AGRICULTURAL CAPABILITY ASSESSMENT

for

41069 North Nicomen Road, Deroche, BC

PARCEL "A" (REFERENCE PLAN 6766) OF SECTION 6, TOWNSHIP 24 EXCEPT: PART ON RIGHT OF WAY PLAN 908, NEW WESTMINSTER DISTRICT
PID: 000-819-743

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1.0 INTRODUCTION

1.1 Terms of Reference

As requested by Mr. Dave Vernon (the Client) a detailed on-site Inspection of 41069 North Nicomen Rd (the Subject Property) was carried out by Catherine Orban, MSc, PAg on September 3, 2024. The inspection was focused primarily on the "Study Area", a portion of the Subject Property that lies outside the Agricultural Land Reserve (ALR) boundary. There is a portion of the Subject Property that is located within the ALR, but it was not included in the on site inspection. The purpose of this inspection was to assess the agricultural capability and suitability of the Study Area on the Subject Property. This report is intended to support an application to the Agricultural Land Commission (ALC) to include portions of the Subject Property into the ALR.

1.2 Qualifications & Field Protocols

This report summarizes the findings of the on-site inspection of the Study Area and a review of surrounding lands was carried out on September 3, 2024 and. The fieldwork and reporting was carried out by Catherine Orban, MSc, PAg. She is an agricultural soil specialist with over 30 years of professional experience and is fully qualified to carry out soil survey and land capability classifications. A statement of qualifications is included as Appendix A.

This report has been prepared under procedures and guidelines of the Canadian System for Soil Classification, Publication 1646 (Soil Classification Working Group, 1978), the Land Capability Classification for Agriculture in British Columbia, M.O.E. Manual 1 (BC MOE, April 1983) and the Soil Inventory Methods of BC at Survey Intensity Level 1, (BC MOE, January, 1985).

Soil conditions were determined by excavating 12 test pits using a mini-excavator. The pits were exposed to a depth which penetrated the unweathered parent material. All of the test pits were located in the Study Area, which lies outside the ALR boundary.

2.0 SITE CONDITIONS & LAND USE

2.1 Site Conditions & Zoning

The Subject Property is +/-68.16 ha (168 ac) in size and is located at 41069 North Nicomen Road, Deroche, BC. (Appendix B, Figures 1 & 2). The Study Area is +/-21.8 ha (54 ac) in size and is located in the north central area of the Subject Property outside the ALR (Appendix B, Figure 3).

An area of +/- 5.41 ha (13.4 ac) in the SW corner of the Subject Property is within the ALR. The arable portions of the Subject Property including areas both within and outside the ALR, are in active forage production for grazing dairy heifers and hay production in support of the landowner's large dairy farm on Nicomen Island. (Appendix B, Figure 3). There is an old homestead site with numerous walnut trees in the NE corner of the Study Area. These trees are estimated to be at least 80 years old and are remnants of early farm use.

The remaining +/- 40.95 ha (101.21 ac) majority of the Subject Property is characterized by steep, bedrock mountainous terrain with mature mixed forests as depicted in the topographic mapping for the area (Appendix B, Figure 4). This portion of the Subject Property is non-arable and was not surveyed.

The Subject Property is located in the Fraser Valley Regional District and includes the following zoning:

- *AG4, Agriculture*: SW corner of the Subject Property that is within the ALR.
- *R2, Rural:* The majority of the Subject Property and most of the Study Area – all outside the ALR.
- *R4, Rural:* The NW corner of the Subject Property including a small portion of the Study Area, mostly steep, rocky terrain – all outside the ALR.

2.2 Land Use: Subject Property and Surrounding Area

Land use in the surrounding area includes cleared pastures/grazing, cultivated lands, hay production, rural residential, a mobile home park, hobby farms, gravel pits and forestry. Properties to the south as well as portions of the adjacent property to the west are in the ALR, while those to the north and east are out of the ALR (Appendix B, Figure 3). The land uses summarized in Table 2.1, below were noted on the parcels adjacent to the Subject Property:

Table 2.1: 41069 North Nicomen Road, Deroche, BC – Surrounding Land Use

LOCATION	LAND USE	ALR STATUS
Subject Property	Mixed: Pasture/Grazing/Hay & Mountainous Forest	SW: IN/Remainder OUT
North	Forested & Rural Residential	OUT
East	Rural Residential	OUT
South	Farm Use/Forage Production; N Nicomen Rd & CPR Mainline	IN
West	Farm Use/Forage Production & Forested Hillside	Arable: IN/ Forested: OUT

3.0 SOILS INFORMATION

Soil conditions are a key factor in determining the overall agricultural capability and suitability of any given site. The soil conditions of the Study Area are described in this section, beginning with the published government survey information, followed by the existing soil conditions based on the lab data and observations made during the on-site inspection.

3.1 British Columbia Ministry of Environment 1:25,000 Mapping

The Ministry of Environment *Soils of the Langley-Vancouver Map Area, Report No. 15, British Columbia Soil Survey, RAB Bulletin 18* (RAB Bulletin 18) at 1:25,000 scale, Mapsheet #31, maps the area within the Study Area as Marble Hill Series on the level to moderately sloping areas; Abbotsford Series on the steeply sloping southern boundary and Cannell Series on the steep, rocky outcrop areas along the edges of the Study Area. (Appendix B, Figure 5).

The RAB Bulleting 18, Volume 3 describes the soil series that are mapped for the Study Area as follows:

- Marble Hill Series soils are described as being developed from medium textured, stone free, aeolian deposits, greater than 50 cm thick, which overly gravelly glacio-fluvial deposits. Marble Hill soils are well-suited for most agricultural crops.
- Abbotsford Series soils are described as being developed from 20 to 50 cm of medium textured aeolian deposits underlain by stratified gravelly glacial outwash deposits. Abbotsford soils are well-suited to most agricultural crops.
- Cannell Series soils are described as being developed from a mixture of moderately coarse textured colluvium and glacial till overlying granitic bedrock. Slopes are usually strongly to very steeply sloping. Cannell Soils are generally not suitable for agricultural crops because of shallowness to bedrock, steep slopes and stoniness.

3.2 Soils on Site Inspection – Methods & Results

Twelve soil pits were excavated to depths of 68 to 120 cm with a mini-excavator within the level upper terrace in the Study Area of the Subject Property. The detailed on-site inspection and survey at 1:4,000 scale identified six soil units within this area (Appendix B, Figure 6). All of the test pits were excavated in Soil Units I and II. Soil Unit III was located in the southern steeply sloping area; Soil Unit IV was found along the Study Area boundaries with steeply sloping rock outcrops; Soil Unit V was the gravel pit area and Soil Unit VI was the stockpile site for the topsoil that was stripped from the gravel area. No test pits were excavated in Units III, IV, V or VI due to overriding

non-arable characteristics and/or inaccessibility. Site and soil pit conditions were documented in test pit logs and photographs (Appendix C).

The soil profiles were examined and described according to conventions from the *Canadian System of Soil Classification, Third Edition* (Soil Classification Working Group, 1998). The soil colours were based on the Munsell Soil Colour Charts using dry soil samples. 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 three representative soil samples were taken from TP1, TP6 & TP10 and submitted for laboratory analysis of one or more of the following parameters: various soil nutrients, pH, electrical conductivity, and soil particle sizes/textures. Laboratory soil test results from Element laboratories (fertility package and particle size analysis) are included in this report (Appendix D).

Six Soil Units were identified on the Subject Property (indicated by Roman numerals I - VI) through the detailed soils assessment at a mapping scale intensity of +/- 1:4,000 (Appendix B, Figure 6; and Table 2, below). Information obtained during the site inspection was combined with the lab results to provide site-specific details that were used to fine-tune the soils data presented in RAB Bulletin 18, which was based on mapping at 1:25,000. The soil units were primarily defined by soil physical and morphological properties as well as topography and land use. 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 C). The soil units as mapped for the Subject Properties at a scale of +/-1:4,000 are described in Table 3.1, below:

TABLE 3.1: 41069 North Nicomen Road, Deroche, BC – Site Inspection: Soil Unit Summary

SOIL UNIT	TEST PITS	TOPSOIL DEPTH/COLOUR	SOIL PROFILE TEXTURE (0-50 cm)	SOIL PROFILE STONE CONTENT	SOIL PROFILE DRAINAGE	TOPOGRAPHY	LAND USE	AREA[1] (ha)	% TOTAL STUDY AREA[1]	NOTES
I	1, 9, 10, 11	5-36 cm/Dark Brown	Silt Loam (upper); Silt Loam or vf Sandy Loam (lower)	0 - <5% Coarse Fragments	Well	Nearly Level to Very Gentle	Improved Pasture & Forest	10.08	46%	TP 1, 9 & 10 were located in historically cleared improved pasture. TP 11 had the deepest Ah (36 cm) and was located in an open mixed forest that appeared to be used for grazing.
II	2, 3, 4, 5. 6, 7, 8, 12	14-24 cm/Dark Brown & Dark Reddish Brown	Silt Loam or vfSandy Loam	0 - <5% Coarse Fragments	Well	Nearly Level	Improved Pasture	7.26	33%	All of the test pits in SU II were located in historically cleared improved pasture.
III	N/A	N/A	N/A	N/A	N/A	Simple & Complex Slopes >30% (7T)	Mature Forest	3.65	17%	Located in the southern steeply sloping area.
IV	N/A	N/A	N/A	N/A	N/A	Simple & Complex Slopes >30% (7T)	Mature Forest	0.46	2%	Located along the Study Area boundaries with steeply sloping rock outcrops
V	N/A	N/A	N/A	N/A	N/A	Simple Slopes 5-20% (4T)	Disturbed - Gravel Pit	0.23	1%	Gravel pit site - Has not been rehabilitated.
VI	N/A	N/A	N/A	N/A	N/A	Simple Slopes 16-20% (4T)	Scrub Alder	0.12	1%	Stockpiled topsoil from the gravel extraction site (SU V)*
TOTAL								21.80	100%	

[1] Area measurements derived from field observations and Google Earth

*Note: The topography rating of Class 4T for SU VI is due the presence of the berm of topsoil that was stripped from SU V. The underlying/natural slope of SU VI is nearly level to very gentle.

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 RAB Bulletin 18. In general, the minor differences in soil mapping have been attributed to the different scale intensities as they applied to the Subject Property. The BC Soil Survey is based on generalized mapping at a scale of 1:25,000, 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 +/- 1:4,000.

4.0 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 Subject Property is described in this section; beginning with published government information, followed by that obtained during the on-site inspection conducted on Sept 3, 2024.

4.1 Government of British Columbia – Climatic Capability

General reference information as well as baseline climatic data for the Deroche/Agassiz area was found in *Soil Moisture Deficit Calculations* (NP, RJ Williams, 1987), *Land Capability Classification for Agriculture in British Columbia, Manual 1* (BC Ministry of Agriculture and Food and Ministry of Environment, 1983), and *Climatic Capability for Agriculture, Mapsheet 92G/SE, Langley, Scale 1:100,000* (BC MOE, 1981). (Appendix B, Figure 7). More detailed information was provided by *RAB Bulletin 18, Volume 6, Technical Data, 1981*. Please note that the climatic capability ratings are based entirely on climatic conditions (primarily precipitation and temperature) at a given site. AWSC values are used in determining the soil moisture deficits (SMD's) for key locations according to Williams (1987). Otherwise, site-specific soil characteristics and general site conditions are not considered in the MOE ratings. The overall agricultural capability of the Subject Property is addressed in Section 5 of this report.

The regional mapping specifies a climatic capability rating of thermal Class 1 for the Deroche area. This rating applies to locations where the freeze-free period is more than 150 days in coastal areas, 90-119 days in the interior area of the province. Climatic data for the Agassiz area indicates an estimated annual soil moisture deficit (SMD) of -14 to 300 mm corresponding to AWSC values ranging from 150 to 10 mm (NP, RJ Williams, 1987).

4.2 Site-Specific Climatic Capability

Site-specific climatic capability for agriculture was calculated for the test pits using lab-based soil texture information from TP1, TP6 and TP10, which are representative of Soil Units I & II. These two soil units account for 79% of the Study Area. Soil textures were used in conjunction with existing local and regional data (BC MOE, Manual 1, 1983; Williams, 1987; and Luttmerding, 1984, Vol 6) to calculate the AWSC and SMD values for the upper 50 cm in each of the 12 soil profiles that were examined in the on-site inspection. The results were used to determine site-specific climatic and soil capability ratings for agriculture in the Study Area which have been summarized in Table 4.1, below. A description of agricultural/climatic capability classifications is found in Appendix C.

Table 4.1: 41069 North Nicomen Road, Deroche, BC – Soil Moisture Deficit & Climatic Capability Ratings

	SOIL MOISTURE BALANCE							CLIMATE CAPABILITY RATING			
SITE & SOIL HORIZON	TOTAL DEPTH	MATRIX TEXTURE	MATRIX AWSC[1]	MATRIX FRACTION	CF ADJUSTED AWSC	INTERVAL AWSC	SOIL H_2O DEFICIT[2]	UNIMPROVED H_2O SUBCLASS[4]	IMPROVED H_2O SUBCLASS[4]	THERMAL RATING[2]	IMPROVED OVERALL SUBCLASS
	cm	lab	mm/cm	lab	mm/cm	mm	mm				
TP1/SUI											
Ah	5	SiL	2.70	0.95	2.57	12.83					
Bf	30	SiL	2.30	0.95	2.19	65.55					
Bm	15	vfSL	1.84	0.85	1.56	23.40					
Interval	**50**					**101.78**	**46**	**2A**	**1**	**1**	**1**
TP2/SUI											
Ah	5	SiL	2.70	0.95	2.57	12.83					
Bf	45	SiL	2.30	0.95	2.19	98.33					
Interval	**50**					**111.15**	**33**	**1**	**1**	**1**	**1**
TP3/SUII											
Sod/Ah	13	SiL	2.70	0.95	2.57	33.35					
Bf	30	SiL	2.30	0.95	2.19	65.55					
Bm	7	SiL	1.84	0.95	1.75	12.24					
Interval	**50**					**111.13**	**33**	**1**	**1**	**1**	**1**
TP4/SUII											
Sod/Ah	25	SiL	2.70	1.00	2.70	67.50					
Bf	25	SiL	2.30	1.00	2.30	57.50					
Interval	**50**					**125.00**	**15**	**1**	**1**	**1**	**1**
TP5/SUII											
Sod/Ah	22	SiL	2.70	1.00	2.70	59.40					
Bf	28	SiL	2.30	1.00	2.30	64.40					
Interval	**50**					**123.80**	**16**	**1**	**1**	**1**	**1**
TP6/SUII											
Sod/Ah	24	VFSL	2.10	1.00	2.10	50.40					
Bf	26	VFSL	2.10	1.00	2.10	54.60					
Interval	**50**					**105.00**	**41**	**2A**	**1**	**1**	**1**
TP7/SUII											
Sod/Ah	12	SiL	2.70	0.95	2.57	30.78					
Bf	38	SiL	2.30	0.95	2.19	83.03					
Interval	**50**					**113.81**	**32**	**1**	**1**	**1**	**1**
TP8/SUII											
Sod/Ah	12	SiL	2.70	0.95	2.57	30.78					
Bf	38	SiL	2.30	0.95	2.19	83.03					
Interval	**50**					**113.81**	**32**	**1**	**1**	**1**	**1**
TP9/SUII											
Sod/Ah	5	SiL	2.70	0.95	2.57	12.83					
Bf	29	SiL	2.30	0.90	2.07	60.03					
BC	16	FSL	1.40	0.65	0.91	14.56					
Interval	**50**					**87.42**	**65**	**2A**	**1**	**1**	**1**
TP10/SUI											
Sod/Ah	14	vfSL	2.10	1.00	2.10	29.40					
Bf	36	vfSL	2.10	1.00	2.10	75.60					
Interval	**50**					**105.00**	**41**	**2A**	**1**	**1**	**1**
TP11/SUI											
Ah	36	SiL	2.70	1.00	2.70	97.20					
Bf	14	SiL	2.30	0.95	2.19	30.59					
Interval	**50**					**127.79**	**12**	**1**	**1**	**1**	**1**
TP12/SUII											
Sod/Ah	12	SiL	2.70	0.95	2.57	30.78					
Bf	38	SiL	2.30	0.95	2.19	83.03					
Interval	**50**					**113.81**	**32**	**1**	**1**	**1**	**1**

lab/field Lab Data or Field Estimate
CF Coarse Fragments > 2.0 mm

[1] AWSC Values are Derived from SOILS OF LANGLEY - VANCOUVER MAP AREA RAB BULLETIN 18, VOLUME 6, page 112 for Marble Hill Series; SOD/Ah SiL AWSC = 2.70 mm/cm; Bf SiL av = 2.3 mm/cm; Ah/Bf vfSL= 2.1 mm/cm; Bm vfSL = 1.84mm/cm

[2] SMD values are based on based on Table 2: Soil Moisture Deficit vs AWSC for Fraser Valley Locations; RJ Williams, pg 7

[3] (Interval AWSC)-(Climate H_2O Deficit) = Deficit (negative) or Surplus (positive)

[4] Based on - MOE Manual 1 (BC Ministry of Environment, 1981).

The calculations indicate that the relatively high AWSC combined with low CMD values result in low soil moisture deficits throughout Soil Units I and II. Soil Units I & II account for 79% of the Study Area and have climatic capability ratings of Class I & 2A, unimproved and Class 1, improved, with irrigation.

Climatic capability ratings were not calculated for Soil Units III through VI, which comprise the remaining 21% of the Study Area. Soil Units III and IV account for 19% of the Study Area are not considered to be arable or improvable due to extremely steep slopes, shallow bedrock and rock outcrops. Soil Units V & VI account for only 2% of Study Area so were not included in site-specific climatic capability calculations.

4.3 Comparison of Regional and On-Site Inspection Ratings

There was no difference between the regional and on-site inspection ratings for climatic capability. The regional mapping rated the entire Study Area at Class 1, thermal as did the on-site assessment of the Study Area. The on-site assessment included soil impacts on the water regime that were not included in the regional mapping.

5.0 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 BC Land Inventory (BCLI) 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 balance;
- 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 potentials and limitations for agriculture (See Appendix E 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 MOE, 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 rock outcrops, 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 MOE, April 1983).

Site-specific agricultural capability mapping for the Subject Property was found on Mapsheet 92G1 at 1:25,000 (BC Ministry of Environment, 1985). (Appendix B, Figure 8).

The MOE agricultural capability polygons corresponded closely to the soil polygons mapped in RAB Bulletin 18. The majority of the Study Area is classified as 60% 2A/40% 1, improvable to 100% Class 1. A portion of the property in the SW corner of the Study Area is mapped at Class 2T, unimprovable. The steep southern boundary is mapped as 7T, unimprovable. Minor areas on the boundaries of the Study Area are mapped as 7RT

5.2 Soils on Site Inspection

The overall agricultural capability ratings for each area of the Subject Properties were mapped (Appendix B, Figure 9) and then compared to the soil unit polygons as defined by the site inspection (Section 3.2, above). In this case, the boundaries for the agricultural capability (AC) Units as determined by the field investigation (indicated by numbers 1 to 10) corresponded closely to the SU polygons. 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 +/-1:4,000. The agricultural capability ratings for the Study Area, based on the site inspection are summarized in Table 5.1, below:

TABLE 5.1: 41069 North Nicomen Road, Deroche, BC – Site Inspection: Agricultural Capability Ratings

AG CAPABILITY UNIT	UNIMPROVED AG CAPABILITY	AREA (ha)[1]	% TOTAL AREA[1]	AG CAPABILITY UNIT	IMPROVED AG CAPABILITY[2]	AREA (ha)[1]	% TOTAL AREA[1]
1	1[7]-2A[3]	6.01	27.57%	1	1	6.01	27.57%
2	2TA	4.90	22.48%	2	2T	4.90	22.48%
3	7T	3.22	14.77%	3	7T	3.22	14.77%
4	3T	2.78	12.75%	4	3T	2.78	12.75%
5	3T[5]-2TA[5]	2.35	10.78%	5	3T[6]-2T[4]	2.35	10.78%
6	5T	1.07	4.91%	6	5T	1.07	4.91%
7	4T	0.62	2.84%	7	4T	0.62	2.84%
8	7RT	0.50	2.29%	8	7RT	0.50	2.29%
9	7E	0.23	1.06%	9	1	0.23	1.06%
10	4T	0.12	0.55%	10	1	0.12	0.55%
TOTAL		**21.80**	**100.00%**			**21.80**	**100.00%**

SUMMARY							
1, 2, 4, 5	Class 1-3	16.04	73.58%	1, 2, 4, 5, 9, 10	Class 1-3	16.39	75.18%
6, 7, 10	Class 4 & 5	1.81	8.30%	6, 7	Class 4 & 5	1.69	7.75%
3, 8, 9	Class 7	3.95	18.12%	3, 8	Class 7	3.72	17.06%
TOTAL		**21.80**	**100.00%**			**21.80**	**100.00%**

[1]Ratings based on lab results & field investigation. See Appendix E for class descriptions.
[2]Estimates based on lab results, field investigations and aerial photography.

Some 8.03 ha or 37% of the Study Area is currently being used for improved pasture and hay production including all of AC Unit 1 and significant portions of AC Units 2, 4, 5, 6 and 7.

In the improved condition, together with the undeveloped area within these AC units (Class 1 to 3 agricultural capability), some 16.39 ha or 75.18% of the Study Area would be considered prime agricultural land suitable for a wide range of crops.

AC Units 6 and 7 account for 1.69 ha or 7.8% of the Study Area and are rated at Class 4 and 5 improved capability with topographic limitations. These AC units are considered secondary agricultural lands that are arable but require some management measures due to the slopes.

AC Units 3 and 8 account for 3.72 ha or 17.1% of the Study Area and are rated at Class 7 unimprovable capability. These non-arable lands have been included in the Study Area to provide buffering for the high capability lands and rationale for the proposed new ALR boundary. In addition these areas are used by the cattle for sheltering and some native forage.

AC Unit 9 occupies only 0.23 ha or 1% of the Study Area. The Landowner has used gravel from this area to service roads on the Subject Property. It was rated at Class 7E (erosion) due to the removal of topsoil and gravel extraction activities. The topsoil was salvaged and has been stored in a berm on AC Unit 10, with an unimproved rating of Class 4T. Once the gravel pit site is recontoured and the topsoil is replaced, AC Unit 9 will be improved to a rating of Class 1. The capability of AC Unit 10 will revert to Class 1 when the topsoil berm is removed.

5.3 Comparison of BC Government and On-Site Inspection Ratings

The unimproved and improved agricultural capability ratings applied to the Subject Properties based on the on-site inspection were generally consistent with the ratings ascribed by the MOE mapping.

The biggest difference was the MOE vs. on-site inspection ratings for AC Unit 1/Soil Unit II in the central part of the Study Area that was cleared and has been used for pasture and hay production for many years. The MOE unimproved rating was 60% 2A/40% 1 while the on-site inspection rating was 70% 1/30% 2A. However, in both cases the entire area was considered to be improvable to Class 1 with no limitations.

Otherwise, the agricultural capability ratings in the peripheral portions of the Study Area were primarily related to topographic limitations. The on-site inspection agricultural capability ratings were consistent with the MOE ratings for these polygons and were not considered to be improvable.

In summary, the on-site inspection agricultural capability ratings were generally consistent with the MOE overall AC ratings. The differences are considered to be due primarily to the different scale intensities as they apply to the Study Area. The MOE ratings were based on mapping at a scale of 1:25,000, which is not intended to account for the all the subtle variations in site-specific conditions (eg. soil texture, coarse fragment content, topography, slope angle and aspect) that were identified during the on-site inspection, at a detailed mapping scale intensity of +/- 1:4,000.

5.4 Feasibility of Improvements

The proposed improvements include supplemental moisture (irrigation) during the dry months in AC Units 1, 2, and 5, as well as site recontouring and topsoil replacement at the gravel pit site in AC Units 9 and 10. The results of this assessment suggest that these improvements would be feasible for all five of these AC Units, which account for +/-13.61 ha or 62.43% of the Study Area. The agricultural capability ratings are expected to improve from Classes 2A, 2TA, 4T & 7E to Classes 1, 2T and 1, respectively (See Table 4, above).

Improvements are not considered to be feasible for the remaining +/-8.19 ha or 37.57% of the Study Area which includes steep simple and complex slopes. This area includes AC Units 3, 4, 6, 7 and 8, which are rated at Classes 7T, 3T, 5T, 4T & 7RT.

6.0 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 Study Area:

- Feasibility of improvements;
- Availability of services (water, gas, electricity) for non-soil bound agriculture
- Overall size of the Subject Property and Study Area;
- Location and context of the Subject Property (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 1:25,000 mapping scale); and
- Agricultural capability ratings as determined by this assessment (at +/-1:4,000 mapping scale).

The suitability of the Study Area for various agricultural purposes has been evaluated In terms of the factors listed above and has been summarized in the following sections.

6.1 Soil Bound Agricultural Uses

AC Units 1, 2, 4 and 5 in the Study Area were found to be improvable to Classes 1-3 and suitable for the widest range of adapted crops in the Lower Fraser Valley Region, with few limitations under irrigated conditions.

AC Units 9 and 10 can also be improved to Class 1 capability if the gravel pit site is rehabilitated including topsoil replacement.

Soil bound agricultural uses include high value crops such as small fruits and berries, tree fruits, grapes, vegetables and the widest range of field crops. Information from well logs from surrounding properties indicate that drilled wells would provide adequate irrigation water on the Subject Property (BC Ministry of Environmental Protection and Sustainability, March 2022).

AC Units 6 and 7 were considered secondary agricultural lands that are arable but require some management measures due to the slopes.

6.2 Non-Soil Bound Agricultural Uses

Non soil bound uses include greenhouses, mushroom production, poultry, feedlots and pot nurseries. The primary limitation in the Study Area to these uses is a minor access issue. The existing access is along a steep and narrow trail. This issue could be resolved by adjusting the layout and reducing the grade on the trail.

Natural gas is not available which would eliminate greenhouses, mushrooms and poultry as a use. With such high capability soils, non-soil bound agriculture would not be a suitable use from a highest and best use resource management perspective.

7.0 IMPACT ANALYSIS

7.1 Impact of Agricultural Development of Subject Lands on Surrounding Lands

The Study Area and the lower bench are used for dairy heifer grazing and hay production in support of the landowner's large dairy farm on Nicomen Island. While the Subject Property including the Study Area is being used beneficially for agriculture, it has much higher agricultural potential rivalling any other land in the lower Fraser Valley for producing high value crops including small fruits and berries, tree fruits, grapes, vegetables and the widest range of field crops. Only minor tree removal and cultivation would render the land suitable for this wide range of crop options. There is very little Class 1 land in the Lower Fraser Valley and it is a very valuable agricultural resource deserving of protection.

The Study Area/Subject Property is isolated from all other similar lands which render it unique and highly suitable for specialty crops and certified crop production due to its isolation.

8.0 SUMMARY AND CONCLUSIONS

8.1 Subject Property

- The entire Subject Property is 68.16 ha (168 ac) in size including an area of 5.41 ha (13.4 ac) that is within the ALR with the remaining 62.75 ha (155 ac) lying outside the ALR.
- A large portion of the property that lies outside the ALR has historically been used for grazing dairy cows and hay production and is currently being used for these purposes. There is an old homestead site with numerous walnut trees in the NE corner of the Study Area. These trees are estimated to be at least 80 years old and are remnants of early farm use.
- The Study Area that was the focus for the on-site soil inspection included 21.80 ha (54 ac) of land in the central area of the Subject Property, most of which is currently being used for agricultural purposes, as noted above.
- In the improved condition, some 16.39 ha (40.5 ac) or 75.2% of the Study Area would be considered prime agricultural land (agricultural capability Class 1 to 3) and suitable for a wide range of crops.
- An additional 1.69 ha (4.2 ac) or 7.8% of the Study Area was rated at Class 4 and 5 improved capability with topographic limitations. These AC units are considered secondary agricultural lands that are arable but have some management limitations imposed by the slopes.
- The remaining 3.72 ha (9.19 ac) or 17.0 % of the Study Area which includes steep simple and complex slopes is rated at Class 7 unimprovable capability. These non-arable lands have been included in the Study Area to provide buffering for the high capability lands, shelter and native forage for cattle as well as rationale for the proposed new ALR boundary.
- There is evidence that the Subject Property and the Study Area have been farmed for more than 80 years and possibly longer.

8.2 Conclusions

- The isolated location and high agricultural capability soils of the Study Area make it uniquely suited for growing certified and foundation seedstock crops and for plant breeding.
- Marble Hill soils; which are dominant in the Study Area, are among the very best soils in the Fraser Valley and currently support most of the berry production in the Abbotsford area.
- Almost all of the Marble Hill soils in the Fraser Valley are in full agricultural production and properties with Marble Hill soil are in high demand by farmers.

- The dominantly high agricultural capability land in the Study Area is currently out of the ALR and vulnerable to subdivision and development for non-farm uses which would render it unsuitable and/or unavailable for commercial agricultural production.
- The preservation of the land in the Study Area for soil bound agriculture is considered to be the highest and best use of this unique resource from a soil management perspective.

9.0 REFERENCES

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10.0 LIMITATIONS

I, Catherine Orban 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.

Catherine Orban, MSc, PAg

November 17, 2024

APPENDIX A

Statement of Qualifications

Catherine M. Orban, MSc, PAg

Catherine Orban, MSc, PAg
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1911 Bonito Cres
Nanoose Bay, BC, V9P 9J1
c: 250-612-2166 e: catherineo@telus.net

Catherine Orban is a Professional Agrologist with a Master of Science Degree in Geography, specializing in Soil Science. She has been conducting soils and agricultural capability assessments and managing soil rehabilitation projects since 1985. She has been a registered Professional Agrologist (PAg) since 1999 in both Alberta and British Columbia where she has worked on a variety of soils assessment, management, remediation and reclamation projects in the agricultural, oil & gas and environmental sectors throughout western Canada. Catherine has been an independent consultant for over 30 years and founded *Soil Matters Consulting Ltd (BC)* in 2014.

Catherine has had extensive experience as an environmental inspector and as a dedicated soil specialist on a variety of linear development (pipeline) projects in western Canada since 1993. She has conducted numerous soil surveys and terrain assessments for a wide range of pipeline, wellsite and access road construction and rehabilitation projects located in a variety of landscapes throughout BC. She has prepared soil survey and construction as-built reports including; environmental overviews, soil descriptions and classifications, soil management and reclamation plans, and post-construction monitoring programs. Her specialization and strongest areas of expertise in the linear development sector include soil surveys and assessments, management and rehabilitation; before, during and after linear construction.

Catherine is based in Nanoose Bay on Vancouver Island and has worked extensively on Agricultural Land Reserve (ALR) properties on the island, in the lower mainland and in the Okanagan region. Her experience with agricultural capability assessments in support of Agricultural Land Commission (ALC) applications includes a variety of over 100 projects comprising site assessments and reports, gravel extraction and rehabilitation plans, fill site monitoring, city council/regional district submissions, 3rd party reviews and participation in public meetings. She has also been retained as an expert witness to review agricultural capability assessments prepared by other practitioners for legal proceedings. Catherine has mentored several professional agrologists in conducting and interpreting agricultural capability assessments.

APPENDIX B

Maps & Figures

41069 North Nicomen Road, Deroche, BC

Figure 1: 41069 North Nicomen Road, Deroche, BC – Regional Location

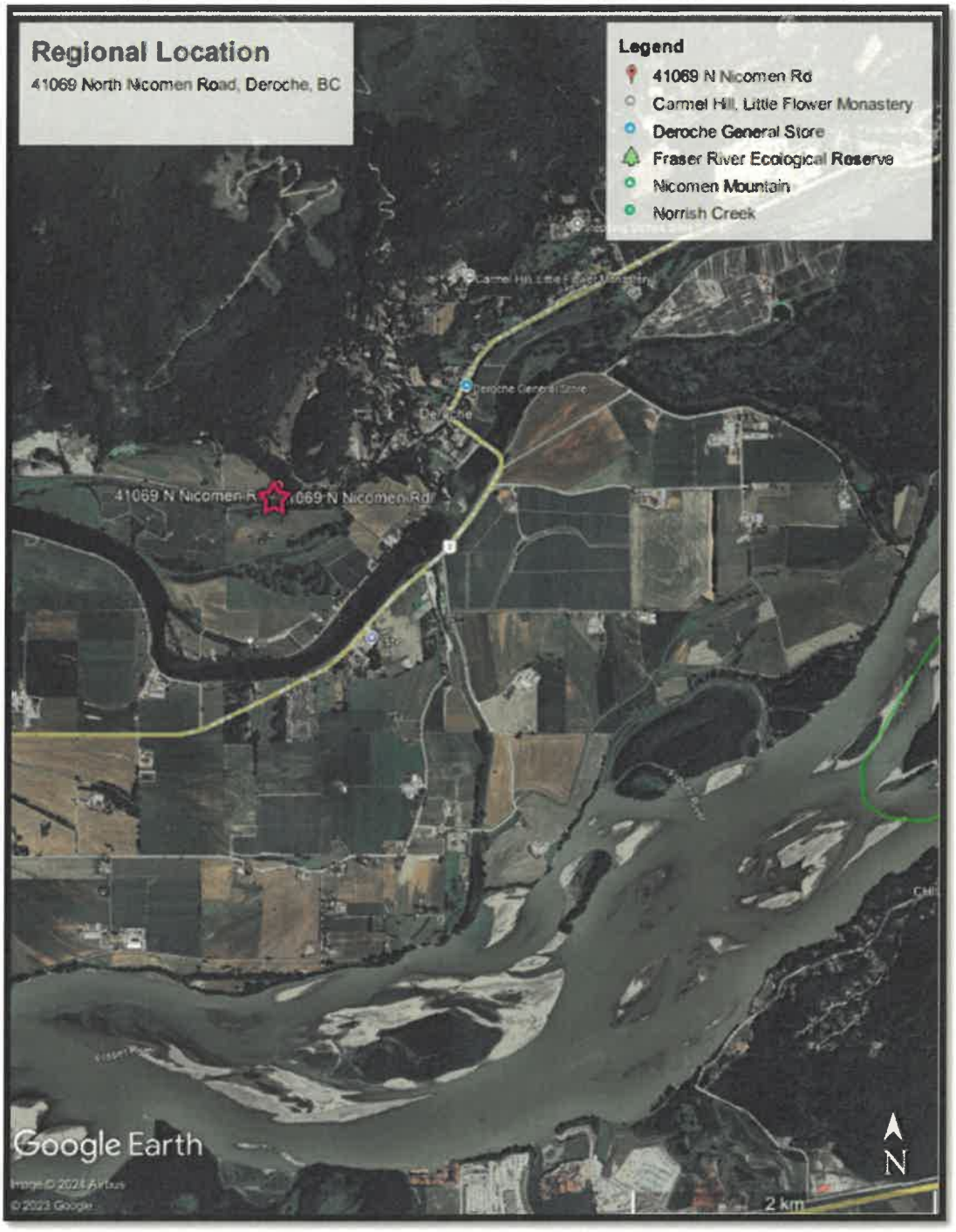
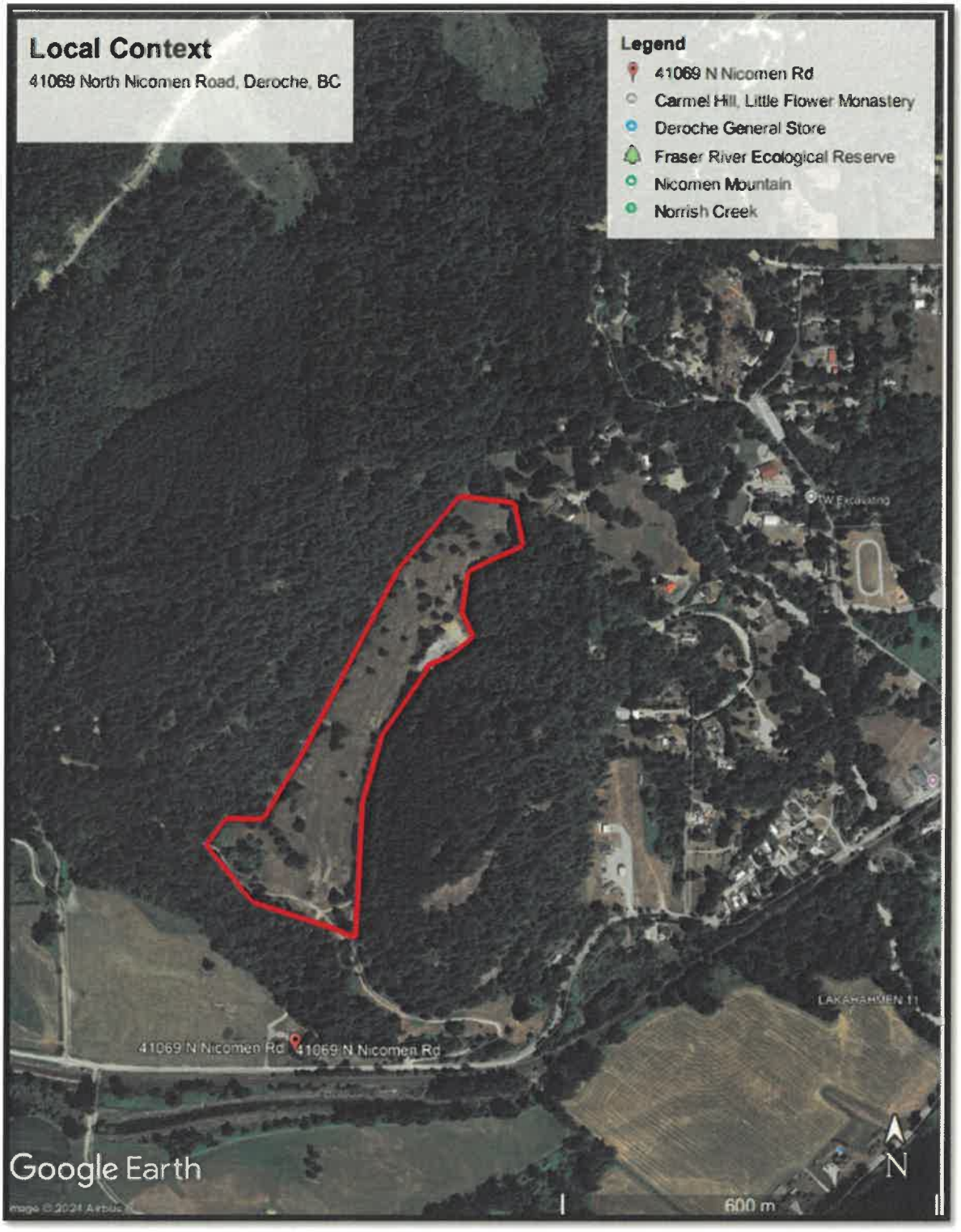
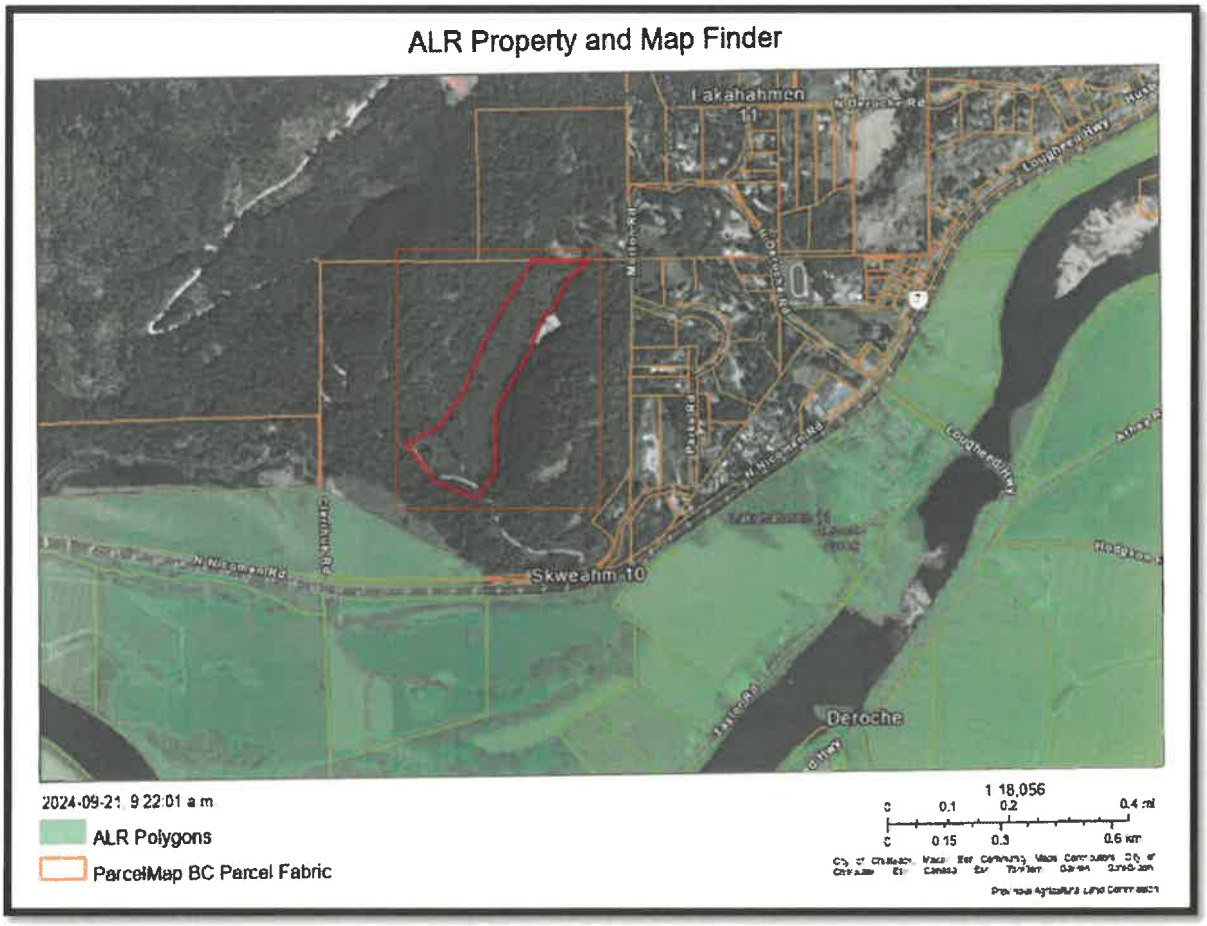


Figure 2: 41069 North Nicomen Road, Deroche, BC – Local Context



Study Area

Figure 3: 41069 North Nicomen Road, Deroche, BC – ALR Mapping



Study Area

Figure 4: 41069 North Nicomen Road, Deroche, BC – Topography & Test Pits

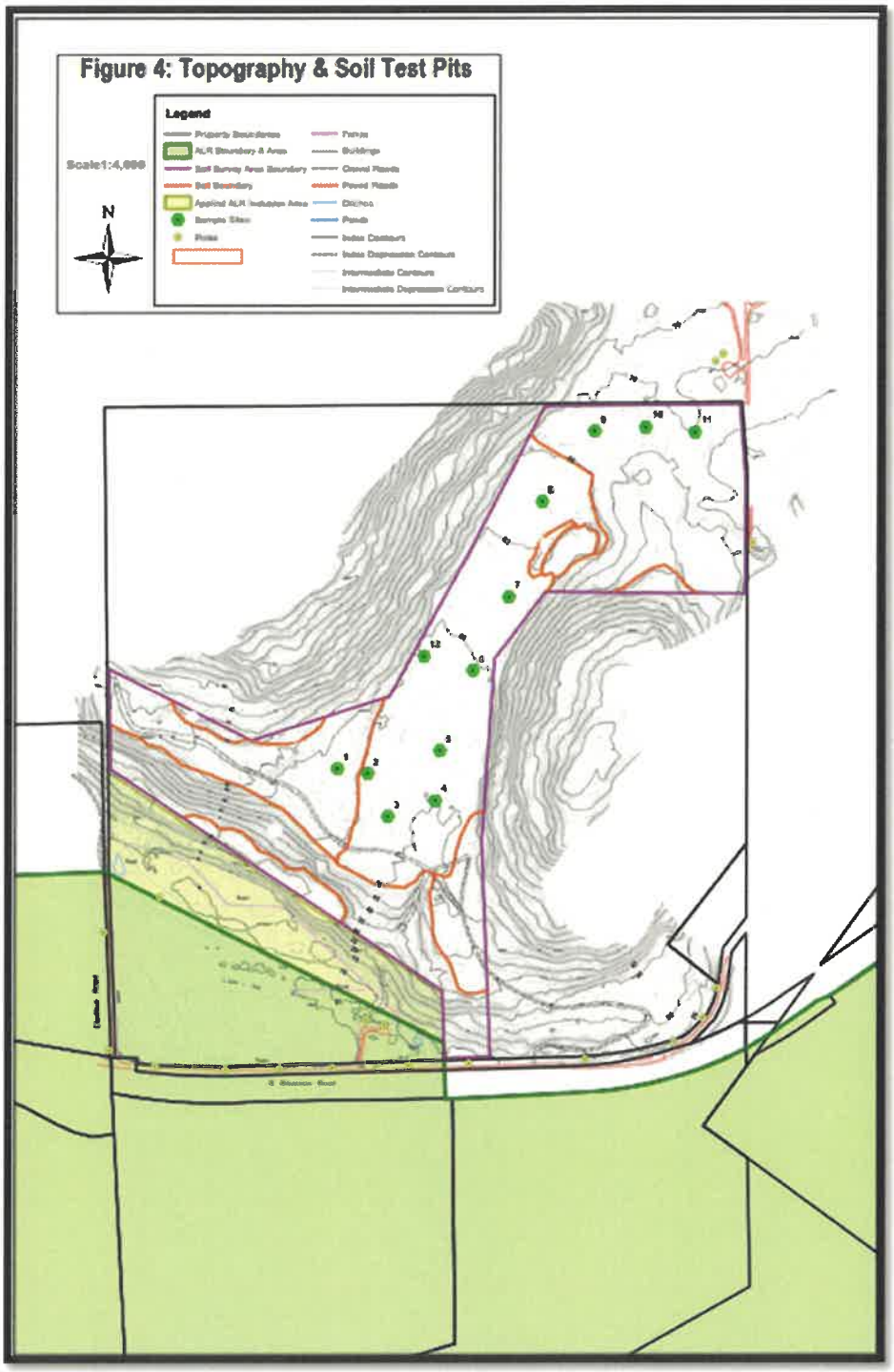
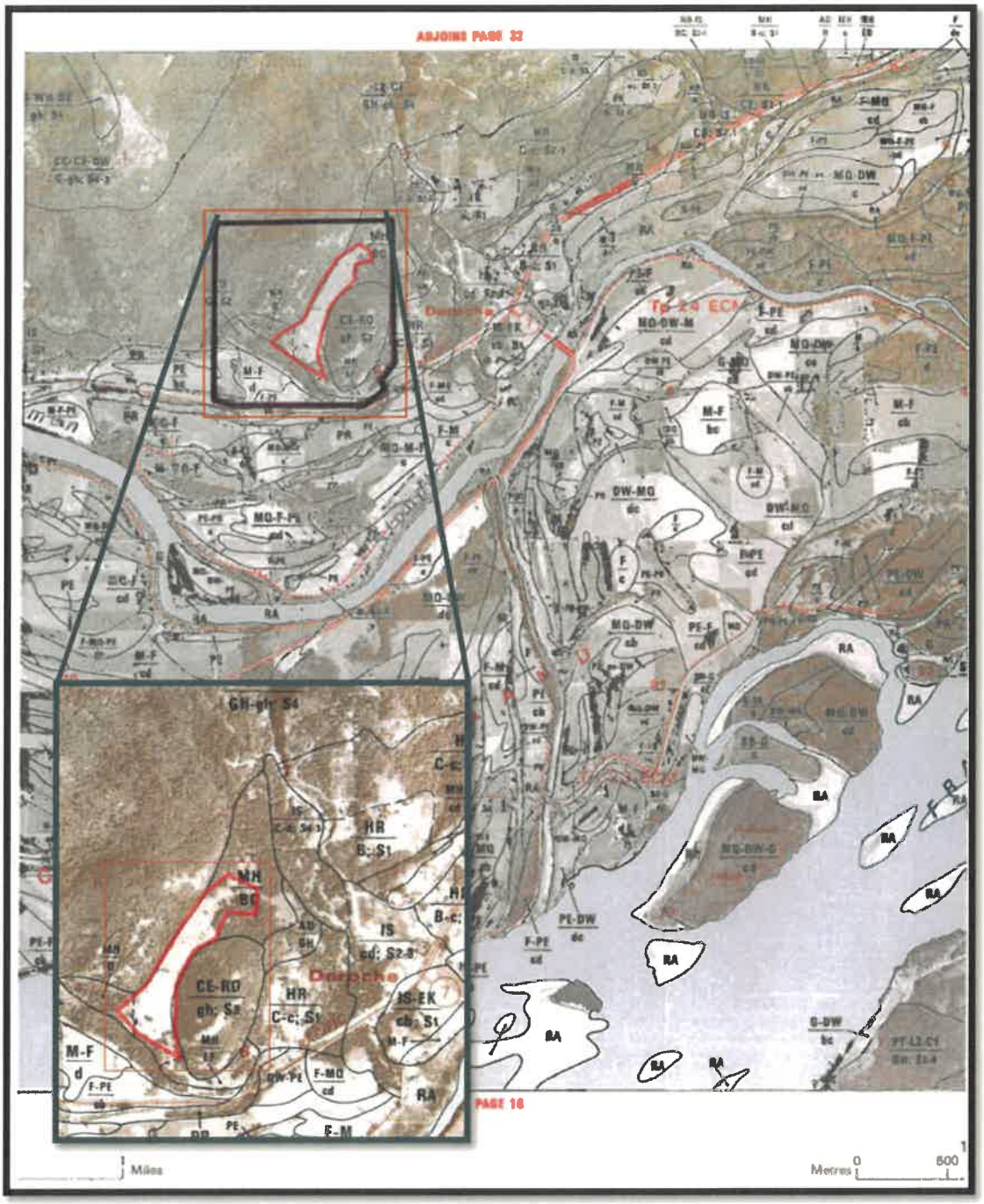


Figure 5: 41069 North Nicomen Road, Deroche, BC – Soils Mapping



Study Area Subject Property SOURCE: Report No 15, BC Soil Survey, v.1, Map 31

Soil Series	**Slope** - Simple
MH – Marble Hill: Over 50 cm of medium-textured eolian deposits over gravelly glacial outwash deposits. Well drained - Orthic Humo-Ferric Podzols	B - Very gently sloping or gently undulating – 0.5-2% C - Gently sloping or undulating – 2+-5%

Figure 6: 41069 North Nicomen Road, Deroche, BC – Soil Units

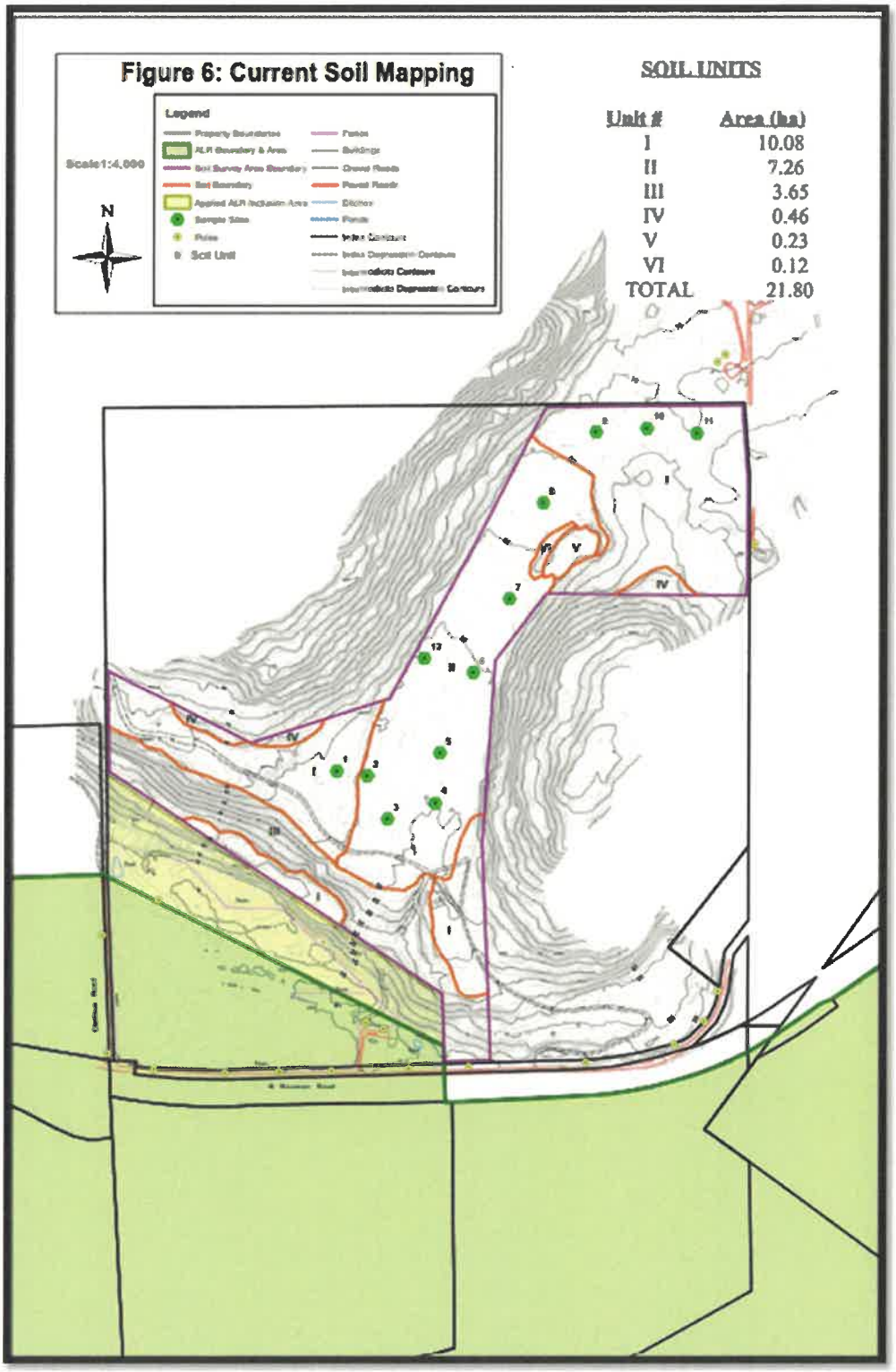
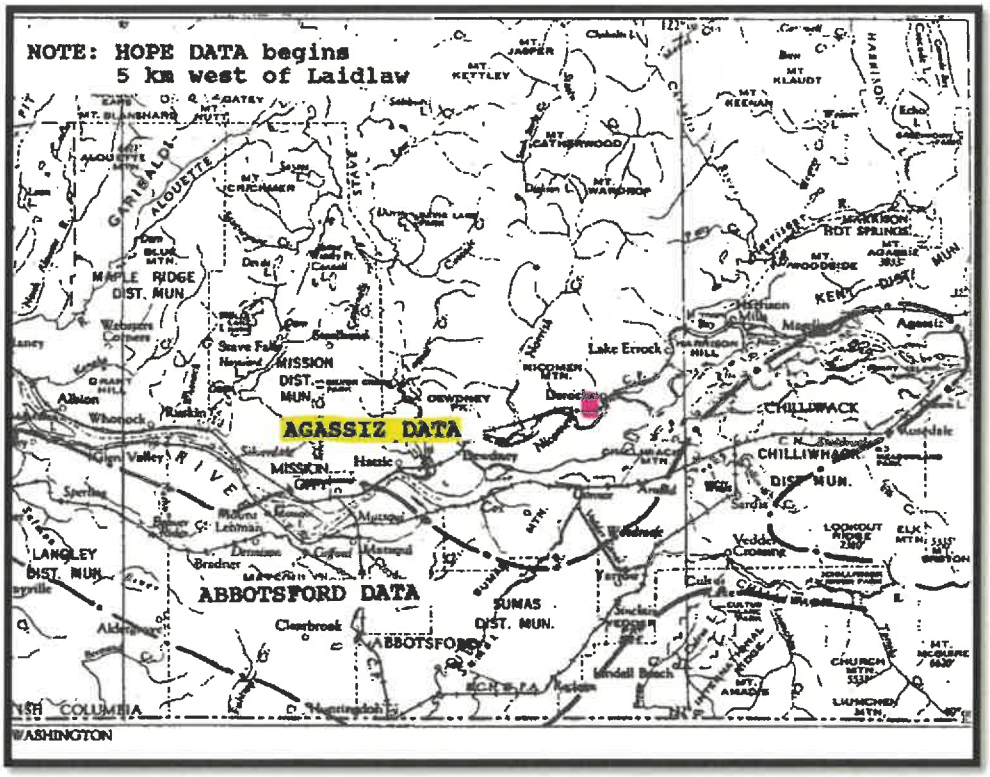


Figure 7: 41069 North Nicomen Road, Deroche, BC – Climatic Capability Mapping & Table

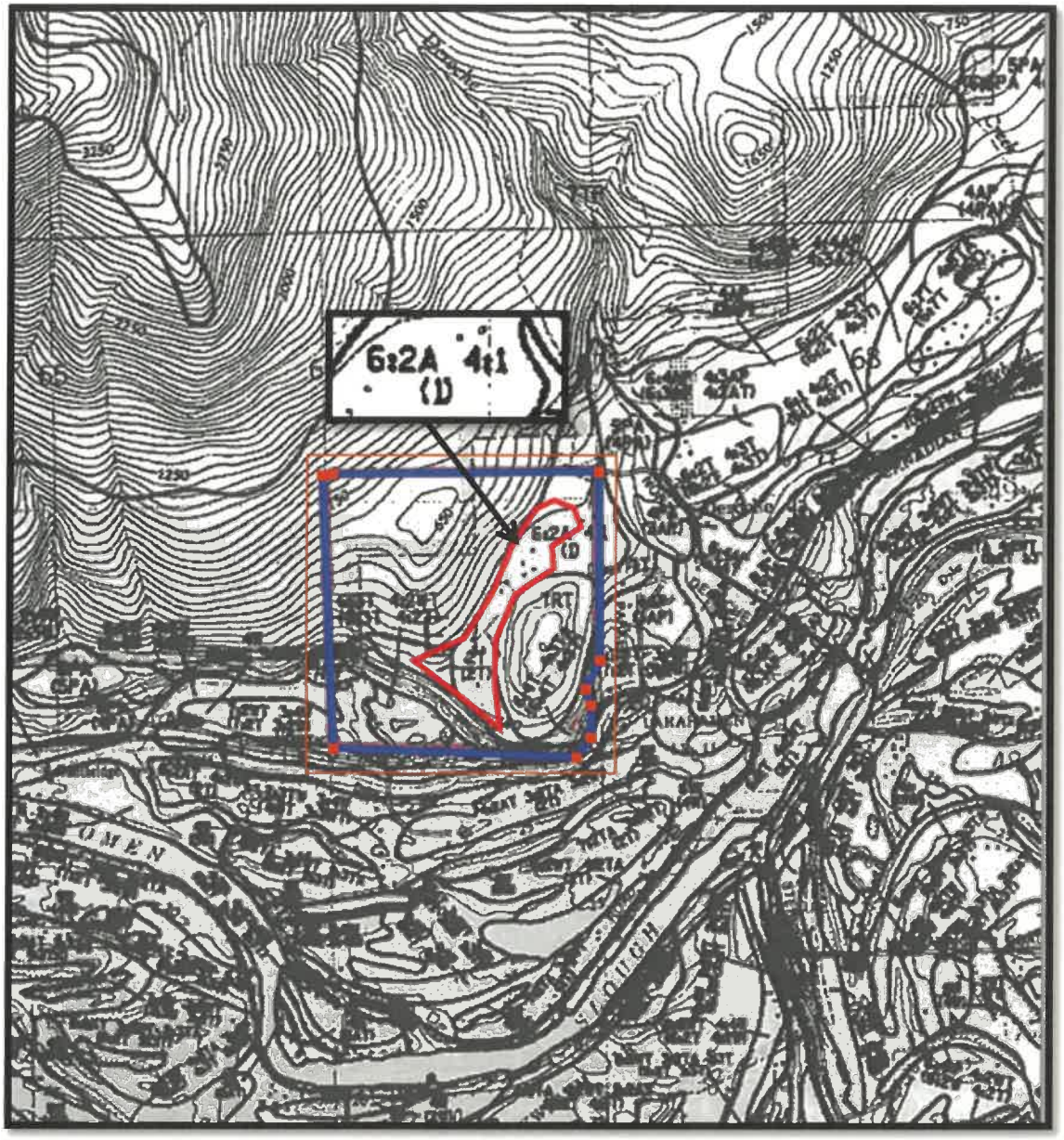


AWSC mm	TEXTURE	VANCOUVER mm	ABBOTSFORD mm	AGASSIZ mm	HOPE mm	CLASS
10	g	321	319	300	294	5A
20	vgs	275	260	219	234	
25	vgs	267	240	195	219	4A
30	cs	249	225	170	197	
40	s	229	199	151	171	
50	ls	212	178	128	151	3A
60	sl	198	160	109	132	
70	fsl	184	144	91	116	
80	fsl	172	129	75	101	
85	l	166	122	68	93	
90	l	160	115	61	86	
100	c, cl	149	102	47	72	2A
105	sicl	143	95	41	66	
110		137	88	34	59	
120		127	76	21	46	
125	humic(o.m.)	122	70	15	39	
130		117	65	9	33	
140		107	54	1	22	1A
150		97	43	-14	12	

Table 2: Soil Moisture Deficit vs Available Water Storage Capacity (AWSC) for Fraser Valley Locations

SOURCE: Williams, RJ, March, 1987: *Soil Moisture Deficit Calculations for Southwestern British Columbia (NP).* British Columbia Ministry of Environment & Parks, Kelowna, British Columbia

Figure 8: 41069 North Nicomen Road, Deroche, BC – Agricultural Capability Mapping



Study Area

Subject Property

SOURCE: Land Capability for Agriculture, Map 92G1, @ 1:25,000

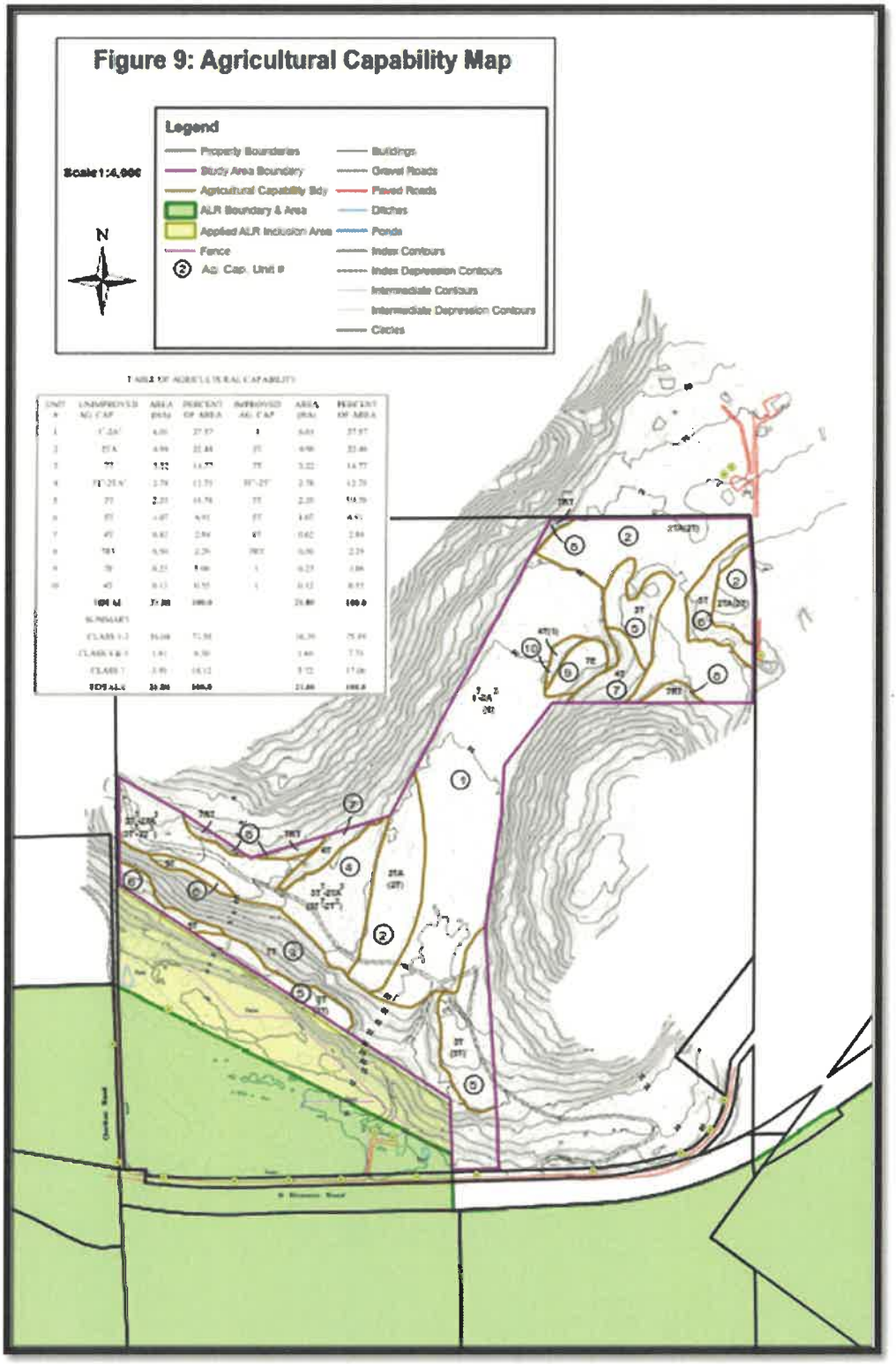
Surveys & Resource Mapping Branch, BC MOE, 1985

6:2A 4:1 – Unimproved Rating (60% Class 2A – 40% Class 1)

(1) – Improved Rating (100% Class 1)

Subclasses	**Classes**
A – Soil moisture deficiency	1. Land in this class either has no or 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.

Figure 9: 41069 North Nicomen Road, Deroche, BC – Agricultural Capability Units



APPENDIX C

Site & Soil Test Pit Photos

41069 North Nicomen Road, Deroche, BC

Photo 1a: TP1 Location

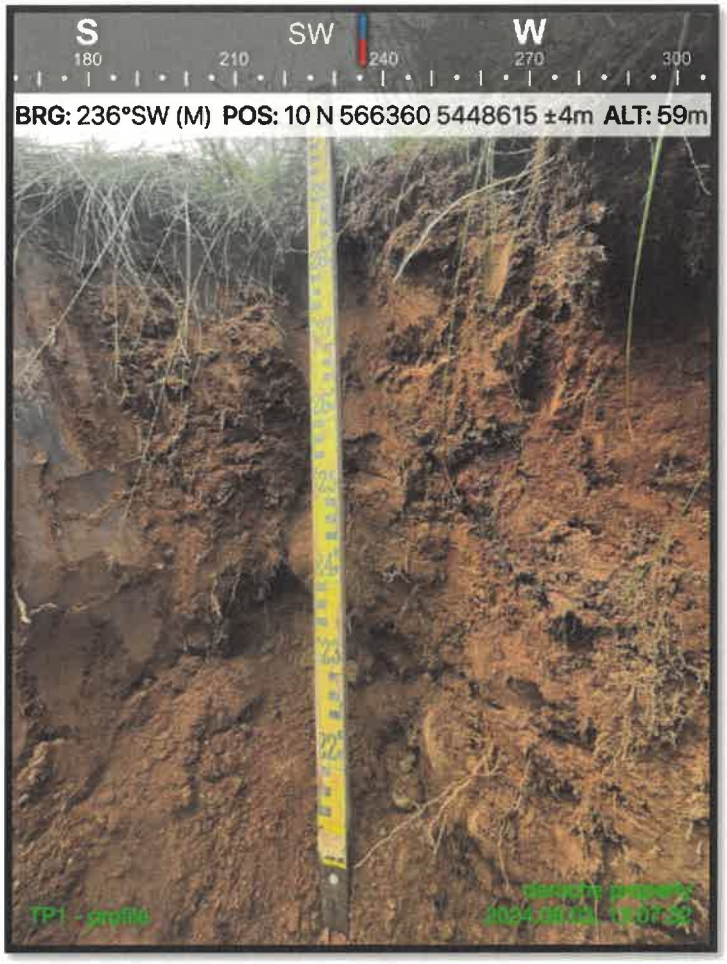


Photo 1b: TP1 Soil Profile

Test Pit 1: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah	0-5	Dark brown (7.5YR 3/4 d); silt loam (lab); moderate, fine-medium, granular; friable; abundant roots; <5% coarse fragments[1] (incl.1 rock 60+cm diameter); abrupt, wavy boundary to:
Bf	5-35	Dark reddish brown (5YR 3/3 d); silt loam (lab); moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments[1]; clear, wavy boundary to:
Bm	35-85+	Brown (7.5YR 4/3 d); VF loamy sand with fine gravel; moderate, fine-medium, subangular blocky; very friable; 10-15% coarse fragments[1]; few roots to 85 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: I
Slope: Very gentle; <3%, N
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: 1 @ 30cm
Notes: Site has been used for agricultural purposes.

Photo 2a: TP2 Site Conditions

Photo 2b: TP2 Location

Photo 2c: TP2 Soil Profile

Test Pit 2: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; friable; abundant roots; <5% coarse fragments[1] (incl.1 rock 60+cm diameter); abrupt, wavy boundary to:
Bf	5-50	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments[1]; clear, wavy boundary to:
BC	50-85+	Dark yellowish brown (10YR 4/4 d); VF sandy loam; moderate, fine-medium, subangular blocky; very friable; 10-15% coarse fragments[1]; few roots to 85 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Very gentle; <3%, NE
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 3a: TP3 Site Conditions

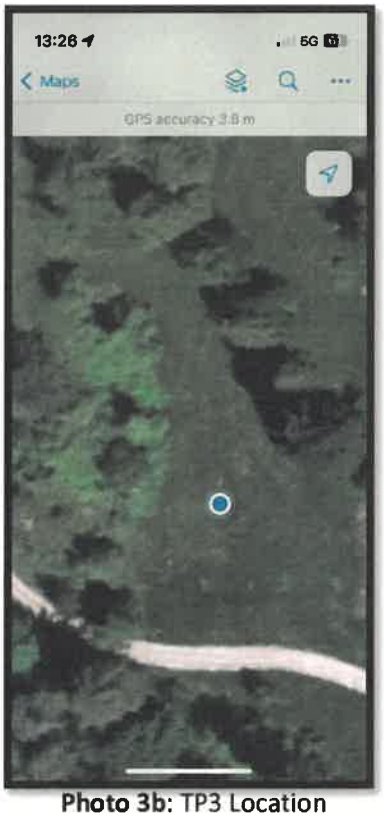


Photo 3b: TP3 Location

Photo 3c: TP3 Soil Profile

Test Pit 3: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; friable; abundant roots; <5% coarse fragments[1]; abrupt, wavy boundary to:
Ah	5-13	Dark brown (10YR 3/3 d); silt loam; weak, fine, granular; friable; abundant roots; <5% coarse fragments[1] (incl.1 rock 60+cm diameter); clear, wavy boundary to:
Bf	13-43	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments[1]; clear, wavy boundary to:
Bm	43-100+	Brown (7.5YR 4/3 d); VF sandy loam; moderate, fine-medium, subangular blocky; very friable; 10-15% coarse fragments[1] including a few large cobbles; few roots to 65 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Nearly level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 4a: TP4 Site Conditions

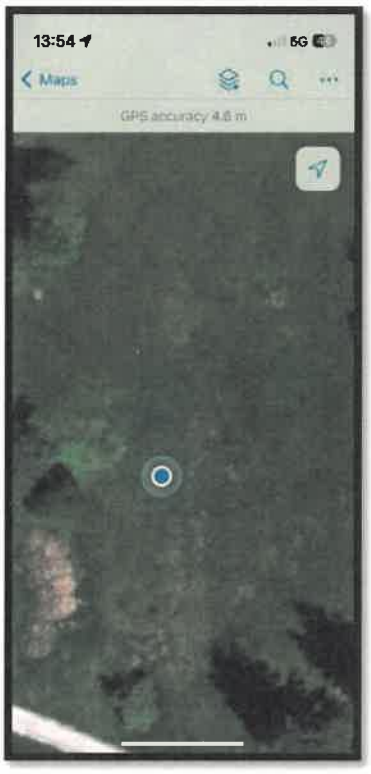


Photo 4b: TP4 Location

Photo 4c: TP4 Soil Profile

Test Pit 4: 41069 North Nicomen Road, Deroche, BC

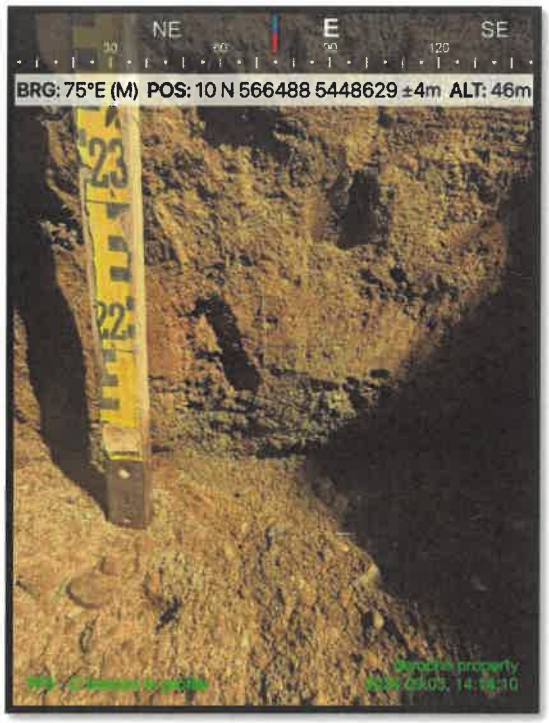
Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; 0% coarse fragments; abrupt, wavy boundary to:
Ah	5-20	Dark brown (10YR 3/3 d); silt loam; weak, fine, granular; very friable; abundant roots; 0% coarse fragments; clear, wavy boundary to:
Bf	20-55	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; 0% coarse fragments; scattered charcoal fragments; clear, wavy boundary to:
Bm	55-110+	Brown (7.5YR 4/3 d); VF sandy loam; moderate, fine-medium, subangular blocky; very friable; 0% coarse fragments[1]; few roots to 75 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 5a: TP5 Site Conditions

Photo 5b: TP5 Location



Photos 5c & 5d: TP5 Soil Profile

Test Pit 5: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; 0% coarse fragments; abrupt, wavy boundary to:
Ah	5-22	Dark brown (10YR 3/3 d); silt loam; weak, fine, granular; very friable; abundant roots; 0% coarse fragments; clear, wavy boundary to:
Bf	22-61	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; 0% coarse fragments; clear, wavy boundary to:
Bm	61-110	Brown (7.5YR 4/3 d); VF sandy loam; moderate, fine-medium, subangular blocky; very friable; 0% coarse fragments[1]; few roots; clear, wavy boundary to:
C	110-120+	Dark yellowish brown (10YR 4/4 d); coarse sand; weak, fine-medium, single-grained; very friable; 5-10% coarse fragments[1]; few roots to 100 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 6a: TP6 Site Conditions

Photo 6b: TP6 Location

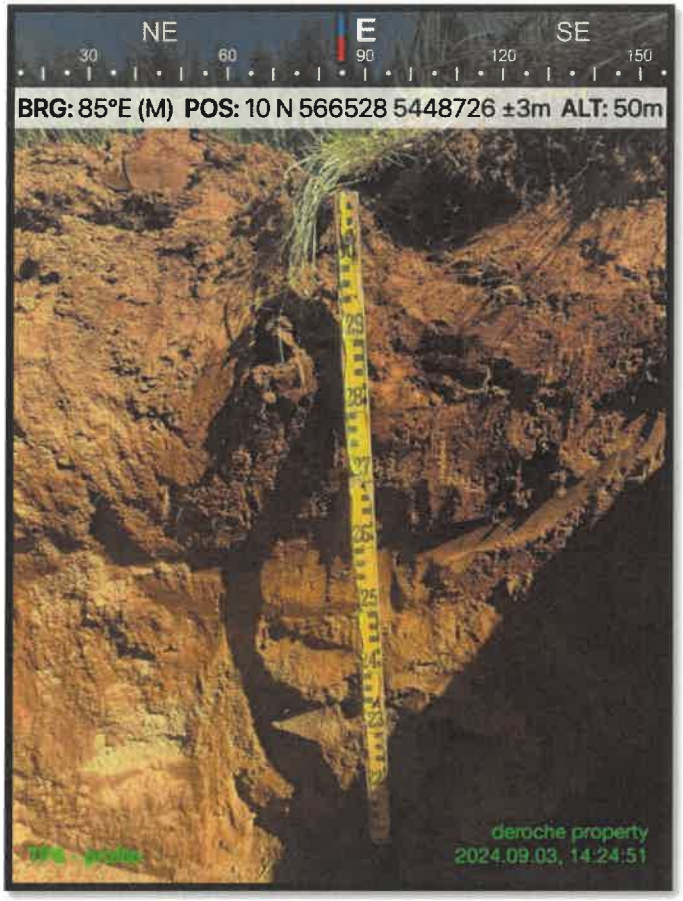


Photo 6c: TP6 Soil Profile

Test Pit 6: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-8	Dark brown (7.5YR 3/4 d); sandy loam (lab); moderate, fine-medium, granular; very friable; abundant roots; 0% coarse fragments; abrupt, wavy boundary to:
Ah	8-24	Dark brown (10YR 3/3 d); sandy loam (lab); weak, fine, granular; very friable; abundant roots; 0% coarse fragments; clear, wavy boundary to:
Bf	24-73	Dark reddish brown (5YR 3/3 d); sandy loam (lab); moderate, medium, subangular blocky; very friable; few roots; 0% coarse fragments; clear, wavy boundary to:
Bm	73-95	Brown (7.5YR 4/3 d); VF sandy loam; moderate, fine-medium, subangular blocky; very friable; 0% coarse fragments[1]; few roots to 95 cm; clear, wavy boundary to:
C	95-110+	Dark yellowish brown (10YR 4/4 d); coarse sand; weak, fine-medium, single-grained; very friable; 15-20% coarse fragments[1].

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: 1 @ 0-55cm
Notes: Site has been used for agricultural purposes.

Photo 7a: TP7 Site Conditions

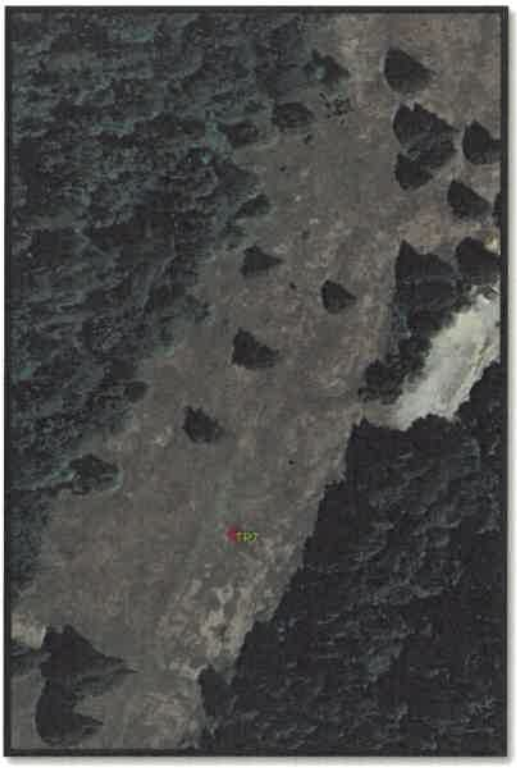


Photo 7b: TP7 Location

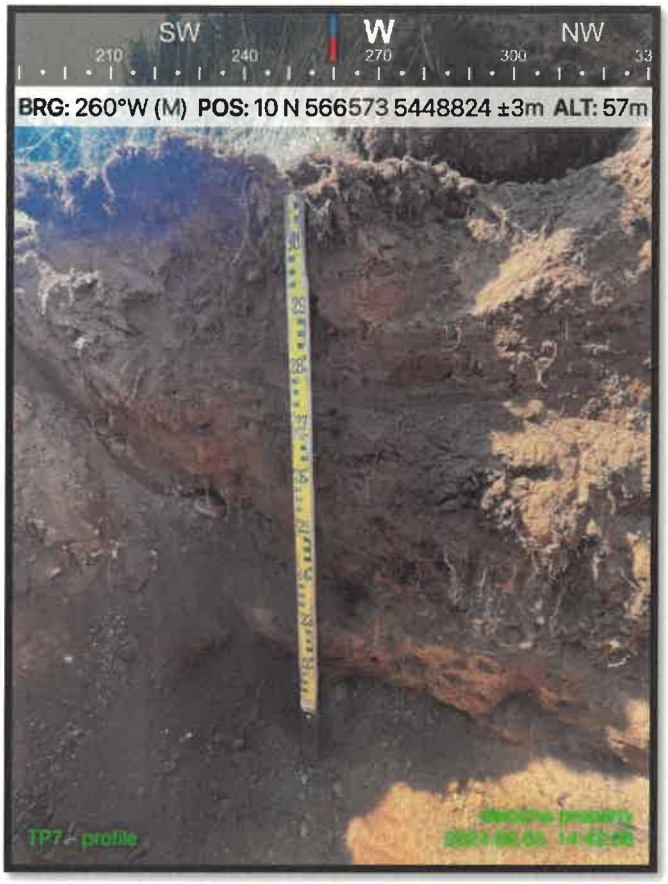


Photo 7c: TP7 Soil Profile

Test Pit 7: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; <5% coarse fragments; abrupt, wavy boundary to:
Ah	5-12	Dark brown (10YR 3/3 d); silt loam; weak, fine, granular; very friable; abundant roots; <5% coarse fragments; clear, wavy boundary to:
Bf	12-80	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments; clear, wavy boundary to:
Bm	80-98	Brown (7.5YR 4/3 d); VF sandy loam; moderate, fine-medium, subangular blocky; very friable; <5% coarse fragments[1]; few roots to 95 cm; clear, wavy boundary to:
IIC	98-110+	Dark yellowish brown (10YR 4/4 d); gravelly sandy loam; weak, fine-medium, single-grained; very friable; 20-25% coarse fragments[1].

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 8a: TP8 Site Conditions

Photo 8b: TP8 Location

Photo 8c: TP8 Soil Profile

Test Pit 8: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; <5% coarse fragments; abrupt, wavy boundary to:
Ah	5-12	Dark brown (10YR 3/3 d); silt loam; weak, fine, granular; very friable; abundant roots; <5% coarse fragments; clear, wavy boundary to:
Bf	12-54	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments; clear, wavy boundary to:
Bm	54-72	Brown (7.5YR 4/3 d); gravelly sandy loam; moderate, fine-medium, subangular blocky; very friable; 15-20% coarse fragments[1]; few roots to 95 cm; clear, wavy boundary to:
IIC	72-80+	Dark yellowish brown (10YR 4/4 d); gravelly sandy loam; weak, fine-medium, single-grained; very friable; 20-25% coarse fragments[1]; few roots to 80 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 9a: TP9 Site Conditions

Photo 9b: TP9 Location

Photo 9c: TP9 Soil Profile

Test Pit 9: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; <5% coarse fragments; abrupt, wavy boundary to:
Bf	5-34	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; 5-10% coarse fragments; clear, wavy boundary to:
B/C	34-68+	Dark yellowish brown (10YR 4/4 d); gravelly sandy loam; weak, fine-medium, single-grained; very friable; 30-40% coarse fragments[1]; few roots to 68 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: I
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

Photo 10a: TP10 Site Conditions

Photo 10b: TP10 Location

Photos 10c & 10d: TP10 Soil Profile

Test Pit 10: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); VF sandy loam (lab); moderate, fine-medium, granular; very friable; abundant roots; 0% coarse fragments; abrupt, wavy boundary to:
Ah	5-14	Dark brown (10YR 3/3 d); VF sandy loam (lab); weak, fine, granular; very friable; abundant roots; 0% coarse fragments; clear, wavy boundary to:
Bf	14-76	Dark reddish brown (5YR 3/3 d); VF sandy loam (lab); moderate, medium, subangular blocky; very friable; few roots; 0% coarse fragments; clear, wavy boundary to:
C	76-90+	Light gray (10YR 7/1 d); gravelly sandy loam; weak, fine-medium, single-grained; very friable; 30-40% coarse fragments[1]; few roots to 90 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: I
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: 1 @ 0-76 cm
Notes: Site has been used for agricultural purposes.

Photo 11a: TP11 Site Conditions

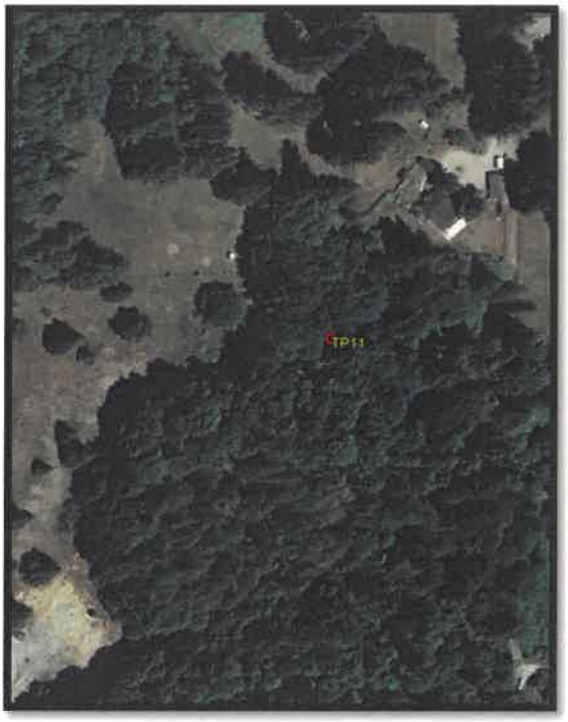


Photo 11b: TP11 Location

Photo 11c: TP11 Soil Profile

Test Pit 11: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Forest litter
Ah	0-36	Dark brown (7.5YR 3/2 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; 0% coarse fragments; clear, wavy boundary to:
Bf	36-59	Dark brown (7.5YR 3/4 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments; clear, wavy boundary to:
Bm	59-87+	Brown (7.5YR 4/3 d); silt loam; moderate, fine-medium, subangular blocky; friable; 0% coarse fragments[1]; few roots to 87 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: I
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Mature mixed forest; Unimproved pasture
Samples: None
Notes: Undisturbed, stone-free profile. Used for grazing cattle.

Photo 12a: TP12 Site Conditions

Photo 12b: TP12 Location

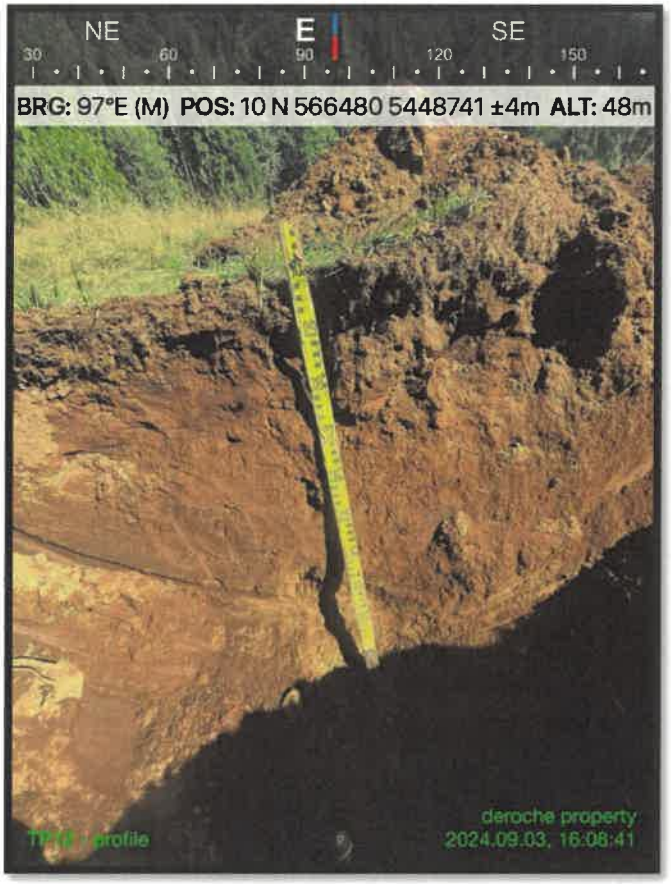


Photo 12c: TP12 Soil Profile

Test Pit 12: 41069 North Nicomen Road, Deroche, BC

Horizon	Depth (cm)	Description
LFH	2-0	Grasses
Ah/Sod Mat	0-5	Dark brown (7.5YR 3/4 d); silt loam; moderate, fine-medium, granular; very friable; abundant roots; <5% coarse fragments; abrupt, wavy boundary to:
Ah	5-12	Dark brown (10YR 3/3 d); silt loam; weak, fine, granular; very friable; abundant roots; <5% coarse fragments; clear, wavy boundary to:
Bf	12-76	Dark reddish brown (5YR 3/3 d); silt loam; moderate, medium, subangular blocky; very friable; few roots; <5% coarse fragments; clear, wavy boundary to:
Bm	76-102	Brown (7.5YR 4/3 d); gravelly sandy loam; moderate, fine-medium, subangular blocky; very friable; 15-20% coarse fragments[1]; few roots to 95 cm; clear, wavy boundary to:
C	102-110+	Dark yellowish brown (10YR 4/4 d); gravelly silt loam; weak, fine-medium, single-grained; very friable; 20-25% coarse fragments[1]; few roots to 80 cm.

[1] Coarse Fragments > 2.5cm as determined by field observations

Soil Unit: II
Slope: Almost level
Soil Drainage: Well
Site Drainage: Well
Vegetation: Sod - Established pasture/hay
Samples: None
Notes: Site has been used for agricultural purposes.

APPENDIX D

Soil Analytical Results – Element Labs

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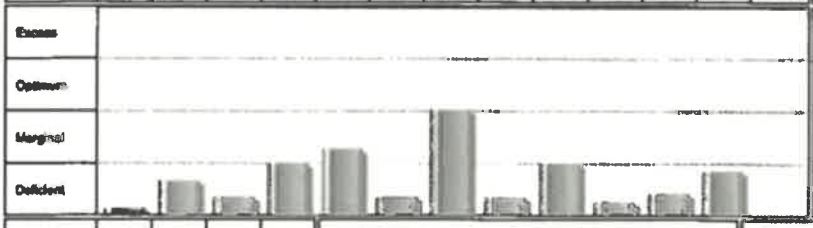
Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:	Deroche	Lot ID:	1780665
Address:		Site ID:		Report Number:	3047151
	4383 Happy Valley Road	Field Name:	Pit #1 30 cm	Report Type:	Final Report
	Victoria, BC., Canada	Acres:		Date Received:	Sep 18, 2024
	V9C 3Z3	Legal Location:		Date Reported:	Sep 21, 2024
Agreement:	101593	Previous Crop:	Crop not provided	Event Code:	

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	Na
0" - 12"	<2	7	<25	2	92	10	35.1	<0.1	<0.5	<0.1	0.4	3	<30
Total lbs/acre	8	28	100	7									
Estimated lbs/acre	10	20	80	6									



Soil Quality

pH	EC(dS/m)	OM(%)	Lot Ref #
5.9	0.03	4.3	28526

Alkaline	Extreme	High
Neutral	Very High	Normal
Acidic	High	Low
Very Acidic	Good	Very Low

Texture Silt Loam — Hand Texture n/a
Sand 43.0 % Silt 51.0 % Clay 6.3 %
Ammonium n/a
Lime n/a — Buffer pH n/a — K/Mg Ratio <0.76

BS 7.9 % CEC 6.8 meq/100 g
Ca 6.7 % Mg 1.2 % Na <1.8 % K <0.9 %
TEC 6.8 meq/100 g

*Nitrate-N **Sulfate-S n/a = not analyzed

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	**Yield**	**N**	**P2O5**	**K2O**	**S**
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

Comments:

Element uses nutrient extraction and analytical methods specifically developed for western Canadian soils.

The modified Kelowna extractant used to analyze key nutrients in this Farm Soil Analysis report is the standard method used in soil fertility research in western Canada. It is used in developing crop response curves to fertilizer in the prairies. The Element "RECOMMENDATIONS FOR BALANCED CROP NUTRITION" are based on those research data. Element recommendations are accurate but should not replace responsible judgement.

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Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:	Deroche	Lot ID:	1760665
Address:		Site ID:		Report Number:	3047152
	4363 Happy Valley Road	Field Name:	Pit #6 0-55 cm	Report Type:	Final Report
	Victoria, BC., Canada	Acres:		Date Received:	Sep 18, 2024
	V9C 3Z3	Legal Location:		Date Reported:	Sep 21, 2024
Agreement:	101693	Previous Crop:	Crop not provided	Event Code:	

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	Na
0" - 22"	7	37	91	3	134	18	35.1	0.8	0.6	0.5	0.8	4	<30
Excess													
Optimum													
Marginal													
Deficient													
Total lbs/acre	52	273	667	20									
Estimated lbs/acre	53	182	183	20									

Soil Quality

pH	EC(dS/m)	OM(%)	Lot Ref #
5.5	0.1	3.4	28527
Alkaline	Extreme	High	
Neutral	Very High	Normal	
Acidic	High	Low	
Very Acidic	Good	Very Low	

Texture *Sandy Loam* Hand Texture n/a
Sand 66.0 % Silt 27.0 % Clay 6.0 %
Ammonium n/a
Lime n/a Buffer pH n/a K/Mg Ratio 1.6

BS 9.5 % CEC 11.0 meq/100 g
Ca 6.0 % Mg 1.3 % Na <1.2 % K 2.1 %
TEC 11.9 meq/100 g

*Nitrate-N **Sulfate-S n/a = not analyzed

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	**Yield**	**N**	**P2O5**	**K2O**	**S**
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	**Iron**	**Copper**	**Zinc**	**Boron**	**Manganese**
To be added (lbs/ac)					

Comments:

Element uses nutrient extraction and analytical methods specifically developed for western Canadian soils.

The modified Kelowna extractant used to analyze key nutrients in this Farm Soil Analysis report is the standard method used in soil fertility research in western Canada. It is used in developing crop response curves to fertilizer in the prairies. The Element "RECOMMENDATIONS FOR BALANCED CROP NUTRITION" are based on those research data. Element recommendations are accurate but should not replace responsible judgement.

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Farm Soil Analysis

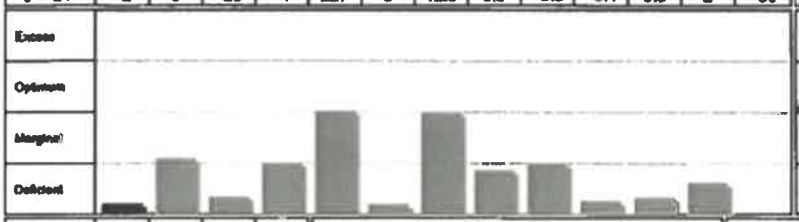
Bill To:	C & F Land Resource	Grower Name:	Deroche	Lot ID:	1760665
Address:		Site ID:		Report Number:	3047153
	4383 Happy Valley Road	Field Name:	Pit #10 0-76 cm	Report Type:	Final Report
	Victoria, BC., Canada	Acres:		Date Received:	Sep 18, 2024
	V9C 3Z3	Legal Location:		Date Reported:	Sep 23, 2024
Agreement:	101593	Previous Crop:	Crop not provided	Event Code:	

Nutrient Analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	Na
0" - 24"	<2	8	<26	<1	227	5	12.8	0.3	<0.5	<0.1	0.3	2	<30
Total lbs/acre	16	48	200	8									
Estimated lbs/acre	16	32	80	8									

Soil Quality

pH	EC(dS/m)	OM(%)	Lot Ref #
6.0	0.03	4.5	28528



Alkaline	Extreme	High	
Neutral	Very High	Normal	
Acidic	High	Low	
Very Acidic	Good	Very Low	

Texture Sandy Loam Hard Texture n/a
Sand 57.0 % Silt 37.0 % Clay 6.3 %
Ammonium n/a
Lime n/a Buffer pH n/a K/Mg Ratio <1

BS 20 % CEC 6.0 meq/100 g
Ca 19 % Mg 0.8 % Na <2.2 % K <1.1 %
TEC 6.0 meq/100 g

*Nitrate-N **Sulfate-S n/a = not analyzed

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	Yield	N	P_2O_5	K_2O	S
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

Comments:

Element uses nutrient extraction and analytical methods specifically developed for western Canadian soils.

The modified Kelowna extractant used to analyze key nutrients in this Farm Soil Analysis report is the standard method used in soil fertility research in western Canada. It is used in developing crop response curves to fertilizer in the prairies. The Element "RECOMMENDATIONS FOR BALANCED CROP NUTRITION" are based on those research data. Element recommendations are accurate but should not replace responsible judgement.

APPENDIX E

Agricultural Capability

Reference Documents

(Excerpts)

APPENDIX 2

LEGEND FOR LAND CAPABILITY CLASSIFICATION FOR AGRICULTURE

1. EXPLANATORY NOTES

In this classification, mineral and organic soils are each grouped into seven classes on the basis of soil and climate characteristics according to their potentials and limitations for agricultural use. Lands in Classes 1 to 4 inclusive are considered capable of sustained production of common cultivated field crops. The need for management practices to overcome limitations increases, and/or the possible range of crops decreases, from Class 1 to Class 4. 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.

This classification takes into account the relative degree and type of limitation or hazard to agricultural use and/or the range of possible crops. It also indicates the type and intensity of management practices required for good management of the soil resource to maintain sustained production. Productivity (i.e. yield per hectare) of any specific crop is not considered.

Important factors on which the classification is based are:

1) The soils will be managed and cropped under a largely mechanized system.

2) This classification provides most lands with two ratings - one under unimproved conditions, and one for improved conditions. Unimproved ratings are based on the conditions that exist at the time of the survey, without irrigation. Improved ratings indicate the capability after existing limitations and/or hazards have been adequately alleviated.

3) In determining improved ratings, irrigation water is assumed to be available and inundation is assumed to be controlled by diking. Other types of improvement considered are drainage, stone removal, salinity alleviation, subsoiling and the intensive addition of fertilizers or other soil amendments. The extent to which these improvements can increase the land capability is determined from site specific assessments.

4) The following are not considered in the classification: distance to market, available transportation facilities, location, farm size, type of ownership, cultural patterns, skill or resources of individual operators, and hazard of crop damage by storms (e.g. wind, hail).

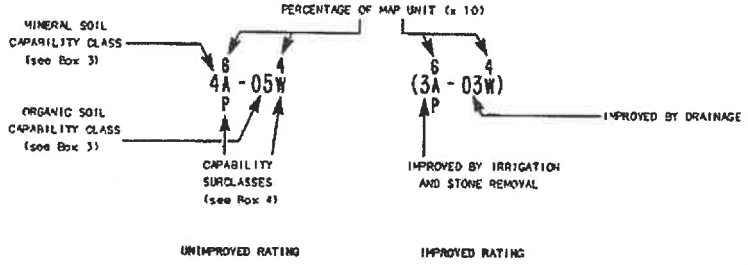
5) The classification does not include capability of lands for trees, tree fruits, grapes, ornamental plants, recreation, or wildlife. A modified classification is applied in some areas climatically suited to tree fruits and grapes (see Box 3).

The agriculture capability classification consists of two main components: (1) the capability class, and (2) the capability subclass. The capability class and subclass together provide information about the degree and kind of limitation for agricultural use. In addition to land capability designation, they are also useful for land use planning and assessment of management needs.

The detailed method for determining the capability classification outlined here is contained in Reference #3 (Box 5).

2. EXAMPLE OF MAP SYMBOL

A dual rating system (for both unimproved and improved conditions) is applied to most lands. Most Class 6 and 7 lands are not considered improvable and are given only unimproved ratings. However, some Class 6 and 7 lands limited by excess water (W), soil moisture deficiency (A), or inundation (I) may be improved by drainage, irrigation and/or diking and in these cases a dual rating is applied. The improved rating is contained in parentheses on the map.



Explanation:

Under unimproved conditions this map unit consists of 60% Class 4 mineral soil with soil moisture deficiency (A) and stoniness (P) limitations, and 40% Class 5 organic soil with frequent or continuous occurrence of excess water (W) during the growing season. The improved rating indicates that with irrigation and stone picking the mineral soil improves to Class 3, and with drainage the organic soil improves to Class 03.

3. CAPABILITY CLASSES

The capability class, the broadest category in the classification, is a grouping of lands that have the same relative degree of limitation or hazard for agricultural use. The intensity of the limitation or hazard becomes progressively greater from Class 1 to Class 7. The class indicates the general suitability of the land for agricultural use.

Two sets of classes exist, one for mineral soils and one for organic soils. The classes are as follows:

LAND CAPABILITY CLASSES FOR MINERAL SOILS

The seven land capability classes for mineral soils are defined and described as follows:

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 PRACTICES OR SLIGHTLY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in Class 2 has limitations which constitute a continous minor management problem or may cause lower crop yields or slightly smaller range of crops compared to Class 1 land but which do 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 PRACTICES OR MODERATELY RESTRICT THE RANGE OF CROPS, OR BOTH.

The limitations are more severe than for Class 2 land and management practices are more difficult to apply and maintain. The limitations may restrict the choice of suitable crops or affect one or more of the following practices: 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 PRACTICES 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 practices are required. The limitations may seriously affect one or more of the following practices: 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 forage 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 practices. Some unimproved Class 6 lands can be improved by draining, diking and/or irrigation.

CLASS 7 LAND IN THIS CLASS HAS NO CAPABILITY FOR ARABLE CULTURE 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 unsuited natural vegetation. Also included are rockland, other nonsoil areas, and small water-bodies not shown on the maps. Some unimproved Class 7 land can be improved by draining, diking and/or irrigation.

LAND CAPABILITY CLASSES FOR ORGANIC SOILS

Organic soils are grouped into seven classes, designated as 01 to 07. The organic soil class definitions are equivalent in terms of their relative capabilities and limitations for agricultural use to those defined for mineral soils.

MODIFIED LAND CAPABILITY CLASSIFICATION FOR TREE FRUITS AND GRAPES

In some areas climatically suitable for growing tree fruits and grapes, a modified classification has been used. The modified classification takes into account the fact that tree fruits and grapes can be grown successfully on steeper and stonier land than the common field crops. An * prescript is appended to the class designation (*1 to *3)to indicate the modified classification has been used. Note only improved ratings are indicated where the modified classification is used.

4. CAPABILITY SUBCLASSES

The subclass indicates lands with similar kinds but varying intensities of limitations and hazards. It provides information on the kind of management problem or use limitation. Except for Class 1 and 01 lands, which have no significant limitations, the capability classes are divided by subclasses on the basis of type of limitation to agricultural use. Each class can include many different kinds of soil, similar with respect to degree of limitation; but soils in any class may require unlike management and treatment as indicated by the subclasses shown. For detailed definitions and guidelines refer to Reference #3 (Box 5).

LAND CAPABILITY SUBCLASSES FOR MINERAL SOILS

A SOIL MOISTURE DEFICIENCY: Crops are adversely affected by droughtiness caused by soil and/or climate characteristics. Improvable by irrigation.

*C ADVERSE CLIMATE: Thermal limitations to plant growth. Minimum temperatures near freezing and/or insufficient heat units during the growing season and/or extreme minimum temperatures during the winter season. Not improvable.

D UNDESIRABLE SOIL STRUCTURE AND/OR LOW PERVIOUSNESS: Soils are difficult to till, require special management for seedbed preparation, pose trafficability problems, have insufficient aeration, absorb and distribute water slowly, and/or have the depth of rooting zone restricted by conditions other than high water table, bedrock or permafrost. Improvement practices vary; improvement if indicated is based on past experience with improving comparable soils.

E EROSION: Past damage from erosion limits agricultural use due to loss of productivity and hampering of access by gullies. Not improvable.

*F FERTILITY: Lack of available nutrients, low cation exchange capacity or nutrient holding ability, high acidity or alkalinity, high levels of carbonates, presence of toxic elements or compounds, or high fixation of plant nutrients. Usually improvable through fertilizers and amendments.

*I INUNDATION: Overflow by streams, lakes or marine tides causes crop damage or restricts agricultural use. Improvable by diking.

*N SALINITY: Soluble salts in the soil reduce crop growth or restrict the range of crops. Improvement practices vary; improvement if indicated is based on past experience with improving comparable soils.

P STONINESS: Coarse fragments significantly hinder tillage, planting and harvesting. Improvable by stone picking, usually only one class because of the continuing nature of the limitation. Note that in areas which are climatically suitable for growing tree fruits and grapes, a Class 5 level stoniness limitation may not be a significant limitation to these crops.

R DEPTH TO SOLID BEDROCK AND/OR ROCKINESS: Bedrock near the surface and/or rock outcrops restrict rooting depth and cultivation. Not improvable.

T TOPOGRAPHY: Steepness or the pattern of slopes hinders the use of farm machinery, decreases the uniformity of growth and maturity of crops, and/or increases the potential for water erosion. Not improvable. Note that in areas which are climatically suitable for growing tree fruits and grapes, a Class 5 level topography limitation may not be considered a significant limitation to these crops.

*W EXCESS WATER: Excess free water, other than from flooding, limits agricultural use and may be due to poor drainage, high water tables, seepage, and/or runoff from surrounding areas. Improvable by drainage; feasibility and level of improvement is assessed on a site specific basis.

*Z PERMAFROST: Permafrost maintains undesirably cold soil temperatures and causes drainage and subsidence problems when it is near the surface. Not improvable.

LAND CAPABILITY SUBCLASSES FOR ORGANIC SOILS

B WOOD IN THE PROFILE: Layers of wood interfere with cultivation and/or with ditching and drain installation. Improvement if indicated is based on past experience with improving comparable soils.

H DEPTH OF ORGANIC SOIL OVER BEDROCK AND/OR ROCKINESS: Bedrock near the surface restricts rooting depth and the feasibility of subsurface drainage, and/or rock outcrops restrict agricultural use. Not improvable.

L DEGREE OF DECOMPOSITION - PERMEABILITY: Degree of decomposition affects drainage, permeability, capillary rise of water and rate of subsidence. Layers of mineral soil in an organic profile may pose a limitation to optimum crop yield and to drainage. Not improvable.

* These subclasses are the same for both organic soils and mineral soils.