



**CANADA NICKEL**  
COMPANY



**Stantec**

# **Crawford Nickel Project Impact Statement**

## Chapter 11 Assessment of Potential Effects on Soil



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**Prepared for:**  
**Canada Nickel Company**

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## Acronyms and Abbreviations

ESC	Erosion and Sediment Control
LSA	Local Study Area
LiDAR	Light Detection and Ranging
O. Reg.	Ontario Regulation
TMF	Tailings Management Facility
PA	Project Area
RSA	Regional Study Area
VC	Valued Component

## Glossary of Technical Terms

Brunisol	Soils with a B horizons (designated as Bm horizons) that have undergone only minor alterations from the parent material.
Calcium Carbonate Equivalent	The quantity of carbonate ( $\text{CO}_3$ ) in the soil expressed as $\text{CaCO}_3$ and as a weight percentage of the less than 2 mm size fraction.
Clay	A soil mineral particle that is less 0.002 mm in size.
Coarse Fragment	A primary particle with a nominal diameter greater than 2 millimetres (mm) (includes gravels, cobbles and boulders).
Cover Soil	The Topsoil Peat/Forest Duff Layers salvaged and replaced for as rehabilitation material.
Duff Layer	A layer of partially and fully decomposed organic materials lying on the forest floor below the litter (layer) and immediately above the mineral soil.
Glacial Till	Sediments consisting of well compacted heterogeneous material that has been transported on or in the vicinity of a glacier.
Glaciofluvial	Fluvial sediments that were deposited in contact with glacial ice.
Glaciolacustrine	Lacustrine deposits that were deposited in contact with glacial ice.
Gleysol	Soils whose morphology is created by the effects of water saturation on soil processes in mineral soil horizons. The g (for gleyed) suffix is applied both to horizons with reddish or grayish mottling present and to horizons with dull, blue grey colours.
Luvisol	Soils with a coarser-textured surface mineral horizon (the Ae) overlying a finer-textured mineral horizon that is higher in clay than the overlying horizon. The higher clay B horizon is assigned a t suffix (Bt).

Organic Soil	Soils that have developed largely from organic deposits under saturated conditions and are derived dominantly from vegetation that grows in poorly and very poorly drained areas.
Overburden	Depositional material that is found below topsoil or organic soil and above mine rock that can sometimes be used in rehabilitation.
Parent materials	Sediments from which soils form that are classified based on their mode of formation.
Peat	Organic (i.e., humic, mesic, or fibric material) horizons of Organic soils.
Reclamation Suitability	Good - None to slight soil limitations that affect use as a plant growth medium.  Fair - Moderate soil limitations that affect use, but which can be overcome by proper planning and good management.  Poor - Severe soil limitations that make use questionable.  Unsuitable - Chemical or physical properties of the soil are so severe reclamation would not be economically feasible or in some cases impossible.
Sand	A soil mineral particle that is 2 to 0.062 mm in size.
Sediment	A naturally occurring material that has been broken down by the process of weathering and erosion and subsequently transported by wind, water ice or gravity.
Silt	A soil mineral particle that is 0.062 to 0.002 mm in size.
Soil	An unconsolidated mix of mineral or organic matter on the surface of the Earth that has been subjected to and shows effects of genetic and environmental factors of climate and biological activity and supports plant and animal life.
Soil Admixing	Mixing of topsoil with subsurface soils or unsuitable material that results in a reduction of topsoil quality, which can be topsoil degradation structurally and/or chemically.

Soil Bulk Density	The dry weight of soil per unit volume of soil.
Soil Contamination	The condition of soil that is caused by the release of a substance that can cause detrimental effects to the environment and human health.
Soil Drainage	A natural process by which water moves across, through, and out of the soil as a result of the force of gravity.
Soil Erosion	The detachment, movement and later deposition of soil particles caused by water or wind. Accelerated erosion can be caused by human activity and can have adverse effects.
Soil Organic Matter	Soil organic matter is the fraction of the soil that consists of plant or animal tissue in various stages of breakdown (decomposition).
Soil Quality	The measure of the capacity of a soil to function within a natural or managed ecosystem to sustain plant or animal productivity, maintain or enhance water and air quality and support human health and habitation.
Soil Reclamation Suitability	Good (G) - None to slight soil limitations that affect use as a plant growth medium. 2. Fair (F) - Moderate soil limitations that affect use, but which can be overcome by proper planning and good management. 3. Poor (P) - Severe soil limitations that make use questionable. This does not mean the soil cannot be used, but rather careful planning and very good management are required. 4. Unsuitable (U) - Chemical or physical properties of the soil are so severe reclamation would not be economically feasible or in some cases impossible.
Soil Texture	The relative percentages of sand, silt, and clay particles that make up the mineral (inorganic) fraction of soil.
Soil Tilth	The physical condition of soil as related to its ease of tillage, fitness as a seedbed, and its promotion of seedling emergence and root penetration.
Subsoil	Weathered material underlying the surface soil.
Topsoil	A and/or AB horizon of mineral soils.

Undulating                      A regular sequence of gentle slopes that extend from rounded concavities to rounded convexities producing a wavelike pattern in low local relief.

## 11 Assessment of Potential Effects on Soil

Soil was selected as a Valued Component (VC) because of the potential effects the Crawford Nickel Project ('the Project') may have on soil quality and quantity that supports existing terrestrial ecosystems. The Project may affect soil because of potential changes to soil quality and quantity through construction activities, soil storage, and site rehabilitation.

The Tailored Impact Statement Guidelines (TIS Guidelines) require an assessment of the effects of the Project on topography, soil, and sediment. Project activities have the potential to result in soil disturbance, which could affect soil quality parameters such as drainage, fertility, tilth, texture, cover soil organic matter, soil bulk density, coarse fragment content and calcium carbonate equivalent, that may alter soil quality. Additionally, a loss of soil quantity can occur during salvage and rehabilitation activities or due to a physical loss of soils and accelerated erosion. These changes to soil quality and quantity can negatively affect soil's ability to function within an ecosystem, to sustain plant or animal recovery following rehabilitation, maintain or enhance water quality and support human health and habitation.

For this assessment, soil is defined as unconsolidated mineral or organic matter that has been subjected to and shows effects of genetic and environmental factors of climate and biological activity and supports plant and animal life. Soil consists of a solid phase of minerals and organic matter (the soil matrix), as well as porous/gas and water phases.

Sediment is defined as naturally occurring material that has been broken down by the process of weathering and erosion and subsequently transported by wind, water, ice or gravity. An assessment of the potential changes to sediment as a result of Project activities, such as grading activities and mining operations that result in suspended sediment in water discharged to the environment, is discussed in Chapter 17 (Assessment of Potential Effects on Fish and Fish Habitat).

Topography refers to the mosaic of surface expressions, or landforms, present at the earth surface. In the absence of unique landforms or key links between topography and ecosystem functions in this area, consideration for changes in topography has been limited to the "visual effect" or "visual disturbance" of the Project and is discussed in Chapter 22 (Assessment of Potential Effects on Social Conditions).

Soil is linked to other VCs, including:

- Geology and Geologic Hazards (Chapter 10), whereby changes in terrain stability may affect topography, soil quality and/or quantity.
- Ground Water (Chapter 14), whereby changes in soil quality and/or quantity may affect groundwater quality and/or quantity.
- Surface Water (Chapter 15), whereby changes in soil quality and/or quantity may affect surface water quality and/or quantity.
- Vegetation, Riparian and Wetland Environments (Chapter 16), whereby changes in soil quality and/or quantity may affect vegetation communities.

## 11.1 Scope of Assessment

An assessment of the impacts of the Project, as it relates to soil, was conducted to determine potential residual changes to soils.

### 11.1.1 Regulatory and Policy Setting

#### 11.1.1.1 Federal Requirements

The scope, direction, and requirements for the preparation of the Impact Statement are provided in the Tailored Impact Statement Guidelines (Appendix A.1 of the Impact Statement [TIS Guidelines]). The TIS Guidelines require consideration of effects on soil.

#### 11.1.1.2 Provincial Requirements

The Ontario *Mining Act* and Ontario Regulation (O. Reg.) 35/24 requires the completion of a closure plan that outlines soil cover materials, vegetation and surface water features modified during the life of the mine that must be restored to a quality, quantity and appearance that is as close as possible to pre-development conditions or the baseline environmental conditions measured and described during the beginning of mine development. The Act also sets out requirements to progressively rehabilitate.

### 11.1.2 The Influence of Consultation and Engagement on the Assessment

Canada Nickel Company ('Canada Nickel') has engaged with potentially affected Indigenous nations, regulators, landowners, and other stakeholders. Table 11.1 provides a summary of the topics, key information including Indigenous knowledge, and concerns that Canada Nickel identified as part of their engagement efforts that relate to soil, as well as a summary of the influence that the outcomes of this engagement had on the assessment.

This information was considered when evaluating whether Canada Nickel's planned mitigation will effectively manage the identified potential interactions, or whether additional or refined mitigation is warranted. To date, concerns regarding soil, have been raised during engagement for the Project. Additional and specific mitigation measures were added to address one or more of the concerns, as described in Table 11.1.

**Table 11.1 Summary of Key Information, Indigenous Knowledge, and Concerns for the Project Related to Soil**

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Erosion and sedimentation	<ul style="list-style-type: none"> <li>Taykwa Tagamou Nation expressed concern that erosion and sedimentation may occur, resulting in changes to water quality and habitats.</li> <li>Métis Nation of Ontario – Region 3 expressed concern regarding sediment entering the channels near the Project Area.</li> </ul>	<ul style="list-style-type: none"> <li>Considered in the development of mitigation and management measures and supported scope of issues assessed such as changes in water quality and fish and fish habitats as a result of erosion and sedimentation, and to be considered during the development of an Erosion and Sediment Control Plan.</li> <li>Informed the assessment on surface water in Chapter 15 of the Impact Statement (Assessment of Potential Effects on Surface Water) with regard to the effects of erosion and sedimentation on water quality.</li> <li>Informed the assessment on fish and fish habitat in Chapter 17 of the Impact Statement (Assessment of Potential Effects on Fish and Fish Habitat) with regard to the effects of erosion and sedimentation on fish habitats.</li> <li>Informed the assessment on Indigenous Interests in Chapters 25-28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).</li> </ul>	<ul style="list-style-type: none"> <li>Chapter 11 (Assessment of Potential Effects on Soil), Sections 11.4 and 11.9</li> <li>Chapter 15 (Assessment of Potential Effects on Surface Water), Section 15.9.1</li> <li>Chapter 17 (Assessment of Potential Effects on Fish and Fish Habitat), Sections 17.4 and 17.8</li> <li>Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)</li> <li>Chapter 34 (Follow-up Programs), Section 34.4</li> </ul>

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Soil Quality	<ul style="list-style-type: none"> <li>Flying Post First Nation, Matachewan First Nation and Mattagami First Nation expressed concern regarding the potential for stockpiled materials to leach toxins into the environment.</li> </ul>	<ul style="list-style-type: none"> <li>Considered in the development of mitigation and management measures, including the Site-Wide Water Management Plan (Appendix J of the Impact Statement) and the Metal Leaching and Acid Rock Drainage Management Plan (Appendix L of the Impact Statement). Informed the assessment of effects on water quality (surface and ground water) including the potential effects from for metal leaching and run off.</li> <li>Informed the assessment on Indigenous Interests in Chapters 25-28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).</li> </ul>	<ul style="list-style-type: none"> <li>Chapter 10 (Assessment of Potential Effects on Geology and Geologic Hazards), Section 10.4.2.1</li> <li>Chapter 11 (Assessment of Potential Effects on Soil), Sections 11.4 and 11.9</li> <li>Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)</li> <li>Surface Water Resources Baseline Report (Appendix B.6 of the Impact Statement)</li> <li>Site-Wide Water Management Plan (Appendix J of the Impact Statement)</li> <li>Conceptual Metal Leaching and Acid Rock Drainage Management Plan (Appendix L of the Impact Statement)</li> </ul>

Where made available by Indigenous nations through engagement, information gathering, and voluntary information sharing, Indigenous knowledge has been considered and incorporated into the Impact Statement, as applicable. Refer to the Description of Engagement with Indigenous Peoples (Chapter 7 of the Impact Statement) for detailed methods regarding the incorporation of Indigenous knowledge to the Impact Statement.

### 11.1.3 Potential Effects, Pathways and Measurable Parameters

Project-related effects to be assessed for soil were determined by the TIS Guidelines.

Table 11.2 outlines the potential effects, effects pathways and measurable parameters for sediment.

**Table 11.2 Potential Effects, Effect Pathways and Measurable Parameters for Soil**

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in Soil Quality	Development activities and rehabilitation alters the landscape and can change soil quality as a result of admixing, compaction, water erosion and soil contamination.	<ul style="list-style-type: none"> <li>• Soil chemistry parameters (e.g., soil organic matter, pH)</li> <li>• Soil physical parameters (e.g., soil bulk density)</li> <li>• Soil contaminant levels</li> </ul>
Change in Soil Quantity	Development activities, soil salvage, storage and rehabilitation could result in a soil erosion and a loss of soils or a change in cover soil thickness.	<ul style="list-style-type: none"> <li>• Depth and volume of soil salvage and replacement</li> </ul>

### 11.1.4 Boundaries

#### 11.1.4.1 Spatial Boundaries

The **Project Area (PA)** encompasses the Project footprint and is the anticipated area of physical disturbance associated with the construction, operations, and decommissioning and closure of the Project. The PA includes the Open Pit, Stockpiles, two ore Processing Plants, and other mine related infrastructure, as well as a new rail spur line and the relocation of Highway 655 and existing 500 kilovolt (kV) transmission line.

The **Local Study Area (LSA)** encompasses the area in which Project-related effects (direct or indirect) on to soil can be predicted or measured with a level of confidence appropriate for the assessment. The LSA includes the PA as well as a 500 metre (m) buffer applied to the PA. This LSA is considered large enough to provide a confident assessment of the effects to soil from the Project and potential cumulative effects from the Project and previous, existing and reasonably foreseeable developments. The extent of the LSA for soil is shown on Figure 11.1.

Given the localized nature of potential Project-related effects to soil, the **Regional Study Area (RSA)** is the same as the LSA, which encompasses a sufficiently broad area for assessing cumulative effects.

### 11.1.4.2 Temporal Boundaries

The temporal boundary of the assessment includes all Project phases from the start of construction through to the end of closure. Based on the current Project schedule, the Project phases include:

- Construction (Year -3 to Year -1)
- Operations
  - Operations phase 1 (Year 1 to Year 5): 60 kilotonnes per day (kt/d) milling capacity with ore extraction
  - Operations phase 2 (Year 5 to Year 30): 120 kt/d milling capacity with ore extraction
  - Operations phase 3 (Year 30 to Year 41): 120 kt/d milling capacity with no ore extraction
- Decommissioning and closure
  - Active closure (Year 41 to Year 46)
  - Passive closure (Year 46+)

### 11.1.5 Residual Effects Characterization

The characterizations used to assess residual effects on soil are provided in Table 11.3.

**Table 11.3 Characterization of Residual Effects on Soil**

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	<p><b>Positive</b> – a residual effect that moves measurable parameters in a direction beneficial to soil relative to baseline.</p> <p><b>Adverse</b> – a residual effect that moves measurable parameters in a direction detrimental to soil relative to baseline.</p> <p><b>Neutral</b> – no net change in measurable parameters for soil relative to baseline.</p>
Magnitude	The amount of change in measurable parameters or the VC relative to existing conditions	<p><b>Negligible</b> – no measurable change in soil quality/quantity.</p> <p><b>Low</b> – a measurable change in soil quality/quantity but within the normal variability of baseline conditions.</p> <p><b>Moderate</b> – measurable change in soil quality/quantity with regard to baseline conditions but soil quality parameters do not affect the soils ability to function within a natural ecosystem or sustain plant growth.</p> <p><b>High</b> – measurable change in soil quality/quantity that affects the soils ability of to function within a natural ecosystem or sustain plant growth.</p>
Geographic Extent	The geographic area in which a residual effect occurs	<p><b>PA</b> – residual effects are restricted to the PA</p> <p><b>LSA/RSA</b> – residual effects extend into the LSA/RSA</p>

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Timing	Considers when the residual effect is expected to occur, where relevant to the VC.	<b>No sensitivity</b> – timing does not affect VC. <b>Moderate sensitivity</b> – timing may affect VC during lower sensitivity period, but the effects are manageable with proper planning and mitigation measures. <b>High sensitivity</b> – residual effects occur during high sensitivity period.
Duration	The time required until the measurable parameter or the VC returns to its existing condition, or the residual effect can no longer be measured or otherwise perceived	<b>Short-term</b> – residual effect restricted to no more than the duration of the construction phase (<3 years). <b>Medium-term</b> – residual effect extends through the operations phase (3-41 years). <b>Long-term</b> – residual effect extends beyond the operations phase (>41years).
Frequency	Identifies how often the residual effect occurs and how often during the project or in a specific phase	<b>Single event</b> – occurs once. <b>Multiple irregular event</b> – occurs at no set schedule. <b>Multiple regular event</b> – occurs at regular intervals. <b>Continuous</b> – occurs continuously.
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the project activity ceases	<b>Reversible</b> – the residual effect is likely to be reversed after activity completion and rehabilitation. <b>Irreversible</b> – the residual effect is unlikely to be reversed.

## 11.2 Existing Conditions for Soil

This section summarizes the investigative approach, main data sources and existing conditions relevant to soil in the PA and LSA/RSA. Existing conditions are covered in more detail in the Soils and Terrain Baseline Report (Appendix B.1 of the Impact Statement).

### 11.2.1 Methods

Baseline conditions for soil in the PA and LSA/RSA were characterized by completing the following tasks, listed in operational order:

1. Compilation and review of available background information, including:
  - a. Site-specific datasets and reports provided by Canada Nickel, including Light Detection and Ranging (LiDAR) data used for terrain mapping
  - b. Project-specific reporting completed by third-party consultants, including 2022 and 2023 geotechnical field investigations by SRK Consulting Ltd. and WSP (formerly Golder).
  - c. Recent satellite imagery (Google™ Earth Pro and ESRI® ArcGIS online imagery), dated from 2019-2022.
  - d. Provincial and federal surficial geology mapping, bedrock geology mapping, soils mapping, and well records (water).

- e. Other relevant, publicly available reports and scientific literature.
2. Preliminary mapping and classification - Completion of preliminary (pre-field assessment) mapping and terrain classification in ESRI® ArcGIS using client-supplied LiDAR and terrain mapping and classification (Howes and Kenk 1997).
3. Field survey program - Execution of a field investigation program that included assessment of both the terrain (including but not limited to characteristics such as topography, surficial materials, drainage condition) and soils.

The soil survey component included data collection from 106 soil inspection sites. The survey results were used to describe the soils according to the Canadian System of Soil Classification (Agriculture Canada 1998); determine current land use; collect field and laboratory data to map the soil associations, determine soil reclamation suitability and assign water erosion and compaction risk ratings to each soil map unit; and to inform soil conservation and handling requirements.

4. Final soils and terrain mapping - Post-field revision and mapping. Following completion of the terrain mapping, soils map units were delineated and assigned reclamation suitability ratings, water erosion and compaction risk ratings. Summary statistics (metrics) were then calculated based on the terrain and soil coverage within both the PA and LSA.

## 11.2.2 Overview

The following are key findings from the Soils and Terrain Baseline Report (Appendix B.1 of the Impact Statement):

- The topography across the PA and LSA/RSA is flat to gently undulating, generally ranging between 265 and 290 m above sea level and averaging about 15 m in local relief. The few rare areas of relief are associated to an esker complex, locally entrenched river systems, and a few rare bedrock-controlled hills.
- Very poorly to poorly drained Organic and Gleysolic soils developed on nearly level to very gently sloped Lacustro-Till or Glaciolacustrine parent materials were mapped for most (82.3 percent [%]) of the LSA/RSA. Moderately well to imperfectly drained Luvisols were mapped on approximately 12.3% of the LSA/RSA. Coarse textured, well drained Brunisols with juvenile pedogenesis were mapped on well drained Glaciofluvial deposits and occupy 2.3% of the LSA.
- Surface layer water erosion risk is very low to low for approximately 28.1% of the LSA and subsurface layer water erosion is low and low to moderate for approximately 94.6% of the LSA. There is a high to severe water erosion risk on escarpments along Jocko Creek.
- Compaction risk is high for most soils in the LSA/RSA due to the combination of clay loam, clay, silt loam, silty clay loam, silty clay and clay textures and imperfect to very poor drainage regime.
- Approximately 34.2% of the surface layer of mineral soils has a 'good' or 'good to fair' reclamation suitability rating and approximately 47.9% surface layer in the LSA/RSA are organic soils. Mineral soil reclamation suitability ratings were not assigned to organic/peat soils however this material has value in reclamation when mixed with mineral soils as it improves soil organic

matter, soil nutrient and water holding capacity and soil tilth. Approximately 15.8% of the surface layer of mineral soils and 34.3% of the subsurface layer have a 'poor' reclamation suitability rating. Soil limitations to reclamation suitability in mineral soils are usually due to fine soil textures (e.g., clay) and/or high Calcium Carbonate (CaCO<sub>3</sub>) equivalent values.

### 11.3 Project Interactions with Soil

Table 11.4 identifies, for each potential effect, the physical activities that might interact with the VC and result in the identified effect. These interactions are indicated by a check mark (✓) are discussed in detail in Section 11.4, in the context of effects pathways, standard and project-specific mitigation/enhancement, and residual effects.

**Table 11.4 Project Interactions with Soil**

Physical Activities	Effects	
	Changes to soil quality	Change to soil quantity
<b>Construction</b>		
Mobilization of construction equipment and materials on site.	–	–
Vegetation clearing, including the removal and disposal of trees, brush, shrubs, and other foliage.	✓	✓
Stripping, including the removal of topsoil and other organic materials, as well as storing of some materials for use in reclamation.	✓	✓
Grading of overburden to be used as fill.	✓	✓
Handling and use of explosives, including blasting.	✓	✓
Excavating and pre-stripping of mine rock from the Open Pit and surrounding area.	✓	✓
Development of the Impoundment Facility for storage of rock, clay, sand, and till.	✓	✓
Preparation of construction surfaces, including hauling reclaimed graded material and crushed mine rock to construction locations.	✓	✓
Construction of water management systems to collect, manage, treat and discharge contact water from mine components to the receiving waterbodies via collection ponds, ditches, and water treatment plants.	✓	✓
Construction of minor water diversions around perimeter of the mine site to collect and divert surface water flows.	✓	✓
Dewatering of natural water bodies within the Project Area.	–	–
Waste management, including collection and temporary storage.	✓	–

Physical Activities	Effects	
	Changes to soil quality	Change to soil quantity
Construction of mine infrastructure, including crusher facilities, process plant and Tailings Management Facility, as well as the potable water well, and ancillary infrastructure (e.g., offices, workshop, fuel farm, magazine storage and explosives pad).	✓	✓
Construction of internal haul roads and internal access roads, including water crossings.	✓	✓
Construction of power supply and distribution systems.	✓	✓
Construction of temporary Highway 655 by-pass and overpass.	✓	✓
Construction of the rail spur.	✓	✓
Vehicle operation within the Project Area.	–	–
Employment and expenditures <sup>1</sup>	–	–
<b>Operation (Mining and Processing)</b>		
Construction of Project infrastructure, including the expansion of ore processing components.	✓	✓
Relocation and decommissioning of Highway 655 and associated infrastructure.	✓	✓
Relocation of 500 kV transmission line.	✓	✓
Construction of the North Driftwood Diversion Channel.	✓	✓
Handling and use of explosives including blasting.	–	–
Ore extraction in the Main Zone and East Zone of the Open Pit, including drilling, loading and hauling of mine rock from the pits.	–	–
Maintenance and management of mine rock stockpiles, overburden, and Tailings Management Facility.	✓	✓
Ore processing, including conveyor, crushing and processing activities with and between the Stockpiles, crusher facilities and Process Plant.	–	–
Operation of water management systems, including the collection, management, treatment and discharge of contact water from mine components to the receiving waterbodies via collection ponds, ditches and water treatment plants.	–	–
Transportation of Ore via the rail spur line.	–	–
Waste management, including collection and temporary storage.	✓	–
Vehicle operation within the Project Area.	–	–

Physical Activities	Effects	
	Changes to soil quality	Change to soil quantity
Progressive rehabilitation of disturbed areas.	✓	✓
Employment and expenditures <sup>1</sup> .	–	–
<b>Decommissioning and Closure</b>		
Pit flooding through the creation of channels from the collection ponds towards the Open Pit.	✓	✓
Water management, including groundwater and surface water.	–	–
Decommissioning, dismantling and/or disposal of buildings and mine infrastructure.	✓	✓
Removal of power lines and electrical equipment.	✓	✓
Decommissioning of potable water and sewage systems.	✓	✓
Vehicle operation within the Project Area.	–	–
Rehabilitation, including the placement of overburden, seeding and re-grading.	✓	✓
Monitoring and maintenance.	✓	✓
Employment and expenditures <sup>1</sup> .	–	–
Notes: ✓ = Potential interaction – = No interaction 1. Project employment and expenditures are generated by most Project activities and are the main drivers of many potential socio-economic effects. Rather than acknowledging this by placing a checkmark against each of these activities, 'employment and expenditures' is listed as a separate item under each phase of the Project.		

Project activities and physical works that have no potential to cause a measurable interaction with soils are not considered further in the assessment. A justification for effects considered to have no interaction is provided below.

### Construction Phase

Mobilization of construction equipment and materials on site, dewatering of natural water bodies within the PA, and employment and expenditures will not result in soil disturbance and therefore will not interact with soil quality and quantity.

### Operations Phase

Handling and use of explosives, vehicle operation within the PA, and employment and expenditures will not result in soil disturbance and hence will not interact with soil quality and quantity. Soil disturbance associated with ore extraction of the Open Pit, ore processing, operation of water management systems, and transportation of ore via the rail spur line occurred during the construction and therefore the effects these activities have on soil quality and quantity are covered under the construction phase.

## **Decommissioning and Closure Phase**

Water management and vehicle operation within the PA. will not result in soil disturbance and therefore will not interact with soil quality and quantity.

## **11.4 Assessment of Residual Effects on Soil**

The assessment of soils focuses on changes to soil quantity and quality, which is predominately a result of earth moving activities. The methods used in the assessment of residual effects are described below, specifically analytical methods and residual effects characterization definitions.

### **11.4.1 Analytical Assessment Techniques**

Changes in soil quality from water erosion, compaction, admixing and contamination were qualitatively assessed. Soil water erosion was determined based on the anticipated soil textures and slope gradients of the reclaimed landscape with the implementation of erosion mitigations. Soil compaction was determined based on anticipated soil textures, depths and drainage and the implementation of a soil management practices related to for soil salvage, storage and replacement. Soil admixing was determined based on anticipated soil salvage and replacement techniques and mitigations. Soil contamination was based on anticipated vehicle filling and proposed mitigations.

Changes in soil quantity was determined by comparing depths of cover soil at baseline with the replacement depths outlined in the Feasibility Study (Ausenco 2023).

### **11.4.2 Change in Soil Quality**

This section describes the pathways, mitigation measures, and predicted Project residual effects related to changes in soil quality.

#### **11.4.2.1 Project Pathways**

Changes to soil quality have been further refined based on the potential pathway of affect, which are further described below:

- Change in soil quality due to water erosion - The removal of vegetation cover during construction exposes soil to raindrop, sheet, rill and gully erosion. Soil is also exposed to erosion once it is stockpiled and immediately after replacement if it is not promptly covered or revegetated. Water erosion has the potential to be higher on the closure/reclaimed landscape than at baseline due to the steeper slope gradients on the Impoundment Facility and TMF. Soil erosion can also result in the loss of soil chemical parameters such as total soil organic matter.
- Change in soil quality due to compaction - There is potential for changes to soil quality due to compaction that can occur from vehicle traffic, especially during wet conditions and on soils with finer textures and imperfect, poor and very poor drainage. Compaction results in changes to soil bulk density with accompanying alterations in soil structure, tilth, and soil porosity.

- Change in soil quality due to admixing - There is potential for changes to soil quality from admixing of cover soil and subsurface layers which may result changes in soil chemistry (i.e., soil organic matter, carbonates) or physical parameters (i.e. texture) that lead to a reduction of fertility and tilth.
- Change in soil quality due to contamination - There is potential for changes to soil quality resulting from potential fuel leaks or chemical spills (soil contamination) from equipment during the construction, operations, and decommissioning and closure phases. There is also a potential for changes to soil quality from fugitive dust. These two pathways can result in soil contaminant levels and soil chemical parameters.

#### **11.4.2.2 Mitigation and Enhancement Measures**

The following mitigation measures have been incorporated into the design of the Project and/or are proposed to avoid or reduce Project-related effects on soil quality:

- Canada Nickel will implement grading so that the surface flow of water is not impeded or concentrated to accelerate erosion, where practical. This will be further discussed in the Erosion and Sediment Control Plan.
- Canada Nickel will maintain all sediment barriers until permanent revegetation or other stabilization measures are successful.
- Canada Nickel will promptly cover and revegetate exposed soil, to the extent practical.
- Canada Nickel will restrict access, clearing and construction activities to frozen soil conditions (i.e., winter) or will implement other best management practices to limit compaction of soils that are planned to be or that are being reused for site reclamation, to the extent practical.
- Canada Nickel will avoid construction and rehabilitation activities during excessively wet soil conditions to limit soil structure damage through compaction of soils that are planned to be or that are being reused for site reclamation due to wet soil conditions, to the extent practical.
- Canada Nickel will chisel/rip/plough cover soil and subsoil (e.g., glacial till) to alleviate areas of suspected compaction during site reclamation activities, if needed.
- Canada Nickel will develop a Construction Environmental Protection Plan which will describe the proposed mitigation measures related to soils compaction.
- Canada Nickel will develop and implement a Soil Management and Rehabilitation Plan which will describe the mitigation measures related to the handling and storage of soils including how suitable soil excavated for the Project will be stockpiled for later use in rehabilitation during decommissioning.
- Canada Nickel will develop and implement a Spill Prevention and Contingency Plan which will describe spill prevention, contingency planning and reporting practices for the timely and effective response to fuel and other chemical spills. As it relates to changes to soil quality:
  - Refueling activities will be monitored at all times.
  - Vehicles and equipment will not be left unattended while being refueled.

- Containers, hoses and nozzles will be free of leaks.
  - Spills will be reported immediately to a designated Canada Nickel representative, who will then confirm appropriate spill response measures have been initiated and will undertake the necessary spill reporting procedures.
  - Containment measures will be immediately initiated to limit the spread of the spill and to limit impacts on waterbodies or other areas of environmental concern and to prevent damage to property.
  - Any contaminated soil and vegetation, as well as spent sorbent material, will be collected and disposed of at a licenced waste facility.
  - Contaminated soils will be cleaned up in consultation with spill response specialists and the appropriate government agencies.
- Canada Nickel will implement dust control measures as described in Chapter 12 of the Impact Statement (Assessment of Potential Effects on the Atmospheric Environment), including the development of an Air Quality Management Plan.

#### **11.4.2.3 Project Residual Effects**

The residual effects to soil quality are expected to be 'adverse', the magnitude of soil erosion is expected to be 'low' to 'moderate' and limited to the extent of the PA. The effects of soil erosion may occur as 'multiple irregular events' subject to weather and rainfall. The effects of soil erosion on soil quality are 'medium-term' as soil erosion is expected during the construction phase and rehabilitation (progressive rehabilitation during the operations phase and active closure) of the Project and the loss of soil from erosion is considered 'reversible'.

Implementation of mitigation measures such as preferably trying to conduct soil salvage and replacement in frozen conditions, and chisel/ploughing soils with suspected compaction during replacement operations. Where compaction occurs, the effect will be 'adverse', the magnitude of soil compaction is expected to be 'low' and limited to the extent of the PA. The effects of soil compaction may occur as 'multiple irregular events' subject to weather and level of activity during non-frozen conditions or wet conditions. The potential effects of soil compaction on soil quality are 'medium-term' and 'reversible'.

Implementation of mitigation measures such as supervising and/or monitoring soil salvage and replacement operations by the Environmental Department the risk of admixing. The residual effects of admixing to soil quality are expected to be 'adverse' and 'low' in magnitude and limited to the extent of the PA. The effects of soil admixing may occur as 'multiple irregular events' due to soil moisture conditions and are 'medium-term' occurring during soil salvage and replacement activities. The effect of soil admixing is considered 'reversible'.

The application of mitigation measures should greatly reduce the risk of soil contamination. The residual effects of contamination to soil quality are expected to be 'adverse' and 'low' in magnitude, and limited to the extent of the PA. The effects of soil contamination may occur as 'multiple irregular events' and the effects are considered 'reversible'.

### 11.4.3 Change in Soil Quantity

This section describes the pathways, mitigation measures, and predicted Project residual effects related to changes in soil quantity.

#### 11.4.3.1 Project Pathways

Cover soils will be salvaged and stockpiled from planned disturbed areas. Stockpiled materials would be used for rehabilitation purposes during reclamation. Table 11.5 outlines the approximate cover soil depths and areas at baseline, the replacement depths, and areas on rehabilitated facilities as well as areas where no cover soil will be replaced (refer to Figures 11.3.1-11.3.12 for visual representation of the planned closure soil types). Soil disturbance is limited to the PA and hence approximately 8,291 hectares (ha) (49%) of the LSA will not be disturbed and cover soil will remain intact. Reclamation cover soil will be replaced on approximately 6,475 ha (38% of the LSA) of land disturbed by mining at closure. Reclamation cover soils depths replacement was based on depth outlined in the feasibility study (Ausenco 2023). These reclamation cover soil depths and the exact schedule of reclamation activities may change as the reclamation planning process progresses through the life of the Project in accordance with O. Reg. 35/24. Cover soil will not be replaced for areas such as the pit lake, ponds, and diversion channels which occupy approximately 2,131 ha (13% of the LSA) of land disturbed by the Project.

**Table 11.5 Baseline and Closure Cover Soil Depths in the Soil Local Study Area**

Baseline				Closure and Rehabilitation			
Baseline Soil Map Unit	Area (ha)	Area (%)	Cover Soil Depths (cm)	Closure Soil Map Units or Rehabilitation Areas	Area (ha)	Area (%)	Cover Soil Depths (cm)
Abitibi 1	454	2.68%	15 to 25	Abitibi 1	405	2%	15 to 25
Abitibi 2	9	0.05%	15 to 25	Abitibi 2	9	< 1%	15 to 25
Devitt 1	49	0.88%	15 to 35	Devitt 1	81	1%	15 to 35
Devitt 2	1,051	6.22%	15 to 35	Devitt 2	813	5%	15 to 35
Fluvial	108.7	0.64%	20	Fluvial	97.0	1%	20
Ford 1	678.0	4.01%	20	Ford 1	499	3%	20
Ford 2	854.2	5.06%	20 to 40	Ford 2	415	2%	20 to 40
Ford 3	1,868.2	11.06%	20 to 40	Ford 3	1,221	7%	20 to 40
Harley	1,879.2	11.12%	140	Harley	1,024	6%	140
Kenogami 1	321	1.90%	40 to 120	Kenogami 1	191	1%	40 to 120
Kenogami 2	1,327	7.85%	40 to 120	Kenogami 2	366	2%	40 to 120
Kenogami 3	2,347	13.87%	40 to 120	Kenogami 3	814	5%	40 to 120
Kushog	146	0.86%	60 to 100	Kushog	86	1%	60 to 100
Larder	298	1.76%	140	Larder	192	1%	140
Lowther 1	175	1.04%	20 to 25	Lowther 1	111	1%	20 to 25
Lowther 2	614	3.64%	20 to 25	Lowther 2	219	1%	20 to 25

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Baseline				Closure and Rehabilitation			
Lowther 3	122	0.72%	20 to 25	Lowther 3	120	1%	20 to 25
Shetland 1	712	4.22%	5 to 40	Shetland 1	199	1%	5 to 40
Shetland 2	708	4.19%	5 to 40	Shetland 2	228	1%	5 to 40
Shetland 3	1,023	6.06%	5 to 40	Shetland 3	547	3%	5 to 40
Uno Park	1,598	9.46%	40 to 140	Uno Park	656	4%	40 to 140
<b>Subtotal Natural Soils</b>	<b>16,438</b>	<b>97%</b>		<b>Subtotal Natural Soils</b>	<b>8,291</b>	<b>49.%</b>	
	-	-	-	Conveyor	3	<1%	15
	-	-	-	Explosive Pad	1	<1%	15
	-	-	-	HV Fuel Farm	1	<1%	15
	-	-	-	Magazine Storage	0.2	<1%	15
	-	-	-	Ponds Water Treatment Plant	3	<1%	15
	-	-	-	Primary Crusher Phase	0.0	0.00%	15
	-	-	-	Process Plant Area	166	2%	15
	-	-	-	Process Plant Phase	22.	<1%	15
	-	-	-	Reclaim Waste Rock Dump	13	<1%	15
	-	-	-	ROM Stockpile Phase	2	<1%	15
	-	-	-	Site Ditch	61	<1%	15
	-	-	-	Site Road	60	<1%	15
	-	-	-	Stockpile East	253	2%	15
	-	-	-	Stockpile West	435	3%	15
	-	-	-	Substation	1	<1%	15
	-	-	-	TMF Water Treatment Plants	2	<1%	15
	-	-	-	Truckshop & Wash/ Warehouse/ Office	1	<1%	15
	-	-	-	Clay Impoundment	1,078	6%	5
	-	-	-	Reclaim Stockpile	26	<1%	5

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**Chapter 11 Assessment of Potential Effects on Soil**  
September 30, 2024

Baseline				Closure and Rehabilitation			
	-	-	-	Rock Impoundment	1,801	11%	5
	-	-	-	Sand & Till Impoundment	252	2%	5
	-	-	-	Tailings Management Facility	2,293	14%	Simple Cover and vegetate
	-	-	-	<b>Subtotal Reclaimed Soils</b>	<b>6,475</b>	<b>38%</b>	
	-	-	-	Discharge Route	15	1%	0
	-	-	-	Open Pit	993	6%	0
	-	-	-	Ponds	82	1%	0
	-	-	-	TMF Diversion	40	<1%	0
	-	-	-	Storage Pond	2	<1%	0
	-	-	-	Pit Lake Shoreline	58	<1%	0
	-	-	-	Rail Spur	50	<1%	0
	-	-	-	Highway 655	95	1%	0
	-	-	-	TMF Collection Pond	90	1%	0
				<b>Subtotal No Soil Replacement</b>	<b>1,424</b>	<b>9%</b>	
Existing Disturbance	297	1.76%	0		196	1%	0
Water	160	0.95%	0		129	1%	0
Rock	1	0.01%	0		1	<1%	0
Diversion Channel Area Alternative A	-	-			381	2%	0
<b>Subtotal Misc</b>	<b>459</b>	<b>2.71%</b>		<b>Subtotal Misc</b>	<b>707</b>	<b>4%</b>	
<b>Total</b>	<b>16,896</b>	<b>100.00%</b>		<b>Total</b>	<b>16,896</b>	<b>100.00%</b>	

### **11.4.3.2 Mitigation and Enhancement Measures**

The following mitigation measures have been incorporated into the design of the Project and/or are proposed to avoid or reduce Project-related effects on soil quantity:

- Canada Nickel will limit the construction footprint (i.e., Project Area), to the extent possible, to reduce soil disturbance.
- Canada Nickel will salvage cover soil prior to disturbance and reuse this material for rehabilitation at closure, to the extent practical (refer to Figure 11.2 and Figure 11.3 for details on soil type and condition at closure).
- Canada Nickel will implement grading so that the surface flow of water is not impeded or concentrated to accelerate erosion, where practical, in accordance with the Erosion and Sediment Control Plan.
- Canada Nickel will implement grading so that the surface flow of water is not impeded or concentrated to accelerate erosion, where practical, in accordance with the Erosion and Sediment Control Plan.
- Canada Nickel will develop and implement an Erosion and Sediment Control Plan which will describe the measures and best management practices to be implemented to protect the environment, through reduction of site erosion and protection of nearby watercourses and/or waterbodies from sedimentation. Specifically:
  - Implementation of soil stabilization and erosion protection measures.
  - Inspection of measures regularly and after substantive precipitation events.
  - Maintenance of measures until soils are stabilized and/or permanent revegetation measures are successful, and the adjacent upland areas are stabilized.

### **11.4.3.3 Project Residual Effects**

The residual effects of changes to soil baseline and replacement depths are expected to be adverse and moderate in magnitude since approximately 87% of the LSA will have intact or replaced cover soil that can sustain plant growth following reclamation. The effects of changes in cover soil depth will occur as a single event when soils are being salvaged and is considered irreversible.

### 11.4.4 Summary of Project Residual Effects

Table 11.6 summarizes Project residual effects on soil.

**Table 11.6 Project Residual Effects on Soil**

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in soil quality	C and O	A	L-M	PA	MS	MT	IR	R
	D	A	L	PA	MS	MT	IR	R
Change to soil quantity	C, O and D	A	M	PA	MS	MT	S	IR
<p><b>KEY</b>                      See Table 11.3 for detailed definitions.</p> <p><b>Project Phase</b>                      C: Construction                      O: Operations                      D: Decommissioning and closure</p> <p><b>Direction:</b>                      P: Positive                      A: Adverse                      N: Neutral</p> <p><b>Magnitude:</b>                      N: Negligible                      L: Low                      M: Moderate                      H: High</p> <p><b>Geographic Extent:</b>                      PA: Project Area                      LSA: Local Study Area                      RSA: Regional Study Area</p> <p><b>Timing</b>                      NS: No sensitivity                      MS: Moderate sensitivity                      HS: High sensitivity</p> <p><b>Duration:</b>                      ST: Short-term                      MT: Medium-term                      LT: Long-term</p> <p><b>Frequency:</b>                      S: Single event                      IR: Multiple irregular event                      R: Multiple regular event                      C: Continuous</p> <p><b>Reversibility:</b>                      R: Reversible                      I: Irreversible</p> <p>N/A: Not applicable</p>								

#### 11.4.4.1 Summary of Adverse Residual Effects

There is an adverse change in soil quality and soil quantity due to soil erosion, soil compaction, soil admixing, soil contamination and changes in soil cover depths. The magnitude of adverse effects to soil quality is low to moderate during construction and operations phases, and low during the decommissioning and closure phase, limited to the PA, medium-term in duration and reversible. The magnitude of adverse effects to soil quantity is moderate, limited to the PA, medium-term in duration and irreversible. While soil will be lost during construction, the quantity of soil lost will be reduced through salvage activities in preparation for progressive rehabilitation throughout the life of the mine and during reclamation. By salvaging soil and managing it throughout the Project phases, potential adverse effects on soil will be reduced.

## **11.5 Potential Effects on Federal Lands**

There are no federal lands within the PA, LSA or RSA for Soil. As such, no effects to federal lands are anticipated as a result of the Project.

## **11.6 Prediction Confidence**

### **11.6.1 Change in Soil Quality**

Prediction confidence for changes on soil quality is high based on professional judgement and prior experience. Field data collected in the PA allows for a high level of confidence of predicted effects on erosion and compaction risk. The mitigation measures proposed will be designed on scientific principles, known best management practices that has past been effective at mitigating against soil erosion, compaction and contamination.

### **11.6.2 Change in Soil Quantity**

Prediction confidence for changes on soil quantity is high based on the quality of the baseline soil data collected in the PA that allows for a high level of confidence in the depth of cover soil. The mitigation measures proposed are based on scientific principles and known best management practices.

## **11.7 Assumptions**

A conservative approach was taken when assessing the Project effects on the soil quality parameters of soils erosion, soil compaction, soil admixing and soil contamination in order to assess for a worst-case scenario. Hence project effects may be overestimated.

Soil erosion risk may increase as vegetation is cleared, slope gradients are recontoured and steepened, and soils are exposed splash, sheet wash, rill and gully erosion. However, it is assumed that Canada Nickel will plan and implement adequate surface erosion mitigations and set up a robust monitoring program that determines the effectiveness of mitigation and can respond to changing conditions and events.

Soil compaction may increase due to machine traffic moving over soil during vegetation clearing, soil salvage, construction and soil replacement activities. The risk of soil compaction is greatest when machinery traffic moves over the same spot numerous times and/or during wet weather/moist soil conditions. Canada Nickel will preferably try to conduct soil salvage and replacement in frozen conditions, where feasible. In addition, soil compaction may be alleviated on reclaimed soils by plowing/chiselling soils.

Soil admixing may occur during soil salvage and replacement activities when the cover soil is mixed with the underlying subsoil. It is assumed that Canada Nickel will plan and implement measures such as separately salvaging and stockpiling cover soils and subsoils and appointing the Environmental Department to oversee soil salvage and replacement activities.

Soil contamination is a risk machine traffic spills, refueling and maintenance. It is assumed that the mitigations enacted by Canada Nickel will significantly reduce soil contamination and there will be a prompt monitoring and clean up of spill/contamination events.

Soil will be salvaged, stockpiled and later replaced on the reclaimed landscape. The volumes and depth of replaced cover soil will be less than baseline, but this should not affect the soil's ability to function within a natural ecosystem or sustain plant growth.

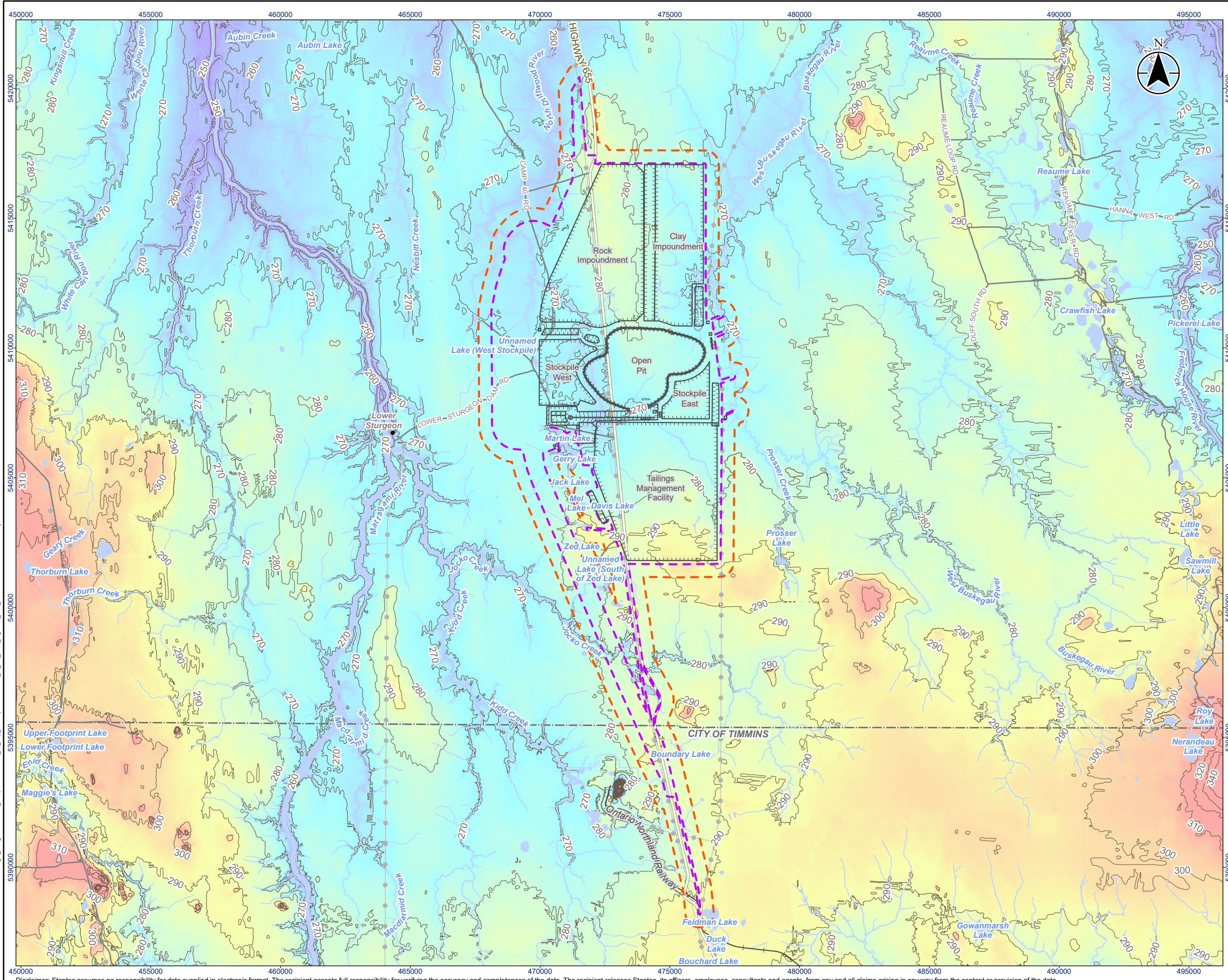
## 11.8 Follow-up and Monitoring

Canada Nickel will implement follow-up and monitoring programs to verify the accuracy of effects and to evaluate the effectiveness of mitigation measures, the results of which will be used to identify and implement adaptive management measures, as appropriate. As it relates to soil quality and quantity, follow-up and monitoring measures will be implemented to monitor effectiveness of erosion and sediment control measures and the effectiveness and suitability of soils for reclamation. Chapter 34 of the Impact Statement includes additional details on follow-up and monitoring programs proposed by Canada Nickel.

## 11.9 References

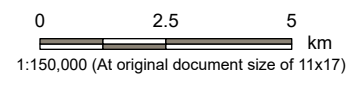
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## 11.10 Figures



**Legend**

- Project Area
  - Local/Regional Study Area
  - Contour (10 m Interval)
  - Major Road
  - Minor Road
  - Railway
  - Existing Transmission Line
  - Watercourse
  - Municipal Boundary - Lower Tier
  - Waterbody
- Elevation (masl)**
- 327.17
251.03



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
  3. Elevation: Provincial Digital Elevation Model (PDEM), updated 2023-100-16, Ontario Ministry of Natural Resources and Forestry.



Project Location: Timmins, Ontario  
 Prepared by: awhite on 2024-09-20

Client/Project: Canada Nickel Company (CNC)  
 Crawford Nickel Project

Figure No. **11.1**  
 Title **Local/Regional Study Area for Soil**

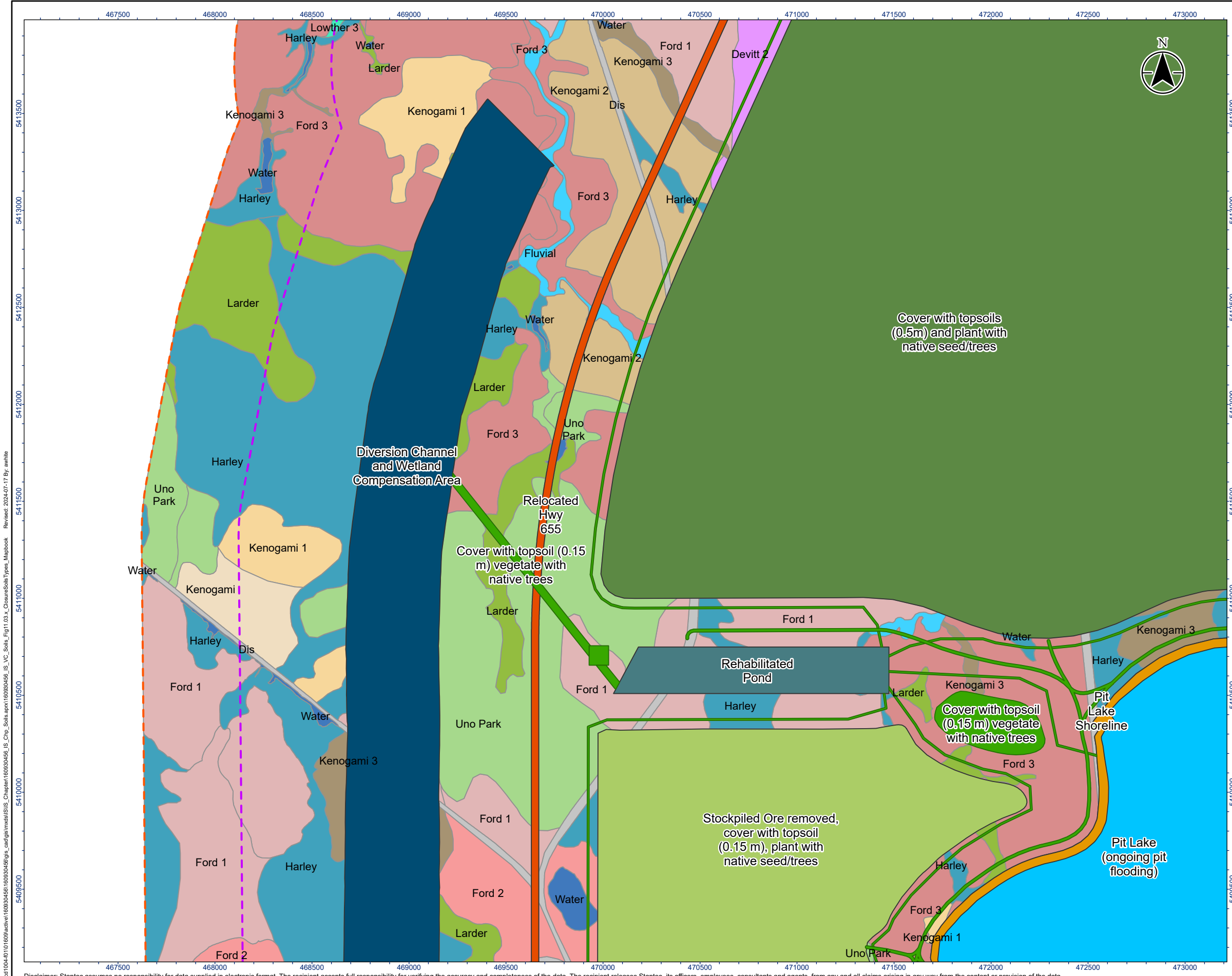
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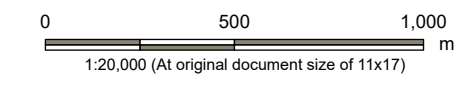






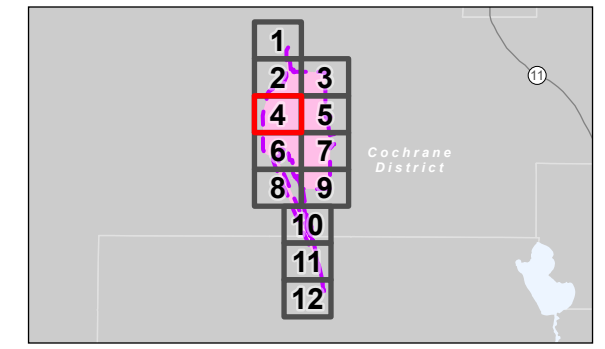
**Legend**

Project Area	Soil Management Units
Local/Regional Study Area	Devitt 2
<b>Soil Replacement</b>	Dis
Cover with topsoil (0.15 m) vegetate with native trees	Fluvial
Cover with topsoils (0.5m) and plant with native seed/trees	Ford 1
Stockpiled Ore removed, cover with topsoil (0.15 m), plant with native seed/trees	Ford 2
<b>Rehabilitated Features</b>	Ford 3
Diversion Channel and Wetland Compensation Area	Harley
Pit Lake Shoreline	Kenogami
Rehabilitated Pond	Kenogami 1
<b>Permanent Feature</b>	Kenogami 2
Pit Lake (ongoing pit flooding)	Kenogami 3
Relocated Hwy 655	Larder
	Lowther 3
	Uno Park
	Water



**Notes**

1. Coordinate System: NAD 1983 UTM Zone 17N
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Project Location: Timmins, Ontario  
 Prepared by: awhite on 2024-07-17

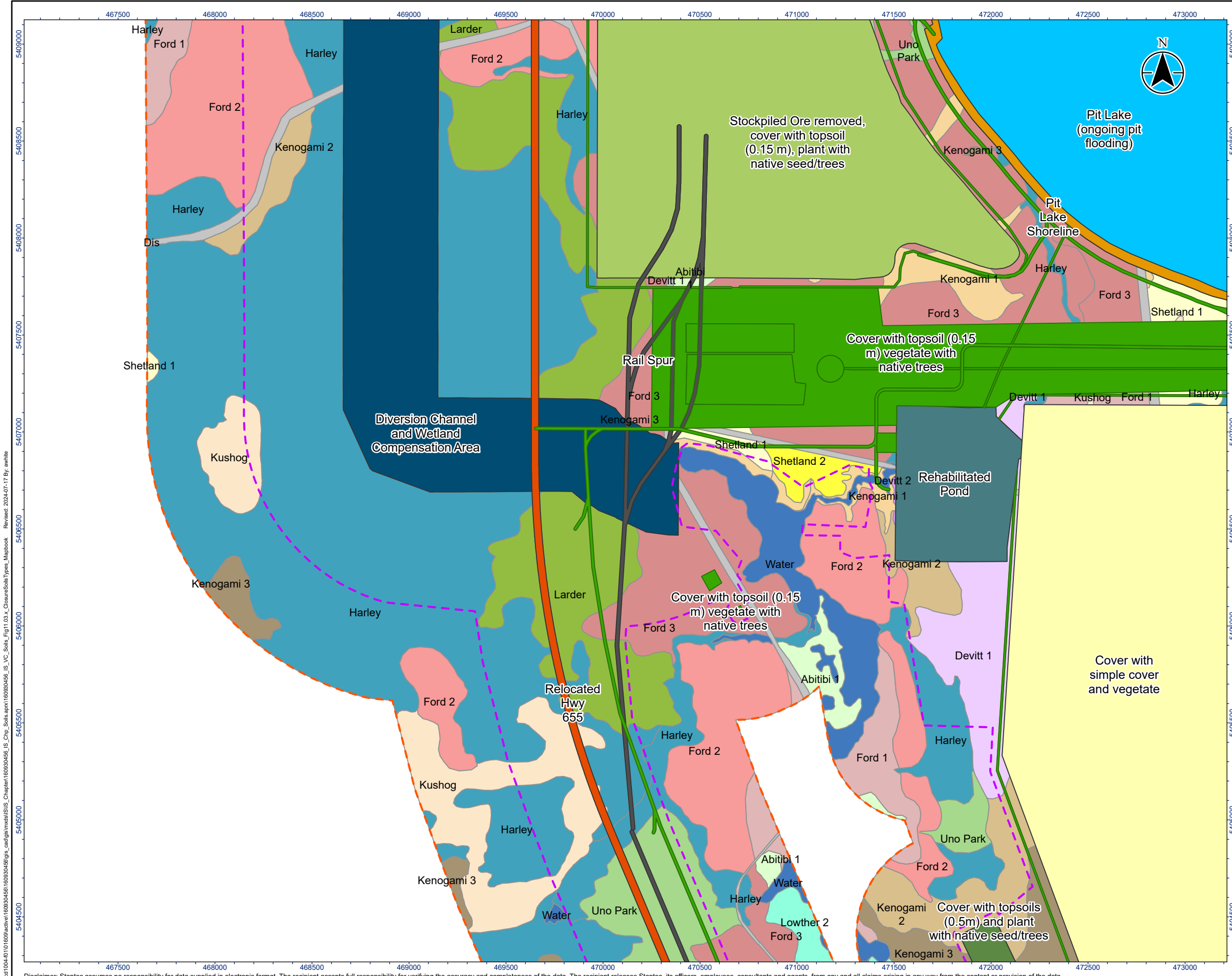
Client/Project: Canada Nickel Company (CNC)  
 Crawford Nickel Project

Figure No.: **11.3.4**

Title: **Closure Soil Types**

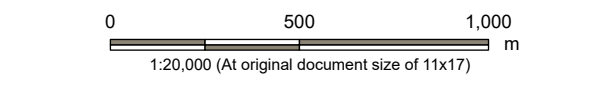
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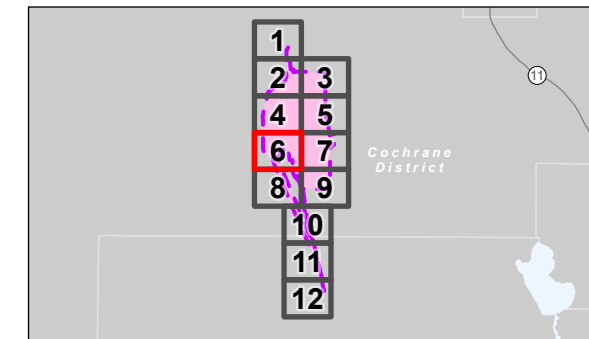


**Legend**

Project Area	Soil Management Units
Local/Regional Study Area	Abitibi 1
Cover with simple cover and vegetate	Devitt 1
Cover with topsoil (0.15 m) vegetate with native trees	Devitt 2
Cover with topsoils (0.5m) and plant with native seed/trees	Dis
Stockpiled Ore removed, cover with topsoil (0.15 m), plant with native seed/trees	Ford 1
Diversion Channel and Wetland Compensation Area	Ford 2
Pit Lake Shoreline	Ford 3
Rehabilitated Pond	Harley
Permanent Feature	Kenogami 1
Pit Lake (ongoing pit flooding)	Kenogami 2
Rail Spur	Kenogami 3
Relocated Hwy 655	Kushog
	Larder
	Lowther 2
	Shetland 1
	Shetland 2
	Uno Park
	Water



**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 17N  
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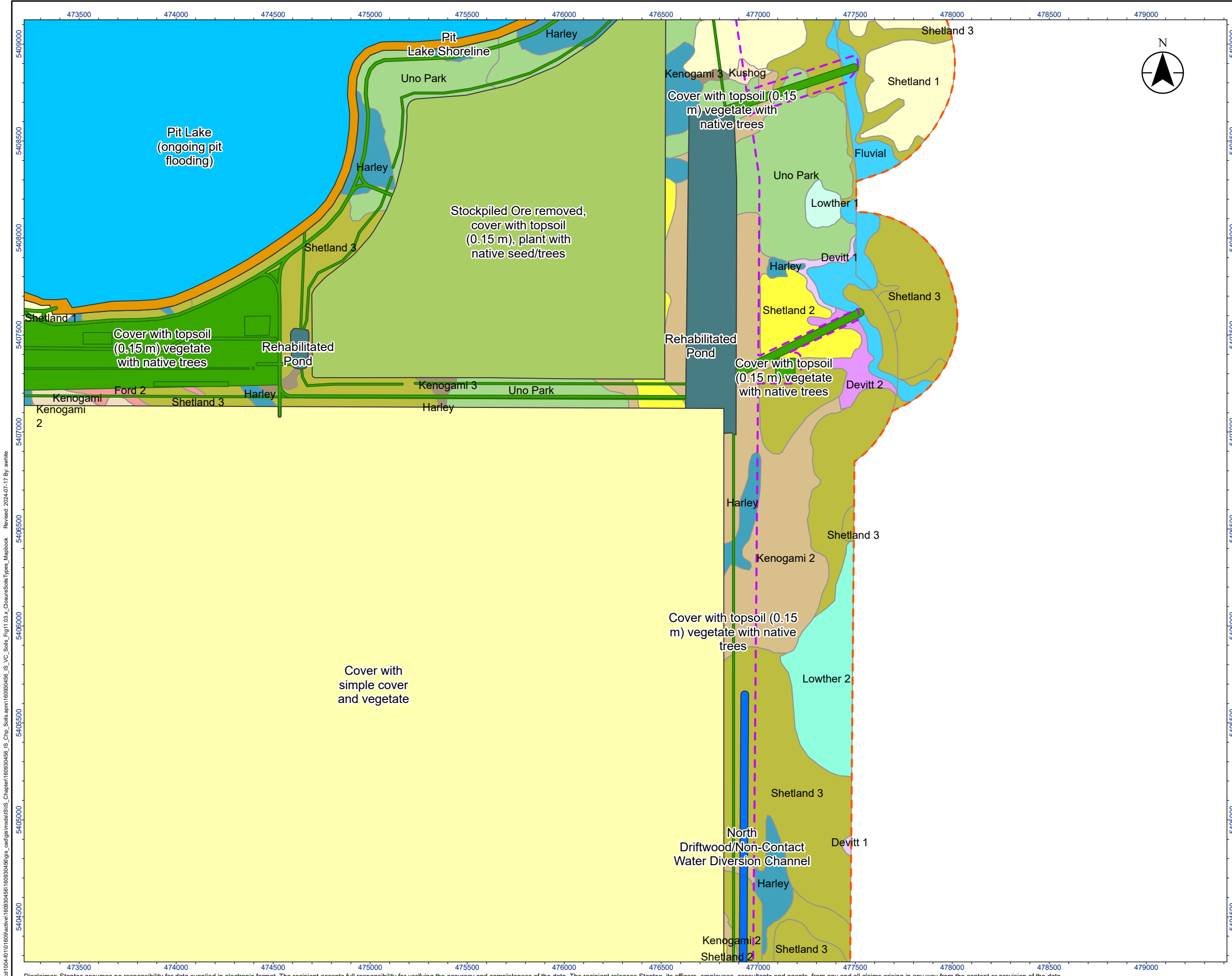
Project Location: Timmins, Ontario  
 Prepared by: awwhite on 2024-07-17

Client/Project: Canada Nickel Company (CNC)  
 Crawford Nickel Project

Figure No.: **11.3.6**

Title: **Closure Soil Types**

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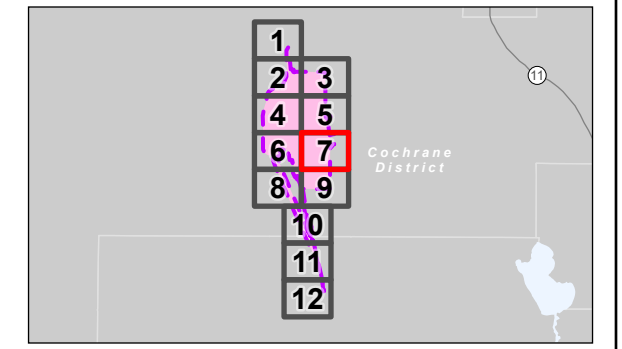


**Legend**

Project Area	Soil Management Units Devitt 1
Local/Regional Study Area	Devitt 2
Cover with simple cover and vegetate	Fluvial
Cover with topsoil (0.15 m) vegetate with native trees	Ford 2
Stockpiled Ore removed, cover with topsoil (0.15 m), plant with native seed/trees	Harley
Rehabilitated Features Pit Lake Shoreline	Kenogami
Rehabilitated Pond	Kenogami 2
Permanent Feature North Driftwood/Non-Contact Water Diversion Channel	Kenogami 3
Pit Lake (ongoing pit flooding)	Kushog
	Lowther 1
	Lowther 2
	Shetland 1
	Shetland 2
	Shetland 3
	Uno Park



**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 17N  
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

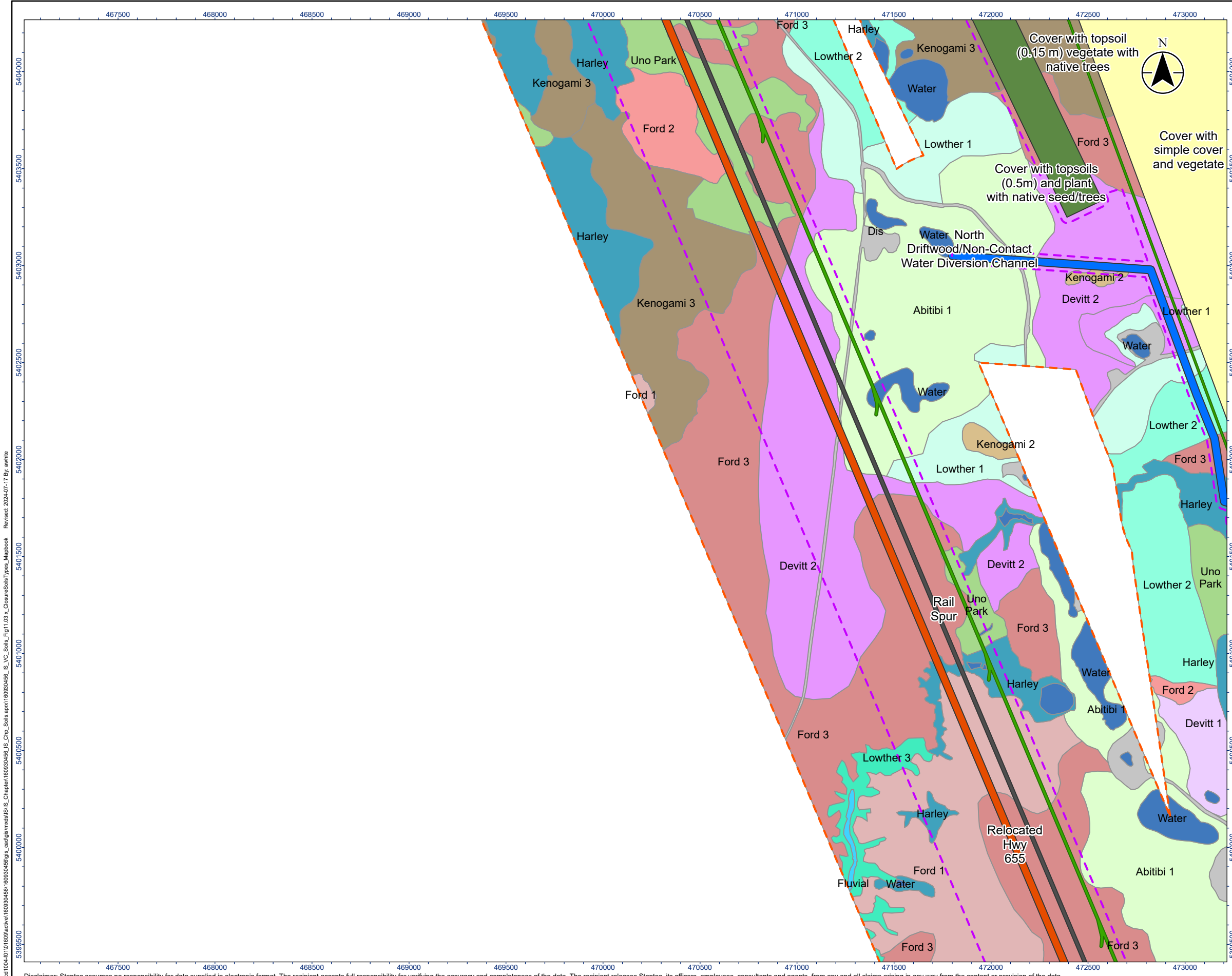


Project Location: Timmins, Ontario  
 Prepared by: awwhite on 2024-07-17  
 Reference: 160903456 REVA

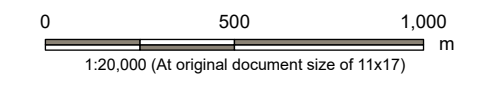
Client/Project: Canada Nickel Company (CNC) Crawford Nickel Project

Figure No.: **11.3.7**  
 Title: **Closure Soil Types**

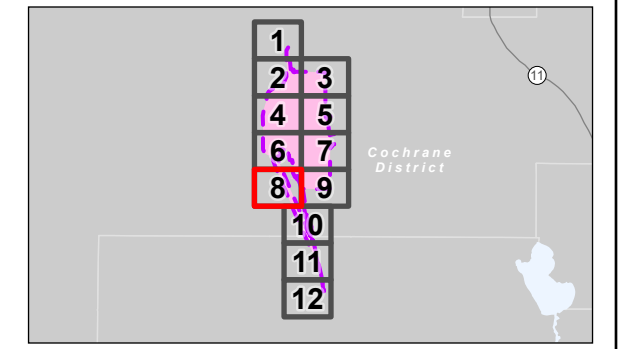
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- Legend**
- Project Area
  - Local/Regional Study Area
  - Cover with simple cover and vegetate
  - Cover with topsoil (0.15 m) vegetate with native trees
  - Cover with topsoils (0.5m) and plant with native seed/trees
  - Permanent Feature
  - North Driftwood/Non-Contact Water Diversion Channel
  - Rail Spur
  - Relocated Hwy 655
- Soil Management Units**
- Abitibi 1
  - Devitt 1
  - Devitt 2
  - Dis
  - Fluvial
  - Ford 1
  - Ford 2
  - Ford 3
  - Harley
  - Kenogami 2
  - Kenogami 3
  - Lowther 1
  - Lowther 2
  - Lowther 3
  - Uno Park
  - Water



**Notes**  
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Project Location: Timmins, Ontario  
 Prepared by: awwhite on 2024-07-17

Client/Project: Canada Nickel Company (CNC)  
 Crawford Nickel Project

Figure No.: **11.3.8**

Title: **Closure Soil Types**







