APPENDIX G
TERRAIN AND SOILS

Attachment 9A TERRAIN AND SOILS ADDITIONAL DATA FOR ASSESSMENT 3B

9A.1 INTRODUCTION

This attachment includes information on soils that supports the environmental assessment for the flood and post-flood phases of the Springbank Off-stream Reservoir Project (the Project). Specifically, this attachment identifies methods to assess potential:

- effects of the Project on rates of soil dewatering and presents the results of that analysis
- changes to wind erosion risk and the effectiveness of mitigation, and presents the results of that analysis

9A.2 SOILS DEWATERING

9A.2.1 Rationale

Flood events are expected to saturate the vadose zone and elevate the water table to the land surface in the reservoir. While reservoir drainage will remove water above the land surface in just a few days, the process of removing water from the soil will proceed more slowly. Two major processes will contribute to de-watering of soil profiles. The first is gravitational drainage and the second is evapotranspiration by the atmosphere (primarily through vegetation). Gravitational drainage will be limited by the very low saturated hydraulic conductivity of the clay textured, massive structured C horizons of the dominant fine textured soils. Gravitational drainage will result in soil moisture content near field capacity values if soil drainage is not prevented by persistently high water tables. Rates of soil gravitational drainage are thus linked to groundwater recession rates.

Evapotranspiration through vegetation or though the land surface will reduce soil moisture content below field capacity towards the range of pre-flood moisture content. Rates of soil moisture loss are controlled by the moisture deficit, the difference between precipitation and potential evapotranspiration. A water balance approach has been used to estimate the rate at which soils dewater to pre-flood water contents.

Rates of gravitational drainage are not quantified, but estimates are provided in order to assess rates of soil dewatering. Because of uncertainties with respect to evaporation, two methods of estimating evapotranspiration are used to bracket the range of outcomes.

9A.2.2 Mitigation

No mitigation measures are planned to accelerate the process of soil dewatering

9A.2.3 Procedure for Estimating Water Removal Rates from Soil

Estimating the time required to dewater soils (after initial drainage through subsurface drains) is based on a water balance approach. The time required will depend on the rate of withdrawal through evapotranspiration and the amount of water stored in the soil above the water table.

The annual average moisture deficit, determined as the balance of precipitation and evapotranspiration, sets the theoretical rate annual evapotranspiration (E). Two approaches have been used to estimate moisture deficit.

The first, more conservative lake evaporation (Alberta Government 2013) approach, compares annual precipitation (Environment Canada 2016) with lake evaporation to calculate a moisture deficit. Lake evapotranspiration is 541 mm/y, whereas precipitation is 470/y. The moisture deficit is, therefore, 71 mm/y.

A second, less-conservative, approach uses potential evapotranspiration instead of lake evaporation. For this approach, moisture deficit expected for the LAA is estimated from potential evapotranspiration normals predicted using data from the Calgary International Airport (Alberta Government 2013) and average annual precipitation for the Springbank Airport (Environment Canada 2016). Precipitation is 470 mm/y, while potential evapotranspiration is 966 mm/y. Annual moisture deficit calculated in this manner is 496 mm. This means that average net removal of soil water is 496 mm *per* year.

The amount of water in the soil (S) to the depth of the water table was determined for soil hydraulic properties. Moisture content at two points in time are required to calculate the amount of water that should be removed from the soil. Moisture content at time 1 (T1) was estimated from soil hydraulic properties documented in the Alberta Soil Layer File (Soil Landscapes of Canada Working Group, 2010); properties include water storage at saturation, field capacity and wilting point of all major soil horizons present in the LAA. Hydraulic properties allowed estimation of the amount of water stored in the soil, both at saturation (S1). The second moisture content concerns the amount of water typically present in the soil profile in the region (S2). This moisture content defines the lower limit of moisture content, or the pre-flood moisture content. The difference between initial water content (S1) and the final water content at the end of dewatering (S2) marks the amount of water to be removed ($\Delta S=S1-S2$).

The time required to dewater soils to pre-flood moisture content is shown in equation 1.

Eq 1: $(\Delta S)/E$

Because annual moisture deficits are expressed in units of years the resulting rate is years, with years understood to mean growing seasons. One year is equal to one growing season.

The typical soil water content in soils in the reservoir is estimated based on data from long term agro-climatic monitoring sites managed by the province. Data were obtained from a site at Lacombe, Alberta (Alberta Agriculture 2016). This site was chosen to represent typical soil moisture patterns for the Project site because of similar soil and climate conditions. The Lacombe site had an 8-year record of soil moisture (measured hourly, summarized by month). This dataset allowed an empirical approach to estimate the long-term variation in soil moisture content expected for the LAA. This estimated water content represents a pre-flood moisture content of moderately well and well drained Chernozems in the LAA and is the benchmark used for de-watering estimates.

Table 9A-1 shows estimates of S2 obtained from Lacombe. Values of S2 for the topsoil, subsoil, and lower subsoil are 0.76, 0.75 and 0.82 of field capacity water contents. In other words, while soil moisture content varies, soil moisture is typically 76, 75, and 82% of field capacity for these respective depths over an 8-year period of record.

Table 9A-1 Summary of Soil Moisture Statistics from Lacombe Climate Station

Parameter	Topsoil (20 cm depth) (% by volume)	Subsoil (50 cm depth) (% by volume)	Parent Material (100 cm depth) (% by volume)
Average April to September moisture content, period of record[1]	25	21	31
Field capacity for Local Soils[2]	33	28	38
Ratio of average to field capacity[3]	0.76	0.75	0.82

NOTES:

[1] eight-year period of record, moisture measured hourly and summarized by month, (Alberta Agriculture 2016).

[2] field capacity of Lone Pine Series (Walker 2006)

[3] ratio represents long term average moisture variability for that depth increment as a percentage of field capacity

9A.2.4 Analytical Methods for Dewatering Estimates

A water balance approach has been used to estimate the time required to dewater flooded soils to a background threshold. The amount of water storage in soils in the LAA are estimated based on water holding properties of each constituent series and the depth to water table (Table 9A-2). Table 9A-2 shows calculations of how much water should be removed from the soil profile to reach background moisture content. The calculations show amounts by horizon (topsoil, subsoil, and parent material) to the estimated depth of the water table. Saturation water content is the quantity of water present when all soil pores are filled. Minimum air requirement is the water content when 10% of porosity is filled with air, and the other 90% of porosity remains filled with water. The largest soil pores are typically those that drain first and provide active aeration. Field capacity is the moisture content measured typically at 33 kilopascals of suction (Brady and Weil 2010), or in practical terms, the amount of water present about two days following a major rain event, assuming soils are well drained. The estimated average content water content based on data collected for an 8-year period in Black Chernozem soil profiles at Lacombe, Alberta. The effect of artificial drainage on soil is to reduce water content to field capacity in the horizons above the drain depth. When drains are not present, this water remains in the soil.

The time required to dewater soil to background is based on two estimates of evaporative demand. The more conservative approach uses the ratio of average annual moisture deficit based on lake evaporation (71mm) to the amount of water stored in the soil (Table 9A-3). The less conservative approach uses the ratio of average annual moisture deficit based on potential evapotranspiration (496 mm) to the amount of water stored in the soil (Table 9A-4). Both approaches are reasonable for determining the number of years required to dewater the soil profile to the pre-flood moisture content.

Table 9A-2 Quantity of Soil Water to Remove by Unit and Depth

Soil Units	Increment	Amount of Soil Water to Remove (mm)[1,3,4,5]			
		Saturation to Minimum Air Requirement[6]	Minimum Air Requirement to Field Capacity[7]	Field Capacity to Background	Total (mm)
DVG1	Topsoil	14	31	22	67
	Subsoil	11	13	21	45
	Parent Material[2]	91	55	137	282
Total					394

Table 9A-2 Quantity of Soil Water to Remove by Unit and Depth

Soil Units	Increment	Amount of Soil Water to Remove (mm)[1,3,4,5]			
		Saturation to Minimum Air Requirement[6]	Minimum Air Requirement to Field Capacity[7]	Field Capacity to Background	Total (mm)
DVFS1 and FSH1	Topsoil	17	33	29	78
	Subsoil	10	0	24	28
	Parent Material[2]	76	0	132	161
Total					267
DVFS2 and FSH2	Topsoil	17	33	29	78
	Subsoil	10	0	24	28
	Parent Material[2]	64	0	110	135
Total					241
POT1	Topsoil	16	31	27	75
	Subsoil	10	0	26	25
	Parent Material[2]	25	4	41	70
Total					170
POT2	Topsoil	16	31	27	75
	Subsoil	10	0	26	25
	Parent Material[2]	38	6	61	105
Total					205
POT6	Topsoil	16	31	27	75
	Subsoil	10	0	26	25
	Parent Material[2]	51	8	81	140
Total					240

Table 9A-2 Quantity of Soil Water to Remove by Unit and Depth

Soil Units	Increment	Amount of Soil Water to Remove (mm)[1,3,4,5]			
		Saturation to Minimum Air Requirement[6]	Minimum Air Requirement to Field Capacity[7]	Field Capacity to Background	Total (mm)
POT7	Topsoil	17	8	35	60
	Subsoil	6	0	15	15
	Parent Material[2]	24	35	32	91
Total					166
MSTB1	Topsoil	20	45	32	97
	Subsoil	3	0	7	9
	Parent Material[2]	28	21	42	91
Total					197
SRC1	Topsoil	13	25	22	60
	Subsoil	5	9	9	24
	PM Drained	29	27	42	97
	Parent Material[2]	22	20	32	73
Total					254
SRCgr	Topsoil	13	25	22	60
	Subsoil	3	6	6	15
	PM Drained	17	23	24	64
	Parent Material[2]	13	17	18	48
Total					187
ZGC	Topsoil	19	0	47	39
	Subsoil	0	0	0	0
	PM Drained	29	115	26	170
	Parent Material[2]	21	82	19	121
Total					330

Table 9A-2 Quantity of Soil Water to Remove by Unit and Depth

Soil Units	Increment	Amount of Soil Water to Remove (mm)[1,3,4,5]			
		Saturation to Minimum Air Requirement[6]	Minimum Air Requirement to Field Capacity[7]	Field Capacity to Background	Total (mm)
SRC4	Topsoil	13	25	22	60
	Subsoil	5	9	9	22
	PM Drained	26	26	38	90
	Parent Material[2]	20	20	29	68
Total					240
TBR1 and TBSR1 and TBR2	Topsoil	3	8	4	16
	Subsoil	1	2	1	4
	PM Drained	37	147	34	219
	Parent Material[2]	21	82	19	121
Total					360
TBRgr	Topsoil	3	8	18	29
	Subsoil	1	2	1	3
	PM Drained	22	103	18	143
	Parent Material[2]	12	57	10	79
Total					254
TBR4	Topsoil	3	8	7	18
	Subsoil	1	2	1	4
	PM Drained	34	138	31	203
	Parent Material[2]	19	77	17	113
Total					338

Table 9A-2 Quantity of Soil Water to Remove by Unit and Depth

Soil Units	Increment	Amount of Soil Water to Remove (mm)[1,3,4,5]			
		Saturation to Minimum Air Requirement[6]	Minimum Air Requirement to Field Capacity[7]	Field Capacity to Background	Total (mm)
TBRgr1 and TBRgr2	Topsoil	3	8	18	29
	Subsoil	1	2	1	3
	PM Drained	22	103	18	143
	Parent Material[2]	12	57	10	79
Total					254

NOTES:

[1] Areas and proportions will not sum exactly to totals because of rounding

[2] Lower depth of PM is set to the depth of the water table; capillary effects on moisture content ignored. Depth of water table based on field observations and professional judgment. Water table ranges from 0.5 m below surface for Gleysolic dominated units to more than 2 m in well drained Chernozem dominated units.

[3] thickness of all topsoil and subsoil layers based on averages from field data

[4] bulk density from Alberta Soil Layer file for respective Alberta soil series. Units Mg m^{-3} (mega grams per cubic meter)

[5] volumetric water content at saturation estimated from bulk density and assumed particle density of 2.65

[6] minimum required air filled porosity set at 10% of total porosity; this is the moisture content when 10% of porosity is air-filled, considered minimum that supports aerobic respiration processes in soils (Brady and Weil 2010)

[7] field capacity water content from Soil Layer file for Alberta soils

9A.2.5 Time Requirements Assuming Lake Evaporation Rates Control Moisture Deficit

Using lake evaporation rates to estimate annual moisture deficit is the most conservative approach because these rates are much lower than potential evapotranspiration. Time estimates for soil dewatering are for two mitigation measures (Table 9A-3):

- The first set of estimates assumes that no artificial drainage is provided.

The unit of time is year, with a year understood to mean one growing season. There is no translation into units of months or weeks because moisture deficit is distributed unequally over and within the seasons.

Table 9A-3 Time Requirements to Achieve Dewatering of Soil Assuming Lake Evaporation Rates

Soil Units	Increment	Time to Minimum Air Requirement[1,2] (y)	Time to Background Soil Moisture Content[1,2] (y)
DVG1	Topsoil	0.2	0.9
	Subsoil	0.2	0.6
	Parent Material[2]		4.0
Total (y)			5.5
DVFS1 and FSH1	Topsoil	0.2	1.1
	Subsoil	0.1	0.4
	Parent Material[2]		2.3
Total (y)			3.8
DVFS2 and FSH2	Topsoil	0.2	1.1
	Subsoil	0.1	0.4
	Parent Material[2]		1.9
Total (y)			3.4
POT1	Topsoil	0.2	1.1
	Subsoil	0.1	0.4
	Parent Material[2]		1.0
Total (y)			2.5

Table 9A-3 Time Requirements to Achieve Dewatering of Soil Assuming Lake Evaporation Rates

Soil Units	Increment	Time to Minimum Air Requirement[1,2] (y)	Time to Background Soil Moisture Content[1,2] (y)
POT2	Topsoil	0.2	1.1
	Subsoil	0.1	0.4
	Parent Material[2]		1.5
Total (y)			3.0
POT6	Topsoil	0.2	1.1
	Subsoil	0.1	0.4
	Parent Material[2]		2.0
Total (y)			3.5
POT7	Topsoil	0.2	0.9
	Subsoil	0.1	0.2
	Parent Material[2]		1.3
Total (y)			2.4
MSTB1	Topsoil	0.3	1.4
	Subsoil	0.0	0.1
	Parent Material[2]		1.3
Total (y)			2.8
SRC1	Topsoil	0.2	0.8
	Subsoil	0.1	0.3
	PM Drained[3]	0.4	1.4
	Parent Material[2]		1.0
Total (y)			3.5
SRCgr	Topsoil	0.2	0.8
	Subsoil	0.0	0.2
	PM Drained[3]	0.2	0.9
	Parent Material[2]		0.7
Total (y)			2.6

Table 9A-3 Time Requirements to Achieve Dewatering of Soil Assuming Lake Evaporation Rates

Soil Units	Increment	Time to Minimum Air Requirement[1,2] (y)	Time to Background Soil Moisture Content[1,2] (y)
ZGC1	Topsoil	0.3	0.5
	Subsoil	0.0	0.0
	PM Drained[3]	0.4	2.4
	Parent Material[2]		1.7
Total (y)			4.6
SRC4	Topsoil	0.2	0.8
	Subsoil	0.1	0.3
	PM Drained[3]	0.4	1.3
	Parent Material[2]		1.0
Total (y)			3.4
TBR1 and TBSR1 and TBR2	Topsoil	0.0	0.2
	Subsoil	0.0	0.1
	PM Drained[3]	0.5	3.1
	Parent Material[2]		1.7
Total (y)			4.9
TBRgr1	Topsoil	0.0	0.4
	Subsoil	0.0	0.0
	PM Drained[3]	0.3	2.0
	Parent Material[2]		1.1
Total (y)			3.5
TBR4	Topsoil	0.0	0.3
	Subsoil	0.0	0.1
	PM Drained[3]	0.5	2.9
	Parent Material[2]		1.6
Total (y)			4.9

Table 9A-3 Time Requirements to Achieve Dewatering of Soil Assuming Lake Evaporation Rates

Soil Units	Increment	Time to Minimum Air Requirement[1,2] (y)	Time to Background Soil Moisture Content[1,2] (y)
TBRgr1 and TBRgr2	Topsoil	0.0	0.4
	Subsoil	0.0	0.0
	PM Drained[3]	0.3	2.0
	Parent Material[2]		1.1
Total (y)			3.5
ZREC	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		1.9
Total (y)			3.2
ZREC2A	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		1.9
Total (y)			3.2
ZREC2B	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		0.9
Total (y)			2.2
ZREC2C	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		0.6
Total (y)			1.9
ZREC3A	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		5.5
Total (y)			6.8

Table 9A-3 Time Requirements to Achieve Dewatering of Soil Assuming Lake Evaporation Rates

Soil Units	Increment	Time to Minimum Air Requirement[1,2] (y)	Time to Background Soil Moisture Content[1,2] (y)
ZREC3B	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		2.7
Total (y)			4.0
ZREC3C	Topsoil	0.2	0.8
	Subsoil	0.2	0.5
	Parent Material[2]		1.8
Total (y)			3.1

NOTES:

[1] a growing season is the equivalent of one year's evapotranspiration, assuming precipitation occurs at the long term average rate for this duration

[2] sites rely only on evapotranspiration to remove soil water

9A.2.6 Time Requirements Assuming Potential Evapotranspiration Rates Control Moisture Deficit

This set of estimates is based on the less conservative use of potential evapotranspiration to calculate annual moisture deficit. Several key assumptions underlie this approach that may not be fully met under the project conditions. Most important, vegetation health and vigor is assumed to not be effected by flooding, or at the least, vegetation quickly responds to reservoir drainage and uses water at the potential rate. the time required to restore soil moisture to background is much less with this approach than with the use of lake evaporation rates.

Table 9A-4 Time Requirements to Achieve Dewatering of Soil Assuming Potential Evapotranspiration Rates

Soil Units	Increment	Time to minimum air requirement[1,2] (y)	Time to background soil moisture content[1,2] (y)
DVG1	Topsoil	0.03	0.13
	Subsoil	0.02	0.09
	Parent Material[2]		0.57
Total (y)			0.79
DVFS1 and FSH1	Topsoil	0.03	0.16
	Subsoil	0.02	0.06
	Parent Material[2]		0.33
Total (y)			0.54
DVFS2 and FSH2	Topsoil	0.03	0.16
	Subsoil	0.02	0.06
	Parent Material[2]		0.27
Total (y)			0.48
POT1	Topsoil	0.03	0.15
	Subsoil	0.02	0.05
	Parent Material[2]		0.14
Total (y)			0.34
POT2	Topsoil	0.03	0.15
	Subsoil	0.02	0.05
	Parent Material[2]		0.21
Total (y)			0.41

Table 9A-4 Time Requirements to Achieve Dewatering of Soil Assuming Potential Evapotranspiration Rates

Soil Units	Increment	Time to minimum air requirement[1,2] (y)	Time to background soil moisture content[1,2] (y)
POT6	Topsoil	0.03	0.15
	Subsoil	0.02	0.05
	Parent Material[2]		0.28
Total (y)			0.49
POT7	Topsoil	0.03	0.12
	Subsoil	0.01	0.03
	Parent Material[2]		0.18
Total (y)			0.34
MSTB1	Topsoil	0.04	0.20
	Subsoil	0.01	0.02
	Parent Material[2]		0.18
Total (y)			0.40
SRC1	Topsoil	0.03	0.12
	Subsoil	0.01	0.05
	PM Drained[3]	0.06	0.20
	Parent Material[2]		0.15
Total (y)			0.51
SRCgr	Topsoil	0.03	0.12
	Subsoil	0.01	0.03
	PM Drained[3]	0.03	0.13
	Parent Material[2]		0.10
Total (y)			0.38
ZGC1	Topsoil	0.04	0.08
	Subsoil	0.00	0.00
	PM Drained[3]	0.06	0.34
	Parent Material[2]		0.24
Total (y)			0.67

Table 9A-4 Time Requirements to Achieve Dewatering of Soil Assuming Potential Evapotranspiration Rates

Soil Units	Increment	Time to minimum air requirement[1,2] (y)	Time to background soil moisture content[1,2] (y)
SRC4	Topsoil	0.03	0.12
	Subsoil	0.01	0.04
	PM Drained[3]	0.05	0.18
	Parent Material[2]		0.14
Total (y)			0.49
TBR1 and TBSR1 and TBR2	Topsoil	0.01	0.03
	Subsoil	0.00	0.01
	PM Drained[3]	0.08	0.44
	Parent Material[2]		0.24
Total (y)			0.73
TBRgr1	Topsoil	0.01	0.06
	Subsoil	0.00	0.01
	PM Drained[3]	0.05	0.29
	Parent Material[2]		0.16
Total (y)			0.51
TBR4	Topsoil	0.01	0.04
	Subsoil	0.00	0.01
	PM Drained[3]	0.07	0.41
	Parent Material[2]		0.23
Total (y)			0.68
TBRgr1 and TBRgr2	Topsoil	0.01	0.06
	Subsoil	0.00	0.01
	PM Drained[3]	0.05	0.29
	Parent Material[2]		0.16
Total (y)			0.51
ZREC	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.27
Total (y)			0.45

Table 9A-4 Time Requirements to Achieve Dewatering of Soil Assuming Potential Evapotranspiration Rates

Soil Units	Increment	Time to minimum air requirement[1,2] (y)	Time to background soil moisture content[1,2] (y)
ZREC2A	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.27
Total (y)			0.45
ZREC2B	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.13
Total (y)			0.32
ZREC2C	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.09
Total (y)			0.28
ZREC3A	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.78
Total (y)			0.97
ZREC3B	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.39
Total (y)			0.58
ZREC3C	Topsoil	0.03	0.12
	Subsoil	0.02	0.07
	Parent Material2		0.26
Total (y)			0.45

NOTES:

[1] a growing season is the equivalent of one year's evapotranspiration, assuming average precipitation for this duration

[2] subsurface drainage relies on evapotranspiration to remove soil water; [3]

9A.2.7 Conclusion

Assuming average seasonal precipitation, the better drained upland soils typically require approximately 2 to 6 years (lake evaporation model) and 0.5 to 1 year (Potential evapotranspiration) to reach pre-flood moisture content.

9A.3 WIND EROSION EFFECTS

Due to the addition of fresh coarse textured sediment to the reservoir during operations, there is a possibility of increased wind erosion risk. The potential for increased wind erosion risk exists when sediments deposited on the reservoir bottom during water impoundment are exposed to the atmosphere after the water is drained. The rate of drying for the sediments will be controlled by seasonality, climatic factors and the vegetation cover on the ground surface. Coarser textured sediments (sand size) are expected to be commonly encountered on the reservoir bottom because their settling times are rapid compared to silt and clay particles when suspended in solution (See Hydrology Section, 3B).

Mitigation will be used to reduce the risk of wind erosion of the newly added sediment and will need to be designed for winter months: wind erosion is a concern in winter months in this region (Larney et al. 1995).

One possible mitigation for wind erosion in the reservoir floodplain involves reestablishment of vegetation soon after reservoir dewatering. Revegetation success, however, is not assured, given initial high moisture contents and reduced energy inputs during autumn.

An alternative (it will protect soil from wind erosion over winter) is using a tackifier. Niveo-aeolian deposits (coarse soil deposited by wind during winter) are prevalent world-wide and thus provide evidence that winter soil wind erosion is common (McKenna and Nueman 1993).

It is proposed that a sprayable erosion control product be applied to the reservoir floodplain to reduce soil erodibility due to wind if vegetative controls are not effective. An example sprayable erosion control product is composed of thermally processed wood fibre, wetting agents, and other ingredients. The product bonds with the soil surface and creates a porous and absorbent erosion resistant blanket that can last for up to 12 months.

The effectiveness of sprayable erosion control products to control wind erosion is evaluated using a standard risk model. Wind erosion risk classes for both bare soil and covered soil were determined using the methods of Coote and Pettapiece (1989). The following algorithm was evaluated to calculate the risk of wind erosion:

$$E = KC\ (V2^{*} - \gamma W2)1.5$$

Where:

E = maximum instantaneous soil movement by wind (dimensionless)

K = surface roughness and aggregation factor (dimensionless)

C = factor representing soil resistance to movement by wind (dimensionless)

V* = drag velocity of wind at the soil surface (cm/s)

γ = soil moisture shear resistance (dimensionless)

W = available moisture of the surface soil (m^3 water m^{-3} soil)

The K, C and γ factors are provided in Coote and Pettapiece (1989). Wind speed data to calculate the V* factor were obtained from Environment Canada (Environment Canada 2014). Available moisture at the surface was estimated for each soil texture class based on data available in the soil layer table of the CanSIS (Soil Landscapes of Canada Working Group 2010). Wind erosion risk ratings are presented in Table 9A-5.

Table 9A-5 Wind Erosion Risk Ratings

E	Rating
<100	Negligible
100 to <250	Low
250 to <400	Moderate
400 to <700	High
700+	Severe

The rating system in Table 9A-5 is based on a land surface that is bare and unprotected (no vegetation or litter cover) with a non-crusted surface. Coote and Pettapiece (1989) developed a percentage reduction estimation of wind erosion for crops and crop groups. Hay crop cover has a 98% reduction factor and it is utilized because hayland is a common land use in the LAA. Soil covered with the tackifier is given a 95% risk reduction factor because after the tackifier is applied to the bare soil, it is expected to have greater than 98% ground cover and percent effectiveness is rated at greater than 95%.

Each soil cover scenario (bare, crop, tackifier and hay) is rated with two coarse textured soils, fine sand and sandy loam. In addition, wind speeds from 0 to 120 km/h in 10 km/h increments are applied to each soil cover scenario and soil texture. Maximum hourly wind speed at the nearest weather station (Sprinkbank A) is 76 km/h and maximum gust speed at the nearest weather station that measures it (Calgary International Airport) is 120 km/h (Environment Canada 2014).

The following is a summary of the wind erosion risk ratings for fine sand textured soils (Figure 9A-2 and Table 9A-6):

- The wind erosion risk for bare soil is rated as severe in winds greater than 60 km/h.
- A crop with 50% ground cover is rated as severe in winds greater than 80 km/h.
- On ground covered with tackifier, the wind erosion risk is rated as negligible to low in winds up to 100 km/h
- On hayland, wind erosion risk is rated as negligible to low in winds up to 120 km/h.

The following is a summary of the wind erosion risk ratings for sandy loam textured soil (Figure 9A-3 and Table 9A-7):

- On bare soils, wind erosion risk is rated as severe in winds greater than 60 km/h.
- With a 50% crop cover, the wind erosion risk is rated as severe in winds greater than 80 km/h.
- On ground covered with tackifier, the wind erosion risk is rated as negligible to low in winds up to 120 km/h
- On hayland, wind erosion risk is rated as negligible in winds up to 120 km/h.

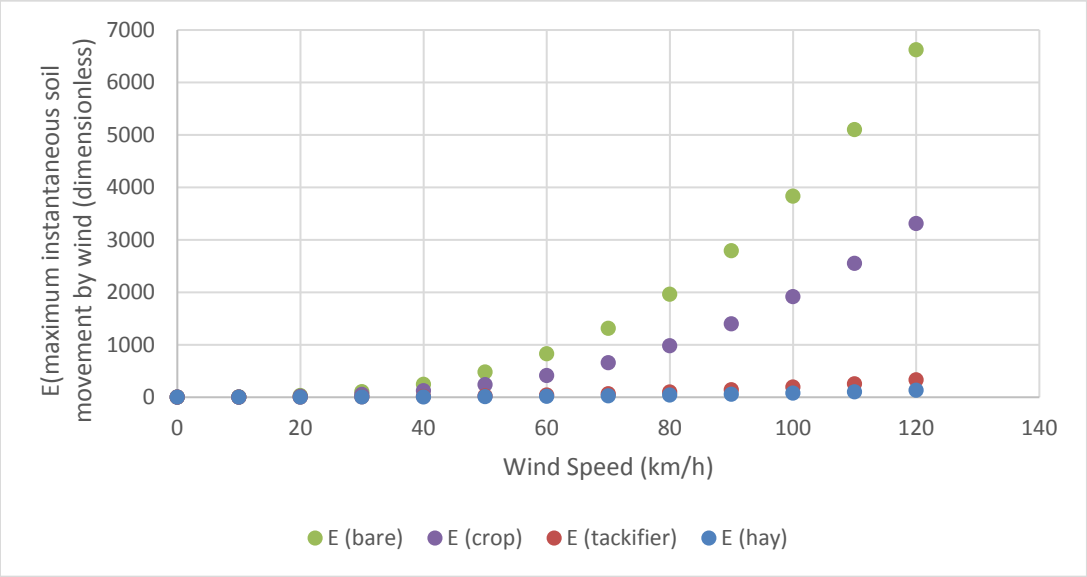

Figure 9A-1 Find Sand Wind Erosion Risk Scenarios

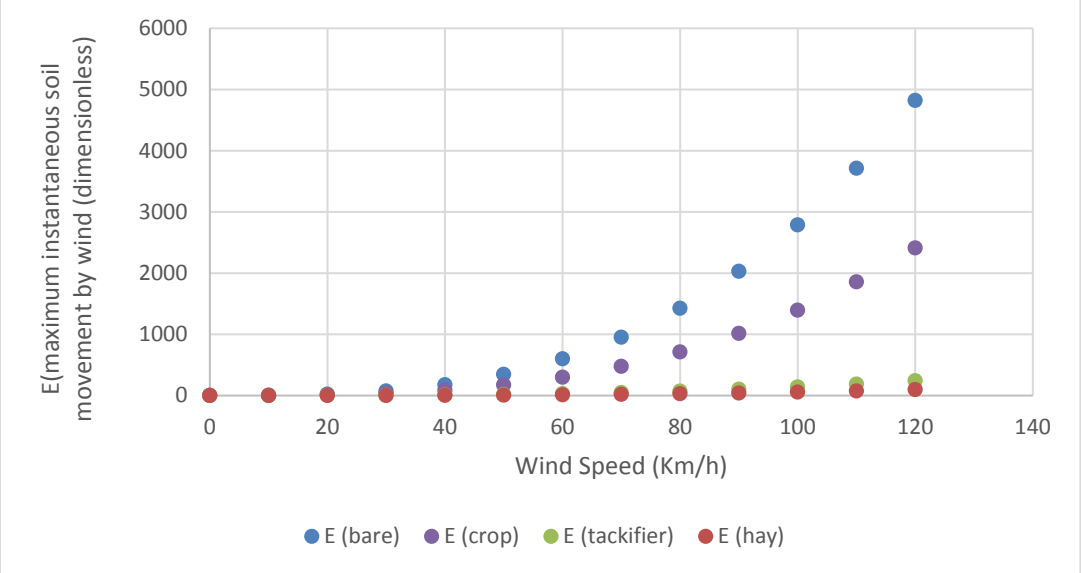

Figure 9A-2 Sandy Loam Wind Erosion Risk Scenarios

Table 9A-6 Find Sand Wind Erosion Risk Scenarios

Ground Cover	Ground Cover Reduction Factor (%)	Maximum Hourly Wind Speed (km/h)[1]	E[2]	Wind Erosion Rating
Bare	0	0	0	Negligible
Bare	0	10	4	Negligible
Bare	0	20	30	Negligible
Bare	0	30	103	Low
Bare	0	40	244	Low
Bare	0	50	478	High
Bare	0	60	826	Severe
Bare	0	70	1313	Severe
Bare	0	80	1960	Severe
Bare	0	90	2792	Severe
Bare	0	100	3830	Severe
Bare	0	110	5099	Severe
Bare	0	120	6620	Severe
Crop	50	0	0	Negligible
Crop	50	10	2	Negligible
Crop	50	20	15	Negligible
Crop	50	30	51	Negligible
Crop	50	40	122	Low
Crop	50	50	239	Low

Table 9A-6 Find Sand Wind Erosion Risk Scenarios

Ground Cover	Ground Cover Reduction Factor (%)	Maximum Hourly Wind Speed (km/h)[1]	E[2]	Wind Erosion Rating
Crop	50	60	413	High
Crop	50	70	656	High
Crop	50	80	980	Severe
Crop	50	90	1396	Severe
Crop	50	100	1915	Severe
Crop	50	110	2549	Severe
Crop	50	120	3310	Severe
Tackifier	95	0	0	Negligible
Tackifier	95	10	0	Negligible
Tackifier	95	20	2	Negligible
Tackifier	95	30	5	Negligible
Tackifier	95	40	12	Negligible
Tackifier	95	50	24	Negligible
Tackifier	95	60	41	Negligible
Tackifier	95	70	66	Negligible
Tackifier	95	80	98	Negligible
Tackifier	95	90	140	Low
Tackifier	95	100	192	Low
Tackifier	95	110	255	Moderate

Table 9A-6 Find Sand Wind Erosion Risk Scenarios

Ground Cover	Ground Cover Reduction Factor (%)	Maximum Hourly Wind Speed (km/h)[1]	E[2]	Wind Erosion Rating
Tackifier	95	120	331	Moderate
Hay	98	0	0	Negligible
Hay	98	10	0	Negligible
Hay	98	20	1	Negligible
Hay	98	30	2	Negligible
Hay	98	40	5	Negligible
Hay	98	50	10	Negligible
Hay	98	60	17	Negligible
Hay	98	70	26	Negligible
Hay	98	80	39	Negligible
Hay	98	90	56	Negligible
Hay	98	100	77	Negligible
Hay	98	110	102	Low
Hay	98	120	132	Low

NOTES:

[1] Maximum hourly wind speed is 76 km/h at the Springbank A Weather Station. Maximum gust speed is 120 km/h at the Calgary International Airport Weather Station (no maximum gust speed at the Springbank A Weather Station is available). Wind data are from Canadian Climate Normals 1981-2010 (Environment Canada 2014).

Table 9A-7 Sandy Loam Wind Erosion Risk Scenarios

Ground Cover	Ground Cover Reduction Factor (%)	Wind Speed (km/h)[1]	E[2]	Wind Erosion Rating
Bare	0	0	0	Negligible
Bare	0	10	2	Negligible
Bare	0	20	21	Negligible
Bare	0	30	73	Negligible
Bare	0	40	176	Low
Bare	0	50	345	Moderate
Bare	0	60	599	High
Bare	0	70	953	Severe
Bare	0	80	1425	Severe
Bare	0	90	2030	Severe
Bare	0	100	2787	Severe
Bare	0	110	3711	Severe
Bare	0	120	4820	Severe
Crop	50	0	0	Negligible
Crop	50	10	1	Negligible
Crop	50	20	10	Negligible
Crop	50	30	37	Negligible
Crop	50	40	88	Negligible
Crop	50	50	173	Low

Table 9A-7 Sandy Loam Wind Erosion Risk Scenarios

Ground Cover	Ground Cover Reduction Factor (%)	Wind Speed (km/h)[1]	E[2]	Wind Erosion Rating
Crop	50	60	299	Moderate
Crop	50	70	477	High
Crop	50	80	712	Severe
Crop	50	90	1015	Severe
Crop	50	100	1394	Severe
Crop	50	110	1856	Severe
Crop	50	120	2410	Severe
Tackifier	95	0	0	Negligible
Tackifier	95	10	0	Negligible
Tackifier	95	20	1	Negligible
Tackifier	95	30	4	Negligible
Tackifier	95	40	9	Negligible
Tackifier	95	50	17	Negligible
Tackifier	95	60	30	Negligible
Tackifier	95	70	48	Negligible
Tackifier	95	80	71	Negligible
Tackifier	95	90	102	Low
Tackifier	95	100	139	Low
Tackifier	95	110	186	Low

Table 9A-7 Sandy Loam Wind Erosion Risk Scenarios

Ground Cover	Ground Cover Reduction Factor (%)	Wind Speed (km/h)[1]	E[2]	Wind Erosion Rating
Tackifier	95	120	241	Low
Hay	98	0	0	Negligible
Hay	98	10	0	Negligible
Hay	98	20	0	Negligible
Hay	98	30	1	Negligible
Hay	98	40	4	Negligible
Hay	98	50	7	Negligible
Hay	98	60	12	Negligible
Hay	98	70	19	Negligible
Hay	98	80	28	Negligible
Hay	98	90	41	Negligible
Hay	98	100	56	Negligible
Hay	98	110	74	Negligible
Hay	98	120	96	Negligible

NOTES:

[1] Maximum hourly wind speed in the summer months is 76 km/h at the Springbank A Weather Station. Maximum gust speed is 120 km/h at the Calgary International Airport Weather Station (no maximum gust speed at the Springbank A Weather Station is available). Wind data are from Canadian Climate Normals 1981-2010 (Environment Canada 2014).

[2] E – a dimensionless index of wind erosion risk (Coote and Pettapiece 1989).

9A.4 REFERENCES

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SPRINGBANK OFF-STREAM RESERVOIR PROJECT
Environmental Impact Assessment

Volume 4: Appendices
Appendix G: Terrain and Soils

Terrain and Soils
Technical Data Report

Prepared for:
Alberta Transportation

Prepared by:
Stantec Consulting Ltd.

March 2018

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Abbreviations

AFPA/LFS	Alberta Forest Products Association/Land and Forest Service
AGRASID	Agricultural Regions of Alberta Soil Inventory Database
CALA	Canadian Association for Laboratory Accreditation Inc.
CanSIS	Canadian Soil Information System
GIS	global information system
GPS	Global Positioning System
LAA	Local Assessment Area
LiDAR	Light Detection and Ranging
QC	Quality Control
RAA	Regional Assessment Area
RUSLEFAC	Revised Universal Soil Loss Equation for Application in Canada
SAR	sodium adsorption ratio
SCA	Soil Correlation Area
SIL	Survey Intensity Level
the Project	Springbank Off-stream Reservoir Project
TSIL	terrain survey intensity level

1.0 INTRODUCTION

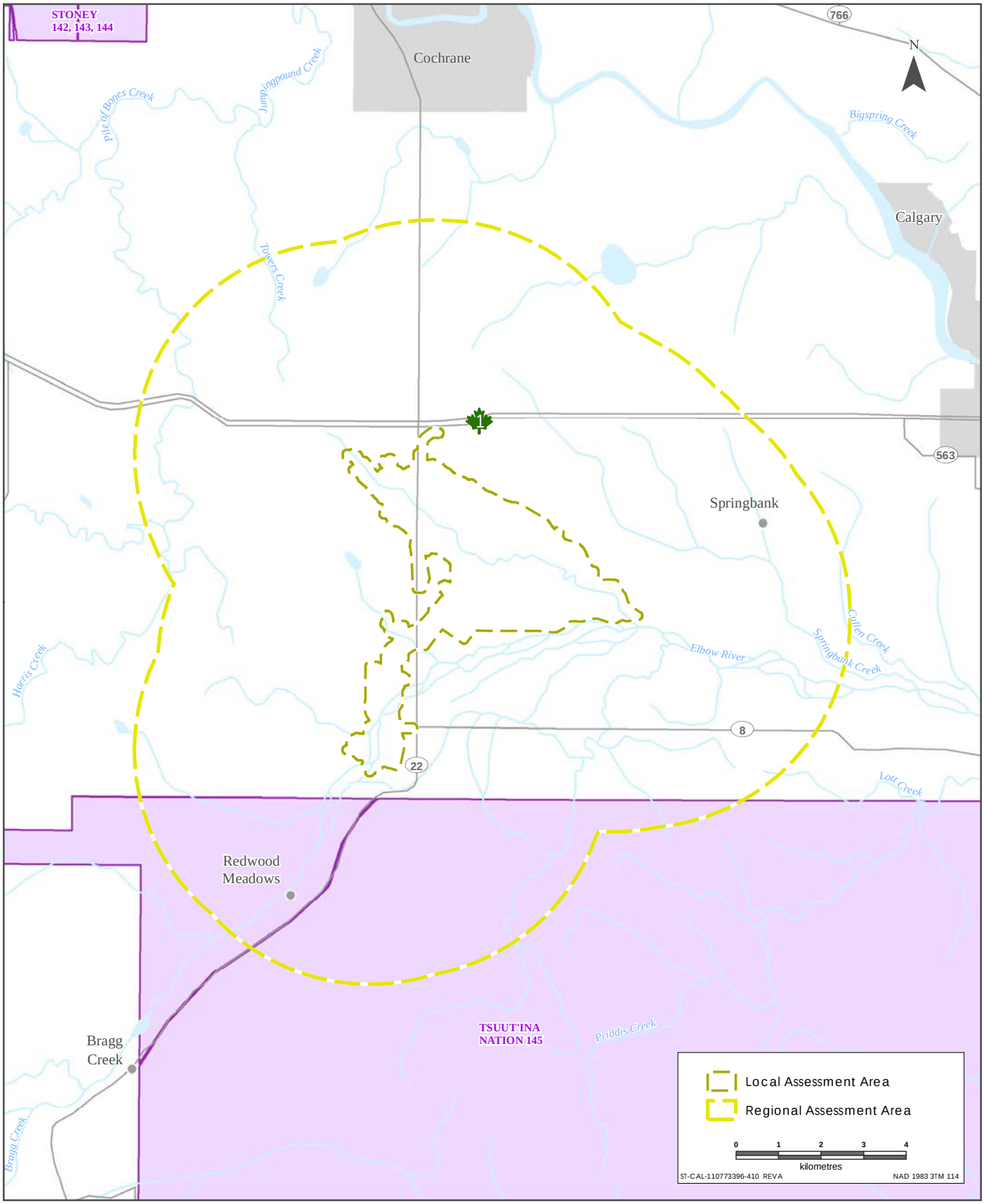
This Technical Data Report supports the terrain and soils environmental assessment for the Springbank Off-stream Reservoir Project (the Project) in the following areas:

- provides a general description of the geology, topography, landforms, soils, and geomorphic processes present in the terrain and soils Local Assessment Area (LAA),
- describes methods and presents results for terrain and terrain stability mapping of the LAA, and the terrain field inventory program,
- describes methods and presents results for the detailed soil survey, and soils mapping of the LAA,
- provides evaluations of potential risks for water and wind erosion, rutting and compaction, and
- provides ratings of agricultural land capability and reclamation suitability based on soil characteristics and laboratory analysis associated with mapped soil units

1.1 STUDY AREA

The LAA for terrain and soils is the project development area (PDA) plus a 100 m buffer and an additional extension of approximately 200 m south of the dam to include the scarps adjacent to the Elbow River. The entire terrain and soils LAA encompasses an area of 1,886.5 ha.

The regional assessment area (RAA) is the PDA plus a modified 5 km buffer. The terrain and soils RAA encompasses an area of 22,540.2 ha. This RAA is includes the Foothill Parkland Natural Subregion but not the Montane Natural Subregion (west of the Project and higher in elevation). The prevailing wind direction in the summer is westerly or southwesterly (Environment and Climate Change Canada 1981-2010). Similarly, effects north and south will be restricted to the Elbow river watershed, and are unlikely to extend beyond this. The eastern boundary of the RAA is between the town of Springbank and the western edge of the City of Calgary.



Sources: Base Data - ESRI, Natural Earth, Government of Alberta, Government of Canada
Thematic Data - ERBC, Government of Alberta, Stantec Ltd

Soils and Terrain Regional Assessment Area (RAA)
and Local Assessment Area (LAA)

Stantec

1.2 PROJECT SETTING

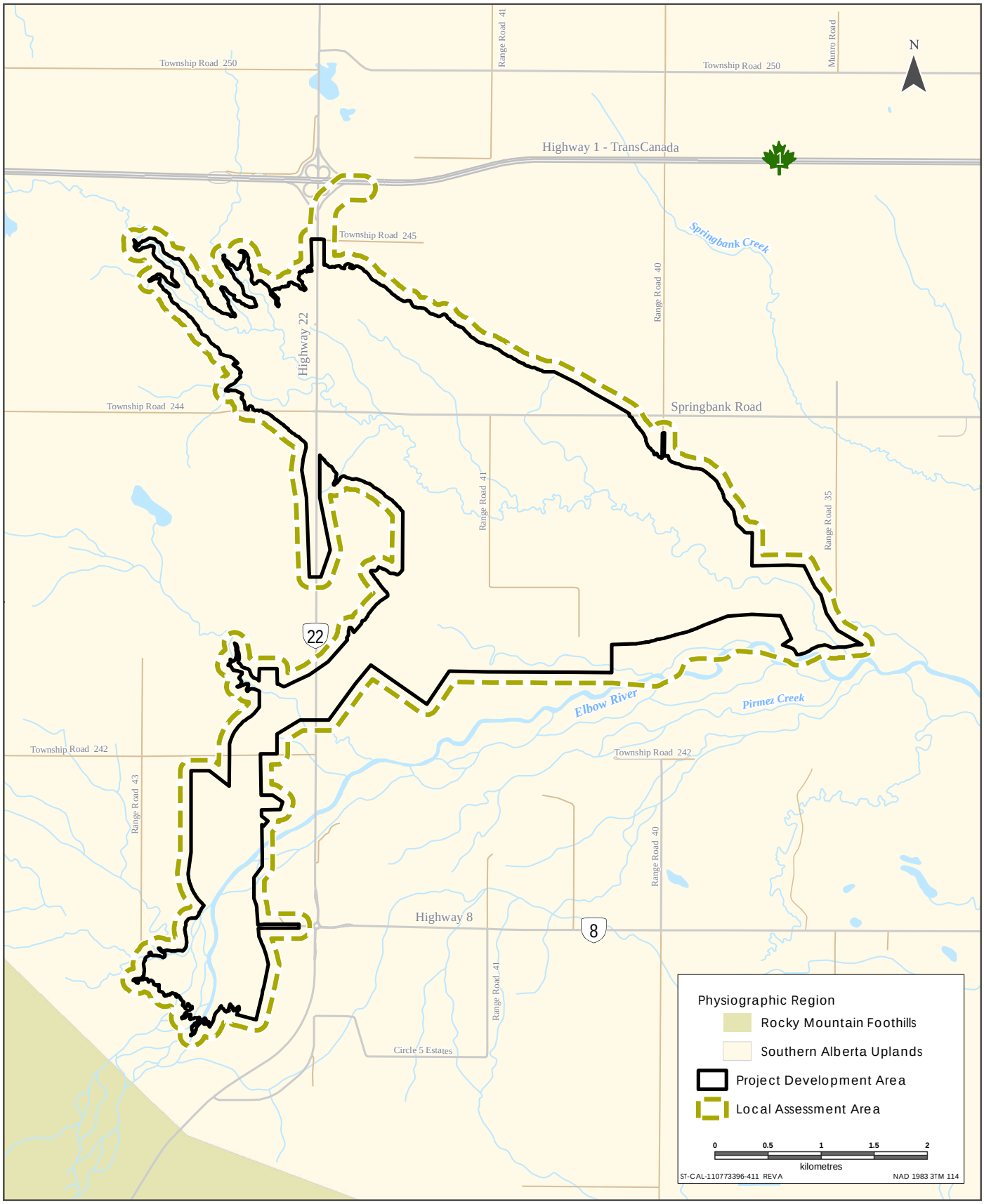
This section describes the physical setting of the LAA based on a review of existing background information collected from a variety of sources including (but not limited to):

- satellite imagery and air photos,
- digital surficial geology data,
- bedrock geology data from the Alberta Geological Survey,
- soil survey maps and reports, and
- publicly available scientific literature relevant to the quaternary history in the area

1.2.1 Physiography

The Project PDA is located within western Alberta, approximately 15 km west of Calgary, and 10 km south of the town of Cochrane. It is within the Springbank District of the Calgary Urban Area (Moran 1986); this area is bounded to the west by the Rocky Mountain Foothills, and by river valleys and hilly terrain along its remaining perimeter. The Project PDA lies within the Okotoks Uplands District of the Western Benchlands Section of the Southern Alberta Uplands Physiographic Region (Figure 1-2). The region is characterized by low relief, undulating and hummocky surface expressions, with some rolling areas controlled by underlying bedrock (Pettapiece 1986).

The PDA comprises a flood berm, diversion structure, diversion channel, an earthen dam and reservoir area. The flood berm is located on the Elbow River, with the diversion structure located on the scarp northwest of the flood plain. The diversion channel, dam and reservoir area are located on the plateau to the northwest of the river. An unnamed tributary to the Elbow River disects the sediments in the reservoir area; it crosses the area from the northwest and joins the Elbow River in the southeast.



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Physiographic Regions

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1.2.2 Bedrock Geology

The LAA is underlain by Paleogene-aged sedimentary rocks of the Paskapoo Formation, and Upper Cretaceous-aged sedimentary rocks from the Coalspur Formation, Brazeau Formation, and the Alberta and Smokey groups. These comprise sandstone, siltstone, mudstone, and shale (Prior et al. 2013; Figure 1-3).

1.2.3 Quaternary History

During the latest Late Wisconsinan Glaciation (approximately 27,000-30,000 years ago), the Calgary area was overridden by ice from both the Cordilleran Ice Sheet, advancing from the mountains in the northwest, and the Laurentide Ice Sheet, advancing from the east. The earliest advance of ice into the Calgary area in the Late Wisconsinan, was from a valley glacier advancing eastwards from the foothills down the Bow River valley (Moran 1986). As it advanced, this glacier encountered the Laurentide Ice Sheet, and was diverted southward along the mountain front (Jackson 1980). Ice flow from the foothills slowed and eventually the westward flowing Laurentide Ice overrode stagnant ice and deposits from the initial advance (Jackson 1980; Moran 1986). As the climate warmed the Laurentide Ice Sheet dammed meltwater from the retreating mountain glaciers and runoff from streams in the Rocky Mountains, resulting in the formation of a series of glacially-dammed lakes during its complex retreat (Moran 1986).

A glacial lake occupied the unnamed creek valley throughout the retreat phases, resulting from the Laurentide Ice Sheet blocking drainage of meltwater from the Foothills through the Elbow River valley. The location and extent of this lake changed over time as the Laurentide Ice retreated and spillways opened up. At this glacial lake's largest extent, it merged with the glacial lake in the Bow River valley, with a water level of about 1,220 meters above sea level. However, as the Laurentide Ice retreated, the glacial lake migrated eastward with the ice front and dropped to a level of 1,150 meters when a tunnel beneath the ice opened along the eastern end of the Sarcee upland (Figure 24 in Moran 1986).

1.2.4 Surficial Materials

The existing 1:50,000-scale mapping for the Calgary Urban Area (Moran 1986) provides a general overview of surficial materials in the LAA. The area is predominantly mapped as comprising of silt and clay glaciolacustrine offshore deposits. However, a significant portion of the LAA in mapped as Spy Hill Drift overlying rocks from the Porcupine Hills Formation[1]. This material is a pebble-loam till overlying sandstone, siltstone and mudstone, and was deposited by the earliest Late Wisconsinan ice advance into Calgary from the foothills. Scattered bedrock outcrops and the fluvial sediments of the modern Elbow River constitute relatively minor coverage of the LAA.

[1] The Porcupine Hills Formation is equivalent to the Paskapoo Formation without coal beds.

Areas of glaciofluvial and modern fluvial sediments, characterized as silt overlying gravel possibly with minor sand, are subordinate in the LAA and mapped in smaller units along the Elbow River.

Moran (1986) notes that slope failures are uncommon in the Calgary Urban Area, and are generally restricted to steep slopes along major river valleys. Moran (1986) makes the observation that slope failures are most common in thick, erodible, silt and fine sand-dominated lacustrine sediment.

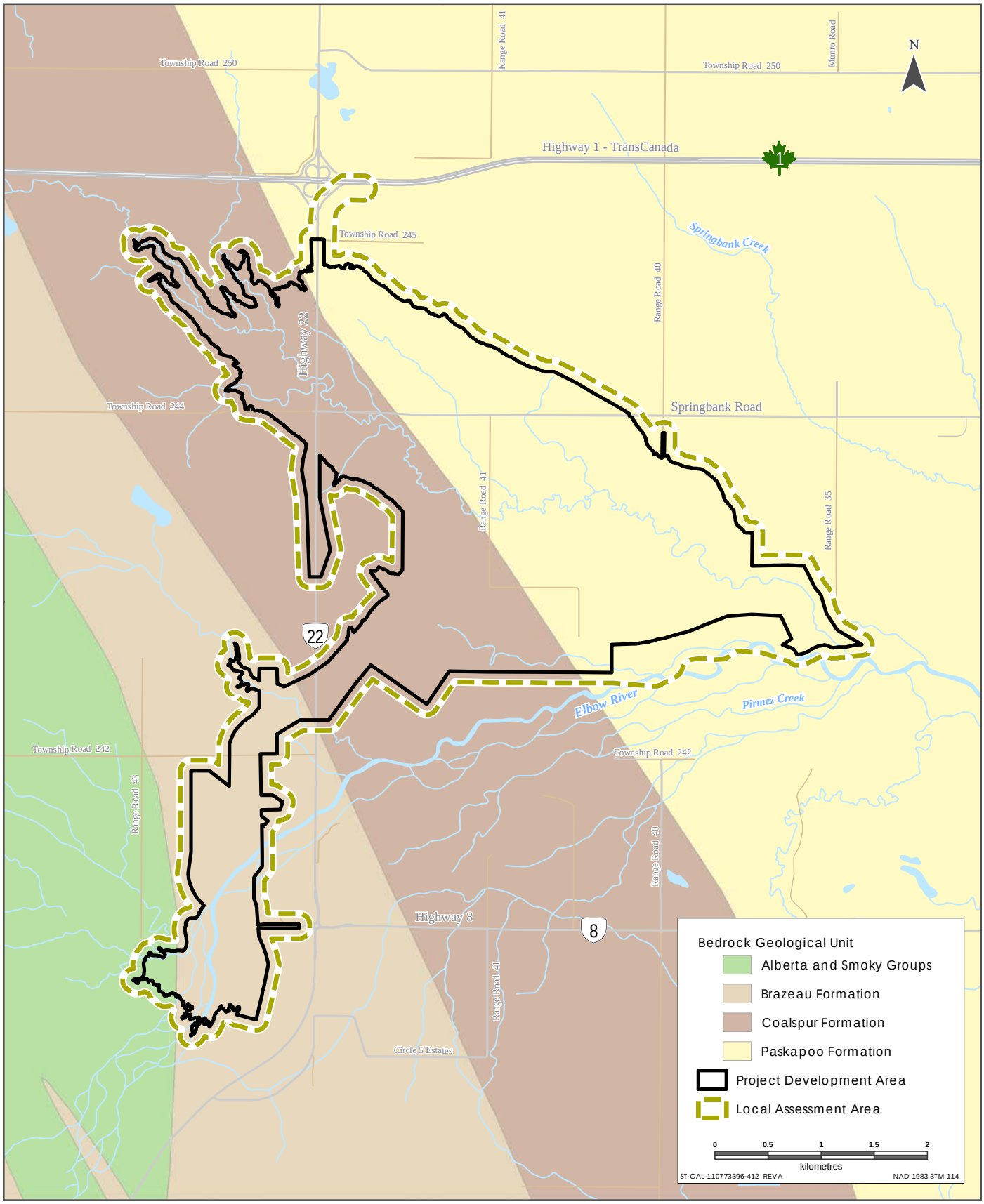
1.2.5 Natural Subregions and Soil Correlation Areas

The LAA is located within the Foothills Parkland Natural Subregion of Alberta (Natural Regions Committee 2006). The Foothills Parkland Natural Subregion has cooler summers and shorter growing seasons, but warmer winters and more precipitation than other parkland Natural Subregions. The average annual precipitation is approximately 517 mm, with most precipitation falling between April and August. The mean annual temperature is 3.0°C ranging from monthly averages of 14.8°C in July to -7.0°C in December (1981-2010 Climate Normals at Springbank Airport). The average frost free period is approximately 76 days.

Soil Correlation Areas (SCAs) are delineated based on the relationship between climate and soil development (Bock et al. 2006) while the Natural Subregion divisions are defined by a combination of climate, vegetation, soil and physiographic features. Although the SCA and Natural Subregion boundaries are not perfectly matched, both classification systems contribute to an understanding of soil distribution. The LAA is in SCA 8 (Thick *Black Soil Zone of South-Western Alberta*) and is dominated by Black and Dark Grey Chernozems (Bock et al. 2006). Deep Orthic Black Chernozems with surface humus horizons at least 15 cm thick are the most common soil types, and are associated with grassland and open woodland vegetation. Orthic Dark Gray Chernozemic soils are typically associated with forested areas. Seepage areas are common on lower slope positions and depressions, which typically support willow shrublands (Natural Regions Committee 2006). This seepage is well oxygenated, which supports classification of moist Chernozems rather than Gleysols in some wetter than typical conditions. Orthic Gleysols occur in the wettest, mostly poorly drained areas.

1.2.6 Land Use

Land uses within the LAA include residences, improved pasture, native pasture, crop, hayland, and undisturbed forest/riparian land. Land Use within the LAA is further explored in Volume 4, Appendix M. Agricultural land capability is presented in Section 3.2.



Sources: Base Data - Government of Alberta, Government of Canada, Alberta Geological Survey. Thematic Data - Stantec Ltd.

Bedrock Geology

Stantec

2.0 TERRAIN

2.1 TERRAIN METHODS

2.1.1 Preliminary Mapping

Preliminary desktop terrain mapping was completed for the LAA at 1:20,000-scale in April 2015 using a combination of colour, 1:10,000-scale (2013) orthophotos, Bing Maps imagery from 2014, and Light Detection and Ranging (LiDAR) data. The LiDAR data was processed to produce bare-earth hillshade imagery, a slope percentage map, and 1 meter contours. Bare-earth hillshade imagery allows for more accurate delineation of landforms and identification of slope breaks, which might otherwise be obscured by vegetation.

Because there is no standard for terrain mapping in Alberta, the mapping methods are based on standards and guidelines used in the Province of British Columbia (Resources Inventory Committee 1996; Howes and Kenk 1997). Relatively homogeneous terrain units (polygons) are delineated with the following attributes:

- surficial material (e.g., till, organics, glaciolacustrine, bedrock)
- surface expression (e.g., blanket, undulating, terraced, hummocky)
- geomorphological processes (e.g., landslides, active gullying)
- slope steepness range in percent
- soil drainage (e.g., rapid, well, moderately well, imperfect, poor, very poor) (Section 5.2)
- terrain stability class (e.g., I-V, see Table 2-1)

A simplified terrain map legend is provided in Section 5.2. See Howes and Kenk (1997) for a detailed explanation of terrain symbols (terrain polygon label).

Table 2-1 Terrain Stability Classes and Terminology

Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following right-of-way forest clearing or access road construction
II	Expected to have a very low likelihood of landslide initiation following right-of-way forest clearing or access road construction
III	Expected to have a low likelihood of landslide initiation following right-of-way forest clearing or access road construction"
IV	Expected to contain areas with a moderate likelihood of landside initiation following right-of-way forest clearing or access road construction
V	Expected to contain areas with a high likelihood of landslide initiation following right-of-way forest clearing or access road construction

NOTES:

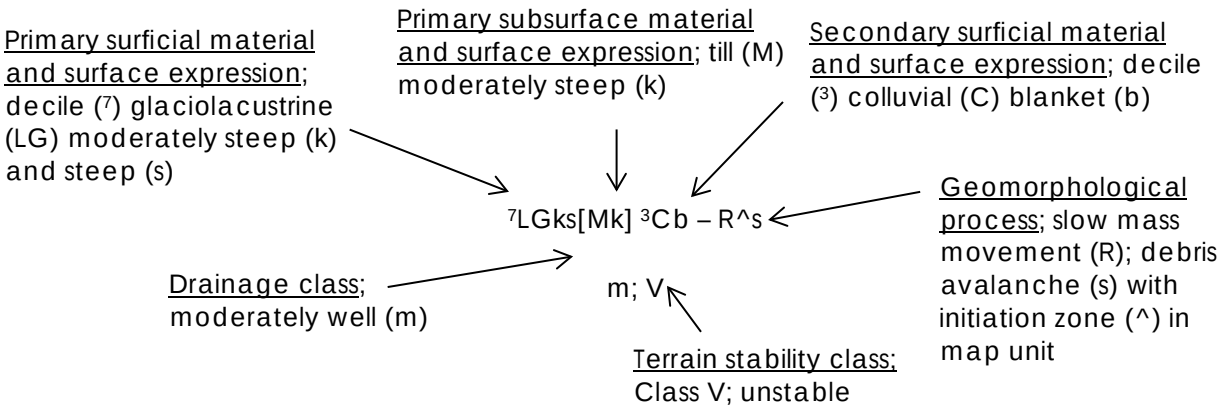
[1] These are qualitative interpretations adapted from BCMOF and BCMOE (1999) and Chatwin et al. (1994). The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction. It makes no inferences about the potential effects of dam construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

All terrain polygons are assigned a soil drainage class (excluding open water). Soil drainage classes are relative, qualitative descriptions of the removal of water from a soil in relation to water supply. The drainage classes used in this assessment are derived from the Canadian Soil Information System (CanSIS[2]) and consist of the following: very poor, poor, imperfect, moderately well, well, rapid and very rapid. Terrain polygons are assigned up to two soil drainage classes, based on interpreted soil drainage variability within a given polygon.

[2] http://sis.agr.gc.ca/cansis/nsdb/soil/v1/snt/drainage.html

A terrain map book was produced at a scale of 1:5,000 (see Section 5.1). Each terrain has a label as follows:



The terrain polygons can be composed of up to three types of surficial materials. Proportions of each type of material are expressed with deciles included in the terrain symbol.

2.1.2 Field Surveys

A terrain field inventory program was conducted between June 27 and July 4, 2016.

Approximately 60 field sites were pre-selected during the desktop terrain study for areas of higher likelihood of landslide initiation or reactivation. Sites were distributed throughout the LAA to ensure that materials and landscape types were adequately sampled to verify the surficial geology and their physical characteristics.

A total of 66 formal terrain sites (41percent) were visited out of 162 mapped polygons to attain terrain survey intensity level (TSIL) C (20-50 % polygon ground checking). Following ground disturbance protocols, shallow (less than 1 metre) hand-dug soil pits were completed at each site. Global positioning system (GPS) coordinates were taken at each site along with digital photographs. Data was collected on slope and aspect, surficial material type (e.g., till, glaciolacustrine), surface expression (e.g., undulating, steep, etc.), estimated depth-to-bedrock, coarse fragment content, sorting and structure of sediment (e.g., matrix or clast-supported), matrix texture (e.g., clayey silt), soil drainage (e.g., moderately well, poor), and geomorphological processes (e.g., gullying, mass wasting). Notes were also made on terrain stability (e.g., tension cracks, up-turned roots, landslides, buried soil).

2.1.3 Final Mapping

The preliminary terrain mapping was reviewed and compared with data collected from both the terrain and soils field surveys. Changes were made to terrain polygon labels where appropriate, and textures were added to polygons that had been field checked. Final terrain mapping and terrain stability ratings were reviewed by a senior terrain mapper and edits were incorporated. The final terrain and terrain stability mapping is presented in Section 5.1.

2.2 TERRAIN RESULTS

2.2.1 Surface Materials

Surficial materials are presented in the terrain mapping for the terrain and soils Local Study Area (Section 5.1). Table 2-2 provides a statistical summary of the surficial materials mapped in the LAA.

Table 2-2 Distribution of Surface Materials in the Terrain and Soils LAA

Surface Material	Area (Ha)	Percentage of Total Area (%)
Glaciolacustrine (LG)	1,311.8	69.5
Till (M)	254.2	13.5
Fluvial (F)	271.3	14.4
Organic (O)	35.4	1.9
Glaciofluvial (FG)	8.1	0.4
Colluvium (C)	4.0	0.2
Open water (N)	1.0	0.1
Bedrock (R)	0.6	0.0
Total	**1,886.4**	**100.0**

Glaciolacustrine material, deposited in or along the margins of ice-dammed lakes, is the most common surficial material, comprising over 1,312 ha and almost 70 percent of the LAA. Glaciolacustrine material covers most of the central part of the LAA; including the area underlying the earthen dam, and the area behind the dam, to the northwest, surrounding Springbank Creek; and most of the diversion channel. The glaciolacustrine deposits mostly occur as flat to gently sloping or gently undulating deposits, and are relatively thick (greater than 3 m). However, some glaciolacustrine blankets (1–3 m) were mapped overlying till deposits on the sloping topography along the edges of the PDA. Some steep (greater than 70%) glaciolacustrine deposits were also mapped on the scarps overlooking the Elbow River and adjacent to the unnamed tributary. The glaciolacustrine deposits in the LAA predominantly have a silty clay texture with no coarse fragments (Photo 2-1).

Photo 2-1 Field Photo Showing Typical Glaciolacustrine Deposit in the LAA

Till material, deposited directly by glacier ice, is the second most common surficial material, comprising almost 14% and almost 254 ha of the LAA. Till is mainly found on the sloping terrain on the eastern edge of the PDA, and is exposed in the scarps eroded by the Elbow River. Field studies in the LAA found that the till is typically greater than 3 m thick, and predominantly has a clayey silt texture with 10–20% coarse fragments (Photo 2-2).

Photo 2-2 Field Photo Showing Typical Till Deposit in the LAA

Fluvial material, transported and deposited by rivers and streams, l, comprises 14% and over 271 ha of the LAA. The largest deposit of fluvial material is found adjacent to the Elbow River in a large floodplain, which is likely several metres thick. This deposit underlies the intake for the proposed diversion channel. Fluvial deposits are also mapped along unnamed creek; however, these deposits typically occur as fluvial veneers (less than 1 m thick). Field studies in the LAA found the texture of fluvial deposits to be highly variable and range from clayey silt to sandy pebbly deposits (Photo 2-3).

Photo 2-3 Field photo of the Elbow River flood plain showing the spatial variability in the texture of fluvial deposits

Organic material, resulting from the accumulation of vegetative matter, comprises almost 2% and 35 ha of the LAA. The largest area of organic material has accumulated on the Elbow River floodplain. Organic material generally accumulates in poorly drained areas. Poorly drained areas occurring in depressions within open pasture fields, such as in Photo 2-6, are common in the LAA. These were initially mapped as organic veneers during the preliminary mapping phase of the Project, however field studies in the LAA found that very little or no organic material has accumulated in these areas (Photo 2-4).

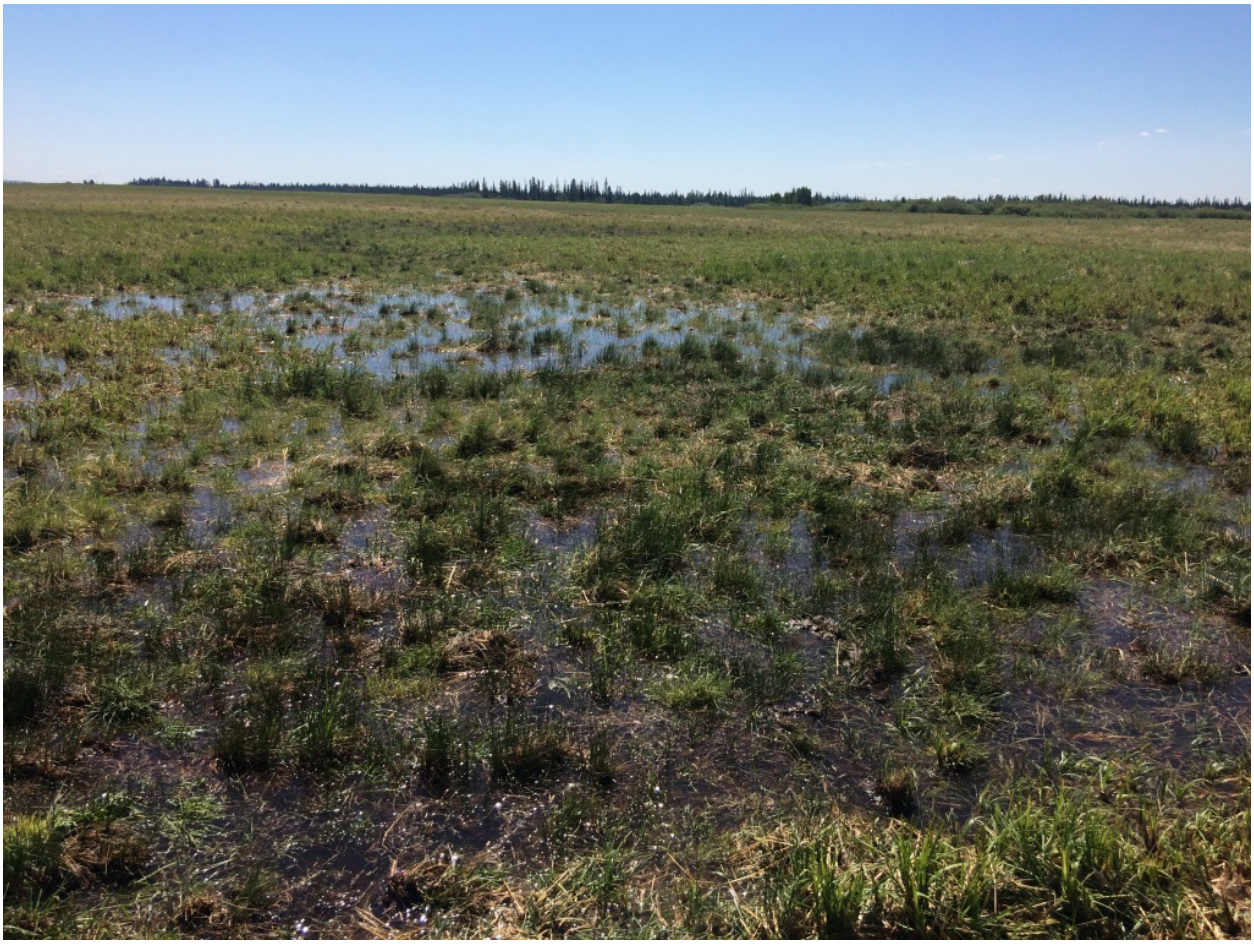


Photo 2-4 Field photos showing poorly drained soils occurring in depression within open pasture field in LAA

Glaciofluvial material transported and deposited directly by glacial meltwater streams, covers over 8 ha of the LAA and accounts for 0.4% of the surficial materials. Glaciofluvial deposits generally have a sandy textured matrix with relatively high gravels content. Glaciofluvial deposits are mapped around the area where the unnamed tributary meets the Elbow River flood plain.

Colluvium deposits, which have reached their present position as a direct result of gravity-induced movements, comprise less than 1% and almost 4 ha of the surface materials in the LAA. Colluvium is mainly located along the scarps of the Elbow River, where slopes have been over steepened by down cutting of the river, and are often undercut by the river causing landslide initiation on the slopes. The texture of colluvial material generally reflects the material from which it was derived. The fine-grained glaciolacustrine material in the PDA is prone to landslide

initiation, particularly when slopes have been over-steepened, for example the Elbow River scarps (Photo 2-5).

Photo 2-5 Field photo showing colluvium deposits, derived from glaciolacustrine material on over-steepened scarps adjacent to the Elbow River

Bedrock outcrops account for only 0.02% and cover less than 1 ha of the LAA. Thick (greater than 3 m) glacial deposits blanket the underlying bedrock in the LAA. Those outcrops that are present are exposed along or close to the Elbow River scarps.

2.2.1.1 Terrain Stability

Table 2-3 provides a summary of terrain stability conditions mapped within the LAA.

Table 2-3 Distribution of Terrain Stability Classes Mapped within the LAA

Terrain Stability Class	Total Area (ha)	Percent (%)
I	1743.5	92.4
II	55.5	2.9
III	64.3	3.4
IV	9.6	0.5
V	12.6	0.7
Water	1.0	0.1

For the most part, the LAA consists of flat to undulating terrain with negligible to low likelihood of landslide initiation. Almost 99 percent of the LAA is rated as terrain stability class I–III (benign or relatively stable). These benign areas mainly consist of flat to gently sloping or gently undulating glaciolacustrine deposits, fluvial plains, and gently sloping till deposits (Photo 2-6).

Photo 2-6 Field Photo Showing Typical Flat to Gently Sloping Topography within the LAA

Over 9 ha, or 0.5%, of the LAA is rated as terrain stability class IV (Table 3-4). Slopes rated as terrain stability class IV are steep slopes that have a moderate likelihood for landslide initiation. Slopes rated as terrain stability class IV are mainly located along the Elbow River scarps (Photo 2-9), and along unnamed tributary close to where it joins the Elbow River. These slopes range from 25–70% in steepness and are mainly composed of till or glaciolacustrine material.

Photo 2-7 Field photo showing slopes rated as moderate likelihood for landslide initiation

Less than 12 ha, or 0.7%, of the LAA is rated as terrain stability class V (Table 2-3). Polygons rated as terrain stability class V are steep slopes that contain active landslides and/or show evidence of high likelihood of landslide initiation. These are all located along the Elbow River scarps. The Elbow River scarps mainly expose glaciolacustrine deposits overlying till overlying bedrock. Landslides are common on these slopes (Photo 2-8) and often associated with oversteepening due to bank erosion. Slumps are particularly common in the glaciolacustrine deposits (Photo 2-9), whereas debris avalanches are more common in the till deposits.

Photo 2-8 Debris Avalanche Along the Elbow River Scarps Exposing Glaciolacustrine Silt and Clay Overlying Consolidated Clay Till.

Photo 2-9 Field Photo of Surficial Material Slump in Glaciolacustrine Silt and Clay on the Elbow River Scarps

2.3 TERRAIN SUMMARY

Over 92% of the terrain and soils LAA is underlain by terrain than is stable with negligible to low likelihood of landslide initiation. This terrain mostly consists of flat to gently undulating glaciolacustrine deposits, which are relatively thick (greater than 3 m) and have silty clay textures with little to no coarse fragments. Other terrain with negligible to low likelihood of landslide initiation include fluvial plains and gently sloping till deposits.

Less than 1% of the LAA comprises slopes that are rated as moderately likelihood of landslide initiation. These slopes are located mainly along the south bank of unnamed tributary and on the scarps adjacent to the Elbow River.

Only 0.7% (12 ha) of the LAA comprises slopes that are rated as high likelihood of landslide initiation. These areas include scarps actively eroded by the Elbow River and are mainly composed of glaciolacustrine deposits overlying till and bedrock. Landslides are common on these slopes, mainly debris avalanches and slumps.

3.0 SOILS

3.1 SOILS METHODS

The methods employed for this soil information include both desktop and fieldwork. Soils mapping at 1:50,000 scale was undertaken to produce the soil information appendix. Soil inspection sites and soil sampling locations in the LAA are shown in Figure 3-1.

3.1.1 Review of Existing Data

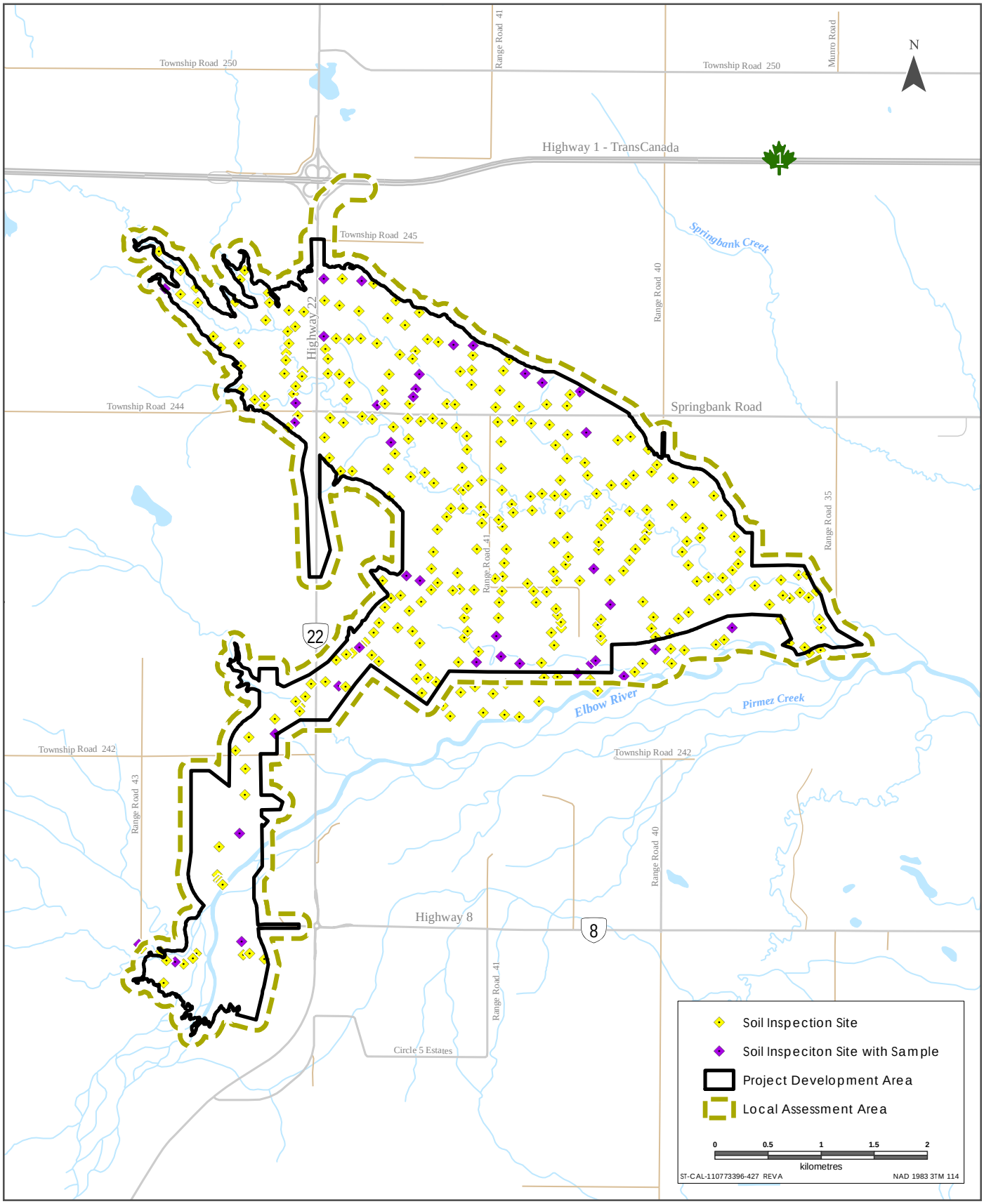
3.1.1.1 Historical Data

A desktop assessment of existing data sources and literature to compile existing soils information for both the LAA and RAA included Agricultural Regions of Alberta Soil Inventory Database ([AGRASID] 2001) online viewer and the Soil Survey of the Calgary urban perimeter report (MacMillan 1987). Applicable information from these sources is summarized below and discussed further in the results section for the RAA.

The surficial geology as described in the Soil Survey of the Calgary urban perimeter report described the till commonly found in the LAA as a mixed till that had been deposited by a glacier that advanced out of the Athabasca and other major valleys north of Calgary and was deflected southeast upon encountering the margin of the Laurentide glacier (MacMillan 1987). The glaciolacustrine sediment mapped in the area is fine-textured, associated with deeper, quiet water environments. It was deposited mainly in proglacial lakes that formed where meltwater was trapped between the margins of retreating glaciers and the regional slope (MacMillan 1987).

Proportionally smaller areas of the LAA are mapped as glaciofluvial or fluvial parent materials (gravel, sandy gravel, sand and sandy loam), commonly deposited by the Elbow river and in some of the larger streams. The gravel in these deposits is generally well rounded and well sorted and is associated with the level to gently sloping topography of valley floors and terraces (MacMillan 1987). In areas of the LAA where meltwater channels emptied into glacial lakes, ice-contact gravel deposits grade into deltaic deposits. The gravel in these deltas is better sorted and less angular than the ice-contact gravel, and forms deeper, more continuous deposits. The deltas have gently sloping surfaces, but may have moderately to steeply sloping sides (MacMillan 1987).

Relatively minor amounts of organic material is mapped in wet, low-lying areas where the unconsolidated peat accumulation is greater than 40 cm thick (MacMillan 1987). The rapid growth and slow decay of fen type vegetation in these locations has resulted in the buildup of moderately peaty material.



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Soil Inspection and Sampling Sites in the LAA

Stantec

A total of 11 distinct AGRASID soil map units occur in the LAA (Table 3-1). Within each map unit there are up to 3 soil series, each with a defined proportion designated by a percentile. There are 12 soil series occurring within the AGRASID map units. Table 3-2 contains key information used to describe each soil series. The most common soil series mapped within the LAA is Fish Creek, followed by Dunvargan, Miscellaneous Gleysols and Miscellaneous Coarse – ZBL. The most common soil subgroup is a well-drained Orthic Black Chernozem. Textures vary from coarse to fine, depending on parent material.

Table 3-1 AGRASID Map Units in the LAA

Map Unit Label	Series 1	Percentile 1	Series 2	Percentile 2	Series 3	Percentile 3
DRSR1	DRW	5	SRC	5	-	0
DVFS1	DVG	5	FSH	5	-	0
DVFS1	DVG	5	FSH	5	-	0
DVG1	DVG	8	BVA	2	-	0
DVG4	DVG	6	ZERzbl	2	BVA	2
FSH1	FSH	8	FSHxt	2	-	0
FSH1	FSH	10	-	0	-	0
FSH2	FSH	8	ZGW	2	-	0
FSH6	FSH	8	DVG	2	-	0
POT6	POT	6	CRW	2	FSH	2
ZCOzbl8	ZCOzbl	6	ZUN	2	ZGW	2

Table 3-2 AGRASID Key Characteristics of the Soil Series in the LAA

Series Code	Series Name	Soil Order	Subgroup	Parent Material	PM Texture	Drainage
BVA	Beauvais	Chernozemic	O.DGC	Till	MF	Well
CRW	Carway	Chernozemic	O.BLC	Glaciofluvial	MC	Well
DRW	Drywood	Chernozemic	O.BLC	Glaciofluvial/Glaciofluvial	ME/VGVC	Well
DVG	Dunvargan	Chernozemic	O.BLC	Till	MF	Well
FSH	Fish Creek	Chernozemic	O.BLC	Glaciolacustrine	FI	Well
FSHxt	Fish Creek	Chernozemic	O.BLC	Glaciolacustrine/Till	FI/FI	Well
POT	Pothole Creek	Gleysolic	O.HG	Glaciolacustrine	FI	Poor
SRC	Sarcee	Chernozemic	O.BLC	Fluvial	ME	Well
ZCOzbl	Miscellaneous Coarse Soils - ZBL	Chernozemic	O.BLC	Undifferentiated	CO	Well
ZERzbl	Miscellaneous Eroded Soils - ZBL	Chernozemic	R.BLC	Undifferentiated	NA	Well
ZGW	Miscellaneous Gleysol	Gleysolic	O.HG	Undifferentiated	NA	Poor
ZUN	Miscellaneous Undifferentiated Mineral Soils	Regosolic	O.R	Undifferentiated	NA	Well

NOTES:

O.DGC – Orthic Dark Gray Chernozem; O.BLC - Orthic Black Chernozem; O.HG – Orthic Humic Gleysol; R.BLC – Rego Black Chernozem; O.R - Orthic Regosol

zbl – Black Soil Zone

MF – moderately fine; MC – moderately coarse; ME – medium; VGVC – very gravelly, very coarse; FI – fine; CO – coarse; NA – not applicable

3.1.2 Field Surveys

Detailed soil profile information was collected to meet requirements defined by *The Canadian Soil Information System (CanSIS) Manual for Describing Soils in the field* (Expert Committee on Soil Survey 1983).

The soil survey documented soil quality, quantity and the profiles of soils within the LAA (Section 5.4). Soil profiles were inspected to a depth of approximately 1.0 m below ground surface for mineral soils and 1-2.0 m below ground for organic soils, depending on the thickness of the organic layer. Soil inspection sites were selected based on a goal of achieving a Survey Intensity Level (SIL) 2 inspection density. Pre-mapping was done using LiDAR imagery and field inspection sites were selected to ground truth polygon boundaries. Adjustments to sites selected by image analysis were made in the field as necessary. GPS coordinates were recorded for each soil inspection location. Soil data were collected according to standards specified by the Canadian System of Soil Classification (SCWG 1998).

Landform information collected at each soil inspection site included:

- slope class, length and gradient
- aspect
- surface expression
- parent geological and surficial material
- site drainage
- depth to water table, where observed
- depth to seepage, where observed
- contrast between topsoil and subsoil
- land use

Information collected for each mineral soil horizon included:

- depth
- texture
- structure
- consistency
- color
- coarse fragment content
- presence of mottles and/or gleying
- presence of carbonates and/or salts

Information collected for each organic soil horizon included decomposition class of the organic horizon according to the Von Post Scale of Decomposition (SCWG 1998)

A total of 360 soil inspection sites were completed in the LAA between July 13 and September 28, 2016 (Table 3-3, Figure 3-1). The data collection equates to a SIL of 2 for the number of soil inspections, with one inspection site per 5.25 ha. An average of 41% of polygons in the LAA have at least one soil inspection site (not including disturbed site portions). The goal of having at least one soil inspection site in approximately 90% of the polygons was not met due to no enforced minimum polygon size (to characterize all wetlands in the LAA) as well as splitting polygons for reasons such as land use and slope class, which affects ratings for wind and water erosion and compaction and rutting but not, necessarily, the soil type. Of the 282 soil polygons without soil inspections, 196, or 69.5% are less than 1 ha in size.

Table 3-3 Soil Inspection Sites Completed in the LAA

ID	Number of Inspections	Number of Polygons[1]	Number of Polygons represented with at least one point (%)[2]	Total Area (ha)[3]	Survey Intensity Level (ha/number of inspections)
LAA	360	461	SIL 4 (40.5)	1,886.48	SIL 2 (1 inspection per 5.25 ha)

NOTES:
[1] Number of polygons includes disturbed site portions
[2] Number of polygons represented with at least one point does not include disturbed site portions
[3] Total area includes disturbed site portions.

Soil series site data and soils horizon profile information for soil inspection sites are provided (see Section 5.4).

3.1.3 Laboratory analyses

Representative profiles were sampled from major soil series, by horizon, to characterize the physical and chemical characteristics of soil series in the LAA. A total of 49 soil samples from eighteen soil profiles representing eight major soil series were submitted for laboratory analysis. Samples were placed in laboratory supplied bags, labelled and delivered to accredited laboratory facilities. Analyses were performed using standard methods, as outlined by McKeague (1978) and Carter (2008).

Selected horizons were analyzed for one or more of the following soil properties:

- pH and electrical conductivity (saturated paste)
- soluble cations (calcium, magnesium, sodium and potassium) and anions (sulphate, chloride)
- saturation percentage and sodium adsorption ratio (SAR)

- cation exchange capacity and base saturation of upper horizons
- exchangeable calcium, magnesium, sodium, potassium
- calcium carbonate equivalent
- total organic carbon
- particle size analysis

Previously published sources of chemical data were used when analytical results were not available from samples collected. Analytical methods and quality assurance reports are provided in Section 5.4. Laboratory results are presented in Attachment C and discussed in the Results (Section 3.2).

3.1.4 Mapping

The RAA soil mapping was completed using desktop information only, and the LAA soil mapping was completed using field data collected in 2016.

3.1.4.1 Regional Assessment Area Soil Mapping

The majority of the RAA had previously been mapped by MacMillan (1987) as part of the soils survey of the Calgary urban perimeter at a scale of 1:50,000. This mapping covered approximately 62% of the RAA, specifically the north and east portions. AGRASID data were available for the remaining 38% of the RAA. The seams between the two data sets were clean, and the AGRASID data references the MacMillan report in describing soil map units for the area. RAA mapping is presented at a scale of 1:50,000.

3.1.4.2 Local Assessment Area Soil Mapping

Polygon boundaries were drawn using LiDAR and high definition imagery combined with interpretations of soil inspection site data acquired during the 2016 field program. The point data were used by interpreters to aid in classification of parent materials, vegetation patterns, and elevation data that all contribute to the final assessment and designation of soil attributes and soil series to map units.

In the closed legend mapping approach employed, each map unit assigned to a soil polygon corresponds to either a single dominant soil series or indicates co-dominance between two soil series (Mapping System Working Group 1981). If a single soil series is dominant, the three letter code for that series is used to represent the unit (Table 3-4). If two soil series share the dominance of the unit then the first two letters of each series code are combined. For example, Dunvargan soils as the single dominant series would be DVG, Fish Creek soils as the single dominant series would be FSH. A combination of Dunvargan and Fish Creek soils in the same polygon would be DVFS. The proportions of the one or two dominant soil series are assigned to the polygon and

whether individual or shared must comprise 50% or greater of the total map unit area. Although some units are assigned only one named series, most are compound units of between two to three soil series. The additional soil series present in these map units are represented numerically as significant soils. The number following the dominant or co-dominant map unit abbreviation further describes these compound units; these numbers are defined in Table 3-5. For example, a map unit including co-dominant Dunvargan and Fish Creek soils with significant inclusions of imperfectly drained soil would be labelled as DVFS2, where 2 represents significant imperfectly drained soils.

Soils were mapped at a scale of 1:50,000 and information on the map units and soil series are presented throughout the results section. At this scale of mapping, the minimum size of delineations is usually one hectare except for highly contrasting situations such as wetlands and water bodies. The soil maps present the following information:

- soil polygons displaying extent of each soil map unit and polygon slope classes
- topsoil, organic material, and subsoil thicknesses
- color coded maps to visually represent risk of wind and water erosion, compaction and rutting
- color coded maps to display agricultural land capability and reclamation suitability ratings

Any residences or roadways are mapped as disturbed.

Individual soil series are listed, along with their subgroup classification, parent material, texture and drainage. These soil series are defined more precisely in Section 5.4.

Soil survey sites were inspected by experienced soil scientists familiar with soils in the region to ensure the collection of accurate field data. Information collected at each soil survey site was reviewed by a senior soil scientist to confirm parent material, soil texture, landscape position, drainage, and soil classification were concordant. Draft soil map polygon delineation and attribution were reviewed by a senior soil scientist.

Table 3-4 Soil Series in the LAA

Soil Series	3 letter Code	Subgroups	Textural Group	Parent Material
Dunvargan	DVG, DVGca	Orthic Black Chernozem, Calcareous Black Chernozem	Fine	Till
Fish Creek	FSH, FSHca, FSHgl	Orthic Black Chernozem, Calcareous Black Chernozem, Gleyed Black Chernozem	Fine to Very Fine	Glaciolacustrine
Mesa Butte	MSB	Rego Black Chernozem	Moderately Coarse	Residuum
Pothole Creek	POT	Orthic Humic Gleysol	Fine to Very Fine	Glaciolacustrine or Till
Sarcee	SRCca, SRCxg	Calcareous Black Chernozem	Very Coarse	Fluvial or Glaciofluvial
Twin Bridges	TBR, TBRgl, TBRgr	Orthic Regosol	Moderately Coarse to Very Coarse	Fluvial or Glaciofluvial
Gleysol - Coarse	ZGC	Orthic Humic Gleysol, Rego Humic Gleysol	Moderately Coarse to Very Coarse	Organic over Fluvial

Table 3-5 Soil Map Unit Numbers and Description

Map Unit Numerical Modifiers	Soil Map Unit Description
1	pure unit
2	significant imperfectly-drained soils
4	significant gravel inclusions
6	significant till or glaciolacustrine erosional remnants
7	significant inclusions of variably textured fluvial

3.1.5 Data Analyses

Data collected during the field program are used to refine:

- estimates of topographic diversity and topsoil and subsoil thickness
- wind and water erosion risk ratings
- compaction and rutting risk ratings
- agricultural land capability ratings
- reclamation suitability ratings

3.1.5.1 Topography

Slope classes (Table 3-6) were assigned to each soil map unit for assigning agricultural capability and predicting the potential for water erosion and rutting. Slope classes are assigned based on the class limits used in the Canadian System of Soil Classification (SCWG 1998).

Table 3-6 Slope Classes

Slope Class	Percent Slope
1	0-0.5
2	>0.5-2
3	>2-5
4	>5-9
5	>9-15
6	>15-30
7	>30-45
8	>45-70
9	>70-100

3.1.5.2 Topsoil and Subsoil Thickness

Topsoil and subsoil thickness were measured for each surveyed soil site to establish a range of thickness for each soil map unit. Topsoil and subsoil were defined as follows:

- topsoil includes all organic horizons (LFH, Om, Oh, Of) and mineral topsoil horizons (e.g., Ah, Ap, Ae).
- Subsoil includes all mineral B horizons (e.g., Bm, Bt, Bnt) and transitional zones between the A and B, or A and C horizons (e.g., AB or AC horizons).

Data collected from all 360 soil inspection points contributed to the calculation of topsoil and subsoil thicknesses for each soil map unit. Topsoil and subsoil values from soil survey locations were used to spatially interpolate raster surfaces representing topsoil and subsoil depths.

Statistics were then run on the rasters and applied to the soil mapping. The average raster value within each polygon was retrained as an approximate value of topsoil and subsoil depth.

3.1.5.3 Wind Erosion

Wind erosion risk classes were determined for each soil series using the methods of Coote and Pettapiece (1989). The following formulas were evaluated to calculate the risk of wind erosion:

$$V_2 = 0.777\ V_h\ /\ (0.233 + 0.656\ log(H + 4.75))$$

Where:

V_2 = *wind velocity at 2 m above the ground (km/hr)*

V_h – *wind velocity at anemometer height (km/hr)*

H = *height of anemometer above the ground (m)*

$$V_* = (27.78\ V_2)\ /\ (5.75\ log\ (2\ /\ k))$$

Where:

V_* = *drag velocity of wind at the soil surface (cm/s)*

V_2 = *wind velocity (km/hr) at 2 m above the ground*

k = *height at which velocity is effectively zero (assumed to be 0.00025 m)*

$$E = KC\ (V_*^2 - \gamma W^2)^{1.5}$$

Where:

E = maximum instantaneous soil movement by wind (dimensionless)

K = surface roughness and aggregation factor (dimensionless)

C = factor representing soil resistance to movement by wind (dimensionless)

V_* = drag velocity of wind at the soil surface (cm/s)

γ = soil moisture shear resistance (dimensionless)

W = available moisture of the surface soil (m^3 water m^{-3} soil)

Wind speed data to calculate the V_* factor, specifically V_h, were obtained from Environment Canada (Environment Canada 2014). Available surface moisture was estimated for each soil texture class based on data collected from the field survey. Remaining variables were either calculated by using the above formulas or by using constants provided by Coote and Pettapiece (1989).

The rating system is based on a land surface that is bare and unprotected (no vegetation or litter cover) with a non-crusted surface. The classification of wind erosion risk consists of five classes based on E, the value of the maximum instantaneous soil movement by wind (see Table 3-7). The wind erosion risk was estimated for each soil map unit by using the area-weighted E value for each soil series that made up each soil unit.

Table 3-7 Value of the Maximum Instantaneous Soil Movement by Wind and Associated Wind Erosion Rating

Wind Erosion Rating	E –Value of the Maximum Instantaneous Soil Movement by Wind
Negligible	<100
Low	100-249.9
Moderate	250-399.9
High	400-699.9
Severe	>700
SOURCE: Coote and Pettapiece (1989)	

3.1.5.4 Water Erosion

A representative water erosion risk class was determined for each soil series using the revised universal soil loss equation for application in Canada (RUSLEFAC) method (Wall et al. 2002). The RUSLEFAC was developed to predict average soil loss by water erosion by considering rainfall, soil and landscape characteristics and management practices. The revised universal soil loss equation is:

$$A = R * K * LS * C * P$$

The following water erosion risk factors are considered in this method:

A = Potential, long-term average annual soil loss (tonnes ha^{-1} yr^{-1})

R = Rainfall and Runoff Factor - a measure of the total annual erosive rainfall for a specific location, and the distribution of erosive rainfall throughout the year (MJ mm ha^{-1} h^{-1})

K = Erodibility Factor - a quantitative measure of the soil's inherent susceptibility to erosion and the soil's influence on runoff amount and rate (t h MJ^{-1} mm^{-1})

LS = Topographic Factor - accounts for the slope angle and length on erosion (dimensionless)

C = Crop / Vegetation and Management Factor - used to determine the effectiveness of soil and crop management systems in terms of preventing or reducing erosion (dimensionless)

P = Support Practice Factor - accounts for the erosion control effectiveness of support practices, and supports the C factor (dimensionless)

R factors were derived from the isoerodent map for Western Canada

K factors are provided in the RUSLEFAC manual based on a combination of soil texture and organic matter content.

LS is determined based on the slope steepness, slope length, and the type of site. Slope steepness and slope length were both determined based on field data and mapping. Table LS-3 was used to derive the LS factor from the RUSLEFAC manual for each soil polygon, as it is intended for highly disturbed sites such as freshly prepared construction sites.

C and P factors were only applied for map units where land use indicated that the ground surface was being actively managed (crop, hayland, pasture).

The RUSLEFAC system has five classes of water erosion risk. For the classes, categories and associated potential soil losses see Table 3-8. The water erosion risk for each soil map unit was determined by using the area-weighted average of potential soil loss (A) of each soil series to determine the risk rating for each soil map unit.

Table 3-8 Water Erosion Class

Water Erosion Class	Category	Potential Loss (t/ha/y)
1	Very Low	<6
2	Low	6 to 11
3	Moderate	11 to 22
4	High	22 to 33
5	Severe	> 33
SOURCE: Wall et al. (2002)		

3.1.5.5 Compaction

A generalized rating system for compaction risk was developed using professional judgment and review of two compaction systems that had been designed for forestry applications; specifically, the soil compaction and puddling hazard key (British Columbia Ministry of Forests 1999) and the table of compaction and rutting hazard for soils in Ontario (Archibald et al. 1997). The generalized rating system developed for compaction risk (see Table 3-9) takes into consideration texture and drainage regime.

Susceptibility to soil compaction is dependent on soil physical properties, the moisture content during the disturbance and the nature of the applied force (Cannon and Landsburg 1990). Generally, compatibility increases with higher clay content, higher soil moisture content and lower organic matter content (Cannon and Landsburg 1990).

Compaction risk ratings are based on results from laboratory texture analysis and drainage is based on field observation. Using these two criteria, each soil series was assigned a compaction risk rating.

Average compaction ratings for map units cannot be calculated because the variables used to estimate compaction are not numeric. Compaction ratings can be assigned to each soil series comprising a map unit and these ratings can be aggregated and represented as complexes, resulting in one or more compaction ratings proportional to the occurrence of a given soil series within a map unit.

Table 3-9 Compaction Risk Matrix

Drainage	Textural Class					
	Very Coarse (S, LS, LFS)	**Moderately Coarse (SL, FSL)**	**Medium (VFSL, L, Sill)**	**Moderately Fine (SCL, CL, Sic, Si)**	**Fine/Very Fine (SC, Sic, C, HC)**	**Organic**
Rapid	Low	Low	-	-	-	
Well	Low	Low	Low	Moderate	Moderate	
Imperfect	Low	Low	Moderate	High	High	
Poor	Moderate	Moderate	High	High	High	
Very Poor						High

NOTES:
S=sand, LS = loamy sand, LFS = loamy fine sand, SL = sandy loamy, FSL = fine sandy loam, VFSL = very fine sandy loam, L = loam, Sill = silt loam, SCL = sandy clay loam, CL = clay loam, Sic = silty clay loam, Si = silt, SC = sandy clay, Sic = silty clay, C = clay, HC = heavy clay

3.1.5.6 Rutting

Several factors affect a soil's susceptibility to rutting, including moisture content at the time of the load, soil texture and landscape position (Alberta Forest Products Association/Land and Forest Service (AFPA/LFS) 1996). According to AFPA/LFS (1996), the most important factor is soil moisture content because dry soils, regardless of texture, will retain their strength. However, as a soil's moisture content increases, so does its susceptibility to rutting. Once saturation is reached, a soil is more prone to rutting than compaction because all the pore space is filled with water. Finer-textured soils, such as clays and silts, are more plastic than coarser-textured soils and are at a greater risk of rutting. The soil's landscape position will play a role in its moisture content by influencing drainage and runoff. Soil texture, water content and landscape position are taken into consideration to estimate the risk of rutting (see Table 3-10).

Rutting risk ratings are based on results from laboratory texture analysis, soil classification and a representative slope class for the soil series. As with compaction, an average rutting rating cannot be calculated for each map unit. Instead, a percentage of each area of the map unit is given its own rating based on the soil series within it. Each map unit can have a combination of low, moderate and high compaction ratings each of which can cover between 0% and 100% of the map unit area.

Table 3-10 Rating System for Rutting Risk

Factor	Characteristic	Rating
Soil	Sand, Loamy Sand, Sandy Loam	1
	All other textures	2
	Organic	3
Soil Water Content	Bruni sols, Podzols, coarse-textured Retools	1
	Chernozems, Lucidols, loamy to fine-textured Retools	2
	Glycols, Organic	3
Landscape	Slope classes 3-5	1
	Slope classes 2-3	1.5
	Slope classes 1-2	2
	Slope class ±6	3
Final Rating (multiplying Soil, Water Content and Landscape ratings together)		
Low		1–4
Moderate		5–11
High		12–27
SOURCE: Modified from AFPA/LFS (1996)		

3.1.5.7 Agricultural Land Capability

Agricultural land capability indices were determined for each identified soil map unit according to the Land Suitability Rating System for Agricultural Crops (Agriculture and Agri-Food Canada 1995). Land capability classes in the LAA were determined using chemical and physical parameters that are representative of the soil map units. Each soil series is assigned an agricultural land capability class based on data collected during the field program using the representative profiles listed in Table 3-11. Locations of these sampling sites are illustrated on Figure 3-1.

The map units are rated by assigning an agricultural land capability rating according to the proportion of each unit within a given soil series. Up to three agricultural land capability classes are assigned to soil map units.

The seven agricultural land capability classes and subclasses are described in Tables 3-12 and 3-13, respectively.

Table 3-11 Soil Series and Sampling Site IDs in the LAA

Soil Series (Series and Phase Name)	Soil Series Code and Phase Modifier	2016 Site Sampling IDs of Representative Profiles
Denarian	DVG	SRBL16019
Calcareous Denarian	Dogcart	SRKF16080
Fish Creek	FSH	SRWC16022
Calcareous Fish Creek	Fishcam	SRWC16080
Gleied Fish Creek	Shel	SRKF16002
Mesa Butte	MSB	SRKF16097
Pothole Creek	POT	SRWC16097
Calcareous Sarcee	Sircar	SRBL16003
Gravelly Sarcee	Sircar	SRWC16003
Twin Bridges	TBR	SRKF16140
Gleied Twin Bridges	Trig	SRBL16027
Twin Bridges over gravel	Trig	SRWC16007
Gleisoil – Coarse	ZGC	SRKF16098
Reclaimed	ZREC	SRWC16020

Table 3-12 Land Capability Classes for Agricultural Production

Land Class	Index Points	Land Capability
1	80-100	Land has no significant limitations for production of the specified crops.
2	60-79	Land has slight limitations that may restrict the growth of the specified crops or require modified management practices.
3	45-59	Land has moderate limitations that restrict the growth of the specified crops or require special management practices
4	30-44	Land has severe limitations that restrict the growth of the specified crops or require special management practices or both. This class is marginal for sustained production of the specified crops.
5	20-29	Land has very severe limitations for sustained production of the specified crops. Annual cultivation using common cropping practices is not recommended.
6	10-19	Land has extremely severe limitations for sustained production of the specified crops. Annual cultivation is not recommended even on an occasional basis.
7	0-9	Land is not suitable to produce the specified crops.
SOURCE: Agriculture and Agri-Food Canada 1995		

Table 3-13 Land Capability Subclasses for Agricultural Production

Category	Subclasses
Climate(C)	Temperature(H); Moisture(A)
Soils(S)	Water Holding Capacity and Texture(M); Soil Structure(D); Organic Matter(F); Depth of Topsoil(E); Soil Reaction(V); Salinity(N); Sodality(Y); Organic Surface(O); Drainage(W); Organic Soil Temperature(Z); Rock(R); Degree of Decomposition or Fiber Content(B); Depth and Substrate(G)
Landscape(L)	Slope(T); Landscape Pattern(K); Stoniness and Coarse Fragments(P)

3.1.5.8 Reclamation Suitability

Reclamation suitability ratings were determined for the first (topsoil) and second lifts (upper subsoil) only of each undisturbed mineral soil map unit using *Soil Quality Criteria Relative to Disturbance and Reclamation* (AAFRD 1987) and the associated physical and chemical data for profiles representative of the series (Table 3-11). Because these criteria were designed for mineral soils, suitability ratings for organic soils were not developed. Suitability ratings range from unsuitable to good (see Table 3-14). The first lift (topsoil) was rated based on the characteristics of the uppermost (A) mineral horizon(s) and the second lift (upper subsoil) was rated based on the first subsoil horizon(s) occurring below the A horizon(s). The second lift is usually comprised of

B horizon(s) for Orphic profiles and C horizon(s) for Regiolect profiles. Transitional horizons (AB and AC) were rated as subsoil.

For soils with a thick peaty or organic horizon above a mineral horizon, the mineral horizon is used to rate both the first and second lift. Reclamation suitability for lower subsoil is not provided because reclamation planning only involved two lifts. The map unit ratings are based on the soil series ratings in the assigned proportions. The resulting map units have a range of reclamation suit abilities that are proportional to the amount of each series in that map unit.

Table 3-14 Reclamation Suitability Classification

Reclamation Suitability Class	Limitations
Good	None to slight soil limitations that affect use for plant growth
Fair	Moderate soil limitations that affect use but can be overcome by proper planning and good management
Poor	Severe soil limitations that make use questionable; careful planning and very good management are required
Unsuitable	Chemical or physical soil properties are so severe that reclamation is not possible of economically feasible
SOURCE: AAFRD 1987	

3.1.6 Quality Control (QC)

The purpose of the QC program was to assess the reliability of the data provided for the assessment. Samples were collected in laboratory supplied bags following sampling procedures. Samples were labeled and control was maintained through use of chain of custody forms. Samples collected were submitted to a laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Duplicate soil samples were collected in the field for internal QC checks of the laboratory analysis. Laboratory duplicate results were supplied from Maxxam Analytics.

All soil profile and landform information collected at each soil inspection site and the soil series name assigned were reviewed and approved by a senior soil scientist. All polygon lines and soil map unit names assigned on the soil maps were also reviewed by a senior soil scientist.

3.2 SOILS RESULTS

3.2.1 Soil Map Units in the LAA

Data collected during the 2016 field study program identified 86 soil series or series phases (soil taxa). These soil taxa form the basis for assigning attributes to mapped soil units in the LAA. These taxa were combined, based on their proportional occurrence within map units as determined by interpretation of imagery and plot information. As a result, 21 aggregate soil map units are used to best represent the soil landscapes of the LAA. To account for topographic variation within soil map units, each unit has one or more slope phases. When combined with the map units representing soil landscapes, a total of 54 map units are used to label map units. In addition to soil map units, ZDL was assigned to disturbed portions of the LAA including roadways and residences. The delineation of disturbed areas was completed by interpretation of air photo imagery.

For completed soil inspection sites on the LAA, see Figure 3-1. For soil map units in the LAA, see Figure 3-2. For a summary of the dominant soil orders and surficial geology, see Tables 3-15 and 3-16, respectively. For the area of individual map units, see Table 3-17.

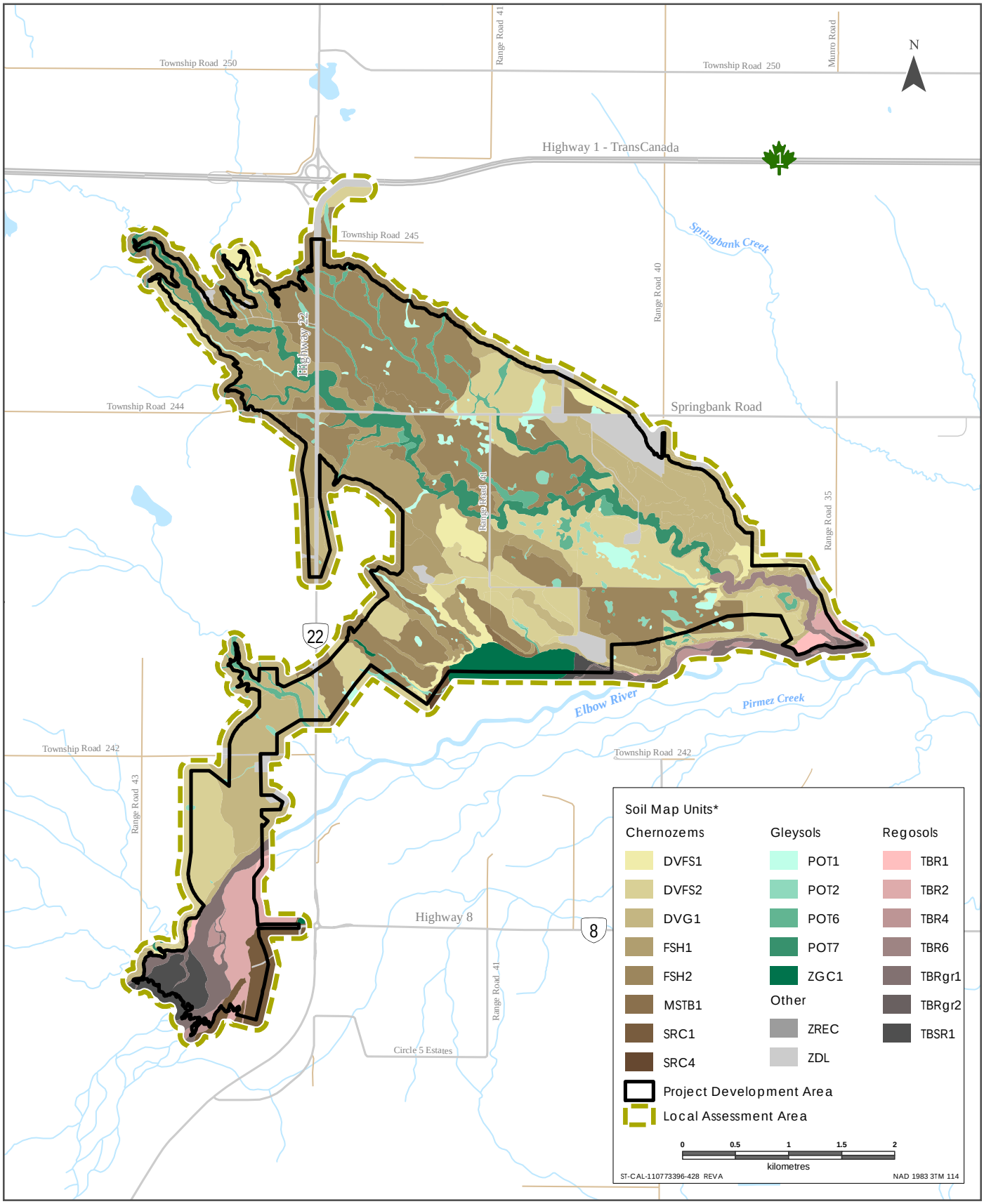
3.2.2 Dominant Soil Orders in the LAA

Soil map units were assigned a dominant soil order (e.g., Chernozemic, Gleysolic) based on the soil dominant soil series. This dominant or co-dominant soil series is always the highest proportioned soil within a soil map unit and can be used to best represent conditions within a map unit. For map presentation, the soil map units have been organized by dominant or best representative soil order.

The dominant soil orders in the LAA are as follows:

- Chernozemic soils comprise 74 percent of the LAA.
- Gleysolic soils comprise 11percent of the LAA.
- Regosolic soils comprise 10 percent of the LAA.
- disturbed and reclaimed soils (other) comprise 5 percent of the LAA.

The dominant soil orders of the LAA are summarized in Table 3-15 and on Figure 3-2.



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Soil Map Units in the LAA

Stantec

Table 3-15 Soil Orders in the LAA

Soil Order	Map Units (Dominant Order)	Area of LAA (ha)	% in LAA
Chernozem	DVFS1, DVFS2, DVG1, FSH1, FSH2, SRC1, SRC4, MSTB1	1,395.7	74.0
Gleysol	POT1, POT2, POT6, POT7, ZGC1	210.3	11.2
Regosol	TBR1, TBR2, TBR4, TBR6, TBSR1, TBRgr1, TBRgr2	182.3	9.7
Other	ZDL, ZREC	98.2	5.2
Total		1,886.5	100.0
NOTES: Areas and proportions might not add up to totals because of rounding			

3.2.3 Surficial Geology and Geomorphology Characteristics in the LAA

Surficial geology and geomorphology trends in the LAA are as follows:

- Fine to very fine-textured till and glaciolacustrine deposits are the most extensive, covering 1,448 ha, or 77% of the LAA (Table 3-16). Soil map units included in this category include DVG (Dunvargan) 1, FSH (Fish Creek) 1, FSH2, POT (Pothole Creek) 1, POT2, POT6, DVFS (Dunvargan-Fish Creek) 1 and DVFS2 (Table 3-16).
- Moderately coarse to very coarse-textured fluvial and glaciofluvial deposits are also extensive, covering 172 ha, or 9.1%, of the LAA (Table 3-16). Soil map units included in this category include TBR (Twin Bridge) 1, TBRgr (Twin Bridges Gravelly) 1, TBRgr2 and ZGC (Gleysol, coarse textured) 1 (Table 3-16).
- Medium-textured fluvial deposits occupy 38 ha, or 2%, of the LAA (Table 3-16). The SRC (Sarcee) 1 and SRC4 soil map units best represents these soils.
- Undifferentiated units or transitional area soil map units occupy 130 ha, or 7%, of the LAA (Table 3-16). These units can be further broken down into:
  - Fine to very fine-textured till and glaciolacustrine with variably textured fluvial parent materials being represented by POT7, which occupies 82 ha, or 4%, of the LAA.
  - Moderately coarse to very coarse-textured, sometimes gravelly fluvial and medium-textured fluvial parent materials, being represented by TBSR (Twin Bridges-Sarcee) 1, which occupies 30 ha, or 2%, of the LAA.
  - Moderately coarse to very coarse-textured fluvial parent materials, and fine to very fine-textured till and glaciolacustrine erosional remnants being represented by TBR6, which occupies 15 ha (less than 1%) of the LAA.

  - Colluvium overlying residuum (sandstone and shale) and moderately coarse to very coarse-textured parent materials, being represented by MSTB (Mesa Butte-Twin Bridges) 1, which occupies 3 ha (less than 1%) of the LAA.

- Other units, including the reclaimed soil map unit (ZREC) and disturbed soil map unit (ZDL) occupy 98 ha, or 5%, of the LAA (Table 3-16).

For detailed composition of each soil map unit see Table 3-17. For the dominant surficial geology see Figure 3-3. For individual series description, see the map unit description tables in Attachment C.

Table 3-16 Dominant Surficial Materials

Dominant Surficial Material	Area of LAA (ha)	% in LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials	1448.4	76.8
Units with medium-textured fluvial parent materials	38.1	2.0
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials	172.1	9.1
Undifferentiated units, transitional areas	129.7	6.9
Other units	98.2	5.2
Totals	1,886.5	100.0
NOTES: Areas and proportions might not add up to totals because of rounding		

Table 3-17 LAA Soil Map Unit Legend – Part One

Unit	Dominant Series One	Code	Percent	Dominant Series Two	Code	Percent	Significant Series One	Code	Percent	Significant Series Two	Code	Percent	Slope Class	Area of LAA (ha)	Percent of LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials														**1448.4**	**76.8**
DVFS1	Dunvargan	DVG	50	Fish Creek	FSH	50	-	-	-	-	-	-	3	32.2	1.7
													4	1.0	0.1
													5	17.4	0.9
													5-6	3.5	0.2
													6	1.1	0.1
DVFS2	Dunvargan	DVG	50	-	-	-	Fish Creek, calcareous	FSHca	30	Fish Creek, gleyed	FSHgl	20	2	98.3	5.2
													3	116.3	6.2
													4	89.7	4.8
DVG1	Dunvargan	DVG	70	-	-	-	Dunvargan, calcareous	DVGca	30	-	-	-	1-3	1.5	0.1
													2	10.0	0.5
													3	154.8	8.2
													4	49.3	2.6
													5	21.1	1.1
													6	11.6	0.6
													6-7	9.3	0.5
													6-8	2.6	0.1
													7	3.5	0.2
													7-8	14.1	0.7
													8	3.6	0.2
FSH1	Fish Creek	FSH	70	-	-	-	Fish Creek, calcareous	FSHca	30	-	-	-	3	120.7	6.4
													4	124.1	6.6
													5	31.9	1.7
FSH2	Fish Creek	FSH	60	-	-	-	Fish Creek, calcareous	FSHca	20	Fish Creek, gleyed	FSHgl	20	1	2.7	0.1
													2	309.2	16.4
													3	124.4	6.6
													4	0.9	<0.1
POT1	Pothole Creek	POT	100	-	-	-	-	-	-	-	-	-	1	6.6	0.4
													2	20.1	1.1
													3	3.3	0.2
POT2	Pothole Creek	POT	80	-	-	-	Fish Creek, gleyed	FSHgl	20	-	-	-	1	0.9	<0.1
													2	19.6	1.0

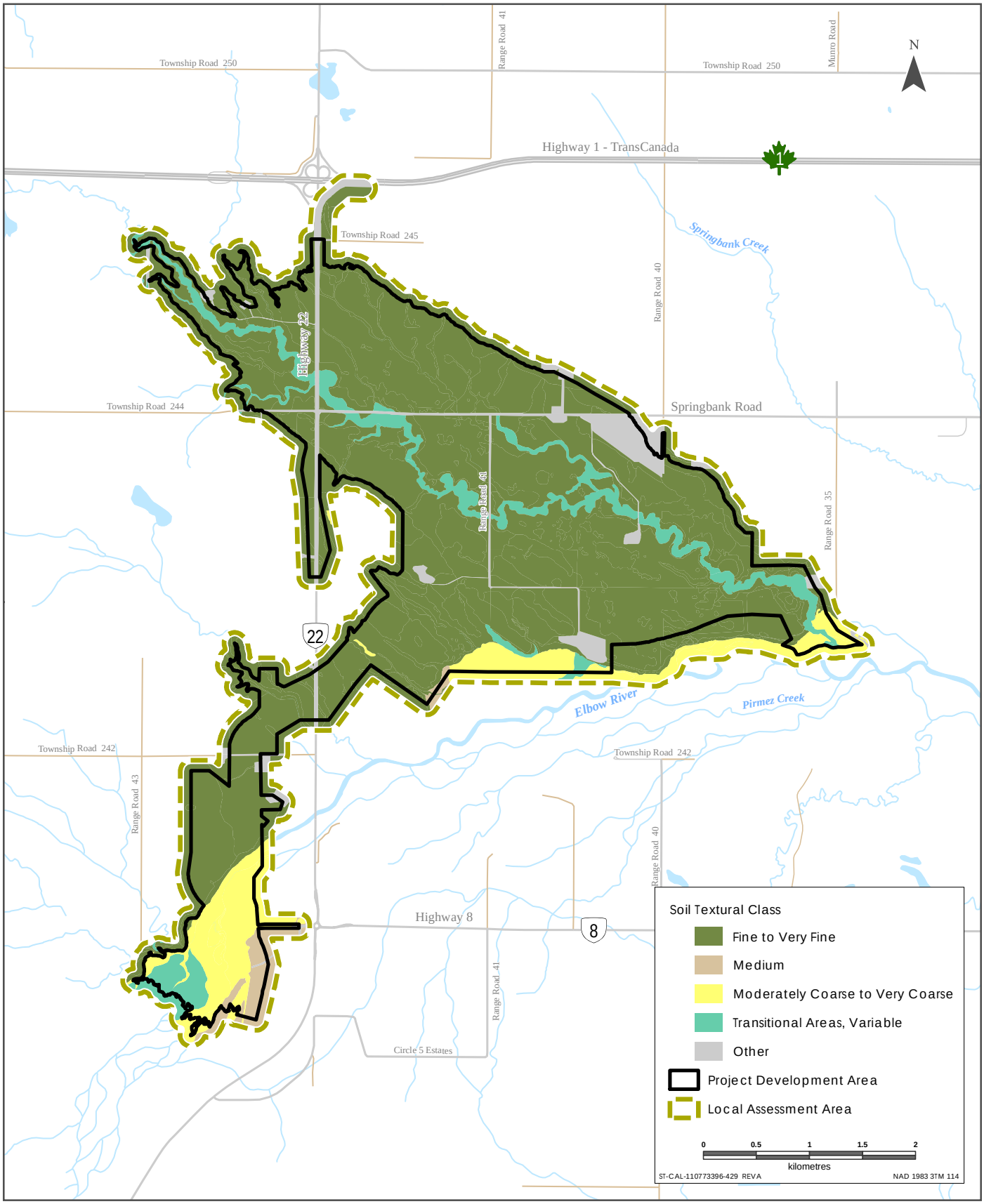
Table 3-17 LAA Soil Map Unit Legend – Part One

Unit	Dominant Series One	Code	Percent	Dominant Series Two	Code	Percent	Significant Series One	Code	Percent	Significant Series Two	Code	Percent	Slope Class	Area of LAA (ha)	Percent of LAA
POT6	Pothole Creek	POT	50	-	-	-	Fish Creek, gleyed	FSHgl	30	Fish Creek	FSH	20	2	40.8	2.2
													3	1.7	0.1
													6	0.6	<0.1
Units with medium-textured fluvial parent materials														**38.1**	**2.0**
SRC1	Sarcee, calcareous	SRCca	100	-	-	-	-	-	-	-	-	-	1	2.3	0.1
													2	33.5	1.8
SRC4	Sarcee, calcareous	SRCca	80	-	-	-	Sarcee, calcareous over gravel	SRCcaxg	20	-	-	-	1	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials														**172.1**	**9.1**
TBR1	Twin Bridges	TBR	100	-	-	-	-	-	-	-	-	-	1-6	6.2	0.3
													3	0.2	<0.1
TBR2	Twin Bridges	TBR	80	-	-	-	Twin Bridges, gleyed	TBRgl	20	-	-	-	1-5	6.9	0.4
													1-6	42.6	2.3
													3	1.3	0.1
TBR4	Twin Bridges	TBR	80	-	-	-	Twin Bridges, gravelly	TBRgr	20	-	-	-	1-6	9.4	0.5
													3	1.9	0.1
TBRgr1	Twin Bridges, gravelly	TBRgr	100	-	-	-	-	-	-	-	-	-	2	61.9	3.3
TBRgr2	Twin Bridges, gravelly	TBRgr	80	-	-	-	Gleysols, coarse textured	ZGC	20	-	-	-	1-6	6.8	0.4
ZGC1	Gleysols, coarse textured	ZGC	100	-	-	-	-	-	-	-	-	-	2	35.0	1.9
Undifferentiated units, transitional areas														**129.7**	**6.9**
POT7	Pothole Creek	POT	60	-	-	-	Gleysols, coarse textured	ZGC	20	Twin Bridges, gleyed	TBRgl	20	1-6	33.0	1.8
													2	48.6	2.6
TBR6	Twin Bridges	TBR	80	-	-	-	Dunvargan	DVG	20	-	-	-	1-6	15.1	0.8
TBSR1	Twin Bridges	TBR	50	Sarcee, calcareous	SRCca	50	-	-	-	-	-	-	1-6	26.2	1.4
													2	3.9	0.2
MSTB1	Mesa Butte	MSB	50	Twin Bridges	TBR	50	-	-	-	-	-	-	7	2.8	0.2
Other Units														98.2	**5.2**
Disturbed	Disturbed	ZDL	100	-	-	-	-	-	-	-	-	-	N/A	**97.1**	5.1
Reclaimed	Reclaimed	ZREC	100	-	-	-	-	-	-	-	-	-	3	1.1	0.1
Total														**1,886.48**	**100.0**

NOTES:
Areas and proportions might not add up to totals because of rounding

Table 3-17 LAA Soil Map Unit Legend - Part Two

Unit	Textural Classes	Genetic Materials	Drainage Regimes	Soil Classes
Units with fine to very fine-textured till and glaciolacustrine parent materials				
DVFS1	Fine to very fine-textured	Till and Glaciolacustrine	Moderately well to well	Orthic Black Chernozem, Calcareous Black Chernozem
DVFS2	Fine to very fine-textured	Till and Glaciolacustrine	Imperfect to well	Orthic Black Chernozem, Calcareous Black Chernozem, Gleyed Black Chernozem
DVG1	Fine to very fine-textured	Developed on moderately to strongly calcareous, mixed Continental and Cordilleran Till	Moderately well to well	Orthic Black Chernozem, Calcareous Black Chernozem
FSH1	Fine to very fine-textured	Developed on non-saline, moderately calcareous Glaciolacustrine	Moderately well	Orthic Black Chernozem, Calcareous Black Chernozem
FSH2	Fine to very fine-textured	Glaciolacustrine	Imperfect to moderately well	Orthic Black Chernozem, Calcareous Black Chernozem, Gleyed Black Chernozem
POT1	Fine to very fine-textured	Till and Glaciolacustrine	Poor	Orthic Humic Gleysol
POT2	Fine to very fine-textured	Till and Glaciolacustrine	Poor to imperfect	Orthic Humic Gleysol, Gleyed Black Chernozem
POT6	Fine to very fine-textured	Till and Glaciolacustrine	Poor to moderately well	Orthic Humic Gleysol, Gleyed Black Chernozem, Orthic Black Chernozem
Units with medium-textured fluvial parent materials				
SRC1	Medium-textured	Fluvial	Well	Calcareous Black Chernozem
SRC4	Medium-textured, sometimes gravelly	Fluvial	Well to rapid	Calcareous Black Chernozem, Gravelly Calcareous Black
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials				
TBR1	Moderately coarse to very coarse-textured	Fluvial and Glaciofluvial	Rapid	Orthic Regosol
TBR2	Moderately coarse to very coarse-textured	Fluvial and Glaciofluvial	Imperfect to rapid	Orthic Regosol, Gleyed Regosol
TBR4	Moderately coarse to very coarse-textured, sometimes gravelly	Fluvial and Glaciofluvial	Rapid	Orthic Regosol, Gravelly Regosol
TBRgr1	Gravelly moderately coarse to very coarse-textured	Fluvial, active channel deposits	Rapid	Gravelly Regosol
TBRgr2	Gravelly moderately coarse to very coarse-textured	Fluvial, active channel deposits	Poor to rapid	Gravelly Gleyed Regosol, Humic Gleysol
ZGC1	Coarse-textured	Fluvial	Poor	Humic Gleysols
Undifferentiated units, transitional areas				
POT7	Fine to very fine-textured, sometimes fine to coarse-textured	Till and Glaciolacustrine with variably textured fluvial parent materials	Poor to imperfect	Orthic Humic Gleysol, Gleyed Regosol
TBR6	Moderately coarse to very coarse-textured, sometimes fine to very fine-textured	Fluvial, with inclusions of Till and Glaciolacustrine erosional remnants	Well to rapid	Orthic Regosol, Black Chernozem
TBSR1	Medium to very coarse-textured, sometimes gravelly	Fluvial	Well to rapid	Orthic Regosol, Calcareous Black Chernozem
MSTB1	Fine to very coarse-textured	Colluvium overlying Residuum (sandstone and shale)	Well to rapid	Rego Black Chernozem, Orthic Regosol
Other				
ZDL	N/A	N/A	N/A	N/A
ZREC	Fine to very fine-textured	Anthropogenically disturbed soils over Till or Glaciolacustrine	Moderately well	N/A



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Soil Textural Classes in the LAA

Stantec

3.2.3.1 RAA

Data collected during the desktop assessment of the RAA identified 44 aggregate soil map units. Topographic variation was not considered for this assessment. In addition to soil map units, ZZ was assigned to open water portions of the RAA, only for the AGRASID mapped portion.

For soil map units in the RAA, see Figure 3-4. For a summary of the dominant soil orders and surficial geology, see Table 3-18 and Table 3-19, respectively. For the area of individual map units, see Table 3-20.

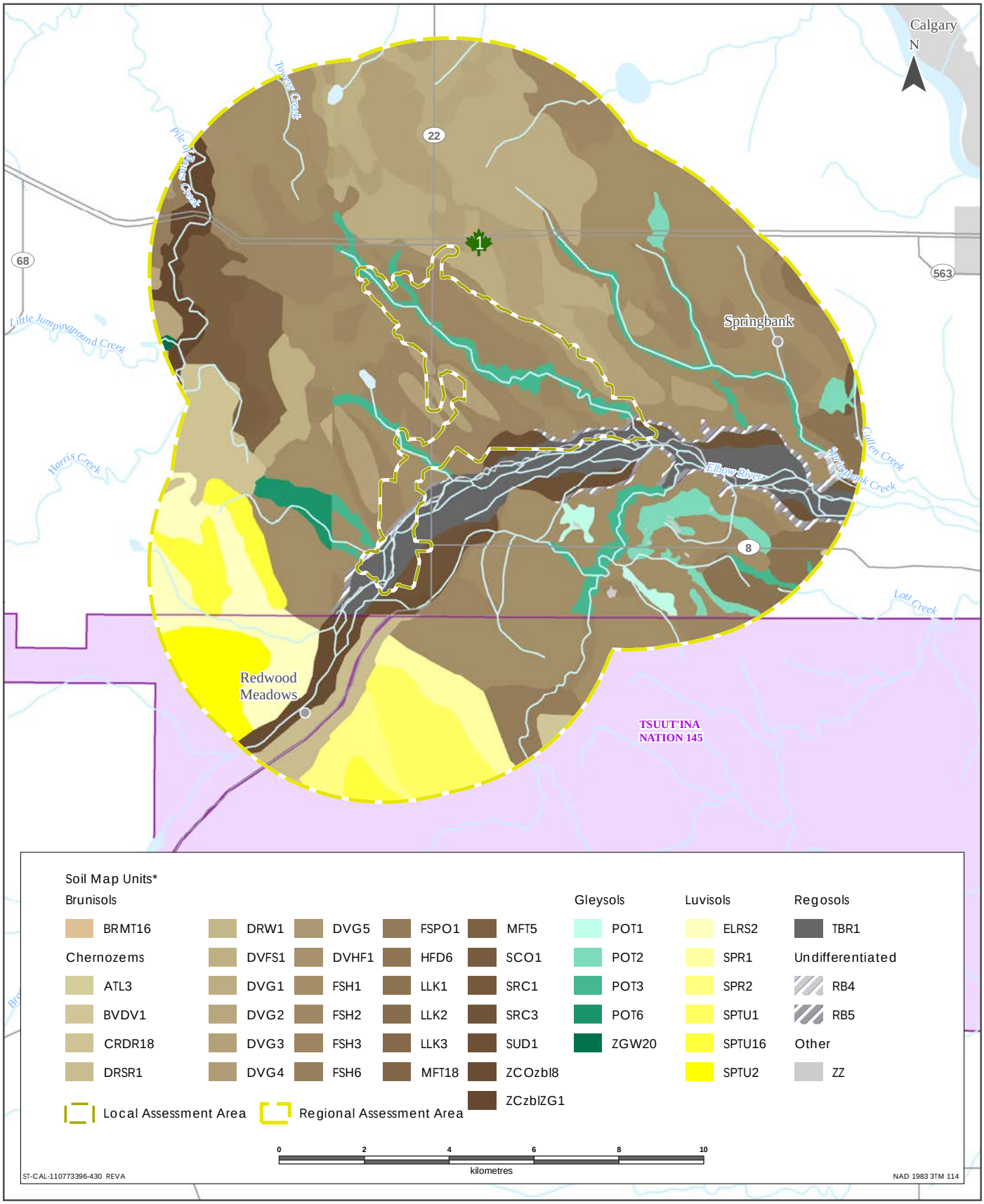
3.2.4 Dominant Soil Orders in the RAA

Soil map units were assigned a dominant soil order (e.g., Chernozemic, Gleysolic), based on the soil dominant soil series. This dominant or co-dominant soil series is always the highest proportioned soil within a soil map unit and can be used to best represent conditions within a map unit. For map presentation, the soil map units are organized by dominant or best representative soil order.

The dominant soil orders in the RAA are as follows:

- Chernozemic soils comprise 76% of the RAA.
- Luvisolic soils comprise 12% of the RAA.
- Gleysolic soils comprise 6% of the RAA.
- Regosolic soils comprise 5% of the RAA.
- undifferentiated soils comprise 1% of the RAA.
- open water (other) comprise less than 1% of the RAA.

The dominant soil orders of the RAA are summarized in Table 3-18 and on Figure 3-4.



Sources: Base Data - ESRI, Natural Earth, Government of Alberta, Government of Canada
Thematic Data - ERBC, Government of Alberta, Stantec Ltd

Soil Map Units in the RAA

Stantec

Table 3-18 Soil Orders in the RAA

Soil Order	Map Units (Dominant Order)	Area of RAA (ha)	% of RAA
Brunisol	BRMT16	2.1	<0.1
Chernozem	ATL3, BVDV1, CRDR18, DRSR1, DRW1, DVFS1, DVG1, DVG2, DVG3, DVG4, DVG5, DVHF1, FSH1, FSH2, FSH3, FSH6, FSPO1, HFD6, LLK1, LLK2, LLK3, MFT5, MFT18, SCO1, SRC1, SRC3, SUD1, ZCOzbl8, ZCzblZG1	17,126.0	76.0
Gleysol	POT1, POT2, POT3, POT6, ZGW20	1274.1	5.7
Luvisol	ELRS2, SPR1, SPR2, SPTU1, SPTU2, SPTU16	2778.1	12.3
Regosol	TBR1	1033.7	4.6
Undifferentiated	RB4, RB5	250.7	1.1
Other	ZZ	75.4	0.3
Total		22,540.2	100.0
NOTES: Areas and proportions might not add up to totals because of rounding			

3.2.5 Surficial Geology and Geomorphology Characteristics in the RAA

Surficial geology and geomorphology trends in the RAA are as follows:

- Fine to very fine-textured parent materials cover 11,720 ha, or 5 %, of the RAA. Soil map units included under this description are predominantly till and glaciolacustrine deposits of the ATL (Antler) 3, FSH (Fish Creek) 1, FSH2, FSH3, LLK (Lloyd Lake) 1, LLK2, LLK3, POT (Pothole Creek) 1, POT2, RB (Rough Broken) 4, RB5, ELRS(Elbow/Robinson) 2, and FSPO (Fish Creek/Pothole Creek) 1 soil map units (Table 3-19).
- Moderately fine to very fine parent materials are mapped over 18% of the RAA. These soil map units are predominantly till deposits of the DVG (Dunvargan) soil map unit and include the following variations: DVFS (Dunvargan-Fish Creek) 1, DVG1, DVG2, DVG3, DVG4 and DVG5 (Table 3-19). AGRASID describes Dunvargan till as being predominantly moderately fine to fine textured, while the MacMillan report describes it as being fine to very fine textured. Field data collected in 2016 identified the till in the RAA as being fine to very fine textured (Table 3-16).
- Units with moderately fine to fine-textured parent materials cover 687 ha, or 3%, of the RAA and included the soil map units MFT (Maycroft) 18 and MFT5, which were formed on glaciolacustrine deposits (Table 3-19).

- Units with moderately fine-textured parent materials in the RAA were mainly formed on gravelly or cobbly till, and comprise approximately 9% of the area. The soil map units grouped under this texture class are BVDV (Beauvais/Dunvargan) 1, SPR (Spruce Ridge) 1, SPR2 and SPTU (Spruce Ridge/Tough Creek) 1, 2 and 16 (Table 3-19).
- Medium to coarse textured parent materials in the RAA are typically describing fluvial or glaciofluvial deposits, which can contain gravels. This group comprises 7% of the RAA and includes TBR (Twin Bridges) 1, DRSR (Drywood/Sarcee) 1, DRW (Drywood) 1, HFD (Hatfield) 6 and ZCOzbl18 (Miscellaneous Coarse) (Table 3-19).
- Undifferentiated or transitional soil map units occupy 2,446 ha, or 11%, of the RAA (Table 3-19). These units can be further broken down into:
  - Fine to very fine-textured glaciolacustrine with variably textured fluvial parent materials or coarser textured inclusions occupy 4% of the RAA: FSH6, POT3 and POT6.
  - Medium or coarse textured fluvial overlying gravelly very coarse glaciofluvial parent materials occupy 2% of the RAA: SCO (Strathcona) 1, SRC3 and SUD (Sundre) 1.
  - Coarse to very coarse-textured parent materials with inclusions of finer textures occupy 2% of the RAA: BRMT (Bragg Creek/Mitford) 16, CRDR (Carway/Drywood) 18.
  - Variably textured fluvial parent materials occupy 2% of the RAA: SRC1, ZCzblZG (Miscellaneous Coarse) 1, ZGW (Miscellaneous Gleysol) 20.
  - Moderately fine-textured till parent material over medium textured softrock occupy less than 1% of the RAA: DVHF (Dunvargan/Hatfield) 1
- The unit used to represent open water (ZZ) occupies less than 1% or 75 ha, of the RAA (Table 3-19).

For detailed composition of each soil map unit see Table 3-20. For the dominant surficial texture see Figure 3-5. For individual series description see the map unit description tables in Section 5.4.

Table 3-19 Dominant Surficial Materials in the RAA

Dominant Surficial Material	Area of RAA (ha)	% of RAA
Units with fine to very fine-textured parent materials	11,720.4	52.0
Units with moderately fine to very fine-textured parent materials	4,003.5	17.8
Units with moderately fine to fine-textured parent materials	687.2	3.0
Units with moderately fine-textured parent materials	1,976.8	8.8
Units with medium to coarse-textured parent materials	1,631.0	7.2
Undifferentiated unit, transitional areas	2,445.9	10.9
Other Units	75.4	0.3
Totals	22,540.2	100.0
NOTES: Areas and proportions might not add up to totals because of rounding		

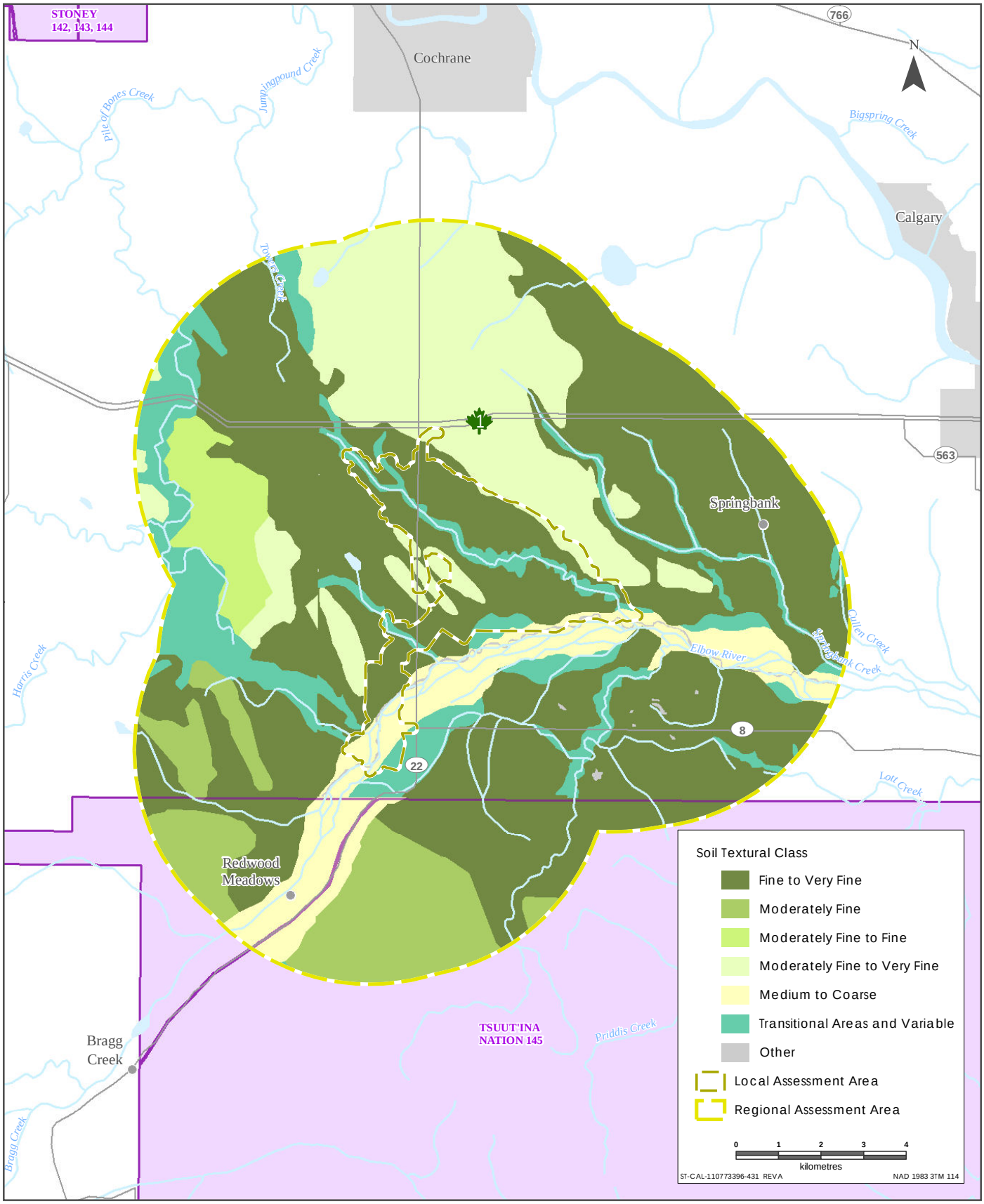
Table 3-20 RAA Soil Map Unit Legend

Map Unit Label	Soil Series	Parent Materials	Soil Classification	Area of RAA (ha)	% of RAA
Units with fine to very fine-textured parent materials				**11,720.41**	**52.0**
ATL3	Antler	Till	Black Chernozemics	2.5	<0.1
FSH1	Fish Creek	Glaciolacustrine	Black Chernozemics	4344.1	19.3
			Orthic Black Chernozems	2,112.8	9.4
FSH2	Fish Creek	Glaciolacustrine	Black Chernozemics, Humic Gleysols	1140.2	5.1
			Orthic Black Chernozems, Gleysolics	698.4	3.1
FSH3	Fish Creek	Glaciolacustrine over Till	Black Chernozemics	1,199.8	5.3
LLK1	Lloyd Lake	Glaciolacustrine	Black Chernozemics	488.3	2.2
LLK2	Lloyd Lake	Glaciolacustrine	Black Chernozemics, Solodized Solonetz, Saline Humic Gleysols	0.2	<0.1
LLK3	Lloyd Lake	Glaciolacustrine over Till	Black Chernozemics	<0.1	<0.1
POT1	Pothole Creek	Glaciolacustrine, Lacustrine	Humic Gleysols	83.5	0.4
POT2	Pothole Creek	Glaciolacustrine, Lacustrine	Humic Gleysols, Black Chernozemics	319.0	1.4
RB4	Rough Broken	Till, Alluvium	Undifferentiated	15.4	0.1
RB5	Rough Broken	Glaciolacustrine	Undifferentiated	235.4	1.0
ELRS2	Elbow/Robinson	Glaciolacustrine, till	Dark Grey Luvisols, Gleysolics	843.4	3.7
FSPO1	Fish creek/Pothole Creek	Glaciolacustrine	Orthic Black Chernozems, Orthic Humic Gleysols	237.7	1.1
Units with moderately fine to very fine-textured parent materials				**4,003.5**	**17.8**
DVFS1	Dunvargan/Fish Creek	Glaciolacustrine, Till	Black Chernozemics and Dark Gray Luvisols	112.0	0.5
			Orthic Black Chernozems	255.3	1.1
DVG1	Dunvargan	Till	Black Chernozemics	1,907.3	8.5
			Orthic Black Chernozems	3.0	<0.1
DVG2	Dunvargan	Till	Black Chernozemics, Humic Gleysols	119.6	0.5
			Orthic Black Chernozems, Gleysolics	90.2	0.4
DVG3	Dunvargan	Till	Black Chernozemics	1,481.0	6.6
DVG4	Dunvargan	Till	Orthic Black Chernozems, Rego Chernozems - potentially eroded or calcareous	27.2	0.1
DVG5	Dunvargan	Till, various	Orthic Black Chernozems	7.9	0.0
Units with moderately fine to fine-textured parent materials				**687.2**	**3.0**
MFT18	Maycroft	Glaciolacustrine, various	Orthic Black Chernozems, Gleysolics	254.3	1.1
MFT5	Maycroft	Glaciolacustrine, various	Orthic Black Chernozems	432.9	1.9

Table 3-20 RAA Soil Map Unit Legend

Map Unit Label	Soil Series	Parent Materials	Soil Classification	Area of RAA (ha)	% of RAA
Units with moderately fine-textured parent materials				**1,976.8**	**8.8**
BVDV1	Beauvais/Dunvargan	gravelly or cobbly Till	Orthic Dark Gray Chernozem, Orthic Black Chernozem	42.1	0.2
SPR1	Spruce Ridge	gravelly or cobbly Till	Orthic Gray Luvisols	297.5	1.3
SPR2	Spruce Ridge	gravelly or cobbly Till	Orthic Gray Luvisols, Gleysolics	268.3	1.2
SPTU1	Spruce Ridge/Tough Creek	gravelly or cobbly Till, till over Softrock	Orthic Gray Luvisols	519.2	2.3
SPTU2	Spruce Ridge/Tough Creek	gravelly or cobbly Till	Orthic Gray Luvisols, Gleysolics	393.7	1.7
SPTU16	Spruce Ridge/Tough Creek	gravelly or cobbly Till	Orthic Gray Luvisols, Chernozemics	456.1	2.0
Units with medium to coarse-textured parent materials				**1,631.0**	**7.2**
TBR1	Twin Bridges	Fluvial	Regosols, Humic Regosols, Humic Gleysols	1,033.7	4.6
DRSR1	Drywood/Sarcee	Glaciofluvial over very gravelly Glaciofluvial, Fluvial	Orthic Black Chernozems	359.8	1.6
DRW1	Drywood	Glaciofluvial over very gravelly Glaciofluvial	Orthic Black Chernozems	1.7	<0.1
HFD6	Hatfield	Till over Softrock, various	Orthic Black Chernozem	0.1	<0.1
ZCOzbl8	misc coarse	Fluvial	Orthic Black Chernozem, Orthic Regosol, Orthic Humic Gleysol	235.8	1.0
Undifferentiated unit, transitional areas				**2,445.9**	**10.9**
POT3	Pothole Creek	Glaciolacustrine, Lacustrine, Fluvial	Humic Gleysols, Black Chernozemics	730.0	3.2
SCO1	Strathcona	Fluvial over Glaciofluvial	Black Chernozemics	24.4	0.1
SRC1	Sarcee	Fluvial	Black Chernozemics	25.8	0.1
SRC3	Sarcee	Fluvial over Glaciofluvial	Black Chernozemics	232.7	1.0
SUD1	Sundre	Fluvial over Glaciofluvial	Dark Gray Chernozemics	286.5	1.3
BRMT16	Bragg creek/Mitford	Glaciofluvial over very gravelly Glaciofluvial, Organic over Till	Eluviated Eutric Brunisols, Chernozemics, Terric Mesisols	2.1	<0.1
CRDR18	Carway/Drywood	Glaciofluvial, Glaciofluvial over very gravelly Glaciofluvial, various fine textures	Orthic Black Chernozems, Gleysolics	433.8	1.9
DVHF1	Dunvargan/Hatfield	Till, Till over Softrock	Orthic Black Chernozems	151.6	0.7
FSH6	Fish Creek	Glaciolacustrine, various coarse textures	Orthic Black Chernozems	86.3	0.4
POT6	Pothole Creek	Glaciolacustrine, various coarse textures	Orthic Humic Gleysols	132.3	0.6
ZCzblZG1	misc coarse	Fluvial, various textures	Orthic Black Chernozem, Orthic Humic Gleysol	330.9	1.5
ZGW20	misc Gleysol	Fluvial, various textures	Orthic Humic Gleysol, Orthic Regosol	9.5	<0.1
Other units				**75.4**	**0.3**
ZZ	Water	n/a	n/a	75.4	0.3
Total				22,540.2	100.0

NOTES:
Areas and proportions might not add up to totals because of rounding
n/a not applicable



Sources: Base Data - ESRI, Natural Earth, Government of Alberta, Government of Canada
Thematic Data - ERBC, Government of Alberta, Stantec Ltd

Soil Textural Classes in the RAA

3.2.6 Topography and Soil Development

3.2.6.1 Topography

Topography in the LAA was evaluated using the slope classes assigned to soil delineations (Table 3-21). Approximately 67% of the topography in LAA has slopes of less than 5%. A significant proportion of the LAA (14%) is on gentle slopes of greater than 5% and less than 10 % slope. Approximately 6% of the LAA is on moderately steep topography to severe slopes (greater than 10% ranging to 70%), mainly along the escarpments of the Elbow River. The slope classes are displayed on Figure 3-6.

Large ranges (polygon slope class 1-5, 1-6) were used to characterize the floodplains which were intersected with narrow fluvial channels, located on 8% of the topography of the LAA, where side slopes of the channels could reach upwards of 30% slope.

Slopes were not determined for the disturbed map unit (ZDL) (5% of the LAA).

Topographic variation was also examined from the perspective of slopes measured at soil inspection sites. For the 361 soil inspection sites completed in 2016, measured slope gradients ranged from 0% to 70%, corresponding to slope classes ranging from 1 to 8.

Table 3-21 Extent of Slope Classes in the LAA- Soil Mapping

Polygon Slope Class	Area of LAA (ha)	% of LAA
1	14.73	0.8
1-3	1.50	0.1
1-5	6.89	0.4
1-6	139.35	7.4
2	680.97	36.1
3	557.73	29.6
4	265.00	14.0
5	70.41	3.7
5-6	3.52	0.2
6	13.31	0.7
6-7	9.30	0.5
6-8	2.55	0.1
7	6.38	0.3
7-8	14.06	0.7

Table 3-21 Extent of Slope Classes in the LAA- Soil Mapping

Polygon Slope Class	Area of LAA (ha)	% of LAA
8	3.64	0.2
N/A	97.13	5.1
Total	1,886.48	100.0
NOTES: Areas and proportions might not add up to totals because of rounding N/A = Not Applicable		

3.2.6.2 Topsoil and Subsoil Thickness

Depths of topsoil (peat and duff layer combined with any mineral topsoil) and subsoil have been reported using a minimum and maximum depth, based on field data collected and global information system (GIS) modelling.

3.2.6.3 Topsoil Depth

The soil map units representing Gleysolic soils in the LAA have consistently larger ranges of topsoil values (POT1, POT2, and POT6) when compared to the Chernozemic, Reclaimed and Regosolic soil map units. Chernozemic soil map units have more consistent topsoil values (less range overall); close in maximum depth to the Gleysolic soil map unit but fewer shallow topsoil occurrences. The Regosols have little or no topsoil in some cases (TBR1, TBR4, TBRgr2). The average topsoil thickness based on field data and GIS modelling is shown for the LAA in Figure 3-7. The range of average topsoil thickness for each soil map unit is displayed in Table 3-22.

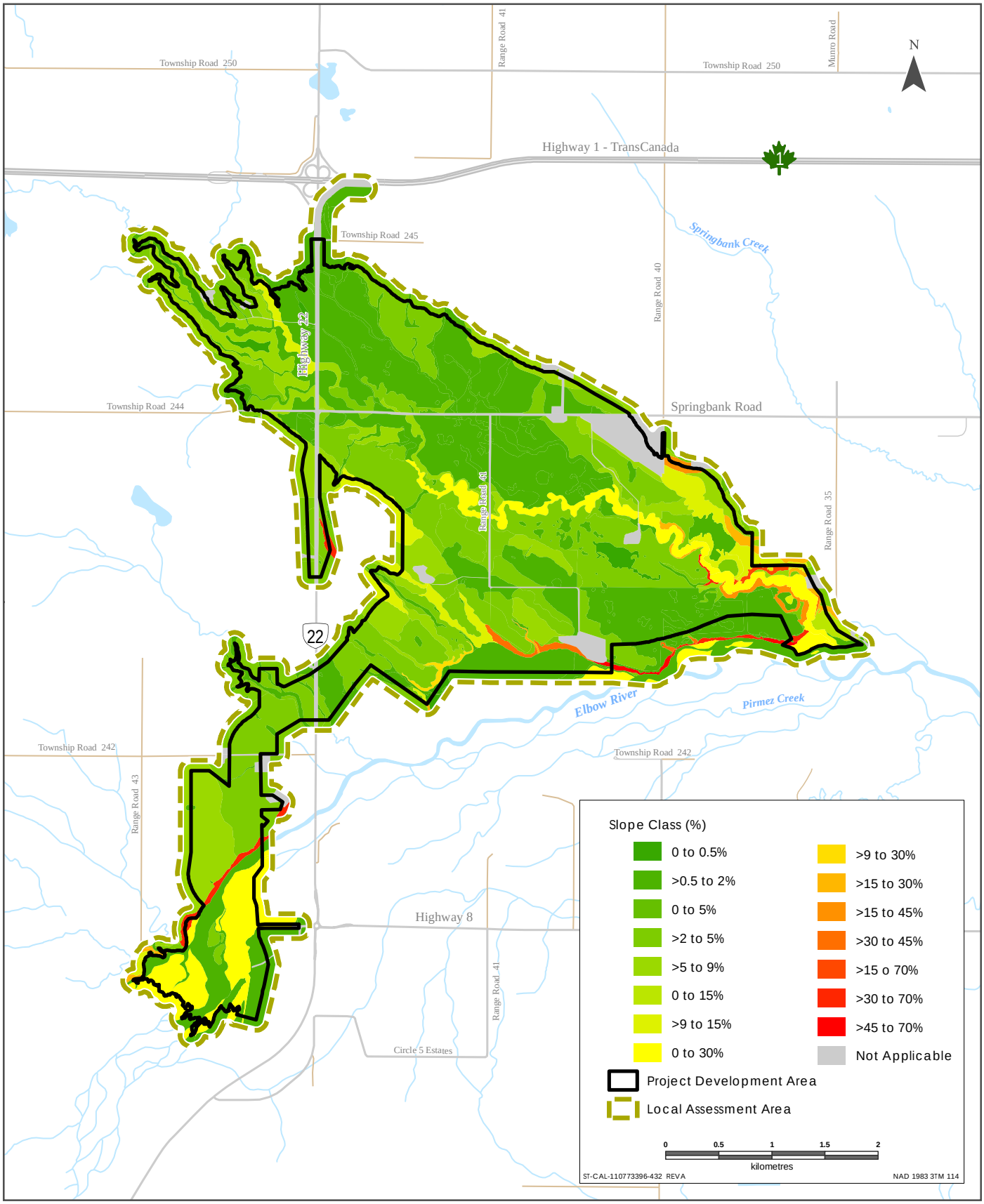
3.2.6.4 Subsoil Depth

Subsoil average thickness varies more than topsoil between the Chernozemic and Gleysolic soil orders. However, the Chernozemic and Gleysolic soil orders are better developed and, therefore, have deeper subsoil than the Regosolic soil order. While a Regosol typically lacks a B horizon, the presence of some subsoil in the LAA is due to weak horizon mixing between the topsoil and lower subsoil or partial upper subsoil horizon development (AC or CA horizon). The average subsoil thickness based on field data and GIS modelling is shown for the LAA in Figure 3-8. The range of average subsoil thickness for each soil map unit is displayed in Table 3-22.

Table 3-22 Estimated Topsoil and Subsoil Depths for Soil Map Units in the LAA

Map Unit	Topsoil range (cm) (minimum-maximum)	Subsoil range (cm) (minimum-maximum)	Area of LAA (ha)	% of LAA
Chernozem			**1395.7**	**74.0**
DVFS1	20-35	2-31	55.2	2.9
DVFS2	16-38	11-30	304.3	16.1
DVG1	6-38	9-37	281.5	14.9
FSH1	17-40	5-39	276.6	14.7
FSH2	22-36	11-34	437.2	23.2
SRC1	18-23	11-27	35.8	1.9
SRC4	23	11	2.3	0.1
MSTB1	35	6	2.8	0.2
Regosol			**182.3**	**9.7**
TBR1	0-5	0-1	6.4	0.3
TBR2	6-20	1-16	50.7	2.7
TBR4	0-6	0-1	11.4	0.6
TBR6	26	11	15.1	0.8
TBSR1	12-21	6-15	30.0	1.6
TBRgr1	3-23	1-7	61.9	3.3
TBRgr2	0-4	0-4	6.8	0.4
Gleysol			**210.4**	**11.2**
POT1	14-47	3-31	30.0	1.6
POT2	15-46	1-47	20.5	1.1
POT6	19-49	3-41	43.1	2.3
POT7	20-29	13-26	81.7	4.3
ZGC1	18-48	7-27	35.0	1.9
Other			**98.2**	**5.2**
ZDL	N/A	N/A	97.1	5.1
ZREC	27-32	23-34	1.1	0.1
Total			**1,886.48**	**100.0**

NOTES:
Areas and proportions might not add up to totals because of rounding



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Slope Classes in the LAA

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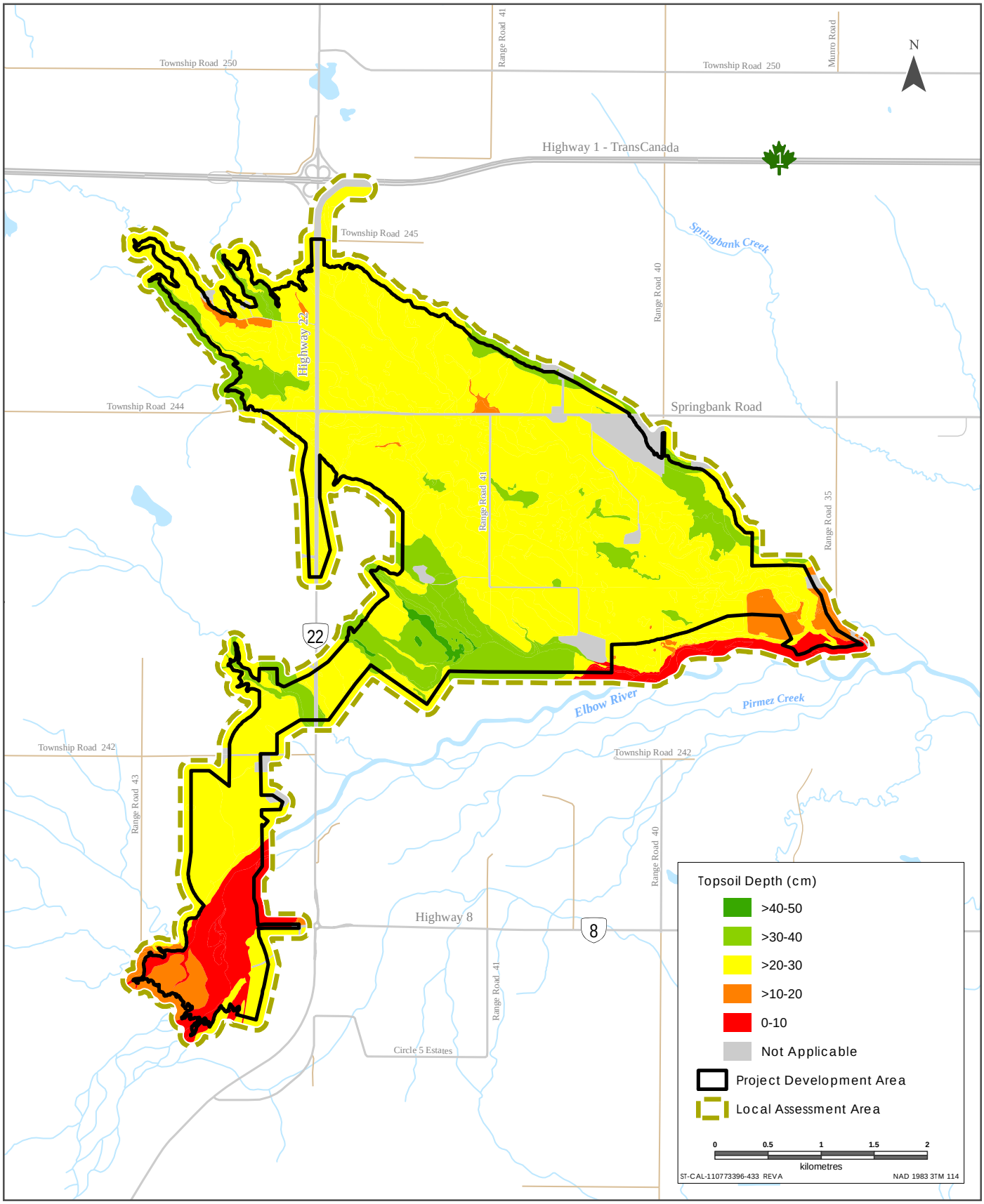
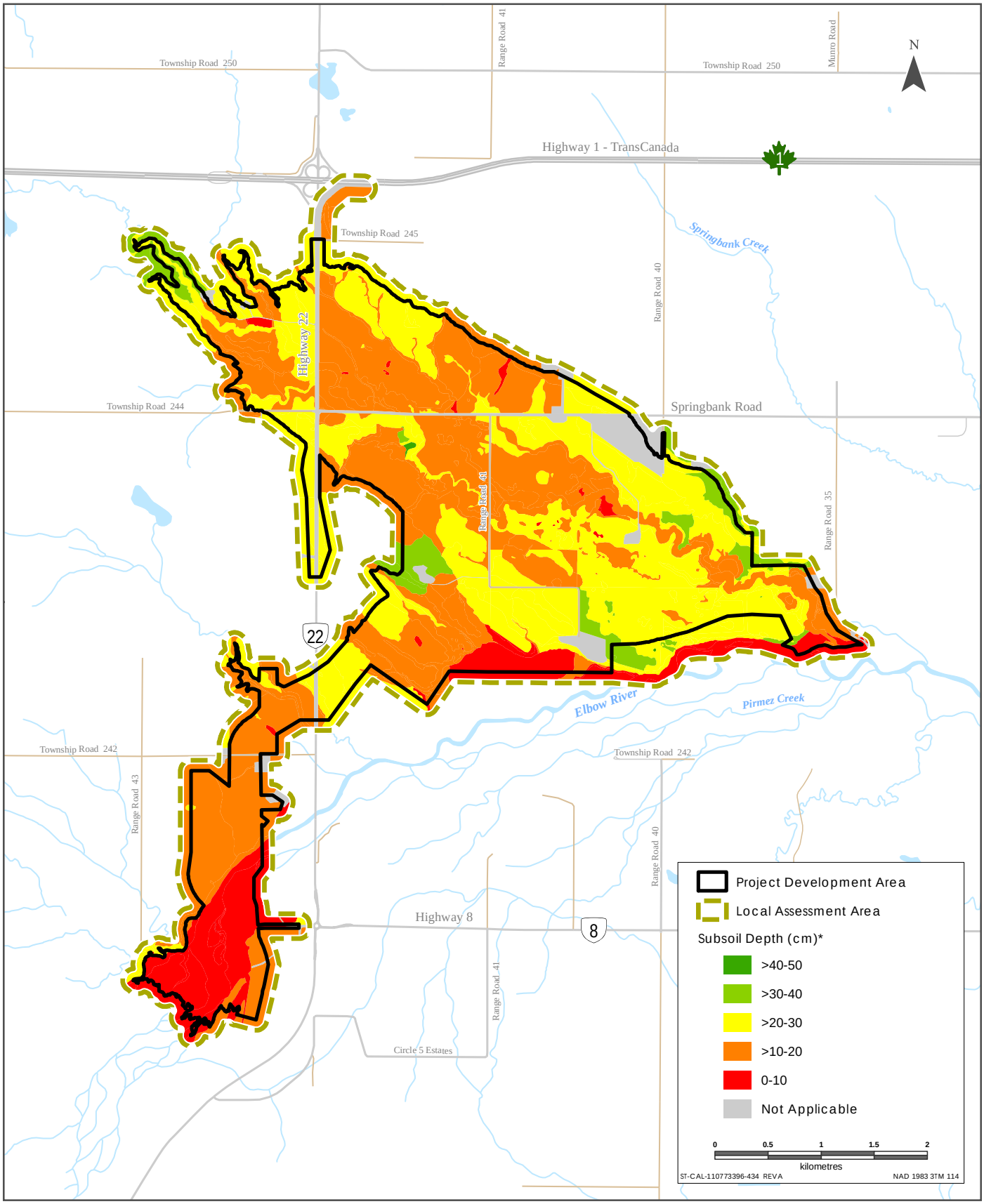


Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Topsoil Depths in the LAA



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Subsoil Depths in the LAA

3.2.6.5 Wind Erosion

Wind erosion indices are used to determine both topsoil and subsoil wind erosion risk for each soil map unit in the LAA (Tables 3-23 and 3-24). A summary of rating classes is presented in Table 3-25.

The most common wind erosion rating in the LAA for topsoil is low (82%). This is due to adequate moisture for soils in the LAA in combination with clay rich soils, which have adhesive qualities. The second largest class is high at 12%. The high-risk class is associated with coarse-textured soil units associated with fluvial materials (well to rapidly drained soils). The remaining 5% is not rated because they represent the disturbed land map units.

The extent of moderate to severe wind erosion risk for subsoil in the LAA is more prevalent that it is for topsoil. About 80% of the LAA is rated as having a moderate risk for wind erosion; 13% is rated as severe.

Figures 3-9 and 3-10 illustrates areas where topsoil and subsoil erosion risk is high or severe, corresponding to the coarse-textures underlying the Elbow River and scattered, smaller drainages.

Table 3-23 Wind Erosion Ratings by Map Unit for Topsoil in the LAA

Soil Map Unit	Topsoil Water Erosion Risk						Area of LAA (ha)	% of LAA
	Negligible (%)	Low (%)	Moderate (%)	High (%)	Severe (%)	Not Rated (%)		
Units with fine to very fine-textured till and glaciolacustrine parent materials							**1448.4**	**76.8**
DVFS1	-	100.0	-	-	-	-	55.2	2.9
DVFS2	-	100.0	-	-	-	-	304.3	16.1
DVG1	-	100.0	-	-	-	-	281.5	14.9
FSH1	-	100.0	-	-	-	-	276.6	14.7
FSH2	-	100.0	-	-	-	-	437.2	23.2
POT1	-	100.0	-	-	-	-	30.0	1.6
POT2	-	100.0	-	-	-	-	20.5	1.1
POT6	-	100.0	-	-	-	-	43.1	2.3
Units with medium-textured fluvial parent materials							**38.1**	**2.0**
SRC1	-	100.0		-	-	-	35.8	1.9
SRC4	-	100.0		-	-	-	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials							**172.1**	**9.1**
TBR1	-	-	-	100.0	-	-	6.4	0.3
TBR2	-	-	-	100.0	-	-	50.7	2.7
TBR4	-	-	-	100.0	-	-	11.4	0.6
TBRgr1	-	-	-	100.0	-	-	61.9	3.3
TBRgr2	-	-	-	100.0	-	-	6.8	0.4
ZGC1	-	-	-	100.0	-	-	35.0	1.9
Undifferentiated units, transitional areas							**129.7**	**6.9**
POT7	-	60.0	-	40.0	-	-	81.7	4.3
TBR6	-	20.0	-	80.0	-	-	15.1	0.8
TBSR1	-	50.0	-	50.0	-	-	30.0	1.6
MSTB1	-	-	-	100.0	-	-	2.8	0.2
Other							**98.2**	**5.2**
ZDL	-	-	-	-	-	100.0	97.1	5.1
ZREC	-	100.0	-	-	-	-	1.1	0.1
Total							**1,886.5**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding

Table 3-24 Wind Erosion Ratings by Map Unit for Upper Subsoil in the LAA

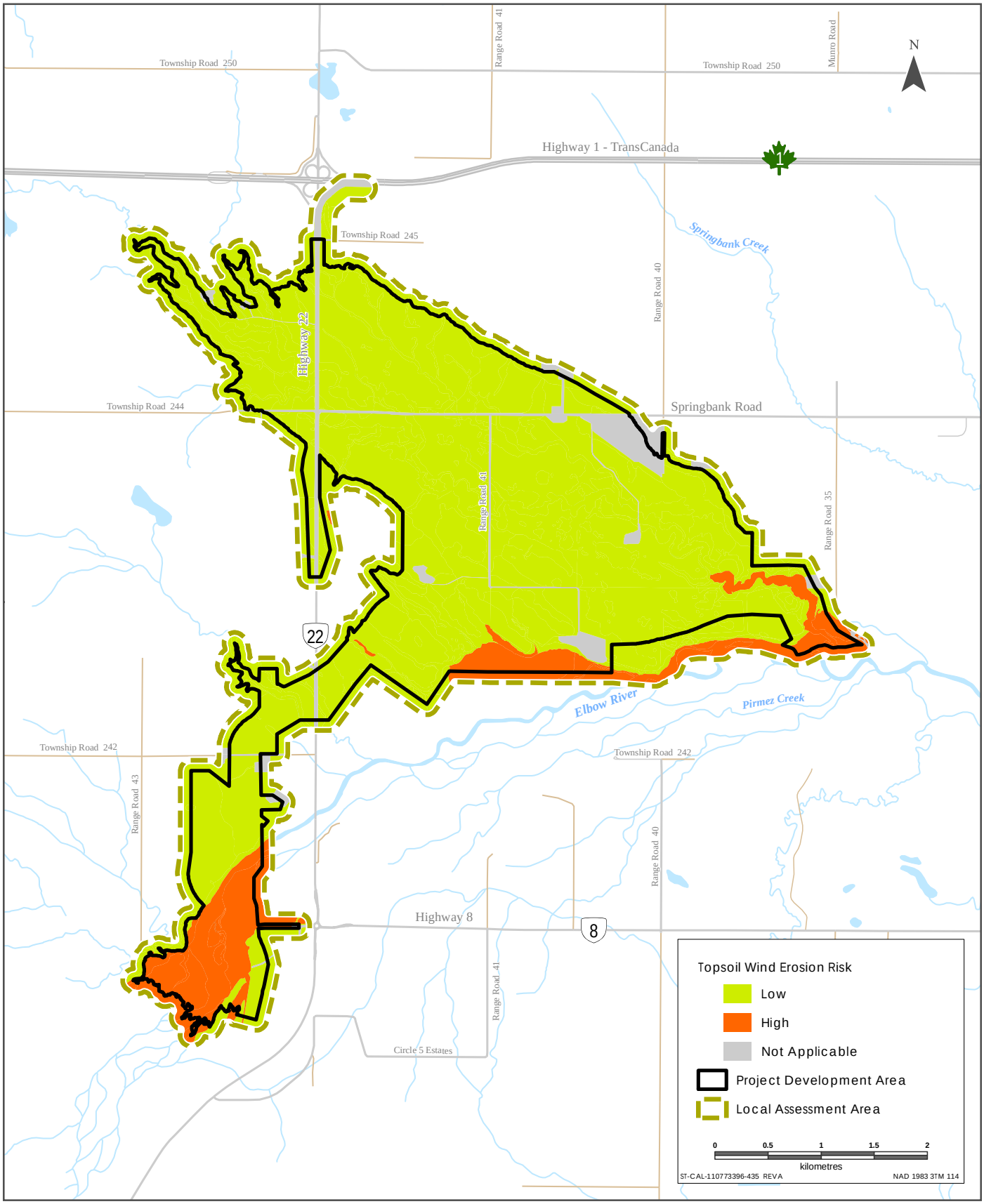
Soil Map Unit	Subsoil Water Erosion Risk						Area of LAA (ha)	% of LAA
	Negligible (%)	Low (%)	Moderate (%)	High (%)	Severe (%)	Not Rated (%)		
Units with fine to very fine-textured till and glaciolacustrine parent materials							**1448.4**	**76.8**
DVFS1	-	-	100.0	-	-	-	55.2	2.9
DVFS2	-	-	100.0	-	-	-	304.3	16.1
DVG1	-	-	100.0	-	-	-	281.5	14.9
FSH1	-	-	100.0	-	-	-	276.6	14.7
FSH2	-	-	100.0	-	-	-	437.2	23.2
POT1	-	-	100.0	-	-	-	30.0	1.6
POT2	-	-	100.0	-	-	-	20.5	1.1
POT6	-	-	100.0	-	-	-	43.1	2.3
Units with medium-textured fluvial parent materials							**38.1**	**2.0**
SRC1	-	100.0	-	-	-	-	35.8	1.9
SRC4	-	80.0	-	-	20.0	-	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials							**172.1**	**9.1**
TBR1	-	-	-	-	100.0	-	6.4	0.3
TBR2	-	-	-	-	100.0	-	50.7	2.7
TBR4	-	-	-	-	100.0	-	11.4	0.6
TBRgr1	-	-	-	-	100.0	-	61.9	3.3
TBRgr2	-	-	-	-	100.0	-	6.8	0.4
ZGC1	-	-	-	-	100.0	-	35.0	1.9
Undifferentiated units, transitional areas							**129.7**	**6.9**
POT7		-	100.0	-	-	-	81.7	4.3
TBR6	-	-	20.0	-	80.0	-	15.1	0.8
TBSR1		50.0	-	-	50.0	-	30.0	1.6
MSTB1	-	-	-	-	100.0	-	2.8	0.2
Other							**98.2**	**5.2**
ZDL	-	-	-	-	-	100.0	97.1	5.1
ZREC	-	-	100.0	-	-	-	1.1	0.1
Total							**1,886.5**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding

Table 3-25 Wind Erosion by Rating for Topsoil and Subsoil in the LAA

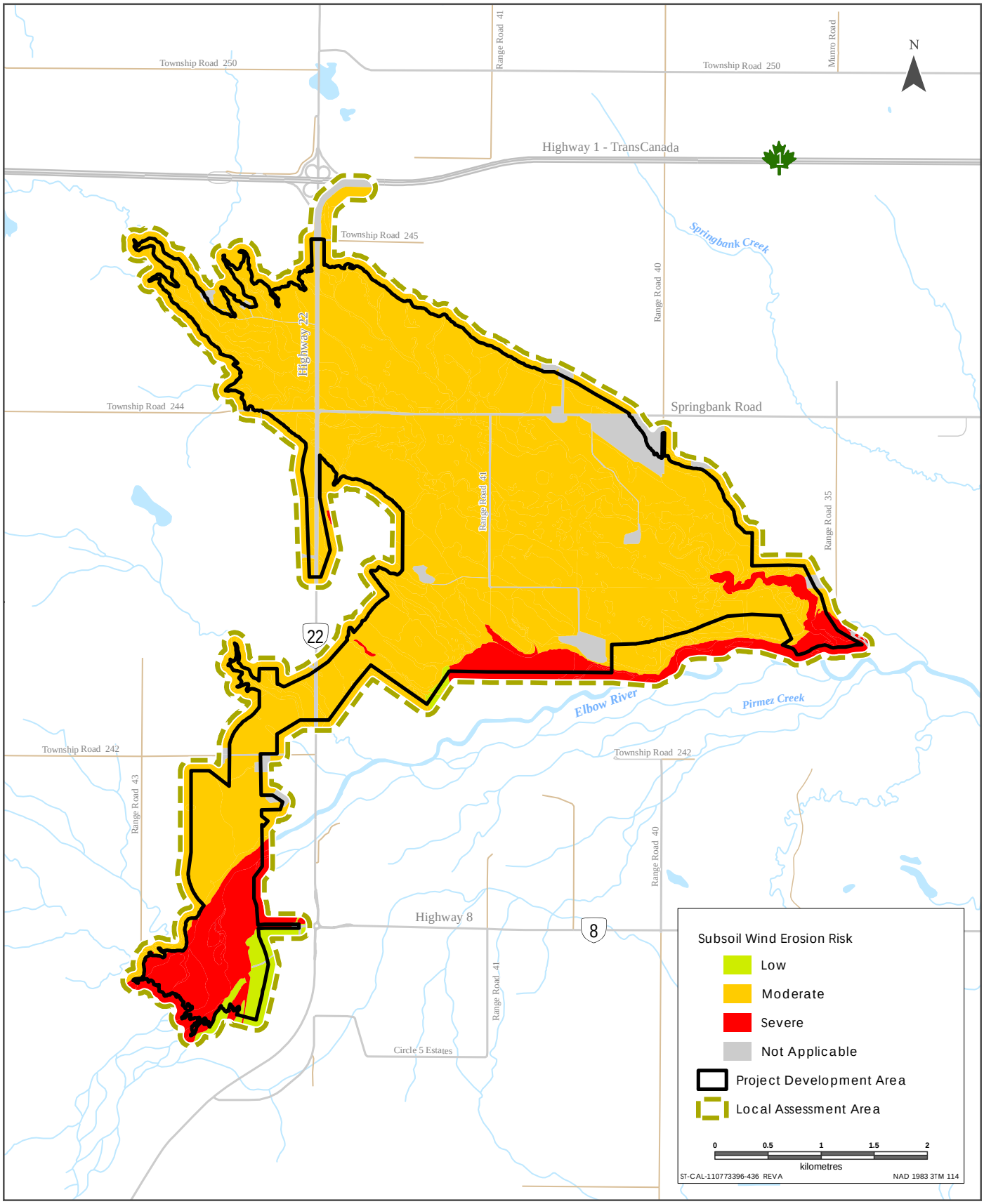
Wind Erosion Rating	Areal Extent of Topsoil in LAA (ha)	% of Topsoil in LAA	Areal Extent of Subsoil in LAA (ha)	% of Subsoil in LAA
Severe	0.0	0.0	235.2	12.5
High	234.8	12.4	0.0	0.0
Moderate	0.0	0.0	1501.5	79.6
Low	1554.6	82.4	52.6	2.8
Negligible	0.0	0.0	0.0	0.0
Not Rated	97.1	5.1	97.1	5.1
Total	**1886.5**	**100.0**	**1886.5**	**100.0**

NOTE:
Areas and proportions will not sum exactly to totals because of rounding



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Topsoil Wind Erosion Risk Ratings in the LAA



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Subsoil Wind Erosion Risk Ratings in the LAA

3.2.6.6 Water Erosion

Water erosion risk ratings were calculated for each soil series of the soil map units. Summaries by individual map unit for topsoil and subsoil in the LAA are presented in Tables 3-26 and 3-27. A summary of rating classes is presented in Table 3-28.

In natural landscapes, tree canopies and/or forest floor vegetation protect the mineral soil surface from rainfall erosion. Consequently, water erosion risk for vegetated topsoil in the LAA is very low. However, if vegetation and organic layers are removed, that protection is removed and bare soils are more susceptible to water erosion.

The spatial distribution of water erosion risk for topsoil and subsoil in the LAA is shown in Figure 3-11 and Figure 3-12. Soil units with moderate to severe wind erosion risk ratings for topsoil and subsoil are associated with soil map units that have steeper slope gradients and finer subsoil textures (DVG1). Soil units ranging from very low to low wind erosion risk for topsoil and subsoil include those formed on very coarse-textured glaciofluvial materials (TBR1, TBR4, TBR6 (very low to moderate), TBRgr2, TBSR1 and MSTB1). Soils that have developed on coarse textured parent materials and Gleysol-dominated map units (generally with low slope gradients) have a very low or low risk of water erosion (ZGC1, DVFS1, FSH2, POT1, POT2, POT6). Medium textured soils on low slope gradients have a very low risk of water erosion (SRC1, SRC4).

Table 3-26 Water Erosion Risk Ratings by Map Unit for Topsoil in the LAA

Soil Map Unit	Topsoil Water Erosion Risk[1]						Area of LAA (ha)	% of LAA
	Very Low (%)	Low (%)	Moderate (%)	High (%)	Severe (%)	Not Rated (%)		
Units with fine to very fine-textured till and glaciolacustrine parent materials							**1448.4**	**76.8**
DVFS1	99.5	0.5	-	-	-	-	55.2	2.9
DVFS2	100.0	-	-	-	-	-	304.3	16.1
DVG1	92.3	0.9	1.8	-	5.0	-	281.5	14.9
FSH1	100.0	-	-	-	-	-	276.6	14.7
FSH2	100.0	-	-	-	-	-	437.2	23.2
POT1	100.0	-	-	-	-	-	30.0	1.6
POT2	100.0	-	-	-	-	-	20.5	1.1
POT6	100.0	-	-	-	-	-	43.1	2.3
Units with medium-textured fluvial parent materials							**38.1**	**2.0**
SRC1	100.0	-	-	-	-	-	35.8	1.9
SRC4	100.0	-	-	-	-	-	2.3	0.1

Table 3-26 Water Erosion Risk Ratings by Map Unit for Topsoil in the LAA

Soil Map Unit	Topsoil Water Erosion Risk[1]						Area of LAA (ha)	% of LAA
	Very Low (%)	Low (%)	Moderate (%)	High (%)	Severe (%)	Not Rated (%)		
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials							**172.1**	**9.1**
TBR1	86.5	13.5 (Slope Class 1-6)	-	-	-	-	6.4	0.3
TBR2	100.0	-	-	-	-	-	50.7	2.7
TBR4	70.6	29.4 (Slope Class 1-6)	-	-	-	-	11.4	0.6
TBRgr1	100.0	-	-	-	-	-	61.9	3.3
TBRgr2	85.2	14.8 (Slope Class 1-6)	-	-	-	-	6.8	0.4
ZGC1	100.0	-	-	-	-	-	35.0	1.9
Undifferentiated units, transitional areas							**129.7**	**6.9**
POT7	100.0	-	-	-	-	-	81.7	4.3
TBR6	98.7	1.1	0.3	-	-	-	15.1	0.8
TBSR1	100.0	-	-	-	-	-	30.0	1.6
MSTB1	-	100.0 (Slope Class 7)	-	-	-	-	2.8	0.2
Other							**98.2**	**5.2**
ZDL	-	-	-	-	-	100.0	97.1	5.1
ZREC	100.0	-	-	-	-	-	1.1	0.1
Total							**1,886.5**	**100.0**

NOTES:

Areas and proportions will not sum exactly to totals because of rounding

[1] Ratings vary within individual map units based on proportions of series with varying textures as well as slope classes (See Table 3-17 for detailed map unit descriptions)

Table 3-27 Water Erosion Risk Ratings by Map Unit for Subsoil in the LAA

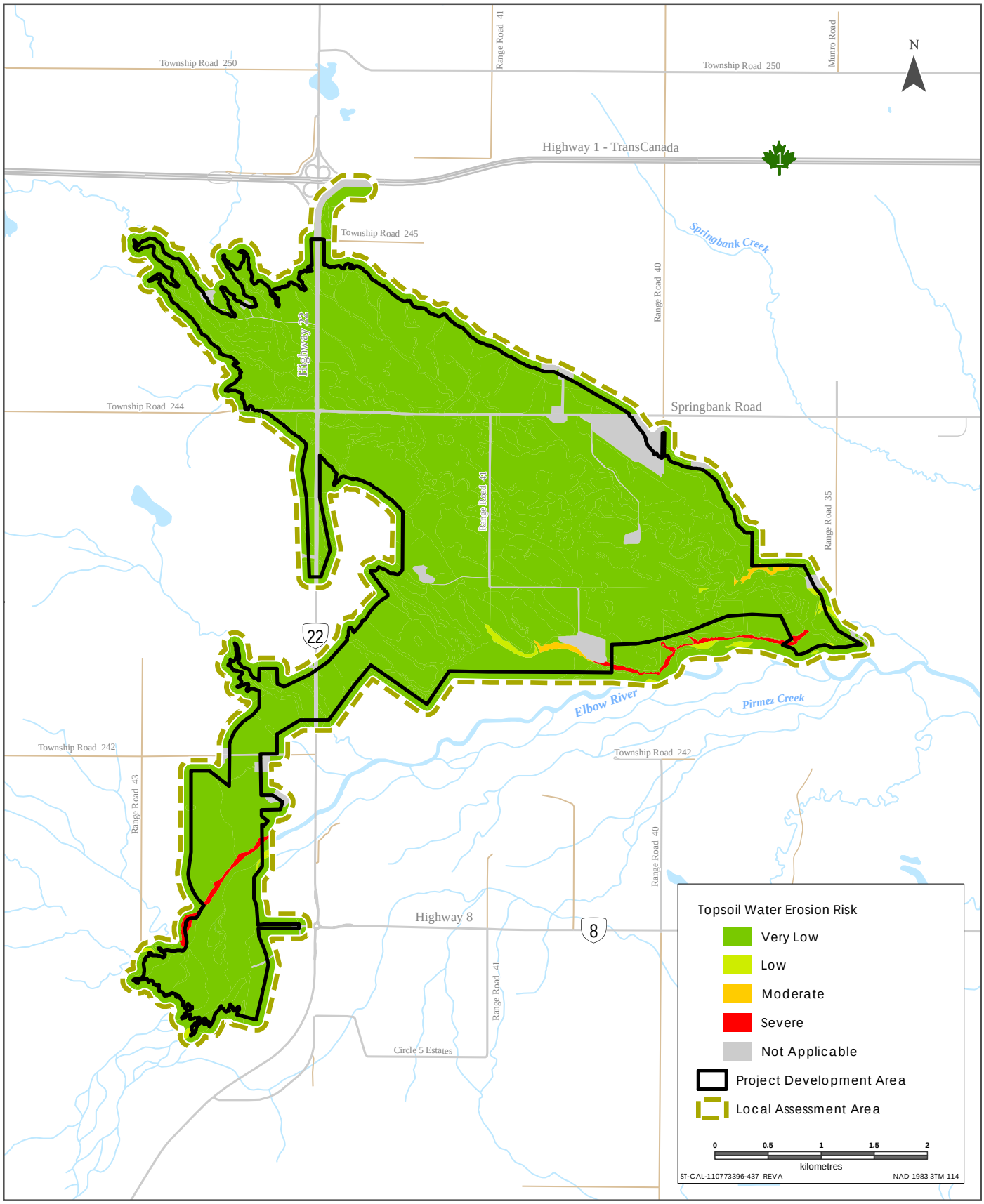
Soil Map Unit	Subsoil Water Erosion Risk[1]						Area of LAA (ha)	% of LAA
	Very Low (%)	Low (%)	Moderate (%)	High (%)	Severe (%)	Not Rated (%)		
Units with fine to very fine-textured till and glaciolacustrine parent materials							**1448.4**	**76.8**
DVFS1	100.0	-	-	-	-	-	55.2	2.9
DVFS2	100.0	-	-	-	-	-	304.3	16.1
DVG1	92.3	0.9	1.8	0.3	4.7	-	281.5	14.9
FSH1	100.0	-	-	-	-	-	276.6	14.7
FSH2	100.0	-	-	-	-	-	437.2	23.2
POT1	100.0	-	-	-	-	-	30.0	1.6
POT2	100.0	-	-	-	-	-	20.5	1.1
POT6	100.0	-	-	-	-	-	43.1	2.3
Units with medium-textured fluvial parent materials							**38.1**	**2.0**
SRC1	100.0	-	-	-	-	-	35.8	1.9
SRC4	100.0	-	-	-	-	-	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials							**172.1**	**9.1**
TBR1	86.5	13.5	-	-	-	-	6.4	0.3
TBR2	100.0	-	-	-	-	-	50.7	2.7
TBR4	70.6	29.4	-	-	-	-	11.4	0.6
TBRgr1	100.0	-	-	-	-	-	61.9	3.3
TBRgr2	85.2	14.8	-	-	-	-	6.8	0.4
ZGC1	100.0	-	-	-	-	-	35.0	1.9
Undifferentiated units, transitional areas							**129.7**	**6.9**
POT7	100.0	-	-	-	-	-	81.7	4.3
TBR6	98.7	1.1	0.3	-	-	-	15.1	0.8
TBSR1	100.0	-	-	-	-	-	30.0	1.6
MSTB1	-	100.0	-	-	-	-	2.8	0.2
Other							**98.2**	**5.2**
ZDL	-	-	-	-	-	100.0	97.1	5.1
ZREC	100.0	-	-	-	-	-	1.1	0.1
Total							**1,886.5**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding
[1] Ratings vary within individual map units based on proportions of series with varying textures as well as slope classes (See Table 3-17 for detailed map unit descriptions)

Table 3-28 Water Erosion by Rating for Topsoil and Subsoil in the LAA

Wind Erosion Rating	Areal Extent of Topsoil in LAA (ha)	% of Topsoil in LAA	Areal Extent of Subsoil in LAA (ha)	% of Subsoil in LAA
Severe	14.0	0.7	13.3	0.7
High	0.0	0.0	0.7	0.0
Moderate	5.1	0.3	5.1	0.3
Low	11.1	0.6	10.8	0.6
Very Low	1759.1	93.2	1759.4	93.3
Not Rated	97.1	5.1	97.1	5.1
Total	**1886.5**	**100.0**	**1886.5**	**100.0**

NOTE:
Areas and proportions will not sum exactly to totals because of rounding



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Topsoil Water Erosion Risk Ratings in the LAA

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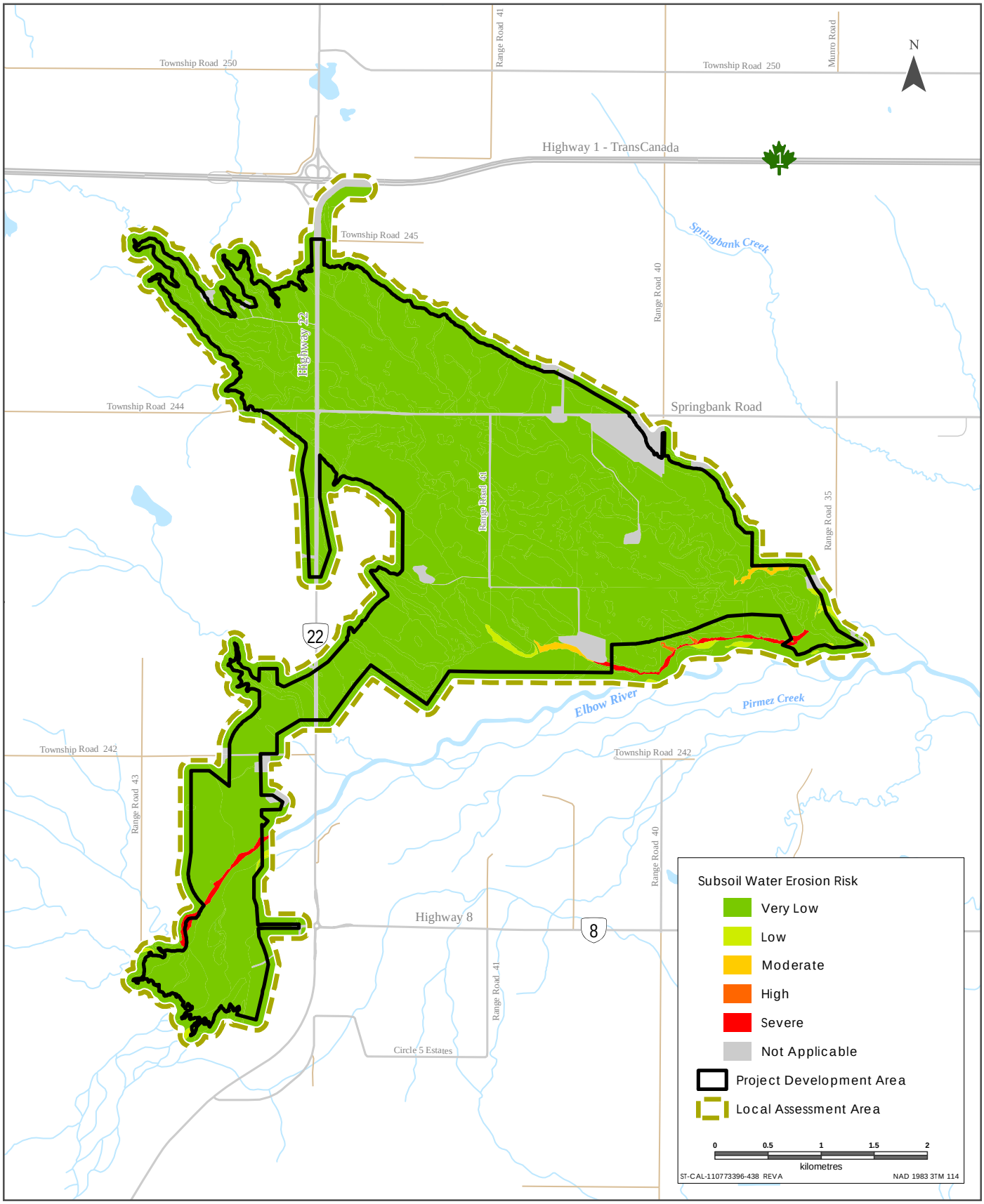

Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Subsoil Water Erosion Risk Ratings in the LAA

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3.2.6.7 Soil Compaction

Compaction is generally related to soil moisture content and texture, with wetter and finer-textured soils tending to have higher compaction ratings. The dominant decile for compaction for topsoil and subsoil is presented for each soil map unit in the LAA (Table 3-29 and Table3-30). Areal summaries for the LAA are presented in Table 3-31 and Table 3-32.

Much of the LAA is rated moderate to high for compaction risk for topsoil (1,565 ha, or 83%) because the area generally has low relief and fine textures. All Gleysolic soil series are rated high for topsoil compaction risk (POT1, POT2, POT6, POT7), with the exception of the ZGC series, a coarse-textured Gleysol that is rated moderate for compaction risk. Even some of the better drained mineral soils (Dunvargan and Fish Creek soil) are rated moderate due to low relief. The Regosolic soils are rated low for topsoil compaction risk (Twin Bridges). The disturbed land unit does not receive a rating.

Soil series rated for subsoil compaction risk closely follow those rated for topsoil compaction risk, with the exception of the coarse Gleysol and Reclaimed soil units. The ZGC series is rated moderate for topsoil compaction risk but low for subsoil risk. And the ZREC unit is rated low for topsoil compaction risk and moderate for subsoil.

Figure 3-13 and Figure 3-14 display the generalized compaction risk of each unit for the topsoil and subsoil, respectively.

Table 3-29 Topsoil Compaction Risk Ratings for Soil Map Units in the LAA

Soil Map Unit	Topsoil Compaction Rating	Area of LAA (ha)	% of LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials		**1448.4**	**76.8**
DVFS1	Moderate	55.2	2.9
DVFS2	Moderate	304.3	16.1
DVG1	Moderate	281.5	14.9
FSH1	Moderate	276.6	14.7
FSH2	Moderate	437.2	23.2
POT1	High	30.0	1.6
POT2	High	20.5	1.1
POT6	High	43.1	2.3
Units with medium-textured fluvial parent materials		**38.1**	**2.0**
SRC1	Low	35.8	1.9
SRC4	Low	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials		**172.1**	**9.1**
TBR1	Low	6.4	0.3
TBR2	Low	50.7	2.7
TBR4	Low	11.4	0.6
TBRgr1	Low	61.9	3.3
TBRgr2	Low	6.8	0.4
ZGC1	Moderate	35.0	1.9
Undifferentiated, transitional areas		**129.7**	**6.9**
POT7	High	81.7	4.3
TBR6	Low	15.1	0.8
TBSR1	Low	30.0	1.6
MSTB1	Low	2.8	0.2
Other		**98.2**	**5.2**
ZDL	Not Rated	97.1	5.1
ZREC	Low	1.1	0.1
Total		**1,886.48**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding

Table 3-30 Subsoil Compaction Risk Ratings for Map Units in the LAA

Soil Map Unit	Subsoil Compaction Rating	Area of LAA (ha)	% of LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials		**1448.4**	**76.8**
DVFS1	Moderate	55.2	2.9
DVFS2	Moderate	304.3	16.1
DVG1	Moderate	281.5	14.9
FSH1	Moderate	276.6	14.7
FSH2	Moderate	437.2	23.2
POT1	High	30.0	1.6
POT2	High	20.5	1.1
POT6	High	43.1	2.3
Units with medium-textured fluvial parent materials		**38.1**	**2.0**
SRC1	Low	35.8	1.9
SRC4	Low	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials		**172.1**	**9.1**
TBR1	Low	6.4	0.3
TBR2	Low	50.7	2.7
TBR4	Low	11.4	0.6
TBRgr1	Low	61.9	3.3
TBRgr2	Low	6.8	0.4
ZGC1	Low	35.0	1.9
Undifferentiated, transitional areas		**129.7**	**6.9**
POT7	High	81.7	4.3
TBR6	Low	15.1	0.8
TBSR1	Low	30.0	1.6
MSTB1	Low	2.8	0.2
Other		**98.2**	**5.2**
ZDL	Not Rated	97.1	5.1
ZREC	Moderate	1.1	0.1
Total		**1,886.5**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding
N/A = Not Applicable
N/R = Not Rated

Table 3-31 Topsoil Compaction Summary in the LAA

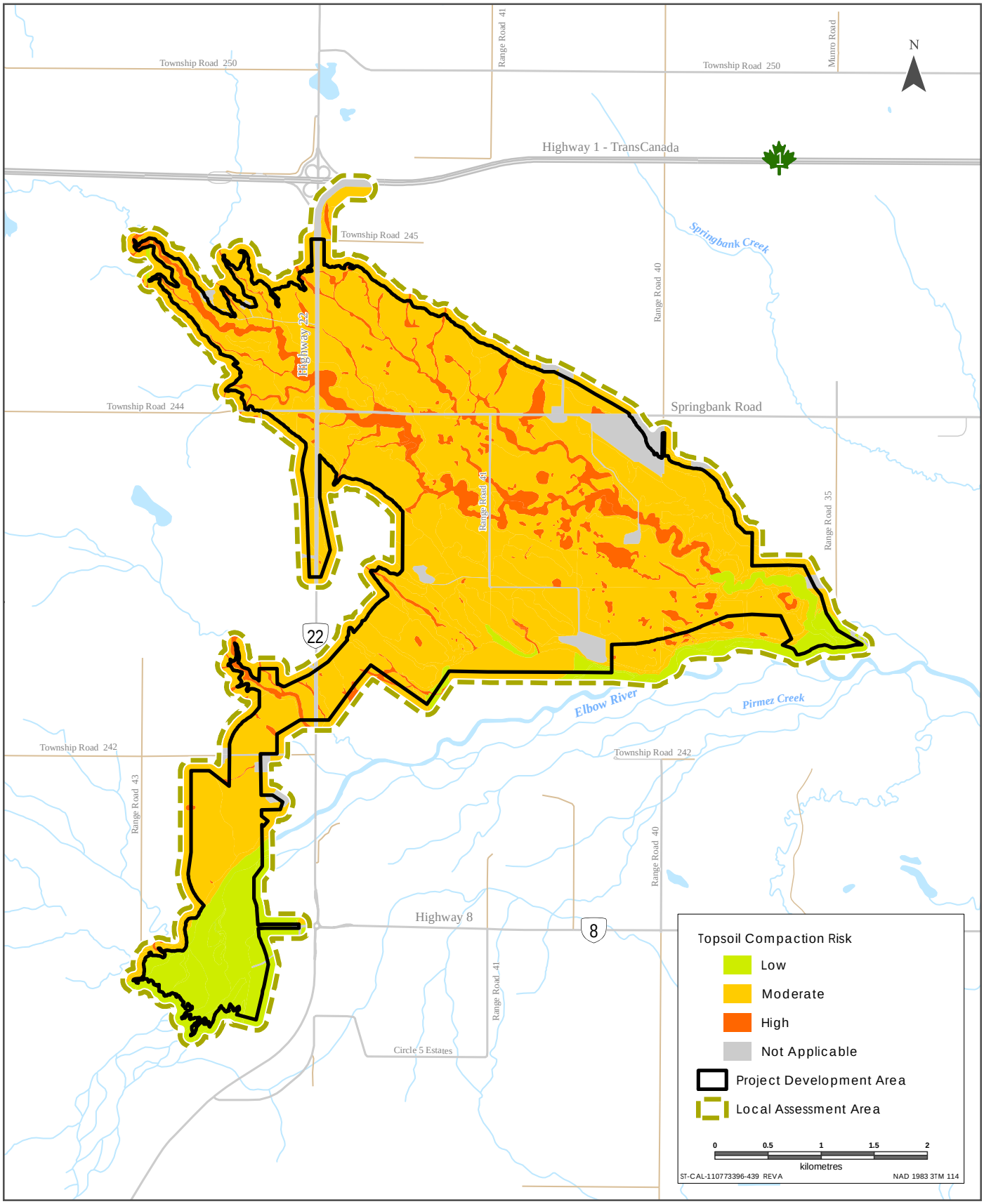
Compaction Rating	Areal Extent in LAA (ha)	% of LAA
Low	224.2	11.9
Moderate	1389.8	73.7
High	175.3	9.3
Not Rated	97.1	5.1
Total	**1,886.5**	**100.0**

NOTE:
Areas and proportions will not sum exactly to totals because of rounding

Table 3-32 Subsoil Compaction Summary in the LAA

Compaction Rating	Areal Extent in LAA (ha)	% of LAA
Low	258.2	13.7
Moderate	1355.8	71.9
High	175.3	9.3
Not Rated	97.1	5.1
Total	**1,886.5**	**100.0**

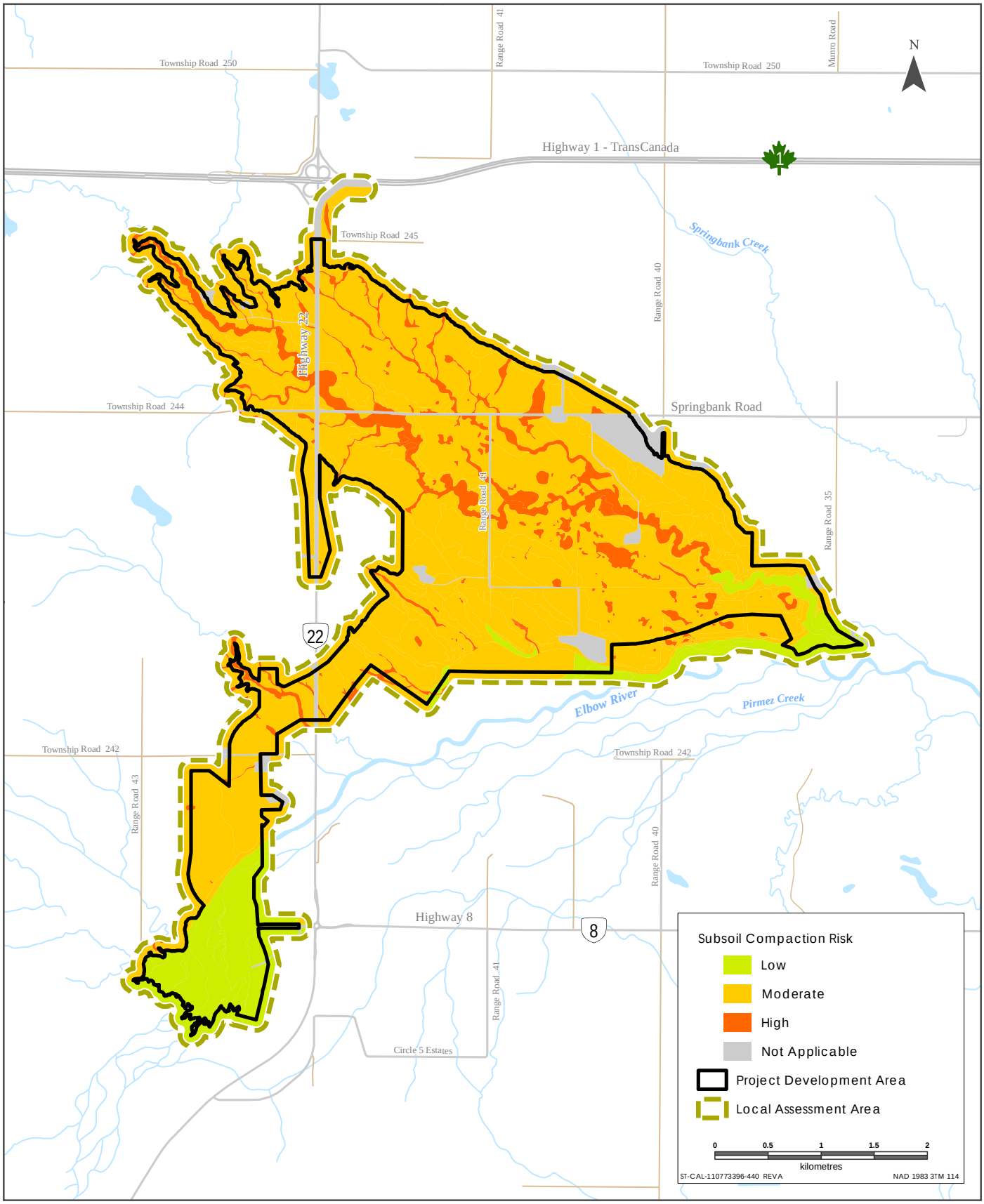
NOTE:
Areas and proportions will not sum exactly to totals because of rounding



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Topsoil Compaction Risk Ratings in the LAA

Stantec



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Subsoil Compaction Risk Ratings in the LAA

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3.2.6.8 Soil Rutting

Rutting risk is summarized by soil map unit in Table 3-33. Lower ratings are typically associated with good drainage or coarse textures. Higher ratings reflect higher moisture content or finer textures. Slope affects soil moisture content and how easily machinery can move (e.g., it is more difficult to move up a steep slope than on a level surface). Summarized rutting risk ratings for topsoil and subsoil are summarized in Table 3-34 and Table 3-35. The first decile rutting and compaction ratings for topsoil and subsoil were presented for each map unit.

The topsoil and subsoil rutting risk for soils derived from coarse-textured glaciofluvial or fluvial parent materials in the LAA is low (TBR1, TBR2, TBR4, TBR6, TBRgr1, TBRgr2, TBSR1 and MSTB1), unless the soils are Gleysolic (ZGC1), which are rated as moderate.

Gleysols developed on fine to very fine-textured glaciolacustrine soils are high risk for rutting on both topsoil and subsoil in the LAA, which includes POT1, POT2, POT6 and POT7.

Chernozems developed on fine to very fine textured till or glaciolacustrine range from low to moderate for rutting risk of both topsoil and subsoil.

As a whole, 1,614 ha, or 86 percent of the topsoil and subsoil within the LAA boundary is low to moderate for rutting risk, with 9% (175 ha) rated as high. The remainder is not rated (5%).

Spatially, high rutting risk for topsoil and subsoil within the LAA is well distributed in the frequent depressional areas associated with gently sloping topography (see Figures 3-15 and 3-16).

Figures 3-15 and Figure 3-16 show the spatial distribution and extent of the generalized rutting risk for topsoil and subsoil, respectively, for each soil map unit.

Table 3-33 Rutting Risk Ratings for Topsoil and Subsoil in Soil Map Units in the LAA

Soil Map Unit	Topsoil Rutting Risk Rating	Subsoil Rutting Risk Rating	Area of LAA (ha)	% of LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials			**1448.4**	**76.8**
DVFS1	Low	Low	55.2	2.9
DVFS2	Low	Low	304.3	16.1
DVG1	Low	Low	281.5	14.9
FSH1	Moderate	Moderate	276.6	14.7
FSH2	Moderate	Moderate	437.2	23.2
POT1	High	High	30.0	1.6
POT2	High	High	20.5	1.1
POT6	High	High	43.1	2.3
Units with medium-textured fluvial parent materials			**38.1**	**2.0**
SRC1	Low	Low	35.8	1.9
SRC4	Low	Low	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials			**172.1**	**9.1**
TBR1	Low	Low	6.4	0.3
TBR2	Low	Low	50.7	2.7
TBR4	Low	Low	11.4	0.6
TBRgr1	Low	Low	61.9	3.3
TBRgr2	Low	Low	6.8	0.4
ZGC1	Moderate	Moderate	35.0	1.9
Undifferentiated units, transitional areas			**129.7**	**6.9**
POT7	High	High	81.7	4.3
TBR6	Low	Low	15.1	0.8
TBSR1	Low	Low	30.0	1.6
MSTB1	Low	Low	2.8	0.2
Other Units			**98.2**	**5.2**
ZDL	N/R	N/R	97.1	5.1
ZREC	Low	Low	1.1	0.1
Total			**1,886.5**	**100.0**

NOTES:
Areas and proportions might not add up to totals because of rounding
N/R = Not Rated

Table 3-34 Topsoil Rutting Risk Summary in the LAA

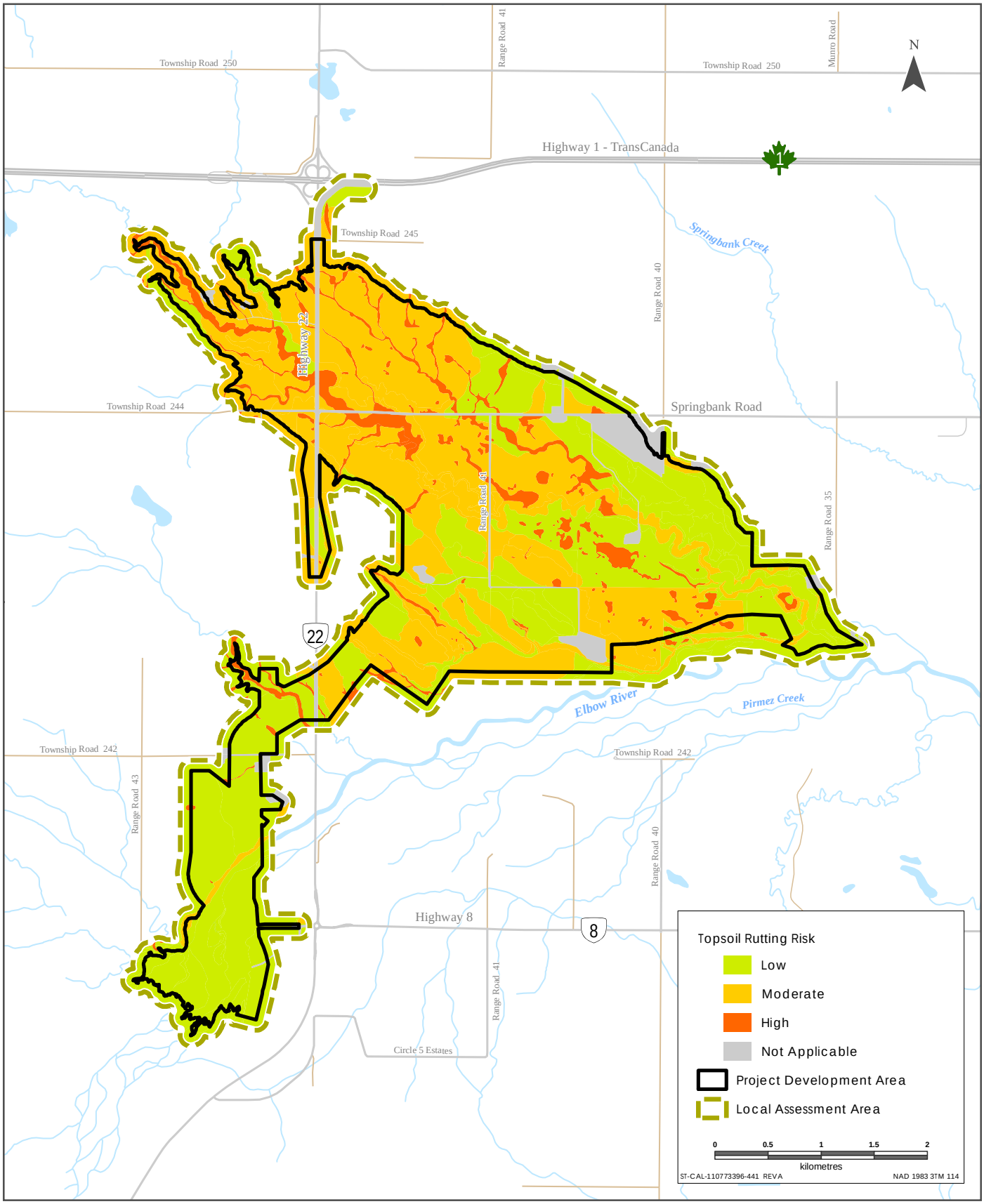
Rutting Rating	Areal Extent in LAA (ha)	% of LAA
High	175.3	9.3
Moderate	748.9	39.7
Low	865.1	45.9
Not Rated	97.1	5.1
Total	**1,886.5**	**100.0**

NOTE:
Areas and proportions will not sum exactly to totals because of rounding

Table 3-35 Subsoil Rutting Risk Summary in the LAA

Rutting Rating	Areal Extent in LAA (ha)	% of LAA
High	175.3	9.3
Moderate	748.9	39.7
Low	865.1	45.9
Not Rated	97.1	5.1
Total	**1,886.5**	**100.0**

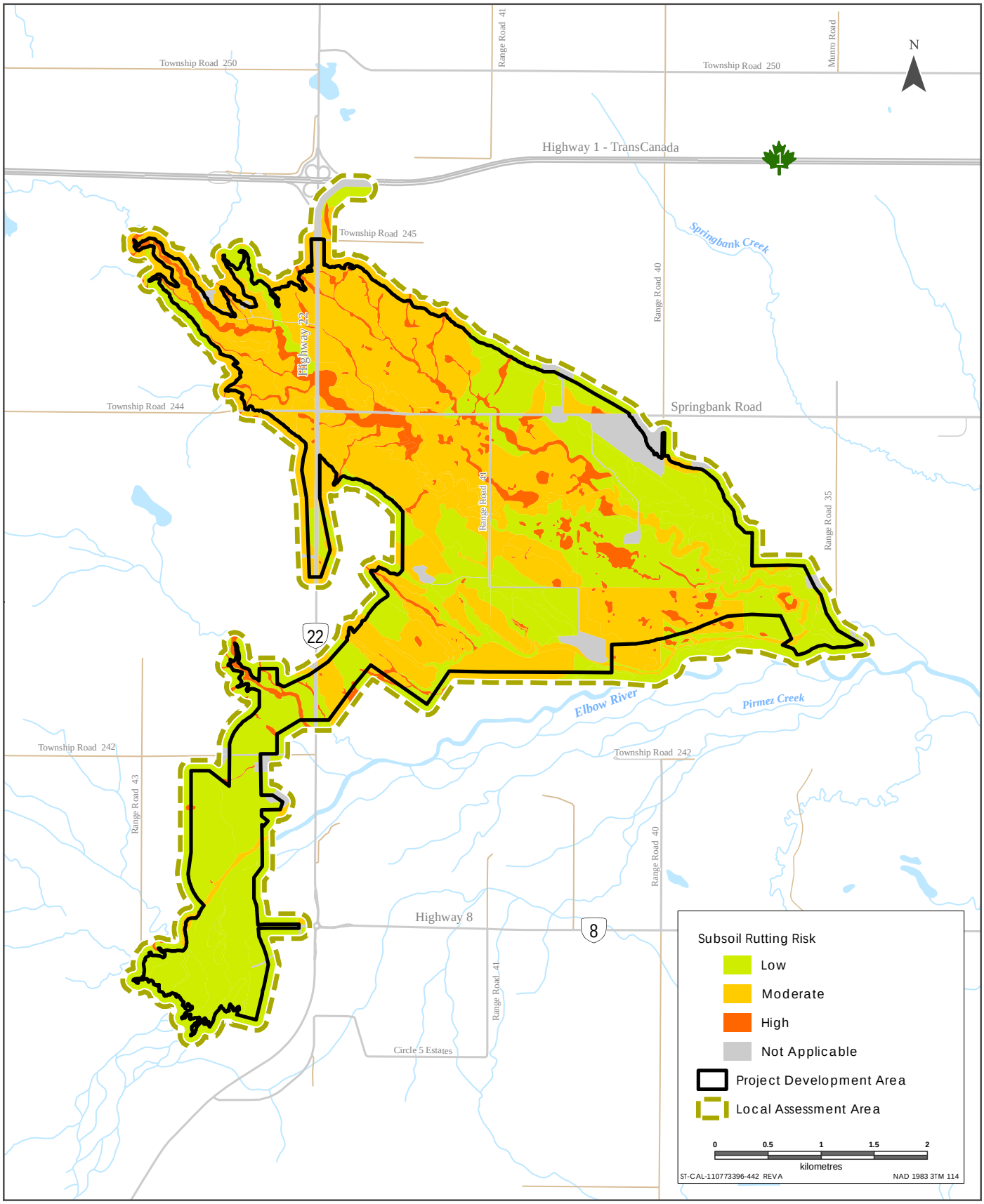
NOTE:
Areas and proportions will not sum exactly to totals because of rounding



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Topsoil Rutting Risk Ratings in the LAA

Stantec



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Subsoil Rutting Risk Ratings in the LAA

Stantec

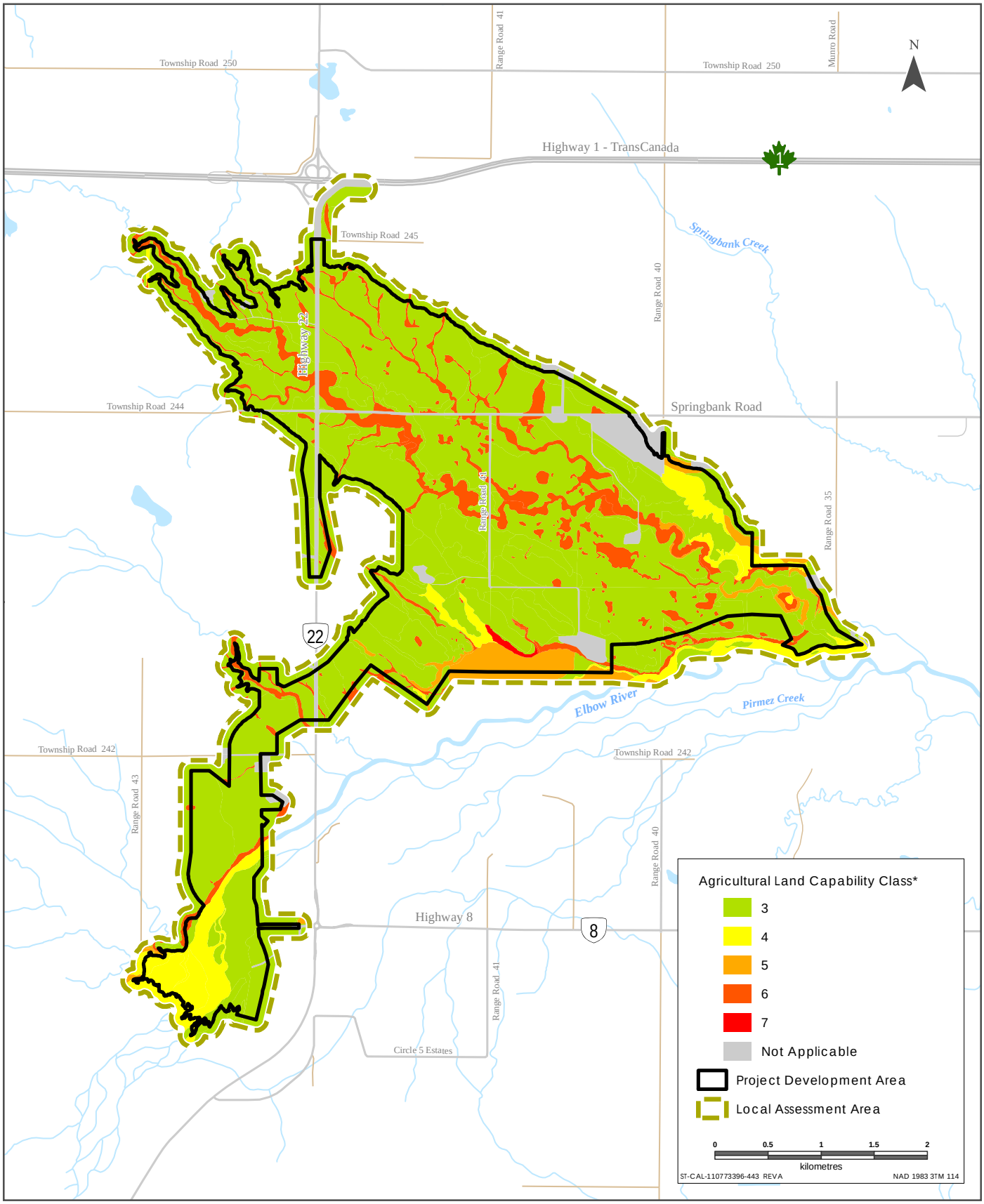
3.2.6.9 Agricultural Land Capability

The agricultural capability of soils in the LAA are limited by the following factors:

- climate
- poor drainage (Gleysolic soils)
- topography (slopes of Class 5 or greater)
- stoniness and shallow depth to bedrock (Twin Bridges and Mesa Butte units)
- moisture holding capacity (TBRgr) and structure (shallow to an impenetrable heavy clay layer)

Extensive areas are rated Class 3 (76%), which is the best possible rating due to a shortened growing season, with relatively equal portions of Class 4 (7%), Class 5 (5%) and Class 6 (8%) (Table 3-36). A small percentage of Class 7 (less than1%) was related to the very steep topography by the Elbow River. The soils labeled as not rated include the 5% of the LAA that is mapped as disturbed (Table 3-37).

Figure 3-17 shows the spatial distribution and extent of the Agricultural Land Capabilities for each soil map unit present in the LAA.



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Agricultural Land Capability Classes in the LAA

Stantec

Table 3-36 Agricultural Land Capability Ratings for Map Units in the LAA

Soil Map Unit	Agricultural Land Capability Class								Area of LAA (ha)	% of LAA
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	N/R %		
Units with fine to very fine-textured till and glaciolacustrine parent materials									**1448.4**	**76.8**
DVFS1	-	-	60.1	31.6	8.3	-	-	-	55.2	2.9
DVFS2	-	-	100.0	-	-	-	-	-	304.3	16.1
DVG1	-	-	76.6	7.5	7.4	8.5	-	-	281.5	14.9
FSH1	-	-	100.0	-	-	-	-	-	276.6	14.7
FSH2	-	-	100.0	-	-	-	-	-	437.2	23.2
POT1	-	-	-	-	-	100.0	-	-	30.0	1.6
POT2	-	-	20.0	-	-	80.0	-	-	20.5	1.1
POT6	-	-	49.3	-	0.7	50.0	-	-	43.1	2.3
Units with medium-textured fluvial parent materials									**38.1**	**2.0**
SRC1	-	-	100.0	-	-	-	-	-	35.8	1.9
SRC4	-	-	100.0	-	-	-	-	-	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials									**172.1**	**9.1**
TBR1	-	-	100.0	-	-	-	-	-	6.4	0.3
TBR2	-	-	100.0	-	-	-	-	-	50.7	2.7
TBR4	-	-	80.0	3.4	16.6	-	-	-	11.4	0.6
TBRgr1	-	-	-	100.0	-	-	-	-	61.9	3.3
TBRgr2	-	-	-	-	100.0	-	-	-	6.8	0.4
ZGC1	-	-	-	-	100.0	-	-	-	35.0	1.9
Undifferentiated units, transitional areas									**129.7**	**6.9**
POT7	-	-	11.9	8.1	20.0	60.0	-	-	81.7	4.3
TBR6	-	-	100.0	-	-	-	-	-	15.1	0.8
TBSR1	-	-	12.8	87.2	-	-	-	-	30.0	1.6
MSTB1	-	-	-	-	-	50.0	50.0	-	2.8	0.2
Other units									**98.2**	**5.2**
ZDL	-	-	-	-	-	-	-	100.0	97.1	5.1
ZREC	-	-	-	100.0	-	-	-	-	1.1	0.1
Total									**1,886.5**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding
N/R = Not rated

Table 3-37 Agricultural Land Capability Summary of the LAA

Agricultural Land Capability Class	Area of LAA (ha)	% of LAA
1	0.0	0.0
2	0.0	0.0
3	1425.2	75.5
4	134.6	7.2
5	85.9	4.6
6	142.2	7.5
7	1.4	0.1
Not Rated	97.1	5.1
Total	**1,886.5**	**100.0**

NOTE:
Areas and proportions will not sum exactly to totals because of rounding

3.2.6.10 Reclamation Suitability

Reclamation suitability ratings are summarized by soil map unit in Table 3-38 and Table 3-39, and grouped into summaries in Table 3-40 and Table 3-41 for first lift and second lift ratings for the LAA.

First lift is defined as topsoil layers, while second lift is defined as the mineral horizon immediately below either the topsoil or organic horizon. Peaty surface layers are not rated for first lift reclamation suitability because the system does not rate organic horizons (TBRgr). In addition, disturbed lands and reclaimed profiles are not rated for either lift. Figures 3-18 and Figure 3-19 show reclamation suitability ratings in the LAA.

The majority of rated series for first lift in the LAA are fair (75%) to good (5%). Black Chernozemic soils dominate the landscape in the LAA and the topsoil substrate is of fair to good suitability for reclamation (DVG, DVGca, FSH, FSHca, FSHgl, MSB, and SRCxg). Saturation percentage is not used for first lift calculation because the organic content of the topsoil is too elevated to properly analyze. Regosols (TBR, TBRgl) are also rated fair to good for first lift (Table 3-38). The 12% that are rated as poor (POT, SRCca and ZGC) is due to deductions for elevated calcium carbonate equivalent and for fine to very fine surface texture. The remaining 9% are not rated because it includes the organic surface horizon (TBRgr), and reclaimed and disturbed soils (Table 3-40).

For the second lift, most of the LAA—except for the portions not rated (5%) for reclaimed and disturbed soil units, and the medium to coarse-textured glaciofluvial units (SRCca, TBR and ZGC)—is rated as poor (81%) to unsuitable (4%). The most common limitations for the second lift are texture (fine to very fine glaciolacustrine and till soils), high coarse fragment content and saturation percent. This group comprises Chernozemic series soils (DVG, DVGca, FSH, FSHca, FSHgl, MSB, SRCxg), Regosolic series soils (TBRgl, TBRgr) and Gleysolic series soils (POT).

Figure 3-18 shows upper lift reclamation suitability ratings. The poorly rated soils densely populate the areas of the terraced floodplains near the Elbow River and the fluvial deposits of the tributaries that feed it.

Figure 3-19 shows lower lift reclamation suitability ratings, which is almost a reversal of the upper lift figure. The poorly rated soils are dominant and cover most of the LAA. Areas of good to fair rated soils are clustered along the Elbow River.

Table 3-38 Reclamation Suitability Ratings for First Lift of Map Units in the LAA

Soil Map Unit	Good %	Fair %	Poor %	Unsuitable %	N/A %	N/R %	Area of LAA (ha)	% of LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials							**1448.4**	**76.8**
DVFS1	-	100.0	-	-	-	-	55.2	2.9
DVFS2	-	100.0	-	-	-	-	304.3	16.1
DVG1	-	100.0	-	-	-	-	281.5	14.9
FSH1	-	100.0	-	-	-	-	276.6	14.7
FSH2	-	100.0	-	-	-	-	437.2	23.2
POT1	-	-	100.0	-	-	-	30.0	1.6
POT2	-	20.0	80.0	-	-	-	20.5	1.1
POT6	-	50.0	50.0	-	-	-	43.1	2.3
Units with medium-textured fluvial parent materials							**38.1**	**2.0**
SRC1	-	-	100.0	-	-	-	35.8	1.9
SRC4	-	20.0	80.0	-	-	-	2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials							**172.1**	**9.1**
TBR1	100.0	-	-	-	-	-	6.4	0.3
TBR2	80.0	20.0	-	-	-	-	50.7	2.7
TBR4	80.0	-	-	-	-	20.0	11.4	0.6
TBRgr1	-	-	-	-	-	100.0	61.9	3.3
TBRgr2	-	-	20.0	-	-	80.0	6.8	0.4
ZGC1	-	-	100.0	-	-	-	35.0	1.9
Undifferentiated, transitional areas							**129.7**	**6.9**
POT7	-	20.0	80.0	-	-	-	81.7	4.3
TBR6	80.0	20.0	-	-	-	-	15.1	0.8
TBSR1	50.0	-	50.0	-	-	-	30.0	1.6
MSTB1	50.0	50.0	-	-	-	-	2.8	0.2
Other units							**98.2**	**5.2**
ZDL	-	-	-	-	100.0	-	97.1	5.1
ZREC	-	100.0	-	-	-	-	1.1	0.1
Total							**1886.5**	**100.0**

NOTES:
Areas and proportions will not sum exactly to totals because of rounding
N/A = Not applicable
N/R = Not rated

Table 3-39 Reclamation Suitability Ratings for Second Lift of Map Units in the LAA

Soil Map Unit	Good %	Fair %	Poor %	Unsuitable %	N/A %	N/R %	Area of LAA (ha)	% of LAA
Units with fine to very fine-textured till and glaciolacustrine parent materials							**1448.4**	**76.8**
DVFS1			100.0				55.2	2.9
DVFS2			100.0				304.3	16.1
DVG1			100.0				281.5	14.9
FSH1			100.0				276.6	14.7
FSH2			100.0				437.2	23.2
POT1			100.0				30.0	1.6
POT2			100.0				20.5	1.1
POT6			100.0				43.1	2.3
Units with medium-textured fluvial parent materials							**38.1**	**2.0**
SRC1		100.0					35.8	1.9
SRC4		80.0	20.0				2.3	0.1
Units with moderately coarse to very coarse-textured fluvial and glaciofluvial parent materials							**172.1**	**9.1**
TBR1	100.0						6.4	0.3
TBR2	80.0		20.0				50.7	2.7
TBR4	80.0			20.0			11.4	0.6
TBRgr1				100.0			61.9	3.3
TBRgr2		20.0		80.0			6.8	0.4
ZGC1		100.0					35.0	1.9
Undifferentiated, transitional areas							**129.7**	**6.9**
POT7		20.0	80.0				81.7	4.3
TBR6	80.0		20.0				15.1	0.8
TBSR1	50.0	50.0					30.0	1.6
MSTB1	50.0			50.0			2.8	0.2
Other units							**98.2**	**5.2**
ZDL					100.0		97.1	5.1
ZREC			100.0				1.1	0.1
Total							**1886.5**	**100.0**

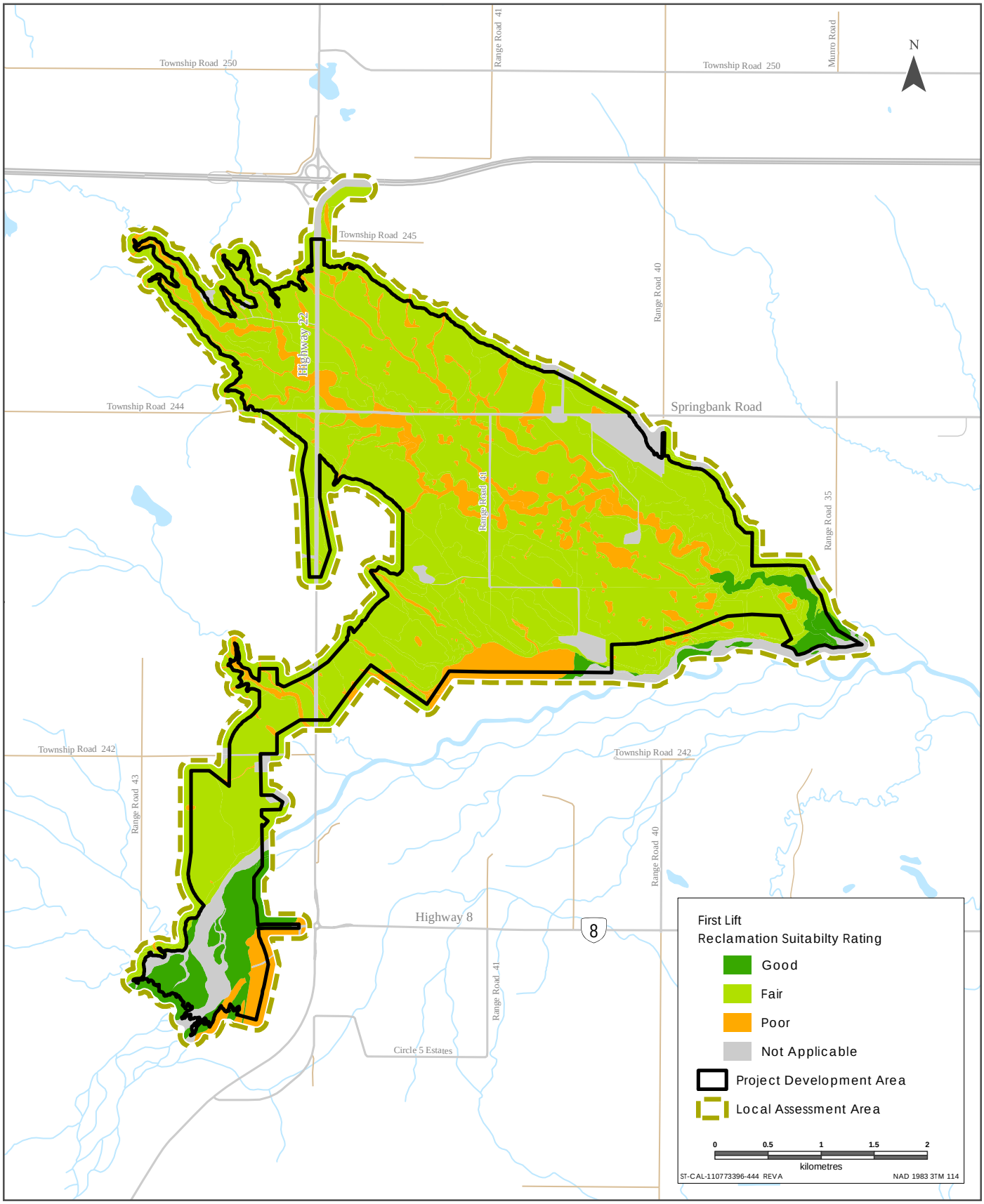
NOTES:
Areas and proportions will not sum exactly to totals because of rounding
N/A = Not applicable
N/R = Not rated

Table 3-40 First Lift Reclamation Suitability Ratings in the LAA

Reclamation Suitability Rating	Areal Extent in LAA (ha)	% of LAA
Good	84.6	4.5
Fair	1412.9	74.9
Poor	222.3	11.8
Unsuitable	-	-
Not Applicable	97.1	5.1
Not Rated	69.5	3.7
Total	1886.5	100.0
NOTE: Areas and proportions might not add up to totals because of rounding		

Table 3-41 Second Lift Reclamation Suitability Ratings in the LAA

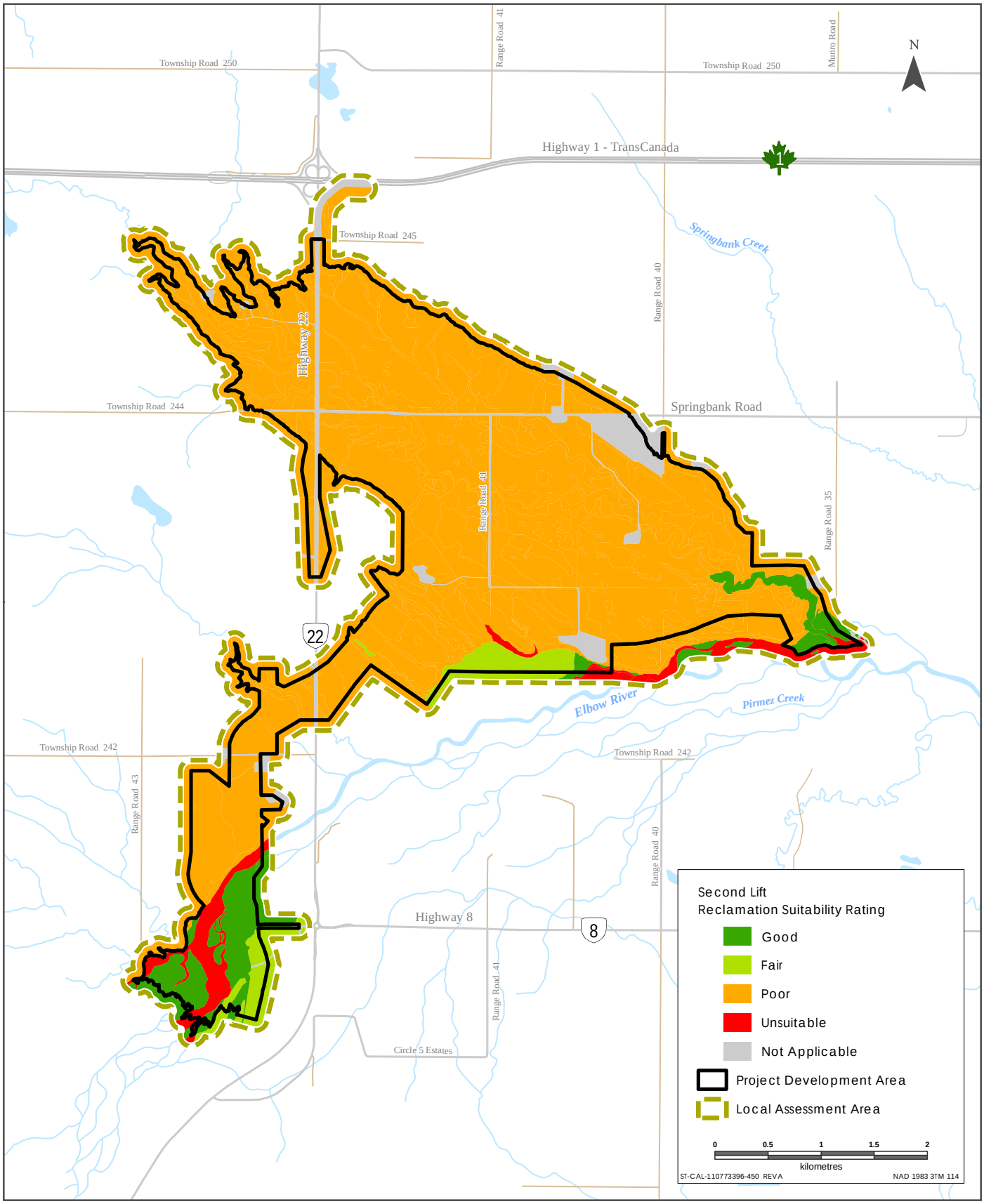
Reclamation Suitability Rating	Areal Extent in LAA (ha)	% of LAA
Good	84.6	4.5
Fair	105.4	5.6
Poor	1528.5	81.0
Unsuitable	71.0	3.8
Not applicable	97.1	5.1
Not rated	-	-
Total	1886.5	100.0
NOTE: Areas and proportions might not add up to totals because of rounding		



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

First Lift Reclamation Suitability in the LAA

Stantec



Sources: Base Data - Government of Alberta, Government of Canada, Thematic Data - Stantec Ltd.

Second Lift Reclamation Suitability in the LAA

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3.3 SOILS SUMMARY

3.3.1 LAA

Soil mapping in the LAA identified the dominant parent material (77% of LAA) to be fine to very fine-textured glaciolacustrine and till deposits. The most common soil orders are Chernozems and Gleysols of the Dunvargan, Fish Creek and Pothole Creek soil series. Soil drainage for these series ranged from well to poor and slope classes ranged from 1 to 8 (0% to 70%).

The second most common parent material (9% of LAA) is moderately coarse to very-coarse textured glaciofluvial and fluvial parent materials, which are located along the Elbow River and in former meltwater channels. The dominant soils for this texture class are Regosols and Gleysols of the Twin Bridges and Gleysol Coarse soil series. The drainage ranged from rapid to poor and the terrain is level to moderately sloping (0% to 30% slope).

Complex parent material units that include a combination of fine to very fine-textured till, colluvial deposits over residuum (sandstone and shale) and medium to very-coarse textured fluvial or glaciofluvial material occupy approximately 11% of the LAA. The soils in this texture group are mainly Regosols, Gleysols and weakly developed Chernozems. The drainage for this group ranges from rapid to poor and the terrain is nearly level to steeply sloping (0% to 45% slope).

Soils developed on medium -textured fluvial materials covered approximately 2% of the LAA and were predominantly Chernozems. The Sarcee soil series best represent this map unit. These units occurred along terraced floodplains on gentle terrain (0% to 2% slope) and are typically well drained.

The remaining units (reclaimed soil and disturbed land) covered 5% of the LAA.

Agricultural land capability in the LAA is primarily Class 3 (76%) and the primary restriction is climate. Other classes are 4 through 7, and the limiting factors included poor drainage, topography, stoniness, shallow depth to bedrock, moisture holding capacity and subsoil structure (shallow to an impeding soil layer. LAA soils typically had fair reclamation suitability for the first lift and poor reclamation suitability for the second lift.

Water erosion risk is primarily very low (60% of LAA) with the remaining area rated as moderate to severe. Wind erosion risk is mainly low for topsoil and moderate for subsoil. Compaction ratings are dominantly moderate to high for topsoil and subsoil in across the LAA due to low relief and high clay contents. Rutting risk is mainly low to moderate depending on soil moisture, organic content and slope factors.

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Attachment A TERRAIN MAP BOOK

Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Surficial Material

- LG=Glaciolacustrine Material
- M=Morainal Material (till)

- Project Development Area
- Local Assessment Area

0 100 200 300 400 500

metres

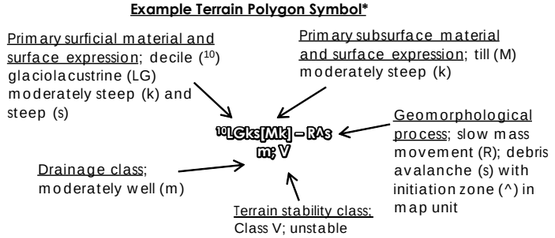
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

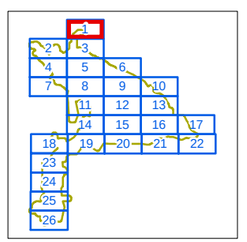
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

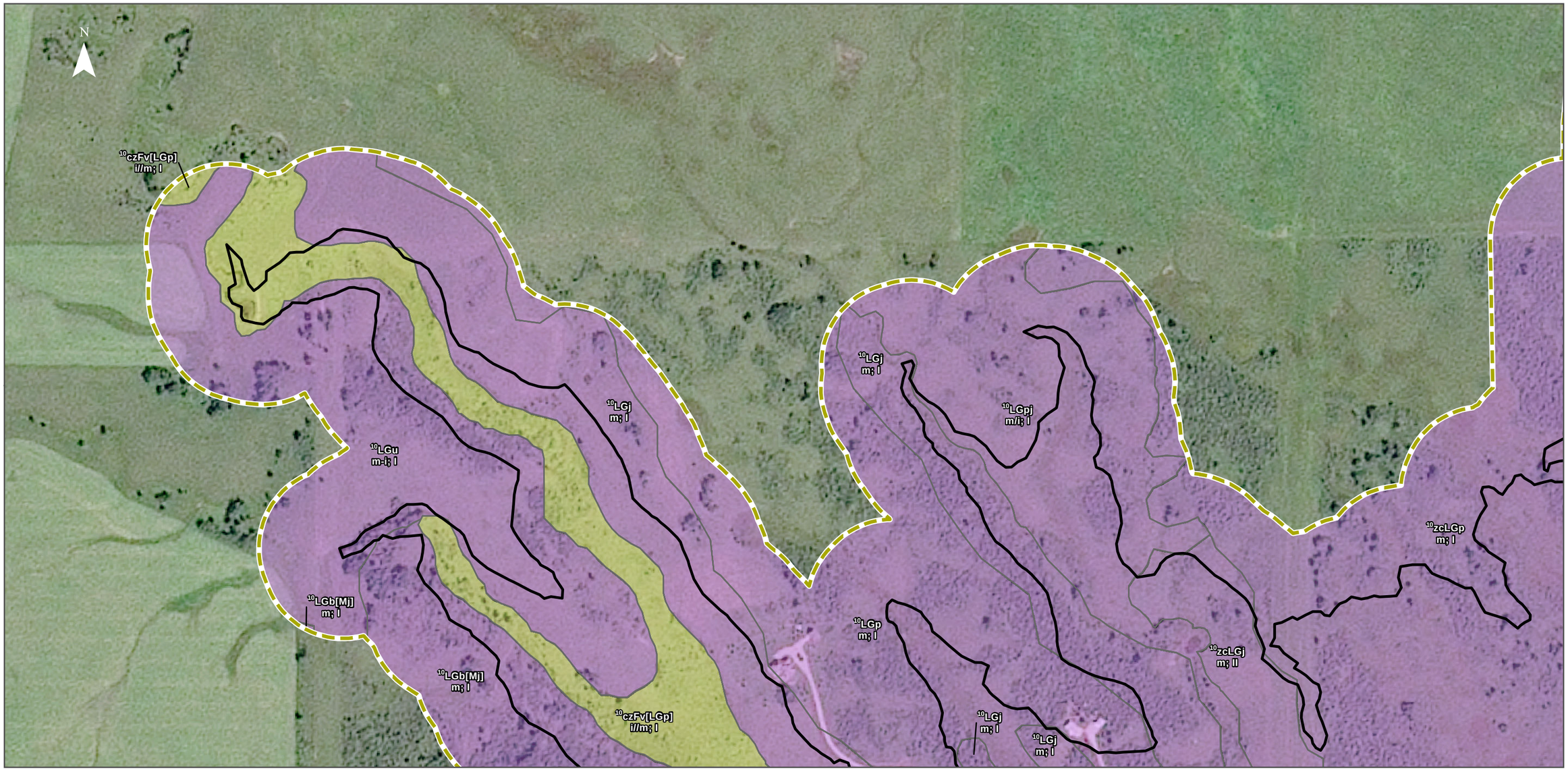
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-1



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material

- Project Development Area
- Local Assessment Area

0 100 200 300 400 500

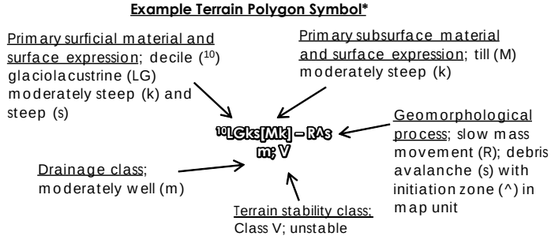
metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



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IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
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[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
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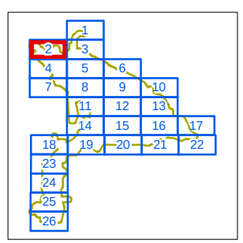
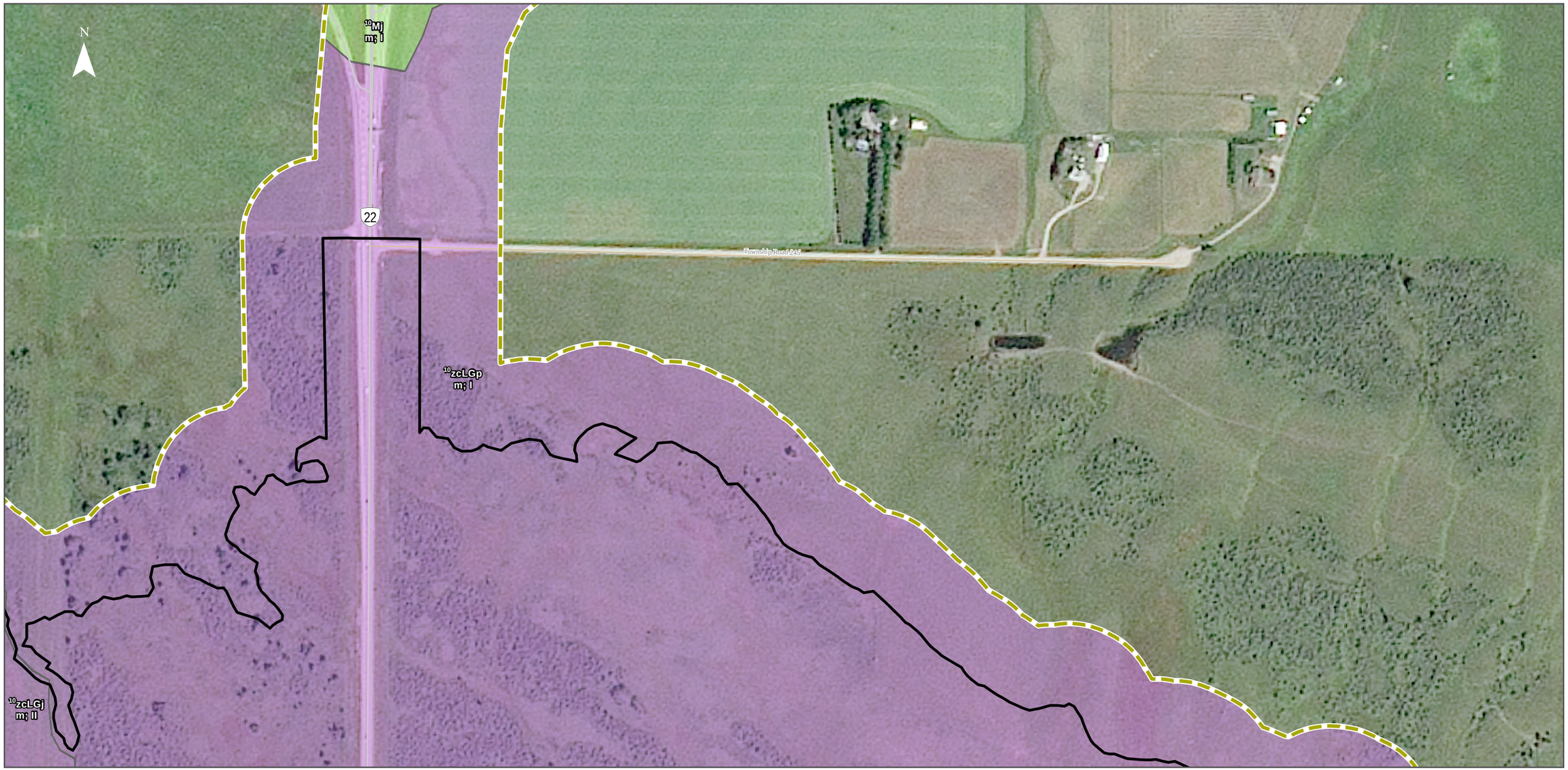
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-2



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Surficial Material

- LG=Glaciolacustrine Material
- M=Morainal Material (till)

- Project Development Area
- Local Assessment Area

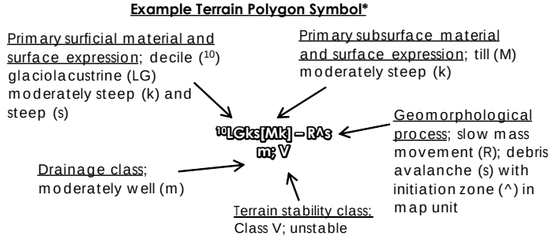
0 100 200 300 400 500
metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1, 2]
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[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

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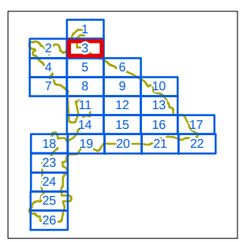
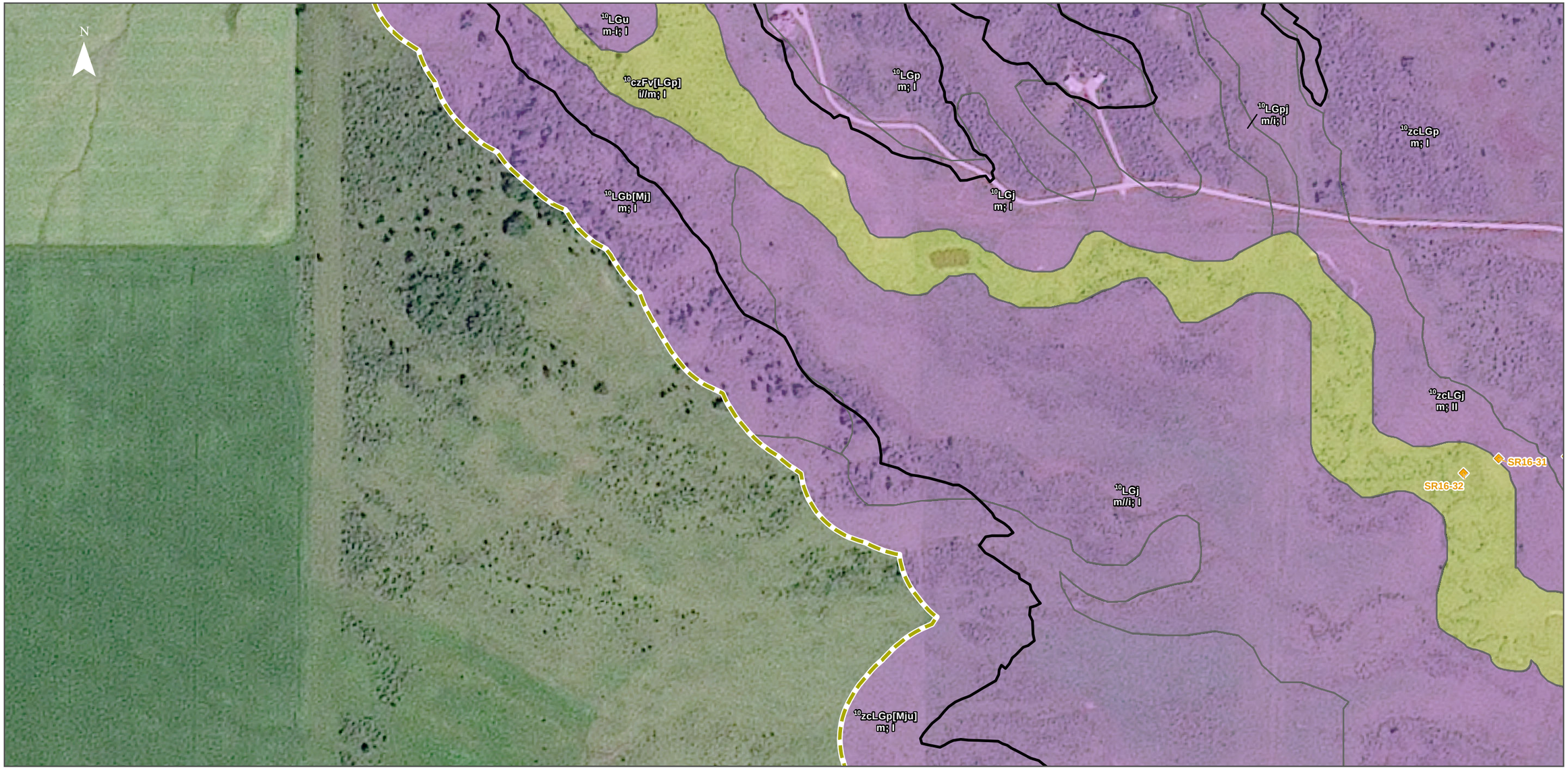


Terrain and Terrain Stability Mapbook

Attachment 1-3



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

F=Fluvial Material

LG=Glaciolacustrine Material

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (10) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

10LGks[Mk]-RAs
m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
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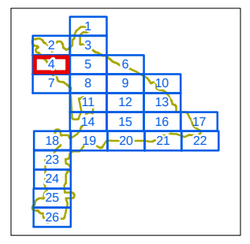
p	poorly drained
v	very poorly drained

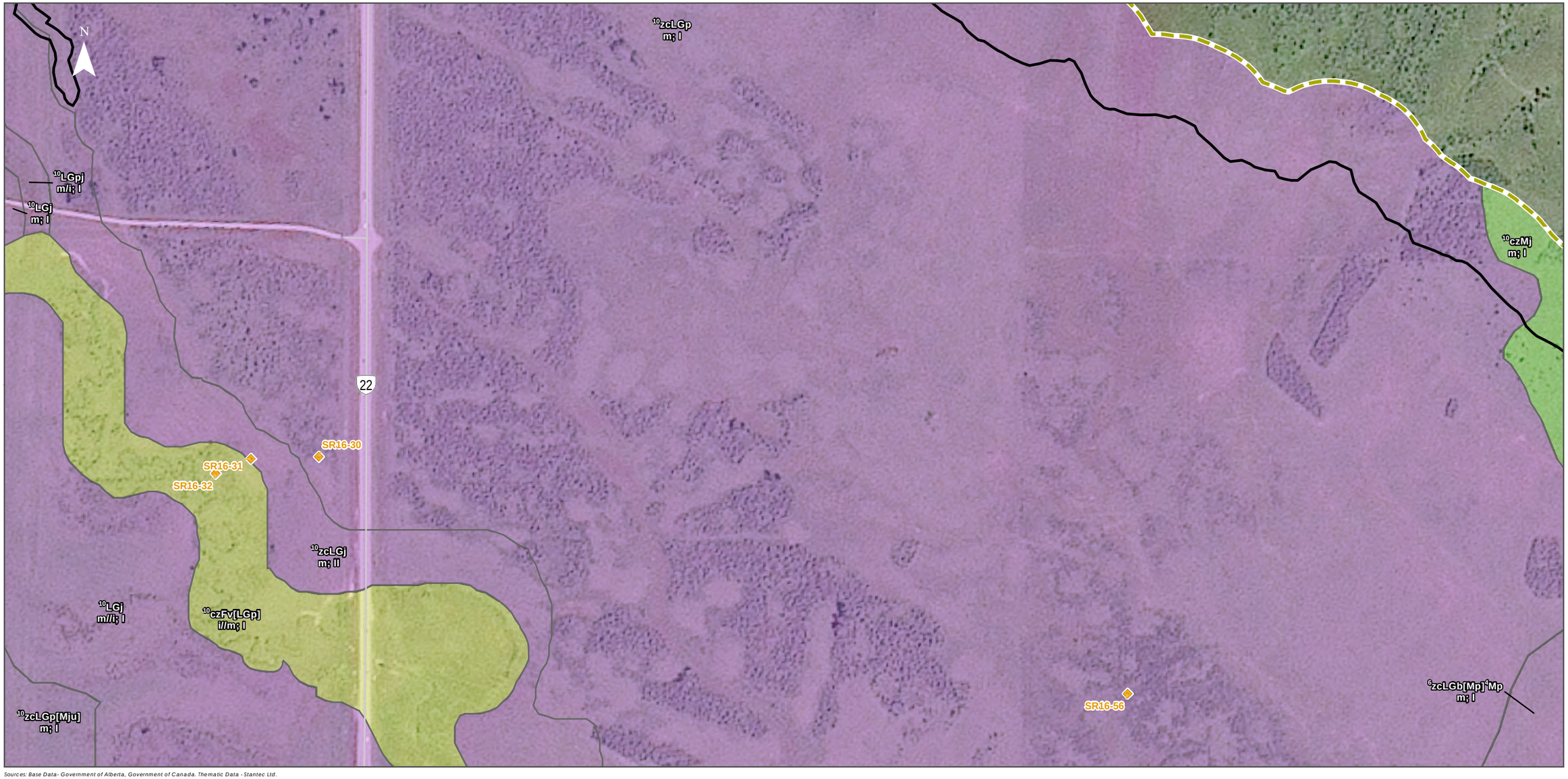


Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-4



Sources: Base Data - Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

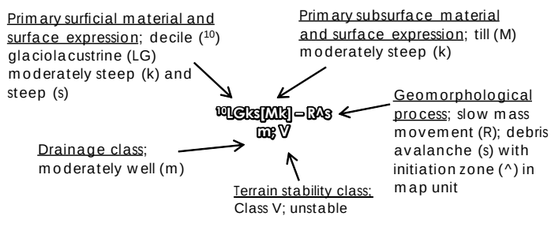
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

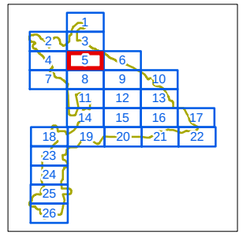
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

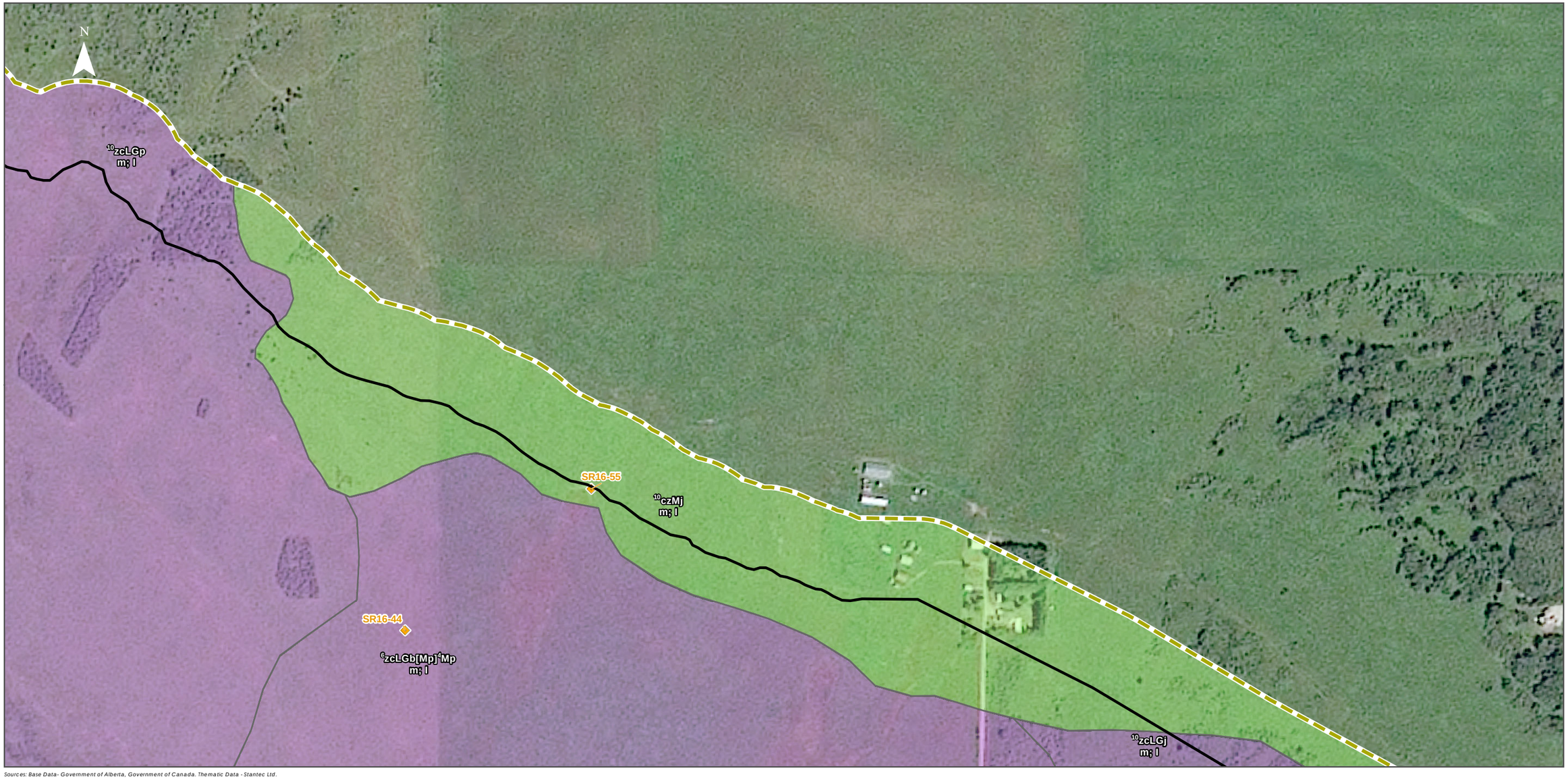
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-5



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

LG=Glaciolacustrine Material

M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

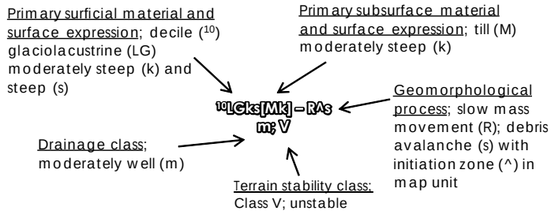
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

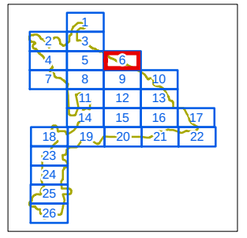
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-6

Sources: Base Data - Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- N=Not Classified

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (^{10}) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

^{10}LCks[Mk] – RAs
m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

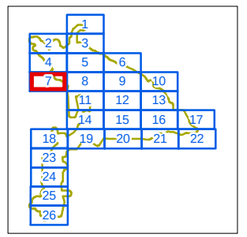
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

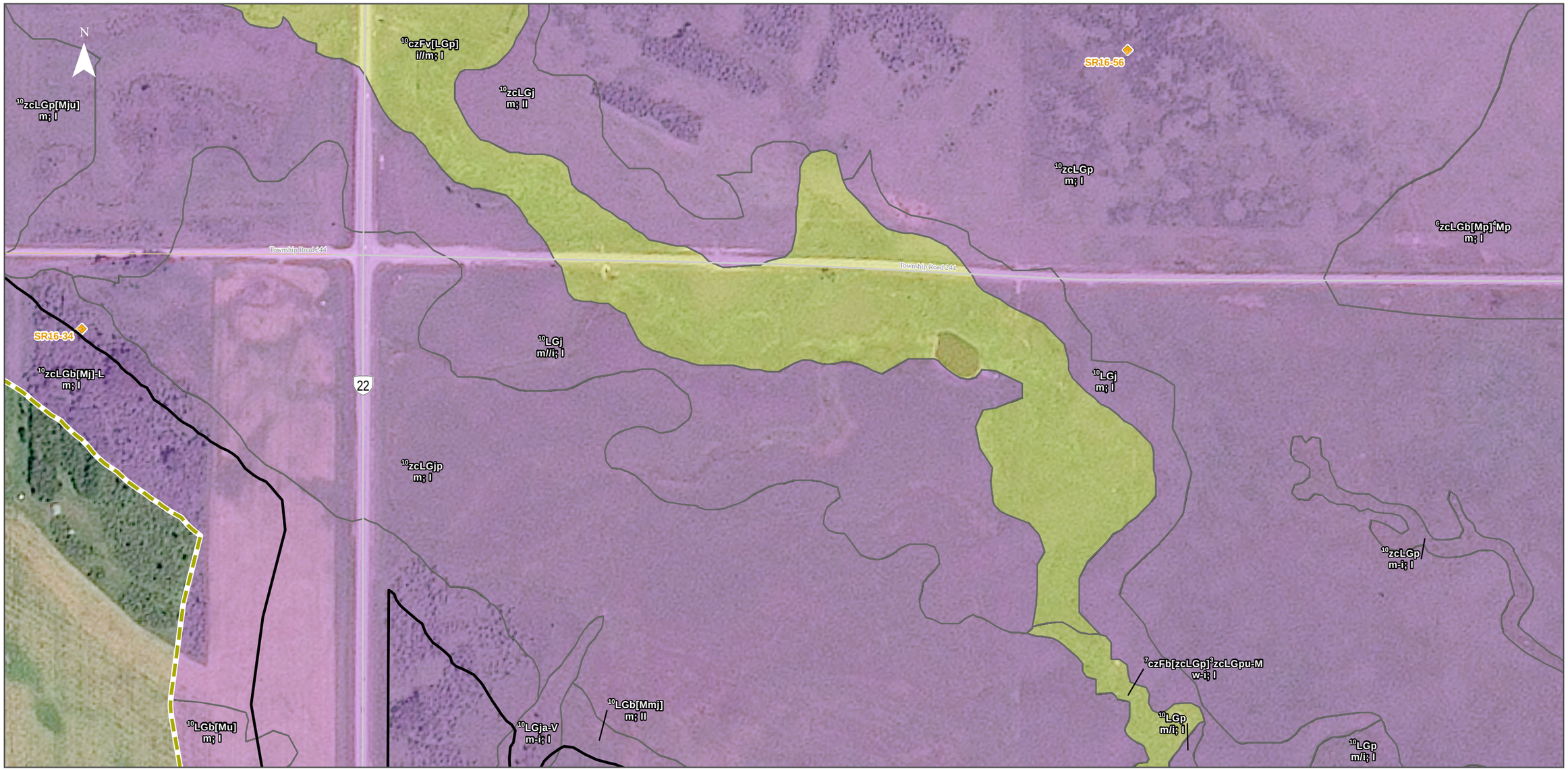
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-7



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

F=Fluvial Material

LG=Glaciolacustrine Material

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (^{10}) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

^{10}LGks[Mk]–RAs
m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

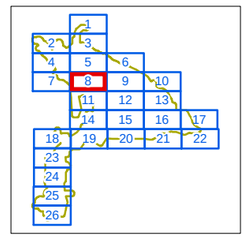
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

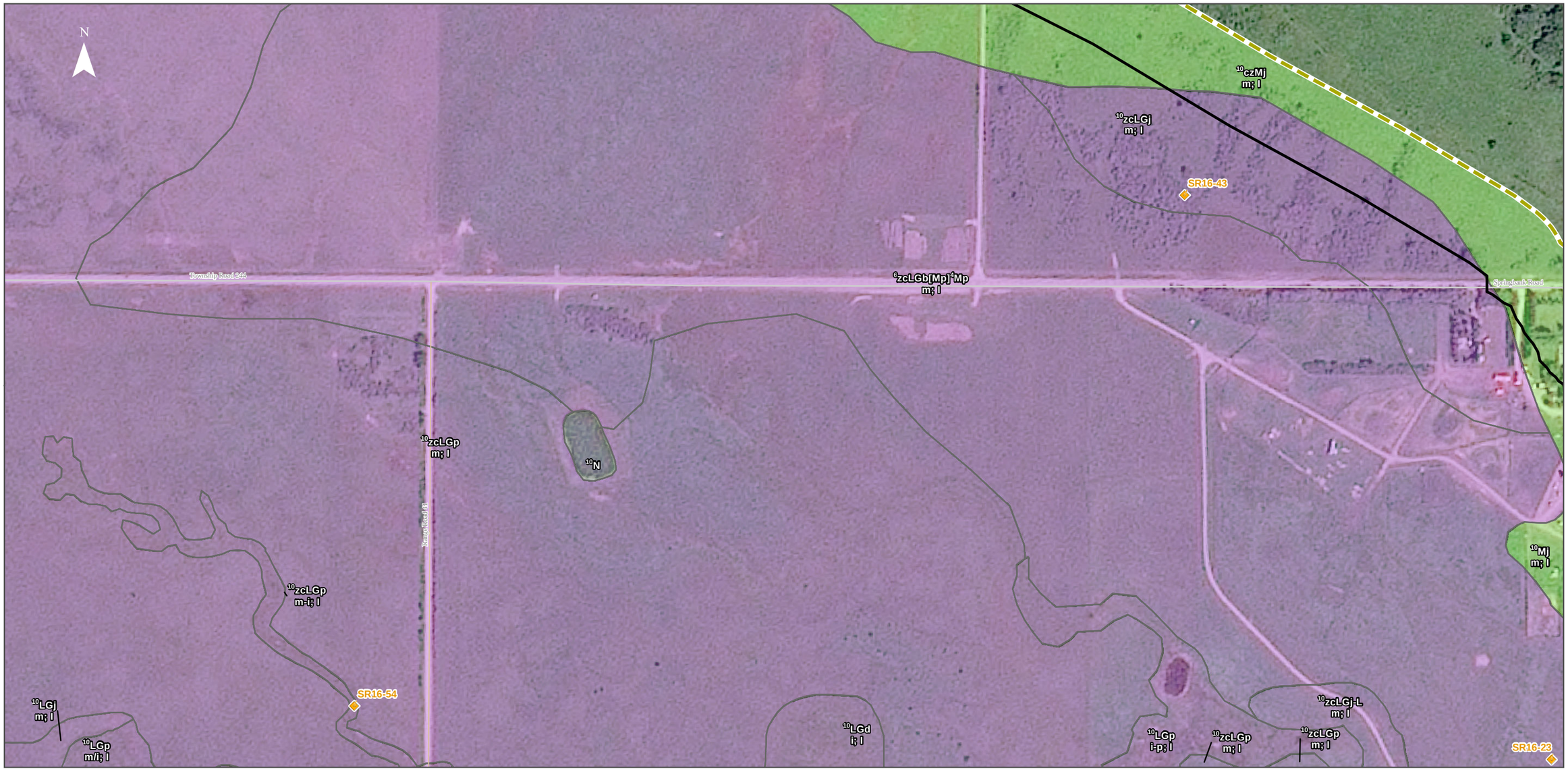
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-8



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- LG=Glaciolacustrine Material
- M=Morainal Material (till)
- N=Not Classified

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

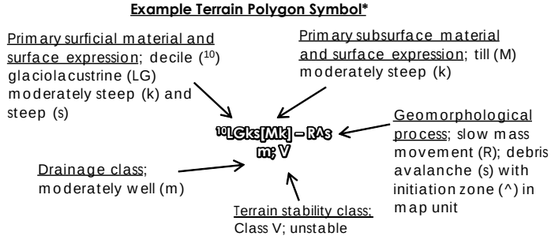
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

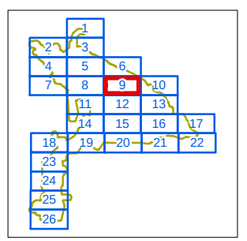
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-9

Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

LG=Glaciolacustrine Material

M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

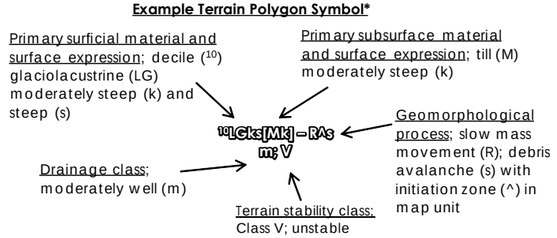
metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

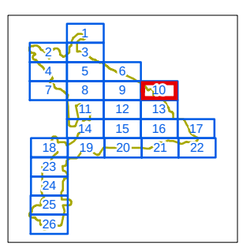
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

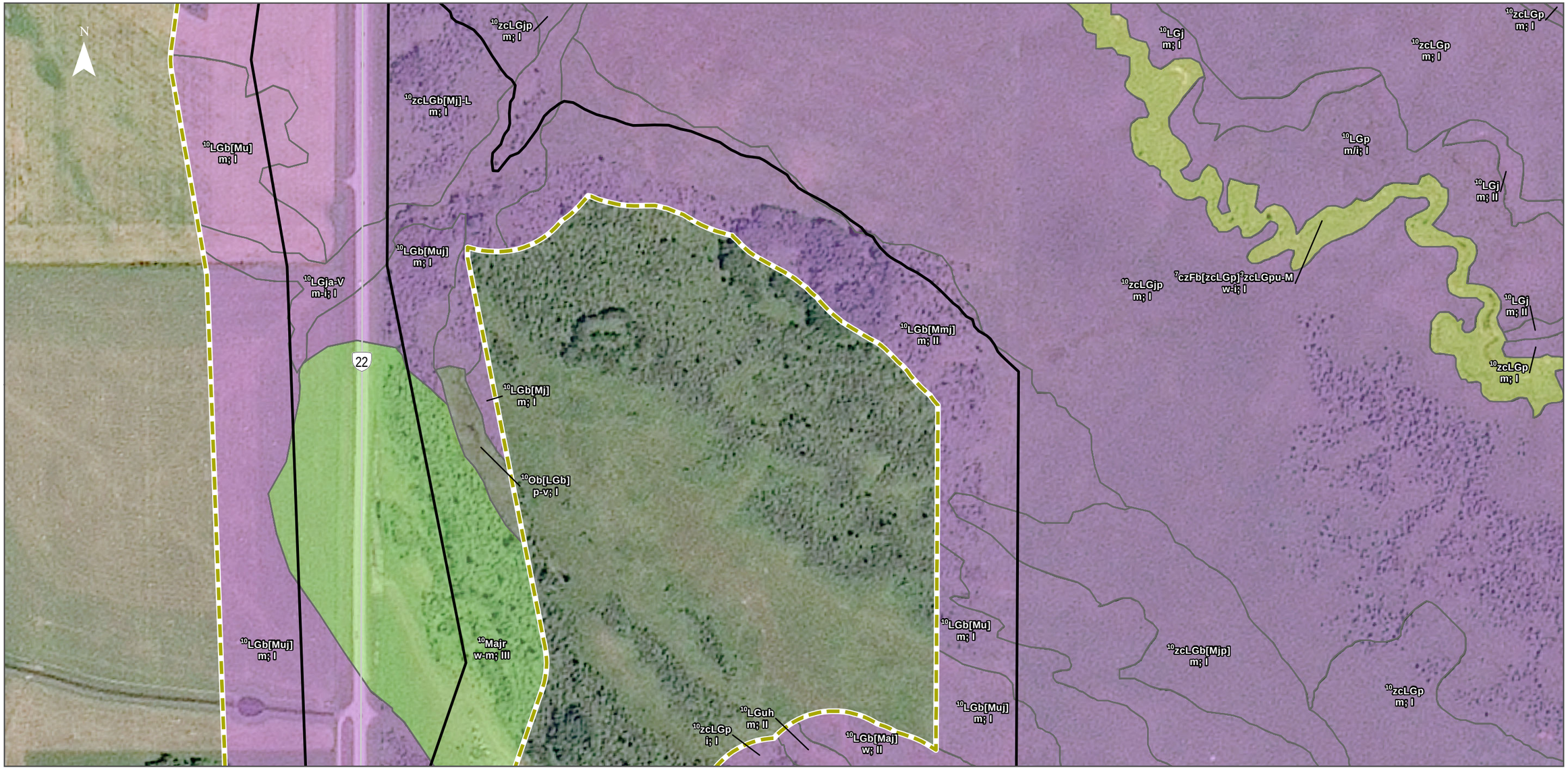
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-10



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)
- O=Organic Material

- Project Development Area
- Local Assessment Area

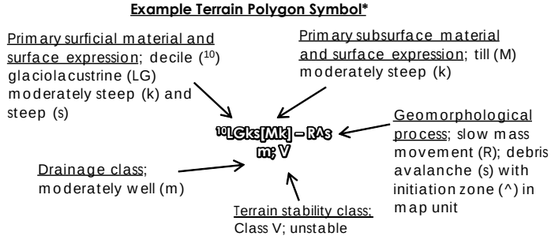
0 100 200 300 400 500
metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*

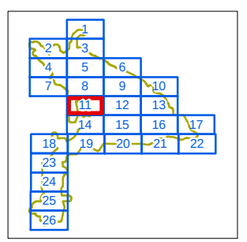


* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

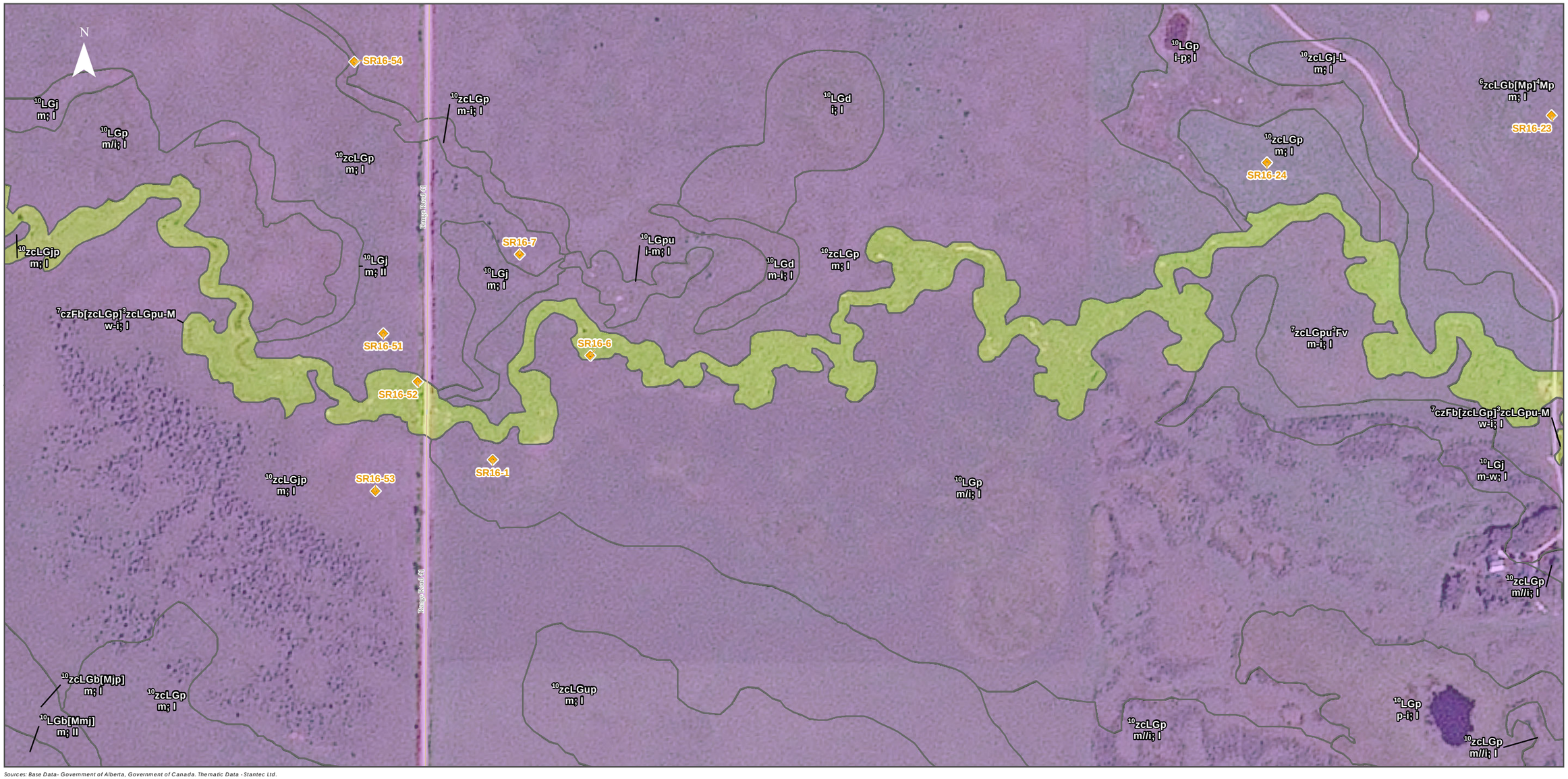
NOTES:
[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-11



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

F=Fluvial Material

LG=Glaciolacustrine Material

Project Development Area

Local Assessment Area

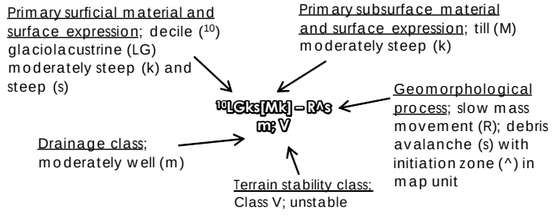
0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

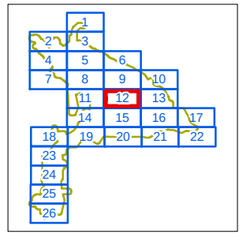
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

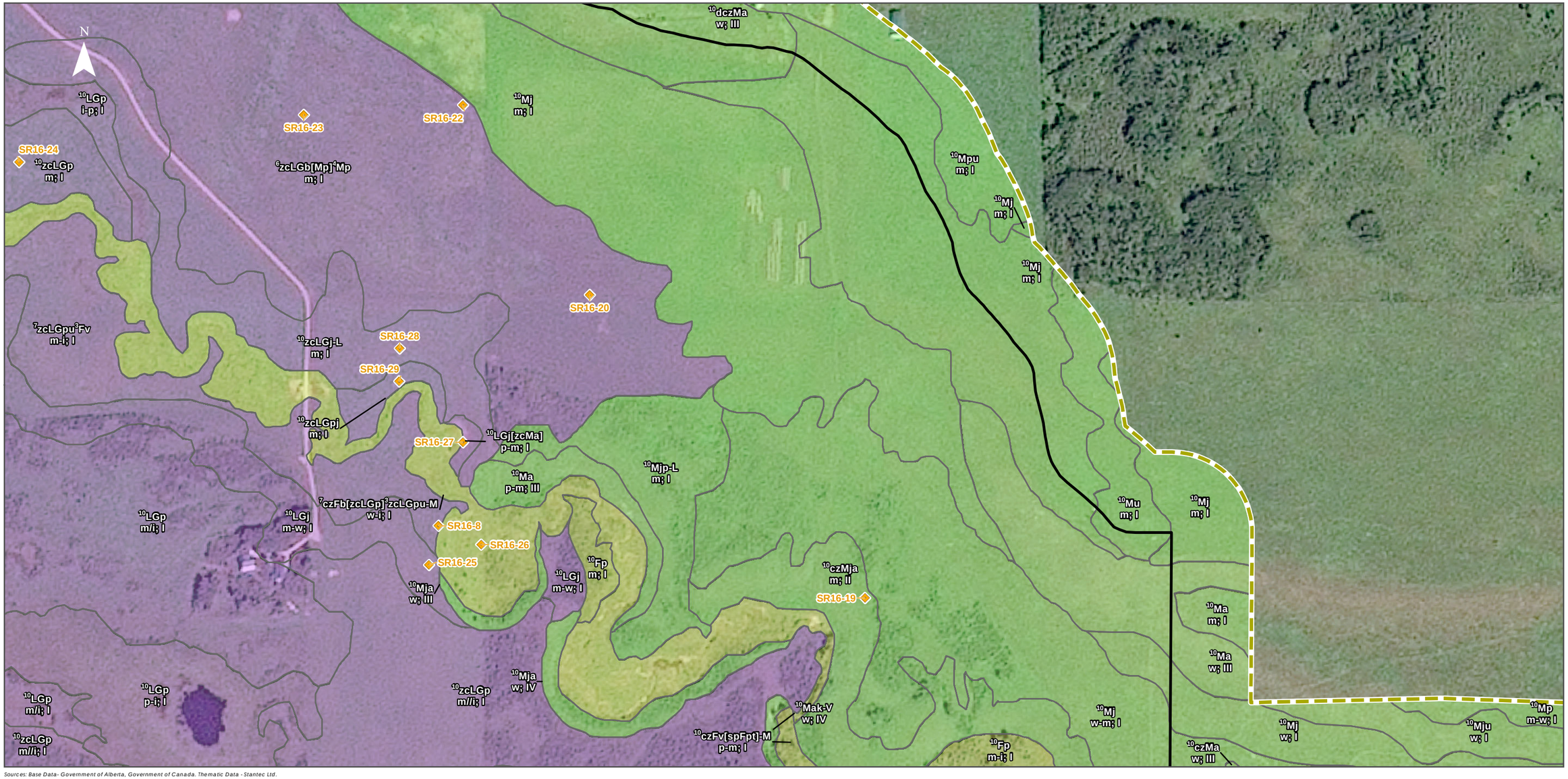
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-12



Sources: Base Data - Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (^{10}) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

^{10}LGks[Mk]–RAs m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

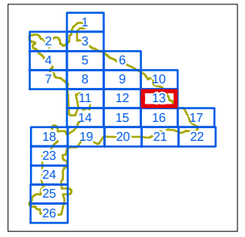
NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes

r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained

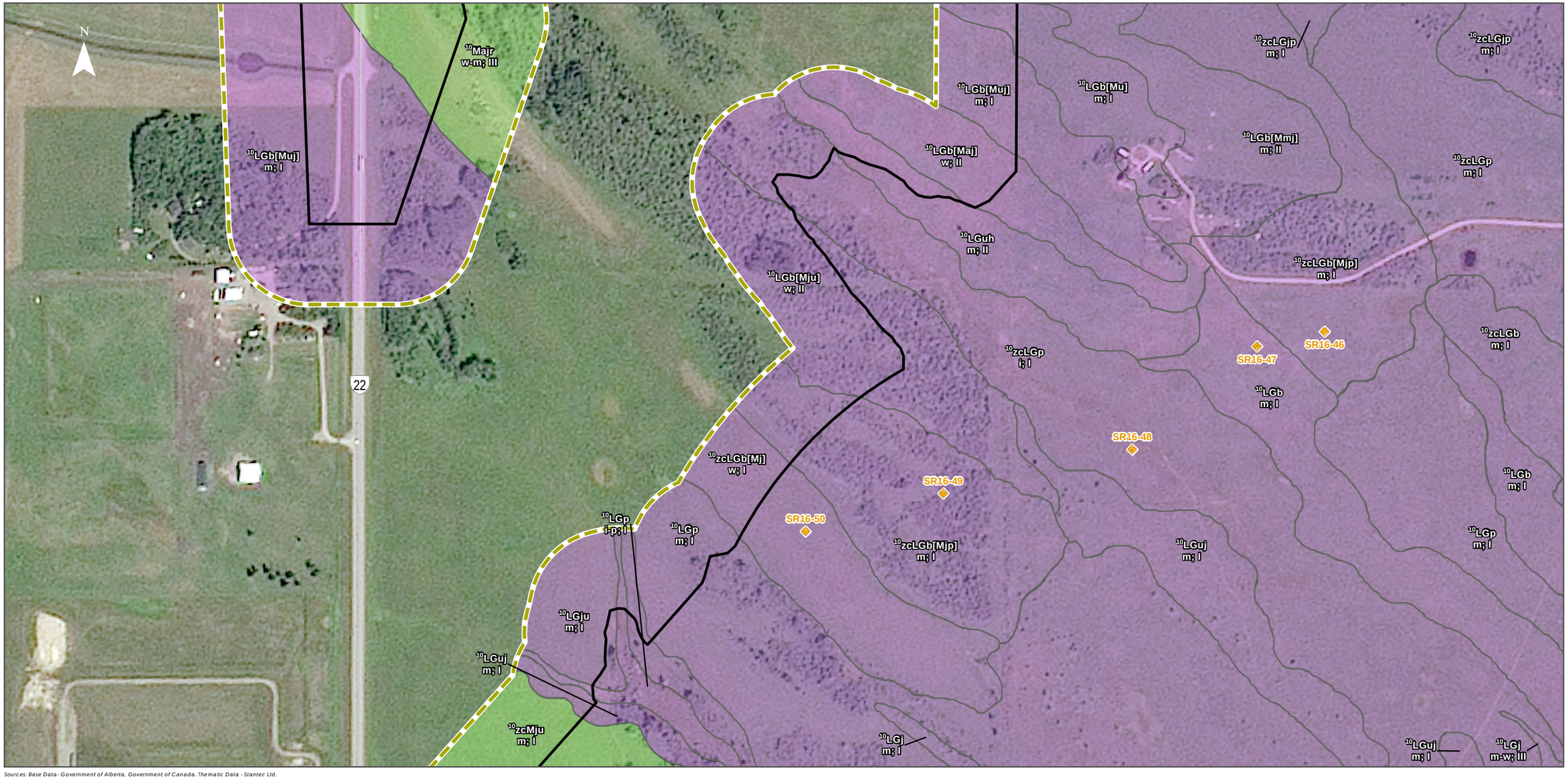


Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-13



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

LG=Glaciolacustrine Material

M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

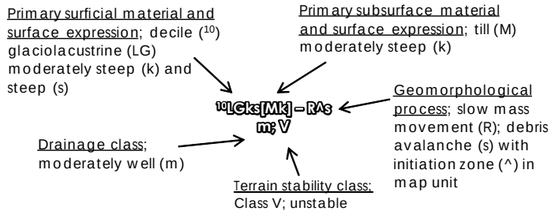
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

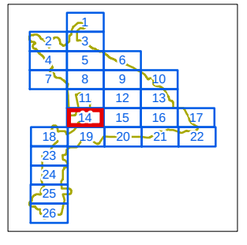
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

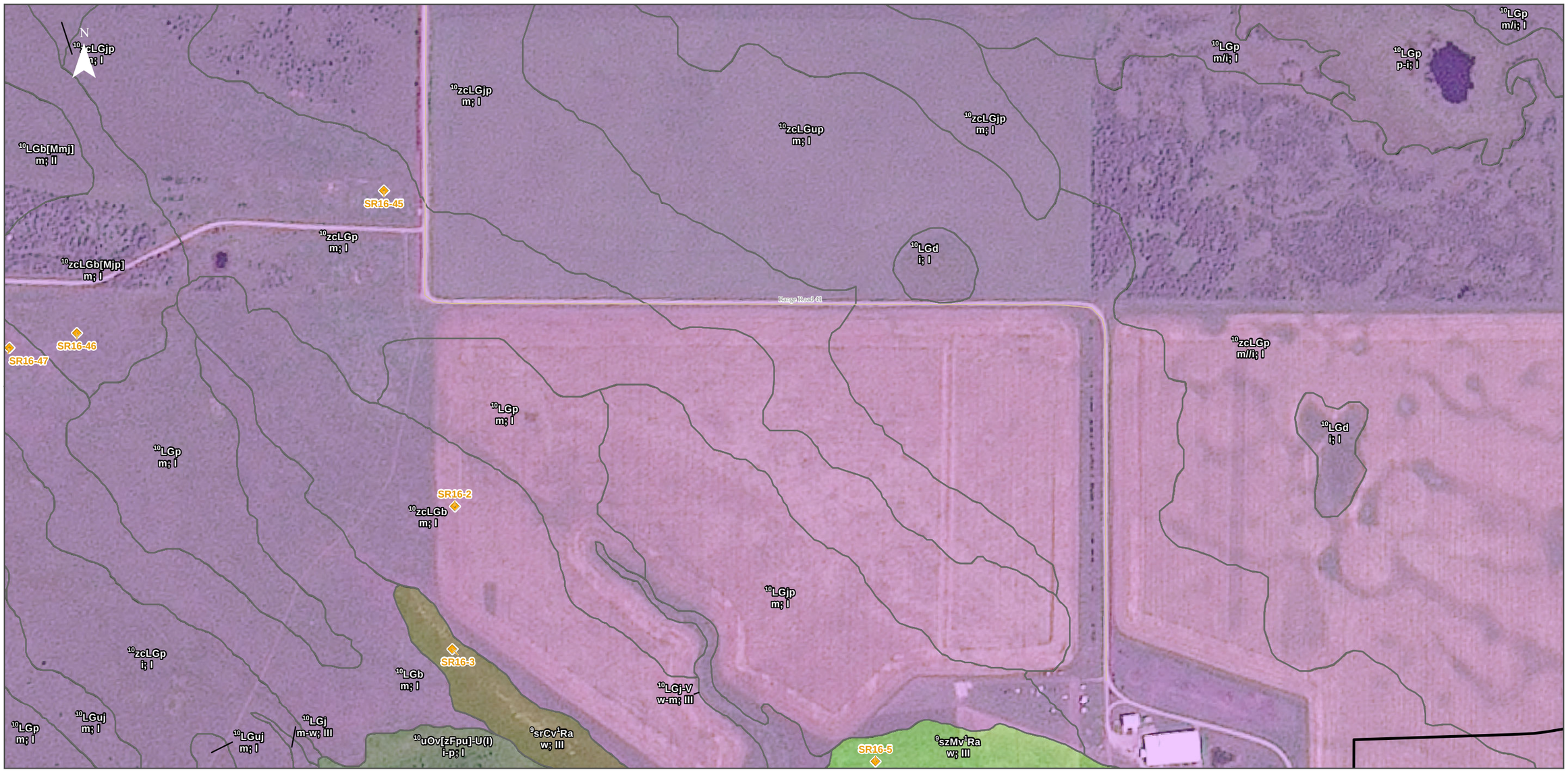
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-14



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- C=Colluvium
- LG=Glaciolacustrine Material
- M=Morainal Material (till)
- O=Organic Material

Project Development Area

Local Assessment Area

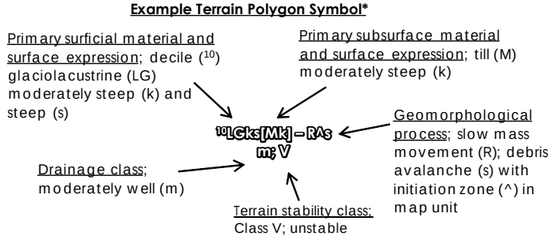
0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

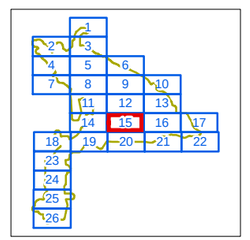
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



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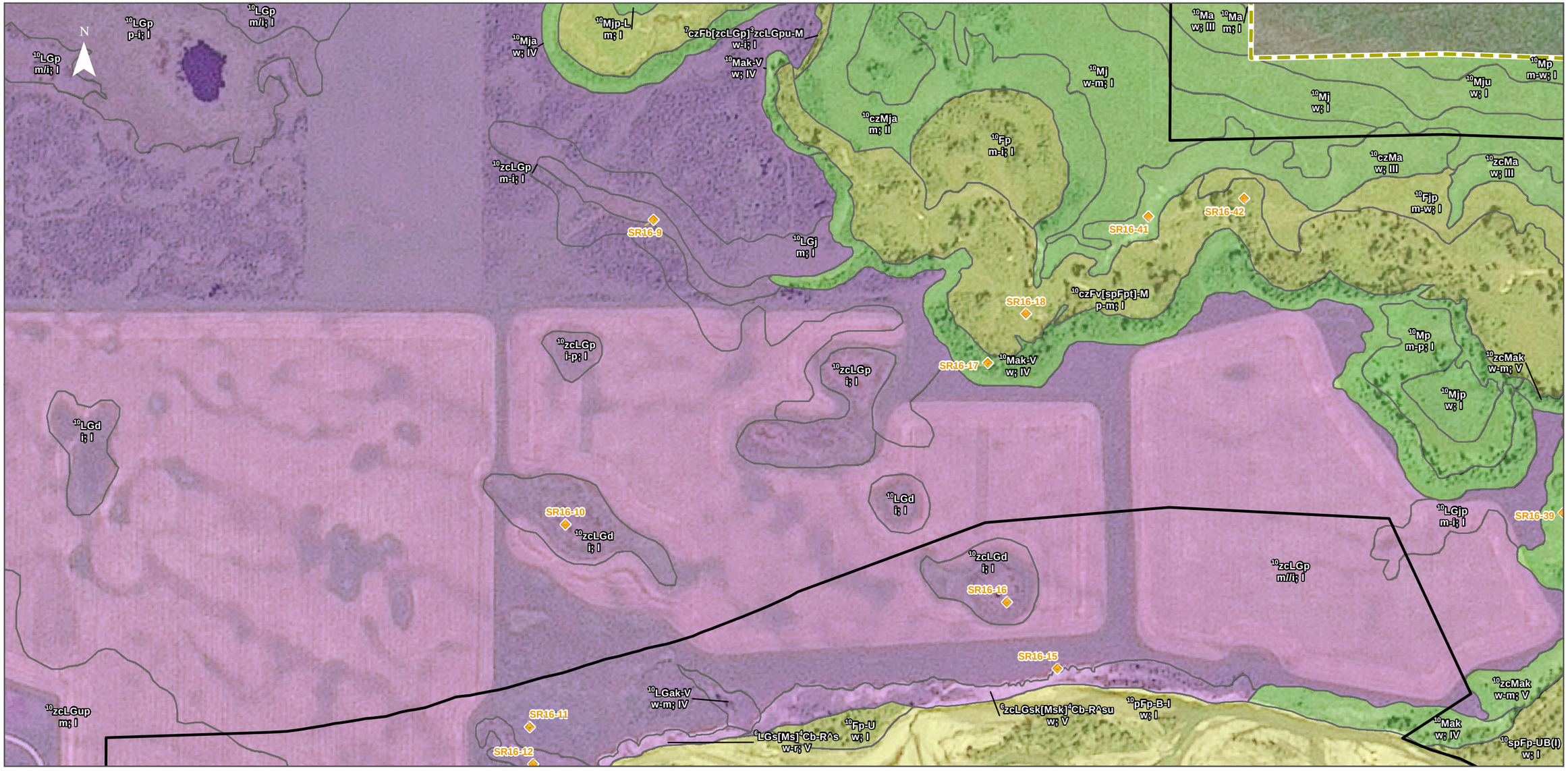
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-15



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

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Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (^{10}) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

^{10}LGks[Mk]–RAs m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

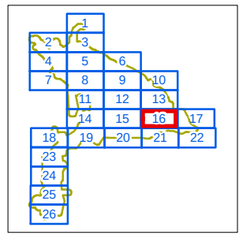
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

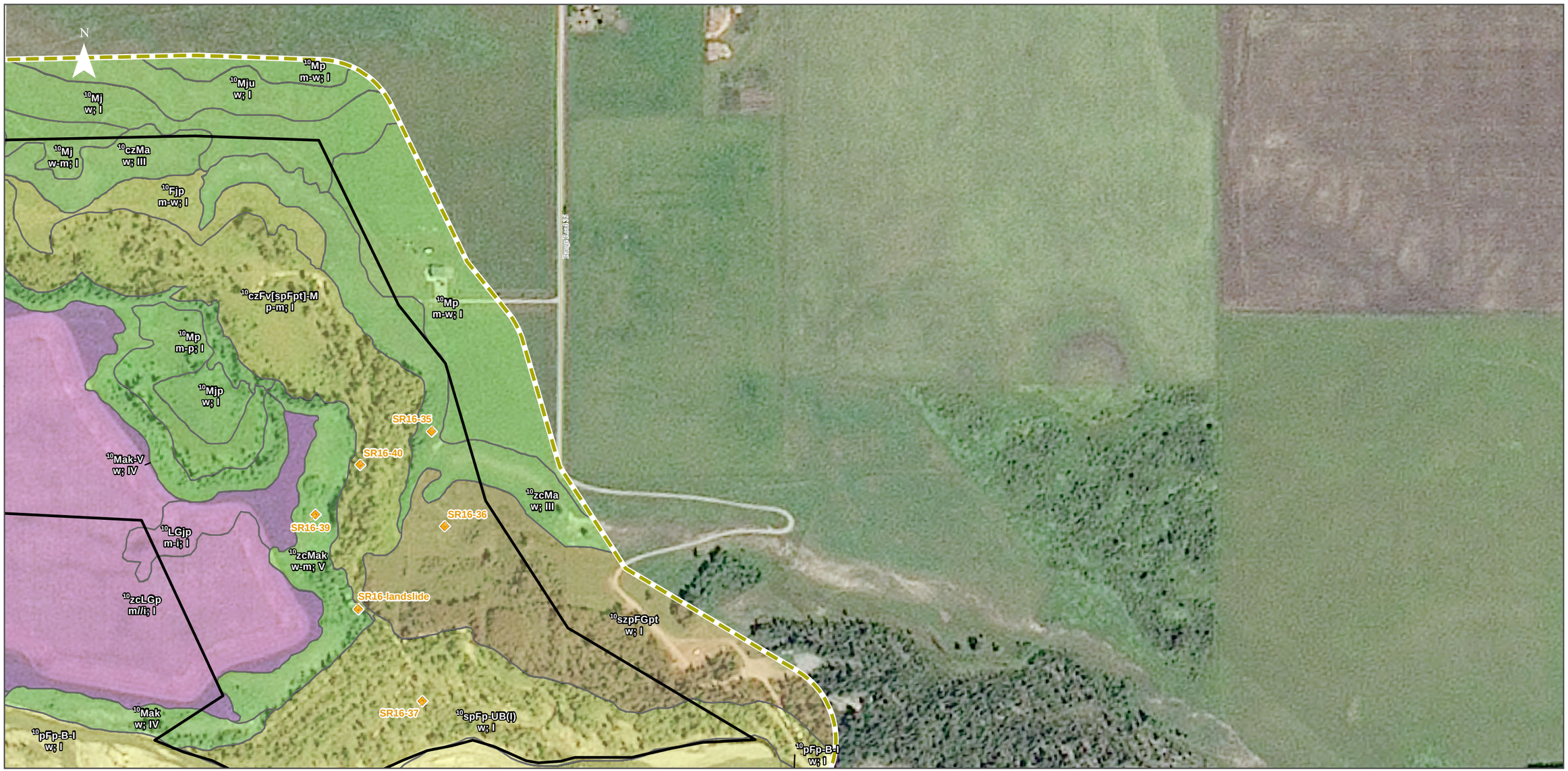
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-16



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

- Terrain Inspection Site
- Project Development Area
- Local Assessment Area

Surficial Material

- F=Fluvial Material
- FG=Glaciofluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

0 100 200 300 400 500
metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile ([10]) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

[10]LGks[Mk] – RAs m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

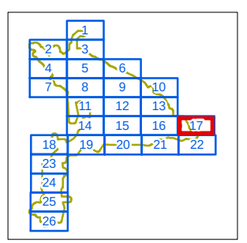
Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:
[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



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ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-17

Sources: Base Data - Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Surficial Material

- LG=Glaciolacustrine Material
- M=Morainal Material (till)

- Project Development Area
- Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

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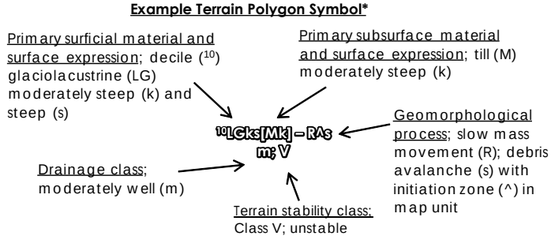
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

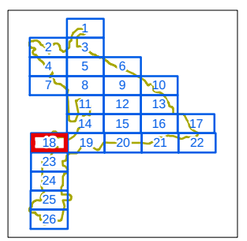
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

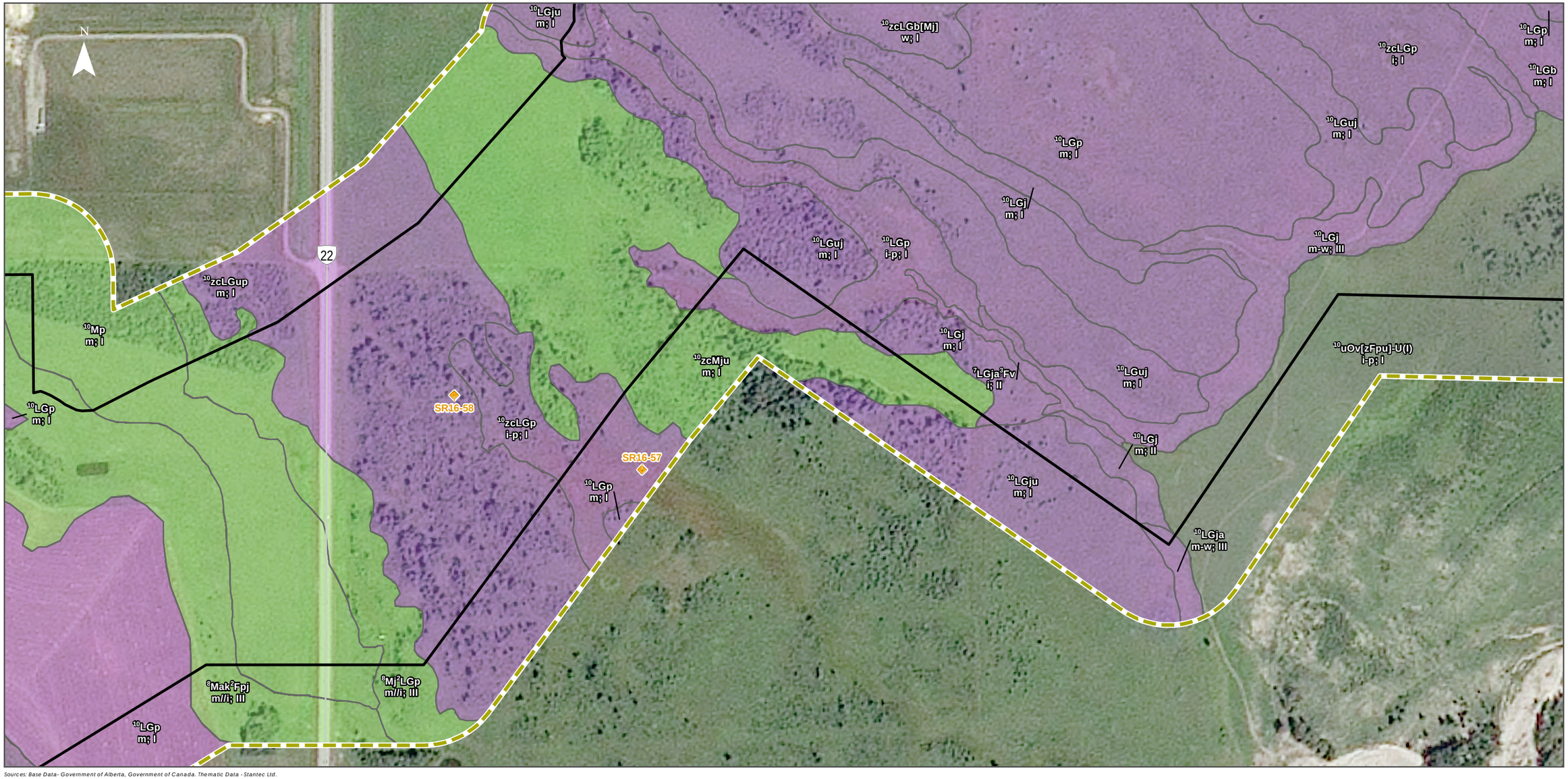
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-18



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- LG=Glaciolacustrine Material
- M=Morainal Material (till)
- O=Organic Material

Project Development Area

Local Assessment Area

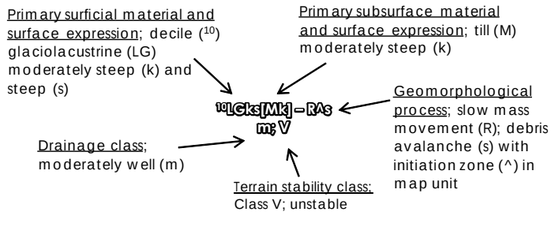
0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

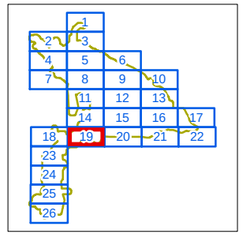
NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes

r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



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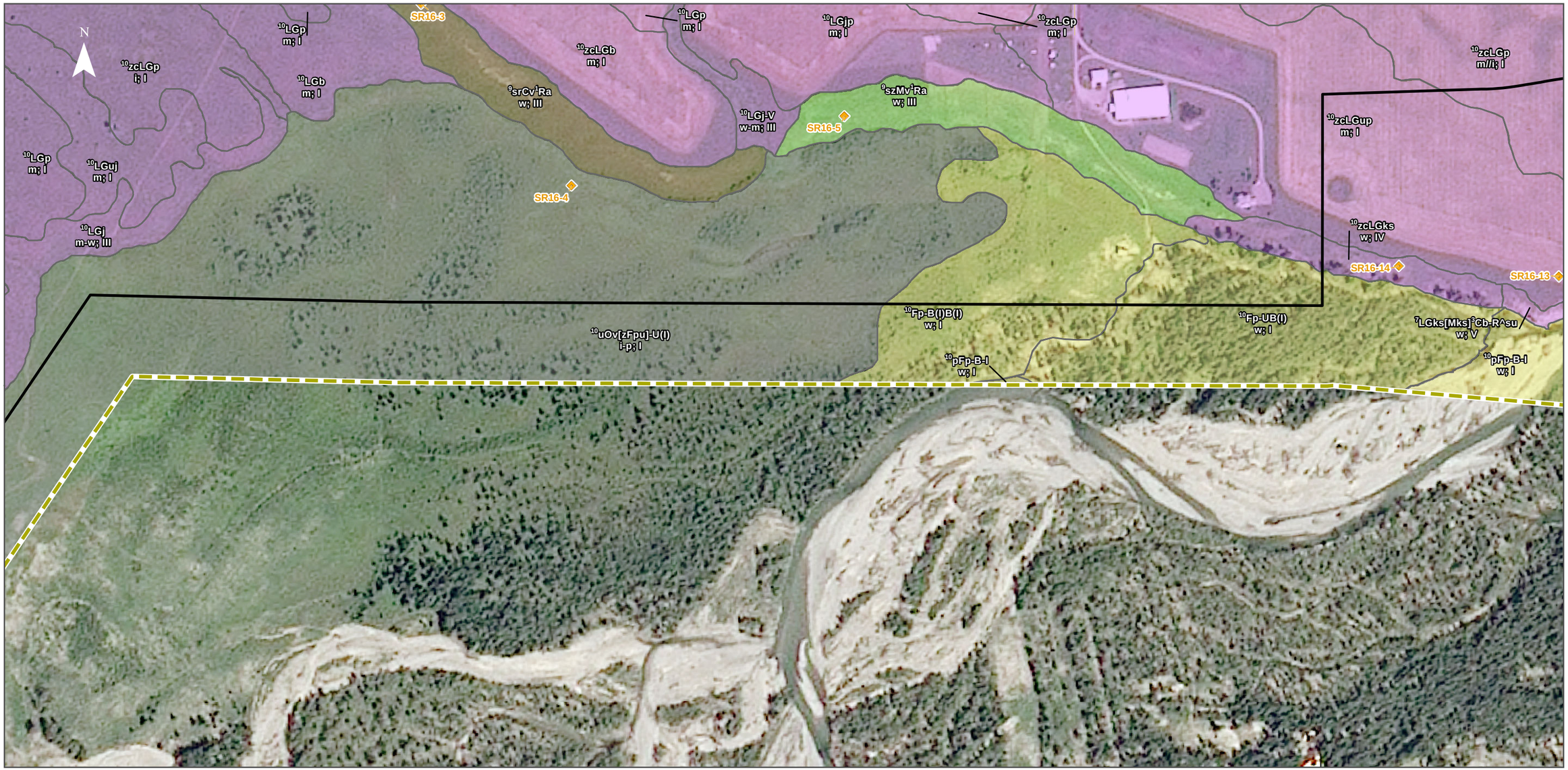
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-19



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- C=Colluvium
- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)
- O=Organic Material

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

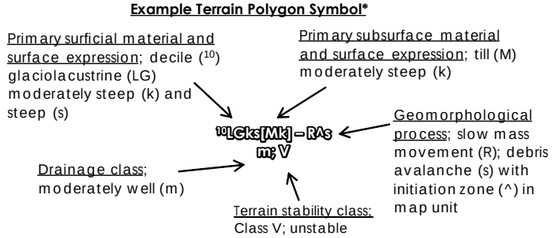
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

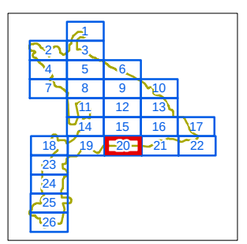
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

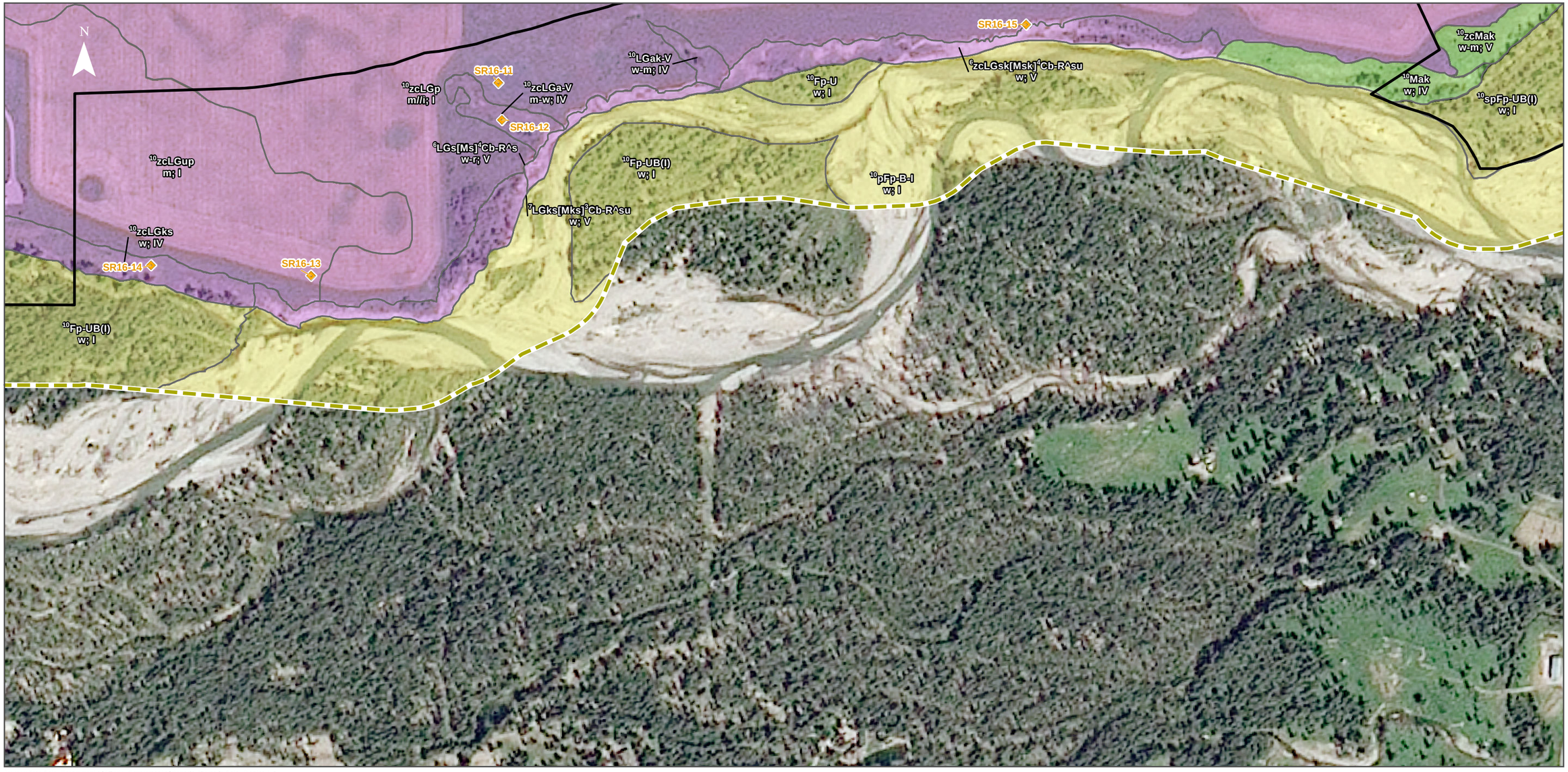
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-20



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

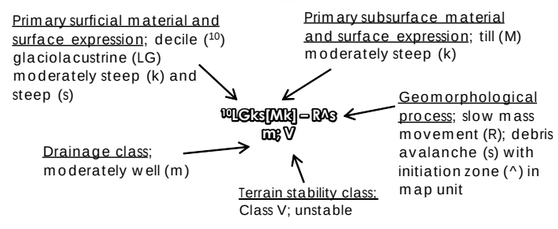
0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

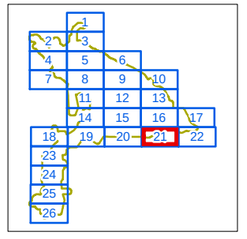
NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes

r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



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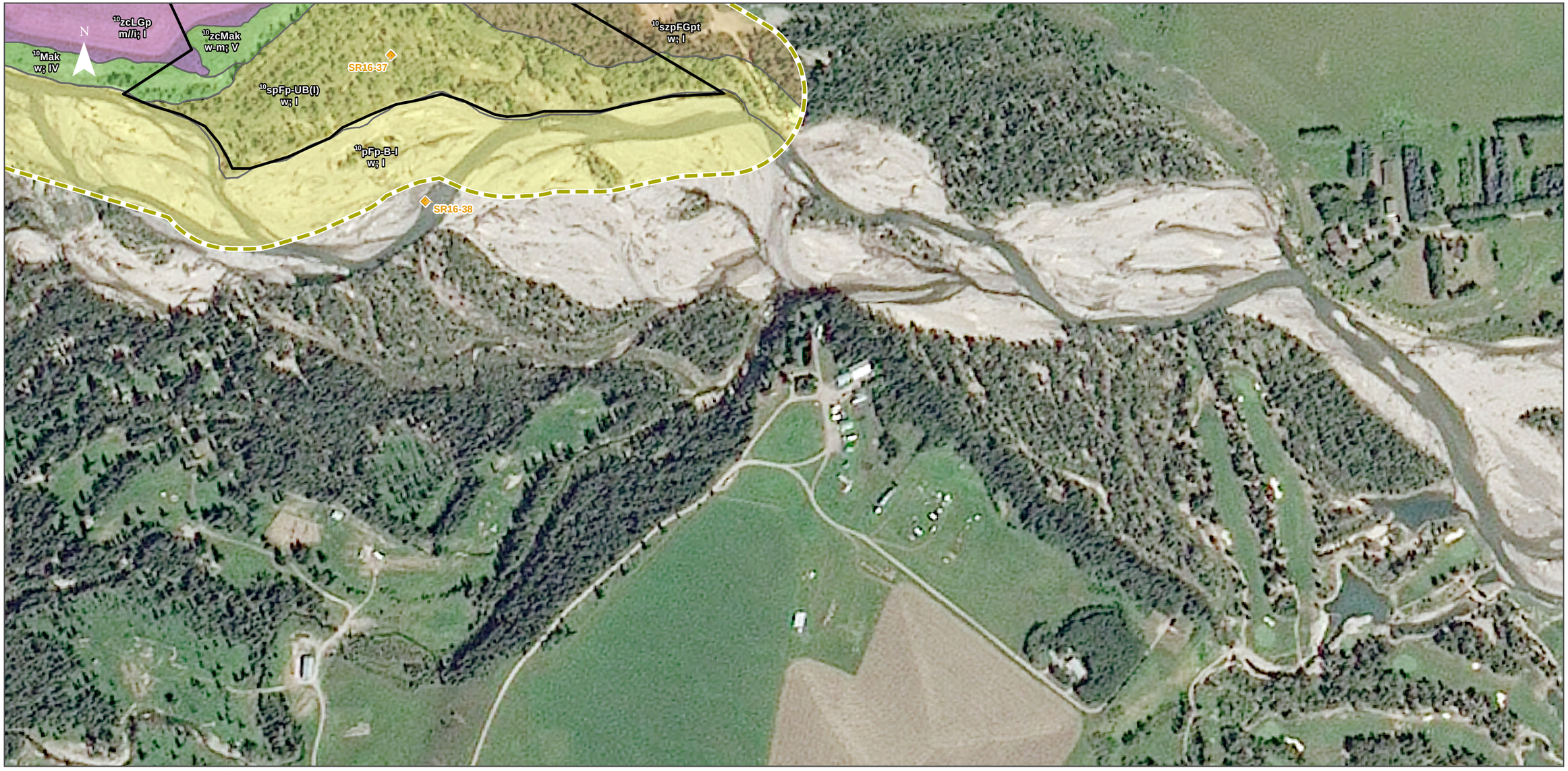
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-21



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- FG=Glaciofluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (^{10}) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

^{10}LGks[Mk] – RAs m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

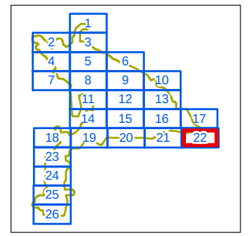
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



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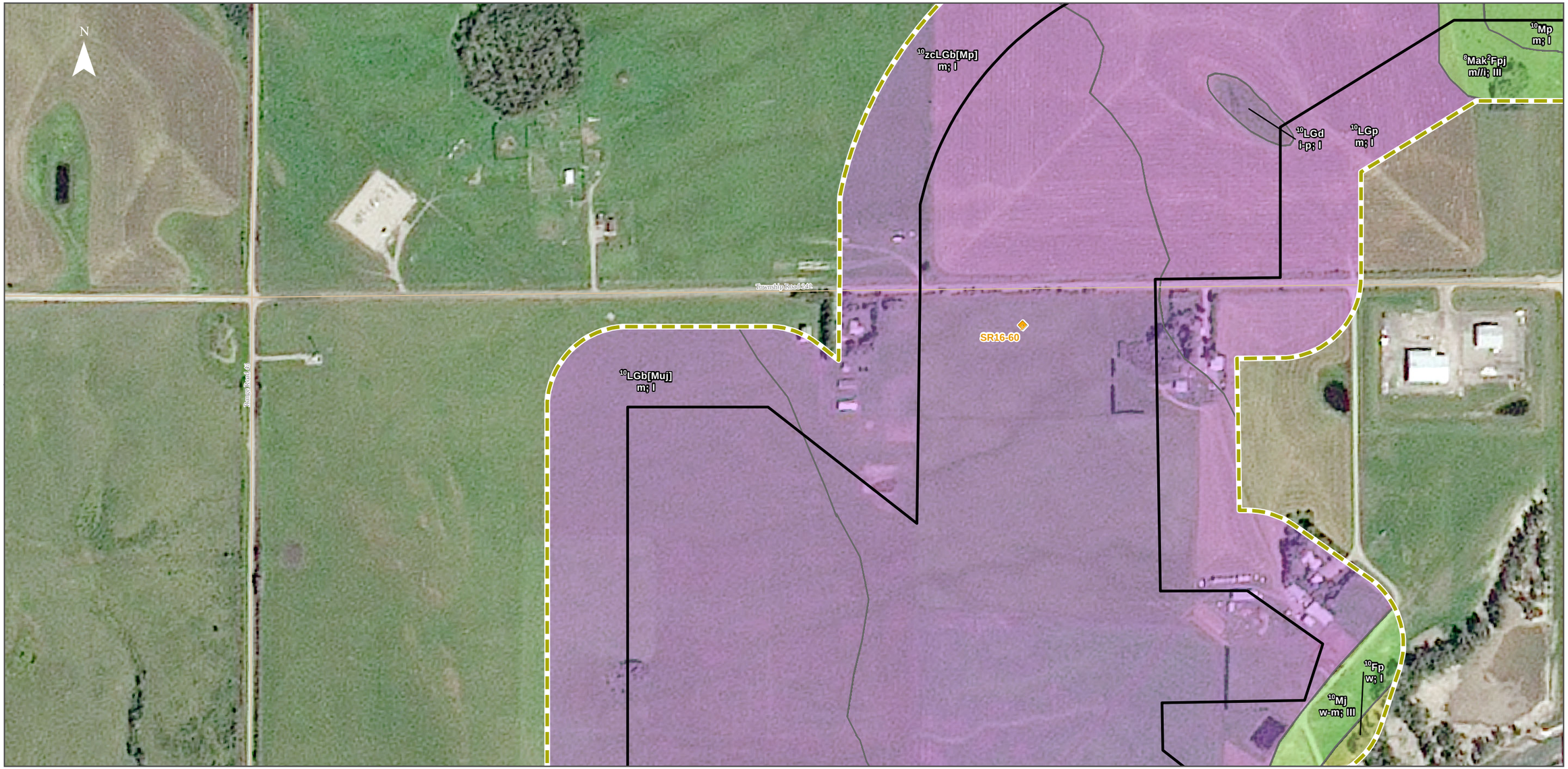
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-22



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

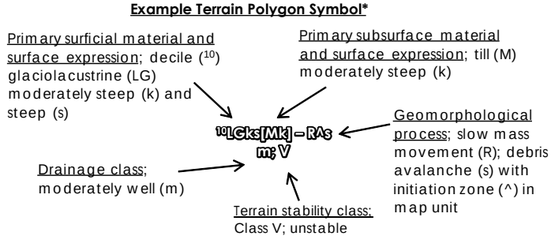
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

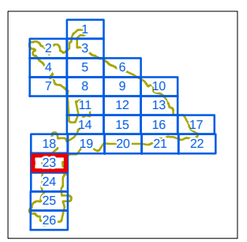
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

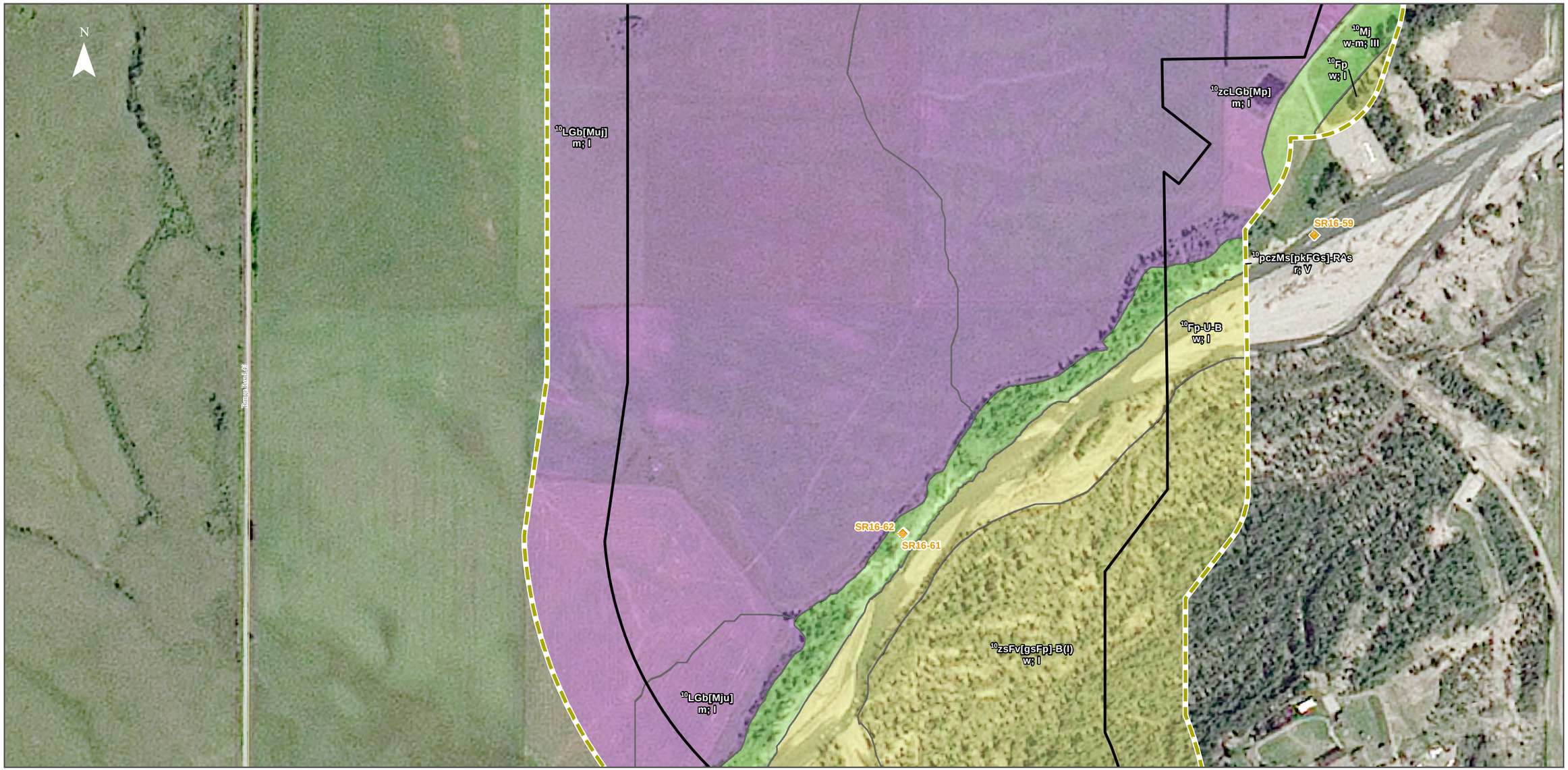
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-23



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Example Terrain Polygon Symbol*

Primary surficial material and surface expression; decile (^{10}) glaciolacustrine (LG) moderately steep (k) and steep (s)

Primary subsurface material and surface expression; till (M) moderately steep (k)

^{10}LGks[Mk]–RAs
m; V

Geomorphological process; slow mass movement (R); debris avalanche (s) with initiation zone (^) in map unit

Drainage class; moderately well (m)

Terrain stability class: Class V; unstable

* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

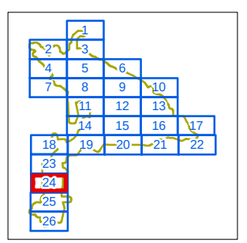
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained

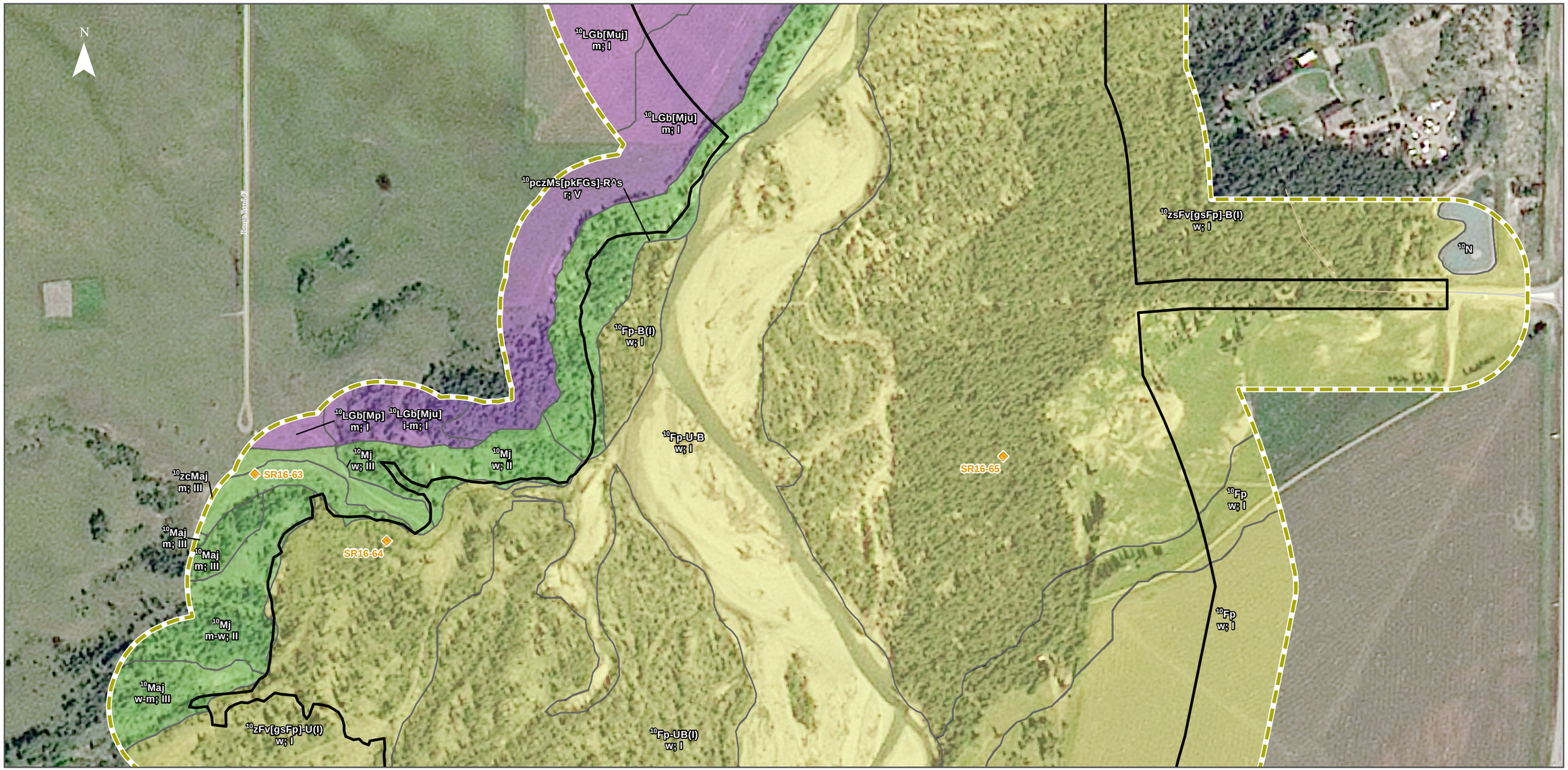


Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Terrain and Terrain Stability Mapbook

Attachment 1-24



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Terrain Inspection Site

Surficial Material

- F=Fluvial Material
- LG=Glaciolacustrine Material
- M=Morainal Material (till)
- N=Not Classified

Project Development Area

Local Assessment Area

0 100 200 300 400 500

metres

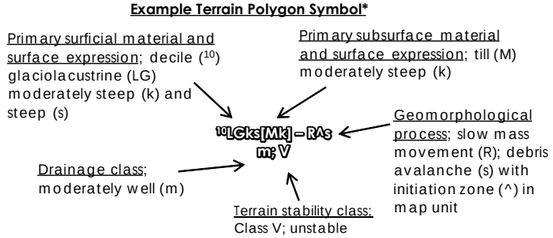
ST-CAL-110773396-413 REVA

NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

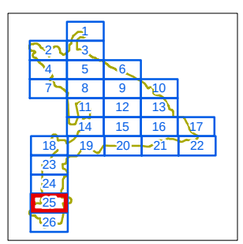
Terrain Stability Class	Description[1, 2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

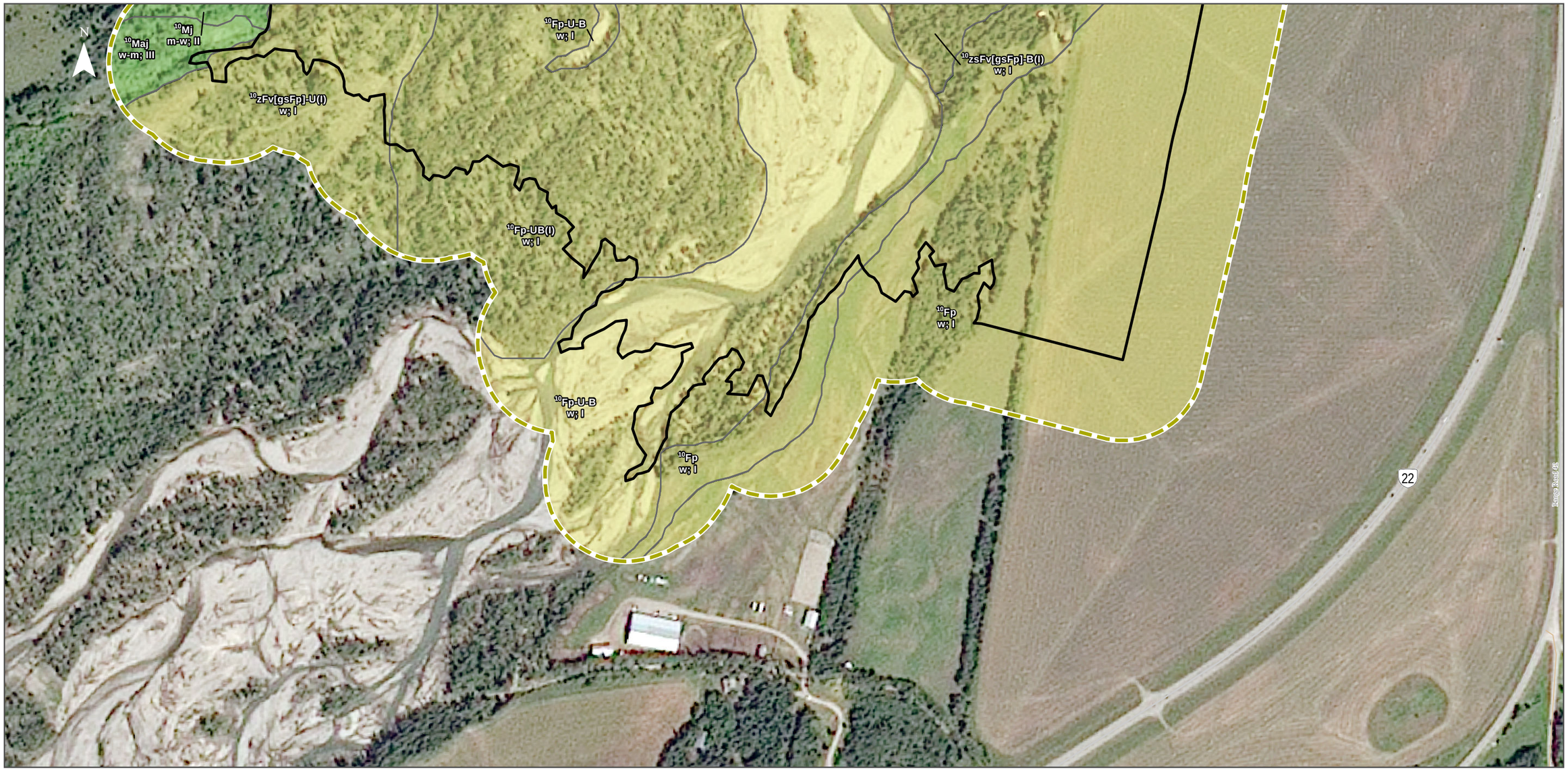
[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



Terrain and Terrain Stability Mapbook

Attachment 1-25



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Surficial Material

- F=Fluvial Material
- M=Morainal Material (till)

- Project Development Area
- Local Assessment Area

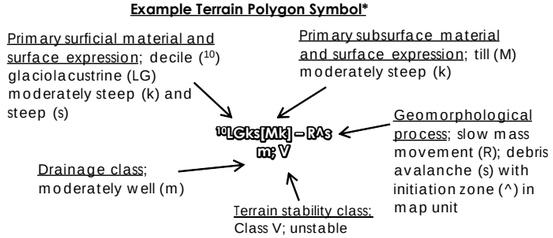
0 100 200 300 400 500
metres

ST-CAL-110773396-413 REVA NAD 1983 3TM 114

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

Example Terrain Polygon Symbol*



* Refer to Section 5.2 of the Terrain and Soils Technical Data Report for full explanation of terrain codes.

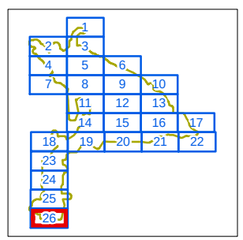
Terrain Stability Class	Description[1,2]
I	Expected to have a negligible likelihood of landslide initiation following dam and conventional road construction activities.
II	Expected to have a very low likelihood of landslide initiation following dam and conventional road construction activities.
III	Expected to have a low likelihood of landslide initiation following dam and conventional road construction activities.
IV	Expected to contain areas with a moderate likelihood of landside initiation following dam and conventional road construction activities.
V	Expected to contain areas with a high likelihood of landslide initiation following dam and conventional road construction activities.

NOTES:

[1] These are qualitative interpretations adapted from *Mapping and Assessing Terrain Stability Guidebook*. 2nd edition. Forest Practices Code of British Columbia 1999. The classification addresses landslides greater than 0.05 ha in size and applies to conventional forest clearing practices and conventional cut and fill resource road construction.

[2] Terrain polygon units ranked as I, II and III may contain minor areas of class IV and V terrain. These areas may not have been delineated due to the mapping scale.

Drainage Classes	
r	rapidly drained
w	well drained
m	moderately well drained
i	imperfectly drained
p	poorly drained
v	very poorly drained



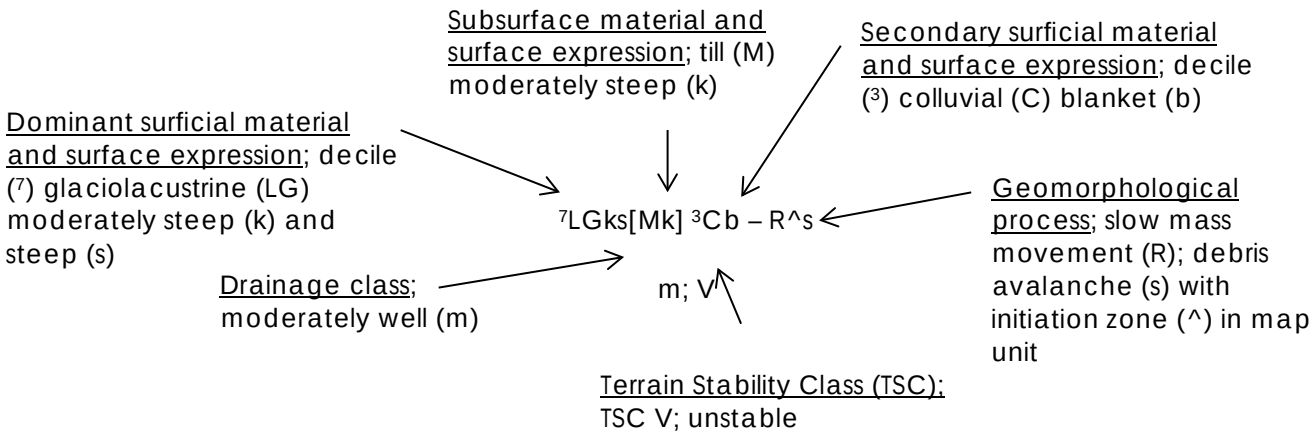
Terrain and Terrain Stability Mapbook

Attachment 1-26

Attachment B TERRAIN MAP LEGEND

Attachment B Terrain Map Legend
March 2018

Terrain Map Legend



Surficial Material

colluvium	C	till	M
fluvial	F	open water	N
glaciofluvial	FG	organic	O
glaciolacustrine	LG	bedrock	R

Surface Expression

plain	p	thin veneer (<0.5m)	x
gentle slope	j	veneer (<1m)	v
moderate slope	a	blanket (>1m)	b
moderate steep slope	k	undulating	u
steep slope	s	hummocky	h
		terraced	t
		depression	d

Geomorphological Processes

braiding channel	B
irregularly sinuous channel	I
surface seepage	L
meandering channel	M
inundation	U
gully erosion	V
Rapid mass movement	R

Subclasses for Mass Movement Processes

Initiation zone	“
slump in surficial material	u
debris avalanche	s

Attachment C SOILS DATA ATTACHMENT

C.1 SOIL MAP UNIT DESCRIPTION TABLES

Table C-1 Characteristics of the Dunvargan (DVG) Map Unit

Soil Classification	Orthic Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Till (Fine)
Salinity	None
Texture (topsoil/subsoil)	CL/C
Average topsoil thickness ; Typical range (cm)	25.4; 20 to 34
Average subsoil thickness ; Typical range (cm)	23.8; 16 to 36
Drainage class	Moderately well to well
Colour Transition (Count)	Good (4), Fair (8), Poor (1)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency [4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ap	0-19	CLAY LOAM	Friable	M/F/GR	10YR 2/1	2	-
Bm	19-43	CLAY	Friable	M/F/SB	10YR 4/3	2	-
Ck	43-100	CLAY	Firm	MA	2.5Y 4/3	2	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1, 3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ap	25	67	7.07	1.9	0.26	0.32	7.2	CLAY LOAM	1.05
Bm	23	55	6.57	0.76	0.25	0.49	-	CLAY	1.3
Ck	52	77	7.72	30	0.30	0.51	-	HEAVY CLAY	1.35

NOTES:
[1] Inspection site SRBL16019
[2] Based on 13 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-2 Characteristics of the Dunvargan, calcareous (DVGca) Map Unit

Soil Classification	Calcareous Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Till (Fine)
Salinity	None
Texture (topsoil/subsoil)	CL/C to HC
Average topsoil thickness ; Typical range (cm)	20.1; 9 to 29
Average subsoil thickness ; Typical range (cm)	24.1; 14 to 40
Drainage class	Moderately well to well
Colour Transition (Count)	Good (2), Fair (4), Poor (1)
Surface Stoniness	1 to 3 (<0.01 to 3%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ap	0-18	CL	Friable	M/M/GR	10YR 2/1	-	-
Bmk	18-45	HC	Firm	M/M/SB	10YR 4/3	-	-
Ck	45-100	HC	Hard	-	2.5Y 4/2	-	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ap	20	83	6.59	1.4	0.48	0.39	6.6	CLAY LOAM	0.95
Bmk	24	65	7.93	23	0.69	1.4	-	HEAVY CLAY	1.3
Ck	66	66	8.11	23	1.3	3.9	-	HEAVY CLAY	1.35

NOTES:
[1] Inspection site SRKF16080
[2] Based on 7 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-3 Characteristics of the Fish Creek (FSH) Map Units

Soil Classification	Orthic Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Glaciolacustrine (Fine to Very Fine)
Salinity	None
Texture (topsoil/subsoil)	CL/C to HC
Average topsoil thickness ; Typical range (cm)	24.9; 14 to 33
Average subsoil thickness ; Typical range (cm)	23.0; 9 to 51
Drainage class	Moderately well to well
Colour Transition (Count)	Good (21) Fair (23) Poor (1)
Surface Stoniness	1 to 2 (<0.01 to 0.1%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ap	0-26	SiCL	Friable	M/F/GR	10YR 2/1	0	-
Bm	26-46	HC	Firm	W/C/SB	10YR 3/2	0	-
Ck	46-120	HC	Very Firm	MA	2.5Y 5/3	0	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ap	25	99	5.68	1.2	0.28	0.33	5.8	SILTY CLAY LOAM	1.1
Bm	23	62	7.23	3.5	0.27	0.88	-	HEAVY CLAY	1.35
Ck	52	78	7.82	29	1.2	2.4	-	HEAVY CLAY	1.3

NOTES:
[1] Inspection site SRWC16022
[2] Based on 45 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-4 Characteristics of the Fish Creek, calcareous (FSHca) Map Unit

Soil Classification	Calcareous Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Glaciolacustrine (Fine to Very Fine)
Salinity	None
Texture (topsoil/subsoil)	CL/C-HC
Average topsoil thickness ; Typical range (cm)	24.4; 16 to 32
Average subsoil thickness ; Typical range (cm)	23.4; 10 to 44
Drainage class	Moderately Well to Well
Colour Transition (Count)	Good (9), Fair (9), Poor (1)
Surface Stoniness	1 to 2 (<0.01 to 0.1%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Apk	0-16	CL	Friable	M/F/GR	10YR 2/1	-	-
Bmk	16-58	HC	Firm	M/C/SB	2.5Y 4/3	-	-
Ck	58-120	HC	Firm	-	2.5Y 5/3	-	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Apk	24	99	7.22	3.0	0.99	0.45	7.2	CLAY LOAM	1.1
Bmk	23	72	7.24	4.0	0.43	0.45	-	HEAVY CLAY	1.35
Ck	53	74	7.58	26	0.37	0.26	-	HEAVY CLAY	1.3

NOTES:
[1] Inspection site SRWC16080
[2] Based on 19 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-5 Characteristics of the Fish Creek, gleyed (FSHgl) Map Unit

Soil Classification	Gleyed Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Glaciolacustrine (Fine to Very Fine)
Salinity	None
Texture (topsoil/subsoil)	CL/C-HC
Average topsoil thickness ; Typical range (cm)	22.1; 16 to 27
Average subsoil thickness; Typical range (cm)	24.8; 13 to 41
Drainage class	Imperfect
Colour Transition (Count)	Good (6), Fair (3), Poor (2)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ap	0-19	CL	Friable	M/F/GR	10YR 2/1	-	-
Bgjk	19-44	HC	Firm	S/C/SB	2.5Y 4/3	-	C/M/D
Ckgj	44-110	HC	Firm	-	2.5Y 4/2	-	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ap	22	130	5.97	1.7	0.28	0.75	10	CLAY LOAM	
Bgjk	25	67	7.75	4.0	0.43	1.5	-	HEAVY CLAY	
Ckgj	53	77	8.00	21	0.77	6.7	-	HEAVY CLAY	

NOTES:
[1] Inspection site SRKF16002
[2] Based on 11 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-6 Characteristics of the Mesa Butte (MSB) Map Unit

Soil Classification	Rego Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Colluvial/Residuum (sandstone and shale, undifferentiated)
Salinity	None
Texture (topsoil/subsoil)	SL/SL
Average topsoil thickness; Typical range (cm)	20
Average subsoil thickness; Typical range (cm)	0
Drainage class	Well
Colour Transition (Count)	Good (1)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ah	0-15	SL	Friable	M/F/GR	10YR 2/2	-	-
Ck	15-35	SL	Friable	-	2.5Y 6/1	60	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm³)
Ah	15	77	7.04	4.0	0.47	0.17	3.5	SANDY LOAM	1.05
Ck	20	69	7.29	14	0.50	0.14	-	SANDY LOAM	1.45

NOTES:
[1] Inspection site SRKF16097
[2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-7 Characteristics of the Pothole Creek (POT) Map Unit

Soil Classification	Orthic Humic Gleysol
Soil Correlation Area	8
Parent material and Textural Group	Glaciolacustrine (Fine to Very Fine) or Till (Fine)
Salinity	None
Texture (topsoil/subsoil)	C/HC
Average topsoil thickness; Typical range (cm)	25.7; 18 to 36
Average subsoil thickness; Typical range (cm)	31.2; 15 to 61
Drainage class	Poor
Colour Transition (Count)	Good (1), Fair (5), Poor (4)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ap	0-20	C	Sticky	W/F/GR	10YR 2/1	5	-
Bkg	20-62	HC	Sticky	M/C/SB	2.5Y 4/1	-	C/F/P
Ckg	62-120	HC	Firm	-	2.5Y 4/2	-	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ap	26	91	6.86	1.4	0.53	0.52	6.5	CLAY	1.0
Bkg	31	66	7.58	18	0.32	0.54	-	HEAVY CLAY	1.3
Ckg	43	74	7.81	18	0.36	0.81	-	HEAVY CLAY	1.25

NOTES:
[1] Inspection site SRWC16097
[2] Based on 10 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-8 Characteristics of the Sarcee (SRC) Map Units

Soil Classification	Calcareous Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Fluvial (Medium) or Glaciofluvial (Medium)
Salinity	None
Texture (topsoil/subsoil)	SiL/SiL
Average topsoil thickness; Typical range (cm)	29
Average subsoil thickness; Typical range (cm)	0
Drainage class	Poor
Colour Transition (Count)	Good (1)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ahk	0-29	SiL	Loose	M/F/GR	10YR 2/1	-	-
Ck	29-60	SiL	Loose	-	10YR 4/1	-	-
Ckgj	60-100	SiL	Friable	-	2.5Y 4/2	-	C/M/F

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ahk	39	110	7.47	24	0.82	0.27	9.8	SILT LOAM	1.05
Ck	31	55	7.62	34	0.43	0.58	-	SILT LOAM	1.4
Ckgj	40	42	7.64	36	0.42	0.77	-	SILT LOAM	1.5

NOTES:
[1] Inspection site SRBL16003
[2] [2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-9 Characteristics of the Sarcee over gravel (SRCxg) Map Units

Soil Classification	Calcareous Black Chernozem
Soil Correlation Area	8
Parent material and Textural Group	Fluvial (Medium) or Glaciofluvial (Medium)
Salinity	None
Texture (topsoil/subsoil)	Clay loam/ Loam
Average topsoil thickness; Typical range (cm)	20
Average subsoil thickness; Typical range (cm)	23
Drainage class	Well
Colour Transition (Count)	Good (1)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ahk	0-33	LS	Friable	W/M/SG	10YR 3/1	-	-
Bmk	33-50	L	Friable	M/F/GR	10YR 3/2	-	-
IICk	50-60	L	Firm	MA	10YR 3/2	45	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[3,6]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ap	33	97	6.9	0	0	NM	4	CLAY LOAM	1.05
Bm	27	99	7.4	0	0	NM	2.1	LOAM	1.4
Ck	50	99	7.6	7	0	NM	0	LOAM	1.5

NOTES:
[1] Inspection site SRWC16033
[2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
[6] Chemical and physical properties are from Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-10 Characteristics of the Twin Bridges (TBR) Map Units

Soil Classification	Orthic Regosol
Soil Correlation Area	8
Parent material and Textural Group	Fluvial (Moderately Coarse to Very Coarse) or Glaciofluvial (Moderately Coarse to Very Coarse)
Salinity	None
Texture (topsoil/subsoil)	SiL/SL
Average topsoil thickness; Typical range (cm)	22
Average subsoil thickness; Typical range (cm)	0
Drainage class	Well
Colour Transition (Count)	Fair (1)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ahk	0-22	SiL	Very Friable	W/F/SB	10YR 2/2	-	-
Ck1	22-33	SiL	Very Friable	SG	10YR 4/2	-	-
Ahkb	33-49	SiL	Very Friable	SG	10YR 2/2	-	-
Ck2	49-110	SL	Very Friable	SG	10YR 4/2	-	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm³)
Ahk	22	69	7.34	-	0.68	0.14	4.6	SILT LOAM	1.1
Ck1	11	55	7.54	28	0.45	0.17	-	SILT LOAM	1.55
Ahkb	16	62	7.44	-	0.57	0.18	4.3	SILT LOAM	1.1
Ck2	61	40	7.79	36	0.37	0.21	-	SANDY LOAM	1.55

NOTES:
[1] Inspection site SRKF16140
[2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-11 Characteristics of the Gleyed Twin Bridges (TBRgl) Map Units

Soil Classification	Gleyed Regosol
Soil Correlation Area	8
Parent material and Textural Group	Fluvial (Moderately Coarse to Very Coarse) or Glaciofluvial (Moderately Coarse to Very Coarse)
Salinity	None
Texture (topsoil/subsoil)	SiL/SL
Average topsoil thickness; Typical range (cm)	28
Average subsoil thickness; Typical range (cm)	0
Drainage class	Imperfect
Colour Transition (Count)	Fair
Surface Stoniness	1 (0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ahk	0-28	vfSL	Friable	M/M/SB	10YR 2/2	-	-
Ckgj1	28-45	LfS	Friable	SG	2.5Y 4/3	-	C/F/F
Ckgj2	45-100	vfSL	Friable	SG	2.5Y 4/3	-	C/M/D

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[3,6]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm³)
Ahk	28	99	7.5	10	0	NM	6.6	SILT LOAM	1.1
Ck	17	99	7.5	42	0	NM	0	LOAM	1.5
Ckg	55	99	7.6	42	0	NM	0	SANDY LOAM	1.55

NOTES:
[1] Inspection site SRBL6027
[2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
[6] Chemical and physical properties are from Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-12 Characteristics of the Gravelly Twin Bridges (TBRgr) Map Units

Soil Classification	Orthic Regosol
Soil Correlation Area	8
Parent material and Textural Group	Fluvial (Moderately Coarse to Very Coarse, gravelly) or Glaciofluvial (Moderately Coarse to Very Coarse, gravelly)
Salinity	None
Texture (topsoil/subsoil)	SL/LS
Average topsoil thickness; Typical range (cm)	0
Average subsoil thickness; Typical range (cm)	0
Drainage class	Moderately Well
Colour Transition (Count)	N/A
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ck1	0-6	SL	Firm	-	2.5Y 3/1	-	-
Ofb	6-12	-	-	-	-	-	-
Ck2	12-24	LS	Loose	-	10YR 3/2	60	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
Ck1	6	47	7.47	29	0.73	<0.10	-	SANDY LOAM	1.55
Ofb	6	150	7.22	-	0.93	N/A	16	-	-
Ck2	12	50	7.58	38	0.73	0.15	-	LOAMY SAND	1.5

NOTES:
[1] Inspection site SRWC16007
[2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-13 Characteristics of the Gleysol Coarse (ZGC) Map Units

Soil Classification	Orthic or Rego Humic Gleysol
Soil Correlation Area	8
Parent material and Textural Group	Fluvial (Medium to Very Coarse)
Salinity	None
Texture (topsoil/subsoil)	L/L
Average topsoil thickness; Typical range (cm)	32.1; 14 to 70
Average subsoil thickness; Typical range (cm)	14; 0 to 32
Drainage class	Poor
Colour Transition (Count)	Good (2), Fair (4), Poor (2)
Surface Stoniness	1 to 2 (<0.01 to 3%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
LFH	16-0	-	-	-	-	-	-
Ahkgj	0-40	L	Friable	-	10YR 2/1	-	C/M/D
Ckg	40-100	L	Firm	-	2.5Y 3/2	-	C/M/P

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
LFH	16	180	7.48	-	1.2	0.28	14	-	
Ahkgj	40	180	7.27	22	1.1	0.64	16	LOAM	
Ckg	60	53	7.52	29	2.5	0.15	-	LOAM	

NOTES:
[1] Inspection site SRKF16098
[2] Based on 9 profiles
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

Table C-14 Characteristics of the Reclaimed (ZREC) Map Units

Soil Classification	N/A
Soil Correlation Area	8
Parent material and Textural Group	Anthropogenic over Glaciolacustrine (Fine to Very Fine) or Till (Fine)
Salinity	None
Texture (topsoil/subsoil)	Various materials
Average topsoil thickness; Typical range (cm)	32
Average subsoil thickness; Typical range (cm)	0
Drainage class	Various
Colour Transition (Count)	Good (1)
Surface Stoniness	1 (<0.01%)

Example Profile[1,3]

Horizon	Depth (cm)	Field Texture	Consistency[4]	Structure (class/grade/kind)	Colour (hue value/ chroma)	Coarse Fragment Content (%)	Mottles (contrast)
Ap	0-20	L	Friable	M/F/GR	10YR 2/1	0	-
Ah	20-32	L	Firm	M/F/GR	10YR 2/1	0	-
Ck	32-120	HC	Firm	MA	2.5Y 4/3	3	-

REPRESENTATIVE CHEMICAL AND PHYSICAL PROPERTIES[1,3]

Master Horizon	Average Thickness[2] (cm)	Sat (%)	pH ($CaCl_2$)	Calcium Carbonate Equivalent (%)	EC (ds/m)	SAR	Organic Carbon (%)	Texture Class	Bulk Density[5] (g/cm^3)
MINk1	20	110	7.24	4.2	0.33	0.32	7.3	L	
MINk2	12	-	-	-	-	-	-	-	-
Ck	88	65	7.88	33	2.2	1.8	-	HC	

NOTES:
[1] Inspection site SRWC16020
[2] Based on 1 profile
[3] The example profile may not match the Representative Chemical and Physical Properties for all parameters.
[4] Consistence measurements are strongly influenced by soil moisture conditions and are subject to change
[5] Bulk Density measurements are from the Agrasid Database (2000)
N/A = Not applicable
– = No data collected

C.2 SOIL HORIZON ATTACHMENT

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRBL16001	1	Lower Subsoil	Ck	0	11	M	Friable	2.5Y 4/2	-	M/F/SB	fSL	-	S	-	-
	2	Topsoil	Ahgjkb	11	22	M	Friable	10YR 2/2	-	W/F/SB	fSL	C/M/D	S	-	-
	3	Lower Subsoil	Ckgj	22	30	M	Friable	2.5Y 3/2	-	MA	fSL	M/M/D	S	-	-
	4	Topsoil	Ahgjkb	30	58	M	Friable	10YR 2/1	-	MA	fSL	C/M/D	S	-	-
	5	Lower Subsoil	Ckgj	58	100	M	Friable	2.5Y 4/2	1	MA	fSL	C/F/F	S	-	-
SRBL16002	1	Topsoil	Ahjk	0	18	M	Friable	10YR 4/2	-	W/M/SB	LfS	-	S	-	-
	2	Upper Subsoil	CAkgj	18	38	M	Friable	10YR 5/2	-	MA	fSL	C/M/D	S	-	-
	3	Lower Subsoil	Ckgj	38	100	M	Friable	2.5Y 4/2	-	MA	LfS	C/M/D	S	-	-
SRBL16003	1	Topsoil	Ahk	0	29	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	S	SRBL16003-Ahk	Y
	2	Lower Subsoil	Ck	29	60	M	Friable	10YR 4/1	-	MA	SiL	-	S	SRBL16003-Ck	Y
	3	Lower Subsoil	Ckgj	60	100	M	Friable	2.5Y 4/2	-	MA	SiL	C/M/F	S	SRBL16003-Ckgj	Y
SRBL16004	1	Topsoil	Ah	0	27	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bt	27	43	M	Firm	2.5Y 4/2	-	S/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	Ck	43	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRBL16005	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bt	21	42	M	Firm	10YR 4/2	-	M/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	Ck	42	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRBL16006	1	Topsoil	Apk	0	20	M	Friable	2.5Y 2/1	-	W/M/SB	SiCL	-	M	-	-
	2	Topsoil	Ahkgj	20	41	M	Friable	2.5Y 2/1	-	W/M/SB	SiCL	F/M/F	M	-	-
	3	Lower Subsoil	Ckg	41	100	M	Firm	2.5Y 3/1	-	MA	SiCL	C/M/P	W	-	-
SRBL16007	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Topsoil	Ah	20	45	M	Friable	10YR 2/1	-	W/F/SB	SiCL	-	-	-	-
	3	Upper Subsoil	Bm	45	59	M	Friable	10YR 4/3	-	W/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	59	100	M	Firm	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRBL16008	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Topsoil	Ah	20	35	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	3	Upper Subsoil	Bm	35	57	M	Friable	10YR 4/3	-	M/F/SB	SiC	-	-	-	-
	4	Lower Subsoil	Ck	57	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRBL16009	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	36	M	Friable	10YR 2/1	1	W/F/GR	SiCL	-	-	-	-
	3	Upper Subsoil	Bm	36	53	M	Firm	10YR 4/3	1	M/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	53	100	M	Firm	2.5Y 5/3	1	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRBL16010	1	Topsoil	Ahkg	0	50	W	Sticky	10YR 2/1	-	W/F/GR	SiCL	-	W	-	-
	2	Lower Subsoil	Ckg1	50	85	W	Sticky	2.5Y 4/1	-	MA	SiCL	-	W	-	-
	3	Lower Subsoil	Ckg2	85	100	W	Sticky	2.5Y 3/1	-	MA	SiC	-	W	-	-
SRBL16011	1	Topsoil	Ap	0	10	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	10	33	M	Firm	10YR 4/4	-	M/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	BC	33	65	M	Firm	10YR 3/3	-	W/F/SB	SiC	-	-	-	-
	4	Lower Subsoil	Ck	65	80	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
	5	Lower Subsoil	IICk	80	100	M	Firm	2.5Y 5/3	2	MA	SiC	-	S	-	-
SRBL16012	1	Topsoil	Ah	0	24	M	Friable	10YR 2/1	1	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	24	42	M	Firm	10YR 4/3	1	W/F/GR	SiC	-	-	-	-
	3	Lower Subsoil	Ck	42	100	M	Firm	2.5Y 5/3	1	MA	SiC	-	S	-	-
SRBL16013	1	Topsoil	Ap	0	18	D	Slightly Hard	10YR 2/1	7	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bmk	18	37	D	Slightly Hard	10YR 4/3	7	M/M/SB	SiCL	-	M	-	-
	3	Lower Subsoil	BCk	37	55	D	Hard	2.5Y 4/3	7	W/M/SB	SiC	-	S	-	-
	4	Lower Subsoil	Ck	55	100	D	Very Hard	2.5Y 5/3	15	MA	SiC	-	S	-	-
SRBL16014	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	24	38	M	Friable	10YR 4/4	-	W/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BC	38	55	M	Friable	10YR 4/3	-	W/M/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	55	75	M	Firm	2.5Y 4/3	-	MA	SiC	-	S	-	-
	5	Lower Subsoil	IICk	75	100	M	Firm	2.5Y 3/2	3	MA	SiC	-	M	-	-
SRBL16015	1	Lower Subsoil	MINk	0	16	D	Slightly Hard	10YR 5/3	-	W/F/GR	LfS	-	S	-	-
	2	Topsoil	Ahkb	16	38	D	Slightly Hard	10YR 3/2	-	M/F/GR	fSL	-	S	-	-
	3	Lower Subsoil	Ck	38	90	D	Slightly Hard	10YR 5/3	-	MA	LfS	-	S	-	-
	4	Lower Subsoil	IICk	90	100	D	Slightly Hard	10YR 5/3	30	MA	LfS	-	S	-	-
SRBL16016	1	Lower Subsoil	Ck	0	12	M	Loose	10YR 4/2	-	MA	LS	-	S	-	-
	2	Topsoil	Ahkb	12	18	M	Friable	10YR 2/2	-	M/F/SB	fSL	-	S	-	-
	3	Lower Subsoil	IICk	18	55	M	Loose	10YR 3/3	60	MA	LS	-	S	-	-
SRBL16017	1	Topsoil	Ap	0	23	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	23	55	M	Firm	10YR 4/3	-	M/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	IICk	55	100	M	Firm	2.5Y 4/2	2	MA	SiC	-	S	-	-
SRBL16018	1	Topsoil	Ahk	0	16	M	Firm	2.5Y 3/2	5	M/F/SB	SiC	-	S	-	-
	2	Upper Subsoil	CAk	16	35	M	Firm	2.5Y 4/2	10	M/F/SB	SiC	-	S	-	-
	3	Lower Subsoil	Ck	35	70	M	Firm	2.5Y 5/3	10	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRBL16019	1	Topsoil	Ap	0	19	M	Friable	10YR 2/1	2	M/F/GR	CL	-	-	SRBL16019-Ap	Y
	2	Upper Subsoil	Bm	19	43	M	Friable	10YR 4/3	2	M/F/SB	C	-	-	SRBL16019-Bm	Y
	3	Lower Subsoil	Ck	43	100	M	Firm	2.5Y 4/3	2	MA	HC	-	M	SRBL16019-Ck	Y
SRBL16020	1	Topsoil	Oh	0	70	-	-	-	-	-	-	-	-	-	-
	2	Lower Subsoil	Cg	70	100	W	Sticky	N 3/1	5	MA	SiCL	-	-	-	-
SRBL16021	1	Topsoil	Ah	0	26	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	26	55	M	Firm	10YR 4/3	-	M/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	S	-	-
SRBL16022	1	Topsoil	Ahk	0	14	M	Friable	10YR 3/2	5	M/F/SB	SiCL	-	M	-	-
	2	Upper Subsoil	Bmk	14	31	M	Friable	2.5Y 4/3	7	W/F/SB	SiCL	-	M	-	-
	3	Lower Subsoil	BCk	31	65	M	Friable	2.5Y 5/3	7	W/M/SB	SiCL	-	S	-	-
	4	Lower Subsoil	Ck	65	100	M	Firm	2.5Y 5/3	7	MA	SiCL	-	S	-	-
SRBL16023	1	Topsoil	Ahk	0	18	M	Friable	10YR 2/1	-	M/F/SB	SiL	-	S	-	-
	2	Upper Subsoil	ACkgj	18	50	M	Friable	10YR 3/2	-	W/F/SB	SiCL	C/M/D	S	-	-
	3	Lower Subsoil	Ckg	50	100	M	Firm	2.5Y 4/3	5	MA	SiCL	A/M/P	S	-	-
SRBL16024	1	Topsoil	Ah	0	20	M	Friable	10YR 3/2	3	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btjk	20	55	M	Friable	2.5Y 4/3	3	M/F/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 5/3	3	MA	SiCL	-	S	-	-
SRBL16025	1	Topsoil	Ah	0	26	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	26	42	M	Firm	10YR 4/4	1	W/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	42	100	M	Friable	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRBL16026	1	Topsoil	Ahk	0	14	M	Friable	10YR 3/2	25	W/M/SB	L	-	M	-	-
	2	Upper Subsoil	Bkg	14	35	M	Friable	2.5Y 4/1	70	M/F/SB	CL	A/M/P	S	-	-
	3	Lower Subsoil	Ckg	35	55	W	Sticky	2.5Y 4/2	70	MA	SCL	A/M/P	S	-	-
SRBL16027	1	Topsoil	Ahk	0	28	M	Friable	10YR 2/2	-	M/M/SB	vfSL	-	S	-	-
	2	Lower Subsoil	Ckgj1	28	45	M	Friable	2.5Y 4/3	-	MA	LfS	C/F/F	S	-	-
	3	Lower Subsoil	Ckgj2	45	100	M	Friable	2.5Y 4/3	-	MA	vfSL	C/M/D	S	-	-
SRBL16028	1	Lower Subsoil	Ck	0	30	M	Loose	2.5Y 4/3	80	MA	S	-	S	-	-
SRBL16029	1	Topsoil	Ahk	0	23	M	Friable	10YR 3/2	5	M/F/SB	SiCL	-	S	-	-
	2	Upper Subsoil	Bmk	23	55	M	Friable	10YR 4/3	7	M/M/BL	SiC	-	S	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 5/3	7	MA	SiC	-	S	-	-
SRBL16030	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	-	M/M/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	17	45	M	Firm	10YR 4/3	-	W/F/SB	SiCL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	BC	45	65	M	Firm	10YR 4/3	-	MA	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	65	100	M	Friable	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRBL16031	1	Topsoil	Ah	0	22	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bgj	22	50	M	Friable	2.5Y 4/2	5	M/F/SB	SiCL	C/M/D	-	-	-
	3	Lower Subsoil	Ckgj	50	100	M	Firm	2.5Y 4/2	5	MA	SiC	C/M/F	S	-	-
SRBL16032	1	Topsoil	Ap	0	28	M	Firm	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	28	50	M	Friable	10YR 4/3	5	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	50	100	M	Friable	2.5Y 4/3	1	MA	SiCL	-	M	-	-
SRBL16033	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	1	M/M/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	22	45	M	Firm	2.5Y 4/1	1	W/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	45	100	M	Firm	2.5Y 4/2	1	MA	SiC	-	S	-	-
SRBL16034	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	22	47	M	Firm	10YR 4/3	2	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	2.5Y 4/2	2	MA	SiC	-	M	-	-
SRBL16035	1	Topsoil	Oh	10	0	-	Friable	-	-	-	-	-	-	-	-
	2	Topsoil	Ahk	0	27	M	Firm	10YR 2/1	-	M/F/GR	SiL	-	S	-	-
	3	Upper Subsoil	Bkg	27	45	M	Firm	2.5Y 4/1	-	W/F/GR	SiCL	C/M/D	M	-	-
	4	Lower Subsoil	IICkg	45	75	M	Firm	2.5Y 5/2	50	MA	SiCL	A/M/D	W	-	-
SRBL16036	1	Topsoil	Ah	0	34	M	Friable	10YR 2/1	2	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bmk	34	55	M	Friable	10YR 4/3	2	M/F/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	55	70	M	Firm	2.5Y 5/3	2	MA	SiCL	-	S	-	-
SRBL16037	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	24	55	M	Friable	10YR 4/3	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	55	90	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
	4	Lower Subsoil	IICk	90	100	M	Firm	2.5Y 5/3	5	MA	SiCL	-	S	-	-
SRBL16038	1	Topsoil	Ahk	0	39	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	W	-	-
	2	Upper Subsoil	Bmk	39	55	M	Friable	2.5Y 4/3	-	M/F/SB	SiCL	-	W	-	-
	3	Lower Subsoil	Ckgj	55	100	M	Friable	2.5Y 5/3	-	MA	SiCL	F/F/F	S	-	-
SRBL16039	1	Topsoil	Ah	0	33	M	Friable	10YR 2/1	-	W/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bgj	33	50	M	Friable	2.5Y 4/3	-	W/F/SB	SiC	C/F/F	-	-	-
	3	Lower Subsoil	Ckgj	50	80	M	Firm	2.5Y 5/3	-	MA	SiC	C/F/D	S	-	-
SRBL16040	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	1	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	27	48	M	Friable	10YR 4/3	5	M/F/SB	SiCL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ck	48	100	M	Firm	2.5Y 5/3	5	MA	SiC	-	S	-	-
SRBL16041	1	Topsoil	Ap	0	21	D	Slightly Hard	10YR 2/1	1	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	21	50	M	Friable	10YR 4/3	3	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BCk	50	65	M	Friable	10YR 3/3	3	W/F/SB	SiCL	-	M	-	-
	4	Lower Subsoil	Ck	65	100	D	Hard	2.5Y 5/3	1	MA	SiC	-	S	-	-
SRBL16042	1	Topsoil	Ahk	0	26	M	Friable	10YR 2/1	-	W/F/GR	SiCL	-	M	-	-
	2	Upper Subsoil	CAkgj	26	45	M	Friable	2.5Y 6/1	-	W/F/SB	SiL	-	S	-	-
	3	Lower Subsoil	Ckg	45	100	M	Friable	2.5Y 4/3	-	MA	SiCL	-	S	-	-
SRBL16043	1	Topsoil	Ah	0	29	M	Friable	10YR 2/1	-	W/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	29	55	M	Friable	2.5Y 4/3	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/2	-	MA	SiCL	-	S	-	-
SRBL16044	1	Topsoil	Oh	18	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ah	0	6	M	Friable	10YR 2/1	-	W/F/GR	SiCL	-	-	-	-
	3	Upper Subsoil	Bg	6	30	M	Friable	2.5Y 4/3	5	M/F/SB	SiCL	C/M/D	-	-	-
	4	Lower Subsoil	Ckg	30	82	M	Firm	2.5Y 5/3	5	MA	SiC	C/F/P	S	-	-
SRBL16045	1	Topsoil	Ah	0	21	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	21	38	M	Friable	10YR 4/3	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BC	38	55	M	Friable	2.5Y 4/3	1	W/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/3	1	MA	SiC	-	S	-	-
SRBL16046	1	Topsoil	Oh	6	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahgj	0	30	M	Friable	10YR 2/1	-	M/M/SB	SiCL	-	-	-	-
	3	Upper Subsoil	Bg	30	45	M	Friable	N 2/1	-	M/F/SB	SiCL	C/F/D	-	-	-
	4	Lower Subsoil	Ckg	45	100	M	Firm	N 3/1	-	MA	SiC	C/F/D	M	-	-
SRBL16047	1	Topsoil	Ap	0	23	D	Slightly Hard	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	23	47	M	Friable	10YR 4/2	1	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
SRBL16048	1	Topsoil	Ap	0	23	D	Slightly Hard	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	23	44	M	Friable	10YR 4/2	2	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BCk	44	60	M	Friable	2.5Y 4/2	-	W/F/SB	SiCL	-	M	-	-
	4	Lower Subsoil	Ck	60	100	D	Hard	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRBL16049	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	W/M/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	25	53	M	Firm	10YR 4/2	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	53	80	M	Hard	2.5Y 4/2	-	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	4	Lower Subsoil	IICk	80	100	D	Firm	2.5Y 5/3	5	MA	SiC	-	S	-	-
SRBL16050	1	Topsoil	Ap	0	21	D	Slightly Hard	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	21	42	M	Friable	10YR 4/2	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BCk	42	60	M	Firm	2.5Y 4/2	-	M/F/SB	SiC	-	S	-	-
	4	Lower Subsoil	Ck	60	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRBL16051	1	Topsoil	Ap	0	23	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Lower Subsoil	Ck1	23	30	M	Friable	2.5Y 5/2	-	MA	SiL	-	S	-	-
	3	Topsoil	Ahkb1	30	48	M	Friable	10YR 2/1	-	MA	SiL	-	S	-	-
	4	Lower Subsoil	Ck2	48	65	M	Friable	2.5Y 5/2	-	MA	SiL	-	S	-	-
	5	Topsoil	Ahkb2	65	80	M	Friable	10YR 2/1	-	MA	SiL	-	S	-	-
	6	Lower Subsoil	Ckgj	80	100	M	Friable	2.5Y 4/2	-	MA	SiL	-	S	-	-
SRBL16052	1	Topsoil	Apk	0	22	M	Friable	10YR 2/1	-	W/F/GR	SiL	-	M	-	-
	2	Lower Subsoil	Ck	22	36	M	Friable	2.5Y 4/1	-	MA	SiL	-	S	-	-
	3	Topsoil	Ahkbgj	36	55	M	Friable	10YR 2/1	-	MA	SiL	C/F/D	S	-	-
	4	Lower Subsoil	Ckgj	55	100	W	Sticky	2.5Y 4/1	-	MA	SiL	C/F/D	S	-	-
SRBL16053	1	Topsoil	Apk	0	25	M	Friable	10YR 2/1	-	W/C/SB	SiCL	-	M	-	-
	2	Lower Subsoil	Ck	25	38	M	Friable	2.5Y 5/1	-	W/F/SB	SiCL	-	S	-	-
	3	Topsoil	Ahkb	38	48	M	Friable	2.5Y 2/1	-	M/M/PL	SiL	-	S	-	-
	4	Lower Subsoil	Ckgj	48	100	M	Friable	2.5Y 5/3	-	MA	SiL	-	S	-	-
SRKF16001	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bgj	20	45	M	Friable	2.5Y 4/1	5	S/C/SB	CL	C/F/D	-	-	-
	3	Lower Subsoil	BCgj	45	70	M	Firm	2.5Y 4/1	-	MA	CL	C/M/F	-	-	-
	4	Lower Subsoil	Ckg	70	120	M	Firm	2.5Y 4/2	-	MA	C	-	M	-	-
SRKF16002	1	Topsoil	Ap	0	19	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	SRKF16002 -Ap	Y
	2	Upper Subsoil	Bgj	19	44	M	Firm	2.5Y 4/3	-	S/C/SB	HC	C/M/D	-	SRKF16002 -Bgj	Y
	3	Lower Subsoil	Ckgj	44	110	M	Firm	2.5Y 4/2	-	MA	HC	-	M	SRKF16002 -Ckgj	Y
SRKF16003	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	4	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bgj	22	59	M	Firm	2.5Y 4/1	-	M/C/SB	C	C/F/F	-	-	-
	3	Lower Subsoil	Ckgj	59	120	M	Firm	2.5Y 4/2	5	MA	C	F/F/F	M	-	-
SRKF16004	1	Topsoil	Apk	0	9	M	Friable	2.5Y 3/1	10	M/M/GR	CL	-	S	-	-
	2	Upper Subsoil	Bmkgj	9	49	M	Firm	2.5Y 4/2	15	M/C/SB	C	C/M/F	S	-	-
	3	Lower Subsoil	Ck	49	105	D	Hard	2.5Y 4/1	12	MA	C	-	S	-	-
	4	Topsoil	Apkb	105	120	M	Firm	10YR 2/1	-	-	CL	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRKF16005	1	Topsoil	Apk	0	18	W	Sticky	2.5Y 2/1	-	-	SiCL	-	S	-	-
	2	Upper Subsoil	CAgjk	18	41	W	Sticky	2.5Y 4/1	-	MA	SiC	C/M/D	S	-	-
	3	Lower Subsoil	Ckgj	41	120	M	Firm	2.5Y 5/2	-	MA	C	C/F/F	S	-	-
SRKF16006	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/BL	CL	-	-	SRKF16006 -Ap	N
	2	Topsoil	Ah	20	31	M	Firm	10YR 2/1	-	M/M/BL	CL	-	-	-	-
	3	Upper Subsoil	Bt	31	56	M	Firm	10YR 3/2	-	S/M/BL	C	-	-	SRKF16006 -Bnj	N
	4	Lower Subsoil	Ck	56	100	M	Friable	2.5Y 4/2	-	MA	C	-	M	SRKF16006 -Ck	N
SRKF16007	1	Topsoil	Apk	0	30	M	Friable	10YR 2/1	-	M/M/GR	SiCL	-	M	-	-
	2	Upper Subsoil	Bgk	30	65	M	Friable	2.5Y 2/1	-	MA	SiL	-	M	-	-
	3	Lower Subsoil	IICkg	65	110	M	Friable	2.5Y 5/3	5	MA	SiL	-	S	-	-
SRKF16008	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	27	63	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	63	110	M	Firm	2.5Y 4/4	-	MA	SiCL	-	M	-	-
SRKF16009	1	Topsoil	Apk	0	26	M	Friable	10YR 2/1	-	M/M/SB	SiL	-	W	-	-
	2	Upper Subsoil	Bmkgj	26	55	M	Friable	2.5Y 4/1	-	M/C/SB	SiL	C/M/D	S	-	-
	3	Lower Subsoil	Ckg	55	110	M	Firm	2.5Y 5/3	-	MA	SiC	F/F/F	S	-	-
SRKF16010	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Topsoil	Ah	20	34	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	3	Upper Subsoil	Bgjk	34	63	M	Firm	10YR 3/2	-	M/C/SB	SiCL	F/M/D	M	-	-
	4	Lower Subsoil	IICkg	63	110	M	Friable	2.5Y 5/3	4	MA	CL	C/M/D	M	-	-
SRKF16011	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	-	M/C/GR	L	-	-	SRKF16011-Ap	N
	2	Upper Subsoil	Bmk	17	43	M	Friable	10YR 4/3	-	M/C/SB	CL	-	S	SRKF16011-Bmk	N
	3	Lower Subsoil	Ck	43	110	M	Firm	2.5Y 5/3	-	MA	CL	-	S	SRKF16011-Ck	N
SRKF16012	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	17	40	M	Firm	10YR 2/2	2	M/C/SB	C	-	-	-	-
	3	Lower Subsoil	Ck	40	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16013	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	SRKF16013-Ap	Y
	2	Topsoil	Ah	20	41	M	Firm	10YR 2/1	-	M/M/GR	L	-	-	SRKF16013-Ck	Y
	3	Lower Subsoil	Ck	41	110	M	Firm	2.5Y 4/3	3	MA	C	-	M	-	-
SRKF16014	1	Topsoil	Apk	0	26	M	Friable	10YR 2/1	-	M/M/GR	SiCL	-	W	-	-
	2	Upper Subsoil	Bmkgj	26	58	M	Friable	10YR 4/3	4	M/M/SB	SiCL	F/M/D	M	-	-
	3	Lower Subsoil	Ckg	58	110	M	Firm	2.5Y 5/3	-	MA	SiC	C/M/D	S	-	-
SRKF16015	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Upper Subsoil	Bm	22	39	M	Firm	10YR 3/3	-	M/C/SB	C	-	-	-	-
	3	Lower Subsoil	Ckgj	39	100	M	Firm	2.5Y 5/2	-	MA	C	C/M/D	S	-	-
SRKF16016	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	-	M/M/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bmk	28	42	M	Friable	10YR 4/2	-	M/F/GR	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	42	110	M	Firm	2.5Y 4/3	-	MA	CL	-	S	-	-
SRKF16017	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	21	53	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	53	110	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16018	1	Water	W	10	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	-	Si	-	S	-	-
	3	Lower Subsoil	Ckg	20	70	M	Friable	2.5Y 3/1	-	MA	SiCL	-	VS	-	-
	4	Lower Subsoil	IICkg	70	100	M	Friable	2.5Y 6/2	5	MA	CL	C/M/P	VS	-	-
SRKF16019	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	22	49	M	Friable	10YR 4/3	-	M/M/GR	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	49	110	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16020	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	21	47	M	Firm	10YR 3/3	-	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	47	110	M	Firm	2.5Y 5/3	-	MA	C	-	S	-	-
SRKF16021	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	22	48	M	Firm	10YR 4/3	-	M/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	48	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16022	1	Topsoil	Apk	0	25	M	Firm	10YR 2/1	-	-	SiC	-	W	SRKF16022-Apk	N
	2	Lower Subsoil	Ckg	25	100	M	Firm	2.5Y 6/3	-	MA	SiC	C/F/P	M	SRKF16022-Ckg	N
SRKF16023	1	Topsoil	Ap	0	23	W	Sticky	10YR 2/1	-	-	SiL	-	-	-	-
	2	Upper Subsoil	Bm	23	56	M	Firm	10YR 4/3	-	M/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ckg	56	100	M	Firm	2.5Y 6/3	2	MA	SiC	F/F/F	S	-	-
SRKF16024	1	Water	W	10	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ap	0	20	M	Firm	10YR 2/1	-	-	CL	-	-	-	-
	3	Upper Subsoil	AC	20	35	M	Firm	2.5Y 3/1	-	-	CL	-	-	-	-
	4	Lower Subsoil	Ckg	35	60	M	Firm	2.5Y 5/2	-	MA	C	C/F/F	S	-	-
	5	Lower Subsoil	IICkg	60	75	M	Firm	2.5Y 4/2	35	MA	CL	-	S	-	-
	6	Lower Subsoil	IIICkg	75	100	M	Firm	2.5Y 4/3	-	MA	C	-	S	-	-
SRKF16025	1	Topsoil	Apk	0	20	M	Friable	-	-	M/M/GR	L	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Topsoil	Ahk	20	38	M	Friable	-	-	M/M/GR	L	-	S	-	-
	3	Upper Subsoil	Bmk	38	57	M	Friable	-	-	M/M/SB	SiCL	-	S	-	-
	4	Lower Subsoil	Ckgj	57	110	M	Firm	-	2	MA	SiC	C/M/D	S	-	-
SRKF16026	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	M	-	-
	2	Upper Subsoil	ACkg	20	80	W	Slightly Sticky	2.5Y 3/2	-	MA	SiL	-	M	-	-
	3	Lower Subsoil	Ckg	80	110	M	Firm	2.5Y 4/1	-	MA	C	C/F/F	M	-	-
SRKF16027	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	S	-	-
	2	Topsoil	Ahkg	20	31	M	Friable	10YR 2/1	-	M/M/SB	SiL	C/M/D	S	-	-
	3	Lower Subsoil	Ckg	31	80	M	Firm	2.5Y 3/1	-	MA	SiCL	C/M/D	S	-	-
	4	Lower Subsoil	IICkg	80	110	M	Firm	2.5Y 4/1	15	MA	SiC	C/M/P	S	-	-
SRKF16028	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bmkgj	25	54	M	Friable	2.5Y 3/2	-	M/M/SB	SiL	-	M	-	-
	3	Lower Subsoil	Ckg	54	100	W	Sticky	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRKF16029	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/M/GR	L	-	W	-	-
	2	Topsoil	Ahk	20	53	M	Friable	10YR 2/1	-	M/M/GR	CL	-	W	-	-
	3	Lower Subsoil	Ck	53	100	M	Firm	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRKF16030	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	21	44	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	44	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16031	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Topsoil	Ah	20	40	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	3	Upper Subsoil	Bmk	40	75	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	M	-	-
	4	Lower Subsoil	Ck1	75	85	D	Soft	2.5Y 6/2	-	MA	Si	-	S	-	-
	5	Lower Subsoil	Ck2	85	110	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16032	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/M/GR	L	-	W	-	-
	2	Topsoil	Ah	20	36	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	36	68	M	Friable	10YR 4/3	-	M/C/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck	68	110	M	Firm	2.5Y 5/3	-	MA	SiC	-	M	-	-
SRKF16033	1	Topsoil	Ah	0	36	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	36	62	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	62	100	M	Firm	2.5Y 6/3	-	MA	SiC	-	M	-	-
SRKF16034	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bm	25	64	M	Friable	10YR 4/2	-	W/M/SB	SiCL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ck	64	110	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16035	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	-	-	-
	2	Topsoil	Ah	20	32	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	-	-	-
	3	Upper Subsoil	Bm	32	58	M	Friable	10YR 4/2	-	M/M/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck	58	110	M	Firm	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRKF16036	1	Water	W	5	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Apk	0	30	W	Sticky	10YR 2/1	-	MA	SiCL	-	W	-	-
	3	Lower Subsoil	Ckg	30	100	M	Firm	2.5Y 6/3	-	MA	SiC	F/F/F	W	-	-
SRKF16037	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	33	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	33	47	M	Friable	10YR 3/3	-	M/M/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck1	47	75	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
	5	Lower Subsoil	Ck2	75	110	D	Hard	2.5Y 6/3	-	MA	SiC	-	S	-	-
SRKF16039	1	Topsoil	Ap	0	23	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	23	43	M	Friable	10YR 3/3	-	M/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	43	100	M	Firm	2.5Y 6/3	-	MA	SiC	-	S	-	-
SRKF16040	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Topsoil	Ah	20	32	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	32	54	M	Friable	10YR 3/4	-	M/C/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	54	100	M	Firm	2.5Y 4/2	-	MA	SiCL	-	S	SRKF16040-Ck	N
SRKF16041	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bm	17	40	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ckgj	40	100	M	Firm	2.5Y 5/3	-	MA	SiC	C/F/D	S	-	-
SRKF16042	1	Water	W	10	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahg	0	20	W	Slightly Sticky	10YR 2/1	-	MA	SiL	C/M/D	-	-	-
	3	Upper Subsoil	ACg	20	70	M	Friable	2.5Y 2/1	-	MA	SiCL	C/M/D	-	-	-
	4	Lower Subsoil	IICkg	70	100	M	Firm	2.5Y 4/1	6	MA	SiL	F/M/F	-	-	-
SRKF16043	1	Topsoil	Ahkg	0	25	W	Slightly Sticky	10YR 2/1	-	-	SiL	C/M/D	M	-	-
	2	Upper Subsoil	ACkg	25	60	M	Friable	2.5Y 2/1	-	-	SiCL	C/M/D	M	-	-
	3	Lower Subsoil	Ckg	60	90	M	Firm	2.5Y 3/1	-	MA	SiCL	F/F/F	M	-	-
	4	Lower Subsoil	IICkg	90	120	M	Firm	2.5Y 4/1	5	MA	CL	F/F/F	S	-	-
SRKF16044	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	2	M/M/GR	L	-	-	-	-
	2	Topsoil	Ah	20	35	M	Friable	10YR 2/1	2	M/M/GR	L	-	-	SRKF16044-Ap	N

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Upper Subsoil	Bm	35	57	M	Friable	10YR 4/3	2	M/M/SB	CL	-	-	SRKF16044-Bm	N
	4	Lower Subsoil	Ck	57	100	M	Firm	2.5Y 4/3	-	MA	C	-	S	SRKF16044-Ck	N
SRKF16045	1	Topsoil	Apk	0	26	M	Friable	10YR 2/1	-	M/F/GR	L	-	M	-	-
	2	Upper Subsoil	Bmk	26	56	M	Friable	10YR 4/2	-	M/F/SB	SiL	-	M	-	-
	3	Lower Subsoil	Ck	56	100	M	Firm	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRKF16046	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	25	69	M	Friable	10YR 5/2	-	W/M/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	69	100	M	Firm	2.5Y 6/3	-	MA	SiC	-	S	-	-
SRKF16048	1	Water	W	10	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahkg	0	20	W	Slightly Sticky	2.5Y 2/1	-	MA	SiL	C/M/P	W	-	-
	3	Upper Subsoil	ACkg	20	60	W	Sticky	2.5Y 3/2	-	MA	SiL	C/M/P	W	-	-
	4	Lower Subsoil	IICkg	60	120	M	Firm	2.5Y 4/1	-	MA	SiC	C/F/P	W	-	-
SRKF16049	1	Topsoil	MINk1	0	12	M	Friable	10YR 2/2	-	M/F/SB	SiL	-	S	-	-
	2	Upper Subsoil	MINk2	12	60	M	Friable	2.5Y 5/2	-	M/M/SB	CL	-	M	-	-
	3	Lower Subsoil	Ckg	60	100	W	Sticky	2.5Y 6/2	-	MA	SiC	-	M	-	-
SRKF16050	1	Topsoil	Apk	0	24	M	Friable	10YR 2/1	-	M/F/GR	L	-	W	-	-
	2	Upper Subsoil	Bmk	24	61	M	Friable	10YR 5/2	-	M/M/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	61	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
SRKF16051	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	W/M/GR	SiL	-	-	-	-
	2	Topsoil	Ah	20	49	M	Friable	10YR 2/1	-	W/M/GR	SiL	-	-	-	-
	3	Upper Subsoil	Bmk	49	56	M	Friable	10YR 3/3	-	M/M/SB	SiL	-	M	-	-
	4	Lower Subsoil	Ck	56	100	M	Firm	2.5Y 4/3	-	MA	SiCL	-	S	-	-
SRKF16052	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bm	25	36	M	Friable	10YR 3/2	-	M/M/SB	SiL	-	-	-	-
	3	Lower Subsoil	Ck1	36	80	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
	4	Lower Subsoil	Ck2	80	100	D	Hard	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16053	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	24	39	M	Friable	10YR 3/2	-	W/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	39	100	M	Firm	2.5Y 5/2	-	MA	SiCL	-	S	-	-
SRKF16054	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	1	M/M/GR	SiL	-	-	-	-
	2	Topsoil	Ah	20	42	M	Friable	10YR 2/1	1	W/M/GR	SiL	-	-	-	-
	3	Upper Subsoil	Bm	42	63	M	Friable	10YR 4/3	-	M/C/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	63	100	M	Firm	2.5Y 5/2	-	MA	SiCL	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRKF16055	1	Topsoil	Ap	0	29	-	-	10YR 2/1	3	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	29	54	-	-	10YR 4/3	-	W/C/SB	SiL	-	M	-	-
	3	Lower Subsoil	Ck	54	100	-	-	2.5Y 4/3	2	MA	CL	-	S	-	-
SRKF16056	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	28	43	M	Friable	10YR 3/2	-	M/M/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	43	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16057	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	W	-	-
	2	Topsoil	Ahk	20	44	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	W	-	-
	3	Lower Subsoil	Ck	44	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	M	-	-
SRKF16058	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bkgj	25	50	M	Friable	2.5Y 5/2	-	W/M/SB	SiL	F/C/F	M	-	-
	3	Lower Subsoil	Ckgj	50	100	M	Firm	2.5Y 6/3	2	MA	SiC	C/M/D	S	-	-
SRKF16059	1	Water	W	10	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahkg	0	15	W	Slightly Sticky	10YR 2/1	-	MA	SiCL	-	W	-	-
	3	Upper Subsoil	ACkg	15	35	W	Slightly Sticky	2.5Y 3/2	-	MA	SiCL	-	W	-	-
	4	Lower Subsoil	Ckg	35	100	M	Firm	2.5Y 6/3	4	MA	SiC	C/M/D	M	-	-
SRKF16060	1	Topsoil	Ap	0	29	M	Friable	10YR 2/1	1	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bmgj	29	51	M	Friable	2.5Y 4/3	-	M/M/SB	SiCL	C/M/F	-	-	-
	3	Topsoil	Ahkb	51	65	M	Friable	2.5Y 2/1	-	MA	L	-	W	-	-
	4	Lower Subsoil	IICkgj	65	100	M	Firm	2.5Y 5/2	2	MA	C	C/M/D	M	-	-
SRKF16061	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	30	58	M	Friable	10YR 4/3	-	M/C/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	58	100	M	Firm	2.5Y 4/2	-	MA	CL	-	S	-	-
SRKF16062	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/M/GR	LfS	-	-	-	-
	2	Upper Subsoil	Bmk	30	56	M	Friable	10YR 4/3	-	W/M/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	56	100	M	Firm	2.5Y 4/3	-	MA	SiCL	-	S	-	-
SRKF16063	1	Topsoil	Apkg	0	27	M	Friable	10YR 2/1	-	M/M/GR	SiCL	-	W	-	-
	2	Upper Subsoil	Bkg	27	47	M	Friable	2.5Y 4/3	-	-	SiCL	C/F/P	W	-	-
	3	Lower Subsoil	Ckg	47	100	M	Firm	2.5Y 4/1	3	MA	SiC	F/F/F	M	-	-
SRKF16064	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	W	-	-
	2	Topsoil	Ahk	20	38	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	W	-	-
	3	Upper Subsoil	Bmkgj	38	52	M	Friable	2.5Y 3/2	-	W/M/SB	SiL	-	W	-	-
	4	Lower Subsoil	Ckgj	52	100	M	Firm	2.5Y 6/3	-	MA	SiCL	-	M	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRKF16065	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/M/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bmk	30	55	M	Friable	2.5Y 4/3	2	M/F/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16066	1	Water	W	15	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Apkg	0	15	M	Friable	10YR 2/1	-	MA	SiC	C/M/D	W	-	-
	3	Upper Subsoil	Bkg	15	35	M	Firm	2.5Y 4/3	-	MA	SiC	C/F/P	W	-	-
	4	Lower Subsoil	Ckg1	35	55	M	Firm	2.5Y 5/3	-	MA	SiC	C/M/D	W	-	-
	5	Lower Subsoil	Ckg2	55	100	M	Friable	2.5Y 5/3	10	MA	SC	C/M/D	W	-	-
SRKF16067	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	W	-	-
	2	Topsoil	Ahk	20	37	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	W	-	-
	3	Lower Subsoil	Ck	37	100	M	Firm	2.5Y 5/3	-	MA	CL	-	M	-	-
SRKF16068	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/M/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bmk	27	47	M	Friable	10YR 4/3	2	W/M/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
SRKF16069	1	Water	W	3	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Apk	0	25	W	Sticky	10YR 2/1	-	MA	SiL	C/M/F	W	-	-
	3	Upper Subsoil	ACk	25	45	W	Sticky	2.5Y 3/2	-	MA	SiL	C/F/D	W	-	-
	4	Lower Subsoil	Ckg	45	100	M	Firm	2.5Y 5/3	-	MA	SiCL	C/F/D	M	-	-
SRKF16070	1	Topsoil	Apk	0	24	M	Friable	10YR 2/1	-	M/C/GR	SiCL	F/F/F	M	-	-
	2	Upper Subsoil	Bmkgj	24	46	M	Friable	2.5Y 4/3	-	-	CL	C/M/D	S	-	-
	3	Lower Subsoil	Ckg	46	100	M	Firm	2.5Y 6/3	-	MA	SiC	C/F/D	S	-	-
SRKF16071	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	3	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	24	43	M	Friable	10YR 3/2	1	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	43	100	M	Firm	2.5Y 4/3	5	MA	CL	-	S	-	-
SRKF16072	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	21	55	M	Friable	10YR 4/3	-	W/F/SB	CL	-	M	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/3	2	MA	CL	-	S	-	-
SRKF16073	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bmkgj	22	47	M	Friable	2.5Y 4/2	-	M/M/SB	SiL	F/F/F	M	-	-
	3	Lower Subsoil	Ckgj	47	100	M	Firm	2.5Y 4/3	-	MA	SiC	C/M/D	M	-	-
SRKF16074	1	Topsoil	Ap	0	19	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bmkgj	19	44	M	Friable	2.5Y 4/3	-	W/M/SB	CL	F/M/D	M	-	-
	3	Lower Subsoil	Ckg	44	100	M	Firm	2.5Y 4/2	-	MA	C	C/M/D	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRKF16075	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Topsoil	Ah	20	36	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	3	Upper Subsoil	Bmk	36	49	M	Friable	10YR 4/4	2	W/M/SB	SiCL	-	M	-	-
	4	Lower Subsoil	Ckgj	49	100	M	Firm	2.5Y 4/3	2	MA	SiC	C/M/F	VS	-	-
SRKF16076	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	22	43	M	Friable	2.5Y 3/2	15	M/F/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ckgj	43	100	M	Firm	2.5Y 4/2	10	MA	C	C/F/D	VS	-	-
SRKF16077	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	1	M/F/GR	SiL	-	-	-	-
	2	Topsoil	Ah	27	44	M	Friable	10YR 2/1	1	M/F/GR	SiL	-	-	-	-
	3	Upper Subsoil	Bm	44	80	D	Hard	10YR 4/4	2	W/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	80	100	D	Hard	10YR 6/1	2	MA	SiCL	-	S	-	-
SRKF16078	1	Topsoil	Ap	0	23	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	23	54	M	Friable	10YR 4/3	2	M/C/SB	SiC	-	-	-	-
	3	Lower Subsoil	Ck	54	100	M	Firm	2.5Y 4/2	-	MA	C	-	S	-	-
SRKF16079	1	Topsoil	Apk	0	27	M	Friable	10YR 2/2	8	M/M/GR	L	-	M	-	-
	2	Topsoil	Ahk	27	44	M	Friable	10YR 2/3	-	M/M/GR	L	-	M	-	-
	3	Upper Subsoil	Bmk	44	59	M	Friable	10YR 3/3	10	M/M/SB	SiCL	-	M	-	-
	4	Lower Subsoil	Ck	59	100	D	Hard	2.5Y 4/2	10	MA	SiCL	-	S	-	-
SRKF16080	1	Topsoil	Ap	0	18	M	Friable	10YR 2/1	5	M/M/GR	CL	-	-	SRKF16080-Ap	Y
	2	Upper Subsoil	Bmk	18	45	M	Firm	10YR 4/3	1	M/M/SB	HC	-	S	SRKF16080-Bmk	Y
	3	Lower Subsoil	Ck	45	100	D	Hard	2.5Y 4/2	5	MA	HC	-	S	SRKF16080-Ck	Y
SRKF16081	1	Topsoil	Apk	0	25	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	S	-	-
	2	Upper Subsoil	Bmkgj	25	47	M	Friable	2.5Y 4/1	-	W/C/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ckg	47	100	W	Sticky	2.5Y 5/2	-	MA	SiCL	C/M/D	S	-	-
SRKF16082	1	Water	W	5	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Apkg	0	30	W	Sticky	10YR 2/1	-	MA	SiCL	-	W	-	-
	3	Lower Subsoil	Ckg	30	100	M	Firm	2.5Y 4/1	-	MA	SiCL	C/M/P	W	-	-
SRKF16083	1	Topsoil	Apk	0	25	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	W	-	-
	2	Topsoil	Ahk	25	40	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	W	-	-
	3	Lower Subsoil	Ckg1	40	100	W	Sticky	2.5Y 3/1	-	MA	SiL	-	W	-	-
	4	Lower Subsoil	Ckg2	100	120	M	Firm	2.5Y 4/1	-	MA	SC	C/M/P	W	-	-
SRKF16084	1	Topsoil	Apk	0	19	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	W	-	-
	2	Upper Subsoil	Bmkgj	19	39	M	Friable	2.5Y 3/2	-	M/M/SB	SiCL	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ckgj1	39	60	W	Sticky	2.5Y 5/3	-	MA	SiCL	C/C/D	S	-	-
	4	Lower Subsoil	Ckgj2	60	100	M	Firm	2.5Y 4/3	-	MA	SiC	C/M/D	S	-	-
SRKF16085	1	Topsoil	Ap	0	25	M	Friable	-	-	M/M/GR	L	-	-	-	-
	2	Topsoil	Ah	25	39	M	Friable	-	-	M/M/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	39	53	M	Friable	-	2	M/M/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck	53	100	M	Firm	-	-	MA	C	-	M	-	-
SRKF16086	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	2	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	26	55	M	Friable	10YR 3/3	1	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/3	7	MA	SCL	-	S	-	-
SRKF16087	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	30	59	M	Friable	10YR 2/2	-	M/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	59	100	M	Firm	2.5Y 4/2	5	MA	SiC	-	VS	-	-
SRKF16088	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	2	M/M/GR	CL	-	-	-	-
	2	Topsoil	Ah	25	50	M	Friable	10YR 2/1	2	M/M/GR	CL	-	-	-	-
	3	Upper Subsoil	Bmk	50	75	M	Friable	10YR 4/3	3	M/M/SB	CL	-	W	-	-
	4	Lower Subsoil	Ck	75	100	M	Firm	2.5Y 4/2	5	MA	C	-	S	-	-
SRKF16089	1	Topsoil	Ap	0	16	M	Friable	10YR 2/1	4	W/M/SB	L	-	-	-	-
	2	Upper Subsoil	Bmk	16	41	M	Friable	10YR 4/4	20	M/M/SB	CL	-	W	-	-
	3	Lower Subsoil	Ck	41	100	M	Firm	2.5Y 4/2	1	MA	C	-	M	-	-
SRKF16090	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	2	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	28	42	M	Friable	10YR 4/4	5	M/F/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	42	100	M	Firm	2.5Y 4/3	2	MA	C	-	M	-	-
SRKF16091	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	2	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	28	55	M	Friable	10YR 4/4	1	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/3	1	MA	C	-	M	-	-
SRKF16092	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	2	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	28	60	M	Firm	10YR 4/3	1	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	60	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	M	-	-
SRKF16093	1	Topsoil	Ap	0	18	M	Friable	10YR 4/3	5	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	18	47	M	Friable	2.5Y 4/3	5	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	10YR 2/1	-	MA	SiC	-	M	-	-
SRKF16094	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	1	M/M/SB	L	-	-	-	-
	2	Upper Subsoil	Bm	25	48	M	Friable	10YR 4/3	3	M/M/SB	CL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ck	48	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	M	-	-
SRKF16095	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	2	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	17	33	M	Friable	10YR 4/4	10	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	33	100	M	Firm	2.5Y 4/3	1	MA	SiC	-	M	-	-
SRKF16096	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	2	M/M/SB	L	-	-	-	-
	2	Upper Subsoil	Bm	17	39	M	Friable	10YR 4/3	-	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	39	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	M	-	-
SRKF16097	1	Topsoil	Ah	0	15	M	Friable	10YR 2/2	-	M/F/GR	SL	-	-	SRKF16097-Ah	Y
	2	Lower Subsoil	Ck	15	35	M	Firm	2.5Y 6/1	60	MA	SL	-	W	SRKF16097-Ck	Y
SRKF16098	1	Duff	LFH	16	0	-	-	-	-	-	-	-	-	SRKF16098-Ahkgj	Y
	2	Topsoil	Ahkgj	0	40	M	Friable	10YR 2/1	-	-	L	C/M/D	W	SRKF16098-Ckg	Y
	3	Lower Subsoil	Cskg	40	100	M	Firm	2.5Y 3/2	-	MA	L	C/M/P	W	SRKF16098-LFH	Y
SRKF16100	1	Duff	LFH	3	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahk	0	29	M	Friable	10YR 2/1	1	W/M/GR	SL	-	S	-	-
	3	Upper Subsoil	Bmkgj	29	49	M	Very Friable	10YR 4/3	-	W/M/SB	LS	C/C/F	S	-	-
	4	Lower Subsoil	Ckg	49	100	M	Friable	2.5Y 4/3	100	MA	LS	C/M/F	S	-	-
	5	Lower Subsoil	IIC	100	110	M	-	-	-	MA	-	-	-	-	-
SRKF16101	1	Duff	LFH	2	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahk	0	36	M	Friable	10YR 2/2	-	M/F/GR	SL	-	S	-	-
	3	Upper Subsoil	Bkgj	36	50	M	Friable	2.5Y 3/2	-	W/M/SB	LS	C/M/F	S	-	-
	4	Lower Subsoil	Ckgj	50	100	M	Friable	2.5Y 4/3	-	MA	LS	F/M/D	S	-	-
SRKF16102	1	Duff	LFH	4	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahk	0	13	M	Friable	10YR 2/2	-	M/F/GR	SL	-	S	-	-
	3	Upper Subsoil	Bmk	13	40	M	Friable	2.5Y 4/3	-	W/F/SB	LS	F/M/F	S	-	-
	4	Lower Subsoil	Ckg	40	60	M	Friable	2.5Y 4/2	-	MA	LS	F/M/P	S	-	-
	5	Lower Subsoil	IICkg	60	100	M	Friable	2.5Y 4/2	50	MA	LS	-	S	-	-
SRKF16103	1	Topsoil	Ahk	0	16	M	Loose	10YR 3/2	-	-	S	-	S	-	-
	2	Lower Subsoil	Ck	16	25	M	Loose	10YR 3/3	90	SG	S	-	S	-	-
SRKF16104	1	Topsoil	Ahk	0	28	M	Loose	-	-	-	S	-	S	-	-
	2	Upper Subsoil	Bgk	28	60	M	Friable	-	-	W/M/SB	SL	C/C/D	S	-	-
	3	Lower Subsoil	IICkg	60	100	M	Loose	-	90	SG	S	F/C/D	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRKF16105	1	Topsoil	Ahk	0	27	M	Very Friable	10YR 2/2	1	M/M/GR	LS	-	S	-	-
	2	Upper Subsoil	Bmkgj	27	56	M	Very Friable	2.5Y 3/2	-	W/M/SB	LS	C/M/D	S	-	-
	3	Lower Subsoil	IICkgj	56	100	M	Very Friable	2.5Y 4/3	65	MA	LS	F/M/F	S	-	-
SRKF16107	1	Organic	Om	0	80	-	-	-	-	-	-	-	-	SRKF16107-Om	Y
	2	Lower Subsoil	Ckg	80	120	W	Slightly Sticky	2.5Y 4/1	60	MA	SiL	-	W	SRKF16107-Ckg	Y
SRKF16108	1	Organic	Om	30	0	-	-	-	-	-	-	-	-	-	-
	2	Lower Subsoil	Ckg	0	80	W	Slightly Sticky	2.5Y 4/1	-	MA	SiL	C/M/D	W	-	-
	3	Lower Subsoil	IICkg	80	100	M	Friable	2.5Y 4/1	-	MA	SL	-	W	-	-
SRKF16109	1	Duff	FH	3	0	-	-	-	-	-	-	-	-	-	-
	2	Water	W	8	3	-	-	-	-	-	-	-	-	-	-
	3	Topsoil	Ahk	0	15	W	Slightly Sticky	10YR 2/2	-	MA	SL	-	W	-	-
	4	Lower Subsoil	Ckg	15	100	W	Slightly Sticky	2.5Y 4/1	-	MA	SL	C/C/D	W	-	-
SRKF16110	1	Topsoil	Apkg	0	20	W	Sticky	2.5Y 3/2	5	-	SiCL	C/M/D	W	-	-
	2	Topsoil	Ahkg	20	40	W	Sticky	2.5Y 3/2	5	-	SiCL	C/M/D	W	-	-
	3	Lower Subsoil	Ckg	40	100	M	Firm	2.5Y 4/1	-	MA	SiC	C/M/D	M	-	-
SRKF16111	1	Topsoil	Ap	0	19	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	19	47	M	Friable	2.5Y 4/3	-	W/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
SRKF16112	1	Topsoil	Apk	0	17	M	Friable	10YR 3/1	-	S/M/SB	SiC	-	W	-	-
	2	Upper Subsoil	Bmkgj	17	53	M	Friable	2.5Y 4/3	2	S/M/SB	SiC	F/F/F	W	-	-
	3	Lower Subsoil	Ckgj	53	100	M	Firm	2.5Y 4/2	1	MA	SiC	C/M/F	M	-	-
SRKF16113	1	Duff	LFH	2	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahk	0	12	M	Friable	2.5Y 2/1	-	S/M/GR	SiC	-	W	-	-
	3	Upper Subsoil	Bmk	12	39	M	Friable	2.5Y 4/3	-	M/M/SB	SiC	-	W	-	-
	4	Lower Subsoil	Ck	39	100	M	Firm	2.5Y 4/2	1	MA	SiC	-	M	-	-
SRKF16114	1	Lower Subsoil	Ck	0	30	M	Loose	10YR 4/3	70	SG	S	-	S	-	-
SRKF16115	1	Topsoil	Ahk	0	16	M	Friable	10YR 2/2	15	W/M/GR	LS	-	S	-	-
	2	Lower Subsoil	Ck	16	20	M	Firm	10YR 4/2	75	SG	S	-	S	-	-
SRKF16116	1	Lower Subsoil	Ck	0	30	M	Loose	10YR 4/3	90	SG	S	-	S	-	-
SRKF16117	1	Topsoil	Apk	0	23	M	Friable	10YR 2/1	-	M/M/GR	L	-	M	-	-
	2	Upper Subsoil	Bmk	23	49	M	Friable	10YR 4/3	3	M/M/SB	CL	-	S	-	-
	3	Lower Subsoil	Ck	49	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	S	-	-
SRKF16118	1	Topsoil	Apks	0	25	M	Friable	10YR 2/1	-	M/M/GR	SiL	-	W	SRKF16118-Apk	Y

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Upper Subsoil	Bg	25	46	M	Friable	2.5Y 4/1	-	M/M/SB	HC	A/F/P	W	SRKF16118-Bgk	Y
	3	Lower Subsoil	Ckg	46	100	M	Firm	2.5Y 4/2	1	MA	HC	C/M/D	M	SRKF16118-Ckj	Y
SRKF16119	1	Topsoil	Ahk	0	36	M	Friable	10YR 2/1	1	M/M/GR	L	-	M	-	-
	2	Upper Subsoil	Bmk	36	53	M	Friable	10YR 4/3	5	M/M/SB	SCL	-	M	-	-
	3	Lower Subsoil	Ckg	53	100	M	Firm	2.5Y 4/3	15	MA	SCL	C/M/P	VS	-	-
SRKF16120	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	22	52	M	Friable	10YR 4/3	-	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	52	100	M	Firm	2.5Y 4/3	5	MA	CL	-	W	-	-
SRKF16121	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/M/GR	CL	-	-	-	-
	2	Upper Subsoil	Bg	25	43	M	Friable	2.5Y 6/2	-	M/M/SB	SiCL	C/M/P	-	-	-
	3	Lower Subsoil	Ckg	43	100	M	Firm	2.5Y 5/3	1	MA	C	C/M/D	M	-	-
SRKF16122	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	24	47	M	Friable	10YR 4/3	-	M/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
SRKF16123	1	Topsoil	Apk	0	25	M	Friable	10YR 2/2	-	M/F/GR	SL	-	S	-	-
	2	Topsoil	Ahk	25	41	M	Friable	10YR 2/1	2	M/F/GR	SL	-	S	-	-
	3	Upper Subsoil	Bmk	41	55	M	Friable	10YR 4/4	2	W/F/SB	fSL	-	S	-	-
	4	Lower Subsoil	Ck	55	100	M	Friable	2.5Y 4/3	2	MA	fSL	-	S	-	-
SRKF16124	1	Topsoil	Ahk	0	18	M	Friable	10YR 2/2	-	M/M/GR	fSL	-	S	-	-
	2	Upper Subsoil	Bmk	18	24	M	Friable	10YR 4/4	-	W/M/SB	fSL	-	S	-	-
	3	Lower Subsoil	IICk	24	30	M	Friable	10YR 4/3	70	SG	LS	-	S	-	-
SRKF16125	1	Lower Subsoil	Ck	0	25	M	Friable	2.5Y 4/2	2	M/M/SB	fSL	-	S	-	-
	2	Topsoil	Ahkb	25	30	M	Friable	10YR 2/1	2	W/M/SB	fSL	-	S	-	-
	3	Upper Subsoil	Bmkb	30	50	M	Friable	10YR 4/4	2	W/M/SB	fSL	-	S	-	-
	4	Lower Subsoil	IICk	50	70	M	Loose	2.5Y 4/3	25	SG	S	-	S	-	-
SRKF16126	1	Organic	Om	0	70	-	-	-	-	-	-	-	-	-	-
	2	Lower Subsoil	Ckg	70	100	M	Firm	5Y 3/1	-	MA	SiC	-	S	-	-
SRKF16127	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	-	M/F/GR	Si	-	-	-	-
	2	Topsoil	Ah	17	21	M	Friable	10YR 2/1	-	M/F/GR	Si	-	-	-	-
	3	Upper Subsoil	Btj	21	65	M	Friable	10YR 4/2	-	M/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	65	100	M	Firm	2.5Y 3/2	-	MA	SiCL	-	-	-	-
SRKF16128	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	21	40	M	Firm	2.5Y 4/2	-	M/F/SB	SiC	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ckgj	40	100	M	Firm	2.5Y 5/3	-	MA	Si	-	S	-	-
SRKF16129	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	2	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	43	M	Firm	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	3	Lower Subsoil	IIC	43	100	M	Firm	2.5Y 4/3	-	MA	C	-	-	-	-
SRKF16130	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/F/SB	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	22	47	M	Firm	10YR 4/3	-	M/M/SB	SiC	-	S	-	-
	3	Lower Subsoil	Ck	47	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16131	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	28	46	M	Friable	10YR 4/3	-	W/M/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	46	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16132	1	Topsoil	Apk	0	23	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	W	-	-
	2	Upper Subsoil	Bmk	23	44	M	Friable	10YR 4/4	-	M/F/SB	SiCL	-	W	-	-
	3	Lower Subsoil	BCk	44	70	M	Firm	10YR 5/3	-	MA	SiC	-	W	-	-
	4	Lower Subsoil	Ck	70	100	M	Firm	2.5YR 5/3	-	MA	SiC	-	S	-	-
SRKF16133	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	2	M/F/GR	SiCL	-	W	-	-
	2	Topsoil	Ahk	20	42	M	Friable	10YR 2/1	8	W/F/GR	SiCL	-	W	-	-
	3	Upper Subsoil	Bmk	42	70	M	Friable	10YR 4/3	2	M/M/SB	SiCL	-	W	-	-
	4	Lower Subsoil	IICk	70	100	M	Firm	2.5Y 5/3	2	MA	SiC	-	S	-	-
SRKF16134	1	Topsoil	Ah	0	31	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bm	31	56	M	Friable	10YR 4/4	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	C	56	80	M	Firm	2.5Y 4/3	-	MA	SiC	-	-	-	-
	4	Lower Subsoil	IICk	80	100	M	Firm	2.5Y 4/2	2	MA	SiC	-	S	-	-
SRKF16135	1	Topsoil	Ap	0	16	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	16	55	M	Firm	10YR 4/4	-	M/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	IIBC	55	70	M	Firm	10YR 5/3	-	W/F/SB	SiC	-	-	-	-
	4	Lower Subsoil	IICk	70	100	M	Firm	2.5Y 4/3	1	MA	SiC	-	S	-	-
SRKF16136	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	33	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	3	Lower Subsoil	Cg	33	75	W	Sticky	2.5Y 4/1	-	MA	SiCL	-	-	-	-
	4	Lower Subsoil	Ckg	75	100	M	Firm	2.5Y 3/1	-	MA	SiC	-	S	-	-
SRKF16137	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	3	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	39	M	Friable	10Y 2/1	-	M/F/SB	SiCL	-	-	-	-
	3	Upper Subsoil	Bm	39	55	M	Friable	10YR 4/3	-	W/M/SB	SiCL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	4	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 5/3	1	MA	SiC	-	S	-	-
SRKF16138	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	34	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	3	Upper Subsoil	Bm	34	57	M	Friable	10YR 4/3	-	M/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	BC	57	90	M	Friable	10YR 4/3	-	W/M/SB	SiCL	-	-	-	-
	5	Lower Subsoil	Ck	90	100	M	Firm	2.5Y 4/3	-	MA	SiC	-	S	-	-
SRKF16139	1	Topsoil	Apk	0	18	M	Very Friable	10YR 3/2	-	M/F/GR	LS	-	S	-	-
	2	Topsoil	Ahk	18	70	M	Very Friable	10YR 3/2	-	M/M/SB	LfS	-	S	-	-
	3	Lower Subsoil	IICk	70	80	M	Very Friable	10YR 4/3	40	MA	LfS	-	S	-	-
SRKF16140	1	Topsoil	Ahk	0	22	M	Very Friable	10YR 2/2	-	W/F/SB	SiL	-	S	SRKF16140-Ahk	Y
	2	Lower Subsoil	Ck1	22	33	M	Very Friable	10YR 4/2	-	MA	SiL	-	S	SRKF16140-Ck1	Y
	3	Topsoil	Ahkb	33	49	M	Very Friable	10YR 2/2	-	MA	SiL	-	S	SRKF16140-Ahkb	Y
	4	Lower Subsoil	Ck2	49	110	M	Very Friable	10YR 4/2	-	MA	SL	-	S	SRKF16140-Ck2	Y
SRKF16141	1	Topsoil	Ahk	0	25	M	Firm	10YR 2/1	10	M/F/SB	SiCL	-	S	-	-
	2	Lower Subsoil	Ck	25	70	M	Firm	2.5Y 4/3	35	MA	SiC	-	S	-	-
SRKF16142	1	Lower Subsoil	Ck	0	10	M	Friable	10YR 4/3	90	MA	LS	-	S	-	-
SRKF16143	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	5	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	20	38	D	Slightly Hard	10YR 4/3	5	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	38	70	D	Hard	10YR 4/3	5	MA	SiCL	-	M	-	-
SRKF16144	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	3	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	32	M	Firm	10YR 2/1	3	M/F/SB	SiC	-	-	-	-
	3	Upper Subsoil	Bm	32	48	M	Firm	10YR 4/4	3	M/F/SB	SiC	-	-	-	-
	4	Lower Subsoil	Ck1	48	90	M	Firm	2.5Y 4/3	3	MA	SiC	-	M	-	-
	5	Lower Subsoil	Ck2	90	100	M	Firm	2.5Y 5/3	3	MA	SiC	-	VS	-	-
SRKF16145	1	Topsoil	Ap	0	20	M	Firm	10YR 2/1	-	M/F/SB	SiC	-	-	-	-
	2	Topsoil	Ah	20	30	M	Firm	10YR 2/1	-	M/F/SB	SiC	-	-	-	-
	3	Upper Subsoil	Bm	30	50	M	Firm	10YR 4/3	-	M/F/SB	SiC	-	-	-	-
	4	Lower Subsoil	IICk	50	100	M	Firm	2.5Y 5/3	7	MA	SiC	-	S	-	-
SRKF16146	1	Topsoil	Ah	0	29	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	29	44	M	Firm	10YR 4/3	-	M/M/SB	SiC	-	-	-	-
	3	Lower Subsoil	Ck	44	100	M	Firm	-	-	MA	SiC	-	M	-	-
SRKF16147	1	Topsoil	Ap	0	25	M	Firm	10YR 2/1	-	M/M/GR	SiC	-	-	-	-
	2	Upper Subsoil	Bmk	25	45	M	Firm	10YR 4/3	-	M/F/SB	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ck	45	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16148	1	Organic	Oh	35	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahkg	0	35	W	Slightly Sticky	2.5Y 2/1	-	-	SiCL	-	W	-	-
	3	Lower Subsoil	Ckg	35	65	W	Sticky	5Y 3/1	-	MA	SiC	-	W	-	-
SRKF16149	1	Topsoil	Ahk	0	18	M	Friable	10YR 3/2	-	M/M/SB	SiCL	-	M	-	-
	2	Upper Subsoil	Bmk	18	36	M	Firm	2.5Y 4/3	5	W/M/SB	SiCL	-	S	-	-
	3	Lower Subsoil	Ck	36	100	M	Friable	2.5Y 4/3	5	MA	SiCL	-	S	-	-
SRKF16150	1	Duff	LFH	6	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ah	0	14	M	Very Friable	10YR 2/2	70	W/F/GR	LS	-	-	-	-
	3	Lower Subsoil	Ck	14	50	M	Very Friable	2.5Y 3/2	75	MA	LS	-	S	-	-
SRKF16151	1	Topsoil	Ahk	0	41	M	Very Friable	10YR 2/1	5	M/F/GR	L	-	W	-	-
	2	Lower Subsoil	Ck	41	75	M	Firm	2.5Y 4/3	10	MA	SiCL	-	S	-	-
SRKF16152	1	Topsoil	Ah	0	26	M	Very Friable	10YR 2/1	15	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	CA	26	40	M	Friable	2.5Y 3/2	65	W/F/SB	L	-	-	-	-
SRKF16153	1	Topsoil	Ahk	0	21	M	Friable	10YR 2/1	40	M/F/SB	SL	-	W	-	-
	2	Upper Subsoil	Bmk	21	50	M	Friable	10YR 4/3	70	W/F/SB	SL	-	M	-	-
SRKF16154	1	Lower Subsoil	Ck1	0	7	M	Loose	2.5Y 4/3	-	SG	S	-	S	-	-
	2	Lower Subsoil	Ck2	7	20	M	Loose	2.5Y 4/3	80	SG	S	-	S	-	-
SRKF16155	1	Lower Subsoil	Ck1	0	22	M	Very Friable	2.5Y 4/3	-	SG	LS	-	S	-	-
	2	Lower Subsoil	Ck2	22	40	M	Very Friable	2.5Y 4/3	60	SG	LS	-	S	-	-
SRKF16156	1	Topsoil	Ap	0	15	D	Slightly Hard	10YR 2/1	5	M/C/PL	L	-	-	-	-
	2	Upper Subsoil	Bgj	15	36	D	Hard	2.5Y 4/1	7	M/C/SB	SiC	C/M/D	-	-	-
	3	Lower Subsoil	BCgj	36	100	M	Firm	2.5Y 5/3	-	MA	SiCL	F/F/F	-	-	-
SRKF16157	1	Topsoil	Ah	0	26	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	SRKF16157-Ah	N
	2	Upper Subsoil	Bkgj	26	50	W	Sticky	2.5Y 4/2	-	W/M/GR	SiC	C/M/F	M	SRKF16157-Bkgj	N
	3	Lower Subsoil	Ckgj	50	100	M	Firm	2.5Y 4/2	-	MA	SiC	C/F/F	S	SRKF16157-Ckgj	N
SRKF16158	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	2	M/F/SB	SiCL	-	-	-	-
	2	Topsoil	Ah	20	31	M	Friable	10YR 2/1	2	M/F/SB	SiCL	-	-	-	-
	3	Upper Subsoil	Bm	31	48	M	Firm	10YR 4/3	1	M/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	48	80	M	Friable	2.5Y 4/2	1	MA	SiCL	-	M	-	-
SRKF16159	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	2	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	20	42	M	Friable	10YR 4/3	2	M/F/SB	SiC	-	-	-	-
	3	Lower Subsoil	Ck	42	100	D	Hard	2.5Y 4/3	-	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRKF16160	1	Organic	Oh	18	0	-	-	-	-	-	-	-	-	SRKF16160-Oh	N
	2	Topsoil	Ahg	0	14	M	Friable	5Y 2.5/1	-	M/F/GR	SiCL	-	-	SRKF16160-Ahg	N
	3	Lower Subsoil	Ckg	14	80	M	Firm	2.5Y 5/1	-	MA	SiCL	C/M/D	S	SRKF16160-Ckg	N
SRKF16161	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	1	M/F/GR	SiCL	-	-	-	-
	2	Topsoil	Ah	20	44	M	Friable	10YR 2/1	1	M/F/GR	SiCL	-	-	-	-
	3	Upper Subsoil	Btj	44	60	M	Friable	2.5Y 4/2	1	W/F/SB	SiCL	-	-	-	-
SRKF16162	1	Organic	Om	17	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahk	0	30	M	Friable	10YR 2/1	-	M/M/SB	SiCL	-	W	-	-
	3	Lower Subsoil	Ckg	30	80	M	Firm	2.5Y 4/1	-	MA	SiCL	C/M/D	S	-	-
	4	Lower Subsoil	IICkg	80	90	M	Firm	2.5Y 5/1	40	MA	CL	C/M/P	S	-	-
SRKF16163	1	Topsoil	Ap	0	18	M	Friable	10Y 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	18	40	M	Friable	10YR 4/3	2	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck1	40	80	M	Firm	2.5Y 4/2	1	MA	SiCL	-	M	-	-
	4	Lower Subsoil	Ck2	80	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
SRKF16164	1	Topsoil	Ah	0	24	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	24	46	M	Friable	2.5Y 4/3	-	M/F/SG	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	46	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16165	1	Organic	Om	30	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ahg	0	20	W	Slightly Sticky	2.5Y 2/1	-	-	SiCL	-	-	-	-
	3	Lower Subsoil	Ckg	20	70	W	Sticky	5Y 5/1	-	MA	SiC	C/F/F	M	-	-
SRKF16166	1	Topsoil	Ap	0	26	D	Slightly Hard	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Bm	26	50	D	Slightly Hard	10YR 4/3	5	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	50	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16167	1	Topsoil	Ap	0	29	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmk	29	48	M	Friable	10YR 4/3	-	M/F/SB	SiL	-	S	-	-
	3	Lower Subsoil	IICk	48	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16168	1	Topsoil	Ahk	0	31	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	M	-	-
	2	Upper Subsoil	Bkg	31	50	M	Friable	2.5Y 4/1	-	W/F/SB	SiL	-	M	-	-
	3	Lower Subsoil	Ckg	50	100	M	Firm	2.5Y 3/1	-	MA	SiCL	-	S	-	-
SRKF16169	1	Topsoil	Ah	0	26	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Btj	26	43	M	Friable	10YR 4/2	2	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	43	100	M	Firm	2.5Y 4/2	1	MA	SiC	-	M	-	-
SRKF16170	1	Organic	Oh	12	0	-	-	-	-	-	-	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Topsoil	Ah	0	5	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	3	Upper Subsoil	CAkgj	5	22	M	Firm	2.5Y 4/3	-	MA	SiCL	C/M/F	S	-	-
	4	Lower Subsoil	Ckgj	22	100	M	Firm	2.5Y 5/3	-	MA	SiL	F/F/F	S	-	-
SRKF16171	1	Topsoil	Ah	0	29	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	SRKF16171-Ah	N
	2	Upper Subsoil	Bm	29	44	M	Friable	10YR 4/3	-	M/F/SB	SiCL	-	-	SRKF16171-Bm	N
	3	Lower Subsoil	Ck	44	100	M	Firm	2.5Y 5/3	-	MA	SiCL	-	S	SRKF16171-Ck	N
SRKF16172	1	Topsoil	Ap	0	25	D	Firm	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	25	46	D	Slightly Hard	10YR 4/2	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BC	46	70	M	Slightly Hard	2.5Y 4/2	-	MA	SiC	-	-	-	-
	4	Lower Subsoil	Ck	70	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16173	1	Topsoil	Ap	0	25	D	Slightly Hard	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	25	44	D	Slightly Hard	10YR 4/2	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	44	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
SRKF16174	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	3	Lower Subsoil	Ck	44	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
	2	Upper Subsoil	Btj	27	42	M	Friable	10YR 4/2	-	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BCk	42	65	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
	4	Lower Subsoil	Ck	65	100	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRKF16175	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Topsoil	Ah	20	34	M	Friable	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	3	Upper Subsoil	Btj	34	55	M	Friable	10YR 4/2	1	M/F/SB	SiCL	-	-	-	-
	4	Lower Subsoil	Ck	55	100	M	Firm	2.5Y 4/2	-	MA	SiC	-	M	-	-
SRKF16176	1	Topsoil	Ap	0	20	D	Slightly Hard	10YR 2/1	-	M/F/SB	SiCL	-	-	-	-
	2	Upper Subsoil	Btj	20	39	D	Slightly Hard	10YR 4/2	2	M/F/SB	SiCL	-	-	-	-
	3	Lower Subsoil	BC	39	65	D	Hard	10YR 4/2	1	MA	SiC	-	-	-	-
	4	Lower Subsoil	IICk	65	100	D	Hard	2.5Y 4/3	1	MA	SiC	-	M	-	-
SRKF16177	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bkgj	25	50	M	Friable	10YR 5/2	-	M/F/SG	SiCL	C/M/D	S	-	-
	3	Lower Subsoil	Ckgj	50	100	M	Firm	2.5Y 4/2	-	MA	SiCL	F/M/F	S	-	-
SRKF16178	1	Topsoil	Apk	0	27	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	S	-	-
	2	Lower Subsoil	Ck1	27	34	M	Friable	2.5Y 4/1	-	MA	SiL	-	S	-	-
	3	Topsoil	Ahkb	34	49	M	Friable	10Y 2/1	-	MA	SiL	-	S	-	-
	4	Lower Subsoil	Ck	49	100	M	Friable	2.5Y 5/3	-	MA	SiL	-	S	-	-
SRKF16179	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Upper Subsoil	Btjk	21	45	M	Friable	10YR 4/3	-	M/F/SB	SiCL	-	M	-	-
	3	Lower Subsoil	Ck	45	100	M	Firm	2.5Y 5/3	-	MA	SiCL	-	S	-	-
SRKF16180	1	Topsoil	Ahk	0	25	M	Friable	2.5Y 2/1	-	M/F/GR	SiL	-	M	-	-
	2	Lower Subsoil	Ckg	25	100	W	Slightly Sticky	2.5Y 3/1	-	MA	SiL	C/M/D	S	-	-
SRWC16001	1	Topsoil	Apk	0	21	M	Friable	10Y 3/2	-	M/F/GR	SiL	-	S	-	-
	2	Upper Subsoil	Bmk	21	49	M	Friable	10YR 5/4	-	W/M/SB	SiL	-	S	-	-
	3	Lower Subsoil	BCk	49	100	M	Firm	10YR 4/3	-	MA	SiC	-	S	-	-
	4	Lower Subsoil	Ck	100	120	M	Firm	2.5Y 4/2	-	MA	SiCL	-	S	-	-
SRWC16002	1	Duff	LFH	2	0	-	-	-	-	-	-	-	-	-	-
	2	Topsoil	Ah	0	15	M	Friable	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	3	Upper Subsoil	Btgj	15	44	M	Friable	2.5Y 3/1	-	M/M/SB	SiL	C/M/P	-	-	-
	4	Lower Subsoil	Ckgj1	44	60	M	Firm	10YR 3/1	-	MA	SiC	C/M/D	M	-	-
	5	Lower Subsoil	Ckgj2	60	70	M	Firm	10YR 3/1	-	MA	SiC	C/M/F	M	-	-
SRWC16003	1	Topsoil	Ahk	0	33	M	Friable	10YR 3/1	-	W/M/SG	LS	-	M	-	-
	2	Upper Subsoil	Bmk	33	50	M	Friable	10YR 3/2	-	M/F/GR	L	-	S	-	-
	3	Lower Subsoil	IICk	50	60	M	Firm	10YR 3/2	45	MA	L	-	S	-	-
SRWC16004	1	Lower Subsoil	Ck	0	30	M	Loose	2.5Y 3/1	65	SG	S	-	S	-	-
SRWC16005	1	Lower Subsoil	Ck1	0	3	M	Friable	2.5Y 3/1	-	MA	SL	-	M	-	-
	2	Duff	LFH	3	11	M	-	-	-	-	-	-	-	-	-
	3	Lower Subsoil	Ck2	11	23	M	Loose	2.5Y 3/2	65	SG	S	-	S	-	-
SRWC16006	1	Lower Subsoil	Ck1	0	12	M	Friable	2.5Y 3/2	5	MA	LS	-	S	-	-
	2	Lower Subsoil	Ck2	12	22	M	Loose	2.5Y 3/2	70	SG	S	-	VS	-	-
SRWC16007	1	Lower Subsoil	Ck1	0	6	M	Firm	2.5Y 3/1	-	MA	SL	-	M	SRWC16007-Ck1	Y
	2	Organic	Ofb	6	12	-	-	-	-	-	-	-	M	SRWC16007-LFH	Y
	3	Lower Subsoil	Ck2	12	24	M	Loose	10YR 3/2	60	MA	LS	-	S	SRWC16007-Ck2	Y
SRWC16008	1	Lower Subsoil	Ck1	0	5	M	Friable	2.5Y 3/1	-	MA	L	-	S	-	-
	2	Topsoil	Apkb	5	12	M	Friable	10YR 3/1	25	W/F/GR	L	-	S	-	-
	3	Lower Subsoil	Ck2	12	25	M	Loose	2.5Y 3/2	60	MA	L	-	VS	-	-
SRWC16009	1	Topsoil	Apk	0	21	M	Friable	10YR 2/1	2	M/F/GR	CL	-	W	SRWC16009-Apk	N
	2	Upper Subsoil	Bmk	21	41	M	Friable	10YR 4/3	-	W/C/SB	C	-	M	SRWC16009-Bmk	N
	3	Lower Subsoil	Ck	41	120	M	Firm	10YR 6/3	-	MA	SiC	-	S	-	-
SRWC16010	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	W	-	-
	2	Topsoil	Ahk	20	33	M	Firm	10YR 2/1	-	M/F/GR	L	-	W	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Upper Subsoil	CAk	33	48	M	Firm	2.5YR 5/3	-	S/C/SB	C	-	M	-	-
	4	Lower Subsoil	Ck	48	120	M	Friable	2.5Y 5/4	-	MA	C	-	S	-	-
SRWC16011	1	Topsoil	Apk	0	20	W	Slightly Sticky	-	-	-	L	-	W	-	-
	2	Topsoil	Ahkgj	20	35	W	Slightly Sticky	-	-	-	L	-	W	-	-
	3	Lower Subsoil	Ckg	35	120	W	Slightly Sticky	-	-	MA	L	-	W	-	-
SRWC16012	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	5	M/F/GR	CL	-	-	SRWC16012-Ap	N
	2	Upper Subsoil	ACk	21	49	M	Friable	10YR 2/1	5	W/M/SB	CL	-	M	SRWC16012-ACk	N
	3	Lower Subsoil	Ck	49	120	M	Firm	2.5Y 4/2	3	MA	C	-	S	SRWC16012-Ck	N
SRWC16013	1	Topsoil	Ahk	0	45	W	Slightly Sticky	2.5Y 3/1	0	-	L	-	S	SRWC16013-Ahk	Y
	2	Lower Subsoil	Cgk	45	120	W	Very Sticky	2.5Y 5/1	3	MA	C	-	VS	SRWC16013-Cgk	Y
SRWC16014	1	Topsoil	Ap	0	15	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	15	20	M	Friable	10YR 3/2	-	W/M/SB	L	-	W	-	-
	3	Lower Subsoil	BCk	20	42	M	Firm	10YR 4/1	-	S/M/SB	CL	-	W	-	-
	4	Lower Subsoil	Ck	42	120	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	-	-
SRWC16015	1	Topsoil	Ap	0	16	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	16	48	M	Very Firm	10YR 3/1	-	M/M/SG	CL	-	-	-	-
	3	Lower Subsoil	Ck	48	120	M	Friable	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16016	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bmk	24	50	M	Friable	10YR 3/1	-	W/C/SB	CL	-	M	-	-
	3	Lower Subsoil	Ck	50	120	M	Very Firm	2.5Y 5/3	-	MA	C	-	S	-	-
SRWC16017	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bmk	24	50	M	Friable	10YR 3/1	-	W/C/SB	CL	-	M	-	-
	3	Lower Subsoil	Ck	50	120	M	Very Firm	2.5Y 5/3	-	MA	C	-	S	-	-
SRWC16018	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	W/M/GR	CL	-	-	-	-
	2	Upper Subsoil	ACk	27	39	W	Slightly Sticky	2.5Y 5/1	-	W/C/SB	CL	A/M/P	S	-	-
	3	Lower Subsoil	Ck	39	120	W	Sticky	2.5Y 4/3	5	MA	C	-	S	-	-
SRWC16019	1	Topsoil	Apk	0	27	M	Friable	10YR 2/1	-	M/F/GR	CL	-	W	-	-
	2	Upper Subsoil	ACk	27	44	M	Friable	10YR 3/2	-	W/C/SB	CL	-	S	-	-
	3	Lower Subsoil	Ck	44	116	M	Firm	2.5Y 4/3	-	MA	SiC	-	S	-	-
SRWC16020	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	SRWC16020-Ap	Y
	2	Topsoil	Ah	20	32	M	Firm	10YR 2/1	-	M/F/GR	L	-	-	-	-
	3	Lower Subsoil	Ck	32	120	M	Firm	2.5Y 4/3	3	MA	HC	-	S	SRWC16020-Ck	Y

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16021	1	Topsoil	Ap	0	16	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	SRWC16021-Ap	N
	2	Upper Subsoil	Bmkgj	16	48	M	Friable	2.5Y 3/2	-	W/C/SB	CL	C/F/D	M	SRWC16021-Bmkgj	N
	3	Lower Subsoil	Ck	48	120	M	Very Firm	2.5Y 4/2	-	MA	C	-	S	SRWC16021-Ck	N
SRWC16022	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	-	M/F/GR	SiCL	-	-	SRWC16022-Ap	Y
	2	Upper Subsoil	Bm	26	46	M	Friable	10YR 3/2	-	W/C/SB	HC	-	-	SRWC16022-Bm	Y
	3	Lower Subsoil	Ck	46	120	M	Very Firm	2.5Y 5/3	-	MA	HC	-	S	SRWC16022-Ck	Y
SRWC16023	1	Topsoil	Ap	0	16	W	Nonsticky	10YR 2/1	-	M/F/GR	SiL	-	-	-	-
	2	Upper Subsoil	Bmgj	16	39	W	Sticky	2.5Y 4/1	-	MA	CL	A/C/D	-	-	-
	3	Lower Subsoil	Ckgj	39	120	W	Sticky	2.5Y 4/2	-	MA	C	A/F/D	S	-	-
SRWC16024	1	Topsoil	Ap	0	22	W	Slightly Sticky	10YR 2/1	-	W/M/GR	SiCL	-	-	-	-
	2	Upper Subsoil	Bkgj	22	31	M	Firm	10YR 3/2	-	W/C/SB	CL	C/F/D	M	-	-
	3	Upper Subsoil	Bkg	31	41	M	Firm	2.5Y 4/1	-	W/C/SG	CL	-	M	-	-
	4	Lower Subsoil	Ck	41	47	W	Sticky	2.5Y 5/3	-	MA	SiC	-	S	-	-
	5	Lower Subsoil	IICk	47	120	W	Sticky	2.5Y 5/3	-	MA	SC	-	S	-	-
SRWC16025	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Topsoil	Ah	20	32	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	3	Upper Subsoil	Bmk	32	49	M	Firm	2.5Y 3/2	-	W/C/SB	CL	-	M	-	-
	4	Lower Subsoil	Ck	49	118	M	Firm	2.5Y 4/2	-	MA	C	-	S	-	-
SRWC16026	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	SRWC16026-Ap	Y
	2	Upper Subsoil	Bmgj	27	44	M	Friable	2.5Y 3/1	-	S/C/SG	HC	C/F/F	-	SRWC16026-Bmgj	Y
	3	Lower Subsoil	Ck	44	120	M	Firm	2.5Y 5/3	-	MA	HC	-	S	SRWC16026-Ck	Y
SRWC16027	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bm	27	43	M	Friable	10YR 4/3	-	W/C/SB	C	-	-	-	-
	3	Lower Subsoil	Ck	43	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	M	-	-
SRWC16028	1	Topsoil	Ap	0	18	W	Firm	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmkgj	18	45	M	Slightly Sticky	2.5Y 3/2	-	M/F/SB	SiC	F/M/F	W	-	-
	3	Lower Subsoil	Ckgj	45	120	M	Firm	2.5Y 5/3	-	MA	SiC	C/F/F	-	-	-
SRWC16029	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bm	25	45	M	Friable	10YR 3/2	-	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	45	120	M	Firm	2.5Y 5/3	-	MA	C	-	M	-	-
SRWC16030	1	Topsoil	Ap	0	27	W	Slightly Sticky	-	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bm	27	49	M	Friable	-	-	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	49	120	M	Firm	-	-	MA	C	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16031	1	Topsoil	Ap	0	14	W	Slightly Sticky	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bm	14	41	M	Friable	10YR 3/2	-	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	41	120	M	Firm	2.5Y 5/3	-	MA	C	-	S	-	-
SRWC16032	1	Topsoil	Ap	0	26	W	Sticky	10YR 2/1	-	-	CL	-	-	-	-
	2	Upper Subsoil	Bm	26	39	M	Friable	10Y 3/2	-	-	CL	-	-	-	-
	3	Lower Subsoil	Ck	39	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16033	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	SRWC16033-Ap	Y
	2	Upper Subsoil	Bm	21	44	M	Firm	2.5Y 4/3	-	W/C/SB	C	-	-	SRWC16033-Bm	Y
	3	Lower Subsoil	Ck	44	120	M	Firm	2.5Y 5/3	-	MA	HC	-	S	SRWC16033-Ck	Y
SRWC16034	1	Topsoil	Ap	0	29	-	-	10YR 2/1	-	M/F/GR	-	-	-	-	-
	2	Upper Subsoil	Bm	29	43	-	-	10YR 4/2	-	W/C/SB	-	-	-	-	-
	3	Lower Subsoil	Ck	43	120	-	-	2.5Y 5/3	-	MA	-	-	-	-	-
SRWC16035	1	Topsoil	Ap	0	20	M	Friable	-	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	32	M	Friable	-	-	W/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	32	41	M	Firm	-	-	S/C/SB	L	-	-	-	-
	4	Lower Subsoil	Ck	41	120	M	Friable	-	-	MA	SiC	-	S	-	-
SRWC16036	1	Topsoil	Apk	0	26	W	Slightly Sticky	10YR 2/1	-	W/F/GR	L	-	M	-	-
	2	Upper Subsoil	ACk	26	43	M	Firm	2.5Y 4/1	-	W/C/SB	CL	-	S	-	-
	3	Lower Subsoil	Cgk	43	120	M	Firm	2.5Y 2/1	-	MA	SiC	-	S	-	-
SRWC16037	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Lower Subsoil	Ck	26	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16038	1	Topsoil	Ap	0	24	M	Friable	-	-	-	L	-	-	-	-
	2	Upper Subsoil	Bm	24	39	M	Firm	-	-	-	CL	-	-	-	-
	3	Lower Subsoil	Ck	39	120	M	Firm	-	-	MA	SiC	-	S	-	-
SRWC16039	1	Topsoil	Apk	0	28	W	Slightly Sticky	2.5Y 2/1	-	M/F/GR	L	-	W	SRWC16039-Apk	N
	2	Upper Subsoil	ACk	28	45	M	Friable	2.5Y 4/1	-	W/C/SB	CL	-	M	SRWC16039-ACk	N
	3	Lower Subsoil	Cgk	45	120	M	Firm	2.5Y 2/1	-	MA	SiC	-	S	SRWC16039-Cgk	N
SRWC16040	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	S/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	20	29	M	Firm	10YR 3/2	-	W/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	29	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16041	1	Topsoil	Apk	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	W	-	-
	2	Upper Subsoil	Bmk	30	40	M	Friable	10YR 4/3	-	W/C/SB	L	-	M	-	-
	3	Lower Subsoil	Ck	40	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16042	1	Topsoil	Apk	0	26	-	-	10YR 2/1	-	M/F/GR	-	-	-	-	-
	2	Upper Subsoil	Bmk	26	41	-	-	2.5Y 3/2	-	W/C/SB	-	-	-	-	-
	3	Lower Subsoil	Ck	41	120	-	-	2.5Y 5/3	-	MA	-	-	-	-	-
SRWC16043	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	-	-	CL	-	-	-	-
	2	Upper Subsoil	Bmgj	26	39	M	Friable	2.5Y 4/2	-	-	CL	C/F/D	-	-	-
	3	Lower Subsoil	Ck	39	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16044	1	Topsoil	Ap	0	25	M	Friable	-	-	M/F/GR	CL	-	-	-	-
	2	Lower Subsoil	Cgk	25	120	M	Firm	-	-	MA	SiC	-	S	-	-
SRWC16045	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/M/GR	CL	-	-	-	-
	2	Topsoil	Ah	20	41	M	Friable	10YR 2/1	-	W/M/GR	CL	-	-	-	-
	3	Lower Subsoil	Ck	41	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16046	1	Topsoil	Ap	0	14	-	-	10YR 2/1	-	M/F/GR	-	-	-	SRWC16046-Ap	N
	2	Lower Subsoil	Ck	14	120	-	-	2.5Y 5/3	-	MA	-	-	M	SRWC16046-Ck	N
SRWC16047	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	22	38	M	Friable	10YR 4/3	-	M/M/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	38	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16048	1	Topsoil	Ap	0	20	W	Slightly Sticky	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	32	W	Slightly Sticky	10YR 2/1	-	W/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bmk	32	45	W	Slightly Sticky	10YR 3/2	-	W/C/SB	CL	-	M	-	-
	4	Lower Subsoil	Ck	45	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16049	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	W/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	43	M	Friable	10YR 3/2	-	W/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	43	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16050	1	Topsoil	Ap	0	23	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	23	39	M	Friable	10YR 3/2	-	W/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	39	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16051	1	Topsoil	Ap	0	28	-	-	10YR 2/1	-	M/F/GR	-	-	-	-	-
	2	Upper Subsoil	Bm	28	37	-	-	10YR 3/2	-	W/C/SB	-	-	-	-	-
	3	Lower Subsoil	Ck	37	120	-	-	2.5Y 5/3	-	MA	-	-	S	-	-
SRWC16052	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	26	41	M	Friable	10YR 4/3	-	M/M/SB	L	-	M	-	-
	3	Lower Subsoil	Ck	41	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16053	1	Topsoil	Ap	0	25	W	Slightly Sticky	10YR 2/1	-	-	L	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Upper Subsoil	Bgk	25	58	W	Slightly Sticky	2.5Y 3/1	-	-	CL	-	M	-	-
	3	Lower Subsoil	IICgk	58	95	W	Slightly Sticky	2.5Y 3/1	10	MA	SiL	-	S	-	-
	4	Lower Subsoil	IICgk	95	120	W	Sticky	2.5Y 6/1	20	MA	SiC	C/M/P	S	-	-
SRWC16054	1	Topsoil	Ap	0	19	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	19	37	M	Friable	10YR 4/3	-	M/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	37	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16055	1	Topsoil	Ap	0	20	-	-	10YR 2/1	-	M/F/GR	-	-	-	-	-
	2	Topsoil	Ah	20	33	-	-	10YR 2/1	-	W/F/GR	-	-	-	-	-
	3	Upper Subsoil	Bm	33	60	-	-	10YR 3/2	-	M/C/SB	-	-	-	-	-
	4	Lower Subsoil	Ck	60	120	-	-	2.5Y 5/3	-	MA	-	-	M	-	-
SRWC16056	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	60	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	33	M	Friable	10YR 2/1	50	W/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	33	43	M	Friable	10YR 4/3	-	M/C/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck	43	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16057	1	Topsoil	Apk	0	23	M	Friable	10YR 2/1	-	M/F/GR	L	-	M	-	-
	2	Upper Subsoil	Bgk	23	65	M	Friable	2.5Y 3/1	-	W/C/SB	L	-	M	-	-
	3	Lower Subsoil	Cgk	65	120	M	Firm	2.5Y 5/1	-	MA	SiC	-	S	-	-
SRWC16058	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	SRWC16058-Ap	N
	2	Upper Subsoil	Bm	24	75	M	Friable	10YR 4/1	-	M/F/SB	CL	-	-	SRWC16058-Bm	N
	3	Lower Subsoil	Ck	75	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	SRWC16058-Ck	N
SRWC16059	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	-	M/F/GR	C	-	-	-	-
	2	Upper Subsoil	Bm	25	45	M	Friable	10YR 4/2	-	W/M/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	45	118	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16060	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	28	60	M	Friable	10YR 4/3	-	W/M/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	60	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16061	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	-	M/C/GR	L	-	-	-	-
	2	Upper Subsoil	Bgk	24	85	M	Friable	2.5Y 4/1	-	W/C/SB	L	-	M	-	-
	3	Lower Subsoil	Cgk	85	115	W	Sticky	2.5Y 5/3	-	MA	SiC	F/F/D	S	-	-
SRWC16062	1	Topsoil	Apk	0	27	M	Friable	2.5Y 3/1	-	M/F/GR	L	-	W	-	-
	2	Lower Subsoil	Ck	27	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16063	1	Topsoil	Apk	0	20	M	Friable	10YR 3/1	-	M/F/GR	L	-	M	-	-
	2	Lower Subsoil	Ck	20	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16064	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	W	-	-
	2	Topsoil	Ahk	20	33	M	Firm	10YR 2/1	-	W/F/GR	L	-	W	-	-
	3	Upper Subsoil	Bmkgj	33	47	M	Friable	10YR 3/1	-	W/C/SB	CL	-	M	-	-
	4	Lower Subsoil	Ckgj	47	120	M	Firm	2.5Y 5/3	-	MA	SiC	F/F/D	S	-	-
SRWC16065	1	Topsoil	Apk	0	20	M	Friable	10YR 2/1	-	M/F/GR	CL	-	M	-	-
	2	Topsoil	Ahk	20	35	M	Firm	10YR 2/1	-	W/F/GR	CL	-	M	-	-
	3	Lower Subsoil	Ckg	35	120	M	Friable	2.5Y 5/2	-	MA	CL	C/C/P	S	-	-
SRWC16066	1	Topsoil	Apk	0	29	M	Friable	10YR 2/1	-	M/F/GR	L	-	M	-	-
	2	Upper Subsoil	Bgk	29	75	W	Slightly Sticky	2.5Y 4/1	-	W/F/SB	L	-	M	-	-
	3	Lower Subsoil	Cgk	75	120	M	Firm	2.5Y 5/3	-	MA	SiC	C/F/D	S	-	-
SRWC16067	1	Topsoil	Apk	0	19	M	Friable	10YR 2/1	-	M/F/GR	L	-	M	-	-
	2	Upper Subsoil	Bmk	19	41	M	Friable	2.5Y 3/2	-	W/C/SB	CL	-	M	-	-
	3	Lower Subsoil	Ck	41	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16068	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	31	M	Friable	10YR 2/1	-	W/F/GR	L	-	-	-	-
	3	Lower Subsoil	Ck	31	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16069	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmk	27	47	M	Friable	10YR 3/1	-	W/C/SB	L	-	M	-	-
	3	Lower Subsoil	Ck	47	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16070	1	Topsoil	Ap	0	22	-	-	10YR 2/1	-	M/F/GR	-	-	-	-	-
	2	Upper Subsoil	Bmk	22	42	-	-	2.5Y 3/2	-	W/C/SB	-	-	M	-	-
	3	Lower Subsoil	Ck	42	120	-	-	2.5Y 5/3	-	MA	-	-	S	-	-
SRWC16071	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	32	M	Friable	10YR 2/1	-	W/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bmkgj	32	47	M	Friable	2.5Y 3/1	-	W/C/SB	L	-	M	-	-
	4	Lower Subsoil	Ckgj	47	120	M	Firm	10YR 4/1	-	MA	SiC	F/F/D	S	-	-
SRWC16072	1	Topsoil	Ap	0	15	M	Friable	2.5Y 4/2	-	W/C/SB	L	-	-	-	-
	2	Upper Subsoil	Bmk	15	35	M	Firm	2.5Y 5/3	-	M/F/GR	SiC	-	M	-	-
	3	Lower Subsoil	Ck	35	120	M	Friable	10YR 2/1	-	MA	L	-	S	-	-
SRWC16073	1	Topsoil	Ap	0	19	M	Friable	10YR 2/1	-	M/C/GR	L	-	-	-	-
	2	Upper Subsoil	Bmkgj	19	31	M	Friable	10YR 3/2	-	W/F/SB	L	C/F/D	M	-	-
	3	Lower Subsoil	Ckgj	31	120	M	Firm	2.5Y 5/3	-	MA	SiC	C/F/D	S	-	-
SRWC16074	1	Topsoil	Ap	0	21	-	-	10YR 2/1	3	M/F/GR	-	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Upper Subsoil	Bmkgj	21	45	-	-	10YR 3/2	-	W/C/SB	-	-	W	-	-
	3	Lower Subsoil	Ckgj	45	120	-	-	2.5Y 5/3	-	MA	-	C/F/D	S	-	-
SRWC16075	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmgj	17	55	M	Friable	10YR 4/2	-	W/C/SB	L	C/F/D	-	-	-
	3	Lower Subsoil	Ckg	55	120	M	Firm	2.5Y 5/3	-	MA	SiC	F/F/D	S	-	-
SRWC16076	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/C/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	58	M	Friable	10YR 4/3	-	M/M/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	58	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16077	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	55	M	Friable	10YR 2/1	-	W/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	55	70	M	Firm	2.5Y 4/3	-	-	CL	-	-	-	-
	4	Lower Subsoil	Ck	70	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16078	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	40	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	40	60	M	Firm	10YR 3/2	7	-	CL	-	-	-	-
	4	Lower Subsoil	Ck	60	120	M	Firm	2.5Y 5/3	3	MA	SiCL	F/M/D	S	-	-
SRWC16079	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmgj	26	67	M	Firm	2.5Y 4/2	-	-	CL	F/F/D	-	-	-
	3	Lower Subsoil	Ckgj	67	120	M	Firm	2.5Y 5/1	-	MA	SiC	F/F/D	S	-	-
SRWC16080	1	Topsoil	Apk	0	16	M	Friable	10YR 2/1	-	M/F/GR	CL	-	W	SRWC16080-Apk	Y
	2	Upper Subsoil	Bmk	16	58	M	Firm	2.5Y 4/3	-	M/C/SB	HC	-	M	SRWC16080-Bmk	Y
	3	Lower Subsoil	Ck	58	120	M	Firm	2.5Y 5/3	-	MA	HC	-	S	SRWC16080-Ck	Y
SRWC16081	1	Topsoil	Ap	0	22	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	SRWC16081-Ap	N
	2	Upper Subsoil	Bm	22	67	M	Friable	10YR 4/3	-	M/C/SB	L	-	-	SRWC16081-Bm	N
	3	Lower Subsoil	Ck	67	120	M	Firm	2.5Y 4/2	-	MA	SiC	-	S	SRWC16081-Ck	N
SRWC16082	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	26	50	M	Friable	10YR 4/3	-	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	50	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16083	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bgk	30	45	M	Friable	2.5Y 3/1	-	W/C/SB	CL	F/F/P	M	-	-
	3	Lower Subsoil	Cgk	45	120	M	Firm	2.5Y 4/1	-	MA	SiC	-	S	-	-
SRWC16084	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	58	M	Friable	2.5Y 4/2	-	W/C/SB	L	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	3	Lower Subsoil	Ck	58	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16085	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/C/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	30	62	M	Friable	10YR 4/3	-	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	62	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16086	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	20	31	M	Friable	10YR 2/1	-	W/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	31	62	M	Firm	2.5Y 4/3	-	W/C/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck	62	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16087	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bm	30	41	M	Friable	10YR 4/3	-	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	41	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16088	1	Topsoil	Ap	0	21	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bgk	21	40	M	Friable	2.5Y 3/1	-	W/C/SB	L	-	M	-	-
	3	Lower Subsoil	Cgk	40	120	M	Firm	2.5Y 4/1	-	MA	CL	-	S	-	-
SRWC16089	1	Topsoil	Ap	0	29	M	Friable	10YR 2/1	-	M/F/GR	CL	-	-	-	-
	2	Upper Subsoil	Bg	29	70	M	Friable	10YR 3/1	-	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	C	70	105	M	Firm	2.5Y 5/1	-	MA	CL	-	-	-	-
	4	Lower Subsoil	Ck	105	120	M	Very Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16090	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	10	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	25	80	M	Friable	10YR 4/3	-	M/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	80	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16091	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	12	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	58	M	Firm	10YR 4/3	-	S/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	58	120	M	Firm	2.5Y 2/1	-	MA	SiC	-	S	-	-
SRWC16092	1	Topsoil	Ap	0	25	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	25	67	M	Friable	10YR 4/3	-	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	67	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16093	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	12	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	67	M	Friable	10YR 4/3	3	M/M/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	67	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16094	1	Topsoil	Ap	0	23	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	23	56	M	Friable	10YR 4/3	-	M/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	56	120	M	Firm	2.5Y 4/2	5	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16095	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	52	M	Friable	10YR 4/3	-	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	52	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16096	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	3	M/M/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	53	M	Friable	10YR 4/3	-	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	53	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16097	1	Topsoil	Ap	0	20	W	Sticky	10YR 2/1	5	W/F/GR	C	-	-	SRWC16097-Ap	Y
	2	Upper Subsoil	Bgk	20	62	W	Sticky	2.5Y 4/1	-	M/C/SB	HC	C/F/P	-	SRWC16097-Bg	Y
	3	Lower Subsoil	Ckg	62	120	M	Firm	2.5Y 4/2	-	MA	HC	-	S	SRWC16097-C	Y
SRWC16098	1	Topsoil	Ap	0	19	M	Friable	10YR 5/2	5	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bgj	19	44	M	Firm	2.5Y 3/2	5	M/C/SB	CL	C/F/F	-	-	-
	3	Lower Subsoil	Ck	44	105	M	Firm	2.5Y 4/2	5	MA	SiC	-	M	-	-
SRWC16099	1	Topsoil	Ap	0	29	M	Friable	10YR 2/1	7	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	29	51	M	Friable	10YR 4/3	5	W/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	51	120	M	Firm	2.5Y 5/3	7	MA	SiC	-	S	-	-
SRWC16100	1	Topsoil	Ap	0	18	M	Friable	10YR 2/1	10	W/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bkg	18	39	M	Friable	2.5Y 4/1	10	M/C/SB	CL	A/F/P	S	-	-
	3	Lower Subsoil	Ckg	39	120	M	Firm	2.5Y 4/2	7	MA	SiC	-	S	-	-
SRWC16101	1	Topsoil	Ap	0	29	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	29	70	M	Firm	2.5Y 4/2	-	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	70	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16102	1	Topsoil	Apk	0	16	W	Slightly Sticky	10YR 2/1	7	M/F/GR	CL	-	S	SRWC16102-Ap	N
	2	Upper Subsoil	Bkg	16	65	M	Friable	2.5Y 4/1	7	W/C/SB	CL	A/F/P	S	SRWC16102-Bg	N
	3	Lower Subsoil	Ckgj	65	120	M	Firm	2.5Y 5/2	5	MA	SiC	C/F/F	S	SRWC16102-Ckgj	N
SRWC16103	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	53	M	Loose	10YR 2/1	-	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bmk	53	90	M	Firm	10YR 4/3	-	-	CL	-	M	-	-
	4	Lower Subsoil	Ck	90	120	M	Firm	2.5Y 4/2	-	MA	CL	-	S	-	-
SRWC16104	1	Upper Subsoil	Bmk	0	26	M	Firm	2.5Y 4/2	-	-	CL	-	M	-	-
	2	Lower Subsoil	Ck	26	120	M	Firm	2.5Y 5/4	-	MA	SiC	-	S	-	-
SRWC16105	1	Lower Subsoil	Ck	0	71	M	Friable	10YR 4/2	-	W/F/GR	LS	-	S	SRWC16105-Ck1	N
	2	Lower Subsoil	Ckg	71	90	M	Friable	10YR 3/2	-	W/C/SB	LS	F/F/P	S	SRWC16105-Ckg	N
	3	Lower Subsoil	IICkg	90	115	M	Friable	10YR 4/2	70	MA	LS	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16106	1	Lower Subsoil	Ck	0	12	D	Loose	2.5Y 4/2	80	MA	LS	-	VS	-	-
SRWC16107	1	Lower Subsoil	Ck	0	52	M	Firm	2.5Y 3/2	-	W/F/GR	LS	-	S	-	-
	2	Lower Subsoil	Cgk	52	93	M	Firm	10YR 4/1	-	W/C/SB	LS	C/F/P	S	-	-
SRWC16108	1	Lower Subsoil	Ck	0	46	M	Friable	10YR 3/2	-	W/F/MA	LS	-	S	SRWC16108-Ck	N
	2	Lower Subsoil	IICk	46	80	M	Firm	10YR 3/2	5	MA	L	-	S	SRWC16108-Ck	N
SRWC16109	1	Topsoil	Apk	0	24	M	Friable	10YR 3/1	3	-	L	-	S	SRWC16109-Apk	N
	2	Upper Subsoil	Bgk	24	50	M	Friable	10YR 4/1	-	-	SiL	A/F/P	S	-	-
	3	Lower Subsoil	IICgk	50	75	M	Firm	10YR 4/2	-	SG	LS	F/F/F	S	-	-
	4	Lower Subsoil	IICgk	75	115	M	Loose	10YR 4/1	10	SG	S	C/F/D	S	-	-
	5	Lower Subsoil	IIICgk	115	120	M	Firm	2.5Y 4/1	-	MA	SiC	-	S	-	-
SRWC16110	1	Upper Subsoil	Bmk	0	24	M	Friable	2.5Y 4/2	-	M/F/GR	CL	-	S	SRWC16110-Bmk	N
	2	Lower Subsoil	Ck	24	105	M	Firm	2.5Y 5/4	-	MA	SiC	-	S	SRWC16110-Ck	N
SRWC16111	1	Topsoil	Ap	0	16	M	Friable	10YR 2/1	10	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	16	47	M	Friable	10YR 4/3	9	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	47	120	M	Firm	2.5Y 5/2	9	MA	SiC	-	S	-	-
SRWC16112	1	Topsoil	Ap	0	30	M	Friable		10	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	47	M	Friable	10YR 2/1	10	-	L	-	-	-	-
	3	Upper Subsoil	Bmgj	47	68	M	Firm	10YR 4/2	8	W/C/SB	CL	C/F/F	-	-	-
	4	Lower Subsoil	Ck	47	120	M	Friable	2.5Y 4/2	10	MA	SiC	-	S	-	-
SRWC16113	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	12	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	20	56	M	Friable	10YR 4/3	10	W/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	56	120	M	Firm	2.5Y 4/3	15	MA	CL	-	M	-	-
SRWC16114	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	12	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	34	M	Friable	10YR 2/1	12	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	34	60	M	Friable	10YR 4/3	5	M/C/SB	L	-	-	-	-
	4	Lower Subsoil	Ck	60	120	M	Firm	2.5Y 5/3	12	MA	SiC	-	S	-	-
SRWC16115	1	Topsoil	Apk	0	20	M	Friable	10YR 3/1	7	M/F/GR	L	-	M	-	-
	2	Upper Subsoil	Bgk	20	50	M	Friable	2.5Y 4/1	7	M/C/SB	L	A/M/P	M	-	-
	3	Lower Subsoil	Cgk1	50	95	M	Firm	2.5Y 4/1	10	MA	CL	-	M	-	-
	4	Lower Subsoil	Cgk2	95	103	M	Firm	2.5Y 5/3	40	MA	CL	C/F	S	-	-
SRWC16116	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bmgj	27	59	M	Friable	10YR 4/2	-	M/C/SB	L	F/F/F	-	-	-
	3	Lower Subsoil	Ck	59	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
SRWC16117	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	7	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	26	54	M	Friable	10YR 4/3	7	M/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	54	120	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16118	1	Topsoil	Ap	0	20	M	Friable	10YR 2/1	10	M/F/GR	L	-	-	-	-
	2	Lower Subsoil	Ck	20	120	M	Firm	2.5Y 5/3	10	MA	CL	-	M	-	-
SRWC16119	1	Topsoil	Apk	0	28	M	Friable	10YR 2/1	15	M/F/GR	L	-	M	-	-
	2	Upper Subsoil	Bmk	28	60	M	Friable	2.5Y 4/2	20	W/C/SB	L	-	M	-	-
	3	Lower Subsoil	Ckgj	60	95	M	Firm	2.5Y 3/1	30	MA	CL	C/M/D	S	-	-
SRWC16120	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	30	49	M	Friable	2.5YR 4/3	-	M/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	49	116	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16121	1	Topsoil	Ap	0	17	M	Friable	10YR 2/1	20	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	17	39	M	Friable	10YR 4/3	20	M/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	39	107	M	Firm	2.5Y 5/3	30	MA	SiC	-	S	-	-
SRWC16122	1	Topsoil	Ap	0	26	M	Friable	10YR 2/1	-	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	26	73	M	Friable	10YR 4/3	-	M/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	73	115	M	Firm	2.5Y 5/3	-	MA	SiC	-	S	-	-
SRWC16123	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	12	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	47	M	Friable	10YR 2/1	12	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	47	70	M	Friable	10YR 3/2	7	M/C/SB	L	-	-	-	-
	4	Lower Subsoil	Ck	70	112	M	Firm	2.5Y 5/3	5	MA	SiC	-	S	-	-
SRWC16124	1	Topsoil	Ap	0	28	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	28	60	M	Friable	2.5Y 4/3	3	M/C/SB	CL	-	-	-	-
	3	Lower Subsoil	Ck	60	119	D	Hard	2.5Y 5/3	5	MA	SiC	-	S	-	-
SRWC16125	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	33	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bm	33	55	M	Friable	10YR 4/3	9	M/C/SB	CL	-	-	-	-
	4	Lower Subsoil	Ck	55	116	M	Firm	2.5Y 5/3	15	MA	SiC	-	S	-	-
SRWC16126	1	Topsoil	Ap	0	30	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	2	Topsoil	Ah	30	32	M	Friable	10YR 2/1	5	M/F/GR	L	-	-	-	-
	3	Upper Subsoil	Bmk	32	42	M	Friable	2.5Y 3/2	5	M/C/SB	L	-	S	-	-
	4	Lower Subsoil	Ck	42	120	M	Firm	2.5Y 5/3	7	MA	SiC	-	S	-	-
SRWC16127	1	Topsoil	Ap	0	24	M	Friable	10YR 2/1	12	S/F/GR	L	-	-	-	-

Table C-15 Soil Horizon

Site #	Layer #	Layer Type	Horizon	Upper (cm)	Lower (cm)	Moisture Code	Consistence	Horizon Color	CFrag %	Horizon Structure	Texture Code	Mottles	Carbonate Code	Sample ID	Sample Submitted for Analysis (Y/N)
	2	Upper Subsoil	Bmgj	24	70	M	Friable	2.5Y 3/1	12	M/M/SB	CL	C/F/F	-	-	-
	3	Lower Subsoil	Ck	70	120	M	Firm	2.5Y 5/3	15	MA	SiC	-	S	-	-
SRWC16128	1	Topsoil	Ap	0	27	M	Friable	10YR 2/1	7	M/F/GR	L	-	-	-	-
	2	Upper Subsoil	Bm	27	49	M	Friable	2.5Y 3/2	7	W/C/SB	L	-	-	-	-
	3	Lower Subsoil	Ck	49	120	M	Firm	2.5Y 5/3	12	MA	SiC	-	S	-	-

Table C-15 Soil Horizon

KEY:

Horizon Modifiers

b	a buried soil horizon
g	characterized by gray colours, or prominent mottling, or both
h	a horizon enriched with organic matter
j	a modifier of suffixes g, n and t, used to denote an expression of, but failure to meet the specified limits of the suffix it modifies
k	denotes the presence of carbonate as indicated by visible effervescence when dilute HCL is added.
m	a horizon slightly altered by hydrolysis, oxidation, or solution, or all three to give a change in colour or structure, or both
n	a horizon in which the ratio of exchangeable Ca to exchangeable Na is 10 or less
p	a horizon disturbed by human activity, such as cultivation, logging, and habitation
t	an illuvial horizon enriched with silicate clay
1/2	denotes a change in structure, colour or a slight change in texture
II/III	denotes a change in parent material (wider variation in texture) or deposit

Moisture Code

D	dry
M	moist
W	wet

Horizon Structure

Grade	
W	weak
M	moderate
S	strong
Class	
F	fine
M	medium
C	coarse
Kind	
GR	granular
SB	subangular blocky
BL	blocky
PL	platy
SG	single grain
MA	massive

Texture

C	clay
CL	clay loam
fSL	fine sandy loam
HC	heavy clay
L	loam
LfS	loamy fine sand
LS	loamy sand
S	sand
SCL	sandy clay loam
Si	silt
SiCL	silty clay loam
SiC	silty clay
SiL	silt loam
SL	sandy loam
vfSL	very fine sandy loam

Mottles

Abundance	
F	few (<2% of area)
C	common (2-20% of area)
M	many (>20% of area)
Contrast	
F	faint (barely noticeable)
D	distinct (clearly evident)
P	prominent (mottles standout with high contrast to surrounding matrix)
Size	
F	fine (<5mm)
M	medium (5-15mm)
C	coarse (>15mm)

Horizon Color

10Y 2/1	greenish black
10Y 3/2	very dark grayish olive
10YR 2/1	black
10YR 2/2	very dark brown
10YR 2/3	very dark brown
10YR 3/1	very dark gray
10YR 3/2	very dark grayish brown
10YR 3/3	dark brown
10YR 3/4	dark yellowish brown
10YR 4/1	dark gray
10YR 4/2	dark grayish brown
10YR 4/3	brown
10YR 4/4	dark yellowish brown
10YR 5/2	grayish brown
10YR 5/3	brown
10YR 5/4	yellowish brown
10YR 6/1	gray
10YR 6/3	pale brown
2.5Y 2/1	black
2.5Y 3/1	very dark gray
2.5Y 3/2	very dark grayish brown
2.5Y 4/1	dark gray
2.5Y 4/2	dark grayish brown
2.5Y 4/3	olive brown
2.5Y 4/4	olive brown
2.5Y 5/1	gray
2.5Y 5/2	grayish brown
2.5Y 5/3	light olive brown
2.5Y 5/4	light olive brown
2.5Y 6/1	gray
2.5Y 6/2	light brownish gray
2.5Y 6/3	light yellowish brown
2.5YR 4/3	reddish brown
2.5YR 5/3	reddish brown
5Y 2.5/1	black
5Y 3/1	very dark gray
5Y 5/1	gray
N 2/1	black
N 3/1	very dark gray

C.3 SOIL SITE ATTACHMENT

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRBL16001	Scrubland	2016	GLCU.R	FLUV(M)	TBRgl	ZGC1	1	-	D	0.5 - 2.0%	100-500	Imperfect	Level	0.01 - 0.1%	0	0	N/A	-	679078	5657814	11
SRBL16002	Scrubland	2016	GL.R	FLUV(M)\FLUV(MC)\FLUV(M)	TBRgl	TBSR1	0	-	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	18	20	P	-	678855	5657522	11
SRBL16003	Forested Range	2016	O.BLC	FLUV(M)	SRC	ZGC1	1	352	U	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	29	0	G	-	679081	5658040	11
SRBL16004	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS1	16	136	M	>15 - 30%	50-100	Well	Inclined	<0.01%	27	16	G	-	678708	5657837	11
SRBL16005	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	3	62	M	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	21	21	G	-	678555	5657991	11
SRBL16006	Improved Pasture	2016	O.HG	GLLC(MF)	POTco	POT2	10	44	L	>15 - 30%	50-100	Poor	Hummocky	<0.01%	41	0	G	85	678579	5657733	11
SRBL16007	Improved Pasture	2016	O.BLC	GLLC(MF)	FSHco	FSH2	3	70	M	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	45	14	G	-	678957	5658268	11
SRBL16008	Improved Pasture	2016	O.BLC	GLLC(F)	FSHtk	FSH1	3	86	M	>10 - 15%	100-500	Well	Inclined	<0.01%	35	22	G	-	678949	5658455	11
SRBL16009	Improved Pasture	2016	O.BLC	GLLC(F)	FSHtk	FSH1	5	12	U	>5 - 10%	50-100	Well	Inclined	<0.01%	36	17	G	-	678430	5658503	11
SRBL16010	Wetland	2016	R.HG	GLLC(F)	POTzr	POT1	1	-	D	0.5 - 2.0%	50-100	Poor	Level	<0.01%	50	0	P	60	678539	5658202	11
SRBL16011	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVFS2	9	210	M	>5 - 10%	50-100	Well	Inclined	<0.01%	10	23	F	-	678148	5658377	11
SRBL16012	Scrubland	2016	O.BLC	GLLC(F)	FSH	FSH1	9	56	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	24	18	G	-	678252	5658611	11
SRBL16013	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVFS1	13	76	M	>15 - 30%	100-500	Well	Inclined	0.01 - 0.1%	18	19	F	-	678626	5658708	11
SRBL16014	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	FSH2	2	270	M	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	24	14	F	-	678894	5658721	11
SRBL16015	Improved Pasture	2016	N/A	FLUV(MC)\GLFL(VC)	TBRxg	SRC1	1	-	E	0.5 - 2.0%	100-500	Well	Level	<0.01%	0	0	N/A	-	677198	5655168	11
SRBL16016	Woodland	2016	CU.R	FLUV(MC)\FLUV(MC)	TBRxg	TBR2	1	-	E	0 - 0.5%	100-500	Well	Level	<0.01%	0	0	N/A	-	676997	5655198	11
SRBL16017	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVFS2	3	128	M	>5 - 10%	100-500	Well	Inclined	<0.01%	23	22	F	-	676725	5655938	11
SRBL16018	Woodland	2016	R.BLC	TILL(F)	DVGzrfi	DVG1	38	140	U	>30 - 45%	100-500	Well	Inclined	0.1 - 3%	16	0	F	-	676734	5655887	11
SRBL16019	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	5	67	M	>5 - 10%	50-100	Well	Inclined	<0.01%	19	24	G	-	676917	5656339	11
SRBL16020	Wetland	2016	T.H	ORG(HU)\FLUV(MF)	ZORxt	ZGC1	0	-	D	0 - 0.5%	50-100	Very Poor	Level	<0.01%	70	0	G	10	678094	5658066	11
SRBL16021	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	3	36	M	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	26	29	G	-	678102	5658277	11
SRBL16022	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGca	DVG1	15	270	M	>15 - 30%	50-100	Well	Hummocky	<0.01%	14	17	P	-	682253	5658839	11
SRBL16023	Improved Pasture	2016	GLCA.BLC	TILL(MF)	DVGcagltk	TBR6	2	22	M	>2.0 - 5.0%	25-50	Imperfect	Inclined	0.01 - 0.1%	50	0	G	-	682081	5658986	11
SRBL16024	Scrubland	2016	O.BLC	TILL(MF)	DVG	DVG1	35	308	M	>30 - 45%	50-100	Well	Inclined	<0.01%	20	35	F	-	681672	5658868	11
SRBL16025	Scrubland	2016	O.BLC	TILL(MF)	DVG	DVG1	3	-	E	>10 - 15%	50-100	Well	Hummocky	<0.01%	26	16	G	-	682007	5658762	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRBL16026	Riparian	2016	O.HG	FLUV(MF)	ZGW	TBR6	1	78	E	0.5 - 2.0%	50-100	Poor	Level	0.1 - 3%	14	21	F	-	682184	5658777	11
SRBL16027	Woodland	2016	GL.HR	FLUV(MC)	TBRgl	TBR2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	28	0	F	-	682312	5658499	11
SRBL16028	Floodplain	2016	O.R	FLUV(VC)	TBRaa	TBRgr1	1	-	E	0.5 - 2.0%	50-100	Well	Level	>50%	0	0	N/A	-	682214	5658254	11
SRBL16029	Scrubland	2016	CA.BLC	TILL(F)	DVGcaerfi	DVG1	52	182	M	>45 - 70%	50-100	Well	Inclined	0.1 - 3%	23	32	F	-	682019	5658339	11
SRBL16030	Crop	2016	O.BLC	GLLC(MF)	FSHco	DVFS2	2	22	M	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	17	28	G	-	681819	5658696	11
SRBL16031	Woodland	2016	GL.BLC	TILL(F)	DVGglfi	DVFS2	1	270	M	0.5 - 2.0%	50-100	Imperfect	Inclined	<0.01%	22	28	G	-	677908	5658081	11
SRBL16032	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVFS2	5	62	M	>2.0 - 5.0%	50-100	Well	Undulating	<0.01%	28	22	F	-	677762	5658010	11
SRBL16033	Hayland	2016	O.BLC	TILL(F)	DVGfi	DVG1	3	35	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	22	23	G	-	676969	5657251	11
SRBL16034	Hayland	2016	O.BLC	TILL(F)	DVGfi	DVG1	3	242	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	22	25	G	-	677203	5657427	11
SRBL16035	Scrubland	2016	O.HG	FLUV(M)\FLUV(MF)	ZGW	POT6	1	20	D	0.5 - 2.0%	100-500	Poor	Level	<0.01%	37	18	F	48	677415	5657578	11
SRBL16036	Scrubland	2016	O.BLC	TILL(MF)	DVG	POT6	5	270	L	>5 - 10%	25-50	Moderately Well	Inclined	<0.01%	34	21	G	-	677438	5657559	11
SRBL16037	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(MF)	FSHxt	DVFS2	3	210	U	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	24	31	G	-	677535	5657775	11
SRBL16038	Scrubland	2016	O.BLC	GLLC(MF)	FSHcotk	DVFS2	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	39	16	F	-	680431	5658961	11
SRBL16039	Scrubland	2016	GL.BLC	GLLC(F)	FSHgltk	DVFS2	2	212	L	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	33	17	G	-	680533	5659170	11
SRBL16040	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVFS2	2	12	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	27	21	F	-	680634	5659331	11
SRBL16041	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	4	178	M	>5 - 10%	50-100	Well	Inclined	<0.01%	21	29	G	-	680628	5659540	11
SRBL16042	Improved Pasture	2016	R.HG	FLUV(MF)	ZGW	POT6	1	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	26	0	G	-	680278	5659505	11
SRBL16043	Scrubland	2016	O.BLC	TILL(MF)	DVG	DVFS2	1	352	M	0.5 - 2.0%	50-100	Moderately Well	Level	<0.01%	29	26	F	-	680260	5659446	11
SRBL16044	Wetland	2016	O.HG	TILL(F)	POTzz	POT1	1	-	E	0 - 0.5%	100-500	Poor	Level	<0.01%	24	24	G	50	680189	5659146	11
SRBL16045	Scrubland	2016	O.BLC	TILL(F)	DVGfi	FSH2	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	21	17	G	-	680022	5658849	11
SRBL16046	Wetland	2016	O.HG	GLLC(F)	POT	POT2	1	-	D	0.5 - 2.0%	50-100	Poor	Level	<0.01%	36	15	F	-	679807	5658841	11
SRBL16047	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	5	58	M	>5 - 10%	100-500	Well	Inclined	<0.01%	23	24	F	-	679883	5658995	11
SRBL16048	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	62	M	>5 - 10%	100-500	Well	Inclined	<0.01%	23	21	G	-	679321	5659122	11
SRBL16049	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVFS2	2	62	U	>5 - 10%	100-500	Well	Inclined	<0.01%	25	28	F	-	679296	5658857	11
SRBL16050	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	3	52	M	>5 - 10%	100-500	Well	Inclined	<0.01%	21	21	F	-	679768	5659197	11
SRBL16051	Improved Pasture	2016	CU.HR	FLUV(M)	TBRzz	DVFS2	2	32	L	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	23	0	G	-	679809	5659472	11
SRBL16052	Improved Pasture	2016	GLCU.HR	FLUV(M)	TBRzzgll	POT7	2	90	E	0.5 - 2.0%	100-500	Imperfect	Inclined	<0.01%	22	0	G	-	679352	5659547	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRBL16053	Improved Pasture	2016	GLCU.HR	FLUV(M)	TBRzzgl	POT7	1	58	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	25	0	G	-	679274	5659326	11
SRKF16001	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	20	25	G	-	677666	5657800	11
SRKF16002	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	19	25	G	-	677796	5657767	11
SRKF16003	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	DVFS2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	22	37	G	-	677857	5657764	11
SRKF16004	Improved Pasture	2016	CA.BLC	TILL(F)	DVGca	POT6	1	68	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	9	40	G	-	679163	5660448	11
SRKF16005	Improved Pasture	2016	GLR.BLC	GLLC(F)	FSHglzr	POT6	1	68	T	0.5 - 2.0%	100-500	Imperfect	Inclined	<0.01%	18	0	G	-	679224	5660795	11
SRKF16006	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS1	3	78	M	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	31	25	P	-	679951	5660631	11
SRKF16007	Improved Pasture	2016	O.HG	GLLC(M)\TILL(M)	POTcoxt	FSH2	1	12	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	30	35	P	-	679859	5660600	11
SRKF16008	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH2	2	24	M	0.5 - 2.0%	100-500	Moderately Well	Inclined	<0.01%	27	36	G	-	679838	5660492	11
SRKF16009	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	DVFS2	3	186	M	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	26	29	G	26	679642	5660498	11
SRKF16010	Improved Pasture	2016	GL.BLC	GLLC(MF)\TILL(MF)	FSHglcoxt	FSH2	0	-	E	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	34	29	P	-	678600	5661047	11
SRKF16011	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH2	2	180	U	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	17	26	G	-	678745	5661022	11
SRKF16012	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVG1	4	210	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	17	23	G	-	678930	5660929	11
SRKF16013	Improved Pasture	2016	R.BLC	TILL(MF)	DVGzrtk	DVG1	5	198	M	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	41	0	G	-	678931	5661024	11
SRKF16014	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	1	-	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	26	32	G	30	678926	5660794	11
SRKF16015	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	3	212	M	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	22	17	P	-	678817	5660774	11
SRKF16016	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGca	DVFS2	3	198	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	28	14	G	-	678927	5660652	11
SRKF16017	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	3	184	U	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	21	32	G	-	678705	5660465	11
SRKF16018	Riparian	2016	R.HG	GLLC(MF)\TILL(MF)	POTzrcoxt	POT1	0	180	E	0.5 - 2.0%	50-100	Very Poor	Level	<0.01%	20	0	G	-	678781	5660460	11
SRKF16019	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	2	224	C	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	22	27	G	-	678352	5660453	11
SRKF16020	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	3	180	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	21	26	G	-	678184	5661418	11
SRKF16021	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	180	L	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	22	26	G	-	677967	5661565	11
SRKF16022	Wetland	2016	R.HG	GLLC(F)	POTzr	POT6	1	180	D	0.5 - 2.0%	100-500	Poor	Inclined	<0.01%	25	0	G	0	677857	5661589	11
SRKF16023	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	POT6	1	180	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	23	23	G	-	677672	5661602	11
SRKF16024	Improved Pasture	2016	R.HG	GLLC(F)	POTzrxt	POT6	2	212	E	>2.0 - 5.0%	100-500	Poor	Inclined	<0.01%	20	15	G	0	677656	5661347	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRKF16025	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	POT7	4	352	M	>2.0 - 5.0%	100-500	Imperfect	Ridged	<0.01%	38	19	G	55	677335	5660714	11
SRKF16026	Improved Pasture	2016	R.HG	FLUV(M)\GLLC(F)	ZGW	POT7	4	20	L	>2.0 - 5.0%	100-500	Poor	Inclined	<0.01%	20	60	P	50	677330	5660668	11
SRKF16027	Improved Pasture	2016	R.HG	FLUV(F)	ZGW	POT7	1	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	31	0	F	-	677172	5660879	11
SRKF16028	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH1	5	68	M	>5 - 10%	50-100	Imperfect	Inclined	<0.01%	25	29	F	40	677172	5660815	11
SRKF16029	Improved Pasture	2016	R.BLC	GLLC(MF)	FSHzrcotk	FSH1	4	26	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	53	0	G	-	677165	5660687	11
SRKF16030	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	9	212	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	21	23	G	-	677192	5660972	11
SRKF16031	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHcatk	FSH1	15		U	>10 - 15%	100-500	Well	Inclined	<0.01%	40	35	G	-	677179	5661081	11
SRKF16032	Improved Pasture	2016	O.BLC	GLLC(F)	FSHtk	FSH2	2	176	E	0.5 - 2.0%	50-100	Moderately Well	Level	<0.01%	36	32	G	-	677247	5661135	11
SRKF16033	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHcatk	FSH1	3	12	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	36	26	G	-	676983	5660380	11
SRKF16034	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	5	34	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	25	39	G	-	676891	5660433	11
SRKF16035	Improved Pasture	2016	O.BLC	GLLC(MF)	FSHco	FSH1	4	182	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	32	26	G	-	676984	5660465	11
SRKF16036	Improved Pasture	2016	R.HG	FLUV(F)	ZGW	FSH2	0	-	E	0 - 0.5%	50-100	Poor	Level	<0.01%	30	0	G	-	676778	5660524	11
SRKF16037	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	4	180	M	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	33	14	G	-	676751	5660741	11
SRKF16038	Improved Pasture	2016	-	-	-	FSH1	-	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	-	-	-	-	677257	5660499	11
SRKF16039	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	5	58	M	>5 - 10%	100-500	Well	Inclined	<0.01%	23	20	F	-	677257	5660499	11
SRKF16040	Improved Pasture	2016	O.BLC	GLLC(MF)	FSHco	FSH2	1	-	C	>5 - 10%	50-100	Well	Inclined	<0.01%	32	22	G	-	677279	5660414	11
SRKF16041	Crop	2016	GL.BLC	GLLC(F)	FSHgl	POT2	1	-	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	17	23	G	100	677305	5660293	11
SRKF16042	Wetland	2016	R.HG	FLUV(MF)\TILL(M)	ZGW	POT7	0	-	D	0.5 - 2.0%	50-100	Poor	Level	<0.01%	20	50	P	0	675935	5661791	11
SRKF16043	Wetland	2016	R.HG	FLUV(MF)\TILL(MF)	ZGW	POT7	1	248	E	>5 - 10%	50-100	Poor	Inclined	<0.01%	25	35	P	10	676145	5661617	11
SRKF16044	Scrubland	2016	O.BLC	TILL(F)	DVGfitk	DVFS2	5	60	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	35	22	G	-	676008	5661438	11
SRKF16045	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH1	5	184	M	>5 - 10%	50-100	Well	Inclined	<0.01%	26	30	G	-	676156	5661396	11
SRKF16046	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	6	226	M	>5 - 10%	50-100	Well	Inclined	<0.01%	25	44	G	-	676298	5661457	11
SRKF16048	Riparian	2016	R.HG	FLUV(MF)\GLLC(F)	ZGW	POT7	0	-	D	0.5 - 2.0%	100-500	Poor	Level	<0.01%	20	40	P	0	676322	5661321	11
SRKF16049	Disturbed	2016	N/A	ANTH(F)\GLLC(F)	ZDL	FSH1	5	58	M	>5 - 10%	100-500	Imperfect	Inclined	<0.01%	12	0	G	37	676966	5661181	11
SRKF16050	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	7	358	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	24	37	G	-	676478	5661011	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRKF16051	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHcatk	FSH1	3	76	L	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	49	7	F	-	676555	5660905	11
SRKF16052	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	0	-	E	>5 - 10%	100-500	Moderately Well	Level	<0.01%	25	11	F	-	676722	5660951	11
SRKF16053	Improved Pasture	2016	O.BLC	GLLC(MF)	FSHco	FSH1	3	238	M	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	24	15	F	-	676671	5661339	11
SRKF16054	Improved Pasture	2016	O.BLC	GLLC(MF)	FSHcotk	FSH1	1	56	L	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	42	21	G	-	676709	5661557	11
SRKF16055	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGca	DVFS1	3	284	U	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	29	25	F	-	676747	5661646	11
SRKF16056	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	2	256	C	>15 - 30%	50-100	Well	Rolling	<0.01%	28	15	F	-	676981	5661439	11
SRKF16057	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzrtk	FSH1	4	268	M	>10 - 15%	50-100	Moderately Well	Inclined	<0.01%	44	0	F	-	676993	5661346	11
SRKF16058	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	25	25	G	43	677180	5661281	11
SRKF16059	Wetland	2016	R.HG	GLLC(F)	POTzr	POT2	0	-	D	0 - 0.5%	-	Poor	Level	<0.01%	15	20	P	0	677324	5661274	11
SRKF16060	Improved Pasture	2016	GL.HR	FLUV(MF)\TILL(F)	TBRzzgl	POT7	3	270	L	>2.0 - 5.0%	50-100	Imperfect	Inclined	<0.01%	29	22	F	-	679190	5660310	11
SRKF16061	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVFS2	1	56	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	30	28	F	-	679227	5660126	11
SRKF16062	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH2	1	180	E	0.5 - 2.0%	100-500	Moderately Well	Inclined	0.01 - 0.1%	30	26	F	-	679240	5659879	11
SRKF16063	Improved Pasture	2016	O.HG	GLLC(F)	POT	POT6	0	-	D	0 - 0.5%	50-100	Poor	Level	<0.01%	27	20	P	-	679255	5659673	11
SRKF16064	Improved Pasture	2016	GLCA.BLC	GLLC(MF)	FSHcaglco	POT6	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	38	14	F	30	679525	5659626	11
SRKF16065	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH2	1	264	M	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	30	25	F	-	679634	5659653	11
SRKF16066	Riparian	2016	O.HG	FLUV(MF)	ZGW	POT7	0	-	D	0 - 0.5%	1-25	Poor	Level	<0.01%	15	20	F	0	679754	5659642	11
SRKF16067	Improved Pasture	2016	R.BLC	GLLC(MF)	FSHzrco	FSH2	0	-	E	0.5 - 2.0%	-	Moderately Well	Level	<0.01%	37	0	G	-	679857	5659658	11
SRKF16068	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH2	2	56	U	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	27	20	F	-	679800	5659786	11
SRKF16069	Riparian	2016	O.HG	GLLC(MF)	POTco	FSH2	0	-	E	0.5 - 2.0%	-	Poor	Level	<0.01%	25	20	P	0	679855	5659995	11
SRKF16070	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	2	12	M	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	24	22	F	40	679742	5660114	11
SRKF16071	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVG1	3	264	M	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	24	19	P	-	679850	5660223	11
SRKF16072	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGca	DVG1	3	210	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	21	34	F	-	679677	5660307	11
SRKF16073	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	1	124	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	22	25	F	50	679506	5660312	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRKF16074	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	DVFS2	1	-	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	19	25	G	-	679330	5660333	11
SRKF16075	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGcatk	ZDL	4	224	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	36	13	F	-	680326	5660182	11
SRKF16076	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGca	ZDL	4	224	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	22	21	F	-	680443	5660224	11
SRKF16077	Improved Pasture	2016	O.BLC	TILL(MF)	DVGtk	ZDL	10	244	M	>5 - 10%	100-500	Well	Inclined	<0.01%	44	36	G	-	680618	5660115	11
SRKF16078	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVG1	6	244	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	23	21	F	-	680657	5659898	11
SRKF16079	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGcatk	ZDL	3	244	U	>5 - 10%	100-500	Well	Inclined	<0.01%	44	15	G	-	680706	5659970	11
SRKF16080	Improved Pasture	2016	CA.BLC	TILL(F)	DVGcafi	DVG1	5	224	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	18	27	F	-	680027	5660250	11
SRKF16081	Improved Pasture	2016	GLCA.BLC	GLLC(MF)	FSHcacogl	FSH2	2	272	E	0.5 - 2.0%	100-500	Imperfect	Inclined	<0.01%	25	22	G	35	680024	5659962	11
SRKF16082	Improved Pasture	2016	R.HG	GLLC(MF)	POTzrco	POT7	0	-	D	0 - 0.5%	50-100	Poor	Level	0.1 - 3%	30	0	G	0	680058	5659842	11
SRKF16083	Improved Pasture	2016	R.HG	FLUV(F)	ZGWzr	POT7	1	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	40	0	P	40	680147	5659676	11
SRKF16084	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	DVFS2	2	256	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	19	20	F	40	680282	5659757	11
SRKF16085	Improved Pasture	2016	O.BLC	TILL(MF)	DVGtk	DVG1	3	226	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	0.01 - 0.1%	39	14	F	-	680422	5659776	11
SRKF16086	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVG1	1	-	M	0.5 - 2.0%	100-500	Well	Level	0.01 - 0.1%	26	19	F	-	680489	5659863	11
SRKF16087	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVFS1	2	22	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	30	29	F	-	679041	5659111	11
SRKF16088	Improved Pasture	2016	CA.BLC	TILL(F)	DVGcafitk	DVG1	20	170	M	>15 - 30%	50-100	Well	Inclined	<0.01%	50	25	F	-	679807	5658229	11
SRKF16089	Crop	2016	CA.BLC	TILL(F)	DVGcafi	DVFS2	5	206	M	>5 - 10%	100-500	Well	Inclined	0.01 - 0.1%	16	25	G	-	679775	5658351	11
SRKF16090	Crop	2016	O.BLC	TILL(F)	DVGfi	DVG1	3	180	E	>2.0 - 5.0%	50-100	Well	Undulating	<0.01%	28	14	G	-	679868	5658399	11
SRKF16091	Crop	2016	O.BLC	TILL(F)	DVGfi	DVG1	2	180	E	>2.0 - 5.0%	100-500	Moderately Well	Inclined	0.01 - 0.1%	28	27	G	68	679863	5658451	11
SRKF16092	Crop	2016	O.BLC	TILL(F)	DVGfi	DVFS2	3	52	M	>2.0 - 5.0%	100-500	Well	Inclined	0.01 - 0.1%	28	32	G	-	679826	5658518	11
SRKF16093	Crop	2016	O.BLC	TILL(F)	DVGfi	DVFS2	1	-	M	>2.0 - 5.0%	100-500	Well	Inclined	0.1 - 3%	18	29	P	-	679808	5658578	11
SRKF16094	Crop	2016	O.BLC	TILL(F)	DVGfi	DVFS2	2	80	M	>2.0 - 5.0%	100-500	Well	Inclined	0.01 - 0.1%	25	23	G	-	679714	5658732	11
SRKF16095	Crop	2016	O.BLC	TILL(F)	DVGfi	DVFS2	3	48	U	>2.0 - 5.0%	100-500	Well	Inclined	0.01 - 0.1%	17	16	G	-	679622	5658625	11
SRKF16096	Crop	2016	O.BLC	TILL(F)	DVGfi	DVFS2	4	40	M	>2.0 - 5.0%	100-500	Well	Inclined	0.01 - 0.1%	17	22	G	-	679592	5658729	11
SRKF16097	Improved Pasture	2016	O.HR	FLUV(C)	MTB	MSTB1	20	210	M	>15 - 30%	100-500	Well	Inclined	<0.01%	15	0	G	-	679259	5658295	11
SRKF16098	Wetland	2016	O.HG	FLUV(M)	ZGW	ZGC1	0	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	56	0	P	-	679310	5658105	11
SRKF16100	Woodland	2016	O.HG	FLUV(MC)\GLFL(VC)	ZGW	ZGC1	1	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	32	20	F	-	679365	5657849	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRKF16101	Floodplain	2016	GL.BLC	FLUV(MC)	SRCgltk	TBSR1	0	-	E	0 - 0.5%	100-500	Imperfect	Level	<0.01%	38	14	F	-	679249	5657752	11
SRKF16102	Woodland	2016	O.HG	FLUV(MC)\GLFL(VC)	ZGW	TBSR1	1	180	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	17	27	F	-	679365	5657556	11
SRKF16103	Riparian	2016	O.HR	FLUV(VC)	TBRxg	TBRgr1	0	-	E	0 - 0.5%	100-500	Rapid	Level	>50%	16	0	P	-	679505	5657544	11
SRKF16104	Floodplain	2016	O.HG	FLUV(C)\GLFL(VC)	ZGWxg	TBRgr1	0	-	E	0 - 0.5%	1-25	Poor	Level	<0.01%	28	32	P	-	679686	5657696	11
SRKF16105	Improved Pasture	2016	GL.BLC	FLUV(C)\GLFL(VC)	SRCglxgco	ZGC1	1	180	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	27	29	F	-	679851	5657932	11
SRKF16107	Wetland	2016	T.M	ORG(ME)\FLUV(M)	ZORxs	ZGC1	0	-	D	0 - 0.5%	50-100	Very Poor	Level	<0.01%	80	0	G	0	679487	5658043	11
SRKF16108	Wetland	2016	R.HG	ORG(ME)\FLUV(MC)	ZGWpt	ZGC1	0	-	E	0 - 0.5%	500-1000	Very Poor	Level	<0.01%	30	0	G	20	679726	5657920	11
SRKF16109	Wetland	2016	R.HG	FLUV(MC)	ZGW	ZGC1	0	-	E	0 - 0.5%	100-500	Very Poor	Level	<0.01%	18	0	G	0	679695	5658060	11
SRKF16110	Improved Pasture	2016	R.HG	GLLC(F)	POTzr	POT2	1	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	40	0	G	0	680969	5658532	11
SRKF16111	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	2	12	M	>2.0 - 5.0%	25-50	Moderately Well	Inclined	<0.01%	19	28	G	-	680889	5658385	11
SRKF16112	Improved Pasture	2016	GLCA.BLC	TILL(F)	DVGcaglfi	DVG1	25	200	M	>15 - 30%	25-50	Imperfect	Inclined	<0.01%	17	36	P	-	680906	5658241	11
SRKF16113	Forested Range	2016	CA.BLC	TILL(F)	DVGcafi	DVG1	2	-	M	>2.0 - 5.0%	1-25	Well	Inclined	<0.01%	14	27	F	-	680885	5658126	11
SRKF16114	Riparian	2016	O.R	FLUV(VC)	TBRaagr	TBRgr1	0	-	E	0 - 0.5%	100-500	Rapid	Level	>50%	0	0	N/A	-	680919	5658102	11
SRKF16115	Woodland	2016	R.BLC	GLFL(VC)	TBRxg	TBR4	1	-	E	0.5 - 2.0%	100-500	Rapid	Level	0.1 - 3%	16	0	F	-	681033	5658234	11
SRKF16116	Riparian	2016	O.R	FLUV(VC)	TBRaagr	TBRgr1	0	-	E	0 - 0.5%	100-500	Rapid	Level	>50%	0	0	N/A	-	681330	5658300	11
SRKF16117	Improved Pasture	2016	CA.BLC	TILL(F)	DVGcafi	DVG1	0	-	E	0 - 0.5%	1-25	Well	Level	<0.01%	23	26	F	-	681405	5658351	11
SRKF16118	Improved Pasture	2016	O.HG	TILL(F)	POTzz	POT1	1	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	25	21	G	45	681476	5658462	11
SRKF16119	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGcatk	TBR6	0	-	E	0.5 - 2.0%	50-100	Moderately Well	Level	<0.01%	36	17	F	-	681444	5658817	11
SRKF16120	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVFS1	0	-	E	0 - 0.5%	100-500	Moderately Well	Level	0.01 - 0.1%	22	30	F	-	681332	5658775	11
SRKF16121	Improved Pasture	2016	O.HG	TILL(F)	POTzz	POT1	0	-	E	0.5 - 2.0%	100-500	Poor	Level	<0.01%	25	18	G	60	681247	5658721	11
SRKF16122	Hayland	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	0.01 - 0.1%	24	23	F	-	681060	5658591	11
SRKF16123	Scrubland	2016	CA.BLC	FLUV(M)	SRCcatk	SRC4	0	-	D	0.5 - 2.0%	25-50	Moderately Well	Level	<0.01%	41	14	F	-	678946	5657750	11
SRKF16124	Riparian	2016	CA.BLC	FLUV(M)\FLUV(MC)	SRCca	TBSR1	1	170	M	0.5 - 2.0%	50-100	Well	Level	0.01 - 0.1%	18	6	F	-	679164	5657567	11
SRKF16125	Improved Pasture	2016	CU.R	FLUV(M)\GLFL(VC)	SRCxg	SRC4	0	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	0.01 - 0.1%	0	0	N/A	-	678785	5657621	11
SRKF16126	Wetland	2016	T.M	ORG(ME)\LACU(F)	ZORxc	ZGC1	0	-	E	0.5 - 2.0%	25-50	Poor	Level	<0.01%	70	0	G	90	679098	5658143	11
SRKF16127	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	5	210	U	>10 - 15%	50-100	Well	Hummocky	0.01 - 0.1%	21	44	F	-	678632	5657877	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRKF16128	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	115	L	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	21	19	F	-	678524	5657862	11
SRKF16129	Improved Pasture	2016	R.BLC	GLLC(MF)\TILL(F)	FSHzrxt	DVFS1	14	145	M	>10 - 15%	25-50	Moderately Well	Inclined	0.01 - 0.1%	43	0	F	-	678911	5658038	11
SRKF16130	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	4	225	M	>5 - 10%	100-500	Well	Inclined	0.01 - 0.1%	22	25	F	-	678984	5658330	11
SRKF16131	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS1	11	260	M	>10 - 15%	50-100	Well	Hummocky	<0.01%	28	18	F	-	678972	5658541	11
SRKF16132	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	2	210	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	23	21	F	-	678538	5658593	11
SRKF16133	Improved Pasture	2016	CA.BLC	GLLC(F)\TILL(F)	FSHcaxttk	FSH2	2	190	M	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	42	27	F	-	678466	5658309	11
SRKF16134	Scrubland	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVFS2	2	100	M	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	31	25	G	-	678326	5658334	11
SRKF16135	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVFS2	7	145	M	>5 - 10%	100-500	Well	Inclined	0.01 - 0.1%	16	39	G	-	678199	5658524	11
SRKF16136	Wetland	2016	R.HG	GLLC(F)	POTzr	POT1	2	30	L	>5 - 10%	100-500	Poor	Inclined	<0.01%	33	0	G	-	678343	5658646	11
SRKF16137	Improved Pasture	2016	O.BLC	TILL(F)	DVGfitk	DVFS2	3	45	M	>5 - 10%	50-100	Well	Inclined	0.01 - 0.1%	39	16	F	-	678830	5658706	11
SRKF16138	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	FSH2	2	45	M	>5 - 10%	100-500	Well	Inclined	<0.01%	34	23	F	-	679029	5658724	11
SRKF16139	Improved Pasture	2016	O.HR	FLUV(MC)\FLUV(MC)	TBRxg	SRC1	1	25	E	0.5 - 2.0%	100-500	Well	Level	<0.01%	70	0	P	-	677056	5655213	11
SRKF16140	Woodland	2016	CU.HR	FLUV(MC)	TBR	TBR2	2	260	M	0.5 - 2.0%	100-500	Well	Inclined	<0.01%	22	0	F	-	676980	5655325	11
SRKF16141	Riparian	2016	O.HR	TILL(F)	MTB	DVG1	47	130	T	>45 - 70%	50-100	Well	Inclined	0.1 - 3%	25	0	F	-	676762	5655877	11
SRKF16142	Floodplain	2016	O.R	FLUV(VC)	TBRaagr	TBRgr1	0	-	E	0.5 - 2.0%	25-50	Well	Terraced	>50%	0	0	N/A	-	676776	5655852	11
SRKF16143	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVFS2	10	145	M	>5 - 10%	100-500	Well	Inclined	0.01 - 0.1%	20	18	F	-	676730	5656204	11
SRKF16144	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	3	45	M	>2.0 - 5.0%	100-500	Well	Undulating	0.01 - 0.1%	32	16	F	-	676954	5656706	11
SRKF16145	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVG1	2	54	M	>2.0 - 5.0%	50-100	Well	Undulating	<0.01%	30	20	F	-	676947	5656948	11
SRKF16146	Scrubland	2016	O.BLC	GLLC(F)	FSH	FSH2	2	80	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	29	15	G	-	678162	5658011	11
SRKF16147	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	2	245	M	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	25	20	G	-	678026	5658184	11
SRKF16148	Wetland	2016	R.HG	ORG(HU)\FLUV(F)	ZGWpt	ZGC1	0	-	D	0.5 - 2.0%	25-50	Poor	Level	<0.01%	70	0	G	10	677996	5658154	11
SRKF16149	Native Range	2016	CA.BLC	TILL(MF)	DVGca	DVG1	8	230	U	>15 - 30%	50-100	Well	Inclined	0.01 - 0.1%	18	18	F	-	682156	5658996	11
SRKF16150	Woodland	2016	O.HR	GLFL(VC)	TBRgr	TBR6	0	-	E	0.5 - 2.0%	25-50	Well	Level	0.1 - 3%	20	0	P	-	681918	5658937	11
SRKF16151	Scrubland	2016	R.BLC	TILL(MF)	DVGzrtk	POT6	0	-	E	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	41	0	G	-	681940	5658788	11
SRKF16152	Scrubland	2016	O.HR	GLFL(M)	TBRfixg	TBR6	0	-	E	0.5 - 2.0%	50-100	Well	Level	0.1 - 3%	26	0	P	-	682101	5658819	11
SRKF16153	Scrubland	2016	CA.BLC	GLFL(MC)	SUDfigr	TBR2	0	-	E	0.5 - 2.0%	50-100	Well	Terraced	0.01 - 0.1%	21	29	F	-	682296	5658579	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRKF16154	Riparian	2016	O.R	FLUV(VC)	TBRaaxg	TBRgr1	0	-	E	0.5 - 2.0%	50-100	Well	Level	3 - 15%	0	0	N/A	-	682318	5658288	11
SRKF16155	Floodplain	2016	O.R	FLUV(MC)	TBRaaxg	TBR1	0	-	E	0.5 - 2.0%	100-500	Well	Level	3 - 15%	0	0	N/A	-	682165	5658307	11
SRKF16156	Wetland	2016	GL.BLC	TILL(F)	DVGglfi	POT2	0	-	D	>2.0 - 5.0%	50-100	Imperfect	Undulating	0.01 - 0.1%	15	21	G	-	681931	5658560	11
SRKF16157	Scrubland	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	2	60	L	>2.0 - 5.0%	50-100	Imperfect	Inclined	<0.01%	26	24	F	-	677974	5658134	11
SRKF16158	Improved Pasture	2016	O.BLC	TILL(MF)	DVG	DVFS2	3	40	M	>2.0 - 5.0%	100-500	Well	Undulating	0.01 - 0.1%	31	17	F	-	677854	5658066	11
SRKF16159	Hayland	2016	O.BLC	TILL(MF)	DVG	DVG1	3	40	M	>2.0 - 5.0%	100-500	Well	Inclined	0.1 - 3%	20	22	G	-	676848	5657115	11
SRKF16160	Wetland	2016	R.HG	GLLC(MF)	POTzrco	POT2	0	-	D	0.5 - 2.0%	25-50	Poor	Level	<0.01%	32	0	G	-	677215	5657288	11
SRKF16161	Hayland	2016	O.BLC	TILL(MF)	DVGtk	DVG1	2	30	M	>2.0 - 5.0%	50-100	Well	Undulating	0.01 - 0.1%	44	16	P	-	677394	5657601	11
SRKF16162	Riparian	2016	R.HG	FLUV(MF)\FLUV(MF)	ZGWxg	POT6	1	360	D	0.5 - 2.0%	500-1000	Poor	Level	<0.01%	47	0	F	80	677435	5657512	11
SRKF16163	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	2	210	M	>2.0 - 5.0%	100-500	Well	Inclined	0.01 - 0.1%	18	22	G	-	677484	5657655	11
SRKF16164	Scrubland	2016	O.BLC	GLLC(F)	FSH	DVFS2	0	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	24	22	F	-	680307	5658871	11
SRKF16165	Wetland	2016	R.HG	ORG(ME)\GLLC(F)	POTzrpt	POT1	0	-	D	0 - 0.5%	100-500	Poor	Level	<0.01%	50	0	G	0	680484	5659058	11
SRKF16166	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVFS2	0	-	E	>2.0 - 5.0%	50-100	Well	Undulating	<0.01%	26	24	F	-	680619	5659264	11
SRKF16167	Improved Pasture	2016	CA.BLC	FLUV(M)\GLLC(F)	SRCcaxc	POT7	0	-	E	>2.0 - 5.0%	50-100	Moderately Well	Undulating	<0.01%	29	19	G	-	680658	5659402	11
SRKF16168	Riparian	2016	O.HG	FLUV(MF)	ZGW	POT7	0	-	E	0.5 - 2.0%	500-1000	Poor	Level	<0.01%	31	19	F	-	680467	5659521	11
SRKF16169	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVFS2	0	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	26	17	F	-	680205	5659376	11
SRKF16170	Scrubland	2016	GLR.BLC	GLLC(MF)	FSHglzrco	DVFS2	2	160	L	0.5 - 2.0%	25-50	Imperfect	Inclined	<0.01%	17	0	G	-	680185	5659220	11
SRKF16171	Scrubland	2016	O.BLC	GLLC(MF)	FSHco	DVFS2	2	330	M	>2.0 - 5.0%	25-50	Moderately Well	Undulating	<0.01%	29	15	F	-	680149	5658966	11
SRKF16172	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	3	30	M	>2.0 - 5.0%	500-1000	Well	Inclined	0.01 - 0.1%	25	21	F	-	679532	5658802	11
SRKF16173	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	0	-	E	0.5 - 2.0%	50-100	Well	Inclined	0.01 - 0.1%	25	19	F	-	679771	5658925	11
SRKF16174	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	3	30	M	>5 - 10%	100-500	Well	Inclined	<0.01%	27	15	F	-	679905	5659068	11
SRKF16175	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	2	40	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	34	21	F	-	679306	5658985	11
SRKF16176	Improved Pasture	2016	O.BLC	GLLC(F)\TILL(F)	FSHxt	DVFS2	0	-	C	0.5 - 2.0%	50-100	Well	Level	0.01 - 0.1%	20	19	F	-	679227	5658838	11
SRKF16177	Improved Pasture	2016	GLCA.BLC	GLLC(MF)	FSHcacogl	POT6	0	-	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	25	25	G	-	679891	5659252	11
SRKF16178	Improved Pasture	2016	CU.HR	FLUV(M)	TBRzz	POT7	0	-	E	0.5 - 2.0%	500-1000	Moderately Well	Level	<0.01%	27	0	G	-	679549	5659495	11
SRKF16179	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	DVFS2	1	170	L	0.5 - 2.0%	25-50	Moderately Well	Level	<0.01%	21	24	F	-	679370	5659464	11
SRKF16180	Wetland	2016	R.HG	FLUV(M)	ZGW	POT7	1	150	T	0.5 - 2.0%	50-100	Poor	Inclined	<0.01%	25	0	P	-	679237	5659392	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRWC16001	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	DVFS1	24		U	>15 - 30%	50-100	Well	Inclined	<0.01%	21	28	G	-	676036	5655218	11
SRWC16002	Riparian	2016	GL.BLC	GLLC(F)	FSHgl	POT7	2	36	E	>30 - 45%	25-50	Imperfect	Inclined	<0.01%	17	29	P	-	676222	5655196	11
SRWC16003	Woodland	2016	CA.BLC	FLUV(M)\GLFL(M)	SRCcaxg	TBSR1	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	33	17	P	-	676259	5654900	11
SRWC16004	Riparian	2016	O.R	FLUV(VC)	TBRaagr	TBRgr1	1	28	E	0.5 - 2.0%	500-1000	Rapid	Level	>50%	0	0	N/A	-	676556	5655193	11
SRWC16005	Riparian	2016	CU.R	GLFL(VC)	TBRxg	TBSR1	22		C	>15 - 30%	1-25	Well	Ridged	3 - 15%	3	0	N/A	-	676524	5655143	11
SRWC16006	Riparian	2016	O.R	FLUV(VC)	TBRaaxg	TBRgr1	1	28	E	0.5 - 2.0%	100-500	Rapid	Level	15 - 50%	0	0	N/A	-	676438	5655088	11
SRWC16007	Improved Pasture	2016	CU.R	GLFL(VC)	TBRxg	TBSR1	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	0	0	N/A	-	676361	5655104	11
SRWC16008	Improved Pasture	2016	CU.R	GLFL(M)	SRCzr	TBRgr1	1	12	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	0	0	N/A	-	676279	5655111	11
SRWC16009	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	2	190	M	0.5 - 2.0%	50-100	Well	Undulating	<0.01%	21	20	G	-	676011	5655253	11
SRWC16010	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	DVFS2	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	33	0	F	-	679197	5660613	11
SRWC16011	Improved Pasture	2016	R.HG	FLUV(M)	ZGW	POT6	2	200	D	0.5 - 2.0%	100-500	Poor	Inclined	<0.01%	35	0		-	679273	5660905	11
SRWC16012	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	DVFS2	4	30	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	21	28	P	-	679427	5660782	11
SRWC16013	Improved Pasture	2016	R.HG	GLLC(F)	POTzr	POT1	3	20	D	>2.0 - 5.0%	100-500	Poor	Inclined	<0.01%	45	0	G	-	679594	5660697	11
SRWC16014	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	DVFS2	1	180	M	0.5 - 2.0%	100-500	Moderately Well	Inclined	<0.01%	15	27	F	-	679387	5660467	11
SRWC16015	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	-	E	0.5 - 2.0%	100-500	Well	Level	<0.01%	16	32	F	-	678497	5661067	11
SRWC16016	Improved Pasture	2016	CA.BLC	-	-	FSH2	2	335	M	0.5 - 2.0%	50-100	Well	Inclined	<0.01%	24	26	F	-	678386	5660949	11
SRWC16017	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	2	20	M	0.5 - 2.0%	50-100	Well	Inclined	<0.01%	24	26	G	-	678386	5660948	11
SRWC16018	Improved Pasture	2016	R.HG	GLLC(F)	POTzr	POT6	2	300	D	>2.0 - 5.0%	50-100	Poor	Inclined	<0.01%	27	12	G	-	678362	5660872	11
SRWC16019	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	POT6	3		L	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	27	17	P	-	678244	5660909	11
SRWC16020	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	FSH2	2	30	L	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	32	0	G	-	678432	5660733	11
SRWC16021	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	16	32	G	-	678405	5660594	11
SRWC16022	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	26	20	G	-	678383	5660515	11
SRWC16023	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	4	30	L	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	16	23	G	-	678409	5661313	11
SRWC16024	Improved Pasture	2016	O.HG	GLLC(F)\TILL(MC)	POTxt	POT1	2	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	22	19	G	-	678278	5661193	11
SRWC16025	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	2	-	E	0.5 - 2.0%	50-100	Well	Level	0.01 - 0.1%	32	17	F	-	678114	5661245	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRWC16026	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	27	17	G	-	677495	5661593	11
SRWC16027	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	27	16	F	-	677511	5661391	11
SRWC16028	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	1	67	L	0.5 - 2.0%	50-100	Imperfect	Inclined	<0.01%	18	27	F	-	677841	5661301	11
SRWC16029	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	-	-	L	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	25	20	F	-	678021	5661008	11
SRWC16030	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	340	L	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	27	22	F	-	677756	5661035	11
SRWC16031	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	14	27	F	-	677869	5661046	11
SRWC16032	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	POT6	1	345	L	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	26	13	F	-	677638	5661037	11
SRWC16033	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	21	23	G	-	677519	5661053	11
SRWC16034	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	100-500	Well	Level	<0.01%	29	14	F	-	677540	5660935	11
SRWC16035	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	15	M	0.5 - 2.0%	100-500	Well	Inclined	<0.01%	32	9	F	-	677567	5660842	11
SRWC16036	Improved Pasture	2016	R.HG	GLLC(F)	POTzr	POT7	1	-	D	0.5 - 2.0%	50-100	Poor	Level	<0.01%	26	17	F	-	677572	5660705	11
SRWC16037	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	FSH1	8	40	U	>5 - 10%	50-100	Well	Inclined	<0.01%	22	0	G	-	677680	5660698	11
SRWC16038	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	120	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	24	15	F	-	677777	5660623	11
SRWC16039	Improved Pasture	2016	R.HG	GLLC(F)	POTzr	POT7	4	80	D	>2.0 - 5.0%	50-100	Poor	Inclined	<0.01%	28	17	P	-	678047	5660425	11
SRWC16040	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	1	-	E	>2.0 - 5.0%	50-100	Well	Level	<0.01%	20	9	F	-	677761	5660476	11
SRWC16041	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	9	345	M	>5 - 10%	50-100	Well	Inclined	<0.01%	30	10	G	-	677272	5660575	11
SRWC16042	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	8	25	U	>5 - 10%	50-100	Well	Inclined	<0.01%	26	15	F	-	678120	5660442	11
SRWC16043	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	5	35	L	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	26	13	F	-	678094	5660563	11
SRWC16044	Improved Pasture	2016	R.HG	GLLC(F)	POTzr	POT1	1	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	25	0		-	678147	5660719	11
SRWC16045	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzrtk	POT7	4	40	L	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	41	0	G	-	678209	5660224	11
SRWC16046	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	FSH1	6	55	L	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	14	0	G	-	678190	5660081	11
SRWC16047	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	5	60	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	22	16	G	-	678234	5659976	11
SRWC16048	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	4	80	L	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	32	13	F	-	678179	5659827	11
SRWC16049	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	6	45	M	>5 - 10%	100-500	Well	Inclined	<0.01%	27	16	F	-	678200	5659566	11
SRWC16050	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	5	345	M	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	23	16	F	-	677837	5659792	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRWC16051	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	POT6	-	-	L	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	28	9	F	-	677728	5659790	11
SRWC16052	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	4	40	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	26	15	F	-	677910	5660312	11
SRWC16053	Improved Pasture	2016	O.HG	GLFL(M)\GLLC(F)	ZGWxc	POT7	4	-	L	>2.0 - 5.0%	50-100	Poor	Inclined	<0.01%	25	33	P	-	677739	5660244	11
SRWC16054	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	3	45	U	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	19	18	G	-	677563	5660098	11
SRWC16055	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	3	-	M	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	33	27	F	-	677620	5659906	11
SRWC16056	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	65	U	0.5 - 2.0%	50-100	Well	Inclined	<0.01%	33	10	F	-	677609	5660288	11
SRWC16057	Improved Pasture	2016	O.HG	GLLC(F)	POT	POT7	1	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	23	32	P	-	678007	5660287	11
SRWC16058	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	1	225	M	0.5 - 2.0%	50-100	Moderately Well	Inclined	0.01 - 0.1%	24	51	F	-	677276	5660227	11
SRWC16059	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	2	35	M	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	25	20	F	-	677220	5660178	11
SRWC16060	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	2	45	M	0.5 - 2.0%	50-100	Well	Inclined	<0.01%	28	32	G	-	678341	5660311	11
SRWC16061	Improved Pasture	2016	O.HG	GLLC(F)	POT	POT6	1	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	24	61	F	-	678358	5660117	11
SRWC16062	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	FSH1	3	105	U	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	27	0	G	-	678391	5659761	11
SRWC16063	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	POT7	12	45	L	>10 - 15%	1-25	Moderately Well	Inclined	<0.01%	20	0	G	-	678521	5659805	11
SRWC16064	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	6	50	L	>5 - 10%	50-100	Imperfect	Inclined	<0.01%	33	14	F	-	678609	5659714	11
SRWC16065	Improved Pasture	2016	R.HG	GLLC(MF)	POTzrco	POT7	2	50	D	0.5 - 2.0%	50-100	Poor	Level	<0.01%	35	0	F	-	678847	5659667	11
SRWC16066	Improved Pasture	2016	O.HG	GLLC(F)	POT	POT7	1	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	29	46	F	-	678889	5659659	11
SRWC16067	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	5	50	M	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	19	22	F	-	678937	5659696	11
SRWC16068	Improved Pasture	2016	R.BLC	GLLC(F)	FSHzr	FSH2	1	-	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	31	0	G	-	679059	5659758	11
SRWC16069	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH2	2	-	E	0.5 - 2.0%	100-500	Moderately Well	Level	<0.01%	27	20	P	-	678872	5659866	11
SRWC16070	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	POT6	2	60	L	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	22	20	P	-	678913	5660040	11
SRWC16071	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	3	70	D	>2.0 - 5.0%	100-500	Imperfect	Inclined	<0.01%	32	15	P	-	678802	5660240	11
SRWC16072	Improved Pasture	2016	CA.BLC	GLLC(MF)	FSHcaco	FSH2	1	45	M	0.5 - 2.0%	50-100	Moderately Well	Inclined	<0.01%	15	20	F	-	678666	5660276	11
SRWC16073	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	2	90	L	0.5 - 2.0%	1-25	Imperfect	Inclined	<0.01%	19	12	P	-	678902	5660165	11
SRWC16074	Improved Pasture	2016	GLCA.BLC	GLLC(F)	FSHcagl	FSH2	2	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	21	24	F	-	678577	5660322	11
SRWC16075	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH2	1	40	L	0.5 - 2.0%	100-500	Imperfect	Inclined	<0.01%	17	38	P	-	678465	5660288	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRWC16076	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	2	40	M	0.5 - 2.0%	50-100	Well	Inclined	<0.01%	27	31	G	-	678869	5658873	11
SRWC16077	Improved Pasture	2016	O.BLC	GLLC(F)	FSHtk	DVFS2	3	350	L	>2.0 - 5.0%	100-500	Moderately Well	Inclined	<0.01%	55	15	F	-	678684	5658778	11
SRWC16078	Improved Pasture	2016	O.BLC	GLLC(MF)	FSHcotk	FSH1	6	80	M	>5 - 10%	50-100	Moderately Well	Inclined	<0.01%	40	20	F	-	678624	5658905	11
SRWC16079	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	FSH1	9	30	L	>5 - 10%	100-500	Imperfect	Inclined	<0.01%	26	41	F	-	678635	5659066	11
SRWC16080	Improved Pasture	2016	CA.BLC	GLLC(F)	FSHca	FSH1	9	80	M	>5 - 10%	50-100	Well	Inclined	<0.01%	16	42	F	-	678389	5658829	11
SRWC16081	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	ZDL	8	340	M	>5 - 10%	100-500	Well	Inclined	<0.01%	22	45	G	-	678518	5658789	11
SRWC16082	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH2	4	233	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	26	24	G	-	679064	5659504	11
SRWC16083	Improved Pasture	2016	O.HG	GLLC(F)	POT	POT7	2	158	D	0.5 - 2.0%	50-100	Poor	Inclined	<0.01%	30	15	P	-	679093	5659433	11
SRWC16084	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	3	350	M	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	27	31	F	-	679081	5659353	11
SRWC16085	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS1	3	30	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	30	32	F	-	678662	5659277	11
SRWC16086	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS1	3	11	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	31	31	F	-	678745	5659398	11
SRWC16087	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	FSH1	4	50	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	30	11	G	-	678784	5659481	11
SRWC16088	Improved Pasture	2016	O.HG	GLLC(F)	POT	POT7	6	10	D	>5 - 10%	50-100	Poor	Inclined	<0.01%	21	19	F	-	678894	5659488	11
SRWC16089	Improved Pasture	2016	O.HG	GLLC(F)	POT	FSH2	6	-	D	>5 - 10%	100-500	Poor	Inclined	<0.01%	29	41	P	-	678167	5658773	11
SRWC16090	Crop	2016	O.BLC	TILL(F)	DVGfi	DVFS2	1	270	L	0.5 - 2.0%	100-500	Well	Inclined	0.1 - 3%	25	45	G	-	679293	5658721	11
SRWC16091	Hayland	2016	O.BLC	TILL(F)	DVGfi	DVFS2	3	95	L	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	27	31	G	-	679273	5658613	11
SRWC16092	Hayland	2016	O.BLC	GLLC(F)	FSH	FSH2	4	18	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	25	42	G	-	679271	5658466	11
SRWC16093	Improved Pasture	2016	O.BLC	GLLC(F)	FSHst	ZDL	2	50	M	0.5 - 2.0%	100-500	Well	Inclined	0.01 - 0.1%	27	40	G	-	680250	5658299	11
SRWC16094	-	2016	O.BLC	GLLC(F)	FSH	FSH1	4	23	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	23	33	G	-	680239	5658336	11
SRWC16095	Hayland	2016	O.BLC	GLLC(F)	FSH	FSH1	1	21	M	0.5 - 2.0%	100-500	Well	Inclined	<0.01%	27	25	G	-	680208	5658438	11
SRWC16096	Hayland	2016	O.BLC	GLLC(F)	FSH	FSH2	3	7	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	27	26	G	-	680236	5658495	11
SRWC16097	Hayland	2016	O.HG	GLLC(F)	POT	POT2	1	340	D	0.5 - 2.0%	50-100	Poor	Undulating	<0.01%	20	42	G	-	680319	5658635	11
SRWC16098	Hayland	2016	GL.BLC	-	FSHgl	FSH2	1	109	L	0.5 - 2.0%	100-500	Imperfect	Undulating	<0.01%	19	25	G	-	680626	5658675	11
SRWC16099	Hayland	2016	O.BLC	GLLC(F)	FSH	FSH2	1	-	E	0.5 - 2.0%	100-500	Well	Level	<0.01%	29	22	G	-	680729	5658536	11
SRWC16100	Hayland	2016	O.HG	GLLC(F)	POT	POT1	1	276	L	0.5 - 2.0%	50-100	Poor	Undulating	<0.01%	18	21	F	-	680717	5658428	11
SRWC16101	Hayland	2016	O.BLC	GLLC(F)	FSH	FSH2	1	348	M	0.5 - 2.0%	25-50	Moderately Well	Undulating	<0.01%	29	41	P	-	680758	5658349	11
SRWC16102	Hayland	2016	O.HG	TILL(F)	POTzz	POT2	1	330	D	0.5 - 2.0%	1-25	Poor	Undulating	<0.01%	16	49	F	-	680759	5658229	11
SRWC16103	Hayland	2016	CA.BLC	GLLC(MF)	FSHcacotk	FSH1	1	36	M	0.5 - 2.0%	50-100	Well	Inclined	<0.01%	53	37	F	-	680645	5658093	11

Table C-16 Soil Site

Soil Site ID	Land Use	Year	Soil Classification	Parent Material	Soil Series	Map Unit	Slope Gradient (%)	Aspect	Site Slope Position Code	Slope Range	Slope Length (m)	Drainage	Surface Expression	Surface Stoniness	Topsoil Thickness	Subsoil Thickness	TS/SS Contrast	Seepage / Water Table Depth (cm)	Easting	Northing	UTM Zone
SRWC16104	Riparian	2016	O.BLC	GLLC(F)	FSHer	DVG1	65	184	M	>45 - 70%	25-50	Well	Steep	<0.01%	0	26	N/A	-	680573	5658015	11
SRWC16105	Riparian	2016	GL.R	FLUV(VC)\FLUV(VC)	TBRaaglxg	TBRgr2	1	-	E	0.5 - 2.0%	50-100	Imperfect	Level	<0.01%	0	0	N/A	-	680476	5657968	11
SRWC16106	Floodplain	2016	O.R	GLFL(VC)	TBRaagr	TBRgr1	1	-	E	0.5 - 2.0%	50-100	Rapid	Level	>50%	0	0	N/A	-	680235	5657817	11
SRWC16107	Woodland	2016	GL.R	FLUV(C)\FLUV(M)	TBRgl	TBRgr2	1	-	E	0.5 - 2.0%	50-100	Imperfect	Level	0.1 - 3%	0	0	N/A	-	680157	5657919	11
SRWC16108	Floodplain	2016	O.R	FLUV(VC)\FLUV(M)	TBRaa	TBSR1	1	-	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	0	0	N/A	-	680037	5657976	11
SRWC16109	Floodplain	2016	O.HG	FLUV(M)\FLUV(VC)\GLLC(F)	ZGWgryc	TBSR1	1	-	E	0.5 - 2.0%	50-100	Poor	Level	<0.01%	24	26	F	-	680163	5658076	11
SRWC16110	Riparian	2016	CA.BLC	GLLC(F)	FSHcaer	ZDL	22	222	M	>15 - 30%	25-50	Moderately Well	Steep	<0.01%	0	24	N/A	-	680203	5658105	11
SRWC16111	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	12	209	M	>10 - 15%	100-500	Well	Inclined	0.1 - 3%	16	29	G	-	680858	5659851	11
SRWC16112	Improved Pasture	2016	O.BLC	TILL(F)	DVGfitk	DVG1	11	220	L	>10 - 15%	50-100	Moderately Well	Inclined	0.1 - 3%	47	21	F	-	681059	5659820	11
SRWC16113		2016	O.BLC	TILL(MF)	DVG	DVG1	8	213	M	>5 - 10%	100-500	Well	Inclined	<0.01%	20	36	G	-	681252	5659698	11
SRWC16114	Improved Pasture	2016	O.BLC	TILL(F)	DVGfitk	DVG1	4	50	M	>2.0 - 5.0%	50-100	Well	Ridged	<0.01%	34	26	G	-	681015	5659258	11
SRWC16115	Improved Pasture	2016	O.HG	FLUV(MF)	ZGW	POT7	2	5	L	0.5 - 2.0%	50-100	Poor	Inclined	3 - 15%	20	30	F	-	680976	5659160	11
SRWC16116	Improved Pasture	2016	GL.BLC	GLLC(F)	FSHgl	DVFS2	1	-	E	0.5 - 2.0%	100-500	Imperfect	Level	<0.01%	27	32	F	-	681038	5659040	11
SRWC16117	Improved Pasture	2016	O.BLC	TILL(M)\GLLC(F)	DVGxc	DVFS1	3	192	M	>2.0 - 5.0%	50-100	Well	Inclined	<0.01%	26	28	F	-	681127	5658891	11
SRWC16118	Improved Pasture	2016	R.BLC	TILL(MF)	DVGzr	DVG1	39	89	M	>30 - 45%	25-50	Moderately Well	Steep	<0.01%	20	0	G	-	681233	5658930	11
SRWC16119	Improved Pasture	2016	CA.BLC	TILL(MF)	DVGcagr	TBR6	3	146	E	>2.0 - 5.0%	50-100	Moderately Well	Inclined	<0.01%	28	32	F	-	681369	5658930	11
SRWC16120	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS2	3	45	M	>2.0 - 5.0%	100-500	Well	Inclined	<0.01%	30	18	G	-	681457	5659006	11
SRWC16121	Improved Pasture	2016	O.BLC	TILL(F)	DVGfigr	DVG1	12	215	M	>10 - 15%	25-50	Well	Inclined	<0.01%	17	22	F	-	681509	5659069	11
SRWC16122	Improved Pasture	2016	O.BLC	GLLC(F)	FSH	DVFS1	14	199	M	>10 - 15%	100-500	Well	Inclined	<0.01%	26	47	G	-	681523	5659181	11
SRWC16123	Improved Pasture	2016	O.BLC	TILL(F)	DVGfitk	DVG1	18	210	M	>15 - 30%	50-100	Moderately Well	Inclined	<0.01%	47	23	F	-	681461	5659327	11
SRWC16124	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	13	200	L	>10 - 15%	50-100	Moderately Well	Inclined	<0.01%	28	32	G	-	681330	5659516	11
SRWC16125	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	1	-	E	0.5 - 2.0%	50-100	Well	Level	<0.01%	33	22	G	-	681158	5659394	11
SRWC16126	Improved Pasture	2016	CA.BLC	TILL(F)	DVGcafi	DVG1	-	-	-	-	-	Moderately Well	-	-	32	10	F	-	681139	5659302	11
SRWC16127	Improved Pasture	2016	GL.BLC	TILL(F)	DVGglfi	DVG1	1	-	E	0.5 - 2.0%	50-100	Imperfect	Inclined	<0.01%	24	46	F	-	680995	5659485	11
SRWC16128	Improved Pasture	2016	O.BLC	TILL(F)	DVGfi	DVG1	6	194	E	>5 - 10%	100-500	Moderately Well	Inclined	<0.01%	27	22	G	-	680864	5659603	11

Table C-16 Soil Site

KEY

Soil Classification

CA.BLC	Calcareous Black Chernozem
CU.HR	Cumulic Humic Regosol
CU.R	Cumulic Regosol
GL.BLC	Gleyed Black Chernozem
GL.HR	Gleyed Humic Regosol
GL.R	Gleyed Regosol
GLCA.BLC	Gleyed Calcareous Black Chernozem
GLCU.HR	Gleyed Cumulic Humic Regosol
GLCU.R	Gleyed Cumulic Regosol
GLR.BLC	Gleyed Regosolic Black Chernozem
O.BLC	Orthic black Chernozem
O.HG	Orthic Humic Gleysol
O.HR	Orthic Humic Regosol
O.R	Orthic Regosol
R.BLC	Regosolic Black Chernozem
R.HG	Regosolic Humic Gleysol
T.H	Terric Humisol
T.M	Terric Mesisol

Parent Material

ANTH	Anthropogenic
FLUV	Fluvial
GLFL	Glaciofluvial
GLLC	Glaciolacustrine
LACU	Lacustrine
ORG	Organic
TILL	Morainal

Parent Material Texture

C	coarse (LS, LfS)
F	fine (SC, SiC, C)
M	medium (vfSL, L, SiL)
MC	moderately coarse (SL, fSL)
MF	moderately fine (SCL, CL, SiCL, Si)
VC	very coarse (S)
VF	very fine (HC)

TS/SS Contrast

F	fair
G	good
P	poor

Soil Series

CRW	Caraway
DRW	Drywood
DVG	Dunvargan
FSH	Fish Creek
MTB	Mesa Butte
POT	Pothole Creek
SRC	Sarcee
TBR	Twin Bridges
ZCO	Miscellaneous Coarse Soil Unit
ZDL	Disturbed Soil Unit
ZGW	Undifferentiated Gleysolic Soil Unit
ZOR	Undifferentiated Organic Soil Unit

Slope Position Code

C	crest
D	depression
E	level
L	lower slope
M	mid slope
T	toe
U	upper slope

Soil Series Modifiers

ca	calcareous - soil with primary alkaline earth carbonates in the B horizon
co	coarse - greater than 10% coarse fragments or one textural group coarser than modal
er	eroded - B horizon has been cultivated
fi	fine - one textural group finer than modal
gl	gleyed - poor drainage and periodic reduction
gr	gravelly - 20-50% coarse fragments (>2 mm - 7.5 cm) by volume
pt	peaty - an organic horizon (>17% organic carbon) which is >10 cm thick
sa	saline
st	stony (20-50% coarse fragments (>25 cm diameter) by volume
tk	thick A horizon
xc	clay at 30-99 cm
xg	gravel at 30-99 cm
xs	sand at 30-99 cm
xt	till at 30-99 cm
yc	clay at 100-200 cm
zr	regosolic
zz	atypical subgroup

C.4 LAB SUMMARY TABLE

Table C-17 Lab Summary

Sample ID	Sampling Date (DD/MM/YYYY)	Maxxam ID	Soluble Parameters									Soil Properties	Inorganics	Physical Properties			
			Soluble Conductivity	Soluble ($CaCl_2$) pH	Sodium Adsorption Ratio	Soluble Calcium (Ca)	Soluble Magnesium (Mg)	Soluble Sodium (Na)	Soluble Potassium (K)	Saturation %	Theoretical Gypsum Requirement	Calcium Carbonate Equivalent	Total Organic Carbon	% sand by hydrometer	% silt by hydrometer	Clay Content	Texture
		UNITS	dS/m	pH	N/A	mg/L	mg/L	mg/L	mg/L	%	tonnes/ha	%	%	%	%	%	N/A
		RDL	0.020	-	0.10	1.5	1.0	2.5	1.3	-	0.20	0.60	0.050	2.0	2.0	2.0	-
SRBL16003-AHK	9/22/2016	PT6986	0.82	7.47	0.27	110	45	13	8.5	110	<0.20	24	9.8	29	55	16	SILT LOAM
SRBL16003-AHK Lab-Dup	9/22/2016	PT6986	-	-	-	-	-	-	-	-	-	23	9.5	-	-	-	-
SRBL16003-CK	9/22/2016	PT6987	0.43	7.62	0.58	98	14	23	3.9	55	<0.20	34	-	24	51	25	SILT LOAM
SRBL16003-CK Lab-Dup	9/22/2016	PT6987	0.43	N/A	N/A	93	13	24	3.6	54	-	-	-	23	51	25	-
SRBL16003-CKGJ	9/22/2016	PT6988	0.42	7.64	0.77	62	11	25	<1.3	42	<0.20	36	-	23	57	20	SILT LOAM
SRBL16019-AP	9/24/2016	PT6989	0.26	7.07	0.32	39	11	8.7	2.2	67	<0.20	1.9	7.2	24	38	38	CLAY LOAM
SRBL16019-BM	9/24/2016	PT6990	0.25	6.57	0.49	32	10	12	4.9	55	<0.20	0.76	-	12	29	60	CLAY
SRBL16019-CK	9/24/2016	PT6991	0.30	7.72	0.51	61	12	16	4.9	77	<0.20	30	-	<2.0	20	79	HEAVY CLAY
SRBL16019-CK Lab-Dup	9/24/2016	PT6991	-	7.66	-	-	-	-	-	-	-	-	-	-	-	-	-
SRKF16002-AP	7/13/2016	PT6992	0.28	5.97	0.75	18	20	19	6.7	130	<0.20	1.7	10	23	41	36	CLAY LOAM
SRKF16002-BGJ	7/13/2016	PT6993	0.43	7.75	1.5	25	30	48	5.4	67	<0.20	4.0	-	4.0	17	79	HEAVY CLAY
SRKF16002-CKGJ	7/13/2016	PT6994	0.77	8.00	6.7	15	10	140	2.6	77	0.37	21	-	<2.0	17	83	HEAVY CLAY
SRKF16013-AP	7/14/2016	PT6995	0.49	7.05	1.7	35	19	51	31	100	<0.20	1.8	7.6	49	31	20	LOAM
SRKF16013-CK	7/14/2016	PT7071	0.70	7.79	2.6	49	18	83	6.4	60	<0.20	23	-	12	29	59	CLAY
SRKF16080-AP	7/19/2016	PT7072	0.48	6.59	0.39	25	21	11	89	83	<0.20	1.4	6.6	34	34	32	CLAY LOAM
SRKF16080-BMK	7/19/2016	PT7073	0.69	7.93	1.4	42	40	52	7.6	65	<0.20	23	-	3.9	24	72	HEAVY CLAY
SRKF16080-CK	7/19/2016	PT7074	1.3	8.11	3.9	44	60	170	7.4	66	<0.20	23	-	7.2	22	71	HEAVY CLAY
SRKF16097-AH	7/20/2016	PT7075	0.47	7.04	0.17	77	9.6	5.9	7.2	77	<0.20	4.0	3.5	69	25	5.4	SANDY LOAM

Table C-17 Lab Summary

Sample ID	Sampling Date (DD/MM/YYYY)	Maxxam ID	Soluble Parameters									Soil Properties	Inorganics	Physical Properties			
			Soluble Conductivity	Soluble ($CaCl_2$) pH	Sodium Adsorption Ratio	Soluble Calcium (Ca)	Soluble Magnesium (Mg)	Soluble Sodium (Na)	Soluble Potassium (K)	Saturation %	Theoretical Gypsum Requirement	Calcium Carbonate Equivalent	Total Organic Carbon	% sand by hydrometer	% silt by hydrometer	Clay Content	Texture
SRKF16097-CK	7/20/2016	PT7076	0.50	7.29	0.14	86	9.9	5.2	8.1	69	<0.20	14	-	67	26	6.9	SANDY LOAM
SRKF16098-AHKGJ	7/20/2016	PT7077	1.1	7.27	0.64	190	22	35	<1.3	180	<0.20	22	16	38	46	16	LOAM
SRKF16098-CSKG	7/20/2016	PT7078	2.5	7.52	0.15	560	88	15	1.5	53	<0.20	29	-	41	41	18	LOAM
SRKF16098-LFH	7/20/2016	PT7079	1.2	7.48	0.28	220	29	17	18	180	<0.20	-	14	-	-	-	-
SRKF16107-CKG	7/21/2016	PT7080	1.3	7.30	0.55	250	27	35	<1.3	73	<0.20	34	-	17	58	26	SILT LOAM
SRKF16107-OM	7/21/2016	PT7132	0.71	6.90	0.37	85	27	15	24	94	<0.20	-	7.5	-	-	-	-
SRKF16118-APKS	7/21/2016	PT7133	2.7	6.28	0.20	570	73	19	11	260	<0.20	25	17	19	61	20	SILT LOAM
SRKF16118-BG	7/21/2016	PT7134	0.35	6.78	0.45	42	15	13	11	70	<0.20	1.0	-	7.6	19	73	HEAVY CLAY
SRKF16118-BGK Lab-Dup	-	PT7134	-	-	-	-	-	-	-	-	-	1.1	-	-	-	-	-
SRKF16118-CKG	7/21/2016	PT7135	0.27	7.48	0.55	38	8.9	15	9.4	69	<0.20	16	-	5.6	21	74	HEAVY CLAY
SRKF16140-AHK	9/24/2016	QE1984	0.68	7.34	0.14	130	18	6.4	8.6	69	<0.20	-	4.6	25	60	15	SILT LOAM
SRKF16140-AHK Lab-Dup	9/24/2016	QE1984	N/A	7.36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	-	26	59	15	N/A
SRKF16140-CK1	9/24/2016	QE1986	0.45	7.54	0.17	94	13	6.8	4.3	55	<0.20	28	-	25	65	9.7	SILT LOAM
SRKF16140-AHKB	9/24/2016	QE1985	0.57	7.44	0.18	120	15	8.0	5.3	62	<0.20	-	4.3	22	66	12	SILT LOAM
SRKF16140-CK2	9/24/2016	QE1987	0.37	7.79	0.21	67	8.2	6.9	3.2	40	<0.20	36	-	69	26	5.5	SANDY LOAM
SRWC16007-CK1	7/12/2016	PT7136	0.73	7.47	<0.10	140	19	3.9	8.1	47	<0.20	29	-	45	50	5.6	SANDY LOAM
SRWC16007-CK1 Lab-Dup	7/12/2016	PT7136	0.71	N/A	N/A	130	19	5.5	8.2	46	-	-	-	43	51	5.8	-
SRWC16007-CK2	7/12/2016	PT7137	0.73	7.58	0.15	110	26	6.5	4.9	50	<0.20	38	-	78	19	2.9	LOAMY SAND
SRWC16007-CK2 Lab-Dup	7/12/2016	PT7137	-	7.49	-	-	-	-	-	-	-	-	-	-	-	-	-
SRWC16007-LFH	7/12/2016	PT7138	0.93	7.22	<0.10	160	29	4.4	12	150	<0.20	-	16	-	-	-	-
SRWC16013-AHK	7/14/2016	PT7139	1.9	7.19	0.46	260	78	33	19	140	<0.20	53	11	39	41	21	LOAM
SRWC16013-CGK	7/14/2016	PT7140	0.91	7.54	0.66	110	27	29	13	67	<0.20	22	-	19	22	59	CLAY
SRWC16020-AP	7/14/2016	PT7141	0.33	7.24	0.32	51	11	9.5	6.5	110	<0.20	4.2	7.3	39	41	19	LOAM

Table C-17 Lab Summary

Sample ID	Sampling Date (DD/MM/YYYY)	Maxxam ID	Soluble Parameters									Soil Properties	Inorganics	Physical Properties			
			Soluble Conductivity	Soluble ($CaCl_2$) pH	Sodium Adsorption Ratio	Soluble Calcium (Ca)	Soluble Magnesium (Mg)	Soluble Sodium (Na)	Soluble Potassium (K)	Saturation %	Theoretical Gypsum Requirement	Calcium Carbonate Equivalent	Total Organic Carbon	% sand by hydrometer	% silt by hydrometer	Clay Content	Texture
SRWC16020-CK	7/14/2016	PT7180	2.2	7.88	1.8	210	130	140	3.4	65	<0.20	33	-	4.3	35	61	HEAVY CLAY
SRWC16022-AP	7/14/2016	PT7181	0.28	5.68	0.33	31	13	8.7	14	99	<0.20	1.2	5.8	20	48	33	SLTY CL LO
SRWC16022-BM	7/14/2016	PT7182	0.27	7.23	0.88	27	15	23	5.0	62	<0.20	3.5	-	10	27	62	HEAVY CLAY
SRWC16022-CK	7/14/2016	PT7183	1.2	7.82	2.4	73	54	110	4.1	78	<0.20	29	-	<2.0	27	72	HEAVY CLAY
SRWC16026-AP	7/15/2016	PT7184	0.12	5.64	0.62	13	2.3	9.3	<1.3	73	<0.20	0.70	3.7	28	42	30	CLAY LOAM
SRWC16026-BMGJ	7/15/2016	PT7185	0.77	6.09	0.75	55	45	31	5.6	59	<0.20	0.91	-	5.7	26	68	HEAVY CLAY
SRWC16026-CK	7/15/2016	PT7186	1.5	7.78	0.97	150	100	62	5.0	76	<0.20	18	-	4.9	14	81	HEAVY CLAY
SRWC16033-AP	7/16/2016	PT7187	0.38	5.78	0.43	30	9.9	11	14	85	<0.20	1.6	12	47	37	17	LOAM
SRWC16033-BM	7/16/2016	PT7188	0.30	5.99	0.49	29	10	12	3.8	56	<0.20	0.82	-	14	30	56	CLAY
SRWC16033-CK	7/16/2016	PT7189	0.32	7.75	0.42	66	14	14	4.0	66	<0.20	32	-	4.6	29	67	HEAVY CLAY
SRWC16080-APK	7/19/2016	PT7220	0.99	7.22	0.45	120	17	20	92	99	<0.20	3.0	7.2	39	30	31	CLAY LOAM
SRWC16080-BMK	7/19/2016	PT7221	0.43	7.24	0.45	69	14	16	15	72	<0.20	4.0	-	10	30	60	HEAVY CLAY
SRWC16080-CK	7/19/2016	PT7222	0.37	7.58	0.26	78	11	9.3	6.3	74	<0.20	26	-	3.7	19	77	HEAVY CLAY
SRWC16097-AP	7/20/2016	PT7223	0.53	6.86	0.52	64	22	19	17	91	<0.20	1.4	6.5	19	33	48	CLAY
SRWC16097-AP Lab-Dup	-	PT7223	-	-	-	-	-	-	-	-	-	1.4	-	-	-	-	-
SRWC16097-BGK	7/20/2016	PT7224	0.32	7.58	0.54	52	13	17	7.1	66	<0.20	18	-	3.7	22	74	HEAVY CLAY
SRWC16097-CK	7/20/2016	PT7225	0.36	7.81	0.81	34	14	22	4.7	74	<0.20	18	-	8.7	20	71	HEAVY CLAY

C.5 MAXXAM ANALYTICS COC DOCUMENTS

Your Project #: 110773396.301.600.208.5
Site#: 110773396-SR1
Site Location: WEST OF CALGARY

Attention:BRET LEOPPKY

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2016/10/28
Report #: R2291185
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B690828
Received: 2016/10/14, 12:46

Sample Matrix: Soil
Samples Received: 46

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Calcium Carbonate Equivalent (1)	43	N/A	2016/10/21	AB SOP-00019	Carter 2nd ed 20.2 m
Conductivity @25C (Soluble) (1)	2	2016/10/18	2016/10/18	AB SOP-00033 / AB SOP-00004	SM 22 2510 B m
Conductivity @25C (Soluble) (1)	44	2016/10/20	2016/10/20	AB SOP-00033 / AB SOP-00004	SM 22 2510 B m
pH @25C (1:2 Calcium Chloride Extract) (1)	46	2016/10/19	2016/10/19	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Sodium Adsorption Ratio (1)	2	N/A	2016/10/19	AB WI-00065	Auto Calc
Sodium Adsorption Ratio (1)	20	N/A	2016/10/20	AB WI-00065	Auto Calc
Sodium Adsorption Ratio (1)	24	N/A	2016/10/21	AB WI-00065	Auto Calc
Soluble Ions (1)	2	2016/10/18	2016/10/19	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Ions (1)	20	2016/10/19	2016/10/20	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Ions (1)	24	2016/10/20	2016/10/20	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste (1)	2	2016/10/18	2016/10/18	AB SOP-00033	Carter 2nd ed 15.2m
Soluble Paste (1)	40	2016/10/19	2016/10/20	AB SOP-00033	Carter 2nd ed 15.2m
Soluble Paste (1)	4	2016/10/20	2016/10/20	AB SOP-00033	Carter 2nd ed 15.2m
Texture by Hydrometer (1)	23	N/A	2016/10/19	AB SOP-00030	Carter 2nd ed 55.3 m
Texture by Hydrometer (1)	20	N/A	2016/10/20	AB SOP-00030	Carter 2nd ed 55.3 m
Texture Class (1)	3	N/A	2016/10/19	AB SOP-00030	Auto Calc
Texture Class (1)	20	N/A	2016/10/20	AB SOP-00030	Auto Calc
Texture Class (1)	20	N/A	2016/10/21	AB SOP-00030	Auto Calc
Theoretical Gypsum Requirement (1, 2)	2	N/A	2016/10/19	AB WI-00065	Auto Calc
Theoretical Gypsum Requirement (1, 2)	20	N/A	2016/10/20	AB WI-00065	Auto Calc
Theoretical Gypsum Requirement (1, 2)	24	N/A	2016/10/21	AB WI-00065	Auto Calc

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

(1) This test was performed by Maxxam Edmonton Environmental
(2) TGR calculation is based on a theoretical SAR of 4. Salt Contamination and Assessment and remediation guideline 2001 recommended SAR is ranging 4-8. TGR is reported in tonnes/ha.

Your Project #: 110773396.301.600.208.5
Site#: 110773396-SR1
Site Location: WEST OF CALGARY

Attention:BRET LEOPPKY

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10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2016/10/28
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Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B690828
Received: 2016/10/14, 12:46

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Wendy Sears, Project manager
Email: WSears@maxxam.ca
Phone# (403)735-2277
==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B690828
Report Date: 2016/10/28

STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

SOIL SALINITY 3 (SOIL)

Maxxam ID		PT6986		PT6987	PT6987		
Sampling Date		2016/09/22		2016/09/22	2016/09/22		
	UNITS	SRBL16003-AHK	QC Batch	SRBL16003-CK	SRBL16003-CK Lab-Dup	RDL	QC Batch
Soluble Parameters							
Soluble Conductivity	dS/m	0.82	8439579	0.43	0.43	0.020	8439579
Soluble (CaCl2) pH	pH	7.47	8438127	7.62	N/A	N/A	8438104
Sodium Adsorption Ratio	N/A	0.27	8433949	0.58	N/A	0.10	8433949
Soluble Calcium (Ca)	mg/L	110	8440389	98	93	1.5	8440389
Soluble Magnesium (Mg)	mg/L	45	8440389	14	13	1.0	8440389
Soluble Sodium (Na)	mg/L	13	8440389	23	24	2.5	8440389
Soluble Potassium (K)	mg/L	8.5	8440389	3.9	3.6	1.3	8440389
Saturation %	%	110	8438966	55	54	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434088	<0.20	N/A	0.20	8434088

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		PT6988	PT6989		PT6990	PT6991		
Sampling Date		2016/09/22	2016/09/24		2016/09/24	2016/09/24		
	UNITS	SRBL16003-CKGJ	SRBL16019-AP	QC Batch	SRBL16019-BM	SRBL16019-CK	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	0.42	0.26	8440628	0.25	0.30	0.020	8439579
Soluble (CaCl2) pH	pH	7.64	7.07	8438127	6.57	7.72	N/A	8438127
Sodium Adsorption Ratio	N/A	0.77	0.32	8433949	0.49	0.51	0.10	8433949
Soluble Calcium (Ca)	mg/L	62	39	8441210	32	61	1.5	8440389
Soluble Magnesium (Mg)	mg/L	11	11	8441210	10	12	1.0	8440389
Soluble Sodium (Na)	mg/L	25	8.7	8441210	12	16	2.5	8440389
Soluble Potassium (K)	mg/L	<1.3	2.2	8441210	4.9	4.9	1.3	8440389
Saturation %	%	42	67	8440065	55	77	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	<0.20	8434088	<0.20	<0.20	0.20	8434088

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Maxxam Job #: B690828
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STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

SOIL SALINITY 3 (SOIL)

Maxxam ID		PT6991	PT6992		PT6993		
Sampling Date		2016/09/24	2016/07/13		2016/07/13		
	UNITS	SRBL16019-CK Lab-Dup	SRKF16002-AP	QC Batch	SRKF16002-BGJ	RDL	QC Batch
Soluble Parameters							
Soluble Conductivity	dS/m	N/A	0.28	8439579	0.43	0.020	8440628
Soluble (CaCl2) pH	pH	7.66	5.97	8438127	7.75	N/A	8438127
Sodium Adsorption Ratio	N/A	N/A	0.75	8433949	1.5	0.10	8433949
Soluble Calcium (Ca)	mg/L	N/A	18	8440389	25	1.5	8441210
Soluble Magnesium (Mg)	mg/L	N/A	20	8440389	30	1.0	8441210
Soluble Sodium (Na)	mg/L	N/A	19	8440389	48	2.5	8441210
Soluble Potassium (K)	mg/L	N/A	6.7	8440389	5.4	1.3	8441210
Saturation %	%	N/A	130	8438966	67	N/A	8440065
Theoretical Gypsum Requirement	tonnes/ha	N/A	<0.20	8434088	<0.20	0.20	8434088

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		PT6994		PT6995		PT7071	PT7072		
Sampling Date		2016/07/13		2016/07/14		2016/07/14	2016/07/19		
	UNITS	SRKF16002-CKGJ	QC Batch	SRKF16013-AP	QC Batch	SRKF16013-CK	SRKF16080-AP	RDL	QC Batch
Soluble Parameters									
Soluble Conductivity	dS/m	0.77	8439579	0.49	8439579	0.70	0.48	0.020	8439579
Soluble (CaCl2) pH	pH	8.00	8438104	7.05	8438127	7.79	6.59	N/A	8438104
Sodium Adsorption Ratio	N/A	6.7	8433949	1.7	8433949	2.6	0.39	0.10	8433949
Soluble Calcium (Ca)	mg/L	15	8440389	35	8440389	49	25	1.5	8440389
Soluble Magnesium (Mg)	mg/L	10	8440389	19	8440389	18	21	1.0	8440389
Soluble Sodium (Na)	mg/L	140	8440389	51	8440389	83	11	2.5	8440389
Soluble Potassium (K)	mg/L	2.6	8440389	31	8440389	6.4	89	1.3	8440389
Saturation %	%	77	8438966	100	8438966	60	83	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	0.37	8434088	<0.20	8434088	<0.20	<0.20	0.20	8434088

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Maxxam Job #: B690828
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STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

SOIL SALINITY 3 (SOIL)

Maxxam ID		PT7073		PT7074		PT7075	PT7076		
Sampling Date		2016/07/19		2016/07/19		2016/07/20	2016/07/20		
	UNITS	SRKF16080-BMK	QC Batch	SRKF16080-CK	QC Batch	SRKF16097-AH	SRKF16097-CK	RDL	QC Batch
Soluble Parameters									
Soluble Conductivity	dS/m	0.69	8439579	1.3	8439579	0.47	0.50	0.020	8439579
Soluble (CaCl2) pH	pH	7.93	8438127	8.11	8438104	7.04	7.29	N/A	8438127
Sodium Adsorption Ratio	N/A	1.4	8433949	3.9	8433949	0.17	0.14	0.10	8433949
Soluble Calcium (Ca)	mg/L	42	8440389	44	8440389	77	86	1.5	8440389
Soluble Magnesium (Mg)	mg/L	40	8440389	60	8440389	9.6	9.9	1.0	8440389
Soluble Sodium (Na)	mg/L	52	8440389	170	8440389	5.9	5.2	2.5	8440389
Soluble Potassium (K)	mg/L	7.6	8440389	7.4	8440389	7.2	8.1	1.3	8440389
Saturation %	%	65	8438966	66	8438966	77	69	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434088	<0.20	8434088	<0.20	<0.20	0.20	8434088

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7077		PT7078		PT7079		
Sampling Date		2016/07/20		2016/07/20		2016/07/20		
	UNITS	SRKF16098-AHKGJ	QC Batch	SRKF16098-CKG	QC Batch	SRKF16098-LFH	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	1.1	8440628	2.5	8439504	1.2	0.020	8439579
Soluble (CaCl2) pH	pH	7.27	8438104	7.52	8438104	7.48	N/A	8438114
Sodium Adsorption Ratio	N/A	0.64	8433949	0.15	8433949	0.28	0.10	8433949
Soluble Calcium (Ca)	mg/L	190	8441210	560	8440591	220	1.5	8440389
Soluble Magnesium (Mg)	mg/L	22	8441210	88	8440591	29	1.0	8440389
Soluble Sodium (Na)	mg/L	35	8441210	15	8440591	17	2.5	8440389
Soluble Potassium (K)	mg/L	<1.3	8441210	1.5	8440591	18	1.3	8440389
Saturation %	%	180	8440065	53	8438899	180	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	8434089	<0.20	0.20	8434089

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Maxxam Job #: B690828
Report Date: 2016/10/28

STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

SOIL SALINITY 3 (SOIL)

Maxxam ID		PT7080		PT7132		PT7133		
Sampling Date		2016/07/21		2016/07/21		2016/07/21		
	UNITS	SRKF16107-CKG	QC Batch	SRKF16107-OM	QC Batch	SRKF16118-APK	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	1.3	8439504	0.71	8439579	2.7	0.020	8439579
Soluble (CaCl2) pH	pH	7.30	8438114	6.90	8438106	6.28	N/A	8438114
Sodium Adsorption Ratio	N/A	0.55	8433949	0.37	8433949	0.20	0.10	8433949
Soluble Calcium (Ca)	mg/L	250	8440591	85	8440389	570	1.5	8440389
Soluble Magnesium (Mg)	mg/L	27	8440591	27	8440389	73	1.0	8440389
Soluble Sodium (Na)	mg/L	35	8440591	15	8440389	19	2.5	8440389
Soluble Potassium (K)	mg/L	<1.3	8440591	24	8440389	11	1.3	8440389
Saturation %	%	73	8438899	94	8438966	260	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	8434089	<0.20	0.20	8434089

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Maxxam ID		PT7134		PT7135	PT7136	PT7136		
Sampling Date		2016/07/21		2016/07/21	2016/07/12	2016/07/12		
	UNITS	SRKF16118-BGK	QC Batch	SRKF16118-CKG	SRWC16007-CK1	SRWC16007-CK1 Lab-Dup	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	0.35	8439504	0.27	0.73	0.71	0.020	8439504
Soluble (CaCl2) pH	pH	6.78	8438106	7.48	7.47	N/A	N/A	8438104
Sodium Adsorption Ratio	N/A	0.45	8433949	0.55	<0.10	N/A	0.10	8433949
Soluble Calcium (Ca)	mg/L	42	8440591	38	140	130	1.5	8440591
Soluble Magnesium (Mg)	mg/L	15	8440591	8.9	19	19	1.0	8440591
Soluble Sodium (Na)	mg/L	13	8440591	15	3.9	5.5	2.5	8440591
Soluble Potassium (K)	mg/L	11	8440591	9.4	8.1	8.2	1.3	8440591
Saturation %	%	70	8438899	69	47	46	N/A	8438899
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	<0.20	N/A	0.20	8434089

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Maxxam Job #: B690828
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STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

SOIL SALINITY 3 (SOIL)

Maxxam ID		PT7137		PT7137		PT7138		
Sampling Date		2016/07/12		2016/07/12		2016/07/12		
	UNITS	SRWC16007-CK2	RDL	SRWC16007-CK2 Lab-Dup	QC Batch	SRWC16007-LFH	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	0.73	0.020	N/A	8439504	0.93	0.020	8439579
Soluble (CaCl2) pH	pH	7.58	N/A	7.49	8438104	7.22	N/A	8438114
Sodium Adsorption Ratio	N/A	0.15	0.10	N/A	8433949	<0.10	0.10	8434085
Soluble Calcium (Ca)	mg/L	110	1.5	N/A	8440591	160	1.5	8440389
Soluble Magnesium (Mg)	mg/L	26	1.0	N/A	8440591	29	1.0	8440389
Soluble Sodium (Na)	mg/L	6.5	2.5	N/A	8440591	4.4	2.5	8440389
Soluble Potassium (K)	mg/L	4.9	1.3	N/A	8440591	12	1.3	8440389
Saturation %	%	50	N/A	N/A	8438899	150	N/A	8438966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	N/A	8434089	<0.20	0.20	8434089

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Maxxam ID		PT7139		PT7140		PT7141		
Sampling Date		2016/07/14		2016/07/14		2016/07/14		
	UNITS	SRWC16013-AHK	QC Batch	SRWC16013-CGK	QC Batch	SRWC16020-AP	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	1.9	8439579	0.91	8439504	0.33	0.020	8439504
Soluble (CaCl2) pH	pH	7.19	8438114	7.54	8438114	7.24	N/A	8438106
Sodium Adsorption Ratio	N/A	0.46	8434085	0.66	8434085	0.32	0.10	8434085
Soluble Calcium (Ca)	mg/L	260	8440389	110	8440591	51	1.5	8440591
Soluble Magnesium (Mg)	mg/L	78	8440389	27	8440591	11	1.0	8440591
Soluble Sodium (Na)	mg/L	33	8440389	29	8440591	9.5	2.5	8440591
Soluble Potassium (K)	mg/L	19	8440389	13	8440591	6.5	1.3	8440591
Saturation %	%	140	8438966	67	8438899	110	N/A	8438899
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	8434089	<0.20	0.20	8434089

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SOIL SALINITY 3 (SOIL)

Maxxam ID		PT7180		PT7181		PT7182		
Sampling Date		2016/07/14		2016/07/14		2016/07/14		
	UNITS	SRWC16020-CK	QC Batch	SRWC16022-AP	QC Batch	SRWC16022-BM	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	2.2	8439504	0.28	8439579	0.27	0.020	8439504
Soluble (CaCl2) pH	pH	7.88	8438129	5.68	8438114	7.23	N/A	8438114
Sodium Adsorption Ratio	N/A	1.8	8434085	0.33	8434085	0.88	0.10	8434085
Soluble Calcium (Ca)	mg/L	210	8440591	31	8440389	27	1.5	8440591
Soluble Magnesium (Mg)	mg/L	130	8440591	13	8440389	15	1.0	8440591
Soluble Sodium (Na)	mg/L	140	8440591	8.7	8440389	23	2.5	8440591
Soluble Potassium (K)	mg/L	3.4	8440591	14	8440389	5.0	1.3	8440591
Saturation %	%	65	8438899	99	8438966	62	N/A	8438899
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	8434089	<0.20	0.20	8434089

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7183		PT7184		PT7185		
Sampling Date		2016/07/14		2016/07/15		2016/07/15		
	UNITS	SRWC16022-CK	QC Batch	SRWC16026-AP	QC Batch	SRWC16026-BMGJ	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	1.2	8439579	0.12	8437331	0.77	0.020	8439504
Soluble (CaCl2) pH	pH	7.82	8438106	5.64	8438133	6.09	N/A	8438125
Sodium Adsorption Ratio	N/A	2.4	8434085	0.62	8434085	0.75	0.10	8434085
Soluble Calcium (Ca)	mg/L	73	8440389	13	8438508	55	1.5	8440591
Soluble Magnesium (Mg)	mg/L	54	8440389	2.3	8438508	45	1.0	8440591
Soluble Sodium (Na)	mg/L	110	8440389	9.3	8438508	31	2.5	8440591
Soluble Potassium (K)	mg/L	4.1	8440389	<1.3	8438508	5.6	1.3	8440591
Saturation %	%	78	8438966	73	8435732	59	N/A	8438899
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	8434089	<0.20	0.20	8434089

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Maxxam Job #: B690828
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STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

SOIL SALINITY 3 (SOIL)

Maxxam ID		PT7186		PT7187	PT7188	PT7189		
Sampling Date		2016/07/15		2016/07/16	2016/07/16	2016/07/16		
	UNITS	SRWC16026-CK	QC Batch	SRWC16033-AP	SRWC16033-BM	SRWC16033-CK	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	1.5	8439504	0.38	0.30	0.32	0.020	8439504
Soluble (CaCl2) pH	pH	7.78	8438129	5.78	5.99	7.75	N/A	8438125
Sodium Adsorption Ratio	N/A	0.97	8434085	0.43	0.49	0.42	0.10	8434085
Soluble Calcium (Ca)	mg/L	150	8440591	30	29	66	1.5	8440591
Soluble Magnesium (Mg)	mg/L	100	8440591	9.9	10	14	1.0	8440591
Soluble Sodium (Na)	mg/L	62	8440591	11	12	14	2.5	8440591
Soluble Potassium (K)	mg/L	5.0	8440591	14	3.8	4.0	1.3	8440591
Saturation %	%	76	8438899	85	56	66	N/A	8438899
Theoretical Gypsum Requirement	tonnes/ha	<0.20	8434089	<0.20	<0.20	<0.20	0.20	8434089

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7220	PT7221	PT7222		PT7223		
Sampling Date		2016/07/19	2016/07/19	2016/07/19		2016/07/20		
	UNITS	SRWC16080-APK	SRWC16080-BMK	SRWC16080-CK	QC Batch	SRWC16097-AP	RDL	QC Batch
Soluble Parameters								
Soluble Conductivity	dS/m	0.99	0.43	0.37	8439504	0.53	0.020	8437331
Soluble (CaCl2) pH	pH	7.22	7.24	7.58	8438133	6.86	N/A	8438133
Sodium Adsorption Ratio	N/A	0.45	0.45	0.26	8434085	0.52	0.10	8434085
Soluble Calcium (Ca)	mg/L	120	69	78	8440591	64	1.5	8438508
Soluble Magnesium (Mg)	mg/L	17	14	11	8440591	22	1.0	8438508
Soluble Sodium (Na)	mg/L	20	16	9.3	8440591	19	2.5	8438508
Soluble Potassium (K)	mg/L	92	15	6.3	8440591	17	1.3	8438508
Saturation %	%	99	72	74	8438899	91	N/A	8435732
Theoretical Gypsum Requirement	tonnes/ha	<0.20	<0.20	<0.20	8434089	<0.20	0.20	8434089

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SOIL SALINITY 3 (SOIL)

Maxxam ID		PT7224	PT7225		
Sampling Date		2016/07/20	2016/07/20		
	UNITS	SRWC16097-BG	SRWC16097-CK	RDL	QC Batch
Soluble Parameters					
Soluble Conductivity	dS/m	0.32	0.36	0.020	8439504
Soluble (CaCl2) pH	pH	7.58	7.81	N/A	8438125
Sodium Adsorption Ratio	N/A	0.54	0.81	0.10	8434085
Soluble Calcium (Ca)	mg/L	52	34	1.5	8440591
Soluble Magnesium (Mg)	mg/L	13	14	1.0	8440591
Soluble Sodium (Na)	mg/L	17	22	2.5	8440591
Soluble Potassium (K)	mg/L	7.1	4.7	1.3	8440591
Saturation %	%	66	74	N/A	8438899
Theoretical Gypsum Requirement	tonnes/ha	<0.20	<0.20	0.20	8434089

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RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		PT6986	PT6986	PT6987	PT6987	PT6988		
Sampling Date		2016/09/22	2016/09/22	2016/09/22	2016/09/22	2016/09/22		
	UNITS	SRBL16003-AHK	SRBL16003-AHK Lab-Dup	SRBL16003-CK	SRBL16003-CK Lab-Dup	SRBL16003-CKGJ	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	24	23	34	N/A	36	0.60	8440286
Physical Properties								
% sand by hydrometer	%	29	N/A	24	23	23	2.0	8440387
% silt by hydrometer	%	55	N/A	51	51	57	2.0	8440387
Clay Content	%	16	N/A	25	25	20	2.0	8440387
Texture	N/A	SILT LOAM	N/A	SILT LOAM	N/A	SILT LOAM	N/A	8434086

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		PT6989	PT6990	PT6991	PT6992	PT6993		
Sampling Date		2016/09/24	2016/09/24	2016/09/24	2016/07/13	2016/07/13		
	UNITS	SRBL16019-AP	SRBL16019-BM	SRBL16019-CK	SRKF16002-AP	SRKF16002-BGJ	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	1.9	0.76	30	1.7	4.0	0.60	8440286
Physical Properties								
% sand by hydrometer	%	24	12	<2.0	23	4.0	2.0	8440387
% silt by hydrometer	%	38	29	20	41	17	2.0	8440387
Clay Content	%	38	60	79	36	79	2.0	8440387
Texture	N/A	CLAY LOAM	CLAY	HEAVY CLAY	CLAY LOAM	HEAVY CLAY	N/A	8434086

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT6994		PT6995		PT7071		
Sampling Date		2016/07/13		2016/07/14		2016/07/14		
	UNITS	SRKF16002-CKGJ	QC Batch	SRKF16013-AP	QC Batch	SRKF16013-CK	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	21	8440286	1.8	8440286	23	0.60	8440286
Physical Properties								
% sand by hydrometer	%	<2.0	8440387	49	8438301	12	2.0	8440387
% silt by hydrometer	%	17	8440387	31	8438301	29	2.0	8440387
Clay Content	%	83	8440387	20	8438301	59	2.0	8440387
Texture	N/A	HEAVY CLAY	8434086	LOAM	8434086	CLAY	N/A	8434086

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N/A = Not Applicable

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RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		PT7072		PT7073	PT7074		PT7075		
Sampling Date		2016/07/19		2016/07/19	2016/07/19		2016/07/20		
	UNITS	SRKF16080-AP	QC Batch	SRKF16080-BMK	SRKF16080-CK	QC Batch	SRKF16097-AH	RDL	QC Batch
Soil Properties									
Calcium Carbonate Equivalent	%	1.4	8440286	23	23	8440286	4.0	0.60	8440286
Physical Properties									
% sand by hydrometer	%	34	8438301	3.9	7.2	8440387	69	2.0	8438301
% silt by hydrometer	%	34	8438301	24	22	8440387	25	2.0	8438301
Clay Content	%	32	8438301	72	71	8440387	5.4	2.0	8438301
Texture	N/A	CLAY LOAM	8434086	HEAVY CLAY	HEAVY CLAY	8434086	SANDY LOAM	N/A	8434086

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7076	PT7077		PT7078	PT7080		
Sampling Date		2016/07/20	2016/07/20		2016/07/20	2016/07/21		
	UNITS	SRKF16097-CK	SRKF16098-AHKGJ	QC Batch	SRKF16098-CKG	SRKF16107-CKG	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	14	22	8440286	29	34	0.60	8440286
Physical Properties								
% sand by hydrometer	%	67	38	8440387	41	17	2.0	8439482
% silt by hydrometer	%	26	46	8440387	41	58	2.0	8439482
Clay Content	%	6.9	16	8440387	18	26	2.0	8439482
Texture	N/A	SANDY LOAM	LOAM	8434086	LOAM	SILT LOAM	N/A	8434086

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7133		PT7134	PT7134	PT7135		
Sampling Date		2016/07/21		2016/07/21	2016/07/21	2016/07/21		
	UNITS	SRKF16118-APK	QC Batch	SRKF16118-BGK	SRKF16118-BGK Lab-Dup	SRKF16118-CKG	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	25	8440286	1.0	1.1	16	0.60	8440296
Physical Properties								
% sand by hydrometer	%	19	8440387	7.6	N/A	5.6	2.0	8439482
% silt by hydrometer	%	61	8440387	19	N/A	21	2.0	8439482
Clay Content	%	20	8440387	73	N/A	74	2.0	8439482
Texture	N/A	SILT LOAM	8434086	HEAVY CLAY	N/A	HEAVY CLAY	N/A	8434086

RDL = Reportable Detection Limit
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RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		PT7136	PT7136	PT7137		PT7139		
Sampling Date		2016/07/12	2016/07/12	2016/07/12		2016/07/14		
	UNITS	SRWC16007-CK1	SRWC16007-CK1 Lab-Dup	SRWC16007-CK2	QC Batch	SRWC16013-AHK	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	29	N/A	38	8440296	53	0.60	8440296
Physical Properties								
% sand by hydrometer	%	45	43	78	8439482	39	2.0	8440387
% silt by hydrometer	%	50	51	19	8439482	41	2.0	8440387
Clay Content	%	5.6	5.8	2.9	8439482	21	2.0	8440387
Texture	N/A	SANDY LOAM	N/A	LOAMY SAND	8434086	LOAM	N/A	8434086

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		PT7140	PT7141	PT7180		PT7181		
Sampling Date		2016/07/14	2016/07/14	2016/07/14		2016/07/14		
	UNITS	SRWC16013-CGK	SRWC16020-AP	SRWC16020-CK	QC Batch	SRWC16022-AP	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	22	4.2	33	8440296	1.2	0.60	8440296
Physical Properties								
% sand by hydrometer	%	19	39	4.3	8439482	20	2.0	8440387
% silt by hydrometer	%	22	41	35	8439482	48	2.0	8440387
Clay Content	%	59	19	61	8439482	33	2.0	8440387
Texture	N/A	CLAY	LOAM	HEAVY CLAY	8434086	SLTY CL LO	N/A	8434086

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7182		PT7183	PT7184		PT7185		
Sampling Date		2016/07/14		2016/07/14	2016/07/15		2016/07/15		
	UNITS	SRWC16022-BM	QC Batch	SRWC16022-CK	SRWC16026-AP	QC Batch	SRWC16026-BMGJ	RDL	QC Batch
Soil Properties									
Calcium Carbonate Equivalent	%	3.5	8440296	29	0.70	8440296	0.91	0.60	8440296
Physical Properties									
% sand by hydrometer	%	10	8439482	<2.0	28	8440387	5.7	2.0	8439482
% silt by hydrometer	%	27	8439482	27	42	8440387	26	2.0	8439482
Clay Content	%	62	8439482	72	30	8440387	68	2.0	8439482
Texture	N/A	HEAVY CLAY	8434086	HEAVY CLAY	CLAY LOAM	8434087	HEAVY CLAY	N/A	8434087

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RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		PT7186	PT7187	PT7188	PT7189	PT7220		
Sampling Date		2016/07/15	2016/07/16	2016/07/16	2016/07/16	2016/07/19		
	UNITS	SRWC16026-CK	SRWC16033-AP	SRWC16033-BM	SRWC16033-CK	SRWC16080-APK	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	18	1.6	0.82	32	3.0	0.60	8440296
Physical Properties								
% sand by hydrometer	%	4.9	47	14	4.6	39	2.0	8439482
% silt by hydrometer	%	14	37	30	29	30	2.0	8439482
Clay Content	%	81	17	56	67	31	2.0	8439482
Texture	N/A	HEAVY CLAY	LOAM	CLAY	HEAVY CLAY	CLAY LOAM	N/A	8434087

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PT7221	PT7222		PT7223	PT7223		
Sampling Date		2016/07/19	2016/07/19		2016/07/20	2016/07/20		
	UNITS	SRWC16080-BMK	SRWC16080-CK	QC Batch	SRWC16097-AP	SRWC16097-AP Lab-Dup	RDL	QC Batch
Soil Properties								
Calcium Carbonate Equivalent	%	4.0	26	8440296	1.4	1.4	0.60	8440278
Physical Properties								
% sand by hydrometer	%	10	3.7	8439482	19	N/A	2.0	8440387
% silt by hydrometer	%	30	19	8439482	33	N/A	2.0	8440387
Clay Content	%	60	77	8439482	48	N/A	2.0	8440387
Texture	N/A	HEAVY CLAY	HEAVY CLAY	8434087	CLAY	N/A	N/A	8434087

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		PT7224	PT7225		
Sampling Date		2016/07/20	2016/07/20		
	UNITS	SRWC16097-BG	SRWC16097-CK	RDL	QC Batch
Soil Properties					
Calcium Carbonate Equivalent	%	18	18	0.60	8440278
Physical Properties					
% sand by hydrometer	%	3.7	8.7	2.0	8439482
% silt by hydrometer	%	22	20	2.0	8439482
Clay Content	%	74	71	2.0	8439482
Texture	N/A	HEAVY CLAY	HEAVY CLAY	N/A	8434087

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	14.7°C
Package 2	13.7°C

Sample PT7181-01 : SLTY CL LO = SILTY CLAY LOAM

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8435732	LX	QC Standard	Saturation %	2016/10/18		101	%	89 - 111
8435732	LX	RPD	Saturation %	2016/10/18	0.78		%	12
8437331	BJO	QC Standard	Soluble Conductivity	2016/10/18		106	%	84 - 116
8437331	BJO	Spiked Blank	Soluble Conductivity	2016/10/18		99	%	90 - 110
8437331	BJO	Method Blank	Soluble Conductivity	2016/10/18	<0.020		dS/m	
8437331	BJO	RPD	Soluble Conductivity	2016/10/18	13		%	35
8438104	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438104	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438104	ACZ	RPD [PT7137-01]	Soluble (CaCl2) pH	2016/10/19	1.2		%	N/A
8438106	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438106	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438106	ACZ	RPD	Soluble (CaCl2) pH	2016/10/19	1.7		%	N/A
8438114	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438114	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438114	ACZ	RPD	Soluble (CaCl2) pH	2016/10/19	0.19		%	N/A
8438125	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438125	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438125	ACZ	RPD	Soluble (CaCl2) pH	2016/10/19	1.1		%	N/A
8438127	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438127	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438127	ACZ	RPD [PT6991-01]	Soluble (CaCl2) pH	2016/10/19	0.78		%	N/A
8438129	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438129	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438129	ACZ	RPD	Soluble (CaCl2) pH	2016/10/19	3.1		%	N/A
8438133	ACZ	QC Standard	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438133	ACZ	Spiked Blank	Soluble (CaCl2) pH	2016/10/19		100	%	97 - 103
8438133	ACZ	RPD	Soluble (CaCl2) pH	2016/10/19	0.55		%	N/A
8438301	JB9	QC Standard	% sand by hydrometer	2016/10/19		98	%	75 - 125
			% silt by hydrometer	2016/10/19		98	%	75 - 125
			Clay Content	2016/10/19		109	%	75 - 125
8438301	JB9	RPD	% sand by hydrometer	2016/10/19	7.5		%	35
			% silt by hydrometer	2016/10/19	1.3		%	35
			Clay Content	2016/10/19	3.9		%	35
8438508	CJ5	Matrix Spike	Soluble Calcium (Ca)	2016/10/19		94	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/19		103	%	75 - 125
			Soluble Sodium (Na)	2016/10/19		96	%	75 - 125
			Soluble Potassium (K)	2016/10/19		101	%	75 - 125
8438508	CJ5	QC Standard	Soluble Calcium (Ca)	2016/10/19		100	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/19		103	%	75 - 125
			Soluble Sodium (Na)	2016/10/19		104	%	75 - 125
			Soluble Potassium (K)	2016/10/19		90	%	75 - 125
8438508	CJ5	Spiked Blank	Soluble Calcium (Ca)	2016/10/19		95	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/19		102	%	75 - 125
			Soluble Sodium (Na)	2016/10/19		97	%	75 - 125
			Soluble Potassium (K)	2016/10/19		99	%	75 - 125
8438508	CJ5	Method Blank	Soluble Calcium (Ca)	2016/10/19	<1.5		mg/L	
			Soluble Magnesium (Mg)	2016/10/19	<1.0		mg/L	
			Soluble Sodium (Na)	2016/10/19	<2.5		mg/L	
			Soluble Potassium (K)	2016/10/19	<1.3		mg/L	
8438508	CJ5	RPD	Soluble Calcium (Ca)	2016/10/19	11		%	35
			Soluble Magnesium (Mg)	2016/10/19	NC		%	35
			Soluble Sodium (Na)	2016/10/19	NC		%	35

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Maxxam Job #: B690828
Report Date: 2016/10/28

STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Soluble Potassium (K)	2016/10/19	NC		%	35
8438899	LX	QC Standard	Saturation %	2016/10/20		99	%	89 - 111
8438899	LX	RPD [PT7136-01]	Saturation %	2016/10/20	1.0		%	12
8438966	LX	QC Standard	Saturation %	2016/10/20		100	%	89 - 111
8438966	LX	RPD [PT6987-01]	Saturation %	2016/10/20	2.0		%	12
8439482	JB9	QC Standard	% sand by hydrometer	2016/10/19		99	%	75 - 125
			% silt by hydrometer	2016/10/19		101	%	75 - 125
			Clay Content	2016/10/19		101	%	75 - 125
8439482	JB9	RPD [PT7136-01]	% sand by hydrometer	2016/10/19	2.6		%	35
			% silt by hydrometer	2016/10/19	1.9		%	35
			Clay Content	2016/10/19	NC		%	35
8439504	BJO	QC Standard	Soluble Conductivity	2016/10/20		104	%	84 - 116
8439504	BJO	Spiked Blank	Soluble Conductivity	2016/10/20		99	%	90 - 110
8439504	BJO	Method Blank	Soluble Conductivity	2016/10/20	<0.020		dS/m	
8439504	BJO	RPD [PT7136-01]	Soluble Conductivity	2016/10/20	3.0		%	35
8439579	BJO	QC Standard	Soluble Conductivity	2016/10/20		103	%	84 - 116
8439579	BJO	Spiked Blank	Soluble Conductivity	2016/10/20		99	%	90 - 110
8439579	BJO	Method Blank	Soluble Conductivity	2016/10/20	<0.020		dS/m	
8439579	BJO	RPD [PT6987-01]	Soluble Conductivity	2016/10/20	1.7		%	35
8440065	LX	QC Standard	Saturation %	2016/10/20		101	%	89 - 111
8440065	LX	RPD	Saturation %	2016/10/20	0.36		%	12
8440278	ACZ	QC Standard	Calcium Carbonate Equivalent	2016/10/21		104	%	75 - 125
8440278	ACZ	Spiked Blank	Calcium Carbonate Equivalent	2016/10/21		102	%	80 - 120
8440278	ACZ	Method Blank	Calcium Carbonate Equivalent	2016/10/21	<0.60		%	
8440278	ACZ	RPD [PT7223-01]	Calcium Carbonate Equivalent	2016/10/21	NC		%	35
8440286	ACZ	QC Standard	Calcium Carbonate Equivalent	2016/10/21		102	%	75 - 125
8440286	ACZ	Spiked Blank	Calcium Carbonate Equivalent	2016/10/21		104	%	80 - 120
8440286	ACZ	Method Blank	Calcium Carbonate Equivalent	2016/10/21	<0.60		%	
8440286	ACZ	RPD [PT6986-01]	Calcium Carbonate Equivalent	2016/10/21	1.2		%	35
8440296	ACZ	QC Standard	Calcium Carbonate Equivalent	2016/10/21		102	%	75 - 125
8440296	ACZ	Spiked Blank	Calcium Carbonate Equivalent	2016/10/21		98	%	80 - 120
8440296	ACZ	Method Blank	Calcium Carbonate Equivalent	2016/10/21	<0.60		%	
8440296	ACZ	RPD [PT7134-01]	Calcium Carbonate Equivalent	2016/10/21	NC		%	35
8440387	JB9	QC Standard	% sand by hydrometer	2016/10/20		102	%	75 - 125
			% silt by hydrometer	2016/10/20		97	%	75 - 125
			Clay Content	2016/10/20		100	%	75 - 125
8440387	JB9	RPD [PT6987-01]	% sand by hydrometer	2016/10/20	1.7		%	35
			% silt by hydrometer	2016/10/20	0.52		%	35
			Clay Content	2016/10/20	0.52		%	35
8440389	PM5	Matrix Spike [PT6987-01]	Soluble Calcium (Ca)	2016/10/20		93	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		93	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		94	%	75 - 125
			Soluble Potassium (K)	2016/10/20		96	%	75 - 125
8440389	PM5	QC Standard	Soluble Calcium (Ca)	2016/10/20		104	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		97	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		99	%	75 - 125
			Soluble Potassium (K)	2016/10/20		84	%	75 - 125
8440389	PM5	Spiked Blank	Soluble Calcium (Ca)	2016/10/20		94	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		94	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		94	%	75 - 125
			Soluble Potassium (K)	2016/10/20		96	%	75 - 125
8440389	PM5	Method Blank	Soluble Calcium (Ca)	2016/10/20	<1.5		mg/L	

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Maxxam Job #: B690828
Report Date: 2016/10/28

STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Soluble Magnesium (Mg)	2016/10/20	<1.0		mg/L	
			Soluble Sodium (Na)	2016/10/20	<2.5		mg/L	
			Soluble Potassium (K)	2016/10/20	<1.3		mg/L	
8440389	PM5	RPD [PT6987-01]	Soluble Calcium (Ca)	2016/10/20	4.5		%	35
			Soluble Magnesium (Mg)	2016/10/20	3.1		%	35
			Soluble Sodium (Na)	2016/10/20	4.4		%	35
			Soluble Potassium (K)	2016/10/20	NC		%	35
8440591	PM5	Matrix Spike [PT7136-01]	Soluble Calcium (Ca)	2016/10/20		97	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		106	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		105	%	75 - 125
			Soluble Potassium (K)	2016/10/20		105	%	75 - 125
8440591	PM5	QC Standard	Soluble Calcium (Ca)	2016/10/20		111	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		111	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		108	%	75 - 125
			Soluble Potassium (K)	2016/10/20		85	%	75 - 125
8440591	PM5	Spiked Blank	Soluble Calcium (Ca)	2016/10/20		93	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		102	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		101	%	75 - 125
			Soluble Potassium (K)	2016/10/20		100	%	75 - 125
8440591	PM5	Method Blank	Soluble Calcium (Ca)	2016/10/20	<1.5		mg/L	
			Soluble Magnesium (Mg)	2016/10/20	<1.0		mg/L	
			Soluble Sodium (Na)	2016/10/20	<2.5		mg/L	
			Soluble Potassium (K)	2016/10/20	<1.3		mg/L	
8440591	PM5	RPD [PT7136-01]	Soluble Calcium (Ca)	2016/10/20	2.1		%	35
			Soluble Magnesium (Mg)	2016/10/20	3.3		%	35
			Soluble Sodium (Na)	2016/10/20	NC		%	35
			Soluble Potassium (K)	2016/10/20	0.21		%	35
8440628	BJO	QC Standard	Soluble Conductivity	2016/10/20		91	%	84 - 116
8440628	BJO	Spiked Blank	Soluble Conductivity	2016/10/20		99	%	90 - 110
8440628	BJO	Method Blank	Soluble Conductivity	2016/10/20	<0.020		dS/m	
8440628	BJO	RPD	Soluble Conductivity	2016/10/20	7.4		%	35
8441210	PM5	Matrix Spike	Soluble Calcium (Ca)	2016/10/20		94	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		103	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		105	%	75 - 125
			Soluble Potassium (K)	2016/10/20		106	%	75 - 125
8441210	PM5	QC Standard	Soluble Calcium (Ca)	2016/10/20		85	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		87	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		99	%	75 - 125
			Soluble Potassium (K)	2016/10/20		84	%	75 - 125
8441210	PM5	Spiked Blank	Soluble Calcium (Ca)	2016/10/20		97	%	75 - 125
			Soluble Magnesium (Mg)	2016/10/20		106	%	75 - 125
			Soluble Sodium (Na)	2016/10/20		108	%	75 - 125
			Soluble Potassium (K)	2016/10/20		108	%	75 - 125
8441210	PM5	Method Blank	Soluble Calcium (Ca)	2016/10/20	<1.5		mg/L	
			Soluble Magnesium (Mg)	2016/10/20	<1.0		mg/L	
			Soluble Sodium (Na)	2016/10/20	<2.5		mg/L	
			Soluble Potassium (K)	2016/10/20	<1.3		mg/L	
8441210	PM5	RPD	Soluble Calcium (Ca)	2016/10/20	14		%	35
			Soluble Magnesium (Mg)	2016/10/20	9.8		%	35
			Soluble Sodium (Na)	2016/10/20	2.8		%	35

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Maxxam Job #: B690828
Report Date: 2016/10/28

STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Soluble Potassium (K)	2016/10/20	NC		%	35

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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STANTEC CONSULTING LTD
Client Project #: 110773396.301.600.208.5
Site Location: WEST OF CALGARY
Sampler Initials: BL, KF, WC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Suwan Fock, B.Sc., QP, Inorganics Senior Analyst

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

7/12(2)

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company :	Stantec	Company:		Quotation #:		[x] 5 - 7 Days Regular (Most analyses)	
Contact Name:	Bret Leoppky	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address:	10160 - 112 Street	Address:				Rush TAT (Surcharges will be applied)	
	Edmonton, T5K2L6			Project #:	110773396.301.600.208.5	[ ] Same Day [ ] 2 Days	
Phone:	780.265.5837	Phone:		Site Location:	West of Calgary	[ ] 1 Day [ ] 3-4 Days	
Email:	bret.leoppky@stantec.com	Email:		Site #:	110773396 - SR1	Date Required:	
Copies:	kahlie.forster@stantec.com	Copies:		Sampled By:	B.leoppky/K.Forster/W.Chiyoka	Rush Confirmation #:	

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present	✓					
Seal Intact	✓		Temp	14	15	15
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present	✓					
Seal Intact	✓		Temp	14	13	14
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Analysis Requested

Regulatory Criteria

- [ ] AT1/CCME
- [ ] Drinking Water
- [ ] Saskatchewan
- [ ] D50 (Drilling Waste)
- [ ] Other:

Special Instructions

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals ☐ Tot ☐ Diss	Mercury Total ☐ Dissolved ☐	Salinity 4:3	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PSA (hydrometer)	CCE	TOC (LECO)	HOLD - DO NOT ANALYZE
1	SRBL16003-Ahk		9/22/2016		soil								x				x	x	x	
2	SRBL16003-Ck		9/22/2016		soil								x				x	x		
3	SRBL16003-Ckgj		9/22/2016		soil								x				x	x		
4	SRBL16019-Ap		9/24/2016		soil								x				x	x	x	
5	SRBL16019-Bm		9/24/2016		soil								x				x	x		
6	SRBL16019-Ck		9/24/2016		soil								x				x	x		
7	SRKF16002-Ap		7/13/2016		soil								x				x	x	x	
8	SRKF16002-Bgj		7/13/2016		soil								x				x	x		
9	SRKF16002-Ckgj		7/13/2016		soil								x				x	x		
10	SRKF16013-Ap		7/14/2016		soil								x				x	x	x	

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
			Jena Walts	20161014	1246	B690828 D_T

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CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company :	Stantec	Company:		Quotation #:		[x] 5 - 7 Days Regular (Most analyses)	
Contact Name:	Bret Leoppky	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address:	10160 - 112 Street	Address:				Rush TAT (Surcharges will be applied)	
	Edmonton, T5K2L6			Project #:	110773396.301.600.208.5	[ ] Same Day [ ] 2 Days	
Phone:	780.265.5837	Phone:		Site Location:	West of Calgary	[ ] 1 Day [ ] 3-4 Days	
Email:	bret.leoppky@stantec.com	Email:		Site #:	110773396 - SR1	Date Required:	
Copies:	kahlie.forster@stantec.com	Copies:		Sampled By:	B.leoppky/K.Forster/W.Chiyoka	Rush Confirmation #:	

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present	✓					
Seal Intact	✓		Temp	14	15	15
Cooling Media						

	YES	NO	Cooler ID			
Seal Present	✓					
Seal Intact	✓		Temp	14	13	14
Cooling Media						

	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Regulatory Criteria

- [ ] AT1/CCME
- [ ] Drinking Water
- [ ] Saskatchewan
- [ ] D50 (Drilling Waste)
- [ ] Other:

Special Instructions

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 [ ] VOC [ ]	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot [ ] Diss [ ]	Mercury Total [ ] Dissolved [ ]	Salinity # 3	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PSA (hydrometer)	CCE	TOC (LECO)	HOLD - DO NOT ANALYZE
1	SRKF16013-Ck		7/14/2016		soil								x				x	x		
2	SRKF16080-Ap		7/19/2016		soil								x				x	x	x	
3	SRKF16080-Bmk		7/19/2016		soil								x				x	x		
4	SRKF16080-Ck		7/19/2016		soil								x				x	x		
5	SRKF16097-Ah		7/20/2016		soil								x				x	x	x	
6	SRKF16097-Ck		7/20/2016		soil								x				x	x		
7	SRKF16098-Ahkgj		7/20/2016		soil								x				x	x	x	
8	SRKF16098-Ckg		7/20/2016		soil								x				x	x		
9	SRKF16098-LFH		7/20/2016		soil								x						x	
10	SRKF16107-Ckg		7/21/2016		soil								x				x	x		

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
			Jenna Walter	20161014	1246	B690828 D_T

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Maxxam Analytics - Partner in Client Results

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CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required
Company :	Stantec	Company:		Quotation #:		[x] 5 - 7 Days Regular (Most analyses)
Contact Name:	Bret Leoppky	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	10160 - 112 Street	Address:				Rush TAT (Surcharges will be applied)
	Edmonton, T5K2L6			Project #:	110773396.301.600.208.5	[ ] Same Day [ ] 2 Days
Phone:	780.265.5837	Phone:		Site Location:	West of Calgary	[ ] 1 Day [ ] 3-4 Days
Email:	bret.leoppky@stantec.com	Email:		Site #:	110773396 - SR1	Date Required:
Copies:	kahlie.forster@stantec.com	Copies:		Sampled By:	B.leoppky/K.Forster/W.Chiyoka	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present	✓	✓				
Seal Intact	✓	✓	Temp	14	15	15
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present	✓					
Seal Intact	✓		Temp	14	13	14
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Regulatory Criteria

- [ ] AT1/CCME
- [ ] Drinking Water
- [ ] Saskatchewan
- [ ] D50 (Drilling Waste)
- [ ] Other:

Special Instructions

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 [ ] VOC [ ]	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot [ ] Diss [ ]	Mercury Total [ ] Dissolved [ ]	Salinity	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PSA (hydrometer)	CCE	TOC (LECO)	HOLD - DO NOT ANALYZE
1	SRKF16107-Om		7/21/2016		soil								x						x	
2	SRKF16118-Apk		7/21/2016		soil								x				x	x	x	
3	SRKF16118-Bgk		7/21/2016		soil								x				x	x		
4	SRKF16118-Ckj		7/21/2016		soil								x				x	x		
5	SRWC16007-Ck1		7/12/2016		soil								x				x	x		
6	SRWC16007-Ck2		7/12/2016		soil								x				x	x		
7	SRWC16007-LFH		7/12/2016		soil								x						x	
8	SRWC16013-Ahk		7/14/2016		soil								x				x	x	x	
9	SRWC16013-Cgk		7/14/2016		soil								x				x	x		
10	SRWC16020-Ap		7/14/2016		soil								x				x	x	x	

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
			Jenna Walters	2016/07/14	1246	B690828 D_T

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CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company :	Stantec	Company:		Quotation #:		x	5 - 7 Days Regular (Most analyses)
Contact Name:	Bret Leoppky	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address:	10160 - 112 Street	Address:				Rush TAT (Surcharges will be applied)	
	Edmonton, T5K2L6			Project #:	110773396.301.600.208.5	☐ Same Day ☐ 2 Days	
Phone:	780.265.5837	Phone:		Site Location:	West of Calgary	☐ 1 Day ☐ 3-4 Days	
Email:	bret.leoppky@stantec.com	Email:		Site #:	110773396 - SR1	Date Required:	
Copies:	kahlie.forster@stantec.com	Copies:		Sampled By:	B.leoppky/K.Forster/W.Chiyoka	Rush Confirmation #:	

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present	✓		30 Package			
Seal Intact	✓		Temp	14	15	15
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present	✓		Seal Package			
Seal Intact	✓		Temp	14	13	14
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present			Temp			
Seal Intact						
Cooling Media						

Depot Reception

Analysis Requested

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals ☐ Tot ☐ Diss	Mercury ☐ Total ☐ Dissolved	Salinity #3	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PSA (hydrometer)	CCE	TOC (LECO)	HOLD - DO NOT ANALYZE
1	SRWC16020-Ck		7/14/2016		soil								x				x	x		
2	SRWC16022-Ap		7/14/2016		soil								x				x	x	x	
3	SRWC16022-Bm		7/14/2016		soil								x				x	x		
4	SRWC16022-Ck		7/14/2016		soil								x				x	x		
5	SRWC16026-Ap		7/15/2016		soil								x				x	x	x	
6	SRWC16026-Bmgj		7/15/2016		soil								x				x	x		
7	SRWC16026-Ck		7/15/2016		soil								x				x	x		
8	SRWC16033-Ap		7/16/2016		soil								x				x	x	x	
9	SRWC16033-Bm		7/16/2016		soil								x				x	x		
10	SRWC16033-Ck		7/16/2016		soil								x				x	x		
	Please indicate Filtered, Preserved or Both (F, P, F/P) →																			

Regulatory Criteria

- ☐ AT1/CCME
- ☐ Drinking Water
- ☐ Saskatchewan
- ☐ D50 (Drilling Waste)
- ☐ Other:

Special Instructions

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
			Jenna Walter	2016/07/14	12:46	B690828 D-T

AB FCD-00331/6

Maxxam
A Bureau Veritas Group Company

Calgary: 4000 19th St. NE, T2E 6P8. Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company :	Stantec	Company:		Quotation #:		[x] 5 - 7 Days Regular (Most analyses)	
Contact Name:	Bret Leoppky	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address:	10160 - 112 Street	Address:				Rush TAT (Surcharges will be applied)	
	Edmonton, T5K2L6			Project #:	110773396.301.600.208.5	[ ] Same Day [ ] 2 Days	
Phone:	780.265.5837	Phone:		Site Location:	West of Calgary	[ ] 1 Day [ ] 3-4 Days	
Email:	bret.leoppky@stantec.com	Email:		Site #:	110773396 - SR1	Date Required:	
Copies:	kahlie.forster@stantec.com	Copies:		Sampled By:	B.leoppky/K.Forster/W.Chiyoka	Rush Confirmation #:	

Laboratory Use Only — JD M0166014

	YES	NO	Cooler ID			
Seal Present	✓	✓	Temp	14	15	15
Seal Intact	✓	✓				
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present	✓	✓	Temp	14	13	14
Seal Intact	✓					
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present			Temp			
Seal Intact						
Cooling Media						

Depot Reception

Analysis Requested

Regulatory Criteria

- [ ] AT1/CCME
- [ ] Drinking Water
- [ ] Saskatchewan
- [ ] D50 (Drilling Waste)
- [ ] Other:

Special Instructions

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 [ ] VOC [ ]	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot [ ] Diss [ ]	Mercury Total [ ] Dissolved [ ]	Salinity #3	Sieve (75 micron)	Texture (% Sand,Silt, Clay)	Basic Class II Landfill	PSA (hydrometer)	CCE	TOC (LECO)	HOLD - DO NOT ANALYZE
1	SRWC16080-Apk		7/19/2016		soil								x				x	x	x	
2	SRWC16080-Bmk		7/19/2016		soil								x				x	x		
3	SRWC16080-Ck		7/19/2016		soil								x				x	x		
4	SRWC16097-Ap		7/20/2016		soil								x				x	x	x	
5	SRWC16097-Bg		7/20/2016		soil								x				x	x		
6	SRWC16097-C K		7/20/2016		soil								x				x	x		
7					soil															
8					soil															
9					soil															
10					soil															

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
			Jenna Walter	20161014	1246	B690828 D_T

AB FCD-00331/6

Maxxam
A Bureau Veritas Group Company

Your P.O. #: N/A
Your Project #: 110773396.301.600.208.5
Site#: B690828
Your C.O.C. #: na

Attention:Stantec Reporting

Stantec Consulting Ltd
200 325 25 St SE
Calgary, AB
Canada T2A 7H8

Report Date: 2016/11/03
Report #: R4234518
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6N4804
Received: 2016/10/29, 10:20

Sample Matrix: Soil
Samples Received: 18

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Organic Carbon in Soil	18	N/A	2016/11/03	CAM SOP-00468	BCMOE TOC Aug 2014

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: ADobosz@maxxam.ca
Phone# (905)817-5700 Ext:5798

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		DIT574	DIT574	DIT575	DIT576	DIT577		
Sampling Date		2016/09/22	2016/09/22	2016/09/24	2016/07/13	2016/07/14		
COC Number		na	na	na	na	na		
	UNITS	SRBL16003-AHK	SRBL16003-AHK Lab-Dup	SRBL16019-AP	SRKF16002-AP	SRKF16013-AP	RDL	QC Batch
Inorganics								
Total Organic Carbon	mg/kg	98000	95000	72000	100000	76000	500	4726852

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		DIT578	DIT579	DIT580	DIT581	DIT582		
Sampling Date		2016/07/19	2016/07/20	2016/07/20	2016/07/20	2016/07/21		
COC Number		na	na	na	na	na		
	UNITS	SRKF16080-AP	SRKF16097-AH	SRKF16098-AHKGJ	SRKF16098-LFH	SRKF16107-OM	RDL	QC Batch
Inorganics								
Total Organic Carbon	mg/kg	66000	35000	160000	140000	75000	500	4726852

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		DIT583	DIT584	DIT585	DIT586	DIT587		
Sampling Date		2016/07/21	2016/07/12	2016/07/14	2016/07/14	2016/07/14		
COC Number		na	na	na	na	na		
	UNITS	SRKF16118-APK	SRWC16007-LFH	SRWC16013-AHK	SRWC16020-AP	SRWC16022-AP	RDL	QC Batch
Inorganics								
Total Organic Carbon	mg/kg	170000	160000	110000	73000	58000	500	4726852

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		DIT588	DIT589	DIT590	DIT591		
Sampling Date		2016/07/15	2016/07/16	2016/07/19	2016/07/20		
COC Number		na	na	na	na		
	UNITS	SRWC16026-AP	SRWC16033-AP	SRWC16080-APK	SRWC16097-AP	RDL	QC Batch
Inorganics							
Total Organic Carbon	mg/kg	37000	120000	72000	65000	500	4726852

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

TEST SUMMARY

Maxxam ID: DIT574 **Collected:** 2016/09/22
Sample ID: SRBL16003-AHK **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT574 Dup **Collected:** 2016/09/22
Sample ID: SRBL16003-AHK **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT575 **Collected:** 2016/09/24
Sample ID: SRBL16019-AP **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT576 **Collected:** 2016/07/13
Sample ID: SRKF16002-AP **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT577 **Collected:** 2016/07/14
Sample ID: SRKF16013-AP **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT578 **Collected:** 2016/07/19
Sample ID: SRKF16080-AP **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT579 **Collected:** 2016/07/20
Sample ID: SRKF16097-AH **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

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Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

TEST SUMMARY

Maxxam ID: DIT580 **Collected:** 2016/07/20
Sample ID: SRKF16098-AHKGJ **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT581 **Collected:** 2016/07/20
Sample ID: SRKF16098-LFH **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT582 **Collected:** 2016/07/21
Sample ID: SRKF16107-OM **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT583 **Collected:** 2016/07/21
Sample ID: SRKF16118-APK **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT584 **Collected:** 2016/07/12
Sample ID: SRWC16007-LFH **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT585 **Collected:** 2016/07/14
Sample ID: SRWC16013-AHK **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT586 **Collected:** 2016/07/14
Sample ID: SRWC16020-AP **Shipped:**
Matrix: Soil **Received:** 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

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Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

TEST SUMMARY

Maxxam ID: DIT587
Sample ID: SRWC16022-AP
Matrix: Soil

Collected: 2016/07/14
Shipped:
Received: 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT588
Sample ID: SRWC16026-AP
Matrix: Soil

Collected: 2016/07/15
Shipped:
Received: 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT589
Sample ID: SRWC16033-AP
Matrix: Soil

Collected: 2016/07/16
Shipped:
Received: 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT590
Sample ID: SRWC16080-APK
Matrix: Soil

Collected: 2016/07/19
Shipped:
Received: 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

Maxxam ID: DIT591
Sample ID: SRWC16097-AP
Matrix: Soil

Collected: 2016/07/20
Shipped:
Received: 2016/10/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	4726852	N/A	2016/11/03	Bramdeo Motiram

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Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C

Results relate only to the items tested.

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Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4726852	BMO	QC Standard	Total Organic Carbon	2016/11/03		110	%	75 - 125
4726852	BMO	Method Blank	Total Organic Carbon	2016/11/03	<500		mg/kg	
4726852	BMO	RPD [DIT574-01]	Total Organic Carbon	2016/11/03	2.5		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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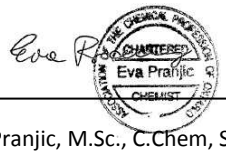
Maxxam Job #: B6N4804
Report Date: 2016/11/03

Stantec Consulting Ltd
Client Project #: 110773396.301.600.208.5
Your P.O. #: N/A

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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