Conservation and Reclamation Plan
Georgetown Solar Energy Project
Mossleigh, Alberta

Prepared for:

Georgetown Solar Inc.

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Version 2.0

WEST

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REPORT REFERENCE

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1 INTRODUCTION

Georgetown Solar Inc. (Georgetown Solar) is proposing the development of Georgetown Solar + Energy Storage Project, a 230-megawatt (MW) solar power facility coupled with a 100MW/200MW-hour battery energy storage system (BESS; the Project) located in Vulcan County, approximately eight kilometres northwest of Mossleigh, Alberta.

Western EcoSystems Technology, ULC (WEST), was retained to complete environmental work on the Project including an initial Conservation and Reclamation (C&R) Plan submitted to the Alberta Utilities Commission (AUC) and this update to the C&R Plan. The purpose of a C&R Plan is to include Project-specific information from a Desktop Review Assessment and Field Level Assessments, consistent with the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018a).This C&R Plan is considered a 'living' document for the duration of construction and operation. The contents of the C&R Plan will be used to assist with a Reclamation Certificate after the project ceases operation. Updates to this C&R Plan will include Project-specific information for, but not limited to:

- Land use planning
- Temporary and progressive reclamation
- Pre-disturbance site assessments (PDSA)
- Conservation planning
- Seeding planning
- Vegetation management planning
- Weed management
- Reclamation planning
- Interim monitoring site assessments (IMSA)
- Final reclamation certification
- Reclamation criteria

2 SUMMARY OF UPDATES

This C&R Plan will be updated annually, or as needed, with new information as development and reclamation progresses, PDSAs and IMSAs are completed, new approvals and/or permits are obtained, approvals and/or permits are renewed, and stakeholder input is received that influences or alters the C&R planning. After approval from the AUC, a PDSA and a Seeding Plan were completed. This C&R Plan has been updated with the results of the field surveys and reporting (Table 1).

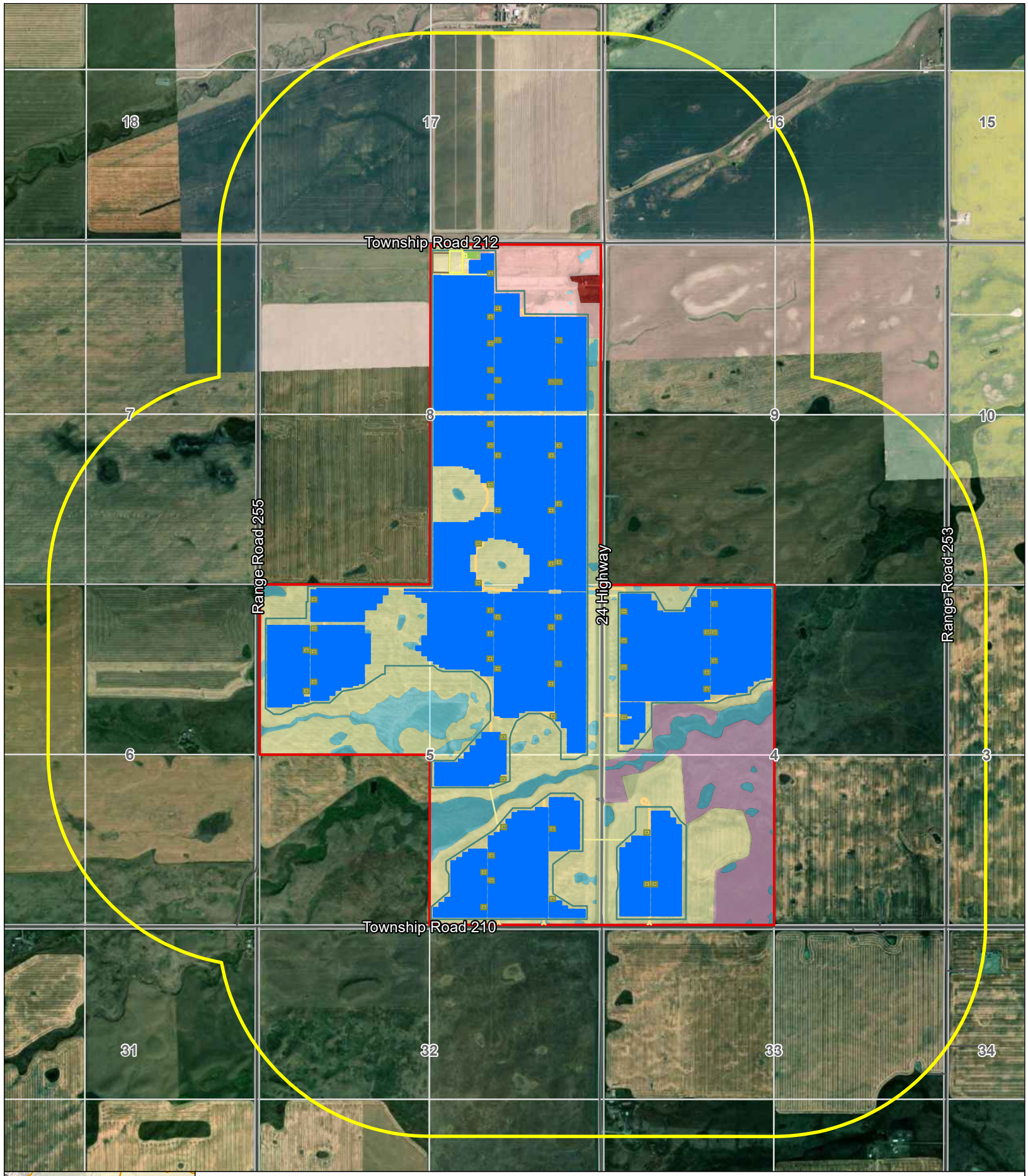
Table 1. Summary of Conservation and Reclamation Plan Updates.

Version Number	Update Summary
1	• Updated to reflect new construction schedule and in-service date and additional details on each part of the schedule. • Addition of assessment of crop residue and process for considering cover crop and spreading of straw/mulch, prior to construction to protect the soil. • Provided additional details on the process and the documents to be developed prior to the project going to bid for construction and restoration contractors.
2	• Pre-disturbance site assessments and soils summary added following field confirmation and soil analysis. • Change in approach to soil protection during construction from crop residue to pre-construction seeding. • Pre-construction seeding plan added. • Update schedule. • Reframing of Construction Plan and Operation Plan into a Vegetation Management Plan, incorporating components from both. • Removal of ambiguity between grassland, perennial grassland, and native grassland. • Updates to ensure references are current.

3 PROJECT DESCRIPTION

The Project is planned as a 230-MW, alternating current (AC), photovoltaic (PV) solar generation facility and a 100MW/200MW-hour BESS. The construction footprint for the Project is 274.9 hectares (ha), and the operational footprint is also 274.9 ha (Figure 1). The Project Footprint (i.e., the area where infrastructure installation and temporary disturbance for construction will occur) extends over seven quarter sections (northeast and southeast of Section 8; northwest, northeast, and southeast of Section 5; and northwest and southwest of Section 4-21-25 W4M). Those seven quarter sections are held for the Project and make up the Project Area.

The solar component of the Project requires installation of solar panels and associated racking and foundations, inverter and transformer stations, a collector system and substation, and access roads. The BESS requires installation of modular battery units, transformers, safety systems and controls, and an access road to be shared with the Project substation. The Project infrastructure will be surrounded by chain-linked fencing.



Project Boundary
Study Area
Quarter Section
Road

Land Cover
Agricultural
Residential
Industrial
Native /Tame Grassland
Road
Wetlands/ Watercourses
Access Road

Layout
Battery Energy Storage System
Temporary Laydown
Substation
Fenceline
Inverter
Operation and Maintenance Building
Collector Lines
Solar Panel

Figure 1. The Georgetown Solar Energy Project near Mossleigh, Alberta.

N
W E
S

0 0.1 0.3 0.4 mi
0 0.3 0.6 0.9 km

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: J. Sholtz

WEST

3.1 Project Components

- Bi-facial Solar PV Modules: Bi-facial solar panels have been selected for the Project due to the ability to receive and transform solar radiation from both the top and bottom sides.
- Racking and Mounting Systems: The solar panels will be installed on a fixed-tilt racking system mounted on screw piles, which remains at a stationary tilt angle throughout the year. The panels will range in height between 0.6 metres (m) to 2.5 m above ground level.
- Inverters/Transformer Stations: Power conversion stations that receive the direct-current (DC) power collected by the solar panels and convert it to AC power at key junction points where the stations connect to the collector system. Transformers are electrical equipment that increase the voltage of the electricity produced by the solar PV facility to connect into the Alberta Electricity System.
- Electrical Collection System: The collection system for the Project consists of underground cables connecting the inverters to a step-up transformer within the Project substation.
- Collector Substation: A main power transformer located at the Project substation will take the generated power at 34.5 kilovolts (kV) and will step up the voltage to 240 kV to connect into the Alberta Electric System.
- Battery Station: The BESS will be situated adjacent to the Project substation and will share common access.
- BESS Inverters: There will be 21 bi-directional inverters situated alongside the battery units to convert between DC and AC power.
- Interconnection: Georgetown Solar proposes to connect the Project to the existing 240-kV transmission line located north of the Project boundary. A short connection line will be required to connect the Project substation to the 240-kV transmission line. This line is planned to be located on a combination of private land participating in the Project and existing AltaLink right-of-way.
- Access Roads: To deliver and transport materials during the construction phase and to access the Project equipment for regular operations and maintenance, the Project will require construction of new access roads or upgrades to existing access where possible to minimize additional disturbance. During construction and operations, the entire Project will be fenced for security and safety reasons.

3.2 Project Schedule

The conservation and reclamation work, relative to the construction and operation of the proposed Project, is illustrated below and shows that conservation and reclamation is ongoing throughout the life of the Project and after decommissioning (Figure 2, Table 2).

It is important to note that specific conservation and reclamation measures are dependent on the final construction schedule and will, by necessity, be adaptive in consideration of time of year, soil moisture conditions, cropping, and other factors.

AUC approval was received on November 2, 2022, and then transferred to Georgetown Solar on November 28, 2023. Due to significant delays with stages 2 and 3 of the Alberta Electric System Operator interconnection studies process, a request for an extension to the construction completion date was submitted to the AUC and approved. The substation is expected to be complete by November 16, 2026. Commercial operation is expected to commence July 20, 2027 (Table 2).

Project construction is anticipated to begin in spring 2025. During construction, a third party on-site environmental inspector will ensure adherence to this C&R Plan. The environmental inspector will monitor construction activities and audit at random. They will also monitor for weeds and ensure that appropriate treatment is implemented at an appropriate time to maximize results. Clean up and reclamation activities are planned to be completed Quarter 2 to Quarter 3, 2027.

Concurrent with the end of construction, interim reclamation will occur, which involves seeding of the vegetation cover that is intended to subsist during the Operations phase of the Project. Following construction completion, implementation of the Operation Plan, and installation of the targeted vegetation cover for operations, an inspection will be completed to ensure the construction and restoration contractors have met the parameters for site conditions and seeding acceptance. Once acceptance takes place by Georgetown Solar, the site becomes operational and enters the Operations phase (Figure 2).

Monitoring for weeds and other issues (e.g., erosion, bare areas, sub-optimal vegetation establishment) will continue by a qualified third-party contractor who will be contracted by Georgetown Solar to complete vegetation stewardship and management during the Operations phase.

Once the Project has reached the end of its life, and the land is no longer required or desired for solar energy production, the site will be decommissioned. All Project infrastructure will be removed including underground cables, inverters, piles, and buildings. An assessment will be completed to ensure there are no areas of contamination (e.g., fuel spills). Any areas of contamination will be remediated to ensure contaminated soils are removed or cleaned. Soil will be moved from stockpiles and replaced anywhere soil was stripped for infrastructure, such as buildings and inverter/transformation sites. As part of soil replacement, the locations will be contoured to match the surrounding landscape. Subsequently, the site will either be converted back to annual cultivation or left with the perennial vegetation cover at the discretion of the landowner and the intended final land use. If perennial vegetation cover is to be left, areas where soils were replaced will be seeded to the same or a similar seed mix and monitored until the vegetation meets the reclamation requirements provided in *2010 Reclamation Criteria for Wellsites and Associated Facilities for Cultivated Lands* (Government of Alberta 2013).

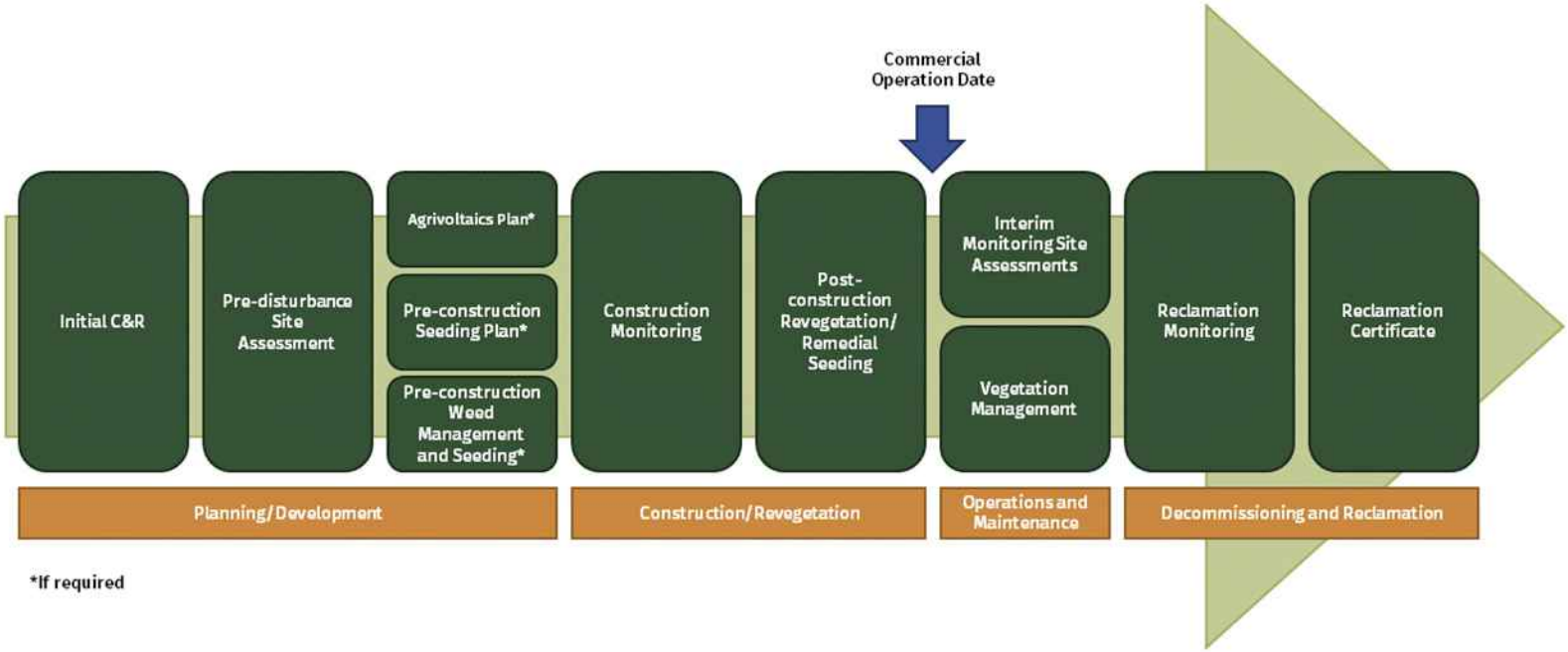
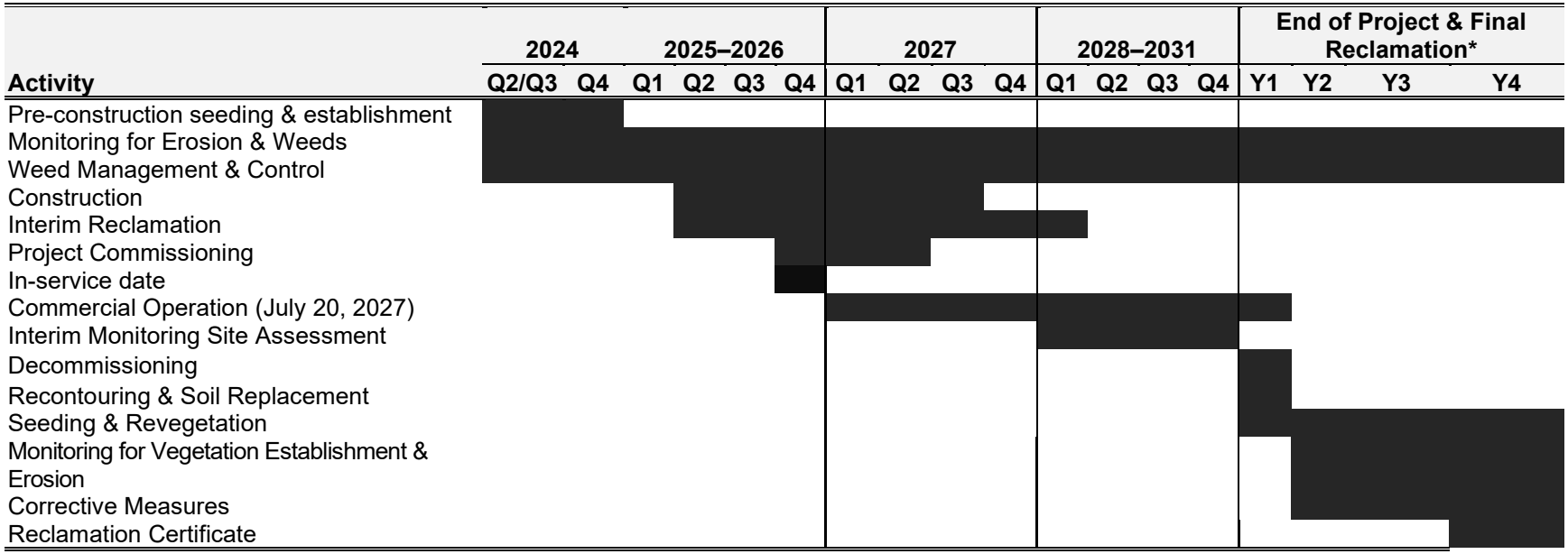


Figure 2. Life Cycle Stages for Solar Energy Groundcover Restoration.

Table 2. Preliminary timeline of the conservation and reclamation effort at the Georgetown Solar Energy Project, Mossleigh, Alberta.



* Actual dates of end of Project and final reclamation are undetermined due to opportunities to extend lease agreements and retrofit the site with new solar technology as it advances, and the progression of vegetation growth.

Q = quarter; Y = year.

4 CONSERVATION PLANNING

Conservation planning entails methods to ensure a successful reclamation outcome after the life of the Project. Conservation planning begins at the Project siting phase. The Project Area includes all lands held for the Project. The Project Footprint includes the area upon which Project infrastructure and components will be placed, or where ground will be disturbed (e.g., temporary workspaces). The following sections describe the process and activities taken during the Development/Planning stage (Figure 2).

4.1 Policy Alignment

Land-use planning and C&R planning, execution, and certification in Alberta are guided by legislation and associated regulations. Under the legislation and regulations, regional plans are developed for land use planning. To support land use and C&R planning, several directives, guides, standards, and best management practices (BMPs) have been developed and implemented.

4.1.1 Legislation and Regulations

The *Environmental Protection and Enhancement Act* (Government of Alberta 2023a) and the associated *Conservation and Reclamation Regulation* (Government of Alberta 2023b) provide the legislative authority for directing reclamation in Alberta. Under this legislation and regulation, the Government of Alberta, through Alberta Environment and Protected Areas, assures that land used for industrial activities is conserved and reclaimed.

The *Alberta Land Stewardship Act* (ALSA; Government of Alberta 2022a) provides the legal basis for regional land-use planning and the development of regional plans. The Government of Alberta can give direction and provide leadership in identifying provincial objectives, during the development of regional plans. Objectives include those that are economic, environmental, and social, in nature.

The *Municipal Government Act* (Government of Alberta 2023c) provides the legislative framework to guide the operations of municipalities. The purpose of municipalities are to provide good government; foster the well-being of the environment; provide services, facilities and/or other things deemed necessary or desirable within the municipality; develop and maintain safe and viable communities; and work collaboratively with neighbouring municipalities for coordinating inter-municipal services.

Other applicable legislation and regulations that must be adhered to include:

- *Historical Resources Act* (Government of Alberta 2022b)
- *Water Act* (Government of Alberta 2023d)

- *Weed Control Act* (Government of Alberta 2023e) and *Weed Control Regulation* (Government of Alberta 2016a)
- *Wildlife Act* (Government of Alberta 2022c) and *Wildlife Regulation* (Government of Alberta 2023f)

4.1.2 Regional Plans

Regional plans, developed under the ALSA, help plan for the future through sustainable development and coordination of decisions that balance the environment, land, species, natural resources, and human settlement, while striving to meet the reasonably foreseeable needs of current and future generations of all Albertans.

The Project is located within the boundaries of the *South Saskatchewan Regional Plan* (SSRP; Government of Alberta 2018b). The SSRP is a 10-year plan to establish and maintain growth, sustainable development, healthy environments, and thriving communities via sound regulatory and policy provisions.

The Project is consistent with the following objectives under the SSRP implementation plan:

- Economy and Renewable Energy – maintaining opportunities for the responsible development of the region's abundant renewable energy resources in support of Alberta's commitment to greener energy production, economic development, and the diversification and sustainability of industries and communities.
- Biodiversity and Ecosystems – maintaining terrestrial and aquatic species and ecosystem diversity through environmental studies and applied Project mitigations, preservation of native prairie habitats and obligate species by siting the Project on cultivated lands.
- Watershed Management – maintaining surface water quality by avoiding wetlands, named watercourses, and mitigating impacts to ephemeral, temporary, and seasonal wetlands.
- Efficient Land Use – siting the Project adjacent to transmission infrastructure to avoid unnecessary build out of new transmission lines and substation.
- Historic Resources – ensuring the identification and preservation of historic resources, artifacts, aboriginal heritage sites, and fossils through avoidance and site screenings.
- Planning Cooperation and Integration – ensuring Project information is shared with all residents, landowners, occupants, communities, government agencies, industry, and other stakeholders to ensure multiple interests are considered during Project planning and presented to regulatory agencies.

Section 33 of the Vulcan County Land Use Bylaw No. 2020-028 (Vulcan County 2021), establishes the standards for commercial renewable energy projects, within the county. Georgetown Solar has received a Municipal Development Permit from Vulcan County (Development Permit 74-2022). The Project is located on private lands currently zoned as Rural

General, a designation whose purpose is to protect the agricultural land base within Vulcan County, while allowing non-agricultural developments that complement the county's economy.

Vulcan County considers commercial scale renewable energy developments to be a discretionary use, on lands designated as Rural General (Vulcan County 2021). Feedback from Vulcan County (Exhibit 27205-X0056 Vulcan County – Georgetown AUC Submission) included concerns with establishing vegetation and mitigating soil erosion. Vulcan County has requested that the AUC condition the project to include bi-monthly meetings between Georgetown Solar and Vulcan County and require Vulcan County to review and approve vegetation and soil management plans (which includes this C&R Plan). Vulcan County also suggests the AUC and Georgetown Solar implement mitigation measures for vegetation and soils, such as weed control, sourcing and pinning of straw and manure spreading. during the construction and operation phases of the Project. Georgetown Solar is committed to ongoing collaboration with Vulcan County to ensure a successful conservation and reclamation outcome.

4.1.3 Directives, Standards, and Criteria

The following directives contain standards, BMPs, and/or criteria that the Project will implement and adhere to:

- *Wildlife Directive for Alberta Solar Energy Project*s (Government of Alberta 2017)
- *Alberta Wetland Mitigation Directive* (Government of Alberta 2018c)
- *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018a)

Additionally, the Project will follow the reclamation criteria described in the *2010 Reclamation Criteria for Wellsites and Associated Facilities for Cultivated Lands* (Government of Alberta 2013).

4.1.4 Approvals and Permits

A summary of all approvals and permits currently held for the Project, including conditions, is provided below (Table 4). This table will be updated as new approvals and/or permits are acquired or renewed.

Table 4. Approval and permits.

Approval/Permit Type and Number	Conditions
AUC Power Plant Decision (27205-D01-2022)	Engagement in good faith with the County to address concerns in relation to vegetation, soil management, and related matters.
AUC Power Plant Approval (28586-D02-2022)	None relevant
AUC Substation Permit and Licence (28586-D03-2022)	None relevant
Vulcan County Development Permit 74-2022	CONSTRUCTION • Any permits or approvals, if required by Alberta Environment, shall be obtained, and a copy submitted to the County. • The applicant is solely responsible to obtain and comply with any other required Municipal, Provincial or Federal government permits, approvals, or licenses. • Shall submit a decommissioning Plan, which includes (but not limited to), a recycling and reclamation component, as it relates to the Decommissioning Standards of the day. Vulcan County and the owner/operator shall conduct a review of the Decommissioning Plan every 5 years to ensure the plan is to the standards of the day, and submit an updated copy for Vulcan County's files. • To limit the introduction of weeds and prevent the pathogen Clubroot being introduced into Vulcan County, construction equipment and employee vehicles shall be inspected as they arrive on site and upon failing inspection, be cleaned, and re-inspected prior to being allowed on site. • Appropriate trash bins to be located on site; no garbage to be imported to the site; and all seasonal shut down garbage, recyclables and used oil are to be removed to an approved disposal facility. • On site weed control shall be provided for the lifespan of the development. • Soil reclamation will be required if contamination occurs. OPERATIONS • Must enter Vulcan Country's Dust Abatement Program and remain enrolled until such a time the Director of Operations is satisfied dust abatement is not required. • Prior to development commencement, a copy of the Stormwater Management Plan be submitted to Vulcan County which shall include a copy of the approval from Alberta Environment and Parks and any other provincial agencies (if required). GENERAL • The applicant must work with Administration in the development of the Vegetation Management Plan, and ensure that meetings will continue, on a monthly basis, throughout construction and operation of the development. • The final Conservation and Reclamation Plan and the Vegetation Management Plan must be submitted to and approved by the Director of Agriculture Services prior to construction commencement.

AUC = Alberta Utilities Commission.

4.1.5 Best Management Practices

As part of conservation planning, an Environmental Protection Plan was completed for the Project (WEST 2022). BMP and mitigation measures relevant to soils, vegetation, wetlands and general BMPs include the following:

4.1.5.1 Soils

- Minimize disturbed area by maximizing use of existing roads.
- Where new access roads are required, minimize the number, length, and area.
- Construction will be conducted under dry or frozen ground conditions to limit the potential for soil disturbance and compaction, or rig matting will be used.
- Construction will not occur during or after high rainfall events when soil is wet and risk of compaction is increased, unless low tire pressure equipment, tracked equipment, or rig matting will be used.
- The Environmental Monitor will inspect the construction area regularly for excessive rutting and compaction.
- Compacted areas will be paratilled or harrowed, and rutted areas will be bladed smooth.
- Minimal surface disturbance techniques, such as matting, reduced soil stripping, frozen construction, minimized fencing, and reduced road grades, will be implemented and followed, where applicable.
- Underground boring will be used to place collector lines across Highway 24 and the watercourse located in the SE-05-21-25W4M.
- Erosion and sediment control measures will be implemented where necessary (e.g., straw bales, silt fencing).
- The majority of collector system, as illustrate in Figure 1, will be ploughed in to further minimize soil handling.
- For short areas of collector line, tie-in areas at inverter stations and the collector substation, each extremity of underground bores, and other small areas that may require excavation, trenching installation will be required using a small (30–46 centimeter [cm] wide) bucket on a small rubber-tired backhoe. Soils will be salvaged from these areas prior to trenching/excavation.
- Topsoil and subsoil will be salvaged from trenched areas of collector lines, inverter stations, substation and BESS station. Topsoil and subsoil will be stored separately.
- Subsoil and topsoil will be replaced following backfill of the excavated areas.
- At the substation and BESS station, topsoil and subsoil will be salvaged and stockpiled in a location determined by the Construction Manager and Vegetation Reclamation Manager (VRM).
- Grading under panels will be limited to localized areas such as knolls and depressions with slopes exceeding racking tolerances. Topsoil and subsoil will be salvaged prior to grading. After grading, subsoil and topsoil will be replaced and the location revegetated.

- Depressions (i.e. ephemeral waterbodies) will not be filled in without prior Water Act approval.
- If topsoil needs to be sourced, it will be sourced locally.
- Material stockpiles will be sheltered from wind erosion or dust suppressants (e.g., being sprayed with water) will be used to minimize wind erosion. Seeding of stockpiles will be used for long term soil storage where applicable.

4.1.5.2 Vegetation

- Development and implementation of a pre-construction seeding plan.
- Minimize soil disturbance, soil salvage, and soil handling to reduce germination and spread of weed seeds in the seedbank.
- Construction equipment and employee vehicles should arrive to the construction site clean and free of soil or plant debris.
- The EPC contractor will inspect equipment as it arrives at site. Any equipment failing inspection will need to be cleaned and re-inspected before being allowed onto the site. A third-party Environmental Monitor(s) will audit equipment inspections to ensure compliance.
- Herbicides will be used in consultation with the Construction Manager and the VRM and if used, not used within 30 m of an open water body (consistent with the *Weed Control Act* [Government of Alberta 2023e]).
- Vegetation clearing will be limited to the minimum amounts required for construction and operation and only where soils must be stripped (substation, site, operations and management site, roads, inverters).
- Construction areas will be clearly marked before clearing to avoid accidental vegetation removal.
- Areas where vegetation has been accidently removed or damaged will be re-planted with similar species.
- Revegetation will occur as soon as practicable.
- Disturbed areas that will not be impacted by ongoing construction activities (e.g., high traffic areas), terrestrial soil surfaces will be protected within 14 days of clearing by seeding cover crop (i.e., annual grass seed species, such as winter wheat [*Triticum aestivum*]), temporary erosion control blankets, or any combination of temporary erosion control installed as a system fit for the terrain and drainage patterns of the disturbed area.

4.1.5.3 Wetlands and Waterbodies

- Low tire pressure equipment, tracked equipment, or rig matting will be used to reduce the potential for adverse effects to soil quality and amphibians when working within 100 m seasonal or higher-classed wetlands.
- *Water Act* (Government of Alberta 2023d) approval will be obtained prior to any impacts to wetlands and ephemeral waterbodies.

- Wetland setbacks will be marked in advance of construction activities.
- Construction activities will not occur inside of the wetland setbacks between April and September.
- Construction within the wetland setbacks to only occur between October and March and low tire pressure equipment, tracked equipment, or rig matting will be used, or under dry/frozen conditions.
- Erosion and sediment control products will be erected around all wetlands between the wetland and construction activities.
- Erosion and sediment control products will protect seasonal and higher-classed wetlands within 100 m of the Project Footprint from temporary soil placement and construction site surface water flow from bare and eroding soils (all bare soil is planned to be stabilized with cover crop).
- Snow removal will not occur within setbacks of waterbodies or wetlands.
- Snow will not be placed within waterbodies during removal.

4.1.5.4 General

- A spill and leaks protocol will be followed to prevent, minimize and clean up any spills or leaks that may cause contamination of soils.
- Emergency spill kits will be kept onsite.
- Hazardous materials will be stored in appropriate locations and disposed of by authorized means.
- If a spill occurs, work will cease in the spill area and the appropriate authorities notified. Efforts will be made to control the spill. The Construction Manager and Environmental Advisor will be notified immediately.
- Hazardous materials will be appropriately labelled in accordance with applicable regulations and stored in designated areas with appropriate safety measures as outlined in the spill management and prevention plan.
- All fuel storage and equipment servicing areas will be located at least 100 m away from any wetland and/or waterbody.
- All garbage, construction materials, debris, and hazardous waste will be contained and disposed of by authorized and approved off-site vendors.
- Georgetown Solar will develop and implement a stormwater management plan prior to the start of construction.
- Snow will be removed from construction areas, where necessary, to provide safe working conditions and/or to expose soils for grading and excavation.
- Snow removal equipment will remain within the Project Footprint and access roads.

When solar array construction has been completed, perennial grassland seed mixes will be planted to stabilize the disturbed workspace around each array (in alleys and under panels). Following construction, Georgetown Solar will be responsible for establishing and maintaining

perennial grassland vegetation in the entirety of the restoration footprint. This restoration vegetation will be expected to perform the following functions for the life of the Project:

- Protect the structural integrity of the solar facility structural features through uniform soil stability lacking erosion rills and gullies.
- Withstand drought and the need for supplemental watering through deep root systems.
- Build soil health and maintain a competitive advantage against noxious weed establishment through maintenance practices, which maintain healthy above- and below-ground plant biomass.
- Provide nesting habitat to ground-nesting songbirds.
- Create pollinator-friendly habitat.
- Provide suitable grazing opportunities for sheep.
- Provide opportunities for seed harvesting.

While grassland seed mixes are not required for disturbances to areas that were previously not grassland, such mixes will be used to provide the vegetation restoration functions listed above. All grassland seed mixes will be selected such that maximum height without cutting or mowing will not significantly interfere with panels and production.

4.2 Adaptive Management

During the conservation and reclamation of a project, site conditions may be encountered that were not anticipated, or new approval/permit conditions may be imposed. Adaptive management allows the opportunity to develop, modify, and update the reclamation techniques or strategies as the Project is developed and becomes operational. Adaptive management will be implemented throughout all phases of the Project (i.e., construction, operation, decommissioning, reclamation) based on the results of monitoring programs (e.g., IMSA). As part of adaptive management, this C&R Plan will be regularly updated with information from the IMSA.

The IMSA is intended to monitor the Project Area for alignment with conservation and reclamation targets, including, but not limited to, soil stability, revegetation, and weeds. During an IMSA, factors that may be affecting the meeting of targets should be identified, if possible. IMSA results will be incorporated into future updates of this C&R Plan to inform changes to mitigation measures, BMPs, or reclamation techniques (e.g., weed control, erosion control, soil salvage and handling, revegetation techniques, seed mixes). Updates based on IMSA data will be applied to future reclaimed areas.

Adaptive management will also allow Georgetown Solar to incorporate:

- the latest advancements in reclamation strategies and techniques;
- new technologies and machinery;
- results from applicable regional research programs;

- experience of other projects in the area;
- ongoing stakeholder feedback and consultation; and
- new reclamation criteria established for the region.

Any variances that occur between this C&R Plan and the activities/plans that are implemented during construction to address variances will be documented in updated versions of this C&R Plan.

4.3 Baseline Conditions

The Project Area is located primarily in the Foothills Fescue Natural Subregion, with a small portion in the Mixedgrass Natural Subregion of the Grassland Natural Region (Natural Regions Committee 2006). Key features of the Foothill Fescue Subregion include nearly level cultivated plains with rolling to hummocky uplands (Natural Regions Committee 2006). Native grassland communities are abundant with little forested or shrubby areas. Trees and shrubs can be found in poorly drained depressions and along rivers. Key features of the Mixedgrass Subregion include intensively cultivated areas dominated by fertile soils and scattered prairies (Natural Regions Committee 2006). Shrub communities are predominantly found in depressions, ravines, coulees and northerly aspects. Trees and tall shrubs are generally absent, except adjacent to rivers. Land use in the Project Area is dominated by agricultural activity. Native grassland and tame grassland areas are used for grazing livestock. Shallow oil and gas exploration and development is common in the Mixedgrass Subregion and significant in the Foothills Fescue Subregion, with extensive wellsite, pipeline, and access infrastructure (Natural Regions Committee 2006).

The Project Area is situated in cultivated cropland (80%) and native grassland (7%). Several small- to medium-sized wetlands also occur, composing 5% of the Project Area. The Project was sited to access the existing transmission infrastructure north of the Project Area, existing access roads, relatively level topography, and cultivated lands.

Wildlife and wildlife habitat and wetland field studies were completed by WEST during 2020 and 2021. These studies informed the Project design and layout and the Project schedule in consideration of mitigating adverse effects to environmental features. WEST conducted a wildlife assessment and prepared a post-construction monitoring plan, both of which were submitted to Alberta Environment and Parks for a referral report.

4.3.1 Baseline Soils

A desktop assessment was completed using the Agricultural Regions of Alberta Soil Inventory Database. The Alberta Soil Information Viewer was used to identify the soil series and subgroups present within the Project Area (Government of Alberta 2016b). This information was used to inform the PDSA, which was completed October 10 to 21, 2023 (Appendix A). The PDSA was completed in alignment with the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018a).

The Project Area is composed of Chernozemic and Gleysolic soils, heavily disturbed by agriculture activities. Seventeen soil series are identified within the Project Area, comprising seven subgroups: Orthic Black Chernozem, Calcareous Black Chernozem, Gleyed Black Chernozem, Rego Black Chernozem, Orthic Dark Brown Chernozem, Orthic Humic Gleysol, and Rego Humic Gleysol (Table 3).

Topsoil and subsoil salvage depths average between 11–40 cm and 12–59 cm, respectively (Appendix A). Soil is not salvaged under the solar arrays. Soil needs to be salvaged under impervious surfaces (e.g., inverters, substation, access roads). Topsoil also needs to be salvaged under subsoil storage piles and from temporary laydown areas.

Table 3. Soil series and Agriculture Region of Alberta Soil Inventory Data.

Soil Series	Soil Subgroup	Parent Material	Drainage[1]	Calcareousness	Salinity
Balzac-ZZSA	Rego Humic Gleysol	Glaciolacustrine over Till[2]	Poorly	Strongly	Strong to very strong
Delacour	Orthic Black Chernozem	Morainal Till	Well	Moderately	Non to very weak
Delacour-CA	Calcareous Black Chernozem	Morainal Till	Well	Moderately	Non to very weak
Delacour-GL	Gleyed Black Chernozem	Morainal Till	Imperfectly	None	Non to very weak
Midnapore	Orthic Black Chernozem	Glaciofluvial	Well	Strongly	Non to very weak
Midnapore-CA	Calcareous Black Chernozem	Glaciofluvial	Well	Moderately	Non to very weak
Midnapore-XT	Orthic Black Chernozem	Glaciofluvial	Well	Strongly	Non to very weak
Midnapore-ZR	Rego Black Chernozem	Glaciofluvial	Well	Strongly	Non to very weak
Nose Creek-AA	Rego Black Chernozem	Morainal Till	Well	Moderately	Moderately
Pulteney	Orthic Dark Brown Chernozem	Morainal Till	Well	Moderately	Non to very weak
Readymade	Orthic Black Chernozem	Morainal Till	Well	Moderately	Non to very weak
Rockyview	Orthic Black Chernozem	Glaciolacustrine	Well	Strongly	Non to very weak
Rockyview-CA	Calcareous Black Chernozem	Morainal Till/ Glaciolacustrine	Well	Very Strongly	Non to very weak
Whitney	Orthic Dark Brown Chernozem	Glaciolacustrine	Well	Moderately	Non to very weak
Whitney-GL	Gleyed Dark Brown Chernozem	Glaciolacustrine	Well	Moderately	Non to very weak
Whitney-XC	Orthic Dark Brown Chernozem	Glaciolacustrine	Moderately	Moderately	Non to very weak
Misc. Gleysol	Orthic Humic Gleysol	Undifferentiated Mineral/Morainal Till	Poorly	None	None

Source: Agriculture Region of Alberta Soil Inventory Database (Government of Alberta 2016b)

[1] Drainage Class: Poorly – water removed so slowly versus supply that soil remains wet for a large part of the time it is not frozen; Imperfectly – water is removed slow enough versus supply to keep its wet for a significant part of the growing season; Well – water is removed readily versus supply, but not rapidly; Rapidly – water is removed rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Soils have low available water storage capacity.

[2] Site is disturbed.

4.3.2 Vegetation and Wetlands

WEST conducted a wetland and vegetation assessment, consisting of both desktop review and a field survey.

4.3.2.1 Methods

4.3.2.1.1 Desktop

A desktop delineation was conducted to identify and delineate the wetland boundaries identified in historical and recent aerial photographs and satellite imagery, as outlined in the *Alberta Wetland Identification and Delineation Directive* (Government of Alberta 2015a). Google imagery from 1949, 1962, 1967, 1989, 1997, 2004, 2009, 2012, 2013, and 2015 was used, as well as current (2020) imagery from Google and Esri (2020).

4.3.2.1.2 Field

A field assessment was conducted between June 1 to 2, 2021, to confirm and clarify the presence of the wetlands identified in the desktop study. Per the *Alberta Wetland Identification and Delineation Directive* (Government of Alberta 2015a), the boundary of the wetland is identified by the primary indicators, which are vegetation and soil characteristics that can be reliably used to indicate the presence of a wetland. Since the land use within the Project Area was agricultural and the land had been cultivated, in many cases the vegetation indicators were unclear or not present. Soil indicators (e.g., mottling, gleying) were used to confirm the boundary and presence of wetlands in the absence of vegetation. Some wetlands were also classified as ephemeral/temporary waterbodies. This was due to the lack of vegetation indicators with strong soil indicators, providing evidence to not rule them out as a temporary wetland class. Wetland surveys for the *Water Act* application will be completed in 2022. Classification followed the *Alberta Wetland Classification System* (Government of Alberta 2015b). If present, wetland plants were identified to species. Weeds and invasive species were also recorded, if observed. Photographs were also taken to illustrate the site conditions of the wetland.

4.3.2.2 Results

The field surveys identified 83 wetlands within the Project Area: 16 seasonal graminoid marshes, 43 temporary graminoid marshes, 7 ephemeral/temporary graminoid marshes, and 17 ephemeral waterbodies (Figure 3). One small permanent watercourse, one intermittent watercourse, and 33 ephemeral draws were also identified in the Project Area.

Georgetown Solar will adhere to the 100 m setback for all seasonal and higher-class wetlands, except wetland GEWET70. This is a small wetland (i.e., less than 0.3 ha) that has been entirely cultivated through and a fence line will be on the quarter line to the west at 93 m. A collector line will cross under the small permanent watercourse (GEWAC01) but will be installed via a directional drill to avoid impact to the watercourse and setback. The intermittent watercourse will maintain a setback of 45 m. Georgetown Solar will submit applications for *Water Act* (Government of Alberta 2023d) approvals for any affected wetlands, as required.

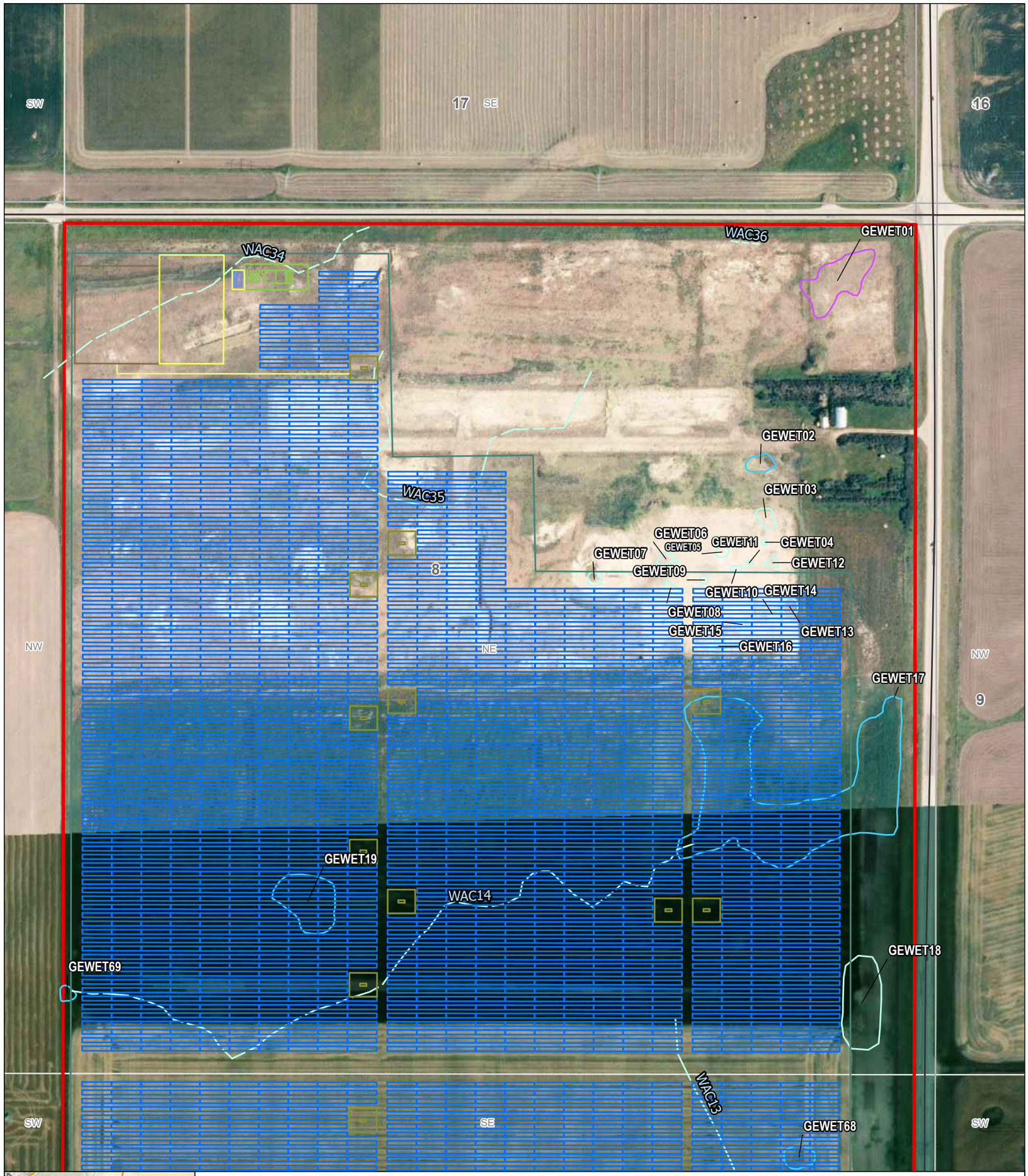
In addition, where Georgetown Solar proposes to reduce the setback on seasonal wetland GEWET70, they will commit to:

- Developing procedures to minimize the risk of water contamination or siltation from construction activities.
- Construction during frozen ground conditions. If construction under these conditions is not possible, rig matting will be placed to prevent compaction of hibernating amphibians.
- Construction in accordance with the *Water Act* (Government of Alberta 2023d), following existing disturbances, using appropriate construction methods and equipment.
- Delaying construction during sensitive periods for amphibians (e.g., ground conditions conducive to emergence, dispersal of young, high amphibian abundance).
- Erecting silt fencing around all wetlands with a setback encroachment, to avoid amphibians moving in to the construction area.
- Having a wildlife monitor be present during construction within setback to monitor for amphibian presence, and relocate amphibians as required.
- Consulting with a qualified wildlife biologist on any amphibian issues.

During the 2021 wetland and watercourse surveys, the Project lands were cultivated and seeded to annual crops. An area of approximately 14.5 ha encompassing most of 15-08-21-25W4M has been disturbed by significant civil earthworks prior to Georgetown obtaining its land lease.

The extent of the earthworks may have impacted the local seasonal drainage patterns, which are predominantly west to east in this area. Georgetown will need to level subsoil piles and recontour the lands in Legal Subdivision (LSD) 15 sufficient to construct the substation and BESS pad sites. Site drainage within LSD 15 and the surrounding Project area will be addressed in the Stormwater Management Plan, which was committed to by Georgetown, will be completed prior to construction.

During surveys conducted in 2021 and 2023, two species of noxious weeds were documented: creeping thistle and perennial sow-thistle (*Sonchus arvensis*; Appendix A). Fourteen invasive vascular plant species were documented. Weed management is described in the section on Vegetation Management and is informed by results of the PDSA and ongoing monitoring.



Project Boundary
Quarter Section
Existing Road

Watercourses
Ephemeral Draw

Wetland
Ephemeral Waterbody
Temporary Graminoid Marsh (M-G-II)
Seasonal Graminoid Marsh (M-G-III)

Layout
Battery Energy Storage System
Temporary Laydown
Substation
Fenceline

Inverter
Operation and Maintenance Building
Collector Lines
Solar Panel

Figure 3. Page 1. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

N
W
E
S

0 0.03 0.06 0.09 mi
0 0.07 0.1 0.2 km

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST

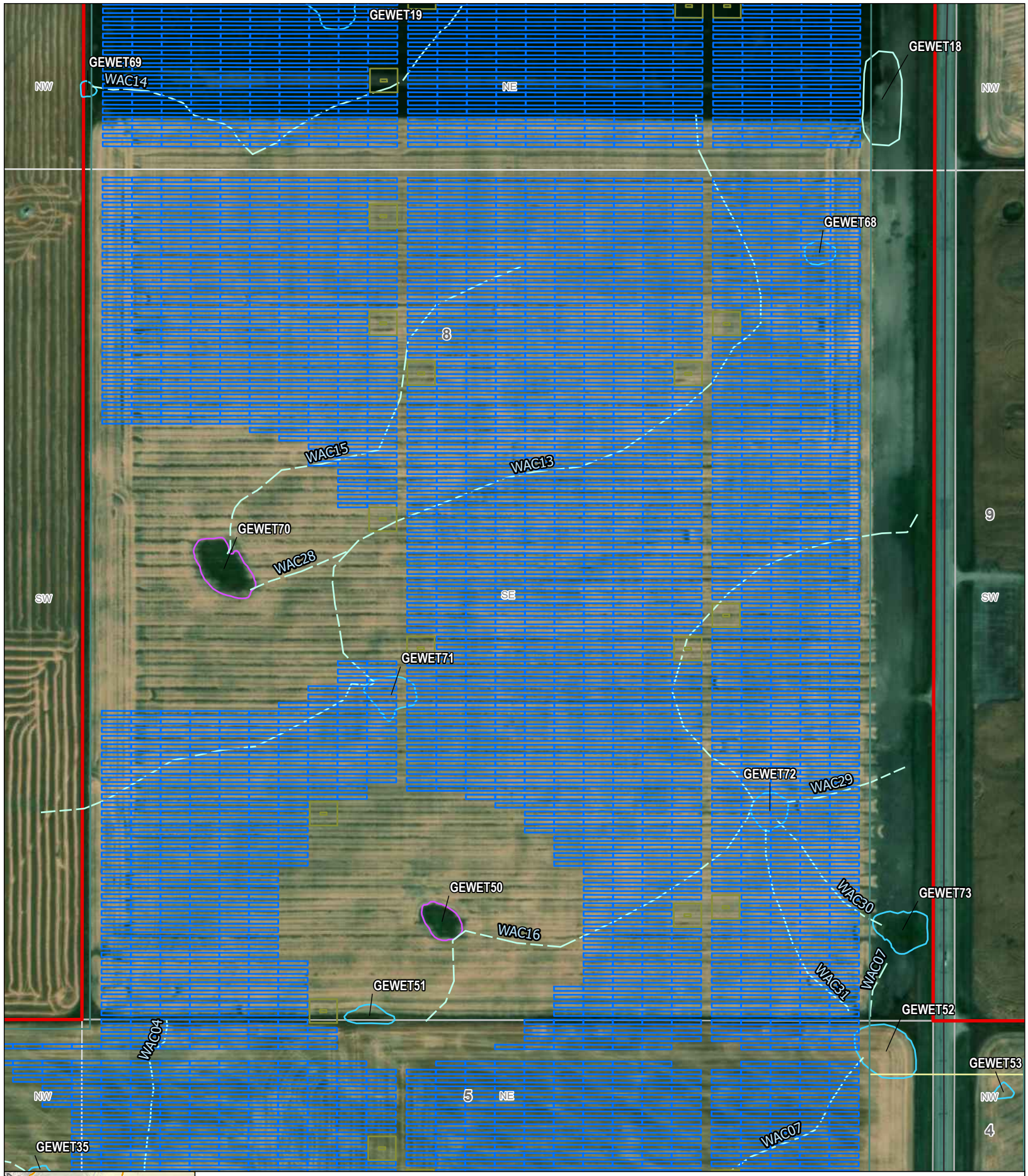
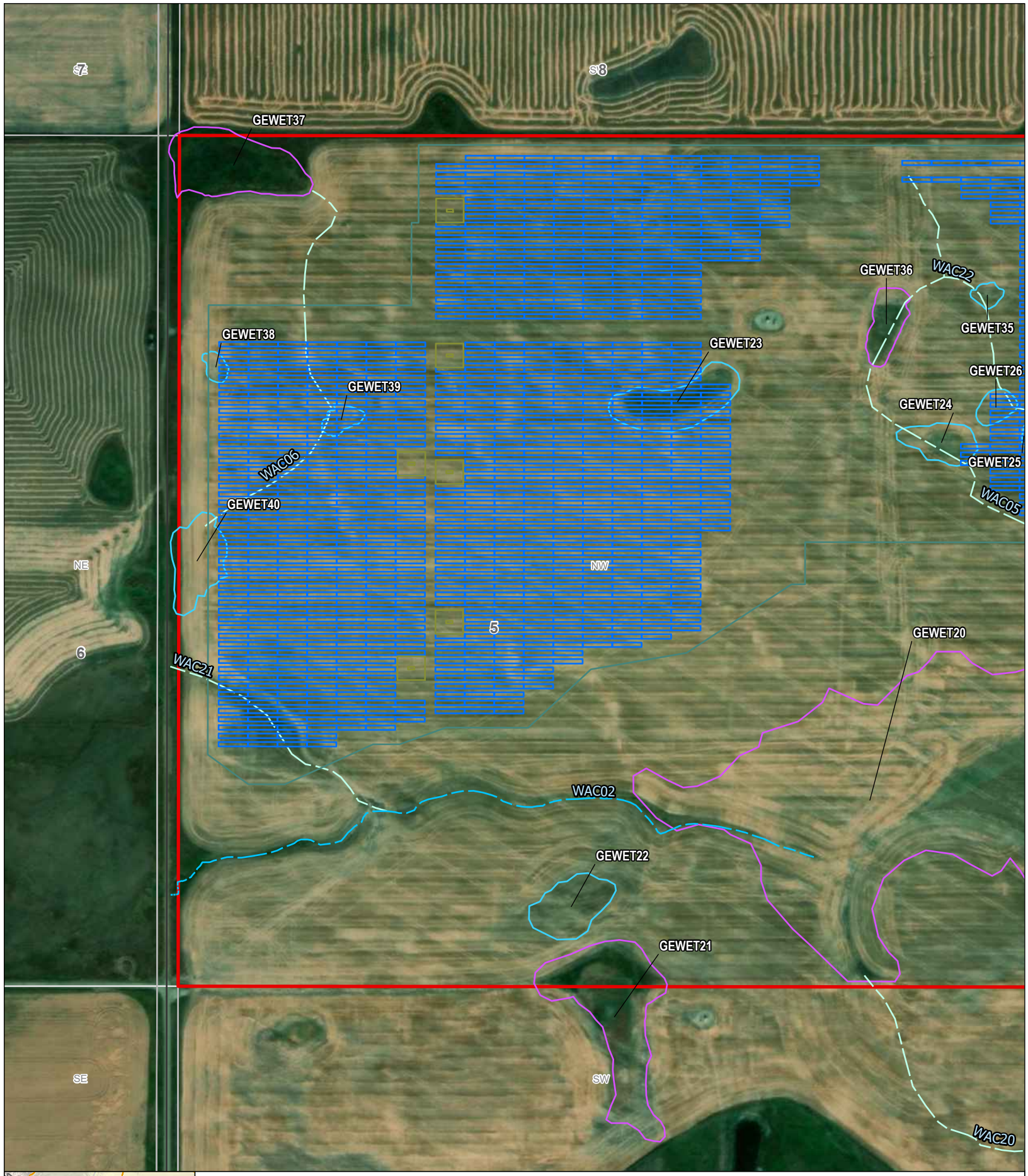


Figure 3. Page 2. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST



Project Boundary
Quarter Section
Existing Road

Watercourses
Ephemeral Draw
Intermittent Watercourse

Wetland
Temporary Graminoid Marsh (M-G-II)
Seasonal Graminoid Marsh (M-G-III)

Layout
Fenceline
Inverter
Solar Panel

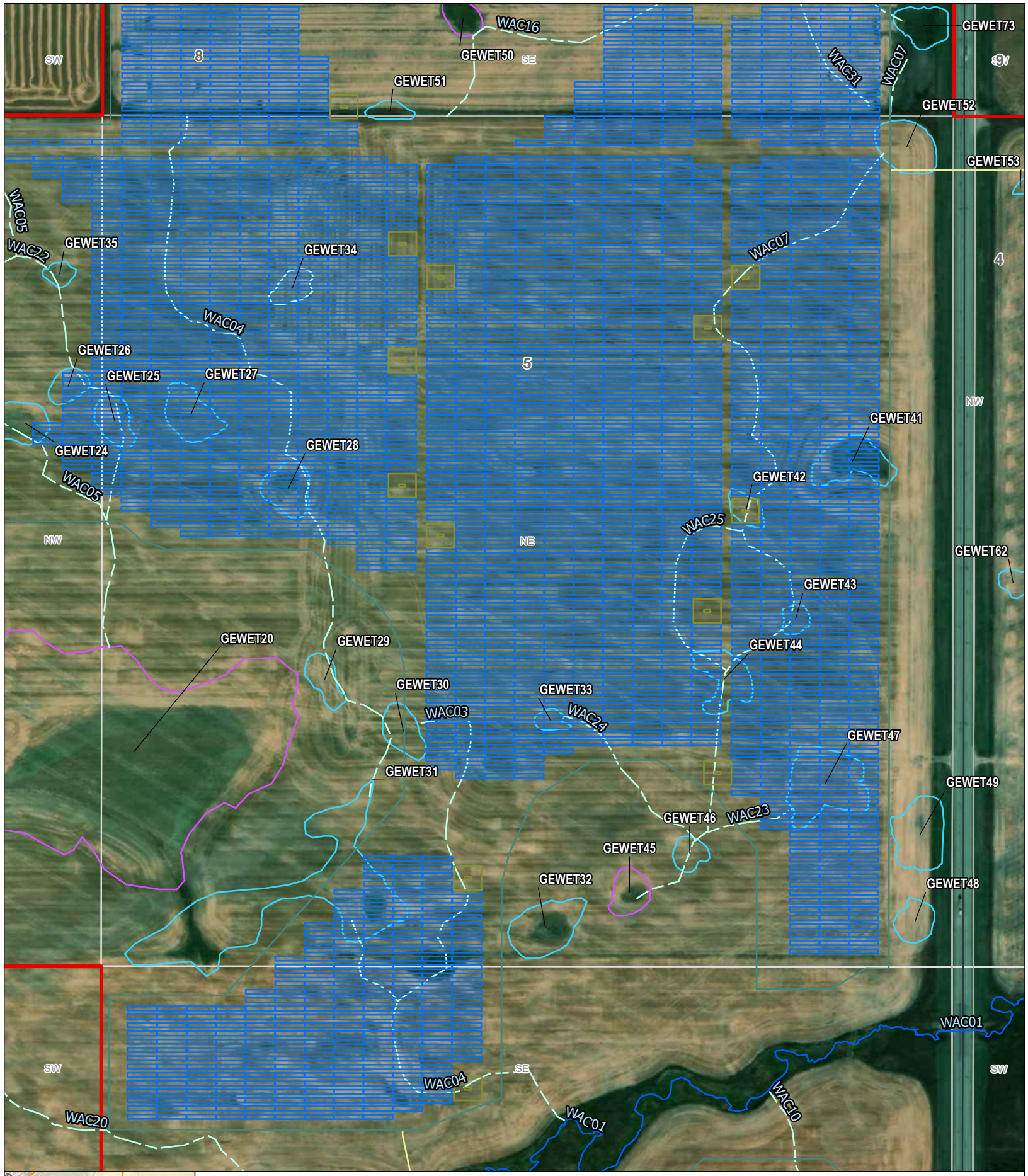
Figure 3. Page 3. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

N
W E
S

0 0.03 0.06 0.09 mi
0 0.07 0.1 0.2 km

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST



Project Boundary
Quarter Section
Existing Road

Watercourses
Ephemeral Draw
Small Permanent Watercourse

Wetland
Ephemeral Waterbody
Temporary Graminoid Marsh (M-G-II)
Seasonal Graminoid Marsh (M-G-III)

Layout
Fenceline
Inverter
Collector Lines
Solar Panel

Figure 3. Page 4. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

N
W E
S

0 0.03 0.06 0.09 mi
0 0.07 0.1 0.2 km

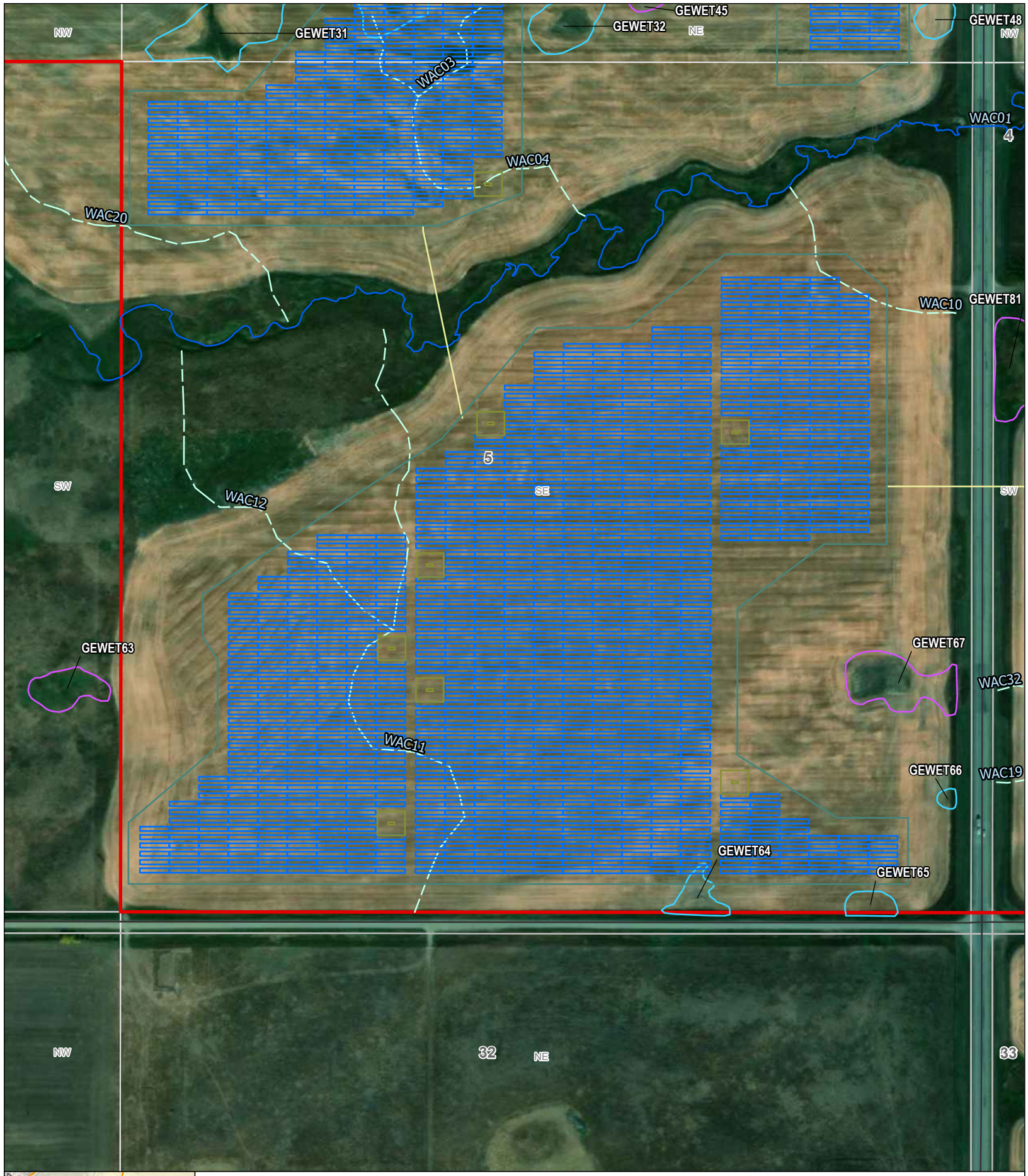
Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST

Figure 3. Page 5. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST



Project Boundary
Quarter Section
Existing Road

Watercourses
Ephemeral Draw
Small Permanent Watercourse

Wetland
Temporary Graminoid Marsh (M-G-II)
Seasonal Graminoid Marsh (M-G-III)

Layout
Fenceline
Inverter
Collector Lines
Solar Panel

Figure 3. Page 6. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

N
W E
S

0 0.03 0.06 0.09 mi
0 0.07 0.1 0.2 km

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST

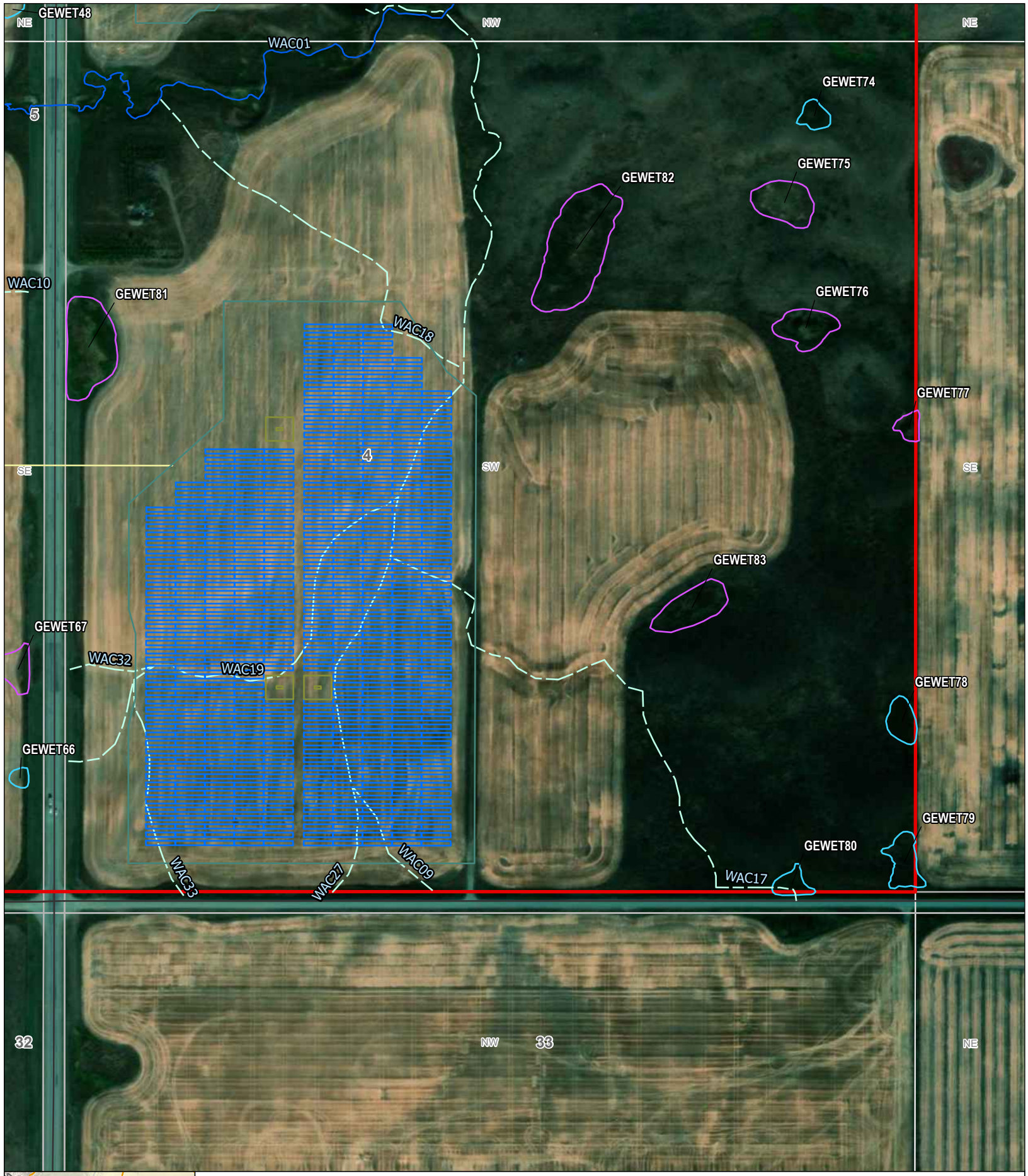


Figure 3. Page 7. Waterbody Locations in the Georgetown Solar Energy Project near Mossleigh, Alberta

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: B. Barbieri

WEST

4.4 Soil Conservation

The overall Project design will only strip topsoil and subsoil for stockpiling and subsequent replacement, for the inverter/transformation sites, substation, BESS site, access roads and localized knolls and depressions under the arrays where slopes exceed the racking tolerance. Soils will be protected during construction by establishment of a vegetation cover prior to construction (Appendix B). Except for the cut and fill areas for localized knolls and depressions (non-wetland), no overall site grading will occur. To address previous earthworks in LSD 15-08-21-25W4M, site levelling and recontouring will occur to prepare the lands for construction of the substation and BESS sites and to ensure a level area for placement of solar PV racking and tables.

The facility stormwater strategy will utilize soil infiltration capacity to maintain snowmelt and rain events onsite, following a green infrastructure approach. Structural appurtenances, such as drainage pipes and catch basins, are not intended. Culverts will be placed under the access road, where necessary, to maintain existing drainage.

In the spring of 2024, a mix of annual and perennial grass species will be seeded, following application of a non-selective herbicide within the Project Area (Appendix B). Crop residue is no longer the sole approach to soil stabilization during construction.

The final design of the post and racking installation has not been determined. The geotechnical site investigation has been completed. Georgetown Solar anticipates using a suspended table racking system whereby the table racking is supported between two piles. The intent of this racking system is to minimize the amount of ground penetration by reducing the number of required piles and precludes the need for larger equipment to install (and remove) piles. Georgetown Solar expects that approximately 51,000 helical piles will be required, subject to change based on the detailed engineering design and geotechnical analysis.

Collector lines will be placed underground and plough-in will be the predominant installation method. To avoid the small permanent watercourse in SE-05-21-25W4M collector lines will be installed via a directional drill to avoid impact to watercourses and setbacks. A setback will be maintained, and no collector lines will be installed under any intermittent watercourses. Soils will not be salvaged from the alignment prior to ploughing. For short areas of collector line, tie-in areas at inverter stations and the collector substation, each extremity of underground bores, and other small areas that may require excavation, trenching installation will be required using a small (30–46 cm wide) bucket on a small rubber-tired backhoe. Soils will be salvaged from these areas prior to trenching/excavation.

The Project has been sited on mostly flat terrain; therefore, minimal site grading is expected. Localized grading will be required for the inverter/transformer sites, substation, BESS site, and access roads. The areas expected to be graded will be confirmed by the EPC through site inspections, topographical surveys, engineering design, and wildlife surveys. Results will be used as soon as available to update the specific impact areas.

No soil stripping is planned under panels nor at the pile locations, unless required to smooth out localized knolls and depressions, or to facilitate appropriate stormwater runoff. In areas to be developed into impervious surfaces (e.g., inverters, substation), soils will be salvaged.

5 RECLAMATION PLANNING

5.1 Objectives

The goal of reclamation is to allow for return of the land to pre-Project conditions, or an equivalent land capability. Reclamation for this Project would entail returning the lands to crop production, unless the landowner requests the vegetation established after construction remain intact following decommissioning. The following sections describe the process and activities during the Restoration and Stewardship stages (Figure 2), through to Project decommissioning and return of the land to the landowner.

5.2 Stakeholder Involvement

The Participant Involvement Program (PIP) was initiated in 2020 with host landowner consultation and acquisition of land leases and is ongoing. Georgetown Solar continues to collect feedback and engage the local community. The concerns brought forward during the PIP are summarized below (Table 5).

Table 5. Participant Involvement Program – concerns.

Concern	Response Provided	C&R Section
Weeds	Weed management will be part of a detailed Vegetation Management Plan and ascertained annually through the Interim Monitoring Site Assessment process and long-term monitoring. Weeds will be controlled with various methods, to be selected based on the species of weed, extent and severity of infestation and time of year. The use of herbicides will be an option.	3.2, Table 2, Table 4, 4.1.5, 4.2, 5.6, 5.7, 5.9
Seeding	An approved seed mix has not yet been confirmed, but will be a mix of short grass grassland seeds. Details will be included in the Vegetation Management Plan.	2, Table 1, 3.2, Table 2, 4.1.5, 4.2, 4.4, 5.6, 5.7, 5.9, Appendix B
Final Reclamation	Lands will be returned to pre-construction land use or left as is following decommissioning. Either way a reclamation certificate will be acquired.	5.11
Soil erosion (wind)	Soils will be protected from erosion, prior to and during construction, by retaining crop stubble/residue, over which construction traffic will drive. An assessment of the stubble will be completed after the crop has been harvested to determine if there is sufficient stubble remaining or if a cover crop (e.g., fall rye) needs to be seeded to increase soil protection. In the limited cases where soils must be disturbed, salvaged and stockpiled, soils will be protected by temporary revegetation with annual species, erosion control blankets or any combination of erosion control methods as a system fit for the situation. After construction, the site will be seeded with the targeted long-term perennial species (see section Vegetation Stewardship), which may include a cover crop of an annual grass species (e.g., oats, barley, fall rye, winter wheat).	3.2, Table 2, 4.1.2, Table 4 (dust abatement), 4.1.5, 4.2, 5.6, 5.7, 5.9
Reduced visibility on Highway 24	Mitigation measures, as described above, will be implemented to reduce soil erosion on the site. When conditions require, water will be sprayed on soil surfaces, including stockpiles, to eliminate soil blowing across the highway.	3.2, Table 2, 4.1.2, Table 4 (dust abatement), 4.1.5, 4.2, 5.6, 5.7, 5.9
Use of native grass species	Georgetown recognizes that native grass takes time to establish and has considered the use of non-native perennial grass species as part of the targeted long-term perennial grass cover for the Project (see section Vegetation Stewardship). Species will be selected following completion of the Pre-disturbance Site Assessment.	4.1.5, 4.4, 5.6, 5.7

Decommissioning and reclamation funds will be secured in the form of a security bond or other security or insurance, a segregated reclamation fund or such other alternative as is reasonably acceptable to the Project lessor. Alternatively, Georgetown Solar may comply with any mandatory reclamation regulations implemented by the government in effect at the applicable time.

5.3 Criteria

The Project will follow the reclamation criteria described in the *2010 Reclamation Criteria for Wellsites and Associated Facilities for Cultivated Lands* (Government of Alberta 2013).

5.4 End Land-use

The Project site may be returned to agricultural land use, consistent with pre-Project conditions and surrounding land use. While the site will be revegetated to grassland plant species during operation, the land is easily converted back to annual cropland.

5.5 Soil Replacement

Approximately 41,500 cubic metres (m^3) of topsoil and subsoil will be salvaged and replaced (Table 6). Final volumes will be provided following final design and award of the EPC. For short areas of collector line, tie-in areas at inverter stations and the substation, each extremity of underground bores, and other small areas that may require excavation, trenching installation will be required using a small (30–46 cm wide) bucket on a small rubber-tired backhoe. Soils will be salvaged from these areas prior to trenching/excavation but are not included in the volumes below, as the locations and sizes are currently undetermined.

Table 6. Soil salvage and replacement volumes.

Project Component	Soil Salvage Volume (m^3)	Soil Replacement Volume (m^3)
Roads	22,800	22,800
Temporary Laydown Area	16,500	16,500
Invertors	2,200	2,200
Total	**41,500**	**41,500**

m^3 = cubic metre.

5.6 Temporary Revegetation

While crop residue was the primary strategy for topsoil erosion protection, the site will be seeded to a grassland cover prior to construction. Some soil will be disturbed and require stabilization such as temporary seeding, along with hydro- or other means of mulching. Soil stabilizers are also under consideration, should they be required. In areas that will not be impacted by ongoing construction activities (e.g., high traffic areas), terrestrial soil surfaces will be protected within 14 days of clearing by using cover crop seeding (i.e., annual grass seed species, such as winter wheat), temporary erosion control blankets, or any combination of temporary erosion control installed as a system fit for the terrain and drainage patterns of the disturbed region.

If soil stockpiles are anticipated to remain in place longer than six months, temporary cover of annual vegetation or pollinator habitat will be seeded to reduce erosion. Weeds will be controlled on stockpiles to prevent seed set and dispersal, including addition to the seedbank of the soil.

5.7 Vegetation Management Plan

A detailed Vegetation Management Plan will be created and implemented prior to construction. Details will include methods for weed management and vegetation establishment. As part of the vegetation management, monitoring will occur. Included will be guidance for annual and ongoing monitoring for weeds and vegetation establishment will be developed, including details on the as-built record and an annual schedule of activities for vegetation stewardship, such as scouting for weeds and deficiencies in target vegetation establishment and required treatments and correction measures. Vegetation stewardship and management activities will be completed by a qualified third-party contractor during the Operations phase of the Project.

Vegetation restoration and weed management will be concurrent with interim reclamation activities during the construction phase and immediately after construction to ensure that the seeding establishes, weeds do not proliferate, and perennial grassland vigor is maintained through to decommissioning. The following sections outline the general approach of vegetation stewardship.

The weed management strategy is to reduce weed seed germination and to create a weed management schedule to target potential locations of spread for management during construction and operation. Weed seed germination reduction will be tied into the topsoil erosion protection strategy of pre-construction non-selective herbicide application, followed by pre-construction seeding of a grass mix (Appendix B)

The planned reclamation species are grass species suited to the soil (predominantly loam) and drainage characteristics (predominantly well-drained). The species selected have mature heights not expected to interfere with panel operation and require minimal long-term management expense, while providing forage for sheep. Depending on the seasonal rainfall and grass productivity, height reduction at the edges of the panels may be required. In general, panel zone mowing will be used, meaning that only the area of potential panel interference will be disturbed. The timing of this mowing will typically be in mid-late July. During the avian breeding season, approximately April 15 to August 31 (Government of Canada 2023), nest surveys will be conducted in areas planned for panel zone mowing or application of herbicide. Areas grazed by sheep do not require nest surveys. Disturbance to nesting birds from grazing is different from mowing and herbicide applications.

Following construction, Georgetown Solar will be responsible for establishing and maintaining perennial grassland vegetation in the entirety of the restoration footprint. This restoration vegetation will be expected to perform the following functions for the life of the Project:

- Provide nesting habitat to ground-nesting songbirds.
- Create pollinator-friendly habitat.

- Provide suitable grazing opportunities for sheep.
- Provide opportunities for native seed harvesting.
- Protect the structural integrity of the solar facility features through uniform soil stability lacking erosion rills and gullies.
- Withstand drought and the need for supplemental watering through deep root systems.
- Build soil health and maintain a competitive advantage against noxious weed establishment through maintenance practices, which maintain healthy above- and below-ground plant biomass.

While grassland seed mixes are not required for disturbances to areas that were previously not grassland, such mixes shall be used to provide the vegetation restoration functions listed above. The pre-construction seed mix includes annual and perennial species that will establish quickly and provide longer term forage. The mix will provide a low, yet effective ground cover to stabilize the soil while allowing for construction traffic. Slender wheatgrass (*Elymus trachycaulus* ssp. *subsecundus* or ssp. *trachycaulus*), spring green festulolium (festulolium; *X Festulolium*), and Oro Verde perennial rye grass (*Lolium perenne*) serve as a quick establishing short-term cover. Sheep fescue (*Festuca ovina*), ginger Kentucky blue grass (*Poa pratensis*) and creeping red rescue (*Festuca rubra*) serve as a long-lived, low growing forage cover that is good for sheep grazing. Recent drought years have resulted in the depletion of soil moisture in the region. If conditions do not improve, this could result in challenges to the establishment of vegetation on the site. Seed mixes will be sowed in the spring, to take advantage of early season moisture.

Low-growing, ecologically appropriate grass seed mixes will be sowed throughout the Project Area that can be mowed or grazed where panel interference may occur. In ecologically appropriate locations around the perimeter, seed mixes for both grasses and wildflowers beneficial to pollinators will be sowed. It is highly likely that native species adapted to the regional conditions and able to sustain themselves over time without fertilizer inputs, irrigation, and re-seeding will be used. Periodically, all areas of the Project will need to be mowed or otherwise grazed to target woody stems that establish and reduce build-up of thatch that can inhibit regrowth of stems and seed.

For the perimeter, the grass and wildflower mix(es) will be sown after construction. Species selection will be influenced by commercial availability of seeds and can be further tailored if drought conditions persist, such as establishment of a drought-tolerant annual cover crop like fall rye (*Secale cereale*). Potential plant species include (selected from *Mixedgrass – Upland Dark Brown Soils* from Native Plant Working Group [2000] and from the *Mesic Grassland Categories in the Mixedgrass Subregion and Foothills Subregion* from Sinton Gerling et al. [1996]):

Graminoids:

- needle and thread grass (*Hesperostipa comata*)
- western porcupine grass (*H. curtiseta*)
- green needlegrass (*Nassella viridula*)
- Richardson's needlegrass (Achnatherum richardsonii)
- plains reedgrass (*Calamagrostis montanensis*)
- northern wheat grass (*Elymus lanceolatus*)
- slender wheatgrass (*E. trachycaulus*)
- sweetgrass (*Anthoxanthum hirtum*)
- Junegrass (*Koeleria macrantha*)
- blue grama (*Bouteloua gracilis*)
- western wheatgrass (*Pascopyrum smithii*)
- Sandberg bluegrass (*Poa secunda*)
- early bluegrass (*P. cusickii*)
- Parry's oatgrass (*Danthonia parryi*)
- bluebunch fescue (*Festuca idahoensis*)
- Hooker's oat grass (*Avenula hookeri*)
- Pumpelly's brome (*Bromus pumpellianus*)

Wildflowers and Forbs:

- common sunflower (*Helianthus annuus*)
- scarlet globemallow (*Sphaeralcea coccinea*)
- bee plant (*Peritoma serrulata*)
- prairie selaginella (*Selaginella densa*)
- pasture sagewort (*Artemisia frigida*)
- moss phlox (*Phlox hoodii*)
- tufted white prairie aster (*Symphyotrichum ericoides*)
- creeping prairie aster (*S. falcatum*)
- golden aster (*Heterotheca villosa*)
- low goldenrod (*Solidago missouriensis*)
- slender milkvetch (*Astragalus flexuosus*)
- small-leaved everlasting (*Antennaria parvifolia*)
- rosy everlasting (*A. rosea*)
- showy milkweed (*Asclepias speciosa*)
- three-flowered avens (*Geum triflorum*)
- yellow beardtongue (*Penstemon confertus*)
- slender blue beardtongue (*P. procerus*)
- wild strawberry (*Fragaria virginiana*)
- graceful cinquefoil (*Potentilla gracilis*)
- common yarrow (*Achillea millefolium*)
- sticky purple geranium (*Geranium viscosissimum*)
- alpine hedysarum (*Hedysarum alpinum*)
- harebell (*Campanula rotundifolia*)
- smooth fleabane (*Erigeron glabellus*)
- showy fleabane (*E. speciosus*)
- northern bedstraw (*Galium boreale*)
- smooth aster (*Symphyotrichum laeve*)
- wild bergamot (*Monarda fistulosa*)
- low larkspur (*Delphinium bicolor*)
- blue-eyed grass (*Sisyrinchium montanum*)

- mountain cinquefoil (*Potentilla diversifolia*)
- cutleaf anemone (*Anemone multifida*)
- prairie crocus (*A. patens*)
- long-fruited anemone (*A. cylindrica*)
- silky lupine (*Lupinus sericeus*)
- silvery lupine (*L. argenteus*)
- gaillardia (*Gaillardia aristata*)
- low goldenrod (*Solidago missouriensis*)
- wild blue flax (*Linum lewisii*)
- wild vetch (*Vicia americana*)
- broomweed (*Gutierrezia sarothrae*)
- golden bean (*Thermopsis rhombifolia*)
- spiny ironplant (*Xanthisma spinulosum*)
- scarlet butterflyweed (*Oenothera suffrutescens*)
- narrowleaf milkvetch (*Astragalus pectinatus*)
- purple prairie clover (*Dalea purpurea*)
- white prairie clover (*D. candida*)
- shining arnica (*Arnica fulgens*)
- twin arnica (*A. sororia*)
- dotted blazing star (*Liatris punctata*)
yellow evening-primrose (*Oenothera biennis*)
- wild licorice (*Glycyrrhiza lepidota*)
- upright prairie coneflower (*Ratibida columnifera*)

The Project lands will be seeded with a drill seeder. The weed management strategy previously described will be implemented prior to and during construction.

To limit the introduction of weed seed to the site, construction equipment and employee vehicles must arrive to the site clean and free of soil or plant debris. The EPC contractor will inspect equipment as it arrives to site. Any equipment failing inspection will need to be cleaned and re-inspected before being allowed onto the site. A third-party Environmental Monitor(s) will audit equipment inspections to ensure compliance.

A representative of, or on behalf of, Georgetown Solar, with specialized knowledge of specific plant species of the region, will assess for weeds according to the targeted weed management schedule and trigger deployment of a qualified contractor to manage weeds in selected locations.

The targeted weed management schedule will be updated toward the end of construction to reflect newly identified species and/or locations for targeting during the first three years of seed establishment. Although not identified during the PDSA, kochia (summer-cypress; *Bassia scoparia*) is recognized as a significant weed species of concern within Vulcan County. Other weed species of concern, as identified in the region by Vulcan County, include foxtail barley (*Hordeum jubatum*), absinthe wormwood (*Artemisia absinthium*) and black henbane (*Hyoscyamus niger*). These species will be monitored for and controlled on site. Weed management will be timed to avoid the avian breeding seasons, and nest surveys will be conducted in advance of management activities if avoidance of this period is not possible. The method of weed management and control will vary depending on the species, level of infestation (numbers and area), stage of growth, and location. Methods may include mowing, hand-pulling, chemical control (e.g., herbicides), or biological control (e.g., sheep). Biological control programs exist for some species of prohibited noxious and noxious weeds. Should these plant species be

found to occur within the Project or in the region, the Project Area may serve as a point of deployment for the biological control organism(s).

During operation, a representative of, or on behalf of, Georgetown Solar, with specialized knowledge of plant species of the region, will oversee long-term vegetation management decision-making. Actions taken will include annual training of operations staff for supporting observations, triggering deployment of qualified contractors, including contract grazers, and periodic health assessments of the overall vegetation.

5.8 Post-construction Monitoring/Interim Monitoring Site Assessments

As per the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018a), a qualified environmental professional will complete IMSAs following construction, during operation at key milestones (e.g., retrofitting), and when any temporary reclamation activities occur. Vegetation monitoring will be conducted for a minimum of three growing seasons after construction.

5.9 Progressive Reclamation

Temporary workspaces will be reclaimed as the areas become unnecessary for construction. Soil will be replaced and the sites revegetated. Any erosion, compaction, rutting, admixing, or contamination will be addressed prior to soil replacement and revegetation. Revegetation will utilize the same seed mix(es) and seeding methods described in the *Vegetation Management Plan* Section, unless IMSA and adaptive management have led to changes in the species composition and methods.

IMSA monitoring will occur after areas are reclaimed to ensure targets are met, erosion is not occurring, seeds are establishing, and weeds are managed/controlled. All IMSA results will be incorporated into the C&R Plan and updates will be implemented during reclamation of the next area.

5.10 Decommissioning and Remediation

After finalization of the Project design, a detailed decommissioning plan will be completed. The removal of all structural features will be performed with the least amount of impact to the vegetation established post-construction. After removal of the infrastructure, the site will be assessed through Phase 1 and 2 Environmental Site Assessments (ESAs), as standardized under the *Contaminated Sites Policy Framework* (Government of Alberta 2023g).

Should contamination be identified during Phase 1 and 2 ESAs, Georgetown Solar will remediate the affected areas utilizing the end points for site remediation, established by the Alberta Tier 1 and Tier 2 guidelines (Government of Alberta 2023h, 2023i) and the *Alberta Exposure Control Guide* (Government of Alberta 2016c).

5.11 Final Reclamation

After the Project is decommissioned and any contamination remediated, the Project Area will undergo final reclamation. All updates to the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018a) and this C&R Plan will be applied during final reclamation. Areas disturbed during decommissioning and remediation will undergo soil de-compaction, if required.

5.12 Monitoring

After final reclamation has been completed and vegetation has had a chance to establish, a Reclamation Certificate Site Assessment will be completed to ensure the site meets the *2010 Reclamation Criteria for Wellsites and Associated Facilities for Cultivated Lands* (Government of Alberta 2013).

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Appendix A. Pre-disturbance Site Assessment

Conservation and Reclamation Plan Update
Pre-Disturbance Site Assessment
Georgetown Solar Energy Project
Mossleigh, Alberta

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1.0 INTRODUCTION

The following document provides the results of the Pre-Disturbance Site Assessment (PDSA) for the Georgetown Solar Energy Project (Project), near Mossleigh, Alberta (Figure 1 in Appendix A) and is an update to the Conservation & Reclamation Plan (C&R) initially released June 10, 2022 (Western EcoSystems Technology, ULC [WEST] 2022).

2.0 CONSERVATION PLANNING

Conservation planning entails methods to ensure a successful reclamation outcome after the life of the Project. Conservation planning begins at the Project-siting phase. The Project Area includes all lands held for the Project. The Project Footprint includes the area upon which Project infrastructure and components will be placed, or where ground will be disturbed (e.g., temporary workspaces).

2.1 Policy Alignment

Land-use planning and C&R planning, execution, and certification in Alberta are guided by legislation and associated regulations. Under the legislation and regulations, regional plans are developed for land use planning. To support land use and C&R planning, several directives, guides, standards, and best management practices (BMPs) have been developed and implemented.

Per the *Environmental Protection and Enhancement Act* (Government of Alberta 2023) and the associated *Conservation and Reclamation Regulation* (Government of Alberta 2021) soils within the Project Area have been documented in detail, including topsoil and subsoil horizons and depths.

This addendum fulfills the requirements under the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018), by providing data, information, and maps which:

- identify and verify pre-construction soil properties (e.g., topsoil depth, subsoil depth, texture, rooting restrictions, reclamation suitability);
- verify the soil series map developed during the desktop review assessment, in support of activities for conserving topsoil and subsoil; and
- verify the vegetation and land use maps developed during the desktop review assessment, including weeds.

2.2 Adaptive Management

This PDSA contributes to adaptive management during the planning and construction phases of the Project by describing site conditions not encountered or anticipated during the desktop review assessment. Adaptive management allows the opportunity to develop, modify, and update the reclamation techniques or strategies as the Project is developed and becomes operational.

3.0 BASELINE SOIL CONDITIONS

The Project Area is located primarily in the Foothills Fescue Natural Subregion, with a small portion in the Mixedgrass Natural Subregion of the Grassland Natural Region. The Foothills Fescue Natural Subregion is climatically more similar to the Montane Natural Subregion at higher elevation and to the west, than it is to the other Grassland Natural Subregions. The Mixedgrass Natural Subregion is most similar, climatically, to the Dry Mixedgrass Natural Subregion. Climatic characteristics of the Foothills Fescue and Mixedgrass Natural Subregions are provided in Table 1 (Natural Regions Committee [NRC] 2006):

Table 1. Select Climate Parameters for Natural Subregions

Climate Parameter	Foothills Fescue Natural Subregion	Mixedgrass Natural Subregion
mean annual temperature	3.9	4.4 degrees Celsius (˚C)
mean temperature, warmest month	16.3	17.6˚C
mean temperature, coldest month	-9.7	-10.2°C
mean daily maximum of warmest month	23.8	25.1°C
mean daily minimum of coldest month	-15.7	-15.9°C
growing degree days >5°C	1388	1578
date at which 100 growing degree days accumulated	May 12	May 7
mean annual precipitation	470	394 millimetres (mm)
growing season precipitation	333	282mm (April through August)
percentage of total annual precipitation that falls during growing season	71%	71%
summer moisture index[1]	4.2	5.6
Continentality[2]	26	28

[1] where summer moisture index is a measure of precipitation effectiveness during the growing season, a high ratio indicates a greater likelihood that evaporation will exceed precipitation at some time during the growing season. Greater than four indicates dry to very dry climatic conditions with the likelihood of significant moisture deficits for extended periods during the growing season.
[2] "Continentality" is a relative index of the degree to which an area is affected by continental rather than Cordilleran influences. It is calculated simply by subtracting the mean temperature of the coldest month from the mean temperature of the warmest month.

The Project Area also lies within the heart of the Chinook Zone of Alberta (NRC 2006), resulting in high winds and warm temperatures during part of the winter months.

3.1 Methods

3.1.1 Pre-field Soil Mapping

A review of available geospatial data for the Project Area was conducted by gathering relevant data and information from different sources. A 12.5-m spatial resolution digital elevation model (DEM) data for the Project Area was downloaded from the Alaska Satellite Facility (ASF; 2023). Terrain parameters, including slope, aspect, topographic wetness index, and terrain roughness index, were derived from the DEM. A Sentinel 2 satellite image acquired on August 6, 2022,

covering the Project Area was downloaded from the ASF website. Historical satellite imagery for the Project Area was taken from Google Earth and georeferenced in ArcMap to be used in conjunction with the terrain parameters and ArcMap's base layer. A 100 m x 100 m grid cell covering the entire Project Area was generated in ArcMap.

Preliminary shallow and deep soil inspection sites were assigned based on the DEM terrain derivatives, Sentinel 2 multi-spectral image and vegetation indexes derived, ArcMap base layer, Agricultural Regions of Alberta Soil Inventory Database Version 4.1 soil layer, surficial geology layer, and historical image of the Project Area. Available geospatial data of underground utilities was used to adjust the locations of soil inspection sites to avoid buried underground utilities in the area.

3.1.2 Field Soil Survey

3.1.2.1 Soil Inspection

The field soil survey was conducted from October 10 – 21, 2023. Two hundred ninety inspection sites were assessed, putting the survey intensity level (SIL) of the PDSA to 1.2 inspections/ha, which lies within the SIL 1 (Very detailed) category of Soil Survey Handbook Volume 1 (Government of Canada 1987). The SIL of this PDSA satisfies the requirement suggested in the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018).

Soils were assessed by manually digging shallow pits to a depth of 30–50 centimetres (cm) with shovels and hand auguring utilizing a Dutch auger to a maximum depth of one m below ground level. Shallow inspection sites were extended to parent material (C horizon) to help delineate soil series boundaries with better accuracy.

The soil profile at each inspection site was described according to *The Canada Soil Information System Manual for Describing Soils in the Field* (Expert Committee on Soil Survey 1983). Site characteristics recorded at each inspection site included land use, surface expression, local slope, slope position, and surface stoniness. Soil profile characteristics recorded at each inspection site include soil horizon designation, horizon depth, color, texture, structure, consistency, percent coarse fragment, mottles, drainage, calcium carbonate's ($CaCO_3$) reaction to 10% hydrochloric acid, presence of salts, depth to groundwater or seepage, and type of parent material. The Global Positioning System coordinates (North American Datum 83, Zone 12), terrain features, and detailed soil characteristics observed at each inspection site are provided in section.

Soils were classified to the soil Subgroup level according to the Canadian System of Soil Classification (Soil Classification Working Group 1998). Soil series were designated using the *Alberta Soil Names File (Generation 4) User's Handbook* (Alberta Soil Information Centre 2016). Most of the Project Area is located within soil correlation area (SCA) 6, while a small section in the southeast part of the Project Area is located within SCA 3.

3.1.2.2 Soil Sampling

The soil sampling was planned in such a way that the sampling location overlaps Project Area with the potential to be disturbed during construction and, at the same time, representative of one of the soil series in the Project Area. At the sampling sites, discrete soil samples were collected from each soil horizon (Ap, Ah, Bm, Bmk, C, Ck, Cca) of the selected deep inspection sites. The soil samples were collected and placed in labelled ALS Environmental Laboratory-supplied soil sampling plastic bags and stored in a cooler. Soil samples along with a completed chain of custody form were submitted to the ALS Environmental Laboratory in Calgary, Alberta.

Soil physical and chemical parameters analyzed include particle size distribution (texture), pH, salinity as measured in electric conductivity (EC), sodium adsorption ratio (SAR), percent saturation, total organic carbon (TOC), organic matter (OM), $CaCO_3$ equivalent, and soluble cations.

3.1.2.3 Soil Mapping

A DEM was created from point elevation data and contour lines supplied by Georgetown Solar. Terrain parameters, including slope, aspect, hillshade, and topographic wetness index, were derived from the DEM. Soil inspection locations were plotted in ArcMap overlying the terrain parameters derived from the DEM and the base map satellite imagery in ArcMap.

Soil Map Units (SMUs) were delineated by grouping closely related soil types with common properties occurring together on the same parent material and similar drainage and landform features. The SMUs codes were formed by combining the three upper case letters of the dominant soils series code and a cardinal number in such a way that number “1” representing a soil polygon occupied with one soils series or variant and the subsequent numbers designating the dominant soil series and other soils occurring within the same polygon. For example, an SMU with a dominant Midnapore (MDP) soil would be assigned with MDP1, which represents a polygon with over 90% MDP soil. An MDP2 SMU represents a polygon with over 90% of MDPxt, MDP3 would designate a polygon with a combination of MDP and MDPxt soil series. The SMUs and the corresponding soil series and variants combination is provided in the Result Section.

3.1.2.4 Evaluation of Topsoil and Upper Subsoil Reclamation Suitability Ratings

Reclamation suitability ratings for topsoil and upper subsoil of the soil series were rated based on the Criteria for Evaluating the Suitability of Topsoil and Subsoil in the Plains Region as described in *Soil Quality Criteria Relative to Disturbance and Reclamation* (Government of Alberta 2004a). The criteria use soil profile physical characteristics observed in the field and laboratory analytical data of soil samples collected from selected inspection sites. Filed site and soil profile characteristics used for the evaluation include surface stoniness classes, consistency, and gravel content. Soil laboratory analytical parameters used for the suitability evaluation include texture, pH, salinity as measured in EC, SAR, TOC, and saturation percent. The criteria for rating topsoil and subsoil materials are provided in Tables 2 and 3 respectively. Table 4 provides the reclamation suitability classes, and their description.

Table 2. Criteria for evaluating suitability of topsoil material in the Plains Region.

Rating/Property	Good	Fair	Poor	Unsuitable
Reaction (pH)	6.5–7.5	5.5–6.4 & 7.6–8.4	4.5–5.4 & 8.5–9.0	<4.5 and >9.0
Salinity (EC; dS/m)	<2	2–4	4–8	>8
Sodicity (SAR)	<4	4–8	8–12	>12[1]
Saturation (%)	30–60	20–30, 60–80	15–20, 80–120	<15 and >120
Stoniness Class	S0, S1	S2	S3, S4	S5
Texture	FSL, VFSL, L, SL, SiL	CL, SCL, SiCL	LS, SiC, C[2], S, HC[3]	–
Moist Consistency	very friable, friable	loose	firm, very firm	extremely firm
Organic Carbon (%)	>2	1–2	<1	–
$CaCO_3$ Equivalent (%)	<2	2–20	20–70	>70

1. Materials characterized by a sodium adsorption ratio (SAR) of 12–20 may be rated as poor if texture is sandy loam or coarser and saturation percent is less than 100%.

2. C – May be upgraded to fair or good in some arid areas.

3. HC – May be upgraded to fair or good in some arid areas.

EC = electric conductivity; dS/m = decisiemens per metre; FSL = Fine sandy loam; VFSL = Very fine sandy loam; L = Loam; SL = Sandy loam: SiL = Silt loam; CL = Clay loam; SCL = Sandy clay loam; SiCL = Silt clay loam; LS = loamy sand; SiC = Silt clay; C = Clay; S = Sand; HC = Heavy clay; $CaCO_3$ = Calcium carbonate.

Source: Government of Alberta 2004a.

Table 3. Criteria for evaluating suitability of subsoil material in the Plains Region.

Rating/Property	Good	Fair	Poor	Unsuitable
Reaction (pH)	6.5–7.5	5.5–6.4 & 7.6–8.5	4.6–5.4 & 8.6–9.0	<4.5 and >9.0
Salinity (EC; dS/m)	<3	3–5	5–10	> 10
Sodicity (SAR)	<4	4–8	8–12	>12[1]
Saturation (%)	30–60	20–30, 60–80	15–20, 80–120	<15 and >120
Stone Content (% V)	<3	3–25	25–50	>50
Texture	FSL, VFSL, L, SL, SiL	CL, SCL, SiCL	S, LS, SiC, C, HC	Bedrock
Moist Consistency	very friable, friable	loose, firm	very firm	extremely firm
Gypsum, $CaCO_3$ Equivalent (%)	The suitability criteria for SAR may be altered by the presence of high levels of either lime ($CaCO_3$) or gypsum ($CaSO_4$) more than other soluble salts.			

1 Materials characterized by a sodium adsorption ratio (SAR) of 12–20 may be rated as poor if texture is sandy loam or coarser and saturation percent is less than 100%.

EC = electric conductivity; dS/m = decisiemens per metre; V = Volume; FSL = Fine sandy loam; VFSL = Very fine sandy loam; L = Loam; SL = Sandy loam; SiL = Silt loam; CL = Clay loam; SCL = Sandy clay loam; SiCL = Silt clay loam; S = Sand; LS = Loamy sand; SiC = Silt clay; C = Clay; HC = Heavy clay; $CaCO_3$ = Calcium carbonate; $CaSO_4$ = Calcium sulfate.

Source: Government of Alberta 2004a.

Table 4. Reclamation suitability rating classes for the Georgetown Solar Energy Project, Mossleigh, Alberta.

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

Source: Government of Alberta 2004a.

3.1.2.5 Soil Erosion Risk Assessment

Wind Erosion Risk Rating

Wind erosion risk ratings for soil series identified in the Project Area were extracted from Pedocan Land Evaluation Ltd. (Pedocan; 1993) and for soil series that are not evaluated by Pedocan, wind erosion risks were estimated based on the method described by Coote and Pettapiece (1989). The attributes that affect wind erosion include surface roughness and aggregation, soil resistance to movement, drag velocity of wind at the soil surface, soil moisture shear resistance, and available moisture of the surface soil (Coote and Pettapiece 1989). The wind erosion ratings and the corresponding soil texture classes are provided in Table 5 below.

Table 5. Classes of wind erosion susceptibility based on soil texture for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Wind Erosion Class	Soil Texture
High	Very fine sand, coarse sand, loamy sand, gravely sand, dry humic organic materials.
Moderate	Sandy loam, fine sandy loam, loam, silt loam, sandy clay loam, sandy clay, mesic organic soil.
Low	Silt, silty clay loam, clay loam, silty clay, clay, heavy clay, fibric organic material.

Source*:* Coote and Pettapiece 1989.

3.1.2.5.1 Water Erosion Risk Rating

Water erosion risk for soil series identified within the Project Area were taken from Pedocan (1993) and for soil series that are not evaluated by Pedocan (1993), the water erosion risk was estimated based on soil texture and slope following Tajek et al. (1985) and Department for Environment, Food and Rural Affairs (2005). The underlying principle is water erosion rates primarily related to the inherent erodibility of the soil matrix, along with rainfall and topographic characteristics. The inherent erodibility of any soil matrix is primarily determined by its texture, although structure can also be a factor. Silty or fine sandy soils with weak structure are generally the most susceptible to water erosion (Tajek et al. 1985). Soils with organic (peaty) surface horizons (organic soils and peaty Gleysols) are typically resistant to the erosive forces of overland water flow, so the water erosion risk is low. Slope gradient and length, especially when steeper or longer, can also be important factors affecting water erosion rates. Soil water erosion risk

calculations assume that all vegetation has been removed and the topsoil or subsoil is exposed to the erosive forces of water. The water erosion risks for different soil texture classes and slope gradients are provided in Table 6, below.

Table 6. Classes of water erosion risks based on soil texture and slope gradient for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Soil Texture	Steep (>Slope Class 5)	Class 4–5: Moderate	Class 3: Gentle	Class 1–2: Level
Coarse (SL, LS, S)	Very High	High	Moderate	Low
Medium (SiCL, CL, SCL, Si, SiL, L)	High	Moderate	Low	Low
Fine (HC, SiC, C, SC)	Low	Low	Low	Low

SL = Sandy loam; LS = Loamy sand; S = Sand; SiCL = Silt clay loam; CL = Clay loam; SCL = Sandy Clay loam Si = Silt; SiL = Silt loam; L = Loam; HC = Heavy Clay; SiC = Silt clay; C = Clay; SC = Sandy clay.

Adapted from Tajek et. al. 1985, Department for Environment, Food and Rural Affairs 2005.

3.1.2.5.2 Soil Compaction and Rutting Risk Ratings

The soil compaction and rutting risk for the soil series identified in the Project Area were determined based on the soil compaction and puddling hazard keys outlined in Government of British Columbia (1999). The hazard key has four risk classes: low, moderate, high, and very high (Table 7). The procedure uses the soil moisture regime, dominant soil texture, and coarse fragment content of the upper 30 cm of mineral soil to assess compaction hazard. If a pronounced textural change occurs within the upper 30 cm, the most limiting soil texture, if at least five cm of the top 30 cm, will be used for the rating.

Table 7. Soil compaction and rutting hazard key for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Soil Texture (zero to 30 centimetres)		Hazard Rating and Moisture Regime	
		Xeric-Subhygric	Subhygric-Subhydric
Fragmental (coarse fragments >70%)		Low	Moderate
Fragmental (coarse fragments <70%)	Sandy (S, LS)	Low	Very High
	Sandy loam (SL, fSL)	Moderate	
	Silty/loamy (SiL, Si, L)	High	
	Clayey (SCL, CL, SiCL. SC, SiC, C)	Very High	

S = Sand; LS = Loamy sand; SL = Sandy loam; fSL = Fine sandy laom; SiL = Silt loam; Si = Silt; L = Loam; SCL = Sandy clay loam; CL = Clay loam; SiCL = Silt clay loam; SC = Sandy clay; SiC = Silt clay; C = Clay.

Source: Government of British Columbia 1999.

3.2 Results

3.2.1 Soil Mapping

Three soil orders, Chernozemic, Gleysolic, and Anthroposolic (not officially recognized) soils were identified within the Project Area. The subgroups identified in the Project Area include Orthic Black Chernozem, Calcareous Black Chernozem, Gleyed Black Chernozem, Rego Black Chernozem, Orthic Dark Brown Chernozem, Orthic Humic Gleysol, and Rego Humic Gleysol (R.HG). Table 8 and Figure 2 provide the SMUs and associated soil series and variants, while section *3.2.2 Soils Map Unit Summary* provides details of the soil series and variants mapped within the Project Area and based on field data collected during the PDSA (Tables 9–21 and Appendix B).

Table 8. Soil map units and the associated soil series and variants for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Map Unit	Soil Series and Variants Code	Soil Series and Variants Name
BZCzzsa1	BZCzzsa	Balzac-ZZSA
DEL1	DEL	Delacour
DEL2	DELgl	Delacour-GL
DEL3	DEL, RKV	Delacour, Rockyview
DIS1	Disturbed Land	Disturbed Land
DIS2	Soil/Spoil Stockpiles	Soil/Spoil Stockpiles
DIS3	Pits and Shallow Excavations	Pits and Shallow Excavations
MDP1	MDP	Midnapore
MDP2	MDPxt	Midnapore-XT
MDP3	MDP, MDPxt	Midnapore, Midnapore-XT
MDP4	MDPzr, MDPxt	Midnapore-ZR, Midnapore-XT
MDP5	MDPca	Midnapore-CA
NSKaa1	NSKaa	Nose Creek-AA
NSKaa2	NSKaa, DEL	Nose Creek-AA, Delacour
PUY1	PUY	Pulteney
RDM1	RDM	Readymade
RDM2	RDM, WNY	Readymade, Whitney
RKV1	RKV	Rockyview
WNY1	WNY	Whitney
WNY2	WNY, PUT	Whitney, Pulteney
ZGW	ZGW	Miscellaneous Gleysol

AA = Not modal soil correlation area; CA = Calcareous – soil with primary alkaline earth carbonates in the B horizon (Bmk); GL = Gleyed – poor drainage and periodic reduction; SA = Saline; XT = Till at 30–99 centimetres (below ground level); ZR = Rego/Regosolic; ZZ = Atypical Subgroup.

3.2.2 Soil Map Unit Summary

The following tables (9 through 21) provide details of the characteristics of the Soil Series and variants present within the Project Area.

Table 9. Delacour (DEL) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

DEL – DEL1	
Soil Classification	Orthic Black Chernozem (O.BLC)
Parent Material	Medium Textured Till
Drainage	Well drained
Surface Stoniness	S1 (Slightly Stony)
Topography	0–15% (Level to Moderate Slopes)

Comments:

DEL soils are the dominant soils within the Project Footprint.

Topsoil thickness ranges from 7–42 centimetres (cm). The average depth is 18 cm.

The upper subsoil thickness ranges from 5–53 cm. The average thickness of the upper subsoil is 24 cm. Thicker upper subsoil may be found in isolated low-lying areas.

Topsoil and upper subsoil colour contrast vary from distinct to faint.

Strip topsoil to colour change where colour transition is obvious. Salvage topsoil up to 20 cm depth, if thick enough. Where the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for DEL soils is rated as moderate.

The water erosion risk for DEL soil is rated as low to moderate.

Table 10. Delacour-Gleyed (DEL-GL) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

DEL-GL – DEL2	
Soil Classification	Gleyed Black Chernozem (GL.BLC)
Parent Material	Medium Textured Till
Drainage	Imperfectly drained
Surface Stoniness	S1 (Slightly Stony)
Topography	0–15% (Level to Moderate Slopes)

Comments:

DEL-GL soils occur as inclusion within the Project Footprint.

Topsoil thickness ranges from 20–29 centimetres (cm). The average depth is 25 cm.

The upper subsoil thickness is 12 cm. The average thickness of the upper subsoil is 11 cm.

Topsoil and upper subsoil colour contrast vary from distinct to faint.

Strip topsoil to colour change where colour transition is obvious. Salvage topsoil up to 20 cm depth, if thick enough. If the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for DEL-GL soils is rated as moderate.

The water erosion risk for DEL-GL soil is rated as low to moderate.

Table 11. Disturbed (DIS) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

DIS – DIS 1, DIS 2, DIS 3	
Soil Classification	Anthropogenic
Parent Material	Anthropogenic
Drainage	Poorly to well drained
Surface Stoniness	S0 (Non-stony) to S5 (Excessively Stony)
Topography	0–15% (Level to Moderate Slopes)

Comments:

DIS soil occupies the northern section of the Project Footprint (PF).

The level of disturbance is variable ranging from deep and shallow pits to something that looks like a reclaimed area to stockpiles and exposed lower subsoils.

Soil Map Unit (SMU) DIS 1 represents a disturbed surface.

SMU DIS 2 represents soil stockpiles.

SMU DIS 3 represents pits and shallow excavations.

Soil may be stripped in some patches of land that might be reclaimed and areas where the upper subsoil is intact.

Any soil salvage (if required) should be under the direct guidance of an on-site environmental/soil monitor.

Any soil salvaged from this area should be stockpiled separately from the soils salvaged from the undisturbed areas of the PF.

At the time of the PDSA field work, disturbances of various extents and levels, including areas where topsoil and upper subsoils were stripped, areas where only topsoil was stripped, areas that look partially reclaimed (DIS1); stockpiles (DIS2); and shallow and deep excavations (DIS3) were observed. The stockpiles include aggregates, sand and salvaged topsoil, and upper subsoil. No formal inspection and soil sampling was completed at any of the stockpiles. The area was infested with different weed species at the time of the assessment.

The site resembles a sand and gravel mine and the total area impacted by the operation is more than 18 ha, which suggests that the operation might be governed by the *Code of Practice for Pits* (Government of Alberta 2004b). If that is the case, the site may have to be reclaimed as per Section 5.2 of the *Code of Practice for Pits* (Government of Alberta 2004b). However, no surveyed boundary and registration of this pit was found on Spatial Information System (SPIN 2; Government of Alberta 2024) or on the Vulcan County website (Vulcan County 2024).

Given the size and extent of the disturbance, a Phase I Environmental Site Assessment (ESA) might be required to establish the presence or absence of any area of potential environmental concern associated with the operation in this area.

To apply the restoration measures proposed in the Construction Plan and for the restoration measures to be effective, the disturbed area needs to be reclaimed to an acceptable level defined by applicable regulation. The reclaimed site will also need to be treated with appropriate weed control measures to reduce the weed seed reserve in the soil to insure a suitable growing medium for vegetation establishment.

Table 12. Midnapore (MDP) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

MDP – MDP1	
Soil Classification	Orthic Black Chernozem (O.BLC)
Parent Material	Glaciofluvial
Drainage	Well drained
Surface Stoniness	S0 (Non-stony)
Topography	0–5% (Level to very gentle slope)

Comments:

MDP soils occur as significant soils within the Project Footprint.

Topsoil thickness ranges from 13–48 centimetres (cm). The average depth is 23 cm.

The upper subsoil thickness ranges from 10–21 cm. The average thickness of the upper subsoil is 15 cm.

Topsoil and upper subsoil colour contrast vary from distinct to faint.

Strip topsoil to colour change where colour transition is obvious. Salvage topsoil up to 15 cm depth, if thick enough. If the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for MDP soils is rated as high.

The water erosion risk for MDP soil is rated as low to very high.

Table 13. Midnapore-Till (MDP-XT) 30–99 centimetres soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

MDP-XT – MDP2	
Soil Classification:	Orthic Black Chernozem (O.BLC)
Parent Material:	Glaciofluvial /Medium Textured Till
Drainage:	Well drained
Surface Stoniness:	S0 (Non-stony)
Topography:	0.5–10.0% (Nearly Level to Gentle Slopes)

Comments:

MDP-XT soils occur as significant soils within the Project Footprint.

Topsoil thickness ranges from 9–40 centimetres (cm). The average depth is 23 cm.

The upper subsoil thickness ranges from 10–46 cm. The average thickness of the upper subsoil is 24 cm.

Topsoil and upper subsoil colour contrast vary from distinct to faint.

Strip topsoil to colour change where colour transition is obvious. Salvage topsoil up to 15 cm depth, if thick enough. If the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for MDP-XT soils is rated as high.

The water erosion risk for MDP-XT soil is rated as low to very high.

Table 14. Midnapore-Rego/Regosolic (MDP-ZR) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

MDP-ZR – MDP4	
Soil Classification:	Rego Black Chernozem (R.BLC)
Parent Material:	Glaciofluvial
Drainage:	Well-drained to Rapidly drained
Surface Stoniness:	S0 (Non-stony) to
Topography:	0–5% (level to Very Gentle Slopes)

Comments:

MDP-ZR soils occur as inclusion within some part of the Project Footprint.

Topsoil thickness ranges from 16–25 centimetres (cm). The average depth is 20 cm.

The upper subsoil thickness ranges from 0–4 cm. The average thickness of the upper subsoil is one cm.

The topsoil and upper subsoil colour contrast is distinct.

Strip topsoil to colour change where the colour transition is obvious. Salvage topsoil up to 15–20 cm depth, if thick enough.

Where there is upper subsoil, overstrip the topsoil to include the upper subsoil.

Care must be taken not to overstrip the topsoil into the strongly to very strongly calcareous lower subsoil (C horizon)

The wind erosion risk for MDP-XT soils is rated as high.

The water erosion risk for MDP-XT soil is rated as low to very high.

Table 15. Nose Creek – Not modal soil correlation area soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Nose Creek-AA (NSK-AA) – NSKaa1	
Soil Classification	Rego Black Chernozem (R.BLC)
Parent Material	Medium Textured Glacial Till
Drainage	Well drained
Surface Stoniness	S1 (Slightly Stony)
Topography	0.5–10.0% (nearly level to gentle slopes)

Comments:

NSK-AA soils occur as significant soils within the Project Footprint.

Topsoil thickness ranges from 9–20 centimetres (cm). The average depth is 13 cm.

The upper subsoil thickness ranges from 0–4 cm. The average thickness of the upper subsoil is one cm.

The topsoil and upper subsoil colour contrast is distinct.

Strip topsoil to colour change where colour transition is obvious. Salvage topsoil up to 10–15 cm depth, if thick enough.

Where there is upper subsoil, overstrip the topsoil to include the upper subsoil.

Care must be taken not to overstrip the topsoil into the strongly to very strongly calcareous lower subsoil (C horizon)

The wind erosion risk for NSK-AA soils is rated as low.

The water erosion risk for NSK-AA soil is rated as low to high.

Table 16. Pulteney (PUY) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

PUY – PUY1	
Soil Classification	Orthic Dark Brown Chernozem (O.DBC)
Parent Material	Medium Textured Glacial Till
Drainage	Well drained
Surface Stoniness	S1 (Slightly Stony)
Topography	0.5–15.0% (nearly level to moderate slopes)

Comments:

PUY soils are the subdominant soils within the Project Footprint.

Topsoil thickness ranges from 11–40 centimetres (cm). The average depth is 17 cm.

The upper subsoil thickness ranges from 5–45 cm. The average thickness of the upper subsoil is 22 cm. Thicker upper subsoil may be found in isolated low-lying areas.

Topsoil and upper subsoil colour contrast vary from distinct to faint.

Strip topsoil to colour change where colour transition is obvious. Salvage topsoil up to 10–20 cm depth, if thick enough. Where the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for PUY soil is rated as low to moderate.

The water erosion risk for PUY soil is rated as low to moderate.

Table 17. Readymade (RDM) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

RDM – RDM1	
Soil Classification:	Orthic Dark Brown Chernozem (O.DBC)
Parent Material:	Medium Textured Glacial Till
Drainage:	Well drained
Surface Stoniness:	S1 (Slightly Stony)
Topography:	2–15% (very gentle slopes to moderate slopes)

Comments:

RDM soils are the dominant soils within the Project Footprint.

Topsoil thickness ranges from 10–18 centimetres (cm). The average depth is 15 cm.

The upper subsoil thickness ranges from 12–38 cm. The average thickness of the upper subsoil is 24 cm. Thicker upper subsoil may be found in isolated low-lying areas.

The topsoil and upper subsoil colour contrast varies from distinct.

Strip topsoil to colour change where the colour transition is obvious. Salvage topsoil up to 10–15 cm depth, if thick enough. Where the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for RDM soils is rated as low.

The water erosion risk for RDM soil is rated as low to moderate.

Table 18. Rockyview (RKV) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

RKV – RKV1	
Soil Classification:	Orthic Black Chernozem (O.BLC)
Parent Material:	Medium Textured Glaciolacustrine/Medium Textured Glacial Till
Drainage:	Well drained
Surface Stoniness:	S1 (Slightly Stony)
Topography:	0–10% (level to gentle slopes)

Comments:

RKV soils occur as significant soils within the Project Footprint.

Topsoil thickness ranges from 11–40 centimetres (cm). The average depth is 20 cm.

The upper subsoil thickness ranges from 10–52 cm. The average thickness of the upper subsoil is 29 cm.

Topsoil and upper subsoil colour contrast vary from distinct to faint.

Strip topsoil to colour change where colour transition is obvious. Where the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for RKV soils is rated as moderate.

The water erosion risk for RKV soil is rated as low to moderate.

Table 19. Whitney (WNY) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

WNY – WNY 1	
Soil Classification:	Orthic Dark Brown Chernozem (O.DBC)
Parent Material:	Medium Textured Glaciolacustrine/Medium Textured Glacial Till
Drainage:	Well drained
Surface Stoniness:	S1(Slightly Stony)
Topography:	0–10% (level to very gentle slopes)

Comments:

WNY soils occur as significant soils within the Project Footprint.

Topsoil thickness ranges from 11–40 centimetres (cm). The average depth is 20 cm.

The upper subsoil thickness ranges from 10–52 cm. The average thickness of the upper subsoil is 29 cm.

Topsoil and upper subsoil colour contrast vary from distinct.

Strip topsoil to colour change where colour transition is obvious. Where the topsoil is less than 10 cm, over-trip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for WNY soils is rated as moderate.

The water erosion risk for WNY soil is rated as low to moderate.

Table 20. Whitney-Gleyed (WNY-GL) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

WNY-GL – WNY2	
Soil Classification:	Orthic Dark Brown Chernozem (O.DBC)
Parent Material:	Medium Textured Glaciolacustrine/Medium Textured Glacial Till
Drainage:	Well drained
Surface Stoniness:	S1 (Slightly Stony)
Topography:	0–0.5% (level)

Comments:

WNY-GL soils occur as minor inclusion within the Project Footprint.

Topsoil thickness 35 centimetres (cm).

The upper subsoil thickness is eight cm.

The topsoil and upper subsoil color contrast is faint.

Strip topsoil to color change where color transition is obvious. Where the topsoil is less than 10 cm, overstrip the topsoil to 15 cm depth.

Strip the upper subsoil to the bottom depth if the change to the lower subsoil is obvious. Where the upper subsoil is thicker than 30 cm, salvage the upper subsoil to a maximum thickness of 30 cm. Where the upper subsoil thickness is less than 10 cm, overstrip the topsoil to include the upper subsoil.

The wind erosion risk for WNY-GL soils is rated as moderate.

The water erosion risk for WNY-GL soil is rated as low to moderate.

Table 21. Miscellaneous Gleysol (ZGW) soil profile for the Georgetown Solar Energy Project, Mossleigh, Alberta.

ZGW – ZGW	
Soil Classification:	Orthic Humic Gleysol (OH.GL)
Parent Material:	Undifferentiated Material/Wetland
Drainage:	Poorly drained
Surface Stoniness:	S0 (Non-stony)
Topography:	0.5–2.0% (Nearly level)

Comments:

ZGW soils occur as minor inclusion soils within the Project Footprint.

Topsoil thickness 28 centimetres (cm).

The upper subsoil thickness is 19 cm.

The topsoil and upper subsoil color contrast is distinct.

Strip topsoil to color change.

Strip the upper subsoil to 19 cm or the bottom depth if the change to the lower subsoil is obvious.

The wind erosion risk for ZGW soils is rated as low.

The water erosion risk for ZGW soil is rated as low to moderate.

3.2.3 Soil Laboratory Analytical Result

The soil parameters analyzed for the samples collected from the Project Footprint include soil particle size distribution and texture class, pH, salinity, measure in EC, SAR, saturation percent, $CaCO_3$ equivalent, TOC, OM, and soluble cations. A summary of the soil analytical result is presented in Table 22 and a detailed laboratory soil analytical report is provided in Appendix C.

3.2.3.1 Soil Analytical Result for the Balzac-ZZSA Soil

The saline Rego Humic Gleysol, Balzac-ZZSA (BZCzzsa), soil is different from the rest of the soils occurring in the Project Footprint and only covers a small area (0.1 ha) of the Project Footprint. The soil chemistry of the BZCzzsa soil is also very different from the non-saline or sodic soils occurring in the rest of the Project Footprint. Thus, the laboratory analytical result of BZCzzsa soil is not included in calculating the range and average values of soil analytical results.

The topsoil texture of the BZCzzsa soil is loam and that of the lower subsoil is clay loam (Table 22). The pH of the topsoil of BZCzzsa soil is 7.89 (mildly alkaline) and that of the lower subsoil (C horizon) is 8.25 (moderately alkaline; Government of Alberta 2003; Table 23). The topsoil EC value is 23.700 decisiemens per metre (dS/m; very strongly saline) and the subsoil is 14.700 dS/m (strongly saline; Government of Alberta 2010). The SAR values of the topsoil and lower subsoil are 17.40 and 16.50, respectively (Table 22).

3.2.3.2 Soil Analytical Result for Soils in the Rest of the Project Footprint

3.2.3.2.1 Texture

The topsoil texture of the sampled soils varied from moderately coarse (sandy loam), to medium (loam), and moderately fine (clay loam). Upper subsoil textures varied from medium (loam), to moderately fine (clay loam), moderately fine (clay loam, silty clay loam, sandy clay loam), and fine (clay). The lower subsoil texture is moderately fine (clay loam, sandy clay loam).

3.2.3.2.2 pH (Acidity)

The topsoil pH ranges from 5.63 (moderately acidic) to 7.38 (neutral), the average topsoil pH is 6.41 (neutral; Government of Alberta 2003). The pH level of upper subsoil samples ranges from 6.01 (slightly acidic) to 7.13 (neutral). The average pH level of upper subsoil samples is 6.62 (neutral; Government of Alberta 2003). The pH level of the lower subsoil (C horizon) samples ranges from 7.32 (mildly alkaline) to 7.91 (moderately alkaline). The average pH level of the lower subsoil samples is 7.53 (moderately alkaline; Government of Alberta 2003; Table 22).

3.2.3.2.3 Salinity (Electric Conductivity)

The topsoil salinity value (EC) ranges from 0.160 dS/m to 1.330 dS/m (non-saline). The average topsoil salinity level is 0.711 dS/m (non-saline; Government of Alberta 2010; Table 23). The upper subsoil salinity level ranges from 0.123 dS/m to 0.891 dS/m (non-saline). The average salinity level of the upper subsoil samples is 0.433 dS/m (non-saline; Government of Alberta 2010: Table 22). The salinity level of the lower subsoil ranges from 0.238 dS/m (non-saline) to 0.841 dS/m (non-saline). The average salinity of the lower subsoil samples is 0.495 dS/m (non-saline; Table 22).

3.2.3.2.4 Sodium Adsorption Ratio

The SAR value of the topsoil samples range from less than 0.10 (below the method detection limit) to 0.42. The average SAR value for the topsoil sample soils is 0.25 (Table 22). The SAR value of the upper subsoil samples range from less than 0.10 (below the method detection limit) to 8.88. The average SAR value of the upper subsoil samples is 1.85. The SAR value of the lower

subsoil samples range from 0.18 to 0.69. The average SAR value of the lower subsoil samples is 0.48 (Table 22).

3.2.3.2.5 Calcareousness

The $CaCO_3$ equivalent level of the topsoil samples ranges from 0.54% (noncalcareous) to 6.94% (moderately calcareous). The average $CaCO_3$ equivalent level is 1.45% (Table 22).

3.2.3.2.6 Total Organic Carbon and Organic Matter

The TOC percent of the topsoil samples ranges from 1.56% to 4.26%, and the average TOC percent is 2.64% (Table 22). The OM level in the topsoil samples ranged from 2.69% to 7.34%, and the average OM level in the topsoil samples is 4.76% (Table 22).

3.2.3.2.7 Reclamation Suitability of Topsoil and Upper Subsoil

The topsoil and upper subsoil reclamation suitability of the soils series identified within the Project Area were rated as “Good,” “Poor,” “Fair,” and “Unsuitable.”

The reclamation suitability rating for the range of topsoil pH levels is Fair (5.63, 7.38), and the average topsoil pH (6.41) is rated as Good (Government of Alberta 2004a; Table 22). The reclamation suitability rating for the range of upper subsoil pH levels is Fair to Good. The average upper subsoil pH (6.62) is rated as Good for reclamation (Government of Alberta 2004a; Table 22).

The topsoil salinity level of the topsoil samples (0.160 to 1.330 dS/m) is rated as Good for reclamation. The salinity level of the upper subsoil samples (0.123 to 0.891 dS/m) is rated as Good for reclamation (Government of Alberta 2004a; Table 22).

The SAR values of the topsoil samples (less than 0.10 to 0.42) is rated as Good for reclamation (Government of Alberta 2004a). The range of SAR values of the upper subsoil samples (less than 0.10 to 8.88) are rated as Good to Poor, while the average SAR value (1.85) of the upper subsoil samples rated as Good for reclamation (Government of Alberta 2004a; Table 22).

Table 22. Summary of soil laboratory analytical result for soil samples collected from the Georgetown Solar Energy Project Area, Mossleigh, Alberta.

				Soil Particle Size Distribution (%)				Soil Chemistry					Soil Fertility	
Site ID	Soil Series	Horizon Designation	Depth Interval (cm)	Sand	Silt	Clay	Texture	pH	EC (dS/m)	SAR	Saturation (%)	$CaCO_3$ equi. (%)	Total Organic Carbon (%)	Organic Matter (%)
AG19	RDM	Ap	0–14	23.6	39.9	36.5	Clay Loam	6.23	0.978	0.42	82.3	0.80	2.77	4.78
		Bm	14–27	14.4	36.2	49.4	Clay	6.01	0.290	0.96	87.4	0.70	1.47	2.53
		Ck	27–70	–	–	–	–	7.32	0.779	0.59	62.5	–	–	–
AB20	RDM	Bm	25–32	16.4	49.1	34.4	Silty Clay Loam	7.13	0.891	8.88	75.1	–	–	–
AE18	RDM	Bm	19–33	15.2	32.6	52.2	Clay	6.13	0.525	0.94	90.4	–	–	–
W02	BZCzzsa	Ap	0–15	44.8	33.3	21.9	Loam	7.89	23.700	17.40	73.0	0.96	1.56	2.69
		Ck	15–60	40.0	31.8	28.2	Clay Loam	8.25	14.700	16.50	54.8	–	–	–
V19	RKV	Ap	0–19	50.0	33.6	16.4	Loam	6.50	0.305	0.33	63.4	0.60	2.44	4.21
		Bm1	19–33	43.6	42.5	13.9	Loam	6.84	0.444	0.68	76.7	0.63	1.25	2.16
		Bm2	33–48	31.6	47.5	20.9	Loam	7.07	0.530	0.79	74.4	0.70	1.14	1.96
		Ck	48–80	–	–	–	–	7.59	0.247	0.34	79.0	–	–	–
V18	NSKaa	Apk	0–13	52.0	30.2	17.7	Sandy Loam	7.38	0.660	0.23	64.9	6.94	2.15	3.71
		Ck	13–60	54.8	23.6	21.6	Sandy Clay Loam	7.62	0.238	0.19	54.5	–	–	–
AF11	WNY	Ah	3–13	39.2	38.5	22.3	Loam	6.43	0.734	<0.10	98.4	0.54	3.24	5.58
		Bm	13–30	39.6	35.3	25.0	Loam	6.75	0.282	<0.10	76.4	3.32	1.20	2.07
		Ck	30–40	51.2	24.4	24.4	Sandy Clay Loam	7.36	0.467	0.69	69.1	–	–	–
F10	DEL	Ap	0–28	48.0	31.5	20.5	Loam	6.49	1.080	0.11	44.6	0.83	2.50	4.31
		Bm	28–39	36.0	35.1	28.9	Clay Loam	6.13	0.714	0.27	77.0	0.49	1.36	2.34
		Ck1+Ck2	39–50	–	–	–	–	7.48	0.841	0.18	70.3	–	–	–
		IICk	50–70	–	–	–	–	7.91	0.410	0.66	62.7	–	–	–
B11	DIS	TS	0–15	50.8	30.1	19.1	Loam	7.75	0.519	<0.10	70.0	0.46	1.53	2.64
		Bm	15–37	32.4	42.5	25.0	Loam	6.50	0.498	<0.10	70.4	0.59	1.03	1.78
		Ck	37–110	–	–	–	–	7.60	0.251	<0.10	55.3	–	–	–
P15	DEL	Ap+Ah	0–32	43.6	35.5	20.9	Loam	6.10	0.437	0.23	88.4	0.83	3.42	5.90
		Bm	32–50	31.6	44.7	23.7	Loam	6.80	0.166	<0.10	75.3	0.73	1.86	3.21
Q11	DEL	Ap	0–14	42.8	32.8	24.4	Loam	5.63	1.330	0.18	74.2	0.57	2.48	4.28
		Bm1+Bm2	14–52	50.8	21.0	28.2	Sandy Clay Loam	6.90	0.297	<0.10	68.3	0.58	0.92	1.59
		Ck	52–84	–	–	–	–	7.39	0.724	0.69	43.0	–	–	–
P14	RKV	Ap+Ah	0–40	36.0	42.8	21.2	Loam	6.54	0.160	<0.10	93.4	0.94	4.26	7.34
		Bm	40–70	30.0	44.2	25.8	Loam	6.56	0.123	0.43	85.4	0.78	1.81	3.12

ID = identification; cm = centimetre; EC = electric conductivity; dS/m = decisiemens per metre; SAR = sodium adsorption ratio; $CaCO_3$ = Calcium carbonate; equi. = equivalent; RDM = Readymade; BZCzzsa = Balzac-ZZSA; RKV = Rockyview; NSKaa = Nose Creek-AA; WNY = Whitney; DEL = Delacour; DIS = Disturbed.

The topsoil of Delacour is rated as Good; the topsoil of the rest of the mapped soil series, except for BZCzzsa soil, are rated Fair to Poor (Table 24). The percent saturation is one of the limiting soil parameters that contributed to these ratings. The BZCzzsa soil is a saline sodic R.HG with no sign of diagnostic Solonetzic B horizon, identified at a groundwater discharge area with salt crust on the surface and a massive wet C horizon under a ploughed A (Ap) horizon. The topsoil of BZCzzsa soil, with EC of 23.700 dS/m and SAR of 17.40, is rated as Unsuitable for reclamation (Table 23).

Table 23. Topsoil and uppers subsoil reclamation suitability rating for soils samples for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Soil Series Code	Soil Name	Soil Subgroup	Suitability Rating[1]	
			Topsoil	Subsoil
RDM	Readymade	Orthic Dark Brown Chernozem	P (1)	P (1,2)
WNY	Whitney	Orthic Dark Brown Chernozem	P (1)	F (1)
BZCzzsa	Balzac-ZZSA	Rego Humic Gleysol	U (3,4)	N/A
NSKaa	Nose Creek-AA	Rego Black Chernozem	F (1,5)	N/A
RKV	Rockyview	Orthic Black Chernozem	P (1)	P (1)
DEL	Delacour	Orthic Black Chernozem	G	F (6,1,7)
PUY	Pulteney	Orthic Dark Brown Chernozem	N/R	P (1,2)
DIS	Disturbed	Anthropogenic	F (6,1,7)	F (1)

[1.] Suitability Rating: F = Fair, G = Good, P = Poor, U = Unsuitable with limiting soil parameters in brackets; N/R = Not Rated; N/A = Not Applicable.

Limiting soil parameters: 1 = Saturation (%), 2 = Texture, 3 = Salinity (electric conductivity), 4 = sodium adsorption ratio, 5 = Calcium Carbonate ($CaCO_3$) equivalent, 6 = pH, 7 = Total organic carbon (%).

3.2.4 Soil Erosion, Compaction, and Rutting Risks

Wind erosion risk for MDP, Readymade (RDM), Pulteney (PUY), Miscellaneous Gleysol (ZGW), and BZC soils were evaluated from soil texture based on Coote and Pettapiece (1989). The wind erosion risks for the rest of the soils were extracted from Pediocan (1993). Water erosion risks for MDP, RDM, PUY, ZGW, and BZC at different slope categories (less than 5%, 5–9%, and 9–15%) were derived using soil texture based on Tajek et. al. (1985). Water erosion risks for the rest of the soils were derived from Pedocan (1993; Table 24).

Table 24. Soil erosion, compaction, and rutting risks for mapped soils at the Georgetown Solar Energy Project, Mossleigh, Alberta.

Soil Series Code	Wind Erosion Risk	Water Erosion Risk by Slope Class			Compaction and Rutting Risk
		<5%	5–9%	9–15%	
BZCzzsa	Low	Low	Low	High	Very High
DEL	Moderate	Low	Low	Moderate	High–Very High
DELca	Moderate	Low	Low	Moderate	High–Very High
DELgl	Moderate	Low	Low	Moderate	Very High
MDP	High	Low	Moderate–High	Very high	Moderate
MDPca	High	Low	Moderate–High	Very high	Moderate
MDPxt	High	High	High	High	Moderate
MDPxtca	High	High	High	High	Moderate
MDPzr	High	High	High	High	Moderate
NSKaa	Low	Low	Moderate	High	Very High
PUY	Low to Moderate	Low	Low	Moderate	High–Very High

Table 24. Soil erosion, compaction, and rutting risks for mapped soils at the Georgetown Solar Energy Project, Mossleigh, Alberta.

Soil Series Code	Wind Erosion Risk	Water Erosion Risk by Slope Class			Compaction and Rutting Risk
		<5%	5–9%	9–15%	
RDM	Low	Low	Low	Moderate	Very High
RKV	Moderate	Low	Low	Moderate	High–Very High
WNY	Moderate	Low	Low	Moderate	High
WNYgl	Moderate	Low	Low	Moderate	High–Very High
WNYxc	Moderate	Low	Low	Moderate	High
ZGW	Low	Low	Low	Moderate	Very High

BZCzzsa = Balzac-ZZSA; DEL = Delacour; DELca = Delacour-Calcareous; DELgl = Delacour-Gleyed; MDP = Midnapore; MDPca = Midnapore-Calcareous; MDPxt = Midnapore-XT; MDPxtca = Midnapore-Till at 30–99 cm; MDPzr = Midnapore-ZR; NSKaa = Nose Creek-AA; PUY = Pulteney; RDM = Readymade; RKV = Rockyview; WNY = Whitney; WNYgl = Whitney-Gleyed; WNYxc = Whitney-Clay; ZGW = Miscellaneous Gleysol.

3.2.5 Soil Salvage

The soil salvage volume for the topsoil and upper subsoil was calculated based on the footprint of the different Project Components (CPs) that could potentially require soil salvage and conservation. The footprints of the components were extracted from the Layout geographic information system (GIS) dataset (GE_Layout_20220112) provided by Georgetown Solar.

The topsoil and upper subsoil thickness, under the footprints of the CPs, was calculated by overlaying the CPs footprint on the mapped soil polygons for the Project Area. Tables 25–28 provide the average stripping thickness for topsoil and upper subsoil and the approximate volume of soil to be salvaged for the respective layers.

The extent of the disturbance associated with the AC collector lines (Figure 1) was determined assuming a worst-case scenario of trenching all collector lines, even though a trenchless plough-in installation method will be used. It is also assumed that the AC Collector line feature in the Layout dataset represents the centerline of the disturbance, and the width of the disturbance will be 30 cm. Soil will only be salvaged from collector lines where they connect to inverters, the substation or at opposite ends of directional drills to pass under waterbodies. The calculated topsoil and upper subsoil volume by soil map unit is provided in Tables 25–28.

Table 25. Soil salvage volume by soil map units from the alternating current (AC) Collector lines footprint for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Map Unit	Area (m^2)	Average Thickness (cm)		Salvage Volume (m^3)	
		Topsoil	Upper Subsoil	Topsoil	Upper Subsoil
DEL1	1,520.4	18.9	22.5	287.4	342.1
DEL2	30.7	17.2	14.2	5.3	4.4
DEL3	7.7	27.7	37.4	2.1	2.9
MDP1	28.1	30.0	59.0	8.4	16.6
MDP2	9.9	40.0	30.0	4.0	3.0
NSKaa1	50.8	12.0	0.0	6.1	0.0
PUY1	166.0	17.3	29.2	28.7	48.5
RDM1	35.7	15.7	28.4	5.6	10.1
RDM2	25.4	17.0	32.5	4.3	8.3
RKV1	64.8	22.9	25.8	14.8	16.7

Table 25. Soil salvage volume by soil map units from the alternating current (AC) Collector lines footprint for the Georgetown Solar Energy Project, Mossleigh, Alberta.

		Average Thickness (cm)		Salvage Volume (m^3)	
Map Unit	**Area (m^2)**	**Topsoil**	**Upper Subsoil**	**Topsoil**	**Upper Subsoil**
WNY1	40.5	17.5	23.0	7.1	9.3
WNY2	270.6	17.2	26.6	46.5	72.0
DIS1	162.4	N/A	N/A	N/A	N/A
DIS2	29.6	N/A	N/A	N/A	N/A
DIS3	30.2	N/A	N/A	N/A	N/A
HIGHWAY	24.5	N/A	N/A	N/A	N/A
WATERCOURSE	19.9	N/A	N/A	N/A	N/A
Total	**2,517.2**	**–**	**–**	**420.4**	**533.8**

m^2 = square metre; cm = centimetre; m^3 = cubed metre; DEL = Delacour; MDP = Midnapore; NSKaa = Nose Creek-AA; PUY = Pulteney; RDM = Readymade; RKV = Rockyview; WNY = Whitney; DIS = Disturbed; N/A = Not Applicable.

The road footprint was determined based on the Roads layer in the Layout GIS dataset. Where the AC Collector disturbance overlaps with the Roads footprints, the extent of the overlap has been removed to avoid double counting.

Table 26. Soil salvage volume by soil map units from the road footprint for the Georgetown Solar Energy Project, Mossleigh, Alberta.

		Average Thickness (cm)		Salvage Volume (m^3)	
Map Unit	**Area (m^2)**	**Topsoil**	**Upper Subsoil**	**Topsoil**	**Upper Subsoil**
DEL1	39,702.0	18.0	18.1	7,146.4	7,186.1
DEL2	1,120.2	17.7	16.4	198.3	183.8
DEL3	128.5	27.7	37.4	35.6	48.1
MDP1	670.6	30.0	59.0	201.2	395.7
MDP2	326.1	25.5	21.0	83.2	68.5
NSKaa1	1,038.8	12.0	0.0	124.7	0.0
PUY1	3,001.4	17.3	37.0	519.3	1,110.6
RDM1	1,145.7	15.3	25.2	175.3	288.8
RDM2	880.9	17.0	32.5	149.8	286.3
RKV1	3,668.8	23.0	24.2	843.9	887.9
WNY1	1,558.4	21.3	24.0	332.0	374.1
WNY2	4,996.7	17.2	26.6	859.5	1,329.2
DIS1	3,805.1	N/A	N/A	N/A	N/A
DIS2	711.6	N/A	N/A	N/A	N/A
DIS3	585.5	N/A	N/A	N/A	N/A
Total	**63,340.3**	**–**	**–**	**10,669.2**	**12,159.1**

m^2 = square metre; cm = centimetre; m^3 = cubed metre; DEL = Delacour; MDP = Midnapore; NSKaa = Nose Creek-AA; PUY = Pulteney; RDM = Readymade; RKV = Rockyview; WNY = Whitney; DIS = Disturbed; N/A = Not Applicable.

The spatial extents of the Temporary Laydown Area and the Inverters were extracted from the Layout GIS dataset.

Table 27. Soil salvage volume by soil map units from temporary laydown footprint for the Georgetown Solar Energy Project, Mossleigh, Alberta.

		Average Thickness (cm)		Salvage Volume (m^3)	
Map Unit	**Area (m^2)**	**Topsoil**	**Upper Subsoil**	**Topsoil**	**Upper Subsoil**
DEL1	16,354.7	16.7	22.7	2,731.3	3,712.6
MDP2	491.4	11.0	12.0	54.1	59.0
NSKaa1	1,993.2	13.0	0.0	259.2	0.0
PUY1	3,931.3	15.5	24.5	609.4	963.2
RDM1	7,413.6	14.4	18.7	1,067.6	1,386.4
RDM2	3,425.5	17.0	32.5	582.4	1,113.3
RKV1	1,967.3	19.0	29.0	373.8	570.6
WNY2	6,907.8	17.2	26.6	1,188.2	1,837.5
DIS1	6,565.6	N/A	N/A	N/A	N/A
DIS2	4,676.3	N/A	N/A	N/A	N/A
DIS3	1,330.9	N/A	N/A	N/A	N/A
Total	**55057.6**	**–**	**–**	**6,866.0**	**9,642.6**

m^2 = square metre; cm = centimetre; m^3 = cubed metre; DEL = Delacour; MDP = Midnapore; NSKaa = Nose Creek-AA; PUY = Pulteney; RDM = Readymade; RKV = Rockyview; WNY = Whitney; DIS = Disturbed; N/A = Not Applicable.

Table 28. Soil salvage volume by soil map units from the inverter footprint for the Georgetown Solar Energy Project, Mossleigh, Alberta.

		Average Thickness (cm)		Salvage Volume (m^3)	
Map Unit	**Area (m^2)**	**Topsoil**	**Upper Subsoil**	**Topsoil**	**Upper Subsoil**
DEL1	3,561.3	18.9	23.3	673.1	829.8
DEL2	92.2	17.5	21.0	16.2	19.4
DEL3	1.6	27.7	37.4	0.5	0.6
MDP1	103.7	30.0	59.0	31.2	61.2
NSKaa1	210.9	12.0	0.0	25.4	0.0
PUY1	276.7	17.1	21.6	47.4	59.8
RDM1	75.1	14.4	18.7	10.9	14.1
RDM2	120.7	17.0	32.5	20.6	39.3
RKV1	184.7	18.2	29.7	33.7	54.9
WNY1	75.0	25.0	25.0	18.8	18.8
WNY2	427.8	17.2	26.6	73.6	113.8
DIS1	399.9	N/A	N/A	N/A	N/A
DIS2	57.6	N/A	N/A	N/A	N/A
DIS3	38.7	N/A	N/A	N/A	N/A
Total	**5,625.9**	**–**	**–**	**951.4**	**1,211.7**

m^2 = square metre; cm = centimetre; m^3 = cubed metre; DEL = Delacour; MDP = Midnapore; NSKaa = Nose Creek-AA; PUY = Pulteney; RDM = Readymade; RKV = Rockyview; WNY = Whitney; DIS = Disturbed; N/A = Not Applicable.

4.0 BASELINE VEGETATION CONDITIONS

As part of the PDSA, WEST documented vegetation and weed species at each soil survey location.

4.1 Methods

During the 2021 wetland and watercourse surveys, presence of weed and invasive vascular plant species were recorded incidentally. During the 2023 PDSA, each 100 x 100 m grid cell was investigated for regulated weeds (Noxious and Prohibited Noxious; Government of Alberta 2016) and invasive vascular plant species. Information on species, areal extent, percent cover, distribution, number of plants and growth stage was documented.

4.2 Results

During the 2021 wetland and watercourse surveys and the 2023 PDSA, the land was cultivated and seeded to annual crops. An area of 14.5 ha in the northernmost portion of NE-08-21-25W4M has been disturbed by significant civil earthworks prior to Georgetown Solar obtaining its land lease. In 2021, incidental observations of weeds included one species of noxious weed: creeping thistle (*Cirsium arvense*). Flixweed (*Descurainia sophia*) and dandelion *(Taraxacum officinale)* were also observed throughout the Project Area. Observed weeds and invasive species occurred sporadically throughout the Project Area. In 2023, during the PDSA, two species of noxious weeds were documented: creeping thistle and perennial sow-thistle (*Sonchus arvensis*; Figure 3 and Appendix D). Thirteen invasive vascular plant species were documented during the PDSA.

5.0 RECLAMATION PLANNING

5.1 Objectives

The goal of reclamation is to allow for return of the land to pre-Project conditions, or an equivalent land capability. Final reclamation for this Project would entail returning the lands to crop production, unless the landowner requests the vegetation established after construction remain intact following decommissioning. Soil conservation, including soil salvage and replacement is an integral part reclamation planning.

5.2 Soil Replacement

Total volume of salvaged topsoil and subsoil will be replaced (Table 29). Soil will not be stored or relocated off-site, nor sold.

Table 29. Soil salvage and replacement volumes for the Georgetown Solar Energy Project, Mossleigh, Alberta.

Project Component	Soil Salvage Volume (m^3)	Soil Replacement Volume (m^3)
Roads	22,800	22,800
Temporary Laydown Area	16,500	16,500
Inverters	2,200	2,200
Total	41,500	41,500

m^3 = cubed metre.

6.0 REFERENCES

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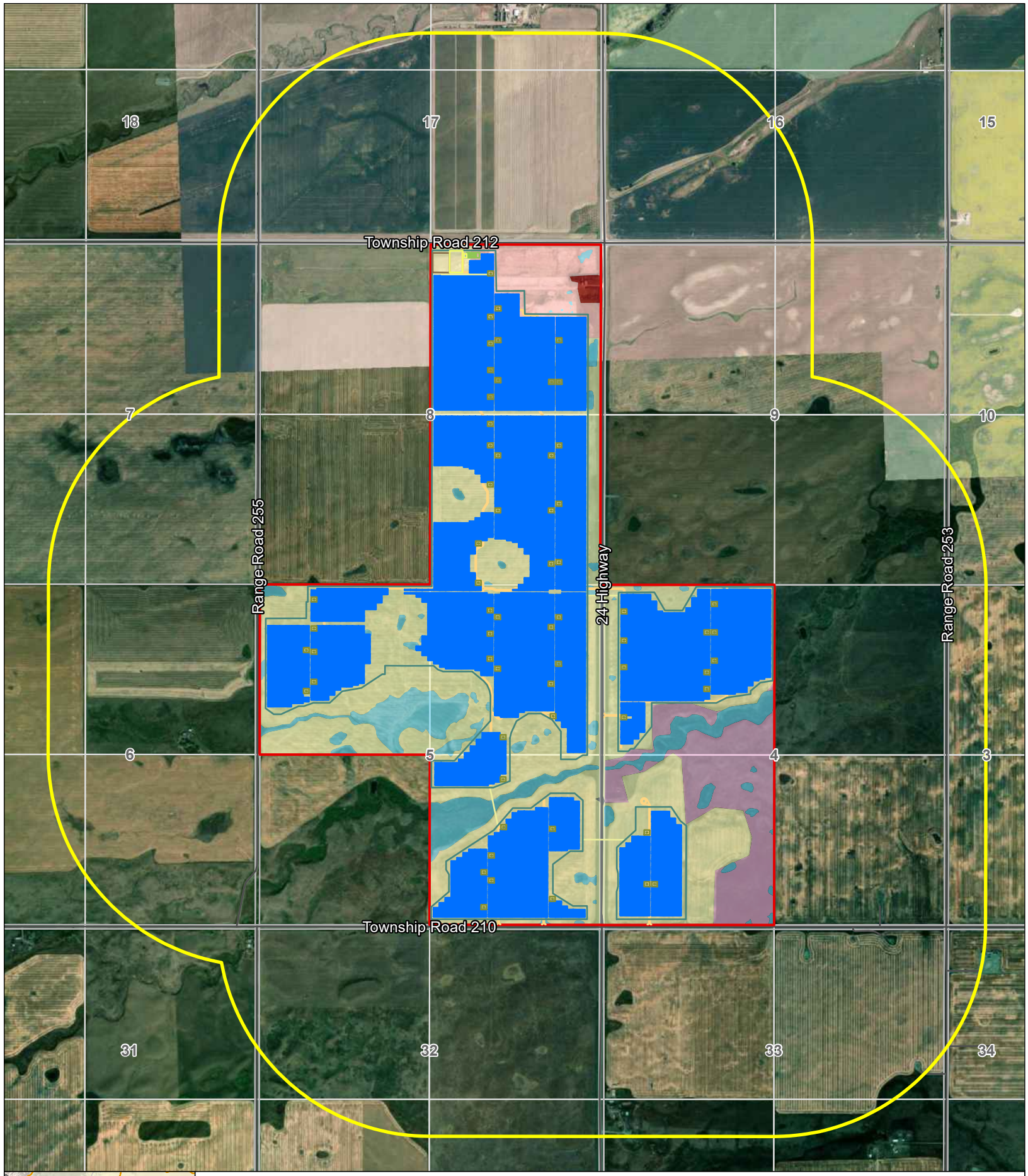
Appendix A. Figures.



Project Boundary
Study Area
Quarter Section
Road

Land Cover
Agricultural
Residential
Industrial
Native /Tame Grassland
Road
Wetlands/ Watercourses
Access Road

Layout
Battery Energy Storage System
Temporary Laydown
Substation
Fenceline
Inverter
Operation and Maintenance Building
Collector Lines
Solar Panel

Figure 1. The Georgetown Solar Energy Project near Mossleigh, Alberta.

N
W E
S

0 0.1 0.3 0.4 mi
0 0.3 0.6 0.9 km

Data Source: World Imagery
Coordinate System: NAD 1983 10TM AEP Forest
Date: 4/30/2024 Author: J. Sholtz

WEST

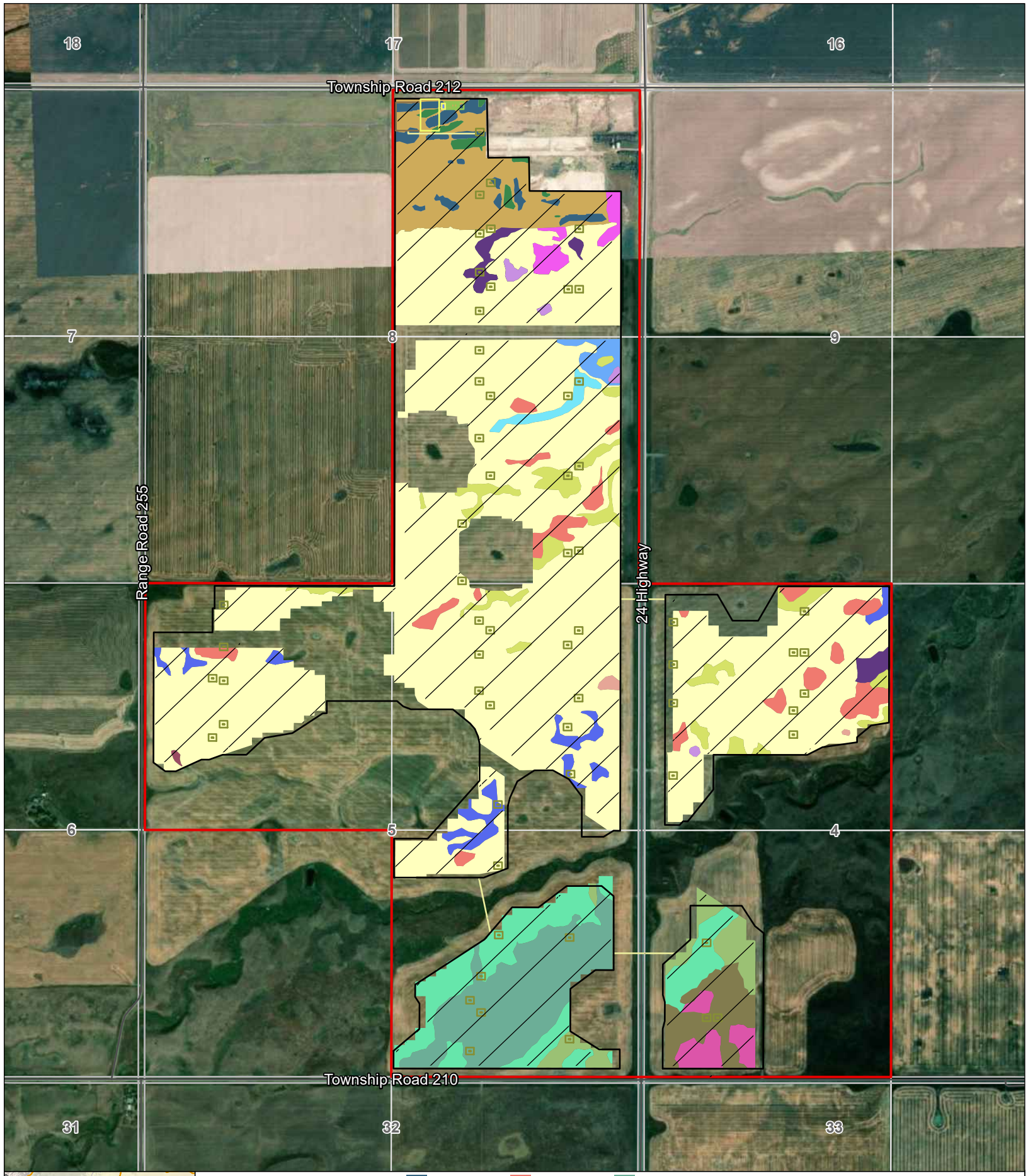
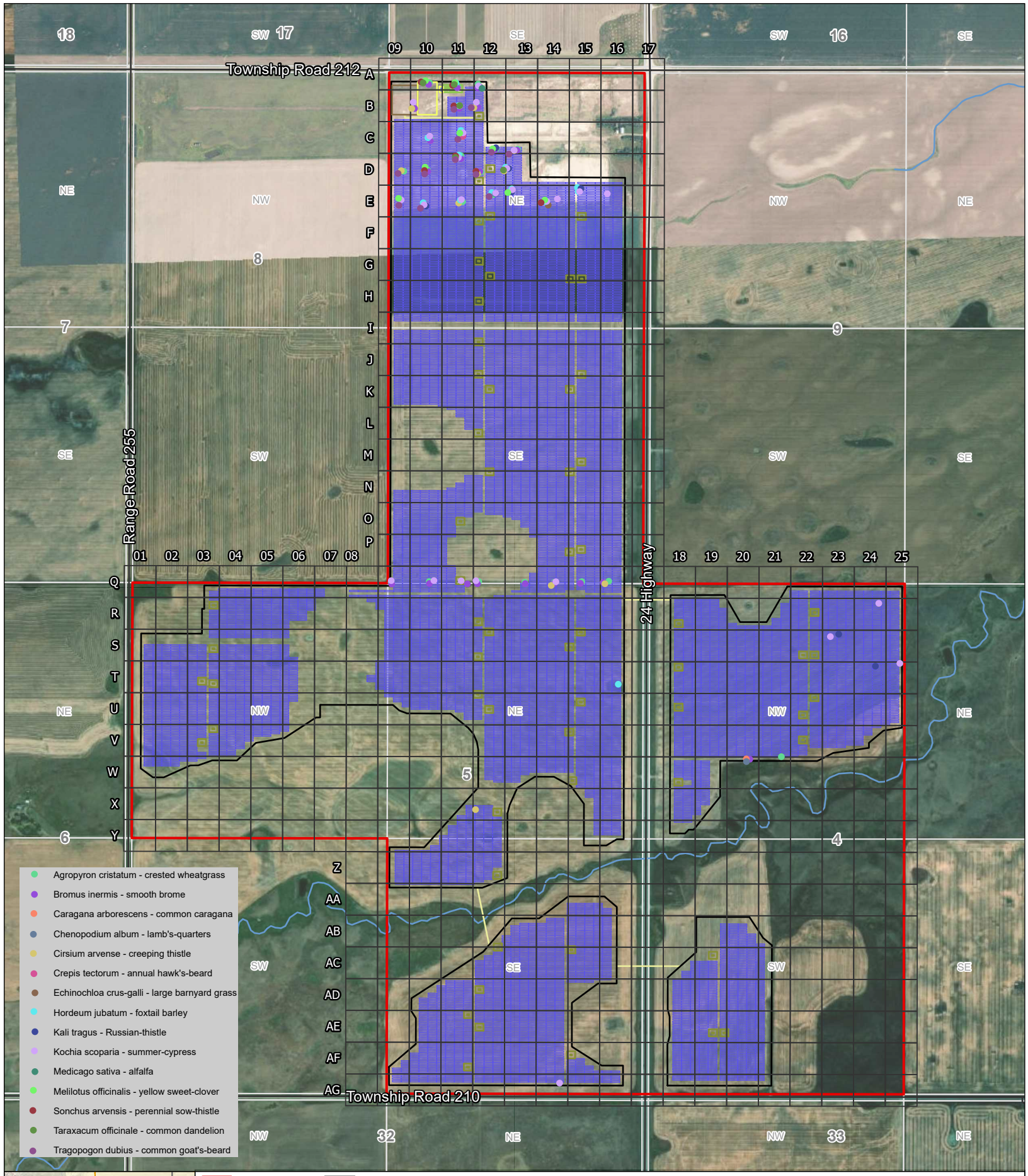


Figure 2. Soil Units at the Georgetown Solar Energy Project near Mossleigh, Alberta.



Project Area
Quarter Section
Road
Stream/River
IMSA Grid Cell (100mx100m)

Layout
Battery Energy Storage System
Temporary Laydown
Substation
Fenceline
Inverter
Operation and Maintenance Building
Collector Lines
Solar Panels

Figure 3. Weed Species in the Georgetown Solar Energy Project near Mossleigh, Alberta

N W E S

0 0.2 0.4 0.6 0.8 km
0 0.1 0.2 0.3 0.4 mi

Data Source: World Imagery
Coordinate System: NAD 1983 UTM Zone 12N
Date: 4/30/2024 Author: J. Sholtz

WEST

Appendix B. Soil Field Site Inspection Data.

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
A10	DIS	Anthroposolic	DIS	4	DIS	0	0	2 - Moderately stony	N/A
A11	DIS	Anthroposolic	DIS	3	DIS	0	0	1 - Slightly stony	Faint
A12	DIS	Anthroposolic	DIS	5	DIS	0	0	2 - Moderately stony	N/A
AA14	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	15	19	1 - Slightly stony	Faint
AA15	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	40	42	1 - Slightly stony	Distinct
AB12	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	4	Well	15	45	1 - Slightly stony	Faint
AB13	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	16	24	1 - Slightly stony	Distinct
AB14	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	20	20	1 - Slightly stony	Faint
AB15	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	20	30	1 - Slightly stony	Faint
AB19	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	23	19	0 - Nonstony	Faint
AB20	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	4	Well	25	30	1 - Slightly stony	Distinct
AC11	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	4	Well	11	10	1 - Slightly stony	Faint
AC12	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	20	20	1 - Slightly stony	Faint
AC13	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	13	27	1 - Slightly stony	Faint
AC14	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	25	25	1 - Slightly stony	Distinct
AC15	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	18	32	1 - Slightly stony	Faint
AC18	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	12	27	1 - Slightly stony	Distinct
AC19	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	12	11	1 - Slightly stony	Distinct
AC20	WNYgl	Gleyed Dark Brown Chernozem (GL.DBC)	L3	1	Well	35	8	0 - Nonstony	Faint
AD09	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	5	Well	20	5	1 - Slightly stony	Faint
AD10	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	20	10	1 - Slightly stony	Faint
AD11	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	12	28	1 - Slightly stony	Faint
AD12	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	17	28	1 - Slightly stony	Faint
AD13	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	19	11	1 - Slightly stony	Faint
AD14	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	27	13	1 - Slightly stony	Distinct
AD18	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	11	10	1 - Slightly stony	Faint
AD19	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	4	Well	13	21	1 - Slightly stony	Distinct
AD20	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	4	Well	23	15	1 - Slightly stony	Distinct
AE10	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	18	17	1 - Slightly stony	Distinct
AE11	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	15	20	1 - Slightly stony	Distinct
AE12	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	15	30	0 - Nonstony	Distinct
AE13	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	18	32	1 - Slightly stony	Distinct
AE14	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Well	10	25	0 - Nonstony	Distinct
AE18	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	2	Well	19	14	1 - Slightly stony	Faint
AE18b	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	26	16	1 - Slightly stony	Distinct
AE19	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	17	38	0 - Nonstony	Faint

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
AE20	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	18	29	1 - Slightly stony	Distinct
AF09	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	20	15	1 - Slightly stony	Distinct
AF10	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	18	22	1 - Slightly stony	Distinct
AF11	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	13	17	1 - Slightly stony	Distinct
AF12	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	20	40	1 - Slightly stony	Distinct
AF13	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	12	28	1 - Slightly stony	Distinct
AF14	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	5	Well	18	70	1 - Slightly stony	Distinct
AF18	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	4	Well	16	36	1 - Slightly stony	Distinct
AF19	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	17	31	1 - Slightly stony	Distinct
AF20	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	5	Well	10	15	1 - Slightly stony	Distinct
AG09	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	18	62	1 - Slightly stony	Distinct
AG10	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	13	27	1 - Slightly stony	Distinct
AG11	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	2	Well	17	18	1 - Slightly stony	Distinct
AG12	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	14	21	1 - Slightly stony	Distinct
AG13	PUY	Orthic Dark Brown Chernozem (O.DBC)	M4	5	Well	20	65	1 - Slightly stony	Faint
AG14	WNYxc	Orthic Dark Brown Chernozem (O.DBC)	L3	3	Moderately	25	25	1 - Slightly stony	N/D
AG15	WNY	Orthic Dark Brown Chernozem (O.DBC)	L3	4	Well	17	23	1 - Slightly stony	Distinct
AG18	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	4	Well	12	12	1 - Slightly stony	Distinct
AG19	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	3	Well	14	13	1 - Slightly stony	Faint
AG20	RDM	Orthic Dark Brown Chernozem (O.DBC)	M4	5	Well	16	14	1 - Slightly stony	Distinct
B10	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	Faint
B11	DIS	Anthroposolic	DIS	3	DIS	15	22	1 - Slightly stony	Distinct
B12	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	N/A
C10	DIS	Anthroposolic	DIS	2	DIS	0	0	2 - Moderately stony	N/A
C11	DIS	Anthroposolic	DIS	4	DIS	0	0	2 - Moderately stony	N/A
C12	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	N/A
C13	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	N/A
D09	DIS	Anthroposolic	DIS	3	DIS	15	0	2 - Moderately stony	N/A
D10	DIS	Anthroposolic	DIS	1	DIS	0	0	2 - Moderately stony	N/A
D11	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	N/A
D12	DIS	Anthroposolic	DIS	1	DIS	0	0	2 - Moderately stony	N/A
D13	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	N/A
E0901	RKV	Orthic Black Chernozem (O.BLC)	L3	2	Well	14	22	1 - Slightly stony	Distinct
E10	DIS	Anthroposolic	DIS	2	DIS	0	0	2 - Moderately stony	N/A
E11	RKV	Orthic Black Chernozem (O.BLC)	L3	2	Well	11	35	1 - Slightly stony	Distinct
E12	DIS	Anthroposolic	DIS	2	DIS	0	0	2 - Moderately stony	Faint

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
E13	DIS	Anthroposolic	DIS	5	DIS	0	0	2 - Moderately stony	Faint
E14	DIS	Anthroposolic	DIS	2	DIS	0	0	2 - Moderately stony	N/A
E14PIT	DIS	Anthroposolic	DIS	2	DIS	0	0	2 - Moderately stony	Faint
E15	DIS	Anthroposolic	DIS	3	DIS	0	0	2 - Moderately stony	Distinct
E16	DIS	Anthroposolic	DIS	2	DIS	0	0	1 - Slightly stony	N/A
F10	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	28	11	1 - Slightly stony	Distinct
F11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	19	46	1 - Slightly stony	Faint
F12	MDPzr	Rego Black Chernozem (R.BLC)	C3	1	Well	18	0	1 - Slightly stony	Distinct
F13	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	36	30	1 - Slightly stony	Faint
F14	MDP	Orthic Black Chernozem (O.BLC)	C3	2	Well	48	70	0 - Nonstony	Faint
F15	MDPzr	Rego Black Chernozem (R.BLC)	C3	2	Well	25	0	1 - Slightly stony	Faint
F16	MDP	Orthic Black Chernozem (O.BLC)	C3	2	Well	13	21	0 - Nonstony	Distinct
G10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	42	43	1 - Slightly stony	Faint
G11	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	21	30	0 - Nonstony	Faint
G12	MDPxt	Orthic Black Chernozem (O.BLC)	C3	3	Well	25	10	1 - Slightly stony	Faint
G13	MDPxt	Orthic Black Chernozem (O.BLC)	C3	3	Well	26	14	1 - Slightly stony	Faint
G14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	26	19	1 - Slightly stony	Faint
G15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	37	43	1 - Slightly stony	Faint
G16	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	53	27	1 - Slightly stony	Distinct
H10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	30	15	1 - Slightly stony	Distinct
H11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	25	5	1 - Slightly stony	Distinct
H12	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	25	11	1 - Slightly stony	Distinct
H13	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	25	40	1 - Slightly stony	Faint
H14	MDPxt	Orthic Black Chernozem (O.BLC)	C3	2	Well	40	30	1 - Slightly stony	Distinct
H15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	80	0	1 - Slightly stony	N/D
H16	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	35	15	1 - Slightly stony	Faint
I10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	15	6	1 - Slightly stony	Distinct
I11	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	12	13	1 - Slightly stony	Distinct
I12	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	18	32	1 - Slightly stony	Distinct
I13	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	21	15	1 - Slightly stony	Distinct
I14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	18	18	2 - Moderately stony	Faint
I15	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	20	22	1 - Slightly stony	Distinct
I16	MDPca	Calcareous Black Chernozem (CA.BLC)	C3	3	Well	12	13	1 - Slightly stony	Distinct
J10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	23	1 - Slightly stony	Distinct
J11	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	12	9	1 - Slightly stony	Distinct
J12	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	20	40	1 - Slightly stony	Faint

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
J13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	25	1 - Slightly stony	Distinct
J14	MDP	Orthic Black Chernozem (O.BLC)	C3	3	Well	14	10	0 - Nonstony	Distinct
J15	RKV	Orthic Black Chernozem (O.BLC)	L3	2	Well	24	51	0 - Nonstony	Faint
J16	MDPxt	Orthic Black Chernozem (O.BLC)	C3	3	Well	9	20	1 - Slightly stony	Faint
K10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	14	41	1 - Slightly stony	Distinct
K11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	19	1 - Slightly stony	Distinct
K12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	21	1 - Slightly stony	Distinct
K13	NSKaa	Rego Black Chernozem (R.BLC)	M4	4	Well	12	0	1 - Slightly stony	Distinct
K14	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	22	33	0 - Nonstony	Faint
K15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	42	38	1 - Slightly stony	Distinct
K16	RKV	Orthic Black Chernozem (O.BLC)	L3	2	Well	25	42	1 - Slightly stony	Distinct
L12	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	10	17	1 - Slightly stony	Distinct
L13	RKV	Orthic Black Chernozem (O.BLC)	L3	4	Well	17	23	1 - Slightly stony	Distinct
L14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	12	1 - Slightly stony	Distinct
L15	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	17	34	1 - Slightly stony	Faint
L16	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	16	46	1 - Slightly stony	Distinct
M12	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	64	0	1 - Slightly stony	Distinct
M13	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	10	0	1 - Slightly stony	Prominent
M14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	8	0 - Nonstony	Distinct
M15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	30	36	1 - Slightly stony	Distinct
M16	RKVca	Calcareous Black Chernozem (CA.BLC)	M4	2	Well	13	22	1 - Slightly stony	Distinct
N09	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	19	21	1 - Slightly stony	Faint
N10	RKV	Orthic Black Chernozem (O.BLC)	L3	1	Well	15	32	1 - Slightly stony	Distinct
N11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	12	10	1 - Slightly stony	Faint
N12	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	12	52	1 - Slightly stony	Faint
N13	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	18	27	1 - Slightly stony	Faint
N14	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	19	34	1 - Slightly stony	Distinct
N15	RKV	Orthic Black Chernozem (O.BLC)	L3	4	Well	20	45	1 - Slightly stony	Faint
N16	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	14	21	1 - Slightly stony	Faint
O09	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	16	34	1 - Slightly stony	Faint
O10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	16	1 - Slightly stony	Faint
O11	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	13	42	1 - Slightly stony	Faint
O12	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	13	32	1 - Slightly stony	Faint
O13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	11	31	1 - Slightly stony	Distinct
O14	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	11	0	1 - Slightly stony	Prominent
O15	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	9	0	1 - Slightly stony	Faint

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
O16	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	11	12	1 - Slightly stony	Faint
P09	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	11	34	1 - Slightly stony	Distinct
P10	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	11	14	1 - Slightly stony	Faint
P11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	11	24	1 - Slightly stony	Faint
P14	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	40	30	0 - Nonstony	Faint
P16	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	44	1 - Slightly stony	Distinct
Q04	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	18	12	0 - Nonstony	Distinct
Q05	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	20	40	1 - Slightly stony	Distinct
Q06	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	12	1 - Slightly stony	Distinct
Q07	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	14	11	1 - Slightly stony	Faint
Q08	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	22	1 - Slightly stony	Distinct
Q09	DELgl	Gleyed Black Chernozem (GL.BLC)	M4	3	Imperfectly	20	12	1 - Slightly stony	Faint
Q10	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	11	0	1 - Slightly stony	Distinct
Q11	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	14	38	2 - Moderately stony	Prominent
Q12	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	12	0	1 - Slightly stony	Distinct
Q13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	36	29	1 - Slightly stony	Faint
Q14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	22	33	2 - Moderately stony	Faint
Q15	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	32	18	1 - Slightly stony	Faint
Q16	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	14	16	1 - Slightly stony	Distinct
R03	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	30	1 - Slightly stony	Distinct
R04	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	65	1 - Slightly stony	Distinct
R05	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	30	25	1 - Slightly stony	Distinct
R09	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	15	10	1 - Slightly stony	Distinct
R10	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	13	0	1 - Slightly stony	Distinct
R11	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	20	10	1 - Slightly stony	Distinct
R12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	19	41	1 - Slightly stony	Prominent
R13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	10	8	1 - Slightly stony	Distinct
R14	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	25	45	1 - Slightly stony	Faint
R15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	17	22	1 - Slightly stony	Faint
R16	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	12	12	1 - Slightly stony	Faint
R18	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	16	44	1 - Slightly stony	Distinct
R22	RKV	Orthic Black Chernozem (O.BLC)	L3	4	Well	33	20	1 - Slightly stony	Faint
R23	MDPxt	Orthic Black Chernozem (O.BLC)	C3	3	Well	14	46	2 - Moderately stony	Distinct
R24	NSKaa	Rego Black Chernozem (R.BLC)	M4	2	Well	13	0	1 - Slightly stony	Faint
R25	DELgl	Gleyed Black Chernozem (GL.BLC)	M4	3	Imperfectly	29	11	1 - Slightly stony	Distinct
S01	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	18	38	1 - Slightly stony	Unknown

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
S02	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	27	33	1 - Slightly stony	Distinct
S03	NSKaa	Rego Black Chernozem (R.BLC)	M4	2	Well	17	0	1 - Slightly stony	Distinct
S04	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	30	1 - Slightly stony	Distinct
S05	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	50	1 - Slightly stony	Distinct
S09	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	14	25	1 - Slightly stony	Distinct
S10	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	17	53	1 - Slightly stony	Faint
S11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	15	10	1 - Slightly stony	Faint
S12	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	20	50	1 - Slightly stony	Distinct
S13	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	15	42	1 - Slightly stony	Distinct
S14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	11	29	1 - Slightly stony	Faint
S15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	14	48	1 - Slightly stony	Distinct
S16	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	22	33	1 - Slightly stony	Distinct
S18	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	10	50	1 - Slightly stony	Distinct
S18b	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	11	5	1 - Slightly stony	Faint
S19	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	12	12	1 - Slightly stony	Distinct
S20	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	22	33	0 - Nonstony	Distinct
S20	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	22	33	1 - Slightly stony	Distinct
S21	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	12	9	1 - Slightly stony	Distinct
S22	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	11	8	1 - Slightly stony	Distinct
S23	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	17	1 - Slightly stony	Distinct
S24	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	12	5	1 - Slightly stony	Distinct
S25	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	9	7	1 - Slightly stony	Faint
T01	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	20	4	1 - Slightly stony	Faint
T02	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	9	1 - Slightly stony	Distinct
T03	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	20	20	1 - Slightly stony	Faint
T04	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	19	21	1 - Slightly stony	Distinct
T05	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	19	29	1 - Slightly stony	Faint
T06	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	32	43	1 - Slightly stony	Distinct
T09	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	19	6	1 - Slightly stony	Distinct
T10	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	20	25	1 - Slightly stony	Distinct
T11	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	15	28	1 - Slightly stony	Distinct
T12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	12	30	1 - Slightly stony	Distinct
T13	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	12	11	1 - Slightly stony	Faint
T14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	15	19	1 - Slightly stony	Faint
T15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	12	19	1 - Slightly stony	Faint
T16	ZGW	Orthic Humic Gleysol (O.HG)	U0	2	Poorly	28	19	0 - Nonstony	Distinct

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
T18	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	16	10	1 - Slightly stony	Distinct
T19	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	15	40	1 - Slightly stony	Distinct
T20	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	12	23	1 - Slightly stony	Distinct
T21	RKVca	Calcareous Black Chernozem (CA.BLC)	L3	3	Well	12	25	1 - Slightly stony	Distinct
T22	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	19	21	1 - Slightly stony	Distinct
T23	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	19	21	1 - Slightly stony	Faint
T24	MDP	Orthic Black Chernozem (O.BLC)	C3	3	Well	18	15	0 - Nonstony	Distinct
T25	MDPzr	Rego Black Chernozem (R.BLC)	C3	3	Well	16	4	1 - Slightly stony	Distinct
U01	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	30	1 - Slightly stony	Unknown
U02	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	14	36	1 - Slightly stony	Distinct
U03	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	15	40	1 - Slightly stony	Faint
U04	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	17	43	0 - Nonstony	Distinct
U05	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	19	36	1 - Slightly stony	Distinct
U06	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	14	21	1 - Slightly stony	Distinct
U10	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	15	10	1 - Slightly stony	Faint
U11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	21	2 - Moderately stony	Faint
U12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	11	5	1 - Slightly stony	Distinct
U13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	15	18	1 - Slightly stony	Distinct
U14	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	40	1 - Slightly stony	Distinct
U15	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	18	43	1 - Slightly stony	Faint
U16	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	27	10	1 - Slightly stony	Faint
U18	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	44	1 - Slightly stony	Distinct
U19	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	19	7	1 - Slightly stony	Distinct
U20	DELca	Calcareous Black Chernozem (CA.BLC)	M4	2	Well	13	6	1 - Slightly stony	Faint
U21	NSKaa	Rego Black Chernozem (R.BLC)	M4	4	Well	13	0	1 - Slightly stony	Faint
U22	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	22	8	1 - Slightly stony	Distinct
U23	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	23	17	1 - Slightly stony	Faint
U24	DEL	Orthic Black Chernozem (O.BLC)	M4	5	Well	15	15	1 - Slightly stony	Distinct
U25	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	10	4	1 - Slightly stony	Distinct
V01	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	11	7	1 - Slightly stony	Unknown
V02	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	15	25	1 - Slightly stony	Distinct
V03	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	14	46	1 - Slightly stony	Distinct
V04	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	35	1 - Slightly stony	Distinct
V12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	19	1 - Slightly stony	Distinct
V13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	15	40	1 - Slightly stony	Distinct
V14	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	15	40	1 - Slightly stony	Faint

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
V15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	27	1 - Slightly stony	N/D
V16	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	20	12	1 - Slightly stony	Faint
V18	NSKaa	Rego Black Chernozem (R.BLC)	M4	3	Well	13	0	1 - Slightly stony	Distinct
V19	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	19	29	1 - Slightly stony	Distinct
V20	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	31	24	1 - Slightly stony	Faint
V21	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	17	1 - Slightly stony	Distinct
V22	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	18	22	1 - Slightly stony	Distinct
V23	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	7	6	1 - Slightly stony	Faint
V24	ZGW	Orthic Humic Gleysol (O.HG)	M3	4	Poorly	21	12	0 - Nonstony	Faint
V24	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	21	12	1 - Slightly stony	Faint
V25	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	32	28	1 - Slightly stony	Distinct
W02	BZCzzsa	Rego Humic Gleysol (R.HG)	DIS	3	Poorly	15	0	0 - Nonstony	Prominent
W12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	14	11	0 - Nonstony	Distinct
W13	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	12	21	1 - Slightly stony	Distinct
W14	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	11	14	1 - Slightly stony	Faint
W15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	15	15	1 - Slightly stony	Distinct
W16	DELca	Calcareous Black Chernozem (CA.BLC)	M4	4	Well	20	10	1 - Slightly stony	Distinct
W19	MDPxtca	Calcareous Black Chernozem (CA.BLC)	C3	4	Well	11	12	1 - Slightly stony	Faint
W20a	DIS	Anthroposolic	DIS	1	DIS	0	0	2 - Moderately stony	N/A
W20b	RKV	Orthic Black Chernozem (O.BLC)	L3	3	Well	25	20	1 - Slightly stony	Distinct
W21	RKV	Orthic Black Chernozem (O.BLC)	L3	4	Well	18	18	1 - Slightly stony	Faint
W22	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	13	35	1 - Slightly stony	Distinct
X11	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	20	0	1 - Slightly stony	Prominent
X12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	16	22	1 - Slightly stony	Distinct
X15	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	30	30	1 - Slightly stony	Distinct
X16	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	18	35	1 - Slightly stony	Distinct
X18	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	12	11	0 - Nonstony	Faint
Y09	NSKaa	Rego Black Chernozem (R.BLC)	M4	2	Well	20	0	1 - Slightly stony	Distinct
Y10	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	18	7	1 - Slightly stony	Distinct
Y11	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	10	10	1 - Slightly stony	Faint
Y12	DEL	Orthic Black Chernozem (O.BLC)	M4	4	Well	17	15	1 - Slightly stony	Distinct
Y15	DEL	Orthic Black Chernozem (O.BLC)	M4	1	Well	26	24	1 - Slightly stony	Distinct
Y16	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	17	15	1 - Slightly stony	Faint
Y18	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	13	15	1 - Slightly stony	Distinct
Z09	DEL	Orthic Black Chernozem (O.BLC)	M4	2	Well	15	21	1 - Slightly stony	Faint

Appendix B. Filed Site Inspection Data

Site ID	Soil Series[1]	Soil Classification	Parent Material Code[2]	Slope Class[3]	Drainage [4]	Topsoil Depth (cm)	Upper Subsoil Depth (cm)	Surface Stoniness[5]	A/B Horizon Color Contrast
Z10	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	28	10	1 - Slightly stony	faint
Z11	NSKaa	Rego Black Chernozem (R.BLC)	M4	4	Well	12	0	1 - Slightly stony	Distinct
Z12	DEL	Orthic Black Chernozem (O.BLC)	M4	3	Well	20	15	1 - Slightly stony	faint

1. BZCzzsa = Balzac-Atypical Subgroup, Saline, electrical conductivity (EC) is greater than four metres siemens per centimeter (S/cm); DEL = Delacour; DELca = Delacour-Calcareous; DELgl = Delacour-Gleyed; DIS = Disturbed; MDP = Midnapore; MDPca = Midnapore-Calcareous; MDPxt = Midnapore-Till at 30–99 centimetres (cm); MDPxt = Midnapore-XT; MDPxtca = Midnapore-Till at 30–99 cm, Calcareous; MDPzr = Midnapore-ZR; NSKaa = Nose Creek-AA - Not modal soil correlation area; PUY = Pulteney; RDM = Readymade; RKV = Rockyview; RKVca = Rockyview-Calcareous; WNY = Whitney; WNYgl = Whitney-Gleyed; WNYxc = Whitney-Clay at 30–99 cm; ZGW = Miscellaneous Gleysol.

2. Parent Material Code: C3 = moderately coarse textured (Sandy loam, Fine sandy loam) sediments deposited by wind or water; DIS = Disturbed by human activity variable material, L3 = medium textured (Very fine sandy loam, Silt clay loam [SiCL], Clay loam [CL]) materials over medium (Loam [L], CL) or fine (Clay) textured till; M3 = moderately fine textured (CL, Sandy clay loam, SiCL) sediments deposited by water; M4 = medium textured (L, CL) till; U0 = undifferentiated materials.

3. Slope Class: 1 = 0–0.5%; 2 = 0.5–2.0%; 3 = 2.0–5.0%; 4 = 5.0–9.0%; 5 = 9.0–15.0%.

4. Drainage Class: Poorly = water removed so slowly versus supply that soil remains wet for a large part of the time it is not frozen; Imperfectly = water is removed slow enough versus supply to keep it wet for a significant part of the growing season; Moderately = water removed somewhat slowly versus supply; Well = water is removed readily versus supply, but not rapidly.

5. 0 = Nonstony - <0.01% of surface covered; 1 = Slightly stony - 0.01–0.10%; 2 = Moderately stony - 0.1–3.0%.

ID = identification; cm = centimetre.

Appendix C. Detailed Soil Analytical Data.

ALS Canada Ltd.

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CERTIFICATE OF ANALYSIS

Work Order	: **CG2315028**	Page	: 1 of 27
Client	: **Western Ecosystem Technology ULC**	Laboratory	: ALS Environmental - Calgary
Contact	: Yohannes Getachew	Account Manager	: Kiazitako Muanza
Address	: 1000 9th Ave SW, Ste 303 Calgary AB Canada T2P 2Y6	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	:	Date Samples Received	: 23-Oct-2023 11:15
PO	: ----	Date Analysis Commenced	: 28-Oct-2023
C-O-C number	: 20-1051713, 20-1051714, 20-1051715	Issue Date	: 07-Nov-2023 09:24
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 38		
No. of samples analysed	: 30		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alphina Mathew	Laboratory Assistant	Inorganics, Calgary, Alberta
Colby Bingham	Laboratory Supervisor	Inorganics, Saskatoon, Saskatchewan
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Kevin Baxter	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Metals, Calgary, Alberta
Kuljeet Chawla		Inorganics, Calgary, Alberta
Mervat Lamose	Lab Assistant	Inorganics, Calgary, Alberta
Vishnu Patel		Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.
Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).
Measurement Uncertainty: The reported uncertainties in this report are expanded uncertainties calculated using a coverage factor of 2, which gives a level of confidence of approximately 95%.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Unit	*Description*
-	no units
%	percent
dS/m	decisiemens per metre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units
t/ha	tonnes per hectare

>: greater than.
<: less than.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

CG2315028-001

Sub-Matrix:**Soil** *Client sample ID:* AG19 AP

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.23	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	23.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	39.9	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	36.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	2.87	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.096	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.80	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	2.77	0.292	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	4.78	0.292	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.978	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.42	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	82.3	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	102	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	83.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	29.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	24.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	17.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	14.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	18.7	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	15.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	57.2	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	47.1	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<16	16	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-002

Sub-Matrix:**Soil** *Client sample ID:* AG19 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.01	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	14.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	36.2	1.0	%	E180/CG	-	01-Nov-2023	1216783

Analytical Results

CG2315028-002

Sub-Matrix:**Soil** *Client sample ID:* AG19 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Particle Size								
Clay (<0.002mm)	----	49.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Clay	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.55	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.083	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.70	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.47	0.166	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	2.53	0.166	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.290	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.96	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	87.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	30.4	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	26.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	9.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	8.1	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	23.5	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	20.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	106	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	92.6	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	47	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	41	17	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-003

Sub-Matrix:**Soil** *Client sample ID:* AG19 CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.32	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.779	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.59	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	62.5	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	71.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137

Analytical Results

CG2315028-003

Sub-Matrix:**Soil** *Client sample ID:* AG19 CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Calcium, soluble ion content	7440-70-2	44.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	32.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	20.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	6.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	23.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	14.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	24.9	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	15.6	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<12	12	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-004

Sub-Matrix:**Soil** *Client sample ID:* AB20 - B

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.13	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	16.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	49.1	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	34.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Silty Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.891	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	8.88	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	0.12	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	1.75	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	75.1	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	18.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	13.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	8.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	6.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	182	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	137	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	204	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	153	8	mg/kg	EC485/CG	-	01-Nov-2023	-

Analytical Results

CG2315028-004

Sub-Matrix:**Soil** *Client sample ID:* AB20 - B

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Chloride, soluble ion content	16887-00-6	23	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	17	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-005

Sub-Matrix:**Soil** *Client sample ID:* AE18 - B

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.13	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	15.2	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	32.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	52.2	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Clay	-	-	E180/CG	-	01-Nov-2023	1216783
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.525	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.94	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	90.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	38.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	34.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	19.4	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	17.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	10.7	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	9.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	28.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	25.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	188	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	170	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<18	18	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-006

Sub-Matrix:**Soil** *Client sample ID:* W02 - AP

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.89	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	44.8	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	33.3	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	21.9	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.68	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.116	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.96	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.56	0.179	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	2.69	0.179	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	23.7	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	17.4	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	142	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	7.67	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	73.0	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	577	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	421	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	2360	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	1720	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	33.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	24.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	4230	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	3090	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	16500	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	12000	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-007

Sub-Matrix:**Soil** *Client sample ID:* W02 - CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	8.25	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	40.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	31.8	1.0	%	E180/CG	-	01-Nov-2023	1216783

Analytical Results

CG2315028-007

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: W02 - CK
Client sampling date / time: 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Particle Size								
Clay (<0.002mm)	----	28.2	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Saturated Paste Extractables								
Conductivity, saturated paste	----	14.7	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	16.5	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	40.5	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	5.31	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	54.8	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	311	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	170	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	992	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	544	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	16.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	9.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	2640	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	1450	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	8960	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	4910	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	83	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	45	11	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-008

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: V19 - AP
Client sampling date / time: 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.50	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	50.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	33.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	16.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	2.51	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.072	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.60	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	2.44	0.258	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	4.21	0.258	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.305	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134

Analytical Results

CG2315028-008

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: V19 - AP
Client sampling date / time: 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Sodium adsorption ratio [SAR]	----	0.33	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	63.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	50.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	32.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	11.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	7.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	6.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	10.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	6.3	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	54.5	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	34.6	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<13	13	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-009

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: V19 - BM1
Client sampling date / time: 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.84	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	43.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	42.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	13.9	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.33	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.076	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.63	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.25	0.145	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	2.16	0.145	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.444	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.68	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	76.7	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136

Analytical Results

CG2315028-009

Sub-Matrix:**Soil** *Client sample ID:* V19 - BM1

(Matrix: **Soil/Solid**) *Client sampling date / time:* 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Calcium, soluble ion content	7440-70-2	53.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	41.3	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	12.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	9.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	21.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	16.3	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	97.4	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	74.7	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-010

Sub-Matrix:**Soil** *Client sample ID:* V19 - BM2

(Matrix: **Soil/Solid**) *Client sampling date / time:* 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.07	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	31.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	47.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	20.9	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.22	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.084	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.70	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.14	0.135	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	1.96	0.135	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.530	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.79	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	74.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	59.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	44.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	15.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	11.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-

Analytical Results

CG2315028-010

Sub-Matrix:**Soil** *Client sample ID:* V19 - BM2

(Matrix: **Soil/Solid**) *Client sampling date / time:* 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	26.5	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	19.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	149	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	111	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-011

Sub-Matrix:**Soil** *Client sample ID:* V19 - CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.59	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.247	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.34	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	79.0	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	37.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	29.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	12.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	9.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	9.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	7.3	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	20.7	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	16.4	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<16	16	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-012

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: V18 - APK
Client sampling date / time: 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.38	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	52.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	30.2	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	17.7	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Sandy Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	2.98	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.832	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	6.94	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	2.15	0.319	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	3.71	0.319	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.660	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.23	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	64.9	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	103	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	66.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	9.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	6.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	14.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	9.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	9.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	6.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	29.7	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	19.3	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	45	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	29	13	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-013

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: V18 - CK
Client sampling date / time: 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.62	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	54.8	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	23.6	1.0	%	E180/CG	-	01-Nov-2023	1216783

Analytical Results

CG2315028-013

Sub-Matrix:**Soil** *Client sample ID:* V18 - CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 19-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Particle Size								
Clay (<0.002mm)	----	21.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Sandy Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.238	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.19	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	54.5	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	43.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	23.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	9.5	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	5.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	5.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	12.3	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	<8.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<11	11	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-014

Sub-Matrix:**Soil** *Client sample ID:* AF11 AH

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.43	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	39.2	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	38.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	22.3	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	3.31	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.065	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.54	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	3.24	0.335	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	5.58	0.335	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								

Analytical Results

CG2315028-014

Sub-Matrix:**Soil** *Client sample ID:* AF11 AH

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.734	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	98.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	107	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	105	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	21.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	21.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	22.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	21.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	23.4	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	23.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<20	20	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-015

Sub-Matrix:**Soil** *Client sample ID:* AF11 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.75	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	39.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	35.3	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	25.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.60	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.398	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	3.32	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.20	0.178	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	2.07	0.178	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.282	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-

Analytical Results

CG2315028-015

Sub-Matrix:**Soil** *Client sample ID:* AF11 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
% Saturation	----	76.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	57.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	43.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	9.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	7.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	10.8	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	8.2	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-016

Sub-Matrix:**Soil** *Client sample ID:* AF11 CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.36	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	51.2	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	24.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	24.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Sandy Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.467	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.69	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	69.1	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	50.1	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	34.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	18.5	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	12.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	22.4	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	15.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-

Analytical Results

CG2315028-016

Sub-Matrix:**Soil** *Client sample ID:* AF11 CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 20-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Sulfur (as SO4), soluble ion content	14808-79-8	90.8	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	62.7	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<14	14	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-017

Sub-Matrix:**Soil** *Client sample ID:* F10 AP

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.49	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	48.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	31.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	20.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	2.60	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.100	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.83	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	2.50	0.266	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	4.31	0.266	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	1.08	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.11	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	02-Nov-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	02-Nov-2023	-
% Saturation	----	44.6	1.0	%	E141/CG	31-Oct-2023	02-Nov-2023	1215136
Calcium, soluble ion content	7440-70-2	149	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	66.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	26.7	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	11.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	9.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	5.7	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	37.2	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	16.6	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<10	10	mg/kg	EC266A.Cl/CG	31-Oct-2023	02-Nov-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-018

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: F10 BM
Client sampling date / time: 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.13	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	36.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	35.1	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	28.9	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.42	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.059	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.49	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.36	0.153	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	2.34	0.153	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.714	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.27	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	77.0	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	82.1	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	63.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	23.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	17.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	10.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	8.2	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	42.5	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	32.7	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-021

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: F10 CK1 + CK2
Client sampling date / time: 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.48	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Saturated Paste Extractables								

Analytical Results

CG2315028-021

Sub-Matrix:**Soil** *Client sample ID:* F10 CK1 + CK2

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.841	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	0.18	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	70.3	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	83.5	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	58.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	36.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	25.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	7.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	5.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	10.8	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	<8.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<14	14	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-022

Sub-Matrix:**Soil** *Client sample ID:* B11 TS

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.75	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215262
Particle Size								
Sand (2.0mm - 0.05mm)	----	50.8	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	30.1	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	19.1	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.59	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.056	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.46	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.53	0.169	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	2.64	0.169	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.519	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215134
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-

Analytical Results

CG2315028-022

Sub-Matrix:**Soil** *Client sample ID:* B11 TS

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
% Saturation	----	70.0	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215136
Calcium, soluble ion content	7440-70-2	78.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Calcium, soluble ion content	7440-70-2	54.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	16.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Magnesium, soluble ion content	7439-95-4	11.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	11.1	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215137
Sulfur (as SO4), soluble ion content	14808-79-8	<8.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215135
Chloride, soluble ion content	16887-00-6	<14	14	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-023

Sub-Matrix:**Soil** *Client sample ID:* B11 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.50	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	32.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	42.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	25.0	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.10	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.070	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.59	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.03	0.124	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	1.78	0.124	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.498	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	70.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	75.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	52.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	21.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141

Analytical Results

CG2315028-023

Sub-Matrix:**Soil** *Client sample ID:* B11 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Magnesium, soluble ion content	7439-95-4	14.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	12.3	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	8.6	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<14	14	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-024

Sub-Matrix:**Soil** *Client sample ID:* B11 CK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.60	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.251	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	55.3	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	28.1	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	15.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	20.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	11.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	13.2	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	<8.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<11	11	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-025

Sub-Matrix:**Soil** *Client sample ID:* F10 IICK

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.91	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	40.8	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	25.4	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	33.8	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.410	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	0.66	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	62.7	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	21.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	13.3	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	26.9	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	16.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	19.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	12.1	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	17.7	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	11.1	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<12	12	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-028

Sub-Matrix:**Soil** *Client sample ID:* P15 AP + AH

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.10	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	43.6	1.0	%	E180/CG	-	01-Nov-2023	1216783
Silt (0.05mm - 0.002mm)	----	35.5	1.0	%	E180/CG	-	01-Nov-2023	1216783
Clay (<0.002mm)	----	20.9	1.0	%	E180/CG	-	01-Nov-2023	1216783
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216783
Organic / Inorganic Carbon								
Carbon, total [TC]	----	3.52	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215132
Carbon, inorganic [IC]	----	0.100	0.050	%	E354/SK	-	30-Oct-2023	1213282
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.83	0.40	%	E354/SK	-	30-Oct-2023	1213282

Analytical Results

CG2315028-028

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: P15 AP + AH
Client sampling date / time: 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Organic / Inorganic Carbon								
Carbon, total organic [TOC]	----	3.42	0.355	%	EC356/SK	-	31-Oct-2023	-
Organic matter	----	5.90	0.355	%	EC356/SK	-	31-Oct-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.437	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	0.23	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	88.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	56.1	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	49.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	9.8	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	8.7	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	7.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	6.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	18.0	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	15.9	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<18	18	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-029

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: P15 BM
Client sampling date / time: 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.80	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	31.6	1.0	%	E180/CG	-	01-Nov-2023	1216784
Silt (0.05mm - 0.002mm)	----	44.7	1.0	%	E180/CG	-	01-Nov-2023	1216784
Clay (<0.002mm)	----	23.7	1.0	%	E180/CG	-	01-Nov-2023	1216784
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216784
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.95	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.087	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.73	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.86	0.204	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	3.21	0.204	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.166	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138

Analytical Results

CG2315028-029

Sub-Matrix:**Soil** *Client sample ID:* P15 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	75.3	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	28.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	21.3	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	6.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	<6.0	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	<8.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-030

Sub-Matrix:**Soil** *Client sample ID:* Q11 AP

(Matrix: **Soil/Solid**) *Client sampling date / time:* 16-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	5.63	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	42.8	1.0	%	E180/CG	-	01-Nov-2023	1216784
Silt (0.05mm - 0.002mm)	----	32.8	1.0	%	E180/CG	-	01-Nov-2023	1216784
Clay (<0.002mm)	----	24.4	1.0	%	E180/CG	-	01-Nov-2023	1216784
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216784
Organic / Inorganic Carbon								
Carbon, total [TC]	----	2.55	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.068	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.57	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	2.48	0.262	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	4.28	0.262	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	1.33	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	0.18	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	74.2	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140

Analytical Results

CG2315028-030

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: Q11 AP
Client sampling date / time: 16-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Saturated Paste Extractables								
Calcium, soluble ion content	7440-70-2	164	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	122	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	33.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	24.6	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	10.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	7.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	9.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	7.1	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	50.6	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	37.5	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<15	15	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-031

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: Q11 CL
Client sampling date / time: 16-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	7.39	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.724	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	0.69	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	43.0	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	70.7	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	30.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	30.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	13.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	5.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	27.6	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	11.9	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	121	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	52.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<10	10	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-034

Sub-Matrix:**Soil** *Client sample ID:* P14 AP + AH

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.54	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	36.0	1.0	%	E180/CG	-	01-Nov-2023	1216784
Silt (0.05mm - 0.002mm)	----	42.8	1.0	%	E180/CG	-	01-Nov-2023	1216784
Clay (<0.002mm)	----	21.2	1.0	%	E180/CG	-	01-Nov-2023	1216784
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216784
Organic / Inorganic Carbon								
Carbon, total [TC]	----	4.37	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215132
Carbon, inorganic [IC]	----	0.113	0.050	%	E354/SK	-	30-Oct-2023	1213282
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.94	0.40	%	E354/SK	-	30-Oct-2023	1213282
Carbon, total organic [TOC]	----	4.26	0.437	%	EC356/SK	-	31-Oct-2023	-
Organic matter	----	7.34	0.437	%	EC356/SK	-	31-Oct-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.160	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	93.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	28.4	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	26.5	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	5.4	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	13.2	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	12.3	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<19	19	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

CG2315028-035

Sub-Matrix:**Soil** *Client sample ID:* P14 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.56	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	30.0	1.0	%	E180/CG	-	01-Nov-2023	1216784
Silt (0.05mm - 0.002mm)	----	44.2	1.0	%	E180/CG	-	01-Nov-2023	1216784

Analytical Results

CG2315028-035

Sub-Matrix:**Soil** *Client sample ID:* P14 BM

(Matrix: **Soil/Solid**) *Client sampling date / time:* 12-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Particle Size								
Clay (<0.002mm)	----	25.8	1.0	%	E180/CG	-	01-Nov-2023	1216784
Texture class	----	Loam	-	-	E180/CG	-	01-Nov-2023	1216784
Organic / Inorganic Carbon								
Carbon, total [TC]	----	1.90	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.094	0.050	%	E354/SK	-	31-Oct-2023	1215267
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.78	0.40	%	E354/SK	-	31-Oct-2023	1215267
Carbon, total organic [TOC]	----	1.81	0.200	%	EC356/SK	-	01-Nov-2023	-
Organic matter	----	3.12	0.2	%	EC356/SK	-	01-Nov-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.123	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	0.43	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	85.4	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	16.2	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	13.8	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	6.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	5.4	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	6.9	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	<8.0	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<17	17	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

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Analytical Results

CG2315028-038

Sub-Matrix:**Soil** *Client sample ID:* Q11 BM1 +BM2

(Matrix: **Soil/Solid**) *Client sampling date / time:* 16-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests								
pH (1:2 soil:CaCl2-aq)	----	6.90	0.10	pH units	E108B/CG	31-Oct-2023	31-Oct-2023	1215263
Particle Size								
Sand (2.0mm - 0.05mm)	----	50.8	1.0	%	E180/CG	-	01-Nov-2023	1216784
Silt (0.05mm - 0.002mm)	----	21.0	1.0	%	E180/CG	-	01-Nov-2023	1216784
Clay (<0.002mm)	----	28.2	1.0	%	E180/CG	-	01-Nov-2023	1216784
Texture class	----	Sandy Clay Loam	-	-	E180/CG	-	01-Nov-2023	1216784
Organic / Inorganic Carbon								

Analytical Results

CG2315028-038

Sub-Matrix:**Soil**
(Matrix: **Soil/Solid**)

Client sample ID: Q11 BM1 +BM2
Client sampling date / time: 16-Oct-2023

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Organic / Inorganic Carbon								
Carbon, total [TC]	----	0.989	0.050	%	E351/SK	31-Oct-2023	31-Oct-2023	1215072
Carbon, inorganic [IC]	----	0.069	0.050	%	E354/SK	-	30-Oct-2023	1213282
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	0.58	0.40	%	E354/SK	-	30-Oct-2023	1213282
Carbon, total organic [TOC]	----	0.920	0.113	%	EC356/SK	-	31-Oct-2023	-
Organic matter	----	1.59	0.113	%	EC356/SK	-	31-Oct-2023	-
Saturated Paste Extractables								
Conductivity, saturated paste	----	0.297	0.020	dS/m	E102/CG	31-Oct-2023	31-Oct-2023	1215138
Sodium adsorption ratio [SAR]	----	<0.10	0.10	-	EC102/CG	-	01-Nov-2023	-
TGR (brine)	----	Incalculable	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
TGR (sodic)	----	<0.10	0.10	t/ha	EC106/CG	31-Oct-2023	31-Oct-2023	-
% Saturation	----	68.3	1.0	%	E141/CG	31-Oct-2023	31-Oct-2023	1215140
Calcium, soluble ion content	7440-70-2	57.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Calcium, soluble ion content	7440-70-2	39.1	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Magnesium, soluble ion content	7439-95-4	13.3	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Magnesium, soluble ion content	7439-95-4	9.1	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Potassium, soluble ion content	7440-09-7	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Potassium, soluble ion content	7440-09-7	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sodium, soluble ion content	17341-25-2	<5.0	5.0	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sodium, soluble ion content	17341-25-2	<5.0	5	mg/kg	EC485/CG	-	01-Nov-2023	-
Sulfur (as SO4), soluble ion content	14808-79-8	21.3	6	mg/L	E485/CG	31-Oct-2023	01-Nov-2023	1215141
Sulfur (as SO4), soluble ion content	14808-79-8	14.5	8	mg/kg	EC485/CG	-	01-Nov-2023	-
Chloride, soluble ion content	16887-00-6	<20	20	mg/L	E266.Cl/CG	31-Oct-2023	01-Nov-2023	1215139
Chloride, soluble ion content	16887-00-6	<14	14	mg/kg	EC266A.Cl/CG	31-Oct-2023	31-Oct-2023	-

Please refer to the General Comments section for an explanation of any result qualifiers detected.

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Appendix D. Weed Survey Data.

Appendix D. Weed Survey Data

Grid Cell	Species	Areal Extent	Percent Cover	Distribution	Number of Plants	Growth Stage
A10	Agropyron cristatum - crested wheatgrass	100x100	15-20	2 - A few sporadically occurring individuals	10-100	Dispersed,Plant yellowing,Dead
A10	Bromus inermis - smooth brome	100x100	30-35	8 - A few patches plus several sporadically occurring plants	100-500	Dispersed,Plant yellowing,Dead
A10	Melilotus officinalis - yellow sweet-clover	100x100	20-25	6 - Several well spaced patches or clumps	100-500	Flowering,Plant yellowing,Dead
A10	Sonchus arvensis - perennial sow-thistle	100x100	5-10	5 - A few patches or clumps of a species	10-100	Dead
A10	Taraxacum officinale - common dandelion	100x100	5-10	2 - A few sporadically occurring individuals	10-100	Plant yellowing
A11	Agropyron cristatum - crested wheatgrass	100x100	5-10	5 - Several sporadically occurring plants	10-100	Fruiting/Seed Set,Dispersed,Plant yellowing,Dead
A11	Bromus inermis - smooth brome	100x100	55-60	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Dispersed,Plant yellowing,Dead
A11	Hordeum jubatum - foxtail barley	100x100	<1	2 - A few sporadically occurring individuals	10-100	Fruiting/Seed Set,Dispersed,Plant yellowing,Dead
A11	Melilotus officinalis - yellow sweet-clover	100x100	1-5	4 - Several sporadically occurring individuals	10-100	Flowering,Dispersed,Plant yellowing,Dead
A11	Poa pratensis - Kentucky bluegrass	100x100	10-15	7 - A few patches	100-500	Dispersed,Plant yellowing,Dead
A11	Sonchus arvensis - perennial sow-thistle	100x100	5-10	5 - A few patches or clumps of a species	10-100	Dead
A11	Taraxacum officinale - common dandelion	100x00	<1	2 - A few sporadically occurring individuals	10-100	Dispersed,Plant yellowing,Dead
A12	Agropyron cristatum - crested wheatgrass	10x10	1-5	5 - Several sporadically occurring plants	10-100	Dispersed,Plant yellowing,Dead
A12	Bromus inermis - smooth brome	10x10	5-10	7 - A few patches	10-100	Plant yellowing,Dead
A12	Kochia scoparia - summer-cypress	10x10	25-30	8 - A few patches plus several sporadically occurring plants	100-500	Plant yellowing,Dead
A12	Medicago sativa - alfalfa	10x10	<1	2 - A few sporadically occurring individuals	< 10	Flowers Fading,Plant yellowing
A12	Kali tragus - Russian-thistle	10x10	1-5	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
AG14	Kochia scoparia - summer-cypress	10x10	5-10	7 - A few patches	10-100	Dead
B10	Artemisia frigida - pasture sagewort	100x100	<1	2 - A few sporadically occurring individuals	10-100	Fully Developed
B10	Bromus inermis - smooth brome	100x100	1-5	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
B10	Cirsium arvense - creeping thistle	100x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
B10	Kochia scoparia - summer-cypress	100x100	85-90	10 - Continuous uniform occurrences of well spaced plants	> 1000	Plant yellowing,Dead
B10	Solidago sp. - goldenrod species	100x100	<1	3 - A single patch or clump of a species	10-100	Plant yellowing,Dead
B11	Agropyron cristatum - crested wheatgrass	100x100	15-20	5 - Several sporadically occurring plants	10-100	Dispersed,Plant yellowing,Dead
B11	Tragopogon dubius - common goat's-beard	100x100	1-5	2 - A few sporadically occurring individuals	10-100	Plant yellowing,Dead
B11	Bromus inermis - smooth brome	100x100	20-25	9 - Several well spaced patches	100-500	Plant yellowing,Dead
B11	Hordeum jubatum - foxtail barley	100x100	1-5	5 - Several sporadically occurring plants	10-100	Dispersed,Plant yellowing,Dead
B11	Kochia scoparia - summer-cypress	100x100	20-25	8 - A few patches plus several sporadically occurring plants	500-100	Plant yellowing,Dead
B11	Poa pratensis - Kentucky bluegrass	100x100	15-20	7 - A few patches	100-500	Plant yellowing,Dead
B11	Sonchus arvensis - perennial sow-thistle	100x100	5-10	5 - A few patches or clumps of a species	10-100	Dispersed,Plant yellowing,Dead
B11	Taraxacum officinale - common dandelion	100x100	1-5	5 - Several sporadically occurring plants	10-100	Dispersed,Plant yellowing,Dead
B12	Agropyron cristatum - crested wheatgrass	100x100	10-15	5 - Several sporadically occurring plants	10-100	Fruiting/Seed Set,Dispersed,Plant yellowing,Dead
B12	Tragopogon dubius - common goat's-beard	100x100	1-5	2 - A few sporadically occurring individuals	10-100	Dispersed,Plant yellowing,Dead
B12	Bromus inermis - smooth brome	100x100	40-45	10 - Continuous uniform occurrences of well spaced plants	100-500	Plant yellowing,Dead
B12	Cirsium arvense - creeping thistle	100x100	5-10	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
B12	Kochia scoparia - summer-cypress	100x100	20-25	7 - A few patches	100-500	Plant yellowing,Dead
C10	Agropyron cristatum - crested wheatgrass	100x100	5-10	5 - Several sporadically occurring plants	10-100	Fruiting/Seed Set,Plant yellowing,Dead
C10	Bromus inermis - smooth brome	100x100	1-5	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
C10	Hordeum jubatum - foxtail barley	100x100	<1	2 - A few sporadically occurring individuals	10-100	Plant yellowing,Dead
C10	Kochia scoparia - summer-cypress	100x100	75-80	11- Continuous occurrence of plants with a few gaps in the distribution	> 1000	Plant yellowing,Dead
C10	Poa pratensis - Kentucky bluegrass	100x100	<1	2 - A few sporadically occurring individuals	10-100	Fruiting/Seed Set,Plant yellowing,Dead
C11	Tragopogon dubius - common goat's-beard	100x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
C11	Bromus inermis - smooth brome	100x100	1-5	7 - A few patches	10-100	Plant yellowing,Dead
C11	Crepis tectorum - annual hawk's-beard	100x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead

Appendix D. Weed Survey Data

Grid Cell	Species	Areal Extent	Percent Cover	Distribution	Number of Plants	Growth Stage
C11	Hordeum jubatum - foxtail barley	100x100	1-5	2 - A few sporadically occurring individuals	100-500	Dispersed,Plant yellowing,Dead
C11	Kochia scoparia - summer-cypress	100x100	80-85	11- Continuous occurrence of plants with a few gaps in the distribution	> 1000	Plant yellowing,Dead
C11	Melilotus officinalis - yellow sweet-clover	100x100	1-5	4 - Several sporadically occurring individuals	10-100	Flowering,Plant yellowing,Dead
C12	Agropyron cristatum - crested wheatgrass	100x100	10-15	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
C12	Bromus inermis - smooth brome	100x100	5-10	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
C12	Melilotus officinalis - yellow sweet-clover	100x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
C12	Poa pratensis - Kentucky bluegrass	100x100	10-15	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
C12	Kali tragus - Russian-thistle	100x100	60-65	10 - Continuous uniform occurrences of well spaced plants	100-500	Plant yellowing,Dead
C12	Tragopogon dubius - common goat's-beard	100x100	1-5	4 - Several sporadically occurring individuals	10-100	Plant yellowing,Dead
C13	Agropyron cristatum - crested wheatgrass	100x100	15-20	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
C13	Tragopogon dubius - common goat's-beard	100x100	1-5	4 - Several sporadically occurring individuals	10-100	Plant yellowing,Dead
C13	Bromus inermis - smooth brome	100x100	10-15	5 - Several sporadically occurring plants	100-500	Plant yellowing,Dead
C13	Cirsium arvense - creeping thistle	100x100	5-10	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
C13	Kochia scoparia - summer-cypress	100x100	45-50	8 - A few patches plus several sporadically occurring plants	500-100	Plant yellowing,Dead
C13	Poa pratensis - Kentucky bluegrass	100x100	5-10	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D09	Agropyron cristatum - crested wheatgrass	100x100	75-80	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Plant yellowing,Dead
D09	Tragopogon dubius - common goat's-beard	100x100	<1	2 - A few sporadically occurring individuals	< 10	Dead
D09	Cirsium arvense - creeping thistle	100x100	5-10	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D09	Poa pratensis - Kentucky bluegrass	100x100	5-10	7 - A few patches	10-100	Plant yellowing,Dead
D10	Agropyron cristatum - crested wheatgrass	100x100	15-20	9 - Several well spaced patches	10-100	Dispersed,Plant yellowing
D10	Tragopogon dubius - common goat's-beard	100x100	10-15	4 - Several sporadically occurring individuals	10-100	Dead
D10	Bromus inermis - smooth brome	100x100	15-20	7 - A few patches	10-100	Plant yellowing,Dead
D10	Cirsium arvense - creeping thistle	100x100	10-15	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D10	Melilotus officinalis - yellow sweet-clover	100x100	<1	2 - A few sporadically occurring individuals	< 10	Flowering,Plant yellowing
D10	Poa pratensis - Kentucky bluegrass	100x100	15-20	7 - A few patches	10-100	Plant yellowing,Dead
D10	Sonchus arvensis - perennial sow-thistle	100x100	<1	2 - A few sporadically occurring individuals	< 10	Dispersed,Plant yellowing,Dead
D11	Agropyron cristatum - crested wheatgrass	100x100	20-25	7 - A few patches	10-100	Plant yellowing,Dead
D11	Agropyron cristatum - crested wheatgrass	100x100	20-25	7 - A few patches	10-100	Plant yellowing,Dead
D11	Tragopogon dubius - common goat's-beard	100x100	5-10	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
D11	Bromus inermis - smooth brome	100x100	5-10	7 - A few patches	10-100	Plant yellowing,Dead
D11	Hordeum jubatum - foxtail barley	100x100	5-10	7 - A few patches	10-100	Plant yellowing,Dead
D11	Kochia scoparia - summer-cypress	100x100	25-30	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Plant yellowing,Dead
D11	Sonchus arvensis - perennial sow-thistle	100x100	15-20	5 - A few patches or clumps of a species	10-100	Plant yellowing,Dead
D11	Taraxacum officinale - common dandelion	100x100	1-5	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
D12	Agropyron cristatum - crested wheatgrass	100x100	10-15	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D12	Tragopogon dubius - common goat's-beard	100x100	1-5	4 - Several sporadically occurring individuals	10-100	Plant yellowing,Dead
D12	Bromus inermis - smooth brome	100x100	35-40	9 - Several well spaced patches	100-500	Plant yellowing,Dead
D12	Cirsium arvense - creeping thistle	100x100	5-10	5 - Several sporadically occurring plants	10-100	Dispersed,Plant yellowing
D12	Poa pratensis - Kentucky bluegrass	100x100	15-20	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D12	Sonchus arvensis - perennial sow-thistle	100x100	5-10	4 - Several sporadically occurring individuals	10-100	Dispersed,Plant yellowing
D13	Agropyron cristatum - crested wheatgrass	100x100	15-20	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D13	Cirsium arvense - creeping thistle	100x100	1-5	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D13	Hordeum jubatum - foxtail barley	100x100	1-5	5 - Several sporadically occurring plants	10-100	Fruiting/Seed Set,Dispersed,Plant yellowing,Dead
D13	Kochia scoparia - summer-cypress	100x100	50-55	10 - Continuous uniform occurrences of well spaced plants	500-100	Plant yellowing,Dead
D13	Kali tragus - Russian-thistle	100x100	15-20	5 - Several sporadically occurring plants	10-100	Plant yellowing,Dead
D13	Taraxacum officinale - common dandelion	100x100	1-5	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead

Appendix D. Weed Survey Data

Grid Cell	Species	Areal Extent	Percent Cover	Distribution	Number of Plants	Growth Stage
E09	Tragopogon dubius - common goat's-beard	100x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
E09	Kochia scoparia - summer-cypress	100x100	75-80	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Plant yellowing,Dead
E09	Melilotus officinalis - yellow sweet-clover	100x100	1-5	5 - A few patches or clumps of a species	10-100	Flowering,Plant yellowing,Dead
E09	Poa pratensis - Kentucky bluegrass	100x100	5-10	7 - A few patches	10-100	Plant yellowing,Dead
E10	Agropyron cristatum - crested wheatgrass	100x100	1-5	2 - A few sporadically occurring individuals	10-100	Plant yellowing,Dead
E10	Tragopogon dubius - common goat's-beard	100x100	1-5	5 - Several sporadically occurring plants	10-100	Dispersed,Plant yellowing,Dead
E10	Hordeum jubatum - foxtail barley	100X100	<1	7 - A few patches	10-100	Plant yellowing,Dead
E10	Kochia scoparia - summer-cypress	100x100	70-75	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Plant yellowing,Dead
E10	Kali tragus - Russian-thistle	100x100	15-20	9 - Several well spaced patches	100-500	Plant yellowing,Dead
E11	Agropyron cristatum - crested wheatgrass	100x100	5-10	2 - A few sporadically occurring individuals	< 10	Dead
E11	Cirsium arvense - creeping thistle	100x100	5-10	2 - A few sporadically occurring individuals	10-100	Fully Developed,Plant yellowing,Dead
E11	Hordeum jubatum - foxtail barley	100x100	10-15	7 - A few patches	10-100	Plant yellowing,Dead
E11	Kochia scoparia - summer-cypress	100x100	25-30	7 - A few patches	100-500	Plant yellowing,Dead
E11	Poa pratensis - Kentucky bluegrass	100x100	25-30	9 - Several well spaced patches	100-500	Plant yellowing,Dead
E12	Agropyron cristatum - crested wheatgrass	100x100	1-5	2 - A few sporadically occurring individuals	10-100	Plant yellowing,Dead
E12	Tragopogon dubius - common goat's-beard	100x100	1-5	5 - Several sporadically occurring plants	10-100	Dead
E12	Hordeum jubatum - foxtail barley	100x100	1-5	7 - A few patches	10-100	Plant yellowing,Dead
E12	Kochia scoparia - summer-cypress	100x100	20-25	9 - Several well spaced patches	100-500	Dead
E12	Kali tragus - Russian-thistle	100x100	25-30	10 - Continuous uniform occurrences of well spaced plants	100-500	Dead
E12	Setaria viridis - green foxtail	100x100	25-30	7 - Continuous uniform occurrence of well spaced individuals	100-500	Dead
E13	Hordeum jubatum - foxtail barley	100x100m	10-15	9 - Several well spaced patches	100-500	Fruiting/Seed Set,Dispersed,Plant yellowing,Dead
E13	Kochia scoparia - summer-cypress	100x100	40-45	9 - Several well spaced patches	100-500	Fruiting/Seed Set,Dispersed,Plant yellowing,Dead
E13	Melilotus officinalis - yellow sweet-clover	10x10	1-5	3 - A single patch or clump of a species	< 10	Flowering,Plant yellowing
E13	Kali tragus - Russian-thistle	100x100	20-25	9 - Several well spaced patches	10-100	Plant yellowing,Dead
E14	Echinochloa crus-galli - large barnyard grass	10x10m	1-5	2 - A few sporadically occurring individuals	< 10	Fully Developed
E14	Hordeum jubatum - foxtail barley	100x100m	15-20	6 - Several well spaced patches or clumps	10-100	Dispersed,Plant yellowing,Dead
E14	Kochia scoparia - summer-cypress	Bottom of pit	85-90	12 - Continuous dense occurrence of plants	10-100	Dead
E14	Kochia scoparia - summer-cypress	100 x 100m	35-40	11- Continuous occurrence of plants with a few gaps in the distribution	100-500	Plant yellowing,Dead
E14	Melilotus officinalis - yellow sweet-clover	100x100	1-5	2 - A few sporadically occurring individuals	< 10	Plant yellowing
E14	Sonchus arvensis - perennial sow-thistle	10x10	5-10	5 - A few patches or clumps of a species	10-100	Fruiting/Seed Set,Dispersed,Plant yellowing
E15	Hordeum jubatum - foxtail barley	1x5	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing
E15	Hordeum jubatum - foxtail barley	100x100	<1	2 - A few sporadically occurring individuals	10-100	Plant yellowing
E15	Kochia scoparia - summer-cypress	100x100	70-75	8 - Continuous occurrence of a species with a few gaps in the distribution	> 1000	Plant yellowing,Dead
E15	Kali tragus - Russian-thistle	100x100	20-25	8 - Continuous occurrence of a species with a few gaps in the distribution	100-500	Dead
E16	Kochia scoparia - summer-cypress	100x100	40-45	8 - A few patches plus several sporadically occurring plants	100-500	Dead
Q09	Agropyron cristatum - crested wheatgrass	5x100	1-5	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Dispersed,Plant yellowing,Dead
Q09	Bromus inermis - smooth brome	5x100	1-5	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Dispersed,Plant yellowing,Dead
Q09	Kochia scoparia - summer-cypress	5x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
Q10	Agropyron cristatum - crested wheatgrass	5x100	1-5	12 - Continuous dense occurrence of plants	100-500	Plant yellowing,Dead
Q10	Bromus inermis - smooth brome	5x100	<1	7 - A few patches	100-500	Dispersed,Plant yellowing,Dead
Q10	Kochia scoparia - summer-cypress	5x100	<1	2 - A few sporadically occurring individuals	< 10	Dead
Q11	Bromus inermis - smooth brome	5x100	5-10	12 - Continuous dense occurrence of plants	500-100	Dispersed,Plant yellowing,Dead
Q11	Kochia scoparia - summer-cypress	5x100	<1	2 - A few sporadically occurring individuals	< 10	Plant yellowing,Dead
Q12	Agropyron cristatum - crested wheatgrass	5x100	5-10	12 - Continuous dense occurrence of plants	500-100	Dispersed,Plant yellowing,Dead
Q12	Bromus inermis - smooth brome	5x100	1-5	12 - Continuous dense occurrence of plants	10-100	Plant yellowing,Dead
Q12	Kochia scoparia - summer-cypress	5x100	<1	2 - A few sporadically occurring individuals	< 10	Dead

Appendix D. Weed Survey Data

Grid Cell	Species	Areal Extent	Percent Cover	Distribution	Number of Plants	Growth Stage
Q13	Agropyron cristatum - crested wheatgrass	5x100	1-5	12 - Continuous dense occurrence of plants	500-100	Dispersed,Plant yellowing,Dead
Q13	Bromus inermis - smooth brome	5x100	1-5	11- Continuous occurrence of plants with a few gaps in the distribution	500-100	Dispersed,Plant yellowing,Dead
Q14	Agropyron cristatum - crested wheatgrass	5x100	1-5	10 - Continuous uniform occurrences of well spaced plants	100-500	Dispersed,Plant yellowing,Dead
Q14	Bromus inermis - smooth brome	5x100	1-5	9 - Several well spaced patches	100-500	Dispersed,Plant yellowing,Dead
Q14	Cirsium arvense - creeping thistle	5x100	<1	2 - A few sporadically occurring individuals	10-100	Plant yellowing,Dead
Q14	Kochia scoparia - summer-cypress	5x100	<1	2 - A few sporadically occurring individuals	< 10	Dead
Q15	Agropyron cristatum - crested wheatgrass	5x100	1-5	10 - Continuous uniform occurrences of well spaced plants	100-500	Dispersed,Plant yellowing,Dead
Q15	Bromus inermis - smooth brome	5x100	1-5	7 - A few patches	100-500	Plant yellowing,Dead
Q16	Agropyron cristatum - crested wheatgrass	5x100	1-5	7 - A few patches	500-100	Dispersed,Plant yellowing,Dead
Q16	Bromus inermis - smooth brome	5x100	<1	6 - A single patch plus several sporadically occurring plants	100-500	Dispersed,Plant yellowing,Dead
Q16	Cirsium arvense - creeping thistle	5x100	<1	5 - Several sporadically occurring plants	10-100	Dead
R24	Kochia scoparia - summer-cypress	50x50	30-35	9 - Several well spaced patches	100-500	Dead
S23	Kochia scoparia - summer-cypress	100x200	25-30	8 - A few patches plus several sporadically occurring plants	100-500	Dead
S23	Kali tragus - Russian-thistle	200x100	10-15	2 - A few sporadically occurring individuals	100-500	Dead
T16	Beckmannia syzigachne - slough grass	~15 m radius	1-5	3 - A single patch or clump of a species	10-100	Dead
T16	Beckmannia syzigachne - slough grass	~15 m radius	5-10	3 - A single patch or clump of a species	10-100	Dead
T16	Gnaphalium palustre - marsh cudweed	~15 m radius	10-15	8 - Continuous occurrence of a species with a few gaps in the distribution	500-100	Dead
T16	Hordeum jubatum - foxtail barley	~15 m radius	55-60	6 - Several well spaced patches or clumps	> 1000	Plant yellowing
T16	Polygonum amphibium - water smartweed	~15 m radius	10-15	7 - Continuous uniform occurrence of well spaced individuals	100-500	Dead
T16	Rumex fueginus - American golden dock	~15 m radius	5-10	4 - Several sporadically occurring individuals	10-100	Dead
T24	Kali tragus - Russian-thistle	30x30	1-5	7 - A few patches	10-100	Dead
T25	Kochia scoparia - summer-cypress	200x100	5-10	8 - A few patches plus several sporadically occurring plants	100-500	Dead
W20	Chenopodium album - lamb's-quarters	1x100	1-5	13 - Continuous occurrence of plants with a distinct linear edge in the polygon	> 1000	Dead
W20	Salix stolonifera - willow	1x100	<1	2 - A few sporadically occurring individuals	10-100	Dead
W20	Bromus inermis - smooth brome	3x100	5-10	9 - Continuous dense occurrence of a species	> 1000	Plant yellowing,Dead
W20	Caragana arborescens - common caragana	10x100	10-15	9 - Continuous dense occurrence of a species	10-100	Plant yellowing
W21	Agropyron cristatum - crested wheatgrass	100x100	95-100	9 - Continuous dense occurrence of a species	> 1000	Dead
X11	Cirsium arvense - creeping thistle	10x10	5-10	7 - A few patches	10-100	Dead,Leaves Unfolding

Appendix B. Pre-construction Seeding Plan.

ENVIRONMENTAL & STATISTICAL CONSULTANTS
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TECHNICAL MEMORANDUM

Date: March 25, 2024

To: Georgetown Solar Inc.

From: Janet Bauman, B.Sc., P. Biol. RPBio, Senior Ecologist
Nick Bartok, M.Sc., P. Biol., Senior Wildlife Biologist, Senior Manager
Western EcoSystems Technology, ULC

Subject: Georgetown Pre-construction Seeding Plan

Western EcoSystems Technology, ULC (WEST) is pleased to provide this Pre-Construction Seeding Plan (the Plan) for the Georgetown Solar + Energy Storage Project (the Project). The purpose of this Plan is to quickly establish a sufficient cover of temporary vegetation for soil protection before construction begins. Construction is anticipated to start in April 2025. This memo uses Imperial measurements (e.g., acres [ac], pounds) as this is the system most used by farmers and seed suppliers. The goals of the Plan include:

- Soil stabilization during construction,
- Ease of establishment,
- Drought tolerance, and
- Grass only, to allow for control of kochia (*Bassia scoparia*) and other broadleaf weeds.

Species selection, planting timing, early weed control, planting mechanics (i.e., seeding depth, soil packing, seeding rate) are all critical to establishment of a good grass sward.

WEST would like to acknowledge the advice and input of Vern Turchyn from Performance Seed and Daniel Hutton from Field Level Agronomy Ltd.

SPECIES

To establish sufficient vegetation cover to protect soil during construction, a grass mix is planned (Table 1) and will be seeded in spring 2024. The mix will provide a low, yet effective ground cover to stabilize the soil while allowing for construction traffic. Slender wheatgrass (*Elymus trachycaulus* ssp. *subsecundus* or ssp. *trachycaulus*), spring green festulolium (festulolium; *X Festulolium*), and Oro Verde perennial rye grass (*Lolium perenne*) serve as a quick establishing short-term cover. Sheep fescue (*Festuca ovina*), ginger Kentucky blue grass (*Poa pratensis*) and

creeping red rescue (*Festuca rubra*) serve as a long-lived, low growing forage cover that is good for sheep grazing.

This grass mix will allow application of broad-leaf herbicides to control kochia (*Bassia scoparia*) and other noxious and nuisance weeds. Species were selected for their tolerance of site conditions, ease of establishment, quick emergence, drought tolerance, longevity, compatibility with agrivoltaics, availability in large volumes, and cost efficiency. Fast establishing short-term grasses account for 28.1% of the seed count, while long-term low-growing grasses account for 71.9% of the seed count.

Table 1. Species mix and seeding rates.

Species	Seeding Rate (pounds per acre)	Seeds per Square Foot per Pound of Planting	Seeds per Square Foot
Slender wheatgrass	2.0	2.5	5.0
Spring green festulolium	0.8	4.5	3.4
Oro Verde perennial rye grass	2.0	5.0	10.0
Sheep fescue	1.5	11.0	16.5
Ginger Kentucky blue grass	0.7	25.0	17.5
Creeping red fescue	1.3	10.0	13.0
Canadian prairie spring wheat*	20**	–	–
Totals	8.3	58.0	65.4

* Will be supplied and installed by landowner or Arrowwood Colony.

** Excluded from totals as this will be a harvest crop for the first year

Slender wheatgrass is a native, cool season, perennial grass species, with a short to intermediate life span (Sinton Gerling et al. 1996). Individual slender wheatgrass plants will persist for three to five years and a high degree of erosion control (USDA NRCS 2012). Slender wheatgrass is a bunch grass that reproduces by seeds, short rhizomes, and tillers. It is drought tolerant and tolerant of saline, alkaline, and flood conditions. Seed stalks may grow up to 1.5 metres (5.0 feet) tall (Sinton Gerling et al. 1996). Slender wheatgrass germinates quickly, has very good forage quality and dry matter yield. It is very vigorous as a seedling and will help the new stand to compete with weeds as the slower establishing grasses fill in.

Festulolium, is a perennial bunchgrass that is a hybrid of Italian rye grass and meadow fescue. Performance Seed has a variety of festulolium called Spring Green that has proven to have good germination and establishment in the region. It is quick to germinate and has rapid growth for green-up with a one-to-three-year lifespan. Spring Green has the nutritive, palatability, and digestive qualities of a rye grass, while maintaining the durability and drought resistance of meadow fescue. Spring Green produces longer under higher summer temperatures and has high disease resistance.

Oro Verde Perennial Rye Grass was selected for its rapid establishment and excellent drought tolerance. This easily established grass is a short-term species, providing cover and soil stability while the longer-term grasses establish. This variety is widely adapted to many soil types. The extensive root system makes this rye grass an effective crop to help break up compacted soils. It

offers many other benefits including erosion control, improvement of aggregate stability, and increased organic matter in the soil profile.

Sheep fescue is a long-lived, low-growing fescue with good drought tolerance. This perennial grass forms dense tufts and thrives in well-drained, poor soil because it forms a symbiotic relationship with mycorrhizal fungi, allowing it to gather moisture, minerals and nutrients. Sheep fescue is an excellent option for stabilization of disturbed soils, erosion and weed control, due to its extensive root system. This species is also low maintenance and performs well as a groundcover.

Ginger Kentucky blue grass is a low growing forage type blue grass that spreads well through rhizomes, creating an excellent cover and resulting in a low percentage of weeds. It is a persistent species with a tolerance to a wide range of soils and performing well under a variety of management regimes. The roots spread to 10 inches deep and the rhizomes result in dense sod. Ginger Kentucky blue grass greens up early in the spring and is tolerant of close grazing, providing a palatable and nutritious option for all livestock.

Creeping red fescue is another low growing fescue species with high forage quality and soil stabilizing features. This hardy and persistent perennial grass is another creeping rooted grass that will form a dense sod. The rhizomes allow the plants to access moisture in dry conditions, allowing it to stay greener throughout the summer. It performs well on a range of soil types and tolerates shady conditions. Another palatable grass in the mix, creeping red fescue has early spring and persistent fall growth. It tends to hold its feed quality well, making it one of the better species for late fall or dormant season grazing.

In addition to the mix to be planted for the construction and operation of the solar facility (Table 1), a wheat crop (Canadian prairie spring [CPS] wheat), to be harvested for silage, will be planted in spring 2024.

In southern Alberta, spring planting has the highest rate of success. Optimal seeding time at this site is around May 15th, once soil temperatures exceed 5-7^{O}C. This timing also maximizes the chance of adequate soil moisture and prolonged temperatures to allow germination and growth (Table 2). Prolonged periods of dry soil may result in seed or seedling mortality, due to seed borne diseases as well as incomplete or interrupted germination. Adequate spring moisture and rapid and prolonged warming promote the best results.

Table 2. Activities and Timing.

Activity	Preferred Timing	Notes
Weed control spraying	Late April/Early May	Done prior to seeding
Seeding/Land Roll	Mid-May	Dependent on weather; includes rolling
Seed germination	Early June	Dependent on weather
Spot seeding	As Needed	Depends on moisture conditions
Fertilizer application	Mid-May	
Silage	August	Dependent on weather

* Indicates dependencies of the timing and necessity of activities, and other things that are good to know.

The total seeding rate is 8.3 pounds per acre (Table 1). Seeding rates for each species range between 0.8 and 2.0 pounds per acre for the fast-establishing short-term species and between 0.7 and 1.5 pound per acre for the long-term low-growing species. The smaller seed sizes of the long-term low-growing species result in more seeds per square foot.

SITE PREPARATION AND INSTALLATION METHODS

The Arrowwood Hutterite Colony has local field knowledge and will plant the wheat crop and grasses in one pass, ideally in mid-May. The site currently has weed issues. Pre-seeding weed control will occur prior to seeding (at least 24 hours prior to seeding, depending on spay used), using a non-selective herbicide with good efficacy on target weeds. This will help control spring emerging weeds as well as winter annuals. Arrowwood Hutterite Colony will spray around mid-May, although the timing of seeding and spraying is dependent on field and weather conditions (Table 2).

The application of fertilizer at the time of seeding is also recommended, at a rate of 50 pounds (lbs) per acre of Urea and 25 lbs per acre of phosphorous as 11-52-0 Nitrogen-Phosphorous-Potassium (N-P-K) granular fertilizer. This nutrient boost will help germination and establishment. Fertilizer rates will be adjusted, as appropriate, after soil samples are completed. Soil samples will be collected in spring 2024, as soon as the fields have dried enough to access. The Project Area is dryland farmed. Critical considerations for successful establishment of grasses into dryland conditions include:

- precision depth control,
- effective furrow openers, and
- on row packing.

Precise depth control is needed to limit the seed that is placed too shallow (will dry out) or too deep (cannot emerge). Optimum depth control is between 4 and 6 times the seed diameter. The small seed size in this mix (except Spring Green and CPS wheat) requires shallow seeding with in-row packing. The seeds will be sowed in one pass at a single depth between 1/2 and 3/4 inches. Seed moisture is critical as planting depth is shallow.

Effective furrow openers are required to properly open the seed trench allowing the seed to drop into position and the trench to close effectively. The maximum row spacing is seven inches.

On row packing further aids in germination and establishment by reducing seedbed moisture losses and reducing pore space which allows for effective water movement. Effective water movement allows better moisture during seed germination.

Zero tillage disc planters, such as the John Deere, Great Plains, or Haybuster drill systems provide the mechanisms to address the critical considerations described above. Additional

measures can be employed to aid germination of the smaller seeds, such as seed coating, which is discussed further below.

ADDITIONAL MEASURES

There are additional measures that can be employed to enhance erosion control and seed germination, including seed coating and soil tackifiers.

Seed Coating

Seed coating, a method that enhances seed germination, is planned. Coatings include both an apron seed treatment and hydrophilic compounds, which achieve the two primary functions:

- protection of seeds in cold/cool soil from seed borne diseases and fungal infection, and
- increased germination by absorbing and holding water to the seed.

The recent and ongoing drought of the site location poses challenges with germination for smaller seeded species. Smith Seeding Coaters, based in Halsey, Oregon, provide this service, and are highly reputable. A starch-based polymer is applied to the seeds to support water absorption and retention. Additionally, the application of seed fungicide is also planned during coating.

Soil Tackifiers

Tackifiers, or soil stabilizers, are additional measures that may be applied to aid in erosion control. Tackifiers act as a soil stabilizer and mulch binding agent to provide immediate protection from soil erosion until vegetation is established (i.e., like a soil glue). They can temporarily protect against dust, wind, and rain erosion. Tackifiers work by changing soil properties, typically by aggerating finer soil particles. They can be used in areas with dry, highly permeable soils, or soils subjected to sheet flow rather than concentrated flows. They are also used in areas where conventional soil stabilization techniques are difficult, such as steep slopes. The use of a tackifier will be determined closer to the seeding date, as use is dependent on weather and site conditions.

Use and Limitations

Application methods vary by product, but can include broadcasting, furrowing, or spraying. Tackifiers should be applied according to the supplier's recommended application rate. Typically, tackifiers remain effective for several weeks to months, depending on the application rate. Tackifier longevity increases with increased application rate; however, care should be taken because increased application rates may prevent seeds from germinating. Repetitive application at recommended rates can also prolong effectiveness. After application, the site should be inspected biweekly or after significant rain events.

A list of tackifiers approved for use in Alberta, by Alberta Transportation, for road projects, is provided below (Table 3), as a reference. Use of tackifiers under solar panels is a novel approach and no government agencies in Alberta have an approved list for use in Alberta. A list of possible vendors, also from Alberta Transportation, is provided below (Table 4). Some products can be

installed dry, as pellets and are activated when it rains. Other products would be hydraulically applied. Soil stabilizer can be applied as additional protection where additional soil protection is necessary or on temporary access only. Application over the entire site is not necessary.

Table 3. Alberta Transportation approved tackifiers*.

Product name	Application Type
Flexterra FGM	Hydraulically applied
Earth Guard	Hydraulically applied
TakGood Tackifier	Hydraulically applied
Ecomatrix	Hydraulically applied
Soil Lynx	Hydraulically applied
Tack-30	Hydraulically applied
Hydretain ES Plus Granular OC	Granular
Pennington Slopemaster	Granular
Seed and cover grow	Granular
M-Binder Tackifier	Granular

*Alberta Transportation 2011

Table 4. List of possible vendors and/or manufacturers for tackifiers*.

Vendor	Website	Location	Contact Info
Clear Flow Enviro Systems Group Inc	https://www.clearflowgroup.ca/	Unit 140, 134 Pembina Road Sherwood Park, AB, T8H 0M2	Phone: 1-780-410-1403
TerraStar Solutions (EarthGuard)	https://terrastarsolutions.com/	West Vancouver, BC	Phone: 1-877-903-8600 Email: gdawson@terrastarsolutions.com
Profile Products (Flexterra FGM, EcoMatrix)	https://www.profileevs.com/products	750 W. Lake Cook Rd, Suite 440 Buffalo Grove, IL, 60089	Phone: 1-800-508-8681
Erosion Control Blanket	https://erosioncontrolblanket.com/	Highway 8 & RD 136N Riverton, MB, R0C 2R0	Phone: 1-866-280-7327 Email: csr@ecb.ca
Cascade Geotechnical Inc	https://cascade.ca/	15620-121a Ave. NW Edmonton, AB, T5V 1B5	Phone: 1-800-565-6130 Email: mailbox@cascade.ca
Grizzly Peak Revegetation	http://grizzlypeak.ca/	#6 - 11651 40 St SE Calgary, AB, T2Z 4M8	Email: sales@grizzlypeak.ca
Granite Seed	https://graniteseed.com/location/colorado/	490 East 76th Ave., Unit A Denver, CO, 80229	Phone: 720-496-0600

*Alberta Transportation 2011

ESTABLISHMENT AND MAINTENANCE

The site will be assessed in late summer 2024, after harvest of the silage crop, to determine if there are areas of poor germination that require additional seeding. Note that the CPS must be cut before it reaches maturity. A second seeding of the whole site is not planned. The disturbance created during a second seeding of the whole site would negate the first seeding, particularly when the seedlings are small and susceptible to uprooting.

Establishment of an effective and robust grass stand requires support for sustainability. A final target of two to six plants per square foot over 50 to 60 percent of the area is the minimum for successful establishment.

To achieve this target, additional stand reinforcement (direct overseeding) may be required, particularly during or after construction. Weed control (e.g., mowing, spraying) will also be required to provide better growth and persistence of the target grass species. Removal of competition from weeds is critical during the first 30 to 45 days of plant growth.

REFERENCES

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