AGRICULTURAL FEASIBILITY REPORT
***Project Location*: SE 12-50-02 W4M**
***Main Pump Site Location*: SW 12-50-02 W4M**
County of Vermillion River #24, and MPE – a Division of Englobe
Near Blackfoot, Alberta

GENERAL: This project will irrigate a total of 27.7 hectares (68.5 acres), where application of municipal wastewater from the existing Hamlet of Blackfoot municipal sewage treatment lagoon for mixed native and improved pasture grasses and forbs, will be conducted using a stationary or travelling volume gun equipped with one overhead sprinkler. Wastewater will be applied over a period of days once per year, during the May 1 to September 30 growing season; total application will include the volume capacity of wastewater stored in the source lagoon, which is 40,000 m^3, plus evaporation losses, but stored supply replenishes through the municipal disposal system from feeder buildings as stored wastewater is discharged. Wastewater will be applied on irrigable areas of SE12-50-02 W4M both to manage the continuous accumulation of treated wastewater in the lagoon, and provide alternative moisture for growing plants suffering from a climate-induced moisture deficit, but is supplemental to soil moisture obtained naturally through snow-melt, run-off, and rain. The irrigation system design will be managed to minimize wastewater application into nonirrigable sloughs/wetlands, areas of heavy bush/tree cover, freshwater dugouts, registered water wells, public roads, or adjacent properties utilized by humans, by enforcing regulatory set-back buffers of 30 or 60 m. Irrigation events will also be scheduled so that wastewater discharge does not occur during and for 30 days prior to harvesting of crops or grazing by dairy cattle, or seven days prior to pasturing by livestock other than diary cattle**,** as specified in Alberta Environment and Protected Area's (AEPA) "*Guidelines for Municipal Wastewater Irrigation" (AEP 2000).*

WATER SUPPLY: The irrigation water supply will be sourced as municipal wastewater, which originates from various residential, municipal, commercial or light industrial properties comprising the Hamlet of Blackfoot located to the southwest, and is currently collected for temporary storage prior to irrigation in a rectangular-shaped, single-cell lagoon located in the central-east margin of SW12-50-02 W4M, immediately west of the Subject Property. The open-air lagoon has a water volume capacity of 40,000 m^3: the useable depth is about 2.85 m, and surface area is approximately 14,035 m^2.

Wastewater will be drawn via the main pump, which is located on the southeast bank of the lagoon reservoir and is driven by a 15 horsepower to 60 HP motor that utilizes 3-phase electrical power, and capable of operating a small (150 US gallons per minute at 80 pounds per square inch pressure) or medium (400 gpm at 150 psi) capacity volume gun. Water will be discharged at the lagoon's southeast corner into an effluent discharge pipeline (proposed), which will then be pushed under pressure to the volume gun sprinkler applicator via the discharge pipeline system, equipped with risers for attachment by the supply hose connecting to the volume gun, as illustrated in Drawing SFC24-13-1, attached in at the end of this main report**.** The stored wastewater effluent would be applied during a single irrigation event, over a duration of 20 or 50 days, depending if the flow rate from lagoon to applicator will be 400 gpm or 150 gpm. A medium-capacity volume gun can wet approximately 3.3 ha (8 ac) per lane of application.

A grab sample of wastewater collected by SFC from the east margin of the lagoon on August 29, 2024 and reported on September 6, 2024 generally met the AEPA 2000 guidelines, as summarized in Table 1 attached at the end of this main report, with exceptions of concentrations of total coliforms (2,100 CFU/100 ml, where the guideline is 1,000 CFU/100 ml) and fecal coliforms (610 CFU/100 ml, where the guideline is 200 CFU/100 ml). The electrical conductivity (EC) result of 1.79 dS/m did not meet the AEPA 2000 guideline of 1 dS/m for *unrestricted* use, but was considered suitable for restricted use, where the guideline is 1 dS/m to 2.5 dS/m. The chloride concentration of 176 mg/L did not meet the "*Alberta Tier 1 Soil and Groundwater Remediation Guidelines"* of 100 mg/L for irrigation water (AEPA 2019), but met the "*Surface Water Quality Guidelines for Use in Alberta*" (AEPA 1999) of 860 mg/L. A grab sample of wastewater collected by staff of MPE - a Division of Englobe on April 2, 2024 and reported om April 8, 2024, met AEPA 2000 guidelines for parameters tested (i.e. EC of 0.249 dS/m, as well as biochemical oxygen demand, pH, soluble cations, and sodium adsorption ratio (SAR)), also as summarized in Table 1 (Appendix A). Irrigation of salt-tolerant agricultural crops is a feasible and practical way to utilize the wastewater and prevent the lagoon from overflowing. Applied wastewater rich in nitrogen (N) and phosphorus (P) also improves plant-available levels of these macro nutrients, which are often present at marginal to deficient levels for optimum crop production in Alberta soils, and are therefore topped up with commercial NP fertilizer applications.

SOILS: Level II land irrigability classification for SE 12-50-02 W4M was completed by SFC on September 18, 2024 (Appendix A). The land proposed for irrigation development is primarily classified as irrigable, having *good* (Class 2) capability in the south half, but has *restricted* (Class 4) capability for irrigation in the west and north portions, due to small and irregularly-shaped fields with some steeply sloped ridges, located adjacent to sloughs/wetlands and aspen-poplar forest stands or planted trees, and cultural features (e.g. overhead electrical powerline, demolished former farmstead and oilfield wells, soil stockpiles, rubble accumulations and two water dugouts) that would impede conventional sprinkler system (i.e. centre pivot or wheel-move). The sloughs/wetlands and forested areas are considered *nonirrigable* (Class 6) due to poorly drained soils and/or heavy tree/brush cover.

In irrigable areas, the black chernozemic soils are mainly well drained, low in salts, and formed in *fine* (clay loam to sandy clay loam) to *very fine*, clay textured, morainal (glacial) sediments, but imperfectly drained, gleyed and eluviated soils occur in some scattered low-lying areas that are susceptible to surface water ponding under high moisture conditions. Calcareous chernozemic soils that occur on upper slopes of some ridges observed north, south, or east of the former farmstead have shallow profile development with carbonates at or near the surface. The topsoil appears thin and eroded in places, particularly on upper slopes, is 50 mm to 420 mm thick and *coarse* (sandy loam) to *fine* (sandy clay loam or clay loam) textured. *Very fine*, clay textured moraine was encountered at 1,000 mm to 5,000 mm depths in SFC24-13-01.

Detailed soil profile descriptions, and analytical results for twelve test profile sites (SFC24-01 to SFC24-12), advanced by subcontracted drill rig to 1 m to 3 m depths on August 14 to 15, 2024, are summarized in Appendix B and Appendix C, respectively. Groundwater was not encountered within an environmental groundwater monitoring well 5 m deep

below ground surface (SFC24-13-01), either on August 14 date of drilling/installation or when subsequently assessed on August 29, 2024. This well is located within a low-lying area, approximately 50 m north of the former farmstead. Detailed analytical results for the wastewater effluent collected from the east margin lagoon, near the discharge point, on August 29 or April 2, 2024, are provided in Appendix C.

TOPOGRAPHY: The majority of Class 2 and Class 4 land has nearly level to gently undulating topography, characterized by complex, 0.5 % to 5 % slopes, best suited to be developed for irrigation by sprinkler methods. Long, narrow ridges with steep side slopes of 6% to 30% slopes that decline easterly, southerly or westerly occur in the north, northeast and south portions of SE12-50-02 W4M, beyond which are often found sloughs or wetlands with waterlogged, poorly drained soils. The ridges can be irrigated but may require a special irrigation applicator such as a volume gun sprinkler that can operate efficiently on the steep slopes. The irrigable land units lying north or southwest of the farmstead tend to be broken into small, irregularly-shaped fields by natural (i.e. sloughs/wetlands, tree groves or shelterbelts, steep slopes) or cultural (i.e. overhead electrical powerlines, rubble piles, and a demolished former farmstead) obstacles to effective irrigation equipment operation; such management impediments require a special system design that utilizes an custom sprinkler applicator like a volume gun to irrigate the land more efficiently, whereby the topography rating is downgraded to “3” and a Class 4 land class ((Irrigable, restricted capability) is applied.

As required by Alberta *Guidelines for Municipal Wastewater Irrigation*, the topography of SE12-50-02 W4M was mapped by a survey company MPE- a division of Englobe at a scale of 1:2,000, and a contour interval of 0.5 m. The detailed topography map is attached in Appendix D.

ANNUAL IRRIGATION REQUIREMENTS[1]:

	mm
Seasonal moisture requirement (alfalfa)	480
Estimated (growing season) precipitation	310
Estimated effective stored moisture	50
Net irrigation requirement	120
Estimated gross irrigation requirement (67 % application efficiency)	180

METHOD OF IRRIGATION: travelling volume gun.

RATE OF DIVERSION: 25.2 litres per second, (based upon 400 US gallons per minute).

ANNUAL DIVERSION: 49,865 m^3. This annual diversion should accommodate annual irrigation of 40,000 m^3 of wastewater, on 277,000 m^2 (27.7 ha), plus compensate for net annual evaporation losses of 9,865 m^3 from water stored in the 14,035 m^2 lagoon between May 1 and September 30. This assumes that 690 mm of water could evaporate annually from small lakes, reservoirs, or dugouts in the Blackfoot-Lloydminster area, based on data

[1] Alberta Agriculture, Forestry and Rural Economic Development. 1996. “*Preparing Agricultural Feasibility Study Reports for Irrigation Water Licensing Support (Sprinkler, Drip and Surface Methods*”. Irrigation Branch. Lethbridge, Alberta.

collected by Alberta Environment and Sustainable Resource Development for 1980 to 2009 (Alberta Government 2013)[2]. This annual surface water loss of 675 mm is less than the 800 mm that was predicted from historic (1961 to 1990) Alberta Agriculture, Forestry, and Rural Economic Development (AAFRED 1996) or Prairie Farm Rehabilitation Administration (PFRA 2000)[3] data for moisture deficits for alfalfa production in the Blackfoot-Lloydminster area, but more than the 300 mm to 450 mm net annual evaporation accorded to Evaporation Zone #2 for the Canadian prairie provinces, wherein S1/2 12-50-02 W4M is located.

RECOMMENDATIONS: This project is recommended for licensing. Careful irrigation management and cultivation practices will help minimize potential for build-up and spread of surplus soil moisture and salts in low-lying areas.

Although wastewater quality for irrigation use currently does not meet the Alberta regulatory guidelines, particularly regarding total and fecal coliforms, it is anticipated that water will be carefully applied, and that County of Vermillion River #24 and MPE – a Division of Englobe, will continue to sample and analyze wastewater from the lagoon, annually both prior to and after each irrigation event, in accordance to AEPA 2000 "*Guidelines for Municipal Wastewater Irrigation*." Buffer zone setbacks of 30 m or 60 m will be provided between the irrigated land and adjacent occupied buildings, ephemeral drainage, sloughs/wetlands, public roads, or water wells. Wastewater would be applied during the May 1 to September 30 growing season, unless authorized for fall irrigation, but shall not take place during or within 30 days prior to harvesting of crops or grazing by dairy cattle, or during or within 7 days prior to pasturing by livestock other than dairy cattle on the area to be irrigated. Applying wastewater also improves plant-available macro nutrient levels and keeps the water accumulating in the lagoon at acceptable volumes.

Prepared by:

Robert G. Proudfoot, P.Ag., RPF

ALBERTA INSTITUTE OF AGROLOGISTS
ROBERT G. PROUDFOOT, P.Ag.
727
MEMBER

Robert G. Proudfoot, P.Ag., R.P.F.
Owner / operator and Senior Environmental Scientist
Soil & Forestry Consulting
September 22, 2024
cc: Mr. Ben McPhee, P. Tech (Eng), General Manager – Public Works Operations,

---

[2] Alberta Government. 2013. *"Evaporation and Evapotranspiration in Alberta – The Morton Method"*. Edmonton, Alberta.

[3] Prairie Farm Rehabilitation Act. 2000. "*Dugouts for Farm Water Supplies"* and *"Evaporation from Surface Water"*. Agriculture and Agri-Food Canada. Westlock, Alberta.

County of Vermillion River #24, Kitscoty, AB.

cc: Mr. Ivan Kagoro, P.Eng., Project Manager, MPE – A division of Englobe, Lethbridge, AB.

cc: Mr. Ryan Sharpe, P.Eng. Water and Wastewater Manager, MPE – A division of Englobe, Lethbridge, AB.

cc: Ms. Marie Oxley, Irrigation Management Technologist – Natural Resource Innovation Section, Alberta Agriculture and Irrigation Lethbridge, AB.

cc: Mr. Nazmus Sakib, P.Eng., Water Administration Engineer, Regulatory Assurance, Red Deer District, Alberta Environment and Protected Areas, Edmonton, AB.

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LEGEND

- IRRIGABLE AREA, PROJECT
- NON-IRRIGABLE AREA, PROJECT
- MAIN INTAKE & PUMP SITE (APPROX)
- MAIN LINE
- Ⓦ REGISTERED GROUNDWATER WELL (APPROXIMATE LOCATION)
- D.O. DUGOUT
- F.S. FARMSTEAD / BUILDINGS
- SLOUGH OR WETLAND (NON-IRRIGABLE)
- OVERHEAD POWER LINE

QUARTER SECTION	IRRIGABLE		NON-IRRIGABLE	
	Ha	Ac	Ha	Ac
SE12	27.7	68.5	36.9	91.1

0 100 200 300 400 500 600m

SCALE 1:10000

COUNTY OF VERMILION RIVER No. 24
AND MPE - A DIVISION OF ENGLOBE

AGRICULTURAL FEASIBILITY REPORT
SE 12-050-02 W4M

SITE PLAN

DWG No. SFC24-13-1

DRAWN BY	KLP
DESIGNED BY	RGP
APPROVED BY	RGP
SCALE	1:10000
DATE	SEPTEMBER 2024
FILE No.	SFC24-13

SOIL & FORESTRY CONSULTING

TABLE 1.
WASTEWATER CHARACTERIZATION RESULTS
HAMLET OF BLACKFOOT MUNICIPAL SEWAGE TREATMENT AND STORAGE LAGOON
FOR 2024 LEVEL II LAND IRRIGABILITY CLASSIFICATION AND
AGRICULTURAL FEASIBILITY REPORTS
SE12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

PARAMETER	UNITS	ALBERTA GUIDELINE[1]	RESULTS SFC24-13 LAGOON WATER (Sampled 2024/08/29) (Submitted 2024/08/30)	RESULTS SFC24-13 LAGOON WATER (Sampled 2024/04/02) (Submitted 2024/04/06)
1) Aggregate Organic Constituents				
Biochemical Oxygen Demand	mg/L	100 ([2])	6	6
Chemical Oxygen Demand	mg/L	150 ([2])	40	not analyzed
2) Inorganic Nonmetalic Parameters				
Ammonium - N	mg/L	6.77 to 10.13 [(4)]	7.11	not analyzed
Dissolved Phosphorus	mg/L		4.48	not analyzed
Total Kjeldahl Nitrogen	mg/L		11.4	not analyzed
Total Organic Carbon	mg/L		45.5	not analyzed
3) Dissolved Metals				
Silicon	mg/L		5.46	not analyzed
Sulfur	mg/L		101	not analyzed
Aluminum	mg/L	5	0.004	not analyzed
Antimony	mg/L	0.006	0.0004	not analyzed
Arsenic	mg/L	0.16	0.0027	not analyzed
Barium	mg/L	1	0.007	not analyzed
Beryllium	mg/L		<0.0001	not analyzed
Bismuth	mg/L		<0.0005	not analyzed
Boron	mg/L	1.0	0.318	not analyzed
Cadmium	mg/L	0.0082	<0.00001	not analyzed
Chromium	mg/L	0.0049 to 0.008	<0.0005	not analyzed
Cobalt	mg/L	0.0016 ([4])	0.0005	not analyzed
Copper	mg/L	0.2	0.0008	not analyzed
Lead	mg/L	0.2	<0.0001	not analyzed
Lithium	mg/L		0.050	not analyzed
Mercury			<0.000005	not analyzed
Molybdenum	mg/L		<0.001	not analyzed
Nickel	mg/L	0.2	0.0034	not analyzed
Selenium	mg/L	0.02	0.0007	not analyzed
Silver	mg/L	0.02	<0.00001	not analyzed
Strontium	mg/L		0.816	not analyzed
Thallium	mg/L		<0.00005	not analyzed
Tin	mg/L		<0.001	not analyzed
Titanium	mg/L		<0.0005	not analyzed
Uranium	mg/L	0.01	0.0053	not analyzed
Vanadium	mg/L		0.0005	not analyzed
Zinc	mg/L	1	0.002	not analyzed
Zirconium	mg/L			

Notes:

[1] Alberta Government. "*Alberta Tier 1 Soil and Groundwater Remediation Guidelines*". January 10, 2019.

[2] Alberta Environment and Parks. "*Guidelines for Municipal Wastewater Irrigation*". April, 2000.

[3] Alberta Agriculture, Forestry and Rural Economic Development. "*Procedures Manual for the Classification of Land for Irrigation in Alberta*". 2004.

[4] Alberta Government. "*Environmental Quality Guidelines for Alberta Surface Waters*". March 28, 2018.

BOLD Result does not meet Alberta Tier 1 guidelines for agricultural land, all water uses but focussing upon irrigation use.

BOLD Result does not meet "*Guidelines for Municipal Wastewater Irrigation*" or other provincial guidelines.

TABLE 1. (Continued)

PARAMETER	UNITS	ALBERTA GUIDELINE[1] Agricultural or Residential / Parkland Use Fine-grained Soils	ALBERTA GUIDELINE[1] Agricultural or Residential / Parkland Use Coarse-grained Soils	RESULTS SFC24-13 LAGOON WATER (Sampled 2024/08/29) (Submitted 2024/08/30)	RESULTS SFC24-13 LAGOON WATER (Sampled 2024/04/02) (Submitted 2024/04/06)
4) Microbiological Analyses[2]					
Total Coliforms	CFU/100 ml	1,000	1,000	**2,100**	not analyzed
Fecal Coliforms	CFU/100 ml	200	200	**610**	not analyzed
5) Physical and Aggregate Properties[2]					
Total Suspended Solids	mg/L	100	100	4	not analyzed
6) Routine Water[1,2,3]					
pH	6.5 to 9	6.5 to 9 (6.5 to 8.5 [2])	6.5 to 9 (6.5 to 8.5 [2])	7.85	7.66
Electrical Conductivity	dS/m at 25 oC	1 (2.5[2,3])	1 (2.5[2,3])	**1.79**	0.249
Calcium	mg/L			86.5	9.3
Magnesium	mg/L			76.8	8.1
Sodium	mg/L	200	200	187	18.9
Potassium	mg/L			18.4	not analyzed
Iron	mg/L	5	5	0.02	not analyzed
Manganese	mg/L	0.2	0.2	0.009	not analyzed
Chloride	mg/L	100 [(1)], 860 [(4)]		**176**	not analyzed
Nitrate-N	mg/L	3 [(1)]		<0.01	not analyzed
Nitrite-N	mg/L	1 [(1)], 0.06 [(4)]		<0.005	not analyzed
Nitrate + Nitrite-N	mg/L			<0.01	not analyzed
Sulphate (SO_4)	mg/L	500 [(1)]		304	not analyzed
Hydroxide	mg/L			<5	not analyzed
Carbonate	mg/L			<6	not analyzed
Bicarbonate	mg/L			466	not analyzed
P-Alkalinity	mg/L			<5	not analyzed
T-Alkalinity	mg/L			383	not analyzed
Total Dissolved Solids	mg/L	500 to 3,000 [(1)]		1,090	not analyzed
Ionic Balance	%			104	not analyzed
Hardness	mg/L			532	not analyzed
Sodium Adsorption Ratio		5 (9[2,3])	5 (9[2,3])	3.5	1.1
7) Mono-Aromatic Hydrocarbons[1]					
Benzene	mg/L	0.005	0.005	<0.001	not analyzed
Toluene	mg/L	0.024	0.021	<0.0004	not analyzed
Ethylbenzene	mg/L	0.0016	0.0016	<0.0010	not analyzed
Total Xylenes	mg/L	0.02	0.02	<0.001	not analyzed

Notes:

[1] Alberta Government. "*Alberta Tier 1 Soil and Groundwater Remediation Guidelines*". January 10, 2019.

[2] Alberta Environment and Parks. "*Guidelines for Municipal Wastewater Irrigation*". April, 2000.

[3] Alberta Agriculture, Forestry and Rural Economic Development. "*Procedures Manual for the Classification of Land for Irrigation in Alberta*". 2004.

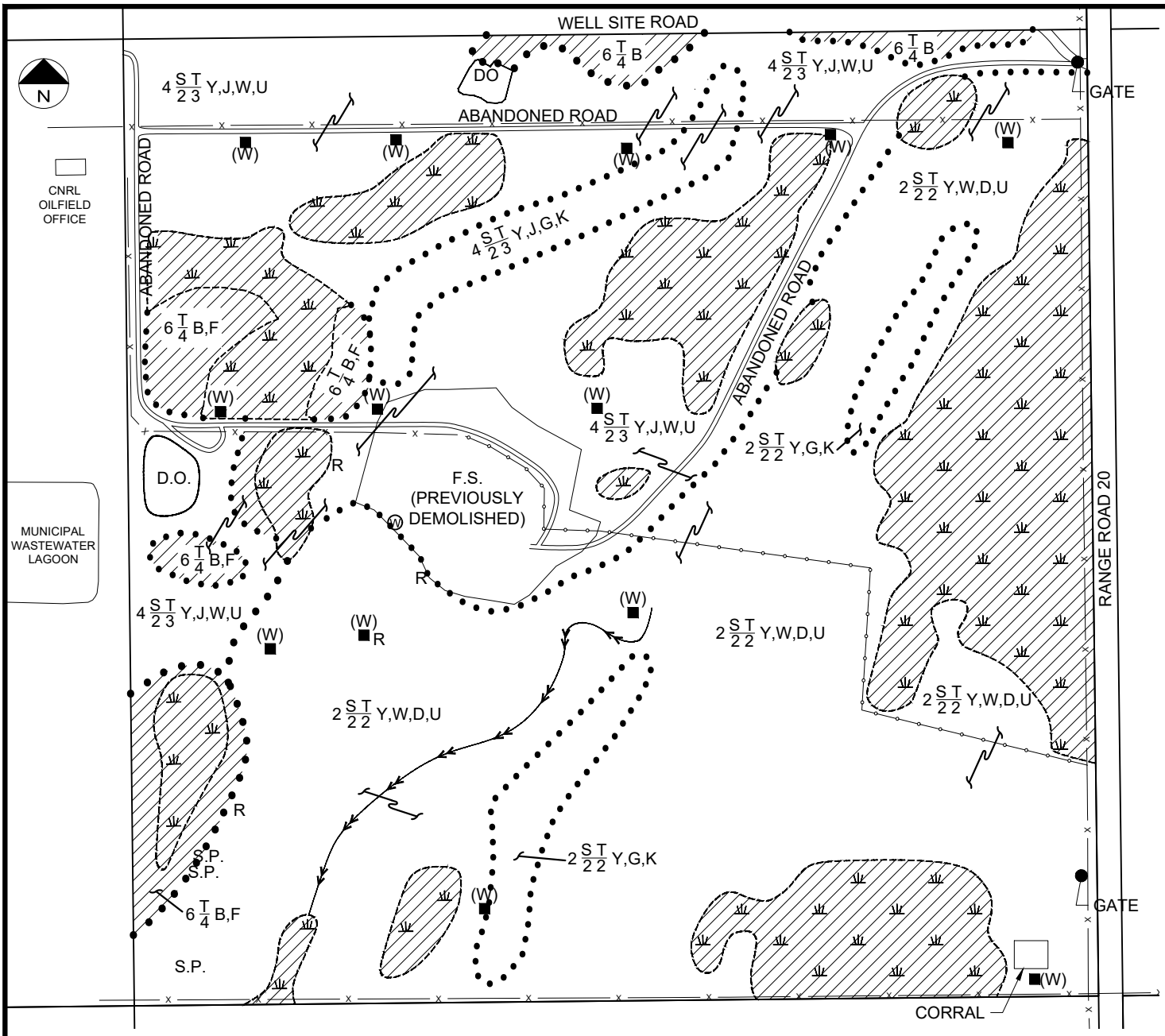
[4] Alberta Government. "*Environmental Quality Guidelines for Alberta Surface Waters*". March 28, 2018.

BOLD Result does not meet Alberta Tier 1 guidelines for agricultural land, all water uses but focussing upon irrigation use.

BOLD Result does not meet "*Guidelines for Municipal Wastewater Irrigation*" or other provincial guidelines.

APPENDIX A

Level II Land Irrigability Classification Report



SOIL SYMBOL — LAND CLASS — SOIL CATEGORY — TOPOGRAPHY SYMBOL — LIMITING FACTORS — DRAINABILITY — TOPOGRAPHY CATEGORY

$\frac{S\ T}{3\ 1}$ Y,S,M

LEGEND

- LAND CLASS BOUNDARY
- (W) RECLAIMED OILFIELD WELL SITE (APPROXIMATE LOCATION)
- Ⓦ REGISTERED GROUNDWATER WELL (APPROXIMATE LOCATION)
- EPHEMERAL DRAINAGE
- D.O. DUGOUT
- S.P. CONCRETE OR CLAY STOCKPILES (2015)
- SLOUGH OR WETLAND (NON-IRRIGABLE)
- R RUBBISH PILE
- OVERHEAD POWER LINE
- F.S. FARMSTEAD / BUILDINGS (CURRENT)
- ELECTRIC FENCE

0 50 100 150 200m

SCALE 1:5000

SOIL & FORESTRY CONSULTING

LEVEL II LAND IRRIGABILITY CLASSIFICATION

SE12-050-02 W4M

SCALE: 1:5,000	FILE NO.: SFC24-13-2A
AERIAL PHOTO: AS5404B	NO.: 140

LEGEND

LAND CLASSES

1 - Excellent irrigation capability
2 - Good irrigation capability
3 - Fair irrigation capability
4 - Restricted irrigation capability
5R - Temporarily irrigable, undergoing reclamation
5 - Nonirrigable pending further study
6 - Nonirrigable

SOIL CATEGORIES

1 - Irrigable - Excellent
2 - Irrigable - Good
3 - Irrigable - Fair
4 - Nonirrigable

TOPOGRAPHY CATEGORIES

1 - Irrigable - Gravity
2 - Irrigable - Sprinkler
3 - Irrigable - Special System
4 - Nonirrigable

SOIL LIMITATIONS

A - combination of minor soil limitations
D - low permeability/undesirable structure
E - erosion damage
K - shallow profile development
L - geological layering
M - low moisture holding capacity
N - sodicity
R - shallowness to bedrock
S - salinity
W - excessive wetness

TOPOGRAPHY LIMITATIONS

B - brush/tree cover
F - surface drainage
G - steep slopes
I - periodic flooding
J - field size, shape
P - stoniness
RB - rough-broken
U - earth moving

DRAINABILITY

X - moderately to rapidly permeable
Y - slowly permeable
Z - relatively impermeable

REMARKS

The Class 2 and Class 4 land units delineated within this quarter section are considered suitable for irrigation development. The Class 2 and Class 4 land, plus various sloughs and wetlands, are considered nonirrigable. Since the proponent intends to irrigate with municipal wastewater, buffer zone set-backs of 30 m from identified sloughs, wetlands, dugouts, a registered water well and Range Road 20 at SE12-50-02 W4M; and of 60 m from the occupied commercial oilfield offices in adjacent SW12-50-02 W4M will apply. Supporting soil profile descriptions (Appendix B) and chemical analyses (Appendix C).

2 ST Y,W,D,U
22

Irrigable, good irrigation capability. The dominantly Orthic Black Chernozemic soils are well-drained and low in salts, but imperfectly drained, Gleyed Eluviated Black Chernozemic soils occur in some scattered, low-lying areas that are susceptible to surface water ponding under prolonged, high-moisture conditions. The topsoil is *medium*, mainly loam or occasionally sandy loam, *coarse* textured, but is abruptly underlain by *fine*, mainly clay loam textured morainal sediments within the subsoil B and C layers, at 85 mm to 420 mm depths. The nearly level to gently undulating topography has complex, 0.5% to 5% slopes, best suited to be developed for irrigation by sprinkler methods. Careful irrigation management will help control build-up and spread of surplus moisture. This mixed native and improved pasture is generally found in open areas south and east of the demolished former farmstead.

2 ST Y,G,K
22

Irrigable, good irrigation capability. The dominantly Orthic Black Chernozemic soils are well-drained and low in salts. Calcareous Black Chernozemic soils, which have shallow profile development and/or lime accumulations at or near the surface, are a minor occurrence. These soils are formed in *fine* (clay loam or sandy clay loam) textured, morainal sediments, including within the topsoil, which can be *medium*, loam textured, but is generally thin (i.e. 50 mm to 120 mm thick) and eroded. Soil profile SFC24-13-6 was found by laboratory analyses to be slightly saline in the lower subsoil C layer at 500 mm to 1,000 mm depths. The ridged topography is comprised by scattered, pronounced and elongated uplands with narrow tops that have gently undulating, 2% to 5% slopes, but steep, short side slopes declining at 6% to 30%, which should be irrigated by sprinkler methods only, using machinery that can climb or descend such pronounced slopes. Careful irrigation management is required to control soil erosion under high moisture conditions, where surplus moisture could shed rapidly and run off into adjacent, low-lying areas. This mixed native and improved pasture is

generally found in open areas south and east of the demolished former farmstead.

4 ST Y,J,W,U 23 **Irrigable, restricted irrigation capability.** The soil landscapes that are assessed as Class 4 have similar soils and topography as does the first Class 2 land unit type described above, but ability to manage the application of irrigation water is restricted by adjacent natural obstacles such as sloughs/wetlands, aspen-poplar forest stands or planted trees, and steep ridges; and cultural impediments such as an overhead electrical powerline, abandoned access road, and soil stockpiles, rubble accumulations, rocks, water dugouts, and other excavations associated with the demolished former farmstead or oilfield well sites. The land that is suitable to be irrigated is cut up into small, irregularly-shaped fields where water can't be efficiently applied using conventional sprinkler systems (i.e. centre pivots or wheel-move applicators) that operate best on open and square fields. A special irrigation system design that utilizes an applicator that operates more efficiently on the difficult terrain (e.g. a stationary or travelling volume gun sprinkler) should be utilized. Soil profile SFC24-13-4 was found by laboratory analyses to be slightly saline in the lower subsoil C layer at 500 mm to 1,000 mm depths. This mixed native and improved pasture is generally found in open areas northwest of the demolished former farmstead, or else in the west margin of the quarter section. Groundwater was not encountered to 5 m depth during August 14 installation or August 29, 2024 assessment at an environmental groundwater monitoring well SFC24-13-1, located within a low-lying area approximately 50 m north of the farmstead.

6 T B,F 4 **Nonirrigable.** Such land units are currently considered nonirrigable and not farmable, due to heavy brush/tree cover and poorly drained soils. This low-lying, Class 6 land is adjacent to low-lying sloughs or wetlands scattered across the west portion of the quarter section.

6 T B 4 **Nonirrigable.** Such land units are currently considered nonirrigable, due to heavy brush/tree cover, which would need to be cleared to facilitate irrigation development.

STATISTICAL SUMMARY (Acres, approximately):

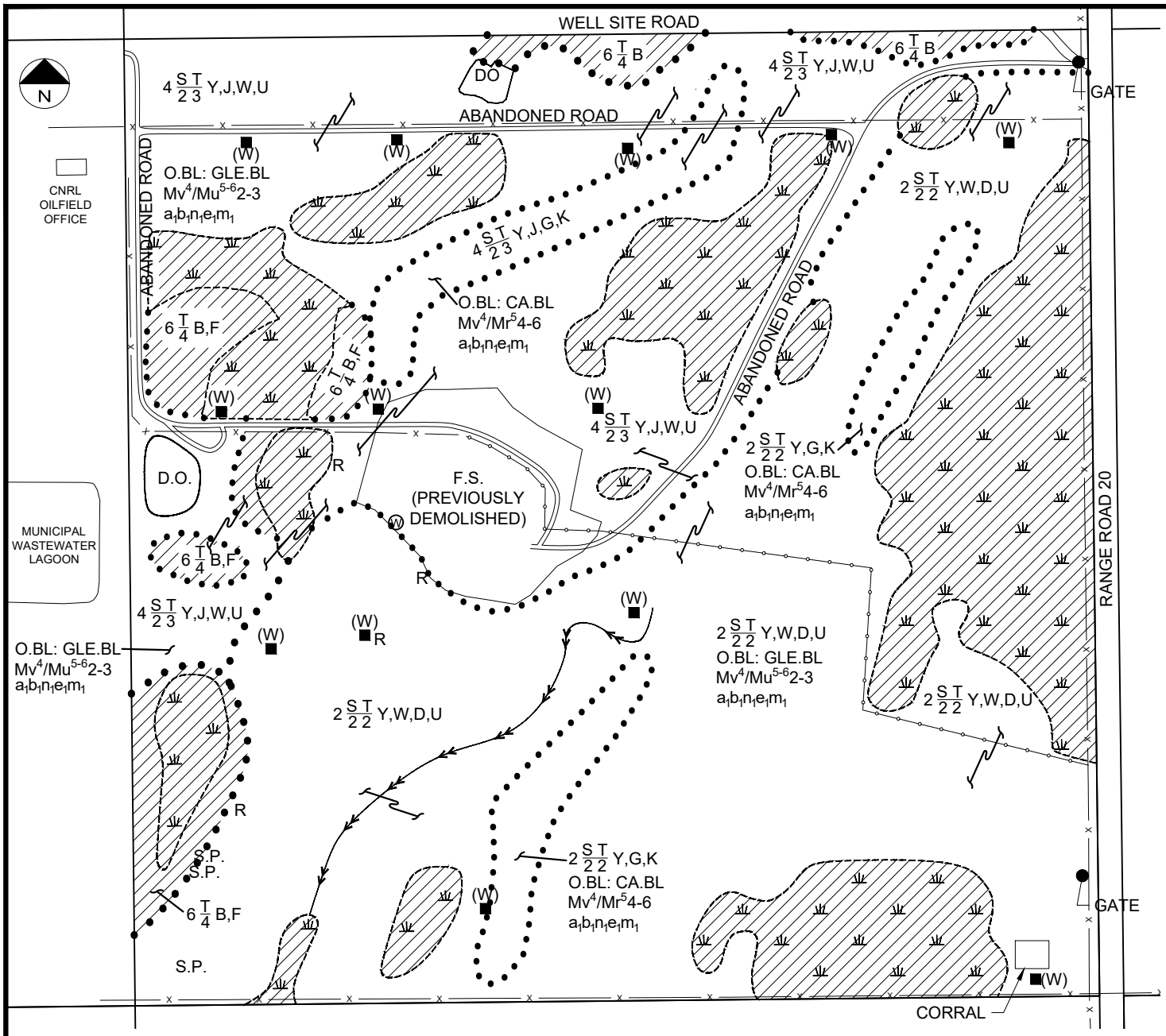
Irrigable: 63.3 Demolished former farmstead (irrigable): 5.2 Class 6 land (nonirrigable): 7.8
Sloughs (nonirrigable): 36.3 Dugouts (nonirrigable): 0.9 Set-back buffers (nonirrigable): 46.1.

ALBERTA INSTITUTE OF AGROLOGISTS — ROBERT G. PROUDFOOT, P.Ag. — SCIENTIA AD OMNIA — 727 — MEMBER

Robert G. Proudfoot

PREPARED: Robert G. Proudfoot, PAg, RPF LOCATION: SE 12-50-02 W4M

DATE: September 18, 2024



LEGEND

- LAND CLASS BOUNDARY
- (W) RECLAIMED OILFIELD WELL SITE (APPROXIMATE LOCATION)
- Ⓦ REGISTERED GROUNDWATER WELL (APPROXIMATE LOCATION)
- EPHEMERAL DRAINAGE
- D.O. DUGOUT
- S.P. CONCRETE OR CLAY STOCKPILES (2015)
- SLOUGH OR WETLAND (NON-IRRIGABLE)
- R RUBBISH PILE
- OVERHEAD POWER LINE
- F.S. FARMSTEAD / BUILDINGS (CURRENT)
- ELECTRIC FENCE

0 50 100 150 200m

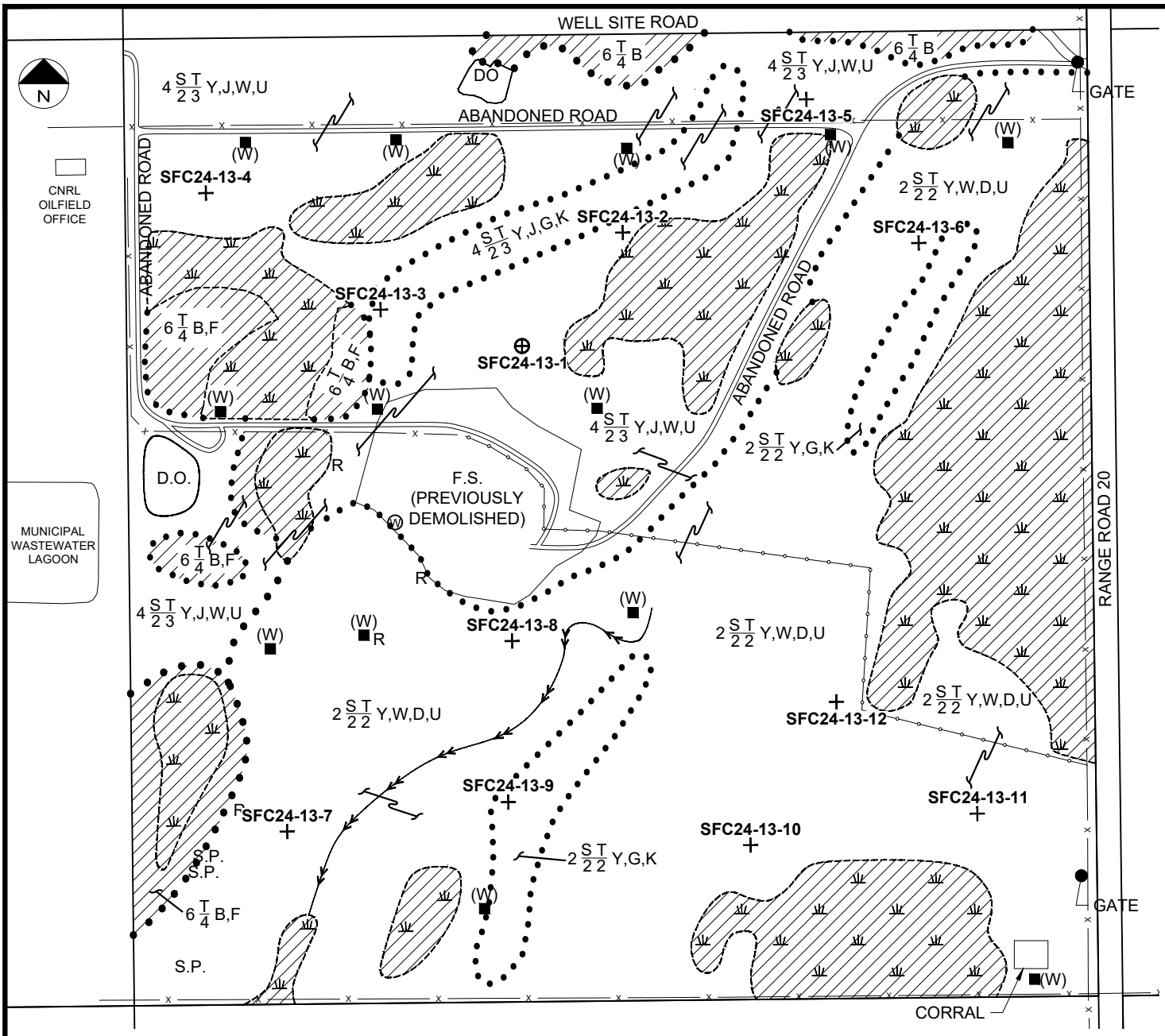
SCALE 1:5000

SOIL & FORESTRY CONSULTING

LEVEL II LAND IRRIGABILITY CLASSIFICATION

SE12-050-02 W4M

SCALE: 1:5,000	FILE NO.: SFC24-13-2B
AERIAL PHOTO: AS5404B	NO.: 140



SOIL SYMBOL — LAND CLASS — SOIL CATEGORY — TOPOGRAPHY SYMBOL — LIMITING FACTORS — DRAINABILITY — TOPOGRAPHY CATEGORY

Example: $\frac{S\ T}{3\ 1}$ 3 Y,S,M

LEGEND

- LAND CLASS BOUNDARY
- (W) RECLAIMED OILFIELD WELL SITE (APPROXIMATE LOCATION)
- × 1.5m TEST HOLE (APPROX. LOCATION)
- Ⓦ REGISTERED GROUNDWATER WELL (APPROXIMATE LOCATION)
- EPHEMERAL DRAINAGE
- ⊕ 5.0m TEST HOLE (APPROX. LOCATION)
- D.O. DUGOUT
- S.P. CONCRETE OR CLAY STOCKPILES (2015)
- SLOUGH OR WETLAND (NON-IRRIGABLE)
- R RUBBISH PILE
- OVERHEAD POWER LINE
- F.S. FARMSTEAD / BUILDINGS (CURRENT)
- ELECTRIC FENCE

0 50 100 150 200m

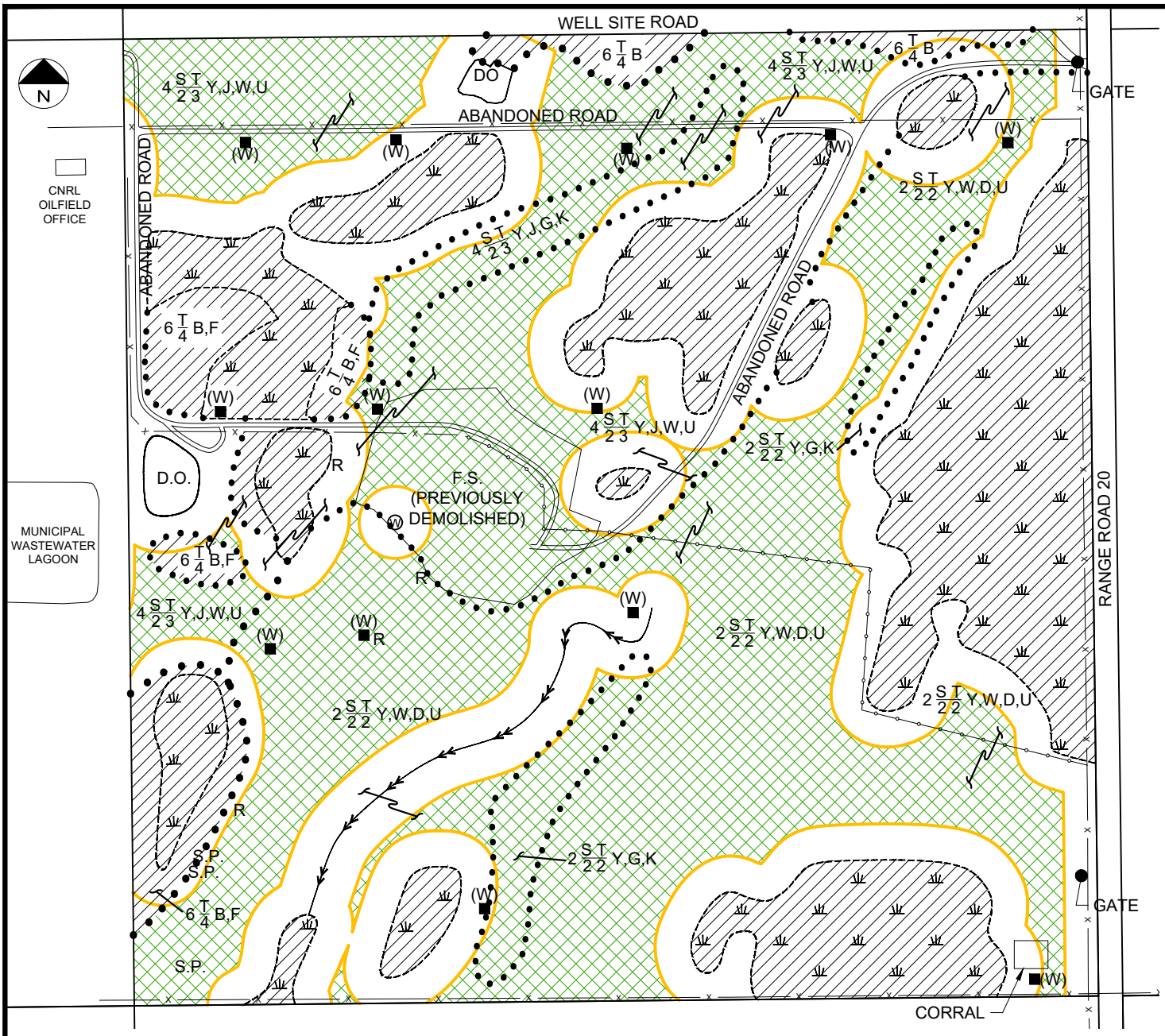
SCALE 1:5000

SOIL & FORESTRY CONSULTING

LEVEL II LAND IRRIGABILITY CLASSIFICATION

SE12-050-02 W4M

SCALE: 1:5,000	FILE NO.: SFC24-13-2C
AERIAL PHOTO: AS5404B	NO.: 140



SOIL & FORESTRY CONSULTING

LEVEL II LAND IRRIGABILITY CLASSIFICATION

SE12-050-02 W4M

SCALE: 1:5,000	FILE NO.: SFC24-13-2D
AERIAL PHOTO: AS5404B	NO.: 140

DATA SUMMARY FOR MAP UNITS
LEVEL II LAND IRRIGABILITY RE-CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

LEGAL LOCATION	LAND CLASSIFICATION						MAP UNIT DESCRIPTION				SURFACE AREA (Acres)
	Land Class	Soil Category	Topography Category	Drainability	Limitations		Soil Types	Surficial Geology	Slope Class	Salinity-Sodicity	
					Soil	Topography					
SE 12-50-02 W4M	2	2	2	Y	W, D	U	O.BL: GLE.BL	Mv^{4}/Mu^{5-6}	2 to 3	a1b1n1e1m1	38.4
	2	2	2	Y	K	G	O.BL: CA.BL	$Mv4/Mr^{5}$	4 to 6	a1b1n1e1m1	3.4
	4	2	3	Y	W	J, U	O.BL: GLE.BL	Mv^{4}/Mu^{5-6}	2 to 3	a1b1n1e1m1	17.6
	4	2	3	Y	K	J, G	O.BL: CA.BL	$Mv4/Mr^{5}$	4 to 6	a1b1n1e1m1	3.9
	Sub Total (Classified irrigable areas)										**63.3**
	Abandoned and Demolished Farmstead (irrigable)										5.2
	SUB TOTAL (IRRIGABLE AREAS)										**68.5**
	6		4			B					4.1
	6		4			B, F					3.7
	Sub Total (Classified nonirrigable areas)										**7.8**
	Sloughs and Wetlands										36.3
	Dugouts										0.9
	30 m or 60 m Setback Buffers										46.1
	Sub Total (Other nonirrigable areas)										**83.3**
	SUB TOTAL (NONIRRIGABLE AREAS)										**91.1**
	NOT INVESTIGATED AREA										**0.0**
TOTAL AREA	**TOTAL AREA (acres)**										**159.6**

APPENDIX B

Soil Profile Classifications

TABLE 1. SOIL CLASSIFICATION RESULTS
COUNTY OF VERMILLION #24 IRRIGATION PROJECT WITH MUNICIPAL WASTEWATER
LEVEL II LAND IRRIGABILITY CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

TEST HOLE SFC24-13-1 **SOIL** GLE.BL **LAND USE** Improved pasture, adjacent to low, wet area. **SLOPE** 0.5 to 2 **POSITION** lower **SLOPE** North
DATE 14-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE CLASS	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ahegj	0 to 150	SL	grayish brown	d	0 to 150	0	Mor	Eluviated. Mottled. Hard.
Btgj	150 to 300	SCL	yellow brown	d	150 to 300	0	Mor	Mottled. Very hard. Took BTEX, F1 to F4 hydrocarbon fractions, and grain size sample, as well as for salinity and particle size an.
Bm	300 to 500	SCL	brownish gray	d to m	300 to 500	0	Mor	Took extractable metals sample, as well as for salinity and particle size analyses.
Ck1	500 to 1,000	CL	yellow olive	d	500 to 1,000	0 to 1	Mor	Coal, iron, and gravel.
Cca	1,000 to 1,350	CL	yellow olive	d	1,000 to 1,350	3	Mor	Coal, iron, and gravel. $CaCO_3$.
Ck2	1,350 to 1,500	CL	orange	d	1,350 to 1,500	1	Mor	Coal, iron, and gravel. Sand lense.
Ck3	1,500 to 1,900	CL	olive gray	d		1	Mor	Coal, iron, and gravel.
Ckgj1	1,900 to 4,300	CL to C	olive dark gray	m		1	Mor	Mottled orange.
Ckgj2	4,300 to 5,000	C	dark gray	vm		1	Mor	Gleyed.

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 70x60x70 29.4 (S3)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 29.4 (S3) W, D
Topography Rating, Limitations: T2 F, U

Notes: Installed a 50 mm-diameter, environmental groundwater monitoring well to 5.2 m depth below ground surface, after drilling on August 14, 2024. Groundwater was not observed or detected on August 14, 2024 within the well or test hole.

TEST HOLE SFC24-13-2 **SOIL** O.BL **LAND USE** Native prairie, with some improved pasture tame forage species seeded in. **SLOPE** 2 to 9 **POSITION** middle **SLOPE** South
DATE 14-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 210	L	black	d	0 to 150	0	Mor	
					150 to 210			
Bm1	210 to 350	L	brown	d	210 to 300	0	Mor	
Btj	350 to 420	L	brown	d	300 to 420	0	Mor	
Bt	420 to 750	CL	yellow brown	d	420 to 750	0	Mor	
Bm2	750 to 900	CL	brown	d	750 to 900	0	Mor	
BC	900 to 1,100	CL	olive gray	d	900 to 1,100	2	Mor	$CaCo_3$. Gravel, coal, and iron.
Cca	1,100 to 1,500	CL	olive gray	d	1,100 to 1,500	3 to 4	Mor	$CaCo_3$. Gravel, coal, and iron.

GPS Coordinates:
GPS Way Point: 100x90x100 90.0 (S1)
Basic Soil Rating:
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 90.0 (S1)
Topography Rating, Limitations: T2 U

TABLE 1. SOIL CLASSIFICATION RESULTS
COUNTY OF VERMILLION #24 IRRIGATION PROJECT WITH MUNICIPAL WASTEWATER
LEVEL II LAND IRRIGABILITY CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

TEST HOLE SFC24-13-3 **SOIL** O.BL to CA.BL **LAND USE** Native pasture. **SLOPE CLASS (%)** 10 to 30 **POSITION ON SLOPE** crest **SLOPE DIRECTION** West
DATE 14-Aug-24 **SUB GROUP** toe

HORIZON	DEPTH (mm)	TEXTURE CLASS	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 80	SCL	dark gray	d	0 to 80	0	Mor	Thin and eroded topsoil horizon.
Bm(k)	80 to 150	SCL	brown	d	80 to 150	0 to 2	Mor	Thin and eroded subsoil B horizon. $CaCO_3$.
Cca	150 to 700	SCL	olive gray	d	150 to 300	4	Mor	Coal, iron, and very gravelly. $CaCO_3$.
					300 to 700			
Ck	700 to 1,500	SCL	olive gray	d	700 to 1,000	2	Mor	Coal, iron, and very gravelly.
					1,000 to 1,500			

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 90x90x80 64.8 (S2)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 64.8 (S2) K
Topography Rating, Limitations: T3 G, J

TEST HOLE SFC24-13-4 **SOIL** O.BL **LAND USE** Native pasture. **SLOPE CLASS (%)** 2 to 5 **POSITION ON SLOPE** lower to toe **SLOPE DIRECTION** South
DATE 14-Aug-24 **SUB GROUP**

HORIZON	DEPTH (mm)	TEXTURE	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 70	L	black	d	0 to 70	0	Mor	Thin and eroded, topsoil horizon.
Bm	70 to 170	L to CL	brown	d	70 to 170	0	Mor	
Bt	170 to 400	CL	brown	d	170 to 400	0	Mor	Dense and prismatic.
Cca	400 to 600	CL	olive gray	d	500 to 600	4	Mor	$CaCo_3$. Gravel, coal, and iron.
Ck	600 to 1,500	CL	olive dark gray	d	600 to 1,000	2	Mor	$CaCo_3$. Gravel, coal, and iron. Very hard and dense.
					1,000 to 1,500			

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 100x90x100 90.0 (S1)
Soil Chemical Analyses: a1b2n1e1m1 90x0.9 = 81.0 (S1)
Final Soil Rating, Limitations: 81.0 (S1) S
Topography Rating, Limitations: T3 J

TABLE 1. SOIL CLASSIFICATION RESULTS
COUNTY OF VERMILLION #24 IRRIGATION PROJECT WITH MUNICIPAL WASTEWATER
LEVEL II LAND IRRIGABILITY CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

TEST HOLE	SFC24-13-5	**SOIL**	E.BL	**LAND USE**	Native pasture.		**SLOPE**	6 to 9	**POSITION**	toe	**SLOPE** Southeast
DATE	14-Aug-24	**SUB GROUP**					**CLASS (%)**		**ON SLOPE**		**DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE CLASS	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ahe	0 to 80	SiL	dark gray	d	0 to 80	0	Mor	Thin and eluviated topsoil horizon.
Ae	80 to 140	SiL	brownish gray	d	80 to 150	0	Mor	Thin and eluviated topsoil horizon.
Bt	140 to 500	CL	brown	m	140 to 300	0	Mor	Dense and prismatic.
					300 to 500			
Bm	500 to 820	CL to L	yellow brown	m	500 to 820	0	Mor	Gravel, coal, and iron.
Cca1	820 to 1,300	CL	olive gray	m	820 to 1,000	4	Mor	Coal, iron, and gravel. $CaCO_3$.
					1,000 to 1,300			
Cca2	1,300 to 1,500	SCL	olive gray	m	1,300 to 1,500	4	Mor	Coal, iron, and gravel. $CaCO_3$.

GPS Coordinates:		
GPS Way Point:		
Basic Soil Rating:	80x70x100	56.0 (S2)
Soil Chemical Analyses:	a1b1n1ne1m1	
Final Soil Rating, Limitations:	56.0 (S2)	D
Topography Rating, Limitations:	T3	G, J

TEST HOLE	SFC24-13-6	**SOIL**	O.BL	**LAND USE**	Native pasture.		**SLOPE**	6 to 9	**POSITION**	lower	**SLOPE** Northwest
DATE	15-Aug-24	**SUB GROUP**					**CLASS (%)**		**ON SLOPE**		**DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 120	L	black	d	0 to 120	0	Mor	
Bt	120 to 420	CL	brown	d	120 to 150	0	Mor	Dense.
					150 to 420	0	Mor	
Cca	420 to 1,250	CL	olive	m	420 to 500	4	Mor	$CaCo_3$. Gravel, coal, and iron.
					500 to 1,000			
					1,000 to 1,250			
Ck	1,250 to 1,500	CL	dark olive	vm	1,250 to 1,500	2	Mor	Gravel, coal, and iron.

GPS Coordinates:		
GPS Way Point:		
Basic Soil Rating:	100x90x100	90.0 (S1)
Soil Chemical Analyses:	a1b2n1e1m1	90.0x0.9 = 81.0
Final Soil Rating, Limitations:	81.0 (S1)	S
Topography Rating, Limitations:	T3	J

TABLE 1. SOIL CLASSIFICATION RESULTS
COUNTY OF VERMILLION #24 IRRIGATION PROJECT WITH MUNICIPAL WASTEWATER
LEVEL II LAND IRRIGABILITY CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

TEST HOLE SFC24-13-7 **SOIL** O.BL **LAND USE** Native pasture. **SLOPE** 2 to 5 **POSITION** middle **SLOPE** Southwest
DATE 15-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE CLASS	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 130	L	black	d	0 to 130	0	Mor	
Btj	130 to 420	CL	brown	d	130 to 300	0	Mor	
					300 to 420			
BC	420 to 530	CL	yellow brown	d	420 to 500	2	Mor	$CaCO_3$.
					500 to 530			
Cca	530 to 1,200	CL	olive gray	d	530 to 1,000	4	Mor	Coal, iron, and gravel. $CaCO_3$.
					1,000 to 1,200			
Ck	1,200 to 1,500	CL	olive dark gray	m	1,200 to 1,500	2	Mor	Coal, iron, and gravel. $CaCO_3$.

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 100x90x100 90.0 (S1)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 90.0 (S1)
Topography Rating, Limitations: T2 U, P

Notes: There are two soil stockpiles, and several piles of rubble and debris, such broken concrete, fence wire, boulders, and waste wood. There is a metal standpipe that is approximately 100 mm in diameter and 800 mm tall above ground surface, which could be an old oil well pipe. A sign in the low, wet area to the southeast denotes a decommissioned CNRL pipeline.

TEST HOLE SFC24-13-8 **SOIL** GLE.BL **LAND USE** Native pasture. Low area. **SLOPE** 0.5 to 5 **POSITION** depression **SLOPE** North
DATE 15-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ahe	0 to 125	L	dark gray	d	0 to 125	0	Mor	Eluviated.
Btgj	125 to 400	C	grayish brown	d	125 to 150	0	Mor	Orange mottles.
					150 to 300	0		
					300 to 400	0		
Bmgj	400 to 700	CL	olive gray	m	400 to 500	0	Mor	Gravel.
					500 to 700			
Ccagj	700 to 1,200	CL	olive	m	700 to 1,000	3	Mor	$CaCo_3$. Gravel, coal, and iron. Dense. Orange mottles.
					1,000 to 1,200			
Ckgj	1,200 to 1,500	CL	olive	vm	1,200 to 1,500	2	Mor	Gravel, coal, and iron. Orange mottles. Dense.

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 70x60x100 42.0 (S3)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 42.0 (S3) W, D
Topography Rating, Limitations: T2 F, U

Notes: There is no slough at or in the vicinity of this test hole location, which is just a low area that has pasture vegetation. The site is near a shelterbelt of mature and previously planted trees (i.e. poplar, ash). The shallow drainage course is dry, and vegetated by native and tame pasture grasses or forbs. A metal standpipe, 100 mm in diameter and 800 mm tall is nearby.

TABLE 1. SOIL CLASSIFICATION RESULTS
COUNTY OF VERMILLION #24 IRRIGATION PROJECT WITH MUNICIPAL WASTEWATER
LEVEL II LAND IRRIGABILITY CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

TEST HOLE SFC24-13-9 **SOIL** O.BL **LAND USE** Native pasture. **SLOPE** 6 to 15 **POSITION** crest **SLOPE** South. Northwest
DATE 15-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE CLASS	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 50	CL	black	d	0 to 50	0	Mor	Very thin and eroded, topsoil horizon.
Bm	50 to 120	CL	grayish brown	d	50 to 120	0	Mor	Very thin subsoil B horizon,
Cca1	120 to 600	CL	pale olive gray	d	120 to 150	3	Mor	$CaCO_3$. Coal, iron, and gravel.
					150 to 300			
					300 to 500			
					500 to 600			
Cca2	600 to 1,000	CL	olive gray	d	600 to 1,000	4	Mor	Coal, iron, and gravel. $CaCO_3$.
Ck	1,000 to 1,500	CL	olive	m	1,000 to 1,500	2	Mor	Coal, iron, and gravel.

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 90x90x100 81.0 (S1)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 81.0 (S1)
Topography Rating, Limitations: T2 U, G

Notes: Site is located on a prominent ridge, south of which is a historical oilfield well that is capped below ground surface.

TEST HOLE SFC24-13-10 **SOIL** GLE.BL **LAND USE** Native pasture. Low area. **SLOPE** 2 to 5 **POSITION** toe **SLOPE** Southwest
DATE 15-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ahe	0 to 50	SiL	dark gray	d	0 to 50	0	Mor	Eluviated. Very thin topsoil horizon.
Aegj	50 to 120	SiL	gray	d	50 to 120	0	Mor	Orange mottles. Eluviated.
Btgj1	120 to 400	CL	brown	d	120 to 150	0	Mor	
					150 to 300			
					300 to 400			
Btgj2	400 to 900	CL	olive	d	400 to 500	0	Mor	Mottled blue and orange.
					500 to 900			
Ccagj	900 to 1,500	CL	olive	vm	900 to 1,000	3	Mor	Gravel, coal, and iron. Orange mottles. $CaCO_3$.
					1,000 to 1,500			

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 70x70x100 49.0 (S2)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 49.0 (S2) W, D
Topography Rating, Limitations: T2 F, U

Notes: The test hole is located within a low lying area vegetated by native and tame, pasture grasses or forbs. Willows and/or poplar trees ring low, wet slough or wetland areas that are located approximately 50 m further south.

TABLE 1. SOIL CLASSIFICATION RESULTS
COUNTY OF VERMILLION #24 IRRIGATION PROJECT WITH MUNICIPAL WASTEWATER
LEVEL II LAND IRRIGABILITY CLASSIFICATION
SE 12-50-02 W4M, NEAR BLACKFOOT, ALBERTA

TEST HOLE SFC24-13-11 **SOIL** O.BL **LAND USE** Native pasture. **SLOPE** 0.5 to 2 **POSITION** middle **SLOPE** Northeast
DATE 15-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE CLASS	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 85	CL	black	d	0 to 85	0	Mor	Thin topsoil horizon.
Bm	85 to 200	CL	yellow brown	d	85 to 150	0	Mor	
					150 to 200			
Bt	200 to 300	CL	yellow brown	d	200 to 300	0	Mor	
Cca1	300 to 600	CL	olive gray	d	300 to 500	3	Mor	Coal, iron, and gravel. $CaCO_3$.
					500 to 600			
Cca2	600 to 1,200	CL	olive	d	600 to 1,000	4	Mor	Coal, iron, and gravel. $CaCO_3$.
					1,000 to 1,200			
Cca3	1,200 to 1,500	CL	dark olive gray	m	1,200 to 1,500	4	Mor	Coal, iron, and gravel. $CaCO_3$.

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 100x90x80 72.0 (S1)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 72.0 (S1)
Topography Rating, Limitations: T2 U

Notes: Site is located approximately 50 m north of an historical oilfield well that is capped below ground surface. A metal corral and cattle shute are located approximately 75 m southeast, where cattle can be unloaded or loaded.

TEST HOLE SFC24-13-12 **SOIL** O.BL **LAND USE** Native pasture. **SLOPE** 0.5 to 2 **POSITION** middle **SLOPE** East
DATE 15-Aug-24 **SUB GROUP** **CLASS (%)** **ON SLOPE** **DIRECTION**

HORIZON	DEPTH (mm)	TEXTURE	COLOUR	MOISTURE	SAMPLE DEPTH (mm)	EFFERVESCENCE	PARENT MATERIAL	COMMENTS
Ah	0 to 90	L	black	d	0 to 90	0	Mor	Thin topsoil horizon.
Bm	90 to 200	L to CL	yellow	d	90 to 150	0	Mor	
					150 to 200			
Btj	200 to 350	CL	yellow brown	d	200 to 300	0	Mor	
					300 to 350			
Cca1	350 to 800	CL	yellow gray	d	350 to 500	3	Mor	Coal, iron, and gravel. $CaCO_3$.
					500 to 800			
Cca2	800 to 1,400	CL	olive	m	800 to 1,000	4	Mor	Gravel, coal, and iron. $CaCO_3$.
					1,000 to 1,400			
Ck	1,400 to 1,500	CL	dark olive	m	1,400 to 1,500	2	Mor	

GPS Coordinates:
GPS Way Point:
Basic Soil Rating: 100X90x100 90.0 (S1)
Soil Chemical Analyses: a1b1n1e1m1
Final Soil Rating, Limitations: 90.0 (S1)
Topography Rating, Limitations: T2 U

Notes: The test hole is located within a low lying area vegetated by native and tame, pasture grasses or forbs. Willows and/or poplar trees ring low, wet slough or wetland areas that are located approximately 50 m further east. Pasture is crossed nearby via an electric cattle fence.

APPENDIX C

Detailed Soil and Wastewater Laboratory Analyses

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

T: +1 (780) 438-5522
E: info.Edmonton@element.com
W: www.element.com

Report Transmission Cover Page

Bill To: Soil & Forestry Consulting
9228 - 60 Street
Edmonton, AB, Canada
T6B 1N1
Attn: Accounts Payable
Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Contact	Company	Address
Accounts Payable	**Soil & Forestry Consulting**	9228 - 60 Street Edmonton, AB T6B 1N1 Phone: (780) 413-9089 Fax: (780) 469-2621 Email: georann@telus.net

Delivery	Format	Deliverables
Email - Merge	PDF	COC / Invoice

Contact	Company	Address
Robert Proudfoot	**Soil & Forestry Consulting**	9228 - 60 Street Edmonton, AB T6B 1N1 Phone: (780) 465-6083 Fax: (780) 469-2621 Email: georann@telus.net

Delivery	Format	Deliverables
Email - Merge	PDF	COA / COC
Email - Merge	PDF	COC / Invoice
Email - Merge	PDF	COC / Test Report

Notes To Clients:

- All wet soil samples received in a soil bag will be disposed 30 days after receipt on 2024-09-16.

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

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E: info.Edmonton@element.com
W: www.element.com

Analytical Report

Bill To: Soil & Forestry Consulting
9228 - 60 Street
Edmonton, AB, Canada
T6B 1N1
Attn: Accounts Payable
Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-1	1753400-2	1753400-3
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-1 / Apgj/Btgj / 0-150 / mm	SFC24-13-1 / Btgj/Bm / 150-300 / mm	SFC24-13-1 / Bm / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	22	15	12	5
Ammonium - N	Available-dry basis	mg/kg	0.6	0.7	0.8	0.3
Physical and Aggregate Properties						
Texture			Sandy Loam	Sandy Clay Loam	Sandy Clay Loam	
Sand	50 µm - 2 mm	% by weight	64	48	45	0.1
Silt	2 µm - 50 µm	% by weight	18	22	23	0.1
Clay	<2 µm	% by weight	18	30	32	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.17	0.32	0.30	0.01
SAR	Saturated Paste		0.5	0.4	0.4	
% Saturation		%	50	64	54	
Calcium	Saturated Paste	meq/L	0.54	1.30	0.92	0.01
Calcium	Saturated Paste	mg/kg	5.3	16.7	9.9	
Magnesium	Saturated Paste	meq/L	0.33	0.72	0.52	0.02
Magnesium	Saturated Paste	mg/kg	2.0	5.6	3.4	
Sodium	Saturated Paste	meq/L	0.31	0.36	0.34	0.04
Sodium	Saturated Paste	mg/kg	4	5	4	
Potassium	Saturated Paste	meq/L	0.30	0.30	0.2	0.03
Potassium	Saturated Paste	mg/kg	6	8	5	
Chloride	Saturated Paste	meq/L	0.23	0.16	1.33	0.06
Chloride	Saturated Paste	mg/kg	4	4	25	
Sulfate (SO4)	Saturated Paste	meq/L	0.75	2.13	0.68	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	17.9	65.8	17.7	
Sulfate-S	Saturated Paste	meq/L	0.75	2.13	0.68	0.06
Sulfate-S	Saturated Paste	mg/kg	6.0	21.9	5.9	
Boron	Saturated Paste	mg/L			0.08	0.05
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.1	7.1	7.3	

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Analytical Report

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Attn: Accounts Payable
Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-2
Sample Date	Aug 14, 2024
Sample Time	NA
Sample Location	
Sample Description	SFC24-13-1 / Btgj/Bm / 150-300 / mm
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Particle Size Analysis - Wet Sieve						
Texture			Fine-Grained			
75 micron sieve	% Retained	% by weight	41.1			0.1
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005			0.005
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03			0.03
Methanol Field Preservation			Yes			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		19-Aug-24			
F2c C10-C16	Dry Weight	mg/kg	<25			25
F3c C16-C34	Dry Weight	mg/kg	<50			50
F4c C34-C50	Dry Weight	mg/kg	<100			100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100			100
% C50+		%	<5			
Silica Gel Cleanup						
Silica Gel Cleanup			Done			
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	9.78			

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-3
Sample Date	Aug 14, 2024
Sample Time	NA
Sample Location	
Sample Description	SFC24-13-1 / Bm / 300-500 / mm
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Antimony	Strong Acid Extractable	mg/kg	0.4			0.2
Arsenic	Strong Acid Extractable	mg/kg	7.9			0.2
Barium	Strong Acid Extractable	mg/kg	104			1
Beryllium	Strong Acid Extractable	mg/kg	0.5			0.1
Cadmium	Strong Acid Extractable	mg/kg	0.04			0.01
Chromium	Strong Acid Extractable	mg/kg	22.6			0.5
Cobalt	Strong Acid Extractable	mg/kg	9.4			0.1
Copper	Strong Acid Extractable	mg/kg	20			1
Lead	Strong Acid Extractable	mg/kg	8.5			0.1
Mercury	Strong Acid Extractable	mg/kg	0.07			0.05
Molybdenum	Strong Acid Extractable	mg/kg	<1.0			1.0
Nickel	Strong Acid Extractable	mg/kg	26.0			0.5
Selenium	Strong Acid Extractable	mg/kg	0.5			0.3
Silver	Strong Acid Extractable	mg/kg	<0.1			0.1
Thallium	Strong Acid Extractable	mg/kg	0.21			0.05
Tin	Strong Acid Extractable	mg/kg	<1.0			1.0
Uranium	Strong Acid Extractable	mg/kg	0.8			0.5
Vanadium	Strong Acid Extractable	mg/kg	31.4			0.1
Zinc	Strong Acid Extractable	mg/kg	50			1
Water Soluble Parameters						
Chromium (VI)	Dry Weight	mg/kg	<0.05			0.05

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-4	1753400-5	1753400-6
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-1 / Cki / 500-1000 / mm	SFC24-13-1 / Cca/Ck2 / 1000-1500 / mm	SFC24-13-2 / Ah / 0-150 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Loam	
Sand	50 µm - 2 mm	% by weight	38	44	42	0.1
Silt	2 µm - 50 µm	% by weight	27	25	38	0.1
Clay	<2 µm	% by weight	35	31	20	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.34	0.29	0.22	0.01
SAR	Saturated Paste		0.3	0.2	0.1	
% Saturation		%	55	52	66	
Calcium	Saturated Paste	meq/L	1.17	1.49	0.96	0.01
Calcium	Saturated Paste	mg/kg	12.9	15.5	12.8	
Magnesium	Saturated Paste	meq/L	0.67	0.73	0.59	0.02
Magnesium	Saturated Paste	mg/kg	4.4	4.6	4.7	
Sodium	Saturated Paste	meq/L	0.30	0.25	0.13	0.04
Sodium	Saturated Paste	mg/kg	4	3	2	
Potassium	Saturated Paste	meq/L	0.2	0.2	0.75	0.03
Potassium	Saturated Paste	mg/kg	5	3	20	
Chloride	Saturated Paste	meq/L	1.79	0.38	0.40	0.06
Chloride	Saturated Paste	mg/kg	35	7	9	
Sulfate (SO4)	Saturated Paste	meq/L	0.62	0.68	0.42	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	16	17.1	13	
Sulfate-S	Saturated Paste	meq/L	0.62	0.68	0.42	0.06
Sulfate-S	Saturated Paste	mg/kg	5.5	5.7	4.4	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.6	7.8	7.2	

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Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-6	1753400-7	1753400-8
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-2 / Ah / 0-150 / mm	SFC24-13-2 / Ah/Bm1 / 150-300 / mm	SFC24-13-2 / Bm1/Btj/Bt / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	14	7	<5	5
Ammonium - N	Available-dry basis	mg/kg	0.7	0.3	0.4	0.3

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Lot ID: **1753400**
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Date Received: Aug 17, 2024
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Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-7	1753400-8	1753400-9
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-2 / Ah/Bm1 / 150-300 / mm	SFC24-13-2 / Bm1/Btj/Bt / 300-500 / mm	SFC24-13-2 / Bt/Bm2/BC / 500-1000 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Loam	Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	48	44	26	0.1
Silt	2 µm - 50 µm	% by weight	32	36	44	0.1
Clay	<2 µm	% by weight	20	20	30	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.15	0.12	0.26	0.01
SAR	Saturated Paste		0.2	0.4	0.6	
% Saturation		%	55	62	61	
Calcium	Saturated Paste	meq/L	0.73	0.60	1.08	0.01
Calcium	Saturated Paste	mg/kg	8.1	7.3	13.3	
Magnesium	Saturated Paste	meq/L	0.48	0.40	0.99	0.02
Magnesium	Saturated Paste	mg/kg	3.3	3.0	7.4	
Sodium	Saturated Paste	meq/L	0.17	0.29	0.60	0.04
Sodium	Saturated Paste	mg/kg	2	4	8	
Potassium	Saturated Paste	meq/L	0.42	0.1	0.07	0.03
Potassium	Saturated Paste	mg/kg	9	3	2	
Chloride	Saturated Paste	meq/L	0.33	0.29	0.26	0.06
Chloride	Saturated Paste	mg/kg	6	6	6	
Sulfate (SO4)	Saturated Paste	meq/L	0.37	0.30	0.52	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	9.8	9.0	15	
Sulfate-S	Saturated Paste	meq/L	0.37	0.31	0.52	0.06
Sulfate-S	Saturated Paste	mg/kg	3.3	3.0	5.1	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.0	6.9	7.1	

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Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-10	1753400-11	1753400-12
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-2 / BC/Cca / 1000-1500 / mm	SFC24-13-3 / Ah/Bm 9k) / 0-150 / mm	SFC24-13-3 / Cca / 150-300 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Sandy Clay Loam	Sandy Clay Loam	
Sand	50 µm - 2 mm	% by weight	42	54	50	0.1
Silt	2 µm - 50 µm	% by weight	29	24	24	0.1
Clay	<2 µm	% by weight	29	22	26	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.56	0.52	0.32	0.01
SAR	Saturated Paste		2.1	0.3	0.4	
% Saturation		%	53	58	49	
Calcium	Saturated Paste	meq/L	1.45	3.08	1.64	0.01
Calcium	Saturated Paste	mg/kg	15.4	35.4	16.1	
Magnesium	Saturated Paste	meq/L	1.59	1.53	1.17	0.02
Magnesium	Saturated Paste	mg/kg	10.2	10.6	6.9	
Sodium	Saturated Paste	meq/L	2.55	0.51	0.42	0.04
Sodium	Saturated Paste	mg/kg	31	7	5	
Potassium	Saturated Paste	meq/L	0.06	0.2	0.06	0.03
Potassium	Saturated Paste	mg/kg	1	5	1	
Chloride	Saturated Paste	meq/L	0.57	0.74	0.56	0.06
Chloride	Saturated Paste	mg/kg	11	15	10	
Sulfate (SO4)	Saturated Paste	meq/L	1.80	0.46	0.19	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	46.0	13	4.6	
Sulfate-S	Saturated Paste	meq/L	1.81	0.46	0.19	0.06
Sulfate-S	Saturated Paste	mg/kg	15.3	4.2	1.5	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	8.0	7.5	8.1	

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-11	1753400-12	1753400-13
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-3 / Ah/Bm 9k) / 0-150 / mm	SFC24-13-3 / Cca / 150-300 / mm	SFC24-13-3 / Cca / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	0.4	0.3	0.4	0.3

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Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-13	1753400-14	1753400-15
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-3 / Cca / 300-500 / mm	SFC24-13-3 / Cca/Ck / 500-1000 / mm	SFC24-13-3 / Ck / 1000-1500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	
Sand	50 µm - 2 mm	% by weight	54	58	58	0.1
Silt	2 µm - 50 µm	% by weight	24	21	20	0.1
Clay	<2 µm	% by weight	22	21	22	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.25	0.24	0.27	0.01
SAR	Saturated Paste		0.4	0.5	0.8	
% Saturation		%	49	46	45	
Calcium	Saturated Paste	meq/L	1.05	0.93	0.83	0.01
Calcium	Saturated Paste	mg/kg	10.4	8.5	7.5	
Magnesium	Saturated Paste	meq/L	0.97	0.94	1.02	0.02
Magnesium	Saturated Paste	mg/kg	5.8	5.2	5.6	
Sodium	Saturated Paste	meq/L	0.43	0.51	0.77	0.04
Sodium	Saturated Paste	mg/kg	5	5	8	
Potassium	Saturated Paste	meq/L	0.05	0.06	0.07	0.03
Potassium	Saturated Paste	mg/kg	<1	1	1	
Chloride	Saturated Paste	meq/L	0.37	0.16	0.46	0.06
Chloride	Saturated Paste	mg/kg	7	3	7	
Sulfate (SO4)	Saturated Paste	meq/L	0.21	<0.12	0.18	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	5.1	<2.7	3.9	
Sulfate-S	Saturated Paste	meq/L	0.21	<0.12	0.18	0.06
Sulfate-S	Saturated Paste	mg/kg	1.7	<0.9	1.3	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.8	7.8	8.1	

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-16	1753400-17	1753400-18
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-4 / Ah/Bm / 0-150 / mm	SFC24-13-4 / Bm/Bt / 150-300 / mm	SFC24-13-4 / Bt/Cca / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	0.9	0.9	0.4	0.3
Physical and Aggregate Properties						
Texture			Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	38	40	42	0.1
Silt	2 µm - 50 µm	% by weight	36	28	26	0.1
Clay	<2 µm	% by weight	26	32	32	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.25	0.66	1.89	0.01
SAR	Saturated Paste		0.7	1.4	1.9	
% Saturation		%	63	67	61	
Calcium	Saturated Paste	meq/L	0.95	2.05	8.13	0.01
Calcium	Saturated Paste	mg/kg	11.8	27.6	98.9	
Magnesium	Saturated Paste	meq/L	0.70	1.77	7.20	0.02
Magnesium	Saturated Paste	mg/kg	5.3	14.3	53.0	
Sodium	Saturated Paste	meq/L	0.60	1.97	5.21	0.04
Sodium	Saturated Paste	mg/kg	9	30	73	
Potassium	Saturated Paste	meq/L	0.09	0.08	0.1	0.03
Potassium	Saturated Paste	mg/kg	2	2	3	
Chloride	Saturated Paste	meq/L	0.62	0.72	1.03	0.06
Chloride	Saturated Paste	mg/kg	14	17	22	
Sulfate (SO4)	Saturated Paste	meq/L	0.40	4.67	17.8	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	12	150	520	
Sulfate-S	Saturated Paste	meq/L	0.40	4.67	17.8	0.06
Sulfate-S	Saturated Paste	mg/kg	4.0	50.2	173	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.9	7.2	7.8	

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Analytical Report

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Attn: Accounts Payable
Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-19	1753400-20	1753400-21
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-4 / Cca/Ck / 500-1000 / mm	SFC24-13-4 / Ck / 1000-1500 / mm	SFC24-13-5 / Ahe/Ae/Bt / 0-150 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	44	40	38	0.1
Silt	2 µm - 50 µm	% by weight	26	26	34	0.1
Clay	<2 µm	% by weight	30	34	28	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	4.17	3.74	0.26	0.01
SAR	Saturated Paste		2.1	3.2	0.5	
% Saturation		%	54	61	70	
Calcium	Saturated Paste	meq/L	30.5	15.1	1.21	0.01
Calcium	Saturated Paste	mg/kg	332	184	16.8	
Magnesium	Saturated Paste	meq/L	28.0	24.6	0.88	0.02
Magnesium	Saturated Paste	mg/kg	185	181	7.4	
Sodium	Saturated Paste	meq/L	11.2	14.2	0.52	0.04
Sodium	Saturated Paste	mg/kg	141	198	8	
Potassium	Saturated Paste	meq/L	0.3	0.4	0.09	0.03
Potassium	Saturated Paste	mg/kg	7	9	2	
Chloride	Saturated Paste	meq/L	0.82	0.57	0.21	0.06
Chloride	Saturated Paste	mg/kg	16	12	5	
Sulfate (SO4)	Saturated Paste	meq/L	60.4	50.6	0.81	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	1580	1480	27.2	
Sulfate-S	Saturated Paste	meq/L	60.4	50.6	0.81	0.06
Sulfate-S	Saturated Paste	mg/kg	527	492	9.1	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4	7.9	7.0	

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-21	1753400-22	1753400-23
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-5 / Ahe/Ae/Bt / 0-150 / mm	SFC24-13-5 / Bt / 150-300 / mm	SFC24-13-5 / Bt2 / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	<0.3	0.4	<0.3	0.3

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-22	1753400-23	1753400-24
Sample Date	Aug 14, 2024	Aug 14, 2024	Aug 14, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-5 / Bt / 150-300 / mm	SFC24-13-5 / Bt2 / 300-500 / mm	SFC24-13-5 / Bm/Cca1 / 500-1000 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Loam	
Sand	50 µm - 2 mm	% by weight	23	26	46	0.1
Silt	2 µm - 50 µm	% by weight	41	40	29	0.1
Clay	<2 µm	% by weight	36	34	25	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.23	0.18	0.24	0.01
SAR	Saturated Paste		1.1	1.4	2.3	
% Saturation		%	64	59	46	
Calcium	Saturated Paste	meq/L	0.81	0.57	0.62	0.01
Calcium	Saturated Paste	mg/kg	10.3	6.8	5.7	
Magnesium	Saturated Paste	meq/L	0.59	0.42	0.47	0.02
Magnesium	Saturated Paste	mg/kg	4.6	3.0	2.6	
Sodium	Saturated Paste	meq/L	0.91	1.01	1.66	0.04
Sodium	Saturated Paste	mg/kg	13	14	18	
Potassium	Saturated Paste	meq/L	0.05	0.05	0.03	0.03
Potassium	Saturated Paste	mg/kg	1	1	<1	
Chloride	Saturated Paste	meq/L	0.26	0.38	0.24	0.06
Chloride	Saturated Paste	mg/kg	6	8	4	
Sulfate (SO4)	Saturated Paste	meq/L	0.62	0.54	0.61	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	19	15	13	
Sulfate-S	Saturated Paste	meq/L	0.62	0.54	0.61	0.06
Sulfate-S	Saturated Paste	mg/kg	6.3	5.2	4.5	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.8	7.0	7.7	

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-25	1753400-26	1753400-27
Sample Date	Aug 14, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-5 / CCa1/Cca2 / 1000-1500 / mm	SFC24-13-6 / Ah/Bt / 0-150 / mm	SFC24-13-6 / Bt / 150-300 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Sandy Clay Loam	Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	46	38	43	0.1
Silt	2 µm - 50 µm	% by weight	28	36	23	0.1
Clay	<2 µm	% by weight	26	26	34	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	3.33	0.35	0.24	0.01
SAR	Saturated Paste		1.7	0.4	0.7	
% Saturation		%	50	71	56	
Calcium	Saturated Paste	meq/L	24.5	1.41	0.65	0.01
Calcium	Saturated Paste	mg/kg	244	20.1	7.2	
Magnesium	Saturated Paste	meq/L	18.4	1.59	0.87	0.02
Magnesium	Saturated Paste	mg/kg	111	13.7	5.8	
Sodium	Saturated Paste	meq/L	7.81	0.45	0.64	0.04
Sodium	Saturated Paste	mg/kg	89	7	8	
Potassium	Saturated Paste	meq/L	<0.3	0.2	0.07	0.03
Potassium	Saturated Paste	mg/kg	<5	6	2	
Chloride	Saturated Paste	meq/L	0.43	0.38	1.24	0.06
Chloride	Saturated Paste	mg/kg	8	10	24	
Sulfate (SO4)	Saturated Paste	meq/L	44.2	0.49	0.38	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	1060	17	10	
Sulfate-S	Saturated Paste	meq/L	44.2	0.49	0.38	0.06
Sulfate-S	Saturated Paste	mg/kg	352	5.6	3.4	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	7.0	6.6	

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-26	1753400-27	1753400-28
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-6 / Ah/Bt / 0-150 / mm	SFC24-13-6 / Bt / 150-300 / mm	SFC24-13-6 / Bt/Cca / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	0.3	1.9	0.6	0.3

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-28	1753400-29	1753400-30
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-6 / Bt/Cca / 300-500 / mm	SFC24-13-6 / Ca / 500-1000 / mm	SFC24-13-6 / Cca/Ck / 1000-1500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	42	42	40	0.1
Silt	2 µm - 50 µm	% by weight	26	24	26	0.1
Clay	<2 µm	% by weight	32	34	34	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.86	4.86	4.85	0.01
SAR	Saturated Paste		0.9	1.6	1.8	
% Saturation		%	63	57	57	
Calcium	Saturated Paste	meq/L	2.68	26.0	28.3	0.01
Calcium	Saturated Paste	mg/kg	33.7	296	323	
Magnesium	Saturated Paste	meq/L	4.49	44.5	42.8	0.02
Magnesium	Saturated Paste	mg/kg	34.1	307	295	
Sodium	Saturated Paste	meq/L	1.73	9.76	10.5	0.04
Sodium	Saturated Paste	mg/kg	25	128	138	
Potassium	Saturated Paste	meq/L	0.1	0.3	0.3	0.03
Potassium	Saturated Paste	mg/kg	3	6	7	
Chloride	Saturated Paste	meq/L	0.33	0.41	0.57	0.06
Chloride	Saturated Paste	mg/kg	7	8	12	
Sulfate (SO4)	Saturated Paste	meq/L	4.90	74.9	72.0	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	148	2050	1970	
Sulfate-S	Saturated Paste	meq/L	4.90	74.9	72.0	0.06
Sulfate-S	Saturated Paste	mg/kg	49.3	683	657	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	8.0	7.5	

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-31	1753400-32	1753400-33
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-7 / Au/Btj / 0-150 / mm	SFC24-13-7 / Btj / 150-300 / mm	SFC24-13-7 / Btj/BC / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	<0.3	0.4	0.5	0.3
Physical and Aggregate Properties						
Texture			Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	26	34	44	0.1
Silt	2 µm - 50 µm	% by weight	48	31	22	0.1
Clay	<2 µm	% by weight	26	35	34	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.41	0.31	0.31	0.01
SAR	Saturated Paste		0.3	0.8	0.5	
% Saturation		%	69	58	57	
Calcium	Saturated Paste	meq/L	1.79	0.95	1.28	0.01
Calcium	Saturated Paste	mg/kg	24.8	10.9	14.7	
Magnesium	Saturated Paste	meq/L	1.45	0.92	1.19	0.02
Magnesium	Saturated Paste	mg/kg	12.2	6.4	8.3	
Sodium	Saturated Paste	meq/L	0.40	0.74	0.60	0.04
Sodium	Saturated Paste	mg/kg	6	10	8	
Potassium	Saturated Paste	meq/L	0.31	0.1	0.1	0.03
Potassium	Saturated Paste	mg/kg	8	3	3	
Chloride	Saturated Paste	meq/L	0.19	0.98	0.14	0.06
Chloride	Saturated Paste	mg/kg	5	20	3	
Sulfate (SO4)	Saturated Paste	meq/L	1.87	0.94	0.34	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	62.5	26.1	9.4	
Sulfate-S	Saturated Paste	meq/L	1.88	0.94	0.34	0.06
Sulfate-S	Saturated Paste	mg/kg	20.8	8.7	3.1	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.0	6.9	7.6	

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-34	1753400-35	1753400-36
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-7 / BC/Cca / 500-1000 / mm	SFC24-13-7 / Cca/Ck / 1000-1500 / mm	SFC24-13-8 / Aue/Btgj / 0-150 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Loam	
Sand	50 µm - 2 mm	% by weight	39	42	36	0.1
Silt	2 µm - 50 µm	% by weight	27	24	38	0.1
Clay	<2 µm	% by weight	34	34	26	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.35	0.42	0.85	0.01
SAR	Saturated Paste		0.8	1.2	2.3	
% Saturation		%	58	54	62	
Calcium	Saturated Paste	meq/L	1.36	1.22	2.53	0.01
Calcium	Saturated Paste	mg/kg	15.6	13.2	31.4	
Magnesium	Saturated Paste	meq/L	1.23	1.40	2.33	0.02
Magnesium	Saturated Paste	mg/kg	8.5	9.1	17.5	
Sodium	Saturated Paste	meq/L	0.92	1.32	3.61	0.04
Sodium	Saturated Paste	mg/kg	12	16	52	
Potassium	Saturated Paste	meq/L	0.1	0.1	0.31	0.03
Potassium	Saturated Paste	mg/kg	3	3	7	
Chloride	Saturated Paste	meq/L	0.11	0.28	0.94	0.06
Chloride	Saturated Paste	mg/kg	2	5	21	
Sulfate (SO4)	Saturated Paste	meq/L	0.69	0.99	3.03	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	19.1	25.8	90.5	
Sulfate-S	Saturated Paste	meq/L	0.69	0.99	3.03	0.06
Sulfate-S	Saturated Paste	mg/kg	6.4	8.6	30.2	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	8.2	8.1	7.3	

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-36	1753400-37	1753400-38
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-8 / Aue/Btgj / 0-150 / mm	SFC24-13-8 / Btgj / 150-300 / mm	SFC24-13-8 / Btgj/Bmgj / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	7	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	<0.3	0.6	<0.3	0.3

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-37	1753400-38	1753400-39
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-8 / Btgj / 150-300 / mm	SFC24-13-8 / Btgj/Bmgj / 300-500 / mm	SFC24-13-8 / Bmgj/Ccagj / 500-1000 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	30	40	42	0.1
Silt	2 µm - 50 µm	% by weight	30	24	22	0.1
Clay	<2 µm	% by weight	40	36	36	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	1.74	0.65	0.90	0.01
SAR	Saturated Paste		2.7	4.2	2.7	
% Saturation		%	68	62	60	
Calcium	Saturated Paste	meq/L	8.31	1.14	2.71	0.01
Calcium	Saturated Paste	mg/kg	113	14.1	32.8	
Magnesium	Saturated Paste	meq/L	6.08	0.82	2.06	0.02
Magnesium	Saturated Paste	mg/kg	49.8	6.1	15.1	
Sodium	Saturated Paste	meq/L	7.15	4.21	4.22	0.04
Sodium	Saturated Paste	mg/kg	111	60	59	
Potassium	Saturated Paste	meq/L	0.33	0.2	0.2	0.03
Potassium	Saturated Paste	mg/kg	9	4	5	
Chloride	Saturated Paste	meq/L	0.92	0.92	1.35	0.06
Chloride	Saturated Paste	mg/kg	22	20	29	
Sulfate (SO4)	Saturated Paste	meq/L	16.0	4.81	6.55	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	522	143	190	
Sulfate-S	Saturated Paste	meq/L	16.0	4.82	6.56	0.06
Sulfate-S	Saturated Paste	mg/kg	174	47.6	63.4	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.3	7.6	7.6	

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Analytical Report

Bill To: Soil & Forestry Consulting
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Attn: Accounts Payable
Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-40	1753400-41	1753400-42
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-8 / Ccagj/Ckgj / 1000-1500 / mm	SFC24-13-9 / Ah/Bm/cca / 0-150 / mm	SFC24-13-9 / Cca1 / 150-300 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	38	39	41	0.1
Silt	2 µm - 50 µm	% by weight	24	29	23	0.1
Clay	<2 µm	% by weight	38	32	36	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.96	0.60	0.47	0.01
SAR	Saturated Paste		1.6	0.3	0.9	
% Saturation		%	58	63	65	
Calcium	Saturated Paste	meq/L	4.29	3.74	2.50	0.01
Calcium	Saturated Paste	mg/kg	49.7	47.4	32.5	
Magnesium	Saturated Paste	meq/L	3.07	2.63	1.93	0.02
Magnesium	Saturated Paste	mg/kg	21.5	20.2	15.2	
Sodium	Saturated Paste	meq/L	3.16	0.51	1.35	0.04
Sodium	Saturated Paste	mg/kg	42	7	20	
Potassium	Saturated Paste	meq/L	0.2	0.33	0.2	0.03
Potassium	Saturated Paste	mg/kg	4	8	4	
Chloride	Saturated Paste	meq/L	0.65	1.36	1.00	0.06
Chloride	Saturated Paste	mg/kg	13	31	23	
Sulfate (SO4)	Saturated Paste	meq/L	8.66	0.70	0.61	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	241	21.3	19	
Sulfate-S	Saturated Paste	meq/L	8.66	0.70	0.61	0.06
Sulfate-S	Saturated Paste	mg/kg	80.2	7.1	6.3	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	8.0	7.6	7.9	

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Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-41	1753400-42	1753400-43
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-9 / Ah/Bm/cca / 0-150 / mm	SFC24-13-9 / Cca1 / 150-300 / mm	SFC24-13-9 / Cca1 / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	9	<5	7	5
Ammonium - N	Available-dry basis	mg/kg	<0.3	<0.3	1.1	0.3

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-43	1753400-44	1753400-45
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-9 / Cca1 / 300-500 / mm	SFC24-13-9 / Cca1/Cca2 / 500-1000 / mm	SFC24-13-9 / Ck / 1000-1500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	44	42	42	0.1
Silt	2 µm - 50 µm	% by weight	24	24	24	0.1
Clay	<2 µm	% by weight	32	34	34	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.17	1.14	2.19	0.01
SAR	Saturated Paste		0.8	5.2	5.4	
% Saturation		%	55	54	60	
Calcium	Saturated Paste	meq/L	0.60	1.58	2.4	0.01
Calcium	Saturated Paste	mg/kg	6.6	17.1	29	
Magnesium	Saturated Paste	meq/L	0.40	3.07	10.9	0.02
Magnesium	Saturated Paste	mg/kg	2.7	20.0	79.5	
Sodium	Saturated Paste	meq/L	0.57	7.91	13.9	0.04
Sodium	Saturated Paste	mg/kg	7	98	192	
Potassium	Saturated Paste	meq/L	0.2	0.2	0.5	0.03
Potassium	Saturated Paste	mg/kg	4	5	10	
Chloride	Saturated Paste	meq/L	0.25	1.19	1.96	0.06
Chloride	Saturated Paste	mg/kg	5	23	42	
Sulfate (SO4)	Saturated Paste	meq/L	0.40	7.57	21.7	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	10	196	627	
Sulfate-S	Saturated Paste	meq/L	0.40	7.57	21.7	0.06
Sulfate-S	Saturated Paste	mg/kg	3.5	65.3	209	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	8.2	8.4	

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Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-46	1753400-47	1753400-48
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-10 / Ahe/Aegj/Btgj / 0-150 / mm	SFC24-13-10 / Btgj1 / 150-300 / mm	SFC24-13-10 / Btgj1/Btgj2 / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	22	10	<5	5
Ammonium - N	Available-dry basis	mg/kg	<0.3	<0.3	<0.3	0.3
Physical and Aggregate Properties						
Texture			Silt Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	25	36	40	0.1
Silt	2 µm - 50 µm	% by weight	51	30	26	0.1
Clay	<2 µm	% by weight	24	34	34	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.45	0.50	0.46	0.01
SAR	Saturated Paste		0.3	0.5	2.6	
% Saturation		%	57	56	62	
Calcium	Saturated Paste	meq/L	2.34	2.30	1.38	0.01
Calcium	Saturated Paste	mg/kg	26.8	25.9	17.2	
Magnesium	Saturated Paste	meq/L	1.25	1.42	1.28	0.02
Magnesium	Saturated Paste	mg/kg	8.6	9.7	9.7	
Sodium	Saturated Paste	meq/L	0.42	0.63	3.05	0.04
Sodium	Saturated Paste	mg/kg	5	8	44	
Potassium	Saturated Paste	meq/L	0.60	0.45	0.1	0.03
Potassium	Saturated Paste	mg/kg	13	10	3	
Chloride	Saturated Paste	meq/L	1.44	2.29	0.55	0.06
Chloride	Saturated Paste	mg/kg	29	46	12	
Sulfate (SO4)	Saturated Paste	meq/L	0.75	0.73	0.92	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	20.6	19.8	27.5	
Sulfate-S	Saturated Paste	meq/L	0.75	0.73	0.92	0.06
Sulfate-S	Saturated Paste	mg/kg	6.9	6.6	9.2	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.6	7.5	8.1	

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-49	1753400-50	1753400-51
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-10 / Btgj2/Ccagj / 500-1000 / mm	SFC24-13-10 / Ccagj / 1000-1500 / mm	SFC24-13-11 / Ap/Bm / 0-150 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	44	44	26	0.1
Silt	2 µm - 50 µm	% by weight	24	22	42	0.1
Clay	<2 µm	% by weight	32	34	32	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.17	0.31	0.18	0.01
SAR	Saturated Paste		0.8	0.5	0.6	
% Saturation		%	57	55	65	
Calcium	Saturated Paste	meq/L	0.55	1.57	0.75	0.01
Calcium	Saturated Paste	mg/kg	6.3	17.2	9.8	
Magnesium	Saturated Paste	meq/L	0.36	0.92	0.59	0.02
Magnesium	Saturated Paste	mg/kg	2.5	6.1	4.6	
Sodium	Saturated Paste	meq/L	0.55	0.51	0.52	0.04
Sodium	Saturated Paste	mg/kg	7	6	8	
Potassium	Saturated Paste	meq/L	0.2	0.1	0.2	0.03
Potassium	Saturated Paste	mg/kg	3	2	5	
Chloride	Saturated Paste	meq/L	0.39	0.99	0.43	0.06
Chloride	Saturated Paste	mg/kg	8	19	10	
Sulfate (SO4)	Saturated Paste	meq/L	0.57	0.69	0.38	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	16	18.1	12	
Sulfate-S	Saturated Paste	meq/L	0.57	0.69	0.38	0.06
Sulfate-S	Saturated Paste	mg/kg	5.2	6.0	4.0	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	8.2	7.1	

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Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-51	1753400-52	1753400-53
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-11 / Ap/Bm / 0-150 / mm	SFC24-13-11 / Bm/Bt / 150-300 / mm	SFC24-13-11 / Cca1 / 300-500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Ammonium - N	Available-dry basis	mg/kg	<0.3	0.5	<0.3	0.3

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Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-52	1753400-53	1753400-54
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-11 / Bm/Bt / 150-300 / mm	SFC24-13-11 / Cca1 / 300-500 / mm	SFC24-13-11 / CCa1/Cca2 / 500-1000 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	40	44	40	0.1
Silt	2 µm - 50 µm	% by weight	26	22	28	0.1
Clay	<2 µm	% by weight	34	34	32	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.22	1.03	1.33	0.01
SAR	Saturated Paste		1.3	1.0	1.2	
% Saturation		%	61	58	58	
Calcium	Saturated Paste	meq/L	0.55	4.86	6.62	0.01
Calcium	Saturated Paste	mg/kg	6.7	56.2	77.0	
Magnesium	Saturated Paste	meq/L	0.52	4.56	6.75	0.02
Magnesium	Saturated Paste	mg/kg	3.9	31.9	47.5	
Sodium	Saturated Paste	meq/L	0.94	2.17	3.04	0.04
Sodium	Saturated Paste	mg/kg	13	29	41	
Potassium	Saturated Paste	meq/L	0.08	0.2	0.2	0.03
Potassium	Saturated Paste	mg/kg	2	3	4	
Chloride	Saturated Paste	meq/L	0.89	1.43	1.33	0.06
Chloride	Saturated Paste	mg/kg	19	29	27	
Sulfate (SO4)	Saturated Paste	meq/L	0.45	7.99	13.3	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	13	222	371	
Sulfate-S	Saturated Paste	meq/L	0.45	7.99	13.3	0.06
Sulfate-S	Saturated Paste	mg/kg	4.4	73.8	124	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.2	8.1	8.0	

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Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-55	1753400-56	1753400-57
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-11 / Cca2/Cca3 / 1000-1500 / mm	SFC24-13-12 / Ah/Bm / 0-150 / mm	SFC24-13-12 / Bm/Btj / 150-300 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	41	34	34	0.1
Silt	2 µm - 50 µm	% by weight	25	40	36	0.1
Clay	<2 µm	% by weight	34	26	30	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	1.68	0.40	0.24	0.01
SAR	Saturated Paste		1.4	0.3	0.4	
% Saturation		%	53	66	74	
Calcium	Saturated Paste	meq/L	7.79	2.14	1.04	0.01
Calcium	Saturated Paste	mg/kg	82.9	28.4	15.3	
Magnesium	Saturated Paste	meq/L	9.23	1.31	0.74	0.02
Magnesium	Saturated Paste	mg/kg	59.4	10.6	6.6	
Sodium	Saturated Paste	meq/L	4.23	0.40	0.35	0.04
Sodium	Saturated Paste	mg/kg	52	6	6	
Potassium	Saturated Paste	meq/L	0.2	0.50	0.2	0.03
Potassium	Saturated Paste	mg/kg	4	13	6	
Chloride	Saturated Paste	meq/L	1.19	0.40	0.52	0.06
Chloride	Saturated Paste	mg/kg	23	9	13	
Sulfate (SO4)	Saturated Paste	meq/L	18.9	0.94	0.67	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	483	30.0	23.6	
Sulfate-S	Saturated Paste	meq/L	18.9	0.94	0.67	0.06
Sulfate-S	Saturated Paste	mg/kg	161	10.0	7.9	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	8.3	7.5	7.9	

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Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
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Date Received: Aug 17, 2024
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Report Type: Final Report

		Reference Number	1753400-56	1753400-57	1753400-58
		Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	SFC24-13-12 / Ah/Bm / 0-150 / mm	SFC24-13-12 / Bm/Btj / 150-300 / mm	SFC24-13-12 / Btj/Cca1 / 300-500 / mm
		Matrix	Soil	Soil	Soil
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Available Nutrients						
Phosphorus	Available	µg/g	5	<5	<5	5

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Analytical Report

Bill To: Soil & Forestry Consulting
9228 - 60 Street
Edmonton, AB, Canada
T6B 1N1
Attn: Accounts Payable
Sampled By: RG Proudfoot
Company: Soil & Forestry

Project ID: SFC24-13
Project Name: COVR Migration
Project Location: Blackfoot AB
LSD: SE-12-050-02W4
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Reference Number	1753400-58	1753400-59	1753400-60
Sample Date	Aug 15, 2024	Aug 15, 2024	Aug 15, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	SFC24-13-12 / Btj/Cca1 / 300-500 / mm	SFC24-13-12 / Cca1/Cca2 / 500-1000 / mm	SFC24-13-12 / Cca2/Cca3 / 1000-1500 / mm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	42	40	34	0.1
Silt	2 µm - 50 µm	% by weight	30	26	28	0.1
Clay	<2 µm	% by weight	28	34	38	0.1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.38	0.42	0.47	0.01
SAR	Saturated Paste		0.4	0.6	0.8	
% Saturation		%	60	55	62	
Calcium	Saturated Paste	meq/L	2.05	1.73	1.59	0.01
Calcium	Saturated Paste	mg/kg	24.6	19.0	19.8	
Magnesium	Saturated Paste	meq/L	1.52	1.78	1.99	0.02
Magnesium	Saturated Paste	mg/kg	11.0	11.8	15.0	
Sodium	Saturated Paste	meq/L	0.56	0.83	1.10	0.04
Sodium	Saturated Paste	mg/kg	8	10	16	
Potassium	Saturated Paste	meq/L	0.28	0.30	0.33	0.03
Potassium	Saturated Paste	mg/kg	7	6	8	
Chloride	Saturated Paste	meq/L	0.37	0.22	0.24	0.06
Chloride	Saturated Paste	mg/kg	8	4	5	
Sulfate (SO4)	Saturated Paste	meq/L	1.70	2.11	2.67	0.06
Sulfate (SO4)	Saturated Paste	mg/kg	48.8	55.5	80.2	
Sulfate-S	Saturated Paste	meq/L	1.70	2.11	2.67	0.06
Sulfate-S	Saturated Paste	mg/kg	16.3	18.5	26.7	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	8.1	7.7	7.7	

Approved by:

Jimmy Tran
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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Methodology and Notes

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Lot ID: **1753400**
Control Number:
Date Received: Aug 17, 2024
Date Reported: Aug 22, 2024
Report Number: 3036409
Report Type: Final Report

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
1:5 Water Soluble Extraction	APHA	*	Colorimetric Method, 3500-Cr B	Aug 18, 2024	Element Edmonton - Roper Road
1:5 Water Soluble Extraction	McKeague	*	Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	Aug 18, 2024	Element Edmonton - Roper Road
Ammonium-N (Extractable) in Soil	Carter	*	Extraction of NO3-N and NH4-N with 2.0 M KCl, 6.2	Aug 20, 2024	Element Edmonton - Roper Road
Ammonium-N (Extractable) in Soil	Carter	*	Extraction of NO3-N and NH4-N with 2.0 M KCl, 6.2	Aug 21, 2024	Element Edmonton - Roper Road
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Aug 19, 2024	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Aug 19, 2024	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Aug 20, 2024	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Aug 20, 2024	Element Edmonton - Roper Road
Nutrients in General Soil	Comm. Soil Sci. Pl. Anal.	*	Modified Kelowna Soil Test, Vol 26, 1995	Aug 18, 2024	Element Edmonton - Roper Road
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	Aug 18, 2024	Element Edmonton - Roper Road
Particle Size by Wet Sieve	ASTM	*	Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing, C 117-17	Aug 18, 2024	Element Edmonton - Roper Road
Particle Size by Wet Sieve	Carter	*	Procedure for Particle Size Separation, 55.2.3	Aug 18, 2024	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Aug 18, 2024	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Aug 18, 2024	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Aug 18, 2024	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Aug 19, 2024	Element Calgary

** Reference Method Modified*

References

APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
Comm. Soil Sci. Pl.	Communications in Soil Science and Plant Analysis

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Methodology and Notes

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EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

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Report Transmission Cover Page

Bill To: Soil & Forestry Consulting
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Attn: Accounts Payable
Sampled By:
Company:

Project ID: SFC24-13
Project Name: COVR Blackfoot Wastewater Irrig.
Project Location: Blackfoot, Alberta
LSD: SW-12-050-02W4M
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1756468**
Control Number:
Date Received: Aug 30, 2024
Date Reported: Sep 6, 2024
Report Number: 3041001
Report Type: Final Report

Contact	Company	Address
Accounts Payable	**Soil & Forestry Consulting**	9228 - 60 Street Edmonton, AB T6B 1N1 Phone: (780) 413-9089 Fax: (780) 469-2621 Email: georann@telus.net

Delivery	Format	Deliverables
Email - Merge	PDF	COC / Invoice

Contact	Company	Address
Robert Proudfoot	**Soil & Forestry Consulting**	9228 - 60 Street Edmonton, AB T6B 1N1 Phone: (780) 465-6083 Fax: (780) 469-2621 Email: georann@telus.net

Delivery	Format	Deliverables
Email - Merge	PDF	COA / COC
Email - Merge	PDF	COC / Invoice
Email - Merge	PDF	COC / Test Report

Contact	Company	Address
Soil and Forestry	**Soil & Forestry Consulting**	9228 - 60 Street NW Edmonton, AB T6B 1N1 Phone: (780) 465-6083 Fax: Email: soilandforestry@gmail.com

Delivery	Format	Deliverables
Email - Merge	PDF	COA / COC
Email - Merge	PDF	COC / Invoice
Email - Merge	PDF	COC / Test Report

Notes To Clients:

- Upon receipt, sample had exceeded recommended temperature for bacterial analysis.

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Analytical Report

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Sampled By:
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Project ID: SFC24-13
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Project Location: Blackfoot, Alberta
LSD: SW-12-050-02W4M
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1756468**
Control Number:
Date Received: Aug 30, 2024
Date Reported: Sep 6, 2024
Report Number: 3041001
Report Type: Final Report

Reference Number	1756468-1
Sample Date	Aug 29, 2024
Sample Time	13:00
Sample Location	
Sample Description	SFC24-13 Lagoon Water / Treated Sewage Wastewater Effluent / 22.0 °C
Matrix	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Biochemical Oxygen Demand	5 Day	mg/L	6			4
Chemical Oxygen Demand		mg/L	40			5
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	7.11			0.025
Ammonium/Ammonia Preservation			Yes			
Dissolved Phosphorus Preservation			Yes			
Phosphorus	Dissolved	mg/L	4.48			0.05
Kjeldahl Nitrogen	Total	mg/L	11.4			0.1
Organic Carbon	Total Nonpurgeable	mg/L	45.5			0.5
Metals Dissolved						
Silicon	Dissolved	mg/L	5.46			0.05
Sulfur	Dissolved	mg/L	101			0.3
Aluminum	Dissolved	mg/L	0.004			0.002
Antimony	Dissolved	mg/L	0.0004			0.0002
Arsenic	Dissolved	mg/L	0.0027			0.0002
Barium	Dissolved	mg/L	0.007			0.001
Beryllium	Dissolved	mg/L	<0.0001			0.0001
Bismuth	Dissolved	mg/L	<0.0005			0.0005
Boron	Dissolved	mg/L	0.318			0.002
Cadmium	Dissolved	mg/L	<0.00001			0.00001
Chromium	Dissolved	mg/L	<0.0005			0.0005
Cobalt	Dissolved	mg/L	0.0005			0.0001
Copper	Dissolved	mg/L	0.0008			0.0002
Lead	Dissolved	mg/L	<0.0001			0.0001
Lithium	Dissolved	mg/L	0.050			0.001
Molybdenum	Dissolved	mg/L	<0.001			0.001
Nickel	Dissolved	mg/L	0.0034			0.0005
Selenium	Dissolved	mg/L	0.0007			0.0002
Silver	Dissolved	mg/L	<0.00001			0.00001
Strontium	Dissolved	mg/L	0.816			0.001
Thallium	Dissolved	mg/L	<0.00005			0.00005
Tin	Dissolved	mg/L	<0.001			0.001
Titanium	Dissolved	mg/L	<0.0005			0.0005
Uranium	Dissolved	mg/L	0.0053			0.0005

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Sampled By:
Company:

Project ID: SFC24-13
Project Name: COVR Blackfoot Wastewater Irrig.
Project Location: Blackfoot, Alberta
LSD: SW-12-050-02W4M
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1756468**
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Date Received: Aug 30, 2024
Date Reported: Sep 6, 2024
Report Number: 3041001
Report Type: Final Report

Reference Number	1756468-1
Sample Date	Aug 29, 2024
Sample Time	13:00
Sample Location	
Sample Description	SFC24-13 Lagoon Water / Treated Sewage Wastewater Effluent / 22.0 °C
Matrix	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Dissolved - Continued						
Vanadium	Dissolved	mg/L	0.0005			0.0001
Zinc	Dissolved	mg/L	0.002			0.001
Subsample			Lab Filtered			
Metals Total						
Mercury	Total	mg/L	<0.000005			0.000005
Microbiological Analysis						
Total Coliforms	Membrane Filtration	CFU/100 mL	2100			1
Thermotolerant (Fecal) Coliforms	Membrane Filtration	CFU/100 mL	610			1
Physical and Aggregate Properties						
Solids	Total Suspended	mg/L	4			2
Routine Water						
pH			7.85			1
Temp. of observed pH		°C	21.5			
Electrical Conductivity	at 25 °C	µS/cm	1790			1
Calcium	Dissolved	mg/L	86.5			0.2
Magnesium	Dissolved	mg/L	76.8			0.2
Sodium	Dissolved	mg/L	187			0.4
Potassium	Dissolved	mg/L	18.4			0.4
Iron	Dissolved	mg/L	0.02			0.01
Manganese	Dissolved	mg/L	0.009			0.005
Chloride	Dissolved	mg/L	176			0.4
Nitrate - N		mg/L	<0.01			0.01
Nitrite - N		mg/L	<0.005			0.005
Nitrate and Nitrite - N		mg/L	<0.01			0.01
Sulfate (SO4)	Dissolved	mg/L	304			0.9
Hydroxide		mg/L	<5			
Carbonate		mg/L	<6			
Bicarbonate		mg/L	466			
P-Alkalinity	as CaCO3	mg/L	<5			5
T-Alkalinity	as CaCO3	mg/L	383			5
Total Dissolved Solids	Calculated	mg/L	1090			1
Hardness	Dissolved as CaCO3	mg/L	532			
Ionic Balance	Dissolved	%	104			
SAR	Dissolved		3.5			

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Company:

Project ID: SFC24-13
Project Name: COVR Blackfoot Wastewater Irrig.
Project Location: Blackfoot, Alberta
LSD: SW-12-050-02W4M
P.O.:
Proj. Acct. code: SFC24-13

Lot ID: **1756468**
Control Number:
Date Received: Aug 30, 2024
Date Reported: Sep 6, 2024
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Report Type: Final Report

Reference Number	1756468-1
Sample Date	Aug 29, 2024
Sample Time	13:00
Sample Location	
Sample Description	SFC24-13 Lagoon Water / Treated Sewage Wastewater Effluent / 22.0 °C
Matrix	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	<0.001			0.001
Toluene	mg/L	<0.0004			0.0004
Ethylbenzene	mg/L	<0.0010			0.0010
Total Xylenes (m,p,o)	mg/L	<0.001			0.001

Approved by:

Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Methodology and Notes

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Lot ID: **1756468**
Control Number:
Date Received: Aug 30, 2024
Date Reported: Sep 6, 2024
Report Number: 3041001
Report Type: Final Report

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	*	Alkalinity - Titration Method, 2320 B	Sep 03, 2024	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	*	Conductivity, 2510 B	Sep 03, 2024	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	*	pH - Electrometric Method, 4500-H+ B	Sep 03, 2024	Element Edmonton - Roper Road
Ammonium-N in Water	APHA	*	Automated Phenate Method, 4500-NH3 G	Sep 05, 2024	Element Edmonton - Roper Road
Anions (Routine) by Ion Chromatography	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Sep 03, 2024	Element Edmonton - Roper Road
Approval-Edmonton	APHA		Checking Correctness of Analyses, 1030 E	Sep 04, 2024	Element Edmonton - Roper Road
BOD in water	APHA	*	BOD: 5-Day Test, 5210 B	Sep 04, 2024	Element Edmonton - Roper Road
BTEX-CCME - Water	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Aug 31, 2024	Element Calgary
Carbon Organic (Total) in water (TOC)	APHA		High-Temperature Combustion Method, 5310 B	Sep 03, 2024	Element Edmonton - Roper Road
Chemical Oxygen Demand in water	APHA	*	Closed Reflux, Colorimetric Method, 5220 D	Sep 03, 2024	Element Edmonton - Roper Road
Chloride in Water	APHA	*	Automated Ferricyanide Method, 4500-Cl- E	Sep 03, 2024	Element Edmonton - Roper Road
Coliforms - Membrane Filtration	APHA		Fecal Coliform Membrane Filter Procedure, 9222 D	Aug 31, 2024	Element Calgary
Coliforms - Membrane Filtration	APHA		Standard Total Coliform Membrane Filter Procedure, 9222 B	Aug 31, 2024	Element Calgary
Mercury (Total) in water	EPA	*	Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Sep 05, 2024	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	APHA/USEPA	*	Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.2, 200.8	Sep 03, 2024	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Sep 03, 2024	Element Edmonton - Roper Road
Metals Trace (Dissolved) in water	APHA		Hardness by Calculation, 2340 B	Sep 03, 2024	Element Edmonton - Roper Road
Metals Trace (Dissolved) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	Sep 03, 2024	Element Edmonton - Roper Road
Phosphorus - Dissolved in Water	APHA	*	Automated Ascorbic Acid Reduction Method, 4500-P F	Sep 05, 2024	Element Edmonton - Roper Road
Solids Suspended (Total, Fixed and Volatile)	APHA	*	Total Suspended Solids Dried at 103-105'C, 2540 D	Sep 05, 2024	Element Edmonton - Roper Road
Total and Kjeldahl Nitrogen (Total) in Water	ISO	*	Water Quality - Determination of nitrogen, ISO/TR 11905-2	Sep 03, 2024	Element Edmonton - Roper Road

** Reference Method Modified*

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Lot ID:	**1756468**
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Date Received:	Aug 30, 2024
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Report Type:	Final Report

References

APHA	Standard Methods for the Examination of Water and Wastewater
APHA/USEPA	Standard Methods For Water/ Environmental Protection Agency
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Upon receipt, sample had exceeded recommended temperature for bacterial analysis.

APPENDIX D

Detailed Topography Survey Map, SE 12-50-02 W4M

(Provided by MPE – a Division of Englobe)

POINT LAT/LONG DATA

POINT NUMBER	RAW DESCRIPTION	ELEVATION	LATITUDE	LONGITUDE
2408221434	SFC24 13 1	672.15	5905682.72	556104.96
2408221418	SFC24 13 2	673.82	5905790.33	556090.38
2408221402	SFC24 13 3	676.94	5905732.79	555942.95
2408221324	SFC24 13 4	673.44	5905809.84	555795.51
2408221430	SFC24 13 5	673.10	5905907.86	556229.32
2408221432	SFC24 13 6	673.13	5905771.50	556381.93
2408201995	SFC24 13 7	674.70	5905244.64	555782.84
2408221488	SFC24 13 8	672.64	5905441.14	556078.38
2408221487	SFC24 13 9	675.10	5905247.86	556038.97
2408221437	SFC24 13 10	672.41	5905304.48	556215.64
2408221435	SFC24 13 11	672.06	5905325.22	556414.38
2408221436	SFC24 13 12	671.97	5905401.32	556304.55

NOTES:

1. BOLD ITEMS INDICATE WORK TO BE COMPLETED AND LIGHT ITEMS INDICATE EXISTING CONDITIONS.
2. BOREHOLE LOCATIONS ARE APPROXIMATE ONLY.
3. THE CONTRACTOR SHALL CALL ALBERTA ONE-CALL AT 1-800-242-3447 AT LEAST THREE (3) WORKING DAYS PRIOR TO BEGINNING ANY EXCAVATION OR REMOVALS.
4. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL GAS LINE CROSSINGS WITH UTILITY COMPANY.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATE BARRICADES, CONSTRUCTION SIGNAGE, TRAFFIC CONTROL, AND FLAGPERSONS.
6. THE CONTRACTOR IS RESPONSIBLE FOR MEETING OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
7. MAINTAIN SEPARATE STOCKPILE OF SELECT CLAY MATERIAL TO BE LATER USED FOR CONSTRUCTION OF STRUCTURAL EARTHWORK FILL EMBANKMENTS FOR LAGOON CONSTRUCTION AND FOR BACKFILL AND LANDSCAPING AROUND LAGOON SITE.
8. DESLUDGE EXISTING FACULTATIVE CELL.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED (i.e. 1:1000 etc) ARE BASED ON 11"x17" FORMAT DRAWINGS

ISSUE	YY-MM-DD	REVISION

a division of Englobe

COUNTY OF VERMILLION RIVER

HAMLET OF BLACKFOOT
WASTEWATER SYSTEM UPGRADES
OPTION B - IRRIGATION

CIVIL
EXISTING AND PROPOSED IRRIGATION
CONCEPT SITE PLAN

DESIGNED	R.S., I.K.	JOB	5205-003-03
DRAWN	A.E.	SCALE	1:2000
DATE	SEPTEMBER 2024	DRAWING	C1.1B