

SEPTEMBER 2023

APPLICATION FOR A LAND USE BYLAW AMENDMENT FOR REZONING

SE-12-057-21-W4M

Prepared By:



Executive Summary

543077 Alberta Ltd., operating as Sil Industrial Minerals, is proposing to develop an industrial silica extraction pit within the SE-12-057-21 W4M. This report outlines the activities plan for the project and contains much of the information from the *Code of Practice for Pits* registration application under the *Environmental Protection and Enhancement Act* and the application and water management plan under the *Water Act*.

BACKGROUND INFORMATION	
Operator:	543077 Alberta Ltd., operating as Sil Industrial Minerals
Facility Name:	Pit 79
LSD(s):	SE-12-057-21 W4M
Municipality:	Sturgeon County
Landowner(s):	Miles Chuchmuch 130 Main Street, Thunderbay, ONT P7B 6S4 Phone: 807-686-4122 Email: macrail@tbaytel.net
Access:	Township Road 570H, Victoria Trail, AB 38-A
Disturbance Area:	60 ha (148 ac)
BASELINE TERRAIN, SOILS AND VEGETATION	
Rezoning Area:	64.7 ha
Current Zoning:	AG: Agriculture with resource extraction overlay
Proposed Zoning:	RE: Resource Extraction
PROJECT OVERVIEW	
Activities:	Soil salvage, silica sand extraction, hauling of sand to an off-site processing location, and reclamation
Water Management:	Excavation within groundwater, pit-to-pit dewatering, diversion of water, creation of an end pit lake, surface water impoundment
RECLAMATION PLAN	
End Land Use:	Naturalized Upland (61%), Wetland (13%), Waterbody (26%)

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1. Introduction

543077 Alberta Ltd, operating as Sil Industrial Minerals (Sil), is applying for a Land Use Bylaw map amendment for the purpose of developing an industrial silica extraction pit within the SE 12-057-21 W4M in Sturgeon County (hereinafter referred to as “the Site”). The maximum size of the pit will be approximately 60 ha and activities will include soil salvage, silica extraction, hauling of sand to an off-site processing facility, and reclamation. The Site is currently zoned as Agriculture (AG) and the current land use is natural area with limited usability for agricultural land.

In the Municipal Development Plan (MDP), it states that “The Land Use Bylaw (LUB) is the regulatory document applied by Alberta’s Municipalities to establish rules, procedures and criteria regarding the use and development of buildings and land. The LUB is an important tool when implementing long-range planning policies contained within the MDP” (Sturgeon County, 2014). This rezoning application document intends to demonstrate that the activities proposed by Sil fit with the objectives set out in the MDP. As per Section 3.2.2 of the LUB, this application aims to provide a description of the proposed use of the land and outline reasons in support of the application. The Land Use Bylaw Amendment Application form has been provided in Appendix A. Sil is endeavoring to rezone the lands from Agriculture to Natural Resource Extraction.

Table 1. Registration Holder Information

Registration Holder:	543077 Alberta Ltd.
Address:	9175 14 Street, Edmonton, AB T6P 0C9
Primary Contact:	Laura Cline
Phone Number:	780-486-6336
Facsimile Number:	780-440-2186
Email Address:	enviro.application@sil.ab.ca

1.1. Site Location and Ownership

The Site is located on privately owned land, within the White Zone, in the SE 12-057-21 W4M. It is located approximately 12 km north of Bruderheim, Alberta in Sturgeon County. Township Road 570H is the nearest numbered road to the south. The property is owned by Miles Chuchmuch. Sil has obtained a lease with the landowner for the purpose of extracting silica sand. A copy of the current Certificate of Title has been included in Appendix B and a copy of the Resource Lease with the landowner authorizing Sil to submit regulatory applications has been included in Appendix C.

2. Regulatory Requirements

2.1. Federal Requirements

2.1.1. Migratory Birds Convention Act

As per the *Migratory Birds Convention Act*, Sil will avoid clearing activities between April 15th and August 31st. If clearing cannot be avoided during this period, a survey will be completed by a qualified Professional prior to clearing to determine if any nesting birds are present and require protection.

2.1.2. Species at Risk Act

A search of the ACIMS database did not identify any rare plants, lichen or fungi within the SE-12-057-21 W4M. A Landscape Analysis Tool (LAT) report was generated for the site and did not identify any sensitive species.

2.2. Provincial Requirements

2.2.1. Code of Practice for Pits

Under the *Code of Practice for Pits*, all pits on private land that result in a disturbance of 5.0 ha or larger require a registration. Sil has obtained the required provincial approvals, including a Code of Practice Registration for Pits and a Water Act Approval for mining activities within the water table. These approvals are included in Appendix D.

2.2.2. Water Act

The development of this pit will include mining within the water table, reclaiming wetlands, and creating end-pit waterbodies at the time of final reclamation. As a result, a *Water Act* Approval is required and Sil has obtained the necessary Approvals. Preference will be given to implementing pit to pit dewatering on site. If offsite dewatering is required, Sil will dewater to a location that is hydraulically connected to the source. If additional Water Act Approvals are required for offsite diversion, Sil will obtain the appropriate approval prior to offsite discharge. There will be no consumptive use of the water.

Section 3 of this document provides an overview of surface and groundwater resources in the vicinity of the Site and analyze potential impacts. Based on this review, no adverse effect on surrounding water users, lands, or aquatic environments is expected.

2.2.3. Historical Resources Act

A Historic Resources Application (HRA) was submitted through Alberta Culture and Tourism (ACT) and a Historic Resources Impact Assessment (HRIA) was completed prior to disturbance on the site by Circle CRM Group Inc. under Archaeological Research Permit # 19-176. The HRA and HRIA is included in Appendix E.

2.2.4. Environmental Site Assessments

Alberta's Environmental Site Assessment Repository (ESAR) was checked for environmental site assessments that may have been completed on the location. No results were found during the ESAR search.

2.3. Municipal Requirements

2.3.1. Development Permit

Sil will obtain a development permit with Sturgeon County prior to commencing any activity on the site; however, due to the current zoning of the Site, this application serves as a request for rezoning prior to obtaining the Development Permit.

3. Existing Conditions

3.1. Regional Hydrogeology

A review of The Hydrogeological Map of the Edmonton Area (Northeast Segment) (Stein, 1975) indicates that shallow groundwater in the area of the Site likely flows to the south/southwest towards the North Saskatchewan River, as illustrated by the arrows Figure 1 below.

The total dissolved solids (TDS) in the groundwater from surficial deposits within the vicinity of the Site range from 0 to 1,000 milligrams per litre (mg/L) (Hydrogeological Consultants Ltd., 2001). The surficial sand and gravel deposits are indicated to overlap the non-pumping water level in the vicinity of the Site (Hydrogeological Consultants Ltd., 2001); however, where the sand and gravel are not saturated with water, then they are not considered to be an aquifer.

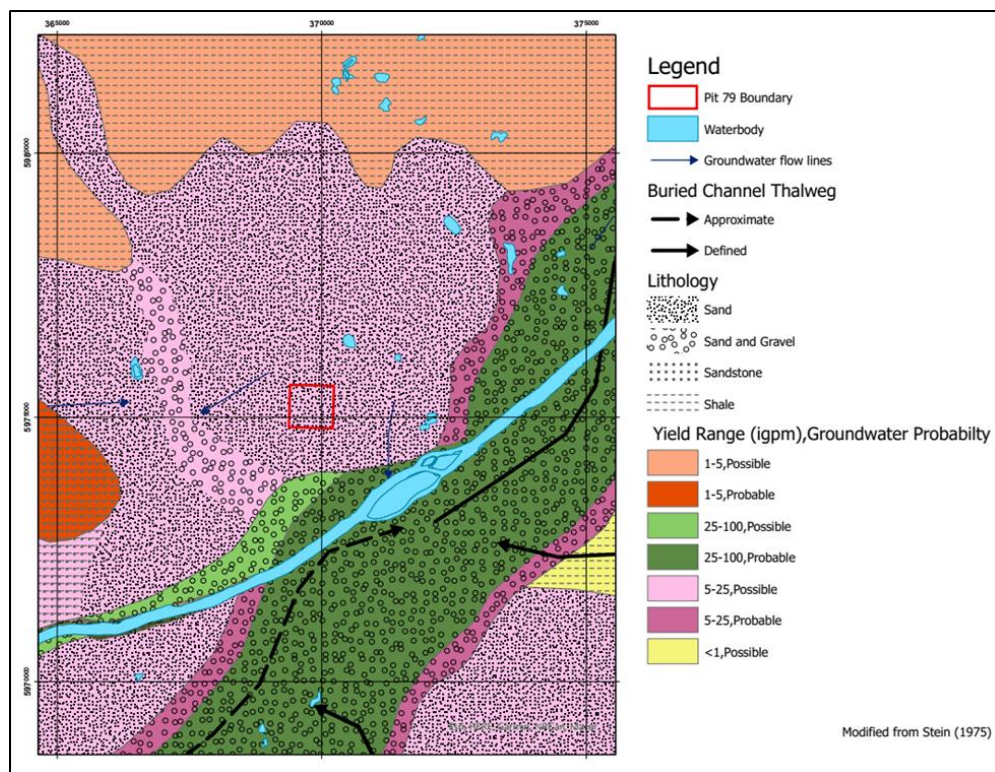


Figure 1. Hydrogeological map of the area; modified from (Stein, 1975)

3.2. Local Setting

3.2.1. Local Stratigraphy

The AEP Water Well Information Database includes water well records in the vicinity of the Site which typically describe the lithology of the drilled well. In addition, exploratory test holes have been drilled to assess the local stratigraphy on the Site itself. The surficial deposits in the region consist of sand and clay. On the Site, the target sand overlies a clay layer, the contact of which is up to 23 m in depth below the surface. The clay layer acts as a protective, low-conductivity barrier to downward groundwater flow.

Exploratory test holes were drilled on the site in 2019 and consisted of 18 holes up to a depth of approximately 23 m below ground level. The subsurface material encountered during drilling consisted of:

- Topsoil: ~0-0.1 m (average = 0.04 m)
- Sand with some interbedded clay: 4-23 m (average = 14.9 m)
- Clay: >23 m

The terrain on-site is gently to moderately sloped (5 to 15%). The Site slopes very gently from the North (631 m above sea level) to the Southeast (622 m above sea level).

3.2.2. Local Hydrogeology

The elevation of shallow groundwater, estimated by drill-hole logs and piezometers, is on average at 620 m above sea level or 7.3 m beneath the surface. The bedrock aquifers in the NE part of the County are completed predominantly in the Birch Lake Member, where apparent yields range from dry to >100 m³/day, though a more specific apparent yield for the Site is likely between 1 to 10 m³/day. Figure 2 shows a comparison between apparent yield for wells completed in Sand and Gravel Aquifers and wells completed through the Birch Lake Member (Hydrogeological Consultants Ltd., 2001).

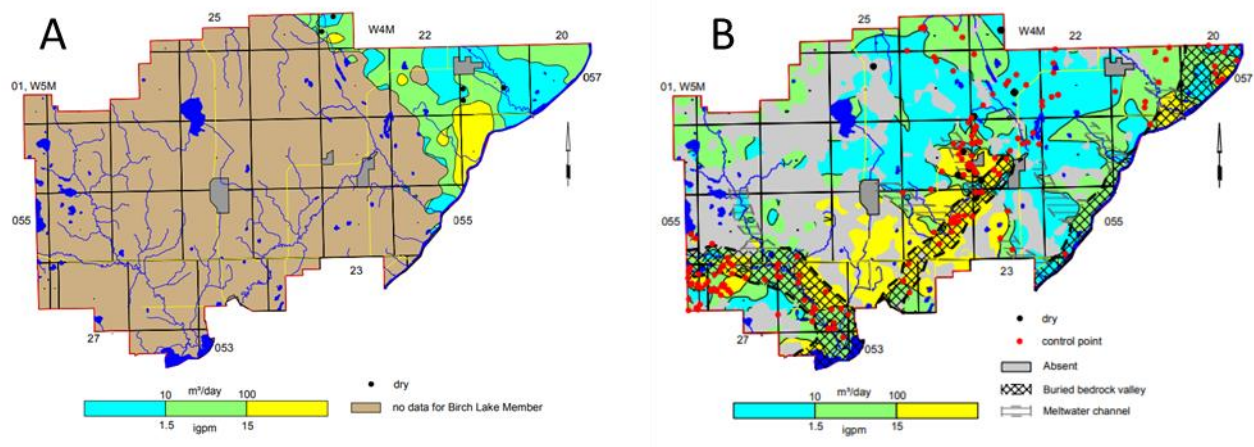


Figure 2. Apparent yield for water wells completed in A) the Birch Lake aquifer and B) sand and gravel aquifers. From (Hydrogeological Consultants Ltd., 2001).

3.2.3. Land Use

The Site exists as mostly natural land use. North East and North West sections of the property show past industrial use (Oil and gas well sites). Various oil and gas facilities are located on-site. A search of Abacus Datagraphics (AbaData) identified several oil and gas facilities on the property:

- Seven high-pressure pipelines held by Ohana Resources Inc. (Licences AB00051687-1, AB00030532-1, AB00013856-4, AB00051687-2, AB00013856-1, AB00051687-3 and AB00013856-2)
- Three high-pressure pipelines held by Conifer Energy Ltd. (Licences AB00042937-179, AB00000397-1, and AB00042937-24)
- One high-pressure pipeline held by Paramount Resources (Licence AB00030299-1)

- Four water lines owned by Redwater Water Disposal Company Ltd. (Licences AB00022786-89, AB00022786-311, AB00022786-273 and AB00022786-88).

The adjacent land uses observed surrounding the site are described in Table 2 and a map of nearby abandoned oil and gas wells is included in Appendix F.

Table 2. Land use surrounding Pit 79

Direction	Land Uses
North	Natural land use
East	Natural land use
South	Natural land with industrial activity
West	Natural land use

As per the Land Use Bylaw 1385-17, the proposed development can be classified as Resource Extraction (RE) and requires rezoning to the appropriate Resource Extraction district. Additionally, the current Land Use Bylaw (1385-17) states that resource extraction development is not permitted within 400 m from the outside wall of an existing dwelling and 800 m from the property boundary of a multi-lot subdivision unless the activity is approved of in writing by the residents of the dwelling or the subdivision. In this case, the subject property is not located within 800m of a multi-lot subdivision and/or within 400m of an adjacent residence. There is a residence located on the subject property and is not a separate titled property. The residence is owned by the same landowner of the subject property, who has provided us with permission to mine within 400 m of the dwelling.

4. Pre-Disturbance Assessments

4.1. Soil and Vegetation

A pre-disturbance assessment was completed on June 17 & 18, 2019 in order to establish baseline data for reclaiming the Site. Information was collected on vegetation, soils, and landscape qualities in order to better understand the existing conditions on site as a target to emulate during reclamation.

4.2. Wetlands

A search of Alberta Merged Wetland Inventory on GeoDiscover Alberta (Government of Alberta, 2021c) on April 15, 2019 shows that no wetlands have been identified on the property. A field visit on June 17 & 18, 2019 confirmed that no wetlands were present.

4.3. Hydrogeology: Groundwater Quantity

4.3.1. Radius of Influence

During development and extraction at the Site, there will be no consumptive use of groundwater. The water will not be removed or discharged off the Site, only mobilized between open pits that are hydraulically connected to on another within the Site boundary. Any water lost to evaporation, transpiration, adhesion, etc. is expected to be negligible.

An estimate of the radius of influence upon groundwater for dewatering operations at the site has been calculated using a simplified analytical approach. The following equation is presented for estimating radius of influence (R_o) for given drawdown (h) and hydraulic conductivity (K):

$$R_o = C \times h \times K^{0.5}$$

Where R_o = Radius of Influence (meters), h = Drawdown (meters), K = Hydraulic conductivity (meters/second), and $C = 3000$ (fixed value, coefficient for radial flow).

Table 3. Radius of Influence Calculations for mining and dewatering activities on the Site.

Input parameter	Value	Justification
h (m)	Maximum depth of mining below water table = 10.6 m	Based on the results from the drilling program at this site. The maximum depth of water Sil anticipates possibly encountering would be 10.6 m.
K (m/sec)	0.000010147 m/sec	Derived from the Alberta Tier 2 Soil and Groundwater Remediation Guidelines: 320 m/year = 0.000010147 m/sec (Alberta Environment and Parks, 2019)
Example Calculation	$R_o = (3000) \times (10.6 \text{ m}) \times (0.000010147 \text{ m/sec})^{0.5} = 101.3 \text{ m}$	

Therefore, the maximum radius of influence within which an impact to water quantity may be experienced due to dewatering at the deepest point of excavation is 10.6 m from the deepest point of mining. However, a map of the estimated drawdown across the pit, based on the water table elevation and proposed pit model, shows that the ROI will extend a maximum of 101.3 m outside the mine boundary.

As the reclamation will be progressive throughout the duration of extraction, including areas intersecting the water table, it is anticipated that water losses will be minimal and there is a low risk of impacting the quantity of water on and around the Site.

4.3.2. Water Table Analysis

Mining is expected to occur within the water table at an elevation between 617 and 619 meters above sea level (masl). Depth of mining below the water table will range from 0 m to 10.6 m at its deepest. Sil does not anticipate mining to affect groundwater quality or any of the surrounding water wells. Pit-to-pit dewatering will be implemented where possible. If dewatering offsite is required, Sil will obtain appropriate authorization under the Water Act.

As part of the reclamation plan for the Site, Sil is proposing to create 3 separate waterbodies totaling 32.25 ha, with an additional 0.5 ha of wetland adjacent to one waterbody (Appendix G, Drawing 4); however, Sil does not anticipate impacting wetlands as part of the development of this pit as there are none existing on the site. Due to the many pipelines and right of ways on this property, it was natural to divide the mining plan into three sections for the purpose of completing water balance calculations.

An analysis was performed using water elevation data from exploratory drill holes, piezometers, and LiDAR information, accounting for potential drawdown from increased evaporation. The existing water table where the reclaimed waterbodies/wetlands will be located is between 614.2 and 619.7 m. Estimates of evaporative losses from the proposed reclaimed waterbodies/wetlands indicate that there is the potential for the water table to be drawn down up to 0.39 m; this places the predicted water table following reclamation between 613.8 and 619.3 m.

Water balance calculations indicate that the reclaimed waterbodies and wetland will function as a net discharge point in an average year.

4.3.3. Surrounding Water Users

A review of the Alberta Water Well Information Database indicates there are 9 registered wells and 2 unnamed springs located within 1.6 km of the site. One of these wells is located within the property boundary and an unnamed spring is located within a 400 m radius. A tabular summary of the Water Well Drilling Reports within a 1.6 km radius of the site boundaries has been included in Appendix H along with a map illustrating the location of these wells/springs. The well located within the property boundary and the spring located within a 400 m radius are summarized as follows:

- Well ID 265897: According to the Alberta Water Well Inventory, this well was originally used for livestock and shows that it was drilled in the center of the property. Based on a previous Field Verified Survey completed for an adjacent pit operation (Sil Pit 54), Sil has confirmed with the landowner that the well is associated with the residence located in the southwest corner of the site. Sil's intent is to mine through the location of this residence, per agreement with the landowner, thus the well would be removed during the mining process.
- Well ID 265795: According to the Alberta Water Wells Inventory database this unnamed spring was inventoried circa 1976 and is currently labeled for livestock use. The spring has no known owner; however, during a previous Field Verified Survey for the adjacent Pit (Sil Pit 54), Sil spoke with the landowner, Arc Resources, and determined that the landowner was aware of the spring but that it was not being utilized. The spring is at an elevation of 623 m above sea level with a recorded location approximately 204 m outside the closest mine boundary; however, the record places the spring at the center of the LSD whereas in the 1968 aerial imagery the spring appears to be in the SW corner of the same LSD. Therefore, according to the radius of influence calculation of 100.3 m, this spring falls outside the radius of influence for the effects of mining and dewatering in this area and above the depth of mining (608 masl). In addition, the regional water table measured from Lidar and drill points sits at around 612 masl at the location of the spring, suggesting that the spring is sourced from a different, shallower local aquifer. Therefore, Sil does not anticipate mining to affect the water in this spring.

4.4. Hydrogeology: Groundwater Quality

Any effects from turbidity during extraction are not expected to affect surrounding water wells. The sand deposit that is the target of extraction is underlain by clay, which is expected to have low to no hydraulic conductivity. As a result, downward migration of water to any aquifers below is anticipated to be minimal, especially considering the propensity of the local area to be a discharge zone.

In addition, the extraction activities do not require the use of chemicals; therefore, it is unlikely that the groundwater chemistry will be affected in this way. However, Sil will ensure that all equipment arrives and leaves the job site clean (i.e. free of soil and vegetative debris) and in good working order (no oil or hydraulic fluid leaks). Inspections of vehicles and equipment will be completed routinely throughout the duration of the project to ensure there are no leaks and that each vehicle carries spill kits with materials suitable for the volume of fluid or oils they carry. Sil does not plan to store hazardous chemicals or fueling

equipment on the Site. These measures minimize the potential for releases to the environment. As such, it is unlikely that the quality of the groundwater in the aquifers used by adjacent residents will be adversely impacted by the mining and reclamation activities on the Site.

5. Construction and Operation

5.1. Purpose

Sil Industrial Minerals intends to develop the site to extract silica sand. Processing of the sand will occur at an off-site facility. The anticipated lifespan of the mine is 10-15 years and progressive reclamation will occur throughout the life of the pit.

5.2. Site Access and Security

Sil plans to access the site via Township Road 570. Sil will ensure that the site is fenced and gated. Visible signage indicating there is an open pit will be installed along property lines. During the life of the pit, Sil personnel will inspect and maintain all fencing and signage. Trucks will haul sand to an off-site processing facility by travelling south on Township Road 570, south on Victoria Trail and east on Highway 38 and then north on Range Road 204. The number of people on site may vary; however, personnel will generally consist of a foreman, a few excavator operators, and truck drivers. The personnel will only be on site during operating hours.

5.2.1. Parking

Any personal or company vehicles parked on site will be left in designated areas and parking will not be required outside of property limits.

5.2.2. Infrastructure

No infrastructure will be constructed during site operations. A temporary office trailer may be moved onto the Site, during extraction along with a generator and some temporary lighting. Portable outhouses will also be left on-site during extraction.

5.3. Proposed Setbacks

Sil will apply the following setbacks:

Table 4. Setbacks surrounding and within 79

Direction	Setback Distance
North property line	30 m
East property line (Range Rd 210 allowance)	15 m
South property line	3 m
West property line	15 m
Long Run Exploration's high-pressure gas line	As indicated by future proximity agreement
Baytex Energy High Pressure Gas Line	As indicated by future proximity agreement
Coronado Gas Co-op Ltd. Pipeline	As indicated by future proximity agreement
Baytex Energy Ltd. Flaring, Venting and Data Collection Site	As indicated by future proximity agreement

5.4. Site Clearing

Trees and forested vegetation will be cleared using a dozer. Large timbers will be retained for use as coarse woody debris in reclamation. The remainder of the cleared material will be piled and burned on-site in accordance with municipal guidelines. If burning is not permitted, woody material will be mulched.

5.5. LFH and Topsoil Salvage

Reclamation material salvage will occur under dry or frozen ground conditions. Topsoil and the LFH layer will be salvaged in a single lift as a topsoil layer at least 5 m ahead of all pit faces to ensure that these materials do not slough into the pit. The salvage distance may be increased if the pit face is unstable or decreased near undisturbed buffer zones in order to maximize aggregate salvage. Overburden, if encountered, will be salvaged separately. Topsoil and overburden salvage will be completed using dozers, motor scrapers and/or rock trucks. Herbaceous flora will be salvaged with the soil. This will help retain the seedbank within the salvaged soils and facilitate natural revegetation of the Site at the time of reclamation.

5.6. Sand Extraction

Pending the receipt of required municipal approvals, initial construction is projected for late 2024 or 2025 and the anticipated lifespan of the mine is 10 to 15 years, depending on market demand. Following salvage of reclamation materials using scrapers and dozers, silica sand will be extracted from the pit, using excavators, dozers and haul trucks. The sequential mining plan is outlined in Drawing 4.

Operation of the resource extraction pits is anticipated to take place seasonally, largely in the fall and winter, when conditions are favourable for the extraction and transport of industrial silica sand. During operation, truck traffic is anticipated to consist of around 200 truck trips per day, which is consistent with current hauling operations in the area – it is not intended that the pit will be operated simultaneously with other pits located along Victoria Trail. Other items that are anticipated to be handled or stored on site include pumps for dewatering, earth-moving equipment, a portable toilet, and possibly a temporary office trailer.

5.6.1. Hours

As per Objective 2.2.5 of the Municipal Development Plan, the application aims to mitigate the impact of natural resource extraction on the local community. Based on the LUB 1385/17, the haul hours will be limited to 6 AM to 6 PM on weekdays and 8 AM to 4 PM on weekends and holidays.

5.6.2. Hauling

Sil intends to haul material from the extraction pit by travelling south on Township Road 570H, then southwest on Victoria Trail. From there, trucks will travel east along Township Road 570 (which becomes provincial Highway 38) to the processing facility located in Lamont County.

Adequate signage will be posted along the haul route during truck hauls, including “truck turning” and “haul in progress” signs. Sturgeon County Transportation and residents located along the haul route will be notified prior to the haul commencing. All haul trucks will be registered with the ASGA. Water trucks will be utilized for dust control as needed.

Haul traffic to and from the pits will be monitored to ensure compliance with site regulations and legislated standards. Haul operations shall comply with the requirements of industrial haul agreements, including regulated road maintenance and dust control. Hauling contractors will be subject to prequalification and all drivers must comply with the Alberta Traffic Safety Act.

5.7. Potential Impacts and Mitigation Strategies

5.7.1. Landscape Appearance

As per the LUB 1385/17, boundaries of the Site that are adjacent to public, residential, and other land uses may require screens at the discretion of the Development Authority. This Site is not visible to the public from roads in the area. The only roads within 400 m of this Site are for accessing oil and gas facilities on this property; therefore, it is unlikely that screening will be required on this property. Victoria Trail, which has very light traffic volumes, is more than 400 m from the Site. Highway 38 is located over 1.5 km away from the property, and the Site is well beyond the sight lines of this road.

5.7.2. Community Standards

Sil will comply with the requirements outlined in the Community Standards Bylaw 1433/19. The Community Standards bylaw generally applies to properties that are left in an unsightly manner. Sil will employ good housekeeping practices in order to keep the site tidy, but also to comply with the bylaw.

5.7.3. Weeds

Sil is committed to a weed management program that includes prevention and control strategies. Prohibited noxious weeds will be destroyed and noxious weeds will be controlled within the Site, as per the Alberta Weed Act (Government of Alberta, 2022). The presence of weeds will be monitored regularly during the growing season.

5.7.4. Noise

Activities at this site will generate some noise in the area. Sil will limit its regular hours of operation to between 6 am and 6 pm from Monday to Saturday and between 8 am and 4 pm on Sundays and statutory holidays. While working on site, Sil will work to reduce the amount of noise generated by maintaining mufflers on equipment and limiting the amount of equipment working on site at one time

5.7.5. Dust

Sil endeavors, through various methods and strategies, to mitigate and minimize dust created by operations on-site. Sil plans to implement the following dust mitigation controls:

1. All production equipment and support vehicles (i.e. scrapers, loaders, rock trucks, pickups) will adhere to site-controlled speeds while traveling on haul roads and within the project area.
 2. All loaded trucks importing and exporting materials to and from site will be tarped.
 3. Dust will be controlled through the application of water or calcium chloride where warranted.
 4. Disturbed areas will be reclaimed progressively and as quickly as possible.
 5. All permanent stockpiles shall be seeded if necessary to prevent dust generation.
-

5.7.6. Spill Response

As per the Municipal Development Plan, this region of Sturgeon County has a complex hydrogeological system that includes permeable near-surface soils. Sil does not want or intend to pollute any soil or groundwater. In this case, equipment and fluid storage areas will be inspected regularly, appropriate secondary containment devices will be utilized and spill response equipment will be available on site. Drip trays will be used for equipment that are left unattended for an extended period of time. In the event of a release, Sil's Spill Response Procedures will be immediately implemented. A copy of the Procedures is included in Appendix I.

5.7.7. Surface Water

All surface water runoff on-site will be directed into the pit. Surface water and drainage will be inspected and maintained throughout the life of the development. Sil will work to ensure that the direction and volume of flow does not change significantly over the course of the construction and operation of the pit. Sil will use best management practices, including the incorporation of erosion and sediment control measures, as required.

Sil intends to implement pit-to-pit dewatering where possible, but anticipates off-site dewatering may be required to facilitate full recovery of the resource within this pit. Sil intends to assess any additional impacts to the environment and/or other water users prior to implementing off-site dewatering at this pit. An approval under the provincial Water Act will be obtained prior to off-site dewatering activities.

5.7.8. Inactive Pit Plan

The pit will be inactive seasonally through late spring, summer and early fall. Some years, the pit will remain inactive annually depending on market demand. Sil will maintain a steady pace of progressive reclamation, to ensure that large cuts are not left during periods of inactivity.

During periods of inactivity, Sil will ensure that the site is safe. Slopes on-site will be 3:1 or gentler, equipment will be removed, the site will be fenced, and "no trespassing" and "danger – open pit" signs will be placed around the perimeter of the pit. Regular monitoring will continue during periods of inactivity, including weed inspections to ensure that noxious and prohibited noxious weeds do not establish.

5.7.9. Erosion and Sediment Control

Sil will install silt fencing downslope of any stripping or grading activities where there is a potential that erosion could harm environmentally sensitive areas such as waterbodies, wetlands or topsoil resources. Topsoil stockpiles will be seeded as soon as practicable to prevent wind and water erosion, Sil will also ensure that no topsoil resources or sand are stockpiled adjacent to pit faces or areas that could result in the sloughing or erosion and subsequent loss of topsoil resources.

To reduce the potential for erosion prior to vegetation establishment, Sil intends to create gentle slopes around the pit edges. Erosion and sediment control can be accomplished using a variety of means. These options can include:

- Placing rip rap, pit run or woody vegetation
 - Sediment barriers (silt fences or wattles)
-

- Timing of construction and reclamation
- Swales
- Temporary cover crops
- Erosion blankets or logs
- Roughing up soils, creating microtopography
- Permanent vegetation cover

Sil will use a variety of these tools in order to prevent erosion; however, the ultimate goal is to establish full permanent vegetation cover using appropriate vegetation, as this would achieve the reclamation objectives. In the interim, Sil will use one or many of the other options outlined above, depending on site conditions, in order to prevent erosion. Sil will also monitor the site, particularly after large rainfall events, spring melt and after long dry weather events in order to ensure that those events do not result in significant erosion. Should those events result in large-scale erosion, Sil will recontour and stabilize affected areas using erosion and sediment controls.

6. Reclamation Plan

6.1. Reclamation History in Sturgeon County

Reclamation is a requirement under the LUB 1385/17, and it is a fundamental principle of Sil to leave the land in good condition following reclamation. Sil has had a history of successful reclamation in Sturgeon County, including Pit 51, which is awaiting final reclamation certification, and Pit 58 which has received reclamation certification. Some of the existing pits along Victoria Trail have been reclaimed for several years, successfully integrating into the landscape, while other pits have been recently reclaimed and are on a successful trajectory.

6.2. Reclamation Process

Sil will follow the LUB 1385/17, that is, by reclaiming in order to create a self-sustaining landscape compatible with the surrounding area and having equivalent or greater land capability than pre-disturbance conditions. Sil's process following decommissioning of the excavation will be to recontour the landscape, replace the topsoil, and then revegetate using a combination of seeding and natural encroachment with frequent monitoring to ensure reclamation success.

6.3. Post-Reclamation

The reclamation objective is to create a self-sustaining landscape that is compatible with the surrounding area and has equivalent or greater land capability than pre-disturbance conditions. The Site will be reclaimed to 17.04 ha of natural upland capable of supporting agriculture uses and 0.5 ha of wetland capable of supporting naturalized ecological wetland functions, as well as wildlife and waterfowl habitat. There will also be 3 end pit lakes, 15.40 ha, 5.62 ha and 11.23 ha in size. The proposed reclamation plan is included in Drawing 4 of Appendix G.

The design, construction and monitoring plan for the reclaimed mineral wetland on the Site strives to meet regulatory requirements, desired reclamation outcomes, and incorporate flexibility and adaptive management. The goal of reclamation is to obtain equivalent land capability to that which existed prior to disturbance; furthermore, the specific reclamation goal of the mineral wetlands on the site is to create stable, resilient and functional wetlands that have the hydrological and vegetation characteristics typical of these types of systems in the region and can fulfill legislated reclamation requirements.

Following the receipt of a reclamation certificate, the land will be returned to Agricultural (AG) zoning, unless an alternative zoning is desired by the landowner.

6.4. Decommissioning

The Site will be decommissioned by removing equipment and temporary infrastructure from the Site. Following decommissioning, there shall be no industrial or domestic refuse remaining on-site.

6.5. Monitoring

Following reclamation, Sil will inspect the site in early summer and fall annually to ensure the success of reclamation. Monitoring will continue until the reclamation objectives outlined in Section 6.3 are achieved. Monitoring activities will assess the following:

- **Integrity and maintenance of fencing and signage:** Damages will be repaired as soon as possible.
- **Erosion:** If erosion or erosion potential are noted, appropriate erosion control measures, such as silt fencing, will be installed.
- **Self-sustaining vegetation cover, including plant vigor, health, cover, density and height:** If vegetation does not appear to be following a trajectory to achieve suitable cover within two years of planting, corrective measures will be taken including, re-transplanting or repeating cutting treatments if plants have died, re-seeding, re-planting seedlings, or consideration of planting other native species.
- **Undesirable species control:** If noxious or prohibited noxious weeds are observed, mechanical means of control will be used around the wetland area.
- **Potential for reclamation certification:** Once the site or portions of the site are anticipated to meet applicable reclamation criteria, a reclamation assessment will be completed.

7. Reasons to Amend the Land Use Bylaw

7.1. Alignment with the Municipal Development Plan

The proposed rezoning aligns with the Community Vision of the Municipal Development Plan (Sturgeon County, 2014). This Community Vision states that Sturgeon County wants “*A diverse, active community that pioneers opportunities and promotes initiative, while embracing rural lifestyles*” (Sturgeon County, 2014). Sil believes that it supports the County’s philosophy by developing a natural resource which contributes to County and community prosperity while preserving and even enhancing agricultural and natural land uses within the landscape upon reclamation.

Additionally, the MDP has as one of its key pillars the Economic Health of the County. Point 5.1.8 of the MDP indicates that the County “*should encourage Non-Residential developments that provide diverse employment opportunities for Sturgeon County residents*”. Sturgeon County also recognizes the importance of aggregate extraction as a major economic contributor to the community. Aggregate extraction operations pay a levy to Sturgeon County that is then used for community groups and local area infrastructure improvements.

7.2. Alignment with the Land Use Bylaw

The pit is located within the Resource Extraction Overlay (REO) which recognizes the existing potential for natural resource extraction activities. Further, natural resources are typically created or deposited in areas due to geologic processes that occurred tens to hundreds of thousands of years ago and are not relocatable activities given the operators have no control over the presence or availability of a resource in a specific area. The area within the REO is uniquely primed for resource extraction because of the very low density of population and traffic in the region. As such, it is advantageous for operators and the County to benefit from the existence of a natural resource in such an operable area, as these opportunities are not always abundant.

7.3. Diversified and Strengthened Economy

Fostering a diverse economy is one of the guiding principle outcomes of the MDP (Section 5.5). The proposed rezoning allows for such diversification of the economy. Silica sand extraction is a unique activity that allows the County to diversify its economy from activities currently typical in this area – oil and gas, agriculture, or gravel operations. Based on drill data and resulting volumetric modeling and calculations, it is projected this property has the potential to generate over \$1.6 million in Community Aggregate Payment (CAP) Levies over the total lifespan of the pit.

7.3.1. Diversification of Regional Silica Resources

It is understood that there are concerns regarding the number of pits located along Victoria Trail; however, Sil must maintain some diversification in pit availability to ensure there is variability in sand sizing and specification to meet changing industry needs and economic demands. Sil's currently active Pit 46 in the SW 8-57-21 W4M is nearing depletion with an estimated 2 to 4 years of activity remaining, depending on economic demand and potential future allowable haul weights on Victoria Trail Bridge. As such, Sil is working towards ensuring availability of a fully permitted pit with appropriate resource specification to be accessed when needed.

There are two other currently permitted pits along Victoria Trail; however, Pit 54 located in the NW 01-57-21 W4M has only one projected cut remaining. Currently, remaining mining at Pit 54 is subject to approvals from Alberta Environment and Protected Areas and Conifer Energy for removal of the abandoned fresh water line infrastructure. Pit 42 in the NE 6-57-21 W4M remains to be depleted, however this property is largely naturalized at this time and well-screened visually from Victoria Trail. Sil has obligations to landowners to commence mining on their properties and is thus considering Pit 79 as the option for succession when Pit 46 is complete. The timeline for completion of mining and final reclamation of Pit 54 is currently pending approvals from AEPA.

7.4. Increased Employment Opportunities

Increased employment comes in the form of direct and indirect employment and produces induced benefits in the community and surrounding area.

7.4.1. Direct Employment

The development of this Site and the operations of the plant will lead to the development of direct jobs at the pits and at the plant north of Bruderheim. A significant portion of our employees at the Bruderheim

plant and at the pits in the area come from Sturgeon County, as well as the County of Lamont and Strathcona County. Development of the pit will lead to an increase in plant operations, which will increase the need for more workers from the area.

7.4.2. Indirect Employment

The development of this Site will lead to an increase in indirect jobs for contractors and other supporting industries in the surrounding area. Examples of these indirect jobs include truck drivers needed for hauling material from the site to the plant. This pit will need other trades such as hydrovac and line locators for safety purposes, fencing contractors, and an array of other contractors.

7.4.3. Induced Benefits

In addition to direct and indirect employment, the development of this pit also produces induced benefits in the County and local area. While these aren't jobs that are immediately visible, they are worth mentioning. An example of an induced benefit is the money brought into the community through resident employment provided by Sil, both directly and indirectly. This subsequently induces an increase in employment elsewhere. For example, a trucker who requires a break will stop at a restaurant or gas station on their way to the Site. Or, an employee of the plant will use their wages to improve their own quality of life and this may involve purchasing goods from local suppliers or hiring local contractors.

7.5. Increased Tax Base

Sturgeon County will directly benefit from this development and the increase in taxes that flow out of this type of operation. Natural resource extraction developments contribute to industrial taxes within the County but demand very limited tax-based services (such as snow or garbage removal). In addition to municipal taxes, Sturgeon County will also benefit from the Community Aggregate Payment levy of \$0.40/tonne – a payment that results from the extraction of sand and aggregate from properties on County property. Indirectly, an increase in employment in the area will increase the tax base for the County, generate funds in the community, and allow further development of the County.

7.6. Environmental Stewardship

Environmental Stewardship is one of the pillars of Sturgeon County's long-term planning goals, highlighted in the MDP. Sil has made environmental stewardship a pillar of its own operations, as evidenced in the reclamation of former pits. Sil endeavors to complete progressive reclamation of pits, whereby previous cuts are reclaimed as new cuts are opened. Several of Sil's pits have been reverted to agricultural land, while others have been converted to more natural landscapes. In those natural landscapes, Sil aims to use native seed when seeding, in congruence with section 4.1.13 of the MDP which indicates that the proponent "*should promote the re-establishment and planting of native vegetation throughout the County to promote a regional identity and a sense of place*" (Sturgeon County, 2014). A cover crop of agronomic species may be used in order to help establish the native seed in the landscape.

7.7. Wetland and Water Body Creation

The majority of activities in Alberta tend to have negative effects on wetlands in Alberta. Point 4.3.9 of the MDP indicates that Sturgeon County should discourage the filling and alteration of existing wetlands. In the long term, Sil's activities do the exact opposite because the reclamation activities will create new

wetlands and water bodies. It is estimated that Sil will create 32.25 ha of water bodies and 0.5 ha of planned wetlands on the Site. Along with the planned wetlands, fringe wetlands will develop between the water bodies and upland areas. This has a positive effect on the environment, as wetland and riparian vegetation can flourish, allowing wildlife and the public to enjoy the diverse landscape.

7.8. Community and Neighborhood Consultation

Sil has undertaken Community Consultation in advance of the submission of this application to address concerns regarding the proposed development of this property, to encourage a positive relationship with the surrounding residents, and establish a point of communication going forward through the development permit application process. Community consultation letters (Appendix J) were sent out to nearby residents within 800 m of the site on August 23, 2023 (Table 5). The deadline for consultation was on September 8, 2023 and Sil did not receive any responses regarding this particular development. One comment was received from a neighbour asking for an update on a different nearby pit; however, that was addressed separately as it was not within the scope of the public consultation for Pit 79.

Table 5. Landowners contacted as part of public consultation

Land Location	# Landowners Contacted	Land Location	# Landowners Contacted
NE-1-57-21-W4M	1	NW-7-57-20-W4M	None (Provincial Rec. Area)
NW-1-57-21-W4M	3	SW-7-57-20-W4M	None (Provincial Rec. Area)
NW-6-57-20-W4M	1	NE-12-57-21-W4M	1
SW-12-57-21-W4M	2	NW-12-57-21-W4M	1

8. Conclusion

Sil is planning on rezoning the quarter section located at SE-12-057-21 W4M (known as “the Site”). The Site is planned on being rezoned from Agriculture (AG) to Resource Extraction (RE). Following rezoning and permitting, Sil will extract industrial silica sand from the site and haul the material to its plant north of Bruderheim. Following extraction, the site will be reclaimed and rezoned back to AG land. The community benefits from this development include increased local employment, increased revenue to the County, and enhanced environmental benefits. Sil’s development is in alignment with the community vision as set out in the MDP. The benefits of silica extraction extend throughout surrounding communities and the County as a whole. A Community Aggregate Payment (CAP) Levy is paid to Sturgeon County on all sand and gravel extracted at a rate of \$0.40/tonne. This pit is estimated to generate over \$1.6 million in CAP levies, which are then in turn invested into the community by way of road maintenance, infrastructure projects, community projects, scholarships and research.

Silica extraction increases county revenue by contributing substantially to property tax revenue while requiring minimal tax funded services such as garbage and snow removal. Further, the operation of this pit will generate direct and indirect employment opportunities. Local jobs will be created directly at the operation while indirect jobs, including truck hauling, and induced jobs will be created in the community as workers will spend money in these surrounding communities to purchase essentials such as food and gas.

Bibliography

Alberta Environment and Parks. (2019). *Alberta Tier 2 Soil and Groundwater Remediation Guidelines* (p. 150). Land Policy Branch, Policy and Planning Division.

Government of Alberta. (2022). Weed Control Act. In *Statutes of Alberta, 2008, Chapter W-5.1*. Alberta King's Printer.

Hydrogeological Consultants Ltd. (2001). *Sturgeon County - Part of the North Saskatchewan River Basin. Parts of Tp 053 to 058, R 20 to 28, W4M and Tp 054 to 057, R 01, W5M. Regional Groundwater Assessment*.

Stein, R. (1975). Hydrogeological Map, Edmonton Area (Northeast Segment), Alberta. In *Map 112*. Alberta Research Council.

Sturgeon County. (2014). 2014 Sturgeon County Municipal Development Plan. In *Bylaw 1313/13*.

Appendix A. Rezoning Application Form

Appendix B. Certificate of Title

Appendix C. Letter of Authorization

November 15, 2019

Re: Legal Land Location: SE 12-057-21 W4M Authorization to Act as Owner's Agent

To Whom It May Concern:

Please be advised that I am the current owner of the above described lands and hereby appoint and authorize 543077 Alberta Ltd. of 9175-14 Street, Edmonton Alberta, to act as my agent and representative in all matters with respect to any applications to the Government of Alberta and Sturgeon County on the above lands.

If you have any questions or concerns please contact Laura Royer at 780-486-6336.

I trust this is satisfactory.

 MILES CHUCHMUCK

Appendix D. Provincial Approval Information

REGISTRATION

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT **R.S.A. 2000, c.E-12, as amended**

REGISTRATION NO.: 460024-00-00

APPLICATION NO.: 001-460024

EFFECTIVE DATE: August 2, 2022

REGISTRATION HOLDER: 543077 Alberta Ltd.

.....

Registration is issued for the following activity:

The construction, operation or reclamation of PIT 79 located in the SE 12-057-21-W4M as per the Updated Activities Plan dated January 2020, revised July 2020 and all supplemental information provided

Designated Director under the Act.....

Muhammad Aziz, P. Eng.

Date Signed August 2, 2022



APPROVAL
PROVINCE OF ALBERTA
Water Act, RSA 2000, c.W-3, as amended

APPROVAL NUMBER:	DAUT0009501
EFFECTIVE DATE:	2022-06-07
EXPIRY DATE:	2032-05-01
ACTIVITY LOCATION:	SE-12-057-21-W4,
APPROVAL HOLDER:	Sil Industrial Minerals

Pursuant to the Water Act, R.S.A. 2000, c. W-3, as amended, an Approval is issued to the Approval Holder to commence and continue the following activities:

- maintaining, removing or disturbing ground, vegetation, water or other material in or on any land, water or water body;

("the Activity")

to disturb the water table and create end pit lakes for the purpose(s) of aggregate extraction subject to the attached terms and conditions

Designated Director under the Water Act:	<i>Muhammad Aziz</i>
--	----------------------

Date Signed:	2022-06-07
--------------	------------



TERMS AND CONDITIONS

1. DEFINITIONS

5050. All definitions from the Act and the Regulations apply except where expressly defined in this approval.

5060. In all parts of this Approval:

- a. "Act" means the Water Act, RSA 2000, c. W-3, as amended;
- b. "Application" means the written submissions to the Director in respect of application number DAPP0001124 and any subsequent applications for amendments of Approval Number DAUT0009501;
- c. "Director" means an employee of the Government of Alberta designated as a Director under the Act;
- d. "Regulations" means the regulations, as amended, enacted under the authority of the Act.

2. GENERAL

5200. The Approval Holder shall immediately report to the Director by telephone, any contravention of the terms and conditions of this approval at 1-780-422-4505.

5210. The terms and conditions of this Approval are severable. If any term or condition of this Approval is held invalid, the application of such term or condition to other circumstances and the remainder of this Approval shall not be affected thereby.

5220. The Approval Holder shall not deposit or cause to be deposited any substance in, on, or around the water body that has, or may have, the potential to adversely affect the water body.

5230. The Approval Holder shall retain a copy of this Approval at the site of the activity.

5235. Notwithstanding the Approval Holder name on page 1, the Approval Holder is corporately identified as 543077 Alberta Ltd.

3. PARTICULARS

5240. This Approval is appurtenant to the following:



- (a) creation of end pit lakes; and
- (b) disturbance of water table

at SE 12-057-21 W4 as described in reports and plans specified in 5250.

5250. The Approval Holder shall only undertake the Activity in accordance with the following plan(s) and report(s).

Report:

Water Management Plan for Pit 79

SE-12-057-21W4M Sturgeon County, Alberta

Prepared by: Sil Industrial Minerals

Dated: March 2022

Submitted with the application in ToDo0013335

Plans:

Pit 79 - Drawing 5

Reclamation Plan

Dated October 2019

Submitted with the Application in ToDo0013335

Pit 79 - Drawing 6, 7, 8 and 9

Cross Section Plans

Dated October 2019

Submitted with the Application in ToDo0013335

5260. The Approval Holder shall retain a copy of the report(s) and plan(s) referred to in 5250 at the site of the Activity at all times while conducting the Activity.

5270. The Approval Holder shall not undertake the Activity in any manner or use any material that causes or may cause an adverse effect on the aquatic environment, human health, property or public safety.

4. MONITORING AND REPORTING

5730. When requested in writing by the Director, based on a reasonable need to monitor an aquifer for potential adverse effects, the Approval Holder shall establish monitoring well(s) as required.

5. SILTATION AND EROSION CONTROL



5480. The Approval Holder shall not do or permit anything to be done, nor omit or permit any omissions, which causes or may cause an adverse effect related to:

(a) siltation; or

(b) erosion

as a result of the activity.

6. COMPLAINTS

6000. The Approval Holder shall:

(a) make reasonable efforts to obtain further information regarding complaints of surface water and groundwater interference as a result of the Activity; and

(b) prepare a written report describing the steps taken to comply with (a) including, at a minimum, each of the following:

(b)(i) a detailed description of the efforts taken by the Approval Holder to obtain further information regarding the complaints as required in (a);

(b)(ii) all of the information obtained by the Approval Holder as result of the efforts required in (a);

(b)(iii) recommendations for measures to remediate and mitigate the interference(s) with surface water and groundwater as a result of the Activity;

(b)(iv) detailed information describing how the Approval Holder will implement the measures recommended in (i);

(b)(v) a schedule of implementation for the measures recommended in (i); and

(b)(vi) any other information required in writing by the Director.

6010. Within 30 days of the receipt of the complaint, the Approval Holder shall submit the written report in 6000(b) to the Director.

6020. If the written report in 6000(b) is found deficient by the Director, the Approval Holder shall correct all the deficiencies identified by the Director by the date specified in writing by the Director.

6030. The Approval Holder shall implement the measures in 6000(b) as approved in writing by the Director.

7. CERTIFICATE OF COMPLETION

6050. The Approval Holder shall submit a Certificate of Completion to the Director within 30 days following completion of the Activity.

6060. The Certificate of Completion shall include:



- (a) a statement that the activity has been completed in accordance with the Approval; and
- (b) any other information requested in writing by the Director.

Appendix E. Historical Resources Act Clearance

Historical Resources Act Approval with Conditions

Proponent: Sureway Construction Group
9175 14 Street, Edmonton, AB T6P 0C9

Contact: Laura Royer

Agent: Circle CRM Group

Contact: Alexandra Burchill

Project Name: Pit 79

Project Components: Other - Industrial silica extraction

Application Purpose: Requesting HRA Approval / Requirements

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to the following conditions.



David Link
Assistant Deputy Minister
Heritage Division
Alberta Culture, Multiculturalism
and Status of Women

SCHEDULE OF CONDITIONS

ARCHAEOLOGICAL RESOURCES

Historical Resources Act approval is granted in relation to archaeological resources, subject to the conditions outlined below.

1. The following *Historical Resources Act* conditions are based on the results of Historic Resources Impact Assessment studies carried out by Circle CRM Group Inc. under Archaeological Research Permit No. 19-176.
2. This *Historical Resources Act* Approval with Conditions is issued for the newly revised footprint that removes site FIPf-66 and its buffer area from the development footprint, as illustrated in the development plans in Appendix A of the final report for Permit 19-176 (attached to this correspondence).
3. Site-specific conditions and approvals are itemized below.

SITE	HRV	SITE DESCRIPTION	CONDITIONS/APPROVAL
FIPf-66	4	scatter >10	There are no further <i>Historical Resources Act</i> requirements for archaeological site FIPf-66 relative to

SCHEDULE OF CONDITIONS (continued)

the current project, conditional on adherence to the newly revised development footprint as illustrated in Appendix A of the final report for Permit 19-176 (attached to this correspondence).

If future development activities are planned for the site area, additional archaeological investigations must be completed prior to the initiation of ground disturbance. The nature of any future investigation requirements will be based on anticipated development impacts.

PALAEONTOLOGICAL RESOURCES

There are no *Historical Resources Act* requirements associated with palaeontological resources; however, the proponent must comply with [Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources](#), which are applicable to all land surface disturbance activities in the Province.

ABORIGINAL TRADITIONAL USE SITES

There are no *Historical Resources Act* requirements associated with Aboriginal traditional use sites of a historic resource nature; however, the proponent must comply with [Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources](#), which are applicable to all land surface disturbance activities in the Province.

HISTORIC STRUCTURES

There are no *Historical Resources Act* requirements associated with historic structures; however, the proponent must comply with [Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources](#), which are applicable to all land surface disturbance activities in the Province.

PROVINCIALY DESIGNATED HISTORIC RESOURCES

There are no *Historical Resources Act* requirements associated with Provincially Designated Historic Resources; however, the proponent must comply with [Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources](#), which are applicable to all land surface disturbance activities in the Province.

Lands Affected: All New Lands

Proposed Development Area:

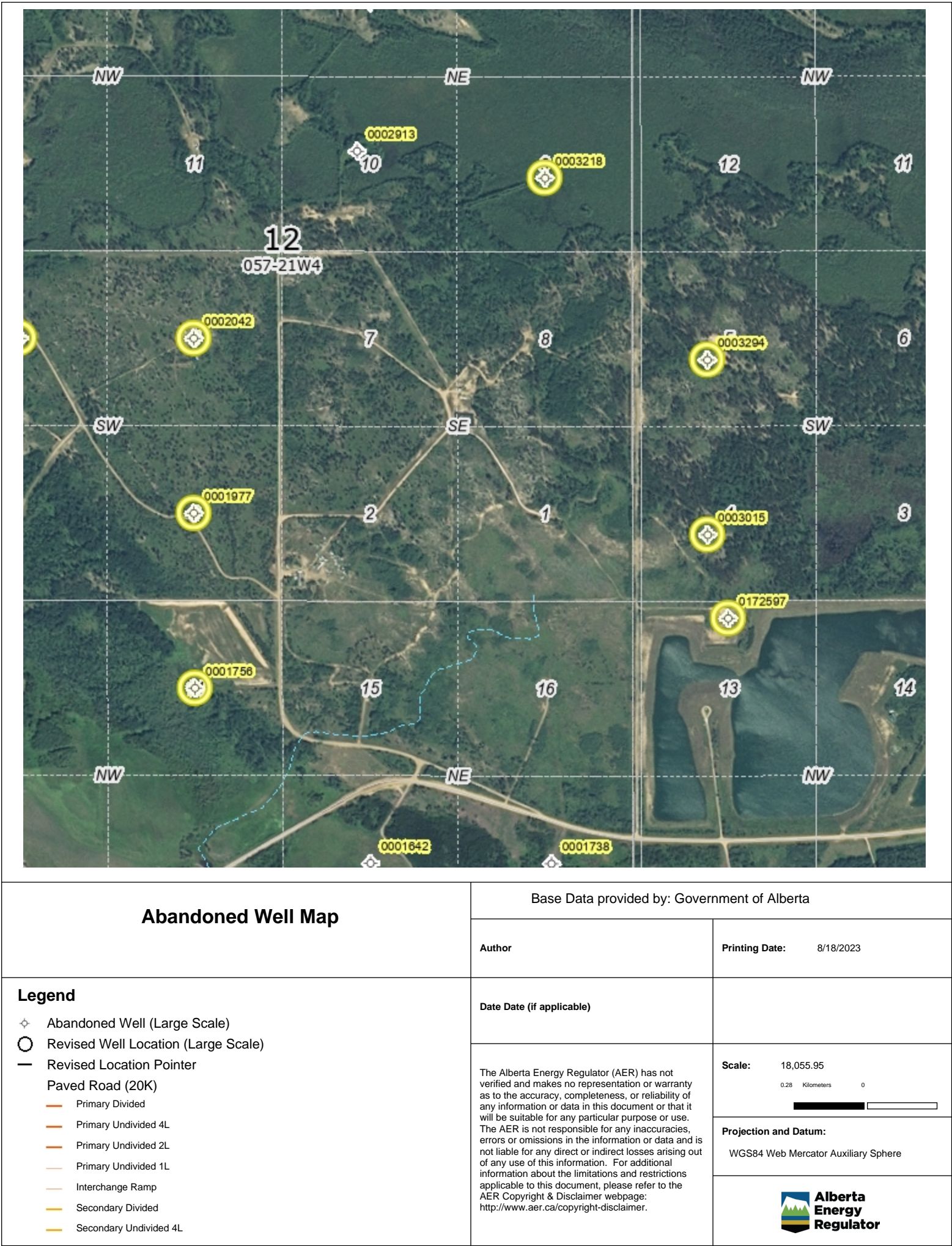
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4	21	57	12	1-2,7-8

Documents Attached:

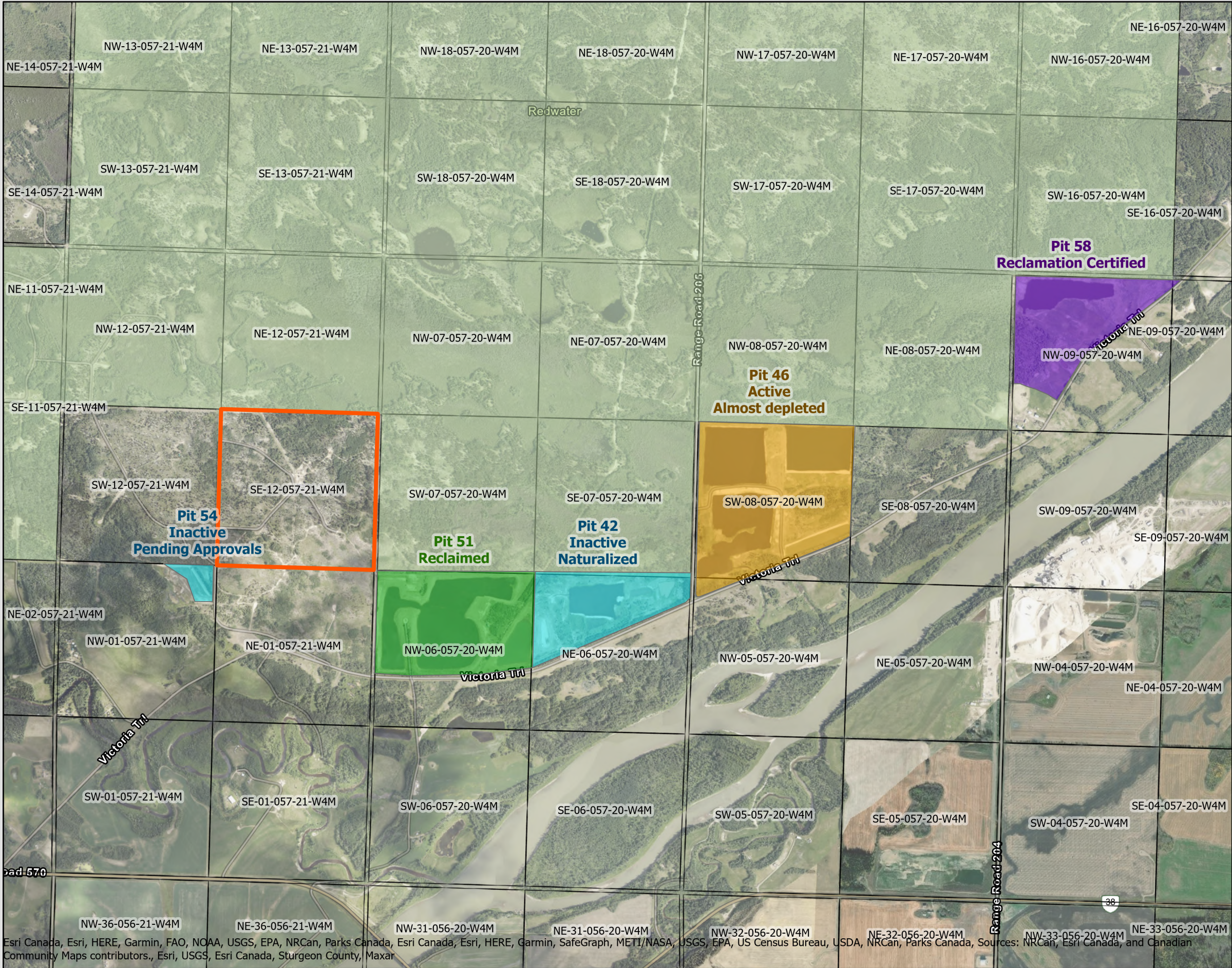
SCHEDULE OF CONDITIONS (continued)

Document Name	Document Type
Formal Project Plans	Illustrative Material

Appendix F. AER Abandoned Wells Map and Information



Appendix G. Drawings



Esri Canada, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, US Census Bureau, USDA, NRCan, Parks Canada, Sources: NRCan, Esri Canada, and Canadian Community Maps contributors, Esri, USGS, Esri Canada, Sturgeon County, Maxar

Client: Sil Industrial Minerals

H-Scale: 1:20,000
V- Scale: N/A

Date: Aug 2023

Drawn by: E. MacLagan

Pit 79

Rezoning Application

Legal Land Description
SE 12-057-21 W4M

Sturgeon County

Drawing 1 Regional Location

Legend

- Property Boundary
- Provincial Recreation Area
- Existing Sil Pits
 - Active
 - Inactive
 - Reclaimed
 - Reclamation Certified



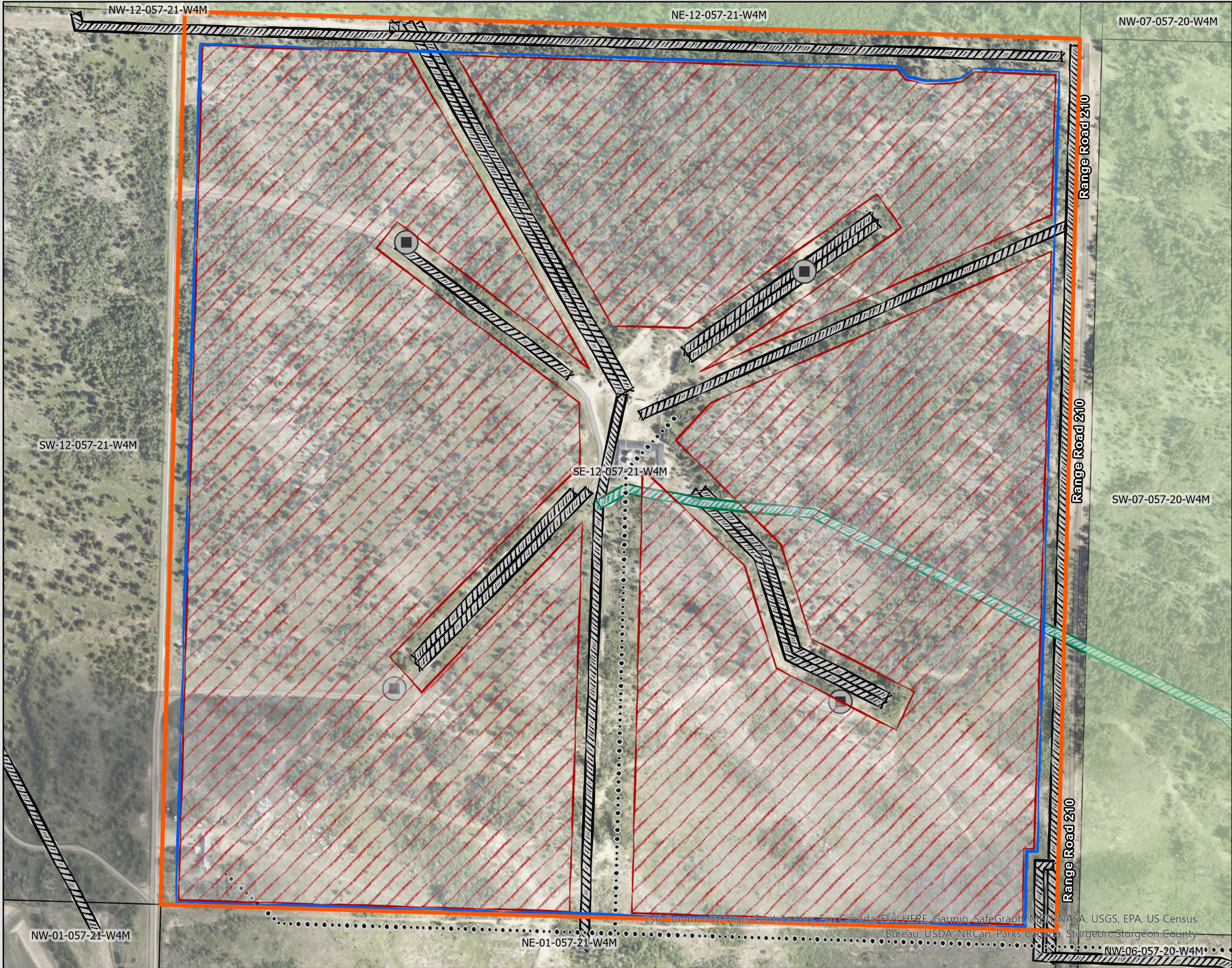
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Decimal Degrees
North Azimuth

Projection: Transverse Mercator
Map Units: Meter

Version:
1.0

Datum: North American 1983





Client: Sil Industrial Minerals

H-Scale: 1:3,500
V- Scale: N/A

Date: Aug 2023

Drawn by: E. MacLagan

Pit 79










Rezoning Application

Legal Land Description
SE 12-57-21 W4M

Sturgeon County

Drawing 2 Existing Conditions

Legend

-  Property Boundary
-  Pit 79 Limit of Disturbance
-  Mine Area
-  Oil and Gas Wells
-  Low Pressure Pipelines
-  Pipelines
-  Line to be removed
-  Quarter Sections
-  Provincial Recreation Area

Bearings:
Decimal Degrees
North Azimuth

Projection: Transverse Mercator
Map Units: Meter

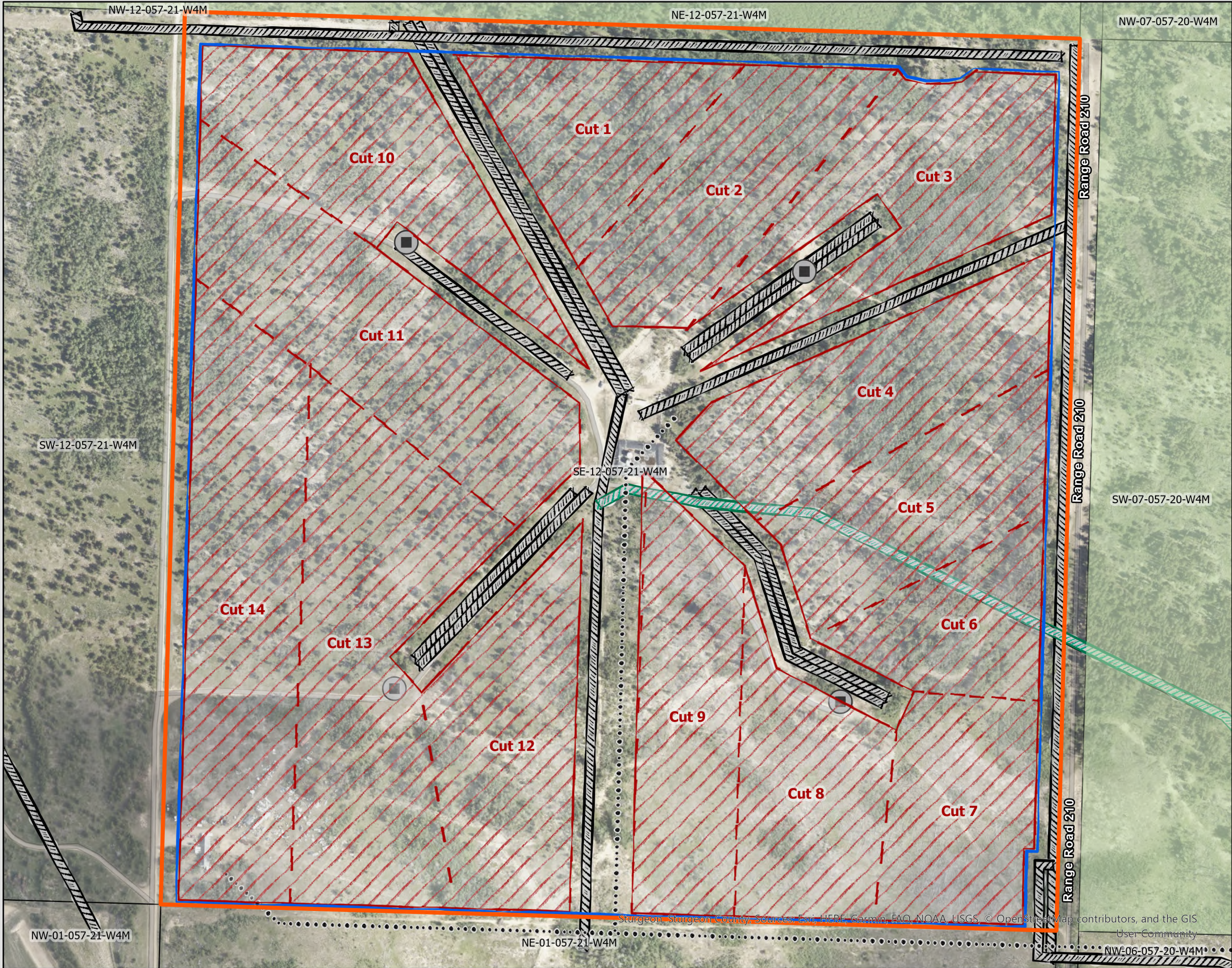
Version:
1.0

Datum: North American 1983

0 40 80 160
Meters



Esri, Community Maps Contributors, Esri Canada, Esri, HERE, Garmin, SafeGraph, Mapbox, NASA, USGS, EPA, US Census Bureau, USDA, NRCAN, Parks Canada, Sturgeon, Sturgeon County



Client: Sil Industrial Minerals

H-Scale: 1:3,500
V- Scale: N/A

Date: Aug 2023

Drawn by: E. MacLagan

Pit 79

Rezoning Application

Legal Land Description
SE 12-057-21 W4M

Sturgeon County

Drawing 3 Mining Plan

Legend

- Property Boundary
- Pit 79 Limit of Disturbance
- Mine Area
- Mine Cuts
- Oil and Gas Wells
- Low Pressure Pipelines
- Line to be removed
- Pipelines
- Quarter Sections
- Provincial Recreation Area

Bearings:
Decimal Degrees
North Azimuth

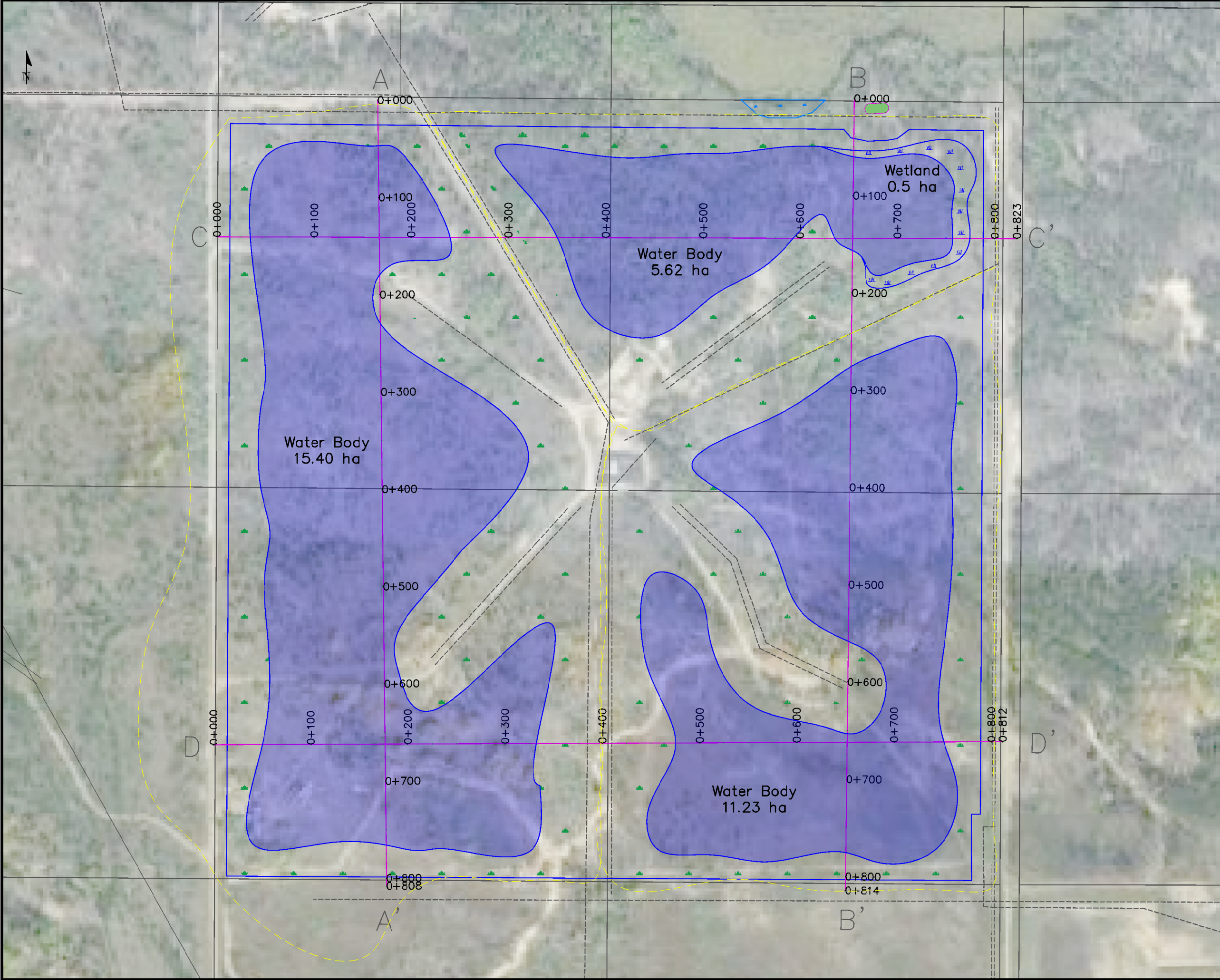
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Map Units: Meter

Version:
1.0

Datum: North American 1983

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Meters





CLIENT: SIL Industrial Minerals

H-SCALE: 1:4000

V-SCALE: N/A

DATE: October 2019

DWN. BY: Jodi Bagshaw

DATE REVISED: -----

REVISED BY: -----

Pit 79

Code of Practice Application

LEGAL LAND DESCRIPTION

SE 12-057-21 W4M

Sturgeon County

DWG. NO: 05 OF 10

Reclamation Plan

LEGEND:

Section Lines

Limit of Disturbance

A-A' Cross Section

Existing Wetlands

To Be Revegetated

Reclaimed Wetland

Reclaimed Waterbody

Historical Resource Site

Catchment Area

NOTE:

- Distances are in Meters

Sil Industrial Minerals

ISO Registered

9175 - 14 STREET NW

EDMONTON, AB

T6P 0J6

Alberta Institute of Agriologists

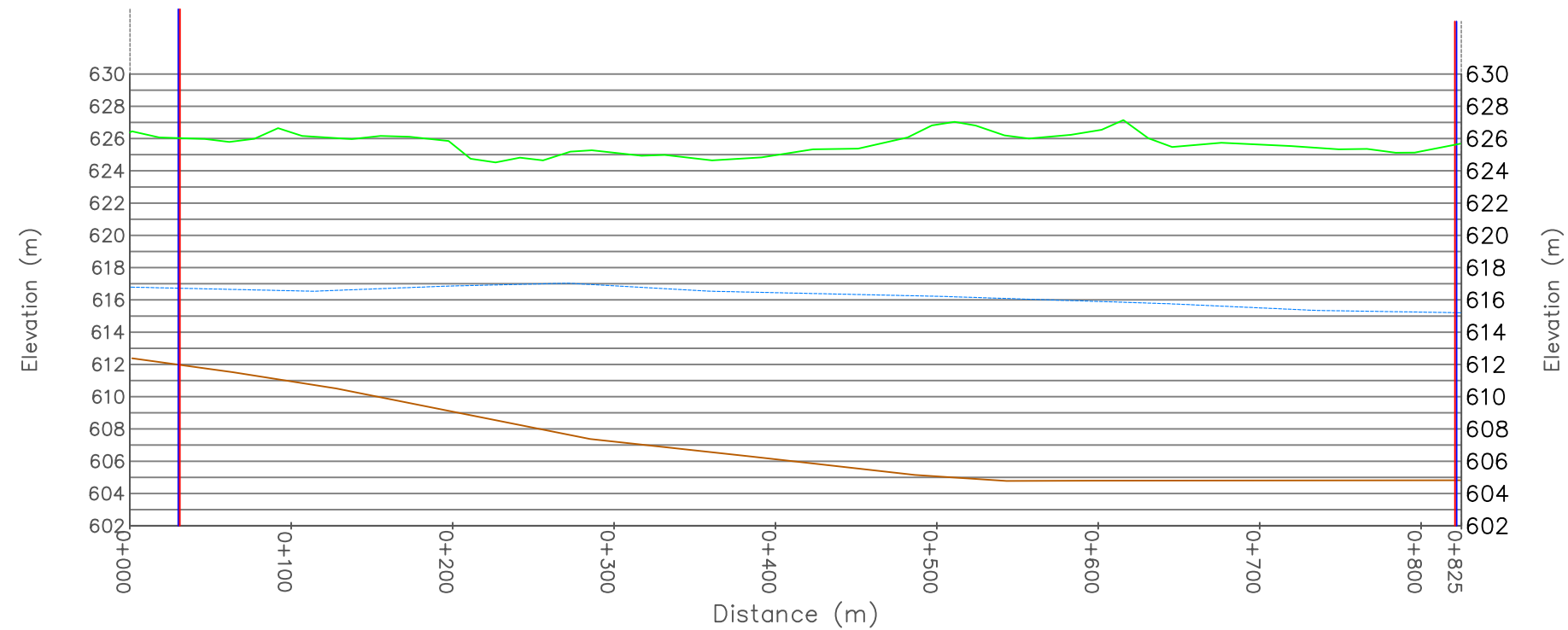
ROYAL SOCIETY OF CANADA

5859

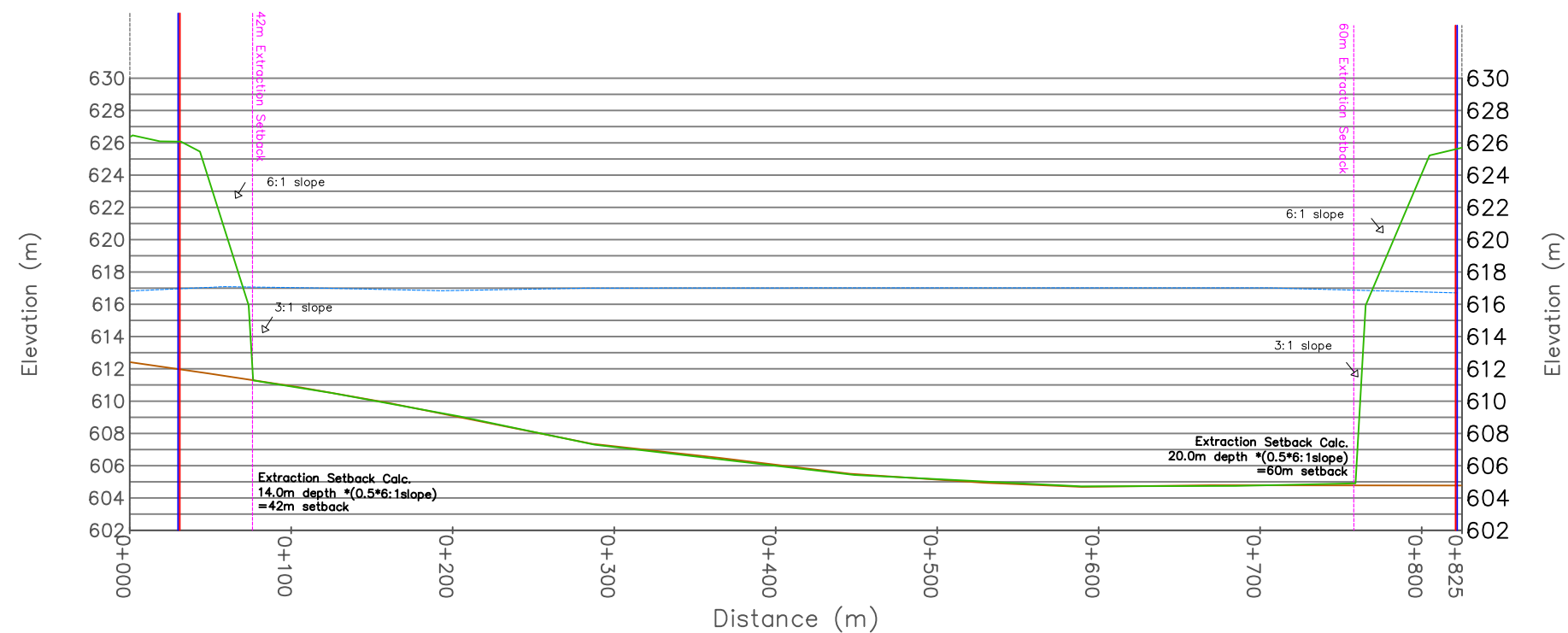
MEMBER



Existing Conditions A-A'



Reclaimed Conditions A-A'



CLIENT: SIL Industrial Minerals

H-SCALE: 1:4000

V-SCALE: N/A

DATE: October 2019

DWN. BY: Jodi Bagshaw

DATE REVISED: October 2020

REVISED BY: Laura Cline

Pit 79

Code of Practice Application

LEGAL LAND DESCRIPTION

SE 12-057-21 W4M

Sturgeon County

DWG. NO: 06 OF 10

Cross Section A

LEGEND:

- Property Line
- Gas Line
- Mining Boundary
- Limit of Disturbance
- Extraction Setback
- Water Table
- Existing Ground Profile
- Reclaim Profile
- Bottom of Sand

NOTE:

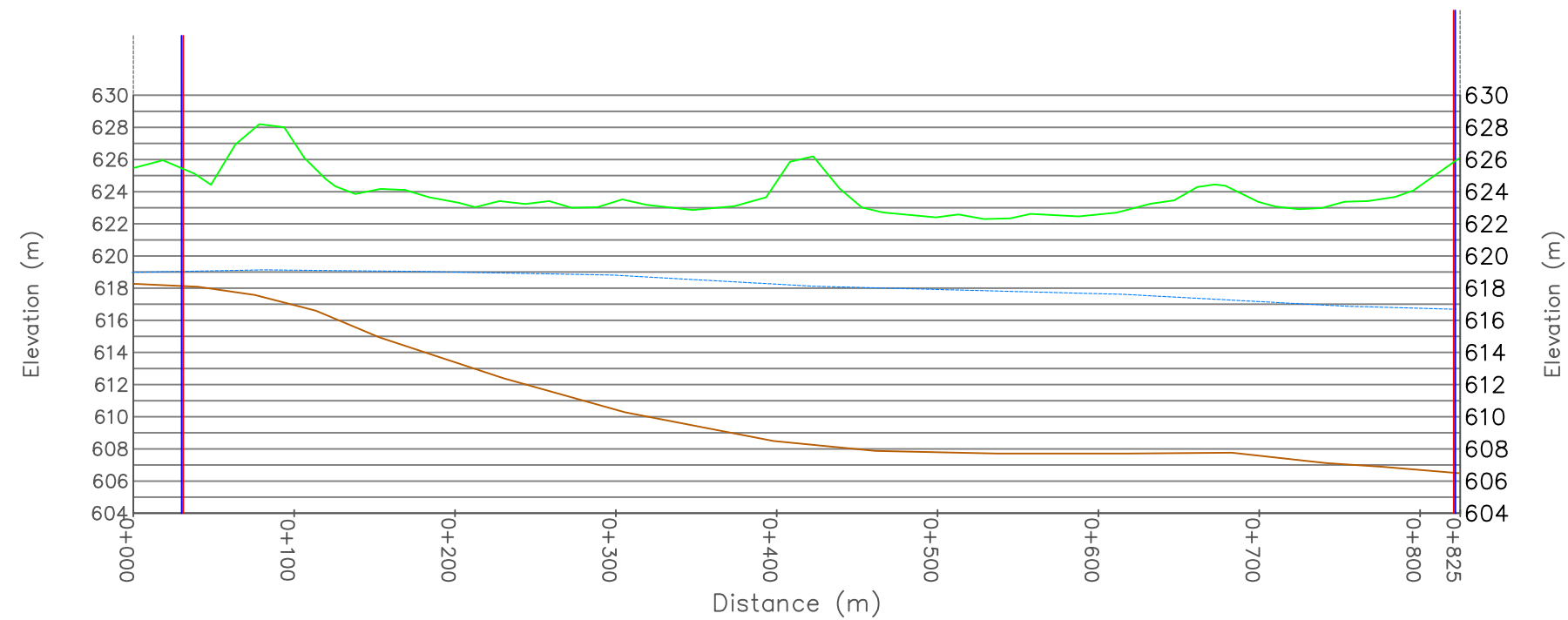
– Distances are in Meters



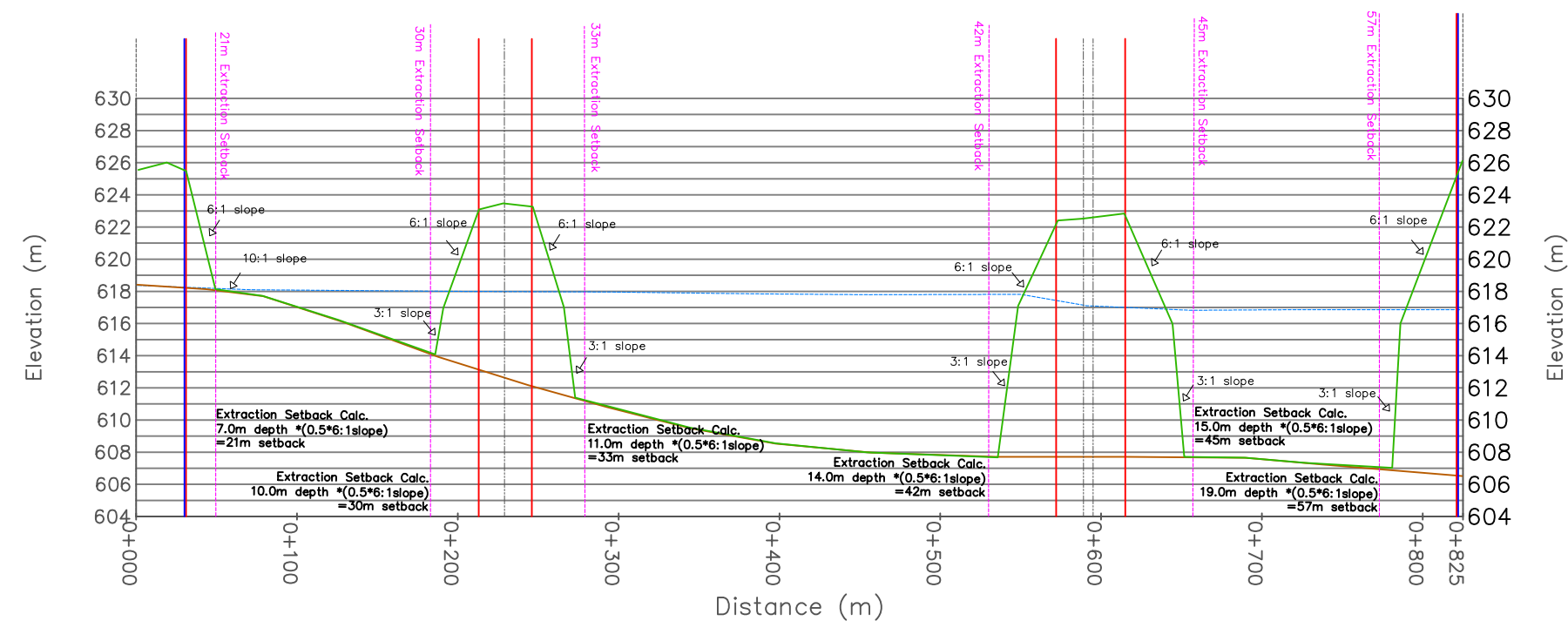
9175 – 14 STREET NW
EDMONTON, AB
T6P 0C9



Existing Conditions B-B'



Reclaimed Conditions B-B'



CLIENT: SIL Industrial Minerals

H-SCALE: 1:4000
V-SCALE: N/A

DATE: October 2019

DWN. BY: Jodi Bagshaw

DATE REVISED: October 2020

REVISED BY: Laura Cline

Pit 79

Code of Practice Application

LEGAL LAND DESCRIPTION

SE 12-057-21 W4M

Sturgeon County

DWG. NO: 07 OF 10

Cross Section B

LEGEND:

- Property Line
- Gas Line
- Mining Boundary
- Limit of Disturbance
- Extraction Setback
- Water Table
- Existing Ground Profile
- Reclaim Profile
- Bottom of Sand

NOTE:

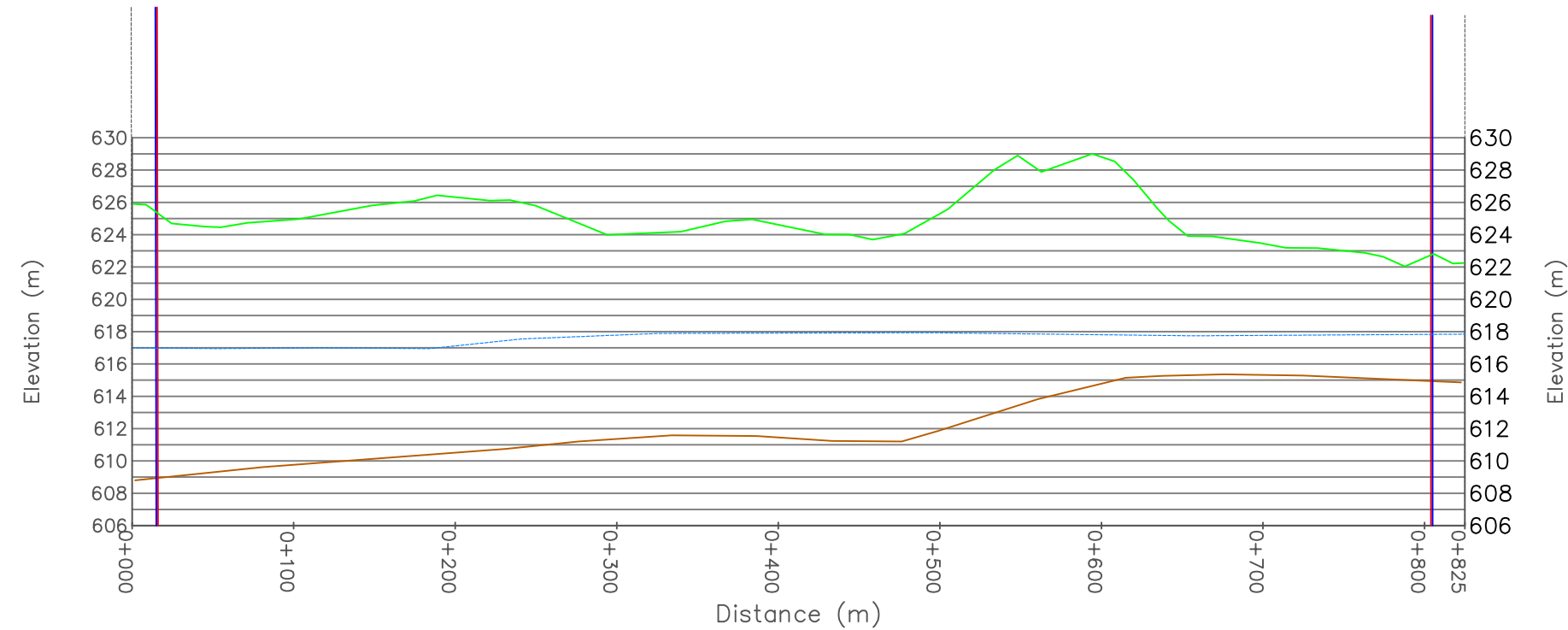
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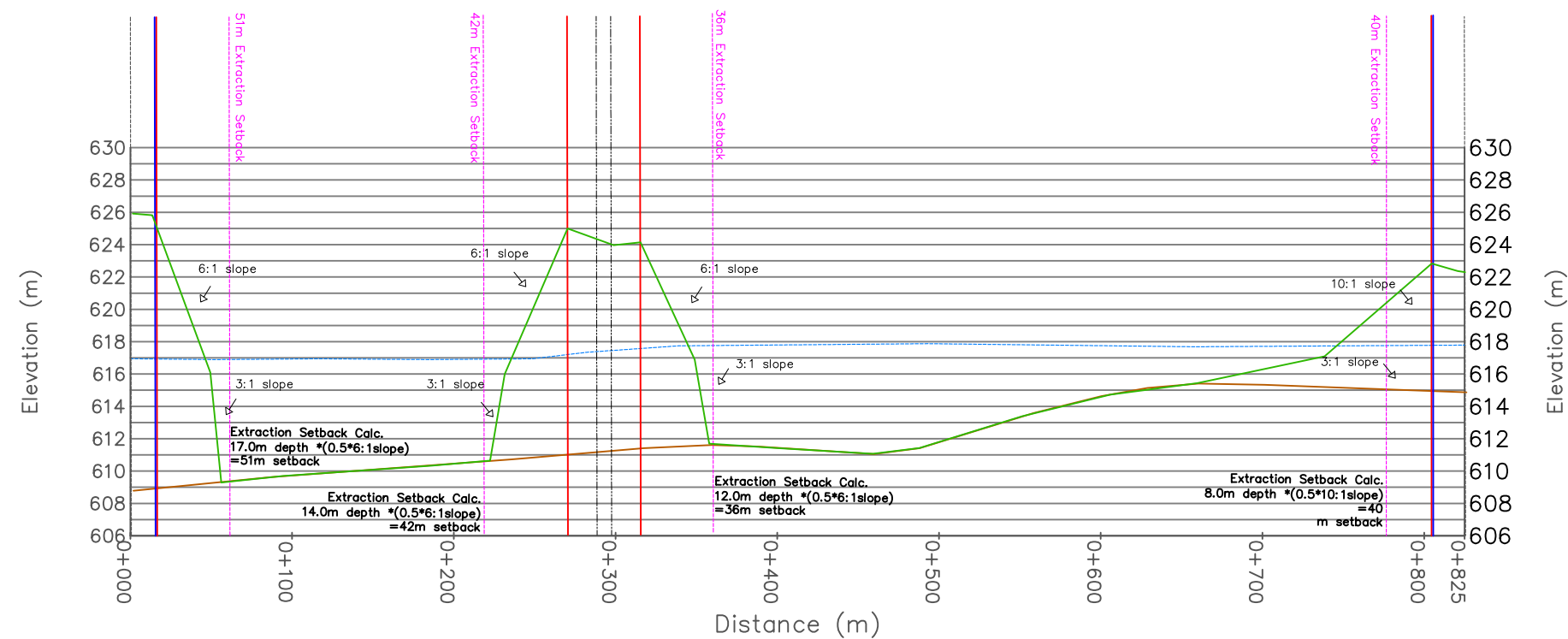
9175 – 14 STREET NW
EDMONTON, AB
T6P 0C9



Existing Conditions C-C'



Reclaimed Conditions C-C'



CLIENT: SIL Industrial Minerals

H-SCALE: 1:4000
V-SCALE: N/A

DATE: October 2019

DWN. BY: Jodi Bagshaw

DATE REVISED: October 2020

REVISED BY: Laura Cline

Pit 79

Code of Practice Application

LEGAL LAND DESCRIPTION

SE 12-057-21 W4M

Sturgeon County

DWG. NO: 8 OF 10

Cross Section C

LEGEND:

- Property Line
- Gas Line
- Mining Boundary
- Limit of Disturbance
- Extraction Setback
- Water Table
- Existing Ground Profile
- Reclaim Profile
- Bottom of Sand

NOTE:

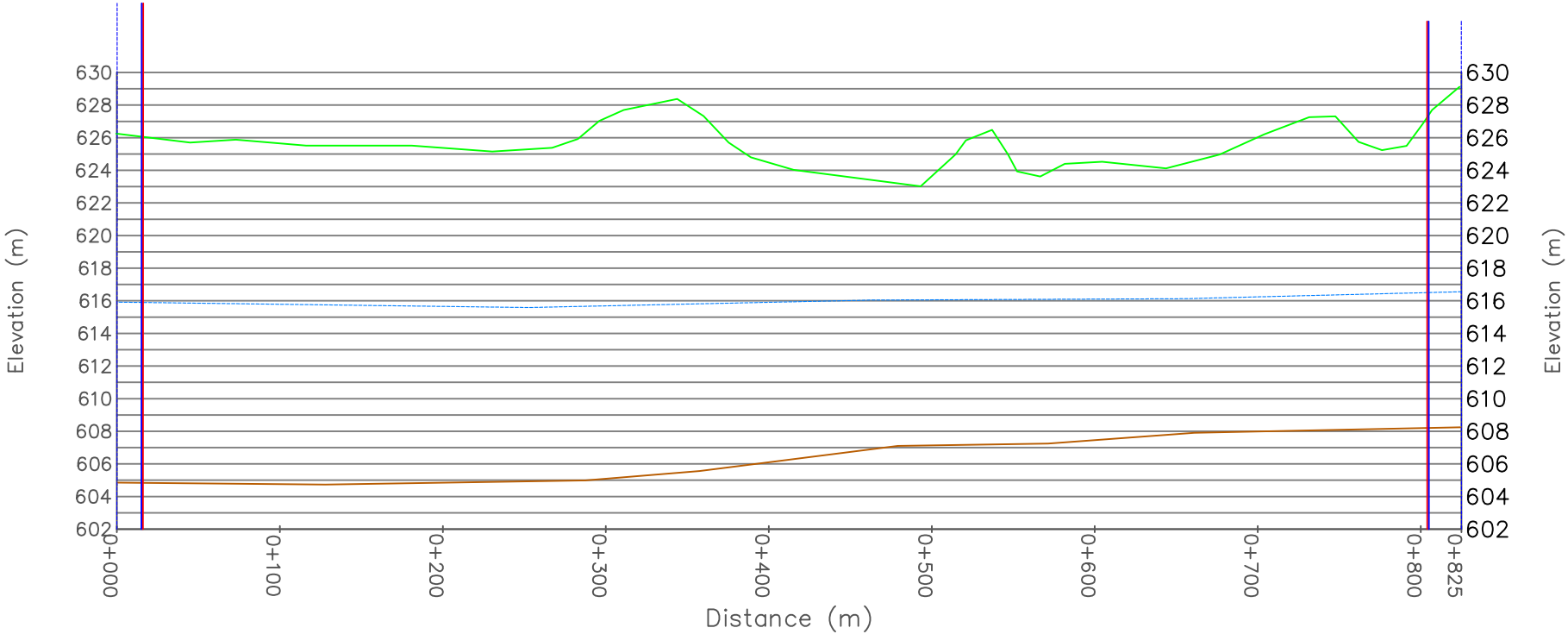
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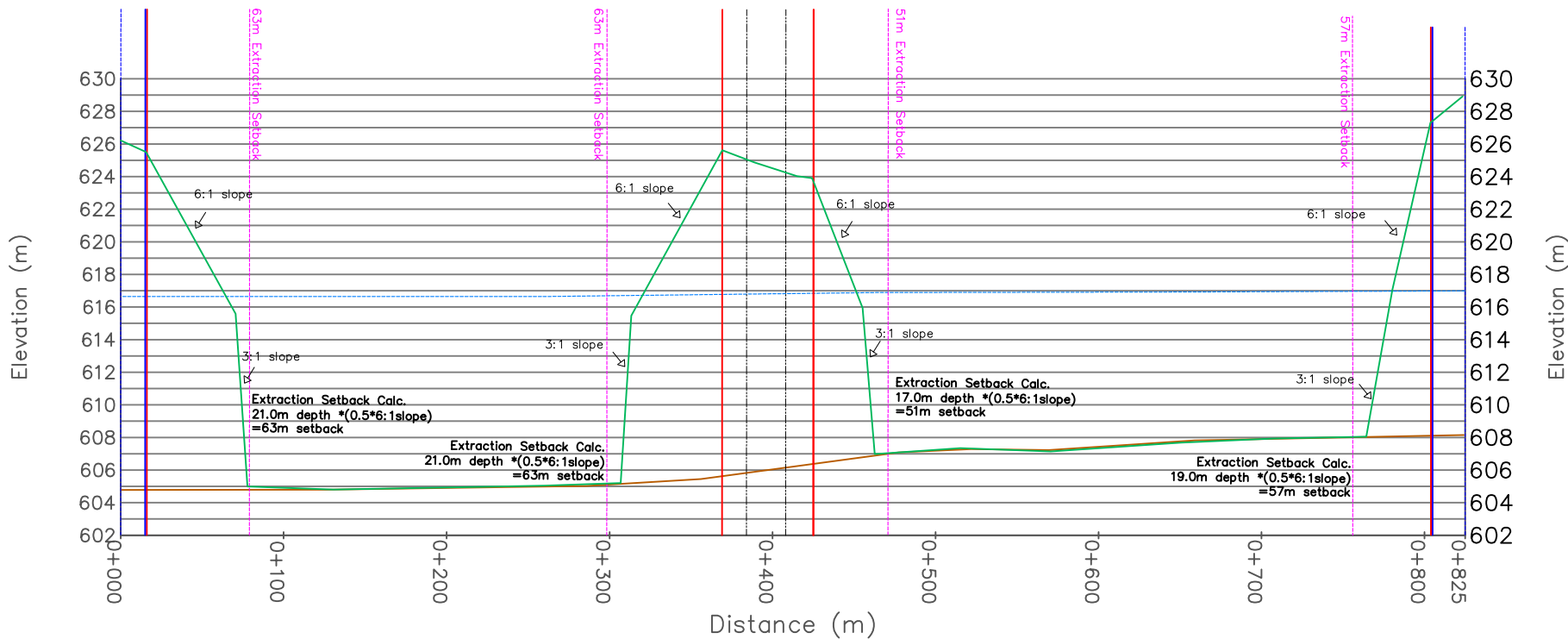
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EDMONTON, AB
T6P 0C9



Existing Conditions D-D'



Reclaimed Conditions D-D'



CLIENT: SIL Industrial Minerals

H-SCALE: 1:4000
V-SCALE: N/A

DATE: October 2019

DWN. BY: Jodi Bagshaw

DATE REVISED: October 2020

REVISED BY: Laura Cline

Pit 79
Code of Practice Application

LEGAL LAND DESCRIPTION
SE 12-057-21 W4M

Sturgeon County

DWG. NO: 09 OF 10
Cross Section D

LEGEND:

- Property Line
- Gas Line
- Mining Boundary
- Limit of Disturbance
- Extraction Setback
- Water Table
- Existing Ground Profile
- Reclaim Profile
- Bottom of Sand

NOTE:
- Distances are in Meters



9175 - 14 STREET NW
EDMONTON, AB
T6P 0C9

Appendix H. Water Management Plan

Water Management Plan
for
Pit 79
SE-12-057-21 W4M
Sturgeon County, Alberta

Prepared by:



March 2022

Pit 79 within SE 12-057-21 W4M

Sturgeon County, Alberta

Prepared by:



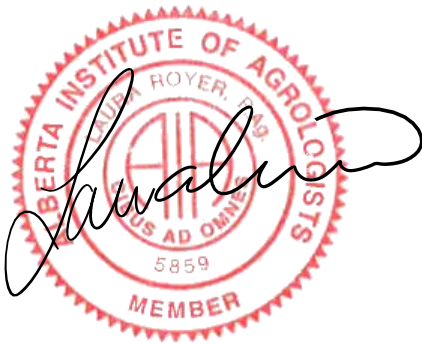
Ebberly MacLagan, G.I.T.

Sil Industrial Minerals

9175 14 Street

Edmonton, AB T6P 0C9

Reviewed By:



Laura Cline, P.Ag.

Sil Industrial Minerals

9175 14 Street

Edmonton, AB T6P 0C

EXECUTIVE SUMMARY

BACKGROUND INFORMATION	
Operator:	543077 Alberta Ltd. o/a Sil Industrial Minerals
Facility Name:	Pit 79
LSD:	SE-12-057-21 W4M
Municipality:	Sturgeon County
Access:	Township Rd 570H or Range Rd 210
Site Area:	60 ha
BASELINE TERRAIN, SOILS AND VEGETATION	
Topography:	Undulating, high relief
Soil Classification:	Sandy Loam
Topsoil Depth:	0.03 m – 0.11 m (average 0.06 m)
Silica Sand Depth:	7 m – 23 m (average 15 m)
PROJECT OVERVIEW	
Activities:	Soil salvage, sand extraction, hauling of sand to an off-site processing location, and reclamation
Water Management:	Pit-to-pit dewatering
RECLAMATION PLAN	
End Land Use:	Upland (45%) and Wetlands/Waterbodies (55%)

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APPENDICES

Appendix A: Pit 79 Water Well Map and Water Well Data

Appendix B: Catchment Areas and Flow Lines

1. INTRODUCTION

Sil Industrial Minerals (Sil) has prepared a Water Management Plan for proposed mining and dewatering activities at Pit 79, hereinafter referred to as “the Site”, located in the SE-12-57-21 W4M within Sturgeon County. The maximum size of the pit will be approximately 50 ha.

1.1. Objective and Scope

The objective of the Plan is to assess the potential for the proposed extraction activities on the Site to adversely impact ground and/or surface water within the SE-12-57-21 W4M. The Plan incorporates information from field assessments, exploratory drilling, and water well records to establish the baseline hydrology and hydrogeology on the site as part of obtaining a *Water Act* approval for the Site.

The scope of work includes:

- Reviewing hydrogeological and geological data;
- Identifying characteristics of water wells located within 1.6 km of SE-12-57-21 W4M;
- Assessing the potential for adverse impacts to water wells in and around SE-12-57-21 W4M; and,
- Providing management strategies for water on the Site and mitigation strategies for potential impacts, as required.

1.2. Proposed Pit 79 Mining Project Overview

The Site is located on privately owned land, entirely within the SE-12-057-21 W4M. It is located approximately 40 km northeast of Edmonton, Alberta in Sturgeon County and is bordered to the east by Range Road 210. The Site is approximately 60 ha in size and is predominantly natural land with sparse to dense tree cover. A large fen (around 700 ha) exists in the Redwater Provincial Recreation Area to the north, but is not within the proposed disturbance boundary of the pit. At its closest point, the edge of the fen is ~15 m from the LOD and the average surface elevation is ~621.5 masl. Surrounding land use is summarized in Table 1.

Table 1. Land use surrounding proposed Pit 63.

Direction	Land Use(s)
North	Redwater Provincial Recreation Area
West	Township Road 570H, pipelines and natural area
South	Township Road 570 (Victoria Trail), natural area, pipelines
East	Range Road 210 and natural area

Sil intends to extract silica sand from the Site and transport to an off-site processing facility. The sand will be excavated to the underlying clay layer. The average depth of excavation will be approximately 15 m, but will vary across the site to a maximum depth of 23 m.

Groundwater will be exposed during the mining process, but will not be used during operation. In addition, groundwater will not be discharged or removed from the Site. Sil will use pit-to-pit dewatering to facilitate sand extraction. The Site will be progressively reclaimed to 45% upland area capable of supporting plant and animal life and 55% waterbodies/wetlands with naturalized ecological function. Drawings depicting the conditions of the Site, mining and reclamation plans are included in the COP document and the associated Water Act Application (Sil Industrial Minerals, 2020).

2. GEOLOGY

2.1. Regional Geology

The regional geology in the area of the Site was determined using the Alberta Geological Society's Bedrock Geology of Alberta map (Prior et al., 2013). Bedrock in the region is composed of sandstone, siltstone, mudstone and ironstone beds from the Belly River Group. Bedrock is generally encountered from 10 to 30 meters below ground surface in the vicinity of the Site (Stein, 1975). The uppermost bedrock unit in the vicinity of the Site is the Birch Lake Member (Hydrogeological Consultants Ltd., 2001).

Surficial geology consists of glacial till with minor, discontinuous sand and gravel units. Shetsen (1990) describes the area as eolian deposits consisting of sand up to 7 m thick. Surficial deposits generally formed as longitudinal or parabolic dunes (Shetsen, 1990).

2.2. Local Stratigraphy

The AEP Water Well Information Database includes water well records which typically describe the lithology of the drilled well, in the vicinity of the Site. In addition, exploratory test holes have been drilled to assess the local stratigraphy on the Site itself. The surficial deposits in the region consist of sand and clay. On the Site, the target sand overlies a clay layer, the contact of which is up to 23 m in depth below the surface. The clay layer acts as a protective, low conductivity barrier to downward groundwater flow.

Regional topography is characterized by level, terraced landforms and undulating high relief landforms. The terrain on-site is gently to moderately sloped (5 to 15%). The site slopes very gently from the south (631 m above sea level) to the north/north east (622 m above sea level).

Exploratory test holes were drilled on the site in 2019 and consisted of 18 holes up to a depth of approximately 23 m below ground level. The subsurface material encountered during drilling consisted of:

- Topsoil: ~0-0.1 m (average = 0.04 m)
- Sand with some interbedded clay: 4-23 m (average = 14.9 m)
- Clay: >23 m

3. HYDROGEOLOGY

3.1. Regional Hydrogeology

A review of The Hydrogeological Map of the Edmonton Area (Northeast Segment) (Stein, 1975) indicates that shallow groundwater in the area of the site likely flows to the south/southwest towards the North Saskatchewan River, as illustrated by the arrows Figure 1 below. The red boundary indicates the location of SE 12-057-21 W4M.

The total dissolved solids (TDS) in the groundwater from surficial deposits within the vicinity of the site range from 0 to 500 milligrams per liter (mg/L) (Hydrogeological Consultants Ltd., 2001). The surficial sand and gravel deposits are indicated to overlap the non-pumping water level in the vicinity of the site (Hydrogeological Consultants Ltd., 2001); however, where the sand and gravel are not saturated with water, then they are not considered to be an aquifer.

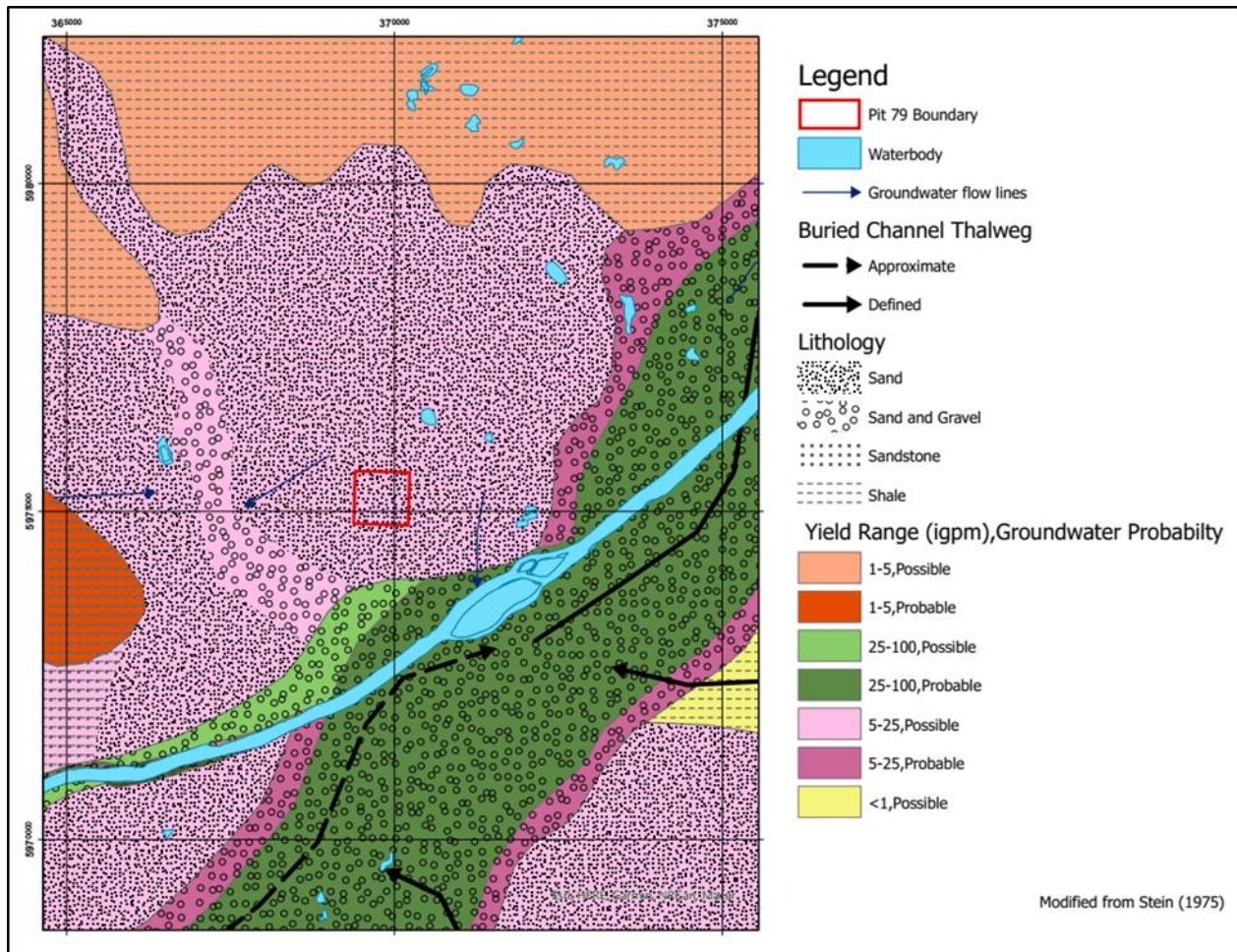


Figure 1. Hydrogeological map of the area; modified from Stein (1975)

The continental Foremost Formation consists mainly of shale with minor sandstone, ironstone, and coal up to a total thickness of 160 m (Hydrogeological Consultants Ltd., 2001). Below the continental Foremost Formation lies the marine Lea Park Formation, which is a shale aquitard (Hydrogeological Consultants Ltd., 2001). The TDS concentrations within the Birch Lake Member of the Foremost Formation are generally >1,000 mg/L and the groundwater types are generally sodium-bicarbonate types within the bedrock (Hydrogeological Consultants Ltd., 2001).

3.2. Local Hydrogeology

The elevation of shallow groundwater, estimated by drill-hole logs, is on average at 617 m above sea level or 8.7 m beneath the surface. The bedrock aquifers in the NE part of the County are completed predominantly in the Birch Lake Member, where apparent yields range from dry to >100 m³/day, though a more specific apparent yield for the Site is likely between 1 to 10 m³/day. Figure 2 shows a comparison between apparent yield for wells completed in Sand and Gravel Aquifers and wells completed through the Birch Lake Member (Hydrogeological Consultants Ltd., 2001).

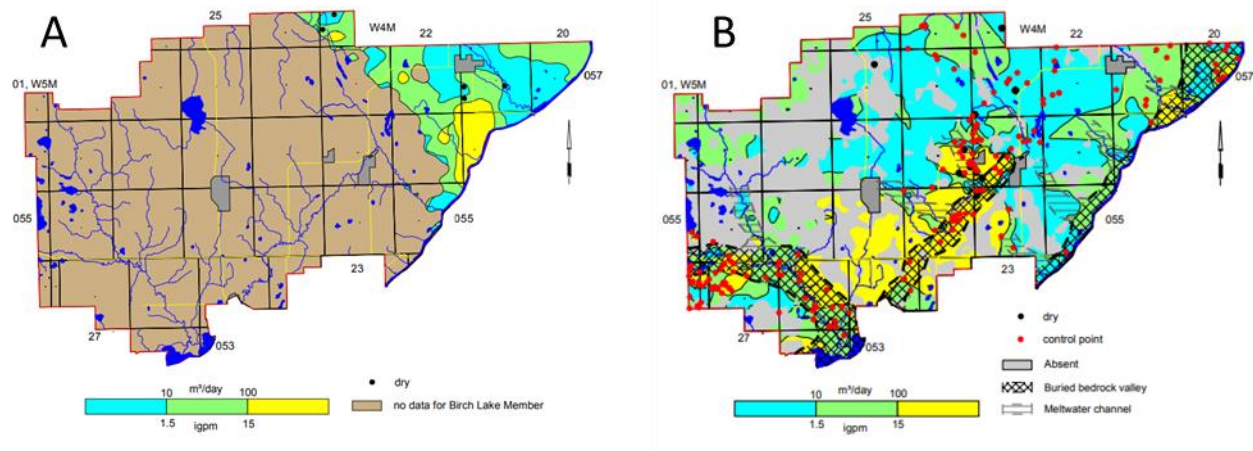


Figure 2. Apparent yield for water wells completed in A) the Birch Lake aquifer and B) sand and gravel aquifers. From Hydrogeological Consultants Ltd. (2001).

4. IMPACT ASSESSMENT

4.1. Groundwater Quantity

4.1.1. Radius of Influence

During development and extraction at the Site, there will be no consumptive use of groundwater. The water will not be removed or discharged off the Site, only mobilized between open pits within the Site boundary. Any water lost to evaporation, transpiration, adhesion, etc. is expected to be negligible.

An estimate of the radius of influence upon groundwater for dewatering operations at the site has been calculated using a simplified analytical approach. The following equation is presented for estimating radius of influence (R_o) for given drawdown (h) and hydraulic conductivity (K):

$$R_o = C \times h \times K^{0.5}$$

Where R_o = Radius of Influence (meters), h = Drawdown (meters), K = Hydraulic conductivity (meters/second), and $C = 3000$ (fixed value, coefficient for radial flow).

Table 2. Radius of Influence Calculations for mining and dewatering activities in the SE-14-057-20 W4M.

Input parameter	Value	Justification
h (m)	23 m	Based on the results from the drilling program at this site. The maximum depth of water Sil anticipates possibly encountering would be 23 m.
K (m/sec)	0.000010147 m/sec	Derived from the Alberta Tier 2 Soil and Groundwater Remediation Guidelines: 320 m/year = 0.000010147 m/sec (Alberta Environment and Parks, 2019)
Calculation	$R_o = (3000) \times (10.5 \text{ m}) \times (0.000010147 \text{ m/sec})^{0.5} = 100.3 \text{ m}$	

Therefore, the maximum radius of influence within which an impact to water quantity may be experienced due to dewatering at the deepest point of excavation is 100 m from the point of diversion.

Reclamation will be progressive throughout the duration of extraction, including intersecting the water table. It is anticipated that water losses will be minimal and there is a low risk of impacting the quantity of water on and around the Site.

4.1.2. *Predicted Water Table Elevations*

An analysis was performed using water elevation data from exploratory drill holes, piezometers, and LiDAR information, accounting for potential drawdown from increased evaporation. The existing water table where the reclaimed waterbodies/wetlands will be located is between 614.2 and 619.7 m. Estimates of evaporative losses from the proposed reclaimed waterbodies/wetlands indicate that there is the potential for the water table to be drawn down up to 0.39 m; this places the predicted water table following reclamation between 613.8 and 619.3 m.

Mining is expected to intersect the water table at an elevation between 617 and 619 m above sea level. Depth of mining below the water table will range from 2 m to 12 m at its deepest. Sil does not anticipate mining to affect groundwater quality or any of the surrounding water wells. Pit-to-pit dewatering will be implemented where possible. If dewatering offsite is required, Sil will obtain the appropriate authorizations under the Water Act. In the case of off-site dewatering, Sil would likely dewater the pit to a nearby existing pit in the NE 6-57-20 W4M, which is then authorized to be drained to the North Saskatchewan River via Approval No. 241834-00-01.

4.1.3. *Water Well Information Review*

A review of the Alberta Water Well Information Database indicates there are 9 registered wells and 2 unnamed springs located within 1.6 km of the site. One of these wells is located within the property boundary and an unnamed spring is located within a 400 m radius. A tabular summary of the Water Well Drilling Reports within a 1.6 km radius of the site boundaries has been included in Attachment A along with a map illustrating the location of these wells/springs. The well located within the property boundary and the spring located within a 400 m radius are summarized as follows:

- **Well ID 265897:** According to the Alberta Water Well Inventory, this well was originally used for livestock and shows that it was drilled in the center of the property. Based on a previous Field Verified Survey completed for an adjacent pit operation (Sil Pit 54), Sil has confirmed with the landowner that the well is associated with the residence located in the southwest corner of the site. Sil's intent is to mine through the location of this residence, per agreement with the landowner, thus the well would be removed during the mining process.
- **Well ID 265795:** According to the Alberta Water Wells Inventory database this unnamed spring was inventoried circa 1976 and is currently labeled for livestock use. The spring has no known owner; however, during a previous Field Verified Survey for the adjacent Pit (Sil Pit 54), Sil spoke with the landowner, Arc Resources, and determined that the landowner was aware of the spring but that it was not being utilized. The spring is at an elevation of 623 m above sea level with a recorded location approximately 204 m outside the closest mine boundary; however, the record places the spring at the center of the LSD whereas in the 1968 aerial imagery the spring appears to be in the SW corner of the same LSD. Therefore, according to the radius of influence calculation of 100.3 m, this spring falls outside the radius of influence for the effects of mining and dewatering in this area and above the depth of mining (608 masl). In addition, the regional water table measured from Lidar and drill points sits at around 612 masl at the location of the spring, suggesting that the spring is sourced from a different, shallower local aquifer. Therefore, Sil does not anticipate mining to affect the water in this spring.

4.1.4. Reclamation Water Balance

Sil does not anticipate impacting wetlands as part of the development of this pit as there are none existing on the site. The closest existing wetland is the large fen north of the site, which is 15 m away at the closest point. While Sil will be mining below the elevation of this fen, the water will not be removed from site and the effects to the fen should be minimal as it is upgradient of the site. Additionally, the large size of the fen will further minimize any potential impacts; the small portion of the fen that is within the radius of influence only accounts for ~2% of the total fen area. Additionally, during the majority of extraction operations, groundwater will be relocated on-site to a part of the pit closer to the fen. To ensure that any potential effects are minimized, an additional monitoring well (piezometer) will be installed at the NE corner of the site, closest to the fen. This will be checked monthly, as per the monitoring plan in Section 5.3.

As part of reclamation, Sil is proposing to create three separate waterbodies totaling 32.75 ha, containing approximately 0.5 ha of wetland around their margins. Due to the many pipelines and right of ways on this property, it was natural to divide the mining plan into three sections for the purpose of completing water balance calculations. These calculations indicate that the reclaimed waterbodies and wetland areas will function as a net discharge point in an average year. Depths of the reclaimed wetlands and waterbodies are based on estimated water table elevation post-mining in an average year. Drawing 5 in Appendix E of the Code of Practice application document (Sil Industrial Minerals, 2020) illustrates the location of the reclaimed wetlands/waterbodies.

Table 3. Water balance calculations for the west wetland/waterbody

Reclaimed Wetland & Waterbody 1 (west) - Water Balance Results	
Water Body Surface Area (m ²)	154,065
Water Body Surface Area (ha)	15.41
Water Body Volume (m ³)	462,195
Wetland Catchment Area (m ²)	273,187
Water Body Catchment Area (ha)	27.32
Net Evaporation:	
Water Body Area (m ²)	154,065
Local Gross Evaporation (mm)	67
Local Precipitation (mm)	439
Net Evaporative Loss (m ³):	-57,312.18
Total Inflow:	
Surface Runoff Area (ha)	11.91
Surface Runoff Area (km ²)	0.12
Runoff Rate by Locale (dam ³ /km ²)	17.00
Median Annual Water Body Inflow (m)	2,025.07
Water Balance Results:	
Net discharge in average year (m)	59,337.25

Table 4. Water balance calculations for the northeast wetland/waterbody

Reclaimed Wetland & Waterbody 2 (northeast) - Water Balance Results	
Water Body Surface Area (m ²)	56,213
Water Body Surface Area (ha)	5.62
Water Body Volume (m ³)	84,320
Wetland Catchment Area (m ²)	116,754
Water Body Catchment Area (ha)	11.68
Net Evaporation:	
Water Body Area (m ²)	56,213
Local Gross Evaporation (mm)	67
Local Precipitation (mm)	439
Net Evaporative Loss (m ³):	-20,911.24
Total Inflow:	
Surface Runoff Area (ha)	6.05
Surface Runoff Area (km ²)	0.06
Runoff Rate by Locale (dam ³ /km ²)	17.00
Median Annual Water Body Inflow (m)	1,029.20
Water Balance Results:	
Net discharge in average year (m)	21,940.43

Table 5. Water balance calculations for the southeast wetland/waterbody

Reclaimed Wetland & Waterbody 3 (southeast) - Water Balance Results	
Water Body Surface Area (m ²)	112,275
Water Body Surface Area (ha)	11.23
Water Body Volume (m ³)	168,413
Wetland Catchment Area (m ²)	218,698
Water Body Catchment Area (ha)	21.87
Net Evaporation:	
Water Body Area (m ²)	112,275
Local Gross Evaporation (mm)	67
Local Precipitation (mm)	439
Net Evaporative Loss (m ³):	-41,766.30
Total Inflow:	
Surface Runoff Area (ha)	10.64
Surface Runoff Area (km ²)	0.11
Runoff Rate by Locale (dam ³ /km ²)	17.00
Median Annual Water Body Inflow (m)	1,809.19
Water Balance Results:	
Net discharge in average year (m)	43,575.49

4.2. Groundwater Quality

Any effects from turbidity during extraction are not expected to affect surrounding water wells. The sand deposit that is the target of extraction is underlain by clay, which is expected to have low to no hydraulic conductivity. As a result, downward migration of water to any aquifers below is anticipated to be minimal, especially considering the propensity of the local area to be a discharge zone. Additionally, the filtration capacity of the natural sand and clay sediments on the site will limit suspended particle migration.

Extraction activities do not require the use of chemicals; therefore, it is unlikely that the groundwater chemistry will be affected in this way. Sil will ensure that all equipment arrives and leaves the job site clean (i.e. free of soil and vegetative debris) and in good working order (no oil or hydraulic fluid leaks). Inspections

of vehicles and equipment will be completed routinely throughout the duration of the project to ensure there are no leaks and that each vehicle carries spill kits with materials suitable for the volume of fluid or oils they carry. Fuel and hazardous chemicals will not be stored on the Site.

5. MANAGEMENT PRACTICES

5.1. Erosion and Sediment Control

Erosion, if left unmonitored and unchecked, may result in sediment transport to surface water. To reduce the potential for erosion prior to vegetation establishment, Sil intends to create gentle slopes around the pit edges. Erosion and sediment control can be accomplished using a variety of means. These options can include:

- Placement of rip rap, pit run or woody vegetation
- Timing of construction and reclamation
- Swales
- Temporary cover crops
- Sediment barriers – such as silt fences or wattles
- Erosion blankets or logs
- Roughing up soils, creating microtopography
- Permanent vegetation cover

Sil will use a variety of these tools in order to prevent erosion; however, the ultimate goal is to establish permanent vegetation cover using an appropriate seed mix approved by the landowner, as this would achieve the reclamation objectives. In the interim, Sil will use one or many of the other options outlined above, depending on site conditions, in order to prevent erosion. Sil will also monitor the site, particularly after large rainfall events, spring melt and after long dry weather events in order to ensure that those events do not result in significant erosion. Should those events result in large-scale erosion, Sil will rectify the situation by recontouring affected areas.

5.2. Establishment of Water Level

The hydrological analysis indicates that the existing water table on Site ranges between 614.2 and 619.7 m elevation. The water table elevation can be expected to vary according to seasonal changes in annual precipitation and other climate and weather factors. Three monitoring wells (i.e. piezometers) were installed during exploratory drilling. Water levels in the monitoring wells will be recorded prior to mining and during periods of inactivity to establish the water equilibrium level. That way, reclamation contours can be adjusted based on water level measurements as opposed to the calculated water level, which may differ.

5.3. Monitoring

The hydrology and water levels will be monitored via piezometers monthly during extraction and reclamation operations and seasonally during periods of inactivity and post-reclamation. Monitoring will continue until the site is certified as reclaimed. Staff gauges may be installed in the reclaimed waterbodies to measure water levels within the wetlands.

Water quality parameters, including electrical conductivity, temperature and pH, will also be measured using field equipment at the same frequency as water levels. Water will be visually inspected to determine if a hydrocarbon sheen or other signs of potential contamination are present. Landscape parameters, including contours, presence of debris, drainage patterns and slope stability, will be monitored seasonally. In particular, monitoring will occur shortly after spring melt and extreme rainfall events.

6. CONCLUSIONS

Based on the results presented above, the following conclusions can be drawn with regards to water management on the Site and potential impacts to water users in the surrounding area.

- Sil drilled a total of 18 test holes within the proposed pit area to a maximum depth of 23 m. Wet soil conditions were encountered in many of these boreholes. Sil does not intend to consume or remove water from the Site; therefore, it is anticipated that the quantity of water currently present in the vicinity of the Site will not be affected.
- The nearest wells and springs located around SE 12-057-21 W4M are located outside of the maximum potential radius of influence of Site dewatering activities.
- Sil will implement adaptive management practices to minimize any possible impacts to surface water and groundwater, and will continue to monitor the site during operations and following reclamation.

7. LIMITATIONS OF THE PLAN

This Management Plan is based solely on data and information collected during test hole drilling and existing resources in the area. Conditions affecting the hydrogeological assessment of the Site can vary with time and, therefore, the conclusions in this report may vary through time.

8. REFERENCES

- Alberta Environment and Parks. (2019). *Alberta Tier 2 Soil and Groundwater Remediation Guidelines* (p. 150). Land Policy Branch, Policy and Planning Division. <https://www.alberta.ca/ministry-environment-parks.aspx>
- Hydrogeological Consultants Ltd. (2001). *Sturgeon County - Part of the North Saskatchewan River Basin. Parts of Tp 053 to 058, R 20 to 28, W4M and Tp 054 to 057, R 01, W5M. Regional Groundwater Assessment.*
- Prior, G. J., Hathway, B., Glombick, P. M., Pana, D. I., Banks, C. J., Hay, D. C., Schneider, C. L., Grobe, M., Elgr, R., & Weiss, J. A. (2013). Bedrock Geology of Alberta. In *Alberta Geological Survey Map 600*. https://static.ags.aer.ca/files/document/MAP/Map_600.pdf
- Shetsen, I. (1990). *Quaternary Geology, Central Alberta*. Alberta Research Council.
- Sil Industrial Minerals. (2020). *Code of Practice Registration & Water Act Application, Pit 79, SE 12-057-21 W4M*.
- Stein, R. (1975). Hydrogeological Map, Edmonton Area (Northeast Segment), Alberta. In *Map 112*. Alberta Research Council. https://static.ags.aer.ca/files/document/MAP/Map_112.pdf

Appendix A:
Water well map and data

Well ID	Owner name	Latitude	Longitude	Legal land location	Distance from Mine (m)	Surface elevation (m)	Type of water source	Well depth (ft)	Static water level (ft)	Recommended pumping rate (lgpm)	Type of Work	Purpose of use
265897	Leo Brisson	53.908899	-112.982094	SE 12-57-21 W4M	20	625	Well	32			Chemistry	Domestic
265795	<i>Unnamed Spring</i>	53.903490	-112.98512	NE 1-57-21 W4M	280	632	Well	0			Spring	Unknown
244108	Art Mceachern	53.901682	-112.994305	NW 1-57-21 W4M	582		Well	57	12	5	New Well	Domestic
265791	Mike Znak	53.901682	-112.994305	NW 1-57-21 W4M	582	602	Well	0			Spring	?
265792	Robert Old	53.901682	-112.994305	NW 1-57-21 W4M	582		Well	140	30	0	New Well	Domestic & Industrial
281159	Alta Env #0793E	53.896258	-112.997364	SW 1-57-21 W4M	1184		Well	20			Test Hole	Investigation
241125	Mceachern, Art #TH 1	53.894451	-112.994302	SW 1-57-21 W4M	1282		Well	280	0		Test Hole - Decommissioned	Domestic
273068	Village of Redwater	53.894509	-112.969434	SW 6-57-20 W4M	1290	632	Well	40			Federal Well Survey	Domestick & Stock
1827851	Alta Env	53.901701	-112.957046	NE 6-57-20 W4M	1338	640	Well	19	12.43	0.29	Old Well - Yield	Monitoring
265406	Rick Strembiski	53.892749	-112.972668	SW 6-57-20 W4M	1429		Well	48	30	2	Old Well - Yield	Domestic

SIL INDUSTRIAL MINERALS

Pit 79

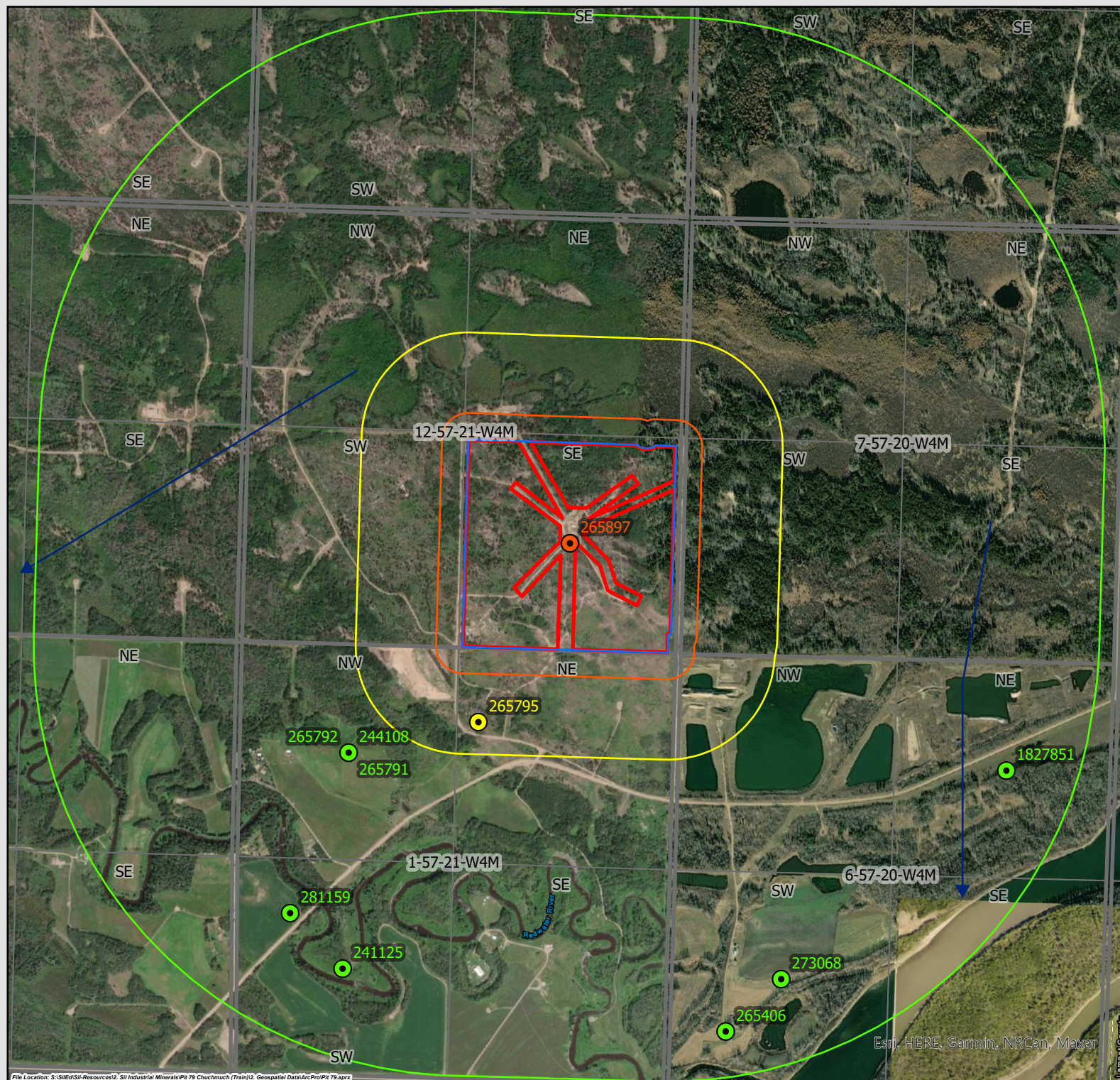
Water Wells

Legend

- LOD
- Mine Area
- 100 m Buffer
- 400 m Buffer
- 1.6 km Buffer

Water Wells

- Within 100m
- Within 400m
- Within 1.6km
- Groundwater flow lines from Stein (1976)



DATE: December 08, 2021	BEARINGS: Decimal Degrees North Azimuth
DRAWN BY: E. MacLagan	PROJECTION: NAD 1983 UTM Zone 12N Units: Meter
VERSION: 1.0	DATUM: North American 1983

MAP SCALE 1:20,000

0 0.13 0.25 0.5 km

Logo: **Sil Industrial Minerals** We're Ready.

Appendix B:

Catchment areas and flow line maps



CLIENT: SIL Industrial Minerals	
H-SCALE:	1:2500
V-SCALE:	N/A
DATE:	Sept 2019
DWN. BY:	J. Bagshaw
DATE REVISED:	April 2021
REVISED BY:	E. MacLagan
Pit 79	
Water Act Application	
LEGAL LAND DESCRIPTION SE 12-057-21 W4M	
Sturgeon County -----	
DWG. NO: 01 OF 02 Existing Catchment Conditions	
LEGEND:	
————	Quarter Section Lines
-----	Pipelines
-----	Pipeline to be removed
————	Limit of Disturbance
————	Mining Boundary
	Existing Wetland
	Historic Resource Site
	Depression Catchment
	Boundary Catchment
	Multi-drain Catchment
	Flow Lines
Note: Catchment areas within 0.25 m depth are merged	
9175 – 14 STREET NW EDMONTON, AB T6P 0C9	



CLIENT: SIL Industrial Minerals	
H-SCALE:	1:2500
V-SCALE:	N/A
DATE:	Sept 2019
DWN. BY:	J. Bagshaw
DATE REVISED:	April 2021
REVISED BY:	E. MacLagan
Pit 79	
Water Act Application	
LEGAL LAND DESCRIPTION SE 12-057-21 W4M	
Sturgeon County -----	
DWG. NO: 02 OF 02 Reclaimed Catchment Conditions	
LEGEND: —— Quarter Section Lines ----- Pipelines ----- Pipeline to be removed —— Limit of Disturbance —— Mining Boundary Existing Wetland Historic Resource Site Reclaimed Catchment Flow Lines	
<div>0100200</div> <div>Meters</div>	
<div> We're Ready.</div> <div>9175 – 14 STREET NW EDMONTON, AB T6P 0C9</div>	

Appendix I. Spill Response Procedures



SPILL RESPONSE PROCEDURES

Sureway Group of Companies

2023

Land and Environment Department
spills@sureway.ca

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1. Objective

The Spill Response Procedures outline the steps to be taken by Sureway Construction Group Employees when responding to a spill event. The goal of spill response is to protect the public, employees, and the environment by ensuring the timely and effective clean-up of a substance release while conserving clean soil resources and costs.

2. Steps

2.1. Identify the release

2.2. Instruct on-site personnel

2.2.1. Ensure the safety of everyone on-site

- Remove all ignition sources from the area
- Use appropriate PPE (i.e. goggles, nitrile gloves, respirator)

2.2.2. Stop the source of the spill, if safe to do so.

- Shut down the equipment
- Close valves and pumps
- Plug hoses
- Set containers upright
- Perform emergency repairs if required

2.2.3. Secure the area and ensure public safety

- Clear the area of all non-essential personnel or the public
- Use fencing, barricades, cones and/or warning signs

2.2.4. Contain the spill.

- Protect high risk areas such as water bodies, sumps, culverts, ditches, etc. Containment may include the use of:
 - Socks, absorbent pads and/or granular absorbent found in spill kits on-site,
 - A drip tray/spill pan, and/or
 - Soil berms/dikes constructed by equipment on-site

2.3. Call or e-mail the Land and Environment Department

Provide as much detail as possible on the spill event.

Email: spills@sureway.ca

2.4. Contact Transportation Safety Compliance Officer

John Dimaria (780-220-9520)

3. Land and Environment Department

3.1. Site Visit

As soon as possible, a member of the Land and Environment Department will visit the site to inspect the spill and collect/complete the following:

- Photographs of the spill, source and surrounding area,
- Date, time, location and duration of the spill, and
- Substance and amount spilled.

3.2. Notification

The Land and Environment Department will notify the appropriate authorities where needed. The following guidelines help identify which authority should be notified.

3.2.1. Alberta Environment and Protected Areas

- The release entered a water course or the groundwater.
- The release has caused, is causing or may cause an adverse environmental effect.
- The release exceeds the following limits outlined in the *Transportation of Dangerous Goods Regulation*

Table 1. Reportable Limits from the TDG Regulations

Spill Type	Reportable Limit
Varsol	≥ 200 L
Engine Oil	≥ 200 L
Gasoline	Any Amount
Diesel Fuel	≥ 30 L
Greases	≥ 25 kg
Glycol*	≥ 200 L
Transmission Oil	≥ 200 L
Hydraulic Oil	≥ 200 L

*Glycol is a 50/50 mix with water. So, a total volume including water would be reportable at ≥ 400 L.

3.2.2. City of Edmonton

- If we are a contractor for the City of Edmonton, all releases must be reported to the City by calling 780-496-6666.

3.2.3. Alberta Transportation

- The Transportation Safety Compliance department (John Dimaria at 780-220-9520) will report to Alberta Transportation, Coordination Information Centre (CIC) at 1-800-272-9600 if:
 - The release occurred on roadway from a bulk fuel hauler (ex. fuel and lube truck, B-trains, etc)
 - A release on a jobsite is from a bulk fuel hauler (ex. fuel and lube truck, B-trains, etc) and greater than 250 L

3.2.4. CANUTEC

- The Transportation Safety Officer will report the spill to CANUTEC (1-613-996-6666) if it is above the reportable *Transportation of Dangerous Goods* limits.

3.3. Restock supplies

Ensure there are enough supplies on-site to respond to the spill. Call *Sureway Dispatch* to obtain more supplies such as socks, absorbent pads, granular absorbent, poly liners or soil bags.

3.4. Remediation and Clean Up

A member of the Lands and Environment Department will coordinate remediation and clean-up strategies. Typical clean-up should include:

3.4.1. Removal of free product from the ground surface

- For a small spill, absorbent pads or granular absorbent may be used.
- For a large spill or standing fluids, a hydrovac may be used.

3.4.2. Scrape impacted soil

- Soil should be scraped in shallow lifts (approximately 6" or 15cm). Following each lift, the base and walls of the excavation should be "sniff-tested" to determine if further excavation is required.
- Prior to scraping impacted soil, consult the site foreman to ensure there are no underground facilities in the area. Underground facilities should be located prior to excavating greater than 12" (30 cm).

3.4.3. Store waste in a secure location until disposal can be arranged

- Used socks and absorbent pads should be disposed of in Secure poly bins.
- Contaminated soil should be placed in soil bags or bins with poly liners.
 - Do not mix pads/rags into contaminated soil – there is an extra fee for separating them from the soil
- For a large spill, contaminated soil can be loaded into trucks and taken to *Terrapure* for disposal. Call the *Terrapure Sludge Pad Manager* in advance to inform them that contaminated soil will be hauled to their facility – soil will not be accepted without a PO

3.4.4. Backfill excavated areas with clean fill

3.4.5. Replace spill supplies on site

- Unused items from spill kits must be returned to the Environment Department
- Every area in which equipment or vehicles are working must have a spill kit
- Each fueling area must have a spill kit
- All trucks or transient vehicles must carry a spill kit

4. Documentation

4.1. Complete the spill report

A Sureway spill report should be completed, regardless of the size of the spill. There should be spill-report sheets inside all spill kits; however, if one is not available, the report should include:

- Date, time and location of the spill
- Substance and amount spilled
- Photographs of the spill, including the source

4.2. Update the Lands and Environment Department

If extensive clean-up is required, a daily update should be sent to the *Environment Manager* and should include:

- A description of the day's activities including photographs
- The volume of impacted soil that was excavated
- Information on the storage or disposal of the impacted soil

4.3. Complete final report

Following clean-up, a final report should be completed and sent to the Lands and Environment Department. This report should include:

- A description of the spill
- A description of the clean-up methods
- The volume of impacted soil that was excavated
- The disposal location of the impacted soil
- Photographs of the spill, clean-up activities and the affected area following clean-up/backfill

5. Contact Information

5.1. Sureway

5.1.1. Land and Environment Department

Land and Environment Manager	Laura Cline	780-486-6336
Exploration and Environment Coordinator	Ebberly MacLagan	780-916-1410
Field Lead	Nathan Holden	780-577-2328

Email: spills@sureway.ca

5.1.2. Dispatch

- Dispatch phone number: 780-916-9001

5.1.3. Transportation Safety Compliance

Transportation Compliance Officer	John DiMaria	780-486-6317
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5.2. Alberta Environment and Protected Areas

Release/Spill Notification:

- **Phone:** 1-800-222-6514 (24 hr)
- **Fax:** 780-427-3178
- **Email:** ERC.Environment@gov.ab.ca

5.3. Alberta Transportation

- 1-800-272-9600

5.4. CANUTEC

- 1-613-996-6666

5.5. GFL (formerly Terrapure)

Sludge Pad Location: 6024 27 Street NW, Edmonton AB, T6P 1Y5

General Manager

Jeff Rowein

780-777-7999

5.6. City of Edmonton

Spill reporting hotline: 780-496-6666

AND contact the City of Edmonton's Project Representative

Spill Report

Report By:		Supervisor on site:	
Reported Date:		Location:	
Reported Time:		Project:	
Report to:		Department:	
Occurrence Date:		Organization:	
Occurrence Time:			

Reported to Company Environmental Department?	YES / NO (Circle one)	If yes, who?
Reported to Alberta Environment and Parks?	YES / NO (Circle one)	

Weather Conditions:	
Environmental Impact to:	AIR / SOIL / WATER / NONE (Circle one)
Name of product spilled:	
Amount spilled:	
List any vehicles/containers/equipment involved:	
Any Witnesses? YES / NO (Circle one)	If yes, who?

Description of what happened:
Immediate action taken after the spill (how was it controlled):
Probable cause:
Corrective actions:

Actual Severity		Potential Severity	
0	N/A	0	N/A
1	Local release: contained	1	Local release: contained
2	Local release: outside sources required	2	Local release: outside sources required
3	Serious release	3	Serious release
4	Major release: controlled	4	Major release: controlled
5	Major release: uncontrolled	5	Major release: uncontrolled

Likelihood of reoccurrence:		How often is the activity performed?	
0	N/A	0	N/A
1	<i>Unlikely</i> to occur	1	1 time per <i>year</i> or less
2	<i>Some</i> chance of occurring	2	1 time per <i>month</i> or less
3	<i>Moderate</i> chance of occurring	3	2-3 times per <i>month</i>
4	<i>Good</i> chance of occurring	4	1-2 times per <i>week</i>
5	<i>Will occur</i> if not attended to	5	1 time per <i>day</i> or more

Completed by Management:

Type of kit: (Circle one) SMALL (5 gallon pail) LARGE (250 L Container)

Re-Order List:

<input type="checkbox"/> Disposable bags	<input type="checkbox"/> Container	<input type="checkbox"/> Granular sorbent material
<input type="checkbox"/> Absorbent pads	<input type="checkbox"/> Drain cover	<input type="checkbox"/> Safety goggles
<input type="checkbox"/> Absorbent socks	<input type="checkbox"/> Reporting sheets	<input type="checkbox"/> Gloves
<input type="checkbox"/> Spill response manual	<input type="checkbox"/> Instruction sheets	<input type="checkbox"/> Spill report

Notes:

Appendix J. Community Consultation Letter

COMMUNITY PUBLIC CONSULTATION



SIL INDUSTRIAL MINERALS

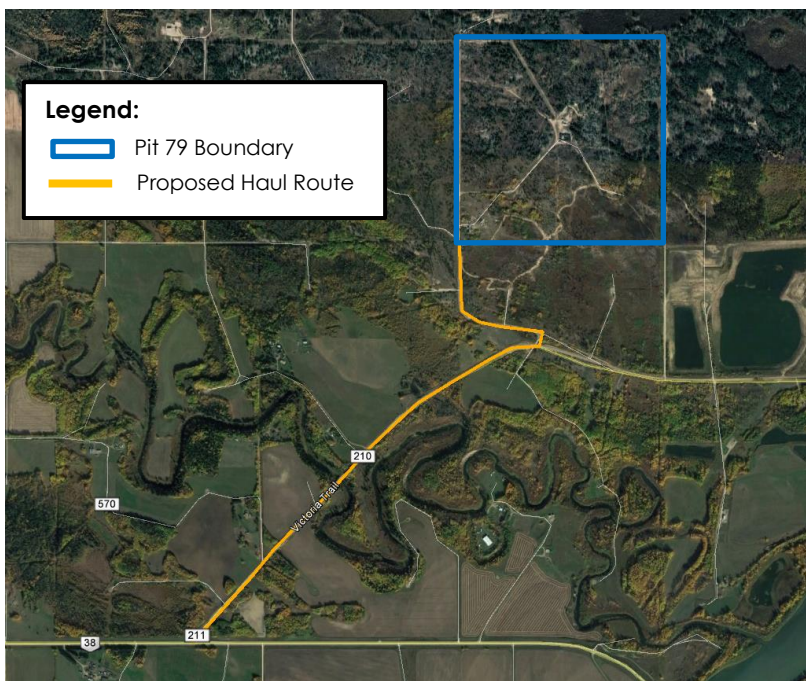
Sil Industrial Minerals would like to notify you that we are making preparations to apply for rezoning of the SE-12-57-21-W4M from the current Agricultural (AG) land use zoning to Resource Extraction (RE) for the purpose of a future Silica Sand Extraction pit. We would like to engage nearby residents in public consultation prior to submitting our application for the rezoning of this property.

The nature of the proposed future development will include:

- Topsoil stripping and salvage
- Silica sand extraction
- Hauling to an off-site processing facility – there will be no processing on-site
- Reclamation to waterbodies including wetland areas with naturalized ecosystem functions
- Off-site dewatering subject to approval from Alberta Environment and Protected Areas

Hours of operation and hauling are proposed to be:

- Monday to Saturday – 7am to 7pm, not including Sundays or Statutory Holidays



If you have any questions, comments, or other feedback on our proposed operations at Pit 79 please contact:

Laura Cline

Land and Environment Manager
Direct: 780 486 6336
laura.cline@sureway.ca

Please provide any comments prior to September 8, 2023.

Thank you for your feedback!