mix of Abbotsford, Monroe, Fairfield, and Page series (Luttmerding, 1980). The largest soil unit in the assessment area is the Monroe and Fairfield soil association. On the ridge and swale topography of the assessed area, Fairfield soils are in the swales where drainage is imperfect and Monroe soils are found on the ridges, where soils have better drainage.

Fairfield soils develop on silty Fraser River floodplain sediments. They are classified as a Gleyed Eluviated Melanic Brunisol, reflecting the imperfect drainage from their lower landscape position with a fluctuating watertable. They are well-suited for agriculture, especially with drainage management (Luttmerding, 1981).

Monroe Soils also develop from stone-free silty Fraser River floodplain sediments. They differ from Fairfield soils because they occupy a slightly higher landscape position. They are classified as Eluviated Eutric Brunisols (Luttmerding, 1981).

Abbotsford soils are located on the steep slopes adjacent to the floodplain. They are classified as Orthic Humo-Ferric Podzols, reflecting their development on course textured parent material under a forest canopy. The parent material is a silty eolian veneer overlying gravelly glaciofluvial sand and gravel deposits. They are suited for most agricultural uses, except where the eolian veneer is very thin or where they occur on steep terrain. They are prone to drought due to the coarse nature of the underlying sediments (Luttmerding, 1981).

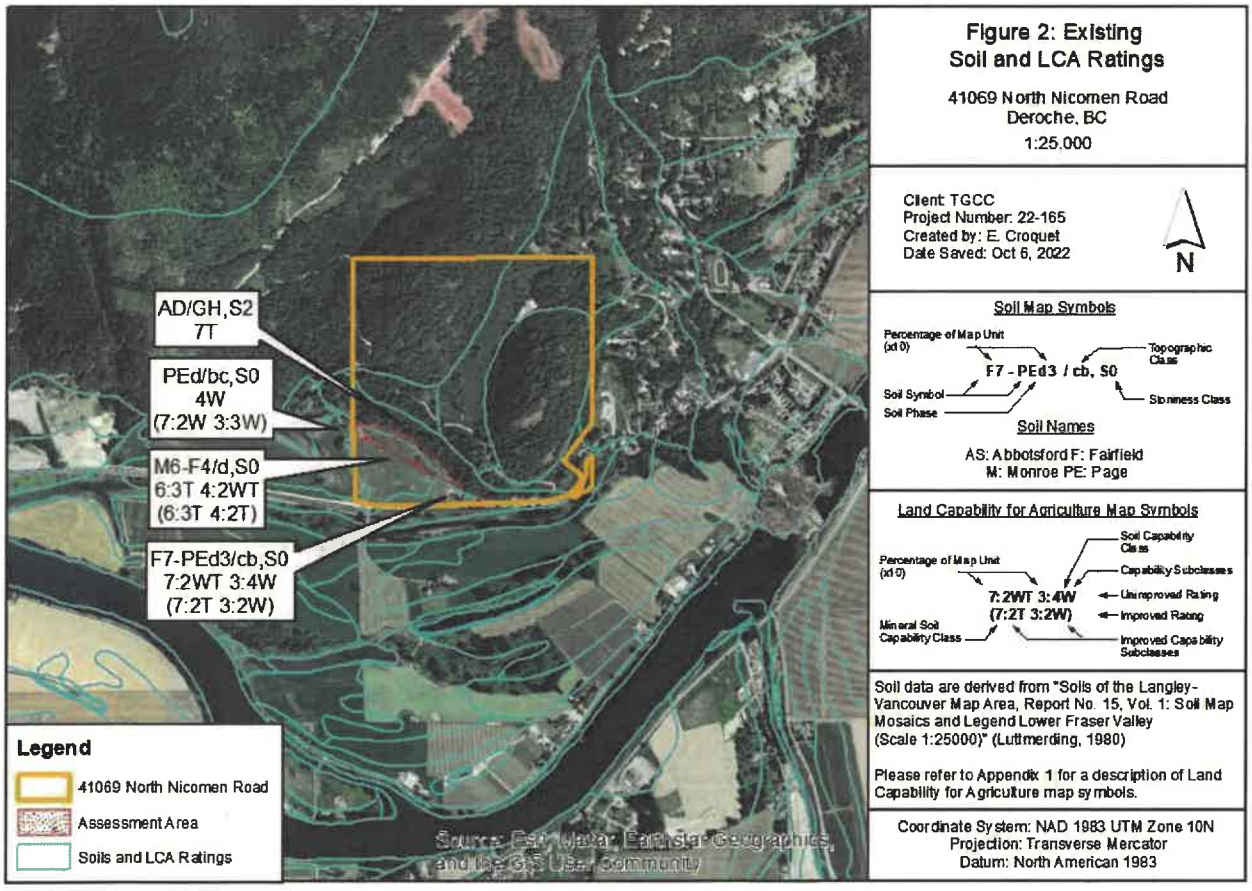
Finally, a small area is mapped as Page soil. These Orthic Gleysols form on silty to sandy Fraser River floodplain deposits in depressions, sometimes next to ponds and wetlands. The poor soil drainage limits agricultural use (Luttmerding, 1981).

The Land Capability for Agriculture (LCA) ratings (Figure 2) describe the general suitability of the land for agriculture (See Appendix 1). The LCA classification for each soil polygon that the assessment areas is described in Table 1.

Table 1: Soil Series and Land Capability for Agriculture Rating of the Assessment Area (Luttmerding, 1986)

Map Label	Soil Series 1	Soil Series 2	LCA Class	Improved Class	Area (ha)
AD/GH,S2	Abbotsford		7T	n/a	1.08
F7-PEd3/cb,S0	Fairfield	Page	7:2WT 3:4W	(7:2T 3:2W)	0.06
M6-F4/d,S0	Monroe	Fairfield	6:3T 4:2WT	(6:3T 4:2T)	1.43
PEd/bc,S0	Page		4W	(7:2W 3:3W)	0.03

Most of the assessed area is rated as Class 2, 3, or 4 with excess water and topographic limitations, with improved ratings of Class 2 or 3 with less significant excess water limitations and similar topographic limitations. A small area is mapped as Class 7 due to extreme topographic limitations.



3.0 LAND CAPABILITY FOR AGRICULTURE ASSESSMENT

I visited the property on September 13, 2022, to describe the soils in three soil pits. The pits were machine excavated and ranged in depth from 106 cm to 119 cm. At each pit, I described the soil profile and made observations of the topography, land use, parent material, and vegetation near the pit. Soil profile descriptions and photographs are included in Appendix 2 and soil analysis results are in Appendix 3. Soil pit locations are shown on Figure 3.

3.1 Soils

The landscape for the assessed area formed when Fraser River sediments deposited next to the steep, bedrock-controlled lower slopes of Nicomen Mountain. The soils formed on floodplain or glacial outwash parent materials. The soils described in the soil pits all formed on these floodplain sediments. The features that distinguish the soils from one another are the amount of mottling and the depth at which it appeared in the profile. Mottling indicates a fluctuating watertable with the depth indicating the upper elevation of the watertable. The soils correlate to the Abbotsford, Fairfield, Monroe, and Page series described in the soil survey reports.

The soil in Pit DP-01 correlates to the Fairfield soil series. It is classified as a Gleyed Melanic Brunisol because it has prominent mottles in the subsoil.

The soils in Pit DP-01 are interesting because a buried soil is below about 40 cm in the profile. The uppermost 40 cm of soil is composed of the same parent material as the buried soil. It appears that this area was a depression that was filled in an attempt to improve growing conditions. The buried soil correlates well to the Page series, but with the additional material at the surface, it is more similar to the Fairfield series. This soil is classified as a Gleyed Cumulic Regosol, based on the addition of material at the surface and the presence of mottles throughout the soil profile.

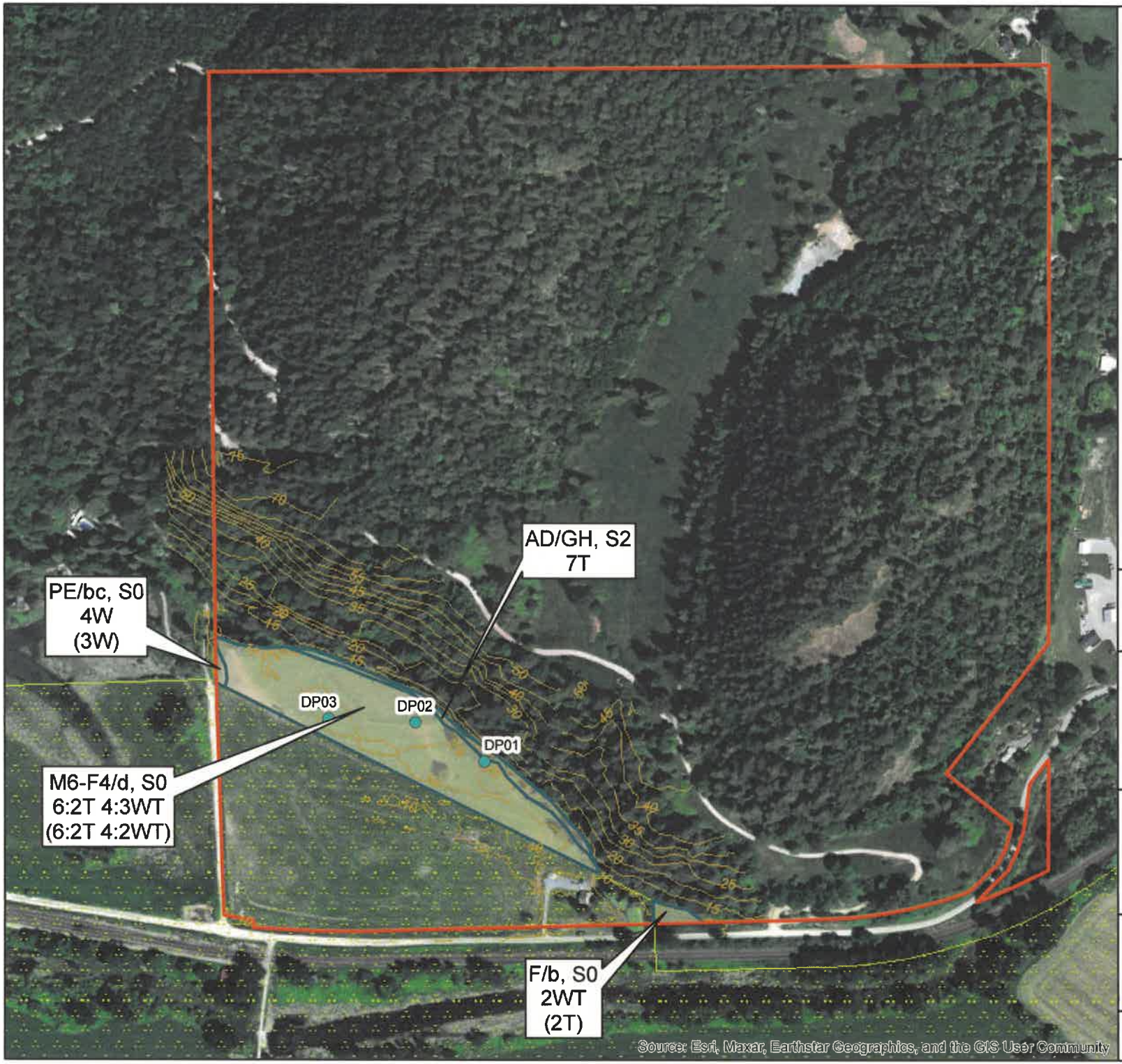


Figure 3: Soils of the Assessed Area

41069 North Nicomen Road
Deroche, BC

1:5,000

Legend

- Contours (5 m interval)
- Assessed Soils
- Assessment Area
- 41069 North Nicomen Road
- ALR

Image Date: May 1, 2021

N

Client: TGCC
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Date Saved: Oct 11, 2022

Soil Map Symbols

Percentage of Map Unit (x10) — F7 - PEd3 / cb, S0 — Topographic Class; Soil Symbol; Soil Phase; Stoniness Class

Soil Names

AS: Abbotsford F: Fairfield
M: Monroe PE: Page

Land Capability for Agriculture Map Symbols

Percentage of Map Unit (x10) — 7:2WT 3:4W (7:2T 3:2W) — Soil Capability Class; Capability Subclasses; Unimproved Rating; Improved Rating; Mineral Soil Capability Class; Improved Capability Subclasses

Soil data are derived from "Soils of the Langley-Vancouver Map Area, Report No. 15, Vol. 1: Soil Map Mosaics and Legend Lower Fraser Valley (Scale 1:25000)" (Luttmerding, 1980)

Please refer to Appendix 1 for a description of Land Capability for Agriculture map symbols.

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

The soil in Pit DP03 correlate to the Monroe series. It is classified as Orthic Melanic Brunisol.

Page soils are found in a small, wet depression. The area they occupy is too small to properly sample and describe. The Abbotsford soils are on steep slopes, where topography presents a permanent limitation to agricultural use, and were therefore not described.

3.2 Climate

Climate is an important factor controlling agricultural capability. Climate variables for the property, predicted from the ClimateWNA model using data from 1991 to 2020, describe the climate as 11.3 °C mean annual temperature, 1603 mm of annual precipitation with 37 cm of snow, 2504 effective growing degree days (a measure of heat accumulation), a 255-day frost-free period, and a climatic moisture deficit of 153 mm (Wang et al., 2016).

3.2.1 Climate Change

Changes to the climate are best described using shared socioeconomic pathways (SSP) because this method captures the effects of global greenhouse gas (GHG) emissions and considers how climate policies will affect them. In addition to SSP, climate change models consider expected changes in radiative forcing (change in Earth's energy flux in the atmosphere) to make predictions on what the future climate might be like.

Using a middle of the road GHG emissions scenario (SSP 2) and a medium time scale (2041 to 2070), the Climate WNA model predicts mean annual temperature will increase to 13.2°C, mean annual precipitation will increase slightly to 1637 mm, with 20 cm of snow. Effective growing degree days will increase to 3106 and the frost-free period will increase to 289. The climate moisture deficit will increase by 32 mm to 185 mm.

The change in climate, in the medium term (to 2070), will result in a longer summer drought but will otherwise improve growing conditions and increase the variety of suitable crop options. These benefits may be overshadowed by predicted increases in extreme storms, floods, and other climate-dependent effects. Floods on Fraser River, for example, will likely occur in late June, which would have negative consequences for most crops.

3.3 Land Capability for Agriculture Ratings

The land capability for agriculture ratings for the assessment area depends on soil and site conditions. I used the *Land Capability Classification for Agriculture in British Columbia* methods to determine LCA classes (Kenk and Cotic, 1983).

Agricultural capability ratings for the property are summarized in Table 2 and shown on Figure 3. There are four polygons with similar soil type and consequent agricultural capability. The range of limitations includes topography (T) and excess water (W).

Table 2: Soil Classification and Agricultural Capability Classification

Soil Classification	Area (ha)	Agricultural Capability	Improved Agricultural Capability
60% Monroe 40% Fairfield	2.26	6:2T 4:3WT	6:2T 4:2WT
100% Abbotsford	0.23	7T	
100% Fairfield	0.07	2WT	2AT
100% Page	0.03	4W	3W

Agricultural capability on the site is limited by excess water and topography. Topography is not improvable in most cases, although land levelling can reduce the slope gradients. On the assessed area, land levelling was done in the past, as shown by the buried soil observed in the field. Excess water in low-lying areas remains a limitation for agricultural uses because those areas remain wet for most of the year, which reduces cropping options and grazing options.

3.4 Soil Management Recommendations

Soil management recommendations for the lower Fraser Valley provide a general guide for management of soils to make them suitable to a range of crops (Bertrand et al., 1991). The management recommendations are made for soil management groups that are composed of soils with similar characteristics.

The four soil series on the assessed area fall within four management groups. Abbotsford soils are in the Abbotsford soil management group. The management recommendations for these soils where slopes are steeper than 10% indicate that perennial forage crops, berry, and fruits are suitable, with the use of a cover crop to reduce erosion. The areas with Abbotsford soils within the assessed area have slopes steeper than 30%, further limiting cropping options.

Fairfield soils are in the Fairfield soil management group. These soils are highly productive for most climatically adapted crops including legumes, berries, cereals, cole crops, corn, landscape plants, forage crops, root crops, and shallow rooted vegetables. The main management recommendation is to plan working the fields during periods when the soil is not saturated to reduce compaction and increase trafficability.

Monroe soils belong in the Monroe soil management group. This group is suited to all climatically adapted crops. Soils in the Monroe soil management group will be increasingly susceptible to drought with climate changes. Irrigation may become a necessary adaptation to support agricultural uses on these lands.

Finally, Page soils are in the Page soil management group. Poor drainage limits cropping options so there are no well-suited crops. The use of a drainage system or land leveling can reduce the drainage limitation, making these soils suited to legumes, berries, cereals, cole crops, corn, forage, and root crops. They are unsuitable for deeply rooted crops.

4.0 CONCLUSION

Part of the property at 41069 North Nicomen Road is outside the ALR. A small, 2.6 ha (6.4 acre) area, is being considered for inclusion into the ALR. This soils in this area were described in three soil pits, and the soil information was used to determine the land capability for agriculture ratings (Table 3).

Table 3: Soils and LCA Classification for the Assessed Area

Soils	LCA Class	Limitations	Area (ha)
60% Monroe 40% Fairfield	2 and 3	Excess water and topography	2.26
Abbotsford	7	Topography	0.23
Fairfield	2	Excess water and topography	0.07
Page	4	Excess water	0.03
		Total Area	2.59

Most of the 2.6 ha area is well-suited for agricultural uses, with the exception of the small area where steep slope gradients limit agricultural use. The steeper area is forested. The area suited to agricultural uses is used for either pasture or residential purposes, with a modest house and associated yard.

The 2.36 ha with soils correlated to the Fairfield, Monroe, or Page soil series is suitable for inclusion in the ALR because it is well-suited to a wide range of agricultural uses.

5.0 LIMITATIONS

The recommendations provided in this report are based on observations made by Statlu and are supported by information Statlu gathered. Observations are inherently imprecise. Soil, agricultural, hydrological, and drainage conditions other than those indicated above may exist on the site. If such conditions are observed or if additional information becomes available, Statlu should be contacted so that this report may be reviewed and/or amended accordingly.

This report was prepared considering circumstances applying specifically to the client. It is intended only for internal use by the client for the purposes for which it was commissioned and for use by government agencies regulating the specific activities to which it pertains. It is not reasonable for other parties to rely on the observations or conclusions contained herein.

Statlu prepared the report in a manner consistent with current provincial standards and on par or better than the level of care normally exercised by Professional Agrologists currently practicing in the area under similar conditions and budgetary constraints. Statlu offers no other warranties, either expressed or implied.

The report is intended only for the client's internal use for the purpose of seeking approval to subdivide and for use by government agencies regulating the subdivision. The ALC can use the report for evaluating the proposed inclusion application.

6.0 CLOSURE

Please contact me should you have any questions or if you require further clarification.

Yours truly,
Statlu Environmental Consulting Ltd.

2022-11-16

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Permit to Practice Number: 1000170

REFERENCES

Armstrong, J. E. 1980. Surficial Geology, Chilliwack (West Half), British Columbia. Geological Survey of Canada, Map 1487A.

BC Ministry of Forests and Range and BC Ministry of Environment. 2010. Field Manual for Describing Terrestrial Ecosystems, 2nd Ed., Land Management Handbook 25, Victoria, BC.

Kenk, E and Cotic, I. 1983. Land Capability Classification for Agriculture in British Columbia, MOE Manual 1, Ministry of Environment and Ministry of Agriculture, Kelowna, BC.

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

Luttmerding, H. 1980. Soils of the Langley-Vancouver Map Area, Report No. 15, Vol. 1: Soil Map Mosaics and Legend Lower Fraser Valley (Scale 1:25000), BC Ministry of Environment, Victoria, BC.

Luttmerding, H. 1981. Soils of the Langley-Vancouver Map Area, Report No. 15, Vol. 3: Description of the Soils, BC Ministry of Environment, Victoria, BC.

Luttmerding, H. 1986. Land Capability for Agriculture Langley-Vancouver Map Area. BC Ministry of Environment, Victoria, BC.

Soil Classification Working Group (SCWG). 1998. The Canadian System of Soil Classification 3rd ed. Research Branch. Agriculture and Agri-Food Canada, Ottawa, ON. Publ. 1646.

Wang T., A. Hamann, D. Spittlehouse, and C. Carroll. 2016. Locally Downscaled and Spatially Customizable Climate Data for Historical and Future Periods for North America. PLoS ONE 11(6): e0156720. doi:10.1371/journal.pone.0156720. http://www.climatewna.com/help/ClimateBC/Help.htm

APPENDIX 1: LAND CAPABILITY FOR AGRICULTURE

This information is summarized from Land Capability Classification for Agriculture in British Columbia (Kenk and Cotic, 1983). It is a classification system developed by the BC government to classify the agricultural land base in terms of suitability for agriculture based on soil properties. It provides pedologists with consistent guidelines for assessing agricultural capability. It is intended for site specific, detailed assessments rather than overview assessments of large areas.

The system classifies mineral and organic soils into one of seven capability classes using easily described soil and landscape factors. The range of suited crops decreases and the management inputs required increase from Class 1 to 7. There are situations where the unique combination of soil, climate, and agricultural practices make land with low capability valuable for agriculture, for example acidic peat soils in the Fraser Valley that are well-suited for growing cranberries or blueberries.

Mineral soils and organic soils are classified in different hierarchies because of the degree of difference in potentials and limitations for agriculture. In general, land in Classes 1 to 4 is suited for agriculture. Class 5 lands support perennial forage crops or specially adapted crops and Class 6 lands are suited for livestock grazing. Class 7 lands are unsuited for agriculture or grazing.

Lands are given two ratings – unimproved and improved. Unimproved ratings are based on actual ground conditions at the time of the assessment. Improved ratings reflect the capability after limitations to agriculture have been alleviated. Examples of common improvements are irrigation, fertilization, drainage, and subsoiling.

LCA ratings for agriculture describes the LCA class and the LCA subclass(es). LCA classes reflect the relative capability for agricultural use and subclasses indicate the type of limitation. When considered together, the class and subclass provide information about the degree and type of limitation to agricultural use.

Land Capability Classes for Mineral and Organic Soils

Class	Description	Management Requirements
Class 1 Class O1	no or very slight limitations that restrict agricultural use	• level or nearly level • deep soils are well to imperfectly drained and hold moisture well • managed and cropped easily • productive
Class 2 Class O2	minor limitations that require ongoing management or slightly restrict the range of crops, or both	• require minor continuous management • have lower crop yields or support a slightly smaller range of crops that Class 1 lands • deep soils that hold moisture well • managed and cropped easily
Class 3 Class O3	limitations that require moderately intensive management practices or moderately restrict the range of crops, or both	• more severe limitations than Class 2 land • management practices more difficult to apply and maintain • limitations may: o restrict choice of suitable crops o affect timing and ease of tilling, planting or harvesting o affect methods of soil conservation

Class	Description	Management Requirements
Class 4 Class O4	limitations that require special management practices or severely restrict the range of crops, or both	• may be suitable for only a few crops or may have low yield or a high risk of crop failure • soil conditions are such that special development and management conditions are required • limitations may: o affect timing and ease of tilling, planting or harvesting o affect methods of soil conservation
Class 5 Class O5	limitations the restrict capability to producing perennial forage crops or other specially adapted crops (e.g. cranberries)	• can be cultivated, provided intensive management is employed or crop is adapted to particular conditions of the land • cultivated crops may be grown where adverse climate is the main limitation, crop failure can be expected under average conditions
Class 6 Class O6	not arable, but capable of producing native and/or uncultivated perennial forage crops	• provides sustained natural grazing for domestic livestock • not arable in present condition • limitations include severe climate, unsuitable terrain or poor soil • difficult to improve, although draining, dyking and/or irrigation can remove some limitations
Class 7 Class O7	no capability for arable culture or sustained natural grazing	• all lands not in Class 1 to 6 • includes rockland, non-soil areas, small water-bodies

Land Capability for Agriculture Subclasses for Mineral Soils

LCA Classes, except Class 1 that has no limitations, can be divided into subclasses depending upon the type and degree of limitation to agricultural use. There are twelve LCA subclasses to describe mineral soils. Mineral soils contain less than 17% organic carbon; except for an organic surface layer (SCWG, 1998).

Subclass	Map Symbol	Description	Improvement
Soil moisture deficiency	A	used where crops are adversely affected by droughtiness, either through insufficient precipitation or low water holding capacity of the soil	irrigation
Adverse climate	C	used on a subregional or local basis, from climate maps, to indicate thermal limitations including freezing, insufficient heat units and/or extreme winter temperatures	n/a
Undesirable soil structure and/or low perviousness	D	used for soils that are difficult to till, requiring special management for seedbed preparation and soils with trafficability problems includes soils with insufficient aeration, slow perviousness or have a root restriction not caused by bedrock, permafrost or a high watertable	amelioration of soil texture, deep ploughing or blading to break up root restrictions cemented horizons cannot be improved
Erosion	E	includes soils on which past damage from erosion limits erosion (e.g. gullies, lost productivity)	n/a
Fertility	F	limited by lack of available nutrients, low cation exchange capacity or nutrient holding ability, high or low pH, high amount of carbonates, presence of toxic elements or high fixation of plant nutrients	constant and careful use of fertilizers and/or other soil amendments
Inundation	I	includes soils where flooding damages crops or restricts agricultural use	dyking

Subclass	Map Symbol	Description	Improvement
Salinity	N	includes soils adversely affected by soluble salts that restrict crop growth or the range of crops	specific to site and soil conditions
Stoniness	P	applies to soils with sufficient coarse fragments, 2.5 cm diameter or larger, to significantly hinder tillage, planting and/or harvesting	remove cobbles and stones
Depth to solid bedrock and/or rockiness	R	used for soils in which bedrock near the surface restricts rooting depth and tillage and/or the presence of rock outcrops restricts agricultural use	n/a
Topography	T	applies to soils where topography limits agricultural use, by slope steepness and/or complexity	n/a
Excess Water	W	applies to soils for which excess free water limits agricultural use	ditching, tilling, draining
Permafrost	Z	applies to soils that have a cryic (permanently frozen) layer	n/a

Land Capability for Agriculture Subclasses for Organic Soil

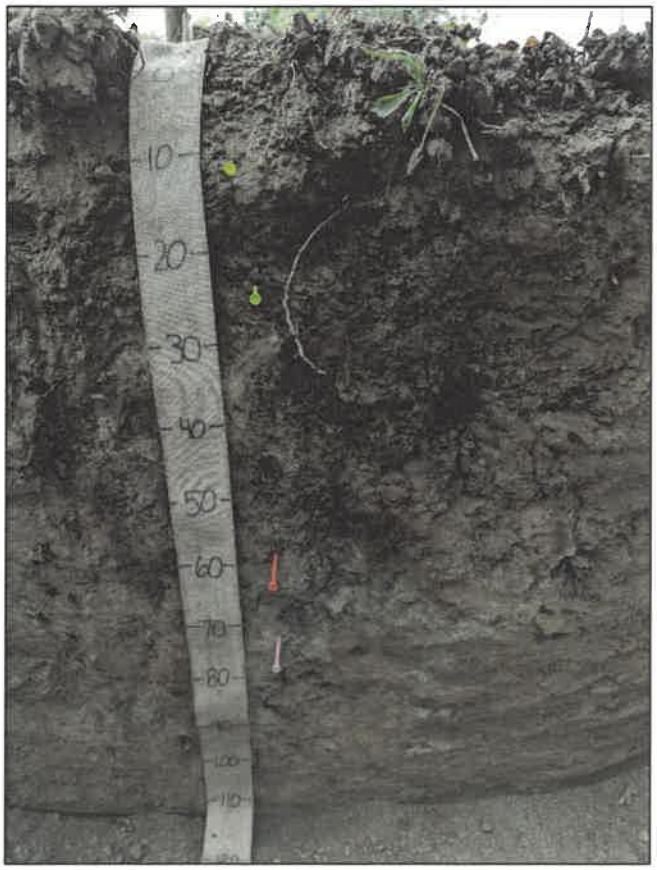
Organic soils are composed of organic materials such as peat and are generally saturated with water (SCWG, 1998). Subclasses for organic soils are based on the type and degree of limitation for agricultural use an organic soil exhibits. There are three subclasses specific to organic soils. Climate (C), fertility (F), inundation (I), salinity (N), excess water (W) and permafrost (Z) limitations for organic soil are the same as defined for mineral soil.

Subclass	Map Symbol	Description	Improvement
Wood in the profile	B	applies to organic soils that have wood within the profile	removal
Depth of organic soil over bedrock and/or rockiness	H	includes organic soils where the presence of bedrock near the surface restricts rooting depth or drainage and/or the presence of rock outcrops restricts agricultural use	n/a
degree of decomposition or permeability	L	applies to organic soils that are susceptible to organic matter decomposition through drainage	n/a

APPENDIX 2: SOIL PROFILE DESCRIPTIONS AND PHOTOGRAPHS

DP-01 Soil Profile Description

Horizon	Depth (cm)	Description
Ap	0 - 9	Dark grayish brown (10YR 4/2 d) and very dark grayish brown (10YR 3/2 m); silt loam; moderately strong, medium, granular structure; loose consistence when dry; few, fine roots; abrupt, smooth boundary; 7 to 10 cm thick; slightly acid; pH 6.1.
Ap2	9 - 20	Grayish brown (10YR 5/2 d) and light grayish brown (10YR 6/2 d); silt loam; moderate, coarse, granular structure; slightly hard when dry; few, medium roots; clear, smooth boundary; 6 to 12 cm thick; medium acid; pH 5.6.
Bm	20 - 58	Pale brown (10YR 6/3 d); silt loam; weak, medium, angular blocky structure; hard when dry; gradual, wavy boundary; 32 to 38 cm thick; medium acid; pH 5.7.
Bg	58 - 72	Pale brown (10YR 5/2 d); silt loam; many, fine, prominent strong brown (7.5YR 5/6 d) mottles; moderate and strong medium angular blocky structure; hard when dry; gradual, wavy boundary; 12 to 15 cm thick; medium acid; pH 5.8.
Cg	72 - 110+	Pale brown (10YR 6/3 d); silt loam; many, coarse, prominent strong brown (7.5YR 5/6 d) mottles, strong, coarse, angular blocky structure; very hard when dry; medium acid; pH 5.9



Stone-free silty floodplain sediments with no coarse fragments are the parent material for this Gleyed Melanic Brunisol

DP-02 Soil Profile Description

Horizon	Depth (cm)	Description
Ap	0 - 14	Brown (10YR 5/3 m); silt loam; few, fine, faint, yellowish brown (10YR 5/6 m) mottles; weak and moderate, fine, angular blocky structure; friable when moist; abundant, fine roots; abrupt, smooth boundary; 12 to 14 cm thick.
Apg	14 - 39	Dark grayish brown (10YR 4/2 m); silt loam; few, fine, faint, yellowish brown (10YR 5/8 m) mottles; weak and moderate, fine, angular blocky structure; friable when moist; plentiful, fine roots; abrupt, smooth boundary; 22 to 26 cm thick.
IIAegb	39 - 47	Very dark brown (10YR 2/2 m) and light gray (10YR 7/2 m); silt loam; few, medium, faint, dark yellowish brown (10YR 4/4 m) mottles; weak, fine, subangular blocky structure; firm when moist; very few, fine roots; clear, wavy boundary; 9 to 14 cm thick.
IIBgb	47 - 54	Light gray (10YR 7/1 m); silt loam; many, medium, distinct, strong brown (7.5YR 4/6 m) mottles; weak and moderate, fine, angular blocky structure; very firm when moist; very few, fine roots; clear, wavy boundary; 47 to 54 cm thick.
IICg	54 - 117+	Light gray (10YR 7/1 m) and brown (10YR 4/3 m); silt loam; many, medium, prominent, strong brown (7.5YR 4/6 m) mottles; weak and moderate, fine, angular blocky structure; very firm when moist.

Note the buried eluviated horizon at 40 cm and the mottling throughout the soil of this Gleyed Cumulic Regosol.

Comments

The original soil was covered with about 40 cm of soil. Based on the soil characteristics and landscape position, the original soil was likely the Page series. The soil pit was in a slightly wetter area, supporting the assumption that the 40 cm cap was placed to fill a wet area on the field.

DP-03 Soil Profile Description

Horizon	Depth (cm)			Description
Ap	0	-	15	Grayish brown (10YR 5/2 d); silt loam; moderate and strong, medium, granular structure; firm when moist; plentiful, fine roots; abrupt, smooth boundary; 13 to 16 cm thick.
Bm	15	-	47	Light yellowish brown (10YR 6/4 d) and dark yellow (10YR 4/4 m); silty clay loam; strong, medium, angular blocky structure; firm when moist; few, fine roots; abrupt, smooth boundary; 30 to 32 cm thick.
BCg	47		75	Light yellowish brown (10YR 6/4 d); silty clay loam; few, coarse, faint, yellowish brown (10YR 5/8 d) mottles; strong, medium, angular blocky structure; friable when moist; gradual, smooth boundary.
Cg	75	-	106+	Light yellowish brown (10YR 6/4 d); silty clay loam; many, fine, distinct yellowish brown (10YR 5/8 d) mottles; weak, medium to coarse, angular blocky structure; friable when moist.

This soil is classified as an Orthic Melanic Brunisol.

Looking southwest over the assessed area, note the subdued ridge and swale topography.

Looking west over the assessed area, note the steep terrain on the left side of the photo.

Looking west over the shallow depression at the edge of the assessed areas. The soil here is mapped as the Page series due to the water in the depression.

APPENDIX 3: SOIL ANALYSIS RESULTS

The Plant Science Lab

Laboratory Soil Test Results

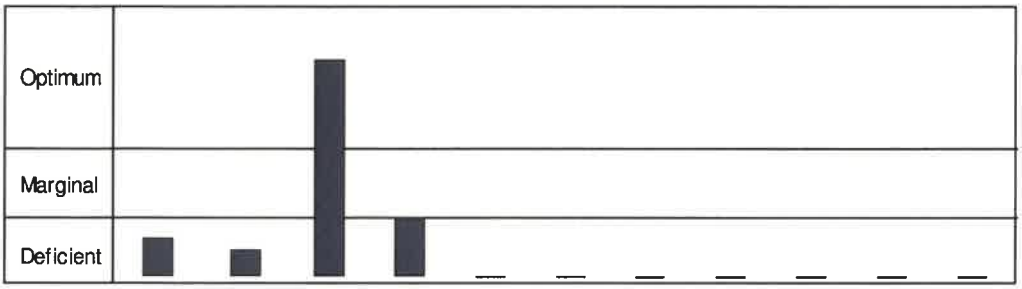
464 Riverside Road
Abbotsford, BC V2S 7M1
Phone: (604) 864-9044 x1602
E-Mail: pwarren@tlhort.com

Grower Name: Eryne
Field ID --- Crop: DP01 01
Lab ID: 59873
Lab Report Number: S59873-1

Date Received: 15/09/2022
Lab Report Date: 19/09/2022
Disposal Date: 17/09/2022
Sales Rep: Counter

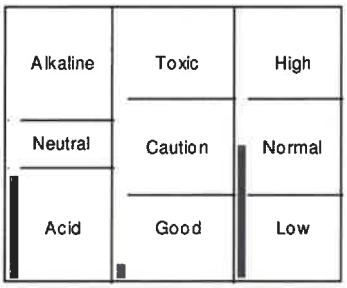
Nutrient Analysis (p.p.m.)

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn
	5	14	238	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a



Soil Quality

pH	EC (dS/m)	OM (%)
6.1	0.210	10.2



Additional (ppm)

Cl	P0	NH4-N	Mo
14	<0.4	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture
Sand: n/a Silt: n/a Clay: n/a

H+ (cmol[+]/kg)
BS (%)
CEC (cmol[+]/kg)
P Index n/a

	Ca	Mg	Na	K
Actual (%)				
Suggested* ppm**	65-75	5-20	0-5	3-10

K:Mg ratio: n/a **N:S ratio:** n/a **C:N ratio:** n/a

Lime: n/a **Buffer pH:** n/a **Moisture:** 8.3 % **Density:** 0.80 g/cc

NO3-N, SO4-S and Cl extracted with ammonium acetate solution. All others extracted using Mehlich III solution.

** Nitrate N ** Sulfate S *** Mineral Soil n/a not analyzed*

Comments:

The Plant Science Lab

Laboratory Soil Test Results

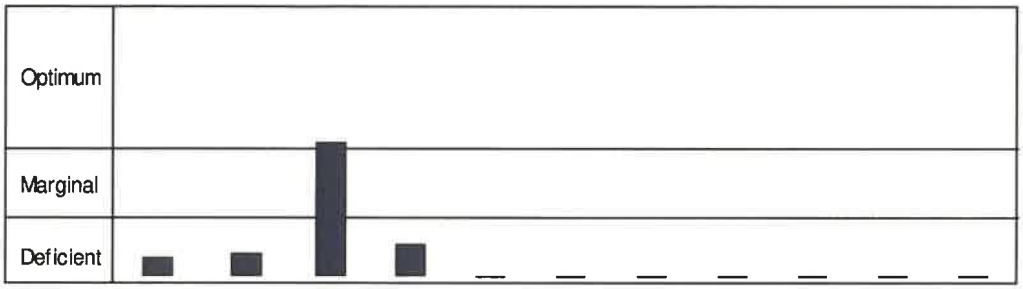
464 Riverside Road
Abbotsford, BC V2S 7M1
Phone: (604) 864-9044 x1602
E-Mail: pwarren@tlhort.com

Grower Name: Eryne
Field ID --- Crop: DP01 02
Lab ID: 59872
Lab Report Number: S59872-1

Date Received: 15/09/2022
Lab Report Date: 19/09/2022
Disposal Date: 17/09/2022
Sales Rep: Counter

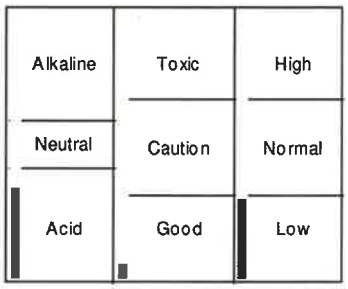
Nutrient Analysis (p.p.m.)

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn
	2	13	148	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a



Soil Quality

pH	EC (dS/m)	OM (%)
5.7	0.191	5.6



Additional (ppm)

Cl	P0	NH4-N	Mo
9	<0.4	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture
Sand: n/a Silt: n/a Clay: n/a

H+ (cmol[+]/kg)
BS (%)
CEC (cmol[+]/kg)
P Index n/a

	Ca	Mg	Na	K
Actual (%)				
Suggested* ppm**	65-75	5-20	0-5	3-10

K:Mg ratio: n/a **N:S ratio:** n/a **C:N ratio:** n/a

Lime: n/a **Buffer pH:** n/a **Moisture:** 10.8 % **Density:** 0.84 g/cc

NO3-N, SO4-S and Cl extracted with ammonium acetate solution. All others extracted using Mehlich III solution.

** Nitrate N* *** Sulfate S* **** Mineral Soil* *n/a not analyzed*

Comments:

The Plant Science Lab

Laboratory Soil Test Results

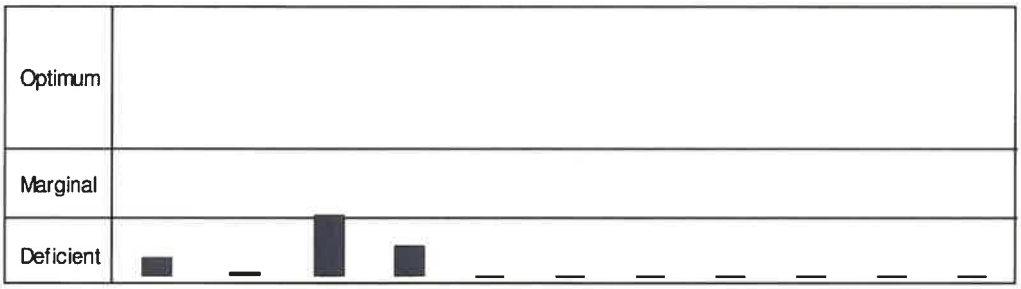
464 Riverside Road
Abbotsford, BC V2S 7M1
Phone: (604) 864-9044 x1602
E-Mail: pwarren@tlhort.com

Grower Name: Eryne
Field ID --- Crop: DP01 03
Lab ID: 59871
Lab Report Number: S59871-1

Date Received: 15/09/2022
Lab Report Date: 19/09/2022
Disposal Date: 17/09/2022
Sales Rep: Counter

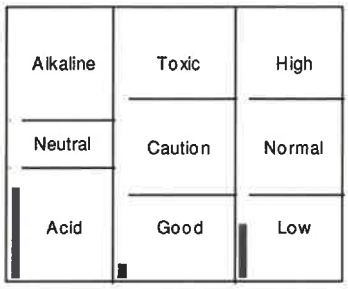
Nutrient Analysis (p.p.m.)

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn
	2	2	67	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a



Soil Quality

pH	EC (dS/m)	OM (%)
5.7	0.191	4.1



Additional (ppm)

Cl	P0	NH4-N	Mo
9	<0.4	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture
Sand: n/a Silt: n/a Clay: n/a

H+ (cmol[+]/kg)
BS (%)
CEC (cmol[+]/kg)
P Index n/a

	Ca	Mg	Na	K
Actual (%)				
Suggested* ppm**	65-75	5-20	0-5	3-10

K:Mg ratio: n/a **N:S ratio:** n/a **C:N ratio:** n/a

Lime: n/a **Buffer pH:** n/a **Moisture:** 11.4 % **Density:** 0.92 g/cc

NO3-N, SO4-S and Cl extracted with ammonium acetate solution. All others extracted using Mehlich III solution.

** Nitrate N* *** Sulfate S* **** Mineral Soil* *n/a not analyzed*

Comments:

The Plant Science Lab

Laboratory Soil Test Results

464 Riverside Road
Abbotsford, BC V2S 7M1
Phone: (604) 864-9044 x1602
E-Mail: pwarren@tlhort.com

Grower Name: Eryne
Field ID --- Crop: DP01 04
Lab ID: 59870
Lab Report Number: S59870-1

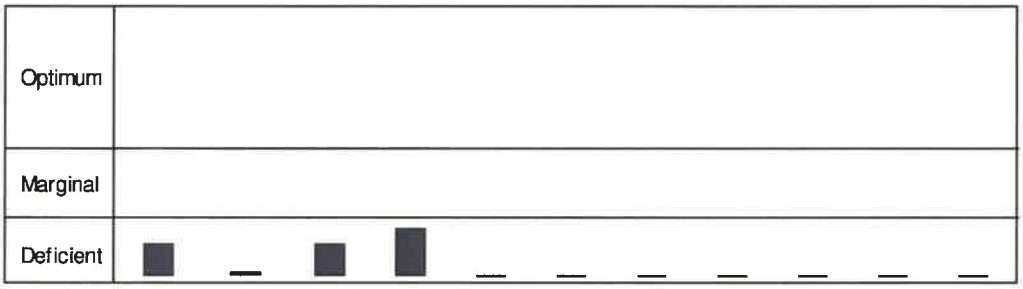
Date Received: 15/09/2022
Lab Report Date: 19/09/2022
Disposal Date: 17/09/2022
Sales Rep: Counter

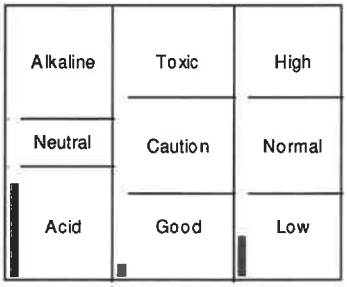
Nutrient Analysis (p.p.m.)

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn
	4	2	37	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Soil Quality

pH	EC (dS/m)	OM (%)
5.8	0.183	3.3





Additional (ppm)

Cl	P0	NH4-N	Mo
8	<0.4	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture
Sand: n/a Silt: n/a Clay: n/a

H+ (cmol[+]/kg):
BS (%):
CEC (cmol[+]/kg):
P Index n/a

	Ca	Mg	Na	K
Actual (%)				
Suggested* ppm**	65-75	5-20	0-5	3-10

K:Mg ratio: n/a **N:S ratio:** n/a **C:N ratio:** n/a

Lime: n/a **Buffer pH:** n/a **Moisture:** 13.3 % **Density:** 0.94 g/cc

NO3-N, SO4-S and Cl extracted with ammonium acetate solution. All others extracted using Mehlich III solution.

** Nitrate N ** Sulfate S *** Mineral Soil n/a not analyzed*

Comments:

The Plant Science Lab

Laboratory Soil Test Results

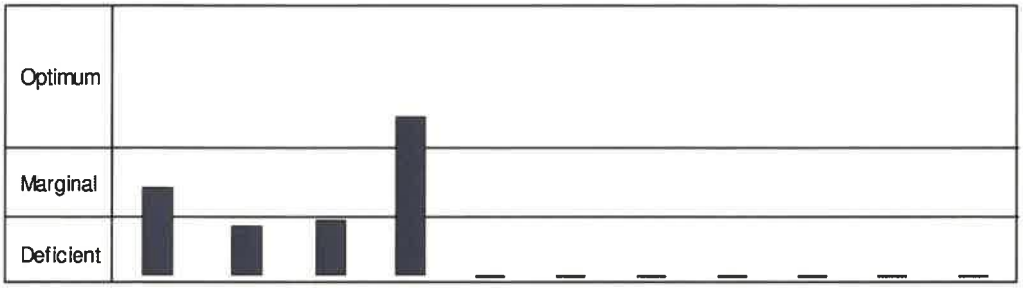
464 Riverside Road
Abbotsford, BC V2S 7M1
Phone: (604) 864-9044 x1602
E-Mail: pwarren@tlhort.com

Grower Name: Eryne
Field ID --- Crop: DP01 05
Lab ID: 59869
Lab Report Number: S59869-1

Date Received: 15/09/2022
Lab Report Date: 19/09/2022
Disposal Date: 17/09/2022
Sales Rep: Counter

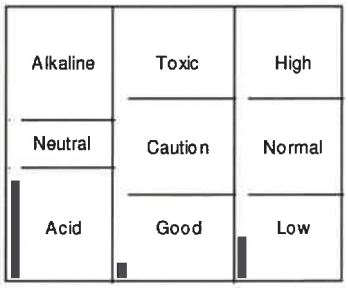
Nutrient Analysis (p.p.m.)

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn
	11	27	61	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a



Soil Quality

pH	EC (dS/m)	OM (%)
5.9	0.208	3.3



Additional (ppm)

Cl	P0	NH4-N	Mo
10	<0.4	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture
Sand: n/a Silt: n/a Clay: n/a

H+ (cmol[+]/kg)
BS (%) **Actual (%)**
CEC (cmol[+]/kg) **Suggested*** 65-75 5-20 0-5 3-10
P Index n/a **ppm**

Ca	Mg	Na	K

K:Mg ratio: n/a **N:S ratio:** n/a **C:N ratio:** n/a

Lime: n/a **Buffer pH:** n/a **Moisture:** 13.5 % **Density:** 0.90 g/cc

NO3-N, SO4-S and Cl extracted with ammonium acetate solution. All others extracted using Mehlich III solution.

** Nitrate N* *** Sulfate S* **** Mineral Soil* *n/a not analyzed*

Comments: