



CANAGOLD



New Polaris Gold Mine Environmental Assessment Certificate Application

Section 7.6 - Soil and Vegetation

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7.6 Soil and Vegetation

7.6.1 Introduction

As specified in Section 5 of the Application Information Requirements (AIR), Soil and Vegetation was identified as a valued component (VC) to be assessed for the New Polaris Gold Mine Project (the Project). The purpose of this section is to describe the existing environmental conditions and to assess the potential effects of the Project on soil and vegetation during all Project Phases. In addition, the assessment considers potential cumulative effects arising from past, present, and anticipated future developments and activities. The section herein presents the assessment of both soil (including terrain) and vegetation VCs.

Soil was selected as a VC based on the likelihood of interaction with the Project. The Project has the potential to result in the effects to three subcomponents: soil quality, soil quantity, and unique geologic landforms (terrain). Effects to soil are interconnected to other VCs as part of the larger environment. Components of this assessment inform and integrate information from the following sections:

- Air Quality (Section 7.2)
- Water Resources (Section 7.4)
- Vegetation (Section 7.6), and
- Wildlife (Section 7.7).

Vegetation was selected as a VC based on the likelihood of interaction with the Project, as well as its contributing role to biodiversity, ecosystem function, and maintenance of wildlife habitat. Vegetation also contributes to environmental, socioeconomic, and cultural values of Indigenous groups, regulators, the public, and other stakeholders. The Project has the potential to result in the alteration or loss of ecosystems, known plant species of interest, plant communities of interest, and wetlands.

The Vegetation VC has four subcomponents: ecosystems, plant species of interest, plant communities of interest, and wetlands. Effects on vegetation are interconnected to other VCs as part of the larger environment. Components of this assessment inform and integrate information from the following sections:

- Air Quality (Section 7.2)
- Water Resources (Section 7.4)
- Aquatic and Marine Resources (Section 7.5)
- Soils (Section 7.6)
- Wildlife (Section 7.7)
- Human Health (Section 7.8)
- Socio-Economic and Community Health (Section 7.9),
- Land and Resource Use (Section 7.10), and
- Culture (Section 7.12).

7.6.2 Relevant Statutes, Policies, and Frameworks

Soil and vegetation assessments are subject to several policies and frameworks. The AIR for the Project, issued by the BC Environmental Assessment Office (BC EAO) in April 2020, outlines the requirements of the soil and terrain effects assessment to meet the requirements under the BC *Environmental Assessment Act*, SBC 2018, c.51. Management of soil and vegetation will be coordinated with management of relevant environmental, social, economic heritage, and health effects VCs, and managed in accordance with applicable legislation and regulations, as outlined in **Table 7.6-1**.

Table 7.6-1 Key Legislation, Policy, and Regulatory Guidance Documents for Soil and Vegetation

Legislation, Policy, or Guiding Document	Summary
Federal	
Canadian Environmental Quality Guidelines, as amended (CEQG 2007)	Provides guidance for contamination of terrestrial habitat under the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (2007); contains Canada-wide standards to the maximum allowable concentrations in soil of numerous potential contaminants of concern.
Federal Policy on Wetland Conservation (Government of Canada 1991)	Provides goals, guiding principles, and strategies to protect, promote, conserve, and enhance wetlands located on federal lands and waters in Canada, based on scientific evidence and cooperation.
Fisheries Act , RSC 1985, c. F-14 (Government of Canada 1985a)	Prohibits harmful alteration, disruption, and destruction of fish habitat, supports restoration of fish habitat and riparian areas, and regulates commercial fisheries and other industry and development, promoting a biodiversity- and ecosystem-based approach.
Seeds Act , RSC 1985, c. S-8, and regulations (Government of Canada 1985b)	Regulates seeds sold, imported, exported, and released into the environment; must meet established standards of registration, quality, testing, inspection, and labelling.
Species at Risk Act , SC 2002, c. 29 (SARA) (Government of Canada 2002)	Protects species listed on Schedule 1 as Extirpated, Endangered, and Threatened, and affords species listed as Special Concern the benefits of management planning. (Species included in Schedule 1 are established by the federal Cabinet and are based on recommendations by COSEWIC and consultation with government, Indigenous groups, and the public.) SARA focuses on establishing and implementing plans to protect listed species and their critical habitat, reduce threats, and foster recovery. A management plan has been proposed for cryptic paw lichen (<i>Nephroma occultum</i>) (Environment Canada 2012), a SARA-listed vegetation species that has the potential to occur in the vicinity of the Project. SARA-listed vegetation species are further described in Section 7.6.2 .
Provincial	
BC Conservation Framework (BC MOE 2009)	Designed to prioritize species and ecosystems for conservation, select effective conservation actions, and co-ordinate management actions; results can be used to advise conservation programs for a variety of stakeholders and organizations.
Contaminated Sites Regulation , BC Reg 375/96 (CSR), last amended October 27, 2025 by B.C. Reg. 171/1015 under the Environmental Management Act , SBC 2003, c. 53 (EMA)	The CSR provides quantitative standards to define site contamination and to assess reclamation success. (Consolidated Regulations; last amended October 27, 2025) The EMA prohibits the introduction of deleterious substances into the environment in any manner or quantity that may cause pollution to the environment.
Develop with Care 2014: Environmental Guidelines for Urban and Rural Development in BC (BC GOV 2014a)	Purpose is to provide province-wide direction for maintaining environmentally valuable resources during urban and rural land development; includes species, features, or environmentally valuable resource locations that enhance the biodiversity of an area; may include common or rare species or habitats.

Legislation, Policy, or Guiding Document	Summary
<u>Energy Resource Activities Act</u> , SBC 2008, c. 36 (<u>BC GOV 2008</u>)	Regulates energy-related infrastructure; sets the legal standards for land clearing and habitat protection through the <u>Environmental Protection and Management Regulation</u> , BC Reg 200/2010; support provincial objectives for forest health, invasive species control, and restoration and reclamation.
<u>Forest Act</u> , RSBC 1996, c. 157 (<u>BC GOV 1996a</u>)	Regulates timber tenure and the legal right to harvest Crown timber; authorizes tree clearing and governs the issuance of cutting permits and occupant licences to cut.
<u>Forest and Range Practices Act</u> , SBC 2002, c. 69 (Minister of Forest and Range Management and Research, BC, assented to November 21, 2002)	Applies constraints to when, where, and how forest clearing is undertaken for forest and range licensees and applies protection to Old Growth forests through establishment of Old Growth Management Areas (OGMAs), and to riparian areas (through Division 3, Riparian Areas, of the <u>Forest Planning and Practices Regulation</u> , BC GOV, 2025).
Handbook for Mineral and Coal Exploration in BC (<u>BC MEMPR and BC MOE 2008</u>)	Compiles existing knowledge and recommended management practices for coal exploration and mining, including practices for water management and reclamation.
Health, Safety and Reclamation Code for Mines in BC (<u>BC MEMLCI 2024</u>)	Guides mining operations to minimize associated risks to human and environmental health and safety and provide standards for reclamation; focuses on mine operation and personnel. Reclamation standards include land use, revegetation, watercourse, and monitoring specifications.
<u>Integrated Pest Management Act</u> , SBC 2003, c. 58 (<u>BC GOV 2003</u>)	Regulates the sale and use of pesticides to reduce reliance on and use of pesticides. From a vegetation perspective, the Act regulates the use of herbicides to control weeds and invasive plants.
<u>Invasive Plant Regulation</u> , BC Reg 18/2004 (<u>BC GOV, 2004</u>)	Identifies specific invasive plant species whose introduction or spread is prohibited under Section 47 of the <i>Forest and Range Practices Act</i> .
<u>Local Government Act</u> , RSBC 2015, c. 1 (BC GOV, 2015)	Provides a legal framework and foundation for the establishment and continuation of local governments to respond to the needs of the communities, the powers to fulfil their purposes and the flexibility to respond to the needs and changing circumstances of their communities.
<u>Local Services Act</u> , RSBC 1996, c. 276 (BC GOV, 1996)	Provides a mechanism for unincorporated rural areas to receive essential services, such fire protection, ambulance, garbage collection, and conservation of heritage property.
<u>Land Act</u> , RSBC 1996, c. 245, and <u>Land Use Objectives Regulation</u> , BC Reg 357/2005 (BC GOV, 2005)	Enables the Province to convey Crown land to the public for community, business, or industrial use, which is partly managed under the Act. Sustainable management of Crown Land and natural resources is guided in part by the Act and associated regulations, in addition to land use plans, which work to protect species at risk and their habitats within certain geographical regions.

Legislation, Policy, or Guiding Document	Summary
Mines Act , RSBC 1996, c. 293 (BC GOV, 1996)	Requires proponents to provide, as part of the approvals process: ▫ Data relating to existing surficial geology, terrain mapping, soils, vegetation, wildlife, and land use, and ▫ A Soil Salvage and Handling Plan, an Erosion Control Plan and a Closure and Reclamation Plan. The Act also warrants terrain stability risks and soil types to be characterized in support of the permitting process. Pursuant to the Act, the above is required under the Health, Safety, and Reclamation Code for Mines in BC (2021), which also requires environmental protection and reclamation of disturbances to be planned for in advance; and the Guide to Processing a Mine Project under the BC Mines Act (2009) cites that terrain mapping must be carried out as part of mine's application.
Order Establishing Provincial Non-Spatial Old Growth Objectives (BC GOV 2004b)	Identifies the age and amount of Old Growth forest (as a percentage) to be maintained in various natural disturbance types (NDTs), biogeoclimatic zones, and landscape units to maintain target biodiversity values, and subsequently the amount available for timber harvesting.
Policy for Mitigating Impacts on Environmental Values (BC GOV 2014b)	Provides guidance to decisions concerning environmental mitigation measures; incorporates environmental, social, and economic values, encourages use of the best available data and data sharing, and provides a recommended mitigation hierarchy and mitigation process and plan.
Riparian Areas Protection Act , SBC 1997, c. 21 (BC GOV 1997), and Riparian Areas Protection Regulation , BC Reg 178/2019 (BC GOV 2019)	Regulates approval of work in and around waterbodies, including provision of directives relating to the protection and enhancement of riparian areas.
Water Sustainability Act , SBC 2014, c. 15 (BC GOV 2014c)	Manages the licensing, diversion, and use of water resources, including regulation of changes made in and around waterbodies, and provision of directives to protect water quantity, water quality, and aquatic ecosystems.
Weed Control Act , RSBC 1996, c. 487 (BC GOV 1996d), and Weed Control Regulation , BC Reg 66/85 (BC GOVC 1985)	Establishes the duty to control designated noxious weeds growing on any occupied land; the regulation specifies provincial and regional noxious weeds and provides instruction on controlling their introduction and spread.
Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in BC (Cox and Cullington 2009)	Provides recommended practices on wetland protection and conservation to land managers and land users, with the goal of maintained or increased wetland quality and quantity; includes specific guidelines for various sectors, including mining.

Legislation, Policy, or Guiding Document	Summary
<u>Agricultural Land Commission Act</u> , SBC 2002, c. 36 (BC GOV, 2002)	Preserves agricultural land to encourage farming on agricultural land in collaboration with other communities of interest, and to encourage local governments, First Nations, the government, and its agents to enable and accommodate farm use of agricultural land and uses compatible with agriculture in their plans, bylaws, and policies.
<u>Park Act</u> , RSBC 1996, c. 344 (BC GOV, 1996)	Provides a legal framework to designate, classify, and manage provincial parks, conservancies, and recreation areas. Its primary purpose is to protect natural environments, biodiversity, and cultural values while providing for public recreation, education, and enjoyment of these areas.
<u>Mineral Tenure Act</u> , RSBC 2004 c. 292 (BC GOV, 2004)	Governs mineral rights acquisition, claim registration, rights of entry to conduct exploration, mandates liability and access to claim holders, prescribes tenure maintenance, and maintains the legal registry of mineral titles.
Joint AIR for Mines Act and Environmental Management Act Permits (BC GOV 2024)	Provides guidance on the technical information requirements expected to be submitted in support of a joint application for a <i>Mines Act</i> permit issued by the BC Ministry of Energy, Mines & Low Carbon Innovation (EMLI) and an effluent discharge permit issued under the EMA by the BC Ministry of Environment and Climate Change Strategy (ENV).
Framework Agreement for Shared Decision-Making Respecting Land Use and Wildlife Management (BC GOV, TRTFN, 2008)	Sets the stage for government-to-government discussions related to land use planning, collaborative wildlife management planning, and the establishment of shared decision-making arrangements.
Atlin Official Community Plan (BC GOV, 1981)	Defines land use; provides guidance on preserving environmental quality, native, and heritage values.
T'aku River Tlingit First Nation Mining Policy (TRTFN, 2019)	Asserts TRTFN authority over its traditional territory, ensuring all mining activities respect cultural, ecological, and, sovereign rights in accordance with environmental, and cultural, standards, including the rehabilitation of mining sites and protection of critical, wildlife habitats. Mandates that mining developments must adhere to TRTFN principles of sustainability, provide, community, benefits, and align with the Wóoshtin Yan. Too.Aat Shared Decision Making Agreement with BC.
<i>Teslin Tlingit Council (TTC) Lands and Resources Act</i> (TTC, 2016)	Enables TTC to regulate land use, specifically allowing the TTC to manage the harvesting of trees on the 2,395.74 km ² settlement land; TTC reviews applications to harvest timber, to ensure compliance with land use and zoning.
TTC Mining Policy (Tsilhqot'in National Government, 2008)	Aims to protect and accommodate TTC's Aboriginal and constitutional rights, satisfy TTC's principles for environmental, economic, social and cultural sustainability, and provide social and economic benefits directly and indirectly to TTC and related businesses. (Policy is in process of being updated by TTC.)

Legislation, Policy, or Guiding Document	Summary
Land Use Planning	
<i>T'akú Tlatsini</i> Indigenous Protected and Conserved Area (IPCA) (TRTFN 2023)	Stewards 1.8 million hectares of the traditional territory; serves as a jurisdictional guide that identifies Tlatsini (places that make us strong) areas where industrial activity is restricted to protect culturally significant plants, salmon habitats, and wildlife corridors; mandates that any proposed mining must obtain Indigenous consent and align with Tlingit laws to ensure that land clearing and reclamation activities preserve the Lingít Kusteeyí (Tlingit Way of Living).
<i>Wóoshtin wudidaa</i> Atlin Taku Land Use Plan (TRTFN and Government of BC 2011)	Overlaps the Vegetation VC study areas; developed through a collaborative government-to-government process; includes resource management objectives for vegetation that are applicable to the Project. Provides a framework for cultural and ecologically sustainable management grounded in ecosystem-based management practices, including principles, goals, and objectives for critical habitat and ecosystem management. Defines designated resource management zones, the scope of acceptable activities including the areas for protection from major industrial development due to their cultural, ecological, wildlife, or fisheries values, and the areas available for ecologically sustainable and culturally appropriate development.

7.6.3 Influence of Consultation and Engagement

The development of the AIR and this assessment was influenced by the Project's consultation with government agencies, First Nations, stakeholders, and community members. This section describes the information and concerns related to soil and vegetation shared through consultation.

Chapter 3 – Public Engagement and Chapter 4 – Local Bodies Engagement of this Application describe Canagold Resources Ltd. (Canagold)'s ongoing and proposed public, stakeholder, and local government engagement activities regarding the Project and during the development of the Application. This engagement was informed by the Assessment Plan issued by the BC EAO.

Chapter 11 – Taku River Tlingit First Nation provides a summary of engagement with TRTFN). This section also includes information on the alignment of the use of knowledge shared by TRTFN, including their respective policies and protocols, consent for its use and public disclosure, and views regarding the characterization of Traditional Knowledge (TK) within the Application. Canagold also engaged the Teslin Tlingit Council (TTC) (see Chapter 12), and United States Tribes (see Chapter 13).

Table 7.6-2 summarizes key information, TK and concerns identified during the consultation process related to soil and vegetation and describes how these items influenced the assessment.

Table 7.6-2 Summary of Key Information, Indigenous Knowledge, and Concerns for the Project Related to Soil and Vegetation

Topic	Key Information and Concerns	Influence on the Assessment
Environment and Traditional Livelihoods	TRTFN citizens and other Atlin residents expressed concerns, including preserving water quality, protecting salmon habitat, and addressing potential impacts on traditional livelihoods.	Numerous environmental management plans: e.g. Spill Prevention and Contingency Plan for the Minesite, Construction Environmental Management Plan, Soil Management Plan, Metal Leaching/Acid Rock Drainage Management Plan, Water Management Plan (including Mine Site water management and discharge management), Aquatic Effects Monitoring Plan (updates to current protocols), and Vegetation Management Plan
Mine Dust	TRTFN citizens expressed concerning impact of mine dust on usability of traditional food and medicine plants.	Modelling exercises were conducted to inform the amount of dust dispersion and deposition that will occur during construction, operations, and closure (see Section 7.2). In turn, the concentrations of metals that may be deposited as dust was quantified and evaluated.
Spiritual Impact	TRTFN citizens concerning the disruption of the terrain and its impact on both the spiritual and aesthetic experience on the land.	Concerns about Project impacts on Terrain that may have spiritual impacts have been considered in the Project design, the earthmoving plans (i.e. the Soil Management Plan) as well as evaluated in Section 7.12.
Fish Habitat	TRTFN citizens concerned about the impact on the terrain to fish habitat, including impacts to fish migration (changes in lands), loss of fish habitat (silts), and contamination from impacted soil.	Concerns were considered in the development of management plans. Plans such as the Soil Management Plan aim to control the movement of soil and mitigate potential impacts to fish habitat.
Indigenous Use of Terrestrial and Wetland Vegetation Species	Various terrestrial and wetland vegetation species are intimately linked to Indigenous communities, providing resources for food, medicines, and material needs in addition to resources required for ceremonial and spiritual activities. Potential Project-related effects during the pre-construction, Construction, and Operations Phases of the Project to vegetation resources and plant harvesting, including changes in plant harvesting location access and the quality of the plant harvest (e.g. abundance).	An assessment of potential Project-related effects on species of importance to First Nations was included. Vegetation management plans will be developed and implemented to reduce adverse Project-related effects on vegetation, including invasive plant management.

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Topic	Key Information and Concerns	Influence on the Assessment
Wetlands and Riparian and Floodplain Ecosystems	The Project is in the watershed of the Taaltsuxéi (Tulsequah) and T'aakú (Taku) Rivers and nearby floodplain wetlands include Shazah Slough and Flannigan Slough, which offer a rich and varied habitat for plant harvesting activities. Consideration for vegetation clearing if any of the Project components include riparian vegetation.	An assessment of potential Project-related effects on wetlands and riparian/floodplain communities was included.
Plant Species of Conservation Concern	Potential effects on plant species of conservation concern.	An assessment of potential Project-related effects on plant species of conservation concern was included, along with mitigation measures (including pre-construction surveys) to reduce potential adverse Project-related effects.

7.6.4 Assessment Boundaries

The spatial, temporal, administrative, and technical boundaries for soil and vegetation are described below.

7.6.4.1 Spatial Boundaries

Spatial boundaries for the effect assessment are considered the geographic extent over which Project activities may affect soil and vegetation. The Local Assessment Area (LAA) and Regional Assessment Area (RAA) are defined in **Table 7.6-3** and presented in **Figure 7.6-1a** and **Figure 7.6-1b**.

Table 7.6-3 Spatial Assessment Boundaries – Soil and Vegetation

Spatial Boundary	Component	Extent
Project Footprint	All Project Components	Physical extent of the existing historical infrastructure, Mine Site, processing facility, CSF, backfill plant, gravel borrow pits, river transport landing site, tote road to river transport landing, new airstrip, power generation plant, associated power lines, access roads, settling ponds, and surface drainage. The Project footprint includes any area required for associated Project infrastructure and construction workspace areas. A buffer was applied to Project infrastructure to identify the maximum area of potential disturbance.
LAA	All Project components	A 1 km buffer extending from the Project Footprint.
RAA	All Project components	A 3 km buffer extending from the Local Assessment Area, truncated at the Canada–US border.

The Project footprint is 150.38 ha in size and includes any area required for associated Project infrastructure and construction workspace areas and is an estimate of the area of direct disturbance effects on the Vegetation VC within this assessment. The Project footprint differs from that described in the AIR, due to design refinements during the assessment.

The LAA is 6,565.95 ha in size and was delineated to capture direct effects and most of the indirect effects likely to occur on the Vegetation VC and its subcomponents. The LAA used within this assessment was formed as a buffer around an early version of Project features (as described in the AIR). As such, it is larger in locations where there has been a reduction in the Project footprint resulting from design refinements during the assessment process. This is expected to result in a conservative estimate of Project-related effects encompassed within the LAA.

Considerations used to establish the spatial boundaries of the LAA include distances typical of microclimatic edge effects and dust deposition. Changes in microclimate resulting from forest edges (e.g. gradients of light intensity, temperature, wind, and humidity) typically range from 25 m to greater than 240 m, depending on aspect and presence of shrubby vegetation at the forest-edge boundary ([Bannerman 1998](#); [Chen 1991](#); [Kremsater and Bunnell 1999](#)). Dust also has variable deposition distance, depending on particle size and weather conditions. Studies have shown that more than 80% of the dust generated by vehicle movements is greater in size than 10 µm and concentrations decrease within 30.5 m of a roadway ([Golder 2010](#)); however, particles of all sizes will travel further (i.e. over 100 m) in high winds. Regardless of particle size, in open conditions 70% to 75% of dust has been observed to be deposited in the first 10 m, 93% deposited within 30 m, and approximately 97% deposited within 125 m from the road edge ([Walker and Everett 1987](#)).

The RAA is 21,852.78 ha in size and was designed to capture all indirect Project-related effects and provide Canadian regional context related to the type, distribution, extent, and prevalence of plant species and ecosystems; it includes all of the Biogeoclimatic Ecosystem Classification (BEC) subzones and variants and related ecosystems that may be affected by the Project. The RAA also represents the area where the direct and indirect influence of other land uses and activities could interact with Project-specific effects, with resulting cumulative effects on the Vegetation VC.

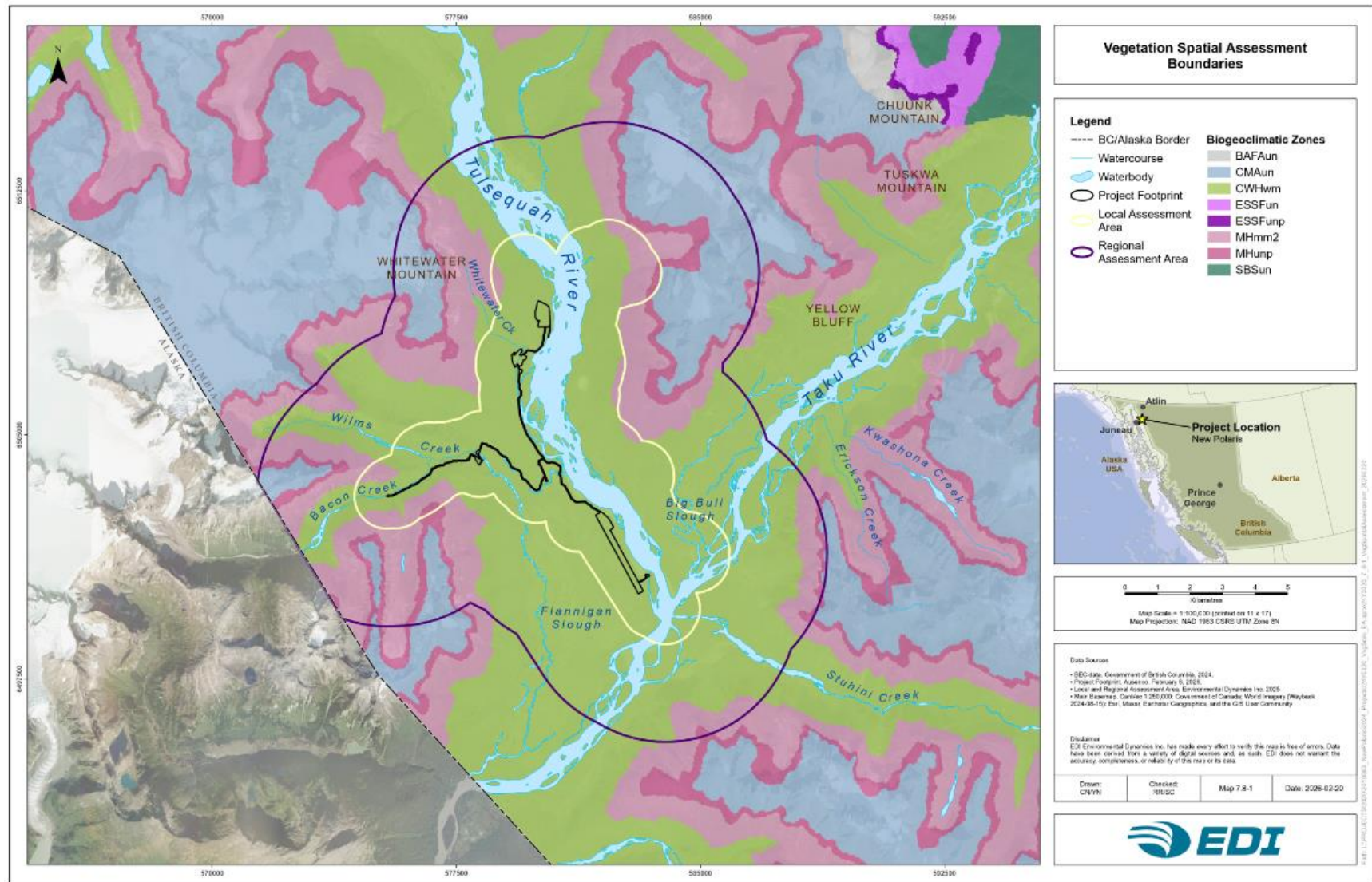


Figure 7.6-1b Spatial Boundaries for Vegetation Assessment

7.6.4.2 Temporal Boundaries

The Project will consist of four distinct phases: Site Preparation and Construction, Operations, Reclamation and Closure, and Post Closure. The anticipated duration for each Project phase is as follows:

- Site Preparation and Construction Phase – An initial one-year period that includes general site preparation and clearing of both previously developed areas and new footprints for the required Project infrastructure. During this period, access to the Project will be constructed from the tote road to the river transport landing. Equipment and structures from historic mining activities will be removed. Following these activities, there will be a second one-year period to mobilize and store equipment, re-activate and construct tote roads, general earthwork activities for infrastructure, and the construction of buildings and storage facilities for fuel and explosives. Utilities will be installed, including potable water, sewage infrastructure and powerlines for communications and electricity. Water management systems will be constructed to handle drainage, and storage and mine services will be completed. The process plant facility will be commissioned, and the CSF will be built.
- Operations Phase – The 10-year phase will cover mining of the Project deposit, including drilling, blasting, and excavation activities, as well as transportation of ore to the onsite processing facility and milling processes. This Phase covers the air, water, and sewer discharges and the handling of tailings and waste rock. The Operations Phase includes activities to transport employees, materials, and supplies for camp operations, including the transportation of concentrate in small aircraft. During this phase, surface mobile equipment and underground equipment will be used, and routine maintenance of Project facilities will occur. Reclamation planning and reporting will start, and required environmental monitoring of implemented management plans will occur.
- Reclamation and Closure Phase – The two-year period includes the demolition and removal of processing and support facilities, as well as the deactivation of site roads, pipelines, and powerlines. Access will be ensured for monitoring purposes (if necessary), and sampling and remediation of any contaminated soils will occur. Disturbed areas will be managed, and the CSF will be covered with a low permeability “clean” cap. Water treatment facilities and any other required management structures will be maintained. Environmental monitoring will be carried out as per the Reclamation and Closure Plans.
- Post Closure Phase – Treated mine contact water is discharged to the environment and water treatment, maintenance, and monitoring of the Project Site occurs. The Phase ends when water treatment is no longer needed, remaining Project facilities and infrastructure are decommissioned and/or removed, final reclamation activities are complete, and ongoing monitoring is no longer required for reclamation and/or water quality.

Additional information on the Project phases is available in Chapter 2 – Regulatory Framework of this Application.

7.6.4.3 *Administrative and Technical Boundaries*

Administrative boundaries refer to the limitations imposed on the assessment by political, economic, or social constraints that may include specific legal objectives outlined in regional land use plans overlapped by the Project footprint. Both provincial and federal guidance was relied upon for the soil and terrain assessment, including the Canadian Environmental Quality Guidelines (CEQG, 2007) and the BC Contaminated Sites Regulation (CSR, 1996).

Technical boundaries refer to limitations imposed by the ability to predict potential effects of a project. No technical boundaries were identified for the soil and terrain assessment.

While administrative and jurisdictional boundaries may influence regulatory processes and Indigenous governance, they are not expected to impose constraints on the Soil and Vegetation VC or the assessment of potential Project-related effects.

7.6.5 *Existing Conditions*

This Section provides a characterization of current baseline conditions within the spatial boundaries defined in **Section 7.6.4.1**. This includes an overview of regional and historical activities on the VC leading to the existing conditions. Understanding these conditions is key for adequately predicting the potential Project effects presented in **Section 7.6.6**.

7.6.5.1 *Regional Overview and Historical Activities*

Regional Overview

The Project is located approximately 100 km south of Atlin, BC and 70 km northeast of Juneau, Alaska (AK), within the TRTFN Traditional Territory. The Project area is in the Boundary Ranges of the Coast Mountains and features steep, mountainous terrain and broad, glacially influenced river valleys (Madrone 2024). Two river valleys are identified within the Project area, including the Taaltsuxéi (Tulsequah) and T'aakú (Taku) river valleys. As detailed in the Baseline Soils and Terrain Existing Conditions report (Appendix 7.6-1), the main soils identified in the Project area include ortho humo-ferric podzols, present mostly in the Mine Site area and road infrastructure in the northern portion of the Project area, including the combined storage facility (CSF) (Madrone 2024). Ortho humic gelysols and typic mesisols soil types were identified in the floodplains and back-channel areas below the Mine Site and throughout the southern region of access roads in the Project area (Madrone 2024). The treed and vegetated areas of the Project area are described by cumelic regosols soils. Surficial soil material throughout the Mine Site and floodplain region below the Mine Site commonly consist of poorly drained cobble, silt, sand glaciofluvial/fluvial deposits and silt, sand, and gravel tills greater than 1 m thick (Madrone 2024).

The Project is situated within a naturally mineralized region of northwestern BC where enriched metals deposits contribute to specific elevated metal concentrations in soils. In accordance with Protocol 4 of the BC CSR, elevated metal concentrations in soil observed in the Project area may be representative of naturally occurring background concentrations.

The RAA is located within the Northern Boundary Ranges ecosection, which is part of the Boundary Ranges ecoregion, within the Coast and Mountains ecoprovince ([Demarchi 2011](#)). The Project lies on the west bank of the Taaltsuxéi Héen (Tulsequah River), north of its confluence with the T'aakú Héeni (Taku River), within the TRTFN Traditional Territory.

The RAA occurs within four BEC units:

- CMAun – Coastal Mountain-heather Alpine, Undifferentiated Subzone
- MHunp – Mountain Hemlock, Undifferentiated Subzone, Parkland Variant
- MHmm2 – Mountain Hemlock, Moist Maritime Subzone, Leeward Variant, and
- CWHwm – Coastal Western Hemlock, Wet Maritime Subzone.

The CMAun is an alpine subzone dominating the area above the treeline at elevations from 1,000 m to 2,400 m ([BC Ministry of Forests and Range 2006](#)). Below the treeline and down to the lower valley slopes, the Mountain Hemlock (MH) BEC zone ranges in elevation from 400 m to 1,600 m ([Banner et al. 1993](#)), and consists of MHunp and MHmm2 BEC subzone variants. The MHunp is found in transitional areas between treeline and alpine ecosystems, where the MHmm2 subzone variant is typically on mid to upper slopes. In the forested valleys, the CWHwm subzone is found in low- to mid-elevations from 0 m to 600 m ([Banner et al. 1993](#)).

Glacier-mediated disturbance has heavily shaped the regional landscape, regulating forest establishment and succession. Local ice influence within the Taaltsuxéi Héen (Tulsequah River) valley has persisted into the recent past, with the Tulsequah Glacier, which is the headwater source of the Taaltsuxéi Héen (Tulsequah River), reaching its Little Ice Age maximum extent in the mid-19th century ([Geertsema and Clague 2003](#); [Souther 1971](#)). Since at least the early to mid-20th century, the region has also experienced recurring jökulhlaups (glacial lake outburst floods) from Tulsequah Glacier-dammed lakes (Tulsequah Lake and the upstream Nolake Lake) ([Geertsema and Clague 2003](#); [Souther 1971](#); [TRTFN & BC GOV 2011](#)).

In the 1970s, jökulhlaup events released an estimated 226 to 368 million cubic metres of water ([Souther 1971](#)) and were later documented to raise Taaltsuxéi Héen (Tulsequah River) water levels by up to approximately 2 m for several days during the early 1990s ([Redfern 1993](#)). During major jökulhlaups, high-velocity, silt-laden flows can inundate the Taaltsuxéi Héen (Tulsequah River) floodplain valley-wide, with channels extensively reworked through sediment deposition, gravel-bar aggradation, and rapid avulsion ([Souther 1971](#)). Plant species and ecosystems that occur on floodplains are tolerant of mechanical disturbance and will recover from most surface disturbances ([Mackenzie and Moran 2004](#)). Other mass-wasting disturbances are also common in the region, particularly in steep terrain, with landslides and earthflows occurring in major valleys ([Souther 1971](#)).

Evidence of historic fire disturbance is limited in the region; no historical wildfires have been recorded within the RAA, and the closest documented wildfire burned approximately 512 ha in 1930, approximately 15 km northeast from the RAA. This is consistent with the hypothesis that fires have historically been very infrequent in wet coastal temperate rain forests of BC due to infrequent opportunities for ignition (e.g. lower lightning frequency in comparison with other parts of BC) combined with low fuel flammability due to high moisture content ([Daniels and Gray 2006](#)). Instead, smaller, gap-forming disturbances such as windthrow are thought to play a bigger role in forest stand dynamics in these systems ([Daniels and Gray 2006](#)).

As described in Appendix 10.0-1, ensemble output data was used to present a range of possible climate conditions under three emissions scenarios: SSP1-2.6 (low warming), SSP2-4.5 (moderate/most likely), and SSP5-8.5 (extreme warming). The scenarios forecast potential futures relevant to the Project site over near-term (2040s) and far-term (2100) horizons. In general, these outputs project warmer temperatures and increased total precipitation over time. While total annual precipitation is modelled to increase across all scenarios ranging from an average predicted mean increase of 4.69% to 6.65% by the 2040s, and 8.64% to 13.64% by 2100, warming trends (increasing approximately 1.88 °C to 2.37 °C by the 2040s, and 2.42 °C to 4.3 °C by 2100) are expected to result in shifting seasonal cycles.

The effects of climate on vegetation are complex, encompassing many interrelated processes such as northward or upward species migration and longer growing seasons. Although uncertainty exists, the following broad potential effects on the Vegetation VC may occur based on the projected climate indicators:

- Increased mean temperatures and longer growing seasons may increase vegetation growth rates and shift habitat suitability for various species (e.g. movement northward or increased elevational preference)
- A reduction in ice days over time (projected to decrease by 19% to 36% by 2100) and changes to freeze-thaw cycles may alter the timing of biological events (e.g. changes in budding and flowering times, which have the potential to affect pollination or result in trophic mismatch)
- Increased frequency of heavy rainfall events, indicated by a rise in wet days (greater than or equal to 20 millimetres) of up to 22.2% by 2100, may lead to periods of high runoff and turbidity, potentially affecting vegetation in wetlands and riparian areas
- Increases in total precipitation and increased temperature, and resultant increased evapotranspiration, may change the availability of water, particularly for wetland ecosystems
- Warmer summers may increase the frequency of wildfires and dust, while more frequent extreme rainfall events could increase particulate wash-off and erosion, and
- Warmer temperatures may alter the distribution and degree of infestation of insect pests.

Historical Activities

The proposed Project footprint was historically occupied by the Polaris-Taku Mine, in operation from 1937 to 1955. In addition, two legacy mines, the Tulsequah Chief mine and Big Bull mine operated on the opposite bank of the Taaltsuxéi Héen (Tulsequah River) of the Project area. Ore from Tulsequah Chief mine was processed through the Polaris-Taku mill for a short period after underground mining operations ended. These legacy mines are both reported to be inactive. However, remediation for acid rock drainage into the Taaltsuxéi Héen (Tulsequah River) is occurring at Tulsequah Chief mine. Due to historical mining activities occurring within the LAA and RAA, soils are likely to contain higher concentrations of metals due to historical mineralization.

Existing disturbance within the RAA was mapped separately from the terrestrial ecosystem mapping (TEM) at a 1:5,000 scale, using recent imagery. Overall, 105.0 ha of existing disturbance was mapped within the RAA, including the existing Project Mine Site and Tulsequah Chief mine, existing roads and trails, existing and abandoned airstrips, borrow pits, cabins, and the historical townsite. Some historic infrastructure is no longer visible on recent imagery (e.g. access to the Project Mine Site), likely influenced by natural disturbance related to past jökulhlaup events.

7.6.5.2 Baseline Assessment Methods

A detailed methodology for field and laboratory activities is available in **Appendix 7.6-1** and **Appendix 7.6-2**.

Existing Data

On July 29, 2024, Madrone Environmental Services Ltd. (Madrone) was retained by Ausenco to complete a Terrain Stability Mapping Report for the Project. The report discusses the geographical location of the Project, climate and biogeoclimatic zones, hydrology, bedrock geology, glacial history, surficial materials, soil development, and land use of the Project to determine the area soils, surficial material, and geohazards and terrain stability within the Project area.

Several historic Project-specific and regional studies and reports were considered in the characterization of existing conditions for vegetation. Reports and their sources for these studies are listed in **Table 7.6-4**.

Table 7.6-4 Reports and Data Sources Considered in the Vegetation Existing Conditions

Report Title	Reference
New Polaris Gold Project 2021-2022 Vegetation and Wildlife Field Study Report	(EDI 2023)
New Polaris Mine – 2021 Baseline Field Survey Summaries	(EDI 2021)
New Polaris Project, Technical Report, 2007, Draft for Discussion	(Gartner Lee 2007a)
New Polaris Project, Technical Report, 2007, Draft for Discussion: Appendix H - Rare Plant List	(Gartner Lee 2007b)
Sensitive Ecosystems of the Atlin–Taku Planning Area	(de Groot and Pojar 2009)
Tulsequah Chief Mine ACB Transportation System – Effects Assessment for Wildlife and Ecosystems	(Gartner Lee 2008)
Tulsequah Chief Mine and Access Road Expanded Terrestrial Ecosystem Mapping, Final Report	(FFIS 2002)
Tulsequah Chief Mine Terrestrial Ecosystem Mapping Expanded Legend Report	(Gartner Lee Limited 2007c)
Tulsequah Chief Project Report – Volume III Appendices (Part 2 of 2)	(Rescan 1997)

Primary Research

Two field sampling programs were completed by Environmental Dynamics Inc. (EDI) and Ausenco in 2021 and 2025, respectively. The purpose was to collect data to determine baseline conditions in the Project area, as follows:

- In August 2021, EDI performed soil sampling as part of a vegetation and ecosystems Existing Conditions report (Section 7.6-2). Soil samples were collected in conjunction with vegetation samples throughout both the LAA and RAA to determine baseline conditions. A total of 19 surficial soils samples were collected and submitted for analysis of select metals to an accredited laboratory.

- In August 2025, Ausenco completed waste rock sampling and soil characterization within the LAA to characterize legacy wastes related to historical mining activities. Ten test pits were advanced throughout the LAA. Two soil samples were collected during the waste rock sampling and soil characterization program, and submitted for analysis of petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and phenols.

In addition, the Project team undertook studies to document vegetation existing conditions within the RAA, in the context of historic survey data. The following subsections summarize the methods used to undertake these Project-specific vegetation studies. Studies documenting existing conditions are described in further detail in Appendix 7.6-2.

Ecosystems

The TEM dataset created for the Tulsequah Chief mine in 2002 was updated to current mapping standards and current conditions, including updating BEC zone/subzone boundaries and classifications to current-day standards. TEM field verification was completed from August 5 to 11, 2021 and August 14 to 15, 2024 to ground truth the 2002 ecosystem classifications and site conditions. Data collection followed the standard ecological data collection methodologies defined in the BC Field Manual for Describing Terrestrial Ecosystems ([BC Ministry of Forests and Range and BC MOE 2010](#)).

TEM updates followed the provincial guidelines described in the Standard for Terrestrial Ecosystem Mapping in BC, Sections 6.2 and 6.5 ([Resources Inventory Committee 1998](#)), with use of a variety of digital datasets (**Table 7.6-2**). BEC units and their boundaries were updated, and polygons were reshaped to match more recent orthophotographs and satellite imagery. Site series and map codes were reviewed and updated to current codes, where applicable, using Wetlands of BC: A Guide to Identification ([MacKenzie and Moran 2004](#)) for wetland and floodplain ecosites, Biogeoclimatic Ecosystem Classification of Non-forested Ecosystems in BC ([Mackenzie 2012](#)) to better reflect alpine ecosystems in the CMAun, and the Standard for Terrestrial Ecosystem Mapping in BC ([Resources Inventory Committee 1998](#)) for non-vegetated map units. The mapping update for the RAA was completed in two dimensions using ArcGIS Pro 3.3 at a scale of 1:20,000.

Table 7.6-5 Datasets Used in the Update of the Terrestrial Ecosystem Mapping

Dataset Name	Description	Source	Date
Canadian Digital Elevation Model	Raster file of elevation data used to extrapolate hill shade, slope, and aspect in 2021 at a 30 m scale	Natural Resources Canada (Government of Canada)	2013
Medium Resolution Digital Elevation Model	Raster file of elevation data used to extrapolate hill shade, slope, and aspect in 2025 at a 30 m scale	Natural Resources Canada (Government of Canada)	2024
Vegetation Resources Inventory	Polygons representing distinct vegetation stands or areas with similar forest conditions	Government of BC, BC Data Catalogue	2023
ESRI Orthophotographs	Satellite imagery used to delineate and attribute TEM data at a 0.5 m scale	Basemap layers ESRI	2018–2020
Digital Road Atlas	Comprehensive geospatial dataset that provides detailed information on BC's road network	Government of BC, BC Data Catalogue	2025

Dataset Name	Description	Source	Date
Historical Fires	Wildfire perimeters for all fire seasons before the current year	Government of BC, BC Data Catalogue	2025
TRIM (wetlands, waterbodies, watercourses, transportation lines, water lines, contours, ice masses)	TRIM mapping datasets produced by the Government of BC	Government of BC, BC Data Catalogue	2021
2002 TEM dataset	Existing TEM data from previous study	FFIS	2002
Biogeoclimatic Ecosystem Classification	Biogeoclimatic boundaries for BC	Government of BC, BC Data Catalogue	2021

Plant Species of Interest

Vegetation Species of Conservation Concern

Vegetation species of conservation concern (SOCC) are defined in this report as those listed federally as Endangered, Threatened, or Special Concern under the *Species at Risk Act*, SC 2002, c. 29 (SARA) ([Government of Canada 2002](#)) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and provincially Red- Yellow- or Blue-listed by the BC Conservation Data Centre (CDC) (**Table 7.6-6**).

Table 7.6-6 Definitions for Government-Listed Plants, Lichens, & Ecological Communities

Designating Agency	Status	Definition
BC Conservation Data Centre	Red	Indigenous species, subspecies, or ecological communities that have been designated, or are candidates for designation as Extirpated, Endangered, or Threatened status in BC.
	Blue	Indigenous species, subspecies, or ecological communities considered to be of Special Concern in BC.
	Yellow	Indigenous species, subspecies, or ecological communities that are apparently secure and not at risk of extinction in BC. Yellow-listed species may have Red- or Blue-listed subspecies.
Committee on the Status of Endangered Wildlife in Canada (COSEWIC) <i>Species at Risk Act</i> (SARA)	Endangered	A species facing imminent extirpation or extinction. Ecological communities are not currently listed by SARA or COSEWIC.
	Threatened	A species that is likely to become endangered if limiting factors are not reversed. Ecological communities are not currently listed by SARA or COSEWIC.
	Special Concern	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events. Ecological communities are not currently listed by SARA or COSEWIC.

The Project team completed a desktop review to identify vegetation SOCC with potential to occur within the RAA. The BC Species and Ecosystem Explorer was queried for provincially Red- and Blue-listed and federally listed plant and lichen species within the CMAun, MHunp, MHmm, and CWHwm BEC units ([BC CDC 2025](#)). Historic occurrences of vegetation SOCC and observations of vegetation SOCC during previous studies within the RAA were also reviewed and incorporated into the list of potential vegetation SOCC (BC MECCS 2025; [de Groot and Pojar 2009](#); [Gartner Lee 2007a](#); [Rescan 1997](#)).

Incidental surveys for vascular plant SOCC were completed from August 5 to 11, 2021 and from August 14 to 15, 2024. Surveys were conducted opportunistically between TEM field plots while travelling on foot within the RAA, as well as within TEM plots with a high potential for vascular plant SOCC occurrences, including alpine ecosystems, wetlands, transitional habitats, and uncommon microsites or unique habitat features (e.g. rocky outcrops or boulder fields).

Species of Importance to First Nations

The RAA is located within the traditional and unceded territory of the TRTFN. The Taaltsuxéi Héen (Tulsequah River) has been named the “root garden” by the TRTFN and is a primary source of sustenance; harvesting of wild plants for subsistence and medicinal purposes is fundamental to Taku River Tlingit land use, historically and currently (TRTFN 2025). The following plant species with importance to First Nations are considered within this report:

- Devil's club (*Oplopanax horridus*), used as a medicine for arthritis and aching bones ([TRTFN 2025](#))
- A variety of berry-producing species, as berry harvesting is an important food source; eleven berry-producing plant taxa were identified with importance to First Nations (**Table 7.6-7**)
- Spruce (*Picea* spp.) gum, used as a plaster for cuts and wounds ([TRTFN 2025](#)) and,
- Waterlily (*Nuphar* sp., *Nymphaea* spp.) roots, used as a medicine to stop nose bleeds ([TRTFN 2025](#)).

Table 7.6-7 Berry-producing Species Identified with Potential Cultural Importance

Scientific Name	Common Name
<i>Empetrum nigrum</i>	Crowberry
<i>Fragaria</i> spp.	Strawberry
<i>Ribes lacustre</i>	Black gooseberry
<i>Rubus parviflorus</i>	Thimbleberry
<i>Rubus spectabilis</i>	Salmonberry
<i>Sambucus racemosa</i> var. <i>arborescens</i>	Red elderberry
<i>Vaccinium alaskaense</i>	Alaskan blueberry
<i>Vaccinium ovalifolium</i>	Oval-leaved blueberry
<i>Vaccinium membranaceum</i>	Black huckleberry
<i>Vaccinium uliginosum</i>	Bog blueberry
<i>Viburnum edule</i>	Highbush cranberry

Mapped ecosystems within the TEM were used to estimate the spatial extent of habitat with the potential to support species of importance to First Nations. Each ecosystem/map unit was assigned a habitat suitability ranking for each species of interest. References used to evaluate habitat suitability included A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region ([Banner et al. 1993](#)), Wetlands of BC: A Guide to Identification ([MacKenzie and Moran 2004](#)), ecosystem descriptions from the Tulsequah Chief Mine and Access Road Report ([FFIS 2002](#)), and the professional judgment of an experienced ecologist.

Where available, species prominence values (i.e. representing the plant cover and frequency of occurrence of a plant within a particular ecosystem) were relied upon to characterize the potential for an ecosystem to support a culturally important species. In general, ecosystem habitat suitability was characterized as follows:

- High – the species is considered a dominant species, occurring in greater than or equal to 50% of plots with greater than or equal to 10% cover. For berry-producing species, at least one species is listed as dominant.
- Moderate – the species is considered an associate species, occurring in greater than 20% of plots with 1% to 9% cover. For berry-producing species, at least one species is listed as associate.
- Low – the species is not considered dominant or associate within the ecosystem/map unit. For berry-producing species, no species are listed as dominant or associate.

Invasive Plant Species

Invasive plants (also referred to as “weeds,” “non-native,” “alien,” “exotic,” or “introduced”) are plants that proliferate beyond their natural distribution range ([Northwest Invasive Plant Council 2024](#); BC Conservation Data Centre 2025). For the Project, invasive plants are defined as:

- Plants designated under the *Invasive Plant Regulation* of the *Forest and Range Practices Act* ([BC GOV 2004a](#))
- Plants designated under the *Weed Control Regulation* of the *Weed Control Act* ([BC GOV 1985](#)), and
- Plants listed by the Northwest Invasive Plant Council (2024).

A review of existing invasive plant species occurrence data near the Project was conducted. Potential observations from InvasivesBC (BC GOV 2025a) and historic reports (1997, 2007, and 2009 studies; **Table 7.6-1**) were reviewed to determine the identity, location, and extent of known occurrences of invasive plants. In addition, a list of invasive plant species with the potential to occur within the RAA was compiled.

Targeted field surveys for invasive plants were completed from August 5 to 11, 2021 at sites with elevated potential for invasive plants (i.e. within areas near previous disturbance including the camp and air strip). Surveys were conducted on foot and involved a thorough search to investigate the presence, abundance, and location of any invasive plants. Methodologies followed provincial guidelines ([BC FLNRORD 2020](#)) and the road side survey methodology adapted from Oldham (2007).

Plant Communities of Interest

Ecological Communities of Conservation Concern

Ecological communities of conservation concern are defined as those Red- or Blue-listed by the BC CDC (**Table 7.6-3**). Mapped ecosystems within the TEM were used to estimate the spatial extent of ecological communities of conservation concern. The Project team completed a desktop assessment to identify provincially listed ecological communities with potential to occur within the RAA. The BC Species and Ecosystem Explorer was queried for provincially Red- and Blue-listed ecological communities within the CMAun, MHunp, MHmmm and CWHwm BEC units ([BC CDC 2025](#)). Listed ecological communities observed during 2007 and 2009 studies (**Table 7.6-1**) were also included in a list of ecological communities of conservation concern with the potential to occur within the RAA.

Field verification surveys were completed from August 5 to 11, 2021 and from August 14 to 15, 2024. All field observations of listed ecological communities were documented, including identification, distribution, photographs, and GPS location.

Ecological Communities Valued for Traditional Use

Ecological communities valued for traditional use by First Nations are associated with vegetation species of importance to First Nations, including:

- Communities dominated by berries near the T'aakú Héeni (Taku River)
- Ecological communities of the Flannigan Slough, where berries and water lily roots are gathered, and
- Forested communities on the mountain slopes of the Taaltsuxéi Héén (Tulsequah River) provide tree sap, which is used for a range of illnesses ([TRTFN 2025](#)).

As species of importance to First Nations have been correlated with habitat suitability on an ecosystem level, the existing conditions related to vegetation species of importance to First Nations also addresses ecological communities valued for traditional use.

Wetlands

Wetland Ecosystems

For the purposes of this report, wetland ecosystems are defined as “areas where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principal determinants of vegetation and soil development. Wetlands will have a relative abundance of hydrophytes in the vegetation community and/or soils featuring hydric characters” ([MacKenzie and Moran 2004](#)).

Wetland ecosystems were mapped as part of the TEM, as described in the preceding sections. Wetland classification within the 2002 TEM was generally broad, with two map units generally mapped for each subzone: graminoid-dominated wetlands, and shrubby wetlands. During TEM updates, wetlands were classified in accordance with the dominant wetland class as per the Wetlands of BC: A Guide to Identification ([MacKenzie and Moran 2004](#)) and consistent with the Canadian Wetland Classification System ([National Wetlands Working Group 1997](#)). In isolated instances, the wetland class of some graminoid-dominated wetlands in the CWHwm was not able to be differentiated with the use of available information; in these cases, wetlands were classified as fen/marsh (Wf/Wm).

Wetland Function

Wetland ecological functions are the natural physical, chemical, and biological processes, such as water quality maintenance, flow regulation, and habitat provision, that occur independently of the benefits they provide to humans ([Hanson et al. 2008](#)). Wetland function surveys were conducted from August 14 to 15, 2024 to assess existing conditions of representative wetlands within the RAA. Prior to the field program, wetlands were identified within the RAA through review of the TEM. Locations for wetland field surveys were selected based on representativeness of the wetlands present in the RAA, proximity to the Project (i.e. intersection with the LAA), and accessibility. Flannigan Slough (NPWF05) was prioritized due to its regional importance.

The crew accessed the wetlands by helicopter and conducted field assessment on foot where access allowed. Wetland characterization data were collected at a representative point, including details on the percent cover of wetland classes, vegetation species and cover, soil characterization, hydrological features and function, and wildlife habitat use for selected species (e.g. dzískw (moose [*Alces alces*]), s'igeidí (beaver [*Castor canadensis*]), dabbling ducks, and songbird communities). The wetland at the plot location was classified to site association according to Wetlands of BC: A Guide to Identification ([MacKenzie and Moran 2004](#)).

To obtain a wetland function rating for each wetland, a detailed rating scheme was developed in the context of Wetland Ecological Functions Assessment: An Overview of Approaches ([Hanson et al. 2008](#)) and Evaluating the Health of Wetlands: Wetland Management Routine Effectiveness Evaluation ([Fletcher et al. 2021](#)). Field results were used to characterize ratings for each wetland plot related to hydrologic, biochemical, habitat, and climate functions. Overall wetland function scores were conservatively assigned to each wetland plot with the use of professional judgment by a qualified wetland ecologist.

7.6.5.3 Existing Conditions Characterization

Terrain

The main soils identified in the Project area include:

- Orthic humo-ferric podzols that have a B horizon greater than 10 cm thick enriched with amorphous material (primarily aluminum and iron) underlay the Mine Site and road infrastructure to the north
- Surficial material at the Mine Site consist of poorly drained cobble, silt, sand glaciofluvial/fluvial deposits and silt, sand, gravel tills greater than 1 m thick
- Floodplains and back-channel areas downstream of the Mine Site and throughout the southern region of access roads consist of orthic humic gleysols that have an organic-rich A horizon at least 10 cm thick overlaying gleyed B horizons and parent material, and typic meisols representing organic, wetland soils consisting of mainly organic material
- Surficial material throughout the floodplains south of the Mine Site and the Flannigan Slough consist of poorly drained cobble, silt, sand glaciofluvial/fluvial deposits
- Cumulic regosols in treed and vegetated zones, and
- Accumulation of poorly drained organic material in alluvial fans of Whitewater Creek and Wilms Creek.

Potential terrain stability issues include:

- Orthic humic gleysols and typic meisols may require stabilization techniques, such as coarse ballast subgrade or a geotextile application along road infrastructure, and
- Flash-flooding from jökulhlaup activity and/or rapid spring/summer melting could affect glaciofluvial and fluvial plains downstream of the Mine Site.

Potential terrain hazards include:

- Moderate risk for debris flow down Whitewater Creek and Wilms Creek
- Moderate rockfall hazard slopes exist along the road from Whitewater Creek to the CSF
- Channel avulsion and/or channel migration may result from flash-flooding events derived from activity upstream, rapid snow melt events, or debris flows, and
- Drone photos reviewed show terrace edge slopes below the upper Mine Site and could be present elsewhere above the lower floodplain.

See the Madrone 2024 report in **Appendix 7.6-1**, Appendix A.

Soils

Soil sampling was conducted by EDI and Ausenco in 2021 and 2025, respectively.

- In 2021, elevated metal concentrations were found throughout the Project area. Of the 19 soil samples collected, antimony (n=1), arsenic (n=14), barium (n=13), cadmium (n=1), chromium (n=4), copper (n=1), iron (n=3), lead (n=1), lithium (n=1), molybdenum (n=2), nickel (n=2), selenium (n=1), and vanadium (n=1) exceeded either applicable BC CSR standards or CCME guidelines. The soil metal exceedances could be a result of historical mining activities (i.e. legacy tailings) or natural mineralization within the Project area. Sample locations are shown on **Appendix 7.6-1**, Figure 1-1.
- In 2025, soil analytical results from two additional soil samples were collected from test pits near the airstrip during the 2025 waste rock sampling and soil characterization performed by Ausenco. These samples were analyzed for hydrocarbons; analytical results showed no exceedances of BC CSR standards or CCME guidelines. Although hydrocarbon odours were observed when these samples were collected, the soils in this area have hydrocarbon and phenol concentrations below applicable standards and guidelines. Sample locations are shown on **Appendix 7.6-1**, Figure 1-1.

Full analytical results are provided in **Appendix 7.6-1**.

Ecosystems

Sixty-four TEM field verification points were assessed from August 5 to 10, 2021, including 26 ground investigations and 38 visual checks (four on foot and 34 by helicopter). An additional six visual checks were completed from August 14 to 15, 2024 during the wetland function surveys. The percentage of ecosystem polygons inspected in the LAA was 18.8% for a Survey Intensity Level (SIL) of 4, and 8.5% in the RAA for a SIL of 5 ([Resources Inventory Committee 1998](#)). The Vegetation and Ecosystem Existing Conditions Report (Appendix 7.6-2) provides a complete summary of ecosystems and their respective cover within each BEC unit in the LAA and RAA.

The study areas are predominantly located within lower elevation habitats consistent with the location of Project infrastructure. The dominant BEC unit mapped within the LAA and the RAA was the CWHwm (91.7% and 63.1%, respectively), followed by the MHmm2 (7.7% and 20.1%, respectively; **Table 7.6-8**). Alpine and parkland BEC units are less common; the CMAun forms 11.7% of the RAA, but only 0.1% of the LAA. Similarly, the MHunp was mapped within 5.0% of the RAA, but only 0.6% of the LAA.

A detailed summary of all map units described within the TEM is provided in **Table 7.6-9**. Subsequent sections will describe ecosystems of interest, including old forest, grasslands, alpine/subalpine, and riparian ecosystems.

Table 7.6-8 Summary of Biogeoclimatic Subzones and Variants Found Within the LAA and RAA

BEC Unit	LAA (ha)	Percent of LAA (%)	RAA (ha)	Percent of RAA (%)
CMAun	3.6	0.1	2,566.2	11.7
MHunp	37.6	0.6	1,100.9	5.0
MHmm2	505.5	7.7	4,401.5	20.1
CWHwm	6,019.2	91.7	13,784.1	63.1
Total^a	6,566.0	100.0	21,852.8	100.0

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Table 7.6-9 Summary of Terrestrial Ecosystem Mapping Within the LAA and RAA

BEC Unit	Site Series / Map Code		LAA		RAA	
	Code	Common Name	Area (ha)	Percent of LAA (%)	Area (ha)	Percent of RAA (%)
CMAun	Af	Alpine fellfield	-	-	17.4	0.1
	Ah	Alpine heath	1.4	<0.1	174.7	0.8
	Am	Alpine meadow	-	-	2.3	<0.1
	At	Alpine tundra	-	-	90.9	0.4
	GL	Glacier	-	-	343.3	1.6
	LA	Lake	-	-	7.9	<0.1
	MN	Moraine	-	-	45.8	0.2
	RO	Rock outcrop	2.1	<0.1	1,567.2	7.2
	RU	Rubble	-	-	254.0	1.2
	TA	Talus	-	-	62.8	0.3
CMAun Total ^a			3.6	0.1	2,566.3	11.7
MHunp	01	Mountain hemlock – amabilis fir/Alaskan blueberry	-	-	9.0	<0.1
	02	Mountain hemlock – amabilis fir/pink mountain-heather	4.3	0.1	56.8	0.3
	05	Amabilis fir – mountain hemlock/rosy twistedstalk	-	-	3.6	<0.1
	AC	Avalanche chute	-	-	74.3	0.3
	AM	Herb meadow	7.9	0.1	77.5	0.4
	CA	Crowberry – bog blueberry – alpine Azalea	-	-	83.8	0.4
	GL	Glacier	-	-	18.7	0.1
MHunp	HM	Heath meadow	6.5	0.1	149.0	0.7
	MK	Mountain hemlock krummholz	-	-	11.7	0.1
	MN	Moraine	-	-	22.2	0.1
	PD	Pond	-	-	1.2	<0.1
	RO	Rock outcrop	7.9	0.1	325.8	1.5
	RU	Rubble	10.9	0.2	219.9	1.0
	TA	Talus	-	-	47.5	0.2
MHunp Total ^a			37.6	0.6	1,100.9	5.0
MHmm2	01	Mountain hemlock – amabilis fir/Alaskan blueberry	185.2	2.8	953.0	4.4
	02	Mountain hemlock – amabilis fir/pink mountain-heather moist maritime 2	15.7	0.2	332.7	1.5
	03	Amabilis fir – mountain hemlock/oak fern moist maritime 2	62.0	0.9	242.4	1.1
	05	Amabilis fir – mountain hemlock/rosy twistedstalk	4.3	0.1	194.7	0.9
	07	Yellow-cedar – mountain hemlock/green false-hellebore	-	-	5.8	<0.1
	AC	Avalanche chute	109.6	1.7	1,003.6	4.6
	AM	Herb meadow	22.3	0.3	132.5	0.6
	CA	Crowberry – bog blueberry – alpine azalea	-	-	84.5	0.4
	GB	Gravel bar	0.2	<0.1	2.7	<0.1
	GL	Glacier	-	-	7.0	<0.1
	HM	Heath meadow	29.9	0.5	261.6	1.2

BEC Unit	Site Series / Map Code		LAA		RAA	
	Code	Common Name	Area (ha)	Percent of LAA (%)	Area (ha)	Percent of RAA (%)
MHmm2	LA	Lake	4.7	0.1	21.8	0.1
	MK	Mountain hemlock krummholz	3.0	<0.1	63.7	0.3
	MN	Moraine	-	-	81.7	0.4
	PD	Pond	-	-	6.3	<0.1
	RI	River	0.2	<0.1	11.4	0.1
	RO	Rock outcrop	19.5	0.3	306.1	1.4
	RU	Rubble	43.6	0.7	278.8	1.3
	TA	Talus	1.3	<0.1	306.2	1.4
	Wf	Fen	-	-	14.9	0.1
	WM	Wet seepage meadow	3.9	0.1	29.6	0.1
	Ws	Swamp	-	-	60.4	0.3
MHmm2 Total ^a			505.5	7.7	4,401.5	20.1
CWHwm	01	Western hemlock – Sitka spruce/Alaskan blueberry	1,350.6	20.6	2,649.8	12.1
	02	Western hemlock – Sitka spruce/step moss	66.8	1.0	205.1	0.9
	03	Sitka spruce – western hemlock/oak fern	268.7	4.1	557.6	2.6
	04	Sitka spruce – western redcedar/devil's club	531.5	8.1	1,013.7	4.6
	05	Sitka spruce/salmonberry wet maritime	174.3	2.7	511.3	2.3
	06	Black cottonwood – red alder/salmonberry	505.4	7.7	1088.5	5.0
	AC	Avalanche chute	415.2	6.3	1,835.3	8.4
	AD	Sitka alder – devil's club	20.1	0.3	36.9	0.2
	AN	Anthropogenic	2.7	<0.1	13.3	0.1
	CS	Clear-cut, shrubby	18.6	0.3	18.6	0.1
	CU	Clear-cut, unvegetated	12.2	0.2	12.2	0.1
	FI50	Sitka willow – false lily-of-the-valley	759.4	11.6	1,352.3	6.2
	GB	Gravel bar	732.7	11.2	1,275.7	5.8
	MI	Mine	2.2	<0.1	5.0	<0.1
	MN	Moraine	-	-	1.4	<0.1
	OW	Shallow open water	95.3	1.5	231.7	1.1
	PD	Pond	-	-	1.9	<0.1
CWHwm	RI	River	292.5	4.5	686.2	3.1
	RO	Rock outcrop	9.4	0.1	90.2	0.4
	RP	Road	62.4	0.9	82.8	0.4
	RU	Rubble	19.3	0.3	34.1	0.2
	TA	Talus	13.7	0.2	101.5	0.5
	Wf	Fen	35.6	0.5	100.4	0.5
	Wf/Wm	Fen/marsh	54.5	0.8	91.5	0.4
	Wm	Marsh	206.0	3.1	697.4	3.2
	Ws	Swamp	370.2	5.6	1089.7	5.0
CWHwm Total ^a			6,019.2	91.7	13,784.1	63.1
Grand Total ^a			6,566.0	100.0	21,852.8	100.0

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Old Forest

Old forest is typically characterized by advanced structural complexity and a diversity of vegetation growth forms, with complex tree canopy structure, patchy shrub and herb understories, and diverse assemblages of species ([BC Ministry of Forests and Range and BC MOE 2010](#)). Old forest is valued for its role in supporting biodiversity and wildlife habitat ([Hilbert and Wiensczyk 2007](#); [Spies 2004](#)). Old forest definitions are related to BEC units and their associated NDTs (BC Ministry of Forests and Range and BC MOE 2010; Resources Inventory Committee 1998), which categorize ecosystems based on the frequency and severity of natural disturbance processes such as fire, wind, and insects.

The most common BEC units within the LAA and RAA (i.e. CWHwm, MHmm2) are considered to be NDT1, indicating that stand-initiating events are rare, and natural disturbance is typically small-scale (e.g. windthrow, landslides). In these BEC units, old forest is defined as treed, upland ecosystems greater than 250 years old (BC Ministry of Forests and Range and BC MOE 2010). Alpine tundra and subalpine parkland BEC units (i.e. MHunp, CMAun) are categorized as NDT5, indicative of ecosystems characterized by harsh conditions, with snowpack and avalanches being a primary natural force. Old forest definitions for these BEC units are not applicable (BC Ministry of Forests and Range and BC MOE 2010).

Glacial recession in the area dates to the mid 19th century, with the Tulsequah Glacier estimated to have achieved its Little Ice Age maximum extent before about 1850 ([Geertsema and Clague 2003](#)). Trees sampled growing on moraines between the Tulsequah Glacier and the Nakonake River north of the RAA indicate the oldest sampled individuals were approximately 150 years old in 2003 ([Geertsema and Clague 2003](#)). Consequently, this recent glacial retreat is expected to be a primary limitation on forest age and structure within the RAA. Currently, forests within the RAA are dominated by mature forests. No old forest was mapped in the RAA.

No legal or non-legal Old Growth Management Areas ([BC GOV 2011a](#); [BC GOV 2011b](#)) or Old Growth Deferral Areas ([BC GOV 2022](#)) have been defined within the RAA. The nearest provincially mapped old forests, classified as Big-treed Old Growth and Deferral Areas, occur approximately 9 km and 23 km northeast from the RAA, respectively ([BC GOV 2025b](#)).

Grasslands

Grassland ecosystems in BC are defined as open landscapes dominated by grasses, sedges, and flowering plants where the lack of tree cover is maintained by physical factors such as low annual precipitation and soil conditions that prevent tree growth, and biotic factors such as frequent wildfire cycles and grazing ([Gayton 2003](#)). While grassland ecosystems are limited in extent in BC, they provide essential habitat for many listed species (Grasslands Conservation Council of BC 2007; [Wikeem and Wikeem 2004](#)). No grassland ecosystems were mapped within the RAA.

Alpine/Subalpine

Alpine and subalpine ecosystems in BC are characterized by high-elevation environments where cold temperatures, heavy snowfall, and short growing seasons limit vegetation growth. Alpine ecosystems are typically restricted to dwarf shrubs, herbs, bryophytes, and lichens, whereas subalpine/parkland ecosystems can also include low deciduous shrubs and stunted trees (krummholz) (Meidinger and Pojar 1991). For the purposes of this report, alpine and subalpine ecosystems are considered to be all vegetated or sparsely vegetated map units within the CMAun and MHunp BEC units.

Alpine/subalpine ecosystems are found within the CMAun and MHunp BEC units, representing 0.6% (41.2 ha) of the LAA and 14.8% (3,228.2 ha) of the RAA (Table 7.6-10, Figure 7.6-2). The most common alpine/subalpine ecosystems within the RAA are rock outcrop in the CMAun and MHunp (1,567.2 ha and 325.8 ha, and 7.2% and 1.5% of the RAA, respectively). Small amounts of alpine and subalpine ecosystems are present within the LAA, including alpine heath and heath meadow (1.4 ha and 6.5 ha, respectively), mountain hemlock–amabilis fir/pink mountain-heather (4.3 ha), and herb meadow (7.9 ha). Each of these ecosystems represents 0.1% or less of the LAA (Table 7.6-10).

Table 7.6-10 Alpine and Subalpine Ecosystems Mapped in the Local and Regional Assessment Areas

BEC Unit	Site Series / Map Code		LAA		RAA	
	Code	Common Name	Area (ha)	Percent of LAA (%)	Area (ha)	Percent of RAA (%)
CMAun	Af	Alpine fellfield	-	-	17.4	0.1
	Ah	Alpine heath	1.4	<0.1	174.7	0.8
	Am	Alpine meadow	-	-	2.3	<0.1
	At	Alpine tundra	-	-	90.9	0.4
	RO	Rock outcrop	2.1	<0.1	1,567.2	7.2
	RU	Rubble	-	-	254.0	1.2
	TA	Talus	-	-	62.8	0.3
MHunp	01	Mountain hemlock – amabilis fir/Alaskan blueberry ¹	-	-	9.0	<0.1
	02	Mountain hemlock – amabilis fir/pink mountain-heather ¹	4.3	0.1	56.8	0.3
	05	Amabilis fir – mountain hemlock/rosy twistedstalk ¹	-	-	3.6	<0.1
	AC	Avalanche chute	-	-	74.3	0.3
	AM	Herb meadow	7.9	0.1	77.5	0.4
	CA	Crowberry – bog blueberry – alpine Azalea	-	-	83.8	0.4
	HM	Heath meadow	6.5	0.1	149.0	0.7
	MK	Mountain hemlock krummholz	-	-	11.7	0.1
	RO	Rock outcrop	7.9	0.1	325.8	1.5
	RU	Rubble	10.9	0.2	219.9	1.0
	TA	Talus	-	-	47.5	0.2
Total Alpine and Subalpine Ecosystems^a			41.2	0.6	3,228.2	14.8

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

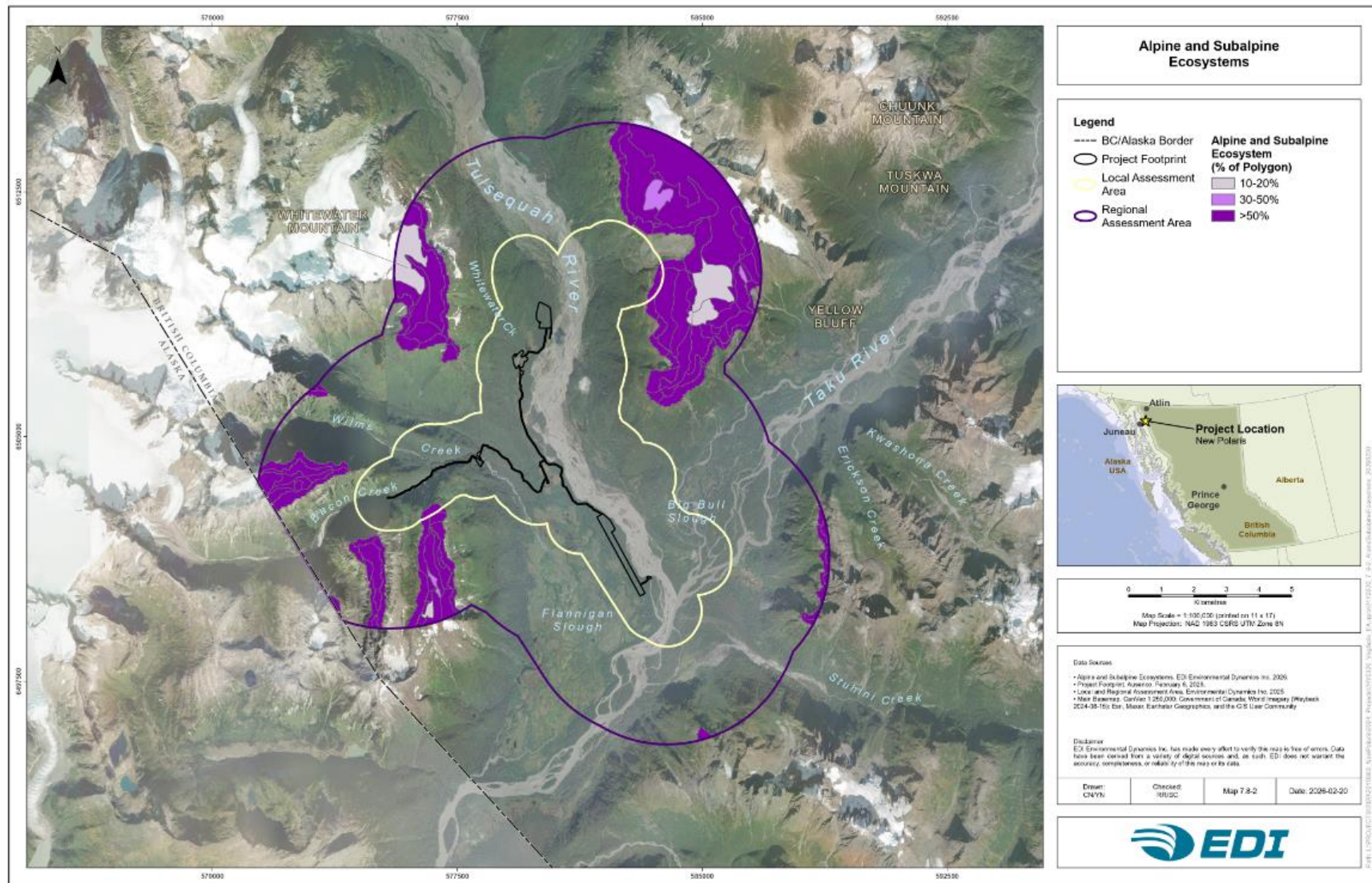


Figure 7.6-2 Alpine and Subalpine Ecosystems

Riparian

Riparian ecosystems are ecotones between upland and aquatic ecosystems, with a variable soil moisture regime and diverse flood-tolerant vegetation ([Banner and MacKenzie 1998](#)). Riparian ecosystems were identified as map units associated with the riparian areas of watercourses and waterbodies, including gravel bars, floodplains, and wet meadow ecological communities. Wetland ecosystems were not included, as they are assessed separately.

The total mapped area of riparian ecosystems covers 33.2% (2,180.3 ha) of the LAA and 20.4% (4,464.2 ha) of the RAA. The majority of riparian ecosystems are found in the CWHwm BEC unit and primarily associated with riparian ecosystems of the Taaltsuxéi Héen (Tulsequah River) (**Table 7.6-11; Figure 7.6-3**).

Table 7.6-11 Riparian Ecosystems Mapped in the Local and Regional Assessment Areas

BEC Unit	Code	Description	LAA		RAA	
			Area (ha)	Percent of LAA (%)	Area (ha)	Percent of RAA (%)
CWHwm	05	Sitka spruce/salmonberry wet maritime	174.3	2.7	511.3	2.3
	06	Black cottonwood – red alder/salmonberry	505.4	7.7	1,088.5	5.0
	FI50	Sitka willow – false lily-of-the-valley	759.4	11.6	1,352.3	6.2
	GB	Gravel bar	732.7	11.2	1,275.7	5.8
MHmm2	GB	Gravel bar	0.2	<0.1	2.7	<0.1
	WM	Wet seepage meadow	3.9	0.1	29.6	0.1
Total Riparian Ecosystems^a			2,175.9	33.1	4,260.1	19.5

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

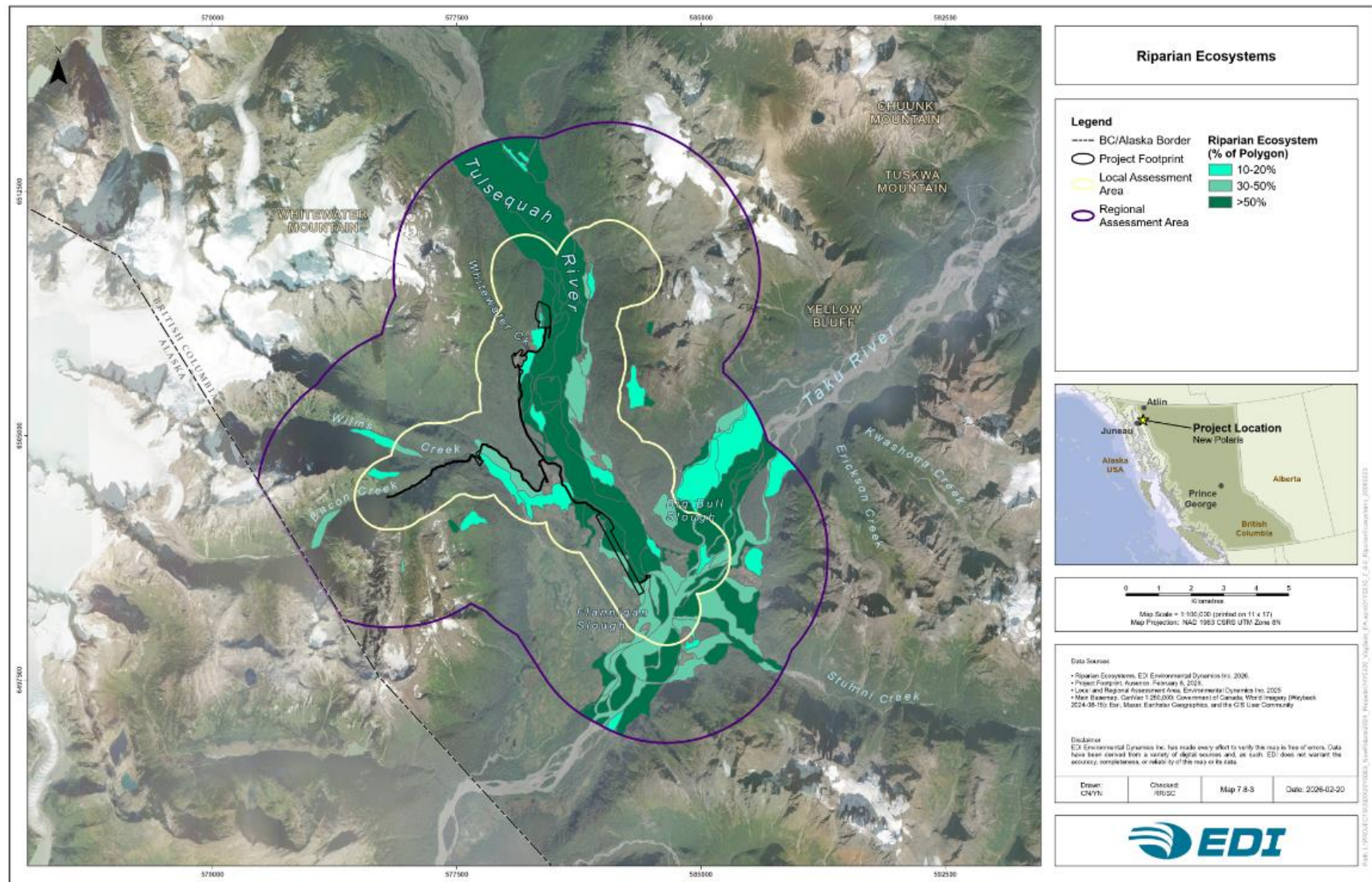


Figure 7.6-3 Riparian Ecosystems

Plant Species of Interest

Plant Species of Conservation Concern

Three historic occurrences of vegetation SOCC have been recorded within the RAA. Two provincially listed plant species were observed in the LAA in 2007, and one federally and provincially listed lichen species was observed in the RAA in 1982 (**Table 7.6-12; Figure 7.6-4**):

- Alaska holy fern (*Polystichum setigerum*) was observed to be growing on the toe slope of the mountain, north of the Project field office, growing in blocky talus under the canopy of a dense stand of Sitka alder (*Alnus alnobetula* ssp. *sinuata*). Approximately 20 plants occupied an area of approximately 50 m², intermixed with other more common *Polystichum* species ([Rescan 1997](#)). Alaska holy fern is provincially Blue-listed.
- Rock sandwort (*Sabulina stricta*; formerly known as *Minuartia stricta*) was observed adjacent to the Project field office on the creek fan, along with other species common to subalpine ecosystems. Approximately 25 plants were observed within an 8 m² area ([Rescan 1997](#)). Rock sandwort is provincially Blue-listed.
- Cryptic paw lichen (*Nephroma occultum*) was observed on the east bank of Taaltsuxéi Héen (Tulsequah River), about 4 km north of T'aakú Héeni (Taku River). Although not abundant, it appeared to be successfully regenerating, with good vigour and many young thalli noted ([BC CDC 2014](#)). Cryptic paw lichen is provincially Blue-listed and federally listed as Threatened under COSEWIC and Special Concern under SARA.

No federally or provincially listed plant or lichen species were observed during the 2021 and 2024 vegetation surveys. A list of vegetation SOCC with the potential to occur within the RAA are provided in **Table 7.6-12** and in the Vegetation and Ecosystem Existing Conditions Report (Appendix 7.6-2).

Table 7.6-12 Vegetation Species of Conservation Concern Historically Observed Within the RAA

Scientific Name	Common Name	UTM Coordinates (Zone 8N)	BC CDC Subnational Ranking ^a	BC CDC Listing 2026	SARA Listing 2002	COSEWIC Listing 2026
<i>Sabulina (Minuartia) stricta</i>	Rock sandwort	579609 E 6507678 N	S3 (2019)	Blue	-	-
<i>Polystichum setigerum</i>	Alaska holy fern	579581 E 6508212 N	S3 (2019)	Blue	-	-
<i>Nephroma occultum</i>	Cryptic paw lichen	582191 E 6503808 N	S3 (2019)	Blue	Special Concern	Threatened

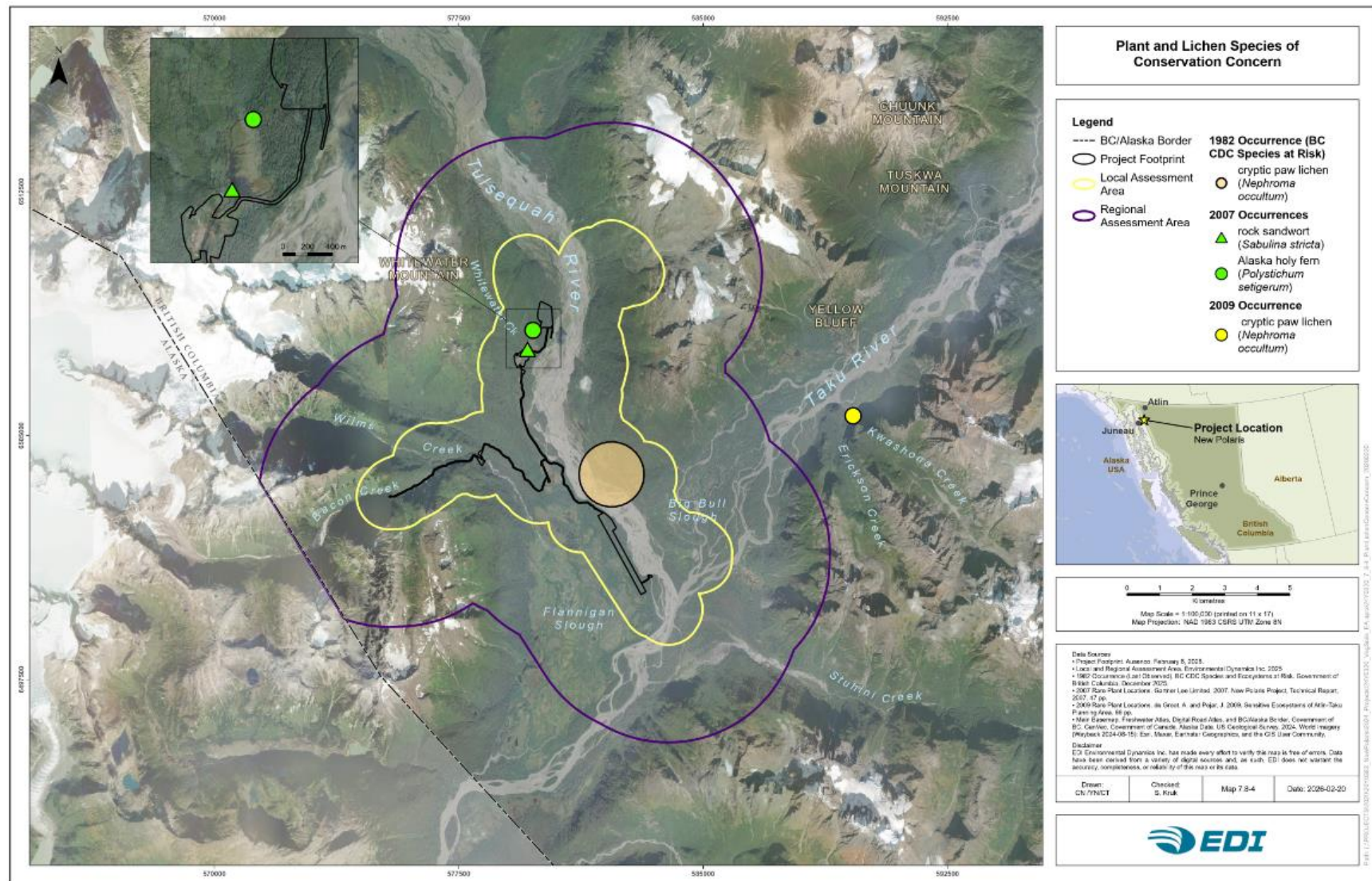


Figure 7.6-4 Plant and Lichen Species of Conservation Concern

Species of Importance to First Nations

Habitat identified as having moderate to high potential to support devil's club has been mapped within 31.3% (2,055.4 ha) of the LAA and 29.7% (6,487.3 ha) of the RAA (**Table 7.6-13**). This habitat is most prevalent in the CWHwm, with high potential habitat occurring in five map units (**Table 7.6-14**). Habitat with moderate and high potential to support devil's club is limited within the MHmm2 and absent within the MHunp and CMAun (**Table 7.6-13; Figure 7.6-5**).

Habitat identified as having moderate to high potential to support berry-producing species is extensive, covering 73.4% (4,822.1 ha) of the LAA and 60.4% (13,189.7 ha) of the RAA (**Table 7.6-13**). Berry-producing habitat is common across all BEC units (**Table 7.6-14**). Proportionally, the LAA has 46.1% high potential and 27.4% moderate potential berry-producing species habitat, whereas the RAA has 38.6% high potential and 21.7% moderate potential habitat (**Table 7.6-13; Figure 7.6-6**).

Habitat identified as having moderate to high potential to support spruce is common, representing 59.2% (3,886.5 ha) of the LAA and 45.4% (9,931.5 ha) of the RAA (**Table 7.6-13**). It is dominant within the CWHwm, where two mapping units are classified with high potential and two with moderate potential (**Table 7.6-14**). Habitat with moderate to high potential to support spruce is limited in the MHmm2 and MHunp and absent in the CMAun. Proportionally, the LAA includes 10.7% high potential and 48.4% moderate potential spruce habitat, compared to 7.0% high potential and 38.5% moderate potential habitat in the RAA (**Table 7.6-13; Figure 7.6-7**).

Habitat identified as having moderate to high potential to support waterlily is limited, accounting for 16.1% (1,059.0 ha) of the LAA and 13.8% (3,014.8 ha) of the RAA (**Table 7.6-13**). Waterlily habitat consists of water features and wetlands and is primarily associated with the CWHwm and MHmm2 BEC units (**Table 7.6-14**). Habitat with moderate to high potential for waterlily is limited in the MHunp and absent in the CMAun (**Table 7.6-13; Figure 7.6-8**).

Table 7.6-13 Habitat with Moderate to High Potential – Species of Importance to First Nations

Species of Importance	Habitat Potential Rank	Potential Habitat			
		LAA Area (ha)	Percent of LAA (%)	RAA Area (ha)	Percent of RAA (%)
Devil's club	High	1,646.6	25.1	4,485.7	20.5
	Moderate	408.8	6.2	2,001.6	9.2
Devil's Club Total^a		2,055.4	31.3	6,487.3	29.7
Berry-producing species	High	3,024.7	46.1	8,441.7	38.6
	Moderate	1,797.3	27.4	4,748.0	21.7
Berry-producing Species Total^a		4,822.1	73.4	13,189.7	60.4
Spruce	High	705.8	10.7	1,525.0	7.0
	Moderate	3,180.7	48.4	8,406.5	38.5
Spruce Total^a		3,886.5	59.2	9,931.5	45.4
Waterlily	Moderate	1,059.0	16.1	3,014.8	13.8
Waterlily Total^a		1,059.0	16.1	3,014.8	13.8

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Table 7.6-14 Habitat Potential – Species of Importance to First Nations

BEC Unit	Map Code	Map Unit	Species of Importance to First Nations	Habitat Ranking				LAA Area (ha)	Percent of LAA	RAA Area (ha)	Percent of RAA
				Devil's Club	Berry Species	Spruce	Waterlily				
CMAun	Af	Alpine fellfield	Bog blueberry, crowberry	Low	High	Low	Low	-	-	17.4	0.1
	At	Alpine tundra	Crowberry	Low	Moderate	Low	Low	-	-	90.9	0.4
MHunp	01	Mountain hemlock – amabilis fir/Alaskan blueberry	Oval-leaved blueberry, Alaskan blueberry, black huckleberry, strawberry, spruce	Low	High	Moderate	Low	-	-	9.0	<0.1
	02	Mountain hemlock – amabilis fir/pink mountain-heather	Bog blueberry, oval-leaved blueberry, crowberry	Low	Moderate	Low	Low	4.3	0.1	56.8	0.3
	05	Amabilis fir – mountain hemlock/rosy twistedstalk	Devil's club, Alaskan blueberry, black huckleberry, oval-leaved blueberry	Moderate	High	Low	Low	-	-	3.6	<0.1
	AC	Avalanche chute	Devil's club	Moderate	Low	Low	Low	-	-	74.3	0.3
	AM	Herb meadow	Strawberry	Low	Moderate	Low	Low	7.9	0.1	77.5	0.4
	CA	Crowberry – bog blueberry – alpine Azalea	Crowberry, bog blueberry, strawberry	Low	High	Low	Low	-	-	83.8	0.4
	HM	Herb meadow	Strawberry	Low	Moderate	Low	Low	6.5	0.1	149.0	0.7
	MK	Mountain hemlock krummholz	Bog blueberry, oval-leaved blueberry, crowberry, strawberry	Low	Moderate	Low	Low	-	-	11.7	0.1
	PD	Pond	Waterlily	Low	Low	Low	Moderate	-	-	1.2	<0.1
MHmm2	01	Mountain hemlock – amabilis fir/Alaskan blueberry	Oval-leaved blueberry, Alaskan blueberry, strawberry, spruce	Low	High	Moderate	Low	185.2	2.8	953.0	4.4
	02	Mountain hemlock – amabilis fir/pink mountain-heather moist maritime 2	Bog blueberry, oval-leaved blueberry, crowberry	Low	Moderate	Low	Low	15.7	0.2	332.7	1.5
	03	Amabilis fir – mountain hemlock/oak fern moist maritime 2	Oval-leaved blueberry, black huckleberry	Low	High	Low	Low	62.0	0.9	242.4	1.1
	05	Amabilis fir – mountain hemlock/rosy twistedstalk	Devil's club, black huckleberry, oval-leaved blueberry	Moderate	High	Low	Low	4.3	0.1	194.7	0.9
	07	Yellow-cedar – mountain hemlock/green false-hellebore	Oval-leaved blueberry, black huckleberry	Moderate	High	Low	Low	-	-	5.8	<0.1
	AC	Avalanche chute (shrub)	Devil's club	Moderate	Low	Low	Low	109.6	1.7	1,003.6	4.6
	AM	Herb meadow	Devil's club, strawberry	Moderate	Moderate	Low	Low	22.3	0.3	132.5	0.6
	CA	Crowberry-bog blueberry-alpine azalea	Crowberry, bog blueberry, strawberry	Low	High	Low	Low	-	-	84.5	0.4
	HM	Herb meadow	Strawberry	Low	Moderate	Low	Low	29.9	0.5	261.6	1.2
	LA	Lake	Waterlily	Low	Low	Low	Moderate	4.7	0.1	21.8	0.1
	MK	Mountain hemlock krummholz	Bog blueberry, oval-leaved blueberry, crowberry, strawberry	Low	Moderate	Low	Low	3.0	<0.1	63.7	0.3
	PD	Pond	Waterlily	Low	Low	Low	Moderate	-	-	6.3	<0.1
	RI	River	Waterlily	Low	Low	Low	Moderate	0.2	<0.1	11.4	0.1
	Wf	Fen	Waterlily	Low	Low	Low	Moderate	-	-	14.9	0.1
	WM	Wet seepage meadow	Crowberry	Moderate	Low	Low	Low	3.9	0.1	29.6	0.1
	Ws	Swamp	Oval-leaved blueberry, Alaskan blueberry, salmonberry, red elderberry, waterlily	Low	Moderate	Low	Moderate	-	-	60.4	0.3

BEC Unit	Map Code	Map Unit	Species of Importance to First Nations	Habitat Ranking				LAA Area (ha)	Percent of LAA	RAA Area (ha)	Percent of RAA
				Devil's Club	Berry Species	Spruce	Waterlily				
CWHwm	01	Western hemlock – Sitka spruce/Alaskan blueberry	Thimbleberry, oval-leaved blueberry, red elderberry, Alaskan blueberry, strawberry, spruce	Low	High	Moderate	Low	1,350.6	20.6	2,649.8	12.1
	02	Western hemlock – Sitka spruce/step moss	Oval-leaved blueberry or Alaskan blueberry, thimbleberry, strawberry, spruce	Low	High	Moderate	Low	66.8	1.0	205.1	0.9
	03	Sitka spruce – western hemlock/oak fern	Devil's club, oval-leaved blueberry, red elderberry, spruce	Moderate	High	Moderate	Low	268.7	4.1	557.6	2.6
	04	Sitka spruce – western redcedar/devil's club	Devil's club, highbush cranberry, oval-leaved blueberry, spruce	High	Moderate	High	Low	531.5	8.1	1,013.7	4.6
	05	Sitka spruce/salmonberry wet maritime	Devil's club, salmonberry, highbush cranberry, black gooseberry, oval-leaved blueberry, red elderberry, spruce	High	High	High	Low	174.3	2.7	511.3	2.3
	06	Act-red-osier dogwood	Devil's club, highbush cranberry, salmonberry, red elderberry, spruce	High	High	Moderate	Low	505.4	7.7	1,088.5	5.0
	AC	Avalanche chute	Devil's club, salmonberry, red elderberry, spruce	High	High	Moderate	Low	415.2	6.3	1,835.3	8.4
	AD	Sitka alder – Devil's club	Devil's club, salmonberry, red elderberry	High	Moderate	Low	Low	20.1	0.3	36.9	0.2
	CS	Clear-cut shrubby	Strawberry, spruce	Low	Moderate	Moderate	Low	18.6	0.3	18.6	0.1
	FI50	Sitka willow - false lily-of-the-valley	Highbush cranberry	Low	Moderate	Low	Low	759.4	11.6	1,352.3	6.2
	OW	Shallow open water	Waterlily	Low	Low	Low	Moderate	95.3	1.5	231.7	1.1
	PD	Pond	Waterlily	Low	Low	Low	Moderate	-	-	1.9	<0.1
	RI	River	Waterlily	Low	Low	Low	Moderate	292.5	4.5	686.2	3.1
	Wf	Fen	Waterlily	Low	Low	Low	Moderate	35.6	0.5	100.4	0.5
	Wf/Wm	Fen/marsh	Waterlily	Low	Low	Low	Moderate	54.5	0.8	91.5	0.4
	Wm	Marsh	Waterlily	Low	Low	Low	Moderate	206.0	3.1	697.4	3.2
	Ws	Swamp	Oval-leaved blueberry, Alaskan blueberry, salmonberry, red elderberry, spruce, waterlily	Low	Moderate	Moderate	Moderate	370.2	5.6	1,089.7	5.0
Total Ecosystems with Moderate to High Potential to Support Species of Importance to First Nations ^a								5,624.4	85.7	16,161.8	74.0

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

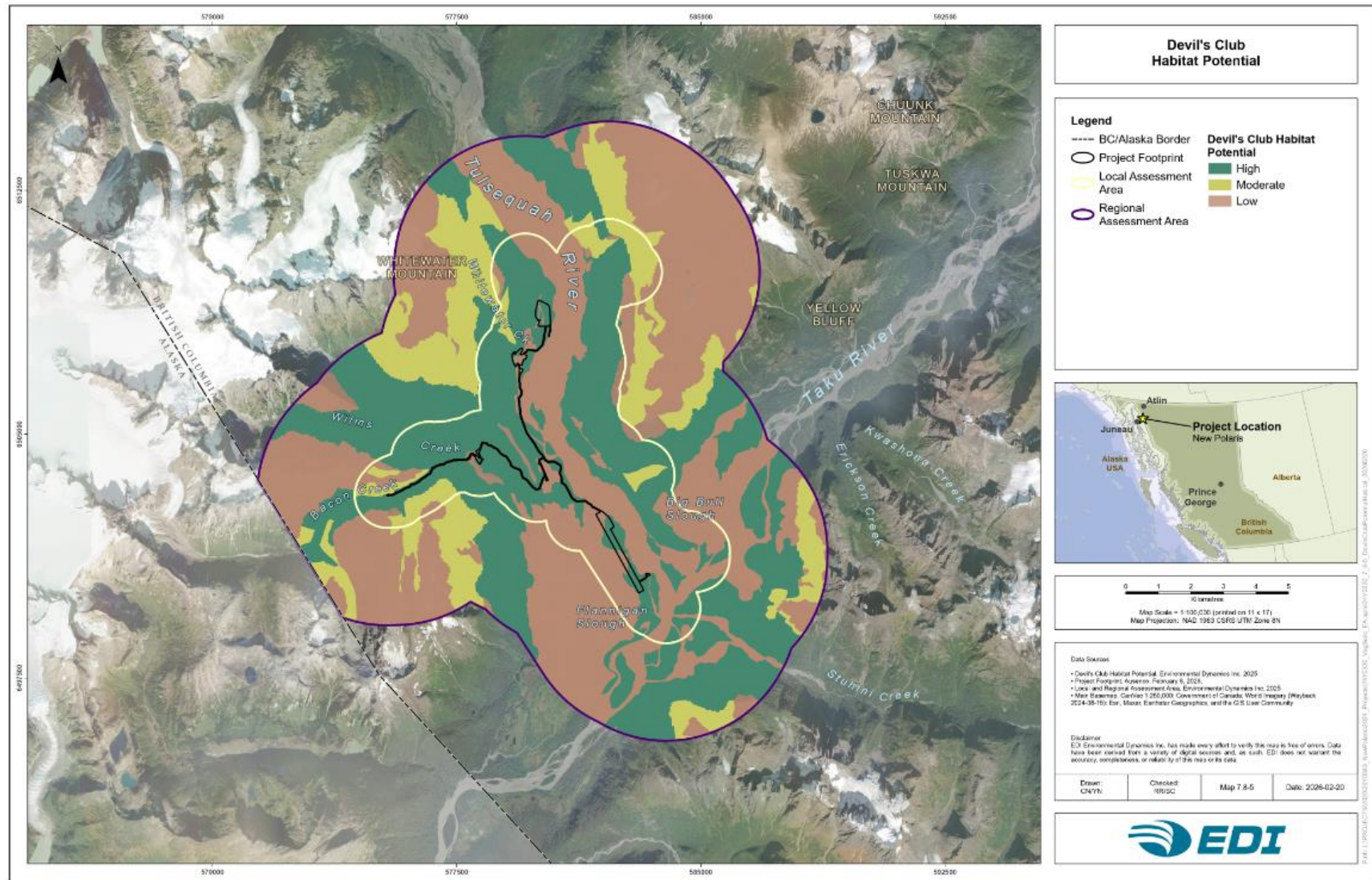


Figure 7.6-5 Devil's Club Habitat Potential

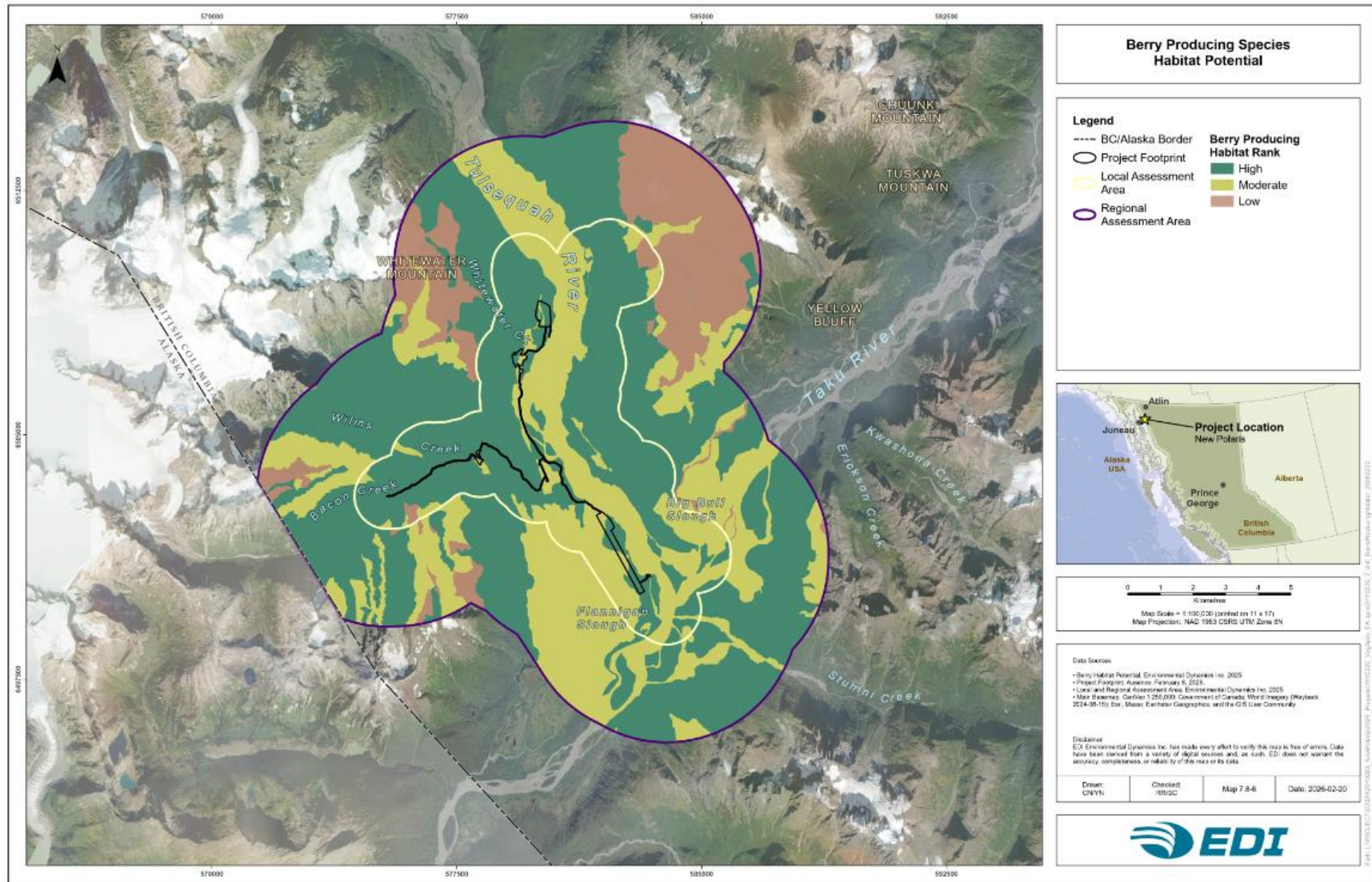


Figure 7.6-6 Berry-Producing Species Habitat Potential

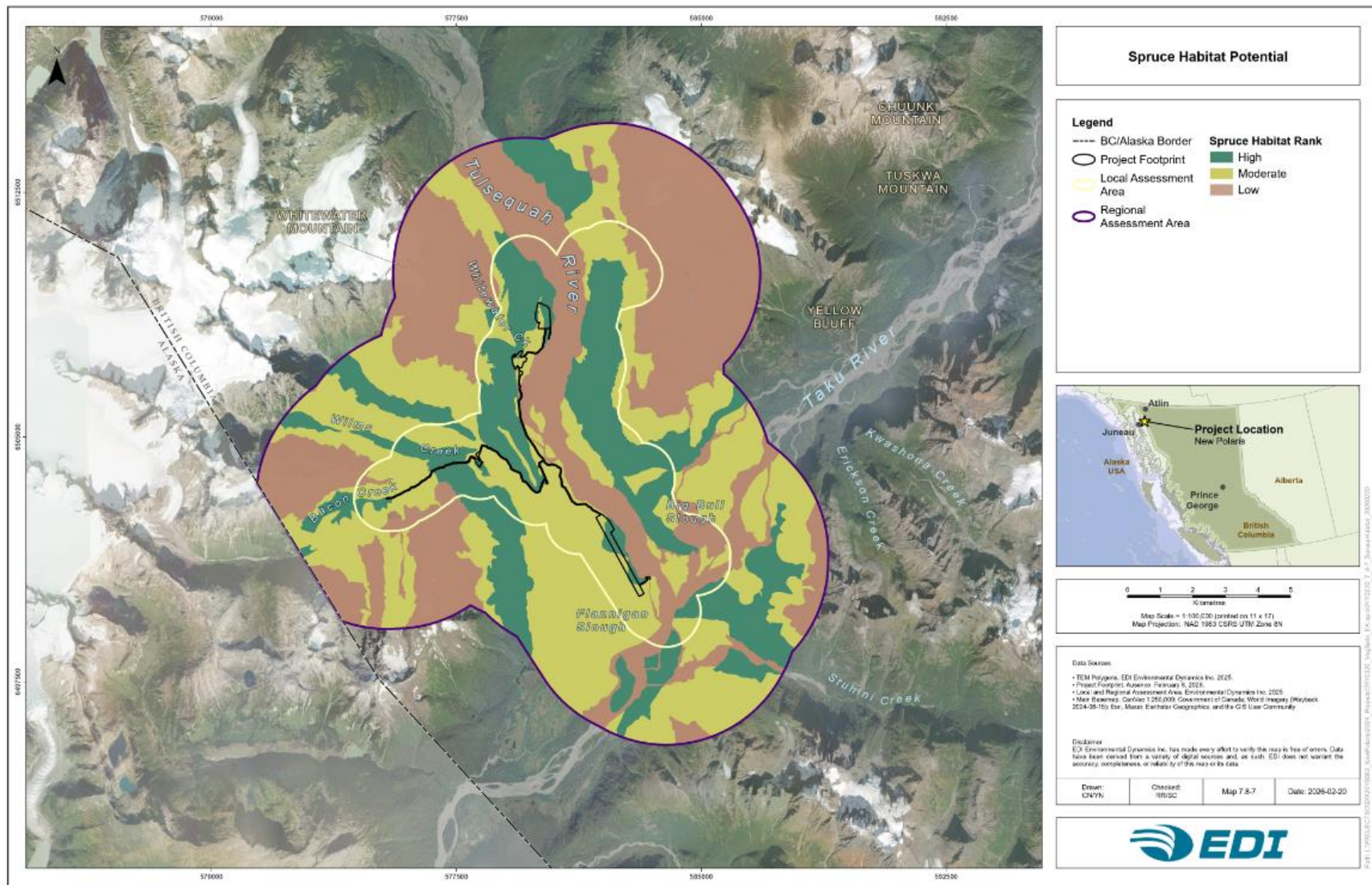


Figure 7.6-7 Spruce Habitat Potential

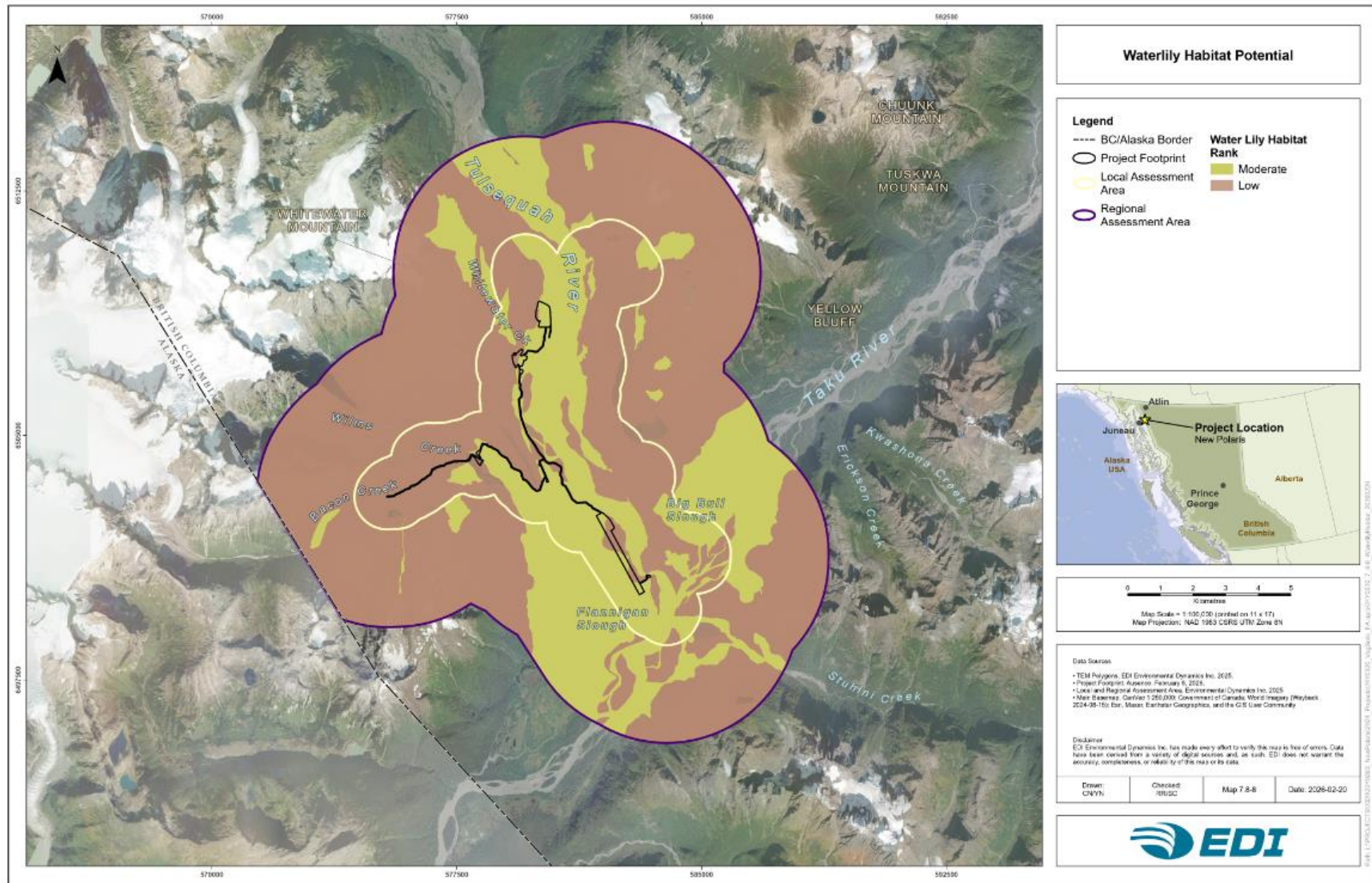


Figure 7.6-8 Waterlily Habitat Potential

Invasive Plant Species

No invasive plants were recorded within the RAA during the 2021 or 2024 vegetation surveys, nor have invasive plants been historically documented in the RAA in InvasivesBC records ([BC GOV 2025a](#)) or historic studies. The updated 2025 list of invasive plant species with the potential to occur at the Project is provided in the Vegetation and Ecosystem Existing Conditions Report in Appendix 7.6-2.

Plant Communities of Interest

Ecological Communities of Conservation Concern

No Red-listed ecological communities were mapped within the RAA. Three Blue-listed ecological communities were mapped within the RAA, all associated with floodplain ecosystems within the CWHwm BEC unit (**Table 7.6-15**). Within the RAA, these floodplain communities were mapped adjacent to the Taaltsuxéi Héén (Tulsequah River), T'aakú Héeni (Taku River), Wilms Creek, Bacon Creek, and Stuhini Creek (**Figure 7.6-9**). Overall, listed ecological communities were mapped across 1,439.1 ha (21.9%) of the LAA and 2,952.1 ha (13.5%) of the RAA. No listed ecological communities were mapped in the MHmm2, MHunp, or CMAun BEC units. A list of ecological communities of conservation concern with the potential to occur within the RAA is provided in the Vegetation and Ecosystem Existing Conditions Report in Appendix 7.6-2.

The most common Blue-listed ecological community within both the LAA and RAA was mapped as the black cottonwood/Sitka willow low bench floodplain community (CWHwm/FI50), covering 11.6% of the LAA and 6.2% of the RAA. This ecological community experiences prolonged annual flooding and sediment erosion/deposition, heavily influenced by floodplain dynamics and the jökulhlaup of the Taaltsuxéi Héén (Tulsequah River) ([Banner et al. 1993](#)).

The black cottonwood–red alder/salmonberry community (CWHwm/06) is the second largest Blue-listed ecological community by area, with 7.7% in the LAA and 5.0% in the RAA. The species composition of this mid-bench floodplain community in the Taaltsuxéi Héén (Tulsequah River) valley varies somewhat from that described in Banner (1993), as red alder (*Alnus rubra*) is not present, salmonberry (*Rubus spectabilis*) is uncommon, and devil's club (*Oplopanax horridus*) is the dominant understory shrub ([Rescan 1997](#)).

The least common Blue-listed ecological community mapped within the LAA and RAA is the Sitka spruce/salmonberry wet maritime community (CWHwm/05), with 2.7% in the LAA and 2.3% in the RAA. This high-bench floodplain community occurs on deep, medium-textured, and coarse-textured soils ([Banner et al. 1993](#)). The abrupt transition between steep mountain slopes and an active floodplain influenced by the jökulhlaup in the Taaltsuxéi Héén (Tulsequah River) valley results in limited extent of high-bench ecosystems ([Rescan 1997](#)).

Table 7.6-15 Ecological Communities of Conservation Concern

BEC Unit/Map Code	Common Name	Scientific Name	BC CDC Subnational Ranking (2025)	BC CDC Listing (2025)	Area in LAA (ha)	Percent of LAA (%)	Area in RAA (ha)	Percent of RAA (%)
CWHwm/05	Sitka spruce/salmonberry wet maritime	<i>Picea sitchensis/Rubus spectabilis</i> wet maritime	S3 (2023)	Blue	174.3	2.7	511.3	2.3
CWHwm/06	Black cottonwood - red alder/salmonberry	<i>Populus trichocarpa - Alnus rubra/Rubus spectabilis</i>	S3 (2010)	Blue	505.4	7.7	1,088.5	5.0
CWHwm/FI50	Black cottonwood/Sitka willow	<i>Populus trichocarpa/Salix sitchensis</i>	S2S3 (2004)	Blue	759.4	11.6	1,352.3	6.2
Total^a					1,439.1	21.9	2,952.1	13.5

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

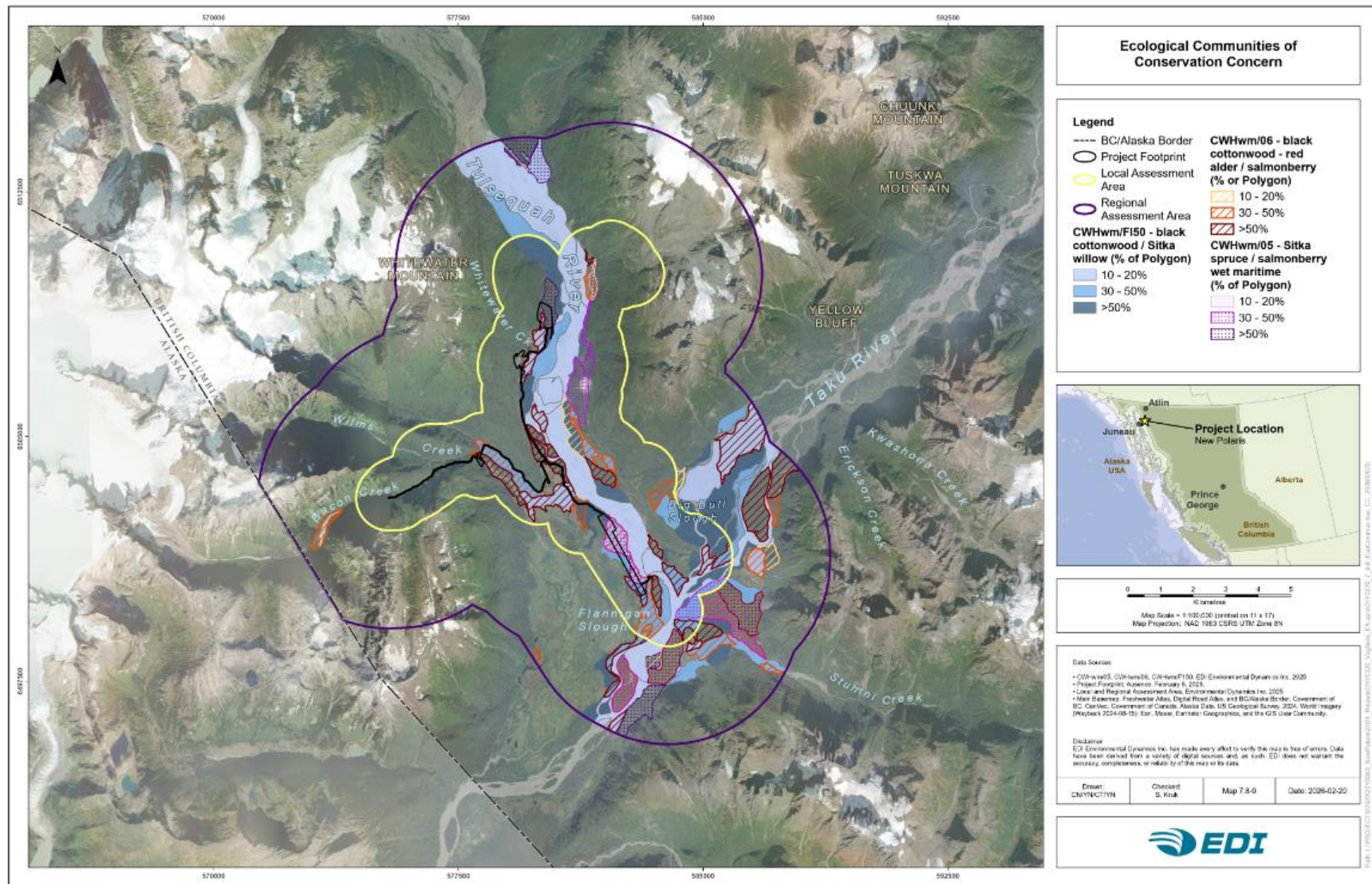


Figure 7.6-9 Ecological Communities of Conservation Concern

Ecological Communities Valued for Traditional Use

Species of importance to First Nations have been correlated with habitat suitability on an ecosystem level. As such, the existing conditions related to vegetation species of importance to First Nations also addresses ecological communities valued for traditional use. For more information, refer to the results for Species of Importance to First Nations in *Species of Importance to First Nations* (above).

Wetlands

Wetland Ecosystems

Wetland ecosystems were mapped predominantly within lower elevation BEC units (i.e. CWHwm and MHmm2), comprising 11.7% (765.5 ha) of the LAA and 10.6% (2,285.9 ha) of the RAA. Mapped wetland classes include fens, marshes, swamps, and shallow open water wetlands (**Table 7.6-16; Figure 7.6-10**). No wetlands were mapped in the CMAun and the MHunp BEC units.

Table 7.6-16 Wetlands Within the Local and Regional Assessment Areas

BEC	Ecosystems	Map Code	Area in LAA (ha)	Percentage in LAA (%)	Area in RAA (ha)	Percentage in RAA (%)
MHmm2	Fen	Wf	-	-	14.9	0.1
	Swamp	Ws	-	-	60.4	0.3
CWHwm	Shallow open water	OW	95.3	1.5	231.7	1.1
	Fen	Wf	35.6	0.5	100.4	0.5
	Fen/marsh	Wf/Wm	54.5	0.8	91.5	0.4
	Marsh	Wm	206.0	3.1	697.4	3.2
	Swamp	Ws	370.2	5.6	1,089.7	5.0
Total Wetlands^a			765.5	11.7	2,285.9	10.6

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Wetland Function

Wetland function surveys were conducted at six wetland assessment plots within four mapped wetlands within the RAA (NPWF02, NPWF03, NPWF04 and NPWF05) (**Table 7.6-17; Figure 7.6-10**). Of the six wetland assessment plots visited, four were classified as predominantly marsh (NPWF02, NPWF03, NPWF05a, b) and two were classified as predominantly swamp (NPWF04, NPWF05c). While these classifications reflect the dominant wetland class at the plot locations, all the wetlands were complexes characterized by multiple wetland classes (e.g. marsh, fen, swamp, shallow water). A summary of the surveyed wetlands is provided in **Table 7.6-17**, including dominant and subdominant wetland classes, and wetland site association. Detailed field data are presented in the Vegetation and Ecosystem Existing Conditions Report in **Appendix 7.6-2**.

All six plots within the four wetlands received overall high wetland function ratings. The wetlands surveyed are large and complex, featuring multiple wetland classes. All of these factors contribute to the high ecological function assessed (**Figure 7.6-10**).

Table 7.6-17 Wetland Function Assessment Plot Descriptions

Wetland ID	Dominant Wetland Class (Subdominant Classes)	Plot ID	Plot Description	Delineated Wetland Area (ha)
NPWF02	Wm (Ws, OW)	02	Sitka sedge – Hemlock-parsley marsh (<i>Carex sitchensis</i> – <i>Oenanthe sarmentosa</i> marsh; Wm50)	31.2
NPWF03	Ws (Wm, OW)	03	Sitka willow – Sitka sedge swamp (<i>Salix sitchensis</i> – <i>Carex sitchensis</i> swamp; Ws06)	39.9
NPWF04	Wm (Wf, OW)	04	Sitka sedge – Hemlock-parsley marsh (<i>Carex sitchensis</i> – <i>Oenanthe sarmentosa</i> marsh; Wm50)	22.7
NPWF05	Wm (Ws, OW)	05a	Sitka sedge – Hemlock-parsley marsh (<i>Carex sitchensis</i> – <i>Oenanthe sarmentosa</i> marsh; Wm50)	1,495.2
	Wm (Ws, OW)	05b	Sitka sedge – Hemlock-parsley marsh (<i>Carex sitchensis</i> – <i>Oenanthe sarmentosa</i> marsh; Wm50)	
	Ws (Wm, OW)	05c	Pink spirea – Sitka sedge swamp (<i>Spiraea douglasii</i> – <i>Carex sitchensis</i> swamp; Ws50)	
Total Area^a				1,589.0

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Table 7.6-18 Wetland Function Assessment Results

Wetland Plot ID	Wetland Description		Ecological Function Score								Overall Wetland Function Rating
	Wetland Class at Plot	Delineated Wetland Area (ha)	Hydrologic		Biochemical			Other			
			Flow	Erosion	Water Quality	Nutrients	Carbon Storage	Wildlife Habitat	Wildlife Use	Climate	
NPWF02	Wm	31.2	Mod-High	Mod-High	High	High	Mod	High	High	Mod-High	High
NPWF03	Ws	39.9	Mod	Mod	High	High	Mod-High	High	High	Mod	High
NPWF04	Wm	22.7	Mod-High	Mod-High	High	High	Mod	High	High	Mod-High	High
NPWF05a, 05b	Wm	1,495.2	Mod-High	Mod-High	High	High	Mod	High	High	Mod-High	High
NPWF05c	Ws		Mod	Mod	High	High	High	High	High	Mod	High

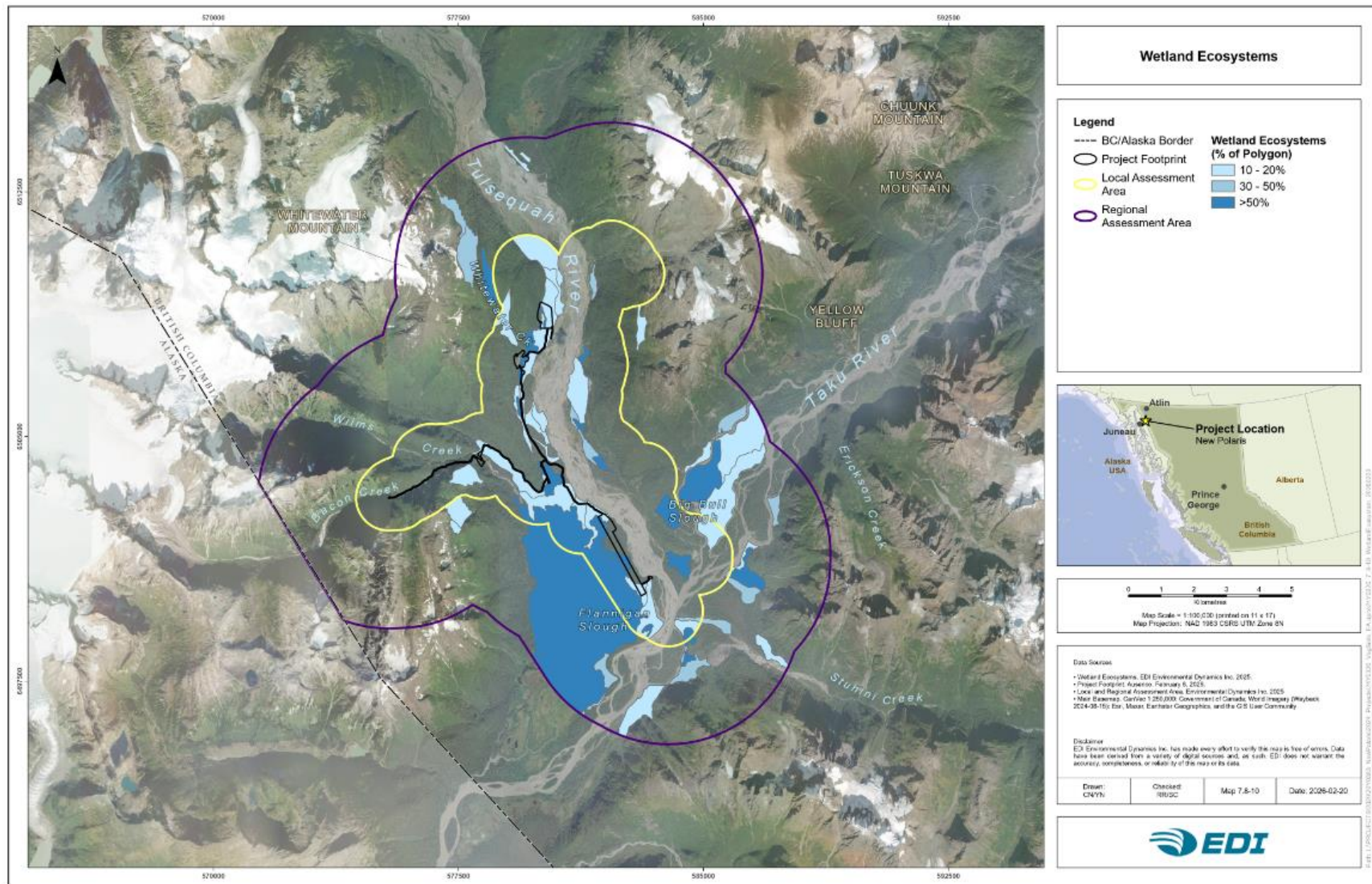


Figure 7.6-10 Wetland Ecosystems

7.6.6 Potential Project Effects

Project effects can be direct or indirect. Direct effects are the result of a Project activity that has a direct effect and physically alters soil, terrain, vegetation, or ecosystems (e.g. clearing, grading). An indirect effect is the result of a more complex effect pathway that is not direct but rather has steps or activities that are a step or more away from a Project activity, through secondary pathways such as changes in hydrology, soil conditions, or the introduction of invasive species. Project effects can be beneficial and desirable and therefore considered positive; alternatively, they can be adverse and undesirable and therefore considered negative. The assessment takes into consideration potential direct and indirect effects that can be either positive or negative effects, during different phases of the Project. This subsection describes Project phases and associated activities, Project–VC interactions, and potential effects to be assessed.

Potential effects to soil and vegetation are expected to be present, considering the following:

- Project area is already changed and vegetation communities altered due to historical mining activities
- Surface soils are already naturally enriched with metals, and
- Erosion will have an impact on both soils and vegetation.

This section aims to:

- Describe Project phases and associated activities, identify potential Project–VC interactions for each Project phase and activity, and determine associated potential effects to be assessed, and
- Identify and evaluate mitigations and enhancement measures to effectively manage potential Project effects.

7.6.6.1 Methods

The evaluation of Project effects on soil and vegetation takes into consideration the interactions that occur across the landscape, information from federal, provincial and regional regulators, First Nations, stakeholders, and local communities.

Key Project-related interactions with the Soil and Vegetation VC and associated subcomponents were determined through a screening evaluation of proposed Project components and activities within the LAA. Key Project-related interactions and the likelihood of interactions were determined with the use of spatial analysis of the extent of Project components, based on the results of studies examining current environmental conditions, review of existing information (e.g. reports and databases) and engagement with First Nations (including input from consultation and traditional knowledge), local governments, stakeholders, and regulators.

7.6.6.2 Valued Components, Effect Interactions, and Measurable Parameters

Soil and terrain subcomponents carried forward into the assessment, potential effects, and indicators and measurable parameters used to characterize and assess effects are provided in **Table 7.6-19** below.

Table 7.6-19 Subcomponent, Pathway, and Interactions/Measurable Parameters – Soil and Terrain

Subcomponent	Potential Effects	Indicators / Measurable Parameters
Soil Quality	- Deposition of metals-enriched dust - Leaching from combined storage facility	- Analysis of metal concentrations in soils - Ongoing visual monitoring
Soil Quantity	- Loss of soil into watercourses - Erosion - Degradation of waterbodies - Loss and/or alteration of soil quantity due to Project activities involved with earthmoving and other anthropogenic activities, as well as degradation due to surface water (e.g. ponding, leaching)	- Total suspended solids in water - Extent of ecological viable soils - Topsoil and subsoil depth changes - Soil suitability ratings - Wind and erosion potential with monitoring - Compaction and rutting potential
Unique Geologic Landforms (Terrain)	- Slope stability - Drainage and soil moisture regime	Maintenance of soil landscapes with minimum likelihood for landslide

Vegetation VC subcomponents carried forward into the assessment, potential effects, and indicators and measurable parameters used to characterize and assess effects are provided in **Table 7.6-20** below.

Table 7.6-20 Subcomponent, Pathway, and Interactions/Measurable Parameters – Vegetation

Subcomponent	Potential Effects	Indicators / Measurable Parameters
Ecosystems	Alteration or loss of ecosystems	Quantitative measurement of the change in the extent of ecosystems (hectares)
Plant Species of Interest	Change in the abundance or distribution of plant species of interest	Quantitative measurement of the change in extent of known occurrences (hectares)
Plant Communities of Interest	Alteration or loss of plant communities of interest	Quantitative measurement of the change in the extent of plant communities (hectares)
Wetlands	Alteration or loss of wetland function	Quantitative measurement of the change in the extent of wetland ecosystems (hectares)

The alteration of vegetation is defined as reduced ecosystem function, plant vigour, and/or changes to population extent. The alteration of vegetation may occur due to introduction and/or proliferation of invasive plants, edge effects, changes in water quantity and quality, soil erosion, deposition, and sedimentation, and dust deposition. Alteration of vegetation can lead to the loss of ecosystems, plant species of interest, plant community interest, and wetland function.

The loss of vegetation is defined as habitat alteration to the extent that it is rendered functionally unable to support vegetation populations or ecosystems. Land clearing and grubbing are anticipated to result in the greatest contribution to loss of vegetation.

As described in **Subsection 7.6.5**, old forest and grassland ecosystems were not identified within the LAA or RAA; as such, these ecosystems will not be carried forward in the assessment of the ecosystems subcomponent of the Vegetation VC. Potential change in the abundance of invasive plants was considered within the effects assessment for all Vegetation VC subcomponents.

7.6.6.3 *Project Interactions*

The interactions of components including subcomponents and activities for all phases of the Project with soil and vegetation are summarized in **Table 7.6-21** (soil and terrain) and **Table 7.6-22** (vegetation). The identification of possible interactions was completed using the following information:

- Technical characteristics of the Project provided by the engineering team
- Soil and vegetation baseline data
- Feedback from First Nations, and
- Professional experience from similar projects.

Activities and their potential interactions with VCs have been characterized as follows:

- Green circle (●) – little to no interaction expected; no further consideration warranted.
- Orange circle (●) – potential interaction requiring further consideration.
- Red circle (●) – key interaction that is likely or certain.

Where an interaction is possible, the anticipated potential effect(s) is identified and carried forward in the assessment. Interactions expected to result in potential effects on the Soil and Vegetation VC are discussed further in **Subsection 7.6.6.4**. Where little to no interaction between the Project and a subcomponent is anticipated or the interaction is considered minor (i.e. not expected to have a substantive influence on the short- or long-term integrity of the subcomponent, as the effect would not be measurable or detectable using the identified Indicator), the interaction is not considered further in the assessment.

Table 7.6-21 Potential Project Interactions – Soil and Terrain

Project Component or Activity	Potential Interactions with Soil and Terrain Subcomponent			Potential Effects
	Soil Quality	Soil Quantity	Unique Geologic Landforms (Terrain)	
Site Preparation and Construction Phase				
Clearing of previously developed ground and overgrowth	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Clean up and disposal of remnants from historic operations	●	●	●	Positive Direct (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of new airstrip	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of new roads and upgrades to existing roads	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and Negative Indirect (Terrain)
Construction of culverts at water crossing during road development	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and Negative Indirect (Terrain)
Road use during construction (equipment, workers, and goods transportation)	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Excavation of borrow pits for aggregate supply sourcing	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and Negative Indirect (Terrain)
Site preparation and development of tailings and waste rock CSF	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of river transport landing site (~10 km from Mine Site), including a small office trailer, genset, diesel fuel tank, temporary storage area of supplies, and container handler	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of new ramp for access to underground mine	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of mine ventilation, water and electrical services, pumps, geotechnical ground support machinery, haulage equipment, compressed air, mine lighting, and refuge stations	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Site preparation and development of fuel storage site	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Site preparation and development of explosive storage facility	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Stripping of topsoil and overburden stockpiling	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Site grading, excavations, including blasting and fill to support infrastructure (e.g. housing, administration office, mine dry, assay building, maintenance building and warehouses) and utilities and services (e.g. communications facility, waste disposal facility, compressed-air plant)	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and Negative Direct (Terrain)
Site preparation and construction of settling ponds and water treatment plant	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and Negative Indirect (Terrain)
Site preparation and construction of hydroelectric facility	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Land clearing and site preparation for transmission line from hydroelectric facility to Mine Site	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Site preparation and construction of processing plant, including crushing and conveying systems and concentrate handling	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Installation of wells and potable water supply and storage facilities	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Construction of new Mine Site roads and upgrades to existing roads	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
New cut/fill construction on the hillside west of Whitewater Creek	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and Negative Direct (Terrain)
Construction of a tote road between the Mine Site and the waste rock and tailings CSF to transport of dry tailings from the mill	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Excavation of aggregate quarry to provide material for construction of the CSF and other facilities	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and Negative Indirect (Terrain)
Installation of culverts to convey surface drainage around CSF	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)

Project Component or Activity	Potential Interactions with Soil and Terrain Subcomponent			Potential Effects
	Soil Quality	Soil Quantity	Unique Geologic Landforms (Terrain)	
Construction of water management system	●	●	●	Positive Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Construction of compressed-air plant and compressors that supply the underground operations, mill, and surface operations with a compressed air supply	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of domestic waste disposal facility (including incinerators) for the disposal of domestic, sanitary, and other waste generated by the camp and other site facilities during operations	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction and installation of transmission line from hydroelectric facility to Mine Site	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Construction of camp for worker accommodations	●	●	●	No Effect (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Operation Phase				
Storage of ore stockpiles	●	●	●	Negative Direct (Soil Quality), No Impact (Soil Quantity), and No Impact (Terrain)
Maintenance and monitoring of explosive storage facility	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Maintenance and monitoring of fuel storage and handling facility	●	●	●	Negative Indirect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Overburden and soil stockpile area maintenance	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Concentrate transport to processing plant	●	●	●	Negative Indirect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Road use and maintenance during operations (equipment, workers, and goods transportation)	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Reclamation and Closure Phase				
Decommissioning of hydroelectric facility and associated transmission line	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Dismantling and removal of buildings and infrastructure from Mine Site	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Disposal of contaminated soil and materials to hazardous waste facility	●	●	●	Positive Direct (Soil Quality), Negative Direct (Soil Quantity), and No Effect (Terrain)
Road use and maintenance during closure (equipment, workers, and goods transportation)	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Water treatment and discharge from settling ponds	●	●	●	Positive Direct (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Decommissioning of processing plant	●	●	●	Negative Indirect (Soil Quality), No Impact (Soil Quantity), and No Impact (Terrain)
Decommissioning and reclamation of roads not in use	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Decommissioning of river transport landing site	●	●	●	Negative Indirect (Soil Quality), Negative Direct (Soil Quantity), and No Impact (Terrain)
Decommissioning of CSF (cover completion, recontouring, and revegetation)	●	●	●	Positive Direct (Soil Quality), Positive Direct (Soil Quantity), and No Impact (Terrain)
Reclamation monitoring	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Post Closure Phase				
Water treatment monitoring	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Decommissioning and dismantling of settling ponds and water treatment plant	●	●	●	Negative Indirect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)
Post-closure monitoring	●	●	●	No Effect (Soil Quality), No Effect (Soil Quantity), and No Effect (Terrain)

Table 7.6-22 Potential Project Interactions – Vegetation

Project Component or Activity	Potential Interactions with Vegetation Subcomponent				Potential Effects
	Ecosystems	Plant Species of Interest	Plant Communities of Interest	Wetlands	
Construction Phase					
Procurement of employment and labour, services, goods, and use of infrastructure in the region	●	●	●	●	Direct adverse effects: vegetation clearing, soil disturbance. Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.
Clearing of previously developed ground and overgrowth	●	●	●	●	
Clean up and disposal of remnants from historic operations	●	●	●	●	
Construction of new airstrip	●	●	●	●	
Construction of culverts at water crossings during road development	●	●	●	●	
Road use and maintenance during construction (transportation of equipment, workers, and supplies)	●	●	●	●	
Excavation of borrow pits for aggregate supply sourcing	●	●	●	●	
Site preparation and development of tailings and waste rock CSF	●	●	●	●	
Construction of river transport landing site (~10 km from Mine Site), including a small office trailer, genset, diesel fuel tank, temporary storage area of supplies, and container handler	●	●	●	●	
Construction of new ramp for access to underground mine, starting at the existing New Polaris portal	●	●	●	●	
Construction of mine ventilation, water, electrical services, pumps, geotechnical ground support machinery, haulage equipment, compressed air, mine lighting, and refuge stations	●	●	●	●	
Site preparation and development of fuel storage site	●	●	●	●	
Site preparation and development of explosive storage facility	●	●	●	●	
Stripping of topsoil and overburden stockpiling	●	●	●	●	
Site grading and excavations to support infrastructure (e.g. housing, administration office, mine dry, assay building, maintenance building, and warehouses) and utilities and services (e.g. communications facility, waste disposal facility, and compressed-air plant)	●	●	●	●	
Site preparation and construction of settling ponds and water treatment plant	●	●	●	●	
Continuing activities for re-opening of previous mine works (e.g. dewatering underground workings, treating and disposing of contact water, management and removal of old equipment or facilities, and legacy tailings)	●	●	●	●	
Waste management and monitoring activities	●	●	●	●	
Site preparation and construction of hydroelectric facility	●	●	●	●	
Land clearing and site preparation for transmission line from hydroelectric facility to Mine Site	●	●	●	●	
Site preparation and construction of processing plant, including crushing and conveying systems, and concentrate handling	●	●	●	●	
Marine traffic control for materials and supply transportation	●	●	●	●	
Air traffic control for materials and supply transportation	●	●	●	●	
Installation of wells, potable water supply, and storage facilities	●	●	●	●	
Transportation of workers, product, and supplies	●	●	●	●	
Construction of new Mine Site roads and upgrades to existing roads	●	●	●	●	

Project Component or Activity	Potential Interactions with Vegetation Subcomponent				Potential Effects
	Ecosystems	Plant Species of Interest	Plant Communities of Interest	Wetlands	
New cut/fill construction on the hillside west of Whitewater Creek	●	●	●	●	
Construction of a tote road between the Mine Site and the waste rock and tailings CSF to transport of dry tailings from the mill	●	●	●	●	
Excavation of aggregate quarry to provide material for construction of the CSF and other facilities	●	●	●	●	
Installation of culverts to convey surface drainage around CSF	●	●	●	●	
Construction of water management system	●	●	●	●	
Construction of communications facility, including satellite-based internet and surface telephone/radio communication system, as well as a specialized communication system for the underground mine to enable communication with the surface crews	●	●	●	●	
Construction of compressed-air plant and compressors that supply the underground operations, mill, and surface operations with a compressed air supply	●	●	●	●	
Construction of domestic waste disposal facility (including incinerators) for the disposal of domestic, sanitary, and other waste generated by the camp and other site facilities during operations	●	●	●	●	
Construction and installation of transmission line from hydroelectric facility to Mine Site	●	●	●	●	
Construction of camp for worker accommodations	●	●	●	●	
Operations Phase					
Procurement of employment and labour, services, goods, and use of infrastructure in the region	●	●	●	●	Direct adverse effects: vegetation clearing, soil disturbance. Direct positive effects: revegetation during progressive reclamation. Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.
Storage of ore stockpiles	●	●	●	●	
Maintenance and monitoring of explosive storage facility	●	●	●	●	
Maintenance and monitoring of fuel storage and handling facility	●	●	●	●	
Operation and maintenance of hydroelectric facility	●	●	●	●	
Operation and maintenance of transmission line	●	●	●	●	
Marine traffic control for materials and supply transportation	●	●	●	●	
Air traffic control for materials and supply transportation	●	●	●	●	
Transportation of workers, product, and supplies	●	●	●	●	
Dewatering activities during advancement of new ramp	●	●	●	●	
Deposition and compaction of tailings at CSF	●	●	●	●	
Transportation of thickened tailing underground placed in mined out voids (stopes) for ground support	●	●	●	●	
Overburden and soil stockpile area maintenance	●	●	●	●	
Concentrate transport to processing plant	●	●	●	●	
Road use and maintenance during operations (transportation of equipment, workers, and supplies)	●	●	●	●	
Waste management and monitoring activities	●	●	●	●	
Backfilling of underground mining excavations	●	●	●	●	
Operation of process plant	●	●	●	●	

Project Component or Activity	Potential Interactions with Vegetation Subcomponent				Potential Effects
	Ecosystems	Plant Species of Interest	Plant Communities of Interest	Wetlands	
Hauling waste rock from underground mine to the CSF	●	●	●	●	
Water intake and use	●	●	●	●	
Operation of water management system (including sedimentation ponds)	●	●	●	●	
Treatment and discharge of process water and wastewater	●	●	●	●	
Marine river transport landing site operation	●	●	●	●	
Reclamation and Closure Phase					
Decommissioning of hydroelectric facility and associated transmission line	●	●	●	●	Direct adverse effects: vegetation clearing, soil disturbance. Direct positive effects: revegetation during reclamation. Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.
Procurement of employment and labour, services, goods, and use of infrastructure in the region	●	●	●	●	
Marine traffic control for materials and supply transportation	●	●	●	●	
Air traffic control for materials and supply transportation	●	●	●	●	
Dismantling and removal of ancillary buildings and infrastructure from Mine Site	●	●	●	●	
Waste management and monitoring activities	●	●	●	●	
Disposal of contaminated soil and materials to hazardous waste facility	●	●	●	●	
Road use and maintenance during closure (transportation of equipment, workers, and supplies)	●	●	●	●	
Water treatment and discharge from settling ponds	●	●	●	●	
Decommissioning of processing plant	●	●	●	●	
Decommissioning and reclamation of roads not in use	●	●	●	●	
Decommissioning of river transport landing site	●	●	●	●	
Decommissioning of CSF (recontouring and revegetation).	●	●	●	●	
Reclamation monitoring	●	●	●	●	
Placement of geotechnical and topsoil cover for CSF to encapsulate the tailings and waste	●	●	●	●	
Post Closure Phase					
Procurement of employment and labour, services, goods, and use of infrastructure in the region	●	●	●	●	Direct adverse effects: vegetation clearing, soil disturbance.
Water treatment monitoring	●	●	●	●	Direct positive effects: revegetation during reclamation.
Decommissioning and dismantling of settling ponds and water treatment plant	●	●	●	●	Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.
Post-closure monitoring of Mine Site	●	●	●	●	

Notes:
Green circle (●) – little to no interaction expected; no further consideration warranted.
Orange circle (●) – potential interaction requiring further consideration.
Red circle (●) – key interaction that is likely or certain.

7.6.6.4 *Description of Potential Effects*

Canagold applied the following engineering and design considerations to the Project design to reduce potential adverse effects on the Soil and Vegetation VC and subcomponents through all Project phases:

- Activities have been limited to previously disturbed areas where possible
- New roads have been designed to follow existing alignments where possible to reduce the overall footprint and lessen potential environmental effects; the number of stream crossings has been minimized to reduce potential adverse effects on riparian vegetation
- Tailings and waste rock will be co-disposed in a CSF that is lined with a geomembrane to capture seepage and runoff, preventing contamination of groundwater, surface water, and the surrounding environment
- The CSF will be covered with alluvium, low permeable soil, and an organic layer to provide control of infiltration at closure
- Protection zones will be established around Whitewater Creek and environmentally sensitive areas, such as wetlands, protected by berms and drainage ditches to capture and divert surface drainage
- Progressive reclamation of disturbed areas will be undertaken where practicable (e.g. exhausted gravel pits, road shoulders, clearing edges, and riparian areas near bridge crossings), including contouring, back filling, and re-vegetating areas no longer needed throughout the mine life to reduce the active footprint and reduce the time land is removed from productivity, and
- A Reclamation and Closure Plan will be developed and implemented that includes re-establishing natural vegetation communities and reducing invasive plant establishment.

In consideration of these design measures, the potential effects are described below as they relate to the Phases during which each potential effect is expected to occur. Most of the potential Project-related effects are expected to be similar among all Vegetation VC subcomponents; however, subcomponents that are expected to be differentially influenced by a particular effect are discussed as appropriate.

Project-related effects on soil and vegetation will occur primarily within the LAA (the construction area) during the Construction Phase, where soil will be removed or disturbed during building. Some additional effects may also occur just outside this area, where activities could compact the ground, create ruts, introduce contaminants, generate dust, affect water filtration in soil, or create new edges and breaks in the landscape over the life of the Project. Additional effects could occur during operations due to dust generation and depositions (which would affect both the LAA and the RAA to a lesser extent). During the Reclamation and Closure Phase, effects should be positive, with a focus on returning the impacted area to a natural state.

How much the Project will affect local soils and vegetation depends on the quantity of ground requiring disturbance and how intensive the mining activity is in each area. Much of the Project will be built and operated on brownfield areas already disturbed by past mining activities; the impacts on soil will be far less than if the work were occurring on completely untouched land. In addition, the Project will limit the need for new roads, transmission lines, and other linear features by using existing cleared areas and infrastructure wherever possible. This helps further reduce new soil disturbance.

Soil Quality

The Project could affect soil health in several ways. During construction, operations, and closure, soils may be damaged through compaction (packed down by heavy equipment, forming deep ruts) and contamination (direct impacts, dust deposition). These changes can reduce overall acceptable soil quality.

Soil compaction happens when soil gets pressed together so tightly that the small spaces between soil particles disappear. When this occurs, the soil cannot hold water or nutrients, which can harm its ability to support healthy plant growth. Compaction often occurs when heavy machinery or vehicles move over the ground, especially when the soil is already wet or does not drain well. How severely soil quality is affected depends on the soil's natural characteristics, such as its texture, the amount of organic matter it contains, and how well it clumps together, as well as conditions at the time, such as how wet or frozen the soil is. Soils within the Project area are young, thin, and high coarse fragment soils with very low compaction and rutting risk. However, within the exception of the wetlands, these soils are at a much greater risk of compaction.

Soil contamination may occur during Project construction, operations, and reclamation and closure, and can introduce harmful substances that negatively affect plants and soil-dwelling organisms. Contamination can result from spills or releases of fuels, chemicals, or other fluids from vehicles, equipment, or industrial processes. It may also occur when metals and metalloids are transported by surface water or groundwater, and subsequently deposited into the soil. Although direct contamination during mining is usually limited to specific areas, through accidental spills or releases of harmful materials such as fuel, lubricants, and solvents, these events can still affect soil quality. Additionally, indirect effects to soil quality can occur through dust deposition, degrading the nutrient quality of the soil and elevating concentrations of metals. The degree of adverse effect on the soil depends on the type and amount of chemical released or deposited. Additionally, contamination can alter important soil properties, including fertility, acidity (pH), and salinity.

Soil Quantity

The Project will disturb soil during construction, operations, and closure, which can temporarily or permanently reduce the land's ability to support plants. Most soil loss will be temporary because topsoil will be stripped and stored for reuse, but some permanent loss may occur in areas like the Mine Site where soils cannot be salvaged or where natural events bury productive layers. Overall, <50 ha of ecologically valuable soil will be affected, with <100,000 m³ temporarily removed and stored for reuse. These estimates are conservative, and efforts will be made to minimize soil loss wherever possible. Additionally, Project activities have the potential to increase potential erosion from wind and water; these processes can also result in a loss of soil quantity, especially during construction when ground disturbance is highest, and again during closure until vegetation stabilizes the surface.

Unique Geologic Landforms

Movement of soil cover, soil, and sediment within the Project footprint has the potential to create terrain instability and impacts to unique geologic landforms, particularly in sloped areas. Such instability may occur during periods of heavy rainfall or snowmelt or when vegetation and root systems are removed or deteriorate over time. Terrain instability can also be influenced by inadequate drainage or ponding around roads and slopes, as well as the weakening or failure of fill or cut slopes. These conditions can lead to mass movement in the form of debris flows or earthen slides. Terrain stability may have the potential to affect other VCs, such as surface water quality through sedimentation, hillslope hydrology, safety risks for Project personnel and infrastructure, and habitat for vegetation, wildlife, and aquatic life.

Pre-existing terrain conditions were documented and compared to those present in unaffected areas of the RAA. Additional movement of soil in these areas could significantly influence the rate of soil loss associated with slope creep. Several construction and operational activities have the potential to affect terrain stability by disturbing surface materials, altering hydrology, or creating steep terrain. These activities include vegetation clearing, soil salvage, landscape contouring, excavation and trenching, blasting, road construction, decline shaft construction, and the storage of soil and waste rock.

Vegetation

The majority of interactions between the Project and the Vegetation VC are expected to occur within the LAA during the Construction Phase. Proposed Project disturbances will occur within existing disturbed areas or within areas requiring additional site clearing (i.e. clearing of surface vegetation, soil salvage and stockpiling) and earthworks (grading). The Project is expected to interact directly and indirectly with the Vegetation VC during the Construction Phase as follows:

- Direct adverse effects on vegetation are expected to occur where vegetation will be cleared and soils will be salvaged, stockpiled, and graded. Clearing will occur within the entire Project footprint and infrastructure will be constructed (e.g. the airstrip, CSF, river transport landing site, explosive storage facility, settling ponds and water treatment plant, hydroelectric facility and associated transmission line, processing plant, Mine Site roads, tote road, quarries, water management system, camp) resulting in the direct loss of ecosystems, plant species of interest, ecological communities of interest, and wetlands.
- Potential indirect adverse effects are expected to extend into areas of intact vegetation at the interface with the Project footprint (e.g. ecosystems, plant species of interest, ecological communities of interest, and wetlands) or have the potential to result in other indirect changes downgradient. These indirect effects have the potential to alter vegetation (e.g. reduce ecosystem function, plant vigour, changes to population extend and abundance). Indirect effects are expected to be most pronounced adjacent to the Project footprint and to diminish with distance from disturbed areas.
- Indirect adverse effects with the potential to occur include the introduction and/or proliferation of invasive plants, edge effects, soil compaction and erosion, alteration of hydrological connectivity, changes to water quantity and quality, soil contamination, and dust deposition. Alteration of vegetation can lead to the loss of vegetation, plant communities, ecosystems, and/or wetlands.

During the Operations Phase, the Project is expected interact directly and indirectly with the Vegetation VC as follows:

- Direct adverse effects on vegetation are expected to be limited, as vegetation maintenance activities are expected to occur primarily along roads and transmission lines to limit vegetation succession and/or vegetation height.
- Indirect adverse effects are expected to occur through mechanisms similar to those described for the Construction Phase. Phase-specific sources of effects during operations include the potential for acid rock drainage and metal leaching from tailings and material stockpiles, which can result in soil acidification and accumulation of metals, potential alterations to local hydrology and chemistry at snow storage locations, and additional dust generation associated with road use and maintenance; transportation of workers, product, and supplies; transportation of thickened tailings; concentrate transport to processing plant; overburden and soil stockpile area maintenance; process plant operation, and waste rock hauling to the CSF. Progressive reclamation conducted during this Phase may introduce invasive plants if non-native seed sources are used ([Polster 2003](#)).

- Direct and indirect positive effects related to progressive reclamation and revegetation activities are expected to increase the extent and abundance of vegetation within the Project footprint and reduce the potential for introduction and/or proliferation of invasive plants, edge effects, and soil erosion in those areas.

During the Reclamation and Closure Phase, the Project is expected to interact directly and indirectly with the Vegetation VC as follows:

- Direct adverse effects on vegetation are not anticipated beyond localized and temporary disturbance associated with regrading, cover placement, and site access.
- Indirect adverse effects may occur through mechanisms similar to those described for the Construction and Operations Phases; however, Phase-specific risks include the persistence of reduced soil infiltration and groundwater recharge in the absence of adequate soil decompaction (as applicable); and the potential for improper recontouring to alter drainage patterns, moisture gradients, and sediment transport downgradient, thereby reducing vegetation health, and ecosystem function. Other Phase-specific potential effects include dust generation resulting from decommissioning of Project components and placing a cover over the CSF to encapsulate the tailings and waste, potential alterations to water quantity and quality related to water discharge from settling ponds, and the introduction and/or proliferation of invasive plants, which may also occur if reclamation and revegetation practices are not appropriately managed.
- Direct and indirect positive effects related to reclamation and revegetation activities are expected to increase the extent and abundance of vegetation within the Project footprint and reduce the potential for introduction and/or proliferation of invasive plants, edge effects, and soil erosion in those areas.

During the Post Closure Phase, the Project is expected interact directly and indirectly with the Vegetation VC as follows:

- Direct adverse effects on vegetation are not anticipated.
- Indirect adverse effects may persist in the short to medium term through mechanisms similar to those described for the Construction, Operations, and Reclamation and Closure Phases. Edge effects at the interface between disturbed areas and native ecosystems are expected to gradually decrease over time as revegetation and tree growth create a progressive structural transition at forest edges.
- Direct and indirect positive effects related to reclamation and revegetation activities are expected to increase the extent and abundance of vegetation on the Project footprint and reduce the potential for introduction and/or proliferation of invasive plants, edge effects, and soil erosion in those areas.

7.6.7 Effects Management

Defining appropriate mitigation or enhancement measures is a critical part of the EA process. This section describes effects management approaches for soil and vegetation, the effectiveness and uncertainty of these approaches, and the description of mitigation measures. Potential residual effects are characterized following the application of proposed mitigation and/or enhancement measures that are designed to effectively manage potential project-related effects.

7.6.7.1 Mitigation Approach

Mitigation measures for the Project are based on the review and consideration of pre-existing best management practices (BMPs), regulatory and guidance documents, and mitigation measures successfully employed for similar projects. The selection of mitigation options appropriate to the Project was assisted through consideration of the Procedures for Mitigating Impacts on Environmental Values (Environmental Mitigation Procedures) (ENV 2014a).

The following mitigation options were also considered:

- Evaluation and selection of alternatives – incorporating alternative design options to avoid or reduce adverse effects (e.g. siting the Project infrastructure within previously disturbed areas and the historical mine footprint)
- Redesign – refining waste rock and tailings management design, including co-disposal within a CSF, to reduce material handling, improve long-term stability, and limit potential effects on surrounding terrestrial and aquatic environments, and
- Schedule changes – altering the timing of an activity to reduce adverse effects (e.g. construction in wetlands during dry or frozen ground conditions).

A list of Project engineering and design considerations applied to reduce potential adverse Project-related effects on soil and vegetation are summarized in **Subsection 7.6.2**. As not all effects can be addressed through design, additional mitigation measures are planned. A common set of mitigation measures has been developed for Soil and Vegetation VC subcomponents due to the similarity of effect pathways; where necessary, measures are applied in a subcomponent-specific manner. Additional mitigation measures specific to the Soil and Vegetation VC and tailored to Project features will be incorporated into the various Project management plans, including:

- Air Quality and Dust Management Plan
- Landing Craft Emergency Response Plan
- Avalanche Hazard Management Plan
- Spill Prevention and Contingency Plan for the Mine Site and River Transport Landing
- Soil Management Plan (covering soil stripping, handling, stockpiling, and management of stockpiled soils)
- Metal Leaching/Acid Rock Drainage Management Plan
- Water Management Plan (including Mine Site water management and discharge management)
- Mine Site Traffic Control Plan
- Chemicals and Materials Storage, Transfer, and Handling Plan
- Hazardous Materials Management Plan
- Environmental Management Plan (EMP)
- Reclamation and Closure Plan (incorporating soil handling, stockpiling, reuse, and restoration)
- Soil Handling Plan
- Hazardous Management Plan
- Surface Erosion Prevention and Sediment Control Plan

- Waste (Refuse and Emission) Management Plan, including a Fugitive Dust Control Plan
- Wildlife Management Plan
- Invasive Plant Management Plan
- Vegetation Management Plan
- Construction Environmental Management Plan (CEMP)
- Community Effects Monitoring and Management Plan, and
- Occupational Health and Safety Management Plan.

Mitigation measures (described below) are based on proven and accepted mitigation used in BC, following standard industry guidelines and BMPs, such as those listed in **Section 7.6.2**. The management plans provide further guidance to the standard of the day for ameliorating positive effects and reducing adverse effects on the Vegetation VC. The management plans provide direction on sequencing, monitoring, and adaptive management to ensure that measures are timely and effective; they will be in place during all phases of the Project and will be subject to ongoing review and revision, as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plans) will be triggered so that the appropriate responses are timely and effective.

7.6.7.2 Mitigation Measures – Project Siting and Construction

- The Project footprint boundaries will be clearly marked in the field. Detailed spatial mapping data of avoidance zones and special management zone boundaries will be provided to construction and clearing crews, including applicable protection zones for sensitive ecosystems, such as wetlands and riparian areas, areas for vegetation SOCC and ecological communities, sensitive wildlife habitats, and wildlife habitat features.
- Limit activities to previously disturbed areas/historical mine footprint to minimize vegetation clearing and soil disturbance activities.
- Avoid soil disturbance and compaction by minimizing equipment moving during construction. Designate specific haul roads and access routes to minimize soil compaction and disturbance across the Project area.
- Construction work requiring the use of machinery in wetlands or riparian areas will be avoided where practicable. Where such work is authorized, it will be conducted during dry or frozen conditions or periods of low runoff, unless otherwise approved by applicable regulators. Soil stripping activities will be shut down during periods of heavy precipitation and/or high runoff, as directed by a Qualified Professional.
- Riparian areas for wetlands and streams will be managed according to the recommended management zone setbacks and work practices provide in the *Mines Act* ([BC GOV 1996c](#)) and the *Forest and Range Practices Act*, as applicable (BC Ministry of Forests 2024).
- A no-disturbance buffer will be maintained around ponds and open water wetlands wherever feasible.

7.6.7.3 Mitigation Measures – Vegetation Clearing and Soil Salvage

A Vegetation Management Plan will be developed and implemented to manage potential effects on plant species and ecological communities.

- Targeted pre-construction surveys for vegetation SOCC will be completed within the Project footprint.
- If vegetation SOCC are identified within the LAA prior to construction, site- and species-specific mitigation measures to avoid and/or limit Project effects will be determined by a Qualified Professional. Specific mitigation measures will depend on the species, its life history characteristics, time of year, and the location of the occurrence in relation to Project activities.
- Vegetation SOCC located adjacent to planned disturbances will be clearly delineated (e.g. with the use of fencing, staking, or flagging) to facilitate avoidance to the extent practicable and reduce the potential for accidental encroachment outside of the Project footprint.
- Herbicide use will be avoided to the extent practical within 100 m of any known occurrences of vegetation SOCC or ecological communities of conservation concern. Where unavoidable, its use will be restricted to direct targeted application instead of broadcast spraying.
- Clearing of vegetation and salvage of surface soils will be restricted to the Project footprint. In areas requiring clearing only, grubbing will be avoided, and the disruption of surface soils reduced.
- Vegetation clearing techniques will be implemented to reduce effects on nearby natural areas (e.g. felling trees away from adjacent lands).
- Riparian vegetation will be retained, and removal of trees or shrubs in or adjacent to watercourses will be avoided wherever practicable.
- A Soil Management Plan will be developed and implemented.
- Separate organic soil, mineral soil, and woody debris to ensure high-quality material is available for later rehabilitation.
- Construction activities will be sequenced (i.e. site clearing, grading preparations, major earthworks and construction of infrastructure and facilities) so that surface vegetation, mineral soil, and organic matter can be salvaged for later use during the Project's Reclamation and Closure Phase.
- Soil resources within the Project footprint will be stripped, salvaged and stockpiled within the Project footprint in accordance with relevant soil management BMPs (i.e. providing guidance on ground-truthing soil conditions, flagging potential hazards and sensitivities, and modifying practices in relation to environmental conditions and avoiding or reducing inadvertent or incidental disturbance).
- Soil stockpiling locations will be sited to reduce soil handling and travel distances, and designed to reduce the potential for soil degradation and downgradient effects (e.g. having defined height and width that optimize soil storage and stockpile stability, and having integrated erosion control measures and surface water management features, if and where necessary). Sediment and erosion control measures will be implemented in accordance with BMPs and commensurate to site conditions and sensitivities.
- Salvage and stockpiling of organic soils/topsoil, and subsoil will be done separately. Topsoil and material suitable for reclamation will be salvaged and stockpiled for reuse.

- Surface soil and overburden that cannot be immediately used for reclamation will be stockpiled. These stockpiles will be vegetated and/or covered as soon as practicable to reduce erosion and the potential for proliferation of invasive plants.
- Potentially contaminated soil will be stockpiled on site and managed to prevent sediment mobilization, reduce water contact, and prevent leaching (e.g. placed on a liner within a berm and covered).
- Contaminated soils will be treated at the site or disposed of at a suitable hazardous waste facility.

7.6.7.4 Mitigation Measures – Invasive Plant Management

An Invasive Plant Management Plan will be developed and implemented to manage the spread and establishment of invasive species.

- Areas with a high risk for the potential spread of invasive plants (i.e. within or adjacent to existing infestations) will be avoided to the extent practicable; if work must occur in these areas, invasive plant management will be implemented before starting work.
- All employees and contractors on the Project will receive an employee orientation appropriate to the work they are undertaking, including instruction on the definition of invasive plants and their potential effects, mitigation measures to avoid the introduction and spread of invasive plants, and training on the presence and identification of common invasive plant species and those known to occur within the RAA.
- Equipment and vehicles will arrive at the Project clean, will be inspected for attached soil, plant material, and seeds, and cleaned as appropriate, to limit the potential for the introduction of invasive plants and noxious weeds.
- Gravel, fill, straw matting, or similar materials to be used for erosion control will be inspected to reduce the potential for seeds or propagules of invasive plants being brought to the Project.
- An Invasive Species Monitoring Plan will be prepared and implemented, with monitoring focused on high-risk areas (e.g. disturbed or bare ground, roadsides, parking areas, and staging areas) to support early detection and rapid response of invasive plant occurrences.
- Invasive plant monitoring will be conducted periodically by personnel skilled in invasive plant identification during all Project Phases to assess, evaluate, and document invasive plant occurrences within the Project footprint. Invasive plant surveys will be completed during a biologically appropriate time of year (e.g. when invasive plants can be identified) within areas identified as most susceptible to invasive plant introduction and spread, including roads, right-of-ways, debris and vegetation management areas (e.g. slash piles, timber decks, exposed soil or stockpiles), and other regularly disturbed habitats.
- Existing regulated noxious weeds found within areas of soil disturbance will be treated as per the *Weed Control Act* ([BC GOV 1996d](#)) and *Integrated Pest Management Act*, SBC 2003, c. 58 ([BC GOV 2003](#)).
- Seed used during revegetation will be free of invasive plants, as verified by review of a valid Certificate of Seed Analysis.

7.6.7.5 Mitigation Measures – Erosion and Sediment Control

An Erosion and Sediment Control Plan will be developed and implemented to specify best practices for managing sediment mobilization and reducing potential effects on vegetation and wetlands.

- Sediment and erosion control measures and surface water management features will be installed and maintained at the Project in accordance with the Erosion and Sediment Control Plan. Erosion controls (e.g. sediment fencing, check-dams, sediment ponds) will be installed as necessary, commensurate to site conditions and sensitivities to manage and mitigate erosion and sedimentation. Sediment ponds, silt fences, and diversion ditches will prevent sediment-laden water from leaving the Project area.
- Collection channels and ditches will be built to capture runoff from disturbed areas (e.g. roads, laydown areas) and convey it to settling ponds for sediment removal.
- Regular inspections will be undertaken to check that drainage, erosion, sediment control, and revegetation measures are effective and functioning properly; all necessary repairs and adjustments will be completed after issues are identified within a timeframe specified by a Qualified Professional.

7.6.7.6 Mitigation Measures – Snow Management

- All heavy equipment operators will receive training on the identification and avoidance of sensitive environmental features.
- Silt fencing or sediment barriers will be installed between designated snow storage areas and downslope wetlands before winter to capture debris during spring melt.
- Designated areas will be established around listed sensitive ecosystems, wetlands, and vegetation SOCC and ecological communities of conservation concern where no snow storage or equipment entry will be permitted.
- The use of chemical de-icers (chlorides) will be restricted near wetlands and vegetation SOCC and ecological communities of conservation concern in favour of traction sand or crushed rock.
- Side-casting or winging-back of snow directly into sensitive ecosystems, listed ecological communities, and wetlands will be prohibited; loaders will be used to remove snow to designated safe storage areas instead.
- Plow blades will be set to leave a 2 cm to 5 cm protective snow/ice pack on gravel roads to avoid gouging the road surface and pushing sediment into vegetation.
- Piling snow directly against tree trunks will be avoided to prevent stripping bark and damaging trees during snow settlement.

7.6.7.7 Mitigation Measures – Metal Leaching/Acid Rock Drainage

A Project-specific ML/ARD Management Plan will be developed and implemented to reduce the potential for metal leaching and acid rock drainage that could adversely affect soil chemistry, water quality, and vegetation.

- Aggregate material for construction will be sourced from non-acid generating and non-metal leaching material to prevent runoff contamination from roads and pads.
- Potentially acid generating (PAG) materials will be stockpiled separately or managed through specific contact water strategies if stored permanently on the surface to control arsenic and antimony release.

7.6.7.8 Mitigation Measures – Surface Hydrology

A Water Management Plan that includes considerations for stormwater management and water use will be developed and implemented to protect hydrological function.

- Stream crossing structures (e.g. culverts, bridges) will be designed and sized to accommodate natural flow regimes, including peak flows (e.g. backchannels of jökulhlaups), to maintain natural drainage patterns and hydrologic connectivity.
- Surface water management structures will be designed to maintain baseline seasonal and annual hydrology conditions of Flannigan Slough for all areas of the slough that are outside the Project footprint.
- Surface disturbances and site components will be reduced as much as possible to maintain natural surface drainages.

7.6.7.9 Mitigation Measures – Dust Suppression and Air Emissions

An Air Quality and Dust Control Management Plan will be developed and implemented prior to the start of Project construction to manage point and non-point air emissions.

- Blast patterns will be kept small to reduce effects of noise, vibration, and fugitive dust from blast patterns. Actual blast results will be monitored, and improvements will be implemented as required as per the adaptive management process.
- Dust-generating activities (e.g. earthworks, material handling) will be avoided to the extent feasible during dry or high wind conditions.
- Construction activities will be staged to reduce the total area of exposed soil at any one time.
- Dropping material from height will be avoided to the extent feasible.
- Soil stockpiles and disturbed soils will be stabilized and revegetated to reduce sediment mobilization into surrounding ecosystems and prevent dust from blowing onto surrounding vegetation.
- Progressive reclamation will be implemented on embankments, backfills, cut and fill slopes, and other Project components where possible to reduce fugitive dust emissions and reduce erosion and sediment generation.
- The CSF will be progressively restored to reduce the size of active areas exposed to wind erosion.
- A rock and soil cover will be placed over the entire CSF at closure to encapsulate tailings and waste rock, preventing long-term dust generation.
- A tackifier will be applied to the surface of the tailings in the CSF to prevent the entrainment of dust into the local area.
- Equipment and vehicles will be maintained per manufacturers' specifications/operating manuals and operated at optimum loads (typically in an Air Quality and Dust Management Plan).
- Loads on haul trucks will be covered to prevent fugitive dust emissions during the transport of materials.
- Mineral concentrate will be loaded into sealed bags for air transport, preventing dust release during transfer and shipment.

- Site and tote roads will be watered during non-frozen conditions to suppress dust generation from vehicle movement.
- Chemical dust suppressants (e.g. calcium chloride) will be applied only when strictly required (e.g. when temperatures are below freezing to avoid icing, which can present a safety hazard).
- Speed limits on Project roads will be a maximum of 60 km/h.
- Haul truck speed on the on-site haul roads will be limited to 40 km/h.
- Particulate collection systems will be utilized where required to capture emissions from equipment and processing activities.
- Fugitive dust will be monitored to detect dispersion from dry stack tailings and waste rock; monitoring results will be used to verify mitigation effectiveness and inform adaptive management if excessive dust generation is observed.

7.6.7.10 Mitigation Measures – Spill Prevention and Response

A Waste and Hazardous Material Management (e.g. fuel, chemicals) Plan and spill response procedures will be developed and implemented to reduce potential for spills of deleterious substances.

- Education on and enforcement of proper waste and hazardous materials management practices will be provided to employees and contractors.
- Appropriate spill response kits will be positioned adjacent to areas where hazardous materials are stored.
- Vehicles and equipment will be maintained in good working condition (e.g. no leaks) and furnished with industry-standard spill response kits.
- Where required, clean (i.e. uncontaminated) construction and fill materials will be used to reduce effects on existing vegetation.
- A minimum 100 m distance from any waterbody will be maintained for fuel storage, refuelling activities, or equipment servicing.

7.6.7.11 Mitigation Measures – Reclamation

A Reclamation and Closure Plan will be developed and implemented as described in Section 1.8.

- First Nations will be engaged regarding restoration efforts to incorporate the use of local or original species that are traditionally used by First Nations.
- During reclamation and closure, the Project will be decommissioned and reclaimed to a safe, stable, and self-sustaining landscape that aligns with end land-use objectives. To the extent practical, reclamation of the Project footprint will re-instate predominant landscape features, topographical contours (e.g. slope, aspect), and surface drainage patterns in a manner that will tie-in to the existing landscape and maintain surface drainage continuity and hydrologic connectivity.
- A rock/soil cover will be placed over the entire CSF at closure to encapsulate the tailings and mine waste rock, providing passive, long-term closure to protect surface vegetation and water quality.
- Soil materials will be de-compacted, as necessary, to establish suitable conditions for revegetation.

- After the Reclamation and Closure Phase, vegetation will be allowed to naturally regenerate. The Reclamation and Closure Plan will provide performance standards and a decision framework to guide adaptive management programs in the event that performance standards are not met. This could include development and implementation of site-specific revegetation plans.
- Revegetation will be undertaken using plant materials suitable for the local region, including those traditionally used by First Nations, during the appropriate growing season and conditions.
- Monitoring of reclaimed areas will be conducted to verify that they are revegetated according to pre-determined reclamation targets.
- A soil testing program will be established to monitor soil quality during the proposed Phases, and a mitigation plan will be introduced if soil contamination is identified.

7.6.7.12 Mitigation Measures, Effectiveness, and Uncertainty for Mitigation

The anticipated effectiveness of mitigation measures to minimize the potential for effects to soil and vegetation was evaluated and classified according to the methods described in Chapter 6 - Valued Components Assessment Methods. Mitigation measures are categorized for effectiveness in eliminating or reducing potential effects. If a mitigation measure will eliminate a potential effect and no potential residual effect is identified, then the effect is not carried forward for further analysis. If a mitigation measure is not expected to eliminate an effect, a residual effect is identified and carried forward for further analysis (i.e. characterization of the negative effect).

The description of mitigation measures and their anticipated effectiveness is summarized in **Table 7.6-23 (Soil and Terrain)** and **Table 7.6-24 (Vegetation)**.

Table 7.6-23 Proposed Mitigation Measures and Effectiveness – Soil

Valued Component / Subcomponent	Project Phase	Project Effects	Mitigation Measures	Effectiveness	Uncertainty	Residual Effect(s)
Soil Quality	Construction, Reclamation and Closure	Historic soil contamination Potential soil contamination as a result of construction and closure activities Dust depositions	• Application of the measures from the Soil Management Plan for the areas with significant historical soil contamination • Minimize vegetation clearing and soil disturbance activities to the extent possible; limit activities to previously disturbed areas/historical mine footprint where possible; plan and stage work to minimize soil exposure; use low ground pressure equipment where possible. • Implementation of the Spill Contingency Plan and facilitation of immediate response to clean up spills • Storage of deleterious products according to regulatory requirements • Designated fuel facilities and handling procedures • Regular maintenance and inspection of the equipment to minimize potential for leaks • Implementation of fugitive dust control plan; strict adherence to speed limits	Medium to High	Low to Medium	Residual historical soil contamination that cannot be mitigated during construction and closure Alteration of soil quality through compaction Fugitive dust not captured by containment systems
Soil Quality	Operations	Soil contamination resulting from ongoing operations Soil compaction Dust depositions	• Implementation of designed fuel facilities and procedures • Storage of deleterious substances according to regulatory requirements • Application of spill response and remediation plans • Equipment maintenance • Use designated roads and routes, avoiding vehicle traffic on wet and compressible areas • Implementation of fugitive dust control plan • Strict adherence to speed limits	Medium to High	Low to Medium	Alteration of soil quality through compaction Fugitive dust not captured by the containment systems increases soil metals concentrations minutely
Soil Quantity	Construction	Loss of ecologically valuable soils	• Minimize the Project’s disturbance footprint to limit the area where soils will be temporarily removed or disturbed • Avoid soil disturbance and compaction by minimizing equipment movement during construction • When soil disturbance is necessary, salvage and stockpile organic and mineral soils separately • Design and construction of geotechnically stable stockpiles or windrows	Medium	Medium	Direct loss of soil quantity
Soil Quantity	Reclamation and Closure, Post Closure	Loss of ecologically valuable soils	• A Reclamation and Closure Plan will be developed and implemented that includes re-establishing natural vegetation communities, minimizing invasive plant establishment, and soil and terrain restoration • Apply progressive reclamation where possible	High	Low	Direct loss of soil quantity

Table 7.6-24 Proposed Mitigation Measures and Effectiveness – Vegetation

Project Phase	Valued Component / Subcomponent	Project Effects	Mitigation Measures	Effectiveness	Uncertainty	Residual Effect
Construction	Ecosystems	Direct adverse effects: vegetation clearing, soil disturbance.	• Project Siting and Construction • Vegetation Clearing and Soil Salvage • Invasive Plant Management • Erosion and Sediment Control • Snow Management • Surface Hydrology • Dust Suppression and Air Emissions • Spill Prevention and Response	Medium to High	Low	Alteration or loss of ecosystems
	Plant Species of Interest					
	Plant Communities of Interest	Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.				
	Wetlands					
Operations	Ecosystems	Direct adverse effects: vegetation clearing, soil disturbance.	• Invasive Plant Management • Erosion and Sediment Control • Snow Management • Metal Leaching/Acid Rock Drainage • Surface Hydrology • Dust Suppression and Air Emissions • Spill Prevention and Response • Reclamation	Medium to High	Low	Change in the abundance or distribution of plant species of interest
	Plant Species of Interest	Direct positive effects: revegetation during progressive reclamation.				
	Plant Communities of Interest	Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.				
	Wetlands					
Reclamation and Closure	Ecosystems	Direct adverse effects: vegetation clearing, soil disturbance.	• Vegetation Clearing and Soil Salvage • Invasive Plant Management • Erosion and Sediment Control • Snow Management • Metal Leaching/Acid Rock Drainage • Surface Hydrology • Dust Suppression and Air Emissions • Spill Prevention and Response • Reclamation	Medium to High	Low	Alteration or loss of plant communities of interest
	Plant Species of Interest	Direct positive effects: revegetation during reclamation.				
	Plant Communities of Interest	Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.				
	Wetlands					
Post Closure	Ecosystems	Direct adverse effects: vegetation clearing, soil disturbance.	• Vegetation Clearing and Soil Salvage • Invasive Plant Management • Erosion and Sediment Control • Snow Management • Metal Leaching/Acid Rock Drainage • Surface Hydrology • Dust Suppression and Air Emissions • Spill Prevention and Response • Reclamation	Medium to High	Low	Alteration or loss of wetland function
	Plant Species of Interest	Direct positive effects: revegetation during reclamation.				
	Plant Communities of Interest	Indirect adverse effects: the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition.				
	Wetlands					

7.6.8 Positive Effects Assessment

As part of the initial construction of the Project, remediation activities will remove historically impacted soils from the Mine Site camp, improving soil quality an estimated volume of up to 20,000 m³ of material is proposed to be excavated and backfilled with clean fill. A geotextile barrier will be installed between the clean fill and tailings.

Positive Project-related effects on the Vegetation VC are expected to be restricted to the Operations, Reclamation and Closure, and Post Closure Phases, related to reclamation and revegetation. Reclamation and revegetation activities are expected to increase the extent and abundance of vegetation within the Project footprint. Reclaimed vegetation may differ in structure, composition, and ecological function from pre-disturbance ecosystems, particularly in early post-reclamation stages.

During progressive reclamation undertaken during the Operations Phase, and final reclamation undertaken during the Reclamation and Closure Phase, activities will be undertaken for the purpose of reclamation and initiating revegetation using native plant species within the Project footprint. This vegetation is expected to continue to grow and proliferate within reclaimed areas during the Post Closure Phase and beyond.

Reclamation and revegetation activities will be implemented, monitored, and adaptively managed in accordance with the Reclamation and Closure Plan. This positive effect is predicted to have high likelihood (i.e. greater than 80% chance of native plant species regenerating within the Project footprint) and high confidence. Mine reclamation practices in BC are generally well understood.

7.6.9 Negative Residual Effects Assessment

7.6.9.1 Summary of Residual Effects

This subsection describes the likely residual effects of the Project on the Soil and Vegetation VC. Residual effects are effects that remain after the implementation of all mitigation measures and management strategies and are the expected consequences of the Project for the Soil and Vegetation VC. The approach to assessing residual Project effects on the Soil and Vegetation VC follows the methodology outlined in Chapter 6 - Valued Components Assessment Methods.

The application of mitigation measures is anticipated to reduce but not eliminate effects to soil and vegetation from the Project. The residual effects for the Soil and Terrain VC after application of mitigation measures are:

- Direct and indirect impacts to soil quality
- Loss of soil quantity, and
- Alteration of unique geologic landforms.

The following residual effects on the Vegetation VC subcomponents are predicted as:

- Alteration or loss of ecosystems, including alpine/subalpine and riparian ecosystems
- Change in the abundance or distribution of plant species of interest, including vegetation SOCC and species of importance to First Nations
- Alteration or loss of plant communities of interest, including ecological communities of conservation concern, and
- Alteration or loss of wetland function.

For each Soil and Vegetation VC subcomponent, the residual effects are assessed in the context of the Project activities that will occur within each Project Phase (i.e. Construction, Operations, Reclamation and Closure, and Post Closure). Residual effects are then characterized based on the combined predicted residual effect for these phases. The assessment includes a determination of risk and uncertainty, the level of confidence associated with the prediction, and the importance of the Soil and Vegetation VC subcomponent to stakeholders, particularly First Nations.

7.6.9.2 Methods

Direct residual effects were quantified by calculating the area of vegetation anticipated to be affected by the Project by overlaying the Project footprint with spatial data related to the existing conditions of the Soil and Vegetation VC (further described in **Subsection 7.6.5.3**). Direct residual effects on subcomponents have been estimated with the use of Project footprint calculations.

Residual Effects Criteria

The characterization of potential residual effects was based on several criteria including direction, context, magnitude, geographic extent, duration, reversibility, frequency, and risk and uncertainty (likelihood and consequence). These criteria are defined for soil and vegetation in **Table 7.6-25**.

Table 7.6-25 Residual Effects Criteria – Soil and Vegetation

Criteria	Characterization
Direction	Positive – a residual effect that moves measurable parameters in a direction beneficial to communities relative to the baseline. Adverse – a residual effect that moves measurable parameters in a direction detrimental to communities relative to the baseline. Neutral – no net change in measurable parameters for the communities relative to existing baseline conditions.
Context	Low – Low vulnerability (i.e. high resiliency) of affected population(s) or ecological system to anthropogenic change from an environmental, economic, social, cultural and/or human health perspective. Project effects at a local level are unlikely to destabilize the affected population(s) or ecological system at the regional scale. Moderate – Moderate vulnerability (i.e. somewhat resilient) of affected population(s) or ecological system to anthropogenic change from an environmental, economic, social, cultural and/or human health perspective. Project effects at a local level are unlikely to destabilize the affected population(s) or ecological system at the regional scale. High – High vulnerability (i.e. low resiliency) of affected population(s) or ecological system to anthropogenic change from an environmental, economic, social, cultural and/or human health perspective. Project effects at a local level may destabilize the affected population(s) or ecological system at the regional scale.
Magnitude	Negligible – no measurable change from existing conditions. Low – a measurable change but residual effects cannot be distinguished from existing conditions within a normal range of variability, based on existing conditions. Moderate – measurable change but effects are not likely to pose serious risk to infrastructure and services. High – measurable change that is likely to pose serious risk to infrastructure and services.

Criteria	Characterization
Geographic Extent	Limited – residual effects are restricted to the Project footprint. Local – residual effects extend into the LAA. Regional – residual effects extend into the RAA. Beyond Regional – residual effects extend beyond the RAA.
Duration	Short-term – the residual effect will be felt temporarily during the Project’s Construction and/or Reclamation/Closure Phases only. Also applies to any effect that will occur for less than two years in operations. Medium-term – the residual effect will be felt for a limited period of time greater than two years, generally corresponding to the Operations Phase and/or Post Closure Phase. Long-term – the residual effect extends beyond Project closure.
Reversibility	Reversible – the VC is likely to return to its pre-Project state after activity completion and reclamation. Irreversible – the VC is unlikely to return to its pre-Project state.
Frequency	Once – occurs once. Irregular – occurs at sporadic intervals. Regular – occurs at regular intervals. Continuous – occurs constantly.

Risk and Uncertainty

For the purposes of this assessment, the likelihood and consequences of a potential residual effect occurring are described as risk(s). Likelihood is the probability of an event occurring and can be influenced by multiple factors. Likelihood is rated as low, medium, or high, using the rating definitions provided in **Section 7.6.7.2**. Consequence can be assessed as minor, moderate, or major (Chapter 6, Table 6-3), based on the combination of magnitude and extent of the residual effect.

Confidence

Types of uncertainty are relevant to assessing whether effect(s) will occur and the implications of the effect. Uncertainty in the assessment is to be expected, particularly when predicting outcomes in complex physical, biological, and human systems. The assessment includes a characterization of uncertainty and level of confidence in the predicted potential residual effects. Confidence is a measure of how well potential residual effects are understood and the quality of the input data. It considers the level of uncertainty associated with the residual effects assessment. The following are considered in the determination of confidence in the residual effects assessment for soil and terrain, and vegetation:

- Reliability of data inputs and analytical methods used to predict Project effects
- Confidence regarding the effectiveness of mitigation measures
- Certainty of the predicted outcome, and
- Confidence ratings and definitions as described in Chapter 6 - Valued Components Assessment Methods.

7.6.9.3 *Potential Residual Effects*

The following subsections outline the potential residual effects on the Soil and Vegetation VC subcomponents:

- Direct loss of soil quantity
- Direct of indirect effects to soil quality
- Alteration of unique landforms
- Alteration or loss of ecosystems, including alpine/subalpine and riparian ecosystems
- Change in the abundance or distribution of plant species of interest, including vegetation SOCC and species of importance to First Nations
- Alteration or loss of plant communities of interest, including ecological communities of conservation concern, and
- Alteration or loss of wetland function.

Direct Loss of Soil Quantity

The assessment considered the direct loss of soil quantity due to erosion and earthmoving activities during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Residual Effect Analysis

As surface disturbance is proposed to be minimal, soil salvage and proper stockpiling were prioritized for this Project, residual effects to soil loss are minimal.

Residual Effect Characterization

The residual effect to soil quantity is characterized in **Table 7.6-26** below.

Table 7.6-26 Residual Effect Characterization – Soil Quantity

Criteria	Characterization	Rationale
Direction	Low	Soil loss due to erosion (even with erosion control measures) can result in adverse residual effects to into surface water bodies and their flow direction, which can change the surrounding environment.
Context	Moderate	The receiving environment has a moderate resilience to the loss of soil, as recovery of soil through natural processes is achievable.
Magnitude	Low	Soil loss will not be to an extent where the function of Project soils will be inhibited. In addition, soil loss from unsuitable soil will be minimal.
Geographic Extent	Local	Effect is limited to the LAA.
Duration	Long-Term	Recovery of soil loss through natural processes is anticipated to be multiple decades and effects will extend beyond Project closure.
Frequency	Irregular	Soil loss will primarily take place during the construction activities at sporadic intervals.
Reversibility	Reversible	Loss of soil will be reversed to pre-Project state through natural processes during and following completion of reclamation.

Likelihood, Risk, Uncertainty, and Confidence

The assessment of the likelihood for direct loss of soil quantity is presented in **Table 7.6-27** below.

Table 7.6-27 Likelihood, Risk, and Uncertainty Characterization – Direct Loss of Soil Quantity

Criteria	Characterization	Rationale
Likelihood	Medium	Loss of soil quantity will occur based on the characterization of suitable soils and the effectiveness of salvage and stockpiling operations.
Consequence	Low	As the magnitude and extent of soil quantity loss is low to medium, and limited to certain areas, the consequence rating is classified as low.
Risk	Low	As the likelihood and consequences of the residual effect is considered low to medium, the risk rating is classified as low.
Confidence	Medium	Soil loss from material being deemed unsuitable or during soil salvage for reclamation, depends on the effectiveness of the operations. As such, the confidence rating is conservatively classified as medium.

Importance

The loss of ecologically valuable soil is important, given the desire to utilize existing resources that are unaltered by development and/or contamination. Confidence that soils, plants, and wildlife have not been negatively affected by the Project has been highlighted as important in the TRTFN legislation. Therefore, the effectiveness of the proposed mitigation measures has a crucial component in rehabilitation of mining sites and protection of critical, wildlife habitats.

Direct or Indirect Effects to Soil Quality

The assessment considered the negative residual effects of direct or indirect effects to soil quality due to Project activities during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Residual Effect Analysis

In addition to soil quality effects from the previous mine activity, it is likely that negative residual effects to soil quality will occur despite the implementation of mitigation measures to maintain and/or improve soil quality. The mitigation measures during construction, including remediation and disposal or capping of legacy tailings from historical operations and preparation of site facilities, aim to limit the negative effect to soil quality while the measures during the Operations Phase are designed to prevent loss of soil quality.

Major residual effects on soil quality include remedial excavation, erosion (resulting in a loss of topsoil content and exposure of poorer quality subsurface soil), standing water (resulting both in leaching of metals or deposition of metals-laden sediment, depending on the source of the water), soil compaction, and dust deposition.

Residual Effect Characterization

The residual effect to soil quality is characterized in **Table 7.6-28** below.

Table 7.6-28 Residual Effect Characterization – Soil Quality

Criteria	Characterization	Rationale
Direction	Adverse (soil compaction and dust deposition)	Remedial excavation will improve soil quality and is a positive residual effect. Dust deposition can affect the surrounding environment and communities, and the direction rating is classified as adverse.
Context	High (soil compaction and dust deposition)	The receiving environment has a high natural resilience to imposed soil quality stresses as recovery through natural processes is achievable or can be supplemented using soil amendments, if necessary.
Magnitude	Moderate (soil compaction and dust deposition)	It is expected that soil quality will decline due although not to an extent where soil functions will be significantly altered.
Geographic Extent	Local	Effect is limited to the LAA.
Duration	Long-Term (soil compaction and dust deposition)	Recovery of soil quality through natural processes is anticipated to be multiple decades and will be felt past Project closure.
Frequency	Continuous (soil compaction and dust deposition)	Dust accumulation will occur continuously during operations.
Reversibility	Reversible (soil compaction and dust deposition)	Effects on soil quality can be reversed through natural processes and application of soil amendments to a near normal background condition.

Likelihood, Risk, Uncertainty, and Confidence

The assessment of the likelihood for soil quality is presented in **Table 7.6-29** below.

Table 7.6-29 Likelihood, Risk, and Uncertainty Characterization – Soil Quality

Criteria	Characterization	Rationale
Likelihood	High	Residual effects on dust deposition will occur based on nature of construction and operation of mine facilities (i.e. dust emissions from road use and equipment traffic) and the nature of salvage operations.
Consequence	Low	As the magnitude and extent of the residual effect is considered low and limited, the consequence rating is classified as low.
Risk	Low	As the likelihood and consequence of the residual effect is considered high and low, respectively, the consequence rating is classified as low.
Confidence	High	The cause-effect relationship between construction and the operation of mine facilities and their effect on soil compaction and dust accumulation is well understood.

Importance

Soil compaction and dust accumulation have been identified by regulatory agencies and local communities as one of the effects of projects that involve earthworks and increased heavy machinery and vehicle traffic. The mitigation measures are designed to limit the impact on soil quality during construction and operations, and to improve soil quality during the closure activities.

Alteration of Unique Landforms

The assessment considered the negative residual effects of the alteration of unique landforms due to Project activities during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Residual Effect Analysis

Alteration to terrain stability/unique landforms as a result of the Project is considered to be minimal due to the limited new disturbance that will take place. As the majority of the Project is located on existing disturbed areas, the creation of unstable slopes is expected to be significantly reduced.

The residual effect to alteration of unique landforms is characterized in **Table 7.6-30** below.

Table 7.6-30 Residual Effect Characterization – Alteration of Unique Landforms

Criteria	Characterization	Rationale
Direction	Neutral	Alteration of terrain stability will not affect the surrounding environment and communities.
Context	Low	The receiving environment has a low resilience as terrain instability will increase as a result of the Project.
Magnitude	Low	Although terrain stability will be impacted by the Project, the integrity of the VC should not be significantly altered should mitigation measures be successfully implemented.
Geographic Extent	Local	Effect is limited to the LAA.
Duration	Long-Term	A recovery of baseline terrain stability is expected to occur within few years after disturbance but before closure, as less-stable material moves from the upper to lower slope. However, permanent recovery of stability will take place after closure as areas are reclaimed and permanent mitigation measures are installed.
Frequency	Irregular	Residual effects to terrain instability are expected sporadically as movement of unstable material from the upper to lower parts of the slope occur.
Reversibility	Reversible	After completion of reclamation and installation of mitigation measures, the VC may recover and return to its pre-Project state.

Likelihood, Risk, Uncertainty, and Confidence

The assessment of the likelihood for a is presented in **Table 7.6-31** below.

Table 7.6-31 Likelihood, Risk, and Uncertainty Characterization – Alteration of Unique Landforms

Criteria	Characterization	Rationale
Likelihood	Low	The residual effect (i.e. landslide) may occur although the likelihood is considered low, as the Project will be designed using accepted safety standards, best practices and mitigation measures (i.e. erosion control measures).
Consequence	Low	As the magnitude and extent of the residual effect is considered low and local, respectively, the consequence rating is classified as low.
Risk	Low	As the likelihood and consequence of the residual effect are considered low, the risk rating is classified as low.
Confidence	Low	The cause-effect relationships between Project activities and their effect on terrain stability depend on a multitude of factors such as soil type, slope, moisture conditions, and design practices; hence, the confidence in the assessment of the effect as low.

Importance

The desire to utilize traditional use resources that are unhindered by development and/or contamination has been identified as important. As increased terrain instability would inhibit future use of the area (e.g. harvesting, spiritual), a moderate importance rating is warranted.

Alteration or Loss of Ecosystems

The assessment considered the direct effect of loss of ecosystems (i.e. clearing during construction), including alpine/subalpine and riparian ecosystems, and the indirect effect of alteration of these ecosystems due to the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Residual Effect Analysis

Alpine/subalpine ecosystems comprise 14.8% (3,228.2 ha) of the RAA (**Table 7.6-32**). The Project footprint does not interact with alpine/subalpine ecosystems; as such, no direct effects are anticipated. Alpine/subalpine ecosystems are located within the LAA at high elevation (**Figure 7.6-2**) and are generally distant from the Project. Although no direct disturbance is expected, these ecosystems may experience limited indirect effects during all Project phases, including dust deposition and/or the introduction/proliferation of invasive plants. Mitigation measures outlined in **Subsection 7.6.7** are expected to reduce these indirect effects but may not eliminate them entirely.

Riparian ecosystems are common, comprising 19.4% (4,260.1 ha) of the RAA (**Table 7.6-32**). Direct loss of riparian ecosystems has been mitigated by reducing the size of the Project footprint to the extent practicable during Project design; however, up to 86.8 ha (2.0%) of riparian ecosystems within the RAA are anticipated to be cleared during the Construction Phase, associated with the CSF, roads, airstrip and hangar, river transport landing, and hydroelectric facility.

Riparian ecosystems within the LAA may experience indirect Project effects, including the introduction and/or proliferation of invasive plants, edge effects, changes to water quantity and quality, and dust deposition. Mitigation measures outlined in **Subsection 7.6.7** are expected to reduce these indirect effects but not eliminate them entirely. Edge effects, for example, will persist following vegetation clearing. Similarly, limited dust deposition on plants and soil is expected in areas adjacent to the Project footprint during all Project Phases.

Residual Effect Characterization

The Project is predicted to result in the alteration or loss of ecosystems, reducing the prevalence of riparian ecosystems within the RAA through direct disturbance on the Project footprint, and altering alpine/subalpine and riparian ecosystems outside of the Project footprint due to indirect Project effects. The residual effects associated with the alteration or loss of ecosystems are characterized in **Table 7.6-32**.

Table 7.6-32 Predicted Residual Effects – Alpine/Subalpine Ecosystems

BEC Unit	Map Code	Common Name	Area of Direct Disturbance Within Project Footprint (ha)	Area Within the LAA Undisturbed by Project Footprint (ha)	Total Area Within RAA (ha)	Portion Directly Disturbed Within RAA (%)
CMAun	Af	Alpine fellfield	-	-	17.4	-
	Ah	Alpine heath	-	1.4	174.7	-
	Am	Alpine meadow	-	-	2.3	-
	At	Alpine tundra	-	-	90.9	-
	RO	Rock outcrop	-	2.1	1,567.2	-
	RU	Rubble	-	-	254.0	-
	TA	Talus	-	-	62.8	-
MHunp	01	Mountain hemlock – amabilis fir/Alaskan blueberry	-	-	9.0	-
	02	Mountain hemlock – amabilis fir/pink mountain-heather	-	4.3	56.8	-
	05	Amabilis fir – mountain hemlock/rosy twistedstalk	-	-	3.6	-
	AC	Avalanche chute	-	-	74.3	-
	AM	Herb meadow	-	7.9	77.5	-
	CA	Crowberry – bog blueberry – alpine Azalea	-	-	83.8	-
	HM	Heath meadow	-	6.5	149.0	-
	MK	Mountain hemlock krummholz	-	-	11.7	-
	RO	Rock outcrop	-	7.9	325.8	-
	RU	Rubble	-	10.9	219.9	-
	TA	Talus	-	-	47.5	-
Total Alpine/Subalpine Ecosystems^a			-	41.2	3,228.2	-

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Table 7.6-33 Predicted Residual Effects – Riparian Ecosystems

BEC Unit	Map Code	Common Name	Area of Direct Disturbance Within Project Footprint (ha)	Area Within LAA Undisturbed by Project Footprint (ha)	Total Area Within RAA (ha)	Portion Directly Disturbed Within RAA (%)
CWHwm	05	Sitka spruce/salmonberry wet maritime	28.5	145.8	511.3	5.6
	06	Black cottonwood – red alder/salmonberry	32.6	472.8	1,088.5	3.0
	FI50	Sitka willow – false lily-of-the-valley	24.7	734.7	1,352.3	1.8
	GB	Gravel bar	1.0	731.8	1,275.7	0.1
MHmm2	GB	Gravel bar	-	-	2.7	-
	WM	Wet seepage meadow	-	-	29.6	-
Total Riparian Ecosystems^a			86.8	2,085.1	4,260.1	2.0

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Table 7.6-34 Residual Effect Characterization – Ecosystems

Criteria	Characterization	Rationale
Direction	Adverse	Both direct and indirect residual effects are anticipated, including the loss of riparian ecosystems within the Project footprint, and alteration of riparian ecosystems and alpine/subalpine ecosystems adjacent to the Project footprint.
Context	Moderate	Overall, the context for ecosystems has been determined to be moderate. Ecosystems have varying levels of vulnerability and resiliency to anthropogenic change. Riparian ecosystems are highly dynamic and frequently disturbed systems that exhibit strong resilience to environmental change. Riparian ecosystems in the RAA are predominantly associated with the Taaltsuxéi (Tulsequah) and T'aakú (Taku) rivers, which experience relatively high levels of natural disturbance, including jökulhlaup events where riparian ecosystems are flooded for extended periods. Conversely, the recovery of alpine and subalpine ecosystems is limited. Because these ecosystems are often restricted to high-elevation "islands," they face unique geographic constraints that limit their ability to migrate or recover from intensive disturbance.
Magnitude	Low	No direct disturbance is anticipated to occur within alpine/subalpine ecosystems. Direct disturbance is anticipated within 2.0% (86.8 ha) of riparian ecosystems within the RAA.
Extent	Local	It is expected that effects will be confined to the LAA.
Duration	Long-Term	Riparian ecosystems affected by the Project are expected to regenerate over time within reclaimed areas of the Project footprint; those areas progressively reclaimed during operations will regenerate throughout the remainder of operations and beyond, and remaining reclaimed areas are expected to regenerate following the Reclamation and Closure Phase. Edge effects are expected to lessen over time following the end of the Reclamation and Closure Phase as a result of natural encroachment of native species and are predicted to persist until revegetation and tree growth within the Project footprint create a more gradual structural transition along forest edges (e.g. a tall shrub or pole/sapling structural stage, approximately 20 years following Reclamation and Closure). Effects on alpine/subalpine ecosystems are anticipated to occur predominantly during the Construction, Operations, and Reclamation and Closure Phases.
Frequency	Continuous	Loss of riparian ecosystems due to clearing during the Construction Phase is expected to occur once; alteration by indirect effects is expected to occur continuously throughout the Construction, Operations, Reclamation and Closure phases, and irregularly during the Post Closure Phase. The nearest Project infrastructure to alpine/subalpine ecosystems with the highest potential to experience indirect effects is the penstock pipeline and access road. Road dust and potential invasive plant propagule dispersal from vehicle traffic is expected to occur many times at regular intervals.
Reversibility	Fully Reversible	Riparian ecosystems cleared within the Project footprint are expected to regenerate on reclaimed areas of the Project footprint over time following the end of operations. Indirect effects on ecosystems are anticipated to be fully reversible. For example, dust is expected to be washed away over time by precipitation, and invasive plants can be eradicated over the long term.

Likelihood, Consequence, Risk, and Confidence

Likelihood, consequence, risk, and confidence assessments for the alteration or loss of ecosystems is presented in **Table 7.6-35**.

Table 7.6-35 Likelihood, Risk, and Uncertainty Characterization – Ecosystems

Criteria	Characterization	Rationale
Likelihood	High	Direct disturbance to riparian ecosystems will occur within the Project footprint, and indirect effects may occur on ecosystems adjacent to the Project footprint.
Consequence	Minor	Low magnitude and local extent are expected; therefore, the consequence was rated as minor.
Risk	Low	High likelihood and minor consequence are expected; therefore, the risk is determined to be low.
Confidence	Moderate	Uncertainty exists with respect to the extent and degree of alteration resulting from dust deposition and invasive plants, and the resiliency of ecosystems to withstand potential Project-related change. As with all ecosystem mapping, some uncertainty also exists in relation to the accuracy of the mapping used to identify vegetation communities and ecosystems.

Importance

The importance of ecosystems is considered high. Alpine/subalpine and riparian ecosystems have been identified by the BC EAO for their importance as a standard VC subcomponent within Environmental Assessments (EAs) ([BC EAO 2024](#)). In addition, riparian ecosystems have been identified by the TRTFN for their importance, particularly around Flannigan Slough ([TRTFN 2025](#)).

Change in the Abundance or Distribution of Plant Species of Interest

This assessment considered the change in abundance or distribution of plant species of interest, including vegetation SOCC and species of importance to First Nations. Plant species of interest may be both directly disturbed by clearing during construction, and indirectly affected by the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Residual Effect Analysis

As detailed in Appendix 7.6-2 - Existing Conditions, three vegetation SOCC have been historically recorded within the LAA: rock sandwort, Alaska holy fern, and cryptic paw lichen.

- Rock sandwort was last observed in 2007 on the creek fan approximately 100 m northwest from the Mine Site to CSF road, and approximately 110 m northeast from the Mine Site.
- Alaska holy fern was last observed in 2007 on the toe slope of the mountain growing in blocky talus under the canopy of a dense stand of Sitka alder, approximately 440 m west from the gravel pit south of the CSF.

- Cryptic paw lichen was last observed in 1982 growing on a birch on the east bank of the Taaltsuxéi Héén (Tulsequah River), approximately 4 km north of the T'aakú Héeni (Taku River). The point location is located over 1 km east from the Mine Site to airstrip road; however, the BC CDC has buffered this occurrence to account for potential spatial uncertainty. The nearest distance between the buffered polygon and the Project footprint is approximately 115 m.

No known occurrences of vegetation SOCC are anticipated to be directly disturbed by the Project footprint; as such, no direct adverse effects on vegetation SOCC are predicted. All known occurrences of vegetation SOCC within the LAA are located greater than 100 m away from the Project footprint. Mitigation measures outlined in **Subsection 7.6.7** are expected to reduce the potential for indirect effects on known occurrences of vegetation SOCC but may not eliminate them entirely. It is possible that limited dust may be deposited on or adjacent to the rock sandwort occurrence, as it is located nearest to the Project footprint in relatively open habitat. Indirect effects are not expected to affect the Alaska holy fern and cryptic paw lichen occurrences, due to their distance from the Project footprint.

Habitat with moderate or high potential to support species of importance to First Nations comprises approximately 74.0% (16,161.8 ha) of the RAA (**Table 7.6-12**). Direct loss to these species has been mitigated by reducing the size of the Project footprint to the extent practicable during Project design; however, up to 0.9% (145.5 ha) of habitat with moderate or high potential to support species of importance to First Nations is anticipated to be disturbed within the RAA during site clearing during the Construction Phase. This includes an anticipated 1.3% (79.6 ha) of habitat with moderate to high potential to support devil's club, 1.1% (104.8 ha) of habitat with moderate to high potential to support spruce, 1.1% (33.4 ha) of habitat with moderate potential to support waterlily, and 0.9% (112.0 ha) of habitat with moderate to high potential to support berry-producing species within the RAA (**Table 7.6-36**).

In addition to these direct effects, habitat with moderate or high potential to support species of importance for First Nations may experience indirect Project effects within the LAA, including the introduction and/or proliferation of invasive plants, edge effects, and dust deposition during Construction, Operations, Reclamation and Closure, and Post Closure Phases. Mitigation measures outlined in **Subsection 7.6.7** are expected to reduce these indirect effects but not eliminate them entirely. Edge effects, for example, will persist following vegetation clearing.

It has been assumed that all species of importance to First Nations present within the Project footprint will be cleared during the Construction Phase; however, progressive reclamation during the Operations Phase may result in the reestablishment of species of importance to First Nations within reclaimed areas, particularly those most resilient to disturbance (e.g. thimbleberry).

Table 7.6-36 Disturbance to Plant Species of Importance to First Nations

Plant Species	Habitat Ranking	Area of Direct Disturbance Within Project Footprint (ha)	Area Within LAA Undisturbed by Project Footprint (ha)	Total Area Within RAA (ha)	Portion Directly Disturbed Within RAA (%)
Devil's club	High	76.7	1,569.9	4,485.7	1.7
	Moderate	2.9	405.9	1635.5	0.2
Devil's club Total^a		79.6	1,975.8	6121.2	1.3
Berry-producing species	High	40.9	2,983.8	7,439.6	0.5
	Moderate	71.1	1,726.2	5437.8	1.3
Berry-producing Species Total^a		112.0	4,710.1	12877.4	0.9
Spruce	High	39.3	666.5	1,525	2.6
	Moderate	65.4	3,115.3	8,406.5	0.8
Spruce Total^a		104.8	3,781.7	9,931.5	1.1
Waterlily	Moderate	33.4	1,025.6	3,014.8	1.1
Waterlily Total^a		33.4	1,025.6	3,014.8	1.1
Ecological Community Total		145.5	5,019.1	16,161.8	0.9

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Residual Effect Characterization for Plant Species of Interest

The Project is predicted to result in a change in the abundance or distribution of plant species of interest, reducing the prevalence of plant species of importance to First Nations through direct disturbance on the Project footprint, and resulting in potential indirect effects (e.g. edge effects, dust deposition, and introduction or proliferation of invasive plants) on plant species of importance to First Nations and vegetation SOCC in areas adjacent to the Project footprint. The residual change in abundance or distribution of plant species of interest, including vegetation SOCC and species of importance to First Nations is characterized in **Table 7.6-37**.

Table 7.6-37 Residual Effect Characterization – Plant Species of Interest

Criteria	Characterization	Rationale
Direction	Adverse	Both direct and indirect residual effects are anticipated, including removal of suitable habitat for species of importance to First Nations within the Project footprint, and alteration of habitat for plant species of interest adjacent to the Project footprint as a result of indirect effects.
Context	Moderate	Vegetation SOCC are often highly habitat-specific with low resiliency to disturbance and habitat loss or degradation. Species of importance to First Nations are generally common within the RAA, occupying diverse assemblage of ecological communities on the landscape. As such, species of importance to First Nations within the RAA are expected to have a high resilience to disturbance. Considering the contrasting resilience of vegetation SOCC and species of importance to First Nations, an overall moderate context rating is considered to be appropriate.
Magnitude	Low	No known vegetation SOCC are expected to be directly disturbed within the Project footprint, and the nearest known occurrence (rock sandwort) is located over 100 m from the Project footprint. Limited indirect effects (e.g. dust deposition) may result in minor alterations to rock sandwort habitat. Up to 0.9% of habitat with high or moderate potential to support species of importance to First Nations within the RAA may be directly disturbed during the Construction Phase. Additional indirect effects (e.g. edge effects, dust deposition, introduction and proliferation of invasive plants) are anticipated adjacent to the Project footprint.
Extent	Local	It is expected that effects will be confined to the LAA.
Duration	Long-Term	Indirect effects on the rock sandwort occurrence (e.g. dust deposition) are anticipated to occur predominantly during the Construction and Operations Phases. Species of importance to First Nations that will be removed during clearing are expected to regenerate over time within reclaimed areas of the Project footprint. Areas progressively reclaimed during operations will begin recovery during the Operations Phase and continue beyond the Post Closure Phase, while remaining reclaimed areas are expected to regenerate following the Reclamation and Closure Phase. Edge effects are expected to lessen over time following the Reclamation and Closure phase as native vegetation establishes along disturbance boundaries. These effects are predicted to persist until revegetation and tree growth within the Project footprint create a gradual structural transition along forest edges (e.g. tall shrub or pole/sapling structural stage, approximately 20 years post-closure).

Criteria	Characterization	Rationale
Frequency	Continuous	Loss of plant species of interest due to clearing during the Construction Phase is expected to occur once; alteration within the LAA by indirect effects is anticipated to occur continuously throughout Construction, Operations, and Reclamation and Closure Phases, and irregularly during the Post Closure Phase.
Reversibility	Fully Reversible	Indirect effects on rock sandwort are anticipated to be fully reversible. For example, dust is expected to be washed away over time by precipitation, and invasive plants can be eradicated over the long term. Species of importance to First Nations directly disturbed within the Project footprint are expected to fully regenerate over time during progressive reclamation throughout the Operations Phase, as well as during final reclamation during the Reclamation and Closure and Post Closure Phases.

Likelihood, Consequence, Risk, and Confidence

Likelihood, consequence, risk, and confidence assessments for the change in abundance or distribution of plant species of interest, is presented in **Table 7.6-38**.

Table 7.6-38 Likelihood, Risk, and Uncertainty Characterization – Plant Species of Interest

Criteria	Characterization	Rationale
Likelihood	High	Habitat with moderate and high potential to support species of importance to First Nations will be cleared on the Project footprint, and indirect effects on these habitat types are anticipated to occur adjacent to the Project footprint.
Consequence	Minor	Low magnitude and local extent are expected; therefore, consequence was rated as minor.
Risk	Low	High likelihood and minor consequence are expected; therefore, the risk is determined to be low.
Confidence	Moderate	No occurrences of vegetation SOCC have been previously observed within the Project footprint; however, uncertainty exists with respect to whether occurrences are present, and if so, where they are in relation to Project activities. Additional uncertainty exists with respect to the extent and degree of alteration resulting from dust deposition and invasive plants, and the resiliency of ecosystems to withstand potential Project-related change. As with all ecosystem mapping, some uncertainty also exists in relation to the accuracy of the mapping used to identify habitat with the potential to support plant species of importance to First Nations.

Importance

The importance of plant species of interest is considered high, as these species have been identified as being used traditionally by First Nations. In addition, vegetation SOCC and plant species of importance to First Nations have been identified by the BC EAO for their importance as a standard VC subcomponent within EAs (BC EAO 2024).

Alteration or Loss of Plant Communities of Interest

Residual Effect Analysis

This assessment considered the alteration or loss of plant communities of interest, defined here as ecological communities of conservation concern. Plant communities of interest may be both directly disturbed by clearing during construction and indirectly affected by the introduction and/or proliferation of invasive plants; edge effects; changes in water quantity and quality; soil erosion, deposition, and sedimentation; and dust deposition during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Three Blue-listed floodplain-associated ecological communities of conservation concern comprise 13.5% (2,952.1 ha) of the RAA (**Table 7.6-15**). All three ecosystems are located within the CWHwm, adjacent to the Taaltsuxéi Héen (Tulsequah River), T'aakú Héeni (Taku River), Wilms Creek, Bacon Creek, and Stuhini Creek. Direct loss of ecological communities of conservation concern has been minimized through Project design; however, up to 2.9% (85.8 ha) of these ecological communities of conservation concern within the RAA are expected to be cleared from the Project footprint during the Construction Phase (**Table 7.6-39**).

Ecological communities of conservation concern are expected to experience indirect effects adjacent to the Project footprint during Construction, Operations, Reclamation and Closure, and Post Closure phases, including edge effects, dust deposition, and introduction and/or proliferation of invasive plants. Mitigation measures outlined in **Subsection 7.6.7** are expected to reduce the extent and intensity of these indirect effects but not eliminate them entirely. Edge effects, for example, will persist following vegetation clearing.

Table 7.6-39 Disturbance to Ecological Communities of Conservation Concern

BEC Unit	Map Code	Common Name	BC CDC Listing	Area of Direct Disturbance Within Project Footprint (ha)	Area Within LAA Undisturbed by Project Footprint (ha)	Total Area Within RAA (ha)	Portion Directly Disturbed Within RAA (%)
CWHwm	05	Sitka spruce/salmonberry wet maritime	Blue	28.5	145.8	511.3	5.6
	06	Black cottonwood – red alder/salmonberry	Blue	32.6	472.8	1,088.5	3.0
	FI50	Black cottonwood/Sitka willow	Blue	24.7	734.7	1,352.30	1.8
Total Blue-listed Ecological Communities^a				85.8	1,353.3	2,952.10	2.9

Notes: ^aSome numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Residual Effect Characterization

The Project is predicted to result in the alteration or loss of plant communities of interest, reducing the prevalence of ecological communities of conservation concern within the RAA through direct disturbance on the Project footprint, and altering ecological communities of conservation concern outside of the Project footprint due to indirect Project effects. The residual effects related to the alteration or loss of plant communities of interest is characterized in **Table 7.6-40**.

Table 7.6-40 Residual Effect Characterization – Plant Communities of Interest

Criteria	Characterization	Rationale
Direction	Adverse	Both direct and indirect residual effects are anticipated, including the loss of plant communities of interest within the Project footprint, and alteration of plant communities of interest within the LAA as a result of indirect effects.
Context	Low	Consisting of floodplain ecosystems largely associated with the Taaltsuxéi (Tulsequah) and T'aakú (Taku) rivers, these plant communities experience relatively frequent natural disturbance, including jökulhlaups events that cause extreme flooding. As such, they are highly dynamic systems with demonstrated resilience to periodic disturbance.
Magnitude	Moderate	Up to 2.9% of plant communities of interest are anticipated to be directly disturbed within the RAA, with further indirect disturbance to plant communities of interest anticipated in areas adjacent to the Project footprint.
Extent	Local	It is expected that effects will be confined to the LAA.
Duration	Long-Term	Plant communities of interest affected by the Project are expected to regenerate over time within reclaimed areas of the Project footprint; those areas progressively reclaimed during Operations will regenerate throughout the remainder of Operations and beyond, and remaining reclaimed areas are expected to regenerate following the Reclamation and Closure Phase. Edge effects are expected to lessen over time following the end of the Reclamation and Closure Phase as a result of natural encroachment of native species and are predicted to persist until revegetation and tree growth on the Project Footprint create a more gradual structural transition along forest edges (e.g. a tall shrub or pole/sapling structural stage, approximately 20 years following Reclamation and Closure).
Frequency	Continuous	Loss of plant communities of interest on the Project footprint during the Construction Phase is expected to occur once; alteration within the LAA by indirect effects is expected to occur continuously throughout the Construction, Operations, Reclamation and Closure Phases, and irregularly during the Post Closure Phase.
Reversibility	Fully Reversible	Plant communities of interest cleared within the Project footprint are expected to regenerate on reclaimed areas of the Project footprint over time following the end of Operations. Indirect effects are anticipated to be fully reversible. For example, dust is expected to be washed away over time by precipitation, and invasive plants can be eradicated over the long term.

Likelihood, Consequence, Risk, and Confidence

Likelihood, consequence, risk, and confidence assessments for the alteration or loss of plant communities of interest is presented in **Table 7.6-41**.

Table 7.6-41 Likelihood, Risk, and Uncertainty Characterization – Plant Communities of Interest

Criteria	Characterization	Rationale
Likelihood	High	Direct disturbance to plant communities of interest will occur within the Project footprint, and indirect effects may occur adjacent to the Project footprint.
Consequence	Minor	Moderate magnitude and local extent are expected; therefore, the consequence was rated as minor.
Risk	Low	High likelihood and minor consequence are expected; therefore, the risk is low.
Confidence	Moderate	Uncertainty exists with respect to the extent and degree of alteration resulting from dust deposition and invasive plants. As with all ecosystem mapping, some uncertainty also exists in relation to the accuracy of the mapping used to identify vegetation communities and ecosystems.

Importance

The importance of ecological communities of interest is considered high, as ecological communities of conservation concern are actively tracked by the BC CDC, and they have further been identified by the BC EAO for their importance as a standard VC subcomponent within EAs (BC EAO 2024).

Alteration or Loss of Wetland Function

This assessment considered the alteration or loss of wetland function. Wetland function may be directly lost through clearing during Construction and indirectly altered by invasive plant introduction and/or proliferation, edge effects, changes in water quantity and quality, soil erosion and sedimentation, and dust deposition during Construction, Operations, Reclamation and Closure, and Post Closure Phases after mitigation.

Residual Effect Analysis

As detailed in **Subsection 7.6.5 Existing Conditions**, wetlands comprise 10.6% (2,285.90 ha) of the RAA (**Table 7.6-42**). Wetland function was assessed as “high” for all wetlands assessed in the field. Direct loss of wetlands has been mitigated by reducing the size of the Project footprint to the extent practicable during Project design; however, loss of wetland function is still expected to occur. Up to 1.5% (33.3 ha) of wetlands within the RAA are anticipated to be cleared from the Project footprint during the Construction Phase (**Table 7.6-42**). Swamps are expected to be the wetland type with the largest area of direct disturbance, with 17.4 ha of swamp habitat mapped within the Project footprint being directly disturbed (**Table 7.6-42**).

In addition to these direct effects, wetlands within the RAA are expected to experience indirect Project effects during all Project phases. Mitigation measures outlined in **Subsection 7.6.7** are expected to reduce these indirect effects but not eliminate them entirely. Edge effects, for example, will persist following vegetation clearing. Similarly, invasive plants may still be introduced and proliferate, dust may be deposited, and water quality and/or quantity may be affected within remaining wetland areas adjacent to the Project footprint during all Project phases.

Table 7.6-42 Disturbance to Wetland Ecosystems

BEC Unit	Map Code	Classification	Area of Direct Disturbance Within Project Footprint (ha)	Area Within LAA Undisturbed by Project Footprint (ha)	Total Area Within RAA (ha)	Portion Directly Disturbed within RAA (%)
MHmm2	Wf	Fen	-	-	14.9	-
	Ws	Swamp	-	-	60.4	-
CWHwm	OW	Shallow open water	5.8	89.5	231.7	2.5
	Wf	Fen	-	35.6	100.4	-
	Wf/Wm	Fen/marsh	8.0	46.5	91.5	8.8
	Wm	Marsh	2.1	203.9	697.4	0.3
	Ws	Swamp	17.4	352.8	1,089.7	1.6
Total Wetland Ecosystems^a			33.3	732.2	2,285.90	1.5

Notes: ^a Some numbers are rounded for presentation purposes; therefore, the totals may not equal the sum of the individual values.

Residual Effect Characterization

The Project is predicted to result in alteration or loss of wetland function, reducing the prevalence of wetland ecosystems within the RAA through direct disturbance on the Project footprint, and resulting in potential indirect effects (e.g. edge effects, dust deposition, introduction or proliferation of invasive plants) on wetland function in areas adjacent to the Project footprint. The residual effects characterization for alteration or loss of wetland function is provided in **Table 7.6-43**.

Table 7.6-43 Residual Effect Characterization – Wetlands

Criteria	Characterization	Rationale
Direction	Adverse	Both direct and indirect residual effects on wetland function are anticipated, including the loss of wetland ecosystems on the Project footprint, and alteration of wetland function adjacent to the Project footprint through indirect effects.
Context	Moderate	Wetlands can exhibit low resilience and high susceptibility to disturbance; however, floodplain wetlands within the RAA are adapted to periodic flood-mediated disturbance, which supports moderate overall resilience.
Magnitude	Low	Up to 1.5% of wetlands within the RAA are expected to be directly disturbed during the Construction Phase. Additional indirect effects (e.g. edge effects, dust deposition, introduction and proliferation of invasive plants) are anticipated adjacent to the Project Footprint.
Extent	Local	It is expected that effects will be confined to the LAA.
Duration	Long-Term	Once natural drainage patterns are restored during the Reclamation and Closure Phase, the structure and function of wetlands altered as a result of indirect Project effects are expected to re-establish by the end of the Post Closure Phase.
Frequency	Continuous	Loss of wetland function due to clearing during the Construction Phase is expected to occur once; alteration by indirect effects is expected to occur continuously throughout the Construction, Operations, Reclamation and Closure Phases, and irregularly during the Post Closure Phase.
Reversibility	Partially Reversible	Loss of wetland function through clearing within the Project footprint is anticipated to be Irreversible. Alterations to wetland function due to indirect effects during all Project phases are expected to be reversible over time.

Likelihood, Consequence, Risk, and Confidence

Likelihood, consequence, risk, and confidence assessments for the alteration or loss of wetland function is presented in **Table 7.6-44**.

Table 7.6-44 Likelihood, Risk, and Uncertainty Characterization – Wetlands

Criteria	Characterization	Rationale
Likelihood	High	Loss of wetland function will occur within the Project footprint, and indirect effects on wetland function may occur adjacent to the Project footprint.
Consequence	Minor	Low magnitude and local extent are expected; therefore, consequence was rated as minor.
Risk	Low	High likelihood and minor consequence are expected; therefore, risk is determined to be low.
Confidence	Moderate	Uncertainty exists with respect to the extent and degree of alteration resulting from indirect effects, and the resiliency of specific ecosystems to withstand potential Project-related change. As with all ecosystem mapping, some uncertainty also exists in relation to the accuracy and resolution of the mapping used to identify wetland ecosystems.

Importance

The importance of wetland function is considered high, as it has been identified by the BC EAO for importance as a standard VC subcomponent within EAs ([BC EAO 2024](#)). In addition, wetland ecosystems have been identified by the TRTFN for their importance, particularly around Flannigan Slough ([TRTFN 2025](#)).

7.6.10 Cumulative Effects

Project residual effects described in **Section 7.6.9** that are likely to interact cumulatively with residual effects from past, present, or reasonably foreseeable projects are identified in this section, and the resulting cumulative effects are assessed. This is followed by an analysis of the Project contribution to residual cumulative effects.

7.6.10.1 Cumulative Effects Assessment Boundaries

Cumulative effects assessment (CEA) boundaries are defined as the maximum spatial and temporal scales over which there is a potential for residual Project effects to the soil and terrain to interact with residual effects of other past, present, or reasonably foreseeable future projects and activities.

The spatial boundaries for soil and vegetation CEA consists of the RAA defined for the soil and vegetation Project-specific effects assessment (**Figure 7.6-1a; Figure 7.6-1b**).

Temporal boundaries considered for the cumulative effects assessment of the Project include:

- Present and Ongoing – initiated before 2025 but anticipated to carry on beyond the construction start date.
- Planned/Reasonably Foreseeable Future – planned to start during mine life (construction through post-closure). Generally, the proposed end date for inclusion in the effects assessment is 2050, which represents the end of the Post Closure Phase.

7.6.10.2 Project Interactions with Past, Present, and Reasonably Anticipated Future Projects

Past, present and reasonably foreseeable future Projects and activities that have been identified for inclusion in the cumulative effects assessment from a variety of sources are listed in Table 6-5. The projects and activities listed in **Table 7.6-45** are expected to interact with the residual effects on soil and/or vegetation within or extending into the RAA.

Table 7.6-45 Projects/Activities with Potential to Interact with Soil and Vegetation Residual Effects

Project / Activity	Temporal	Location	Description
Canadian Commercial Fisheries on the Lower T'aakú Héeni (Taku River)	Present (certain)	T'aakú Héeni (Taku River) from Canada–US border to 18 km upstream	Canadian commercial fishery for chinook, coho, and sockeye salmon harvest
Tulsequah Chief Mine Cleanup	Reasonably Foreseeable Future	6 km NE from Mine Site	The Province of BC will be leading mine reclamation and closure activities at the former Mine Site. A final Reclamation and Closure Plan is being developed by Teck. Reclamation activities are expected to initiate during the Project mine life.

Tulsequah Chief Mine Cleanup

Reclamation and cleanup activities at the Tulsequah Chief mine involve a multi-year strategy to stabilize the area, manage acid mine drainage, and eventually restore the local ecosystem through a final closure plan. In the short term, work at Tulsequah Chief mine, such as maintaining the airstrip and conducting technical investigations, may cause localized adverse direct effects through soil disturbance and vegetation clearing, and indirect effects through increased edge effects, and increased vehicle and equipment traffic that can result in the introduction and/or proliferation of invasive plants and dust deposition within RAA.

However, the long-term positive effects are expected to be greater, as the Project aims to mitigate ongoing discharge of acid rock drainage into the Taaltsuxéi Héen (Tulsequah River) and reclaim historic mine disturbance. By implementing modern reclamation standards and a collaborative revegetation strategy with the TRTFN, the Project seeks to replace disturbed areas with a self-sustaining cover of native plant species, ultimately returning the site to a safe and environmentally sound state.

Commercial Salmon Fisheries

The Canadian commercial fisheries operate on the lower T'aakú Héeni (Taku River) near the Canada–US border to approximately 18 km upstream, primarily targeting sockeye and coho salmon. Annual salmon migration is an important link between the marine and terrestrial environments, functioning as a nutrient pump that delivers essential nitrogen and phosphorus to riparian vegetation and inland forests. As these marine-derived nutrients are important for plant growth of ecosystems associated with the T'aakú Héeni (Taku River) for the growth of local plant life, salmon harvesting can diminish this nutrient supply, and physical activities, such as operating fish wheels or maintaining seasonal camps, can cause localized vegetation trampling and soil compaction, as well as the introduction/proliferation of invasive plants.

The above projects and activities have been carried forward in the CEA. In the absence of comprehensive activity details and spatial information, the assessment was primarily qualitative, based on available information and current understanding of the scope of these projects and activities.

7.6.10.3 Existing Conditions

As the CEA area is identical to the RAA, there are no differences for existing conditions for cumulative effects compared to the existing conditions (Appendix 7.6-1, Appendix 7.6-2). The only projects within the RRA with the potential for the cumulative effect potential for residual Project effects to soil and vegetation and/or to interact with residual effects in the foreseeable future are the Tulsequah Chief Mine cleanup project located 6 km northeast of the Mine Site and the commercial salmon fisheries (vegetation only).

7.6.10.4 Potential Adverse Cumulative Effects

The anticipated cumulative effects associated with soil and vegetation include:

- Soil quality
- Soil quantity
- Alteration or loss of known plant species of interest
- Alteration or loss of known plant communities of interest, and
- Alteration or loss of wetlands.

Table 7.6-46 Interactions with Effects of Past, Present, and Anticipated Future Projects and Activities – Soil and Terrain Residual Effects

Project / Activity	Soil Quality	Soil Quantity	Alteration or Loss of Ecosystems	Change in Abundance or Distribution of Plant Species of Interest	Alteration or Loss of Plant Communities of Interest	Alteration or Loss of Wetland Function
Past and Present						
Tulsequah Chief Mine	Yes	No	Yes	Yes	Yes	Yes
Commercial Salmon Fisheries	N/A	N/A	Yes	Yes	Yes	No

Soil Quality

The major disturbances to soil and activities that result in soil compaction and generate dust will be confined to the surface footprint areas and along roads. While a net additive cumulative effect is expected from past and present mining operations and activities, quantification of the net effect of the Project on soil quality is difficult as the majority of the surface footprint is on brownfield sites that were previously disturbed.

Soil Quantity

Project infrastructure will be located on brownfield site that have been previously disturbed by historical mining operations. Cumulative effects on direct loss of soil quantity can be described as additive (effects result from the sum of individual effects) when combining other past and present effects. The significant cumulative effect on soil quantity is the sum of the effects from historical mining operations and activities, and from the proposed Project effect.

Alteration or Loss of Ecosystems, Plant Species and Communities of Interest, and Wetland Function

Ecosystems, plant species of interest, plant communities of interest, and wetland function were considered together qualitatively, given a lack of available spatial information available for future projects and activities, as well as a lack of information regarding the extent of their residual effects.

Residual effects on ecosystems and plant communities of interest resulting from the Project were identified and assessed in **Subsection 7.6.9**, including effects on alpine/subalpine ecosystems, riparian ecosystems, and ecological communities of conservation concern. Additional cumulative effects on alpine/subalpine ecosystems are not anticipated given the location of anticipated future projects and activities at lower elevations; however, limited and isolated effects on riparian ecosystems and ecological communities of conservation concern may occur.

Residual effects on plant species of interest resulting from the Project were identified and assessed in **Subsection 7.6.9**. Three Blue-listed species have been historically recorded within the RAA: rock sandwort, Alaska holy fern, and cryptic paw lichen, and the potential exists for other occurrences to be present. Further, many terrestrial and wetland ecosystem units support species of importance to First Nations. Contributing projects and activities within the RAA are anticipated to have mitigation measures in place to reduce vegetation disturbance, including plant species of interest, to the extent practicable. Plant species of importance to First Nations are expected to regenerate within disturbed lands that have been reclaimed (e.g. following mine clean up). As such, the cumulative effect on plant species of interest is expected to be limited and isolated.

Residual effects on wetland function resulting from the Project were identified and assessed in **Subsection 7.6.9**. Forestry regulations require licensees to limit activities within wetland areas (e.g. Forest Planning and Practices Regulation, BC Reg 14/2004), and it is expected that other future projects and activities will comply with this requirement; however, potential cumulative effects on wetland function may occur due to overlapping edge effects, changes to water quantity/quality, dust deposition, and/or the introduction/proliferation of invasive plants. However, the cumulative effect on wetland function is expected to be limited and isolated.

7.6.10.5 Mitigation Measures

The application of soil and vegetation management strategies by both interacting projects and activities will limit the intensity and extent of any cumulative effects to soil and vegetation. The most effective mitigation strategies to reduce cumulative effects on soil and vegetation include:

- Development and implementation of soil management plan during Construction and Operations Phases of the Project
- Development and application of BMPs for road construction, road maintenance, erosion control, and land reclamation
- Use of dust suppression measures to mitigate the dust generation potential along the unpaved haul roads, work areas, and storage piles as needed
- Avoiding soil handling and vehicle traffic when soil is wet, especially on compressible soils
- Use of low ground pressure equipment where possible and use of matting if construction is required over wet areas, and
- Application of erosion control measures.

7.6.10.6 Characterization of Residual Cumulative Effects

Soil Quality

The residual cumulative effect on soil quality is characterized in **Table 7.6-47** below

Table 7.6-47 Residual Cumulative Effect Characterization – Soil Quality

Criteria	Characterization	Rationale
Direction	Adverse	Dust deposition can affect the surrounding environment and communities, and the direction rating is classified as adverse
Context	High	The receiving environment has a high natural resilience to imposed soil quality stresses as recovery through natural processes is achievable or can be supplemented using amendments, if necessary.
Magnitude	Medium	Soil quality will diminish although not to an extent where soil function will be significantly altered.
Geographic Extent	Limited	Effect is limited to the surface footprint its buffer areas and only where ecologically valuable soils exist.
Duration	Long-Term	Recovery of soil quality to baseline/undisturbed conditions through reclamation and natural processes is anticipated to be multiple decades and will be felt past Project closure.
Frequency	Continuous	Dust accumulation will occur continuously during operations
Reversibility	Reversible	Cumulative effects to soil quality can be reversed through natural processes (i.e. vegetation succession) and application of soil amendments and decompaction to a near normal background condition.

Likelihood, Risk, Confidence, and Uncertainty of Adverse Cumulative Effects – Soil Quality

The assessment of the likelihood for Residual Cumulative Effect on Soil Quality is presented in **Table 7.6-48** below.

Table 7.6-48 Likelihood, Risk, and Uncertainty Characterization on Residual Cumulative Effect of Soil Quality

Criteria	Characterization	Rationale
Likelihood	High	Residual effects on dust deposition will occur based on nature of construction and operation of mine facilities (i.e. dust emissions from road use and equipment traffic), and the nature of salvage operations.
Consequence	Low	As the magnitude and extent of the residual effect is considered low and limited, respectively, the consequence rating is classified as low.
Risk	Low	As the likelihood and consequence of the residual effect is considered high and low, respectively, the consequence rating is classified as low.
Confidence	High	The cause-effect relationships between construction and operation of mine facilities and their effect on soil compaction and dust accumulation is well understood.

Importance

The loss of soil quality has been identified as important because of the need for maintaining soil quality for revegetation and development of productive and functional ecosystems.

Soil Quantity

The residual cumulative effect on soil quantity is characterized in **Table 7.6-49** below.

Table 7.6-49 Residual Cumulative Effect Characterization – Soil Quantity

Criteria	Characterization	Rationale
Direction	Neutral	It is not expected that soil loss will affect the surrounding environment and communities.
Context	Moderate	The receiving environment has a moderate resilience to the loss of soil as recovery of soil through natural processes is achievable.
Magnitude	Low	Soil loss will not be to an extent where the function of Project soils will be inhibited. In addition, soil loss from unsuitable soils are expected to be minimal.
Geographic Extent	Local	Effect is limited to the surface footprint.
Duration	Long-Term	Recovery of soil loss through natural processes is anticipated to be multiple decades and effect will extend beyond Project closure.
Frequency	Irregular	Soil loss will primarily take place during the construction activities at sporadic intervals.
Reversibility	Reversible	Loss of soil will be reversed to pre-Project state through natural processes after completion of reclamation.

Likelihood, Risk, Confidence, and Uncertainty of Adverse Cumulative Effects – Soil Quantity

The assessment of the likelihood for residual cumulative effect of soil quantity is presented in **Table 7.6-50** below.

Table 7.6-50 Likelihood, Risk, and Uncertainty Characterization on Residual Cumulative Effect of Soil Quantity

Criteria	Characterization	Rationale
Likelihood	Medium	Loss of soil quantity will occur based on the characterization of suitable soils and the effectiveness of salvage and stockpiling operations.
Consequence	Low	As the magnitude and extent of soil quantity loss is medium to low and limited to certain areas, the consequence rating is classified as low.
Risk	Low	As the likelihood and consequences of the residual effect is considered medium and low, the risk rating is classified as low.
Confidence	Medium	Soil loss resulting from material being deemed unsuitable and loss during soil salvage for reclamation depend on the effectiveness of the operations; therefore the confidence rating is conservatively classified as medium.

Importance

The loss of soil quantity has been identified as important because of the need for conserving and utilizing functional soil for reclamation and closure of the surface footprint.

The residual cumulative effect on ecosystems, plant species of interest, plant communities of interest, and wetland function is characterized below in **Table 7.6-51**.

Table 7.6-51 Residual Effect Characterization for the Alteration or Loss of Ecosystems, Plant Species of Interest, Plant Communities of Interest, and Wetland Function

Criteria	Characterization	Rationale
Direction	Adverse	Both direct and indirect residual effects are anticipated, including removal of vegetation and alteration of vegetation as a result of indirect effects.
Context	Moderate	Overall, the context for ecosystems has been determined to be moderate. Ecosystems have varying levels of vulnerability and resiliency to anthropogenic change. Ecosystems within the RAA are dominated by established forested ecosystems and disturbance-mediated floodplain ecosystems, which are expected to confer a moderate to high resilience to stress; however, some ecosystems such as wetlands can exhibit low resiliency to disturbance.
Magnitude	Low	The majority of past, present, and reasonably foreseeable projects and activities are predicted to result in relatively low levels of direct and indirect vegetation disturbance.
Geographic Extent	Regional	Loss and alteration of ecosystems, plant species of interest, plant communities of interest, and wetland function occur throughout the RAA.

Criteria	Characterization	Rationale
Duration	Long-Term	The duration of alteration or loss of ecosystems, plant species of interest, plant communities of interest, and wetland function is expected to occur over the long term because of the extended time periods required for some ecosystems to regenerate following disturbance and reclamation.
Frequency	Regularly	While vegetation loss due to clearing is anticipated to occur irregularly, alteration of vegetation within the RAA by indirect effects such as introduction/proliferation of invasive plants, edge effects, and dust deposition is expected to occur regularly.
Reversibility	Partially Reversible	Most of the vegetation, ecosystems, and/or wetlands lost or altered within the RAA have the potential to regenerate over time after the source of the disturbance has ceased.
Importance	High	Ecosystems, plant species of interest, plant communities of interest, and wetland function have been identified as being used traditionally by First Nations, and have been identified by the BC EAO for importance as a standard VC subcomponent within EAs (BC EAO 2024).

Likelihood, Risk, Confidence, and Uncertainty of Adverse Cumulative Effects

The assessment of the likelihood, consequence, risk, and confidence on the alteration or loss for ecosystems, plant species of interest, plant communities of interest, and wetland function is presented in **Table 7.6-52** below.

Table 7.6-52 Likelihood, Risk, and Uncertainty Characterization for Alteration or Loss of Ecosystems, Plant Species of Interest, Plant Communities of Interest, and Wetland Function

Criteria	Characterization	Rationale
Likelihood	High	Native vegetation is common within the RAA, and this is expected to be affected by both the Project and other projects and activities.
Consequence	Moderate	Low magnitude and regional extent are expected; therefore, the consequence was rated as moderate.
Risk	Moderate	High likelihood and moderate consequence are expected; therefore, the risk is determined to be moderate.
Confidence	Moderate	While the direct effects of clearing are well known, uncertainty exists with respect to the extent and degree of alteration resulting from edge effects, dust deposition, invasive plants, the resiliency of ecosystems, plant species of interest, plant communities of interest, and wetlands to withstand change, and the regeneration of reclaimed areas into native vegetation communities.

7.6.11 Monitoring and Follow-up

The follow-up monitoring and sampling program is designed to evaluate the effectiveness of mitigation measures on the subcomponents where positive or negative residual effects or adverse cumulative effects are predicted or uncertain. A Soil Management Plan will be implemented prior to the start of construction and throughout the Operations Phase of the Project to ensure that measures are in place to minimize loss and alteration of soil quantity and quality. The program will follow with BMPs and scientific methods, and in accordance with current regulations as well as with regulatory changes that may become available during the Project.

The soil management monitoring program includes inspections and sampling during soil salvage operations, and inspections of soil stockpiles and reclaimed areas. The Surface Erosion Prevention and Sediment Control Plan will be implemented to limit soil erosion and dust accumulations.

Continuous monitoring data, collected throughout all Project Phases (Construction, Operations, Reclamation and Closure, and Post Closure) will be used to track environmental effects compared against predicted effects and regulatory standards to determine if mitigation measures are effective.

If data collected during any monitoring activities throughout all Phases of the Project indicate that employed mitigation measures are not eliminating or sufficiently reducing effects, or the accuracy of the predicted effects has been underestimated, additional and perhaps more intensive mitigation measures directed towards cause identification and implementation of new or modified approaches will be implemented (Canadian Environmental Assessment Agency, 2009).

The soil monitoring and sampling program is presented in **Table 7.6-53** below.

Table 7.6-53 Summary of Soil Monitoring and Sampling Program

Valued Component / Subcomponent	Project Phase	Monitoring / Sampling Activity
Soil Quality	Construction	Sampling and analysis of topsoil planned to be excavated in the Construction Phase, and in the event of spill events, to verify acceptable soil quality criteria. Sampling of salvaged materials will be conducted to confirm material properties and suitability for reclamation. Confirmatory soil sampling including walls and floor of the excavation limits during excavation of contaminated soil. Soil sampling in areas with suspected soil contamination. Dust monitoring and sampling.
	Operations	Regular assessments of soil conditions and confirmatory soil sampling Dust monitoring and sampling.
	Closure	Confirmatory soil sampling to assess the effectiveness of mine reclamation. Dust monitoring and sampling.

Valued Component / Subcomponent	Project Phase	Monitoring / Sampling Activity
Soil Quantity	Construction	Visual inspections during stripping to confirm the areas, volumes, types of materials and stockpiling.
	Operations	Regular inspections of stockpiles to assess the vegetation status and evidence of erosion. Assessment of soil stockpiles for suitability for rehabilitation.
	Closure	Visual inspections during soil movement to confirm volumes and overall soil condition.
Terrain Stability	Construction	Follow the recommendations from the Madrone 2024 report: • Road crossing on creeks at risk to debris flows be assessed for debris flow potential and engineered mitigative measures considered where practicable. • A 1:5,000 scale terrain stability field assessment of this section should be conducted prior to road construction to confirm or rule out the likelihood of rockfall and to recommend mitigative measures where practicable. • Road crossings on creeks and back channels should be assessed for channel instability potential and engineered mitigative measures considered where practicable. • Steep angled features prone to instability should be assessed prior to development.
	Operations	Regular visual inspections for erosion and stability checks.
	Closure	Final stability assessment.

The tasks described in **Table 7.6-53** will be conducted by a Qualified Environmental Professional.

TRTFN will be actively involved during the implementation of the follow-up monitoring program, as will other interested parties, including local government and community representatives.

Adaptive management is a structured decision making approach to reduce uncertainty over time through system monitoring. In the present context, the purpose of monitoring and adaptive management is to further quantify and qualify Project effects (if and where necessary), assess the effectiveness of mitigation measures, provide a mechanism for modification and/or adaptation, identify new problems (should they arise), and implement additional mitigation (if and where applicable), including triggers, corrective actions, and regulatory implications.

This chapter characterizes residual and cumulative effects on the Vegetation VC with moderate confidence, as described in the effect-specific assessments. Targeted monitoring and inspection will be undertaken during construction to verify that mitigation measures to reduce effects on vegetation have been appropriately applied, maintained, adapted, and removed, where necessary. Environmental inspectors (on-site monitors) will be present during construction to verify compliance and evaluate the success of mitigation measures outlined in **Subsection 7.6.7**, management plans, and applicable approval conditions.

Should occurrences of vegetation SOCC be identified within the Project footprint at any point during the lifetime of the Project, these occurrences will be visited by a Qualified Professional during a biologically appropriate time of year to confirm identification and conservation status, delineate the extent of the occurrence, and develop site-specific mitigation measures to protect the occurrence during all Project phases.

Project monitoring and adaptive management plans specific to the Vegetation VC include:

- Vegetation and invasive plants will be routinely monitored throughout the life of the Project in accordance with the Vegetation Management Plan
- Soil monitoring during salvaging and stockpiling activities will be undertaken
- Progressive reclamation and revegetation of disturbed areas will be monitored in accordance with the Reclamation and Closure Plan, and
- Metals monitoring will be employed to understand metals uptake in plants in accordance with the Vegetation Management Plan.

Where mitigation measures are not deemed to be successful, adaptive management techniques will be employed. Findings during monitoring, as well as revised BMPs, improved scientific methods, and regulatory changes will be incorporated into the environmental management plans (e.g. Vegetation Management Plan) to reduce effects during the lifetime of the Project. Key stakeholders, Indigenous groups, and government agencies will be involved in developing mitigation and adaptive management measures where applicable.

In consideration of the findings of the EA, the proposed management plans, monitoring programs, and adaptive management approach, no additional Vegetation VC-specific follow-up programs are proposed beyond the monitoring described above. Monitoring results will be used to verify mitigation effectiveness and inform adaptive management, thereby addressing uncertainty in residual and cumulative effects predictions.

7.6.12 Closure/ Sign-Off

This assessment report was prepared by professional services providers registered under the BC *Professional Governance Act*, SBC 2018, c. 47 (Government of BC 2018b).

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Appendix 7.6–1

Soils Existing Conditions Report

New Polaris Gold Mine Project Baseline Soil and Terrain Existing Conditions Report



Photo Credit: Dominic Korn 2025

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March 12, 2026

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Executive Summary

The New Polaris Project (the Project) is a proposed gold mine developed by Canagold Resources Ltd (Canagold; the Proponent). The Project is located in northwestern British Columbia (BC) within the Taaltsuxéi (Tulsequah) and T'aakú (Taku) River valleys, in the traditional and unceded territory of the Taku River Tlingit First Nation (TRTFN). The proposed Project will consist of an underground gold mine, on-site camp, an airstrip with associated facilities, roadways, tailings and waste rock combined storage facility (CSF), process plant, fuel and explosives storage and a barge landing, along with associated utilities and services.

This Baseline Soil Existing Conditions report is part of a baseline monitoring and data collection program documenting current physical condition of the environment in the vicinity of the proposed Project. In addition, baseline soil characterisation also reflects impacts related to historical mining activities that occurred within the Project area.

The Regional Assessment Area (RAA) associated with the Project includes the Boundary Ranges of the Coast Mountains and features steep, mountainous terrain and broad, glacially influenced river valleys. Two river valleys are identified within the Project area, including the Taaltsuxéi (Tulsequah) and T'aakú (Taku) river valleys. Several geohazards and terrain stability issues were identified in the 2024 Madrone Terrain Stability Mapping report that could affect how contamination moves within the Project area.

Ausenco performed waste rock sampling and soil characterisation within the Project area in 2025 to characterise legacy wastes, primarily waste rock and tailings from the historic Polaris-Taku mine, but also tailings and possibly residual ore left over from milling of ore from the nearby Tulsequah Chief mine (TCM). Ore from Tulsequah Chief was processed through the Polaris-Taku mill for a short period after underground mining operations ended.

In 2021, Environmental Dynamics Inc. (EDI) performed soil sampling as part of a vegetation and ecosystems existing conditions report. Soil samples were collected in conjunction with vegetation samples throughout the Project area in order to determine baseline conditions and assess potential effects on terrestrial ecosystems. In addition, Canagold completed a test pitting and soil sampling program in 2022 to assess the extent, depth and geochemical variability of the historical tailings in the Project area and inform decisions on their potential value or liability to the Project.

Soil analytical results associated with the 2025 waste rock sampling and soil characterisation performed by Ausenco were below both BC Contaminated Sites Regulations (CSR) Industrial Land (IL) and Wetland Reverted (WLR), and Canadian Environmental Quality Guidelines (CEQG) IL and parkland (PL) standards. However, soil analytical results associated with the 2021 soil sampling performed by EDI and 2022 soil sampling performed by Canagold indicated metal exceedances exceeding the BC CSR IL and/or WLR and CEQG IL and/or PL samples within the Project area. These exceedances could be a result of historical mining activities or natural background levels within the Project area.

Additional investigations would be required to determine the source of these exceedances. Long-term monitoring of soil quality will be critical to identify any potential impacts of future Project operations and to monitor the effectiveness of any mitigation or adaptive management measures.

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Appendices

Appendix A Previous Environmental Reports
Appendix B Field Methodologies and QAQC
Appendix C Laboratory Certificate of Analysis

List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AK	Alaska
AS	Air Strip
Ausenco	Ausenco Sustainability ULC.
BC	British Columbia
BCEAA	British Columbia <i>Environment Assessment Act</i>
BC EAO	British Columbia Environmental Assessment Office
BGS	Below ground surface
BV	Bureau Veritas
Canagold	Canagold Resources Ltd.
CALA	Canadian Association for Laboratory Accreditation Inc.
CARO	CARO Analytical Services
CCME	Canadian Council for the Minister of the Environment
CEQG	Canadian Environmental Quality Guidelines
COA	Certificate of Analysis
CSF	Combined Storage Facility
CSAP	Contaminated Sites Approved Professional
CSR	Contaminated Sites Regulation
EA	Environmental assessment
EDI	Environmental Dynamics Inc.
EMA	Environmental Management Act
HASP	Health and Safety Plan
HWR	Hazardous Waste Regulation
IL	Industrial Land
JSA	Job Safety Analysis
LP	Lower pad area
LLA	Local Assessment Area
Madrone	Madrone Environmental Services Ltd.
NP	New Polaris portal
NPR	New Polaris Road
PAH	Polycyclic Aromatic Hydrocarbons
PHC	Petroleum Hydrocarbons
PL	Parkland
P4	<i>Protocol 4 Establishing Background Concentrations in Soil</i>
QA	Quality assurance

Acronym/Abbreviation	Definition
QC	Quality control
RAA	Regional Assessment Area
RDL	Reportable detection limit
RPD	Relative percent difference
Taku River	T'aakú Héeni
TCM	Tulsequah Chief Mine
TRTFN	Taku River Tlingit First Nation
Tulsequah River	Taaltsuxéi Héen
US	United States
WLR	Wildlands Reverted land use

1.0 Introduction

1.1 Project Overview

The New Polaris Gold Mine (the Project) is a proposed gold mine developed by Canagold Resources Ltd (Canagold; the Proponent). The Project is located in northwestern British Columbia (BC) within the Taaltsuxéi Héen (Tulsequah River) and T'aakú Héeni (Tuka River) valleys, in the traditional and unceded territory of the Taku River Tlingit First Nation (TRTFN). The proposed Project is an underground gold mine with approximately 1,000 tonnes per day mill throughput rate that would operate year-round, producing on average approximately 365,000 tonnes per year of ore (Ausenco, 2024). Exploration at the site is ongoing, and current estimates suggest the mine will have an approximately 10 year production life, but this could be extended as the limits of the orebody are not fully defined (Ausenco, 2024).

Historically, the Polaris-Taku Mine operated within the Project area between 1937 and 1951, consistent with the Canadian Minerals and Metals Plan (Government of Canada, 2019). Canagold Resources is planning to further exploration the gold resources in this historic Mine Site. In addition, two other notable historical mining operations operated near the Project area, including The Tulsequah Chief Mine (TCM) and Big Bull Mine.

The Project will consist of an underground gold mine, on-site camp, an airstrip with associated facilities, roadways, tailings and waste rock combined storage facility (CSF), process plant, fuel and explosives storage and a barge landing, along with associated utilities and services. After the decommissioning of the legacy mine, roads were no longer maintained and are not functional, therefore an approximately 10 km road is proposed between the barge landing site and the Project site in order to transport materials and equipment. In addition, a 1 km road is proposed between the main mine site and the combined storage facility (Ausenco, 2024). The assessment areas for the baseline report include:

- Local Assessment Area (LAA): 0.5 km buffer surrounding the Project footprint.
- Regional Assessment Area (RAA): 4 km buffer surrounding the LAA.

Soils are a pivotal part of the Project as they are a primary indicator of historical contamination that could be present from the Polaris-Taku mine. Additionally, new impacts from proposed Project operations are measured from the baseline soils condition; how operations could affect sensitive terrestrial ecosystems that exist in the vicinity of the Project are assessed from this baseline. Contamination can be stored in soils long-term and can greatly affect both surface and groundwater conditions, as well as the mobility of contamination through these mediums.

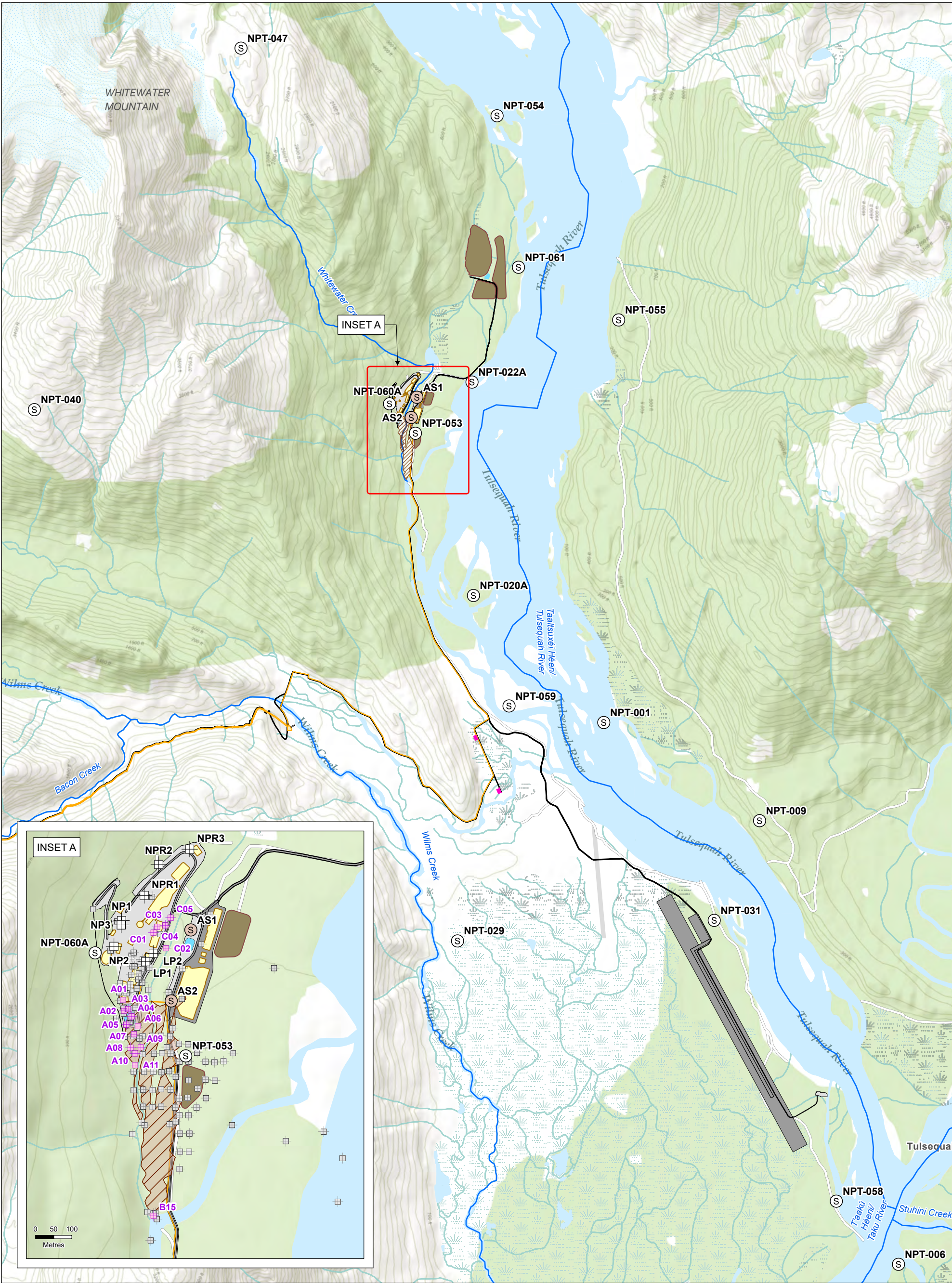
An understanding of the baseline terrain conditions is also critical. Due to the location of the proposed project, the steep slopes and mountainous terrain make the area susceptible to terrain hazards. Terrain hazards can have impacts on the Mine Site and infrastructure during and post-construction development, as well as water quality due to soil deposition and movement of contaminated soils.

Creating a baseline for existing soil conditions in the Project area is important for determining current levels of contaminants and implementing monitoring systems to track and reduce new impacts created by the Project. In addition, the baseline for existing soil conditions reduces liability for the Client and will assist with planning the decommissioning and reclamation of the mining operations at the end of the Project life cycle.

Baseline soil sampling was conducted on three separate occasions. Environmental Dynamics Inc. (EDI) completed field work for soil sampling in 2021 and Canagold completed soil sampling in 2022, both for metals analysis. Ausenco completed field work for waste rock sampling and soil characterisation that included the collection of soil samples in 2025 for hydrocarbon analysis. Additional details of these sampling events are presented in **Section 3.1**.

The Project is subject to a provincial environmental assessment under the British Columbia *Environmental Assessment Act*, 2018 (BCEAA). Ausenco Sustainability ULC (Ausenco) has been retained to assist Canagold with their environmental baseline studies and to support the development of an Application for an Environmental Assessment Certificate under the BCEAA.

This Work was performed in accordance with Professional Services Agreement between Ausenco Sustainability ULC., a wholly owned subsidiary of Ausenco Engineering Canada Inc. (Ausenco), and Canagold Resources Ltd. (Client), dated November 17, 2020 (Contract). This Report has been prepared by Ausenco, based on fieldwork conducted by Ausenco, for sole benefit and use by Canagold Resources Ltd., for review by a Contaminated Sites Approved Professional (CSAP), in accordance with ENV guidelines. This report was prepared by Ausenco by relying on historic reports provided by Canagold Resources Ltd., as well as results of site investigations conducted by Ausenco. In performing this Work, Ausenco has relied in good faith on information provided by other professionals and has assumed that the information provided by those individuals is both complete and accurate. This Work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and project terms of reference; further, the findings are time sensitive and considered valid only at the time the Report was produced. Any use which a third party makes of this Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced. Any changes in the regulatory regime may alter the conclusions and/or recommendations.



Legend

Combined Storage Facility (CSF)

Explosives Storage

Mine Site Facilities

Power Infrastructure

Transportation

Water Management Structures

Clearing Limit

Soil Sampling Location (EDI)

Soil Sampling/Test Pit Location (Ausenco)

Test Pit (Ausenco)

Historical Test Pit Location (2023)

Historical Test Pit Location (2022-2024)

Watercourse

Legacy Tailings

Sources

- Contains information licensed under the Open Government Licence(s) - Canada

- Aerial Image: ESRI World Topographic

- Project Infrastructure Date: 2025/12/16

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New Polar Project

British Columbia, Canada

Soil Existing Conditions

Investigation Locations

105451-05

Production Date: Mar 12, 2026

Figure 1-1

Ausenco

CANAGOLD

1.2 Project Setting

The Project is located approximately 100 kilometers (km) south of Atlin, BC and 70 km northeast of Juneau, Alaska (AK), United States (US) (Ausenco, 2024), within the Taku River Tlingit First Nation (TRTFN) Traditional Territory. The Project area is located in the Boundary Ranges of the Coast Mountains and features steep, mountainous terrain and broad, glacially influenced river valleys [Madrone, 2024]. Two river valleys are identified within the Project area, including the Taaltsuxéi (Tulsequah) and T'aakú (Taku) River valleys. The main soils identified in the Project area include, ortho humo-ferric podzols existing mostly in the Mine Site area and road infrastructure in the northern portion of the Project area, including the combined storage facility [Madrone, 2024]. In addition, ortho humic gelysols and typic mesisols soil types were identified in the floodplains and back-channel areas below the Mine Site and throughout the southern region of access roads in the Project Area [Madrone, 2024]. The treed and vegetated areas of the Project area are described by cumulic regosols soils. Surficial soil material throughout the Mine Site and floodplain region below the Mine Site commonly consists of poorly drained cobble, silt, sand glaciofluvial/fluvial deposits and silt, sand, gravel tills greater than 1 m thick [Madrone, 2024].

Several historical mining operations exist within the footprint of the Project area (Polaris-Taku mine, Whitewater, Silver King, and other historical names) [BC MINFILE No. 104K 003], with two legacy mining sites, Tulsequah Chief Mine (TCM; [MINFILE 104K 002]; 4 km upstream) and Big Bull mine ([MINFILE 104K 008]; 6 km downstream), located on the opposite bank of the Taaltsuxéi Héén (Tulsequah River) from the Project area. These legacy mines are both reported to be inactive, however remediation for acid rock drainage to the Taaltsuxéi Héén is occurring at TCM.

1.3 Previous Environmental Reports

Canagold provided a memorandum (memo) regarding geotechnical testing of historical tailings at New Polaris (completed August 31, 2023), to Ausenco. The memo discusses historical tailings in the Project area as well as test pitting performed by Canagold in 2022 to assess the extent, depth and geochemical variability of the historical tailings and inform decisions on their potential value or liability to the Project.

Key findings from the Canagold 2023 memo include:

- Tulsequah Chief / Big Bull tailings are known to be more acid generating than tailings from Polaris-Taku due to different parent ore composition.
- Two environmental reports were studied prior to the completion of this memo, including Hallam Knight Piesold (1994) site liabilities report and Gartner Lee (1997) that focused on economic viability of re-processing the tailings, where Gartner Lee produced a map outlining historical tailings areas visible at surface,
- Canagold used the Gartner Lee map to create a grid-based test pitting program that captured the historical tailings areas.
- Test pits were mapped out over three areas recognized as historical tailings in a staggered 25 m grid pattern.
- Seventeen test pits were excavated to a depth of approximately 2 m bgs, and in total, 36 soil samples were collected, with 11 soil samples submitted to Bureau Veritas Laboratory (BV Lab) for analysis of metals.

- Typically, a yellow-brown upper fine sandy tailings layer and lower grey fine sandy tailings layer was observed throughout the test pits.
- The lower soil profiles became a mix of pale blue clay and decaying vegetation.
- Test pits A02, A03 and A04 had a hard ferruginous layer close to the surface.
- A 1.7 m thick layer of concentrate near the foot of the old processing plant foundation was excavated through at test pit C04.
- The samples analyzed from test pit A06 were used as a representative tailings profile for this program.
- Elevated levels of silver, barium, cadmium, chromium, copper, iron, mercury, molybdenum, lead, sulfur, tellurium, thallium, tellurium and tungsten but lower concentrations of calcium, cobalt, magnesium, manganese, nickel, scandium, strontium and zinc were observed in the top layer of coloured tailings at A06 and were considered representative of tailings.
- Deeper samples at A06 showed consistent concentrations of aluminum, potassium, antimony and vanadium compared to the upper layer samples, and a decrease in gold and arsenic.
- Canagold suggested that the stratigraphy and results observed could be evidence of Tulsequah / Big Bull tailings overlying Polaris-Taku tailings, however more samples would need to be analyzed to confirm.
- The sample analyzed from A04 which was collected in a hard ferruginous layer and had high concentrations of calcium, cadmium, iron, lanthanum, magnesium, manganese, sulfur, scandium, strontium and zinc, which differed from the concentrations shown at A06, and may be reflective of concentrate, rather than tailings.
- Only one profile was logged where the tailings are exposed in the southern end of Area B, therefore Canagold recommended that the whole area still needs to be test pitted and sampled.
- The absolute extent of all three historical tailings areas has not been defined by the work completed to date.
- The report stated that more information regarding source ore composition and associated concentrate analyses paired with a mineralogical study of the historical tailings would be beneficial to defining the areas of historical tailings, as well as support planning for remediation or potential re-purposing tailings during the Project development and operation.

The Canagold 2023 memo is included in **Appendix A**.

Madrone Environmental Services Ltd. (Madrone), was retained by Ausenco to complete a "Terrain Stability Mapping Report" which was completed on July 29, 2024, for the Project. This report discusses the geographical location of the Project, climate and biogeoclimatic zones, hydrology, bedrock geology, glacial history, surficial materials, soil development and land use of the Project to determine the area soils, surficial material and geohazards and terrain stability within the Project area.

Key findings from the Madrone 2024 report include:

- The Mine Site area and road infrastructure to the north (including the Combined Storage Facility (CSF)) are predominantly underlain by orthic humo-ferric podzols that have a B horizon greater than 10 cm thick and are enriched with amorphous material (primarily aluminum and iron).
- Floodplains and back-channel areas downstream of the Mine Site and throughout the southern region of access roads consist of orthic humic gleysols that have an organic-rich A horizon at least 10 cm thick overlaying gleyed B horizons and parent material, and yypic mesisols representing organic, wetland soils composed of mesic organic material. These soils typically require stabilisation techniques, including coarse ballast subgrade or geotextile application when present along the proposed road infrastructure.
- Cumulic regosols are found in treed and vegetated zones. These soils consist of fluvial parent materials underlain by buried A horizons. In addition, these soils are characterised by thin or absent B or organic-rich A horizons indicative of minimal soil development.
- Poorly drained cobble, silt, sand glaciofluvial/fluvial deposits and silt, sand, gravel tills greater than 1 m thick are also found underlying the Mine Site. The Site-specific geotechnical investigation is required to determine general condition and stability within the two existing tailings areas. In addition, drone photos showed a terrace edge below the upper camp, which could result in instability.
- Poorly drained cobble, silt, sand glaciofluvial/fluvial deposits underlay the floodplain region downstream of the Mine Site and the Flannigan Slough along the southern region of the barge-to-Mine Site access road.
- Accumulations of poorly drained organic material are found in the alluvial fans of Whitewater and Wilms Creek.
- The approximately 1 km long road extending from Whitewater Creek to the CSF traverses the base of slopes classified as having moderate rockfall hazard, then continues across moderate to moderately steep colluvial and till covered slopes above a glaciofluvial terrace.
- Fluvial and glaciofluvial plains downstream of the Mine Site, as well as areas along the barge-to-Mine Site access road may be impacted by flash-flooding resulting from upstream Jökulhlaup activity and/or rapid spring/summer melt. These activities could result in inundation and channel bank erosion, and are expected to occur annually.
- Alpine snow avalanche slopes cover much of the Whitewater Creek basin and the surrounding terrain above 300 m elevation. Although there is a low probability of downslope impact on the Mine Site, a moderate likelihood exists for avalanches to deposit linear runout paths across the Mine Site at both Whitewater Creek and Unnamed Creek.
- Although debris slides were not observed in the vicinity of the Mine Site, or along proposed road infrastructure, approximately 2 km south of the Mine Site, steep, moderately well drained ridge sides are rated with a moderate likelihood of landslide initiation. This lies immediately above an approximately 0.5 km long section of access road.
- Potential terrain hazards include:
 - Moderate risk for debris flow down Whitewater and Wilms Creek
 - Moderate rockfall hazard slopes exist along the road from Whitewater Creek to the CSF

- Channel avulsion and/or channel migration may result from flash-flooding events derived from activity upstream, rapid snow melt events, or debris flows
- Drone photos reviewed show terrace edge slopes below the upper Mine Site and could be present elsewhere above the lower floodplain

The Madrone 2024 report is found in **Appendix A**.

1.4 Scope of Work and Objectives

This Baseline Soil and Terrain Existing Conditions report is part of a comprehensive baseline monitoring and data collection program which documents the current physical conditions in the vicinity of the proposed Project as part of an application to the British Columbia Environmental Assessment Office (BC EAO). In addition, baseline soil characterisation also reflects impacts related to historical mining activities that occurred within the Project area.

Madrone conducted a terrain mapping and stability assessment of the Project area in 2024 to document soils and terrain criteria within the Project area through both desktop mapping and field checks. As part of this assessment, terrain hazards and terrain stability were evaluated for the planned development area and supporting infrastructure.

In 2021, EDI performed soil sampling as part of a vegetation and ecosystems existing conditions report. Soil samples were collected in conjunction with vegetation samples throughout the Project area in order to determine baseline conditions and assess potential effects on terrestrial ecosystems. In addition, Canagold completed a test pitting and soil sampling program in 2022 to assess the extent, depth and geochemical variability of the historical tailings in the Project area. Ausenco performed waste rock sampling and soil characterisation within the Project area in 2025 to characterise legacy wastes, primarily waste rock and tailings from the historic Polaris-Taku mine, but also tailings and possibly residual ore left over from milling of ore from the nearby Tulsequah Chief mine. Ore from Tulsequah Chief was processed through the Polaris-Taku mill for a short period after underground mining operations ended.

Data incorporated in this report includes results from field sampling conducted by Ausenco in 2025, Canagold in 2022 and EDI in 2021, as well as a review of previous studies conducted within the project region. Field data collection included assessment of:

- Metals analysis of soils collected by EDI in 2021
- Metals analysis of soils collected by Canagold in 2022
- Hydrocarbon analysis of soils collected by Ausenco in 2025.

2.0 Regulatory Framework

The following section describes the regulatory framework under which the baseline soil study was completed. The Project area is provincially regulated and therefore must comply with the BC *Environmental Management Act* (EMA), the BC Contaminated Sites Regulation (CSR), and Hazardous Waste Regulation (HWR).

The Project must comply with both provincial and federal requirements as part of the environmental assessment (EA) submission. As such, soil quality guidelines set forth by the Canadian Council for the Minister of the Environment (CCME) were also applied in the evaluation of soil.

In addition, the Madrone 2024 report adhered to the BC Terrain Mapping Standards and Guidelines, including the “Guidelines and Standards to Terrain Mapping in BC”, “Mapping and Assessing Terrain Stability Guidebook”, and “Guidelines for Professional services in the Forest Sector-Terrain Stability Assessments”.

2.1 Applicable Soil Standards and Guidelines

The CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Parkland land use (PL) and Industrial land use (IL) were the primary set of guidelines used to evaluate the soil data collected at the Site. The CCME Canada Wide Standards (CWS) for metals and polycyclic aromatic hydrocarbons (PAH) in soil were also applied to the soil data at the Site. The applicable standards based on soil grain size (coarse or medium/fine) were used.

Applicable numerical soil standards in CSR *Schedule 3.1 – Part 1* (matrix specific), *Part 2* (human health), and *Part 3* (ecological health) are also applicable to the Project area based on land use and potential contaminant receptors. The proposed Project land use will include a large-scale gold mining operation with residential dwellings, as well as an air strip with associated facilities and a barge landing. In addition, the Project resides near large wetland complexes present within the floodplain of the Taaltsuxéi Héen (Tulsequah River) as described in Section 1.2. Therefore, Industrial land use (IL) was applied to samples collected within the Mine Site footprint and Wildlands Reverted land use (WLR) was applied to all samples to inform baseline conditions.

In accordance with the CSR, and considering the groundwater uses at and near the project area, the following site-specific factors were considered to determine the applicable *Schedule 3.1 – Part 1*, matrix soil standards:

- Intake of contaminated soil (mandatory for all sites)
- Toxicity to soil invertebrates and plants (mandatory for all sites)
- Groundwater flow to surface water used by aquatic life (freshwater)
- Groundwater used for drinking water (for protection of groundwater as a current and future resource).

Where applicable, the most stringent of the above-noted matrix standards was used for evaluating the soil analytical results at the Site.

In addition, BC ENV *Protocol 4 for Establishing Background Concentrations in Soil* (P4) background concentration estimates for Region 4 (Skeena) were applied (BC ENV, 2021). In situations where a soil concentration exceeds a CSR land use standard but does not exceed the P4 background concentration estimate for the same parameter, the soil concentration is not considered to be representative of contamination.

2.2 Applicable Guidelines and Standards – Terrain Mapping

On any mapping project where soil, terrain or surficial geology attributes are collected, a set of guidelines and standards is followed, as set out by the Resource Inventory Committee and adhered to by a qualified professional. For this assessment, both Madrone (2024) and EDI (2025. **Section 7.6-2**) used existing Terrain Ecosystem Mapping datasets for their evaluations, confirming that these datasets conformed with the standards set out by the Resources Information Standards Committee.

3.0 Existing Soil Conditions

Soil sampling was completed by EDI in August 2021 in conjunction with their vegetation and ecosystems baseline assessment for the Project area, by Canagold in October 2022 during the test pitting program to assess historical tailings in the Project area, and by Ausenco between August 12 and 28, 2025 as part of the waste rock sampling and soil characterisation field program.

The following sections summarise the results of both field programs. A detailed summary of methodologies and quality assurance/quality control (QA/QC) protocols are found in **Appendix B**.

3.1 Soil Characterisation

Soil characterisation was performed during the waste rock sampling conducted by Ausenco in 2025. **Table 3-1** describes the stratigraphy observed in each test pit advanced in the Project area. Test pit locations are shown on **Figure 1-1**.

Table 3-1 Soil Stratigraphy

Test Pit Location	Depth (m bgs)	Stratigraphy
NP1	0.0 – 0.25	Sand, fine to medium grained, grey-brown, some coarse gravel, damp, wood fragments (debris), trace rootlets.
	0.25 – 0.8	Sand, coarse grained, red-brown, some coarse gravel, damp, wood debris, loose.
	0.8 – 1.0	Large sub-angular boulders, trace silt, coarse sand, red-brown, damp, increase in gravel size.
NP2	0.0 – 0.3	Sand, medium to coarse grained, coarse gravel, brown/grey, trace silt, trace boulders
	0.3 – 1.0	Coarse gravel, some coarse sand, angular and subangular boulders (inferred blasted material), red and grey, loose.
NP3	0.0 – 0.4	Silty sand, medium, brown/grey, wood debris, wire, trace angular gravel, loose.
	0.4 – 1.2	Increased angular/subangular gravel, trace angular cobbles, gravelly silt and sand.
NPR1	0.0 – 0.3	Sand, fine to medium grained, trace silt, grey/brown, trace subangular gravel, trace roots and rootlets, moist.
	0.3 – 0.6	Red-brown, increased angular gravel.
NPR2	0.0 – 0.6	Silty Sand, medium, soft, brown, trace subangular cobbles, trace gravel.
NPR3	0.0 – 0.3	Sand, medium to coarse grained, some subangular/subrounded gravel, trace silt, grey.
	0.3 – 0.6	Increased silt, brown-grey, wood debris, trace angular gravel, dense.
LP1	0.0 – 0.3	Silty sand, medium to coarse grained, brown, trace subangular gravel, wood debris. Black inclusion at 0.2 m bgs.
	0.3 – 0.6	Sand, fine to medium grained, grey, trace coarse subangular gravel, wood debris, wet, loose. Water at 0.5 m bgs.
	0.6 – 1.1	Tailings, wet, grey, fine, soft, dense, moderate plasticity, clay-like.

Test Pit Location	Depth (m bgs)	Stratigraphy
LP2	0.0 – 0.3	Sand, medium to coarse grained, grey, some silt, subrounded gravel, loose.
	0.3 – 0.7	Sand, coarse to medium grained, red, some silt, trace subrounded gravel, wet.
	0.7 – 1.2	Tailings, grey/beige-yellow, wet, moderate plasticity, clay-like, moist.
AS1	0.0 – 0.4	Sand, fine to medium grained, brown-grey, some subangular and subrounded gravel, dry, loose, trace silt.
	0.4 – 0.7	Silty sand, brown, trace subangular gravel.
	0.7 – 1.0	Silty sand, coarse to medium grained, dark grey-blue, wet. Water at 0.9 m bgs. Some sheen and hydrocarbon odours observed.
AS2	0.0 – 0.5	Sand, fine to medium grained, trace silt, dry, trace wood debris, some angular gravel.
	0.5 – 0.7	Woody debris.
	0.7 – 1.0	Silty sand, medium, dark blue-grey, some subangular gravel, trace wood debris, wet. Water at 0.8 m bgs. Hydrocarbon-like odour observed.

Soil characterisation was also performed by Canagold during the test pitting and soil sampling field program completed in 2022. The soil characterisation table is found within the Canagold 2023 memo included **Appendix A**. Test pit locations are shown on **Figure 1-1**.

3.2 Results

3.2.1 Metal Concentrations

Nineteen soil samples collected during the 2021 soil sampling event performed by EDI were analysed for trace metals concentrations and 11 soil samples collected during the 2022 soil sampling event performed by Canagold were analysed for metals concentrations. Soil analytical results indicated metal exceedances exceeding the BC CSR IL and/or WLR standards and the Canadian Environmental Quality Guidelines (CEQG) IL and/or PL standards. The exceedances are summarised below, in **Table 3-2**. Soil sample locations are shown on **Figure 1-1**.

Table 3-2 Metal Exceedances

Metals Parameter	BC CSR IL/WLR Exceedances	CEQG IL/PL Exceedances
Antimony	C04-1* NPT_053_SOILS	A04-2 A06-1 A06-2 A06-3 A06-4 C02-1 C04-1 NPT_053_SOILS
Arsenic	A02-1 A04-2 A06-1 A06-2 A06-3 A06-4 B15-1 B15-2 C02-1 C02-2 C04-1 NPT_003_SOILS NPT_006-SOILS NPT_009_SOILS NPT_020A_SOILS NPT_031_SOIL NPT_053_SOILS NPT_054_SOIL NPT_055_SOILS NPT_058_SOILS / NPT_058_SOILS Lab Dup NPT_059A_SOILS NPT_059B_SOILS NPT_060A_SOILS NPT_061_SOILS NPT_100C_SOILS	A02-1 A04-2 A06-1 A06-2 A06-3 A06-4 B15-1 B15-2 C02-1 C02-2 C04-1 NPT_003_SOILS NPT_009_SOILS NPT_020A_SOILS NPT_031_SOIL NPT_053_SOILS NPT_055_SOILS NPT_058_SOILS/NPT_058_SOILS Lab Dup NPT_059B_SOILS NPT_060A_SOILS NPT_061_SOILS
Barium	B15-1 C02-1 NPT_031_SOIL NPT_053_SOILS NPT_058 / NPT_058_SOILS Lab Dup	-

Metals Parameter	BC CSR IL/WLR Exceedances	CEQG IL/PL Exceedances
Cadmium	A02-1 A04-2 A06-1 A06-2 A06-3 A06-4 B15-1 B15-2 NPT_055_SOILS	C02-1 C02-2 C04-1
Chromium (III+VI)	A04-2 A06-1 A06-2 A06-3 A06-4 NPT_009_SOILS NPT_040 NPT_053_SOILS NPT_055_SOILS	C02-1 NPT_009 NPT_040
Cobalt	A06-4	-
Copper	A02-1 A04-2 A06-1 A06-3 A06-4 B15-1 B15-2 C02-1 C02-2 C04-1 NPT_053_SOILS	A02-1 A04-2 A06-1 C02-1 C02-2 C04-1 NPT_053_SOILS
Iron	A02-1 A06-1 C02-1* C04-1 NPT_040_SOILS* NPT_055_SOILS*	-

Metals Parameter	BC CSR IL/WLR Exceedances	CEQG IL/PL Exceedances
Lead	A02-1 A06-1 B15-1 B15-2 C02-1 C04-1	A02-1 B15-1 B15-2 C04-1 NPT_053_SOILS*
Lithium	NPT_031_SOILS	-
Molybdenum	A02-1	A02-1 NPT_040_SOILS* NPT_053_SOILS*
Nickel	A06-3 A06-4 C04-1 NPT_009_SOILS	A06-3 A06-4 NPT_009_SOILS NPT_100C_SOILS
Selenium	A02-1 C04-1 NPT_040_SOILS	A02-1* C04-1
Silver	-	A02-1 C04-1
Thallium	-	A02-1 B15-1 B15-2 C04-1
Vanadium	NPT_040_SOILS	-
Zinc	A02-1 A04-2 A06-1 A06-3 A06-4 B15-1 B15-2 C02-1 C02-2 C04-1	A02-1 A04-2 A06-1 A06-3 A06-4 B15-1 B15-2 C02-1 C02-2 C04-1

* Samples only exceed BC CSR WLR or CEGQ PL standards

Analytical results are provided in **Table 1**, the laboratory certificate of analysis (COA) are included in **Appendix C**.

3.2.2 Hydrocarbon Concentrations

Two soil samples collected during the 2025 waste rock sampling and soil characterisation event performed by Ausenco were analyzed for PHCs, PAHs, and phenols. All soil analytical results were below applicable BC CSR IL and WLR, and CEQG IL and PL standards. Soil analytical results are provided in **Table 1**, and the COA is included in **Appendix C**. Soil sample locations are shown in **Figure 1-1**.

4.0 Conclusions

Many factors influence the soil quality in the Project area including geographical location, terrain features/hazards, and historical mining operations. It is imperative to create a baseline for existing soil and terrain conditions in the Project area to identify current quality and implementing monitoring systems to track and reduce new impacts from future activities.

The main soils identified in the Project area are ortho humo-ferric podzols existing mostly in the Mine Site area and proposed road infrastructure in the northern portion of the Project area. In addition, ortho humic gelysols and typic mesisols soil types were identified in the floodplains and back-channel areas below the Mine Site and throughout the southern region of access roads in the Project Area. The treed and vegetated areas of the Project area are described by cumulic regosols soils. Surficial soil material throughout the Mine Site and floodplain region below the Mine Site commonly consists of poorly drained cobble, silt, sand glaciofluvial/fluvial deposits and silt, sand, gravel tills greater than 1 m thick. In addition, Madrone identified several terrain and geohazards including moderate rockfall hazards, annual flooding, avalanche risks, landslides and debris flows. These hazards have the potential to transport impacted soils throughout the Project area rendering “clean” soils as impacted after an event.

Soil analytical results associated with the 2021 soil sampling performed by EDI and the 2022 soil sampling performed by Canagold indicated metal exceedances exceeding the BC CSR IL and/or WLR, as well as CEQG IL and/or IL samples within the Project area. These exceedances could be a result of historical mining activities or natural mineralisation within the Project area. However, soil analytical results (hydrocarbon analysis) associated with the 2025 waste rock sampling and soil characterisation performed by Ausenco were below both BC CSR IL and WLR and CEQG IL and PL standards. Although hydrocarbon-like odours were observed when these samples were collected, the soils in this area have hydrocarbon and phenol concentrations below applicable standards/guidelines.

We sincerely appreciate the opportunity to have assisted you with this project and if there are any questions, please do not hesitate to contact any of the undersigned by phone at 604.669.0424.

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Table

Table 1 Baseline Soil Analytical Results

Table 1 Baseline Soil Analytical Results

						Location ID	AS1	AS2	A02	A04	A06			
						Field ID	AS1-0.8	AS2-0.5	A02-1	A04-2	A06-1	A06-2	A06-3	A06-4
						Date	23 Oct 2025	23 Oct 2025	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022
						Lab Report Number	25J3329	25J3329	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷								
Inorganics														
% Moisture	%	-	-	-	-	-	98.3	99.1	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	-	-	120	60	80	60	50	60
Gallium	mg/kg	-	-	-	-	-	-	-	1	3	6	2	1.7	1.9
Gold	mg/kg	-	-	-	-	-	-	-	0.86	1.89	3	3.37	2.6	1.28
Lanthanum	mg/kg	-	-	-	-	-	-	-	0.25	3.4	1.8	1.1	1.2	1
Sulfur	mg/kg	-	-	-	-	-	-	-	10	13,500	6,400	2,700	800	2,200
pH (Saturated Paste)	pH Units	-	-	-	-	-	-	-	See Note 14	See Note 14	See Note 14	See Note 14	See Note 14	See Note 14
Metals														
Aluminum	mg/kg	-	-	40,000	250,000	40,000	-	-	3,100	25,800	10,500	10,100	8,900	9,400
Antimony	mg/kg	40	20	4	40,000	500	-	-	18.77	50.03	146.82	126.23	200.85	344.08
Arsenic	mg/kg	12	12	10	10	10	-	-	144.5	2,772.3	3,614.1	4,592	2,273.9	1,484.2
Barium	mg/kg	2,000	500	300	350	350	-	-	6.6	69.3	140.1	142.1	88.7	59.9
Beryllium	mg/kg	8	4	0.6	1 4 30 250 500	1 4 30 250 500	-	-	-	-	-	-	-	-
Bismuth	mg/kg	-	-	-	-	-	-	-	0.71	0.01	0.16	0.01	0.01	0.01
Boron	mg/kg	-	-	1	>1,000,000	15,000	-	-	0.5	7	6	3	4	5
Calcium	mg/kg	-	-	-	-	-	-	-	200	19,110	1,000	5.68	67,900	60,400
Cadmium	mg/kg	22	10	0.4	1 3 20 50	1 3 20 50	-	-	21.44	6.51	1.17	1.57	0.21	0.23
Chromium (III+VI)	mg/kg	87	64	40	60	60	-	-	1.2	169.7	158.6	106.3	109.4	107.2
Cobalt	mg/kg	300	50	15	25	25	-	-	6.7	11.3	3.4	14.6	18.8	26.4
Copper*	mg/kg	91	63	50	75 100 700 3,000 6,500 7,500	75 100 700 3,000 6,500 7,500	-	-	940.58	2,390.76	226	66.28	77.23	88.28
Iron	mg/kg	-	-	30,000	150,000	35,000	-	-	160,800	73,500	126,800	34,100	29,400	30,700
Lead	mg/kg	600	61	20	120 150 800 3,500 7,500 8,500	120 150 800 3,500 7,500 8,500	-	-	874.81	25.48	268.83	6.97	5.32	3.6
Lithium	mg/kg	-	-	-	450	65	-	-	-	-	-	-	-	-
Magnesium	mg/kg	-	-	-	-	-	-	-	1,500	17,400	7,800	40,000	43,900	3.95
Manganese	mg/kg	-	-	1,500	2,000	2,000	-	-	52	443	103	1,061	1,097	998
Mercury	mg/kg	50	6.6	0.15	75	25	-	-	2.086	0.063	0.361	0.053	0.03	0.051
Molybdenum	mg/kg	40	10	3	15	15	-	-	18.98	2.7	3.9	0.35	0.25	0.6
Nickel	mg/kg	89	45	40	70 250 500	70 250 500	-	-	16	60.9	25.3	57.4	104.7	128.3
Phosphorus	mg/kg	-	-	-	-	-	-	-	10	600	670	560	540	600
Potassium	mg/kg	-	-	-	-	-	-	-	1,000	2,400	2,500	2,600	2,100	2,400
Scandium	mg/kg	-	-	-	-	-	-	-	0.4	37.4	6.4	15.7	15.4	13
Selenium	mg/kg	2.9	1	4	1	1	-	-	6.4	0.5	1.1**	0.2	0.2	0.3
Silver	mg/kg	40	20	1	35,000	400	-	-	20.61	0.5	3.56	0.29	0.17	0.14
Strontium	mg/kg	-	-	100	150,000	20,000	-	-	25	88.9	25	282	344.2	314.3
Tellurium	mg/kg	-	-	-	-	-	-	-	1.15	0.11	1.43	0.06	0.06	0.06
Thallium	mg/kg	1	1	-	-	-	-	-	2.41	0.24	0.24	0.1	0.09	0.08
Thorium	mg/kg	-	-	-	-	-	-	-	0.2	0.9	2.5	0.1	0.1	0.1
Titanium	mg/kg	-	-	-	-	-	-	-	30	90	90	60	50	70
Tin	mg/kg	300	50	4	>1,000,000	50,000	-	-	-	-	-	-	-	-
Tungsten	mg/kg	-	-	-	200	25	-	-	1.4	0.7	0.7	0.7	0.6	0.4
Uranium	mg/kg	300	23	-	30	30	-	-	0.2	2	2	0.1	0.1	0.1
Vanadium	mg/kg	130	130	85	100	100	-	-	2	63	63	55	51	51
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	410	250	150	150 250 350 600 1,500 3,000	150 250 350 600 1,500 3,000	-	-	4,927.1	987	987	398.8	689.1	614.2
PHCs														
F1	mg/kg	-	-	-	-	-	<20	<20	-	-	-	-	-	-
F2	mg/kg	-	-	-	-	-	<100	<100	-	-	-	-	-	-
F3	mg/kg	-	-	-	-	-	993	766	-	-	-	-	-	-
F4	mg/kg	-	-	-	-	-	<200	203	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	B15		C02		C04	NPT_001	NPT_003	NPT_006
						Field ID	B15-1	B15-2	C02-1	C02-2	C04-1	NPT_001_SOIL	NPT_003_SOILS	NPT_006_SOILS
						Date	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	07 Aug 2021	06 Aug 2021	06 Aug 2021
						Lab Report Number	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	644362-02-01	644362-07-01	644362-07-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷								
Inorganics														
% Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	120	90	70	720	90	227	403	231
Gallium	mg/kg	-	-	-	-	-	1.8	0.7	3.1	3.7	4.1	-	-	-
Gold	mg/kg	-	-	-	-	-	0.73	0.82	0.66	0.05	72.93	-	-	-
Lanthanum	mg/kg	-	-	-	-	-	6.2	4.1	2.9	12.9	0.7	-	-	-
Sulfur	mg/kg	-	-	-	-	-	2,100	12,300	3,500	300	100,000	-	-	-
pH (Saturated Paste)	pH Units	-	-	-	-	-	See Note 14	See Note 14	See Note 14	See Note 14	See Note 14	5.85	7.35	6.16
Metals														
Aluminum	mg/kg	-	-	40,000	250,000	40,000	6,800	2,000	22,000	10,700	5,300	6,250	14,000	10,500
Antimony	mg/kg	40	20	4	40,000	500	21.37	21.64	96.98	5	999.9	0.2	0.99	0.59
Arsenic	mg/kg	12	12	10	10	10	98.8	32.1	1,093.8	51.8	>10,000	6.03	18.8	11
Barium	mg/kg	2,000	500	300	350	350	462.2	37.1	425.6	199.4	1	62.8	228	97.2
Beryllium	mg/kg	8	4	0.6	1 4 30 250 500	1 4 30 250 500	-	-	-	-	-	<0.2	0.3	0.29
Bismuth	mg/kg	-	-	-	-	-	1.02	0.53	0.07	0.19	7.18	0.11	0.36	0.18
Boron	mg/kg	-	-	1	>1,000,000	15,000	0.5	0.5	6	0.5	2	<1	2.4	2
Calcium	mg/kg	-	-	-	-	-	200	200	22,300	4,500	12,200	2,970	7,540	5,570
Cadmium	mg/kg	22	10	0.4	1 3 20 50	1 3 20 50	2.1	10.57	119.59	82.53	354.53	0.06	0.493	0.169
Chromium (III+VI)	mg/kg	87	64	40	60	60	2.4	1.2	137.6	29.9	27	16.3	41.4	40.4
Cobalt	mg/kg	300	50	15	25	25	0.3	0.4	5.9	5.2	23.2	5.49	13.6	10.6
Copper*	mg/kg	91	63	50	75 100 700 3,000 6,500 7,500	75 100 700 3,000 6,500 7,500	85.15	87.44	3,618.44	667.81	>10,000	10.3	52.8	32.7
Iron	mg/kg	-	-	30,000	150,000	35,000	14,400	11,500	64,600	19,000	155,800	20,400	30,900	25,600
Lead	mg/kg	600	61	20	120 150 800 3,500 7,500 8,500	120 150 800 3,500 7,500 8,500	1,294.76	2,173.91	454.54	15.04	>10,000	4.52	13.2	8.35
Lithium	mg/kg	-	-	-	450	65	-	-	-	-	-	6.21	12.7	10.1
Magnesium	mg/kg	-	-	-	-	-	7,800	1,000	22,100	6,300	10,200	4,090	10,600	9,210
Manganese	mg/kg	-	-	1,500	2,000	2,000	138	53	392	244	318	224	571	449
Mercury	mg/kg	50	6.6	0.15	75	25	1.642	2.113	0.37	0.013	24.751	<0.05	0.094	0.075
Molybdenum	mg/kg	40	10	3	15	15	11.57	7.63	1.06	1.39	18.66	0.95	2.09	1.16
Nickel	mg/kg	89	45	40	70 250 500	70 250 500	1.2	1.4	47.7	14.5	88.5	7.71	44.2	42.5
Phosphorus	mg/kg	-	-	-	-	-	50	10	75.0	630	210	442	925	721
Potassium	mg/kg	-	-	-	-	-	1,400	700	0.27	1,600	1,200	1,090	1,420	615
Scandium	mg/kg	-	-	-	-	-	0.6	0.3	20.1	3.8	3.1	-	-	-
Selenium	mg/kg	2.9	1	4	1	1	2.2**	1.5**	0.5	0.4	10.7	<0.5	<0.5	<0.5
Silver	mg/kg	40	20	1	35,000	400	14.34	18.73	2.72	0.18	100	0.131	0.267	0.178
Strontium	mg/kg	-	-	100	150,000	20,000	49.7	121.6	133.2	28	26.8	17.4	41.1	32.9
Tellurium	mg/kg	-	-	-	-	-	0.85	0.16	0.12	0.05	2.6	-	-	-
Thallium	mg/kg	1	1	-	-	-	2.12	2.21	0.25	0.11	2.46	0.07	0.152	0.073
Thorium	mg/kg	-	-	-	-	-	0.8	0.4	1.9	6.9	0.7	-	-	-
Titanium	mg/kg	-	-	-	-	-	80	70	100	900	40	527	938	648
Tin	mg/kg	300	50	4	>1,000,000	50,000	-	-	-	-	-	0.2	0.38	0.25
Tungsten	mg/kg	-	-	-	200	25	2.8	1.6	0.5	0.7	2.1	0.93	0.86	<0.5
Uranium	mg/kg	300	23	-	30	30	0.2	0.1	1.4	2	0.4	1.43	1.83	1.3
Vanadium	mg/kg	130	130	85	100	100	6	2	60	51	14	50.6	62.2	53.1
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	0.66	1.8	1.42
Zinc	mg/kg	410	250	150	150 250 350 600 1,500 3,000	150 250 350 600 1,500 3,000	509.6	2,338.9	3,262	680.1	>10,000	25.5	89.2	49.9
PHCs														
F1	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
F2	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
F3	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
F4	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_009	NPT_020A	NPT_022A	NPT_029	NPT_031
						Field ID	NPT_009_SOILS	NPT_020A_SOILS	NPT_022A_SOILS	NPT_029_SOIL	NPT_031_SOIL
						Date	06 Aug 2021	10 Aug 2021	08 Aug 2021	07 Aug 2021	07 Aug 2021
						Lab Report Number	644362-07-01	644362-05-01	644362-03-01	644362-02-01	644362-02-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
Inorganics											
% Moisture	%	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	<100	370	240	489	368
Gallium	mg/kg	-	-	-	-	-	-	-	-	-	-
Gold	mg/kg	-	-	-	-	-	-	-	-	-	-
Lanthanum	mg/kg	-	-	-	-	-	-	-	-	-	-
Sulfur	mg/kg	-	-	-	-	-	-	-	-	-	-
pH (Saturated Paste)	pH Units	-	-	-	-	-	5.01	5.5	5.54	5.92	5.12
Metals											
Aluminum	mg/kg	-	-	40,000	250,000	40,000	14,100	9,530	7,890	11,700	10,400
Antimony	mg/kg	40	20	4	40,000	500	0.74	0.47	0.23	0.14	0.83
Arsenic	mg/kg	12	12	10	10	10	13.7	16.4	4.97	3.41	16.1
Barium	mg/kg	2,000	500	300	350	350	65.9	120	67.6	131	404
Beryllium	mg/kg	8	4	0.6	1 4 30 250 500	1 4 30 250 500	0.36	<0.2	<0.2	<0.2	0.21
Bismuth	mg/kg	-	-	-	-	-	<0.1	0.23	0.37	0.14	0.23
Boron	mg/kg	-	-	1	>1,000,000	15,000	3.6	1.1	<1	<1	<1
Calcium	mg/kg	-	-	-	-	-	5,030	5,690	3,280	5,770	4,950
Cadmium	mg/kg	22	10	0.4	1 3 20 50	1 3 20 50	0.166	0.185	0.111	0.15	0.341
Chromium (III+VI)	mg/kg	87	64	40	60	60	103	26.9	25.1	23.9	29.3
Cobalt	mg/kg	300	50	15	25	25	15.5	8.72	6.61	8.23	8.93
Copper*	mg/kg	91	63	50	75 100 700 3,000 6,500 7,500	75 100 700 3,000 6,500 7,500	36.7	13.2	20.4	24.8	35.9
Iron	mg/kg	-	-	30,000	150,000	35,000	29,700	22,600	24,900	23,700	24,400
Lead	mg/kg	600	61	20	120 150 800 3,500 7,500 8,500	120 150 800 3,500 7,500 8,500	8.2	10.4	4.89	3.59	19.1
Lithium	mg/kg	-	-	-	450	65	12.2	8.1	7.84	9.8	9,075
Magnesium	mg/kg	-	-	-	-	-	13,800	6,930	5,720	6,620	7,260
Manganese	mg/kg	-	-	1,500	2,000	2,000	531	369	285	294	363
Mercury	mg/kg	50	6.6	0.15	75	25	0.093	0.05	<0.05	<0.05	<0.05
Molybdenum	mg/kg	40	10	3	15	15	0.64	1.6	1.08	1.41	1.84
Nickel	mg/kg	89	45	40	70 250 500	70 250 500	92.7	18.3	14.6	12.4	21.3
Phosphorus	mg/kg	-	-	-	-	-	585	714	646	840	878
Potassium	mg/kg	-	-	-	-	-	509	1,440	1,180	2,270	1,430
Scandium	mg/kg	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	2.9	1	4	1	1	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	40	20	1	35,000	400	0.071	0.1	0.068	0.105	0.18
Strontium	mg/kg	-	-	100	150,000	20,000	21	30	18	31.1	27.4
Tellurium	mg/kg	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	1	1	-	-	-	0.131	0.091	0.09	0.141	0.114
Thorium	mg/kg	-	-	-	-	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	782	866	583	1,070	872
Tin	mg/kg	300	50	4	>1,000,000	50,000	0.29	0.3	0.24	0.27	0.38
Tungsten	mg/kg	-	-	-	200	25	<0.5	1.76	<0.5	0.66	1.17
Uranium	mg/kg	300	23	-	30	30	0.446	1.09	1.07	3.44	1.64
Vanadium	mg/kg	130	130	85	100	100	66.2	51.7	64.8	64.3	54
Zirconium	mg/kg	-	-	-	-	-	1.52	0.8	<0.5	0.51	0.95
Zinc	mg/kg	410	250	150	150 250 350 600 1,500 3,000	150 250 350 600 1,500 3,000	64.1	41.5	36.6	43.7	76.4
PHCs											
F1	mg/kg	-	-	-	-	-	-	-	-	-	-
F2	mg/kg	-	-	-	-	-	-	-	-	-	-
F3	mg/kg	-	-	-	-	-	-	-	-	-	-
F4	mg/kg	-	-	-	-	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_040	NPT_047	NPT_053	NPT_054	NPT_055
						Field ID	NPT_040_SOILS	NPT_047_SOILS	NPT_053_SOILS	NPT_054_SOIL	NPT_055_SOILS
						Date	08 Aug 2021	08 Aug 2021	08 Aug 2021	09 Aug 2021	09 Aug 2021
						Lab Report Number	644362-03-01	644362-03-01	644362-03-01	644362-04-01	644362-04-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
Inorganics											
% Moisture	%	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	<100	<100	324	323	<100
Gallium	mg/kg	-	-	-	-	-	-	-	-	-	-
Gold	mg/kg	-	-	-	-	-	-	-	-	-	-
Lanthanum	mg/kg	-	-	-	-	-	-	-	-	-	-
Sulfur	mg/kg	-	-	-	-	-	-	-	-	-	-
pH (Saturated Paste)	pH Units	-	-	-	-	-	4.48	4.01	7.63	5.89	5.83
Metals											
Aluminum	mg/kg	-	-	40,000	250,000	40,000	21,900	9,120	11,700	8,810	16,700
Antimony	mg/kg	40	20	4	40,000	500	<0.1	0.13	53.2	0.34	7.08
Arsenic	mg/kg	12	12	10	10	10	0.9	4.07	459	10.6	14.6
Barium	mg/kg	2,000	500	300	350	350	256	28.4	374	85	84.8
Beryllium	mg/kg	8	4	0.6	1 4 30 250 500	1 4 30 250 500	0.2	<0.2	0.24	<0.2	0.4
Bismuth	mg/kg	-	-	-	-	-	0.25	0.17	0.22	0.16	0.45
Boron	mg/kg	-	-	1	>1,000,000	15,000	<1	<1	2.5	1.5	4.6
Calcium	mg/kg	-	-	-	-	-	570	639	8,440	3,850	2,280
Cadmium	mg/kg	22	10	0.4	1 3 20 50	1 3 20 50	0.066	<0.05	3.66	0.091	1.12
Chromium (III+VI)	mg/kg	87	64	40	60	60	119	39.7	62.7	24.8	72.2
Cobalt	mg/kg	300	50	15	25	25	4.59	5.1	13.3	6.69	7.49
Copper*	mg/kg	91	63	50	75 100 700 3,000 6,500 7,500	75 100 700 3,000 6,500 7,500	61.9	21.5	182*	16.6	13.3
Iron	mg/kg	-	-	30,000	150,000	35,000	38,700	24,000	29,800	32,300	37,600
Lead	mg/kg	600	61	20	120 150 800 3,500 7,500 8,500	120 150 800 3,500 7,500 8,500	6.98	5.34	160	6.21	35.3
Lithium	mg/kg	-	-	-	450	65	10.9	7.45	10.1	8.28	9.2
Magnesium	mg/kg	-	-	-	-	-	10,400	5,080	11,400	5,650	1,820
Manganese	mg/kg	-	-	1,500	2,000	2,000	679	193	545	276	184
Mercury	mg/kg	50	6.6	0.15	75	25	0.072	<0.05	0.253	0.102	0.36
Molybdenum	mg/kg	40	10	3	15	15	12.7	3.11	1.06	1.11	3.1
Nickel	mg/kg	89	45	40	70 250 500	70 250 500	11.1	19.1	48.7	10.9	28.6
Phosphorus	mg/kg	-	-	-	-	-	482	257	699	715	737
Potassium	mg/kg	-	-	-	-	-	2,660	276	1,200	1,380	251
Scandium	mg/kg	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	2.9	1	4	1	1	1.29**	0.67	<0.5	<0.5	<0.5
Silver	mg/kg	40	20	1	35,000	400	0.202	0.315	1.33	<0.05	0.068
Strontium	mg/kg	-	-	100	150,000	20,000	4.83	2.99	50.6	21.5	8.3
Tellurium	mg/kg	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	1	1	-	-	-	0.215	0.063	0.127	0.089	0.107
Thorium	mg/kg	-	-	-	-	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	1,940	813	728	673	347
Tin	mg/kg	300	50	4	>1,000,000	50,000	0.92	0.31	0.53	0.29	0.66
Tungsten	mg/kg	-	-	-	200	25	<0.5	<0.5	1.05	1.48	0.87
Uranium	mg/kg	300	23	-	30	30	1.24	0.636	1.05	1.67	1.63
Vanadium	mg/kg	130	130	85	100	100	141	56.7	57.5	81.8	87
Zirconium	mg/kg	-	-	-	-	-	<0.5	<0.5	0.85	0.91	<0.5
Zinc	mg/kg	410	250	150	150 250 350 600 1,500 3,000	150 250 350 600 1,500 3,000	49.5	32.1	837	36	107
PHCs											
F1	mg/kg	-	-	-	-	-	-	-	-	-	-
F2	mg/kg	-	-	-	-	-	-	-	-	-	-
F3	mg/kg	-	-	-	-	-	-	-	-	-	-
F4	mg/kg	-	-	-	-	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_058			NPT_059A	NPT_059B
						Field ID	NPT_058_SOILS	NPT_058_SOILS Lab-Dup	RPD%	NPT_059A_SOILS	NPT_059B_SOILS
						Date	09 Aug 2021	09 Aug 2021		09 Aug 2021	09 Aug 2021
						Lab Report Number	644362-04-01	644362-04-01		644362-04-01	644362-05-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
Inorganics											
% Moisture	%	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	321	319	1%	262	473
Gallium	mg/kg	-	-	-	-	-	-	-	-	-	-
Gold	mg/kg	-	-	-	-	-	-	-	-	-	-
Lanthanum	mg/kg	-	-	-	-	-	-	-	-	-	-
Sulfur	mg/kg	-	-	-	-	-	-	-	-	-	-
pH (Saturated Paste)	pH Units	-	-	-	-	-	6.59	-	-	5.36	5.92
Metals											
Aluminum	mg/kg	-	-	40,000	250,000	40,000	9,460	9,920	5%	7,350	13,000
Antimony	mg/kg	40	20	4	40,000	500	0.94	0.87	8%	0.33	0.5
Arsenic	mg/kg	12	12	10	10	10	15.7	16.1	3%	11	14.1
Barium	mg/kg	2,000	500	300	350	350	373	353	6%	79.7	150
Beryllium	mg/kg	8	4	0.6	1 4 30 250 500	1 4 30 250 500	<0.2	<0.2	nc	<0.2	0.25
Bismuth	mg/kg	-	-	-	-	-	0.24	0.21	13%	0.14	0.3
Boron	mg/kg	-	-	1	>1,000,000	15,000	1.2	<1	nc	1.2	1.9
Calcium	mg/kg	-	-	-	-	-	4,200	4,090	3%	3,440	6,350
Cadmium	mg/kg	22	10	0.4	1 3 20 50	1 3 20 50	0.263	0.284	8%	0.095	0.217
Chromium (III+VI)	mg/kg	87	64	40	60	60	25.9	26.5	2%	20.5	36.6
Cobalt	mg/kg	300	50	15	25	25	8.61	8.8	2%	7.21	11.9
Copper*	mg/kg	91	63	50	75 100 700 3,000 6,500 7,500	75 100 700 3,000 6,500 7,500	36.4	37.4	3%	20.8	37.7
Iron	mg/kg	-	-	30,000	150,000	35,000	23,700	24,300	3%	19,200	28,300
Lead	mg/kg	600	61	20	120 150 800 3,500 7,500 8,500	120 150 800 3,500 7,500 8,500	12.5	12.6	1%	5.12	11.7
Lithium	mg/kg	-	-	-	450	65	8.93	8.67	3%	7.42	11.3
Magnesium	mg/kg	-	-	-	-	-	6,620	6,950	5%	5,030	9,430
Manganese	mg/kg	-	-	1,500	2,000	2,000	351	362	3%	276	501
Mercury	mg/kg	50	6.6	0.15	75	25	0.072	<0.05	nc	0.101	0.078
Molybdenum	mg/kg	40	10	3	15	15	1.65	1.62	2%	1.51	1.99
Nickel	mg/kg	89	45	40	70 250 500	70 250 500	21.4	21.6	1%	14.9	30.6
Phosphorus	mg/kg	-	-	-	-	-	695	707	2%	709	944
Potassium	mg/kg	-	-	-	-	-	1,350	1,370	1%	1,090	1,530
Scandium	mg/kg	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	2.9	1	4	1	1	<0.5	<0.5	nc	<0.5	<0.5
Silver	mg/kg	40	20	1	35,000	400	0.176	0.179	2%	0.073	0.16
Strontium	mg/kg	-	-	100	150,000	20,000	24.6	24.7	0%	16.8	32.9
Tellurium	mg/kg	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	1	1	-	-	-	0.112	0.106	6%	0.12	0.154
Thorium	mg/kg	-	-	-	-	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	758	745	2%	510	1,070
Tin	mg/kg	300	50	4	>1,000,000	50,000	0.29	0.27	7%	0.22	0.41
Tungsten	mg/kg	-	-	-	200	25	0.99	1.39	34%	0.85	1.23
Uranium	mg/kg	300	23	-	30	30	1.84	1.47	22%	1.17	1.82
Vanadium	mg/kg	130	130	85	100	100	50	50.6	1%	40.8	61.1
Zirconium	mg/kg	-	-	-	-	-	0.87	0.88	1%	0.64	1.57
Zinc	mg/kg	410	250	150	150 250 350 600 1,500 3,000	150 250 350 600 1,500 3,000	65.8	68.3	4%	30.3	60.5
PHCs											
F1	mg/kg	-	-	-	-	-	-	-	-	-	-
F2	mg/kg	-	-	-	-	-	-	-	-	-	-
F3	mg/kg	-	-	-	-	-	-	-	-	-	-
F4	mg/kg	-	-	-	-	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_060A	NPT_061	NPT_100C		
						Field ID	NPT_060A_SOILS	NPT_061_SOILS	NPT_100C_SOILS	NPT_100C_SOILS Lab-Dup	RPD%
						Date	10 Aug 2021	10 Aug 2021	10 Aug 2021	10 Aug 2021	
						Lab Report Number	644362-05-01	644362-06-01	644362-06-01	644362-06-01	
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
Inorganics											
% Moisture	%	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	150	294	264	-	-
Gallium	mg/kg	-	-	-	-	-	-	-	-	-	-
Gold	mg/kg	-	-	-	-	-	-	-	-	-	-
Lanthanum	mg/kg	-	-	-	-	-	-	-	-	-	-
Sulfur	mg/kg	-	-	-	-	-	-	-	-	-	-
pH (Saturated Paste)	pH Units	-	-	-	-	-	4.36	5.48	8.28	8.22	1%
Metals											
Aluminum	mg/kg	-	-	40,000	250,000	40,000	8,950	8,400	11,400	-	-
Antimony	mg/kg	40	20	4	40,000	500	16.6	0.36	0.72	-	-
Arsenic	mg/kg	12	12	10	10	10	334	12.5	10.5	-	-
Barium	mg/kg	2,000	500	300	350	350	180	97.2	145	-	-
Beryllium	mg/kg	8	4	0.6	1 4 30 250 500	1 4 30 250 500	<0.2	<0.2	0.37	-	-
Bismuth	mg/kg	-	-	-	-	-	0.38	0.19	0.13	-	-
Boron	mg/kg	-	-	1	>1,000,000	15,000	1.7	<1	3.6	-	-
Calcium	mg/kg	-	-	-	-	-	2,070	4,070	16,300	-	-
Cadmium	mg/kg	22	10	0.4	1 3 20 50	1 3 20 50	0.464	0.061	0.244	-	-
Chromium (III+VI)	mg/kg	87	64	40	60	60	36.7	23.1	51.8	-	-
Cobalt	mg/kg	300	50	15	25	25	7.02	7.69	12.1	-	-
Copper*	mg/kg	91	63	50	75 100 700 3,000 6,500 7,500	75 100 700 3,000 6,500 7,500	32.1	23.5	36.8	-	-
Iron	mg/kg	-	-	30,000	150,000	35,000	21,800	23,400	29,100	-	-
Lead	mg/kg	600	61	20	120 150 800 3,500 7,500 8,500	120 150 800 3,500 7,500 8,500	73.9	6.53	7.87	-	-
Lithium	mg/kg	-	-	-	450	65	5.69	8.22	11.1	-	-
Magnesium	mg/kg	-	-	-	-	-	5,050	5,820	12,700	-	-
Manganese	mg/kg	-	-	1,500	2,000	2,000	358	275	526	-	-
Mercury	mg/kg	50	6.6	0.15	75	25	0.144	<0.05	0.051	-	-
Molybdenum	mg/kg	40	10	3	15	15	2.87	1.62	1.41	-	-
Nickel	mg/kg	89	45	40	70 250 500	70 250 500	13	15	64.7	-	-
Phosphorus	mg/kg	-	-	-	-	-	405	783	846	-	-
Potassium	mg/kg	-	-	-	-	-	885	1,350	887	-	-
Scandium	mg/kg	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	2.9	1	4	1	1	<0.5	<0.5	<0.5	-	-
Silver	mg/kg	40	20	1	35,000	400	0.2	0.089	0.123	-	-
Strontium	mg/kg	-	-	100	150,000	20,000	14.5	19.8	76.3	-	-
Tellurium	mg/kg	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	1	1	-	-	-	0.115	0.087	0.089	-	-
Thorium	mg/kg	-	-	-	-	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	976	658	895	-	-
Tin	mg/kg	300	50	4	>1,000,000	50,000	0.67	0.26	0.29	-	-
Tungsten	mg/kg	-	-	-	200	25	0.55	1.05	<0.5	-	-
Uranium	mg/kg	300	23	-	30	30	0.684	1.84	1.84	-	-
Vanadium	mg/kg	130	130	85	100	100	73.7	53.6	62.3	-	-
Zirconium	mg/kg	-	-	-	-	-	0.58	1.13	5.01	-	-
Zinc	mg/kg	410	250	150	150 250 350 600 1,500 3,000	150 250 350 600 1,500 3,000	81.9	35.1	61.7	-	-
PHCs											
F1	mg/kg	-	-	-	-	-	-	-	-	-	-
F2	mg/kg	-	-	-	-	-	-	-	-	-	-
F3	mg/kg	-	-	-	-	-	-	-	-	-	-
F4	mg/kg	-	-	-	-	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						<table><tr><th>Location ID</th><th>AS1</th><th>AS2</th><th>A02</th><th>A04</th><th colspan="4">A06</th></tr><tr><th>Field ID</th><th>AS1-0.8</th><th>AS2-0.5</th><th>A02-1</th><th>A04-2</th><th>A06-1</th><th>A06-2</th><th>A06-3</th><th>A06-4</th></tr><tr><th>Date</th><td>23 Oct 2025</td><td>23 Oct 2025</td><td>12 Feb 2022</td><td>12 Feb 2022</td><td>12 Feb 2022</td><td>12 Feb 2022</td><td>12 Feb 2022</td><td>12 Feb 2022</td></tr><tr><th>Lab Report Number</th><td>25J3329</td><td>25J3329</td><td>WHI22001018.1</td><td>WHI22001018.1</td><td>WHI22001018.1</td><td>WHI22001018.1</td><td>WHI22001018.1</td><td>WHI22001018.1</td></tr></table>									Location ID	AS1	AS2	A02	A04	A06				Field ID	AS1-0.8	AS2-0.5	A02-1	A04-2	A06-1	A06-2	A06-3	A06-4	Date	23 Oct 2025	23 Oct 2025	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	Lab Report Number	25J3329	25J3329	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1
Location ID	AS1	AS2	A02	A04	A06																																													
Field ID	AS1-0.8	AS2-0.5	A02-1	A04-2	A06-1	A06-2	A06-3	A06-4																																										
Date	23 Oct 2025	23 Oct 2025	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022																																										
Lab Report Number	25J3329	25J3329	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1																																										
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷																																												
PAHs																																																		
1-Methylnaphthalene	mg/kg	-	-	-	1,000	-	0.044	0.019	-	-	-	-	-																																					
2-methylnaphthalene	mg/kg	-	-	-	950	-	0.122	0.046	-	-	-	-	-																																					
2-chloronaphthalene	mg/kg	-	-	-	20,000	-	<0.010	<0.010	-	-	-	-	-																																					
Acenaphthene	mg/kg	-	-	-	15,000	-	0.180	<0.010	-	-	-	-	-																																					
Acenaphthylene	mg/kg	-	-	-	-	-	<0.005	<0.010	-	-	-	-	-																																					
Anthracene	mg/kg	32	2.5	-	30.000	2.5	<0.047	0.032	-	-	-	-	-																																					
Benz(a)anthracene	mg/kg	-	-	-	10.000	1	<0.015	<0.010	-	-	-	-	-																																					
Benzo(a) pyrene	mg/kg	72	20	-	50.00	10	<0.010	<0.010	-	-	-	-	-																																					
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	<0.010	<0.010	-	-	-	-	-																																					
Benzo(b+j)fluoranthene	mg/kg	-	-	-	10.00	1	<0.010	<0.010	-	-	-	-	-																																					
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	<0.020	<0.020	-	-	-	-	-																																					
Benzo(k)fluoranthene	mg/kg	-	-	-	10.00	1	<0.010	<0.010	-	-	-	-	-																																					
Chrysene	mg/kg	-	-	-	4,500.00	400	0.024	<0.010	-	-	-	-	-																																					
Dibenz(a,h)anthracene	mg/kg	-	-	-	10.000	1	<0.005	<0.005	-	-	-	-	-																																					
Fluoranthene	mg/kg	180	50	-	200.00	50	0.022	<0.010	-	-	-	-	-																																					
Fluorene	mg/kg	-	-	-	9,500.000	1,000	<0.154	<0.015	-	-	-	-	-																																					
Indeno(1,2,3-c,d)pyrene	mg/kg	-	-	-	10.00	1	<0.020	<0.020	-	-	-	-	-																																					
Naphthalene	mg/kg	-	-	-	20.00	0.6	0.028	0.027	-	-	-	-	-																																					
Phenanthrene	mg/kg	-	-	-	50.00	5	0.244	0.036	-	-	-	-	-																																					
Pyrene	mg/kg	-	-	-	100.00	10	<0.040	<0.020	-	-	-	-	-																																					
Quinoline	mg/kg	-	-	-	10.00	4.5	<0.050	<0.050	-	-	-	-	-																																					
Phenols																																																		
2,4-Dimethylphenol	mg/kg	-	-	-	10	1	<0.040	<0.040	-	-	-	-	-																																					
2,4-Dinitrophenol	mg/kg	-	-	-	10	1	<0.080	<0.080	-	-	-	-	-																																					
2-Methylphenol (o-cresol)	mg/kg	-	-	-	10	1	<0.020	<0.020	-	-	-	-	-																																					
2-Nitrophenol	mg/kg	-	-	-	10	1	<0.050	<0.050	-	-	-	-	-																																					
3&4-Methylphenol (m&p-cresol)	mg/kg	-	-	-	-	-	<0.030	<0.030	-	-	-	-	-																																					
4,6-Dinitro-2-methylphenol	mg/kg	-	-	-	10	1	<0.080	<0.080	-	-	-	-	-																																					
4-Nitrophenol	mg/kg	-	-	-	10	1	<0.050	<0.050	-	-	-	-	-																																					
Phenol	mg/kg	-	-	-	7.50	7.5	<0.050	<0.050	-	-	-	-	-																																					

Table 1 Baseline Soil Analytical Results

						Location ID	B15		C02		C04	NPT_001	NPT_003	NPT_006
						Field ID	B15-1	B15-2	C02-1	C02-2	C04-1	NPT_001_SOIL	NPT_003_SOILS	NPT_006_SOILS
						Date	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	12 Feb 2022	07 Aug 2021	06 Aug 2021	06 Aug 2021
						Lab Report Number	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	WHI22001018.1	644362-02-01	644362-07-01	644362-07-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷								
PAHs														
1-Methylnaphthalene	mg/kg	-	-	-	1,000	-	-	-	-	-	-	-	-	-
2-methylnaphthalene	mg/kg	-	-	-	950	-	-	-	-	-	-	-	-	-
2-chloronaphthalene	mg/kg	-	-	-	20,000	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	15,000	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	32	2.5	-	30,000	2.5	-	-	-	-	-	-	-	-
Benz(a)anthracene	mg/kg	-	-	-	10,000	1	-	-	-	-	-	-	-	-
Benzo(a) pyrene	mg/kg	72	20	-	50.00	10	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	4,500.00	400	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	10,000	1	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	180	50	-	200.00	50	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	9,500.000	1,000	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	-	-	-	10.00	1	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	20.00	0.6	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	50.00	5	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	100.00	10	-	-	-	-	-	-	-	-
Quinoline	mg/kg	-	-	-	10.00	4.5	-	-	-	-	-	-	-	-
Phenols														
2,4-Dimethylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-	-	-	-
2-Methylphenol (o-cresol)	mg/kg	-	-	-	10	1	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-	-	-	-
3&4-Methylphenol (m&p-cresol)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	7.50	7.5	-	-	-	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_009	NPT_020A	NPT_022A	NPT_029	NPT_031
						Field ID	NPT_009_SOILS	NPT_020A_SOILS	NPT_022A_SOILS	NPT_029_SOIL	NPT_031_SOIL
						Date	06 Aug 2021	10 Aug 2021	08 Aug 2021	07 Aug 2021	07 Aug 2021
						Lab Report Number	644362-07-01	644362-05-01	644362-03-01	644362-02-01	644362-02-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
PAHs											
1-Methylnaphthalene	mg/kg	-	-	-	1,000	-	-	-	-	-	-
2-methylnaphthalene	mg/kg	-	-	-	950	-	-	-	-	-	-
2-chloronaphthalene	mg/kg	-	-	-	20,000	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	15,000	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	32	2.5	-	30.000	2.5	-	-	-	-	-
Benz(a)anthracene	mg/kg	-	-	-	10.000	1	-	-	-	-	-
Benzo(a) pyrene	mg/kg	72	20	-	50.00	10	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Chrysene	mg/kg	-	-	-	4,500.00	400	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	10.000	1	-	-	-	-	-
Fluoranthene	mg/kg	180	50	-	200.00	50	-	-	-	-	-
Fluorene	mg/kg	-	-	-	9,500.000	1,000	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	20.00	0.6	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	50.00	5	-	-	-	-	-
Pyrene	mg/kg	-	-	-	100.00	10	-	-	-	-	-
Quinoline	mg/kg	-	-	-	10.00	4.5	-	-	-	-	-
Phenols											
2,4-Dimethylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Methylphenol (o-cresol)	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
3&4-Methylphenol (m&p-cresol)	mg/kg	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
Phenol	mg/kg	-	-	-	7.50	7.5	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_040	NPT_047	NPT_053	NPT_054	NPT_055
						Field ID	NPT_040_SOILS	NPT_047_SOILS	NPT_053_SOILS	NPT_054_SOIL	NPT_055_SOILS
						Date	08 Aug 2021	08 Aug 2021	08 Aug 2021	09 Aug 2021	09 Aug 2021
						Lab Report Number	644362-03-01	644362-03-01	644362-03-01	644362-04-01	644362-04-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
PAHs											
1-Methylnaphthalene	mg/kg	-	-	-	1,000	-	-	-	-	-	-
2-methylnaphthalene	mg/kg	-	-	-	950	-	-	-	-	-	-
2-chloronaphthalene	mg/kg	-	-	-	20,000	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	15,000	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	32	2.5	-	30,000	2.5	-	-	-	-	-
Benz(a)anthracene	mg/kg	-	-	-	10,000	1	-	-	-	-	-
Benzo(a) pyrene	mg/kg	72	20	-	50.00	10	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Chrysene	mg/kg	-	-	-	4,500.00	400	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	10,000	1	-	-	-	-	-
Fluoranthene	mg/kg	180	50	-	200.00	50	-	-	-	-	-
Fluorene	mg/kg	-	-	-	9,500.000	1,000	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	20.00	0.6	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	50.00	5	-	-	-	-	-
Pyrene	mg/kg	-	-	-	100.00	10	-	-	-	-	-
Quinoline	mg/kg	-	-	-	10.00	4.5	-	-	-	-	-
Phenols											
2,4-Dimethylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Methylphenol (o-cresol)	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
3&4-Methylphenol (m&p-cresol)	mg/kg	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
Phenol	mg/kg	-	-	-	7.50	7.5	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_058		NPT_059A		NPT_059B
						Field ID	NPT_058_SOILS	NPT_058_SOILS Lab-Dup	RPD%	NPT_059A_SOILS	NPT_059B_SOILS
						Date	09 Aug 2021	09 Aug 2021		09 Aug 2021	09 Aug 2021
						Lab Report Number	644362-04-01	644362-04-01		644362-04-01	644362-05-01
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
PAHs											
1-Methylnaphthalene	mg/kg	-	-	-	1,000	-	-	-	-	-	-
2-methylnaphthalene	mg/kg	-	-	-	950	-	-	-	-	-	-
2-chloronaphthalene	mg/kg	-	-	-	20,000	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	15,000	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	32	2.5	-	30.000	2.5	-	-	-	-	-
Benz(a)anthracene	mg/kg	-	-	-	10.000	1	-	-	-	-	-
Benzo(a) pyrene	mg/kg	72	20	-	50.00	10	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Chrysene	mg/kg	-	-	-	4,500.00	400	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	10.000	1	-	-	-	-	-
Fluoranthene	mg/kg	180	50	-	200.00	50	-	-	-	-	-
Fluorene	mg/kg	-	-	-	9,500.000	1,000	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	20.00	0.6	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	50.00	5	-	-	-	-	-
Pyrene	mg/kg	-	-	-	100.00	10	-	-	-	-	-
Quinoline	mg/kg	-	-	-	10.00	4.5	-	-	-	-	-
Phenols											
2,4-Dimethylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Methylphenol (o-cresol)	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
3&4-Methylphenol (m&p-cresol)	mg/kg	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
Phenol	mg/kg	-	-	-	7.50	7.5	-	-	-	-	-

Table 1 Baseline Soil Analytical Results

						Location ID	NPT_060A	NPT_061	NPT_100C		
						Field ID	NPT_060A_SOILS	NPT_061_SOILS	NPT_100C_SOILS	NPT_100C_SOILS Lab-Dup	RPD%
						Date	10 Aug 2021	10 Aug 2021	10 Aug 2021	10 Aug 2021	
						Lab Report Number	644362-05-01	644362-06-01	644362-06-01	644362-06-01	
	Unit	CEQG ¹¹ Soil Quality for the Protection of Env. and Human Health (Industrial)	CEQG Soil Quality for the Protection of Env. and Human Health (Residential/Parkland)	BC CSR Protocol 4 - Skeena ¹⁰	BC CSR IL ^{2-6,8}	BC CSR WLR ²⁻⁷					
PAHs											
1-Methylnaphthalene	mg/kg	-	-	-	1,000	-	-	-	-	-	-
2-methylnaphthalene	mg/kg	-	-	-	950	-	-	-	-	-	-
2-chloronaphthalene	mg/kg	-	-	-	20,000	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	15,000	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	32	2.5	-	30.000	2.5	-	-	-	-	-
Benz(a)anthracene	mg/kg	-	-	-	10.000	1	-	-	-	-	-
Benzo(a) pyrene	mg/kg	72	20	-	50.00	10	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Chrysene	mg/kg	-	-	-	4,500.00	400	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	10.000	1	-	-	-	-	-
Fluoranthene	mg/kg	180	50	-	200.00	50	-	-	-	-	-
Fluorene	mg/kg	-	-	-	9,500.000	1,000	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	-	-	-	10.00	1	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	20.00	0.6	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	50.00	5	-	-	-	-	-
Pyrene	mg/kg	-	-	-	100.00	10	-	-	-	-	-
Quinoline	mg/kg	-	-	-	10.00	4.5	-	-	-	-	-
Phenols											
2,4-Dimethylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Methylphenol (o-cresol)	mg/kg	-	-	-	10	1	-	-	-	-	-
2-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
3&4-Methylphenol (m&p-cresol)	mg/kg	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	-	-	-	10	1	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	10	1	-	-	-	-	-
Phenol	mg/kg	-	-	-	7.50	7.5	-	-	-	-	-

Notes

- (1) - = No standard or not analyzed.
- (2) BC CSR = BC *Environmental Management Act*, Contaminated Sites Regulation, B.C. Reg. 375/96 - includes amendments up to B.C. Reg. 133/2022, March 1, 2023
- (3) BC CSR Schedule 3.1 - Part 1, Matrix Numerical Soil Standards.
- (4) BC CSR Schedule 3.1 - Part 2, Generic Numerical Soil Standards to Protect Human Health.
- (5) BC CSR Schedule 3.1 - Part 3, Generic Numerical Soil Standards to Protect Ecological Health.
- (6) Default pathway applicable to all sites include 'Intake of Contaminated Soil' for Human Health and 'Toxicity to Soil Invertebrates and Plants' for Ecological Health.
- (7) BC CSR Commercial Land (WLR) = Schedule 3.1 Part 1 (Matrix), Column 3 and/or Schedule 3.1 Parts 2 and 3 (Generic), Column 4 Soil Standard.
- (8) BC CSR Industrial (IL) = Schedule 3.1 Part 1 (Matrix), Column 9 and/or Schedule 3.1 Parts 2 and 3 (Generic), Column 10 Soil Standard.
- (9) For Standards the most stringent of the following site-specific and numerical factors were used: intake of contaminated soil, groundwater used for drinking water, Toxicity to soil invertebrates and plants, groundwater flow to surface water used by aquatic life (freshwater), Human Health (Part 2) or Ecological Health (Part 3).
- (10) BC CSR Protocol 4 Background Concentrations in Soil, Region 6 - Skeena, February 21, 2021
- (11) CEQG = Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health 2024
- (12) * Samples exceed toxicity to soil invertebrates and plants for WLR standards but do not exceed pH dependent standard shown on table for IL or WLR.
- (13) ** Samples exceed the applicable guideline or standard but are below BC CSR Protocol 4 background concentrations
- (14) No measured pH values exist for these samples, therefore the most stringent BC CSR standard was used for pH-dependent parameters

VALUE	= exceeds BC CSR IL standards
VALUE	= exceeds BC CSR WLR standards
VALUE	= exceeds CEQG PL Standards
VALUE	= exceeds CEQG IL standards

pH Dependent Standards

Beryllium:

IL

Standard	pH
1	<6.5
4	6.5-<7.0
30	7.0-<7.5
250	7.5-<8.0
500	>8.0

Cadmium:

IL

Standard	pH
1	<7.0
3	7.0-<7.5
20	7.5-<8.0
50	>8.0

Copper:

IL

Standard	pH
75	<5.5
100	5.5-<6.0
700	6.0-<6.5
3000	6.5-<7.0
6500	7.0-<7.5
7500	>7.5

Lead:

IL

Standard	pH
120	<5.5
150	5.5-<6.0
800	6.0-<6.5
3500	6.5-<7.0
7500	7.0-<7.5
8500	>8.0

Nickel:

IL

Standard	pH
70	<7.5
250	7.5-<8.0
500	>8.0

Zinc:

IL

Standard	pH
150	<6.0
250	6.0-<6.5
350	6.5-<7.0
600	7.0-<7.5
1500	7.5-<8.0
3000	>8.0

WLR

Standard	pH
1	<6.5
4	6.5-<7.0
30	7.0-<7.5
250	7.5-<8.0
500	>8.0

WLR

Standard	pH
1	<7.0
3	7.0-<7.5
20	7.5-<8.0
50	>8.0

WLR

Standard	pH
75	<5.5
100	5.5-<6.0
700	6.0-<6.5
3000	6.5-<7.0
6500	7.0-<7.5
7500	>7.5

WLR

Standard	pH
120	<5.5
150	5.5-<6.0
800	6.0-<6.5
3500	6.5-<7.0
7500	7.0-<7.5
8500	>8.0

WLR

Standard	pH
70	<7.5
250	7.5-<8.0
500	>8.0

WLR

Standard	pH
150	<6.0
250	6.0-<6.5
350	6.5-<7.0
600	7.0-<7.5
1500	7.5-<8.0
3000	>8.0

Appendix A

Previous Environmental Reports

MEMORANDUM

To: Canagold – TRTFN Technical Working Group
From: Troy Gill, VP Exploration
Date: August 31, 2023
Subject: Geochemical Testing of Historical Tailings at New Polaris

The historical tailings generated by flotation processing of ores at the New Polaris site are recorded as being derived from two sources – the Polaris-Taku mine itself from late 1937 to 1951 and then Tulsequah Chief / Big Bull until 1957. It has been generally accepted that the tailings from Tulsequah Chief / Big Bull would be more acid generating than those from Polaris-Taku because of the different nature of the parent ores. They have been studied previously in two environmental reports, the first by Hallam Knight Piesold (1994) as part of a site liabilities report and later by Gartner Lee (1997) seemingly with a focus on the economic viability of re-processing the tailings. Gartner Lee later produced a map for the purposes of baseline water sampling that showed the outlines of two of the historical tailings areas visible at surface. Even so, there had been very little in the way of systematic sampling and geochemical analysis of the material. In October 2022 Canagold commenced a grid-based test pitting program to begin to assess the extent, depth and geochemical variability of the historical tailings and inform decisions on their potential value or liability to the New Polaris project development.

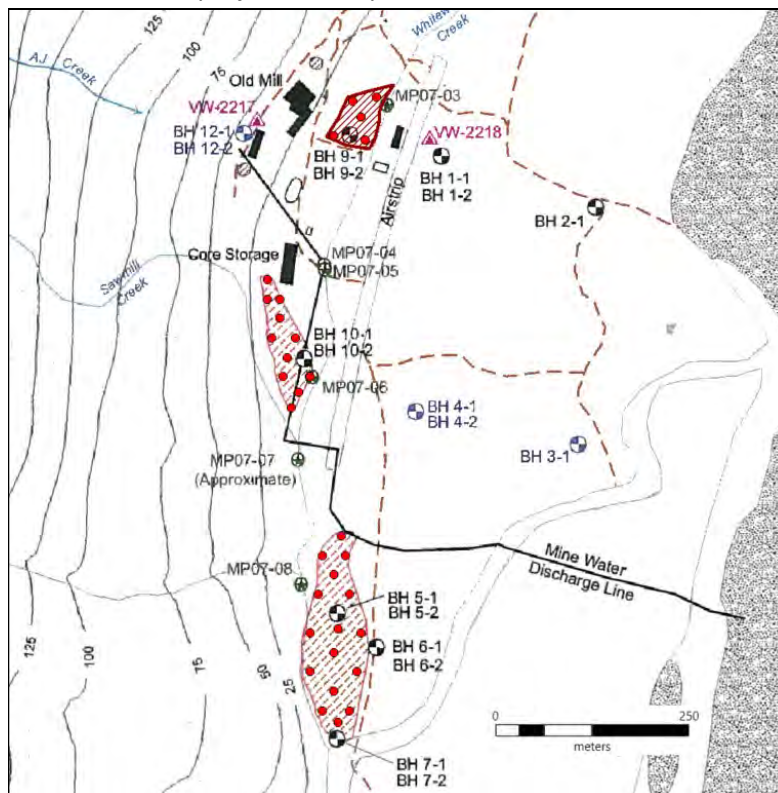


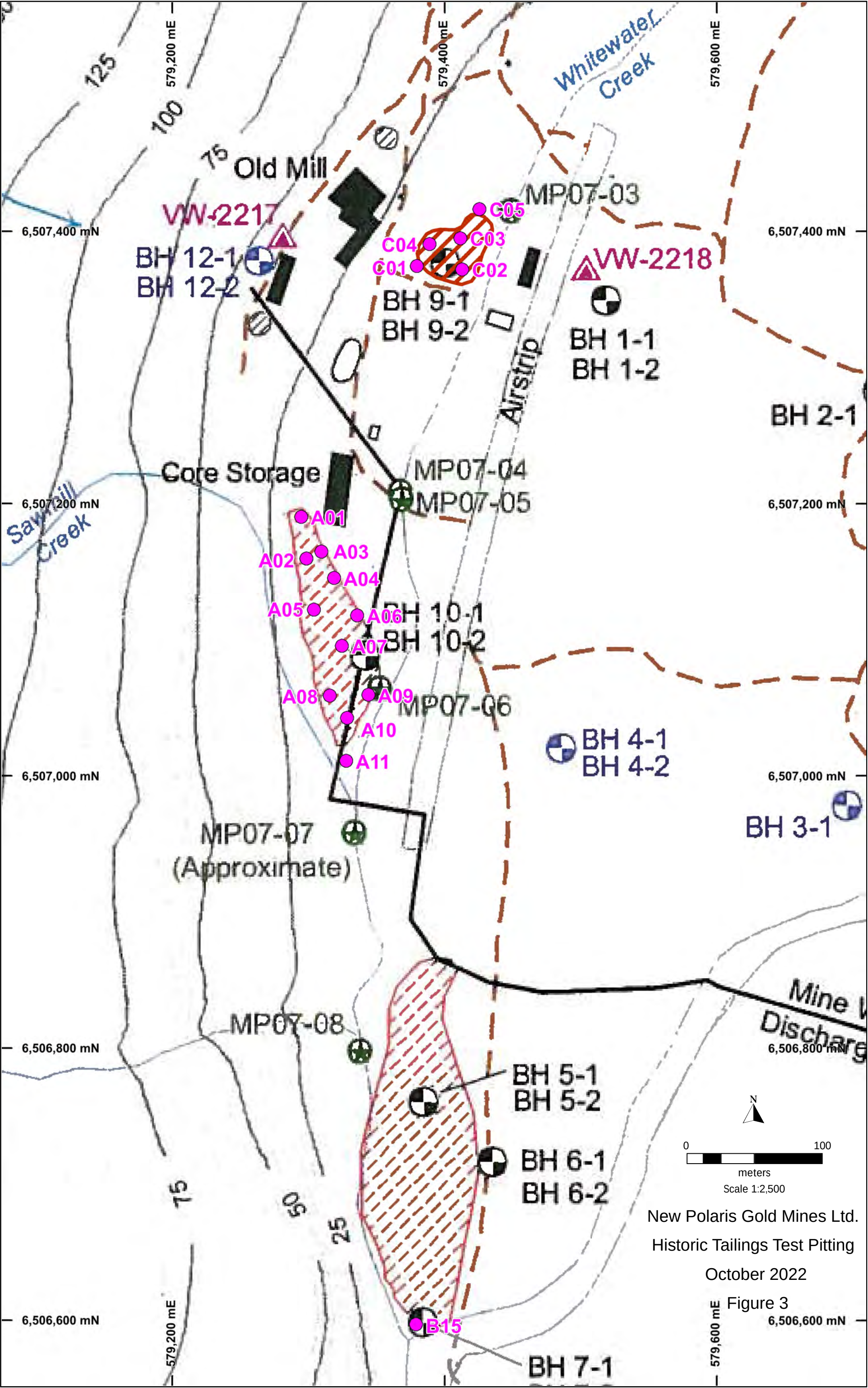
Figure 1: Proposed test pit sites on Gartner Lee water sampling base map (2007)

Test pits were planned out over three areas that are recognized as historical tailings at site, shown as Areas A, B and C (Figure 1). The test pits were arranged in a staggered 25m grid pattern to try and assess as much of the area with as few pits as possible. The pits were dug using the Kubota KX-121/3 mini excavator available on site, to a maximum depth of approximately 2m. Surface cover was set aside to be backfilled last as each pit was started. The operator attempted to preserve the integrity of sample material as the pit progressed to depth with each bucket (Figure 2). If there was any fallback or cave in, this material was cleared out and set aside before digging deeper. Variations in colour, grainsize and composition of the tailings or other materials were logged with depth of each pit (Appendix 1). Representative samples were collected and photographs taken for each logged unit. The test pit was completed when material other than tailings was observed or the excavator could not continue digging because of hard ground or end of reach. Each test pit was back filled with the surface cover replaced on top and the work area reclaimed.



Figure 2: Example of test pit sample layout from A06 (top closest to excavator)

A total of 17 test pits over Areas A, B and C were completed (Figure 3) and 36 samples collected (Appendix 1) before heavy snowfall hindered further work on the program. A typical stratification of a yellow-brown upper fine sandy tailings layer and a lower grey fine sandy tailings layer was observed in most of the pits (Figure 4). Often the lower most parts of the profile became a mix of pale blue clay and decaying vegetation, hinting that the bottom of the tailings pile was close, although the reach of the mini excavator was often not enough to dig through it. Pits A02, A03 and A04 had a hard ferruginous layer close to surface that the excavator could not dig through. When an obvious basement to the tailings pile was



New Polaris Gold Mines Ltd.
Historic Tailings Test Pitting
October 2022

Figure 3
6,506,600 mN

encountered it was often coarse alluvial materials. Test Pit C04 dug through a shallow buried 1.7m thick layer of concentrate near the foot of the old processing plant foundation.



Figure 4: Example of typical tailings profile in test pit A06

In the end it was decided not to send all the samples to the lab for analysis, so 11 samples were selected as being representative of the typical tailings profile or of a distinctly different or significantly interesting material that warranted further investigation. The samples were submitted to Bureau Veritas Commodities Canada Ltd. for multi-element analysis by aqua-regia digestion and ICP-MS to assess for leachable metals as well as SG (Appendix 1). Using the results from A06 as representing a typical tailings profile, it was observed that the top layer of coloured tailings had a distinctly different geochemical signature in terms of relatively elevated levels of elements like Ag, Ba, Cd, Cr, Cu, Fe, Hg, Mo, Pb, S, Te, Th, Tl and W and others including Ca, Co, Mg, Mn, Ni, Sc, Sr and Zn being much lower compared to the deeper samples. Interestingly, Al, K, Sb and V remain fairly uniform and Au shows a steady decline along with As. This could be evidence of Tulsequah / Big Bull tailings overlying Polaris-Taku tailings, however

analysis of more samples that show a fairly uniform pattern across the area would be necessary to reinforce this concept. One sample that returned results contrary to this idea were from the hard ferruginous looking layer in A04 (Figure 5) that was generally lower than might have been anticipated in many elements including Fe and quite high in Ca, Cd, Cu, La, Mg, Mn, S, Sc, Sr and Zn. The presumed concentrate sample came back with a value of 72.9 gpt Au.



Figure 5: Hard ferruginous looking layer in test pit A04

Since only one profile was logged where the tailings are exposed at the southern end of Area B, this whole area still needs to be test pitted and sampled. The absolute extent of all three areas has not been defined completely by the work to date, although Area C is naturally well constrained by the landform to the north and west and Area C is noticeably thinning to the north as evidenced in A01. The remainder of the previously collected samples and samples from new test pits could be analyzed in-house using the Vanta handheld XRF to be used in a much more detailed assessment of the quality of all the tailings areas. Researching the source ore compositions and associated concentrate analysis coupled with mineralogical study of the tailings could help with defining areas of tailings provenance and assist with planning how those tailings will be dealt with in terms of remediation or even re-purposed during the development and operation of New Polaris project.

Appendix 1

Test Pit Location, Logging and Assay Data

Test Pit Locations

Test Pit	UTM East	UTM North	Elevation	Depth
A01	579295	6507190	21.9	0.5
A02	579298	6507160	20.4	0.3
A03	579309	6507165	19.5	0.2
A04	579319	6507145	18.1	0.3
A05	579304	6507122	18.8	1.9
A06	579336	6507118	18.1	1.6
A07	579325	6507096	18.9	1.9
A08	579316	6507059	20.9	2.0
A09	579344	6507060	19.1	1.5
A10	579328	6507043	19.2	1.7
A11	579328	6507011	18.5	1.1
B15	579379	6506597	16.9	1.6
C01	579379	6507375	22.2	0.3
C02	579413	6507372	21.3	1.3
C03	579411	6507395	21.8	2.0
C04	579389	6507391	22.1	2.2
C05	579426	6507416	21.8	1.3

Test Pit Logs and Assays

Test Pit	Depth From	Depth To	Interval	Description	Sample	Comments
A01	0.0	0.3	0.3	Banded white-grey-dark grey silt and clay with fine disseminated pyrite?	NS	
A01	0.3	0.4	0.1	Pale yellow clay	NS	
A01	0.4	0.5	0.1	Brown cobbles and gravel	NS	
A02	0.0	0.2	0.2	Banded white-grey-dark grey silt and clay with fine disseminated pyrite?	A02-1	
A02	0.2	0.3	0.1	Pale yellow clay	NS	Ended at hard ferruginous layer
A03	0.0	0.1	0.1	Light yellow and cream fine sand	NS	
A03	0.1	0.2	0.1	Tan thinly layered hard ferruginous silt	NS	Excavator unable to dig through
A04	0.0	0.2	0.2	Light yellow and cream fine sand	A04-1	
A04	0.2	0.3	0.1	Tan thinly layered hard ferruginous silt	A04-2	Excavator unable to dig through
A05	0.0	1.1	1.1	Light brown fine sand	A05-1	
A05	1.1	1.3	0.2	Thinly layered cream and brown clay bands	A05-2	
A05	1.3	1.6	0.3	Pale blue grey medium sand	A05-3	
A05	1.6	1.9	0.3	Pale and black clay with organics roots and wood	A05-4	
A06	0.0	0.3	0.3	Orange-tan semi hardened ferruginous silt and clay	A06-1	
A06	0.3	1.1	0.8	Khaki fine sand	A06-2	
A06	1.1	1.3	0.2	Cream thin layered clay	A06-3	
A06	1.3	1.6	0.3	Pale and black clay with organics - wood (logs) and roots	A06-4	
A07	0.0	1.6	1.6	Khaki light tan fine sand	A07-1	
A07	1.6	1.9	0.3	Light blue grey medium sand and black clay with tree roots	A07-2	
A08	0.0	1.2	1.2	Khaki fine sand	A08-1	
A08	1.2	1.8	0.6	Khaki sand with light green, brown, black clay layers	A08-2	
A08	1.8	2.0	0.2	Pale blue clay with black organics and tree roots	A08-3	
A09	0.0	1.2	1.2	Khaki-tan fine sand	A09-1	
A09	1.2	1.4	0.2	Light green an black clay, minor roots	A09-2	
A09	1.4	1.5	0.1	Dark green-grey clay and gravel	A09-3	
A10	0.0	0.4	0.4	Light tan-khaki fine sand	A10-1	
A10	0.4	0.7	0.3	Similar with 1-5cm pink an cream clay layers	A10-2	
A10	0.7	1.3	0.6	Light tan-khaki fine sand	A10-3	
A10	1.3	1.7	0.4	Pale blue clay with wood and black organics	A10-4	
A11	0.0	0.9	0.9	Khaki fine sand	A11-1	
A11	0.9	1.1	0.2	Khaki fine sand	NS	4 logs laid down parallel forming a deck or base of some sort
B15	0.0	0.3	0.3	Yellow-brown fine sand	B15-1	
B15	0.3	1.6	1.3	White-cream fine sand	B15-2	
C01	0.0	0.3	0.3	Brown mud and gravel	NS	
C02	0.0	0.7	0.7	Tan-yellow-cream multicoloured clay	C02-1	
C02	0.7	1.2	0.5	Grey fine sand	C02-2	
C02	1.2	1.3	0.1	Grey cobble gravel and fine sand	C02-3	
C03	0.0	0.5	0.5	Yellow brown fine sand	C03-1	
C03	0.5	2.0	1.5	Grey fine sand	C03-2	End of reach
C04	0.0	0.3	0.3	Dark brown mud	NS	
C04	0.3	1.7	1.4	Dark grey green clay with pyrite 40%	C04-1	
C04	1.7	2.0	0.3	Brown-grey organics and clay	C04-2	
C04	2.0	2.2	0.2	Brown clay	C04-3	End of reach
C05	0.0	1.1	1.1	Brown-grey organics and fine sand	C05-1	
C05	1.1	1.3	0.2	Grey cobble gravel and fine sand	C05-2	

Test Pit Logs and Assays

Test Pit	Depth From	Depth To	Interval	Wgt_kg	Au_ppm	Ag_ppm	Al_pct	As_ppm	B_ppm	Ba_ppm	Bi_ppm	Ca_pct	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_pct	Ga_ppm	Hg_ppm
A01	0.0	0.3	0.3																
A01	0.3	0.4	0.1																
A01	0.4	0.5	0.1																
A02	0.0	0.2	0.2	2.10	0.86	20.61	0.31	144.5	0.5	6.6	0.71	0.02	21.44	6.7	1.2	940.58	16.08	1.0	2.086
A02	0.2	0.3	0.1																
A03	0.0	0.1	0.1																
A03	0.1	0.2	0.1																
A04	0.0	0.2	0.2																
A04	0.2	0.3	0.1	1.21	1.89	0.50	2.58	2772.3	7.0	69.3	0.01	1.91	6.51	11.3	169.7	2390.76	7.35	3.0	0.063
A05	0.0	1.1	1.1																
A05	1.1	1.3	0.2																
A05	1.3	1.6	0.3																
A05	1.6	1.9	0.3																
A06	0.0	0.3	0.3	1.76	3.00	3.56	1.05	3614.1	6.0	140.1	0.16	0.10	1.17	3.4	158.6	226.00	12.68	6.0	0.361
A06	0.3	1.1	0.8	1.70	3.37	0.29	1.01	4592.0	6.0	142.1	0.01	5.68	1.57	14.6	106.3	66.28	3.41	2.0	0.053
A06	1.1	1.3	0.2	2.05	2.60	0.17	0.89	2273.9	4.0	88.7	0.01	6.79	0.21	18.8	109.4	77.23	2.94	1.7	0.030
A06	1.3	1.6	0.3	1.53	1.28	0.14	0.94	1484.2	5.0	59.9	0.01	6.04	0.23	26.4	107.2	88.28	3.07	1.9	0.051
A07	0.0	1.6	1.6																
A07	1.6	1.9	0.3																
A08	0.0	1.2	1.2																
A08	1.2	1.8	0.6																
A08	1.8	2.0	0.2																
A09	0.0	1.2	1.2																
A09	1.2	1.4	0.2																
A09	1.4	1.5	0.1																
A10	0.0	0.4	0.4																
A10	0.4	0.7	0.3																
A10	0.7	1.3	0.6																
A10	1.3	1.7	0.4																
A11	0.0	0.9	0.9																
A11	0.9	1.1	0.2																
B15	0.0	0.3	0.3	1.51	0.73	14.34	0.68	98.8	0.5	462.2	1.02	0.02	2.10	0.3	2.4	85.15	1.44	1.8	1.642
B15	0.3	1.6	1.3	1.28	0.82	18.73	0.20	32.1	0.5	37.1	0.53	0.02	10.57	0.4	1.2	87.44	1.15	0.7	2.113
C01	0.0	0.3	0.3																
C02	0.0	0.7	0.7	1.33	0.66	2.72	2.20	1093.8	6.0	425.6	0.07	2.23	119.59	5.9	137.6	3618.44	6.46	3.1	0.370
C02	0.7	1.2	0.5	1.50	0.05	0.18	1.07	51.8	0.5	199.4	0.19	0.45	82.53	5.2	29.9	667.81	1.9	3.7	0.013
C02	1.2	1.3	0.1																
C03	0.0	0.5	0.5																
C03	0.5	2.0	1.5																
C04	0.0	0.3	0.3																
C04	0.3	1.7	1.4	2.12	72.93	100.00	0.53	10000.0	2.0	1.0	7.18	1.22	354.53	23.2	27.0	10000.00	15.58	4.1	24.751
C04	1.7	2.0	0.3																
C04	2.0	2.2	0.2																
C05	0.0	1.1	1.1																
C05	1.1	1.3	0.2																

Test Pit Logs and Assays

Test Pit	Depth From	Depth To	Interval	K_pct	La_ppm	Mg_pct	Mn_ppm	Mo_ppm	Na_pct	Ni_ppm	P_pct	Pb_ppm	S_pct	Sb_ppm	Sc_ppm	Se_ppm	Sr_ppm	Te_ppm	Th_ppm	Ti_pct
A01	0.0	0.3	0.3																	
A01	0.3	0.4	0.1																	
A01	0.4	0.5	0.1																	
A02	0.0	0.2	0.2	0.10	0.25	0.15	52	18.98	0.012	16.0	0.001	874.81	10.00	18.77	0.4	6.4	25.0	1.15	0.2	0.003
A02	0.2	0.3	0.1																	
A03	0.0	0.1	0.1																	
A03	0.1	0.2	0.1																	
A04	0.0	0.2	0.2																	
A04	0.2	0.3	0.1	0.24	3.40	1.74	443	2.70	0.006	60.9	0.060	25.48	1.35	50.03	37.4	0.5	88.9	0.11	0.9	0.009
A05	0.0	1.1	1.1																	
A05	1.1	1.3	0.2																	
A05	1.3	1.6	0.3																	
A05	1.6	1.9	0.3																	
A06	0.0	0.3	0.3	0.25	1.80	0.78	103	3.90	0.008	25.3	0.067	268.83	0.64	146.82	6.4	1.1	25.0	1.43	2.5	0.009
A06	0.3	1.1	0.8	0.26	1.10	4.00	1061	0.35	0.006	57.4	0.056	6.97	0.27	126.23	15.7	0.2	282.0	0.06	0.1	0.006
A06	1.1	1.3	0.2	0.21	1.20	4.39	1097	0.25	0.005	104.7	0.054	5.32	0.08	200.85	15.4	0.2	344.2	0.06	0.1	0.005
A06	1.3	1.6	0.3	0.24	1.00	3.95	998	0.60	0.006	128.3	0.060	3.60	0.22	344.08	13.0	0.3	314.3	0.06	0.1	0.007
A07	0.0	1.6	1.6																	
A07	1.6	1.9	0.3																	
A08	0.0	1.2	1.2																	
A08	1.2	1.8	0.6																	
A08	1.8	2.0	0.2																	
A09	0.0	1.2	1.2																	
A09	1.2	1.4	0.2																	
A09	1.4	1.5	0.1																	
A10	0.0	0.4	0.4																	
A10	0.4	0.7	0.3																	
A10	0.7	1.3	0.6																	
A10	1.3	1.7	0.4																	
A11	0.0	0.9	0.9																	
A11	0.9	1.1	0.2																	
B15	0.0	0.3	0.3	0.14	6.20	0.78	138	11.57	0.012	1.2	0.005	1294.76	0.21	21.37	0.6	2.2	49.7	0.85	0.8	0.008
B15	0.3	1.6	1.3	0.07	4.10	0.10	53	7.63	0.009	1.4	0.001	2173.91	1.23	21.64	0.3	1.5	121.6	0.18	0.4	0.007
C01	0.0	0.3	0.3																	
C02	0.0	0.7	0.7	0.27	2.90	2.21	392	1.06	0.007	47.7	0.075	454.54	0.35	96.98	20.1	0.5	133.2	0.12	1.9	0.010
C02	0.7	1.2	0.5	0.16	12.90	0.63	244	1.39	0.072	14.5	0.063	15.04	0.03	5.00	3.8	0.4	28.0	0.05	6.9	0.090
C02	1.2	1.3	0.1																	
C03	0.0	0.5	0.5																	
C03	0.5	2.0	1.5																	
C04	0.0	0.3	0.3																	
C04	0.3	1.7	1.4	0.12	0.70	1.02	318	18.66	0.009	88.5	0.021	10000.00	10.00	999.90	3.1	10.7	26.8	2.60	0.7	0.004
C04	1.7	2.0	0.3																	
C04	2.0	2.2	0.2																	
C05	0.0	1.1	1.1																	
C05	1.1	1.3	0.2																	

Test Pit Logs and Assays

Test Pit	Depth From	Depth To	Interval	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm	Density_g-cc	Lab	Job	Received	Finalized
A01	0.0	0.3	0.3										
A01	0.3	0.4	0.1										
A01	0.4	0.5	0.1										
A02	0.0	0.2	0.2	2.41	0.2	2	1.4	4927.1	3.81	BV	WHI22001018	2/12/22	8/3/23
A02	0.2	0.3	0.1										
A03	0.0	0.1	0.1										
A03	0.1	0.2	0.1										
A04	0.0	0.2	0.2										
A04	0.2	0.3	0.1	0.24	2.0	63	0.7	987.0	2.77	BV	WHI22001018	2/12/22	8/3/23
A05	0.0	1.1	1.1										
A05	1.1	1.3	0.2										
A05	1.3	1.6	0.3										
A05	1.6	1.9	0.3										
A06	0.0	0.3	0.3	0.73	0.1	63	1.3	248.5	2.87	BV	WHI22001018	2/12/22	8/3/23
A06	0.3	1.1	0.8	0.10	0.1	55	0.7	398.8	2.85	BV	WHI22001018	2/12/22	8/3/23
A06	1.1	1.3	0.2	0.09	0.1	51	0.6	689.1	2.82	BV	WHI22001018	2/12/22	8/3/23
A06	1.3	1.6	0.3	0.08	0.1	51	0.4	614.2	2.83	BV	WHI22001018	2/12/22	8/3/23
A07	0.0	1.6	1.6										
A07	1.6	1.9	0.3										
A08	0.0	1.2	1.2										
A08	1.2	1.8	0.6										
A08	1.8	2.0	0.2										
A09	0.0	1.2	1.2										
A09	1.2	1.4	0.2										
A09	1.4	1.5	0.1										
A10	0.0	0.4	0.4										
A10	0.4	0.7	0.3										
A10	0.7	1.3	0.6										
A10	1.3	1.7	0.4										
A11	0.0	0.9	0.9										
A11	0.9	1.1	0.2										
B15	0.0	0.3	0.3	2.12	0.2	6	2.8	509.6	3.05	BV	WHI22001018	2/12/22	8/3/23
B15	0.3	1.6	1.3	2.21	0.1	2	1.6	2338.9	3.25	BV	WHI22001018	2/12/22	8/3/23
C01	0.0	0.3	0.3										
C02	0.0	0.7	0.7	0.25	1.4	60	0.5	3262.0	2.75	BV	WHI22001018	2/12/22	8/3/23
C02	0.7	1.2	0.5	0.11	2.0	51	0.7	680.1	2.73	BV	WHI22001018	2/12/22	8/3/23
C02	1.2	1.3	0.1										
C03	0.0	0.5	0.5										
C03	0.5	2.0	1.5										
C04	0.0	0.3	0.3										
C04	0.3	1.7	1.4	2.46	0.4	14	2.1	10000.0	3.75	BV	WHI22001018	2/12/22	8/3/23
C04	1.7	2.0	0.3										
C04	2.0	2.2	0.2										
C05	0.0	1.1	1.1										
C05	1.1	1.3	0.2										



BUREAU VERITAS MINERAL LABORATORIES
Canada

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Bureau Veritas Commodities Canada Ltd.

9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

PHONE (604) 253-3158

Client: **New Polaris Gold Mines Ltd.**
#1250 – 625 Howe Street
Vancouver British Columbia V6C 2T6 Canada

Submitted By: Troy Gill
Receiving Lab: Canada-Whitehorse
Received: December 02, 2022
Analysis Start: January 17, 2023
Report Date: March 08, 2023
Page: 1 of 2

CERTIFICATE OF ANALYSIS

WHI22001018.1

CLIENT JOB INFORMATION

Project: New Polaris
Shipment ID: NPGM22_029
P.O. Number
Number of Samples: 11

SAMPLE DISPOSAL

PICKUP-PLP Client to Pickup Pulps
PICKUP-RJT Client to Pickup Rejects

SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

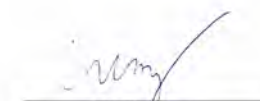
Procedure Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
PRP70-250	11	Crush, split and pulverize 250 g rock to 200 mesh			WHI
AQ252	11	1:1:1 Aqua Regia digestion Ultratrace ICP-MS analysis	30	Completed	VAN
SPG04	11	Specific Gravity by Picnometry		Completed	VAN
SLBHP	0	Sort, label and box pulps			WHI
SHP01	11	Per sample shipping charges for branch shipments			VAN

ADDITIONAL COMMENTS

Bureau Veritas does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: New Polaris Gold Mines Ltd.
#1250 – 625 Howe Street
Vancouver British Columbia V6C 2T6
Canada

CC:


Martin Wong
Data Validation Specialist

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only. All results are considered the confidential property of the client. Bureau Veritas assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.
*** asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.



Bureau Veritas Commodities Canada Ltd.

9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

PHONE (604) 253-3158

Project: New Polaris

Report Date: March 08, 2023

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Part: 1 of 2

CERTIFICATE OF ANALYSIS

WHI22001018.1

	Method Analyte Unit MDL	WGHT	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252
		Wgt	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca
		kg	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%
		0.01	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02	1	0.01
A02-1	Soil	2.10	18.98	940.58	874.81	4927.1	20613	16.0	6.7	52	16.08	144.5	0.2	863.1	0.2	25.0	21.44	18.77	0.71	2	0.02
A04-2	Soil	1.21	2.70	2390.76	25.48	987.0	499	60.9	11.3	443	7.35	2772.3	2.0	1894.1	0.9	88.9	6.51	50.03	<0.02	63	1.91
A06-1	Soil	1.76	3.90	226.00	268.83	248.5	3555	25.3	3.4	103	12.68	3614.1	0.1	3001.2	2.5	25.0	1.17	146.82	0.16	63	0.10
A06-2	Soil	1.70	0.35	66.28	6.97	398.8	294	57.4	14.6	1061	3.41	4592.0	<0.1	3366.5	0.1	282.0	1.57	126.23	<0.02	55	5.68
A06-3	Soil	2.05	0.25	77.23	5.32	689.1	172	104.7	18.8	1097	2.94	2273.9	<0.1	2596.4	0.1	344.2	0.21	200.85	<0.02	51	6.79
A06-4	Soil	1.53	0.60	88.28	3.60	614.2	140	128.3	26.4	998	3.07	1484.2	<0.1	1281.0	0.1	314.3	0.23	344.08	<0.02	51	6.04
B15-1	Soil	1.51	11.57	85.15	1294.76	509.6	14343	1.2	0.3	138	1.44	98.8	0.2	728.7	0.8	49.7	2.10	21.37	1.02	6	0.02
B15-2	Soil	1.28	7.63	87.44	2173.91	2338.9	18732	1.4	0.4	53	1.15	32.1	0.1	815.6	0.4	121.6	10.57	21.64	0.53	2	0.02
C02-1	Soil	1.33	1.06	3618.44	454.54	3262.0	2724	47.7	5.9	392	6.46	1093.8	1.4	660.9	1.9	133.2	119.59	96.98	0.07	60	2.23
C02-2	Soil	1.50	1.39	667.81	15.04	680.1	180	14.5	5.2	244	1.90	51.8	2.0	47.2	6.9	28.0	82.53	5.00	0.19	51	0.45
C04-1	Soil	2.12	18.66	>10000	>10000	>10000	>100000	88.5	23.2	318	15.58	>10000	0.4	72926.2	0.7	26.8	354.53	999.90	7.18	14	1.22



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9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

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Client: **New Polaris Gold Mines Ltd.**
#1250 – 625 Howe Street
Vancouver British Columbia V6C 2T6 Canada

Project: New Polaris

Report Date: March 08, 2023

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Part: 2 of 2

CERTIFICATE OF ANALYSIS

WHI22001018.1

	Method	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	SPG04
	Analyte	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Ti	S	Hg	Se	Te	Ga	Density
	Unit	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm	g/cm3
	MDL	0.001	0.5	0.5	0.01	0.5	0.001	1	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1	0.01
A02-1	Soil	<0.001	<0.5	1.2	0.15	6.6	0.003	<1	0.31	0.012	0.10	1.4	0.4	2.41	>10	2086	6.4	1.15	1.0	3.81
A04-2	Soil	0.060	3.4	169.7	1.74	69.3	0.009	7	2.58	0.006	0.24	0.7	37.4	0.24	1.35	63	0.5	0.11	3.0	2.77
A06-1	Soil	0.067	1.8	158.6	0.78	140.1	0.009	6	1.05	0.008	0.25	1.3	6.4	0.73	0.64	361	1.1	1.43	6.0	2.87
A06-2	Soil	0.056	1.1	106.3	4.00	142.1	0.006	6	1.01	0.006	0.26	0.7	15.7	0.10	0.27	53	0.2	0.06	2.0	2.85
A06-3	Soil	0.054	1.2	109.4	4.39	88.7	0.005	4	0.89	0.005	0.21	0.6	15.4	0.09	0.08	30	0.2	0.06	1.7	2.82
A06-4	Soil	0.060	1.0	107.2	3.95	59.9	0.007	5	0.94	0.006	0.24	0.4	13.0	0.08	0.22	51	0.3	0.06	1.9	2.83
B15-1	Soil	0.005	6.2	2.4	0.78	462.2	0.008	<1	0.68	0.012	0.14	2.8	0.6	2.12	0.21	1642	2.2	0.85	1.8	3.05
B15-2	Soil	0.001	4.1	1.2	0.10	37.1	0.007	<1	0.20	0.009	0.07	1.6	0.3	2.21	1.23	2113	1.5	0.18	0.7	3.25
C02-1	Soil	0.075	2.9	137.6	2.21	425.6	0.010	6	2.20	0.007	0.27	0.5	20.1	0.25	0.35	370	0.5	0.12	3.1	2.75
C02-2	Soil	0.063	12.9	29.9	0.63	199.4	0.090	<1	1.07	0.072	0.16	0.7	3.8	0.11	0.03	13	0.4	0.05	3.7	2.73
C04-1	Soil	0.021	0.7	27.0	1.02	1.0	0.004	2	0.53	0.009	0.12	2.1	3.1	2.46	>10	24751	10.7	2.60	4.1	3.75



Bureau Veritas Commodities Canada Ltd.

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Project: New Polaris
Report Date: March 08, 2023

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QUALITY CONTROL REPORT

WHI22001018.1

	Method Analyte Unit MDL	WGHT	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252
		Wgt	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca
		kg	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%
		0.01	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02	1	0.01
Pulp Duplicates																					
A02-1	Soil	2.10	18.98	940.58	874.81	4927.1	20613	16.0	6.7	52	16.08	144.5	0.2	863.1	0.2	25.0	21.44	18.77	0.71	2	0.02
REP A02-1	QC		17.46	859.38	795.07	4466.6	19087	15.2	6.4	50	15.21	135.7	0.2	879.9	<0.1	24.0	19.77	17.61	0.66	2	0.02
A06-2	Soil	1.70	0.35	66.28	6.97	398.8	294	57.4	14.6	1061	3.41	4592.0	<0.1	3366.5	0.1	282.0	1.57	126.23	<0.02	55	5.68
REP A06-2	QC		0.34	64.00	7.43	386.2	300	56.2	14.6	1058	3.38	4550.0	<0.1	3446.6	0.2	278.8	1.56	120.17	<0.02	54	5.91
C04-1	Soil	2.12	18.66	>10000	>10000	>10000	>100000	88.5	23.2	318	15.58	>10000	0.4	72926.2	0.7	26.8	354.53	999.90	7.18	14	1.22
REP C04-1	QC																				
Reference Materials																					
STD AMIS0342	Standard																				
STD BVGEO01	Standard		9.96	4248.79	172.52	1687.4	2382	157.5	23.1	699	3.59	117.6	3.3	188.3	13.2	54.5	5.88	3.11	23.17	72	1.27
STD BVGEO01	Standard		9.94	4290.93	178.40	1690.1	2497	158.0	24.7	702	3.63	119.7	3.3	211.5	13.6	55.2	5.93	3.18	23.07	73	1.31
STD OREAS262	Standard		0.62	109.34	54.00	155.5	449	63.4	26.6	522	3.21	35.5	1.1	56.8	8.8	34.5	0.60	4.88	0.95	22	2.85
STD OREAS262	Standard		0.62	111.90	52.52	150.3	452	62.0	26.5	514	3.21	34.5	1.1	78.4	8.8	33.9	0.59	4.86	0.91	22	2.86
STD OREAS907	Standard																				
STD AMIS0342 Expected																					
STD BVGEO01 Expected			11.2	4415	187	1712	2530	163	25	706	3.7	121	3.67	214	14.4	55	6.25	3.39	24.3	73	1.3219
STD OREAS262 Expected			0.68	118	56	154	450	62	26.9	530	3.284	35.8	1.22	65	9.33	36	0.61	5.06	1.03	22.5	2.98
BLK	Blank		<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02	<1	<0.01
BLK	Blank		<0.01	<0.01	<0.01	0.2	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02	<1	<0.01
Prep Wash																					
ROCK-WHI	Prep Blank		0.72	4.41	4.80	34.5	13	1.1	3.4	424	1.78	2.2	0.4	1.5	2.1	20.4	0.07	0.07	<0.02	23	0.67
ROCK-WHI	Prep Blank		0.80	5.06	2.44	30.2	8	1.2	3.9	432	1.84	1.2	0.4	1.7	2.1	23.6	0.03	0.05	<0.02	26	0.74



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Project: New Polaris
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QUALITY CONTROL REPORT

WHI22001018.1

	Method Analyte Unit MDL	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	AQ252	SPG04	
		P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Ti	S	Hg	Se	Te	Ga	Density	
		%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm	g/cm3	
		0.001	0.5	0.5	0.01	0.5	0.001	1	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1	0.01	
Pulp Duplicates																					
A02-1	Soil	<0.001	<0.5	1.2	0.15	6.6	0.003	<1	0.31	0.012	0.10	1.4	0.4	2.41	>10	2086	6.4	1.15	1.0	3.81	
REP A02-1	QC	<0.001	<0.5	1.1	0.15	6.6	0.003	1	0.29	0.011	0.09	1.3	0.4	2.23	>10	1912	6.2	1.10	1.0		
A06-2	Soil	0.056	1.1	106.3	4.00	142.1	0.006	6	1.01	0.006	0.26	0.7	15.7	0.10	0.27	53	0.2	0.06	2.0	2.85	
REP A06-2	QC	0.055	1.0	103.5	3.91	148.9	0.006	6	1.00	0.006	0.25	0.7	15.5	0.11	0.28	45	0.2	0.05	2.0		
C04-1	Soil	0.021	0.7	27.0	1.02	1.0	0.004	2	0.53	0.009	0.12	2.1	3.1	2.46	>10	24751	10.7	2.60	4.1	3.75	
REP C04-1	QC																				3.75
Reference Materials																					
STD AMIS0342	Standard																				2.72
STD BVGEO01	Standard	0.072	23.0	175.3	1.30	283.4	0.228	3	2.27	0.199	0.88	4.8	5.4	0.58	0.62	77	4.8	1.06	6.7		
STD BVGEO01	Standard	0.073	24.5	189.3	1.32	302.3	0.231	4	2.37	0.217	0.92	4.7	5.7	0.60	0.62	110	4.9	1.06	6.7		
STD OREAS262	Standard	0.040	16.8	42.0	1.18	236.3	0.003	4	1.30	0.069	0.31	0.2	3.0	0.47	0.24	162	0.5	0.24	3.7		
STD OREAS262	Standard	0.038	17.3	42.7	1.16	236.5	0.003	4	1.31	0.069	0.32	0.2	3.0	0.48	0.26	180	0.6	0.23	3.7		
STD OREAS907	Standard																				2.84
STD AMIS0342 Expected																					2.67
STD BVGEO01 Expected		0.0727	25.9	187	1.3175	260	0.233	3.8	2.2628	0.1924	0.8669	5.3	5.97	0.62	0.6655	100	4.84	1.02	7.37		
STD OREAS262 Expected		0.04	15.9	41.7	1.17	248	0.0027	4	1.3	0.071	0.312	0.2	3.24	0.47	0.253	170	0.4	0.23	4.1		
BLK	Blank	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<1	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1		
BLK	Blank	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<1	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	16	<0.1	<0.02	<0.1		
Prep Wash																					
ROCK-WHI	Prep Blank	0.039	5.6	2.4	0.42	59.8	0.080	1	0.88	0.115	0.11	0.1	2.3	<0.02	<0.02	<5	<0.1	<0.02	3.5	2.70	
ROCK-WHI	Prep Blank	0.039	5.8	2.6	0.44	58.7	0.088	1	0.98	0.119	0.11	0.1	2.4	<0.02	<0.02	<5	<0.1	<0.02	3.8	2.71	



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TERRAIN STABILITY MAPPING REPORT

Ausenco Engineering Canada Inc.

New Polaris Gold Mine, Tulsequah River Valley, B.C.

Prepared for:

Ausenco Engineering Canada Inc.

Prepared by:

Del Ferguson, P.Geo., P.L.Eng.

July 29, 2024

21.0045-001

DRAFT

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Executive Summary

The Terrain study area, geographically centred on latitude 58°43'26.02"N, longitude 133°37'08.58"W, is situated approximately 100 km south of Atlin, British Columbia and 60 km northeast of Juneau, Alaska within the Tulsequah and Taku River valleys in the Stikine region of northwestern BC. These valleys are in the Boundary Ranges of the Coast Mountains, characterized by steep, rugged mountainous terrain dominated by rock, ice, and snow, with elevations ranging from sea level to 2,600 metres above sea level. The area is within the traditional territory of the Taku Tlingit River First Nation (TTRFN).

Area Soils

Orthic humo-ferric podzols, with a B horizon greater than 10 cm thick, are the main soils in the minesite area and road infrastructure to the north, including the Combined Storage Facility (CSF). *Orthic humic gleysols* with an organic-rich A horizon at least 10 cm thick overlying gleyed B horizons and parent material; and *typic mesisols* representing organic, wetland soils occupy floodplains and back-channel areas below the minesite and throughout much of the southern region of access roads. *Cumulic regosols*, with the parent materials underlain by buried A horizons, are dominant in treed and vegetated floodplain areas.

Surficial Material

The minesite area is underlain by poorly drained cobble, silt, sand *glaciofluvial/fluvial* deposits and silt, sand, gravel tills greater than 1 m thick and steep, potentially unstable terrace edges may be present. The floodplain region below the minesite and the Flannigan Slough along the southern region of the barge-to-minesite access road are underlain by imperfectly to poorly drained cobble, silt, sand *glaciofluvial/fluvial* deposits. The alluvial fans of Whitewater and Wilms creeks have thick accumulations of organic material that are poorly drained. The road from the minesite to the Combined Storage Facility (CSF) crosses the toe of moderate rockfall hazard slopes and then back onto moderate to moderately steep *colluvial and till covered slopes* above a glaciofluvial terrace.

Geohazards & Terrain Stability

Potential geohazards and terrain stability concerns which may impact or be influenced by the proposed development include flooding, snow avalanches, debris slides, debris flows, rockfall, channel avulsion and/or migration and terrace edge instability.

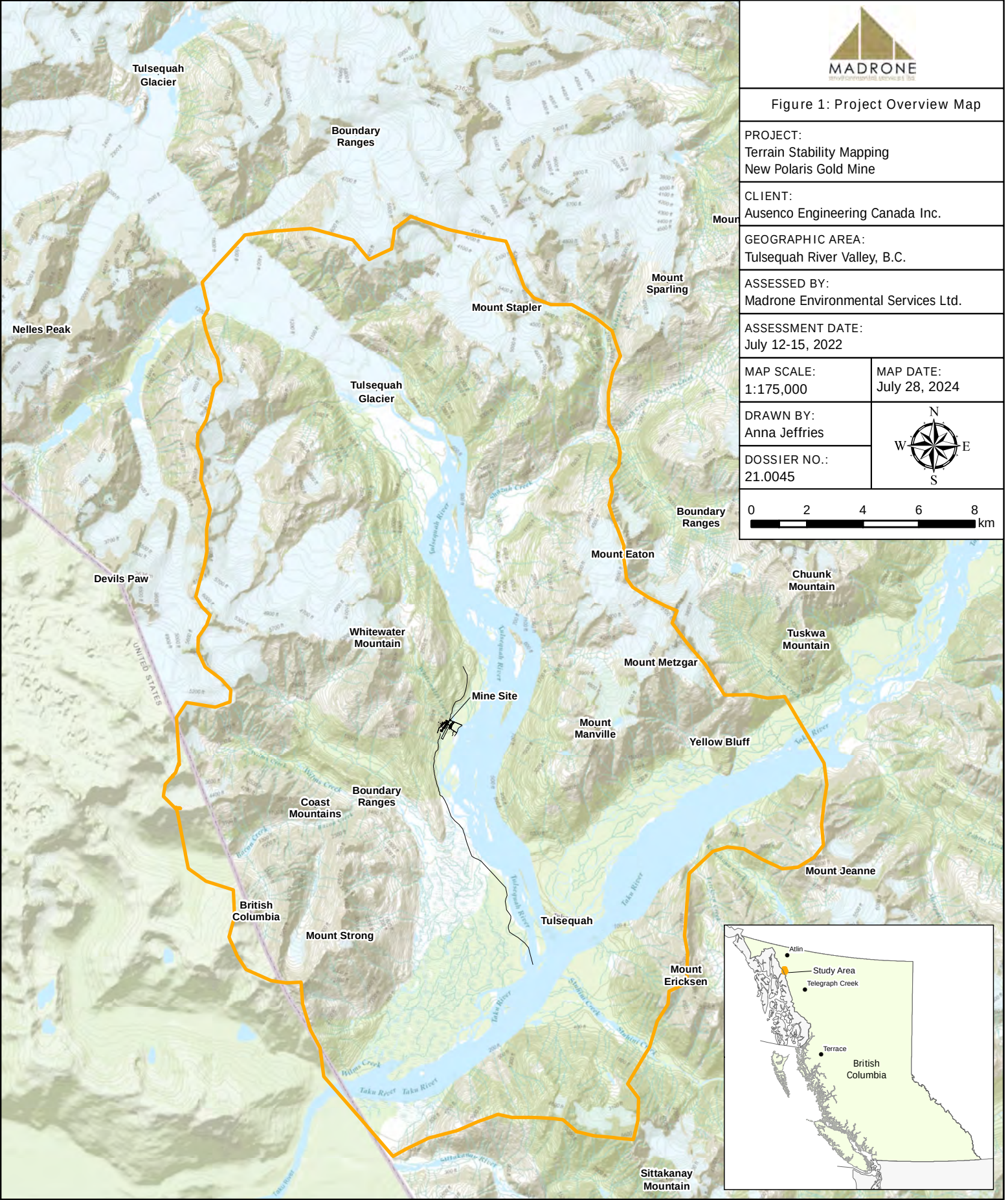
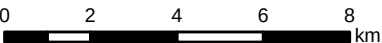


Figure 1: Project Overview Map

PROJECT: Terrain Stability Mapping New Polaris Gold Mine	
CLIENT: Ausenco Engineering Canada Inc.	
GEOGRAPHIC AREA: Tulsequah River Valley, B.C.	
ASSESSED BY: Madrone Environmental Services Ltd.	
ASSESSMENT DATE: July 12-15, 2022	
MAP SCALE: 1:175,000	MAP DATE: July 28, 2024
DRAWN BY: Anna Jeffries	
DOSSIER NO.: 21.0045	
	

- Study Area Boundary
- Operational Area

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Figure 2: Biogeoclimatic Zones

Figure 3: Soil Development Trends in the Boundary Ranges

Figure 4A: Surficial Material Map

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Figure 4D: Soil Drainage Map

Figure 4E: Field Verification Locations Map

Figure 5: Site Geohazards Map

TERRAIN MAPPING & STABILITY ASSESSMENT REPORT

Ausenco Engineering Canada Inc.

1 Introduction

1.1 Background

Type of Assessment: Terrain Mapping and Stability Assessment

Location: New Polaris Mine area, Tulsequah and Taku rivers, approximately 100 km south of Atlin, BC and 60 km northeast of Juneau, AK - **LAT:** 58° 42' 00" **LONG:** 133° 37' 44"

Desktop Review: pre-field-September 2021 to July 2022; post-field-August 2022 to December 2023

Field Verification and Field Personnel: July 12 to 15, 2022: Roberta Adams, P. Geo., Seanna Zintel, GIT, Jeremy Werbowski, GIT.

Proposed Operations: Mining and access infrastructure construction and maintenance

1.2 Purpose, Scope, Rationale and Limitations

The purpose of this project is to document soils and terrain criteria through desktop mapping and field checks for input into the environmental assessment for the study area. The study area, surrounding the Tulsequah River valley, is defined as the outside polygon boundary of the assessed area, which is roughly the same as the client-supplied project area.

Terrain within the study area contains areas of moderate to very steep gradient slopes that may be unstable or potentially unstable. As a result, it is possible that the development could be impacted by landslide activity, or initiate landslide activity. As such, potential terrain hazards and terrain stability were evaluated for the planned development area and proposed supporting infrastructure. A terrain hazard evaluation for the proposed development identifies known elements/resources at risk from a landslide initiating above, within or downslope of the minesite or proposed road infrastructure, or infrastructure failure from other geomorphic or hydrologic processes including:

- 1) Worker safety and impact on the minesite and infrastructure during and post-construction/development

- 2) Water quality and fisheries resources in Tulsequah River, Whitewater Creek, Wilms Creek or other small creeks in the development area and along roads

This report is intended to support the Ausenco baseline study. It should be considered a living document and preliminary assessment of the valued components (VC), potential hazards, and impacts over a regional scale identified as potentially impacting, or being impacted by the proposed mining operations. The infrastructure placement provided by the Client is general in nature. The current study is intended to help support selection or modification of current proposed sites for infrastructure. However, due to the scope and budget, it is not intended to be relied on for detailed design. Once infrastructure placement and conceptual design is finalized, the client should revisit this document to guide future more site-specific assessments that address all the potential hazards, impacts, and consequences in detail (environmental, geotechnical, erosion control, hazards, consequences, water management, etc.).

The reader should be aware that the classification and identification of the type and condition of the geological units present are judgemental in nature. Variations (even over short distances) are inherent and are a function of natural processes. Madrone Environmental Services Ltd. (Madrone) does not represent or warrant that the conditions listed in the report are exact, and the user should recognise that variations likely exist. If sub-surface conditions encountered are significantly different than those identified, the conclusions and recommendations contained in this report should be reviewed by Madrone, with amendments made as needed.

This report does not imply that a landslide or other geomorphic or hydrologic event will or will not occur prior to, during or following the proposed development. An estimate on the likelihood of occurrence of a specific hazardous landslide is given in relation to the proposed operations. The partial risk to the identified resources from the specific hazardous landslide has been assessed in a general sense for the proposed development area. Elements included in the partial risk analysis for the proposed development are those indicated on the mapping and materials determined in this report and by previous assessments. Additional elements may exist.

This Terrain Stability Assessment (TSA) has been prepared in accordance with generally accepted geoscience and engineering practices in the British Columbia resource sector and in general conformance with the "Guideline for Professional Services in the Forest Sector – Terrain Stability Assessments"¹ and "Landslide Assessments in British Columbia - Version 4.1"². General observations are made on the existing slope gradients, shape, morphology, and stability. Information on the surficial material and bedrock conditions are gathered from available data obtained from air photos, previous surveys, assessments, and reports. A comparative-observational approach has been used to provide rationale for conclusions and recommendations. This approach relies on the examination of existing data and professional judgement and experience to assess the response of the terrain to the proposed development.

Classifications were produced by Madrone during desktop mapping, and further defined in the field, providing an effective list of materials and processes encountered in the area. Surficial sediment classifications (Figure 4A), surface expressions (Figure 4B), and geomorphological features (Figure 4C) follow the conventions defined in the publication Terrain Classification System for British Columbia B.C. Ministry of

¹ APEGBC/ABCPF 2010

² EGBC - 2023

Environment 1997. Drainage categories (Figure 4D) are adapted from Land Management Handbook 47 - Silviculture Prescription Data Collection Field Handbook³; and Land Management Handbook 25 – Field Manual for Describing Terrestrial Ecosystems⁴. Soil descriptions rely on the Canadian System of Soil Classification, 3rd Edition. Tables describing surface expressions and drainage are included in Appendix I.

This Terrain Stability Assessment (TSA) has been prepared to conform with the “Guidelines and Standards to Terrain Mapping in BC”⁵, “Mapping and Assessing Terrain Stability Guidebook”⁶ and “Guidelines for Professional Services in the Forest Sector-Terrain Stability Assessments”⁷. Qualitative evaluations outlined in this report are the product of ratings in Appendix I, combined with assessor(s) training, observational skills, knowledge, and experience. The response of the terrain to the proposed development, along with recommendations and rationale rely on a process of comparing observations with past response of similar terrain in similar developments. Interpretations are based on professional judgement and experience, in combination with examining Google Earth™ imagery, topographic maps, air photos, and other available information. Natural variations in geologic and hydrologic conditions exist and are a function of natural processes that may continue to change through time and space. Further, classification and identification of these conditions are made through a judgemental process. Subsequently, Madrone does not guarantee or characterize that the conditions described in the report are precise and the reader should be aware that variations may exist. Should site conditions be observed as inconsistent with those identified in this report, Madrone should be notified in a timely manner, so that conclusions and recommendations contained within this report can be reviewed and amended as required.

1.2.1 Methodology

Initially, a prefield (desktop) analysis was conducted from Spring 2021 to July 2022, reviewing available data listed in Section 1.2.2 and mapping predicted soils and terrain criteria. Polygon linework and labelling were completed at a scale of 1:25,000 within ArcGIS 10.7 for Desktop. Reference data for mapping was provided by Ausenco and delivered through a shared folder online. The spatial data included base layers such as contours, lakes, rivers, and wetlands. BAPID 1054 – a TEM product mapped in 1999 – was available through the TEIS network and DataBC. Plot data tables collected in 1999 for soils and environment were linked to the plot data locations for reference during mapping. Ortho imagery available via ESRI’s ArcGIS Online was used throughout polygon delineation and attribution. Table 1 provides a summary of the data sources referenced for the New Polaris mapping product.

³ BC Ministry of Forests and Range, 2000

⁴ BC Ministry of Forests and Range. 2010

⁵ Resources Inventory Committee, 1996

⁶ Forest Practices Code of BC, 1999

⁷ APEGBC/ABCFP, 2010

TABLE 1: Summary of Data Sources Reviewed for use in the New study area

Data	Layer	Data Source
Freshwater Atlas Rivers	FWA_RIVERS_POLY	Client Provided
Freshwater Atlas Lakes	FWA_LAKES_POLY	Client Provided
Freshwater Atlas Wetlands	FWA_WETLANDS_POLY	Client Provided
Freshwater Atlas Stream Network	FWA_STREAM_NETWORKS_SP	Client Provided
Historical Buildings	HISTOCIAL_BUILDING_FEATURE_POLY	Client Provided
Right of Way	ROW	Client Provided
Contours (20m interval)	CONTOUR	Client Provided
Current Buildings	CURR_BUILDING_FEATURE_LINE	Client Provided
Digital Road Atlas	DGTL_ROAD_ATLAS_MPAR_SP	Client Provided
Water Sample Site Locations	Water Sampling Site	Client Provided
Contours (100m interval)	FO_2570009_1_Clip	DataBC Catalogue
TEM Polygons (BAPID 1056)	tem_1056	EcoCat/LWRS
TEM Plots (BAPID 1056)	tem_1056_tblEnv	EcoCat/LWRS
Orthophoto Basemap Maxar – 0.5m resolution - 8/29/2019	ESRI World Imagery Basemap	Basemap available through ArcMap – ArcGIS Online

1.2.1.1 Quality Assurance and Internal Review

A thorough final internal QA was completed to capture and change any errors in the database. In addition, all digital files have gone through internal quality control using ArcGIS to ensure accuracy of both the polygon delineation and the integrity of the datasets. Quality control was used to assure that the product meets the approval of all mappers.

1.2.1.2 Digital Products

The final GIS product, created in ArcGIS 10.7, represents a seamless digital feature class with corresponding attributes for each polygon. Polygon cleaning (*i.e.*, topology) and map production was conducted by Madrone's in-house digital mapping department who prepared the final files to meet provincial standards and for delivery in an ArcGIS compatible format. The spatial databases are in accordance with the current *Terrestrial Ecosystem Information Digital Data Submission Standard – Draft for Field Testing (Database and GIS Data Standards)* (RISC 2015).

The seamless mapping product contains the polygons with the corresponding digital polygon attribute database. Additional polygon non-standard attributes were included as User Defined tables in the project geodatabase. Each feature within the spatial data has an appropriate feature code and a unique identifier (POLYPROJID) linking spatial features to the attribute database(s).

1.2.1.3 Field Work

A 3-day field assessment was conducted to check the accuracy and quality of the desktop data. This was accomplished by helicopter fly-over with selected intermittent ground checks. Including 26 BAPID 1056 plots⁸ that fall within the study area, 139 of the 1593 polygons have ground and/or helicopter overview verification. This equates to 9% of the polygons being ground-checked⁹ (Figure 4E). As such this reconnaissance terrain stability assessment qualifies as terrain survey intensity level D (TSIL D). Subsequently a post field analysis was done to finalize mapping and classification of soils, surficial material, drainage, and terrain for the study area. Potential hazards associated with the proposed development area (minesite and access) were determined and reporting was finalized.

1.2.2 Background Review Data

For this assessment, the following were collected and reviewed:

- iMapBC¹⁰
- BC Habitat Wizard¹¹
- Air photos for Tulsequah River area via UBC's Geographic Information Centre; BC82009:75-73, BC82009:5658, BC5614:292-288, BC5614:176-182, BC5614:171-166, BC5614:52-56, A11631:423-421, A11631:419-418, A11446:129-124, A11446:48-53, A11446:36-31
- Previous reports and assessments provided by Ausenco Engineering Canada Inc. (see Section 2.3)
- BC Ministry of Forests Land Management Handbook 66, Forest hydrology and geomorphology in BC
- BC Ministry of Forests Land Management Handbook Land Management Handbook 26, a Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region, Part 1
- Geological Survey of Canada Memoir 362: Geology and Mineral Deposits of Tulsequah Map-Area, BC
- Biogeoclimatic Ecosystem Classification mapping
- Regional soils mapping and inventory
- Bedrock geology mapping
- Surficial geology and terrain mapping
- Climate data¹²

⁸ Robert Fuller and Forest Information Systems. *Tulsequah Chief Mine and Access Road Expanded Terrestrial Ecosystem Mapping* (for the BC Ministry of Water, Land, and Air Protection). October 2002

⁹ Mapping and Assessing Terrain Stability Guidebook, FPC-BC, 1999

¹⁰ Government of British Columbia. (updated 2015, September 3). *iMapBC 2.0*. Retrieved November 22, 2022, from <http://maps.gov.bc.ca/ess/sv/imapbc/>.

¹¹ Government of British Columbia. (updated 2015, September 3). *BC Habitat Wizard*. Retrieved November 22, 2022, from <https://maps.gov.bc.ca/ess/hm/habwiz/>.

¹² Government of Canada (2022). Canadian Climate Normals 1981-2010. Retrieved November 22, 2022, from https://climate.weather.gc.ca/climate_normals/.

2 Overview

2.1 Study Area

The Study Area is situated approximately 100 km south of Atlin, British Columbia and approximately 60 km northeast of Juneau, Alaska within the Tulsequah and Taku River valleys in the Stikine region of northwestern BC. The Study Area is geographically centred on latitude 58°43'26.02"N, longitude 133°37'08.58"W and the topographic map coverage of the area is provided by B.C. TRIM Series maps 104K062, 104K063, 104K072, and 104K073 at a scale of 1:20,000. The boundary of the Study Area roughly extends from Tulsequah Glacier at Tulsequah Lake in the northwest to Sittakanay Mountain in the southeast, and from the BC-Alaska border in the west to the Taku River at Mt. Jeanne in the east. The Study Area covers approximately 50,000 ha in area. The general location and area topography of the Study Area is illustrated in **Figure 1**. The area is within the traditional territory of the Taku Tlingit River First Nation (TTRFN).

2.1.1 Physiography

The Study Area falls within the Coast Mountains physiographic region of BC, specifically the Boundary Ranges¹³. The Boundary Ranges are characterized by steep, rugged mountainous terrain dominated by rock, ice, and snow, with elevations ranging from sea level to 2,600 meters above sea level. The Study Area is composed of the lower Tulsequah and Taku River valleys, both 1.5 km to 4 km wide and parabolic throughout their extents, and the high relief west- and east-facing slopes of the local northwest-trending Boundary Ranges that flank and divide the two southwesterly flowing river systems¹⁴. The current physiology of the region comprising the Study Area is a direct result of contemporary alpine glaciation that continues to modify the local topography through erosion of local mountains by glacial dynamics and meltwater and continued mass wasting and deposition of glacial sediments into the fluvial systems below. Accordingly, the region is highly subject to geomorphic hazards (i.e., mass movements, outburst floods) resulting from glacial downwasting and debuitressing, and climate change effects¹⁵.

The lower Tulsequah River Valley, the primary valley within the Study Area, extends from the Tulsequah Glacier in the north to the confluence of the Tulsequah River with the Taku River in the south of the Study Area. The Tulsequah River is a braided river system primarily fed from meltwater from the Tulsequah Glacier and its proglacial lake. The Tulsequah Glacier is an outlet glacier extending for 30 km from its source area in

¹³ BC Ministry of Forests. (1993, June). *Land Management Handbook 66, Compendium of forest hydrology and geomorphology in British Columbia, Chapter 2: Physiography of British Columbia, Figure 2.1*. Retrieved November 22, 2022, from https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/Lmh66/Lmh66_ch02.pdf.

¹⁴ Geological Survey of Canada. (1971). *Memoir 362: Geology and Mineral Deposits of Tulsequah Map-Area, British Columbia*. J.G. Souther. Retrieved November 22, 2022, from <https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&search1=R=119987>.

¹⁵ Geertsema et al. (2006, February). *An Overview of Recent Large Catastrophic Landslides in Northern British Columbia, Canada. Engineering Geology, February 2006*. Retrieved November 22, 2022, from <https://www.sciencedirect.com/science/article/abs/pii/S0013795205002267>.

the northwest, a southeast portion of the larger Juneau Icefield¹⁶. The glacier is the most significant within and up-valley of the Study Area as it dams two major lakes within tributary valleys on its west (Tulsequah Lake) and northeast margins (Lake No Lake), both of which drain periodically as Jökulhlaups (glacial lake outburst floods) during retreat of the Tulsequah Glacier¹⁷.

2.1.2 Climate and Biogeoclimatic Zones

2.1.2.1 Climate

The nearest Environment Canada climate station with complete historical weather data (1981 to 2010 Climate Normals; 30-year average) is Atlin (ID 1200560; 59°34' N, 133°42' W), located approximately 94 km northwest of the geographic centroid of the Study Area at an elevation of 674 metres above sea level. However, climatic conditions within the Study Area are likely most similar to those recorded at the climate station Pleasant Camp (ID 1206197; 59°27' N, 136°22' W)¹⁸ located approximately 180 km northwest of the Study Area at an elevation of 274 metres above sea level and within a similar physiographic setting in a coastally influenced major river valley. In general, snow accumulation will be greater at higher elevations, and the Study Area sees a significant amount of precipitation with extreme daily precipitation events tending to occur in the fall.

During the thirty-year period spanning 1981 to 2010, the mean annual precipitation at Pleasant Camp climate station was 1426.9 mm including a mean annual snowfall of 723.8 cm, while extreme daily precipitation was 158.9 mm on November 2, 1974. Climate data recorded at all climate stations within 200 km of the Study Area is presented in **Table 2**.

¹⁶ Geertsma and Clague. (2004, May 19). *Jökulhlaups at Tulsequah Glacier, northwestern British Columbia, Canada. The Holocene, February 2005*. Retrieved November 22, 2022, from https://www.researchgate.net/publication/233742243_Jökulhlaups_at_Tulsequah_Glacier_northwestern_British_Columbia_Canada.

¹⁷ Geertsema. (2000, December). *Outburst Floods at Tulsequah Glacier; Northwestern British Columbia*. Forest Sciences, Prince Rupert For. Region. Ext. Note 43.

¹⁸ Government of Canada (2022). *Canadian Climate Normals 1981-2010 Station Data. Pleasant Camp (ID 1200560)*. Retrieved November 22, 2022, from https://climate.weather.gc.ca/climate_normals/.

Table 2. Historical Climate Normals (1981-2010) for Environment Canada climate stations within 200 km of the Study Area.

Station	Proximity to Study Area (km)	Latitude, Longitude	Elevation (masl)	Mean Annual Precipitation (mm)	Mean Annual Snowfall (cm)	Extreme Daily Precipitation (mm)
Atlin	93.83	59° 34' N, 133° 42' W	674	364.7	163.9	54.0; Nov. 29, 1988
Teslin A	168.81	60° 10' N, 132° 44' W	705	346.3	148.4	37.8; July 26, 1950
Carcross	172.42	60° 10' N, 134° 42' W	660	279.8	127.6	61.0; Feb. 9, 1923
Pleasant Camp	176.49	59° 27' N, 136° 22' W	274	1426.9	723.8	158.9; Nov. 2, 1974

2.1.2.2 Biogeoclimatic Zones

The BC Ministry of Forests Biogeoclimatic Ecosystem Classification system is an accepted system for describing and classifying ecosystems within BC and delineates areas into “biogeoclimatic zones” according to climate, elevation, soils, and potential climax vegetation¹⁹. The Study Area contains three (3) BEC zones and two (2) subzones²⁰, which range from Coastal Western Hemlock zones with wet maritime (CWHwm) subzones and Mountain Hemlock zones with leeward moist maritime (MHmm2) subzones along the coastally influenced lower Tulesequah and Taku rivers, to Coastal Mountain-heather Alpine zones at high elevations where prolonged heavy snowpack and glaciers dominate. **Figure 2** shows the locations of the zones and subzones within the Study Area.

¹⁹ Pojar et al. (1987, December). *Biogeoclimatic Ecosystem Classification in British Columbia. Forest Ecology and Management Volume 22, Issues 1-2, 1 December 1987, Pages 119-154*. Retrieved November 22, 2022, from <https://www.sciencedirect.com/science/article/abs/pii/0378112787901009>.

²⁰ Government of British Columbia. (2022). *BC Ministry of Forests Biogeoclimatic Ecosystem Classification Subzone/Variant Map for the Cassia Subunit, Skeena Stikine Resource District, Skeena Region, Map 2 of 4*. Retrieved November 22, 2022, from https://www.for.gov.bc.ca/ftp/HRE/external!/publish/becmaps/PaperMaps/wall/DCA_CassiarSubunit_SkeenaStikineResourceDistrict_SkeenaRegion_2of4_wall.pdf.

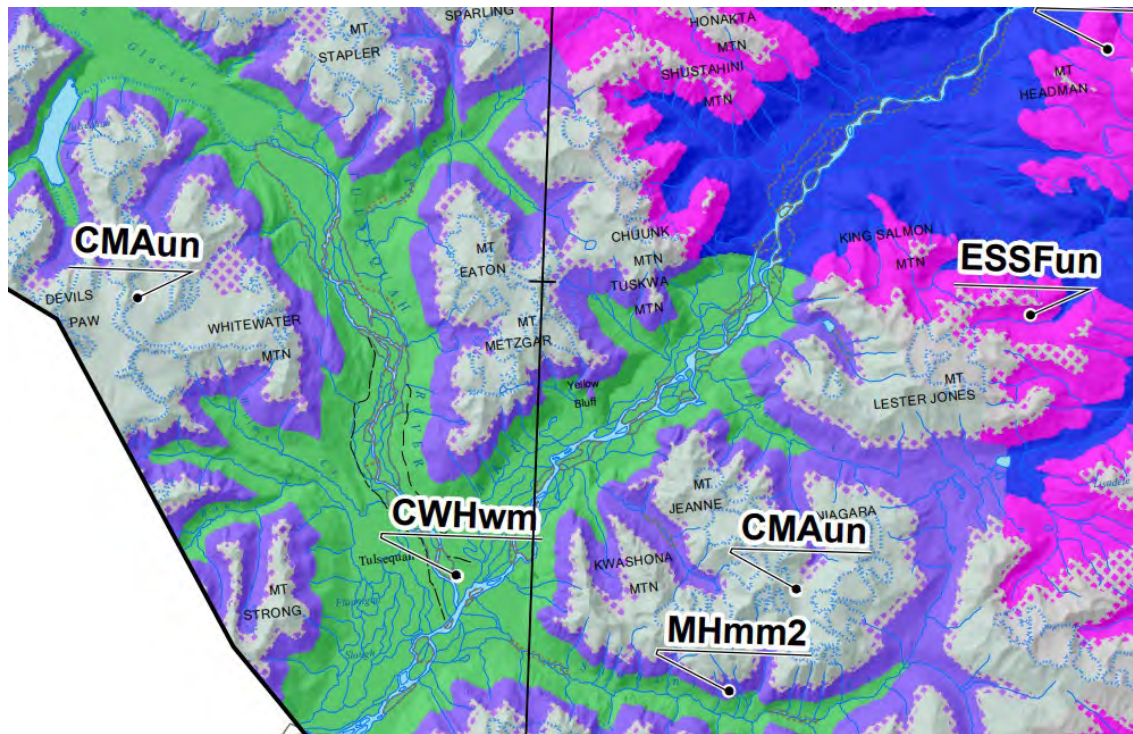


Figure 2. Biogeoclimatic Ecosystem Classification (BEC) regional zoning map of the Study Area and surroundings. Note the distribution of subzones: CMAun (grey) in the high elevation alpine and alpine tundra areas where prolonged heavy snowpack and glaciers dominate; MHmm2 (purple) in the mid to high elevation slopes in the moist, coastally influenced lower Tulesequah and Taku River valleys; and CWHwm (green) in floodplain and lower elevation areas within the wet, coastally influenced lower Tulesequah and Taku River valleys. Adapted from the Government of British Columbia BEC Subzone/Variant Map for the Cassia Subunit, Map 3 of 4 (2021).

Coastal Western Hemlock, wet maritime²¹

The CWHwm is the wet maritime variant of the Coastal Western Hemlock zone and is restricted to low elevations (sea level to 600 m asl) within the Coast Mountains, northern Kitimat Ranges, and southern Boundary Ranges. The subzone is the most northerly of the CWH zones and is characterized by a wet, humid, mild maritime climate with heavier snow and a shorter growing season than more southerly subzones. Plant species diversity is low for this subzone due to heavy snowfall and steep, rocky terrain. Forests within this subzone are dominated by Western hemlock and Sitka spruce, while Western red cedar and yellow cedar are infrequent and amabilis fir is absent.

Mountain Hemlock, leeward moist maritime²²

²¹ BC Ministry of Forests. (1993, June). *Land Management Handbook 26, a Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region, Part 1: CWHwm*. Retrieved November 22, 2022, from https://www.for.gov.bc.ca/hre/becweb/Downloads/Downloads_SubzoneReports/CWHwm.pdf.

²² BC Ministry of Forests. (1993, June). *Land Management Handbook 26, a Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region, Part 1: MHmm2*. Retrieved November 22, 2022, from https://www.for.gov.bc.ca/hre/becweb/Downloads/Downloads_SubzoneReports/MHmm2.pdf.

The MHmm2 is the moist maritime variant of the Mountain Hemlock zone and is restricted to high elevation (1000 m asl to 1600 m asl) eastern slopes of the Kitimat Ranges and Coast Mountains, as well as the western slopes of the Hazelton Mountains. The subzone is characterized by a subarctic climate transitional between the coast and interior, with cold, dry winters that bring heavy, wet snowpack 2 m to 3 m thick; frozen soils are rare. Forests within this subzone are dominated by Mountain hemlock and amabilis fir, while Western hemlock and subalpine fir are infrequent.

Coastal Mountain-heather Alpine²³

The CMAun zone occurs at high elevations (1600 m asl in the south of the zone, 1000 m asl in the north) along the windward spine of the Coast Mountains and the mountains of Vancouver Island and Haida Gwaii where snowpack is deep. The subzone is characterized by the harshest climate of any of the BEC zones where temperatures are cold for most of the year and the treeline is lowered by heavy and prolonged snow cover.

2.1.3 Hydrology

The Study Area contains two significant river systems (Tulsequah River and Taku River) and one large proglacial lake, as well as numerous ice- and snow-fed tributary mountain streams flowing from higher elevation glaciers and glacial lakes in the surrounding Boundary Ranges. Two large glacially-dammed lakes, Tulsequah Lake and Lake No Lake, are situated just beyond the northern extent of the Study Area within tributary valleys on the southwest and northeast sides of Tulsequah Glacier, respectively. The entirety of the Tulsequah River (a tributary of the Taku River, approximately 22 km from Tulsequah Glacier to its mouth at the confluence with the Taku River) and approximately 24 km of the Taku River are contained within the Study Area.

2.1.3.1 Taku River

The Taku River is the major river system within the Taku River watershed with high economic and cultural importance due to its high salmon productivity, its historic and current use for subsistence hunting and fishing by the Taku River Tlingit First Nation, ecotourism, and the surrounding forestry and mining developments. Approximately 24 km of the river is contained within the Study Area boundaries, extending from the southeast boundary to the southwest. The river originates within the Boundary Ranges of British Columbia approximately 26 km northeast of the Study Area at the confluence of the Inklin and Nakina Rivers and flows for approximately 265 km to the southwest where it drains into Taku Inlet, approximately 48 km east of

²³ BC Ministry of Forests. (1993, June). *Land Management Handbook 26, a Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region, Part 1: CMA*. Retrieved November 22, 2022, from https://www.for.gov.bc.ca/hre/becweb/Downloads/Downloads_SubzoneReports/CMA.pdf.

Juneau, Alaska²⁴. Within the Study Area, the Taku River is characterized as a braided river system with a low gradient (<1%, falling approximately 73 m over its length), and contains a high sand and gravel bedload, aggrading beds, and frequent channel avulsion during floods²⁵. The upper and middle portions of the river contained within the Study Area flow through broad (approximately 1.5 to 4 km wide) U-shaped valleys with flat bottoms before emerging onto an even broader braided river plain at the confluence with the Tulsequah River.

River stage is generally very low in the winter (December and January) to early spring (April) but rises to its maximum height between late June and mid-July, with 90% of annual discharge occurring from May to November and maximums occurring during peak snow melt and from glacial lake outburst floods (Jökulhlaups) resulting from high water levels and subsequent dam bursts of blockage by the Tulsequah Glacier. A USGS gauge station is present approximately 7 km downstream from the Study Area boundary and has gauged continuous streamflow on the Taku River since July 1987. The annual mean discharge of the Taku River is 388 m³/s, while the monthly mean discharge ranges from a minimum of 55 m³/s in February to a maximum of 974 m³/s in June²⁶; other sources report a mean annual discharge of 600 m³/s²⁷. Discharge data at the Taku River USGS gauge station indicates peak instantaneous flows occur due to glacial lake outburst floods (generally in July or August), with large outburst floods resulting in Taku River discharges doubling or tripling within a 2-to-3-day period. The maximum recorded instantaneous peak discharge of 3625 m³/s occurred between June 23 and June 26, 2004, resulting from the outburst of Lake No Lake.

2.1.3.2 Tulsequah River

The Tulsequah River is a tributary of the Taku River with its entire length (approximately 22 km) contained within the Study Area. The river supports and provides important spawning habitat for many Pacific salmon species. The floodplain margins and lower Tulsequah River Valley slopes have a history of mineral exploration and mining operations since the 1800s (i.e., Tulsequah Chief, Polaris). The headwater area of Tulsequah River is occupied by the Tulsequah Glacier and its proglacial lake within the northwest reaches of the Study Area, and the river flows south through the centre of the Study area to its confluence with the Taku River. The river is characterized as a broad gravel bed floodplain with a low gradient (approximately 1%, though the gradient is generally steeper in the upper 4 km) and with a high sediment load due to extreme flows from glacial lake

²⁴ United State Geological Survey (USGS). (2007). *Hydrology and Glacier-Lake Outburst Floods (1987-2004) and Water Quality (1998-2003) of the Taku River near Juneau, Alaska*. Retrieved November 22, 2022, from <https://pubs.usgs.gov/sir/2007/5027/pdf/sir20075027.pdf>.

²⁵ Geological Survey of Canada. (1948). *Memoir 248: Taku River Map-Area, British Columbia*. Retrieved November 22, 2022, from <https://emrlibrary.gov.yk.ca/gsc/memoirs/248/memoir-248.pdf>.

²⁶ USGS, 2007.

²⁷ Richardson, J. S., & Milner, A. M., 2005.

outburst floods from localities normally impounded by the Tulsequah Glacier^{28,29}. Similar to the Taku, the river flows through a broad (approximately 1.5 to 4 km wide) U-shaped valley with a flat bottom before emerging onto an even broader plain at the confluence with the Taku River.

“Eventually, all lakes may vanish, and the flow regime of Tulsequah River will return to that of a gravel-bed river that is not influenced by extreme flows. The exact form of such a river cannot be predicted in detail, but there would probably be fewer channels. With a lesser sediment load associated with a much smaller glacier, the river might incise its floodplain” Geertsma and Clague (2005).

2.1.3.3 Tulsequah Glacier, Tulsequah Lake, Lake No Lake and new proglacial lake

The Tulsequah Glacier Columbia drains east from the Juneau Icefield and is known for its Jökulhlaups or glacier lake outburst floods (GLOF) from Tulsequah Lake and Lake No Lake dammed by the glacier. The current retreat of the main glacier at a faster rate than its tributary glaciers raises the potential for more glacier dammed lakes to form. The main terminus has disintegrated in a proglacial lake. By 2017 the terminus has retreated 2900 m since 1984, with a new 3 km long proglacial occupying the former glacier terminus³⁰. The 1988-2004 period identified 41 outburst floods from 1987-2004³¹.

On July 27th-June 30th, 2021, the margin of the distributary glacier tongue receded ~500 m back to the main glacier margin, representing a terminus collapse generating icebergs likely resulting from a fall in water level. The large proglacial lake that has formed after 1984 due to retreat has aided in spreading out discharge from ice dammed lakes GLOF's of Tulsequah Glacier. This lake is expected to expand, and the damming ability of the glacier should decline, which will eventually lead to less of a GLOF threat from Lake No Lake³².

2.1.3.4 Whitewater Creek

Whitewater Creek and several tributaries originate on alpine slopes, gullies and basins on the eastern flanks of Whitewater Mountain, covering a watershed area of approximately 700 hectares. The main channel flows east into a small wetland at the northern end of the New Polaris minesite, then turns south following the western edge of the airstrip. Approximately 300 m south of the airstrip, the channel diverges, with one branch flowing east-northeast for approximately 500 m into the Tulsequah River, and the other flowing southward

²⁸ USGS, 2007.

²⁹ Geertsema and Clague, 2004.

³⁰ Pelto 2017

³¹ Neal 2007

³² Pelto 2021

along the western edge of the valley floor for 1.2 km before emptying into the Tulsequah River. Whitewater Creek has potential debris flow and snow avalanche influences on both the minesite and main access road.

2.1.3.5 Wilms Creek and Bacon Creek

Wilms Creek and Bacon Creek drain a large, combined watershed (>8,000 hectares) originating along the USA/Canada border alpine region. Wilms Creek enters the Tulsequah Valley approximately 6 km northwest of the Tulsequah/Taku rivers junction. It meanders southward for approximately 10 km along the western edge of the valley floor before entering the Taku River near the USA/Canada border. Near its initial entrance onto the Tulsequah Valley floor subsidiary alluvial channels veer eastward for 1.2 km across the northern end of the fan and enter the Tulsequah River. This branch of Wilms Creek would have influences on the mine access road.

2.1.3.6 Shazah Creek

Shazah Creek enters the Tulsequah Valley approximately 7 km upstream from the New Polaris minesite, draining a watershed east of the Tulsequah River. Its mouth is the location of the Tulsequah Chief mine, a historic copper, lead, zinc and gold mine. From 1951 to 1957, mining at the site caused acid mine drainage which has continued discharging into the Tulsequah River and is currently the focus of environmental reclamation efforts. Shazah Creek has no immediate influence on the New Polaris minesite or access road.

2.1.4 Bedrock Geology

Regionally, the Boundary Ranges are made up of the upper extent of the Coast Plutonic Complex, characterized by extensive plutonism, deformation, and intrusions from the Jurassic to the Tertiary³³. The bedrock within the Coast Plutonic Complex consists of felsic intrusive rocks and mafic metamorphic or volcanic rocks. Bedrock geology within the Study Area is composed of seven (7) different igneous and metamorphic units, ranging in age from Pre-Upper Triassic to Late Cretaceous and Early Tertiary³⁴. The dominant bedrock types are quartz diorite, granodiorite, gneiss, schist, greenstone, and volcanics. While bedrock topography controls most of the landscape, glacially derived sediments can be thick over bedrock in lower elevations or recently deglaciated bedrock at higher elevations due to contemporary alpine glaciation and glacial processes.

Geology of Minesite and Road Access Areas

³³ Monger, J., Price, R., & Tempelman-Kluit, D. (1982). Tectonic accretion and plutonic welts in the Canadian Cordillera. *Geology*, 10. [https://doi.org/10.1130/0091-7613\(1982\)10<70:TAATOO>2.0.CO;2](https://doi.org/10.1130/0091-7613(1982)10<70:TAATOO>2.0.CO;2).

³⁴ Geological Survey of Canada. (1971). *Geology of Tulsequah and Juneau, Cassiar District, British Columbia, Map 1262a*. Retrieved November 22, 2022, from <https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&search1=R=119987>.

Regional geological mapping indicates that most of the proposed New Polaris operational area is comprised mostly of the Stikine Assemblage of volcanoclastic rocks and Deformed Stikine Assemblage of mudstone, siltstone, shale and fine clastic sedimentary rocks. South of the airport, a narrow northwest-trending band of greenstone, greenschist metamorphic rocks of the Whitewater Metamorphic Complex cuts through the area and northwest-trending bands of ultramafic rocks exist up Whitewater Creek, west of the minesite. North of the minesite, a narrow north-trending band of gabbroic and dioritic rocks have been intruded into the north and northwest structural fabric of the area.

2.1.5 Glacial History and Surficial Materials

Due to the proximity of the Study Area to the coast, advance and retreat of ice sheets during the Quaternary period have drastically modified the valleys and drainage patterns within this mountainous area. Moreover, present glaciation within and surrounding the Study Area continues to serve as the dominant control over topographic development and modification. In BC, alternating glacial and interglacial periods were both responsible for shaping the current landscape.

The Olympia Interglacial preceded the last major glaciation, the Fraser Glaciation. During the Olympia, valleys and coastal lowlands were free of ice, and subject to depositional environments similar to those that exist today; fluvial and organic sediments were deposited, floodplains were formed at different levels and deltas pro-graded into lakes and the sea. Today it is uncommon to find these Olympia age deposits undisturbed, as they were later reworked and eroded during the Fraser glaciation.

The Fraser Glaciation was the last major glaciation in BC and was the result of climatic cooling, which triggered the growth of alpine glaciers. As these glaciers grew, they ultimately travelled down the mountains into the lower elevations and coalesced into sheets of ice. Within the study area, the existing drainage system that began during the non-glacial period was disrupted, resulting in deposition of new surficial sediments. During the last glacial period, glaciers advanced and receded, leading to meltwater deposits that were subsequently re-buried during later ice advances. Recession created temporary lakes as masses of stagnant ice blocked drainage. In general, glaciofluvial and glaciolacustrine sediments accumulated within the valleys and till was deposited along the mountain slopes and valley sides.

As ice continued to expand, its weight resulted in depression of the lowlands, changing the marine shoreline dynamics. These lowlands remained depressed after the retreat of ice, resulting in the advance of marine water inland to elevations of up to 200 m above the modern sea level.

Within the Study Area, a wide variety of sediments were deposited, and this provides a more refined record of late glacial events. For the purposes of this study, it is important to note that changes in the depositional environment during glaciation have resulted in a complex stratigraphy of Quaternary deposits. In general, the study area is composed of morainal mantles (till) over bedrock, with glaciomarine deposits found along the shorelines and into the valleys up to an elevation of 200 m above sea level. Glaciofluvial sediments

deposited by meltwater rivers issuing from retreating glaciers can be found at lower elevations within the mountain valleys, with various mantles, cones or aprons of colluvium that have accumulated since the final retreat of glacial ice about 12,000 years ago. The valley bottoms are cloaked with a mosaic of alluvial fans and active modern alluvial plains subject to flooding and channel shifting.

2.1.6 Soil Development

Provincial soils mapping does not cover the Study Area. However, a soil mapping inventory report³⁵ exists for the Stikine-Iskut area which describes soil development in a similar biophysiological setting within the coastally influenced Boundary Ranges. The northern boundary of the Stikine-Iskut soil mapping area is approximately 120 km southeast of the Study Area. In general, soil characteristics vary along the climatic and biophysiological gradients that exist from wetter, low elevation areas near the coastal inlets and mouths of rivers to the more continental climates in the interior areas and the rugged alpine environments at higher elevations. As such, distinct soils or soil groupings are distributed in distinct landscape settings within a physiographic area. Six (6) distinct soil classifications are identified within the Boundary Ranges coastal climate area:

- 1) Orthic Humic Gleysols
- 2) Typic Mesisols
- 3) Cumulic Regosols
- 4) Orthic Regosols
- 5) Orthic Humo-Ferric Podzols
- 6) Sombric Humo-Ferric Podzols

Soil development trends and distributions within the coastal climate areas of the Boundary Ranges are presented in **Figure 3** and described below:

2.1.6.1 Regosols³⁶

Soils of the Regosolic order represent young, poorly developed mineral soils in unstable or rapidly changing landscapes. These soils are characterized by thin or absent B or organic-rich A horizons that would normally be indicative of soil development, meaning the soil profile primarily consists of the parent material (the C horizon; i.e., till, colluvium, fluvial sediments).

³⁵ BC Ministry of Environment, Lands, and Parks. (1992). *Biophysical Soil Landscapes Inventory of the Stikine-Iskut Area. Mapsheets 104F, 104G, and Parts of 104B and 104H*. Retrieved November 22, 2022, from https://www.env.gov.bc.ca/esd/distdata/ecosystems/Soils_Reports/bc_stik_report.pdf.

³⁶ Canada, A. and A.-F. (2013a, December 13). *Canadian System of Soil Classification, 3rd edition*. <https://sis.agr.gc.ca/cansis/taxa/cssc3/RG/R/index.html>.

Orthic Regosols are a subgroup that have a thin or absent A horizon, which would normally be indicative of a developed soil with organic matter accumulation at the surface. Within the Boundary Ranges coast climate area, these undeveloped soils are commonly found in braided floodplains and areas subject to flooding; areas of recent deposition on fans and terraces; alpine areas with active periglacial processes, deep snow, and surrounding glaciers, or where morainal material has been recently deposited.

Cumulic Regosols are a subgroup in which the parent material is underlain by buried A horizons. Within the Boundary Ranges coast climate area, these soils are indicative of active, treed and vegetated floodplains subject to annual, periodic flooding; or migrating fluvial channels along major rivers or fans.

2.1.6.2 Gleysols³⁷

Soils of the Gleysolic order represent mineral soils that have been subject to prolonged periods of water saturation, often by intermittent flooding, high water tables, or poor drainage. These soils are characterized by gleying (blue-grey colours or hues) or mottling (irregularly shaped reddish or brown discolorations) resulting from reducing or anoxic conditions.

Orthic Humic Gleysols are a subgroup that have an organic-rich A horizon at least 10 cm thick overlying gleyed B horizons and parent material. Within the Boundary Ranges coast climate area, these soils are indicative of back-channel floodplain areas containing fine textured, poorly drained sediments commonly found in more stable, low-energy environments on the periphery of active channels.

2.1.6.3 Typic Mesisols³⁸

Soils of the Mesisolic order represent organic, wetland soils that are dominated by mesic (or moderately decomposed) organic material. Typic Mesisols are general representations of the soil order. Within the Boundary Ranges coast climate area, these soils are found in the same low-energy wetland landscape settings as Orthic Humic Gleysols, where sedges and grasses are present.

2.1.6.4 Podzols³⁹

Soils of the Podzolic order represent mineral soils within forested environments that have undergone soil development in acidic parent materials. These soils are characterized by the thickness of the B horizon (indicating more advanced soil development) and a chemical weathering zone in the surface horizons where

³⁷ Canada, A. and A.-F. (2013b, December 13). *Canadian System of Soil Classification, 3rd edition*. <https://sis.agr.gc.ca/cansis/taxa/cssc3/GL/G/index.html>.

³⁸ Canada, A. and A.-F. (2013c, December 13). *Canadian System of Soil Classification, 3rd edition*. <https://sis.agr.gc.ca/cansis/taxa/cssc3/OR/M/index.html>.

³⁹ Canada, A. and A.-F. (2013d, December 13). *Chapter 10: Podzolic Order*. <https://sis.agr.gc.ca/cansis/taxa/cssc3/chpt10.html>.

minerals are weathered and leached of their ions and deposited into the B horizon, imparting a characteristic reddish-brown colour to the horizon.

Orthic Humo-Ferric Podzols are a subgroup that have a B horizon over 10 cm thick enriched with amorphous material (primarily aluminum and iron) and are indicative of drier environments. Within the Boundary Ranges coast climate area, these soils are associated with forested areas at lower elevations, including raised fluvial terraces subject to infrequent flooding; active fans and glaciofluvial terraces; and lower slopes comprising morainal and colluvial materials.

Sombrio Humo-Ferric Podzols are a subgroup with the same properties as Orthic Humo-Ferric Podzols but have an organic-rich A horizon at least 10 cm thick indicative of organic matter enrichment and mixing by organisms. Within the Boundary Ranges coast climate area, these soils are associated with avalanche path areas on lower to mid slopes and alpine environments.

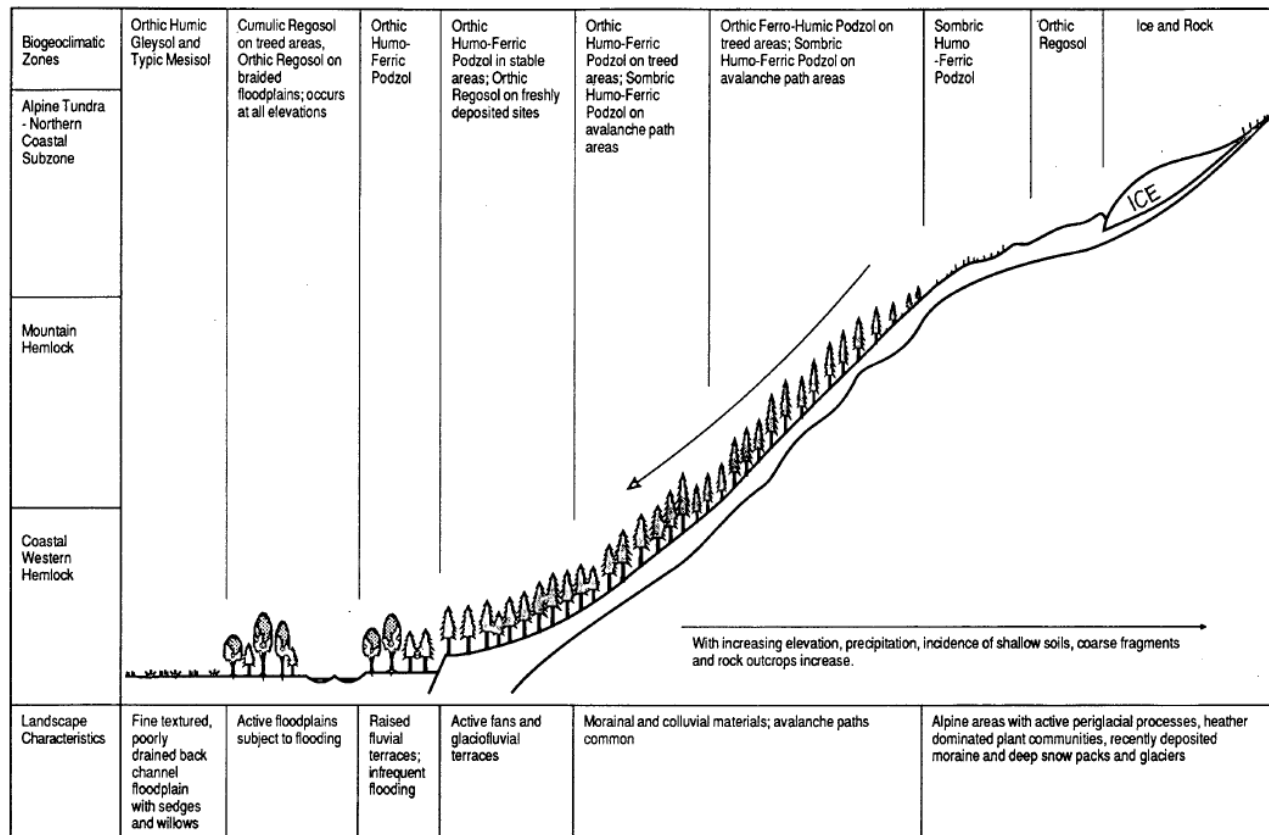


Figure 3. Soil development trends in the Boundary Ranges (Coastal Climate Area). Adapted from BC Ministry of Environment Biophysical Soil Landscapes Inventory of the Stikine-Iskut Area (1992).

Within the Study Area (specifically within the Whitewater Creek watershed immediately northwest and upslope of the current New Polaris camp), previous field assessments in 2007^{40, 41} confirmed that local geomorphology controls soil typing and distribution. The assessments determined that regosols, gleysols, and rarely brunisols are likely extensive in floodplain environments and upland areas likely consist of regosols, brunisols, or podzols depending on the degree of soil development and landscape setting, adding that thin podzols were observed in areas of coniferous forest. A preliminary site evaluation in 2015⁴² found that a thin veneer of organic soil covers much of a lower slope on the west side of the Tulsequah River north of the New Polaris camp, suggesting that modest organic soil development occurs within depressional microtopography controlled by hummocky bedrock.

⁴⁰ Garter Lee Limited. (2007, September 17). *Memorandum RE: Canarc New Polaris Mine Terrestrial Program 2007*.

⁴¹ Garter Lee Limited. (2007, November). *New Polaris Project, Technical Report, 2007. Draft for Discussion. Prepared for Canarc Resource Corp.*

⁴² BCG Engineering Inc. (2015, June 1). *Re: Preliminary Site Evaluation for a Conceptual Tailings Storage Facility for the New Polaris Gold Mine – DRAFT.*

2.1.7 Land Use

The proposed New Polaris Gold Mine is 60 km northeast of Juneau, Alaska and 100 km south of Atlin, BC on the west bank of Tulsequah River, approximately 8 km upstream of the confluence with the Taku River. Gold was discovered on the site in 1929, occurring as finely disseminated arsenopyrite in altered walls of quartz-carbonate veins hosted in mafic volcanic rocks. The previous Polaris Taku mine operated from 1937-1942, shut down during World War II, and resumed operations in 1947 through to 1951. Approximately 15,796 m of underground development on 10 levels and 3,747 m of raise construction was completed at the Polaris Taku mine and a 250 m internal winze was used to haul ore to the main access level.

The Polaris-Taku site was subsequently leased to Cominco who upgraded the mill to process ores mined from the Tulsequah Chief and Big Bull deposits on Shazah Creek.

Exploration resumed on the mine site in 1988, resulting in significant new ore below and beyond the old workings. Canagold engaged Ausenco Engineering in October 2022 to complete a feasibility study and an Initial Project Description (IPD) and Engagement Plan followed in March 2023. The IPD provides an overview and detailed description of the company's plans to develop, operate and eventually decommission the minesite and related infrastructure. The company has established a Technical Working Group with the Taku Tlingit River First Nation (TTRFN) to guide and inform the process of proposed development.

The development plan is to clear and clean up the old mining site, establish a new airstrip, upgrade existing roads and/or build new roads, following existing alignments where practicable. An approximately 10 km tote road to the barge landing site near the junction of the Tulsequah and Taku rivers is to be upgraded with approximately 2.5 km being new construction. The tote road is to cross approximately six drainages with bridges, including the bridge replacement at Whitewater Creek, and a new barge landing site is to be constructed. An approximately 1 km road between the minesite and the waste rock and tailings Combined Storage Facility (CSF) is to be constructed. Gravel borrow pit areas are proposed east of the minesite to supply aggregate for infrastructure requirements. A new ramp is to be installed to provide access to the underground workings, which will have to be dewatered and new services installed.

Proposed development also includes an ore processing plant, a paste backfill plant and a geotechnically prepared and lined tailings and waste Combined Storage Facility (CSF). A bulk tank farm is to be built for fuel storage and a secure explosives storage facility established. Camp, administration, mine dry, assay, maintenance and warehouse buildings would be set up, as well as utilities to facilitate communications, compressed air supplies and domestic waste disposal.

A limestone quarry is to be excavated to provide lime for the ore processing plant. Mine water discharge and surface water are to be collected in settling ponds and treated as required to achieve discharge quality.

2.2 Historical Air Photo, Drone Photos and Google Earth™ Imagery Review

Reviews of historical air photos, drone photos (Hemmera 2021) and Google Earth Imagery of the study area combined with landslide/snow avalanche inventories, geomorphological processes, surficial material, surface expression and drainage provide a method for classifying potential hazards. This 5-class qualitative assessment is used throughout the BC forest industry primarily to determine the potential for landslide initiation within a particular polygon. Terrain Stability classes (I to V) are defined specifically for this report in Appendix I and many of the terrain polygons have been labeled on the accompanying maps.

2.2.1 Study Area

Typical of mountainous regions, there are numerous Class IV and V polygons. These areas are commonly steep, often gullied and contain indicators of instability (i.e., existing landslides, poor drainage, snow avalanches, rock avalanches, etc.) and may pose a risk to downslope resources. A good example of this is the massive rockfall slide, located in the southeast corner of the study area, that initiated on Christmas Eve, 2020. This quake, registering as a 2.9 magnitude earthquake in Juneau, Alaska, dammed the Taku River for several days, drastically lowering river levels downstream.

Polygons assigned to terrain classes of I to II are within plain to moderate slope gradients, most common in valley bottoms. These have a very low to low likelihood of landslide initiation, however, they could be impacted by channel inundation or anthropogenic deposits or road/building construction, or incorporate terrace edges, and thereby could pose a risk to adjacent or downstream resources.

2.2.2 Proposed Development Area

The minesite area has been typed as being underlain by well drained glaciofluvial sediments and bedrock. This is supported by borehole data and a previous terrain assessment indicating fine to coarse grained silty sands, gravels and cobbles, likely fluvial or glaciofluvial in origin. These sediments are typically well drained outside of the two existing tailing piles. Plain to gentle fluvial areas between the minesite and the river are moderately well to imperfectly drained and may be subject to flooding and inundation by the Tulsequah River or its side channels.

Drone photos (supplied by Hemmera) show that there is a terrace edge below the upper camp, which may be potentially unstable.

The Whitewater Creek alluvial fan drains into a marsh north of the minesite and swings south flowing between the minesite and the airstrip, before entering the river. It was noted in previous assessments that channels within the fan may be prone to avulsion or channel migration, which could result in infrastructure

(road) impacts. In addition, the main channel of Whitewater Creek may be prone to debris flows and periodic snow avalanches.

Three small creeks (North to South: AJ, Sawmill, “Unnamed” creeks) transect the minesite/airstrip area and flow into Whitewater Creek. These do not exhibit signs of debris flow activity and have low sediment transport potential, thereby presenting a low landslide hazard. “Unnamed” Creek appears to be the runout stream for a large snow avalanche path, with the toe of avalanche activity situated approximately 400 m above the bridge crossing site. This presents as a moderate potential for a linear runout of snow to reach the road, and rapid melting events, could lead to high creek flows and potential channel avulsion.

The slopes extending 500 to 800 metres above the minesite (~300 m asl) are forested with interspersed bedrock bluff openings. This terrain is comprised of well to rapidly drained, veneer to blanket-thick, colluvial and till deposits. These slopes are rated as having a low likelihood of landslide initiation. Much of the Whitewater Creek basin as well as alpine slopes above 300 m asl are covered by alpine snow avalanche slopes which pose a low likelihood of downslope impact on the minesite area. This rationale is premised on the 500 to 800 m intervening distance between the toe of snow avalanche activity and the minesite.

The approximately 1 km long road from Whitewater Creek to the Combined Storage Facility (CSF) crosses the toe of moderate rockfall hazard slopes and then back onto moderate to moderately steep colluvial and till covered slopes above a glaciofluvial terrace.

Approximately 2 km south of the minesite, steep, moderately well drained ridge sides are rated with a moderate likelihood of landslide initiation. This polygon lies immediately above an approximately 0.5 km long section of access road.

Approximately 3 km south of the minesite the access road crosses a 1 km stretch of an alluvial fan created by side channels of Wilms Creek. Channels throughout the fan may be prone to avulsion or channel migration, which could result in infrastructure (road) impacts. In addition, the main side channel of Wilms Creek may be prone to debris flows emanating from the large catchment basins of Bacon and Wilms creeks.

The remaining ~5 km of access road to the barge landing site area follows along the eastern edge of the poorly drained Flannigan Slough, and adjacent to the Tulsequah River. Sections of this road are susceptible to flooding and inundation.

2.3 Previous Assessment Reviews

As part of our due diligence and in understanding the physiography, soils, hydrology, and geotechnical hazards in the Study Area and Boundary Ranges region, we have reviewed a series of reports pertaining to previous assessments by other consultants.

The following reports were provided by Ausenco Engineering Canada Inc.:

Study Area-specific:

- 1) BGC. *Preliminary Site Evaluation for a Conceptual Tailings Storage Facility for the New Polaris Gold Mine – DRAFT Letter*. June 1, 2015.
- 2) Gartner Lee Limited. Various Memoranda (sent to Canarc Resource Corp):
 - a) *Canarc Field Memo – Terrain Stability/TEM Preliminary Reconnaissance*. July 9, 2007.
 - b) *Canarc Memo – Terrain Mapping and Terrain Stability Mapping Status Report and Preliminary Observations Based on Aerial Photograph Interpretation*. August 21, 2007.
 - c) *Canarc New Polaris Mine Terrestrial Program 2007*. September 17, 2007.
- 3) Gartner Lee Limited. *New Polaris Project, Technical Report, 2007 – Draft for Discussion* (prepared for Canarc Resource Corp). November 2007.
- 4) Moose Mountain Technical Services. *The New Polaris Gold Project, British Columbia, Canada 2019 Preliminary Economic Assessment* (prepared for Canarc Resource Corp). February 28, 2019.

Regional report:

- 5) Robert Fuller and Forest Information Systems. *Tulsequah Chief Mine and Access Road Expanded Terrestrial Ecosystem Mapping* (for the BC Ministry of Water, Land, and Air Protection). October 2002.

These reports are summarized and discussed below:

Study Area-specific:

- 1) BGC. *Preliminary Site Evaluation for a Conceptual Tailings Storage Facility for the New Polaris Gold Mine – DRAFT Letter*. June 1, 2015.
 - Their analysis was based on air photo interpretation and terrain mapping of surficial geology units within the vicinity of a proposed tailings storage facility (TSF) for the New Polaris Gold Mine located within the Study Area on the west bank of the Tulsequah River. Review and mapping were conducted by Ms. Betsy Waddington, with a site visit in 2015.

- This report addresses possible geotechnical concerns such as fine-grained materials, geohazards at or surrounding the proposed TSF site, seepage zones, and difficult terrain. Findings indicate that the Denali Fault is located 85 km from the mine site and is an active fault. They also note the site was recently glaciated, and there are terraces and benches comprised of deltaic marine materials.
- Airphoto interpretation:
 - The Tulsequah River is in a broad floodplain U-shaped valley shaped by glaciation of the last ice-age. Presently the Tulsequah glacier terminates 20 km upstream of the mine site. The site is in an active subduction zone for the Pacific and North American plates and is seismically active. The mine site is near the Denali fault which extends into Alaska, and the Llewellyn Fault which cuts across the Tulsequah River to the north of the TSF site.
- In the one-day field visit to the tailings site, BGC noted moraine, colluvium, talus slopes, glacial erratics/boulders deposited from rockfall (talus and rockfall thought to be triggered by seismic events). They identified possible sackung features appearing as a trough at the bottom of talus slopes, resulting from stress-release in rock in absence of glaciation. These features can be indicative of large slope failure and were found north of the TSF.
- BGC recommended LiDAR be flown to at least 1 m contour capability, an engineering geologist map the sackung features, and a seismic review to outline probability of significant seismic events.
- Appendix contains terrain mapping of the proposed TSF location. The mapped units consist of bedrock (R), colluvium (C), morainal material (M), and some organic soils (O).

2) Gartner Lee Limited. Various Memoranda (sent to Canarc Resource Corp):

- a) *Canarc Field Memo - Terrain Stability/TEM Preliminary Reconnaissance*. July 9, 2007.
 - This memo provided a summary of preliminary field assessments of terrain conditions and terrestrial ecosystems in the vicinity of the proposed New Polaris mine site from TEM mapping conducted from June 28 to June 30, 2007. The assessment included foot traverses of Whitewater Creek from the Tulsequah River floodplain to a small alpine bench above the mining camp to describe the terrain units and terrestrial ecosystems.
 - The terrain assessment indicated: the Tulsequah River floodplain consists of coarse fluvial sediments overlain by fine sediments; the slopes above the camp consist of colluvial veneers and bedrock outcrops; and morainal debris and bedrock are exposed on an alpine bench to the north-northwest of the mining camp.

- o Geohazards observed included: rockfall, debris flows, and snow avalanches within the Whitewater Creek watershed; evidence of forest harvesting; jökulhlaups were observed.
 - o Recommendations included: determining the extents and frequency of these hazards and their runout zones and the Whitewater Creek fan.
- b) *Canarc Memo – Terrain Mapping and Terrain Stability Mapping Status Report and Preliminary Observations Based on Aerial Photograph Interpretation. August 21, 2007.*
- o This memo provided a progress update of the previous memo re: terrain mapping and terrain stability mapping field assessments within the vicinity of the Canarc New Polaris Gold Mine site. Common terrain characteristics and preliminary findings are discussed based on the previous preliminary assessment and terrain stability mapping pretyping. Next steps in the investigation included field checking the preliminary and pretyping assessments.
 - o Large magnitude features in the Tulsequah River watershed were assessed at 1:30,000 and 1:60,000 scale. No undocumented hanging glaciers, or dammed lakes, excessive tension cracks or rock slope deformation suggesting failure were identified, although the Tulsequah floodplain is susceptible to jökulhlaups initiating from both Tulsequah Lake and Lake-No-Lake.
 - o Polygons were determined using uniform slope, surficial material, drainage, and stability and erosive qualities. Pretyping identified five main areas with distinct terrain characteristics:
 - **Flannigan Slough:** poorly drained, organics/silty cobbly Fluvio-glacial Terrace (FGt). Flooded by jökulhlaups annually. At least 4 large snow avalanche paths, originating on Mt. Strong and extending into the western edge of the slough. Alluvial fans extend across most of the northern 2 km² of the slough with regular major channel avulsions.
 - **Tulsequah River western floodplain:** braided gravel bed river about 1.5 km wide. Western mature forested floodplain is meters higher than the gravel bars with recent deposits of silt and sand indicating floodplain is susceptible to jökulhlaup-initiated flooding. Low lying forested areas along the floodplain are regularly washed by fast flowing water and grow young alder.
 - **Lower valley side:** Colluvial veneer (Cv), Colluvial blanket (Cb) derived from Till (M) and Bedrock (R) cliffs characterize the area. In situ Till (M)//Bedrock (R) appear in deeply gullied slopes just north of proposed TSF and along

lower Wilms Creek and Bacon Creek valley sides. Most of lower valley is covered in mature conifer forest but disturbance areas such as avalanche paths exist and are characterized by alder, salmonberry, and grasses.

- **Subalpine slopes:** Colluvial veneer (Cv)/Bedrock ridges (Rr). Where terrain is gentle, C is thin. Steep terrains lead to Cc and talus cones where debris flows and slides originate.
- **Ridges and mountain peaks:** Bedrock (R), talus collects in cirque bottoms and originated debris flows and slides. Most avalanches start on flanks of ridge and cirques where snow accumulates most. Evidence suggests rockfall runout is limited to alpine and subalpine.

- o Preliminary assessments determined that the low bench north of camp, the Whitewater Creek fan, snow avalanche paths above the old tailings location, and Wilms and Bacon Creek fans all require further investigation to assess hazard potential.

c) *Canarc New Polaris Mine Terrestrial Program 2007*. September 17, 2007.

- o This memo provided initial findings of a June 29, 2007, preliminary field assessment of the area above the Canarc New Polaris Mine along Whitewater Creek as well as a July 2007 terrestrial ecosystems mapping program for the Canarc New Polaris Mine. The preliminary assessment included soil pit excavations to characterize the surrounding soils, and an aerial photograph review was conducted July 26 and July 27, 2007, to assess the local geomorphology.
- o Findings indicated that 'soils vary greatly and are largely dependent upon the local geomorphology': gleysols and regosols from sand and gravel parent materials and annual flooding are expected in floodplains, while upland soils are expected to consist of regosols, brunisols, or podzols depending on the landscape setting, parent material, and degree of development.

3) Gartner Lee Limited. *New Polaris Project, Technical Report, 2007 – Draft for Discussion* (prepared for Canarc Resource Corp). November 2007.

- This draft technical report includes all the TEM and terrain stability mapping components discussed in previous memoranda. The 2007 Field Program included assessments of both aquatic and terrestrial environments, including water quality, hydrological, and hydrogeological data, but both programs were put on hold by Canarc Resource Corp at the end of August 2007.

- The findings of the terrain, soils, and terrain stability mapping components within the terrestrial environment report are largely the same as those discussed in the memoranda. Landform characteristics within the assessment area were summarized in the following table:

Table 1. Landform characteristics in the vicinity of the New Polaris mine

Characteristic	Bedrock	Morainal ¹	Colluvial	Glaciofluvial
Landform surface expression	Hummocky, ridged	Ridge	Veneer, blanket	Plain
Texture	N/A	Silty sand matrix, angular to subrounded gravel to boulder clasts	Silty sand matrix, angular cobble to large boulder clasts	Cobbly gravel, medium – coarse sand matrix
Geomorphological processes	Rockfall, avalanche	Rockfall, gullying	Rockfall, debris flow, avalanche, gullying	Channeled, Braided
Drainage	Rapid	Moderate to well	Well	Well to rapid, except where water table close to surface

¹ Little Ice Age deposits; no observations of late Pleistocene morainal debris

- Relevant works to be completed included: finishing the TEM program; and terrain mapping and terrain stability mapping refinement with field checking of the aerial photo interpretation.

4) Moose Mountain Technical Services. *The New Polaris Gold Project, British Columbia, Canada 2019 Preliminary Economic Assessment* (prepared for Canarc Resource Corp). February 28, 2019.

- This report is a preliminary economic assessment of the proposed New Polaris Gold Mine, which included site visits to examine existing infrastructure and core logging procedures of historical and current core drilled at various drill sites to assess the economic viability of the mine. The report summarizes the area geology, mining history, methods, metallurgy, project infrastructure, permitting considerations, scoping cost estimates, and provides interpretations of the feasibility of mining as well as recommendations for further investigation.
- Report conclusions indicate the New Polaris Project would have a positive result with respect to economic parameters and recommended further work to gather baseline data, optimize the project, and complete a Preliminary Feasibility Study.

Regional report:

5) Robert Fuller and Forest Information Systems. *Tulsequah Chief Mine and Access Road Expanded Terrestrial Ecosystem Mapping* (for the BC Ministry of Water, Land, and Air Protection). October 2002*.

- This project included TEM mapping of an expanded area around the Tulsequah Chief Mine at a 1:50,000 scale. The Tulsequah Chief Mine is an historic mine within the Study Area on the east bank of the Tulsequah River. The project study area consisted of approximately 8018.5 km², a vastly wider area than the subject Study Area, spanning the Boundary Ranges and the Taku and Teslin plateaus to the east. This project is referred to herein as BAPID 1056 and 26 of the field plots fall within the current report study area.
- The project study area was found to occur within three (3) ecosections: the Teslin Plateau (TEP), Tahltan Highlands (THH) and the Boundary Ranges (BOR); Nine (9) biogeoclimatic units occur within the project map area including: Wet Maritime Coastal Western Hemlock Subzone (CWHwm), Moist Maritime Mountain Hemlock Leeward Variant (MHmm2), Moist Very Cold Sub-Boreal Spruce Subzone (SBSmv), Moist Very, Very Cold Engelmann Spruce – Subalpine Fir Subzone (ESSFmz), Moist Very, Very Cold Parkland Engelmann Spruce – Subalpine Fir Subzone (ESSFmzp), Moist Cool Spruce – Willow – Birch Subzone (SWBmk), Moist Cool Scrub Spruce – Willow – Birch Subzone (SWBmks), and Alpine Tundra Zone (AT); In total, one-hundred-thirteen (113) ecosystem units and twenty-two (22) non-vegetated and/or anthropogenic units were mapped in the project map area.
- The primary surficial materials observed within the study area included Till (M, M1), Colluvium (C), Bedrock (R), Glaciofluvial Materials (FG), Fluvial Materials (F, FA), Glaciolacustrine Sediment (L, LG), Undifferentiated Materials (U), Organic Materials (O), Weathered Bedrock (R), Lacustrine Materials (L), Eolian Materials (E), and Anthropogenic Materials (A).
 - o Till (M, M1) - M (basal till) was deposited subglacially by ice and is typically massive, poorly-sorted, highly consolidated and has low permeability; M1 (ablation till) is material carried on or around ice that was deposited as glacier ice melted.

*The terrain-ecosystem mapping and associated field work from this project were relied upon extensively for the terrain stability mapping and field sampling for the current report program.

3 Results

3.1 Soil Groups

The following soil groups in the Proposed Development Area are adapted from BC Ministry of Environment Biophysical Soil Landscapes Inventory of the Stikine-Iskut Area (1992).

The main soils in the minesite area and road infrastructure to the north, including the Combined Storage Facility (CSF), are *orthic humo-ferric podzols*, that have a B horizon over 10 cm thick, enriched with amorphous material (primarily aluminum and iron).

Floodplains and back-channel areas below the minesite and throughout much of the southern region of access roads (i.e., Flannigan Slough) are characterised by *orthic humic gleysols* that have an organic-rich A horizon at least 10 cm thick overlying gleyed B horizons and parent material; and *typic mesisols* representing organic, wetland soils that are dominated by mesic (or moderately decomposed) organic material. *These soil types may require stabilization techniques such as a coarse ballast subgrade or geotextile application along the road infrastructure (upon verification by a geotechnical engineer).*

Treed and vegetated floodplain areas are dominated by *cumulic regosols* in which the parent materials (the C horizon: i.e., fluvial sediments) are underlain by buried A horizons. These soils are characterized by thin or absent B or organic-rich A horizons that would normally be indicative of soil development, meaning the soil profile primarily consists of the parent material.

3.2 Surficial Materials

The minesite area is underlain by poorly drained cobble, silt, sand glaciofluvial/fluvial deposits and silt, sand, gravel tills greater than 1 m thick. The general condition and stability within the two existing tailings areas is unknown and requires site-specific geotechnical investigation. Drone photos show that there is a terrace edge below the upper camp, which may be potentially unstable.

The floodplain region below the minesite is underlain by imperfectly to poorly drained cobble, silt, sand glaciofluvial/fluvial deposits as is the Flannigan Slough along the southern region of the barge-to-minesite access road.

The alluvial fans of Whitewater and Wilms creeks have thick accumulations of organic material that are poorly drained.

The approximately 1 km long road from Whitewater Creek to the Combined Storage Facility (CSF) crosses the toe of moderate rockfall hazard slopes and then back onto moderate to moderately steep colluvial and till covered slopes above a glaciofluvial terrace.

3.3 Geohazards & Terrain Stability (Figure 5)

Flooding

Flash-flooding from Jökulhlaup activity upstream or rapid spring/summer melting could impact the fluvial/glaciofluvial plains below the minesite (or on lower regions of the minesite) and along the barge-to-minesite access road, particularly around back channels resulting in inundation and channel bank erosion. Flooding of the plains below the minesite and along the barge-to-minesite access road is expected to occur annually.

Snow Avalanches

Much of the Whitewater Creek basin as well as alpine slopes above 300 m asl are covered by alpine snow avalanche slopes which pose a *low likelihood of downslope impact* on the minesite area. This rationale is premised on the 500 to 800 m intervening distance of largely forested terrain between the toe of snow avalanche activity and the minesite.

There is a moderate potential for snow avalanches to deposit linear paths through the minesite at Whitewater Creek and “Unnamed” Creek.

Debris Slides

No debris slides were noted in the vicinity of the minesite or along proposed road infrastructure to the north and south. Approximately 2 km south of the minesite, steep, moderately well drained ridge sides are rated with a moderate likelihood of landslide initiation. This polygon lies immediately above an approximately 0.5 km long section of access road. *A 1:5,000 scale terrain stability field assessment of this section should be conducted prior to road construction to confirm or rule out this likelihood and to recommend mitigative measures as needed.*

Debris Flows

Debris flow potential down Whitewater and Wilms creeks is considered moderate. *Road crossings on these creeks should be assessed for debris flow potential and engineered mitigative measures considered where practicable.*

Rockfall

The road from Whitewater Creek to the Combined Storage Facility (CSF) crosses the toe of moderate rockfall hazard slopes. *A 1:5,000 scale terrain stability field assessment of this section should be conducted prior to road construction to confirm or rule out the likelihood of rockfall and to recommend mitigative measures where practicable.*

Channel Avulsion/Channel Migration

Channel avulsion and/or channel migration may result from flash-flooding events derived from Jökulhlaup activity upstream, rapid snow melt events, or debris flows. *Road crossings on creeks and back channels should be assessed for channel instability potential and engineered mitigative measures considered where practicable.*

Terrace Edges

Drone photos reviewed show terrace edge slopes below the upper minesite and could also be present elsewhere above the lower floodplain. *These steep-angled terrain features may be prone to instability and should be assessed prior to development.*

It is recommended that detailed geohazard and landslide assessments following EGBC guidelines be completed during engineering phases for areas at risk as outlined in this section.

4 Closure

Should you have any questions, or require further information, please do not hesitate to contact the undersigned.

Report Completion by:

Del Ferguson, P.Geo., P.L.Eng.

DRAFT



Figure 4A: Mapped Surficial Materials,
Landslide & Stability Class

PROJECT:
Terrain Stability Mapping
New Polaris Gold Mine

CLIENT:
Ausenco Engineering Canada Inc.

GEOGRAPHIC AREA:
Tulsequah River Valley, B.C.

ASSESSED BY:
Madrone Environmental Services Ltd.

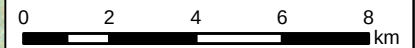
ASSESSMENT DATE:
July 12-15, 2022

MAP SCALE:
1:175,000

MAP DATE:
July 29, 2024

DRAWN BY:
Anna Jeffries

DOSSIER NO.:
21.0045



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Study Area Boundary

Terrain Stability Polygons

Operational Area

Landslide

Dominant Surficial Material

Anthropogenic Material

Ice

Colluvium

Fluvial Material

Glaciofluvial Material

Morainal Material (Till)

Organic Material

Bedrock

Weathered Bedrock (in situ)

Not Classified

Terrain Stability Class:

I Negligible

II Very Low

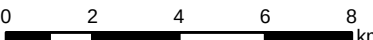
III Low

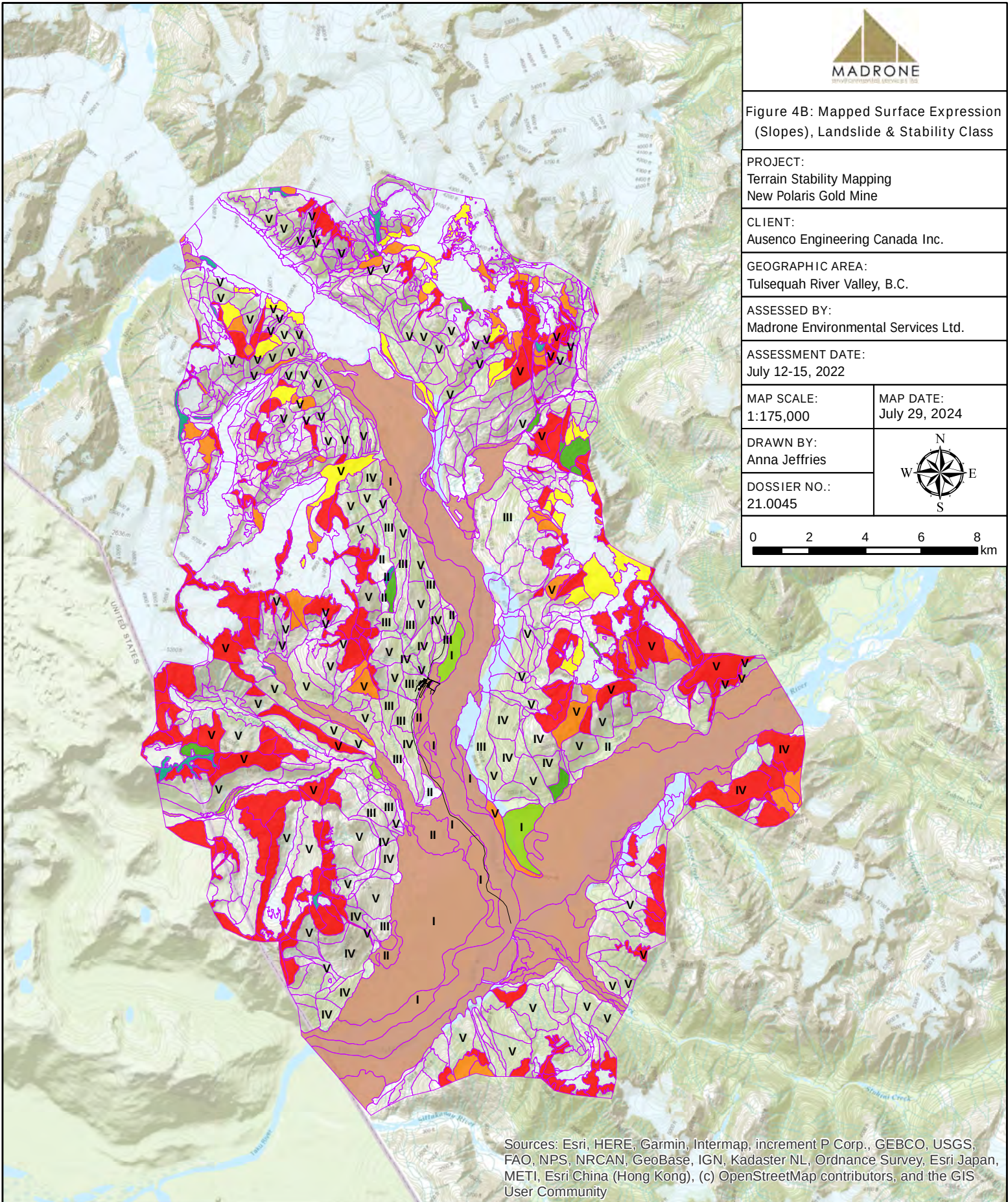
IV Moderate

V High



Figure 4B: Mapped Surface Expression
(Slopes), Landslide & Stability Class

PROJECT: Terrain Stability Mapping New Polaris Gold Mine	
CLIENT: Ausenco Engineering Canada Inc.	
GEOGRAPHIC AREA: Tulsequah River Valley, B.C.	
ASSESSED BY: Madrone Environmental Services Ltd.	
ASSESSMENT DATE: July 12-15, 2022	
MAP SCALE: 1:175,000	MAP DATE: July 29, 2024
DRAWN BY: Anna Jeffries	
DOSSIER NO.: 21.0045	
	



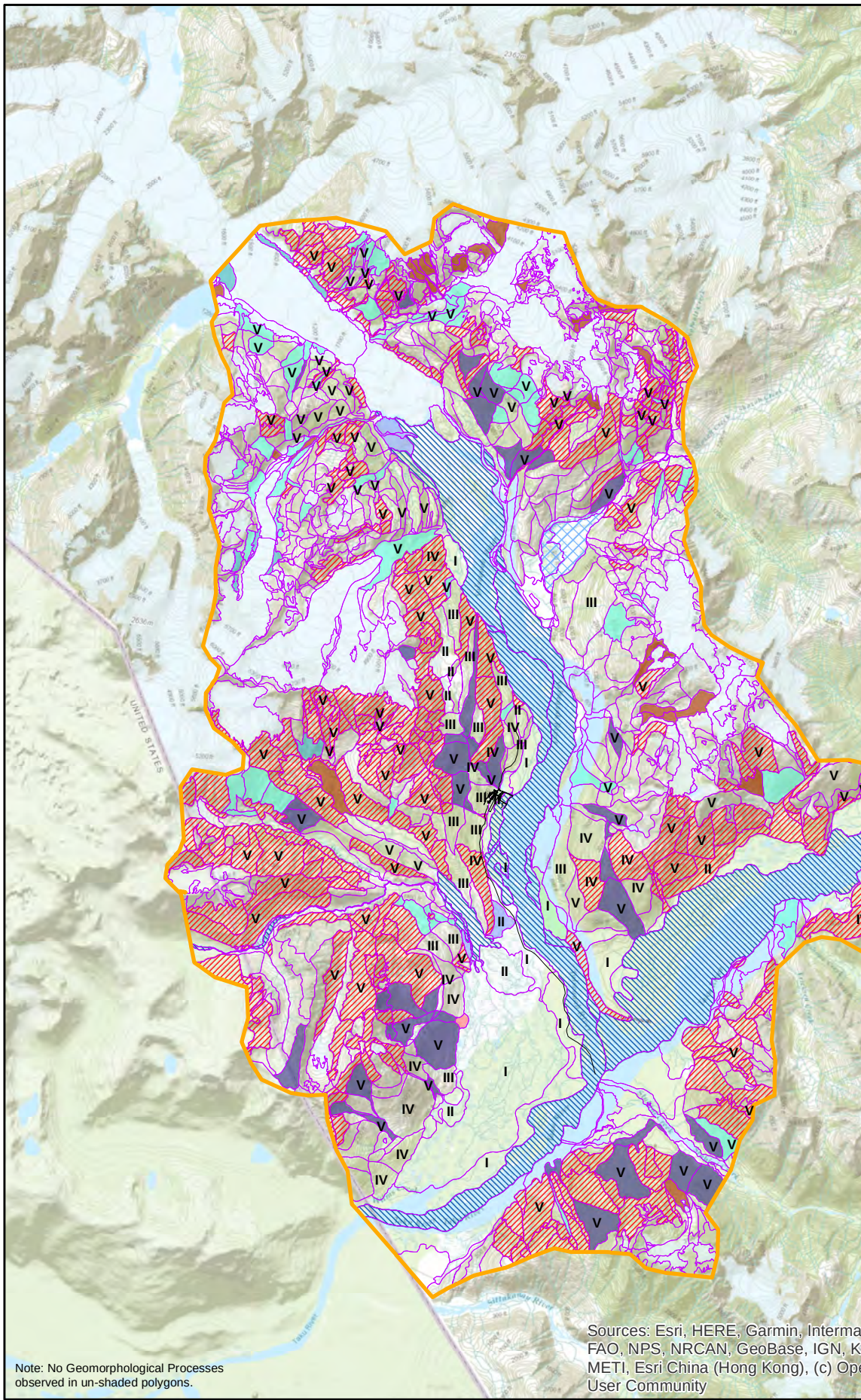
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Study Area Boundary	Surface Expression	moderate slope	plain	Terrain Stability Class:	
Operational Area	gentle slope	moderately steep slope	ridges	I Negligible	IV Moderate
Terrain Stability Polygons	terrace(s)	steep slopes		II Very Low	V High
				III Low	



Figure 4C: Mapped Geomorphological Process, Landslide & Stability Class

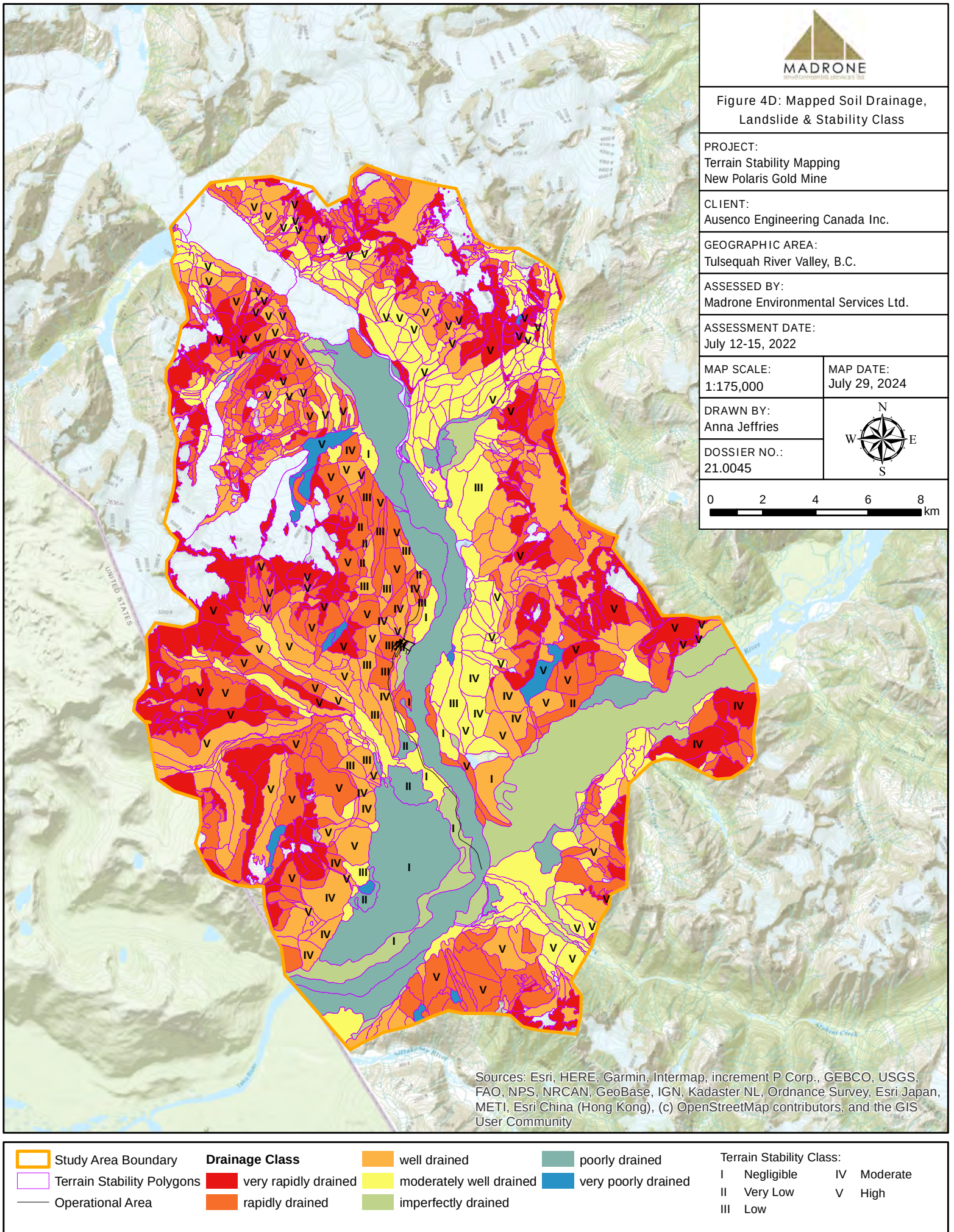
PROJECT: Terrain Stability Mapping New Polaris Gold Mine	
CLIENT: Ausenco Engineering Canada Inc.	
GEOGRAPHIC AREA: Tulsequah River Valley, B.C.	
ASSESSED BY: Madrone Environmental Services Ltd.	
ASSESSMENT DATE: July 12-15, 2022	
MAP SCALE: 1:175,000	MAP DATE: July 29, 2024
DRAWN BY: Anna Jeffries	
DOSSIER NO.: 21.0045	
02468  km	



Note: No Geomorphological Processes observed in un-shaded polygons.

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Study Area Boundary	Geomorphological Process	General periglacial processes	Meandering channel	Terrain Stability Class:	
Terrain Stability Polygons	Anastomosing channel	Gully erosion	Rapid mass movements	I Negligible	IV Moderate
Operational Area	Braiding channel	Inundated	Slow mass movements	II Very Low	V High
	Channeled by meltwater	Irregularly sinuous channel	Snow avalanches	III Low	



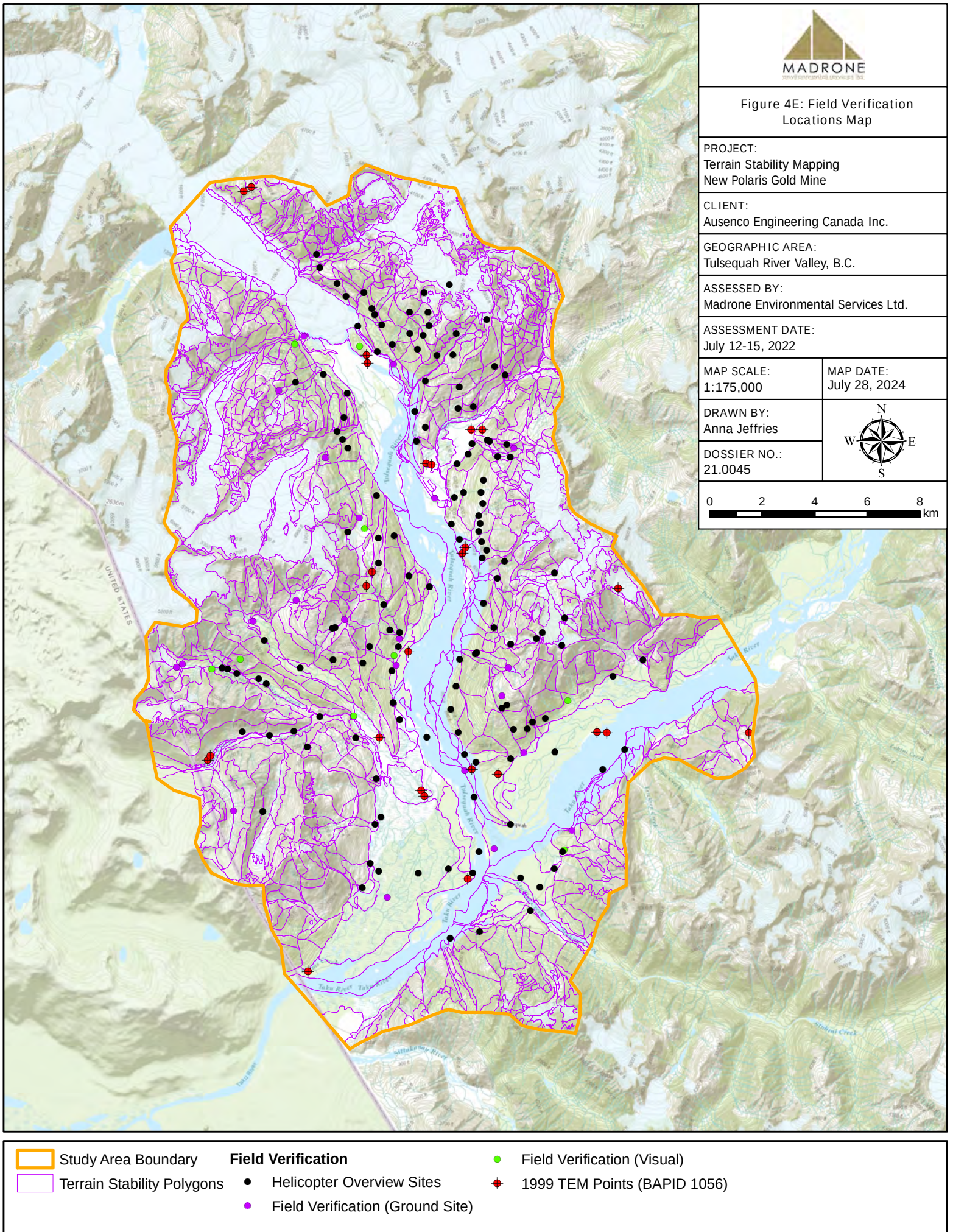




Figure 5: Site Geohazards

PROJECT:
Terrain Stability Mapping
New Polaris Gold Mine

CLIENT:
Ausenco Engineering Canada Inc.

GEOGRAPHIC AREA:
Tulsequah River Valley, B.C.

ASSESSED BY:
Madrone Environmental Services Ltd.

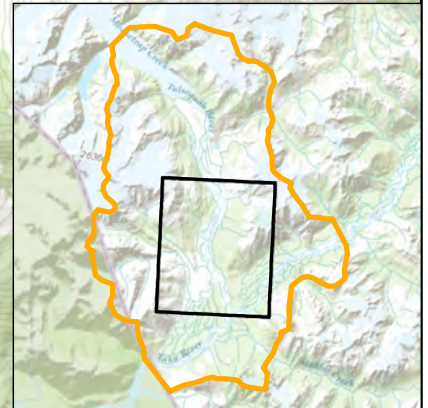
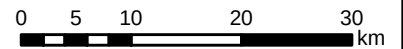
ASSESSMENT DATE:
July 12-15, 2022

MAP SCALE:
1:50,000

MAP DATE:
July 3, 2024

DRAWN BY:
Anna Jeffries

DOSSIER NO.:
21.0045



- | | | |
|-----------------------------|--------------------|-------------------------------------|
| Study Area Boundary | approx. Flood Line | Moderate Debris Slide Hazard |
| Current Building Feature | Snow Avalanche | Moderate Rockfall Hazard |
| Historical Building Feature | Debris Flow | Moderate Channel Avulsion/Migration |

APPENDIX I

Qualitative Ratings and Definitions

Table 1: Qualitative Descriptors and Corresponding Probability Ranges for Landslide Likelihood

Landslide Likelihood / Terrain Stability Class	Description/Interpretation	Annual Probability		Ten Year Probability	
		From	to	From	to
I - Negligible	The event is highly unlikely, as no significant stability problems exist.	0		0	
II - Very Low	The event is conceivable but only under exceptional circumstances.	0	0.0002	0.000	0.002
III - Low	The event could occur under very adverse conditions and minor stability problems can develop.	0.00002	0.001	0.002	0.010
IV - Moderate	The event could occur under adverse conditions; moderate likelihood of landslide initiation.	0.001	0.01	0.010	0.096
V - High	The event will probably occur under adverse conditions; high likelihood of landslide initiation.	0.01	0.1	0.096	0.650

Adapted from LMH56 Table 20, BC Ministry of Forests, 2004;
and Mapping and Assessing Terrain Stability Guidebook, Forest Practices Code, 1999

Table 2: Debris Flow Initialization

Sidewall slope distance (m)	Channel gradient (%)		
	≤30	>30 - ≤40	>40
>15	L	M	H
7 - <15	L	L	M
0 - <7	L	L	L
All headwalls	M	H	H

Two factors are important in determining whether a debris flow will begin in a particular reach of a transport zone or headwall:

- 1) the potential for sidewall or headwall slope failures to occur;
- 2) the potential of a failure to initiate a debris flow within the gully channel

Surficial materials that cover the slope are a large determining factor in the stability of a slope. From most stable to least the choices are:

- 1) Solid rock – stable
- 2) Colluvial – relatively stable
- 3) Morainal (hardpan and till) & Fluvial (sand and gravel, including glaciofluvial) – somewhat stable
- 4) Marine (including glaciomarine) & Lacustrine (including glaciolacustrine) – susceptible to erosion / potentially unstable

⁵⁾ Failure scars indicating past instability – unstable

Table 3: Geomorphology Terms and Classifications

<i>Description</i>	<i>Field Definition</i>
<i>Plain</i>	Slopes are between 0 and 5% (0-3°)
<i>Gentle Slope</i>	Slopes are between 6 and 26% (4-15°)
<i>Moderate Slope</i>	Slopes are between 27 and 49% (16-26°)
<i>Moderately Steep Slope</i>	Slopes are between 50 and 70% (27-35°)
<i>Steep Slope</i>	Slopes are greater than 70% (>35°)
<i>Hummocks</i>	Non-linear rises and hollows with many slopes steeper than 26% (15°)
<i>Ridges</i>	Elongate rises with many slopes steeper than 26% (15°)
<i>Fan</i>	Longitudinal gradient less than 26% (15°)
<i>Cone</i>	Longitudinal gradient greater than 26% (15°)
<i>Terrace(s)</i>	Level area and scarps adjacent downslope; stepped topography.
<i>Braiding Channel</i>	Many diverging and converging channels separated by unvegetated bars (i.e., active floodplains, fans, deltas)
<i>Anastomosing Channel</i>	Channels diverging and converging around many vegetated islands (i.e., active floodplains).
<i>Meandering Channel</i>	Clearly defined channel characterized by a regular and repeated pattern of bends with relatively uniform amplitude and wavelength.
<i>Meltwater Channel</i>	Channel and erosion formed by meltwater alongside, beneath or in front of a glacier or ice sheet.
<i>Inundation</i>	Terrain is seasonally under standing water, resulting from a highly variable watertable.

Table 4: Drainage Class

<i>Description</i>	<i>Code</i>	<i>Field Definition</i>	<i>Mottling / Gleying</i>	<i>Other</i>
<i>Rapidly drained</i>	RD	Soil moisture content seldom exceeds field capacity in any horizons except immediately after water additions	None	Often coarse textured or shallow to bedrock; normally occurs on steep slopes
<i>Well drained</i>	WD	Soil moisture content does not normally exceed field capacity for a significant part of the year in any horizons (except possibly the C)	Usually none or ≥1 m depth	Often medium textured; no seepage

JULY 29, 2024

<i>Moderately well drained</i>	MWD	Soil moisture content exceeds field capacity for a small, but significant period of the year	Often faintly mottled in lower B and C horizons	Often medium textured; seasonal seepage
<i>Imperfectly drained</i>	ID	Soil moisture content exceeds field capacity in subsurface horizons for moderately long periods during the year	Distinctly mottled in B and C horizons	Soils are generally gleyed subgroups of mineral soil orders
<i>Poorly drained</i>	PD	Soil moisture content exceeds field capacity in all horizons for a large part of the year	Usually strongly gleyed	Soils generally of Gleysolic or Organic orders
<i>Very poorly drained</i>	VPD	Free water remains at the surface (or within 30 cm) for most of the year	Usually strongly gleyed	Soils generally of Gleysolic order (peaty phase) or Organic orders

Appendix B

Field Methodologies and QA/QC

1.0 Health and Safety

A site-specific Health and Safety Plan (HASP) was prepared by Ausenco to identify and provide general mitigation measures for potential safety risks and hazards associated with the Ausenco 2025 field work activities at the Site. Job Safety Analysis (JSA) forms specific for excavating tasks were also prepared to provide a step-by-step analysis of the activities with associated hazards and controls to be implemented during the field work program.

The HASP and JSAs were reviewed during daily safety meetings led by Ausenco with all field staff and contractors prior to commencing field work. Any new or unexpected hazards associated with the Site and field program were noted on the field safety forms and discussed in detail to determine and implement mitigation measures and controls to ensure the safety of each worker. After completing work on the Site each day, a short field debrief was also conducted with field staff and contractors to discuss any unexpected hazards or lessons learned that could be carried forward to subsequent work programs at the Site.

2.0 Soil Investigation

2.1 Surface Soil Sampling

EDI completed surface soil sampling in August 2021 as part of their vegetation and ecosystems baseline assessment. Nineteen soil sample locations were advanced throughout the Project area in conjunction with vegetation sampling. Soil samples were collected according to the Canadian Council of Ministers of the Environment (CCME) Suggested Operating Procedures (Canadian Council of Ministers of the Environment 2016). Soil sample locations are shown on **Figure 1-2**.

Soil pits were hand dug within 30 cm of each vegetation plot within the rooting zone of one of the corresponding vegetation species collected at the same plot. Surface soil samples were collected wearing nitrile gloves and using a stainless-steel shovel. The samples were placed into a self-sealing plastic bags (i.e. Ziploc® bag) and sealed. All 19 soil samples were submitted to Bureau Veritas (BV) Labs and analyzed for metal concentrations.

Sample bags were identified with the monitoring location ID, and then temporarily stored in insulated coolers with ice packs to minimize chemical alteration prior to laboratory analysis. Coolers with a site-specific chain-of-custody form were shipped to BV by EDI.

2.2 Test Pitting and Soil Sampling

Canagold completed test pit soil sampling in October 2022 during the test pitting program to assess historical tailings in the Project area. Seventeen test pits were excavated in a staggered 25 m grid pattern in the three areas recognized as historical tailings in the Project area. All test pit locations are shown on **Figure 1-2**

The test pits were excavated using a Kubota KX-121/3 mini excavator to a depth of approximately 2 m bgs. If any cave in occurred during excavation, cave in materials were removed before excavating deeper.

Representative soil samples were collected from each test pit and submitted to BV Labs and analyzed for metals concentrations. After samples were collected each test pit was backfilled with the surface cover replaced on top.

Ausenco completed test pit soil sampling between August 12 and 28, 2026, as part of the waste rock sampling and soil characterization field program. Ten test pits were advanced m bgs at the New Polaris portal entrance (NP), along New Polaris Road (NPR), the lower pad area (LP), and the area where the air strip (AS) is located. Soils were characterized at each test pit advanced in the Project area while waste rock samples were collected. The field program executed by Ausenco in 2025 adhered to the BC Field Sampling Manual (BCSFM) (Field Sampling Manual 2013). Test pit locations are shown on **Figure 1-2**.

Test pits were excavated to a maximum depth of 1.2 m bgs. Soil samples were collected wearing nitrile gloves and using a stainless-steel shovel. The samples were placed into a self-sealing plastic bags (i.e. Ziploc® bag) and sealed. One waste rock sample from each test pit advanced within the air strip were observed to have hydrocarbon-like odours present, therefore these samples were submitted to CARO Analytical Services (CARO) as soil samples and analyzed for petroleum hydrocarbons (PHC), polycyclic aromatic hydrocarbons (PAH), and phenols.

Sample bags were identified with the test pit location ID, and then temporarily stored in insulated coolers with ice packs to minimize chemical alteration prior to laboratory analysis. Coolers with a site-specific chain-of-custody form were shipped to aro by Ausenco.

3.0 Quality Assurance/Quality Control (QA/QC)

Ausenco's QA/QC Program influences a wide range of project tasks including communication plans, health and safety, reporting, record keeping, and data review and validation.

Project-specific elements include data quality objectives, standardized sampling methodologies, and the review of laboratory accreditation and internal QA/QC data. Data quality objectives are outlined below. A description of sampling methodologies is provided in the sections above. Internal QA/QC procedures from BV and CARO, the analytical laboratories used in this assessment are generally similar. They were reviewed for evidence of systematic laboratory imprecision.

The general guideline for the analytical QA/QC program was to submit a field duplicate sample for every ten samples submitted for a particular analysis. The following are the total cumulative sample numbers for soil during the EDI, Canagold and Ausenco field programs:

- A total of 19 soil samples were submitted for analyses by EDI in 2021, plus two laboratory duplicate soil samples.
- A total of 36 soil samples were submitted for analyses by Canagold in 2022.
- A total of two soil samples were submitted for analysis by Ausenco in 2025.

3.1 Field QA/QC

The field QA/QC included practicing standard soil sampling protocols to minimize the potential for cross contamination between samples. General QA/QC measures utilized during this investigation are summarized below:

- BV and CARO are certified by the Canadian Association for Laboratory Accreditation Inc. (CALA).
- To prevent cross-contamination and collect representative samples, the following field QA/QC procedures were implemented:
 - The sampler wore a new pair of nitrile gloves for the collection of each soil sample.
 - Samples were placed in self-sealing sample bags (i.e. Ziploc bags). Sample bags were clearly labelled and identified in the field.
- As a general QA/QC measure, the analytical detection limits were also reviewed to verify that they were below the applicable standards/guidelines for each parameter tested.
- The QA/QC methods were evaluated by determining the relative percent differences (RPD) between characterisation samples and their associated laboratory duplicates.

3.2 Sample Handling and Chain of Custody

Samples were collected, stored, transported and submitted to the laboratory in accordance with the sample container, minimum volume, preservation, temperature (ambient or 4°C) and holding times required for each potential contaminant of concern (PCOC).

The sampler completed and signed chain-of-custody forms for the samples collected at the Site. The forms were placed with the samples in a sealed cooler and accompanied the samples to the laboratory and for analysis. The laboratory sample reception signed each form to acknowledge receipt of the samples, and a copy of the signed form accompanied the laboratory report for inclusion in the project report. All chain-of-custody forms are available at the bottom of the laboratory reports found in **Appendix C**.

3.3 Laboratory QA/QC

Soil sample analyses were completed by BV and CARO Labs during the field work programs. The samples submitted to the laboratories were subjected to QA/QC procedures specific to the laboratory. Laboratory QA/QC included internal/surrogate standards, replicates and duplicates, method blanks and method spikes. Laboratory QA/QC procedures are included in each certified laboratory report (**Appendix C**).

Lab duplicate samples are prepared during sample analysis by the lab and provide an estimate of the precision of the sample collection process. Lab duplicates can be quantified through the calculation of relative percent difference (RPD) between the results of each duplicate. The RPD is calculated as:

$$RPD = \frac{|X_1 - X_2|}{\frac{1}{2}(X_1 + X_2)} \times 100$$

Where X_1 is one aliquot of the duplicate pair and X_2 is the second aliquot of the duplicate pair.

Measures of precision such as RPD are influenced by how close the analytical value is to the detection limit. Consequently, the use of RPD is limited to analytical values that are greater than five times the detection limit (Cavanagh et al. 1998).

The intent of the field duplicate RPD assessment is to identify potential significant issues with the sampling and analytical process, recognizing that there may be inherent sample heterogeneity the project data quality objectives for soil duplicate RPDs is 60%.

Two lab duplicates were analyzed for QA/QC as follows: NPT_058_SOILS and NPT_058_SOILS Lab-Dup for metals, and NPT_100C_SOILS and NPT_100C_SOILS lab-Dup for pH. The RPD between the duplicate and original samples were calculated for parameters that were greater than five times the reportable detection limit (RDL). The metals and pH analysis were all within the acceptable range.

All parameters analyzed in the duplicate soil sample set meet the RPD and data quality objective (DQO) and are considered to be valid. Duplicate RPD values are presented in **Table 1**.

Appendix C

Laboratory Certificate of Analysis

CERTIFICATE OF ANALYSIS

REPORTED TO Global ARD Testing Services Inc.
6891 Antrim Ave.
Burnaby, BC V5J 4M5

ATTENTION Global ARD Testing

PO NUMBER GL25-2242

PROJECT 2559

PROJECT INFO B3

WORK ORDER 25J3329

RECEIVED / TEMP 2025-10-23 03:22 / 15.9°C

REPORTED 2025-10-31 13:42

COC NUMBER GL25-2242

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

Work Order Comments:

Custody Seals Intact: YES

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here:
<https://www.caro.ca/terms-conditions>

If you have any questions or concerns, please contact me at sgulenchyn@caro.ca

Authorized By:

Sara Gulenchyn, B.Sc, P.Chem.
Client Services Manager

1-888-311-8846 | www.caro.ca

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 |
#108 4475 Wayburne Drive Burnaby, BC V5G 4X4

TEST RESULTS

REPORTED TO PROJECT Global ARD Testing Services Inc.
2559

WORK ORDER REPORTED 25J3329
2025-10-31 13:42

Analyte	Result	RL	Units	Analyzed	Qualifier
AS1-0.8 (25J3329-01) Matrix: Solid Sampled: 2025-10-23					
CCME CWS Petroleum Hydrocarbons					
PHC F1 (C6-C10)	< 20	20	mg/kg dry	2025-10-29	
PHC F2 (C10-C16)	< 100	50	mg/kg dry	2025-10-31	
PHC F3 (C16-C34)	993	100	mg/kg dry	2025-10-31	
PHC F4 (C34-C50)	< 200	100	mg/kg dry	2025-10-31	
Reached Baseline at nC50	Yes		mg/kg dry	2025-10-31	
Surrogate: 2-Methylnonane (EPH/F2-4)	92	60-140	%	2025-10-31	
General Parameters					
Moisture	1.7	1.0	% wet	2025-10-30	
Non-Chlorinated Phenols					
Phenol	< 0.050	0.050	mg/kg dry	2025-10-30	
2-Methylphenol	< 0.020	0.020	mg/kg dry	2025-10-30	
3 & 4-Methylphenol	< 0.030	0.030	mg/kg dry	2025-10-30	
2,4-Dimethylphenol	< 0.040	0.040	mg/kg dry	2025-10-30	
2-Nitrophenol	< 0.050	0.050	mg/kg dry	2025-10-30	
4-Nitrophenol	< 0.050	0.050	mg/kg dry	2025-10-30	
2,4-Dinitrophenol	< 0.080	0.080	mg/kg dry	2025-10-30	
2-Methyl-4,6-dinitrophenol	< 0.080	0.080	mg/kg dry	2025-10-30	
Surrogate: 2,4-Dibromophenol	76	50-140	%	2025-10-30	
Surrogate: 2,4,6-Tribromophenol	74	50-140	%	2025-10-30	
Surrogate: Phenol-d6	100	70-130	%	2025-10-30	
Polycyclic Aromatic Hydrocarbons (PAH)					
Acenaphthene	0.180	0.005	mg/kg dry	2025-10-29	
Acenaphthylene	< 0.005	0.005	mg/kg dry	2025-10-29	
Anthracene	< 0.047	0.004	mg/kg dry	2025-10-29	RA1
Benz(a)anthracene	< 0.015	0.010	mg/kg dry	2025-10-29	RA1
Benzo(a)pyrene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(b)fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(b+j)fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(g,h,i)perylene	< 0.020	0.020	mg/kg dry	2025-10-29	
Benzo(k)fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
2-Chloronaphthalene	< 0.010	0.010	mg/kg dry	2025-10-29	
Chrysene	0.024	0.010	mg/kg dry	2025-10-29	
Dibenz(a,h)anthracene	< 0.005	0.005	mg/kg dry	2025-10-29	
Fluoranthene	0.022	0.010	mg/kg dry	2025-10-29	
Fluorene	< 0.154	0.010	mg/kg dry	2025-10-29	RA1
Indeno(1,2,3-cd)pyrene	< 0.020	0.020	mg/kg dry	2025-10-29	
1-Methylnaphthalene	0.044	0.010	mg/kg dry	2025-10-29	
2-Methylnaphthalene	0.122	0.010	mg/kg dry	2025-10-29	
Naphthalene	0.028	0.010	mg/kg dry	2025-10-29	
Phenanthrene	0.244	0.020	mg/kg dry	2025-10-29	
Pyrene	< 0.040	0.020	mg/kg dry	2025-10-29	RA1

TEST RESULTS

REPORTED TO PROJECT Global ARD Testing Services Inc.
2559

WORK ORDER REPORTED 25J3329
2025-10-31 13:42

Analyte	Result	RL	Units	Analyzed	Qualifier
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AS1-0.8 (25J3329-01) | Matrix: Solid | Sampled: 2025-10-23, Continued

Polycyclic Aromatic Hydrocarbons (PAH), Continued

Quinoline	< 0.050	0.050	mg/kg dry	2025-10-29	
Surrogate: Acenaphthene-d10	84	50-140	%	2025-10-29	
Surrogate: Chrysene-d12	58	50-140	%	2025-10-29	
Surrogate: Naphthalene-d8	70	50-140	%	2025-10-29	
Surrogate: Perylene-d12	67	50-140	%	2025-10-29	
Surrogate: Phenanthrene-d10	62	50-140	%	2025-10-29	

AS2-0.5 (25J3329-02) | Matrix: Solid | Sampled: 2025-10-23

CCME CWS Petroleum Hydrocarbons

PHC F1 (C6-C10)	< 20	20	mg/kg dry	2025-10-29	
PHC F2 (C10-C16)	< 100	50	mg/kg dry	2025-10-31	
PHC F3 (C16-C34)	766	100	mg/kg dry	2025-10-31	
PHC F4 (C34-C50)	203	100	mg/kg dry	2025-10-31	
Reached Baseline at nC50	Yes		mg/kg dry	2025-10-31	
Surrogate: 2-Methylnonane (EPH/F2-4)	104	60-140	%	2025-10-31	

General Parameters

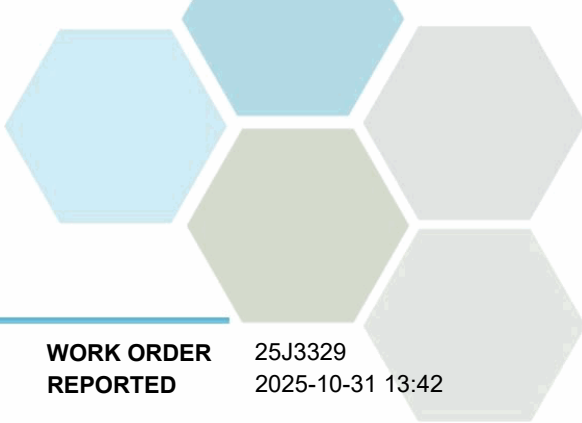
Moisture	< 1.0	1.0	% wet	2025-10-30	
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Non-Chlorinated Phenols

Phenol	< 0.050	0.050	mg/kg dry	2025-10-30	
2-Methylphenol	< 0.020	0.020	mg/kg dry	2025-10-30	
3 & 4-Methylphenol	< 0.030	0.030	mg/kg dry	2025-10-30	
2,4-Dimethylphenol	< 0.040	0.040	mg/kg dry	2025-10-30	
2-Nitrophenol	< 0.050	0.050	mg/kg dry	2025-10-30	
4-Nitrophenol	< 0.050	0.050	mg/kg dry	2025-10-30	
2,4-Dinitrophenol	< 0.080	0.080	mg/kg dry	2025-10-30	
2-Methyl-4,6-dinitrophenol	< 0.080	0.080	mg/kg dry	2025-10-30	
Surrogate: 2,4-Dibromophenol	72	50-140	%	2025-10-30	
Surrogate: 2,4,6-Tribromophenol	69	50-140	%	2025-10-30	
Surrogate: Phenol-d6	100	70-130	%	2025-10-30	

Polycyclic Aromatic Hydrocarbons (PAH)

Acenaphthene	< 0.010	0.005	mg/kg dry	2025-10-29	RA1
Acenaphthylene	< 0.010	0.005	mg/kg dry	2025-10-29	RA1
Anthracene	0.032	0.004	mg/kg dry	2025-10-29	
Benz(a)anthracene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(a)pyrene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(b)fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(b+j)fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
Benzo(g,h,i)perylene	< 0.020	0.020	mg/kg dry	2025-10-29	
Benzo(k)fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
2-Chloronaphthalene	< 0.010	0.010	mg/kg dry	2025-10-29	



TEST RESULTS

REPORTED TO PROJECT	Global ARD Testing Services Inc. 2559	WORK ORDER REPORTED	25J3329 2025-10-31 13:42
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Analyte	Result	RL	Units	Analyzed	Qualifier
AS2-0.5 (25J3329-02) Matrix: Solid Sampled: 2025-10-23, Continued					
Polycyclic Aromatic Hydrocarbons (PAH), Continued					
Chrysene	< 0.010	0.010	mg/kg dry	2025-10-29	
Dibenz(a,h)anthracene	< 0.005	0.005	mg/kg dry	2025-10-29	
Fluoranthene	< 0.010	0.010	mg/kg dry	2025-10-29	
Fluorene	< 0.015	0.010	mg/kg dry	2025-10-29	RA1
Indeno(1,2,3-cd)pyrene	< 0.020	0.020	mg/kg dry	2025-10-29	
1-Methylnaphthalene	0.019	0.010	mg/kg dry	2025-10-29	
2-Methylnaphthalene	0.046	0.010	mg/kg dry	2025-10-29	
Naphthalene	0.027	0.010	mg/kg dry	2025-10-29	
Phenanthrene	0.036	0.020	mg/kg dry	2025-10-29	
Pyrene	< 0.020	0.020	mg/kg dry	2025-10-29	
Quinoline	< 0.050	0.050	mg/kg dry	2025-10-29	
Surrogate: Acenaphthene-d10	96	50-140	%	2025-10-29	
Surrogate: Chrysene-d12	68	50-140	%	2025-10-29	
Surrogate: Naphthalene-d8	86	50-140	%	2025-10-29	
Surrogate: Perylene-d12	77	50-140	%	2025-10-29	
Surrogate: Phenanthrene-d10	73	50-140	%	2025-10-29	

Sample Qualifiers:	
RA1	The Reporting Limit for this sample has been raised due to matrix interference.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Global ARD Testing Services Inc.
2559

WORK ORDER REPORTED 25J3329
2025-10-31 13:42

Analysis Description	Method Ref.	Technique	Accredited	Location
CCME PHC F1 in Soil	EPA 5035A/5030B / CCME CWS PHC	Methanol Extract, Purge&Trap / Gas Chromatography (GC-FID)	✓	Richmond
CCME PHC F2-F4 in Soil	EPA 3570* / CCME CWS PHC	Shaker Extraction (Hexane-Acetone 1:1) / Gas Chromatography (GC-FID)	✓	Richmond
Moisture in Soil	ASTM D2974-87*	Gravimetry (Dried at 105C)		N/A
Phenols, Non-Chlorinated in Soil	EPA 3570* / EPA 8270 D	Shaker Extraction (DCM) / GC-MSD (SIM)	✓	Richmond
Polycyclic Aromatic Hydrocarbons in Soil	EPA 3570* / EPA 8270D	Shaker Extraction (Hexane-Acetone 1:1) / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
% wet	Percent (as received basis)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/kg dry	Milligrams per kilogram (dry weight basis)
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods

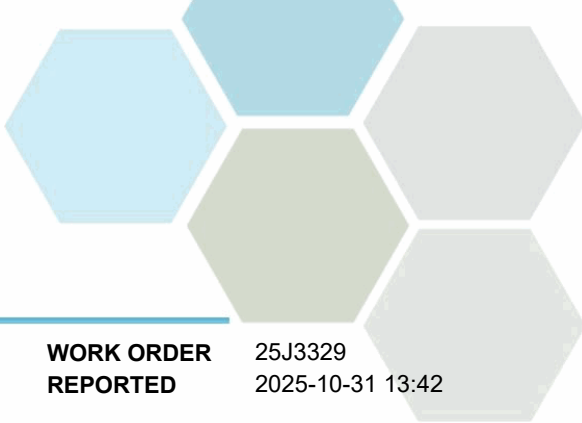
CCME Petroleum Hydrocarbon Comments:

CARO's methods comply with the Reference Method for the CWS PHC and are validated for use.

In cases where results for both F4 and F4G are reported, the greater of the two numbers must be used in any application of the CWS PHC guidelines. The gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.

Unless otherwise qualified, the following quality control criteria were adhered to:

1. All extraction and analysis holding times were met.
2. F1: The C6 and C10 response factors were within 30% of the response factor for toluene.
3. F2-F4: The C10, C16, and C34 response factors were within 10% of their average.
4. F4: The C50 response factor was at least 70% of the average of the C10, C16 and C34 response factors.
5. Linearity of the gasoline and/or diesel+motor oil response was within 15% throughout the calibration range.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Global ARD Testing Services Inc.	WORK ORDER	25J3329
PROJECT	2559	REPORTED	2025-10-31 13:42

General Comments:

The results in this report apply to samples received by CARO and analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety and must not be modified. CARO is not responsible for losses or damages resulting directly or indirectly from errors or omissions in the conduct of the testing. Any liability is limited to the cost of analysis. CARO will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Results in **red** indicate values above the regulatory limits where these have been included. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: [{@Email}](#)

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Global ARD Testing Services Inc.
2559

WORK ORDER REPORTED 25J3329
2025-10-31 13:42

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk):** A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup):** An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS):** A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS):** A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM):** A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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CCME CWS Petroleum Hydrocarbons, Batch B5J5006

Blank (B5J5006-BLK1)		Prepared: 2025-10-28, Analyzed: 2025-10-28							
PHC F1 (C6-C10)	< 20	20 mg/kg wet							
LCS (B5J5006-BS2)		Prepared: 2025-10-28, Analyzed: 2025-10-28							
PHC F1 (C6-C10)	380	20 mg/kg wet	342		111	60-140			

CCME CWS Petroleum Hydrocarbons, Batch B5J5452

Blank (B5J5452-BLK1)		Prepared: 2025-10-30, Analyzed: 2025-10-31							
PHC F2 (C10-C16)	< 100	100 mg/kg wet							
PHC F3 (C16-C34)	< 200	200 mg/kg wet							
PHC F4 (C34-C50)	< 200	200 mg/kg wet							
Reached Baseline at nC50	Yes	mg/kg wet							
Surrogate: 2-Methylnonane (EPH/F2-4)	44.9	mg/kg wet	45.8		98	60-140			
LCS (B5J5452-BS2)		Prepared: 2025-10-30, Analyzed: 2025-10-31							
PHC F2 (C10-C16)	977	100 mg/kg wet	946		103	60-140			
PHC F3 (C16-C34)	3230	200 mg/kg wet	3440		94	60-140			
PHC F4 (C34-C50)	334	200 mg/kg wet	231		145	60-140			SPK
Surrogate: 2-Methylnonane (EPH/F2-4)	45.8	mg/kg wet	45.8		100	60-140			

Non-Chlorinated Phenols, Batch B5J5333

Blank (B5J5333-BLK1)		Prepared: 2025-10-30, Analyzed: 2025-10-30							
Phenol	< 0.050	0.050 mg/kg wet							
2-Methylphenol	< 0.020	0.020 mg/kg wet							
3 & 4-Methylphenol	< 0.030	0.030 mg/kg wet							
2,4-Dimethylphenol	< 0.040	0.040 mg/kg wet							
2-Nitrophenol	< 0.050	0.050 mg/kg wet							
4-Nitrophenol	< 0.050	0.050 mg/kg wet							
2,4-Dinitrophenol	< 0.080	0.080 mg/kg wet							
2-Methyl-4,6-dinitrophenol	< 0.080	0.080 mg/kg wet							
Surrogate: 2,4-Dibromophenol	0.436	mg/kg wet	0.738		59	50-140			
Surrogate: 2,4,6-Tribromophenol	0.394	mg/kg wet	0.742		53	50-140			
Surrogate: Phenol-d6	0.345	mg/kg wet	0.369		93	70-130			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Global ARD Testing Services Inc.
2559

WORK ORDER REPORTED 25J3329
2025-10-31 13:42

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Non-Chlorinated Phenols, Batch B5J5333, Continued									
LCS (B5J5333-BS1)				Prepared: 2025-10-30, Analyzed: 2025-10-30					
Phenol	0.644	0.050 mg/kg wet	0.784		82	50-140			
2-Methylphenol	0.640	0.020 mg/kg wet	0.784		82	50-140			
3 & 4-Methylphenol	1.33	0.030 mg/kg wet	1.57		85	50-140			
2,4-Dimethylphenol	0.520	0.040 mg/kg wet	0.784		66	50-140			
2-Nitrophenol	0.604	0.050 mg/kg wet	0.784		77	50-130			
4-Nitrophenol	0.516	0.050 mg/kg wet	0.784		66	50-130			
2,4-Dinitrophenol	0.197	0.080 mg/kg wet	0.784		25	50-130			SPK1
2-Methyl-4,6-dinitrophenol	0.426	0.080 mg/kg wet	0.784		54	50-130			
Surrogate: 2,4-Dibromophenol	0.597	mg/kg wet	0.784		76	50-140			
Surrogate: 2,4,6-Tribromophenol	0.648	mg/kg wet	0.788		82	50-140			
Surrogate: Phenol-d6	0.372	mg/kg wet	0.392		95	70-130			

Polycyclic Aromatic Hydrocarbons (PAH), Batch B5J5201

Blank (B5J5201-BLK1)				Prepared: 2025-10-29, Analyzed: 2025-10-29					
Acenaphthene	< 0.005	0.005 mg/kg wet							
Acenaphthylene	< 0.005	0.005 mg/kg wet							
Anthracene	< 0.004	0.004 mg/kg wet							
Benz(a)anthracene	< 0.010	0.010 mg/kg wet							
Benzo(a)pyrene	< 0.010	0.010 mg/kg wet							
Benzo(b)fluoranthene	< 0.010	0.010 mg/kg wet							
Benzo(b+j)fluoranthene	< 0.010	0.010 mg/kg wet							
Benzo(g,h,i)perylene	< 0.020	0.020 mg/kg wet							
Benzo(k)fluoranthene	< 0.010	0.010 mg/kg wet							
2-Chloronaphthalene	< 0.010	0.010 mg/kg wet							
Chrysene	< 0.010	0.010 mg/kg wet							
Dibenz(a,h)anthracene	< 0.005	0.005 mg/kg wet							
Fluoranthene	< 0.010	0.010 mg/kg wet							
Fluorene	< 0.010	0.010 mg/kg wet							
Indeno(1,2,3-cd)pyrene	< 0.020	0.020 mg/kg wet							
1-Methylnaphthalene	< 0.010	0.010 mg/kg wet							
2-Methylnaphthalene	< 0.010	0.010 mg/kg wet							
Naphthalene	< 0.010	0.010 mg/kg wet							
Phenanthrene	< 0.020	0.020 mg/kg wet							
Pyrene	< 0.020	0.020 mg/kg wet							
Quinoline	< 0.050	0.050 mg/kg wet							
Surrogate: Acenaphthene-d10	0.333	mg/kg wet	0.530		63	50-140			
Surrogate: Chrysene-d12	0.354	mg/kg wet	0.530		67	50-140			
Surrogate: Naphthalene-d8	0.323	mg/kg wet	0.530		61	50-140			
Surrogate: Perylene-d12	0.332	mg/kg wet	0.530		63	50-140			
Surrogate: Phenanthrene-d10	0.297	mg/kg wet	0.530		56	50-140			

LCS (B5J5201-BS1)				Prepared: 2025-10-29, Analyzed: 2025-10-29					
Acenaphthene	0.093	0.005 mg/kg wet	0.108		86	50-140			
Acenaphthylene	0.092	0.005 mg/kg wet	0.107		87	50-140			
Anthracene	0.115	0.004 mg/kg wet	0.108		107	50-140			
Benz(a)anthracene	0.103	0.010 mg/kg wet	0.108		95	50-140			
Benzo(a)pyrene	0.097	0.010 mg/kg wet	0.107		90	50-140			
Benzo(b)fluoranthene	0.095	0.010 mg/kg wet	0.107		89	50-140			
Benzo(b+j)fluoranthene	0.233	0.010 mg/kg wet	0.214		109	50-140			
Benzo(g,h,i)perylene	0.102	0.020 mg/kg wet	0.107		95	50-140			
Benzo(k)fluoranthene	0.097	0.010 mg/kg wet	0.107		90	50-140			
2-Chloronaphthalene	0.098	0.010 mg/kg wet	0.107		91	50-140			
Chrysene	0.108	0.010 mg/kg wet	0.106		102	50-140			
Dibenz(a,h)anthracene	0.099	0.005 mg/kg wet	0.108		91	50-140			
Fluoranthene	0.106	0.010 mg/kg wet	0.108		98	50-140			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Global ARD Testing Services Inc.
2559

WORK ORDER REPORTED 25J3329
2025-10-31 13:42

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Polycyclic Aromatic Hydrocarbons (PAH), Batch B5J5201, Continued									
LCS (B5J5201-BS1), Continued					Prepared: 2025-10-29, Analyzed: 2025-10-29				
Fluorene	0.099	0.010 mg/kg wet	0.110		90	50-140			
Indeno(1,2,3-cd)pyrene	0.096	0.020 mg/kg wet	0.107		90	50-140			
1-Methylnaphthalene	0.100	0.010 mg/kg wet	0.107		93	50-140			
2-Methylnaphthalene	0.095	0.010 mg/kg wet	0.107		89	50-140			
Naphthalene	0.094	0.010 mg/kg wet	0.107		88	50-140			
Phenanthrene	0.086	0.020 mg/kg wet	0.107		80	50-140			
Pyrene	0.110	0.020 mg/kg wet	0.109		100	50-140			
Quinoline	0.136	0.050 mg/kg wet	0.109		125	50-140			
Surrogate: Acenaphthene-d10	0.422	mg/kg wet	0.542		78	50-140			
Surrogate: Chrysene-d12	0.443	mg/kg wet	0.542		82	50-140			
Surrogate: Naphthalene-d8	0.388	mg/kg wet	0.542		72	50-140			
Surrogate: Perylene-d12	0.444	mg/kg wet	0.542		82	50-140			
Surrogate: Phenanthrene-d10	0.359	mg/kg wet	0.542		66	50-140			

QC Qualifiers:

SPK The recovery of this analyte was outside of established control limits.
 SPK1 The recovery of this analyte was outside of established control limits. The data was accepted based on performance of other batch QC.

**Attention: Rachelle Robitaille**

EDI Environmental Dynamics Inc.
2195 2nd Ave
Whitehorse, YT
Canada Y1A 3T8

Your C.O.C. #: 644362-04-01, 644362-07-01, 644362-05-01, 644362-03-01, 644362-02-01, 644362-06-01

Report Date: 2021/09/27

Report #: R3076787

Version: 2 - Final

CERTIFICATE OF ANALYSIS**BV LABS JOB #: C158547****Received: 2021/08/11, 13:30**

Sample Matrix: Soil
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICPMS (total)	3	2021/08/24	2021/08/24	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
Elements by ICPMS (total)	16	2021/08/25	2021/08/25	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
pH (2:1 DI Water Extract)	3	2021/08/24	2021/08/24	BBY6SOP-00028	BCMOE BCLM Mar2005 m
pH (2:1 DI Water Extract)	16	2021/08/25	2021/08/25	BBY6SOP-00028	BCMOE BCLM Mar2005 m

Sample Matrix: Tissue
Samples Received: 33

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements in Tissue by CRC ICPMS - Dry Wt	20	2021/08/24	2021/09/24	BBY7SOP-00021 / BBY7SOP-00002	EPA 6020b R2 m
Elements in Tissue by CRC ICPMS - Dry Wt	13	2021/09/20	2021/09/25	BBY7SOP-00021 / BBY7SOP-00002	EPA 6020b R2 m
Elements in Tissue - Wet Wt (Calculated)	20	N/A	2021/08/25	BBY WI-00033	Auto Calc
Elements in Tissue - Wet Wt (Calculated)	13	N/A	2021/09/11	BBY WI-00033	Auto Calc
Moisture in Tissue	20	2021/08/24	2021/08/25	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture in Tissue	13	2021/08/31	2021/09/11	BBY8SOP-00017	BCMOE BCLM Dec2000 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or



Attention: Rachelle Robitaille

EDI Environmental Dynamics Inc.
2195 2nd Ave
Whitehorse, YT
Canada Y1A 3T8

Your C.O.C. #: 644362-04-01, 644362-07-01, 644362-05-01, 644362-03-01, 644362-02-01, 644362-06-01

Report Date: 2021/09/27

Report #: R3076787

Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C158547

Received: 2021/08/11, 13:30

implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key



Bureau Veritas

27 Sep 2021 10:47:54

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Customer Solutions, Western Canada Customer Experience Team

Email: customersolutionswest@bureauveritas.com

Phone# (604) 734 7276

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR370	ADR371	ADR373	ADR374		
Sampling Date		2021/08/09	2021/08/09	2021/08/09	2021/08/09		
COC Number		644362-04-01	644362-04-01	644362-04-01	644362-04-01		
	UNITS	NPT_054_SALIA SP	NPT_054_VIBE EDU	NPT_058_CORN SER	NPT_058_VIBE EDU	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	16.9	178	22.7	160	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0110	0.0141	0.0051	0.0155	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.060	0.094	0.051	0.199	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	29.0	139	158	198	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	35.0	10.0	11.5	23.6	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	2.41	0.116	0.0124	0.491	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	9220	13400	20000	10400	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	0.25	ND	0.39	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.419	0.118	0.045	0.167	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	6.97	6.20	4.29	3.50	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	67.3	164	106	203	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.132	0.178	0.046	0.146	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	2080	4110	3140	1770	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	107	63.1	32.3	34.8	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.412	0.465	0.372	0.155	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	4.44	4.10	2.49	5.53	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1190	2830	2160	1430	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	13900	31800	17700	18600	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	0.123	ND	ND	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	ND	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	17	25	14	13	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	35.8	54.6	85.5	46.5	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	0.0022	ND	0.0040	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	0.11	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	1.19	3.96	2.17	5.89	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0047	0.0176	0.0053	0.0506	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	0.30	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	139	45.5	21.4	44.9	0.20	A338154

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR376	ADR377	ADR386	ADR387		
Sampling Date		2021/08/09	2021/08/09	2021/08/06	2021/08/06		
COC Number		644362-04-01	644362-04-01	644362-07-01	644362-07-01		
	UNITS	NPT_055_CON SER	NPT_055_VIBE EDU	NPT_003_CORN SER	NPT_003_VIBE EDU	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	16.4	43.4	620	1030	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0067	0.0062	0.0693	0.124	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.035	0.033	1.43	1.94	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	31.0	95.7	71.9	62.1	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	0.019	0.032	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	0.013	0.025	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	16.7	26.5	10.3	19.0	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0701	1.32	0.0491	0.224	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	37700	22400	26300	11800	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	0.11	1.84	3.39	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.035	0.058	0.656	1.29	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	4.62	4.41	7.02	8.66	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	67.3	58.6	1320	2290	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.123	0.042	0.578	1.02	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	4150	3510	3010	2340	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	78.0	56.7	74.0	63.0	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	0.012	0.013	0.012	0.015	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.380	0.139	0.742	0.482	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	1.19	0.954	4.04	5.27	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	4230	2890	2080	1690	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	18400	28100	14600	19200	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	0.074	0.103	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	0.0155	0.0271	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	14	13	53	49	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	41.4	28.8	86.6	41.4	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	0.0068	0.0108	0.0180	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	1.26	1.18	48.2	78.8	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0046	0.0045	0.125	0.258	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	2.72	4.96	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	21.1	25.8	20.6	26.7	0.20	A338154

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR389		ADR390	ADR392		
Sampling Date		2021/08/06		2021/08/06	2021/08/06		
COC Number		644362-07-01		644362-07-01	644362-07-01		
	UNITS	NPT_006_CORN SER	QC Batch	NPT_006_VIBE EDU	NPT_009_CORN SER	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	45.2	A338154	463	19.8	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0096	A338154	0.0532	ND	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.059	A338154	0.748	0.021	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	42.2	A338154	66.7	38.5	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	A338154	0.017	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	8.6	A338154	20.5	17.8	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0090	A338154	0.0857	0.0091	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	20600	A338154	13300	38300	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.15	A338154	2.23	ND	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.047	A338154	0.523	0.036	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	3.88	A338154	5.94	3.37	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	116	A338154	1010	75.4	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.068	A338154	0.404	0.039	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	3090	A338154	2670	4850	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	27.7	A338154	44.0	63.9	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	A338154	0.015	0.012	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.596	A338154	0.613	0.077	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	2.03	A338154	3.86	2.30	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	2300	A338154	1700	2650	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	16000	A338154	24200	14800	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	A338154	0.066	ND	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	A338154	0.0090	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	13	A338154	25	10	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	68.4	A338154	50.6	88.9	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	A338154	0.0056	0.0023	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	A338154	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	3.69	A338154	42.2	1.49	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0068	A338154	0.0951	0.0041	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	A338154	2.37	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	16.6	A338154	23.6	11.9	0.20	A358708
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR392	ADR393	ADR412	ADR413		
Sampling Date		2021/08/06	2021/08/06	2021/08/09	2021/08/09		
COC Number		644362-07-01	644362-07-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_CORN SER Lab-Dup	NPT_009_VIBE EDU	NPT_059A_CORN SER	NPT_059A_VIBE EDU	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	21.7	108	13.2	168	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	ND	0.0087	0.0067	0.0055	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.023	0.081	0.614	0.025	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	39.3	53.8	90.7	161	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	18.4	21.2	5.1	8.0	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0108	0.0922	0.0133	0.236	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	37900	14900	15100	11300	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	0.36	ND	0.21	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.037	0.123	0.026	0.194	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	3.39	6.05	3.66	4.19	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	75.4	153	51.2	68.9	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.036	0.077	0.039	0.074	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	4890	3730	2390	2830	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	63.2	76.1	21.9	49.4	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	0.013	0.029	ND	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.077	0.229	1.10	1.28	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	2.31	4.52	3.03	6.03	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	2680	3700	1820	1480	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	15000	34800	10800	21600	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	ND	0.056	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	11	16	ND	13	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	91.6	37.6	57.7	50.7	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	0.0020	0.0047	ND	0.0046	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	1.54	4.80	1.06	1.79	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0035	0.0153	0.0025	0.0145	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	0.20	ND	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	12.0	24.7	13.7	25.7	0.20	A358708

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR415	ADR416	ADR418		
Sampling Date		2021/08/09	2021/08/09	2021/08/10		
COC Number		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_059B_CORN SER	NPT_059B_VIBE EDU	NPT_020A_CORN SER	RDL	QC Batch
Total Metals by ICPMS						
Total (Dry Wt) Aluminum (Al)	mg/kg	38.4	157	37.3	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0056	0.0051	ND	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.027	ND	ND	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	112	87.6	89.3	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	5.4	6.5	5.6	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0220	0.153	ND	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	16900	9400	15500	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.13	0.20	ND	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.072	0.100	0.028	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	4.07	3.89	5.12	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	98.7	52.3	51.9	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.085	0.068	0.043	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	2860	1760	2440	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	27.7	31.5	27.5	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	1.45	1.22	0.759	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	4.10	4.74	3.78	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	1850	1260	2280	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	12700	18300	12200	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	ND	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	12	ND	ND	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	64.8	37.0	60.5	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	0.0028	ND	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	3.60	1.18	1.09	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0061	0.0122	0.0032	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	15.3	25.5	24.3	0.20	A358708
RDL = Reportable Detection Limit						
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.						



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR419	ADR421		ADR431		
Sampling Date		2021/08/10	2021/08/10		2021/08/08		
COC Number		644362-05-01	644362-05-01		644362-03-01		
	UNITS	NPT_020A_VIBE EDU	NPT_060A_CORN SER	QC Batch	NPT_022A_SALIX SP	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	153	19.9	A338154	16.1	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0068	0.0445	A338154	0.0050	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.054	0.289	A338154	0.026	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	94.3	143	A338154	45.8	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	A338154	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	A338154	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	14.0	11.8	A338154	20.5	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.193	0.0183	A338154	2.36	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	11700	23100	A338154	14700	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.26	0.10	A338154	ND	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.112	0.030	A338154	0.600	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	5.13	3.75	A338154	7.61	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	105	56.3	A338154	56.1	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.071	0.893	A338154	0.064	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	2860	3160	A338154	2720	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	40.5	71.4	A338154	160	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	0.011	0.012	A338154	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.520	0.615	A338154	0.418	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	3.73	4.15	A338154	12.5	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	2100	2140	A338154	1530	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	30900	9750	A338154	15300	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	A338154	0.077	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	A338154	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	21	15	A338154	12	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	43.9	102	A338154	58.2	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	ND	A338154	0.0021	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	A338154	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	1.96	0.94	A338154	1.06	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0104	0.0038	A338154	0.0036	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	A338154	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	26.8	24.1	A338154	122	0.20	A358708
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR433	ADR435		ADR437		
Sampling Date		2021/08/08	2021/08/08		2021/08/08		
COC Number		644362-03-01	644362-03-01		644362-03-01		
	UNITS	NPT_047_VACC OVA	NPT_040_VACC OVA	QC Batch	NPT_053_SALIX SP	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	64.9	88.5	A358708	25.6	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	ND	ND	A358708	0.142	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	ND	ND	A358708	0.994	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	28.9	57.6	A358708	37.2	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	A358708	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	A358708	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	13.3	9.4	A358708	13.2	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	ND	ND	A358708	4.98	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	5290	5650	A358708	7560	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	ND	A358708	0.13	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	ND	ND	A358708	0.141	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	8.27	6.39	A358708	12.0	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	37.2	37.5	A358708	76.9	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.012	0.014	A358708	0.945	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	2830	2440	A358708	3670	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	1290	1630	A358708	44.2	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	A358708	ND	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.441	0.794	A358708	0.919	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	0.734	0.538	A358708	1.09	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1860	1810	A358708	1660	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	6750	6170	A358708	10800	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	A358708	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	A358708	0.0229	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	14	ND	A358708	14	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	5.00	7.86	A358708	36.0	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	ND	A358708	ND	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	A358708	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	ND	ND	A358708	1.54	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	ND	ND	A358708	0.0049	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	A358708	ND	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	18.8	22.7	A358708	254	0.20	A338154
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR438	ADR438	ADR442	ADR444		
Sampling Date		2021/08/08	2021/08/08	2021/08/07	2021/08/07		
COC Number		644362-03-01	644362-03-01	644362-02-01	644362-02-01		
	UNITS	NPT_053_CORN SER	NPT_053_CORN SER Lab-Dup	NPT_029_SALIX SP	NPT_031_CORN SER	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	24.4	23.1	15.2	46.7	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0882	0.0830	ND	0.0093	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.790	0.752	0.036	0.090	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	63.9	64.3	75.1	203	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	8.1	8.3	8.6	10.6	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0144	0.0151	2.75	0.0238	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	16000	16000	16600	18200	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	0.10	ND	ND	0.13	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.025	0.025	1.54	0.051	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	4.86	5.01	5.31	2.97	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	76.9	74.8	78.5	112	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.921	0.889	0.037	0.115	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	3970	4030	1970	2760	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	17.3	17.5	200	21.2	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	1.92	1.93	0.494	0.857	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	0.777	0.799	7.80	2.99	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1560	1600	2020	1590	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	8890	9190	18000	13500	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	0.055	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	0.0074	0.0070	ND	ND	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	ND	ND	15	13	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	65.7	64.9	39.3	76.3	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	ND	0.0040	0.0028	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	1.63	1.57	1.51	3.69	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0079	0.0060	0.0104	0.0085	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	ND	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	16.9	17.1	93.1	16.6	0.20	A338154

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR445	ADR447	ADR448	ADR449		
Sampling Date		2021/08/07	2021/08/07	2021/08/07	2021/08/10		
COC Number		644362-02-01	644362-02-01	644362-02-01	644362-06-01		
	UNITS	NPT_031_VIBE EDU	NPT_001_CORN SER	NPT_001_VIBE EDU	NPT_060A_VACC OVA	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	156	25.3	128	160	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0082	ND	0.0076	0.0542	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.102	0.048	0.063	0.781	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	268	138	100	171	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	18.7	5.6	5.6	23.2	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.356	0.0110	0.0524	0.204	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	8310	19300	10100	9740	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	0.21	ND	0.11	0.15	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.092	0.039	0.099	0.159	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	2.98	3.73	3.41	9.33	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	122	77.7	87.9	54.0	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.099	0.077	0.044	0.799	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	1480	3400	2450	3360	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	21.7	32.1	35.1	1270	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	0.019	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.427	0.573	1.12	0.407	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	5.08	3.92	2.81	7.48	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1190	1810	1530	1450	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	20800	18700	21500	9400	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	ND	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	0.0085	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	14	23	ND	78	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	42.9	72.6	39.7	21.7	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	0.0050	ND	ND	ND	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	4.14	1.55	1.93	0.93	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0166	0.0064	0.0146	0.0039	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	ND	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	40.1	16.6	25.7	47.1	0.20	A338154

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR451		ADR453	ADR454		
Sampling Date		2021/08/10		2021/08/10	2021/08/10		
COC Number		644362-06-01		644362-06-01	644362-06-01		
	UNITS	NPT_061_VIBE EDU	QC Batch	NPT_100C_CORN SER	NPT_100C_SALIX SP	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	181	A338154	40.1	205	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0106	A338154	ND	0.0232	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.076	A338154	0.051	0.371	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	130	A338154	17.1	25.4	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	17.9	A338154	9.9	17.7	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.146	A338154	ND	1.53	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	11400	A338154	13900	19000	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.13	A338154	0.16	1.62	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.157	A338154	0.058	0.844	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	4.65	A338154	2.94	6.07	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	76.6	A338154	134	534	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.113	A338154	0.029	0.149	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	2790	A338154	1840	3640	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	49.5	A338154	29.3	166	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.600	A338154	0.527	1.09	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	4.25	A338154	0.978	2.84	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	1980	A338154	1830	2130	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	27100	A338154	9330	9490	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	0.070	A338154	0.075	0.212	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	A338154	ND	0.0089	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	20	A338154	ND	17	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	45.3	A338154	54.2	94.5	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	A338154	ND	0.0028	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	A338154	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	1.65	A338154	3.70	21.7	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0182	A338154	0.0113	0.0211	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	A338154	ND	1.09	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	29.4	A338154	11.3	72.5	0.20	A358708
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR370		ADR371		ADR373		
Sampling Date		2021/08/09		2021/08/09		2021/08/09		
COC Number		644362-04-01		644362-04-01		644362-04-01		
	UNITS	NPT_054_SALIA SP	RDL	NPT_054_VIBE EDU	RDL	NPT_058_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	4.54	0.27	31.2	0.18	5.87	0.26	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0029	0.0013	0.00250	0.00088	0.0013	0.0013	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0161	0.0054	0.0164	0.0035	0.0131	0.0052	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	7.78	0.013	24.4	0.0088	40.8	0.013	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0027	ND	0.0018	ND	0.0026	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0027	ND	0.0018	ND	0.0026	A326677
Total (Wet Wt) Boron (B)	mg/kg	9.39	0.27	1.75	0.18	2.98	0.26	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.646	0.0013	0.0203	0.00088	0.0032	0.0013	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2470	2.7	2340	1.8	5170	2.6	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.027	0.044	0.018	ND	0.026	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.112	0.0054	0.0207	0.0035	0.0116	0.0052	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.87	0.013	1.09	0.0088	1.11	0.013	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	18.0	1.3	28.7	0.88	27.5	1.3	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0353	0.0027	0.0311	0.0018	0.0120	0.0026	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	559	1.3	719	0.88	813	1.3	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	28.8	0.013	11.0	0.0088	8.36	0.013	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0027	ND	0.0018	ND	0.0026	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.110	0.0054	0.0815	0.0035	0.0964	0.0052	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	1.19	0.013	0.718	0.0088	0.646	0.013	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	319	2.7	495	1.8	559	2.6	A326677
Total (Wet Wt) Potassium (K)	mg/kg	3720	2.7	5560	1.8	4570	2.6	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.033	0.013	ND	0.0088	ND	0.013	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0013	ND	0.00088	ND	0.0013	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	4.5	2.7	4.3	1.8	3.7	2.6	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	9.59	0.013	9.55	0.0088	22.1	0.013	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00054	0.00040	0.00035	ND	0.00052	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.027	0.020	0.018	ND	0.026	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.32	0.13	0.693	0.088	0.56	0.13	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00130	0.00054	0.00310	0.00035	0.00140	0.00052	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.054	ND	0.035	ND	0.052	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	37.2	0.054	7.97	0.035	5.54	0.052	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR374		ADR376		ADR377		
Sampling Date		2021/08/09		2021/08/09		2021/08/09		
COC Number		644362-04-01		644362-04-01		644362-04-01		
	UNITS	NPT_058_VIBE EDU	RDL	NPT_055_CON SER	RDL	NPT_055_VIBE EDU	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	37.0	0.23	3.40	0.21	7.43	0.17	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0036	0.0012	0.0014	0.0010	0.00110	0.00086	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0462	0.0046	0.0072	0.0041	0.0056	0.0034	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	46.0	0.012	6.42	0.010	16.4	0.0086	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0023	ND	0.0021	ND	0.0017	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0023	ND	0.0021	ND	0.0017	A326677
Total (Wet Wt) Boron (B)	mg/kg	5.48	0.23	3.45	0.21	4.53	0.17	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.114	0.0012	0.0145	0.0010	0.225	0.00086	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2410	2.3	7800	2.1	3830	1.7	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.090	0.023	ND	0.021	0.019	0.017	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0389	0.0046	0.0072	0.0041	0.0099	0.0034	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.813	0.012	0.957	0.010	0.753	0.0086	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	47.0	1.2	13.9	1.0	10.0	0.86	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0339	0.0023	0.0254	0.0021	0.0072	0.0017	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	411	1.2	858	1.0	600	0.86	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	8.06	0.012	16.2	0.010	9.70	0.0086	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0023	0.0025	0.0021	0.0022	0.0017	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.0359	0.0046	0.0787	0.0041	0.0238	0.0034	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	1.28	0.012	0.247	0.010	0.163	0.0086	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	333	2.3	875	2.1	494	1.7	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4310	2.3	3820	2.1	4810	1.7	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.012	ND	0.010	ND	0.0086	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0012	ND	0.0010	ND	0.00086	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	3.0	2.3	2.8	2.1	2.3	1.7	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	10.8	0.012	8.57	0.010	4.92	0.0086	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00090	0.00046	ND	0.00041	0.00120	0.00034	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.023	ND	0.021	ND	0.017	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	1.37	0.12	0.26	0.10	0.202	0.086	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.0117	0.00046	0.00100	0.00041	0.00080	0.00034	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	0.071	0.046	ND	0.041	ND	0.034	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	10.4	0.046	4.36	0.041	4.41	0.034	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR386		ADR387		ADR389		
Sampling Date		2021/08/06		2021/08/06		2021/08/06		
COC Number		644362-07-01		644362-07-01		644362-07-01		
	UNITS	NPT_003_CORN SER	RDL	NPT_003_VIBE EDU	RDL	NPT_006_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	133	0.21	235	0.23	10.1	0.22	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0148	0.0011	0.0282	0.0011	0.0021	0.0011	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.306	0.0043	0.440	0.0045	0.0132	0.0045	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	15.4	0.011	14.1	0.011	9.41	0.011	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	0.0040	0.0021	0.0072	0.0023	ND	0.0022	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	0.0028	0.0021	0.0057	0.0023	ND	0.0022	A326677
Total (Wet Wt) Boron (B)	mg/kg	2.20	0.21	4.31	0.23	1.92	0.22	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0105	0.0011	0.0508	0.0011	0.0020	0.0011	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	5620	2.1	2670	2.3	4590	2.2	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.393	0.021	0.769	0.023	0.034	0.022	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.140	0.0043	0.293	0.0045	0.0105	0.0045	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.50	0.011	1.97	0.011	0.866	0.011	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	282	1.1	520	1.1	25.9	1.1	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.124	0.0021	0.231	0.0023	0.0152	0.0022	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	645	1.1	531	1.1	690	1.1	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	15.8	0.011	14.3	0.011	6.17	0.011	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	0.0025	0.0021	0.0035	0.0023	ND	0.0022	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.159	0.0043	0.109	0.0045	0.133	0.0045	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.864	0.011	1.20	0.011	0.453	0.011	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	444	2.1	384	2.3	513	2.2	A326677
Total (Wet Wt) Potassium (K)	mg/kg	3130	2.1	4360	2.3	3570	2.2	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.016	0.011	0.023	0.011	ND	0.011	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	0.0033	0.0011	0.0062	0.0011	ND	0.0011	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	11.3	2.1	11.1	2.3	2.9	2.2	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	18.5	0.011	9.39	0.011	15.3	0.011	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00230	0.00043	0.00410	0.00045	ND	0.00045	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.021	ND	0.023	ND	0.022	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	10.3	0.11	17.9	0.11	0.82	0.11	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.0268	0.00043	0.0587	0.00045	0.00150	0.00045	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	0.582	0.043	1.13	0.045	ND	0.045	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	4.40	0.043	6.06	0.045	3.69	0.045	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR390		ADR392		ADR393		
Sampling Date		2021/08/06		2021/08/06		2021/08/06		
COC Number		644362-07-01		644362-07-01		644362-07-01		
	UNITS	NPT_006_VIBE EDU	RDL	NPT_009_CORN SER	RDL	NPT_009_VIBE EDU	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	98.6	0.21	4.69	0.24	21.6	0.20	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0113	0.0011	ND	0.0012	0.0017	0.0010	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.159	0.0043	0.0049	0.0047	0.0160	0.0040	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	14.2	0.011	9.13	0.012	10.7	0.010	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	0.0036	0.0021	ND	0.0024	ND	0.0020	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0021	ND	0.0024	ND	0.0020	A326677
Total (Wet Wt) Boron (B)	mg/kg	4.37	0.21	4.23	0.24	4.22	0.20	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0183	0.0011	0.0022	0.0012	0.0183	0.0010	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2840	2.1	9070	2.4	2970	2.0	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.475	0.021	ND	0.024	0.071	0.020	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.111	0.0043	0.0085	0.0047	0.0245	0.0040	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.27	0.011	0.798	0.012	1.20	0.010	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	216	1.1	17.9	1.2	30.4	1.0	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0861	0.0021	0.0093	0.0024	0.0153	0.0020	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	570	1.1	1150	1.2	742	1.0	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	9.36	0.011	15.2	0.012	15.1	0.010	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	0.0032	0.0021	0.0030	0.0024	0.0057	0.0020	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.131	0.0043	0.0183	0.0047	0.0455	0.0040	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.823	0.011	0.546	0.012	0.899	0.010	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	362	2.1	628	2.4	736	2.0	A326677
Total (Wet Wt) Potassium (K)	mg/kg	5160	2.1	3520	2.4	6920	2.0	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.014	0.011	ND	0.012	ND	0.010	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	0.0019	0.0011	ND	0.0012	ND	0.0010	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	5.3	2.1	ND	2.4	3.2	2.0	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	10.8	0.011	21.1	0.012	7.47	0.010	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00120	0.00043	0.00050	0.00047	0.00090	0.00040	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.021	ND	0.024	ND	0.020	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	8.99	0.11	0.35	0.12	0.96	0.10	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.0203	0.00043	0.00100	0.00047	0.00300	0.00040	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	0.505	0.043	ND	0.047	ND	0.040	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	5.03	0.043	2.82	0.047	4.91	0.040	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR412		ADR413		ADR415		
Sampling Date		2021/08/09		2021/08/09		2021/08/09		
COC Number		644362-05-01		644362-05-01		644362-05-01		
	UNITS	NPT_059A_CORN SER	RDL	NPT_059A_VIBE EDU	RDL	NPT_059B_CORN SER	RDL	QC Batch

Calculated Parameters

Total (Wet Wt) Aluminum (Al)	mg/kg	3.42	0.26	35.0	0.21	8.52	0.22	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0017	0.0013	0.0012	0.0010	0.0012	0.0011	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.159	0.0052	0.0053	0.0042	0.0060	0.0044	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	23.5	0.013	33.7	0.010	24.8	0.011	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0026	ND	0.0021	ND	0.0022	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0026	ND	0.0021	ND	0.0022	A326677
Total (Wet Wt) Boron (B)	mg/kg	1.32	0.26	1.68	0.21	1.20	0.22	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0035	0.0013	0.0494	0.0010	0.0049	0.0011	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	3900	2.6	2370	2.1	3760	2.2	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.026	0.044	0.021	0.028	0.022	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0068	0.0052	0.0405	0.0042	0.0160	0.0044	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.949	0.013	0.876	0.010	0.904	0.011	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	13.3	1.3	14.4	1.0	21.9	1.1	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0101	0.0026	0.0154	0.0021	0.0189	0.0022	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	620	1.3	592	1.0	635	1.1	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	5.67	0.013	10.3	0.010	6.15	0.011	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0026	ND	0.0021	ND	0.0022	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.285	0.0052	0.268	0.0042	0.322	0.0044	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.786	0.013	1.26	0.010	0.911	0.011	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	473	2.6	309	2.1	410	2.2	A326677
Total (Wet Wt) Potassium (K)	mg/kg	2800	2.6	4500	2.1	2820	2.2	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.013	0.012	0.010	ND	0.011	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0013	ND	0.0010	ND	0.0011	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	ND	2.6	2.8	2.1	2.7	2.2	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	14.9	0.013	10.6	0.010	14.4	0.011	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00052	0.00100	0.00042	ND	0.00044	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.026	ND	0.021	ND	0.022	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.27	0.13	0.37	0.10	0.80	0.11	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00070	0.00052	0.00300	0.00042	0.00140	0.00044	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.052	ND	0.042	ND	0.044	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	3.56	0.052	5.38	0.042	3.39	0.044	A326677

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR416		ADR418		ADR419		
Sampling Date		2021/08/09		2021/08/10		2021/08/10		
COC Number		644362-05-01		644362-05-01		644362-05-01		
	UNITS	NPT_059B_VIBE EDU	RDL	NPT_020A_CORN SER	RDL	NPT_020A_VIBE EDU	RDL	QC Batch

Calculated Parameters

Total (Wet Wt) Aluminum (Al)	mg/kg	39.6	0.25	10.8	0.29	28.5	0.19	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0013	0.0013	ND	0.0015	0.00130	0.00093	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	ND	0.0051	ND	0.0058	0.0101	0.0037	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	22.2	0.013	25.9	0.015	17.5	0.0093	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0025	ND	0.0029	ND	0.0019	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0025	ND	0.0029	ND	0.0019	A326677
Total (Wet Wt) Boron (B)	mg/kg	1.66	0.25	1.62	0.29	2.61	0.19	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0387	0.0013	ND	0.0015	0.0359	0.00093	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2380	2.5	4500	2.9	2170	1.9	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.052	0.025	ND	0.029	0.049	0.019	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0254	0.0051	0.0082	0.0058	0.0208	0.0037	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.984	0.013	1.48	0.015	0.955	0.0093	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	13.2	1.3	15.0	1.5	19.5	0.93	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0171	0.0025	0.0124	0.0029	0.0133	0.0019	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	446	1.3	709	1.5	532	0.93	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	7.97	0.013	7.97	0.015	7.53	0.0093	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0025	ND	0.0029	0.0020	0.0019	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.308	0.0051	0.220	0.0058	0.0967	0.0037	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	1.20	0.013	1.10	0.015	0.694	0.0093	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	320	2.5	661	2.9	391	1.9	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4630	2.5	3550	2.9	5750	1.9	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.013	ND	0.015	ND	0.0093	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0013	ND	0.0015	ND	0.00093	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	ND	2.5	ND	2.9	3.9	1.9	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	9.36	0.013	17.5	0.015	8.16	0.0093	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00070	0.00051	ND	0.00058	ND	0.00037	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.025	ND	0.029	ND	0.019	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.30	0.13	0.32	0.15	0.365	0.093	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00310	0.00051	0.00090	0.00058	0.00190	0.00037	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.051	ND	0.058	ND	0.037	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	6.45	0.051	7.05	0.058	4.99	0.037	A326677

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR421		ADR431		ADR433		
Sampling Date		2021/08/10		2021/08/08		2021/08/08		
COC Number		644362-05-01		644362-03-01		644362-03-01		
	UNITS	NPT_060A_CORN SER	RDL	NPT_022A_SALIX SP	RDL	NPT_047_VACC OVA	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	3.86	0.19	5.22	0.32	22.4	0.35	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.00860	0.00097	0.0016	0.0016	ND	0.0017	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0561	0.0039	0.0085	0.0065	ND	0.0069	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	27.8	0.0097	14.8	0.016	9.96	0.017	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0019	ND	0.0032	ND	0.0035	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0019	ND	0.0032	ND	0.0035	A326677
Total (Wet Wt) Boron (B)	mg/kg	2.29	0.19	6.64	0.32	4.58	0.35	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.00350	0.00097	0.764	0.0016	ND	0.0017	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	4490	1.9	4770	3.2	1820	3.5	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.020	0.019	ND	0.032	ND	0.035	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0058	0.0039	0.195	0.0065	ND	0.0069	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.728	0.0097	2.47	0.016	2.85	0.017	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	10.9	0.97	18.2	1.6	12.8	1.7	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.173	0.0019	0.0207	0.0032	0.0040	0.0035	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	612	0.97	881	1.6	977	1.7	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	13.9	0.0097	51.8	0.016	444	0.017	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	0.0023	0.0019	ND	0.0032	ND	0.0035	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.119	0.0039	0.136	0.0065	0.152	0.0069	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.806	0.0097	4.04	0.016	0.253	0.017	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	415	1.9	495	3.2	642	3.5	A326677
Total (Wet Wt) Potassium (K)	mg/kg	1890	1.9	4970	3.2	2330	3.5	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.0097	0.025	0.016	ND	0.017	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.00097	ND	0.0016	ND	0.0017	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	2.8	1.9	3.9	3.2	4.7	3.5	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	19.7	0.0097	18.9	0.016	1.73	0.017	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00039	0.00070	0.00065	ND	0.00069	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.019	ND	0.032	ND	0.035	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.182	0.097	0.34	0.16	ND	0.17	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00070	0.00039	0.00120	0.00065	ND	0.00069	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.039	ND	0.065	ND	0.069	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	4.68	0.039	39.4	0.065	6.49	0.069	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR435		ADR437		ADR438		
Sampling Date		2021/08/08		2021/08/08		2021/08/08		
COC Number		644362-03-01		644362-03-01		644362-03-01		
	UNITS	NPT_040_VACC OVA	RDL	NPT_053_SALIX SP	RDL	NPT_053_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	33.2	0.38	8.03	0.31	7.16	0.29	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	ND	0.0019	0.0443	0.0016	0.0258	0.0015	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	ND	0.0075	0.311	0.0063	0.232	0.0059	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	21.6	0.019	11.6	0.016	18.7	0.015	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0038	ND	0.0031	ND	0.0029	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0038	ND	0.0031	ND	0.0029	A326677
Total (Wet Wt) Boron (B)	mg/kg	3.53	0.38	4.14	0.31	2.37	0.29	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	ND	0.0019	1.56	0.0016	0.0042	0.0015	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2120	3.8	2370	3.1	4700	2.9	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.038	0.040	0.031	0.030	0.029	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	ND	0.0075	0.0441	0.0063	0.0073	0.0059	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	2.40	0.019	3.77	0.016	1.43	0.015	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	14.1	1.9	24.1	1.6	22.5	1.5	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0053	0.0038	0.296	0.0031	0.270	0.0029	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	915	1.9	1150	1.6	1160	1.5	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	613	0.019	13.8	0.016	5.07	0.015	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0038	ND	0.0031	ND	0.0029	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.298	0.0075	0.288	0.0063	0.563	0.0059	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.202	0.019	0.341	0.016	0.228	0.015	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	678	3.8	520	3.1	456	2.9	A326677
Total (Wet Wt) Potassium (K)	mg/kg	2310	3.8	3390	3.1	2610	2.9	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.019	ND	0.016	ND	0.015	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0019	0.0072	0.0016	0.0022	0.0015	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	ND	3.8	4.4	3.1	ND	2.9	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	2.95	0.019	11.3	0.016	19.3	0.015	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00075	ND	0.00063	ND	0.00059	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.038	ND	0.031	ND	0.029	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	ND	0.19	0.48	0.16	0.48	0.15	A326677
Total (Wet Wt) Uranium (U)	mg/kg	ND	0.00075	0.00150	0.00063	0.00230	0.00059	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.075	ND	0.063	ND	0.059	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	8.50	0.075	79.5	0.063	4.94	0.059	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR442		ADR444		ADR445		
Sampling Date		2021/08/07		2021/08/07		2021/08/07		
COC Number		644362-02-01		644362-02-01		644362-02-01		
	UNITS	NPT_029_SALIX SP	RDL	NPT_031_CORN SER	RDL	NPT_031_VIBE EDU	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	4.19	0.28	11.4	0.24	42.9	0.27	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	ND	0.0014	0.0023	0.0012	0.0022	0.0014	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0099	0.0055	0.0219	0.0049	0.0280	0.0055	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	20.7	0.014	49.5	0.012	73.5	0.014	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0028	ND	0.0024	ND	0.0027	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0028	ND	0.0024	ND	0.0027	A326677
Total (Wet Wt) Boron (B)	mg/kg	2.36	0.28	2.59	0.24	5.13	0.27	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.757	0.0014	0.0058	0.0012	0.0976	0.0014	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	4570	2.8	4450	2.4	2280	2.7	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.028	0.031	0.024	0.058	0.027	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.424	0.0055	0.0124	0.0049	0.0252	0.0055	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.46	0.014	0.725	0.012	0.817	0.014	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	21.6	1.4	27.4	1.2	33.5	1.4	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0103	0.0028	0.0280	0.0024	0.0270	0.0027	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	542	1.4	674	1.2	404	1.4	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	55.0	0.014	5.18	0.012	5.94	0.014	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0028	ND	0.0024	ND	0.0027	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.136	0.0055	0.209	0.0049	0.117	0.0055	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	2.14	0.014	0.730	0.012	1.39	0.014	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	556	2.8	387	2.4	326	2.7	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4950	2.8	3290	2.4	5700	2.7	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.015	0.014	ND	0.012	ND	0.014	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0014	ND	0.0012	ND	0.0014	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	4.2	2.8	3.2	2.4	3.8	2.7	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	10.8	0.014	18.6	0.012	11.8	0.014	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00110	0.00055	0.00070	0.00049	0.00140	0.00055	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.028	ND	0.024	ND	0.027	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.41	0.14	0.90	0.12	1.13	0.14	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00290	0.00055	0.00210	0.00049	0.00450	0.00055	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.055	ND	0.049	ND	0.055	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	25.6	0.055	4.04	0.049	11.0	0.055	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR447		ADR448		ADR449		
Sampling Date		2021/08/07		2021/08/07		2021/08/10		
COC Number		644362-02-01		644362-02-01		644362-06-01		
	UNITS	NPT_001_CORN SER	RDL	NPT_001_VIBE EDU	RDL	NPT_060A_VACC OVA	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	5.95	0.24	29.8	0.23	34.0	0.21	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	ND	0.0012	0.0018	0.0012	0.0115	0.0011	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0114	0.0047	0.0147	0.0046	0.166	0.0042	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	32.5	0.012	23.3	0.012	36.2	0.011	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0024	ND	0.0023	ND	0.0021	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0024	ND	0.0023	ND	0.0021	A326677
Total (Wet Wt) Boron (B)	mg/kg	1.32	0.24	1.31	0.23	4.91	0.21	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0026	0.0012	0.0122	0.0012	0.0432	0.0011	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	4540	2.4	2350	2.3	2070	2.1	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.024	0.026	0.023	0.031	0.021	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0091	0.0047	0.0230	0.0046	0.0338	0.0042	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.877	0.012	0.791	0.012	1.98	0.011	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	18.2	1.2	20.4	1.2	11.5	1.1	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0181	0.0024	0.0101	0.0023	0.169	0.0021	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	798	1.2	570	1.2	712	1.1	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	7.54	0.012	8.13	0.012	270	0.011	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0024	ND	0.0023	0.0041	0.0021	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.135	0.0047	0.260	0.0046	0.0863	0.0042	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.921	0.012	0.652	0.012	1.59	0.011	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	426	2.4	355	2.3	307	2.1	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4390	2.4	4990	2.3	1990	2.1	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.012	ND	0.012	ND	0.011	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0012	ND	0.0012	0.0018	0.0011	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	5.3	2.4	ND	2.3	16.5	2.1	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	17.1	0.012	9.20	0.012	4.61	0.011	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00047	ND	0.00046	ND	0.00042	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.024	ND	0.023	ND	0.021	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.36	0.12	0.45	0.12	0.20	0.11	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00150	0.00047	0.00340	0.00046	0.00080	0.00042	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.047	ND	0.046	ND	0.042	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	3.90	0.047	5.96	0.046	9.99	0.042	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR451		ADR453		ADR454		
Sampling Date		2021/08/10		2021/08/10		2021/08/10		
COC Number		644362-06-01		644362-06-01		644362-06-01		
	UNITS	NPT_061_VIBE EDU	RDL	NPT_100C_CORN SER	RDL	NPT_100C_SALIX SP	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	32.3	0.18	13.1	0.33	58.5	0.29	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.00190	0.00090	ND	0.0016	0.0066	0.0014	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0136	0.0036	0.0166	0.0065	0.106	0.0057	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	23.2	0.0090	5.60	0.016	7.25	0.014	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0018	ND	0.0033	ND	0.0029	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0018	ND	0.0033	ND	0.0029	A326677
Total (Wet Wt) Boron (B)	mg/kg	3.21	0.18	3.25	0.33	5.06	0.29	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0261	0.00090	ND	0.0016	0.437	0.0014	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2040	1.8	4550	3.3	5420	2.9	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.023	0.018	0.051	0.033	0.461	0.029	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0280	0.0036	0.0190	0.0065	0.241	0.0057	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.833	0.0090	0.960	0.016	1.73	0.014	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	13.7	0.90	43.7	1.6	152	1.4	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0202	0.0018	0.0096	0.0033	0.0425	0.0029	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	499	0.90	602	1.6	1040	1.4	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	8.87	0.0090	9.57	0.016	47.2	0.014	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0018	ND	0.0033	ND	0.0029	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.107	0.0036	0.172	0.0065	0.311	0.0057	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.762	0.0090	0.320	0.016	0.810	0.014	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	354	1.8	598	3.3	607	2.9	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4850	1.8	3050	3.3	2700	2.9	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.0126	0.0090	0.025	0.016	0.060	0.014	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.00090	ND	0.0016	0.0025	0.0014	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	3.7	1.8	ND	3.3	4.7	2.9	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	8.10	0.0090	17.7	0.016	26.9	0.014	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00036	ND	0.00065	0.00080	0.00057	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.018	ND	0.033	ND	0.029	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.295	0.090	1.21	0.16	6.20	0.14	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00330	0.00036	0.00370	0.00065	0.00600	0.00057	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.036	ND	0.065	0.311	0.057	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	5.25	0.036	3.71	0.065	20.7	0.057	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



PHYSICAL TESTING (TISSUE)

BV Labs ID		ADR370	ADR371	ADR373	ADR374		
Sampling Date		2021/08/09	2021/08/09	2021/08/09	2021/08/09		
COC Number		644362-04-01	644362-04-01	644362-04-01	644362-04-01		
	UNITS	NPT_054_SALIA SP	NPT_054_VIBE EDU	NPT_058_CORN SER	NPT_058_VIBE EDU	RDL	QC Batch

Physical Properties							
Moisture	%	73	83	74	77	0.30	A330296
RDL = Reportable Detection Limit							

BV Labs ID		ADR376	ADR376	ADR377	ADR386		
Sampling Date		2021/08/09	2021/08/09	2021/08/09	2021/08/06		
COC Number		644362-04-01	644362-04-01	644362-04-01	644362-07-01		
	UNITS	NPT_055_CON SER	NPT_055_CON SER Lab-Dup	NPT_055_VIBE EDU	NPT_003_CORN SER	RDL	QC Batch

Physical Properties							
Moisture	%	79	80	83	79	0.30	A330296
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							

BV Labs ID		ADR387	ADR389		ADR390	ADR390		
Sampling Date		2021/08/06	2021/08/06		2021/08/06	2021/08/06		
COC Number		644362-07-01	644362-07-01		644362-07-01	644362-07-01		
	UNITS	NPT_003_VIBE EDU	NPT_006_CORN SER	QC Batch	NPT_006_VIBE EDU	NPT_006_VIBE EDU Lab-Dup	RDL	QC Batch

Physical Properties								
Moisture	%	77	78	A330296	79	79	0.30	A338131
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								

BV Labs ID		ADR392	ADR393	ADR412	ADR413		
Sampling Date		2021/08/06	2021/08/06	2021/08/09	2021/08/09		
COC Number		644362-07-01	644362-07-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_CORN SER	NPT_009_VIBE EDU	NPT_059A_CORN SER	NPT_059A_VIBE EDU	RDL	QC Batch

Physical Properties							
Moisture	%	76	80	74	79	0.30	A338131
RDL = Reportable Detection Limit							

BV Labs ID		ADR415	ADR416	ADR418		
Sampling Date		2021/08/09	2021/08/09	2021/08/10		
COC Number		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_059B_CORN SER	NPT_059B_VIBE EDU	NPT_020A_CORN SER	RDL	QC Batch

Physical Properties						
Moisture	%	78	75	71	0.30	A338131
RDL = Reportable Detection Limit						



PHYSICAL TESTING (TISSUE)

BV Labs ID		ADR419	ADR421		ADR431		
Sampling Date		2021/08/10	2021/08/10		2021/08/08		
COC Number		644362-05-01	644362-05-01		644362-03-01		
	UNITS	NPT_020A_VIBE EDU	NPT_060A_CORN SER	QC Batch	NPT_022A_SALIX SP	RDL	QC Batch
Physical Properties							
Moisture	%	81	81	A330296	68	0.30	A338131
RDL = Reportable Detection Limit							

BV Labs ID		ADR433	ADR435		ADR437	ADR438		
Sampling Date		2021/08/08	2021/08/08		2021/08/08	2021/08/08		
COC Number		644362-03-01	644362-03-01		644362-03-01	644362-03-01		
	UNITS	NPT_047_VACC OVA	NPT_040_VACC OVA	QC Batch	NPT_053_SALIX SP	NPT_053_CORN SER	RDL	QC Batch
Physical Properties								
Moisture	%	66	63	A338131	69	71	0.30	A330296
RDL = Reportable Detection Limit								

BV Labs ID		ADR442	ADR444	ADR445	ADR447		
Sampling Date		2021/08/07	2021/08/07	2021/08/07	2021/08/07		
COC Number		644362-02-01	644362-02-01	644362-02-01	644362-02-01		
	UNITS	NPT_029_SALIX SP	NPT_031_CORN SER	NPT_031_VIBE EDU	NPT_001_CORN SER	RDL	QC Batch
Physical Properties							
Moisture	%	73	76	73	77	0.30	A330296
RDL = Reportable Detection Limit							

BV Labs ID		ADR448	ADR449	ADR451		
Sampling Date		2021/08/07	2021/08/10	2021/08/10		
COC Number		644362-02-01	644362-06-01	644362-06-01		
	UNITS	NPT_001_VIBE EDU	NPT_060A_VACC OVA	NPT_061_VIBE EDU	RDL	QC Batch
Physical Properties						
Moisture	%	77	79	82	0.30	A330296
RDL = Reportable Detection Limit						

BV Labs ID		ADR453	ADR454		
Sampling Date		2021/08/10	2021/08/10		
COC Number		644362-06-01	644362-06-01		
	UNITS	NPT_100C_CORN SER	NPT_100C_SALIX SP	RDL	QC Batch
Physical Properties					
Moisture	%	67	72	0.30	A338131
RDL = Reportable Detection Limit					



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR369	ADR372			ADR372		
Sampling Date		2021/08/09	2021/08/09			2021/08/09		
COC Number		644362-04-01	644362-04-01			644362-04-01		
	UNITS	NPT_054_SOIL	NPT_058_SOILS	RDL	QC Batch	NPT_058_SOILS Lab-Dup	RDL	QC Batch
Physical Properties								
Soluble (2:1) pH	pH	5.89	6.59	N/A	A329989			
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	8810	9460	100	A329976	9920	100	A329976
Total Antimony (Sb)	mg/kg	0.34	0.94	0.10	A329976	0.87	0.10	A329976
Total Arsenic (As)	mg/kg	10.6	15.7	0.20	A329976	16.1	0.20	A329976
Total Barium (Ba)	mg/kg	85.0	373	0.10	A329976	353	0.10	A329976
Total Beryllium (Be)	mg/kg	ND	ND	0.20	A329976	ND	0.20	A329976
Total Bismuth (Bi)	mg/kg	0.16	0.24	0.10	A329976	0.21	0.10	A329976
Total Boron (B)	mg/kg	1.5	1.2	1.0	A329976	ND	1.0	A329976
Total Cadmium (Cd)	mg/kg	0.091	0.263	0.050	A329976	0.284	0.050	A329976
Total Calcium (Ca)	mg/kg	3850	4200	100	A329976	4090	100	A329976
Total Chromium (Cr)	mg/kg	24.8	25.9	0.50	A329976	26.5	0.50	A329976
Total Cobalt (Co)	mg/kg	6.69	8.61	0.10	A329976	8.80	0.10	A329976
Total Copper (Cu)	mg/kg	16.6	36.4	0.50	A329976	37.4	0.50	A329976
Total Iron (Fe)	mg/kg	32300	23700	100	A329976	24300	100	A329976
Total Lead (Pb)	mg/kg	6.21	12.5	0.10	A329976	12.6	0.10	A329976
Total Lithium (Li)	mg/kg	8.28	8.93	0.50	A329976	8.67	0.50	A329976
Total Magnesium (Mg)	mg/kg	5650	6620	100	A329976	6950	100	A329976
Total Manganese (Mn)	mg/kg	276	351	0.20	A329976	362	0.20	A329976
Total Mercury (Hg)	mg/kg	0.102	0.072	0.050	A329976	ND	0.050	A329976
Total Molybdenum (Mo)	mg/kg	1.11	1.65	0.10	A329976	1.62	0.10	A329976
Total Nickel (Ni)	mg/kg	10.9	21.4	0.50	A329976	21.6	0.50	A329976
Total Phosphorus (P)	mg/kg	715	695	10	A329976	707	10	A329976
Total Potassium (K)	mg/kg	1380	1350	100	A329976	1370	100	A329976
Total Selenium (Se)	mg/kg	ND	ND	0.50	A329976	ND	0.50	A329976
Total Silver (Ag)	mg/kg	ND	0.176	0.050	A329976	0.179	0.050	A329976
Total Sodium (Na)	mg/kg	323	321 (1)	100	A329976	319	100	A329976
Total Strontium (Sr)	mg/kg	21.5	24.6	0.10	A329976	24.7	0.10	A329976
Total Thallium (Tl)	mg/kg	0.089	0.112	0.050	A329976	0.106	0.050	A329976
Total Tin (Sn)	mg/kg	0.29	0.29	0.10	A329976	0.27	0.10	A329976
Total Titanium (Ti)	mg/kg	673	758	1.0	A329976	745	1.0	A329976
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable ND = Not Detected at a concentration equal or greater than the indicated Detection Limit. (1) Matrix spike exceeds acceptance limits due to probable matrix interference.								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR369	ADR372			ADR372		
Sampling Date		2021/08/09	2021/08/09			2021/08/09		
COC Number		644362-04-01	644362-04-01			644362-04-01		
	UNITS	NPT_054_SOIL	NPT_058_SOILS	RDL	QC Batch	NPT_058_SOILS Lab-Dup	RDL	QC Batch
Total Tungsten (W)	mg/kg	1.48	0.99	0.50	A329976	1.39	0.50	A329976
Total Uranium (U)	mg/kg	1.67	1.84	0.050	A329976	1.47	0.050	A329976
Total Vanadium (V)	mg/kg	81.8	50.0	1.0	A329976	50.6	1.0	A329976
Total Zinc (Zn)	mg/kg	36.0	65.8	1.0	A329976	68.3	1.0	A329976
Total Zirconium (Zr)	mg/kg	0.91	0.87	0.50	A329976	0.88	0.50	A329976
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR375		ADR378	ADR385	ADR388		
Sampling Date		2021/08/09		2021/08/09	2021/08/06	2021/08/06		
COC Number		644362-04-01		644362-04-01	644362-07-01	644362-07-01		
	UNITS	NPT_055_SOILS	QC Batch	NPT_059A_SOILS	NPT_003_SOILS	NPT_006_SOILS	RDL	QC Batch
Physical Properties								
Soluble (2:1) pH	pH	5.83	A329989	5.36	7.35	6.16	N/A	A330651
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	16700	A329976	7350	14000	10500	100	A330648
Total Antimony (Sb)	mg/kg	7.08	A329976	0.33	0.99	0.59	0.10	A330648
Total Arsenic (As)	mg/kg	14.6	A329976	11.0	18.8	11.0	0.20	A330648
Total Barium (Ba)	mg/kg	84.8	A329976	79.7	228	97.2	0.10	A330648
Total Beryllium (Be)	mg/kg	0.40	A329976	ND	0.30	0.29	0.20	A330648
Total Bismuth (Bi)	mg/kg	0.45	A329976	0.14	0.36	0.18	0.10	A330648
Total Boron (B)	mg/kg	4.6	A329976	1.2	2.4	2.0	1.0	A330648
Total Cadmium (Cd)	mg/kg	1.12	A329976	0.095	0.493	0.169	0.050	A330648
Total Calcium (Ca)	mg/kg	2280	A329976	3440	7540	5570	100	A330648
Total Chromium (Cr)	mg/kg	72.2	A329976	20.5	41.4	40.4	0.50	A330648
Total Cobalt (Co)	mg/kg	7.49	A329976	7.21	13.6	10.6	0.10	A330648
Total Copper (Cu)	mg/kg	13.3	A329976	20.8	52.8	32.7	0.50	A330648
Total Iron (Fe)	mg/kg	37600	A329976	19200	30900	25600	100	A330648
Total Lead (Pb)	mg/kg	35.3	A329976	5.12	13.2	8.35	0.10	A330648
Total Lithium (Li)	mg/kg	9.20	A329976	7.42	12.7	10.1	0.50	A330648
Total Magnesium (Mg)	mg/kg	1820	A329976	5030	10600	9210	100	A330648
Total Manganese (Mn)	mg/kg	184	A329976	276	571	449	0.20	A330648
Total Mercury (Hg)	mg/kg	0.360	A329976	0.101	0.094	0.075	0.050	A330648
Total Molybdenum (Mo)	mg/kg	3.10	A329976	1.51	2.09	1.16	0.10	A330648
Total Nickel (Ni)	mg/kg	28.6	A329976	14.9	44.2	42.5	0.50	A330648
Total Phosphorus (P)	mg/kg	737	A329976	709	925	721	10	A330648
Total Potassium (K)	mg/kg	251	A329976	1090	1420	615	100	A330648
Total Selenium (Se)	mg/kg	ND	A329976	ND	ND	ND	0.50	A330648
Total Silver (Ag)	mg/kg	0.068	A329976	0.073	0.267	0.178	0.050	A330648
Total Sodium (Na)	mg/kg	ND	A329976	262	403	231	100	A330648
Total Strontium (Sr)	mg/kg	8.30	A329976	16.8	41.1	32.9	0.10	A330648
Total Thallium (Tl)	mg/kg	0.107	A329976	0.120	0.152	0.073	0.050	A330648
Total Tin (Sn)	mg/kg	0.66	A329976	0.22	0.38	0.25	0.10	A330648
Total Titanium (Ti)	mg/kg	347	A329976	510	938	648	1.0	A330648
Total Tungsten (W)	mg/kg	0.87	A329976	0.85	0.86	ND	0.50	A330648
Total Uranium (U)	mg/kg	1.63	A329976	1.17	1.83	1.30	0.050	A330648
RDL = Reportable Detection Limit								
N/A = Not Applicable								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR375		ADR378	ADR385	ADR388		
Sampling Date		2021/08/09		2021/08/09	2021/08/06	2021/08/06		
COC Number		644362-04-01		644362-04-01	644362-07-01	644362-07-01		
	UNITS	NPT_055_SOILS	QC Batch	NPT_059A_SOILS	NPT_003_SOILS	NPT_006_SOILS	RDL	QC Batch
Total Vanadium (V)	mg/kg	87.0	A329976	40.8	62.2	53.1	1.0	A330648
Total Zinc (Zn)	mg/kg	107	A329976	30.3	89.2	49.9	1.0	A330648
Total Zirconium (Zr)	mg/kg	ND	A329976	0.64	1.80	1.42	0.50	A330648

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR391		ADR414	ADR417	ADR420		
Sampling Date		2021/08/06		2021/08/09	2021/08/10	2021/08/10		
COC Number		644362-07-01		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_SOILS	QC Batch	NPT_059B_SOILS	NPT_060A_SOILS	NPT_020A_SOILS	RDL	QC Batch
Physical Properties								
Soluble (2:1) pH	pH	5.01	A330651	5.92	4.36	5.50	N/A	A331013
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	14100	A330648	13000	8950	9530	100	A331008
Total Antimony (Sb)	mg/kg	0.74	A330648	0.50	16.6	0.47	0.10	A331008
Total Arsenic (As)	mg/kg	13.7	A330648	14.1	334	16.4	0.20	A331008
Total Barium (Ba)	mg/kg	65.9	A330648	150	180	120	0.10	A331008
Total Beryllium (Be)	mg/kg	0.36	A330648	0.25	ND	ND	0.20	A331008
Total Bismuth (Bi)	mg/kg	ND	A330648	0.30	0.38	0.23	0.10	A331008
Total Boron (B)	mg/kg	3.6	A330648	1.9	1.7	1.1	1.0	A331008
Total Cadmium (Cd)	mg/kg	0.166	A330648	0.217	0.464	0.185	0.050	A331008
Total Calcium (Ca)	mg/kg	5030	A330648	6350	2070	5690	100	A331008
Total Chromium (Cr)	mg/kg	103	A330648	36.6	36.7	26.9	0.50	A331008
Total Cobalt (Co)	mg/kg	15.5	A330648	11.9	7.02	8.72	0.10	A331008
Total Copper (Cu)	mg/kg	36.7	A330648	37.7	32.1	13.2	0.50	A331008
Total Iron (Fe)	mg/kg	29700	A330648	28300	21800	22600	100	A331008
Total Lead (Pb)	mg/kg	8.20	A330648	11.7	73.9	10.4	0.10	A331008
Total Lithium (Li)	mg/kg	12.2	A330648	11.3	5.69	8.10	0.50	A331008
Total Magnesium (Mg)	mg/kg	13800	A330648	9430	5050	6830	100	A331008
Total Manganese (Mn)	mg/kg	531	A330648	501	358	369	0.20	A331008
Total Mercury (Hg)	mg/kg	0.093	A330648	0.078	0.144	0.050	0.050	A331008
Total Molybdenum (Mo)	mg/kg	0.64	A330648	1.99	2.87	1.60	0.10	A331008
Total Nickel (Ni)	mg/kg	92.7	A330648	30.6	13.0	18.3	0.50	A331008
Total Phosphorus (P)	mg/kg	585	A330648	944	405	714	10	A331008
Total Potassium (K)	mg/kg	509	A330648	1530	885	1440	100	A331008
Total Selenium (Se)	mg/kg	ND	A330648	ND	ND	ND	0.50	A331008
Total Silver (Ag)	mg/kg	0.071	A330648	0.160	0.200	0.100	0.050	A331008
Total Sodium (Na)	mg/kg	ND	A330648	473	150	370	100	A331008
Total Strontium (Sr)	mg/kg	21.0	A330648	32.9	14.5	30.0	0.10	A331008
Total Thallium (Tl)	mg/kg	0.131	A330648	0.154	0.115	0.091	0.050	A331008
Total Tin (Sn)	mg/kg	0.29	A330648	0.41	0.67	0.30	0.10	A331008
Total Titanium (Ti)	mg/kg	782	A330648	1070	976	866	1.0	A331008
Total Tungsten (W)	mg/kg	ND	A330648	1.23	0.55	1.76	0.50	A331008
Total Uranium (U)	mg/kg	0.446	A330648	1.82	0.684	1.09	0.050	A331008
RDL = Reportable Detection Limit								
N/A = Not Applicable								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR391		ADR414	ADR417	ADR420		
Sampling Date		2021/08/06		2021/08/09	2021/08/10	2021/08/10		
COC Number		644362-07-01		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_SOILS	QC Batch	NPT_059B_SOILS	NPT_060A_SOILS	NPT_020A_SOILS	RDL	QC Batch
Total Vanadium (V)	mg/kg	66.2	A330648	61.1	73.7	51.7	1.0	A331008
Total Zinc (Zn)	mg/kg	64.1	A330648	60.5	81.9	41.5	1.0	A331008
Total Zirconium (Zr)	mg/kg	1.52	A330648	1.57	0.58	0.80	0.50	A331008
RDL = Reportable Detection Limit								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR430	ADR432	ADR434	ADR436	ADR441		
Sampling Date		2021/08/08	2021/08/08	2021/08/08	2021/08/08	2021/08/07		
COC Number		644362-03-01	644362-03-01	644362-03-01	644362-03-01	644362-02-01		
	UNITS	NPT_022A_SOILS	NPT_047_SOILS	NPT_040_SOILS	NPT_053_SOILS	NPT_029_SOIL	RDL	QC Batch

Physical Properties								
Soluble (2:1) pH	pH	5.54	4.01	4.48	7.63	5.92	N/A	A331013
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	7890	9120	21900	11700	11700	100	A331008
Total Antimony (Sb)	mg/kg	0.23	0.13	ND	53.2	0.14	0.10	A331008
Total Arsenic (As)	mg/kg	4.97	4.07	0.90	459	3.41	0.20	A331008
Total Barium (Ba)	mg/kg	67.6	28.4	256	374	131	0.10	A331008
Total Beryllium (Be)	mg/kg	ND	ND	0.20	0.24	ND	0.20	A331008
Total Bismuth (Bi)	mg/kg	0.37	0.17	0.25	0.22	0.14	0.10	A331008
Total Boron (B)	mg/kg	ND	ND	ND	2.5	ND	1.0	A331008
Total Cadmium (Cd)	mg/kg	0.111	ND	0.066	3.66	0.150	0.050	A331008
Total Calcium (Ca)	mg/kg	3280	639	570	8440	5770	100	A331008
Total Chromium (Cr)	mg/kg	25.1	39.7	119	62.7	23.9	0.50	A331008
Total Cobalt (Co)	mg/kg	6.61	5.10	4.59	13.3	8.23	0.10	A331008
Total Copper (Cu)	mg/kg	20.4	21.5	61.9	182	24.8	0.50	A331008
Total Iron (Fe)	mg/kg	24900	24000	38700	29800	23700	100	A331008
Total Lead (Pb)	mg/kg	4.89	5.34	6.98	160	3.59	0.10	A331008
Total Lithium (Li)	mg/kg	7.84	7.45	10.9	10.1	9.80	0.50	A331008
Total Magnesium (Mg)	mg/kg	5720	5080	10400	11400	6620	100	A331008
Total Manganese (Mn)	mg/kg	285	193	679	545	294	0.20	A331008
Total Mercury (Hg)	mg/kg	ND	ND	0.072	0.253	ND	0.050	A331008
Total Molybdenum (Mo)	mg/kg	1.08	3.11	12.7	1.06	1.41	0.10	A331008
Total Nickel (Ni)	mg/kg	14.6	19.1	11.1	48.7	12.4	0.50	A331008
Total Phosphorus (P)	mg/kg	646	257	482	699	840	10	A331008
Total Potassium (K)	mg/kg	1180	276	2660	1200	2270	100	A331008
Total Selenium (Se)	mg/kg	ND	0.67	1.29	ND	ND	0.50	A331008
Total Silver (Ag)	mg/kg	0.068	0.315	0.202	1.33	0.105	0.050	A331008
Total Sodium (Na)	mg/kg	240	ND	ND	324	489	100	A331008
Total Strontium (Sr)	mg/kg	18.0	2.99	4.83	50.6	31.1	0.10	A331008
Total Thallium (Tl)	mg/kg	0.090	0.063	0.215	0.127	0.141	0.050	A331008
Total Tin (Sn)	mg/kg	0.24	0.31	0.92	0.53	0.27	0.10	A331008
Total Titanium (Ti)	mg/kg	583	813	1940	728	1070	1.0	A331008
Total Tungsten (W)	mg/kg	ND	ND	ND	1.05	0.66	0.50	A331008
Total Uranium (U)	mg/kg	1.07	0.636	1.24	1.05	3.44	0.050	A331008

RDL = Reportable Detection Limit

N/A = Not Applicable

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR430	ADR432	ADR434	ADR436	ADR441		
Sampling Date		2021/08/08	2021/08/08	2021/08/08	2021/08/08	2021/08/07		
COC Number		644362-03-01	644362-03-01	644362-03-01	644362-03-01	644362-02-01		
	UNITS	NPT_022A_SOILS	NPT_047_SOILS	NPT_040_SOILS	NPT_053_SOILS	NPT_029_SOIL	RDL	QC Batch
Total Vanadium (V)	mg/kg	64.8	56.7	141	57.5	64.3	1.0	A331008
Total Zinc (Zn)	mg/kg	36.6	32.1	49.5	837	43.7	1.0	A331008
Total Zirconium (Zr)	mg/kg	ND	ND	ND	0.85	0.51	0.50	A331008

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR443	ADR446	ADR450	ADR452			ADR452	
Sampling Date		2021/08/07	2021/08/07	2021/08/10	2021/08/10			2021/08/10	
COC Number		644362-02-01	644362-02-01	644362-06-01	644362-06-01			644362-06-01	
	UNITS	NPT_031_SOIL	NPT_001_SOIL	NPT_061_SOILS	NPT_100C_SOILS	RDL	QC Batch	NPT_100C_SOILS Lab-Dup	QC Batch

Physical Properties									
Soluble (2:1) pH	pH	5.12	5.85	5.48	8.28	N/A	A331013	8.22	A331013
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	10400	6250	8400	11400	100	A331008		
Total Antimony (Sb)	mg/kg	0.83	0.20	0.36	0.72	0.10	A331008		
Total Arsenic (As)	mg/kg	16.1	6.03	12.5	10.5	0.20	A331008		
Total Barium (Ba)	mg/kg	404	62.8	97.2	145	0.10	A331008		
Total Beryllium (Be)	mg/kg	0.21	ND	ND	0.37	0.20	A331008		
Total Bismuth (Bi)	mg/kg	0.23	0.11	0.19	0.13	0.10	A331008		
Total Boron (B)	mg/kg	ND	ND	ND	3.6	1.0	A331008		
Total Cadmium (Cd)	mg/kg	0.341	0.060	0.061	0.244	0.050	A331008		
Total Calcium (Ca)	mg/kg	4950	2970	4070	16300	100	A331008		
Total Chromium (Cr)	mg/kg	29.3	16.3	23.1	51.8	0.50	A331008		
Total Cobalt (Co)	mg/kg	8.93	5.49	7.69	12.1	0.10	A331008		
Total Copper (Cu)	mg/kg	35.9	10.3	23.5	36.8	0.50	A331008		
Total Iron (Fe)	mg/kg	24400	20400	23400	29100	100	A331008		
Total Lead (Pb)	mg/kg	19.1	4.52	6.53	7.87	0.10	A331008		
Total Lithium (Li)	mg/kg	9.75	6.21	8.22	11.1	0.50	A331008		
Total Magnesium (Mg)	mg/kg	7260	4090	5820	12700	100	A331008		
Total Manganese (Mn)	mg/kg	363	224	275	526	0.20	A331008		
Total Mercury (Hg)	mg/kg	ND	ND	ND	0.051	0.050	A331008		
Total Molybdenum (Mo)	mg/kg	1.84	0.95	1.62	1.41	0.10	A331008		
Total Nickel (Ni)	mg/kg	21.3	7.71	15.0	64.7	0.50	A331008		
Total Phosphorus (P)	mg/kg	878	442	783	846	10	A331008		
Total Potassium (K)	mg/kg	1430	1090	1350	887	100	A331008		
Total Selenium (Se)	mg/kg	ND	ND	ND	ND	0.50	A331008		
Total Silver (Ag)	mg/kg	0.180	0.131	0.089	0.123	0.050	A331008		
Total Sodium (Na)	mg/kg	368	227	294	264	100	A331008		
Total Strontium (Sr)	mg/kg	27.4	17.4	19.8	76.3	0.10	A331008		
Total Thallium (Tl)	mg/kg	0.114	0.070	0.087	0.089	0.050	A331008		
Total Tin (Sn)	mg/kg	0.38	0.20	0.26	0.29	0.10	A331008		
Total Titanium (Ti)	mg/kg	872	527	658	895	1.0	A331008		
Total Tungsten (W)	mg/kg	1.17	0.93	1.05	ND	0.50	A331008		

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR443	ADR446	ADR450	ADR452			ADR452	
Sampling Date		2021/08/07	2021/08/07	2021/08/10	2021/08/10			2021/08/10	
COC Number		644362-02-01	644362-02-01	644362-06-01	644362-06-01			644362-06-01	
	UNITS	NPT_031_SOIL	NPT_001_SOIL	NPT_061_SOILS	NPT_100C_SOILS	RDL	QC Batch	NPT_100C_SOILS Lab-Dup	QC Batch
Total Uranium (U)	mg/kg	1.64	1.43	1.84	1.84	0.050	A331008		
Total Vanadium (V)	mg/kg	54.0	50.6	53.6	62.3	1.0	A331008		
Total Zinc (Zn)	mg/kg	76.4	25.5	35.1	61.7	1.0	A331008		
Total Zirconium (Zr)	mg/kg	0.95	0.66	1.13	5.01	0.50	A331008		
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									



BV Labs Job #: C158547
Report Date: 2021/09/27

EDI Environmental Dynamics Inc.

GENERAL COMMENTS

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A329976	JBN	Matrix Spike [ADR372-01]	Total Aluminum (Al)	2021/08/24		NC	%	75 - 125
			Total Antimony (Sb)	2021/08/24	94	%	75 - 125	
			Total Arsenic (As)	2021/08/24	94	%	75 - 125	
			Total Barium (Ba)	2021/08/24	NC	%	75 - 125	
			Total Beryllium (Be)	2021/08/24	87	%	75 - 125	
			Total Bismuth (Bi)	2021/08/24	93	%	75 - 125	
			Total Boron (B)	2021/08/24	89	%	75 - 125	
			Total Cadmium (Cd)	2021/08/24	99	%	75 - 125	
			Total Calcium (Ca)	2021/08/24	NC	%	75 - 125	
			Total Chromium (Cr)	2021/08/24	100	%	75 - 125	
			Total Cobalt (Co)	2021/08/24	97	%	75 - 125	
			Total Copper (Cu)	2021/08/24	103	%	75 - 125	
			Total Iron (Fe)	2021/08/24	NC	%	75 - 125	
			Total Lead (Pb)	2021/08/24	96	%	75 - 125	
			Total Lithium (Li)	2021/08/24	84	%	75 - 125	
			Total Magnesium (Mg)	2021/08/24	NC	%	75 - 125	
			Total Manganese (Mn)	2021/08/24	NC	%	75 - 125	
			Total Mercury (Hg)	2021/08/24	91	%	75 - 125	
			Total Molybdenum (Mo)	2021/08/24	95	%	75 - 125	
			Total Nickel (Ni)	2021/08/24	97	%	75 - 125	
			Total Phosphorus (P)	2021/08/24	87	%	75 - 125	
			Total Potassium (K)	2021/08/24	123	%	75 - 125	
			Total Selenium (Se)	2021/08/24	100	%	75 - 125	
			Total Silver (Ag)	2021/08/24	100	%	75 - 125	
			Total Sodium (Na)	2021/08/24	127 (1)	%	75 - 125	
			Total Strontium (Sr)	2021/08/24	100	%	75 - 125	
			Total Thallium (Tl)	2021/08/24	94	%	75 - 125	
			Total Tin (Sn)	2021/08/24	100	%	75 - 125	
			Total Titanium (Ti)	2021/08/24	NC	%	75 - 125	
			Total Tungsten (W)	2021/08/24	97	%	75 - 125	
			Total Uranium (U)	2021/08/24	97	%	75 - 125	
			Total Vanadium (V)	2021/08/24	101	%	75 - 125	
			Total Zinc (Zn)	2021/08/24	98	%	75 - 125	
			Total Zirconium (Zr)	2021/08/24	107	%	75 - 125	
A329976	JBN	QC Standard	Total Aluminum (Al)	2021/08/24	103	%	70 - 130	
			Total Antimony (Sb)	2021/08/24	111	%	70 - 130	
			Total Arsenic (As)	2021/08/24	80	%	70 - 130	
			Total Barium (Ba)	2021/08/24	96	%	70 - 130	
			Total Beryllium (Be)	2021/08/24	96	%	70 - 130	
			Total Cadmium (Cd)	2021/08/24	97	%	70 - 130	
			Total Calcium (Ca)	2021/08/24	94	%	70 - 130	
			Total Chromium (Cr)	2021/08/24	108	%	70 - 130	
			Total Cobalt (Co)	2021/08/24	102	%	70 - 130	
			Total Copper (Cu)	2021/08/24	102	%	70 - 130	
			Total Iron (Fe)	2021/08/24	105	%	70 - 130	
			Total Lead (Pb)	2021/08/24	109	%	70 - 130	
			Total Lithium (Li)	2021/08/24	97	%	70 - 130	
			Total Magnesium (Mg)	2021/08/24	108	%	70 - 130	
			Total Manganese (Mn)	2021/08/24	107	%	70 - 130	
			Total Mercury (Hg)	2021/08/24	105	%	70 - 130	
			Total Molybdenum (Mo)	2021/08/24	106	%	70 - 130	
			Total Nickel (Ni)	2021/08/24	109	%	70 - 130	
			Total Phosphorus (P)	2021/08/24	95	%	70 - 130	
			Total Potassium (K)	2021/08/24	89	%	70 - 130	
			Total Silver (Ag)	2021/08/24	97	%	70 - 130	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A329976	JBN	Spiked Blank	Total Sodium (Na)	2021/08/24		97	%	70 - 130
			Total Strontium (Sr)	2021/08/24		101	%	70 - 130
			Total Thallium (Tl)	2021/08/24		91	%	70 - 130
			Total Tin (Sn)	2021/08/24		112	%	70 - 130
			Total Uranium (U)	2021/08/24		98	%	70 - 130
			Total Vanadium (V)	2021/08/24		109	%	70 - 130
			Total Zinc (Zn)	2021/08/24		106	%	70 - 130
			Total Aluminum (Al)	2021/08/24		96	%	75 - 125
			Total Antimony (Sb)	2021/08/24		98	%	75 - 125
			Total Arsenic (As)	2021/08/24		96	%	75 - 125
			Total Barium (Ba)	2021/08/24		95	%	75 - 125
			Total Beryllium (Be)	2021/08/24		88	%	75 - 125
			Total Bismuth (Bi)	2021/08/24		95	%	75 - 125
			Total Boron (B)	2021/08/24		92	%	75 - 125
			Total Cadmium (Cd)	2021/08/24		99	%	75 - 125
			Total Calcium (Ca)	2021/08/24		100	%	75 - 125
			Total Chromium (Cr)	2021/08/24		101	%	75 - 125
			Total Cobalt (Co)	2021/08/24		101	%	75 - 125
			Total Copper (Cu)	2021/08/24		103	%	75 - 125
			Total Iron (Fe)	2021/08/24		103	%	75 - 125
			Total Lead (Pb)	2021/08/24		99	%	75 - 125
			Total Lithium (Li)	2021/08/24		87	%	75 - 125
			Total Magnesium (Mg)	2021/08/24		100	%	75 - 125
			Total Manganese (Mn)	2021/08/24		101	%	75 - 125
			Total Mercury (Hg)	2021/08/24		93	%	75 - 125
			Total Molybdenum (Mo)	2021/08/24		95	%	75 - 125
			Total Nickel (Ni)	2021/08/24		101	%	75 - 125
			Total Phosphorus (P)	2021/08/24		91	%	75 - 125
			Total Potassium (K)	2021/08/24		96	%	75 - 125
			Total Selenium (Se)	2021/08/24		99	%	75 - 125
			Total Silver (Ag)	2021/08/24		99	%	75 - 125
			Total Sodium (Na)	2021/08/24		105	%	75 - 125
			Total Strontium (Sr)	2021/08/24		94	%	75 - 125
			Total Thallium (Tl)	2021/08/24		94	%	75 - 125
			Total Tin (Sn)	2021/08/24		99	%	75 - 125
			Total Titanium (Ti)	2021/08/24		101	%	75 - 125
			Total Tungsten (W)	2021/08/24		101	%	75 - 125
			Total Uranium (U)	2021/08/24		95	%	75 - 125
			Total Vanadium (V)	2021/08/24		100	%	75 - 125
			Total Zinc (Zn)	2021/08/24		101	%	75 - 125
			Total Zirconium (Zr)	2021/08/24		98	%	75 - 125
A329976	JBN	Method Blank	Total Aluminum (Al)	2021/08/24	ND, RDL=100		mg/kg	
			Total Antimony (Sb)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Arsenic (As)	2021/08/24	ND, RDL=0.20		mg/kg	
			Total Barium (Ba)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Beryllium (Be)	2021/08/24	ND, RDL=0.20		mg/kg	
			Total Bismuth (Bi)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Boron (B)	2021/08/24	ND, RDL=1.0		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Cadmium (Cd)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Calcium (Ca)	2021/08/24	ND, RDL=100		mg/kg	
			Total Chromium (Cr)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Cobalt (Co)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Copper (Cu)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Iron (Fe)	2021/08/24	ND, RDL=100		mg/kg	
			Total Lead (Pb)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Lithium (Li)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Magnesium (Mg)	2021/08/24	ND, RDL=100		mg/kg	
			Total Manganese (Mn)	2021/08/24	ND, RDL=0.20		mg/kg	
			Total Mercury (Hg)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Molybdenum (Mo)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Nickel (Ni)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Phosphorus (P)	2021/08/24	ND, RDL=10		mg/kg	
			Total Potassium (K)	2021/08/24	ND, RDL=100		mg/kg	
			Total Selenium (Se)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Silver (Ag)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Sodium (Na)	2021/08/24	ND, RDL=100		mg/kg	
			Total Strontium (Sr)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Thallium (Tl)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Tin (Sn)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Titanium (Ti)	2021/08/24	ND, RDL=1.0		mg/kg	
			Total Tungsten (W)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Uranium (U)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Vanadium (V)	2021/08/24	ND, RDL=1.0		mg/kg	
			Total Zinc (Zn)	2021/08/24	ND, RDL=1.0		mg/kg	
			Total Zirconium (Zr)	2021/08/24	ND, RDL=0.50		mg/kg	
A329976	JBN	RPD [ADR372-01]	Total Aluminum (Al)	2021/08/24	4.8		%	40
			Total Antimony (Sb)	2021/08/24	7.8		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Arsenic (As)	2021/08/24	2.7		%	30
			Total Barium (Ba)	2021/08/24	5.6		%	40
			Total Beryllium (Be)	2021/08/24	NC		%	30
			Total Bismuth (Bi)	2021/08/24	12		%	30
			Total Boron (B)	2021/08/24	18		%	30
			Total Cadmium (Cd)	2021/08/24	7.6		%	30
			Total Calcium (Ca)	2021/08/24	2.6		%	30
			Total Chromium (Cr)	2021/08/24	2.4		%	30
			Total Cobalt (Co)	2021/08/24	2.2		%	30
			Total Copper (Cu)	2021/08/24	2.8		%	30
			Total Iron (Fe)	2021/08/24	2.3		%	30
			Total Lead (Pb)	2021/08/24	1.3		%	40
			Total Lithium (Li)	2021/08/24	3.0		%	30
			Total Magnesium (Mg)	2021/08/24	4.8		%	30
			Total Manganese (Mn)	2021/08/24	3.1		%	30
			Total Mercury (Hg)	2021/08/24	36		%	40
			Total Molybdenum (Mo)	2021/08/24	1.5		%	40
			Total Nickel (Ni)	2021/08/24	0.94		%	30
			Total Phosphorus (P)	2021/08/24	1.6		%	30
			Total Potassium (K)	2021/08/24	1.6		%	40
			Total Selenium (Se)	2021/08/24	NC		%	30
			Total Silver (Ag)	2021/08/24	1.3		%	40
			Total Sodium (Na)	2021/08/24	0.79		%	40
			Total Strontium (Sr)	2021/08/24	0.082		%	40
			Total Thallium (Tl)	2021/08/24	5.5		%	30
			Total Tin (Sn)	2021/08/24	4.7		%	40
			Total Titanium (Ti)	2021/08/24	1.7		%	40
			Total Tungsten (W)	2021/08/24	34		%	40
			Total Uranium (U)	2021/08/24	22		%	30
			Total Vanadium (V)	2021/08/24	1.2		%	30
			Total Zinc (Zn)	2021/08/24	3.8		%	30
			Total Zirconium (Zr)	2021/08/24	0.62		%	40
A329989	JGD	Spiked Blank	Soluble (2:1) pH	2021/08/24		100	%	97 - 103
A329989	JGD	RPD	Soluble (2:1) pH	2021/08/24	0.36		%	N/A
A330296	LA5	Method Blank	Moisture	2021/08/25	ND, RDL=0.30		%	
A330296	LA5	RPD [ADR376-01]	Moisture	2021/08/25	0.50		%	20
A330648	JLP	Matrix Spike	Total Aluminum (Al)	2021/08/25		NC	%	75 - 125
			Total Antimony (Sb)	2021/08/25		93	%	75 - 125
			Total Arsenic (As)	2021/08/25		96	%	75 - 125
			Total Barium (Ba)	2021/08/25		93	%	75 - 125
			Total Beryllium (Be)	2021/08/25		93	%	75 - 125
			Total Bismuth (Bi)	2021/08/25		94	%	75 - 125
			Total Boron (B)	2021/08/25		95	%	75 - 125
			Total Cadmium (Cd)	2021/08/25		96	%	75 - 125
			Total Calcium (Ca)	2021/08/25		NC	%	75 - 125
			Total Chromium (Cr)	2021/08/25		95	%	75 - 125
			Total Cobalt (Co)	2021/08/25		99	%	75 - 125
			Total Copper (Cu)	2021/08/25		96	%	75 - 125
			Total Iron (Fe)	2021/08/25		NC	%	75 - 125
			Total Lead (Pb)	2021/08/25		97	%	75 - 125
			Total Lithium (Li)	2021/08/25		90	%	75 - 125
			Total Magnesium (Mg)	2021/08/25		NC	%	75 - 125
			Total Manganese (Mn)	2021/08/25		NC	%	75 - 125
			Total Mercury (Hg)	2021/08/25		94	%	75 - 125



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330648	JLP	QC Standard	Total Molybdenum (Mo)	2021/08/25	93	%	75 - 125		
			Total Nickel (Ni)	2021/08/25	94	%	75 - 125		
			Total Phosphorus (P)	2021/08/25	86	%	75 - 125		
			Total Potassium (K)	2021/08/25	88	%	75 - 125		
			Total Selenium (Se)	2021/08/25	101	%	75 - 125		
			Total Silver (Ag)	2021/08/25	96	%	75 - 125		
			Total Sodium (Na)	2021/08/25	102	%	75 - 125		
			Total Strontium (Sr)	2021/08/25	95	%	75 - 125		
			Total Thallium (Tl)	2021/08/25	93	%	75 - 125		
			Total Tin (Sn)	2021/08/25	96	%	75 - 125		
			Total Titanium (Ti)	2021/08/25	NC	%	75 - 125		
			Total Tungsten (W)	2021/08/25	83	%	75 - 125		
			Total Uranium (U)	2021/08/25	95	%	75 - 125		
			Total Vanadium (V)	2021/08/25	95	%	75 - 125		
			Total Zinc (Zn)	2021/08/25	91	%	75 - 125		
			Total Zirconium (Zr)	2021/08/25	102	%	75 - 125		
			Total Aluminum (Al)	2021/08/25	93	%	70 - 130		
			Total Antimony (Sb)	2021/08/25	105	%	70 - 130		
			Total Arsenic (As)	2021/08/25	88	%	70 - 130		
			Total Barium (Ba)	2021/08/25	98	%	70 - 130		
			Total Beryllium (Be)	2021/08/25	95	%	70 - 130		
			Total Cadmium (Cd)	2021/08/25	121	%	70 - 130		
			Total Calcium (Ca)	2021/08/25	97	%	70 - 130		
			Total Chromium (Cr)	2021/08/25	96	%	70 - 130		
			Total Cobalt (Co)	2021/08/25	98	%	70 - 130		
			Total Copper (Cu)	2021/08/25	101	%	70 - 130		
			Total Iron (Fe)	2021/08/25	100	%	70 - 130		
			Total Lead (Pb)	2021/08/25	110	%	70 - 130		
			Total Lithium (Li)	2021/08/25	99	%	70 - 130		
			Total Magnesium (Mg)	2021/08/25	103	%	70 - 130		
			Total Manganese (Mn)	2021/08/25	99	%	70 - 130		
			Total Mercury (Hg)	2021/08/25	95	%	70 - 130		
			Total Molybdenum (Mo)	2021/08/25	97	%	70 - 130		
			Total Nickel (Ni)	2021/08/25	104	%	70 - 130		
			Total Phosphorus (P)	2021/08/25	95	%	70 - 130		
			Total Potassium (K)	2021/08/25	82	%	70 - 130		
			Total Silver (Ag)	2021/08/25	95	%	70 - 130		
			Total Sodium (Na)	2021/08/25	90	%	70 - 130		
			Total Strontium (Sr)	2021/08/25	99	%	70 - 130		
			Total Thallium (Tl)	2021/08/25	90	%	70 - 130		
			Total Tin (Sn)	2021/08/25	100	%	70 - 130		
			Total Uranium (U)	2021/08/25	96	%	70 - 130		
			Total Vanadium (V)	2021/08/25	100	%	70 - 130		
			Total Zinc (Zn)	2021/08/25	105	%	70 - 130		
A330648	JLP	Spiked Blank	Total Aluminum (Al)	2021/08/25	98	%	75 - 125		
			Total Antimony (Sb)	2021/08/25	98	%	75 - 125		
			Total Arsenic (As)	2021/08/25	99	%	75 - 125		
			Total Barium (Ba)	2021/08/25	96	%	75 - 125		
			Total Beryllium (Be)	2021/08/25	99	%	75 - 125		
			Total Bismuth (Bi)	2021/08/25	96	%	75 - 125		
			Total Boron (B)	2021/08/25	101	%	75 - 125		
			Total Cadmium (Cd)	2021/08/25	99	%	75 - 125		
			Total Calcium (Ca)	2021/08/25	102	%	75 - 125		
			Total Chromium (Cr)	2021/08/25	103	%	75 - 125		
			Total Cobalt (Co)	2021/08/25	104	%	75 - 125		



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330648	JLP	Method Blank	Total Copper (Cu)	2021/08/25		102	%	75 - 125
			Total Iron (Fe)	2021/08/25		102	%	75 - 125
			Total Lead (Pb)	2021/08/25		98	%	75 - 125
			Total Lithium (Li)	2021/08/25		94	%	75 - 125
			Total Magnesium (Mg)	2021/08/25		100	%	75 - 125
			Total Manganese (Mn)	2021/08/25		99	%	75 - 125
			Total Mercury (Hg)	2021/08/25		95	%	75 - 125
			Total Molybdenum (Mo)	2021/08/25		96	%	75 - 125
			Total Nickel (Ni)	2021/08/25		101	%	75 - 125
			Total Phosphorus (P)	2021/08/25		96	%	75 - 125
			Total Potassium (K)	2021/08/25		97	%	75 - 125
			Total Selenium (Se)	2021/08/25		101	%	75 - 125
			Total Silver (Ag)	2021/08/25		99	%	75 - 125
			Total Sodium (Na)	2021/08/25		106	%	75 - 125
			Total Strontium (Sr)	2021/08/25		95	%	75 - 125
			Total Thallium (Tl)	2021/08/25		95	%	75 - 125
			Total Tin (Sn)	2021/08/25		100	%	75 - 125
			Total Titanium (Ti)	2021/08/25		101	%	75 - 125
			Total Tungsten (W)	2021/08/25		102	%	75 - 125
			Total Uranium (U)	2021/08/25		95	%	75 - 125
			Total Vanadium (V)	2021/08/25		98	%	75 - 125
			Total Zinc (Zn)	2021/08/25		98	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		99	%	75 - 125
			Total Aluminum (Al)	2021/08/25	ND, RDL=100		mg/kg	
			Total Antimony (Sb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Arsenic (As)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Barium (Ba)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Beryllium (Be)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Bismuth (Bi)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Boron (B)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Cadmium (Cd)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Calcium (Ca)	2021/08/25	ND, RDL=100		mg/kg	
			Total Chromium (Cr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Cobalt (Co)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Copper (Cu)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Iron (Fe)	2021/08/25	ND, RDL=100		mg/kg	
			Total Lead (Pb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Lithium (Li)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Magnesium (Mg)	2021/08/25	ND, RDL=100		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330648	JLP	RPD	Total Manganese (Mn)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Mercury (Hg)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Molybdenum (Mo)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Nickel (Ni)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Phosphorus (P)	2021/08/25	ND, RDL=10		mg/kg	
			Total Potassium (K)	2021/08/25	ND, RDL=100		mg/kg	
			Total Selenium (Se)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Silver (Ag)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Sodium (Na)	2021/08/25	ND, RDL=100		mg/kg	
			Total Strontium (Sr)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Thallium (Tl)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Tin (Sn)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Titanium (Ti)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Tungsten (W)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Uranium (U)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Vanadium (V)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zinc (Zn)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zirconium (Zr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Aluminum (Al)	2021/08/25	3.0		%	40
			Total Antimony (Sb)	2021/08/25	NC		%	30
			Total Arsenic (As)	2021/08/25	4.7		%	30
			Total Barium (Ba)	2021/08/25	6.4		%	40
			Total Beryllium (Be)	2021/08/25	NC		%	30
			Total Bismuth (Bi)	2021/08/25	NC		%	30
			Total Boron (B)	2021/08/25	NC		%	30
			Total Cadmium (Cd)	2021/08/25	NC		%	30
			Total Calcium (Ca)	2021/08/25	6.4		%	30
			Total Chromium (Cr)	2021/08/25	2.2		%	30
			Total Cobalt (Co)	2021/08/25	4.5		%	30
			Total Copper (Cu)	2021/08/25	0.77		%	30
			Total Iron (Fe)	2021/08/25	2.2		%	30
			Total Lead (Pb)	2021/08/25	19		%	40
			Total Lithium (Li)	2021/08/25	5.6		%	30
			Total Magnesium (Mg)	2021/08/25	1.6		%	30
			Total Manganese (Mn)	2021/08/25	4.0		%	30
			Total Mercury (Hg)	2021/08/25	NC		%	40
			Total Molybdenum (Mo)	2021/08/25	1.1		%	40
			Total Nickel (Ni)	2021/08/25	1.9		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330651	JGD	Spiked Blank	Total Phosphorus (P)	2021/08/25	7.4		%	30
			Total Potassium (K)	2021/08/25	9.5		%	40
			Total Selenium (Se)	2021/08/25	NC		%	30
			Total Silver (Ag)	2021/08/25	NC		%	40
			Total Sodium (Na)	2021/08/25	0.35		%	40
			Total Strontium (Sr)	2021/08/25	5.4		%	40
			Total Thallium (Tl)	2021/08/25	22		%	30
			Total Tin (Sn)	2021/08/25	6.8		%	40
			Total Titanium (Ti)	2021/08/25	7.1		%	40
			Total Tungsten (W)	2021/08/25	NC		%	40
			Total Uranium (U)	2021/08/25	1.2		%	30
			Total Vanadium (V)	2021/08/25	2.9		%	30
			Total Zinc (Zn)	2021/08/25	4.7		%	30
			Total Zirconium (Zr)	2021/08/25	2.0		%	40
			Soluble (2:1) pH	2021/08/25		100	%	97 - 103
A330651	JGD	RPD	Soluble (2:1) pH	2021/08/25	0		%	N/A
A331008	JLP	Matrix Spike	Total Aluminum (Al)	2021/08/25		NC	%	75 - 125
			Total Antimony (Sb)	2021/08/25		91	%	75 - 125
			Total Arsenic (As)	2021/08/25		95	%	75 - 125
			Total Barium (Ba)	2021/08/25		98	%	75 - 125
			Total Beryllium (Be)	2021/08/25		94	%	75 - 125
			Total Bismuth (Bi)	2021/08/25		94	%	75 - 125
			Total Boron (B)	2021/08/25		94	%	75 - 125
			Total Cadmium (Cd)	2021/08/25		96	%	75 - 125
			Total Calcium (Ca)	2021/08/25		NC	%	75 - 125
			Total Chromium (Cr)	2021/08/25		97	%	75 - 125
			Total Cobalt (Co)	2021/08/25		99	%	75 - 125
			Total Copper (Cu)	2021/08/25		96	%	75 - 125
			Total Iron (Fe)	2021/08/25		NC	%	75 - 125
			Total Lead (Pb)	2021/08/25		97	%	75 - 125
			Total Lithium (Li)	2021/08/25		88	%	75 - 125
			Total Magnesium (Mg)	2021/08/25		NC	%	75 - 125
			Total Manganese (Mn)	2021/08/25		NC	%	75 - 125
			Total Mercury (Hg)	2021/08/25		93	%	75 - 125
			Total Molybdenum (Mo)	2021/08/25		93	%	75 - 125
			Total Nickel (Ni)	2021/08/25		94	%	75 - 125
			Total Phosphorus (P)	2021/08/25		89	%	75 - 125
			Total Potassium (K)	2021/08/25		109	%	75 - 125
			Total Selenium (Se)	2021/08/25		98	%	75 - 125
			Total Silver (Ag)	2021/08/25		95	%	75 - 125
			Total Sodium (Na)	2021/08/25		113	%	75 - 125
			Total Strontium (Sr)	2021/08/25		99	%	75 - 125
			Total Thallium (Tl)	2021/08/25		92	%	75 - 125
			Total Tin (Sn)	2021/08/25		97	%	75 - 125
			Total Titanium (Ti)	2021/08/25		NC	%	75 - 125
			Total Tungsten (W)	2021/08/25		93	%	75 - 125
			Total Uranium (U)	2021/08/25		94	%	75 - 125
			Total Vanadium (V)	2021/08/25		96	%	75 - 125
			Total Zinc (Zn)	2021/08/25		92	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		109	%	75 - 125
A331008	JLP	QC Standard	Total Aluminum (Al)	2021/08/25		98	%	70 - 130
			Total Antimony (Sb)	2021/08/25		101	%	70 - 130
			Total Arsenic (As)	2021/08/25		88	%	70 - 130
			Total Barium (Ba)	2021/08/25		98	%	70 - 130
			Total Beryllium (Be)	2021/08/25		92	%	70 - 130



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
				Total Cadmium (Cd)	2021/08/25		94	%	70 - 130
				Total Calcium (Ca)	2021/08/25		96	%	70 - 130
				Total Chromium (Cr)	2021/08/25		102	%	70 - 130
				Total Cobalt (Co)	2021/08/25		99	%	70 - 130
				Total Copper (Cu)	2021/08/25		104	%	70 - 130
				Total Iron (Fe)	2021/08/25		102	%	70 - 130
				Total Lead (Pb)	2021/08/25		112	%	70 - 130
				Total Lithium (Li)	2021/08/25		99	%	70 - 130
				Total Magnesium (Mg)	2021/08/25		106	%	70 - 130
				Total Manganese (Mn)	2021/08/25		102	%	70 - 130
				Total Mercury (Hg)	2021/08/25		103	%	70 - 130
				Total Molybdenum (Mo)	2021/08/25		105	%	70 - 130
				Total Nickel (Ni)	2021/08/25		106	%	70 - 130
				Total Phosphorus (P)	2021/08/25		94	%	70 - 130
				Total Potassium (K)	2021/08/25		85	%	70 - 130
				Total Silver (Ag)	2021/08/25		97	%	70 - 130
				Total Sodium (Na)	2021/08/25		94	%	70 - 130
				Total Strontium (Sr)	2021/08/25		100	%	70 - 130
				Total Thallium (Tl)	2021/08/25		86	%	70 - 130
				Total Tin (Sn)	2021/08/25		96	%	70 - 130
				Total Uranium (U)	2021/08/25		102	%	70 - 130
				Total Vanadium (V)	2021/08/25		103	%	70 - 130
				Total Zinc (Zn)	2021/08/25		103	%	70 - 130
	A331008	JLP	Spiked Blank	Total Aluminum (Al)	2021/08/25		97	%	75 - 125
				Total Antimony (Sb)	2021/08/25		100	%	75 - 125
				Total Arsenic (As)	2021/08/25		101	%	75 - 125
				Total Barium (Ba)	2021/08/25		98	%	75 - 125
				Total Beryllium (Be)	2021/08/25		103	%	75 - 125
				Total Bismuth (Bi)	2021/08/25		99	%	75 - 125
				Total Boron (B)	2021/08/25		104	%	75 - 125
				Total Cadmium (Cd)	2021/08/25		100	%	75 - 125
				Total Calcium (Ca)	2021/08/25		103	%	75 - 125
				Total Chromium (Cr)	2021/08/25		101	%	75 - 125
				Total Cobalt (Co)	2021/08/25		105	%	75 - 125
				Total Copper (Cu)	2021/08/25		104	%	75 - 125
				Total Iron (Fe)	2021/08/25		102	%	75 - 125
				Total Lead (Pb)	2021/08/25		102	%	75 - 125
				Total Lithium (Li)	2021/08/25		97	%	75 - 125
				Total Magnesium (Mg)	2021/08/25		101	%	75 - 125
				Total Manganese (Mn)	2021/08/25		100	%	75 - 125
				Total Mercury (Hg)	2021/08/25		98	%	75 - 125
				Total Molybdenum (Mo)	2021/08/25		97	%	75 - 125
				Total Nickel (Ni)	2021/08/25		101	%	75 - 125
				Total Phosphorus (P)	2021/08/25		96	%	75 - 125
				Total Potassium (K)	2021/08/25		99	%	75 - 125
				Total Selenium (Se)	2021/08/25		103	%	75 - 125
				Total Silver (Ag)	2021/08/25		100	%	75 - 125
				Total Sodium (Na)	2021/08/25		105	%	75 - 125
				Total Strontium (Sr)	2021/08/25		97	%	75 - 125
				Total Thallium (Tl)	2021/08/25		98	%	75 - 125
				Total Tin (Sn)	2021/08/25		100	%	75 - 125
				Total Titanium (Ti)	2021/08/25		100	%	75 - 125
				Total Tungsten (W)	2021/08/25		105	%	75 - 125
				Total Uranium (U)	2021/08/25		99	%	75 - 125
				Total Vanadium (V)	2021/08/25		100	%	75 - 125



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A331008	JLP	Method Blank	Total Zinc (Zn)	2021/08/25		100	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		102	%	75 - 125
			Total Aluminum (Al)	2021/08/25	ND, RDL=100		mg/kg	
			Total Antimony (Sb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Arsenic (As)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Barium (Ba)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Beryllium (Be)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Bismuth (Bi)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Boron (B)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Cadmium (Cd)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Calcium (Ca)	2021/08/25	ND, RDL=100		mg/kg	
			Total Chromium (Cr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Cobalt (Co)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Copper (Cu)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Iron (Fe)	2021/08/25	ND, RDL=100		mg/kg	
			Total Lead (Pb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Lithium (Li)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Magnesium (Mg)	2021/08/25	ND, RDL=100		mg/kg	
			Total Manganese (Mn)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Mercury (Hg)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Molybdenum (Mo)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Nickel (Ni)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Phosphorus (P)	2021/08/25	ND, RDL=10		mg/kg	
			Total Potassium (K)	2021/08/25	ND, RDL=100		mg/kg	
			Total Selenium (Se)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Silver (Ag)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Sodium (Na)	2021/08/25	ND, RDL=100		mg/kg	
			Total Strontium (Sr)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Thallium (Tl)	2021/08/25	ND, RDL=0.050		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A331008	JLP	RPD	Total Tin (Sn)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Titanium (Ti)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Tungsten (W)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Uranium (U)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Vanadium (V)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zinc (Zn)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zirconium (Zr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Aluminum (Al)	2021/08/25	5.6		%	40
			Total Antimony (Sb)	2021/08/25	1.4		%	30
			Total Arsenic (As)	2021/08/25	4.5		%	30
			Total Barium (Ba)	2021/08/25	5.7		%	40
			Total Beryllium (Be)	2021/08/25	NC		%	30
			Total Bismuth (Bi)	2021/08/25	NC		%	30
			Total Boron (B)	2021/08/25	10		%	30
			Total Cadmium (Cd)	2021/08/25	0.50		%	30
			Total Calcium (Ca)	2021/08/25	3.1		%	30
			Total Chromium (Cr)	2021/08/25	7.9		%	30
			Total Cobalt (Co)	2021/08/25	3.1		%	30
			Total Copper (Cu)	2021/08/25	16		%	30
			Total Iron (Fe)	2021/08/25	5.0		%	30
			Total Lead (Pb)	2021/08/25	6.1		%	40
			Total Lithium (Li)	2021/08/25	4.1		%	30
			Total Magnesium (Mg)	2021/08/25	7.0		%	30
			Total Manganese (Mn)	2021/08/25	1.9		%	30
			Total Mercury (Hg)	2021/08/25	21		%	40
			Total Molybdenum (Mo)	2021/08/25	5.4		%	40
			Total Nickel (Ni)	2021/08/25	8.1		%	30
			Total Phosphorus (P)	2021/08/25	4.2		%	30
			Total Potassium (K)	2021/08/25	4.4		%	40
			Total Selenium (Se)	2021/08/25	NC		%	30
			Total Silver (Ag)	2021/08/25	NC		%	40
			Total Strontium (Sr)	2021/08/25	1.9		%	40
			Total Thallium (Tl)	2021/08/25	13		%	30
			Total Tin (Sn)	2021/08/25	12		%	40
			Total Titanium (Ti)	2021/08/25	5.5		%	40
			Total Tungsten (W)	2021/08/25	NC		%	40
			Total Uranium (U)	2021/08/25	3.9		%	30
			Total Vanadium (V)	2021/08/25	6.8		%	30
			Total Zinc (Zn)	2021/08/25	7.1		%	30
			Total Zirconium (Zr)	2021/08/25	2.9		%	40
A331013	JGD	Spiked Blank	Soluble (2:1) pH	2021/08/25		100	%	97 - 103
A331013	JGD	RPD [ADR452-01]	Soluble (2:1) pH	2021/08/25	0.73		%	N/A
A338131	LA5	Method Blank	Moisture	2021/09/11	ND, RDL=0.30		%	
A338131	LA5	RPD [ADR390-01]	Moisture	2021/09/11	0.51		%	20
A338154	SOM	Matrix Spike [ADR438-01]	Total (Dry Wt) Aluminum (Al)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Antimony (Sb)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Arsenic (As)	2021/09/24		98	%	80 - 120



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	QC Standard	Total (Dry Wt) Barium (Ba)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Beryllium (Be)	2021/09/24		107	%	80 - 120
			Total (Dry Wt) Bismuth (Bi)	2021/09/24		91	%	80 - 120
			Total (Dry Wt) Boron (B)	2021/09/24		109	%	80 - 120
			Total (Dry Wt) Cadmium (Cd)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Calcium (Ca)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Chromium (Cr)	2021/09/24		93	%	80 - 120
			Total (Dry Wt) Cobalt (Co)	2021/09/24		92	%	80 - 120
			Total (Dry Wt) Copper (Cu)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Iron (Fe)	2021/09/24		117	%	80 - 120
			Total (Dry Wt) Lead (Pb)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Magnesium (Mg)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Manganese (Mn)	2021/09/24		119	%	80 - 120
			Total (Dry Wt) Mercury (Hg)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Nickel (Ni)	2021/09/24		92	%	80 - 120
			Total (Dry Wt) Phosphorus (P)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Potassium (K)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Selenium (Se)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Silver (Ag)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Sodium (Na)	2021/09/24		102	%	80 - 120
			Total (Dry Wt) Strontium (Sr)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Thallium (Tl)	2021/09/24		94	%	80 - 120
			Total (Dry Wt) Tin (Sn)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Titanium (Ti)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Uranium (U)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Vanadium (V)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Zinc (Zn)	2021/09/24		109	%	80 - 120
			Total (Dry Wt) Aluminum (Al)	2021/09/24		36	%	17 - 93
			Total (Dry Wt) Arsenic (As)	2021/09/24		83	%	42 - 199
			Total (Dry Wt) Boron (B)	2021/09/24		101	%	75 - 125
			Total (Dry Wt) Cadmium (Cd)	2021/09/24		89	%	75 - 125
			Total (Dry Wt) Calcium (Ca)	2021/09/24		86	%	75 - 125
			Total (Dry Wt) Cobalt (Co)	2021/09/24		77	%	75 - 125
			Total (Dry Wt) Copper (Cu)	2021/09/24		81	%	75 - 125
			Total (Dry Wt) Manganese (Mn)	2021/09/24		89	%	75 - 125
			Total (Dry Wt) Mercury (Hg)	2021/09/24		81	%	75 - 125
			Total (Dry Wt) Nickel (Ni)	2021/09/24		73 (2)	%	75 - 125
			Total (Dry Wt) Phosphorus (P)	2021/09/24		97	%	75 - 125
			Total (Dry Wt) Potassium (K)	2021/09/24		90	%	75 - 125
			Total (Dry Wt) Selenium (Se)	2021/09/24		96	%	75 - 125
			Total (Dry Wt) Sodium (Na)	2021/09/24		89	%	75 - 125
			Total (Dry Wt) Strontium (Sr)	2021/09/24		97	%	75 - 125
			Total (Dry Wt) Zinc (Zn)	2021/09/24		84	%	75 - 125
A338154	SOM	Spiked Blank	Total (Dry Wt) Aluminum (Al)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Antimony (Sb)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Arsenic (As)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Barium (Ba)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Beryllium (Be)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Bismuth (Bi)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Boron (B)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Cadmium (Cd)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Calcium (Ca)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Chromium (Cr)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Cobalt (Co)	2021/09/24		94	%	80 - 120



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	Method Blank	Total (Dry Wt) Copper (Cu)	2021/09/24		94	%	80 - 120
			Total (Dry Wt) Iron (Fe)	2021/09/24		104	%	80 - 120
			Total (Dry Wt) Lead (Pb)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Magnesium (Mg)	2021/09/24		103	%	80 - 120
			Total (Dry Wt) Manganese (Mn)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Mercury (Hg)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Nickel (Ni)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Phosphorus (P)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Potassium (K)	2021/09/24		104	%	80 - 120
			Total (Dry Wt) Selenium (Se)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Silver (Ag)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Sodium (Na)	2021/09/24		102	%	80 - 120
			Total (Dry Wt) Strontium (Sr)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Thallium (Tl)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Tin (Sn)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Titanium (Ti)	2021/09/24		103	%	80 - 120
			Total (Dry Wt) Uranium (U)	2021/09/24		102	%	80 - 120
			Total (Dry Wt) Vanadium (V)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Zinc (Zn)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Aluminum (Al)	2021/09/24	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Antimony (Sb)	2021/09/24	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Arsenic (As)	2021/09/24	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Barium (Ba)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Beryllium (Be)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Bismuth (Bi)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Boron (B)	2021/09/24	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Cadmium (Cd)	2021/09/24	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Calcium (Ca)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Chromium (Cr)	2021/09/24	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Cobalt (Co)	2021/09/24	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Copper (Cu)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Iron (Fe)	2021/09/24	ND, RDL=5.0		mg/kg	
			Total (Dry Wt) Lead (Pb)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Magnesium (Mg)	2021/09/24	ND, RDL=5.0		mg/kg	
			Total (Dry Wt) Manganese (Mn)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Mercury (Hg)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24	ND, RDL=0.020		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	RPD	Total (Dry Wt) Nickel (Ni)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Phosphorus (P)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Potassium (K)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Selenium (Se)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Silver (Ag)	2021/09/24	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Sodium (Na)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Strontium (Sr)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Thallium (Tl)	2021/09/24	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Tin (Sn)	2021/09/24	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Titanium (Ti)	2021/09/24	ND, RDL=0.50		mg/kg	
			Total (Dry Wt) Uranium (U)	2021/09/24	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Vanadium (V)	2021/09/24	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Zinc (Zn)	2021/09/24	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Aluminum (Al)	2021/09/24	NC		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/24	NC		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/24	NC		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/24	NC		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/24	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/24	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/24	NC		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/24	NC		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/24	NC		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/24	NC		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/24	NC		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/24	NC		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/24	NC		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/24	NC		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/24	NC		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/24	NC		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/24	NC		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24	NC		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/24	NC		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/24	NC		%	40
			Total (Dry Wt) Potassium (K)	2021/09/24	NC		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/24	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/24	NC		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/24	NC		%	40
			Total (Dry Wt) Strontium (Sr)	2021/09/24	NC		%	60
			Total (Dry Wt) Thallium (Tl)	2021/09/24	NC		%	40
			Total (Dry Wt) Tin (Sn)	2021/09/24	NC		%	40
			Total (Dry Wt) Titanium (Ti)	2021/09/24	NC		%	40
			Total (Dry Wt) Uranium (U)	2021/09/24	NC		%	40



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	RPD [ADR438-01]	Total (Dry Wt) Vanadium (V)	2021/09/24	NC		%	40
			Total (Dry Wt) Zinc (Zn)	2021/09/24	NC		%	40
			Total (Dry Wt) Aluminum (Al)	2021/09/24	5.7		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/24	6.0		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/24	5.0		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/24	0.62		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/24	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/24	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/24	2.9		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/24	4.8		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/24	0.29		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/24	3.6		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/24	1.5		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/24	3.0		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/24	2.9		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/24	3.5		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/24	1.7		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/24	1.3		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/24	NC		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24	0.62		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/24	2.7		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/24	2.9		%	40
			Total (Dry Wt) Potassium (K)	2021/09/24	3.3		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/24	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/24	5.1		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/24	NC		%	40
			Total (Dry Wt) Strontium (Sr)	2021/09/24	1.3		%	60
			Total (Dry Wt) Thallium (Tl)	2021/09/24	NC		%	40
			Total (Dry Wt) Tin (Sn)	2021/09/24	NC		%	40
			Total (Dry Wt) Titanium (Ti)	2021/09/24	4.1		%	40
			Total (Dry Wt) Uranium (U)	2021/09/24	28		%	40
			Total (Dry Wt) Vanadium (V)	2021/09/24	NC		%	40
			Total (Dry Wt) Zinc (Zn)	2021/09/24	1.4		%	40
A358708	SOM	QC Standard	Total (Dry Wt) Aluminum (Al)	2021/09/25		35	%	N/A
			Total (Dry Wt) Arsenic (As)	2021/09/25		54	%	N/A
			Total (Dry Wt) Boron (B)	2021/09/25		100	%	N/A
			Total (Dry Wt) Cadmium (Cd)	2021/09/25		90	%	N/A
			Total (Dry Wt) Calcium (Ca)	2021/09/25		89	%	N/A
			Total (Dry Wt) Cobalt (Co)	2021/09/25		79	%	N/A
			Total (Dry Wt) Copper (Cu)	2021/09/25		85	%	N/A
			Total (Dry Wt) Manganese (Mn)	2021/09/25		89	%	N/A
			Total (Dry Wt) Mercury (Hg)	2021/09/25		91	%	N/A
			Total (Dry Wt) Nickel (Ni)	2021/09/25		76	%	N/A
			Total (Dry Wt) Phosphorus (P)	2021/09/25		96	%	N/A
			Total (Dry Wt) Potassium (K)	2021/09/25		91	%	N/A
			Total (Dry Wt) Selenium (Se)	2021/09/25		102	%	N/A
			Total (Dry Wt) Sodium (Na)	2021/09/25		90	%	N/A
A358708	SOM	Spiked Blank	Total (Dry Wt) Strontium (Sr)	2021/09/25		99	%	N/A
			Total (Dry Wt) Zinc (Zn)	2021/09/25		86	%	N/A
			Total (Dry Wt) Aluminum (Al)	2021/09/25		103	%	80 - 120
			Total (Dry Wt) Antimony (Sb)	2021/09/25		100	%	80 - 120
			Total (Dry Wt) Arsenic (As)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Barium (Ba)	2021/09/25		100	%	80 - 120
			Total (Dry Wt) Beryllium (Be)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Bismuth (Bi)	2021/09/25		103	%	80 - 120



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A358708	SOM	Method Blank	Total (Dry Wt) Boron (B)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Cadmium (Cd)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Calcium (Ca)	2021/09/25		102	%	80 - 120
			Total (Dry Wt) Chromium (Cr)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Cobalt (Co)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Copper (Cu)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Iron (Fe)	2021/09/25		104	%	80 - 120
			Total (Dry Wt) Lead (Pb)	2021/09/25		103	%	80 - 120
			Total (Dry Wt) Magnesium (Mg)	2021/09/25		104	%	80 - 120
			Total (Dry Wt) Manganese (Mn)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Mercury (Hg)	2021/09/25		101	%	80 - 120
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25		104	%	80 - 120
			Total (Dry Wt) Nickel (Ni)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Phosphorus (P)	2021/09/25		101	%	80 - 120
			Total (Dry Wt) Potassium (K)	2021/09/25		102	%	80 - 120
			Total (Dry Wt) Selenium (Se)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Silver (Ag)	2021/09/25		96	%	80 - 120
			Total (Dry Wt) Sodium (Na)	2021/09/25		105	%	80 - 120
			Total (Dry Wt) Strontium (Sr)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Thallium (Tl)	2021/09/25		102	%	80 - 120
			Total (Dry Wt) Tin (Sn)	2021/09/25		107	%	80 - 120
			Total (Dry Wt) Titanium (Ti)	2021/09/25		103	%	80 - 120
			Total (Dry Wt) Uranium (U)	2021/09/25		106	%	80 - 120
			Total (Dry Wt) Vanadium (V)	2021/09/25		100	%	80 - 120
			Total (Dry Wt) Zinc (Zn)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Aluminum (Al)	2021/09/25	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Antimony (Sb)	2021/09/25	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Arsenic (As)	2021/09/25	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Barium (Ba)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Beryllium (Be)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Bismuth (Bi)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Boron (B)	2021/09/25	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Cadmium (Cd)	2021/09/25	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Calcium (Ca)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Chromium (Cr)	2021/09/25	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Cobalt (Co)	2021/09/25	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Copper (Cu)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Iron (Fe)	2021/09/25	ND, RDL=5.0		mg/kg	
			Total (Dry Wt) Lead (Pb)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Magnesium (Mg)	2021/09/25	ND, RDL=5.0		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A358708	SOM	RPD	Total (Dry Wt) Manganese (Mn)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Mercury (Hg)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Nickel (Ni)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Phosphorus (P)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Potassium (K)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Selenium (Se)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Silver (Ag)	2021/09/25	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Sodium (Na)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Strontium (Sr)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Thallium (Tl)	2021/09/25	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Tin (Sn)	2021/09/25	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Titanium (Ti)	2021/09/25	ND, RDL=0.50		mg/kg	
			Total (Dry Wt) Uranium (U)	2021/09/25	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Vanadium (V)	2021/09/25	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Zinc (Zn)	2021/09/25	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Aluminum (Al)	2021/09/25	NC		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/25	NC		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/25	NC		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/25	NC		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/25	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/25	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/25	NC		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/25	NC		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/25	NC		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/25	NC		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/25	NC		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/25	NC		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/25	NC		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/25	NC		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/25	NC		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/25	NC		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/25	NC		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25	NC		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/25	NC		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/25	NC		%	40
			Total (Dry Wt) Potassium (K)	2021/09/25	NC		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/25	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/25	NC		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/25	NC		%	40



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC									
Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits	
A358708	SOM	RPD [ADR392-01]	Total (Dry Wt) Strontium (Sr)	2021/09/25	NC		%	60	
			Total (Dry Wt) Thallium (Tl)	2021/09/25	NC		%	40	
			Total (Dry Wt) Tin (Sn)	2021/09/25	NC		%	40	
			Total (Dry Wt) Titanium (Ti)	2021/09/25	NC		%	40	
			Total (Dry Wt) Uranium (U)	2021/09/25	NC		%	40	
			Total (Dry Wt) Vanadium (V)	2021/09/25	NC		%	40	
			Total (Dry Wt) Zinc (Zn)	2021/09/25	NC		%	40	
			Total (Dry Wt) Aluminum (Al)	2021/09/25	9.2		%	40	
			Total (Dry Wt) Antimony (Sb)	2021/09/25	NC		%	40	
			Total (Dry Wt) Arsenic (As)	2021/09/25	8.6		%	40	
			Total (Dry Wt) Barium (Ba)	2021/09/25	2.1		%	40	
			Total (Dry Wt) Beryllium (Be)	2021/09/25	NC		%	40	
			Total (Dry Wt) Bismuth (Bi)	2021/09/25	NC		%	40	
			Total (Dry Wt) Boron (B)	2021/09/25	3.0		%	40	
			Total (Dry Wt) Cadmium (Cd)	2021/09/25	17		%	40	
			Total (Dry Wt) Calcium (Ca)	2021/09/25	1.0		%	60	
			Total (Dry Wt) Chromium (Cr)	2021/09/25	NC		%	40	
			Total (Dry Wt) Cobalt (Co)	2021/09/25	4.0		%	40	
			Total (Dry Wt) Copper (Cu)	2021/09/25	0.65		%	40	
			Total (Dry Wt) Iron (Fe)	2021/09/25	0.040		%	40	
			Total (Dry Wt) Lead (Pb)	2021/09/25	8.6		%	40	
			Total (Dry Wt) Magnesium (Mg)	2021/09/25	0.92		%	40	
			Total (Dry Wt) Manganese (Mn)	2021/09/25	1.2		%	40	
			Total (Dry Wt) Mercury (Hg)	2021/09/25	5.8		%	40	
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25	0.36		%	40	
			Total (Dry Wt) Nickel (Ni)	2021/09/25	0.50		%	40	
			Total (Dry Wt) Phosphorus (P)	2021/09/25	1.1		%	40	
			Total (Dry Wt) Potassium (K)	2021/09/25	0.87		%	40	
			Total (Dry Wt) Selenium (Se)	2021/09/25	NC		%	40	
			Total (Dry Wt) Silver (Ag)	2021/09/25	NC		%	40	
			Total (Dry Wt) Sodium (Na)	2021/09/25	7.8		%	40	
			Total (Dry Wt) Strontium (Sr)	2021/09/25	3.0		%	60	
			Total (Dry Wt) Thallium (Tl)	2021/09/25	11		%	40	
			Total (Dry Wt) Tin (Sn)	2021/09/25	NC		%	40	
			Total (Dry Wt) Titanium (Ti)	2021/09/25	3.6		%	40	
			Total (Dry Wt) Uranium (U)	2021/09/25	17		%	40	
			Total (Dry Wt) Vanadium (V)	2021/09/25	NC		%	40	
			Total (Dry Wt) Zinc (Zn)	2021/09/25	0.92		%	40	

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Reference material outside acceptance criteria due to digestion limitations.



BV Labs Job #: C158547
Report Date: 2021/09/27

EDI Environmental Dynamics Inc.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

A handwritten signature in black ink, appearing to be "David Huang", written over a horizontal line.

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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Company Name	#13524 Canagold Resources Ltd.	Company Name	#43618 HEMMERA ENVIROCHEM INC.	Quotation #	C01293
Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #	
Address	Suite 810-625 Howe Street Vancouver BC V6C 2T6	Address	Suite 230-2237 2nd Avenue Whitehorse YT Y1A 0K7	Project #	
Phone	(604) 685-9700 Fax: (604) 685-9744	Phone	(867) 456-4865 Fax:	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
Regulatory Criteria		Special Instructions		Chain Of Custody Record	
				C86443612-02-01	
				Bottle Order #:	
				044362	
				Project Manager	
				Nahed Amer	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form		Analysis Requested		Turnaround Time (TAT) Required	
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs				Please provide advance notice for rush projects	
				Regular (Standard) TAT	
				(will be applied if Rush TAT is not specified)	
				Standard TAT = 5-7 Working days for most tests	
				Please note: Standard TAT for certain tests such as BOD and Dissolved Oxygen are > 5 days - contact your Project Manager for details.	
				Job Specific Rush TAT (if applies to entire submission)	
				Date Required: Time Required:	
				Rush Confirmation Number	
				(call lab for #)	
				# of Bottles	
				Comments	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1 NPT-029-Soil	New Polaris	Aug. 7 th '21		Soil	
2 NPT-029-Salixsp	New Polaris	Aug. 7 th '21		Veg	
3 NPT-031-Soil	New Polaris	Aug. 7 th '21		Soil	
4 NPT-031-Corn ser	New Polaris	Aug. 7 th '21		Veg	
5 NPT-031-Vibor ed	New Polaris	Aug. 7 th '21		Veg	
6 NPT-001-Soil	New Polaris	Aug. 7 th '21		Soil	
7 NPT-001-Corn ser	New Polaris	Aug. 7 th '21		Veg	
8 NPT-001-Vibor ed	New Polaris	Aug. 7 th '21		Veg	
9					
10					
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	
Bureau Veritas Canada		21/08/11	13:30	RICHARD SILVERBERG	
				Date: (YY/MM/DD)	
				21/08/13	
				Time	
				6:15	
				# Jars used and not submitted	
				Time Sensitive	
				Temperature (°C) on Receipt	
				2.5/12/18	
				Custody Seal Intact on Cooler?	
				Yes No	
				White BV Labs Yellow Client	
				8/13 DNo	



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Phone	(604) 685-9700 Fax (604) 685-9744	Phone	(867) 456-4865 Fax	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
Regulatory Criteria		Special Instructions		Chain Of Custody Record	
				 C158547_COC Bottle Order #: 544362 Project Manager Named Amer	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs		Analysis Requested Turnaround Time (TAT) Required Please provide advance notice for rush projects		Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: Time Required: Rush Confirmation Number:	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1	NPT-022A Soils	Aug 8 th '21		Soil	
2	NPT-022A Salix sp	Aug 8 th '21		Veg	
3	NPT-047 Soils	Aug 8 th '21		Soil	
4	NPT-047-Vacc ova	Aug 8 th '21		Veg	
5	NPT-040 Soils	Aug 8 th '21		Soil	
6	NPT-040-Vacc ova	Aug 8 th '21		Veg	
7	NPT-053 Soils	Aug 8 th '21		Soil	
8	NPT-053 Salix sp	Aug 8 th '21		Veg	
9	NPT-053 Corn ser	Aug 8 th '21		Veg	
10					
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	
B. Smith BODIE SMITH		21/08/11	13:30	RICHARD STIVENBERG RST	
				Date: (YY/MM/DD) Time	
				21/08/13 10:15	
				# Jars used and not submitted	
				Lab Use Only	
				Time Sensitive ☐ Temperature (°C) on Receipt 2.5/12/8 Custody Seal intact on Receipt? ☒ Yes ☐ No	
				White BV Labs Yellow Client 2.0/6/7 ☒ Yes ☐ No	

Ice: Yes



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Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #	
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Phone	(604) 685-9700 Fax: (604) 685-9744	Phone	(867) 456-4865 Fax:	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
Regulatory Criteria		Special Instructions		Chain of Custody Record	
				 C158547_COC Project Manager Nished Amer	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs		Analysis Requested Turnaround Time (TAT) Required Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number _____ (call lab for it)		# of Bottles _____ Comments _____	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1	NPT-059A - Corn Ser	Aug 9 th '21		Veg	
2	NPT-059A - Vibe edu	Aug 9 th '21		Veg	
3	NPT-059B - Soils	Aug 9 th '21		Soil	
4	NPT-059B - Corn Ser	Aug 9 th '21		Veg	
5	NPT-059B - Vibe edu	Aug 9 th '21		Veg	
6	NPT-020A - Soil	Aug 10 th '21		Soil	
7	NPT-020A - Vibe edu	Aug 10 th '21		Veg	
8	NPT-020A - Corn Ser	Aug 10 th '21		Veg	
9	NPT-060A - Soils	Aug 10 th '21		Soil	
10	NPT-060A - Corn Ser	Aug 10 th '21		Veg	
* RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	
Richard Stulvenberg		31/08/11	13:40	RICHARD STULVENBERG	
				Date: (YYMMDD)	
				21/09/12	
				Time	
				10:15	
				# Jars used and not submitted	
				Time Sensitive	
				Temperature (°C) on Receipt	
				2, 5/12/3	
				Custody Seal Intact on Cooler?	
				Yes No	
				White: BV Labs Yellow: Client	
				2. 0/6/7	
				Ice: yes	



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Phone	(604) 685-9700	Phone	(867) 456-4865	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
				Sampled By	
Regulatory Criteria		Special Instructions		Turnaround Time (TAT) Required	
				Please provide advance notice for rush projects	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form				Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs				Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (not lab for #)	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1	NPT-003 Soils	Aug 6 th '21		Soil	
2	NPT-003 Corn ser	Aug 6 th '21		Veg	
3	NPT-003 Vibe edu	Aug 6 th '21		Veg	
4	NPT-006 Soils	Aug 6 th '21		Soil	
5	NPT-006 Corn ser	Aug 6 th '21		Veg	
6	NPT-006 Vibe edu	Aug 6 th '21		Veg	
7	NPT-009 Soils	Aug 6 th '21		Soil	
8	NPT-009 Corn ser	Aug 6 th '21		Veg	
9	NPT-009 Vibe edu	Aug 6 th '21		Veg	
10					
RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	Date: (YYMMDD) Time
B. Smith BRODIE SMITH		2021/08/11	13:30	RICHARD J. BROWN RJB	21/08/15 12:15
				# Jars used and not submitted	Time Sensitive
					Temperature (°C) on Receipt
					25/12/8
				Custody Seal Intact on Cooler?	Yes No
				White BV Labs Yellow Client	Yes No



C158547_COC

ity

Bottle Order #:

644362

Project Manager

Nahed Amer

Chain Of Custody Record

C01293-07-01

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT

(will be applied if Rush TAT is not specified)

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: _____ Time Required: _____

Rush Confirmation Number

(not lab for #)

of Bottles

Comments

RECEIVED IN WHITEHORSE

BY: M. Duncan 1330

2021-08-11

TEMP: 21.6 °C

9 6 8

2. 6/6/17

See: yes



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Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #			
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Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #		Nashid Amer	
Regulatory Criteria		Special Instructions		Analysis Requested		Turnaround Time (TAT) Required	
						Please provide advance notice for rush projects	
						Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 7 days - contact your Project Manager for details.	
						Job Specific Rush TAT (if applies to entire submission)	
						Date Required: _____ Time Required: _____	
						Rush Confirmation Number: _____ (call lab for #)	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form							
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs							
Sample Barcode Label	Sample Location Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metal Field Filtered ? (Y/N)	
1	NPT_060A_Vaccova	Aug 10 th '21		Veg			
2	NPT_061_Soils	Aug 10 th '21		Soil			
3	NPT_064_Vibe edu	Aug 10 th '21		Veg			
4	NPT_100c_Soils	Aug 10 th '21		Soil			
5	NPT_100c - Corn Ser	Aug 10 th '21		Veg			
6	NPT_100c - Salix sp	Aug 10 th '21		Veg			
7							
8							
9							
10							
* RELINQUISHED BY: (Signature/Print) E Smith Brian Smith		Date: (YY/MM/DD) 21/08/11	Time 13:50	RECEIVED BY: (Signature/Print) Richard Sauvage Bergeron		Date: (YY/MM/DD) 21/08/11	Time 16:15
						# jars used and not submitted	
						Lab Use Only	
						Time Sensitive ☐ Yes ☒ No	Temperature (°C) on Receipt 2.5/12/18
						Custody Seal Intact on Cooler? ☒ Yes ☐ No	
						White: BV Labs Yellow: Client	

*** UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.**

**** IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.**

2.0/6/17



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Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
Regulatory Criteria		Special Instructions		Chain Of Custody Record	
				 C158547_COC 044362 Project Manager: Naled Amer	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs		Analysis Requested Turnaround Time (TAT) Required Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests Please note: Standard TAT for certain tests such as BOD and Dipnifurans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: Time Required: ☐ Rush Confirmation Number: (ref lab for #)		Turnaround Time (TAT) Required Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests Please note: Standard TAT for certain tests such as BOD and Dipnifurans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: Time Required: ☐ Rush Confirmation Number: (ref lab for #)	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1	NPT-054-Soil	Aug. 9 th '21		Soil	
2	NPT-054-Salia sp	Aug. 9 th '21		Veg	
3	NPT-054-Vibe edu	Aug. 9 th '21		Veg	
4	NPT-058-Soils	Aug. 9 th '21		Soil	
5	NPT-058-Corn ser	Aug. 9 th '21		Veg	
6	NPT-058-Vibe edu	Aug. 9 th '21		Veg	
7	NPT-055-Soils	Aug. 9 th '21		Soil	
8	NPT-055-Corn ser	Aug. 9 th '21		Veg	
9	NPT-055-Vibe edu	Aug. 9 th '21		Veg	
10	NPT-051A-Soils	Aug. 9 th '21		Soil	
* RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	
RICHARD PRINCE		21/08/11	13:30	RICHARD PRINCE	
				Date: (YYMMDD)	
				2021/08/13	
				Time	
				10:15	
				# Jars used and not submitted	
				Time Sensitive	
				Temperature (°C) on Receipt	
				5/12/18	
				Custody Seal Intact on Cooler?	
				Yes No	
				White: BV Labs Yellow: Client	
				Yes No	

Ice: Yes



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Appendix 7.6-2

Vegetation and Ecosystems Existing Conditions Report

DRAFT

NEW POLARIS GOLD MINE

Vegetation and Ecosystems Existing Conditions Report



Prepared For

Ausenco Sustainability Ltd.
2237 2nd Ave #230
Whitehorse, YT V1A 0K7

Prepared By

EDI Environmental Dynamics Inc.
2195 2nd Ave
Whitehorse, YT Y1A 3T8

EDI Contact

Shane Cote
Project Manager

EDI Project

24Y0320
Version: 1
June 2025



Down to Earth Biology



EXECUTIVE SUMMARY

The New Polaris Gold Mine (the Project) refers to a proposed underground gold mine by Canagold Resources Ltd. (Canagold) located in northwestern British Columbia (BC) at the site of the former Polaris Taku Mine. The mine is situated approximately 100 km south of Atlin, BC, within the traditional and unceded territory of the Taku River Tlingit (TRT).

EDI Environmental Dynamics Inc. (EDI) was retained by Canagold to characterize existing environmental baseline conditions and assess potential effects on terrestrial ecosystems to inform and align with requirements for Environment Assessment of the Project. EDI conducted desktop and field-based study at the Project from 2021 to 2025. This report summarizes existing conditions and updated mapping products for vegetation and terrestrial ecosystems, including species and communities of concern (e.g., rare plants and listed species and ecological communities, culturally important plants and ecosystems, and invasive species), trace metals in soil and vegetation, and wetland classification and functionality.



AUTHORSHIP

Team members from EDI Environmental Dynamics Inc. who contributed to preparing this report include:

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Barry James, MSc, RPBio.	Contributing Author
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ACRONYMS, ABBREVIATIONS AND UNITS

Acronym/Abbreviation	Definition
>	greater than
<	less than
%	percent
Af	alpine fellfield site series
Ah	alpine heath site series
Am	alpine meadow site series
AM	herb meadow site series
At	alpine tundra site series
AT	Alpine Tundra Zone
ATELP	Atlin Tlingit Economic Limited Partnership
BAFAunp	Boreal Altai Fescue Alpine Subzone
BC	British Columbia
BEC	Biogeoclimatic Ecosystem Classification
BWBS	Boreal White and Black Spruce Zone
BWBSdk1	Dry Cool Boreal White and Black Spruce Subzone, Stikine Variant
cm	centimetre
CMAun	Coastal Mountain-heather Alpine Zone, Undifferentiated Subzone
CMAunp	Coastal Mountain-heather Alpine Zone
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWHwm	Coastal Western Hemlock Zone, Wet Maritime Subzone
EA	Environmental Assessment
EDI	EDI Environmental Dynamics Inc.
e.g.	for example (Latin <i>exempli gratia</i>)
ESSFmz	Moist Very, Very Cold Engelmann spruce – Subalpine Fir Subzone
ESSFmzp	Moist Very, Very Cold Parkland Engelmann spruce – Subalpine Fir Subzone
ESSFwv	Wet Very Cold Engelmann Spruce – Subalpine Fir Subzone
et al	and others (Latine <i>et alia</i>)
g	gram
GL	glacier
GPS	Global Positioning System
ha	hectare
H	High
ICP-MS	Coupled Plasma Mass Spectrometry
i.e.	that is (Latin <i>id est</i>)
km	kilometre
km ²	square kilometre
LAA	Local Assessment Area
LA	lake



Acronym/Abbreviation	Definition
L	Low
LM	Low-Moderate
m	metre
mm	millimetre
m ²	square metre
MH	Mountain Hemlock
MHmm2	Mountain Hemlock, Moist Maritime Subzone, Leeward Variant
MHunp	Mountain Hemlock, Undifferentiated Subzone, Parkland Variant
MN	moraine
M	Moderate
MH	Moderate-High
Project	New Polaris Project
RAA	Regional Assessment Area
RO	rock outcrop
RU	rubble
SARA	<i>Species at Risk Act</i>
SBS	Sub-Boreal Spruce Subzone
SBSmv	Moist Very Cold Sub-Boreal Spruce Subzone
SWB	Spruce-Willow-Birch
SWBmk	Moist Cool Spruce-Willow-Birch Subzone
SWBmks	Moist Cool Scrub Spruce-Willow-Birch Subzone
TA	talus
TEM	terrestrial ecosystem mapping
TCM	Tulsequah Chief Mine
TRTFN	Taku River Tlingit First Nation
VRI	Vegetation Resources Inventory



1 INTRODUCTION

1.1 PROJECT OVERVIEW AND OBJECTIVES

The New Polaris Gold Mine (the Project) refers to a proposed underground gold mine by Canagold Resources Ltd. (Canagold) located in northwestern British Columbia (BC) at the site of the former Polaris Taku Mine (which operated intermittently between 1937 and 1951). The mine is situated approximately 100 km south of Atlin, BC, on the west bank of the Tulsequah River and north of the confluence of the Tulsequah and Taku rivers, within the traditional and unceded territory of the Taku River Tlingit (TRT). Canagold acknowledges the Taku River Tlingit and their ancestors as the stewards of the lands, water, culture and spirit of their homeland. Canagold understands and respects this sacred relationship as essential to being Tlingit.

The Project is anticipated to operate year-round and mill approximately 1,000 tons of ore per day, for a total production of approximately 365,000 tons per year of ore. Exploration at the site is ongoing, and current estimates suggest the mine will have a minimum 10-year production life, that could be extended as the limits of the orebody are further defined.

EDI Environmental Dynamics Inc. (EDI) was retained by Canagold to characterize existing environmental baseline conditions and assess potential effects on terrestrial ecosystems to inform and align with requirements for Environment Assessment of the Project (BC Environmental Assessment Office 2024). EDI conducted desktop and field-based study at the Project in 2021 and 2024-2025. Study objectives were to:

- review, analyze and interpret existing information on rare plants, listed ecological communities, and invasive species collected within the Regional Assessment Area (RAA);
- update existing terrestrial ecosystem mapping (TEM) for the RAA;
- present the results of baseline field programs; and,
- identify plant species and ecological communities of concern (e.g., federally listed species at risk, provincially listed species) and their distribution in the RAA.

This report summarizes existing conditions and updated mapping products for vegetation and terrestrial ecosystems, including species and communities of concern (e.g., rare plants and listed species and ecological communities, culturally important plants and ecosystems, and invasive species), trace metals in soil and vegetation, and wetland classification and functionality.



1.2 SPATIAL BOUNDARIES

The Project is in northwestern BC, near the BC-Alaska border, within the Taku River watershed. The Tulsequah Valley extends from just south of Atlin Park and drains into the mainstem of the Taku River. The areas adjacent to this zone include glacial lakes, which have international significance for their *jökulblaup* (catastrophic, self-draining glacial lake) events that flow into the Tulsequah River (Govt. of BC and Taku River Tlingit FN 2011).

The Project Footprint refers to the existing mine site and associated historical infrastructure, processing facility, combined storage facility, paste backfill plant, gravel borrow pit, limestone quarry, barge landing, tote road to barge landing, new airstrip, associated transmission lines, access roads and surface drainage. As shown (Map 1-1), spatial boundaries for the baseline study are defined as:

- **Local Assessment Area (LAA):** 1 km buffer surrounding the Project Footprint.
- **Regional Assessment Area (RAA):** 3 km buffer surrounding the LAA.



1.3 ECOLOGICAL CONTEXT

The Project RAA is located within the Northern Boundary Ranges Ecosection, which is part of the Boundary Ranges Ecoregion, within the Coast and Mountain Ecoprovince (Demarchi 2011). The Coast and Mountain Ecoprovince extends from southeastern Alaska to the northern Cascade Mountains. Its climate is largely affected by frontal systems from the Pacific Ocean and their lifting over the coastal mountain ranges. The northern portion of the Ecoprovince, including the Boundary Range Ecoregion, has very high granitic and metamorphic-based mountain ranges that rise abruptly from the coast. The Northern Boundary Ranges Ecosection is the most northern of the three ecosections found in the Boundary Range Ecoregion. The mountain ranges here are rugged and ice-capped, with exposed granite (Demarchi 2011). Large sheets of ice shaped much of the landscape, and many glaciers and icefields remain on the summits.

As shown (Map 1-1), the RAA occurs within four Biogeoclimatic Ecosystem Classification (BEC) zones (Demarchi 2011):

- **CMAun:** Coastal Mountain-heather Alpine, Undifferentiated Subzone;
- **MHunp:** Mountain Hemlock, Undifferentiated Subzone, Parkland Variant;
- **MHmm2:** Mountain Hemlock, Moist Maritime Subzone, Leeward Variant; and,
- **CWHwm:** Coastal Western Hemlock, Wet Maritime Subzone.

The CMAun is alpine tundra and dominates the area above the treeline at elevations starting from 1,000 to 1,600 m, and ranging to 2,400 m (Banner et al. 1993a). The CMAun experiences high snowfall and consists of large icefields, glaciers and barren rock, with dwarf evergreen scrub and white and pink mountain-heather (*Cassiope mertensiana* and *Phyllodoce empetriiformis*, respectively) dominating the vegetation layer (Aldritt-McDowel 1998).

Below the treeline and down to the lower valley slopes, the Mountain Hemlock BEC zone ranges in elevation from 400 to 1,100 m (Banner et al. 1993a), and consists of MHunp and MHmm2 BEC subzone variants. The MHunp is found in transitional alpine-subalpine areas and is characterized by discontinuous stunted mountain hemlock (*Tsuga mertensiana*) and amabilis fir (*Abies amabilis*) forest interspersed with subalpine heath and herb meadows that are dominated by alpine-subalpine species, such as mountain-heather and partridge-foot (*Luetkea pectinata*) (Banner et al. 1993a). The MHmm2 subzone variant is typically on upper to midslopes, occurring on colluvial deposits or over bedrock on localized morainal and organic veneers (Banner et al. 1993b). This variant is characterized by closed forest with low productivity, dominated by mountain hemlock and amabilis fir with continuous understory that has an abundance of black huckleberry (*Vaccinium membranaceum*) (Banner et al. 1993b).

In the forested valleys, the CWHwm subzone is found in low- to mid-elevations from 0 to 600 m, typically on rocky terrain that experiences very heavy snowfall (Banner et al. 1993a). The forested subzone has relatively low plant species diversity, where western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) are dominant, with abundant blueberries (*Vaccinium* spp.) (Banner et al. 1993a).



1.4 DATA AND LITERATURE FROM PROJECT-SPECIFIC STUDIES

Several project-specific and regional studies and reports were considered in the characterization baseline conditions for the terrestrial environment. Reports and sources that were consulted for this report are listed in Table 1-1.

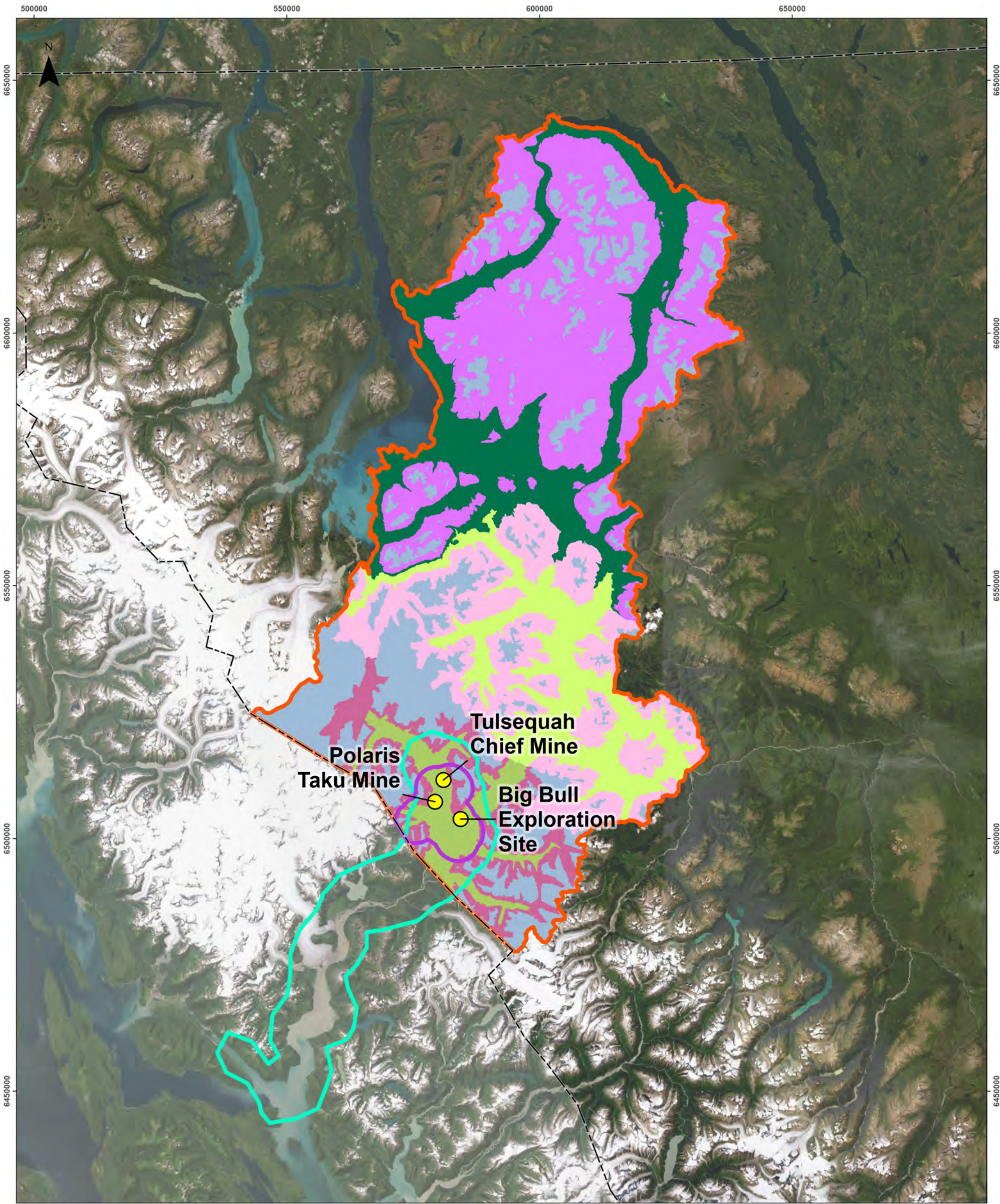
Table 1-1. Reports and data sources considered in the Terrestrial Environmental existing conditions.

Report Title	Reference
General Project Information	
Atlin Official Community Plan	(BC Ministry of Municipal Affairs 1981)
New Polaris Project, Technical Report, 2007, Draft for Discussion	(Gartner Lee Limited 2007a)
Regulatory Risk Management and Gap Analysis for the New Polaris Project	(Gartner Lee Limited 2007b)
Tulsequah Chief Project Report - Volume III Appendices (Part 2 of 2)	(Rescan Environmental Services Ltd 1997a)
Resource Atlas for Planning Under the Atlin-Taku Framework Agreement. Version 1.5.	(Atlin-Taku Framework Agreement Implementation Project 2009)
Taku River Tlingit First Nation Indigenous Protected and Conserved Area Declaration	(Taku River Tlingit First Nation 2023)
Taku-Tulsequah River Mining Activity: Background Environmental Monitoring and Potential Mining Effects. Technical Report No. 12-01.	(Weber Scannell 2012)
The New Polaris Gold Project, British Columbia, Canada 2019 Preliminary Economic Assessment.	(Schulte et al. 2019)
Tulsequah Chief Copper/Lead/Zinc/Gold/Silver Project. Final Project Report Specifications.	(BC-EAO 1996)
Tulsequah Chief Mine Access Route Study	(Kelly 2000)
Tulsequah Chief Project Report Volumes IV and V Appendices. Unpublished report prepared for Redfern Resources Ltd.	(Rescan 1997b)
Tulsequah Chief Project Report: Volume IV Environmental Management From 1997 Environmental Assessment Office Application (various documents)	(Rescan 1997a)
Vegetation and Ecosystems	
Ecological Atlas of Southeast Alaska: Biological Setting	(Smith 2016)
New Polaris Gold Project 2021-2022 Vegetation and Wildlife Field Study Report	(EDI 2023)
New Polaris Mine – 2021 Baseline Field Survey Summaries	(EDI 2021)
New Polaris Project – 2023 Terrestrial Wildlife and Vegetation Gap Analysis	(EDI 2024)
New Polaris Project, Technical Report, 2007, Draft for Discussion	(Gartner Lee Limited 2007a)
New Polaris Project, Technical Report, 2007, Draft for Discussion: Appendix H - Rare Plant List	(Gartner Lee Limited 2007c)
Sensitive Ecosystems of the Atlin-Taku Planning Area	(de Groot and Pojar 2009)
Tulsequah Chief Mine ACB Transportation System – Effects Assessment for Wildlife and Ecosystems.	(Gartner Lee Limited 2008)
Tulsequah Chief Mine and Access Road Expanded Terrestrial Ecosystem Mapping, Final Report	(Fuller and Forest Information Systems 2002)
Tulsequah Chief Mine Terrestrial Ecosystem Mapping Expanded Legend Report	(Gartner Lee Limited 2007d)
Tulsequah Chief Project Report - Volume III Appendices (Part 2 of 2)	(Rescan Environmental Services Ltd 1997a)
Wóoshtin wudidáa Atlin-Taku Land Use Plan	(Government of BC and Taku River Tlingit First Nation 2011)



1.4.1 TERRESTRIAL ECOSYSTEM MAPPING

Existing TEM and rare plant and ecological community survey results were used as a basis for this vegetation baseline study. This included reviewing and updating historical TEM from 2002, including the outdated BEC units. Map 1-2 shows the location of the study areas from 2002 and 2007 used to inform the Project with outdated BEC units from 2002. TEM within the Project RAA was completed in 1997 and 2002 to support EA for the Tulsequah Chief Mine (TCM) (Rescan Environmental Services Ltd 1997a, Fuller and Forest Information Systems 2002), and in 2007 to support mine permit application and site reclamation and restoration planning for the TCM Project (Gartner Lee Limited 2007d) and to provide baseline data for the development of an Environmental Impact Statement for the proposed New Polaris Project (Gartner Lee Limited 2007a). The following subsections describe the methods, mapping products and verifications applicable to these TEM sources.



Legend

Historical Mine Site

BC/Alaska Border

2007 Tulsequah Chief Mine /
Proposed New Polaris Project
boundaries

2002 Tulsequah Chief Mine and
Access Road boundary

Regional Assessment Area

2002 Biogeoclimatic Zone

AT

BWBS

CWH

ESSF

MH

SBS

SWB

**Historical study areas associated with
the New Polaris assessment areas**

Data Sources

- Site Layout. Ausenco. November 19, 2024.
- BEC data. Government of British Columbia.
- TEM data. Fuller, R. and Forest Information Systems. 2002. Tulsequah Chief Mine and Access Road Expanded Terrestrial Ecosystem Mapping. B.C. Ministry of Water, Land and Air Protection, Smothers, BC. 367 pp.
- Main Basemap. Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border. Government of BC. CanVec. Government of Canada, Alaska Data, US Geological Survey. 2024. World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Disclaimer

EDI Environmental Dynamics Inc. has made every effort to verify this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

01020304050

Kilometres

Map Scale 1:750,000 (printed on 11 x 17)
Map Projection: NAD 1983 CSRS UTM Zone 8N

C. Norton

S. Kruk

Map 1-2

Date: 5/29/2025

Juneau

Project Location
New Polaris

Prince
George

Alberta

British
Columbia

Path: L:\PROJECTS\62022\PM\081\New Polaris\BCEI_Figures\SACI\mxd_VegData\AP_644\0826_1_2_C_11000000\510\Area_20250529



1.4.1.1 Tulsequah Chief Mine, 1997

TEM for the TCM Project was completed by JM Holdings specific to the mine site area and proposed access road (Rescan Environmental Services Ltd 1997a). TEM surveys were conducted from July 19 to 24, 1996, adhering to the data collections standards outlined in the *Field Manual for Describing Ecosystem in the Field* (Luttmerding et al. 1990). Ecosystems were defined using *A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region* (Banner et al. 1993a), and were mapped at a 1:50,000 scale in accordance to the *Standards for Terrestrial Ecosystem Mapping in British Columbia* (Resources Inventory Committee 1998a).

The TEM assessment area corresponds to BC mapsheets 104K and 104N, and was located within the Teslin Plateau, Tahltan Highlands, North Boundary Ranges and Central Boundary Ranges ecosections, which contained six BEC units:

- **CWHwm:** Wet Maritime Coastal Western Hemlock Subzone;
- **MH:** Mountain Hemlock;
- **SBS:** Sub-Boreal Spruce Subzone;
- **ESSFwv:** Wet Very Cold Engelmann Spruce – Subalpine Fir Subzone;
- **BWBSdk1:** Dry Cool Boreal White and Black Spruce, Stikine Variant;
- **SWB:** Spruce-Willow-Birch; and,
- **AT:** Alpine Tundra.

A total of 226 sites were surveyed, comprising 29 full plots and 61 reconnaissance-level plots within the Tulsequah River portion of the assessment area, describing 21 ecosystems, and 51 full plots and 85 reconnaissance-level plots within the access road portion of the assessment area, describing 44 ecosystems (Rescan Environmental Services Ltd 1997a).

No digital information is available for this study. Photos of scanned delineated and attributed mapsheets are available and can be found within Appendix B.3-16 of the Tulsequah Chief Project Report (Rescan Environmental Services Ltd 1997a).

1.4.1.2 Tulsequah Chief Mine and Access Road, 2002

The 2002 TEM for the TCM Project expanded on the 1997 TEM to support the proposed re-opening of the mine and access road as well as future development in the Taku River area (Fuller and Forest Information Systems 2002). The objective of this study was to update the TEM and associated databases by addressing uncertainties in the classification and mapping of BEC units from the previous study (Fuller and Forest Information Systems 2002).

The 1:50,000 scale TEM, completed by Forest Information Systems Ltd. from September 1999 to October 2001, adhered to the *Standards for Terrestrial Ecosystem Mapping in British Columbia* (Resources Inventory Committee 1998b), and the *Standard for Terrestrial Ecosystem Mapping Digital Data Capture* (Resources Information Standards Committee 1998).



Bioterrain delineations were conducted during the offseason in 1999 and 2000 using a mirror stereoscope with 1:30,000-scale black-and-white photographs, referencing previously mapped BEC polygons. Bioterrain mapping followed the *Terrain Classification System for British Columbia* (Howes and Kenk 1997), *Guidelines and Standards to Terrain Geology Mapping in British Columbia* (Resources Inventory Committee 1996), and *Standards for Terrestrial Ecosystem Mapping in British Columbia* (Resources Inventory Committee 1998b). BEC units and ecosystems were identified using aerial photographs and topographic maps, with sampling sites and traverse cross-sections marked on paper 1:50,000 topographic maps to guide the sampling program.

Fieldwork was conducted in the 2000 field season, over three sampling periods: June 18 to July 3, July 10 to August 3, and August 17 to September 4. Two field crews, each consisting of a plant ecologist, terrain/soil specialist, and a second ecologist or wildlife technician, were deployed during each sampling period. Data collected included vegetation, site characteristics, wildlife trees, coarse woody debris, plant phenology, terrain, soil and wildlife observations. Following fieldwork, bioterrain polygon lines, terrain symbols, and soil drainage classes were revised, and aerial photographs were orthorectified using softcopy methodologies.

The TEM assessment area was approximately 80,1850 ha, of which 14,000 ha which was previously mapped in 1997, and corresponded to 32 BC mapsheets:

- 104K111, 104K112, 104K113, 104K116, 104K117, 104K118, 104K119, 104K121, 104K122, 104K123, 104K124, 104L120, 104L125, 104M105, 104N101, 104N102, 104N103, 104N106, 104N107, 104N108, 104N109, 104N111, 104N112, 104N113, 104N114, 104N116, 104N117, 104N118, 104N119, 104N122, 104N123 and 104N124.

The study area included the Teslin Plateau, Tahltan Highlands and Boundary Ranges ecosections, which contained nine BEC units:

- **CWHwm:** Wet Maritime Coastal Western Hemlock Subzone (;
- **MHmm2:** Moist Maritime Mountain Hemlock, Leeward Variant;
- **SBSmv:** Moist Very Cold Sub-Boreal Spruce Subzone;
- **ESSFmz:** Moist Very, Very Cold Engelmann spruce – Subalpine Fir Subzone;
- **ESSFmzp:** Moist Very, Very Cold Parkland Engelmann spruce – Subalpine Fir Subzone;
- **SWBmk:** Moist Cool Spruce-Willow-Birch Subzone;
- **SWBmks:** Moist Cool Scrub Spruce-Willow-Birch Subzone; and,
- **AT:** Alpine Tundra Zone.

A total of 1,520 sites were surveyed during the filed program, including 214 full plots, 310 ground inspections and 996 visual inspections. Site series were defined using *A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region* (Banner et al. 1993a) and developed classifications. A total of 113 ecosystem units and 22 non-vegetated or anthropogenic units were mapped within the assessment area.

Project files include the Project report, a map legend, non-spatial polygon attribute databases and field data. Digital information is available for download from the BC Government EcoCat website.



1.4.1.3 Tulsequah Chief Mine, 2007

The 2007 TEM for the TCM Project was conducted in the lower Shazah and Rogers creeks watersheds, including the mine site, airstrip, tailings pond, rock waste dumps, and roads, and expanded on the previous 1997 and 2002 TEM. The 1:10,000 scale TEM was completed by Gartner Lee Limited at a Level 3 survey intensity, with a 26 to 50% polygon inspection, adhering to the *Standards for Terrestrial Ecosystem Mapping in British Columbia* (Resources Inventory Committee 1998b), with the bioterrain components following the *Terrain Classification System for British Columbia* (Howes and Kenk 1997).

Existing information was reviewed, including topographic mapping, aerial photos, BEC mapping, site series descriptions and geological and hydrologic descriptions. *A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region* (Banner et al. 1993a) and *Wetlands of British Columbia: A Guide to Identification* (MacKenzie and Moran 2004) were consulted. A working ecosystem legend and delineated air photos were developed to guide sampling and field verification, with subsequent modifications following sampling.

The majority of field sampling was completed from June 29 to July 1, 2007, with additional information collected during June wildlife assessments and September trace metal sampling. Following fieldwork, air photo line work was transferred to digital files using mono-resolution. Final TEM was completed on ArcView GIS. A total of 92 polygons were mapped, with 49% field -assessed, including 11 full plots, nine ground inspections, 18 visual inspections and seven aerial inspections. A summary of mapped ecosystems can be found in the Tulsequah Chief Mine Terrestrial Ecosystem Mapping Expanded Legend Report (Gartner Lee Limited 2007d).

1.4.1.4 Proposed New Polaris Project, 2007

A preliminary reconnaissance baseline assessment of terrestrial ecosystems and terrain conditions for the proposed Project was conducted from June 28 to June 30, 2007.

A valley-to-alpine transect was surveyed approximately 3 km north-northwest of the mine camp, following Whitewater Creek from the Tulsequah River floodplain to a small alpine bench. Observations included bedrock outcrops, surficial material types and thicknesses, landforms, evidence of instability, and active geomorphological processes, and were recorded on 1:16,000 scale aerial photograph copies from 1994. Surficial material samples were collected for laboratory analysis, with Global Positioning System (GPS) coordinates documenting their locations. Photographs of key ecological and terrain features were taken for reference. In addition, a brief survey was conducted on the valley side immediately above the mine camp and airstrip, focusing on existing roadcuts and excavations to observe soil profiles. A summary of the observed landform characteristics can be reviewed in the New Polaris Project, Technical Report, 2007, Draft for Discussion (Gartner Lee Limited 2007a).

1.4.2 RARE PLANTS AND ECOLOGICAL COMMUNITIES

Three rare vegetation surveys have been conducted within the Project RAA and its surrounding area. In 1997, observations of listed ecological communities were made to support EAs for the TCM Project (Rescan Environmental Services Ltd 1997a). In 2007, a rare plant and ecosystem effects assessment was completed



for the development of an Environmental Impact Statement for the proposed New Polaris Project (Gartner Lee Limited 2007a). Finally in 2009, a sensitive plant and ecosystem inventory was conducted as part of the land use planning initiative for the Atlin-Taku region (de Groot and Pojar 2009).

1.4.2.1 Tulsequah Chief Mine, 1997

Rare ecological communities potentially occurring within the TCM Project assessment area in 1997 were identified through a BC Conservation Data Centre (CDC) search of the Cassiar Forest District (Rescan Environmental Services Ltd 1997a). Ten ecological communities were listed within the TCM Project's BEC units, including seven Blue-listed and three Red-listed (Table 1-2). Knowledge of rare ecosystem occurrences across much of the assessment area was uneven and incomplete at the time of the study. Insights into the occurrence of the listed ecological communities within the TCM Project assessment area are available in the Tulsequah Chief Project Report, Volume III Appendices (Part 2 of 2) (Rescan Environmental Services Ltd 1997a).

A new search of the BC CDC (2025a) of ecological communities of concern was completed and the current list of ecological communities of concern associated with the New Polaris Project can found in Table 1-2. Two of the Blue-listed communities retained their rankings, while the remaining communities dropped by one rank—either from Red-listed to Blue-listed or from Blue-listed to Yellow-listed—resulting in four Blue-listed and six Yellow-listed ecological communities.

Table 1-2. Listed ecological communities with potential to occur (from Rescan Environmental Services Ltd 1997a; updated per BC Conservation Data Centre 2025a).

Scientific Name	Common Name	BEC Units / Site Series	BC Listed (1997)	BC Listed (2025)
<i>Abies lasiocarpa</i> - <i>Pinus contorta</i> / <i>Cladonia</i> spp.	subalpine fir - lodgepole pine / clad lichens	ESSFwv / 02	Blue	Yellow
<i>Luzula piperi</i> Herbaceous Vegetation	Piper's wood-rush Herbaceous Vegetation	AT	Red	Yellow
<i>Picea sitchensis</i> - <i>Thuja plicata</i> / <i>Oplopanax horridus</i>	Sitka spruce - western redcedar / devil's club	CWHwm / 04	Blue	Yellow
<i>Picea sitchensis</i> - <i>Tsuga heterophylla</i> / <i>Gymnocarpium dryopteris</i>	Sitka spruce - western hemlock / oak fern	CWHwm / 03	Blue	Yellow
<i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Sitka spruce / skunk cabbage	CWHwm / 09	Blue	Blue
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Wet Maritime	Sitka spruce / salmonberry Wet Maritime	CWHwm / 05	Red	Blue
<i>Poa glauca</i> ssp. <i>rupicola</i> Herbaceous Vegetation	glaucous bluegrass Herbaceous Vegetation	SWB/AT	Red	Blue
<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	black cottonwood - red alder / salmonberry	CWHwm / 06	Blue	Blue
<i>Tsuga heterophylla</i> - <i>Picea sitchensis</i> / <i>Hylocomium splendens</i>	western hemlock - Sitka spruce / step moss	CWHwm / 02	Blue	Yellow
<i>Tsuga heterophylla</i> / <i>Sphagnum girgensohnii</i>	western hemlock / common green peat-moss	CWHwm / 08	Blue	Yellow



1.4.2.2 Proposed New Polaris Project, 2007

In 2007, Gartner Lee Limited conducted a rare plant and ecosystem effects assessment in the proposed New Polaris development area to delineate rare plant and lichen populations, aiming to avoid habitat development and reduce impacts on identified species. Rare plant species with the potential to occur within the assessment area were identified through a BC CDC search of the Cassiar Forest District in the BEC subzone CWHwm and through a review of *Rare Native Vascular Plants of British Columbia* (Douglas et al. 2002) (Table 1-3).

Table 1-3. Summary of potential rare plants and lichen and their provincial and federal statuses (from Gartner Lee Limited 2007a).

Scientific Name	Common Name	Provincial Status	BC Listed & COSEWIC
<i>Artemisia furcata</i> var. <i>heterophylla</i>	three-fork mugwort	S2S3	Blue
<i>Caltha palustris</i> var. <i>palustris</i>	yellow marsh-marigold	S2S3	Blue
<i>Cornus suecica</i>	dwarf bog bunchberry	S1S3	Red
<i>Epilobium homemannii</i> ssp. <i>bebringianum</i>	Hornemann's willowherb	S2S3	Blue
<i>Epilobium leptocarpum</i>	small-fruited willowherb	S2S3	Blue
<i>Pedicularis parviflora</i> ssp. <i>parviflora</i>	small-flowered lousewort	S3	Blue
<i>Pedicularis verticillata</i>	whorled lousewort	S2S3	Blue
<i>Pinguicula villosa</i>	hair butterwort	S2S3	Blue
<i>Saxifraga nelsoniana</i> ssp. <i>carlottae</i>	dotted saxifrage	S3	Blue
<i>Sclerophora peronella</i>	frosted glass-whiskers	S1	Red
<i>Nephroma occultum</i>	cryptic paw lichen	S2S3	Special Concern

The rare plant field surveys were conducted from June 26 to June 30, 2007, near the proposed tailing storage, alternate tailings storage, the potential barge landing site, various areas in Flannigan Slough, between Flannigan Slough and the townsite, and by the Tulsequah River backchannels and floodplains in habitats with a high potential for supporting rare plant species (e.g. rock outcrops, wetlands, ponds and flood plains). Survey methods followed the Alberta Native Plant Council recommendations and, when a rare species was identified in the field, a CDC field observation form for plant and lichen was completed. Any unidentified specimens were collected and identified in the laboratory under a microscope. The following sources were referenced to identify observed species: *Illustrated Flora of British Columbia* (Douglas et al. 1998), *Flora of Alaska and Neighboring Territories: a Manual for Vascular Plants* (Hulten 1968), *Plants of Coastal British Columbia* (Pojar and MacKinnon 1994), *Lichens of British Columbia: Illustrated Key, Parts 1 and 2* (Goward et al. 1994, Goward 1999), and *Lichens of North America* (Brodo et al. 2001).

Two Blue-listed plants and one Yellow-listed plant were found during the survey (Table 1-4). Alaska holy fern (*Polystichum setigerum*) was growing on the lower slope of talus north of the New Polaris field office, and rock sandwort (*Minnuartia stricta*) and streambank saxifrage (*Saxifraga odontoloma*) were observed adjacent to the field office on the creek fan. Range extensions of two uncommon microlichens, old man's whiskers (*Chaenotheca cinerea*) and cinnamon whiskers (*Sclerophora coniophaea*), were noted. Although not listed, these species were considered insufficiently documented to establish a conservation ranking.



Updated 2025 BC CDC listings are also provided in Table 1-4 and a more detailed description of the species' populations and their habitat can be found in the New Polaris Project Technical Report, 2007, Draft for Discussion (Gartner Lee Limited 2007a).

Table 1-4. Status of rare plants and lichen observed in the 2007 field surveys (from Gartner Lee Limited 2007; updated per BC Conservation Data Centre 2025a).

Scientific Name	Common Name	Coordinates	Provincial Status	BC List (2007)	BC List / BC Status (2025)
<i>Minuartia stricta</i>	rock sandwort	579609 E 6507678 N	S2S3	Blue	Blue / S3
<i>Polystichum setigerum</i>	Alaska holly fern	579581 E 6508212 N	S2S3	Blue	Blue / S3
<i>Saxifraga odontoloma</i>	streambank saxifrage	579581 E 6508212 N	S4	Yellow	Yellow/ S5

1.4.2.3 Atlin-Taku Planning Area, 2009

As part of a land use planning initiative for the Atlin-Taku region of northwest BC by the Integrated Land Management Bureau of the British Columbia Ministry of Agriculture and Lands and the Taku River Tlingit First Nation (TRTFN), a reconnaissance-level inventory of BC CDC listed plant species and ecological communities within the Atlin-Taku planning area was conducted by de Groot and Pojar (2009). The Atlin-Taku planning area covers over 3,000,000 ha and expands over the Boundary Ranges ecoregion and the Stikine Plateau, Tahltan Highland and Teslin Plateau ecozones. It contains nine BEC subzones (Table 1-5), four of which are associated with the Project's Vegetation RAA (BAFAunp, CMAunp, CWHwm, MHund).

Table 1-5. Biogeoclimatic units and their extent within the Atlin-Taku planning area in 2009 (from de Groot and Pojar 2009).

Biogeoclimatic Zone	Biogeoclimatic Subzone/Variant	Area (ha)	Percent of Study Area (%)
Boreal Altai Fescue Alpine (BAFA)	BAFAunp	74,1085	24.4
Boreal White and Black Spruce (BWBS)	BWBSdk1	67,9981	22.4
Coastal Mountain-heather Alpine (CMA)	CMAunp	322,346	10.6
Coastal Western Hemlock (CWH)	CWHwm	61,989	2.0
Engelmann Spruce – Subalpine Fir (ESSF)	ESSFwv	21,0994	6.9
Mountain Hemlock (MH)	MHund	123,217	4.0
Spruce-Willow-Birch (SWB)	SWBmk	252,119	8.3
Spruce-Willow-Birch (SWB)	SWBun	467,739	15.4
Sub-Boreal Spruce (SBS)	SBSund	181,423	6.0
Total		3,040,893	100.0

The sensitive ecosystem inventory was conducted over the 2008 field season to document ecological communities of concern. Areas with uncommon environmental characteristics were identified and targeted for surveying. A list of ecological communities was developed using a CDC search, and published and unpublished reports, EAs for proposed mines, air photos, and traditional knowledge were used to establish a



field sampling plan (de Groot and Pojar 2009). Plots were surveyed in accordance with the *Field Manual for Describing Terrestrial Ecosystems* (BC Ministry of Forests and Range and BC Ministry of Environment 2010). BC CDC Conservation Evaluation Forms were filled out periodically when anthropogenic disturbance was apparent. Unidentifiable and rare species were collected for subsequent identification.

A total of 76 plots were sampled, comprising of 49 full plots, 21 ground inspections, and six visual checks (de Groot and Pojar 2009). Two Red-listed and seven Blue-listed vascular plant species were observed (Table 1-6). Fifteen ecological communities were found within the study area, nine of which were within the Project's BEC subzones (Table 1-7). Approximately 66,700 ha of the study area was mapped as sensitive ecosystems.

Table 1-6. Rare plant and lichen species observed in the 2009 sensitive ecosystem inventory (from de Groot and Pojar; updated per BC Conservation Data Centre 2025a).

Scientific Name	Common Name	UTM Coordinates	BC List /COSEWIC (2009)	BC List /COSEWIC (2025)
<i>Arenaria longipedunculata</i>	low sandwort	580675 6586306	Blue	Yellow
<i>Draba alpina</i>	alpine draba	589195 6625544	Blue	Not listed
<i>Koenigia islandica</i>	Iceland koenigia	590677 6625512	Blue	Yellow
<i>Lomatogonium rotatum</i>	marsh feltwort	574130 6605576	Blue	Yellow
<i>Plantago eriopoda</i>	alkali plantain	573379 6604343	Red	Yellow
<i>Polemonium boreale</i>	northern Jacob's-ladder	632961 6559368	Blue	Unknown
<i>Polystichum kruckebergii</i>	Kruckeberg's holly fern	639557 6535461 640484 6534635	Blue	Yellow
<i>Primula nutans</i>	Siberian primrose	560872 6636003	Red	Not listed
<i>Trichophorum pumilum</i>	dwarf clubrush	590755 6582127 569936 6621903 576026 6607539 560872 6636003	Blue	Yellow
<i>Nephroma occultum</i>	cryptic paw lichen	589604 6505607	Special concern	Blue / Threatened



Table 1-7. Ecological communities observed in the 2009 sensitive ecosystem inventory (from de Groot and Pojar; updated per BC Conservation Data Centre 2025a).

Scientific Name	Common Name	BEC Unit	2009 BC List	2025 BC List
<i>Alnus incana</i> / <i>Equisetum arvense</i>	Mountain alder / common horsetail	CWHwm/FI01	Blue	Blue
<i>Carex sitchensis</i> - <i>Oenanthe sarmentosa</i>	Sitka sedge-Pacific water-parsley	CWHwm/Wm50	Blue	Blue
<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Sitka sedge / peat-mosses	CWHwm/Wf51	Red	Red
<i>Myrica gale</i> / <i>Carex sitchensis</i>	Sweet gale / Sitka sedge	CWHwm/Wf52	Red	Blue
<i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Sitka spruce / skunk cabbage	CWHwm/09	Blue	Blue
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Wet Maritime	Sitka spruce / salmonberry Wet Maritime	CWHwm/05	Blue	Blue
<i>Populus trichocarpa</i> – <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	Black cottonwood - red alder/salmonberry	CWHwm/06	Blue	Blue
<i>Tsuga heterophylla</i> – <i>Picea sitchensis</i> / <i>Hylocomium splendens</i>	Western hemlock - Sitka spruce / step moss	CWHwm/02	Blue	Yellow
<i>Tsuga heterophylla</i> / <i>Sphagnum girgensohnii</i>	Western hemlock / common green peat-moss	CWHwm/08	Blue	Yellow

2 CULTURAL AND MEDICINAL PLANTS

The Project interacts primarily with the traditional and unceded territory of the Taku River Tlingit (TRT). Traditional land use activities, including harvesting of plants for subsistence, cultural, and medicinal purposes, are central to the Taku River Tlingit way of life, both historically and today.

Consultation with the Taku River Tlingit First Nations (TRT FN) is ongoing, and their traditional knowledge regarding culturally and medicinally significant plants will be incorporated into the EA.



3 VEGETATION AND ECOSYSTEMS

After review of previous studies and literature sources, EDI completed Project-specific vegetation field surveys August 5-11, 2021. Field studies included verifications of TEM polygons, rare plant surveys, invasive plant surveys and soil and plant trace metal sampling. Wetland classification and functionality surveys were then conducted on August 14 to 15, 2024. These surveys informed and updated the Project-specific TEM and other mapping products. The field surveys focused on the Project Footprint, LAA and RAA (as described in Section 1.2); these study areas were accessed by helicopter and/or on foot. Methods are described hereafter. Field assessments were occasionally constrained by adverse weather and accessibility; visual site verifications were completed to assess these locations.

3.1 TERRESTRIAL ECOSYSTEM MAPPING

The TEM field verification used the 2002 TEM completed for the TCM Project (described in Section 1.5.2). Surveys included field verification of historic polygons. The collected data was used to update and refine the 2002 TEM to reflect current mapping standards and current conditions (i.e., ecosystem unit, structural stage and polygon boundaries).

3.1.1 METHODS

The TEM field surveys were completed during the summer of 2021 by two EDI biologists and one local assistant from Atlin Tlingit Economic Limited Partnership (ATELP). The main objectives of the field program were to ground truth the 2002 classifications and site and soil conditions in as many TEM polygons as possible, and to visit a diverse range of ecological communities to better understand their distribution within the RAA.

Locations for sample points were selected to maximize the number of TEM polygons assessed with relatively even distribution throughout the study area. Field plots were circular with a radius of 11.3 m for an area of 400 m². Data collection followed the standard ecological data collection methodologies defined in the Field Manual for Describing Terrestrial Ecosystems (BC Ministry of Forests and Range and BC Ministry of Environment 2010). Data were collected to characterize ecosystem attributes by either completing a ground or visual or note/air call plot methodology. Ground plot methodology addressed requirements of the BC Site Visit Form FS1333, including:

- site characteristics (e.g., slope, aspect, disturbance, moisture regime, nutrient regime, elevation, meso-slope position, surface topography);
- soil characteristics (e.g., soil moisture regime, soil nutrient regime, soil texture);
- vegetation characteristics (e.g., dominant species, structural stage, successional stage); and,
- ecosystem classification (site series) (as described by Fuller and Forest Information Systems [2002]).



Visual Plots involved cursory field recordings of site, soil, and vegetation conditions to support ecosite verification and capture additional attributes such as structural stage and soil moisture regime. Note Plots, or air calls, provided rapid confirmations of ecosite identification based on observations from a helicopter or vantage point. GPS coordinates and digital photographs were recorded at each plot location.

TEM updates followed guidelines described in Section 6.2 and Section 6.5 of the Standard for Terrestrial Ecosystem Mapping in BC (Resources Inventory Committee 1998b). A variety of digital data layers were acquired for use in ArcGIS (ArcGIS Pro 3.3) (Table 3-1). Site series were classified in accordance with the Ministry of Forests BEC system, where possible (Banner et al. 1993a), and were expanded to include site series for non-forested ecosystem units (i.e., avalanche units, parkland forest, heathland, dwarf shrub, grassland and wetlands).

Table 3-1. Datasets used in the update of the terrestrial ecosystem mapping.

Dataset Name	Description	Source
Digital Elevation Model	Raster file of elevation data, used to extrapolate hill shade, slope and aspect	Province of British Columbia
Vegetation Resources Inventory	Polygons representing distinct vegetation stands or areas with similar forest conditions.	Province of British Columbia
ESRI Orthophotographs	Satellite imagery used to delineate and attribute TEM data.	A basemap layer provided by ESRI
Google Earth Orthophotographs	Satellite imagery used to delineate and attribute TEM data.	A basemap layer provided by Google Earth
Digital Road Atlas	Comprehensive geospatial dataset that provides detailed information on British Columbia's road network	Province of British Columbia
Historical Fires	Wildfire perimeters for all fire seasons before the current year	Province of British Columbia
Freshwater Atlas	Standardized dataset for mapping BC's hydrological features	Province of British Columbia
Biogeoclimatic Ecosystem Classification	Biogeoclimatic boundaries for British Columbia	Province of British Columbia

After completing spatial data acquisition, the mapping update was completed in two dimensions with a direct-to-digital system using ArcGIS Pro 3.3. Polygon updates were completed for the entire RAA. Mapping was completed at a scale of 1:20,000.

TEM polygons were assessed individually, and ecological attributes were estimated and entered in the TEM database when different from existing TEM, taking care that:

- no more than three ecosystem units (i.e., site series) were entered per polygon;
- defined site series codes were used;
- information was completed for every polygon;
- structural stage was assigned based on field results (where available), BC Vegetation Resources Inventory (VRI) stand age data and species composition, and ortho-imagery; and,
- disturbance class was recorded when apparent (primarily to indicate disturbances such as logging or fire) and regenerating areas (e.g., affected by fire or timber harvesting) were assigned the appropriate structural stage to reflect the stage of regeneration.



Forests were assigned a structural stage based on VRI stand age data and species composition, as well as ortho-interpreted structural stage. A numerical structural stage designation (1 through 7) was applied to describe the dominant seral stage for the ecosystem unit, as appropriate. A structural stage modifier (a single lower-case letter) was used to further characterize the structural stage. For example, Structural Stage 3 (shrub) could be modified into either 3a for low shrub or 3b for tall shrub.

Outdated BEC units and their boundaries were updated to reflect the latest BEC units, and polygons were reshaped where landscape features did not match current conditions. Ecosystem site series and map codes were reviewed and updated to existing codes, where applicable, using *Wetlands of British Columbia: A Guide to Identification* (MacKenzie and Moran 2004) for wetland and floodplain ecosites (Table 3-2), *Biogeoclimatic Ecosystem Classification of Non-forested Ecosystems in British Columbia* (Mackenzie 2012) for Alpine ecosites (Table 3-3), and the *Field Manual for Describing Terrestrial Ecosystems* (BC Ministry of Forests and Range and BC Ministry of Environment 2010) for habitat features (Table 3-4). All other map codes were retained from the 2002 TEM, as were the site modifiers (Appendix Table A-6). All other TEM codes used in the update can be found in Appendix A.

Table 3-2. Wetland and floodplain site series updates from historic to current nomenclature (MacKenzie and Moran 2004).

BEC Unit	2002 Site Series	Updated Site Series
CWHwm	07	F150
CWHwm	AS	Ws
CWHwm	SF	Wm or Wf

Table 3-3. Alpine non-forest ecosystem site series that were used in the Project TEM updates (Mackenzie 2012).

BEC Unit	2025 Site Series Names	Updated Site Series Code
CMAun	Alpine fellfield	Af
	Alpine heath	Ah
	Alpine meadow	Am
	Alpine tundra	At

Table 3-4. Habitat feature map code updates from historic to current nomenclature (BC Ministry of Forests and Range and BC Ministry of Environment 2010).

BEC Unit	2002 Map Code	Updated Map Code
CWHwm	RZ	RP

After completing the mapping, the TEM database was reviewed through an internal quality assurance process for completeness and correctness, including the correct application of ecosites, and structural stages. The spatial attributes of the TEM database were examined to make sure each decile summed to 100%, and that



no sliver polygons (typically less than 0.5 ha) or polygon overlaps were present. A draft seamless polygon spatial coverage was prepared following a database review.

3.1.2 RESULTS

A total of 508 polygons were mapped within the RAA, with an average polygon size of 43.0 ha. Sixty-four TEM sample points were assessed from August 5 to 10, 2021, including 26 ground investigations and 38 visual checks (four on foot and 34 via helicopter), shown on Map 3-1. The total area in the RAA and LAA are 21852.8 ha and 6566.0 ha, respectively. TEM polygon delineation maps are in Appendix B.



3.1.2.1 Ecological Communities

The area mapped in each BEC unit is presented in Table 3-5. The majority of the RAA was mapped within CWHwm and MHmm2 units (63.1% and 20.1%, respectively). The smallest BEC zone mapped in the RAA was the MHmm2 (5.0%); however, only a small portion of CMAun was mapped within the LAA (0.1%). Ninety-one percent of the LAA is within the CWHwm subzone.

Table 3-5. Summary of ecosystem units in the terrestrial ecosystem mapping polygons within the Regional Assessment Area and Local Assessment Area.

BEC Unit	RAA (ha)	Percent of RAA (%)	LAA (ha)	Percent of LAA (%)
CMAun	2566.2	11.7	3.6	0.1
MHunp	1100.9	5.0	37.6	0.6
MHmm2	4401.5	20.1	505.5	7.7
CWHwm	13784.1	63.1	6019.2	91.7
Total	21852.8	100.0	6566.0	100.0

CMAun

The CMAun amounts to the third largest mapped area within the RAA (2566.2 ha) and the smallest in the LAA (3.6 ha). Within the CMAun, 10 site series are mapped: four upland and six non-forested (Table 3-6). The majority of the vegetated upland area found within the CMAun RAA and LAA is alpine heath (Ah) (6.8% and 40.0%, respectively) with well over half of the areas mapped as rock outcrop (RO) (61.1% and 60.0%, respectively). The least commonly mapped upland site series in the RAA is alpine meadow (Am) (0.1%). Only Ah and RO site series were mapped in the LAA portion of the CMAun subzone.

Table 3-6. Summary of ecosystem units in the terrestrial ecosystem mapping polygons within the MHun in the Regional Assessment Area and Local Assessment Area.

Site Series		RAA		LAA	
Code	Common Name	Area (ha)	Percent within MHun (%)	Area (ha)	Percent within MHun (%)
Af	alpine fellfield	17.4	0.7	-	-
Ah	alpine heath	174.7	6.8	1.4	40.0
Am	alpine meadow	2.3	0.1	-	-
At	alpine tundra	90.9	3.5	-	-
GL	glacier	343.3	13.4	-	-
LA	lake	7.9	0.3	-	-
MN	moraine	45.8	1.8	-	-
RO	rock outcrop	1,567.2	61.1	2.1	60.0
RU	rubble	254.0	9.9	-	-
TA	talus	62.8	2.4	-	-
Total		2,566.2	100.0	3.6	100.0



MHun

The MHun amounts to the smallest mapped area within the RAA (1,100.9 ha) and the third largest in the LAA (37.6 ha). Within the MHun, 14 site series are mapped: eight upland and six non-forested (Table 3-7). The majority of the vegetated upland area found within the MHun RAA is heath meadow (HM) (13.5%) with nearly half of the area mapped as rock outcrop (RO) and rubble (RU) (49.6%). In the LAA, herb meadow (AM) is mapped as the largest vegetated area (21.2 ha) with RO and RU mapped as half the area (50.0%). The least commonly mapped upland site series is 05 (amabilis fir - mountain hemlock / rosy twistedstalk) in the RAA (0.3%), and 02 (mountain hemlock-amabilis fir / pink mountain-heather) in the LAA (11.6%).

Table 3-7. Summary of ecosystem units in the terrestrial ecosystem mapping polygons within the MHun in the Regional Assessment Area and Local Assessment Area.

Site Series		RAA		LAA	
Code	Common Name	Area (ha)	Percent within MHun (%)	Area (ha)	Percent within MHun (%)
01	mountain hemlock - amabilis fir / Alaskan blueberry	9.0	0.8	-	-
02	mountain hemlock - amabilis fir / pink mountain-heather	56.8	5.2	4.3	11.6
05	amabilis fir - mountain hemlock / rosy twistedstalk	3.6	0.3	-	-
AC	avalanche chute	74.3	6.7	-	-
AM	herb meadow	77.5	7.0	7.9	21.1
CA	crowberry – bog blueberry – alpine Azalea	83.8	7.6	-	-
GL	glacier	18.7	1.7	-	-
HM	heath meadow	149.0	13.5	6.5	17.3
MK	mountain hemlock krummholz	11.7	1.1	-	-
MN	moraine	22.2	2.0	-	-
PD	pond	1.2	0.1	-	-
RO	rock outcrop	325.8	29.6	7.9	21.1
RU	rubble	219.9	20.0	10.9	28.9
TA	talus	47.5	4.3	-	-
Total		1,100.9	100.0	37.6	100.0

MHmm2

The MHmm2 amounts to the second largest mapped area within the RAA and LAA (4,401.5 ha and 505.5 ha, respectively). Within the MHmm2, 22 site series are mapped: 11 upland, two wetland, and nine non-forested (Table 3-8). The majority of the area found within the MHmm2 RAA, 21.7% and 22.8% respectively, is mapped as the zonal site series 01 (mountain hemlock-amabilis fir / Alaskan blueberry) and as avalanche chute (AC), and 36.6% and 21.7% for the LAA. The least commonly mapped upland site series in the RAA is 05 (amabilis fir - mountain hemlock / rosy twistedstalk), amounting to 0.1% of the RAA. In the LAA, mountain hemlock krummholz is the least common (0.6%).



Table 3-8. Summary of ecosystem units in the terrestrial ecosystem mapping polygons within the MHmm2 in the Regional Assessment Area and Local Assessment Area.

Site Series		RAA		LAA	
Code	Common Name	Area (ha)	Percent within MHmm2 (%)	Area (ha)	Percent within MHmm2 (%)
01	mountain hemlock - amabilis fir / Alaskan blueberry	953.0	21.7	185.2	36.6
02	mountain hemlock - amabilis fir / pink mountain-heather Moist Maritime 2	332.7	7.6	15.7	3.1
03	amabilis fir - mountain hemlock / oak fern Moist Maritime 2	242.4	5.5	62.0	12.3
05	amabilis fir - mountain hemlock / rosy twistedstalk	194.7	4.4	4.3	0.9
07	yellow-cedar - mountain hemlock / green false-hellebore	5.8	0.1	-	-
AC	avalanche chute	1,003.6	22.8	109.6	21.7
AM	herb meadow	132.5	3.0	22.3	4.4
CA	crowberry – bog blueberry – alpine Azalea	84.5	1.9	-	-
GB	gravel bar	2.7	0.1	0.2	<0.1
GL	glacier	7.0	0.2	-	-
HM	heath meadow	261.6	5.9	29.9	5.9
LA	lake	21.8	0.5	4.7	0.9
MK	mountain hemlock krummholz	63.7	1.4	3.0	0.6
MN	moraine	81.7	1.9	-	-
PD	pond	6.3	0.1	-	-
RI	river	11.4	0.3	0.2	>0.1
RO	rock outcrop	306.1	7.0	19.5	3.9
RU	rubble	278.8	6.3	43.6	8.6
TA	talus	306.2	7.0	1.3	0.3
Wf	fen	14.9	0.3	-	-
WM	wet seepage meadow	29.6	0.7	3.9	0.8
Ws	swamp	60.4	1.4	-	-
Total		4,401.5	100.0	505.5	100.0

CWHwm

The CWHwm amounts to the largest mapped area within the RAA and LAA (13,784.1 ha and 6,019.2 ha, respectively). Within the CWHwm, 27 site series are mapped: eight upland, six wetland, three floodplain, seven non-forested, and three anthropogenic (Table 3-9). The majority of the area found within the CWHwm RAA and LAA, 19.2 % and 22.4 % respectively, is mapped as the zonal site series 01 (western hemlock - Sitka spruce / Alaskan blueberry). The least commonly mapped undisturbed upland site series is 03 (western hemlock - Sitka spruce / step moss), amounting to 1.5% of the RAA and 1.1% of the LAA. Three of the ecological communities found in the CWHwm were Blue-listed, see Section 3.2.2.2 for details.



Table 3-9. Summary of ecosystem units in the terrestrial ecosystem mapping polygons within the CWHws in the Regional Assessment Area and Local Assessment Area.

Site Series		RAA		LAA	
Code	Common Name	Area (ha)	Percent within CWHwm (%)	Area (ha)	Percent within CWHwm (%)
01	western hemlock - Sitka spruce / Alaskan blueberry ¹	2,649.8	19.2	1,350.6	22.4
02	western hemlock - Sitka spruce / step moss ¹	205.1	1.5	66.8	1.1
03	Sitka spruce - western hemlock / oak fern ¹	557.6	4.0	268.7	4.5
04	Sitka spruce - western redcedar / devil's club ¹	1,013.7	7.4	531.5	8.8
05	Sitka spruce / salmonberry Wet Maritime ¹	511.3	3.7	174.3	2.9
06	black cottonwood - red alder / salmonberry ¹	1,088.5	7.9	505.4	8.4
AC	avalanche chute	1,835.3	13.3	415.2	6.9
AD	Sitka alder – devil's club	36.9	0.3	20.1	0.3
AN	anthropogenic	13.3	0.1	2.7	0.0
AS	alder - Sitka sedge - bluejoint	791.1	5.7	233.7	3.9
CS	clear-cut, shrubby	18.6	0.1	18.6	0.3
CU	clear-cut, unvegetated	12.2	0.1	12.2	0.2
Fl50	Sitka willow - false lily-of-the-valley ²	1,352.3	9.8	759.4	12.6
GB	gravel bar	1,275.7	9.3	732.7	12.2
MI	mine	5.0	0.0	2.2	0.0
MN	moraine	1.4	0.0	-	-
OW	shallow open water	231.7	1.7	95.3	1.6
PD	pond	1.9	0.0	-	-
RI	river	686.2	5.0	292.5	4.9
RO	rock outcrop	90.2	0.7	9.4	0.2
RP	road	82.8	0.6	62.4	1.0
RU	rubble	34.1	0.2	19.3	0.3
SF	sedge fen	766.4	5.6	288.7	4.8
TA	talus	101.5	0.7	13.7	0.2
Wf	fen	86.8	0.6	22.0	0.4
Wm	marsh	59.9	0.4	9.3	0.2
Ws	swamp	274.6	2.0	112.6	1.9
Total		13,784.1	100.0	6,019.2	100.0



3.1.2.2 Ecological Community Structural Stages

The RAA and LAA are predominately composed of vegetated ecosystems with only 1,340.1 ha of the RAA and 395.5 ha of the LAA considered non-vegetated. Mature forest (Structural Stage 6) is mapped at 6,903.4 ha and 3,039.5 ha of the RAA and LAA, and young forest (Structural Stage 5) at 312.0 ha and 56.6 ha, respectively. The remaining structural stages, which includes alpine ecosystems, harvested stands, avalanche areas and wetland and floodplain ecosystems amount to 60.8% and 46.8% of the RAA and LAA, respectively. No old growth forest was mapped in the RAA, and there are no Old Growth Management Areas in the Project vicinity. See Table 3-10 for a summary of structural stages by RAA and LAA, and Table 3-11 for a summary of structural stages by BEC unit.

Table 3-10. Summary of structural stages within the Regional Assessment Area and Local Assessment Area.

Structural Stage Code	Structural Stage	RAA		LAA	
		Area (ha)	Percent of RAA (%)	Area (ha)	Percent of LAA (%)
1	sparse/bryoid	3,819.8	17.5	175.6	2.7
1a	sparse	1,314.6	6.0	761.8	11.6
2	herb	454.5	2.1	15.3	0.2
2a	forb-dominated	285.0	1.3	50.9	0.8
2b	graminoid-dominated	926.9	4.2	320.0	4.9
2d	dwarf shrub-dominated	794.7	3.6	37.9	0.6
3	shrub/herb	3,034.1	13.9	1,038.7	15.8
3a	low Shrub	218.6	1.0	98.3	1.5
3b	tall Shrub	2,232.3	10.2	514.5	7.8
4	pole/sapling	216.7	1.0	61.4	0.9
5	young forest	312.0	1.4	56.6	0.9
6	mature forest	6,903.4	31.6	3,039.5	46.3
7	Old forest	0.0	0.0	0.0	0.0
n/a	non-vegetated	1,340.1	6.1	395.5	6.0
Total		21,852.8	100.0	6,566.0	100.0



Table 3-11. Summary of structural stages within each Biogeoclimatic Unit.

Assessment Area	BEC Unit	Structural Stage												Area (ha)
		1	1a	2	2a	2b	2d	3	3a	3b	4	5	6	
RAA	CMAun	1,929.8	-	40.5	2.2	-	242.7	-	-	-	-	-	-	2,215.1
	MHunp	615.5	-	43.3	72.7	-	229.7	51.4	38.6	16.3	-	0.9	12.6	1,081.1
	MHmm2	967.0	8.6	333.2	210.2	12.3	322.3	907.8	67.5	434.4	5.2	35.6	1,050.7	4,354.9
	CWHwm	307.6	1,306.0	37.5		914.5		2,074.8	112.5	1,781.5	211.5	275.5	5,840.1	12,861.6
Vegetated RAA Total		3,819.8	1,314.6	454.5	285.0	926.9	794.7	3,034.1	218.6	2,232.3	216.7	312.0	6,903.4	20,512.6
LAA	CMAun	2.1	-	-	-	-	1.4	-	-	-	-	-	-	3.6
	MHunp	18.8	-	-	7.9	-	6.5	4.3	-	-	-	-	-	37.6
	MHmm2	64.4	0.2	6.4	43.0	-	29.9	115.2	4.3	37.1	-	2.4	197.6	500.6
	CWHwm	90.2	761.6	8.9	-	320.0	-	919.1	94.0	477.4	61.4	54.3	2,841.9	5,628.7
Vegetated LAA Total		175.6	761.8	15.3	50.9	320.0	37.9	1,038.7	98.3	514.5	61.4	56.6	3,039.5	6,170.5



3.1.2.3 Wetland Ecosystems

Based on the 2024 field program and 2025 TEM update, eight wetland-associated ecosystems with a total area of 2,354.6 ha were located within the RAA, seven of which were in the LAA and totalled 770.2 ha. Seven of the eight wetland-associated ecosystems were mapped in the CWHwm BEC unit, five were mapped in MHmm2m, and a single ecosystem was in CMAun and MHun BEC units. Wetland-associated ecosystems were 10.8 % of the RAA and 11.7 % of the LAA. Results are summarized in Table 3-12.

Table 3-12. Summary of wetlands within the Regional Assessment Area and Local Assessment Area.

BEC	Ecosystems	Site Series	Area in RAA (ha)	Percentage in RAA (%)	Area in LAA (ha)	Percentage in LAA (%)
CMAun	lake	LA	7.9	<0.1	-	-
MHun	pond	PD	1.2	<0.1	-	-
MHmm2	lake	LA	21.8	0.1	4.7	0.1
	pond	PD	6.3	<0.1	-	-
	fen	Wf	14.9	0.1	-	-
	wet meadow	WM	29.6	0.1	3.9	0.1
	swamp	Ws	60.4	0.3	-	-
CWHwm	alder - Sitka sedge - bluejoint	AS	791.1	3.6	233.7	3.6
	shallow open water	OW	231.7	1.1	95.3	1.5
	pond	PD	1.9	<0.1	-	-
	sedge fen	SF	766.4	3.5	288.7	4.4
	fen	Wf	86.8	0.4	22.0	0.3
	marsh	Wm	59.9	0.3	9.3	0.1
	swamp	Ws	274.6	1.3	112.6	1.7
Total Wetlands			2,354.6	10.8	770.2	11.7

3.2 RARE PLANTS AND ECOLOGICAL COMMUNITIES

Plant species in BC are assessed for rare status federally under the *Species at Risk Act* (SARA) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and plant species and ecological communities provincially by the BC Conservation Data Centre (BC CDC). The BC CDC uses a colour-coded scheme to classify at-risk status. Red-listed species and communities are considered as either extirpated, endangered or threatened; Blue-listed species and communities are considered to be of special concern.

3.2.1 METHODS

3.2.1.1 Rare Plants

A desktop assessment was completed in July 2021 to identify listed plant species with potential of occurring within and around the Project area. Previously identified plant species that occurred in the Project vicinity



from the 2007 and 2009 rare plant programs were also added to the 2021 species list and their statuses were updated. This plant list was used as reference for the 2021 field program. Map 3-2 shows the rare plant occurrence that were historically observed within RAA and the immediate Project vicinity.

Field-based incidental rare plant surveys were completed by two EDI biologists and one local assistant from ATELP from August 5 to 11, 2021. Observations were completed opportunistically while travelling on foot between field plots within the Project area, as well as within terrestrial ecosystem plots completed in habitats with increased potential of rare plant occurrences, including old growth forests, alpine, wetlands, transitional habitats, and uncommon microsites or unique habitat features (i.e. rocky outcrops or boulder fields). All occurrences of rare plants would be documented including identification, presence, abundance, distribution, photographs and GPS location.

In 2025, desktop review of the BC CDC listings from 2007 and 2021 was updated. The 2025 BC CDC query parameters included Red, Blue and SARA-listed plant and lichen species for the North Boundary Ranges ecosection in the CMAun, MHunp, MHmm and CWHwm BEC units.



3.2.1.2 Listed Ecological Communities

A desktop assessment was completed in July 2021 to identify ecological communities with potential of occurring within and around the Project area. Previously identified listed ecological communities that occurred in the Project vicinity in the 2009 rare plant program were also added to the 2021 list and their statuses were updated. This list was used as reference for the 2021 field program and analysis of the TEM results.

Field-based incidental plant community surveys were completed by two EDI biologists and one local assistant from ATELP from August 5 to 11, 2021. Observations were completed opportunistically while travelling on foot between field plots. All field observations of rare ecosystems would be documented including identification, distribution, photographs and GPS location.

In 2025, another desktop review of the BC CDC listings from 2009 and 2021 was completed to update species and ecological community statuses. The 2025 BC CDC query parameters included Red, Blue and SARA-listed plant communities for the North Boundary Ranges ecosection in the CMAun, MHunp, MHmm and CWHwm BEC units.

3.2.2 RESULTS

3.2.2.1 Rare Plants

No federally or provincially listed rare plants were observed while completing the 2021 vegetation surveys.

The 2025 status review of the target species and ecological communities identified for the 2021 rare plant survey confirmed the change in status of one lichen species (Table 3-13). Pebbled paw lichen changed from SH to S3 and from Red-listed to Blue-listed. No additional listed vegetation species were identified in the 2024 BC CDC search results.

The 2025 updates to the historically observed plants found that three observed listed species found in the 2007 rare plant assessment program had improved 2025 statuses, one of which was no longer listed (streambank saxifrage) and, of the 10 listed plant and lichen species in the 2009 survey, the status of nine improved and one worsened. Five of these species changed from Blue-listed to Yellow-listed, one from Red-listed to Yellow-listed, one from Blue-listed to unknown, and two were no longer listed. COSEWIC changed the cryptic paw lichen status from special concern to threatened.

3.2.2.2 Listed Ecological Communities

The 2025 status review of ecological communities identified for the 2021 field program confirmed the change in status of one ecological community (Table 3-14). Sweet gale/Sitka sedge changed from S2 to 3 and from Red-listed to Blue-listed. In addition, Western hemlock-Sitka spruce/step moss and Western hemlock/common green peat-moss, identified in the 2009 study, changed from Blue-listed to Yellow-listed.



Table 3-13. 2025 Updated rare plant and lichen species with potential to occur within the New Polaris Project (Government of Canada 2024).

Scientific Name	Common Name	2021 Provincial Status	2021 BC List	2025 Provincial Status	2025 BC List	BEC Unit	Type	Habitat Description
<i>Chrysosplenium wrightii</i>	Wright's golden-saxifrage	S2S3 (2019)	Blue	S2S3 (2019)	Blue	CMA	forb	Alpine zones on scree slopes, solifluction soil, and areas with wet seepage (1,2); in mountains to at least 2,000 m (1); rare in NW BC (2).
<i>Cornus suecica</i>	dwarf bog bunchberry	S2S3 (2019)	Blue	S2S3 (2019)	Blue	CMA CWHwm	shrub	Remote areas of northern BC; little data on habitat requirements, but potentially extensive suitable habitat (1); moist to mesic forests and meadows from lowland to alpine zones (2).
<i>Draba ventosa</i>	Wind River draba	S2S3 (2019)	Blue	S2S3 (2019)	Blue	CMA	forb	Predominantly in the alpine zone, sometimes subalpine near or above treeline (1,2); found on talus, scree slopes, slides, alpine fell-fields, cliffs, cliff bases, ridges and summits—often on limestone but not exclusively (1); dry meadows, cliffs, rocky slopes, and scree slopes (2).
<i>Micranthes razshwinii</i>	large-petalled saxifrage	S2S3 (2019)	Blue	S2S3 (2019)	Blue	CMA	forb	Remote areas of northern BC; extensive suitable habitat (1).
<i>Montia bostockii</i>	Bostock's montia	S3 (2019)	Blue	S3 (2019)	Blue	CMA	forb	Moist meadows in subalpine and alpine zones (1,2); often north-facing slopes of scree or alpine tundra, wet ridge crest gravels, moist places near springs or lake shores, and frost boils; three known BC locations, but suitable habitat is extensive, and additional populations are expected (1).
<i>Nephroma isidiosum</i>	pebbled paw	SH (2019)	Red	S3 (2010)	Blue	MHmm CWHwm	lichen	Forest and old forest; facultative (1).
<i>Nephroma occultum</i>	cryptic paw	S3 (2019)	Blue	S3 (2019)	Blue	MHmm	lichen	Grows on bark and wood of conifers, mid to upper canopy; most known locations are in Pseudotsuga - Tsuga heterophylla open old growth forests on the western slope of the Cascades (1).
<i>Parrya nudicaulis</i>	northern parrya	SH (2015)	Red	SH (2015)	Red	CMA	forb	Alpine tundra, talus slopes, moist to mesic meadows; often on limestone (1).
<i>Pinus albicaulis</i>	whitebark pine	S2S3 (2019)	Blue	S2S3 (2019)	Blue	HMmm	tree	Montane forests between 1,300 and 3,700 m; moist mountain ranges with warm, dry exposures and thin, rocky, cold soils or near timberline (1).



Scientific Name	Common Name	2021 Provincial Status	2021 BC List	2025 Provincial Status	2025 BC List	BEC Unit	Type	Habitat Description
<i>Tephrosieris lindstroemii</i>	northern groundsel	S3 (2019)	Blue	S3 (2019)	Blue	CMA	forb	Alpine zones on dry rocky fell-fields and slopes; rare in NW BC (2).

Habitat description references: (1) BC Conservation Data Centre: Species Summary; (2) E-Flora BC: Electronic Atlas of the Flora of British Columbia.

Table 3-14. 2025 Updated rare ecological communities with potential to occur within the New Polaris Project (Government of Canada 2024)

Scientific Name	Common Name	2021 Provincial Status	2021 BC List	2025 Provincial Status	2025 BC List	BEC Units/ Site Series
<i>Alnus incana</i> / <i>Equisetum arvense</i>	mountain alder / common horsetail	S3 (2004)	Blue	S3 (2004)	Blue	CWHwm/F101
<i>Carex sitchensis</i> - <i>Oenanthe sarmentosa</i>	Sitka sedge - Pacific water-parsley	S3 (2004)	Blue	S3 (2004)	Blue	CWHwm/Wm50
<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Sitka sedge / peat-mosses	S2 (2014)	Red	S2 (2014)	Red	CWHwm/Wf51
<i>Myrica gale</i> / <i>Carex sitchensis</i>	sweet gale / Sitka sedge	S2 (2004)	Red	S3 (2022)	Blue	CWHwm/Wf52
<i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Sitka spruce / skunk cabbage	S3 (2004)	Blue	S3 (2004)	Blue	CWHwm/09
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Wet Maritime	Sitka spruce / salmonberry Wet Maritime	S3 (2023)	Blue	S3 (2023)	Blue	CWHwm/05
<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	black cottonwood - red alder / salmonberry	S3 (2010)	Blue	S3 (2010)	Blue	CWHwm/06



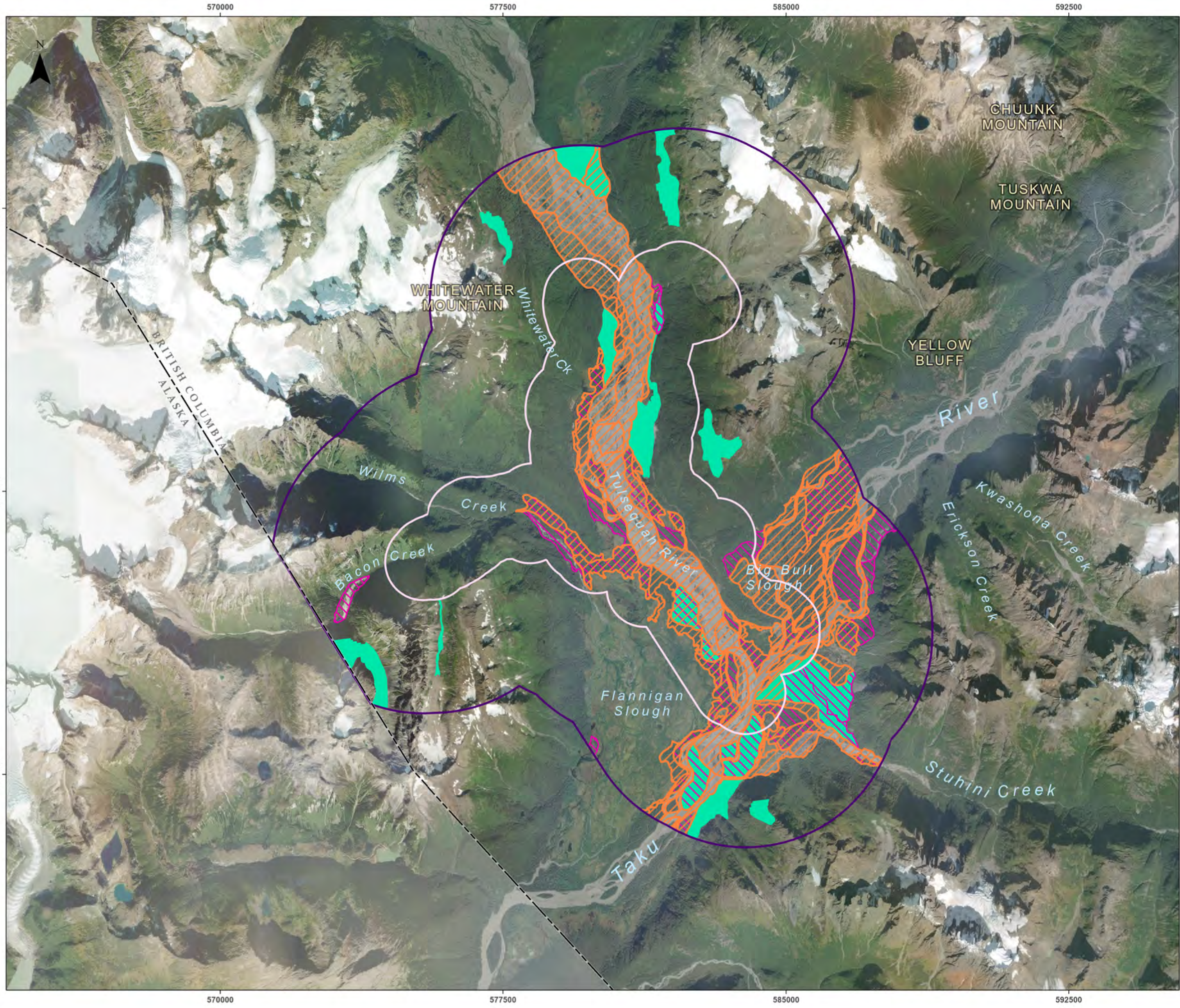
Of these ecological communities, three Blue-listed ecological communities were mapped within the CWHwm, amounting to 2,952.1 ha within the RAA and 1,439.1 ha within the LAA (Table 3-15; Map 3-3). The majority of site series 05 (Sitka spruce / salmonberry wet Maritime) and 06 (black cottonwood-red alder / salmonberry) was mature forest (Structural Stage 6) in both the RAA and LAA; whereas the majority of Fl50 (black cottonwood / Sitka willow) was shrub dominated (Structural Stages 3, 3a, and 3b) in the LAA and RAA (Table 3-16). There were no Red-listed ecological communities mapped in the CWHwm, and no Blue- or Red-listed ecological communities in the MHmm2, MHun or CMAun BEC units.

Table 3-15. Mapped Blue-listed ecological communities within the Project vegetation assessment areas.

BEC Unit/ Site Series	Common Name	Scientific Name	BC List/ Provincial	RAA Area (ha)	LAA Area (ha)
CWHwm/05	Sitka spruce / salmonberry wet Maritime	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Wet Maritime	Blue/ S3 (2023)	511.3	174.3
CWHwm/06	black cottonwood - red alder / salmonberry	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	Blue/ S3 (2010)	1,088.5	505.4
CWHwm/Fl50 CWHwm/07	black cottonwood / Sitka willow	<i>Populus trichocarpa</i> / <i>Salix</i> <i>sitchensis</i>	Blue/ S2S3 (2004)	1,352.3	759.4
Total				2,952.1	1,439.1

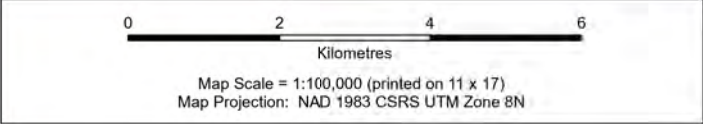
Table 3-16. Summary of structural stages within each BEC Unit.

Assessment Area	BEC Unit/Site Series	Structural Stage Distribution (%)					
		3	3a	3b	4	5	6
RAA	CWHwm/05	5.6	0.0	0.0	0.0	0.0	94.4
	CWHwm/06	4.6	0.0	0.0	3.2	6.2	85.9
	CWHwm/Fl50	40.3	7.0	4.7	5.1	3.8	39.2
	CWHwm/07						
VAA	CWHwm/05	14.2	0.0	0.0	0.0	0.0	85.8
	CWHwm/06	5.7	0.0	0.0	1.9	0.4	91.9
	CWHwm/Fl50	45.2	12.4	2.9	6.8	0.1	32.6
	CWHwm/07						



Potential location of Blue-listed ecological communities within the RAA

- Legend**
- 05 - Sitka Spruce / salmonberry Wet Maritime
 - 06 - black cottonwood - red alder / salmonberry
 - FI50 - black cottonwood / Sitka willow
 - Regional Assessment Area
 - Local Assessment Area



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021.
- BEC data, Government of British Columbia, 2025.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Disclaimer

EDI Environmental Dynamics Inc. has made every effort to verify this map is free of errors. Data have been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: C. Norton	Checked: S. Kruk	Map 3-3	Date: 5/29/2025
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3.3 INVASIVE PLANTS

Invasive plants—also referred to as “weeds,” “non-native,” “alien,” “exotic,” or “introduced”—are plants that proliferate beyond their natural distribution range (Northwest Invasive Plant Council 2024, BC Conservation Data Centre 2025b). For the Project, invasive plants are defined as plants designated under provincial legislation (i.e., *Forest and Range Practices Act*, *Weed Control Act*). These species are also organized into invasiveness categories and management priority by the Northwest Invasive Plant Council (NWIPC) (Northwest Invasive Plant Council 2024). These species are highly competitive, destructive to native flora, and difficult to manage due to their rapid propagation (BC Ministry of Forests and BC Ministry of Agriculture 2023, Northwest Invasive Plant Council 2024). Invasive plants can quickly establish and spread across both disturbed and undisturbed habitats. Documenting their presence is critical for implementing effective management strategies to mitigate their spread.

3.3.1 METHODS

A review of existing invasive plant species occurrence data near the Project was conducted in 2020 (prior to initiating the invasive plant field program). Targeted surveys for invasive plants were completed in August 2021 at sites with higher potential for weeds (i.e., areas near previous disturbance including the camp and air strip). Surveys were conducted on foot and involved a thorough search of the area to investigate the presence, abundance and location of any invasive plants. Surveyors conducted searches within and around the existing camp, airstrip, and associated camp infrastructures for invasive species. Additionally, surveyors also searched and documented incidental observations within ecosystem field plots and along old trails and roads while walking to ecosystem field plots. Methodologies followed provincial guidelines (BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development [BC FLNRORD] 2020) and the road side survey methodology adapted from Oldham (2007). In 2025, the compiled list of potential invasive (plants from 2021 to the present) was reviewed and NWIPC invasiveness categories and management priorities and provincial designations were updated.

3.3.2 RESULTS

No invasive plants were observed during the invasive plant surveys. The update list of potentially invasive plants is provided in Table 3-17.

Table 3-17. Updated invasive plant species reference list.

NWIPC Stikine IPMA Priority ¹	Common name	Scientific Name ²	Invasive Plants Regulation (2004) ³	Weed Control Regulation (2011) ⁴
Provincial EDRR	Yellow floating heart	<i>Nymphoides peltata</i>	-	-
Regional EDRR	Black knapweed	<i>Centaurea nigra</i> ^{3,4}	X	-
	Blueweed	<i>Echium vulgare</i> ⁴	X	-
	Bohemian knotweed	<i>Fallopia x bohémica</i> ⁵	-	noxious
	Brown knapweed	<i>Centaurea jacea</i> ⁴	X	-



NWIPC Stikine IPMA Priority ¹	Common name	Scientific Name ²	Invasive Plants Regulation (2004) ³	Weed Control Regulation (2011) ⁴
	Chicory	<i>Cichorium intybus</i>	-	-
	Cypress spurge	<i>Euphorbia cyparissias</i>	-	-
	Dalmatian toadflax	<i>Linaria dalmatica</i> ^{4,5}	X	noxious
	Diffuse knapweed	<i>Centaurea diffusa</i> ^{3,4,5}	X	noxious
	Field scabious	<i>Knautia arvensis</i> ^{3,4}	X	-
	Garden yellow loosestrife	<i>Lysimachia vulgaris</i>	-	-
	Giant hogweed	<i>Heracleum mantegazzianum</i> ⁵	-	noxious
	Giant knotweed	<i>Fallopia sachalinensis</i> ^{4,5}	X	noxious
	Greater knapweed	<i>Centaurea scabiosa</i>	-	-
	Himalayan balsam	<i>Impatiens glandulifera</i>	-	-
	Himalayan knotweed	<i>Persicaria wallichii</i>	-	noxious
	Hoary alyssum	<i>Berteroa incana</i> ⁴	X	-
	Japanese knotweed	<i>Fallopia japonica</i> ^{4,5}	X	noxious
	Leafy spurge	<i>Euphorbia esula</i> ^{4,5}	X	noxious
	Marsh plume thistle	<i>Cirsium palustre</i> ⁴	X	-
	Meadow knapweed	<i>Centaurea debeauxii</i> ⁴	-	-
	Mountain bluet	<i>Centaurea montana</i> ³	-	-
	Mouse-eared hawkweed	<i>Hieracium pilosella</i> ⁴	X	-
	Purple loosestrife	<i>Lythrum salicaria</i> ^{4,5}	X	noxious
	Russian knapweed	<i>Acroptilon repens</i> ⁴	X	-
	Russian thistle	<i>Salsola kali</i>	-	-
	Scotch thistle	<i>Onopordum acanthium</i> ⁴	X	-
	Spotted hawkweed	<i>Hieracium maculatum</i>	-	-
	St John's-wort	<i>Hypericum perforatum</i> ^{3,4}	X	-
	Sulphur cinquefoil	<i>Potentilla recta</i> ⁴	X	-
	Tansy ragwort	<i>Senecio jacobaea</i> ^{4,5}	X	noxious
	Whiplash hawkweed	<i>Hieracium flagellare</i> ³	-	-
	Wild carrot	<i>Daucus carota</i>	-	-
	Wild chervil	<i>Anthriscus sylvestris</i>	-	-
	Wormwood	<i>Artemisia absinthium</i>	-	-
	Yellow archangel	<i>Lamium galeobdolon</i>	-	-
High Priority	Common tansy	<i>Tanacetum vulgare</i> ^{3,4}	X	-
	Hoary Cress	<i>Cardaria draba</i> ⁴	X	-
	Nodding thistle*	<i>Carduus nutans</i> ^{3,4}	X	-
	Orange hawkweed	<i>Hieracium aurantiacum</i> ^{3,4}	X	-
	Scentless chamomile	<i>Matricaria maritima</i> ^{3,4,5}	X	noxious
	Spotted knapweed	<i>Centaurea stoebe</i> ^{3,4,5}	X	-
Lower Priority	Yellow hawkweed	<i>Hieracium glomeratum</i>	-	-
	Baby's-breath	<i>Gypsophila paniculate</i> ⁴	X	-



NWIPC Stikine IPMA Priority ¹	Common name	Scientific Name ²	Invasive Plants Regulation (2004) ³	Weed Control Regulation (2011) ⁴
	Bishop's Goutweed	<i>Aegopodium podagraria</i>	-	-
	Bladder campion	<i>Silene cucubalus</i> ³	-	-
	Bull thistle	<i>Cirsium vulgare</i> ^{3,4}	X	-
	Canada thistle	<i>Cirsium arvense</i> ^{3,4,5}	X	noxious
	Common bugloss	<i>Anchusa officinalis</i> ⁴	X	-
	Common burdock	<i>Arctium minus</i> ⁴	X	-
	Common comfrey	<i>Symphytum officinale</i> L. ³	-	-
	English Holly	<i>Ilex aquifolium</i>	-	-
	English ivy	<i>Hedera helix</i>	-	-
	Gorse	<i>Ulex europaeus</i> ^{4,5}	X	noxious
	Himalayan blackberry	<i>Rubus discolor</i>	-	-
	Meadow goat's-beard	<i>Tragopogon pratensis</i>	-	-
	Mossy stone crop	<i>Sedum acre</i>	-	-
	Oxeye daisy	<i>Chrysanthemum leucanthemum</i> ³	X	-
	Plumeless thistle	<i>Carduus acanthoides</i> ⁴	X	-
	Scotch Broom	<i>Cytisus scoparius</i> ⁴	X	-
	Yellow flag iris	<i>Iris pseudacorus</i> ^{4,5}	X	-
	Yellow toadflax	<i>Linaria vulgaris</i> ^{3,4,5}	X	noxious

¹ Northwest Invasive Plant Council Invasive Plant Species Priorities for the Stikine Invasive Plant Management Area (2020)

² Nomenclature follows NWIPC (2020) then Integrated Taxonomic Information System (USGS and Smithsonian Institution 2023).

³ Species which have been identified within the Stikine IPMA (2020).

⁴ *Forest and Range Practices Act* (Government of British Columbia 2002), *Invasive Plants Regulation* (Government of British Columbia 2004)

⁵ *Weed Control Act* (Government of British Columbia 1996), *Weed Control Regulation* (Government of British Columbia 1985)

3.4 TRACE METALS

Trace metals are defined as, “elements that occur in natural and perturbed environments in small amounts and when present in sufficient bioavailable concentrations are toxic to living organisms” (Adriano 2001). Trace metals can be incorporated into vegetative material through soil and atmospheric absorption processes. The objectives of vegetation and soil sampling were to characterize baseline concentrations of trace metals within the Project RAA to provide a baseline for future comparisons.

3.4.1 METHODS

3.4.1.1 Field Survey

Trace metal sampling was conducted concurrently with TEM survey work in August 2021. Samples were collected at 19 sample locations as summarized in Table 3-18 and shown on Map 3-4. One soil sample and at least one vegetation sample was collected at each sample location. Vegetation species collected for sampling include red-osier dogwood (*Cornus sericea*), willow (*Salix* spp.), highbush cranberry (*Viburnum edule*), and oval-



leaved blueberry (*Vaccinium ovalifolium*). Sample collection locations were scattered across the RAA at various distances from any existing Project infrastructure, except for sample location NPT-100C which was located more than 10 km from the RAA boundary. This location should be considered a reference location.

Table 3-18. Soil and plant locations and types for trace metal analysis.

Sample Location ID	UTM Easting	UTM Northing	UTM Zone	Sample collected				
				Soil	Red-osier Dogwood	Highbush Cranberry	Willows	Oval-leaved Blueberry
NPT-001	581278	6504255	8	X	X	X	-	-
NPT-003	582589	6498184	8	X	X	X	-	-
NPT-006	584112	6499046	8	X	X	X	-	-
NPT-009	582776	6503311	8	X	X	X	-	-
NPT-020A	580025	6505476	8	X	X	X	-	-
NPT-022A	580011	6507528	8	X	-	-	X	-
NPT-029	579872	6502155	8	X	-	-	X	-
NPT-031	582340	6502353	8	X	X	X	-	-
NPT-040	575803	6507263	8	X	-	-	-	X
NPT-047	577790	6510738	8	X	-	-	-	X
NPT-053	579467	6507036	8	X	X	-	X	-
NPT-054	580252	6510088	8	X	-	X	X	-
NPT-055	581421	6508125	8	X	X	X	-	-
NPT-058	583514	6499653	8	X	X	X	-	-
NPT-059A	580367	6504414	8	X	X	X	-	-
NPT-059B	580367	6504414	8	X	X	X	-	-
NPT-060A	579218	6507319	8	X	X	-	-	X
NPT-061	580458	6508632	8	X	-	X	-	-
NPT-100C	592939	6510437	8	X	X	-	X	-

3.4.1.2 Soil

The following protocol was followed for soil trace metal concentrations sampling at each sampling location, based on the Canadian Council of Ministers of the Environment (CCME) Suggested Operating Procedures (Canadian Council of Ministers of the Environment 2016).

- A soil pit within 30 cm was dug at each plot with a stainless-steel shovel and within the rooting zone of one of the vegetation species.
- Nitrile gloves were worn during sample collection.
- One soil sample in a self-sealing (e.g., Ziploc® bags) bag with a minimum total weight of 500 g was collected at each site.
- Soil was collected with a stainless-steel tool that was cleaned with an alcohol wipe prior to each use.
- Soil samples were labelled with the soil monitoring location ID (e.g., NPT01).

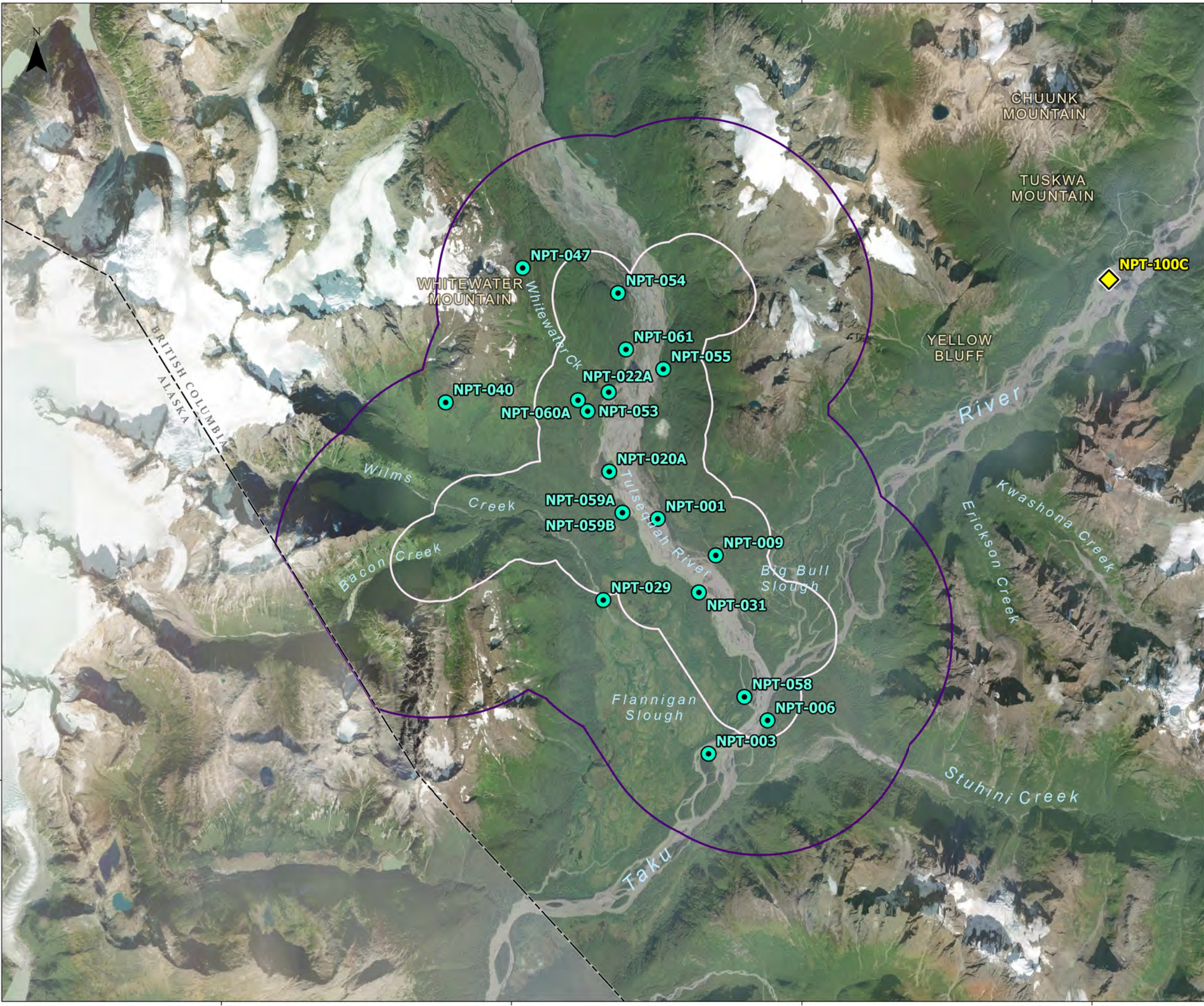


- Soil samples were kept cool in a cooler with ice packs on-site until shipped to the lab.
- Soil samples were sieved (2 mm) by the lab.

3.4.1.3 Vegetation

The following protocol was followed for plant tissue sampling at each monitoring location, based on the CCME (Canadian Council of Ministers of the Environment 2016).

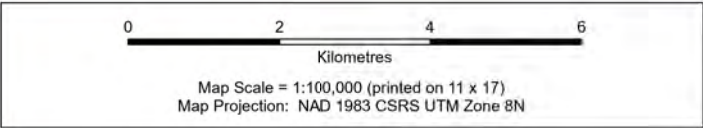
- Vegetation was sampled within a 50 m radius from the sample point coordinates in conjunction with the soil sample.
- Crews wore nitrile gloves during sample collection.
- New shoots with leaves were selected for sampling, and shoots were collected with the use of metal clippers which were cleaned with alcohol wipes before each use.
- Samples were collected in composite by species; each composite sample included at a minimum the collection of three shoots from five plants (i.e., a total of 15 shoots).
- A minimum of 300 g of plant material was collected for each species.
- Samples were collected in self-sealing (e.g., Ziploc[®]) bags, air was removed from the bags as possible.
- Vegetation samples were labelled with plot name (e.g., VM01), and species (W, B or H).
- Vegetation samples were placed in a cooler with ice packs on-site until shipped for laboratory analysis.



Trace metal sample locations

Legend

- Trace Metal Sampling Locations
- Reference Sample Location
- BC/Alaska Border
- Regional Assessment Area
- Local Assessment Area



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- Trace Metal Locations, Environmental Dynamics Inc, 2021.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Disclaimer

EDI Environmental Dynamics Inc. has made every effort to verify this map is free of errors. Data have been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: C. Norton	Checked: B. James	Map 3-4	Date: 5/29/2025
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Path: L:\PROJECTS\2020\2020\0388_May\04\020_Veg\Soils_april24\10000_3_4_TraceMetalLocations_2025



3.4.1.4 Analysis

Analytical parameters for soil and vegetation samples included the following metals provided in Table 3-19. These baseline laboratory results could be compared to minimum detectable concentrations, environmental benchmarks including federal, provincial, and international guidelines where applicable, and available regional datasets available. The following results were compared to the CCME industrial thresholds outlined in the Canadian Environmental Quality Guidelines, which are designed to protect aquatic life, wildlife, and human health from industrial discharges and contamination. These guidelines establish specific soil contaminant concentration limits below which adverse ecological effects are minimal or unlikely, and risks to human health are considered negligible.

Table 3-19. Summary of analytical lab analysis for soil and vegetation samples.

Sample Medium	Parameters
Soil	- pH - Trace Metals Package (Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Tungsten, Uranium, Vanadium, Zinc, Zirconium)
Vegetative Material	- Moisture - Trace Metals Package (Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc)

Soil and vegetation samples were analyzed by Bureau Veritas on August 24 to 25, 2021, using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) for a comprehensive suite of total metals. Soil pH was also measured by Bureau Veritas by means of 1:2 soil:water extraction to inform nutrient availability and metal mobility. While plant tissue metals concentrations were assessed using both dry and wet weight concentrations, relative dry weight concentrations (milligrams per kilogram [mg/kg]) were used for comparison purposes as it is independent of tissue moisture content, which can vary over time depending on a variety of factors, including season, climate and water availability.

3.4.2 RESULTS

A total of 33 vegetation samples and 19 soil samples (quality controls included 10% duplicates) were collected and submitted for laboratory analysis. Complete laboratory data are provided in Appendix C.

3.4.2.1 Quality Assurance/Quality Control

Quality assurance (QA) and quality control (QC) measures completed include a review of sample holding times, precision and accuracy and representativeness. All samples were analyzed within the recommended holding times for the analytes assessed in this report, including metals and pH. Laboratory data were received electronically, reducing the requirement for manual entry, and preventing potential transcription errors.



Precision and accuracy were assessed through a review of laboratory sample duplicate analysis. The laboratory's QA/QC procedures include laboratory duplicates, laboratory control samples and method blanks. No outliers were observed for laboratory control samples or method blanks for either soil or vegetation samples.

3.4.2.2 Soils

Of the 19 soil chemical parameters tested, six exceed the threshold at one or more plots (Table 3-20). Arsenic exceeded the industrial threshold at 10 of the 19 plots. Eight of the plots exceeded the threshold by 4.2% to 56.7%, and the remaining two plots, Plot 053 and Plot 060A, exceeded the thresholds by 3,725% and 2,683.3%, respectively. These two plots are near the historic Polaris Taku Mine site.

In addition to Arsenic, three additional soil chemical parameters exceed the thresholds at Plot 053. At Plot 053, Zinc exceeded the industrial threshold by 104.1%, Copper exceeded the industrial threshold by 100.0%, and Antimony exceeded the industrial threshold at by 33.0%.

Similarly, in addition to Arsenic, the thresholds of two soil chemical parameters were also exceeded at Plot 009. Nickel exceeded the industrial threshold at Plot 009 by 4.2%, and Chromium exceeded the industrial threshold at Plot 009 by 16.1%. Plot 009 is located close to the east bank of the Tulsequah River, just east of the Big Bull Exploration Site, by a clear-cut forested area.

Additionally, the Chromium threshold was exceeded at Plot 040 by 34.5%. This was the only soil chemical parameter that exceeded thresholds at this plot. Plot 040 is far from any disturbed areas, and is one of four sites outside of the LAA.

The remaining seven plots with high levels of arsenic (Plots 003, 020A, 031, 055, 058, 059, and 061) were all located along the bank of the Tulsequah or Taku Rivers.

3.4.2.3 Vegetation

Baseline trace metal dry weight and wet weight concentrations were sampled in vegetation tissues for 19 parameters. Highbush cranberry was sampled at 12 plots (Table 3-21 and Table 3-22), red-osier dogwood was sampled at 13 plots (Table 3-23 and Table 3-24), willow was sampled at five plots (Table 3-25), and blueberry at three plots (Table 3-26).

There are no existing threshold values for vegetation. The dry and wet weight parameter concentrations in vegetation tissues for plots that exceeded soil thresholds are below the soil industrial threshold levels; however, dry weight concentration tended to be one of the highest for those soil parameters that greatly exceeded thresholds.



Table 3-20. Baseline soil trace metal concentrations (n=19).

Parameter (mg/kg)	Industrial Limit Concentration (mg/kg) ¹	Sample Identifiers ²																		
		001	003	006	009	020A	022B	029	031	040	047	053	054	055	058	059A	059B	060A	061	100C
Soluble (2:1) pH		5.85	7.35	6.16	5.01	5.50	5.54	5.92	5.12	4.48	4.01	7.63	5.89	5.83	6.59	5.36	5.92	4.36	5.48	8.28
Antimony (Sb)	40.0	0.20	0.99	0.59	0.74	0.47	0.23	0.14	0.83	ND	0.13	53.2	0.34	7.08	0.94	0.33	0.50	16.6	0.36	0.72
Arsenic (As)	12.0	6.03	18.8	11.0	13.7	16.4	4.97	3.41	16.1	0.90	4.07	459	10.6	14.6	15.7	11.0	14.1	334	12.5	10.5
Barium (Ba)	2000	62.8	228	97.2	65.9	120	67.6	131	404	256	28.4	374	85.0	84.8	373	79.7	150	180	97.2	145
Beryllium (Be)	8.00	ND	0.30	0.29	0.36	ND	ND	ND	0.21	0.20	ND	0.24	ND	0.40	ND	ND	0.25	ND	ND	0.37
Cadmium (Cd)	22.0	0.060	0.493	0.169	0.166	0.185	0.111	0.150	0.341	0.066	ND	3.66	0.091	1.12	0.263	0.095	0.217	0.464	0.061	0.244
Chromium (Cr)	87.0	16.3	41.4	40.4	103	26.9	25.1	23.9	29.3	119	39.7	62.7	24.8	72.2	25.9	20.5	36.6	36.7	23.1	51.8
Cobalt (Co)	300	5.49	13.6	10.6	15.5	8.72	6.61	8.23	8.93	4.59	5.10	13.3	6.69	7.49	8.61	7.21	11.9	7.02	7.69	12.1
Copper (Cu)	91.0	10.3	52.8	32.7	36.7	13.2	20.4	24.8	35.9	61.9	21.5	182	16.6	13.3	36.4	20.8	37.7	32.1	23.5	36.8
Lead (Pb)	600	4.52	13.2	8.35	8.20	10.4	4.89	3.59	19.1	6.98	5.34	160	6.21	35.3	12.5	5.12	11.7	73.9	6.53	7.87
Mercury (Hg)	50.00	ND	0.094	0.075	0.093	0.050	ND	ND	ND	0.072	ND	0.253	0.102	0.360	0.072	0.101	0.078	0.144	ND	0.051
Molybdenum (Mo)	40.0	0.95	2.09	1.16	0.64	1.60	1.08	1.41	1.84	12.7	3.11	1.06	1.11	3.10	1.65	1.51	1.99	2.87	1.62	1.41
Nickel (Ni)	89.0	7.71	44.2	42.5	92.7	18.3	14.6	12.4	21.3	11.1	19.1	48.7	10.9	28.6	21.4	14.9	30.6	13.0	15.0	64.7
Selenium (Se)	2.90	ND	ND	ND	ND	ND	ND	ND	ND	1.29	0.67	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Ag)	40.00	0.131	0.267	0.178	0.071	0.100	0.068	0.105	0.180	0.202	0.315	1.33	ND	0.068	0.176	0.073	0.160	0.200	0.089	0.123
Thallium (Tl)	1.00	0.070	0.152	0.073	0.131	0.091	0.090	0.141	0.114	0.215	0.063	0.127	0.089	0.107	0.112	0.120	0.154	0.115	0.087	0.089
Tin (Sn)	300.0	0.20	0.38	0.25	0.29	0.30	0.24	0.27	0.38	0.92	0.31	0.53	0.29	0.66	0.29	0.22	0.41	0.67	0.26	0.29



Parameter (mg/kg)	Industrial Limit Concentration (mg/kg) ¹	Sample Identifiers ²																		
		001	003	006	009	020A	022B	029	031	040	047	053	054	055	058	059A	059B	060A	061	100C
Uranium (U)	300.0	1.43	1.83	1.30	0.446	1.09	1.07	3.44	1.64	1.24	0.636	1.05	1.67	1.63	1.84	1.17	1.82	0.684	1.84	1.84
Vanadium (V)	130	50.6	62.2	53.1	66.2	51.7	64.8	64.3	54.0	141	56.7	57.5	81.8	87.0	50.0	40.8	61.1	73.7	53.6	62.3
Zinc (Zn)	410	25.5	89.2	49.9	64.1	41.5	36.6	43.7	76.4	49.5	32.1	837	36.0	107	65.8	30.3	60.5	81.9	35.1	61.7

¹ Industrial Soil Quality Guidelines provided by the CCME (2024)
² Red text indicates values that exceeded industrial thresholds, while bold red text signifies extreme exceedances.

Table 3-21. Baseline highbush cranberry trace metal concentrations (n=) dry weight and wet weight.

Parameter	Sample Identifies											
	001		003		006		009		020A		031	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Antimony (Sb)	0.0076	0.0018	0.124	0.0282	0.0532	0.0113	0.0087	0.0017	0.0068	0.00130	0.0082	0.0022
Arsenic (As)	0.063	0.0147	1.94	0.440	0.748	0.159	0.081	0.0160	0.054	0.0101	0.102	0.0280
Barium (Ba)	100	23.3	62.1	14.1	66.7	14.2	53.8	10.7	94.3	17.5	268	73.5
Beryllium (Be)	ND	ND	0.032	0.0072	0.017	0.0036	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	0.0524	0.0122	0.224	0.0508	0.0857	0.0183	0.0922	0.0183	0.193	0.0359	0.356	0.0976
Chromium (Cr)	0.11	0.026	3.39	0.769	2.23	0.475	0.36	0.071	0.26	0.049	0.21	0.058
Cobalt (Co)	0.099	0.0230	1.29	0.293	0.523	0.111	0.123	0.0245	0.112	0.0208	0.092	0.0252
Copper (Cu)	3.41	0.791	8.66	1.97	5.94	1.27	6.05	1.20	5.13	0.955	2.98	0.817



Parameter	Sample Identifies											
	001		003		006		009		020A		031	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Lead (Pb)	0.044	0.0101	1.02	0.231	0.404	0.0861	0.077	0.0153	0.071	0.0133	0.099	0.0270
Mercury (Hg)	ND	ND	0.015	0.0035	0.015	0.0032	0.029	0.0057	0.011	0.0020	ND	ND
Molybdenum (Mo)	1.12	0.260	0.482	0.109	0.613	0.131	0.229	0.0455	0.520	0.0967	0.427	0.117
Nickel (Ni)	2.81	0.652	5.27	1.20	3.86	0.823	4.52	0.899	3.73	0.694	5.08	1.39
Selenium (Se)	ND	ND	0.103	0.023	0.066	0.014	ND	ND	ND	ND	ND	ND
Silver (Ag)	ND	ND	0.0271	0.0062	0.0090	0.0019	ND	ND	ND	ND	ND	ND
Thallium (Tl)	ND	ND	0.0180	0.00410	0.0056	0.00120	0.0047	0.00090	ND	ND	0.0050	0.00140
Tin (Sn)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (U)	0.0146	0.00340	0.258	0.0587	0.0951	0.0203	0.0153	0.00300	0.0104	0.00190	0.0166	0.00450
Vanadium (V)	ND	ND	4.96	1.13	2.37	0.505	0.20	ND	ND	ND	ND	ND
Zinc (Zn)	25.7	5.96	26.7	6.06	23.6	5.03	24.7	4.91	26.8	4.99	40.1	11.0

Table 3-22. Baseline highbush cranberry trace metal concentrations (n=) dry weight and wet weight.

Parameter	Sample Identifiers											
	054		055		058		059A		059B		061	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Antimony (Sb)	0.0141	0.00250	0.0062	0.00110	0.0155	0.0036	0.0055	0.0012	0.0051	0.0013	0.0106	0.00190
Arsenic (As)	0.094	0.0164	0.033	0.0056	0.199	0.0462	0.025	0.0053	ND	ND	0.076	0.0136



Parameter	Sample Identifiers											
	054		055		058		059A		059B		061	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Barium (Ba)	139	24.4	95.7	16.4	198	46.0	161	33.7	87.6	22.2	130	23.2
Beryllium (Be)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	0.116	0.0203	1.32	0.225	0.491	0.114	0.236	0.0494	0.153	0.0387	0.146	0.0261
Chromium (Cr)	0.25	0.044	0.11	0.019	0.39	0.090	0.21	0.044	0.20	0.052	0.13	0.023
Cobalt (Co)	0.118	0.0207	0.058	0.0099	0.167	0.0389	0.194	0.0405	0.100	0.0254	0.157	0.0280
Copper (Cu)	6.20	1.09	4.41	0.753	3.50	0.813	4.19	0.876	3.89	0.984	4.65	0.833
Lead (Pb)	0.178	0.0311	0.042	0.0072	0.146	0.0339	0.074	0.0154	0.068	0.0171	0.113	0.0202
Mercury (Hg)	ND	ND	0.013	0.0022	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Mo)	0.465	0.0815	0.139	0.0238	0.155	0.0359	1.28	0.268	1.22	0.308	0.600	0.107
Nickel (Ni)	4.10	0.718	0.954	0.163	5.53	1.28	6.03	1.26	4.74	1.20	4.25	0.762
Selenium (Se)	ND	ND	ND	ND	ND	ND	0.056	0.012	ND	ND	0.070	0.0126
Silver (Ag)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium (Tl)	0.0022	0.00040	0.0068	0.00120	0.0040	0.00090	0.0046	0.00100	0.0028	0.00070	ND	ND
Tin (Sn)	0.11	0.020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (U)	0.0176	0.00310	0.0045	0.00080	0.0506	0.0117	0.0145	0.00300	0.0122	0.00310	0.0182	0.00330
Vanadium (V)	ND	ND	ND	ND	0.30	0.071	ND	ND	ND	ND	ND	ND
Zinc (Zn)	45.5	7.97	25.8	4.41	44.9	10.4	25.7	5.38	25.5	6.45	29.4	5.25



Table 3-23. Baseline red-osier dogwood trace metal concentrations (n=) dry weight and wet weight.

Parameter	Sample Identifiers											
	001		003		006		009		020A		031	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Antimony (Sb)	ND	ND	0.0693	0.0148	0.0096	0.0021	ND	ND	ND	ND	0.0093	0.0023
Arsenic (As)	0.048	0.0114	1.43	0.306	0.059	0.0132	0.021	0.0049	ND	ND	0.090	0.0219
Barium (Ba)	138	32.5	71.9	15.4	42.2	9.41	38.5	9.13	89.3	25.9	203	49.5
Beryllium (Be)	ND	ND	0.019	0.0040	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	0.0110	0.0026	0.0491	0.0105	0.0090	0.0020	0.0091	0.0022	ND	ND	0.0238	0.0058
Chromium (Cr)	ND	ND	1.84	0.393	0.15	0.034	ND	ND	ND	ND	0.13	0.031
Cobalt (Co)	0.039	0.0091	0.656	0.140	0.047	0.0105	0.036	0.0085	0.028	0.0082	0.051	0.0124
Copper (Cu)	3.73	0.877	7.02	1.50	3.88	0.866	3.37	0.798	5.12	1.48	2.97	0.725
Lead (Pb)	0.077	0.0181	0.578	0.124	0.068	0.0152	0.039	0.0093	0.043	0.0124	0.115	0.0280
Mercury (Hg)	ND	ND	0.012	0.0025	ND	ND	0.012	0.0030	ND	ND	ND	ND
Molybdenum (Mo)	0.573	0.135	0.742	0.159	0.596	0.133	0.077	0.0183	0.759	0.220	0.857	0.209
Nickel (Ni)	3.92	0.921	4.04	0.864	2.03	0.453	2.30	0.546	3.78	1.10	2.99	0.730
Selenium (Se)	ND	ND	0.074	0.016	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Ag)	ND	ND	0.0155	0.0033	ND	ND	ND	ND	ND	ND	ND	ND
Thallium (Tl)	ND	ND	0.0108	0.00230	ND	ND	0.0023	0.00050	ND	ND	0.0028	0.00070
Tin (Sn)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND



Parameter	Sample Identifiers											
	001		003		006		009		020A		031	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Uranium (U)	0.0064	0.00150	0.125	0.0268	0.0068	0.00150	0.0041	0.00100	0.0032	0.00090	0.0085	0.00210
Vanadium (V)	ND	ND	2.72	0.582	ND	ND	ND	ND	ND	ND	ND	ND
Zinc (Zn)	16.6	3.90	20.6	4.40	16.6	3.69	11.9	2.82	24.3	7.05	16.6	4.04

Table 3-24. Baseline red-osier dogwood trace metal concentrations (n=) dry weight and wet weight.

Parameter	Sample Identifiers													
	053		055		058		059A		059B		060A		100C	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Antimony (Sb)	0.0882	0.0258	0.0067	0.0014	0.0051	0.0013	0.0067	0.0017	0.0056	0.0012	0.0445	0.00860	ND	ND
Arsenic (As)	0.790	0.232	0.035	0.0072	0.051	0.0131	0.614	0.159	0.027	0.0060	0.289	0.0561	0.051	0.0166
Barium (Ba)	63.9	18.7	31.0	6.42	158	40.8	90.7	23.5	112	24.8	143	27.8	17.1	5.60
Beryllium (Be)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	0.0144	0.0042	0.0701	0.0145	0.0124	0.0032	0.0133	0.0035	0.0220	0.0049	0.0183	0.00350	ND	ND
Chromium (Cr)	0.10	0.030	ND	ND	ND	ND	ND	ND	0.13	0.028	0.10	0.020	0.16	0.051
Cobalt (Co)	0.025	0.0073	0.035	0.0072	0.045	0.0116	0.026	0.0068	0.072	0.0160	0.030	0.0058	0.058	0.0190
Copper (Cu)	4.86	1.43	4.62	0.957	4.29	1.11	3.66	0.949	4.07	0.904	3.75	0.728	2.94	0.960
Lead (Pb)	0.921	0.270	0.123	0.0254	0.046	0.0120	0.039	0.0101	0.085	0.0189	0.893	0.173	0.029	0.0096



Parameter	Sample Identifiers													
	053		055		058		059A		059B		060A		100C	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Mercury (Hg)	ND	ND	0.012	0.0025	ND	ND	ND	ND	ND	ND	0.012	0.0023	ND	ND
Molybdenum (Mo)	1.92	0.563	0.380	0.0787	0.372	0.0964	1.10	0.285	1.45	0.322	0.615	0.119	0.527	0.172
Nickel (Ni)	0.777	0.228	1.19	0.247	2.49	0.646	3.03	0.786	4.10	0.911	4.15	0.806	0.978	0.320
Selenium (Se)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.075	0.025
Silver (Ag)	0.0074	0.0022	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium (Tl)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tin (Sn)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (U)	0.0079	0.00230	0.0046	0.00100	0.0053	0.00140	0.0025	0.00070	0.0061	0.00140	0.0038	0.00070	0.0113	0.00370
Vanadium (V)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc (Zn)	16.9	4.94	21.1	4.36	21.4	5.54	13.7	3.56	15.3	3.39	24.1	4.68	11.3	3.71

Table 3-25. Baseline willow trace metal concentrations (n=) dry weight and wet weight.

Parameter	Sample Identifiers									
	020A		029		053		054		100C	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Antimony (Sb)	0.0050	0.0016	ND	ND	0.142	0.0443	0.0110	0.0029	0.0232	0.0066
Arsenic (As)	0.026	0.0085	0.036	0.0099	0.994	0.311	0.060	0.0161	0.371	0.106
Barium (Ba)	45.8	14.8	75.1	20.7	37.2	11.6	29.0	7.78	25.4	7.25



Parameter	Sample Identifiers									
	020A		029		053		054		100C	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Beryllium (Be)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	2.36	0.764	2.75	0.757	4.98	1.56	2.41	0.646	1.53	0.437
Chromium (Cr)	ND	ND	ND	ND	0.13	0.040	ND	ND	1.62	0.461
Cobalt (Co)	0.600	0.195	1.54	0.424	0.141	0.0441	0.419	0.112	0.844	0.241
Copper (Cu)	7.61	2.47	5.31	1.46	12.0	3.77	6.97	1.87	6.07	1.73
Lead (Pb)	0.064	0.0207	0.037	0.0103	0.945	0.296	0.132	0.0353	0.149	0.0425
Mercury (Hg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Mo)	0.418	0.136	0.494	0.136	0.919	0.288	0.412	0.110	1.09	0.311
Nickel (Ni)	12.5	4.04	7.80	2.14	1.09	0.341	4.44	1.19	2.84	0.810
Selenium (Se)	0.077	0.025	0.055	0.015	ND	ND	0.123	0.033	0.212	0.060
Silver (Ag)	ND	ND	ND	ND	0.0229	0.0072	ND	ND	0.0089	0.0025
Thallium (Tl)	0.0021	0.00070	0.0040	0.00110	ND	ND	ND	ND	0.0028	0.00080
Tin (Sn)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (U)	0.0036	0.00120	0.0104	0.00290	0.0049	0.00150	0.0047	0.00130	0.0211	0.00600
Vanadium (V)	ND	ND	ND	ND	ND	ND	ND	ND	1.09	0.311
Zinc (Zn)	122	39.4	93.1	25.6	254	79.5	139	37.2	72.5	20.7



Table 3-26. Baseline blueberry trace metal concentrations (n=) dry weight and wet weight.

Parameter	Sample Identifiers					
	040		047		060A	
	Dry	Wet	Dry	Wet	Dry	Wet
Antimony (Sb)	ND	ND	ND	ND	0.0542	0.0115
Arsenic (As)	ND	ND	ND	ND	0.781	0.166
Barium (Ba)	57.6	21.6	28.9	9.96	171	36.2
Beryllium (Be)	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	ND	ND	ND	ND	0.204	0.0432
Chromium (Cr)	ND	ND	ND	ND	0.15	0.031
Cobalt (Co)	ND	ND	ND	ND	0.159	0.0338
Copper (Cu)	6.39	2.40	8.27	2.85	9.33	1.98
Lead (Pb)	0.014	0.0053	0.012	0.0040	0.799	0.169
Mercury (Hg)	ND	ND	ND	ND	0.019	0.0041
Molybdenum (Mo)	0.794	0.298	0.441	0.152	0.407	0.0863
Nickel (Ni)	0.538	0.202	0.734	0.253	7.48	1.59
Selenium (Se)	ND	ND	ND	ND	ND	ND
Silver (Ag)	ND	ND	ND	ND	0.0085	0.0018
Thallium (Tl)	ND	ND	ND	ND	ND	ND
Tin (Sn)	ND	ND	ND	ND	ND	ND



Parameter	Sample Identifiers					
	040		047		060A	
	Dry	Wet	Dry	Wet	Dry	Wet
Uranium (U)	ND	ND	ND	ND	0.0039	0.00080
Vanadium (V)	ND	ND	ND	ND	ND	ND
Zinc (Zn)	22.7	8.50	18.8	6.49	47.1	9.99



3.5 WETLAND FUNCTION

Wetland ecological function can be defined as the natural physical, chemical and biological processes that occur within a wetland ecosystem (Hanson et al. 2008). These processes contribute to a wetland's ability to support biodiversity, regulate water flow, filter and purify water, sequester carbon, and maintain overall environmental health. These natural processes occur independently of human interests or any services they may offer. Wetland ecosystems are dynamic and influenced by numerous factors, making wetland function complex to measure and evaluate accurately. Despite this complexity, understanding wetland ecosystem function is essential for evaluating the potential effects development activities may have on wetlands.

Wetland function assessments can be conducted using a three-tiered approach: Level 1 involves desktop landscape-scale assessments, Level 2 includes rapid field assessments, and Level 3 encompasses the most detailed evaluations, which may involve intensive field data collection, modelling, or long-term monitoring programs (Hanson et al. 2008). A combination of Level 1 and Level 2 approaches were used by EDI to assess wetland function, along with a more detailed field evaluation that included a simple wetland function assessment to provide supplemental pre-construction wetland characteristics.

3.5.1 METHODS

3.5.1.1 Field Survey

Wetland function surveys were conducted in August 2024 to assess baseline conditions of representative wetlands within the RAA. Prior to the field program, a preliminary TEM assessment was conducted to identify wetlands within the vegetation assessment area. Thirteen wetlands were chosen based on their best representation of the wetlands in the RAA and availability of access.

Field surveys were completed by two qualified EDI biologists. The crew accessed the wetlands by helicopter and conducted field assessment on foot where access allowed, and time permitted. Field assessment comprised survey of the perimeter to delineate the wetlands, characterizing the different wetland zones, assess wetland function and identify hydrological connectivity. Access to some wetlands was constrained due to ground conditions. Under these circumstances, selected areas exhibiting representative wetland characteristics were accessed for assessment. The most typical wetland classes observed were noted and sampling plot locations were selected where wetland indicators were observed. Wetland characterization data was collected at representative wetland sample plots, including details on the percent cover of wetland classes, vegetation species and cover, soil characterization, hydrological features and function, and wildlife habitat use for selected species (e.g. moose, beaver, dabbling ducks and songbird communities). Data were recorded on customized wetland function forms for each wetland site. Wetlands were classified as the wetland zone covering the greatest proportion of the wetland area, according to the wetland classes described in *Wetlands of British Columbia: A Guide to Identification* (MacKenzie and Moran 2004).



Where applicable, the boundary of each wetland was delineated where a noticeable change from wetland to upland soil and vegetation indicators occurred. An auger was used to view soil profiles, and mottling and gleying, or other signs of anaerobic and reducing conditions, were used to confirm delineation boundaries as they provided evidence of saturated to seasonally saturated conditions. A visual assessment of vegetation and topographic changes also informed boundary delineations. The identification of wetland soil indicators was based upon EDI's internal wetland assessment practices, which uses the Field Indicators of Hydric Soils with Probable Application in Alberta DRAFT (2019), which is adapted from the Field Indicators of Hydric Soils in the United States v 8.2 (United States Department of Agriculture, Natural Resources Conservation Service 2018). Professional judgment and wetland assessment experience were used to apply the indicators and knowledge in the regional context. The wetland boundary was digitally documented using ArcGIS Online Field Maps software.

3.5.1.2 Function Assessment

Wetland functionality ratings were determined using a detailed rating scheme (Table 3-27) according to Hanson et al (2008). The function ratings were determined primarily by the attributes of the most predominant wetland class within each wetland, though other identified classes were also considered. For wetland complexes, the function rating was assessed based on the class with the greatest proportion. Field based assessment (described in Section 3.5.1.1) informed the function ratings for each wetland according to the criteria outlined in Table 3-27. The scores for each attribute were summed to provide an overall score for each wetland. These final scores were then translated into a rating using the score ranges provided in Table 3-28.



Table 3-27. Summary of wetland class functions and ratings (adapted from Hanson et al. 2008).

Wetland Function	Description	Wetland Class				
		Bog	Fen	Marsh	Swamp	Open Water
Hydrological	Water flow moderation (flood protection): this attribute is based on the volume capability of water within a wetland compared to the flow within the watershed. Volume capability is defined as the ability of a wetland or wetland complex ¹ within a watershed to reduce downstream risks.	Low as generally isolated from surface water inputs. Low-Moderate for cluster of small bogs or large bogs >1 ha. Moderate for bogs >1 ha. Moderate for bogs within wetland complexes where bog area is <50% of the complex.	Variable due to water table fluctuation. Low-Moderate for smaller isolated fens (<1 ha) due to less water storage. Moderate-High for cluster of small fens or larger fens >1 ha. Moderate-High for fens within wetland complexes that are more than 50% of the complex.	Low for small marshes <1 ha. Moderate for riparian or floodplain marshes >1 ha. Moderate-High for larger marshes. Moderate-High for marshes within wetland complexes with marsh area >25% of the complex.	Low for small swamps <1 ha. Low-Moderate for swamps >1 ha. Moderate for swamps in wetland complexes.	Moderate for isolated areas. High for areas in wetland complexes.
	Groundwater recharge: this attribute is difficult to quantify and is variable. The variability within this attribute is dependent on substrate, basin shape, local groundwater gradients, location within the watershed, etc..	Low for bogs in colder high elevation areas. Low for bogs in low-lying areas. Moderate for topographic heights.	Low. Low-Moderate if associated with a complex.	Low for low-lying areas. Moderate for topographic heights.	Low. Low-Moderate if associated with a complex.	Variable.
	Erosion protection: this attribute is associated with erodibility of wetlands in shoreline areas and is related to the energy of the adjacent waterbody and the composition of the substrate. The value is also related to adjacent land use.	Low	Low	Moderate-High	Moderate	Low
Biochemical	Water quality treatment: chemical, biological and physical water quality treatment for constituents of	Low.	Moderate. High if within a wetland complex.	Moderate. High if within a wetland complex.	Moderate. High if within a wetland complex.	Moderate. High if within a wetland complex.



Wetland Function	Description	Wetland Class				
		Bog	Fen	Marsh	Swamp	Open Water
	concern, loading rates, water balance and hydro period, substrate and vegetation assemblages. The value is related to the sensitivity or use of receiving waters. Fish and amphibians are generally sensitive to water quality changes.	Low-Moderate if within a wetland complex.				
	Carbon storage: this attribute is associated with the amount of peat humification and the volume of ericaceous and woody biomass.	Moderate for bogs <0.5 ha. Moderate-High for bogs >0.5 ha. High for bogs within >25% of wetland complex.	Moderate for fens <0.5 ha. Moderate-High for fens >0.5 ha. High for fens that are >25% of wetland complex.	Moderate.	Moderate for swamps <0.5 ha. Moderate-High for swamps >0.5 ha. High for swamps that are >25% of wetland complex.	Low.
	Nutrient and organic export: this attribute is based on the export of organic carbon and nutrients to streams that can contribute positively to the aquatic food chain. An increase in wetland size can increase the contribution to the aquatic food chain over a longer period of time.	Moderate for bogs <5 ha. High for bogs >5 ha.	Moderate for fens <5 ha. High for fens >5 ha.	Moderate for marshes <5 ha. High for marshes >5 ha.	Moderate for swamps <5 ha. High for swamps >5 ha.	Low.



Wetland Function	Description	Wetland Class				
		Bog	Fen	Marsh	Swamp	Open Water
Habitat (Ecological)	Wildlife Habitat: this attribute is associated with the presence/absence associated with wildlife life requisite requirements, such as reproduction, feeding or shelter for selected species.	Low for sparse/cryptogram or herbaceous dominated areas Moderate for shrub/herb, pole/sapling or young forest areas. High for mature and old growth forests. High if mapped as a high value moose wetland.	Low for sparse/cryptogram or treed areas Moderate for herbaceous dominated areas. High for shrub dominated areas. High if mapped as a high value moose wetland.	Moderate. High if associated with open water that provides habitat for migratory birds.	Low to High based on habitat ratings. High if mapped as a high value moose wetland.	High. Shallow open water provides an important habitat for many wildlife species (MacKenzie and Moran 2004). These wetlands provide nesting and foraging habitat for open, wetland and riparian habitat bird species; living, thermal shelter, and foraging habitat for mammals (e.g., grizzly bear, moose).
	Wildlife Use: this attribute is associated with wildlife use by multiple species, increasing a wetlands biodiversity. Use based on auditory, tracks, signs of browsing, scats and den and nest observed.	Low to High based on incidental wildlife observations. High if mapped as a high value moose wetland.	Low to High based on incidental wildlife observations. High if mapped as a high value moose wetland.	Moderate. High if associated with open water that provides habitat for migratory birds.	Low to High based on incidental wildlife observations. High if mapped as a high value moose wetland.	Moderate. High if provides habitat for migratory birds.
Climate	Maintenance of current climate: this attribute is associated with a wetland's capability for CO ₂ balance, carbon fixation, rainfall and humidity control, methane equilibrium and microclimate influences. Also includes climate regulation as it relates to evapotranspiration rates based on the type and size of wetland (vegetation cover).	Low for bogs <1 ha. Moderate for bogs >1 ha. Moderate for bogs that are >25% of wetland complexes.	Moderate for fens <1 ha. Moderate-High for fens >1 ha. Moderate-High for fens that are >25% of wetland complexes.	Moderate for marshes <1 ha. Moderate-High for marshes >1 ha. Moderate-High for marshes that are >25% of wetland complexes.	Low for swamps <1 ha. Moderate for swamps >1 ha.	Moderate. High for shallow open that are >25% of wetland complexes.

¹ The term Wetland Complex(es) refers to wetlands with multiple wetland classes in this table.



Table 3-28. Wetland indicator ratings and function scores.

Indicator Rating	Score	Total Score Range	Function Rating
Low	1	1 – 9	Low (L)
Low – Moderate	2	10 – 18	Low – Moderate (LM)
Moderate	3	19 – 27	Moderate (M)
Moderate – High	4	28 – 36	Moderate – High (MH)
High	5	37 – 45	High H)

3.5.2 RESULTS

3.5.2.1 Field Survey

From August 14 to 15, 2024, wetland function surveys were conducted on four of the 13 wetlands across the Project area (NPWF02, NPWF03, NPWF04 and NPWF05). Planned sampling of all 13 wetlands was prevented by time and access limitations, including difficulties with helicopter landings. These difficulties arose from factors like water depth, proximity to infrastructure and the presence of visible wildlife. Prioritization for surveying wetlands was given to those most likely to be affected by Project activities. Six plots were sampled across the four wetlands, three across one extensive wetland complex (NPWF05). All wetlands were in the CWHwm BEC zone. See Table 3-29 and Map 3-5 for the locations of the four wetlands and field plot locations.

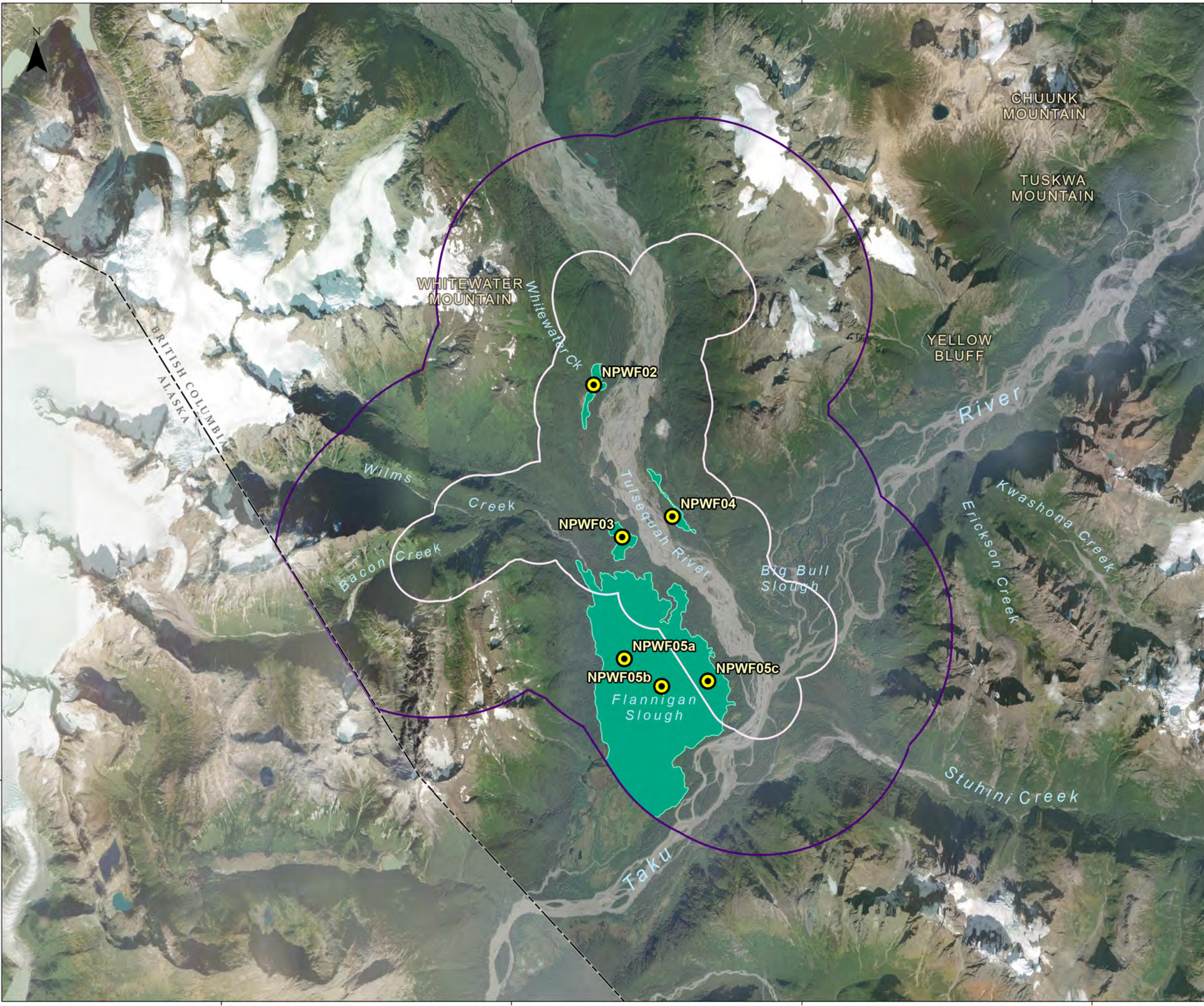
Table 3-29. Wetland locations of field sampled wetlands.

BEC Unit	Wetland ID	Plot ID	Easting	Northing
CWHwm	NPWF02	NPWF02	579624	6507717
	NPWF03	NPWF03	580359	6503784
	NPWF04	NPWF04	581655	6504315
	NPWF05	NPWF05a	580414	6500637
		NPWF05b	581379	6499927
		NPWF05c	582572	6500062

Due to field limitations and the complexity of the sampled wetlands (i.e. diverse and extensive wetland complexes with many classifications and associated site series), the selected field sites may not have fully captured all the characteristics of the wetlands.

The total area of the wetland that were surveyed was 1,589.0 ha. Of the four delineated wetlands, three were classified as marshes (NPWF02, NPWF03, NPWF05) and one was a fen (NPWF04). While these classifications reflect the dominant wetland types, all the wetlands were complex with multiple wetland classes present (marsh, fen, swamp, shallow open water).

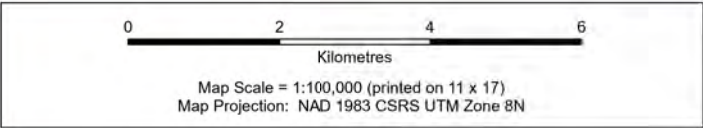
A characterization summary of the surveyed wetlands is provided in Table 3-30, with detailed field data presented in Appendix D.



Field verified wetlands and wetland function plot locations

Legend

- Sample Plots
- BC/Alaska Border
- Local Assessment Area
- Regional Assessment Area
- Wetland Polygons



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- Wetland data, Environmental Dynamics Inc. 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border. Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15): Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Disclaimer

EDI Environmental Dynamics Inc. has made every effort to verify this map is free of errors. Data have been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: C. Norton	Checked: S Kruk	Map 3-5	Date: 5/29/2025
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Table 3-30. Wetland class and plot description of the four wetlands surveyed in the Regional Assessment Area.

Wetland ID	Wetland Class	Plot ID	Plot Description	Wetland Area (ha)
NPWF02	Wm	02	Small-flower bulrush–Mertens' rush dominated marsh and open water complex	31.2
NPWF03	Wm	03	Stika sedge dominated marsh, open water and Stika willow-dominated swamp complex	39.9
NPWF04	Wf	04	Stika sedge dominated fen, open water and Stika willow dominated swamp complex	22.7
NPWF05	Wm	05a	Sitka sedge marsh with multiple watercourses throughout	1495.2
		05b	Sitka sedge–beaked sedge marsh with scattered Stika willow	
		05c	Stika sedge–beaked sedge marsh and sweet gale dominated swamp complex	
Total Area				1589.0

Wetland NPWF02

NPWF02 was 31.2 ha and was dominantly marsh with observed small-flower bulrush–Mertens' rush (*Scirpus microcarpus*–*Juncus mertensianus*) marsh and open water areas near the plot location (Table 3-30). Other observed species included bluejoint reedgrass (*Calamagrostis canadensis*), Sitka sedge (*Carex sitchensis*), Sitka alder (*Alnus alnobetula*), willows (*Salix* spp.), and common mare's-tail (*Hippuris vulgaris*).

The graminoid-dominated marsh was on a level site effected by fluvial and palustrine processes. It was up- and downstream from fish bearing, salmon spawning creeks. It had an average depth of 30 cm and was characterized by very poorly drained silty loam soil. Rooting depth was 43 cm and seepage at 10 cm.

Wetland NPWF03

NPWF03 was 39.9 ha and was dominantly marsh with observed Stika sedge marsh, open water, Stika willow (*Salix sitchensis*) swamp areas near the plot location, with several other marsh types throughout the diverse complex (Table 3-30). Other observed species included swamp horsetail (*Equisetum fluviale*), buckbean (*Menyanthes trifoliata*), common spike-rush (*Eleocharis palustris*), marsh cinquefoil (*Comarum palustre*), common horsetail (*Equisetum arvense*), and common mare's-tail.

The graminoid-dominated marsh was on a depression floodplain site effected by fluvial and palustrine processes. It was up- and downstream from creeks with unknown fish bearing status. It had an average depth of 50 cm and was characterized by very poorly drained silt soil. Rooting depth was 20 cm and seepage at 2 cm.

Wetland NPWF04

NPWF04 was 22.7 ha and was dominantly fen with observed Stika sedge fen, open water and pond (>2 m), and Stika willow swamp areas near the plot location (Table 3-30). Other observed species included marsh cinquefoil, Douglas' water-hemlock (*Cicuta douglasii*), common horsetail and buckbean.

The graminoid-dominated marsh was on a level site with depressions and was affected by palustrine processes. It had a depth of 20 cm near the edge with increasing depth into the open water areas. It was characterized by silt soil that had a rooting depth of 31 cm and a fibric organic horizon with a thickness of 31 cm.



Wetland NPWF05

NPWF05 was 1,495.2 ha and was dominantly marsh with observed Sitka sedge marsh and multiple watercourses near Plot 05a, Sitka sedge–beaked sedge marsh with scattered Sitka willow near Plot 05b, and Sitka sedge–beaked sedge marsh and sweet gale swamp areas near Plot 05c (Table 3-30). Other observed species included common horsetail, bluejoint reedgrass, marsh cinquefoil, Sitka alder and willows.

This wetland complex is diverse and has varying structural stages with the majority being graminoid dominated and low shrub as secondary, often with patch vegetation and graminoid hummocks. It was on a level site with depressions and was affected by both fluvial and lacustrine processes, with creeks up- and downstream. It had a depth of 25 cm at Plot 05b and was characterized by very poorly drained silt soil that had a rooting depth from 30 to 40 cm, seepage from 1 to 4 cm, and a fibric organic horizon with a thickness ranging from 2 to 20 cm across the three plots.

3.5.2.2 Function Assessment

The ecological functions of the four wetlands were assessed and scored based on their most predominant wetland class, using the scoring framework outlined in Table 3-27 and Table 3-28. The hydrologic, biochemical, habitat and climate attribute scores for each wetland, along with their final wetland function ratings, are summarized in Table 3-31.

The wetland function rating offers valuable insight into the ecological suitability of a site for development (Hanson et al. 2008). Overall scores range from 1 to 45 and are categorized into five tiers: Low (L), Low-Moderate (LM), Moderate (M), Moderate-High (MH), and High (H) (Table 3-28). According to Hanson et al. (2008), higher scores reflect greater ecological importance, indicating that development in such areas would result in substantial ecological loss. Conversely, lower scores suggest limited ecological significance, meaning development is unlikely to have a major environmental effect. Moderate scores reflect wetlands that may require further evaluation to assess how development could affect their ecological systems.

All four wetlands received a Moderate-High wetland function rating with overall scores for the three marshes ranging from 30 to 34, and the fen scoring highest at 36. These wetlands feature multiple wetland classes and are very large in size, both factors that contribute to their high ecological value.



Table 3-31. Wetland function assessment results for each wetland assessed.

Wetland ID	Wetland Description		Ecological Function Value Score									Wetland Total Score	Wetland Function Rating
	Site Class	Area (ha)	Hydrologic			Biochemical			Other				
			Flow	Recharge	Erosion	Water Quality	Nutrients	Carbon Storage	Wildlife Habitat	Wildlife Use	Climate		
NPWF02	Wm	31.2	4	1	4	5	3	5	4	4	4	34	MH
NPWF03	Wm	39.9	4	1	4	5	3	5	3	3	4	32	MH
NPWF04	Wf	22.7	4	2	1	5	5	5	5	5	4	36	MH
NPWF05	Wm	1495.2	4	1	2	5	3	5	3	3	4	30	MH



4 SUMMARY OF VEGETATION AND ECOSYSTEMS

This report summarizes existing conditions and updated mapping products for vegetation and terrestrial ecosystems, including species and communities of concern (e.g., rare plants and listed species and ecological communities, culturally important plants and ecosystems, and invasive species), trace metals in soil and vegetation, and wetland classification and functionality. Key findings are:

- Historic TEM maps from 2002 served as the basis for the current TEM. Field verification was completed in the summer of 2021, and revisions to the 2002 TEM were finalized in 2025. A total of 508 polygons were mapped within the 21,852.8 ha RAA, with an average polygon size of 43.0 ha. Of this, 6,566.0 ha was the LAA, where a total of 148 polygons were mapped. Four BEC units, including CWHwm, MHmm2, MHun and CMAun, were mapped in both the RAA and LAA. The CWHwm unit constituted the majority of the RAA (63.1%) and LAA (91.7%). The MHun was the smallest subzone variant in the RAA (5.0%), while the CMAun was the smallest in the LAA (0.1%).

The RAA is predominantly composed of vegetated ecosystems, with only 6.1% considered non-vegetated (6.0% in the LAA). Mature forest (Structural Stage 6) comprised 31.6% of the RAA (46.3% of the LAA). Shrubs (Structural Stage 3a and 3b) dominated 25.1% of the RAA (25.2% in the LAA), including recently harvested stands, disclimax areas and shrubby alpine and wetland ecosystems. Sparsely vegetated ecosystems and herb, grass and dwarf shrub-dominated ecosystems accounted for 23.5% and 11.3% of the RAA (14.3% and 6.5% of the LAA), respectively. Much of this area consisted of rock outcrop, rubble, talus, low-growing alpine and subalpine ecosystems, and avalanche chutes. No old forest (Structural Stage 7) was mapped in the RAA.

- No federally or provincially listed rare plants were observed during the 2021 field program. Three Blue-listed ecological communities were mapped within the CWHwm, covering 2,952.1 ha in the RAA and 1,439.1 ha in the LAA. A 2025 status review of potential species and ecological communities to occur in the RAA was conducted, with some changing in status. No invasive plants were observed during the 2021 field program. A desktop review in 2025 was conducted to update the list of invasive plants with the potential to occur in the RAA, along with their provincial designations and management priorities.
- Trace metal sampling occurred in 2021, with soil and vegetation tissue samples collected and analyzed for 19 soil chemical parameters. Six out of 19 soil chemical parameters exceeded industrial thresholds at one or more plots. Arsenic was particularly high, exceeding thresholds at 10 of 19 plots, with two plots showing exceptionally high exceedances (3,725% and 2,683.3%). Exceedances for zinc (104.1%), copper (100.0%), antimony (33.0%), nickel (4.2%), and chromium (16.1% and 34.5%) were also detected across three plots. While there are no established threshold values for vegetation, dry weight concentrations in vegetation tissues were often higher for some of the parameters that significantly exceeded soil thresholds.



- Wetland function surveys were conducted in 2024 on four representative wetlands in the RAA. Three of these wetlands were classified dominantly as marshes and one as a fen. All four surveyed wetlands received a “Moderate-High” wetland function rating, with scores ranging from 30 to 36, indicating a relatively high ecological value.
- The Project interacts primarily with the traditional and unceded territory of the Taku River Tlingit. Traditional land use activities, including harvesting of plants for subsistence, cultural, and medicinal purposes, are central to the Taku River Tlingit way of life, both historically and today. Consultation with the Taku River Tlingit is ongoing, and their traditional knowledge regarding culturally and medicinally significant plants will be incorporated into the EA.



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APPENDICES



APPENDIX A TERRESTRIAL ECOSYSTEM MAPPING ATTRIBUTE CODES



Appendix Table A-1. Terrestrial ecosystem mapping shapefile attribute descriptions.

Field	Description
OBJECTID *	Autofills with ID number
Shape *	Autofills with "Polygon"
SDEC_1	Decile ecosystem component 1
SITE_S1	Site series ecosystem component 1
SITE_M1A	Site modifier 1 of ecosystem component 1
SITE_M1B	Site modifier 2 of ecosystem component 1
STRCT_S1	Structural stage ecosystem component 1
STAND_A1	Stand composition ecosystem component 1
DISTCLS_1	Disturbance class ecosystem component 1
SDEC_2	Decile ecosystem component 2
SITE_S2	Site series ecosystem component 2
SITE_M2A	Site modifier 1 of ecosystem component 2
SITE_M2B	Site modifier 2 of ecosystem component 2
STRCT_S2	Structural stage ecosystem component 2
STAND_A2	Stand composition ecosystem component 2
DISTCLS_2	Disturbance class ecosystem component 2
SDEC_3	Decile ecosystem component 3
SITE_S3	Site series ecosystem component 3
SITE_M3A	Site modifier 1 of ecosystem component 3
SITE_M3B	Site modifier 2 of ecosystem component 3
STRCT_S3	Structural stage ecosystem component 3
STAND_A3	Stand composition ecosystem component 3
DISTCLS_3	Disturbance class ecosystem component 3
Shape_Length	Polygon length
Shape_Area	Total area of polygon, in hectares

Appendix Table A-2. Terrestrial ecosystem mapping site series codes and other non-forested codes.

BEC Unit	Site Series Code	Map Code	Name	Wetland Classification Equivalent
CWHvh2	Af	-	alpine fellfield	-
	Ah	-	alpine heath	-
	Am	-	alpine meadow	-
	At	-	alpine tundra	-
MHun	01	MB	mountain hemlock - amabilis fir / Alaskan blueberry	-
	02	MM	mountain hemlock - amabilis fir / pink mountain-heather	-
	05	MT	amabilis fir - mountain hemlock / rosy twistedstalk	-



BEC Unit	Site Series Code	Map Code	Name	Wetland Classification Equivalent
	-	AC	avalanche chute	-
	-	AM	herb meadow	-
	-	CA	crowberry – bog blueberry – alpine Azalea	-
	-	HM	heath meadow	-
	-	MK	mountain hemlock krummholz	-
MHmm2	01	MB	mountain hemlock - amabilis fir / Alaskan blueberry	-
	02	MM	mountain hemlock - amabilis fir / pink mountain-heather Moist Maritime 2	-
	03	MO	amabilis fir - mountain hemlock / oak fern Moist Maritime 2	-
	05	MT	amabilis fir - mountain hemlock / rosy twistedstalk	-
	07	YH	yellow-cedar - mountain hemlock / green false-hellebore	-
	-	AC	avalanche chute	-
	-	AM	herb meadow	-
	-	CA	crowberry – bog blueberry – alpine Azalea	-
	-	HM	heath meadow	-
	-	MK	mountain hemlock krummholz	-
	-	Wf	fen	-
	-	WM	wet seepage meadow	-
	-	Ws	swamp	-
CWHwm	01	HB	western hemlock - Sitka spruce / Alaskan blueberry1	-
	02	HM	western hemlock - Sitka spruce / step moss1	-
	03	SO	Sitka spruce - western hemlock / oak fern1	-
	04	SD	Sitka spruce - western redcedar / devil's club1	-
	05	SS	Sitka spruce / salmonberry Wet Maritime1	-
	06	CD	black cottonwood - red alder / salmonberry1	-
	07	CW	Sitka willow - false lily-of-the-valley	F150
	-	AC	avalanche chute	-
	-	AD	Sitka alder - devil's club	-
	-	AS	alder - Sitka sedge - bluejoint	-
	-	CS	clear-cut, shrubby	-
	-	CU	clear-cut, unvegetated	-
	-	SF	sedge fen	-
	-	Wf	fen	-
	-	Wm	marsh	-
	-	Ws	swamp	-



Appendix Table A-3. Terrestrial ecosystem mapping non-vegetated site codes.

Code	Name	Description	Common Modifiers	Structural Stage
AN	Anthropogenic	Area subject to human disturbance. May include buildings or other structures.		-
GB	Gravel Bar	An elongated landform generated by waves and currents and usually running parallel to the shore. It is composed of unconsolidated small, rounded cobbles, pebbles, stones and sand.	n	1
GL	Glacier	Mass of perennial snow and ice.		-
LA	Lake	A naturally occurring static body of water greater than 2 m deep in some portion. The boundary for the lake is the natural high-water mark.		-
MI	Mine	Unvegetated area for the extraction of mineral ore and other materials.		1
MN	Moraine	Unvegetated landform of unstratified glacial drift.		1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep.		-
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha).		-
RI	River	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial.	k,w	-
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover.	g,h,k,r,t,w,z	1
RP	Road Surface	An area cleared for transporting goods and services by vehicles. Paved or gravel.		1
RU	Rubble	Small angular rock fragments (between 2 and 256 mm) deposited by gravity or ice.		1
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium.	k,n,r,w,z	1

Appendix Table A-4. Terrestrial ecosystem mapping structural stage descriptions (STRCT_S).

Code	Name	Description
0	No data	Initial stages of primary and secondary succession; bryophytes and lichens often dominant, can be up to 100%; time since disturbance <20 years for normal forest succession, may be prolonged (50–100+ years) where there is little or no soil development (bedrock, boulder fields); total shrub and herb cover <20%; total tree layer cover <10%
1	Sparse/Bryoid	
1a	Sparse	<10% vegetation cover
1b	Bryoid	Bryophyte-dominated communities (>½ of total vegetation cover)
1c	Lichen	Lichen-dominated communities (>½ of total vegetation cover)
2	Herb	Early successional stage or herbaceous communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding, intensive grazing, intense fire damage); dominated by herbs (forbs, graminoids, ferns); some invading or residual shrubs and trees may be present; tree layer cover <10%, shrub layer cover <or equal to 20% or <1/3 of total cover, herb layer cover >20%, or >or equal to 1/3 of total cover; time since disturbance <20 years for normal forest succession; many herbaceous communities are perpetually maintained in this stage.



Code	Name	Description
2a	Forb-dominated	Herbaceous communities dominated (>½ of the total herb cover) by non-graminoid herbs, including ferns.
2b	Graminoid-dominated	Herbaceous communities dominated (>½ of the total herb cover) by grasses, sedges, reeds and rushes.
2c	Aquatic	Herbaceous communities dominated (>½ of the total herb cover) by floating or submerged aquatic plants; does not include sedges growing in marshes with standing water (which are classed as 2b)
2d	Dwarf Shrub	Communities dominated (>½ of the total herb cover) by dwarf woody species such as <i>Phyllodoce empetrifomis</i> , <i>Cassiope mertensiana</i> , <i>Cassiope tetragona</i> , <i>Arctostaphylos arctica</i> , <i>Salix reticulata</i> and <i>Rhododendron lapponicum</i> . (See list of dwarf shrubs assigned to the herb layer in the Field Manual for Describing Terrestrial Ecosystems.).
3	Shrub	Early successional stage or shrub communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding, intensive grazing, intense fire damage); dominated by shrubby vegetation; seedlings and advance regeneration may be abundant; tree layer cover <10%, shrub layer cover >20% or >or equal to 1/3 of total cover.
3a	Low Shrub	Communities dominated by shrub layer vegetation <2 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance <20 years for normal forest succession.
3b	Tall Shrub	Communities dominated by shrub layer vegetation that are 2–10 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 40 years for normal forest succession.
4	Pole/Sapling	Trees >10 m tall, typically densely stocked, have overtopped shrub and herb layers; younger stands are vigorous (usually >10–15 years old); older stagnated stands (up to 100 years old) are also included; self-thinning and vertical structure not yet evident in the canopy – this often occurs by age 30 in vigorous broadleaf stands, which are generally younger than coniferous stands at the same structural stage; time since disturbance is usually <40 years for normal forest succession; up to 100+ years for dense (5000–15000+ stems per hectare) stagnant stands.
5	Young Forest	Self-thinning has become evident and the forest canopy has begun differentiation into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole/sapling stage; time since disturbance is generally 40–80 years but may begin as early as age 30, depending on tree species and ecological conditions.
6	Mature Forest	Trees established after the last disturbance have matured; a second cycle of shade-tolerant trees may have become established; understories become well-developed as the canopy opens up; time since disturbance is generally 80–140.
7	Old Forest	Old, structurally complex stands composed mainly of shade-tolerant and regenerating tree species, although older seral and long-lived trees from a disturbance such as fire may still dominate the upper canopy; snags and coarse woody debris in all stages of decomposition typical, as are patchy understories; understories may include tree species uncommon in the canopy, due to inherent limitations of these species under the given conditions; time since disturbance generally >140 years.

Appendix Table A-5. Terrestrial ecosystem mapping forest stand composition descriptions (STAND_A).

Code	Description
C	Coniferous (>75%)
M	Mixed
D	Deciduous (>75%)



Appendix Table A-6. Terrestrial ecosystem mapping site modifier descriptions from 2002 study (SITE_MA).

Site Modifier Code	Criteria
a	active floodplain
c	coarse-textured soils (>70% coarse fragments)
d	deep soil (>100 cm)
f	fine-textured soils
g	gullying occurring
h	hummocky terrain
j	gentle slope (<35%)
k	cool aspect (285 deg. – 135 deg.) on 35%-100% slope
m	medium-textured soils
n	fan or cone
p	peaty materials
q	very steep cool aspect (285 deg. – 135 deg., >100%)
r	ridge
s	shallow soils (20-100 cm)
t	terrace
v	very shallow soils (<20 cm)
w	warm aspect (135 deg. – 285 deg.) on 35%-100% slope
z	very warm steep aspect (135 deg. – 285 deg.) on >100% slope

Appendix Table A-7. Terrestrial ecosystem mapping slope descriptions.

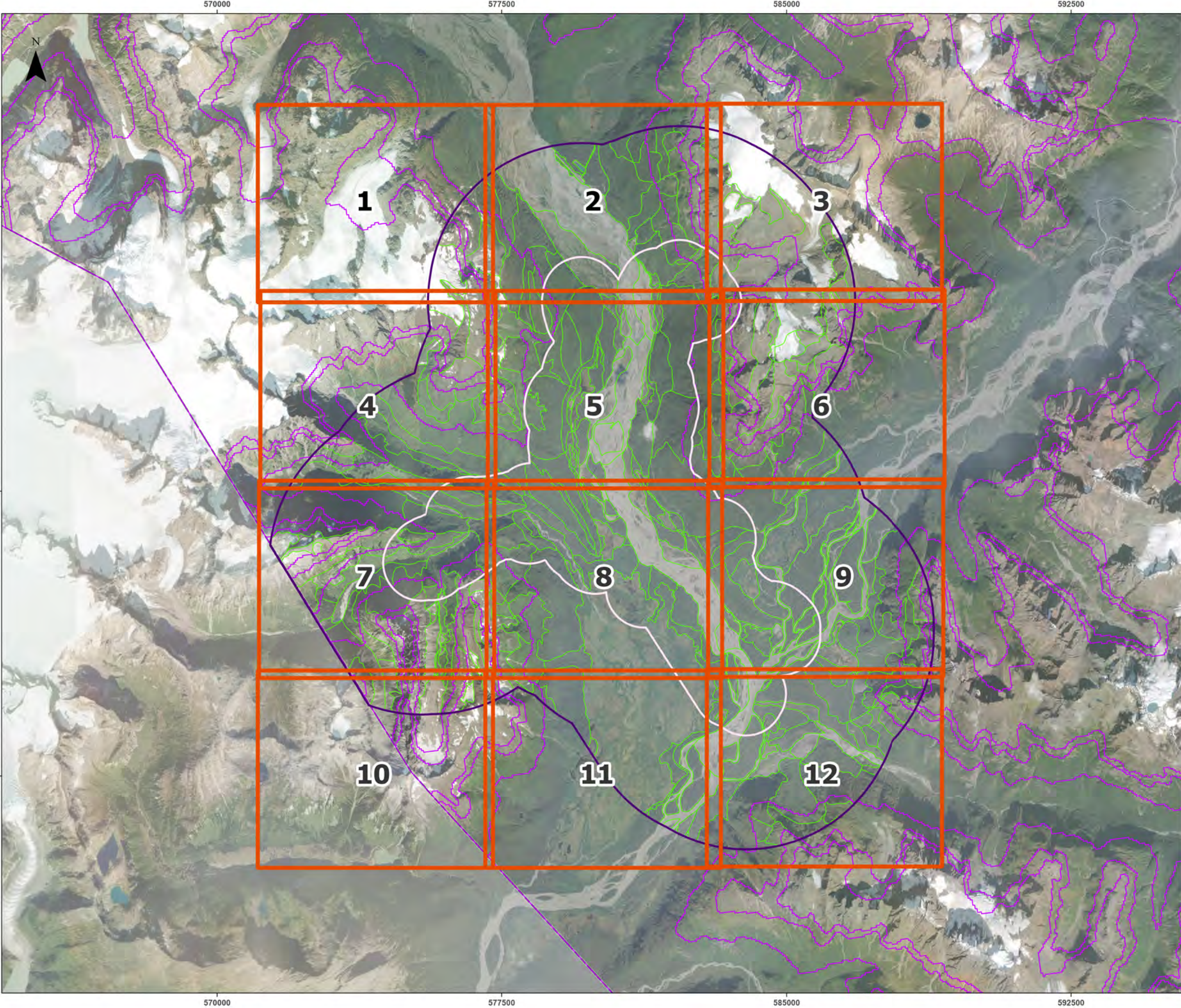
Type of Slope	Slope Range (%)
Flat/Neutral	<10
Gentle	10 – 25
Moderate	25 – 45
Steep	45 -75
Very Steep	>75

Appendix Table A-8. Terrestrial ecosystem mapping aspect descriptions.

Aspect Type	Aspect Range (°)
Cool	285 - 135
Warm	135 -285
Neutral	On slope <10%



APPENDIX B TERRESTRIAL ECOSYSTEM MAPPING POLYGON DELINEATION MAPS



Terrestrial ecosystem mapping polygon overview

Legend

BC/Alaska Border

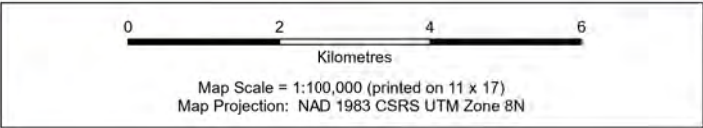
TEM Map Index

Biogeoclimatic Zones

2025 TEM Polygons

Regional Assessment Area

Local Assessment Area



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021
- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community.

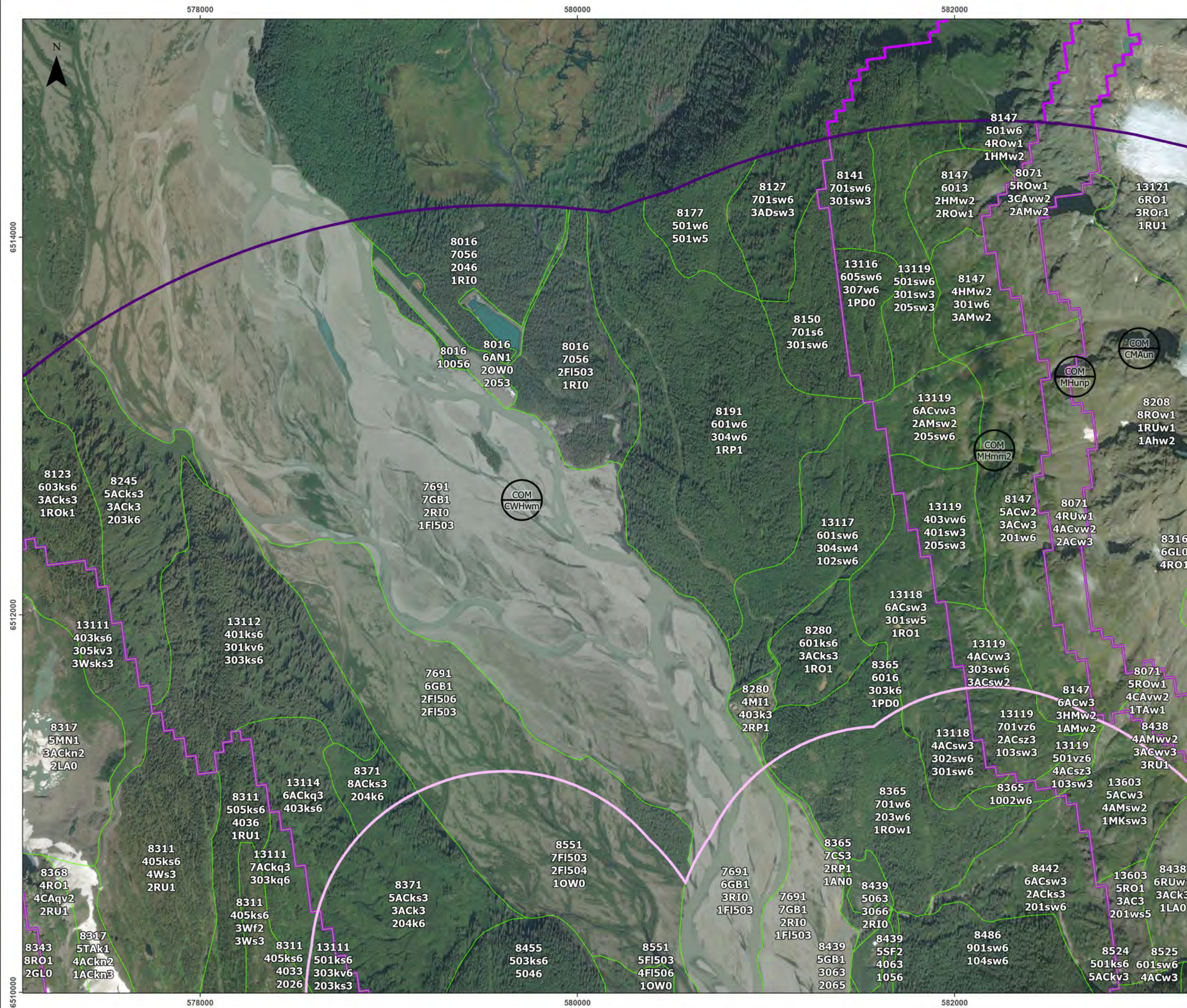
Disclaimer

EDI Environmental Dynamics Inc. has made every effort to verify this map is free of errors. Data have been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: C. Norton	Checked: S Kruk	Map B-1	Date: 5/29/2025
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Path: L:\PROJECTS\2020\20200308_May\04\0301_Venture\04_0301_TEM\Map_B-1_TEM\Map_B-1_TEM.aprx 2025/05/29



Terrestrial ecosystem mapping polygon
map 2 of 12

Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

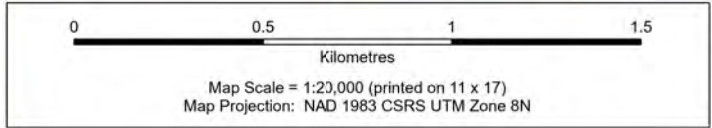
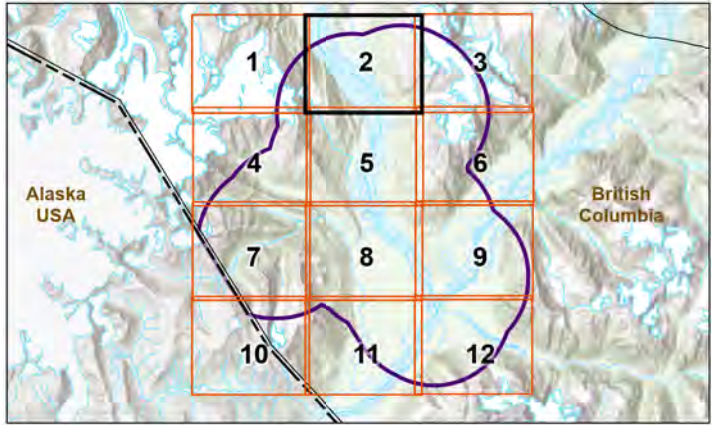
Terrestrial Ecosystem Mapping Label

Polygon Number: 502
Decile: 6
Site Series or Map Code: FFFks6C
Stand Composition: 6C
Structural Stage: 6C
Site Modifiers: 6C

Biogeoclimatic Zone Label

Ecosection Unit: SBP
Biogeoclimatic Unit: SBWmk

Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021
- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024. World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
- Main Basemap, Ecoregions - Ecoregion Ecosystem Classification of British Columbia.
- Main Basemap, World Hillshade: Esri, CGIAR, USGS.

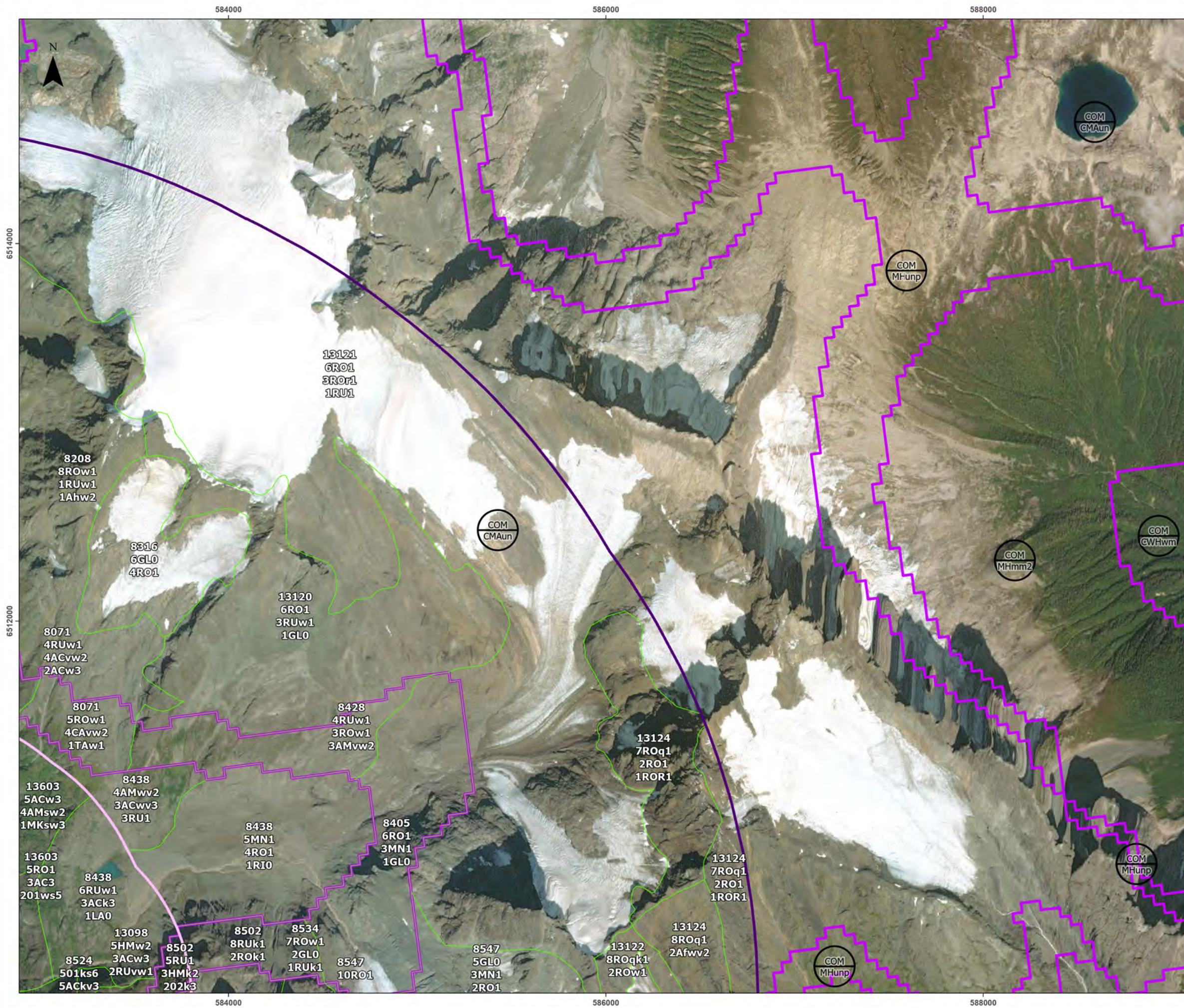
Disclaimer

EDI Environmental Dynamics Inc. has made every effort to verify this map is free of errors. Data have been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-3	Date: 5/29/2025
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Terrestrial ecosystem mapping polygon map 3 of 12

Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

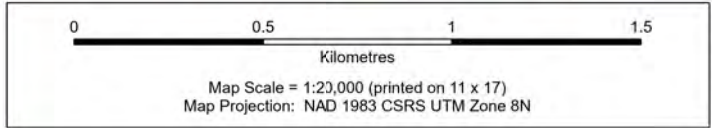
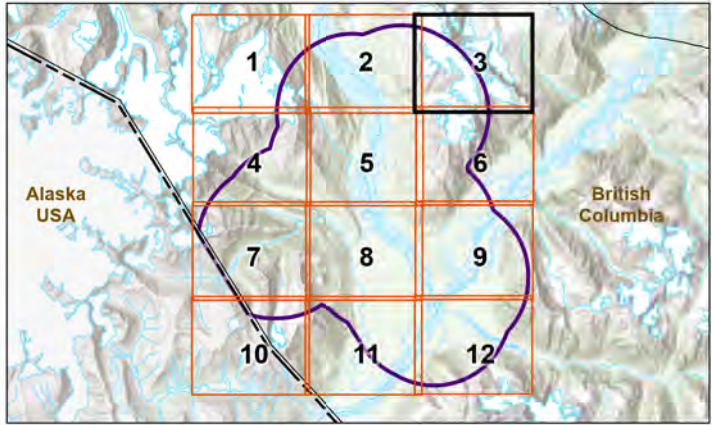
Terrestrial Ecosystem Mapping Label

Polygon Number: 502
Decile: 6FFks6C
Stand Composition: 6C
Site Series or Map Code: 6FFks6C
Site Modifiers: 6C
Structural Stage: 6C

Biogeoclimatic Zone Label

Ecosection Unit: SBP
Biogeoclimatic Unit: SBWmk

Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Data Sources

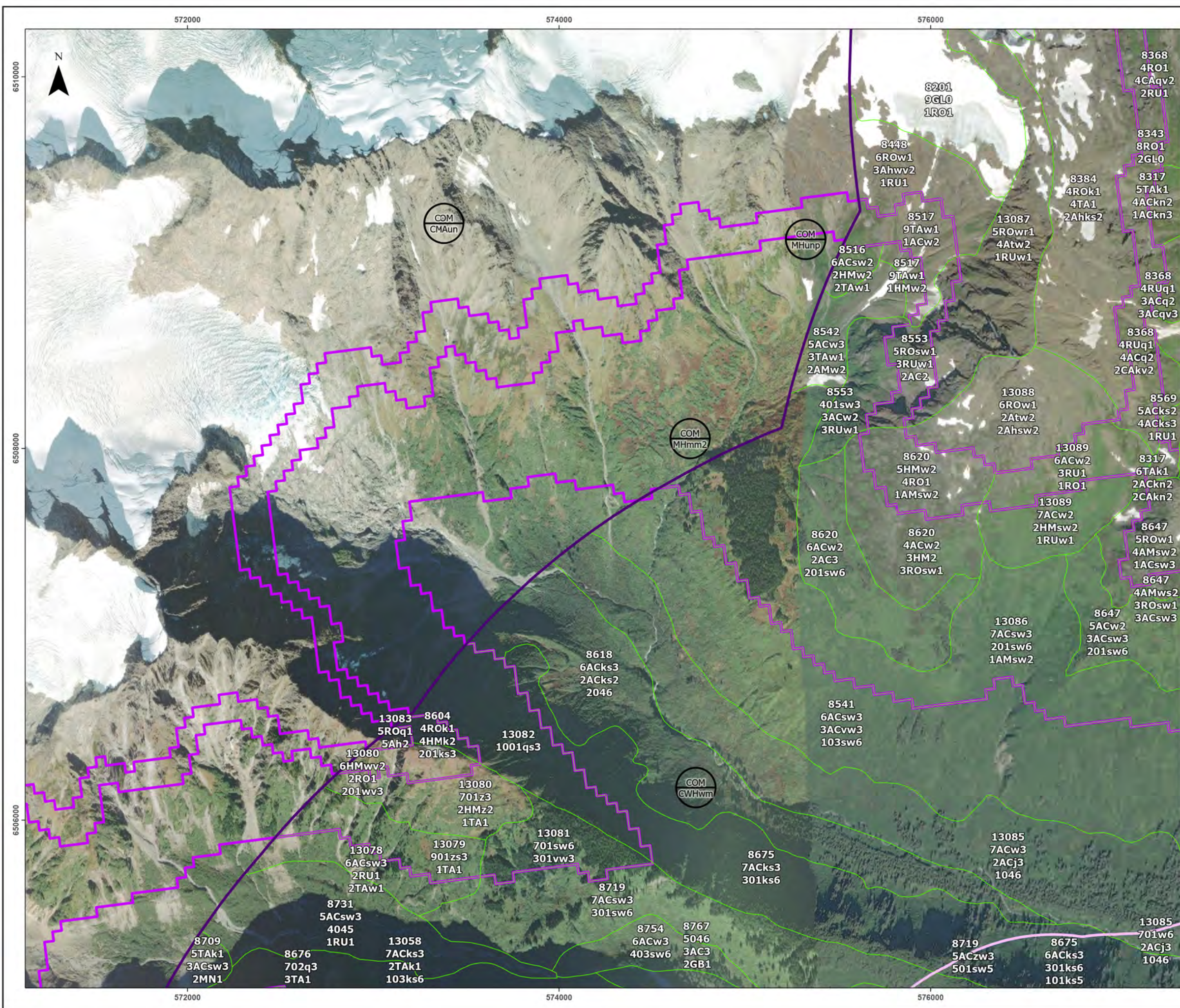
- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021
- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
- Main Basemap, Ecoregions - Ecoregion Ecosystem Classification of British Columbia:
- Main Basemap, World Hillshade: Esri, CGIAR, USGS.

Disclaimer

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Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-4	Date: 5/29/2025
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Terrestrial ecosystem mapping polygon map 4 of 12

Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

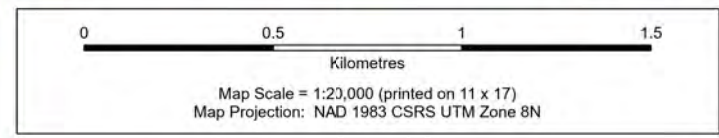
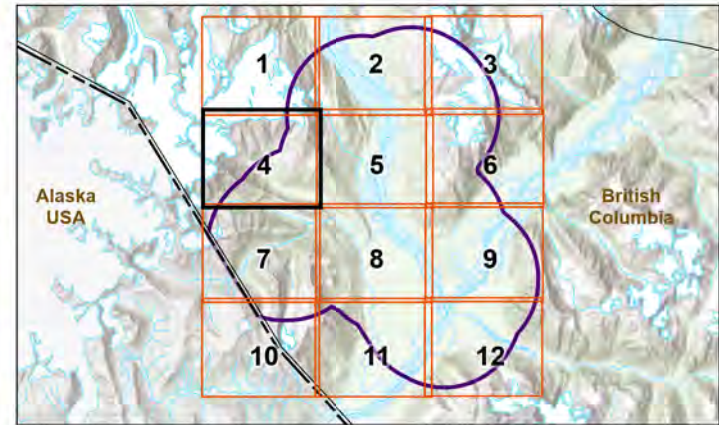
Terrestrial Ecosystem Mapping Label

Polygon Number: 502
Decile: 6
Site Series or Map Code: 6FFks6C
Stand Composition: 6C
Structural Stage: 6C
Site Modifiers: 6C

Biogeoclimatic Zone Label

Ecosection Unit: SBP
Biogeoclimatic Unit: SBWmk

Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Data Sources

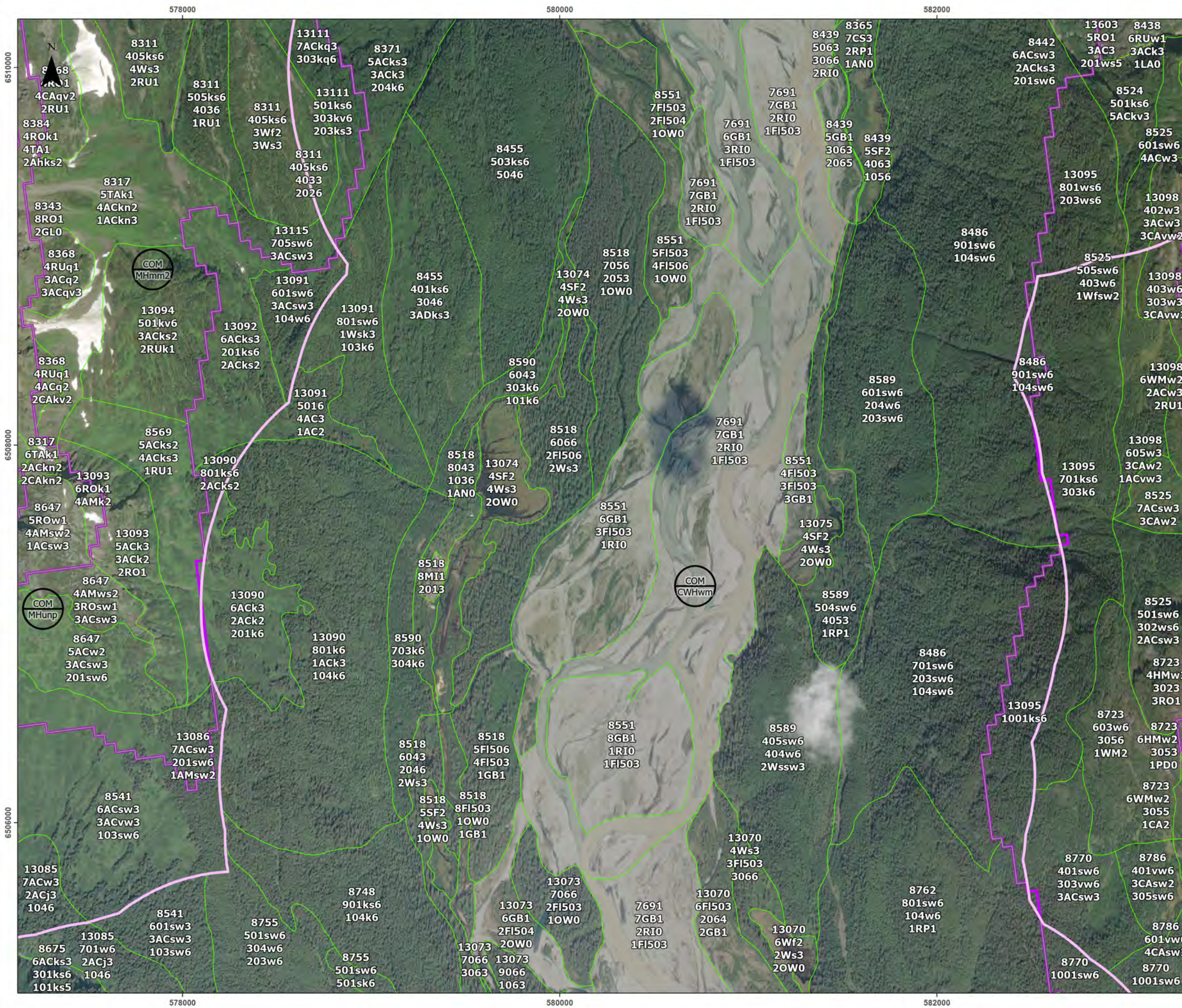
- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021
- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
- Main Basemap, Ecoregions - Ecoregion Ecosystem Classification of British Columbia:
- Main Basemap, World Hillshade: Esri, CGIAR, USGS.

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Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-5	Date: 5/29/2025
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Terrestrial ecosystem mapping polygon map 5 of 12

Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

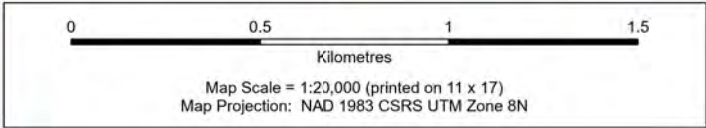
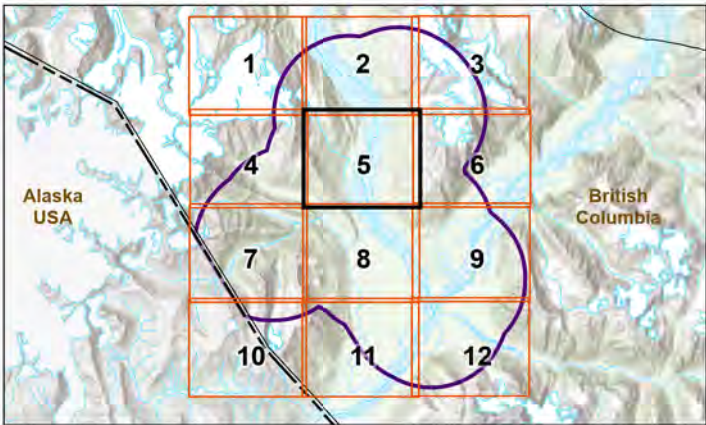
Terrestrial Ecosystem Mapping Label

Polygon Number: 502
Decile: 6
Site Series or Map Code: FFFks6C
Stand Composition: 6C
Structural Stage: 6C
Site Modifiers: 6C

Biogeoclimatic Zone Label

Ecosection Unit: SBP
Biogeoclimatic Unit: SBWmk

Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021
- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
- Main Basemap, Ecoregions - Ecoregion Ecosystem Classification of British Columbia.
- Main Basemap, World Hillshade: Esri, CGIAR, USGS.

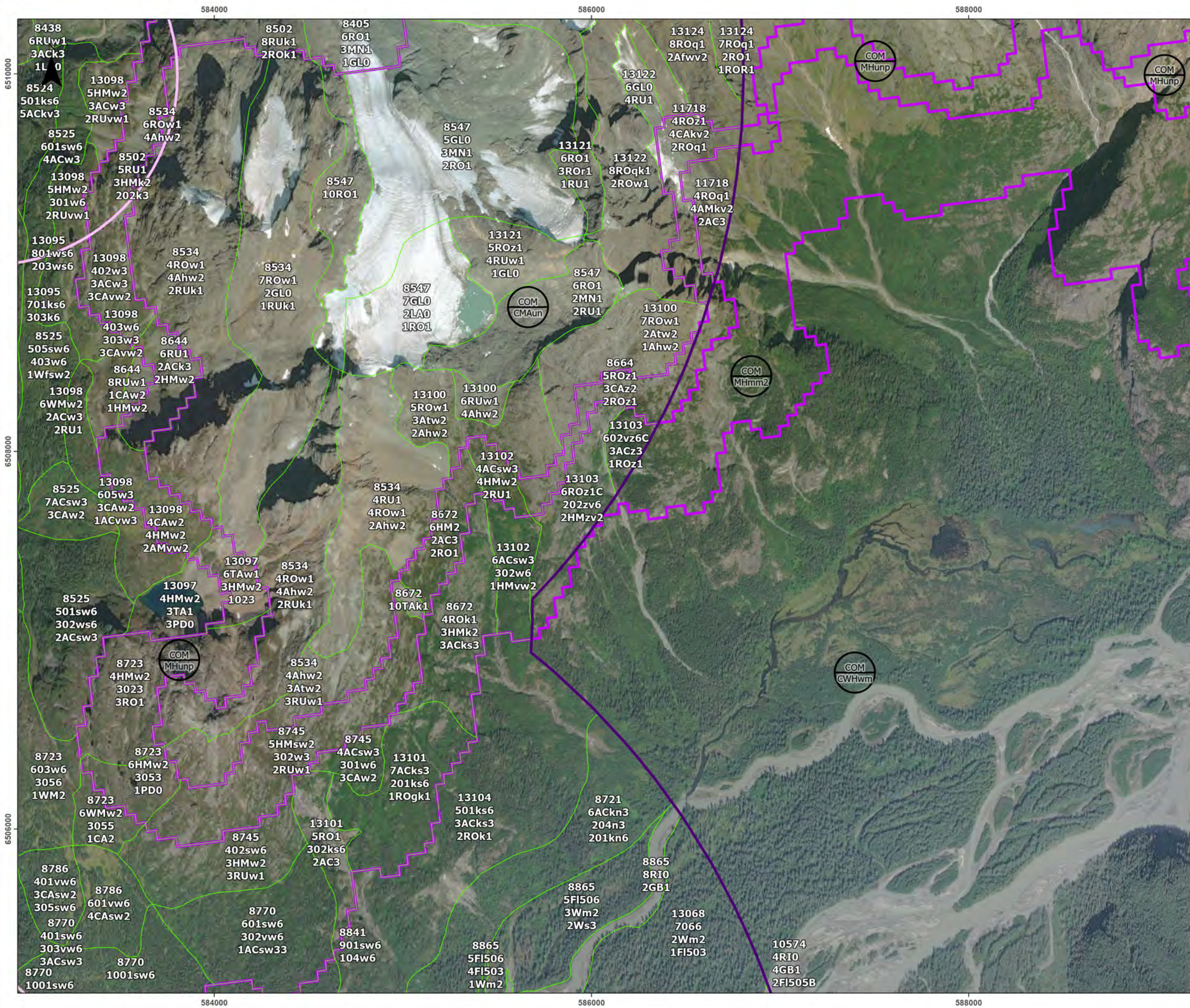
Disclaimer

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Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-6	Date: 5/29/2025
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Terrestrial ecosystem mapping polygon map 6 of 12

Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

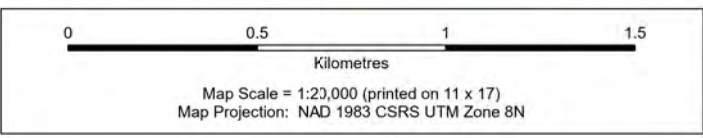
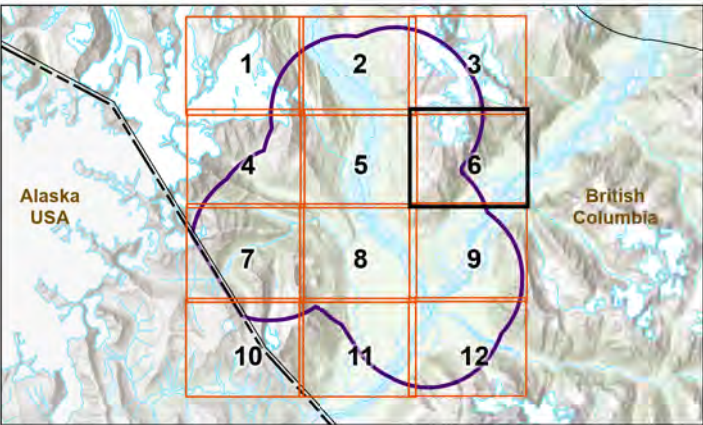
Terrestrial Ecosystem Mapping Label

Polygon Number: 502
Decile: 6
Site Series or Map Code: FFFks6C
Stand Composition: 6C
Structural Stage: 6C
Site Modifiers: FFFks6C

Biogeoclimatic Zone Label

Ecosection Unit: SBP
Biogeoclimatic Unit: SBWmk

Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Data Sources

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- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
- Main Basemap, Ecoregions - Ecoregion Ecosystem Classification of British Columbia:
- Main Basemap, World Hillshade: Esri, CGIAR, USGS.

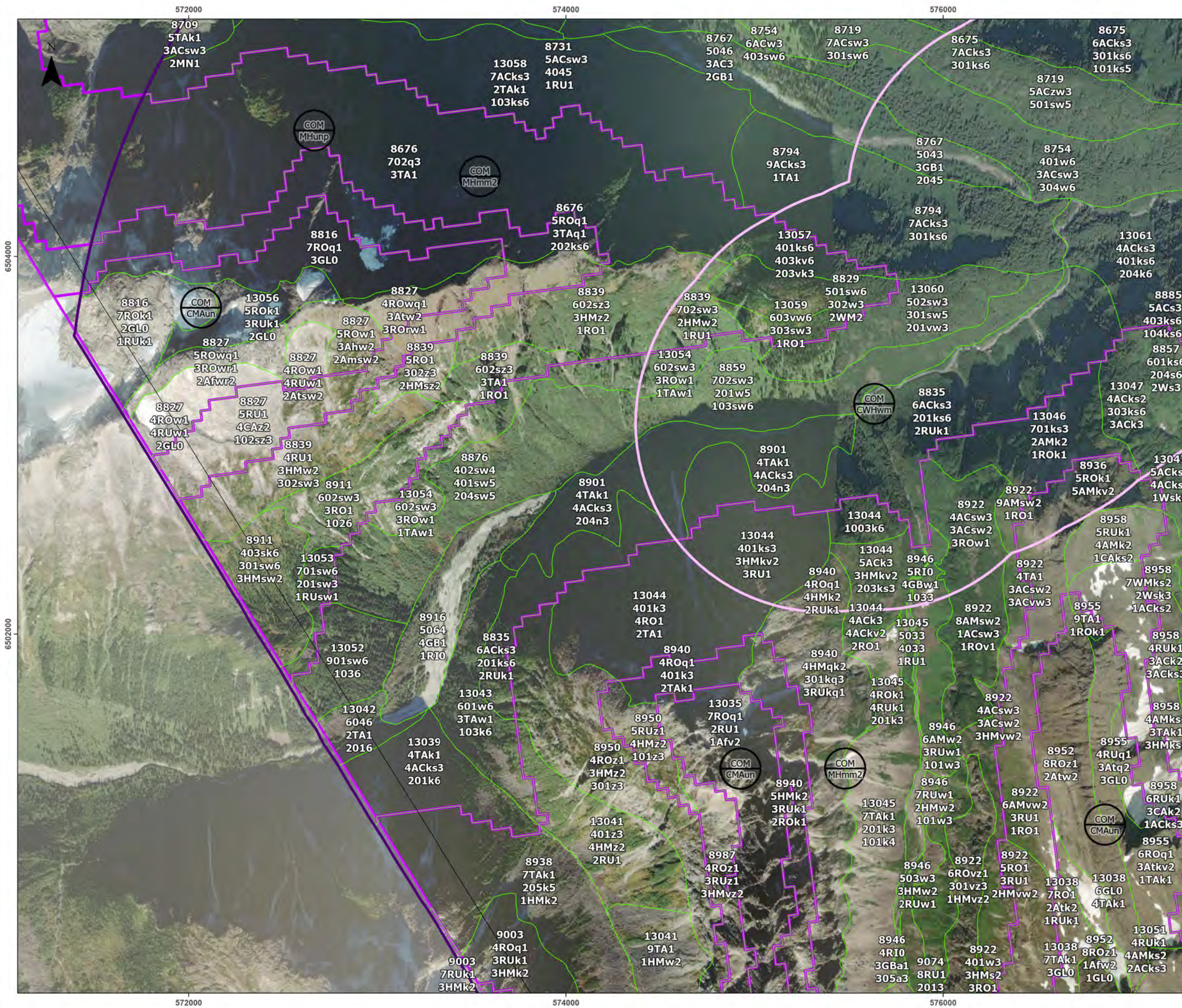
Disclaimer

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Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-7	Date: 5/29/2025
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Terrestrial ecosystem mapping polygon map 7 of 12

Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

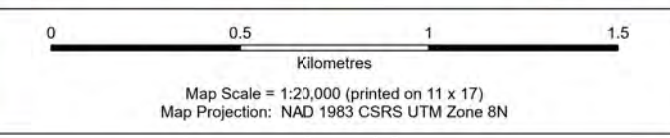
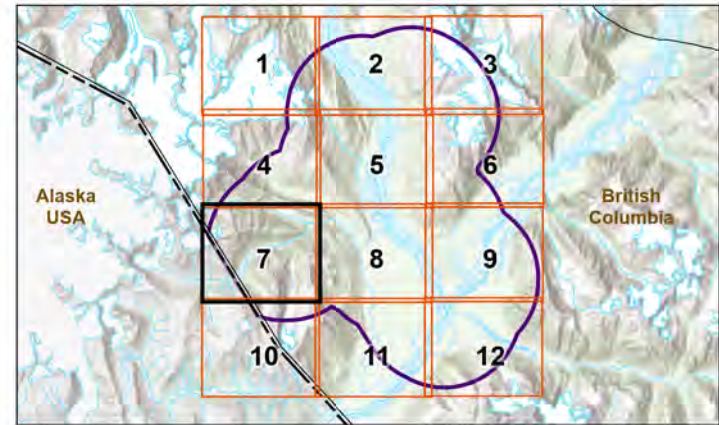
Terrestrial Ecosystem Mapping Label

Polygon Number: 502
Decile: 6
Site Series or Map Code: FFFks6C
Stand Composition: 6C
Structural Stage: 6C
Site Modifiers: FFFks6C

Biogeoclimatic Zone Label

Ecosection Unit: SBP
Biogeoclimatic Unit: SBWmk

Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Data Sources

- Site Layout, Ausenco, November 19, 2024.
- TEM data, Environmental Dynamics Inc. 2021
- BEC data, Government of British Columbia, 2024.
- Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024. World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
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- Main Basemap, World Hillshade: Esri, CGIAR, USGS.

Disclaimer

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Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-8	Date: 5/29/2025
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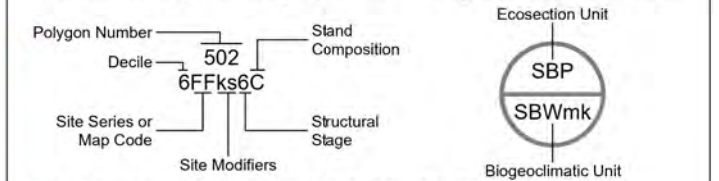


Terrestrial ecosystem mapping polygon map 9 of 12

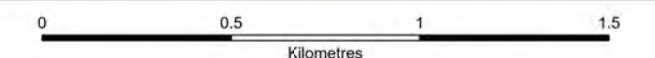
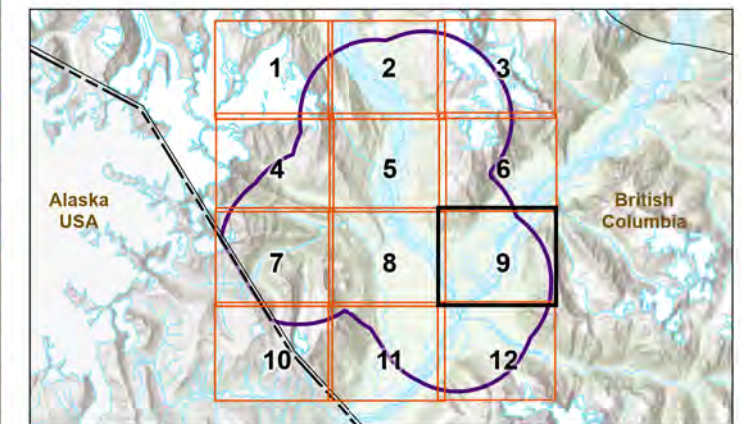
Legend

- 2025 TEM Polygons
- Biogeoclimatic Zones
- Regional Assessment Area
- Local Assessment Area

Terrestrial Ecosystem Mapping Label Biogeoclimatic Zone Label



Note: Label codes are described in Appendix A of the Block Cave Project | Terrestrial Ecosystem Mapping Technical Report (EDI 2024).



Map Scale = 1:23,000 (printed on 11 x 17)
Map Projection: NAD 1983 CSRS UTM Zone 8N

- #### Data Sources
- Site Layout, Ausenco, November 19, 2024.
 - TEM data, Environmental Dynamics Inc. 2021
 - BEC data, Government of British Columbia, 2024.
 - Main Basemap, Freshwater Atlas, Digital Road Atlas, and BC/Alaska Border, Government of BC, CanVec, Government of Canada, Alaska Data, US Geological Survey, 2024, World Imagery (Wayback 2024-08-15); Esri, Maxar, Earthstar Geographics, and the GIS User Community
 - Main Basemap, Ecoregions - Ecoregion Ecosystem Classification of British Columbia:
 - Main Basemap, World Hillshade: Esri, CGIAR, USGS.

Disclaimer
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Drawn: C. Norton	Checked: S. Kruk	Appendix Map B-10	Date: 5/29/2025
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APPENDIX C TRACE METAL LABORATORY RESULTS



Attention: Rachelle Robitaille

EDI Environmental Dynamics Inc.
2195 2nd Ave
Whitehorse, YT
Canada Y1A 3T8

Your C.O.C. #: 644362-04-01, 644362-07-01, 644362-05-01, 644362-03-01, 644362-02-01, 644362-06-01

Report Date: 2021/09/27
Report #: R3076787
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C158547

Received: 2021/08/11, 13:30

implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Customer Solutions, Western Canada Customer Experience Team

Email: customersolutionswest@bureauveritas.com

Phone# (604) 734 7276

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR370	ADR371	ADR373	ADR374		
Sampling Date		2021/08/09	2021/08/09	2021/08/09	2021/08/09		
COC Number		644362-04-01	644362-04-01	644362-04-01	644362-04-01		
	UNITS	NPT_054_SALIA SP	NPT_054_VIBE EDU	NPT_058_CORN SER	NPT_058_VIBE EDU	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	16.9	178	22.7	160	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0110	0.0141	0.0051	0.0155	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.060	0.094	0.051	0.199	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	29.0	139	158	198	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	35.0	10.0	11.5	23.6	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	2.41	0.116	0.0124	0.491	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	9220	13400	20000	10400	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	0.25	ND	0.39	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.419	0.118	0.045	0.167	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	6.97	6.20	4.29	3.50	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	67.3	164	106	203	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.132	0.178	0.046	0.146	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	2080	4110	3140	1770	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	107	63.1	32.3	34.8	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.412	0.465	0.372	0.155	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	4.44	4.10	2.49	5.53	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1190	2830	2160	1430	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	13900	31800	17700	18600	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	0.123	ND	ND	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	ND	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	17	25	14	13	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	35.8	54.6	85.5	46.5	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	0.0022	ND	0.0040	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	0.11	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	1.19	3.96	2.17	5.89	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0047	0.0176	0.0053	0.0506	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	0.30	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	139	45.5	21.4	44.9	0.20	A338154

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR376	ADR377	ADR386	ADR387		
Sampling Date		2021/08/09	2021/08/09	2021/08/06	2021/08/06		
COC Number		644362-04-01	644362-04-01	644362-07-01	644362-07-01		
	UNITS	NPT_055_CON SER	NPT_055_VIBE EDU	NPT_003_CORN SER	NPT_003_VIBE EDU	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	16.4	43.4	620	1030	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0067	0.0062	0.0693	0.124	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.035	0.033	1.43	1.94	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	31.0	95.7	71.9	62.1	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	0.019	0.032	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	0.013	0.025	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	16.7	26.5	10.3	19.0	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0701	1.32	0.0491	0.224	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	37700	22400	26300	11800	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	0.11	1.84	3.39	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.035	0.058	0.656	1.29	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	4.62	4.41	7.02	8.66	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	67.3	58.6	1320	2290	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.123	0.042	0.578	1.02	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	4150	3510	3010	2340	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	78.0	56.7	74.0	63.0	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	0.012	0.013	0.012	0.015	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.380	0.139	0.742	0.482	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	1.19	0.954	4.04	5.27	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	4230	2890	2080	1690	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	18400	28100	14600	19200	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	0.074	0.103	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	0.0155	0.0271	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	14	13	53	49	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	41.4	28.8	86.6	41.4	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	0.0068	0.0108	0.0180	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	1.26	1.18	48.2	78.8	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0046	0.0045	0.125	0.258	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	2.72	4.96	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	21.1	25.8	20.6	26.7	0.20	A338154
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR389		ADR390	ADR392		
Sampling Date		2021/08/06		2021/08/06	2021/08/06		
COC Number		644362-07-01		644362-07-01	644362-07-01		
	UNITS	NPT_006_CORN SER	QC Batch	NPT_006_VIBE EDU	NPT_009_CORN SER	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	45.2	A338154	463	19.8	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0096	A338154	0.0532	ND	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.059	A338154	0.748	0.021	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	42.2	A338154	66.7	38.5	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	A338154	0.017	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	8.6	A338154	20.5	17.8	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0090	A338154	0.0857	0.0091	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	20600	A338154	13300	38300	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.15	A338154	2.23	ND	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.047	A338154	0.523	0.036	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	3.88	A338154	5.94	3.37	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	116	A338154	1010	75.4	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.068	A338154	0.404	0.039	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	3090	A338154	2670	4850	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	27.7	A338154	44.0	63.9	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	A338154	0.015	0.012	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.596	A338154	0.613	0.077	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	2.03	A338154	3.86	2.30	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	2300	A338154	1700	2650	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	16000	A338154	24200	14800	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	A338154	0.066	ND	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	A338154	0.0090	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	13	A338154	25	10	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	68.4	A338154	50.6	88.9	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	A338154	0.0056	0.0023	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	A338154	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	3.69	A338154	42.2	1.49	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0068	A338154	0.0951	0.0041	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	A338154	2.37	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	16.6	A338154	23.6	11.9	0.20	A358708
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR392	ADR393	ADR412	ADR413		
Sampling Date		2021/08/06	2021/08/06	2021/08/09	2021/08/09		
COC Number		644362-07-01	644362-07-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_CORN SER Lab-Dup	NPT_009_VIBE EDU	NPT_059A_CORN SER	NPT_059A_VIBE EDU	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	21.7	108	13.2	168	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	ND	0.0087	0.0067	0.0055	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.023	0.081	0.614	0.025	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	39.3	53.8	90.7	161	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	18.4	21.2	5.1	8.0	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0108	0.0922	0.0133	0.236	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	37900	14900	15100	11300	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	0.36	ND	0.21	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.037	0.123	0.026	0.194	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	3.39	6.05	3.66	4.19	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	75.4	153	51.2	68.9	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.036	0.077	0.039	0.074	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	4890	3730	2390	2830	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	63.2	76.1	21.9	49.4	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	0.013	0.029	ND	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.077	0.229	1.10	1.28	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	2.31	4.52	3.03	6.03	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	2680	3700	1820	1480	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	15000	34800	10800	21600	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	ND	0.056	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	11	16	ND	13	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	91.6	37.6	57.7	50.7	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	0.0020	0.0047	ND	0.0046	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	1.54	4.80	1.06	1.79	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0035	0.0153	0.0025	0.0145	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	0.20	ND	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	12.0	24.7	13.7	25.7	0.20	A358708

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR415	ADR416	ADR418		
Sampling Date		2021/08/09	2021/08/09	2021/08/10		
COC Number		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_059B_CORN SER	NPT_059B_VIBE EDU	NPT_020A_CORN SER	RDL	QC Batch
Total Metals by ICPMS						
Total (Dry Wt) Aluminum (Al)	mg/kg	38.4	157	37.3	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0056	0.0051	ND	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.027	ND	ND	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	112	87.6	89.3	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	5.4	6.5	5.6	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0220	0.153	ND	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	16900	9400	15500	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.13	0.20	ND	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.072	0.100	0.028	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	4.07	3.89	5.12	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	98.7	52.3	51.9	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.085	0.068	0.043	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	2860	1760	2440	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	27.7	31.5	27.5	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	1.45	1.22	0.759	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	4.10	4.74	3.78	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	1850	1260	2280	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	12700	18300	12200	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	ND	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	12	ND	ND	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	64.8	37.0	60.5	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	0.0028	ND	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	3.60	1.18	1.09	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0061	0.0122	0.0032	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	15.3	25.5	24.3	0.20	A358708
RDL = Reportable Detection Limit						
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.						



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR419	ADR421		ADR431		
Sampling Date		2021/08/10	2021/08/10		2021/08/08		
COC Number		644362-05-01	644362-05-01		644362-03-01		
	UNITS	NPT_020A_VIBE EDU	NPT_060A_CORN SER	QC Batch	NPT_022A_SALIX SP	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	153	19.9	A338154	16.1	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0068	0.0445	A338154	0.0050	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.054	0.289	A338154	0.026	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	94.3	143	A338154	45.8	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	A338154	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	A338154	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	14.0	11.8	A338154	20.5	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.193	0.0183	A338154	2.36	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	11700	23100	A338154	14700	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.26	0.10	A338154	ND	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.112	0.030	A338154	0.600	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	5.13	3.75	A338154	7.61	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	105	56.3	A338154	56.1	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.071	0.893	A338154	0.064	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	2860	3160	A338154	2720	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	40.5	71.4	A338154	160	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	0.011	0.012	A338154	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.520	0.615	A338154	0.418	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	3.73	4.15	A338154	12.5	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	2100	2140	A338154	1530	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	30900	9750	A338154	15300	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	A338154	0.077	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	A338154	ND	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	21	15	A338154	12	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	43.9	102	A338154	58.2	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	ND	A338154	0.0021	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	A338154	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	1.96	0.94	A338154	1.06	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0104	0.0038	A338154	0.0036	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	A338154	ND	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	26.8	24.1	A338154	122	0.20	A358708
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR433	ADR435		ADR437		
Sampling Date		2021/08/08	2021/08/08		2021/08/08		
COC Number		644362-03-01	644362-03-01		644362-03-01		
	UNITS	NPT_047_VACC OVA	NPT_040_VACC OVA	QC Batch	NPT_053_SALIX SP	RDL	QC Batch
Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	64.9	88.5	A358708	25.6	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	ND	ND	A358708	0.142	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	ND	ND	A358708	0.994	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	28.9	57.6	A358708	37.2	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	A358708	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	A358708	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	13.3	9.4	A358708	13.2	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	ND	ND	A358708	4.98	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	5290	5650	A358708	7560	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	ND	ND	A358708	0.13	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	ND	ND	A358708	0.141	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	8.27	6.39	A358708	12.0	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	37.2	37.5	A358708	76.9	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.012	0.014	A358708	0.945	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	2830	2440	A358708	3670	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	1290	1630	A358708	44.2	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	A358708	ND	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.441	0.794	A358708	0.919	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	0.734	0.538	A358708	1.09	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1860	1810	A358708	1660	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	6750	6170	A358708	10800	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	A358708	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	A358708	0.0229	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	14	ND	A358708	14	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	5.00	7.86	A358708	36.0	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	ND	A358708	ND	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	A358708	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	ND	ND	A358708	1.54	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	ND	ND	A358708	0.0049	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	A358708	ND	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	18.8	22.7	A358708	254	0.20	A338154
RDL = Reportable Detection Limit							
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.							



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR438	ADR438	ADR442	ADR444		
Sampling Date		2021/08/08	2021/08/08	2021/08/07	2021/08/07		
COC Number		644362-03-01	644362-03-01	644362-02-01	644362-02-01		
	UNITS	NPT_053_CORN SER	NPT_053_CORN SER Lab-Dup	NPT_029_SALIX SP	NPT_031_CORN SER	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	24.4	23.1	15.2	46.7	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0882	0.0830	ND	0.0093	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.790	0.752	0.036	0.090	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	63.9	64.3	75.1	203	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	8.1	8.3	8.6	10.6	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.0144	0.0151	2.75	0.0238	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	16000	16000	16600	18200	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	0.10	ND	ND	0.13	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.025	0.025	1.54	0.051	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	4.86	5.01	5.31	2.97	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	76.9	74.8	78.5	112	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.921	0.889	0.037	0.115	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	3970	4030	1970	2760	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	17.3	17.5	200	21.2	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	1.92	1.93	0.494	0.857	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	0.777	0.799	7.80	2.99	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1560	1600	2020	1590	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	8890	9190	18000	13500	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	0.055	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	0.0074	0.0070	ND	ND	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	ND	ND	15	13	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	65.7	64.9	39.3	76.3	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	ND	0.0040	0.0028	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	1.63	1.57	1.51	3.69	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0079	0.0060	0.0104	0.0085	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	ND	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	16.9	17.1	93.1	16.6	0.20	A338154

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR445	ADR447	ADR448	ADR449		
Sampling Date		2021/08/07	2021/08/07	2021/08/07	2021/08/10		
COC Number		644362-02-01	644362-02-01	644362-02-01	644362-06-01		
	UNITS	NPT_031_VIBE EDU	NPT_001_CORN SER	NPT_001_VIBE EDU	NPT_060A_VACC OVA	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	156	25.3	128	160	1.0	A338154
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0082	ND	0.0076	0.0542	0.0050	A338154
Total (Dry Wt) Arsenic (As)	mg/kg	0.102	0.048	0.063	0.781	0.020	A338154
Total (Dry Wt) Barium (Ba)	mg/kg	268	138	100	171	0.050	A338154
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	ND	ND	ND	0.010	A338154
Total (Dry Wt) Boron (B)	mg/kg	18.7	5.6	5.6	23.2	1.0	A338154
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.356	0.0110	0.0524	0.204	0.0050	A338154
Total (Dry Wt) Calcium (Ca)	mg/kg	8310	19300	10100	9740	10	A338154
Total (Dry Wt) Chromium (Cr)	mg/kg	0.21	ND	0.11	0.15	0.10	A338154
Total (Dry Wt) Cobalt (Co)	mg/kg	0.092	0.039	0.099	0.159	0.020	A338154
Total (Dry Wt) Copper (Cu)	mg/kg	2.98	3.73	3.41	9.33	0.050	A338154
Total (Dry Wt) Iron (Fe)	mg/kg	122	77.7	87.9	54.0	5.0	A338154
Total (Dry Wt) Lead (Pb)	mg/kg	0.099	0.077	0.044	0.799	0.010	A338154
Total (Dry Wt) Magnesium (Mg)	mg/kg	1480	3400	2450	3360	5.0	A338154
Total (Dry Wt) Manganese (Mn)	mg/kg	21.7	32.1	35.1	1270	0.050	A338154
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	ND	ND	0.019	0.010	A338154
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.427	0.573	1.12	0.407	0.020	A338154
Total (Dry Wt) Nickel (Ni)	mg/kg	5.08	3.92	2.81	7.48	0.050	A338154
Total (Dry Wt) Phosphorus (P)	mg/kg	1190	1810	1530	1450	10	A338154
Total (Dry Wt) Potassium (K)	mg/kg	20800	18700	21500	9400	10	A338154
Total (Dry Wt) Selenium (Se)	mg/kg	ND	ND	ND	ND	0.050	A338154
Total (Dry Wt) Silver (Ag)	mg/kg	ND	ND	ND	0.0085	0.0050	A338154
Total (Dry Wt) Sodium (Na)	mg/kg	14	23	ND	78	10	A338154
Total (Dry Wt) Strontium (Sr)	mg/kg	42.9	72.6	39.7	21.7	0.050	A338154
Total (Dry Wt) Thallium (Tl)	mg/kg	0.0050	ND	ND	ND	0.0020	A338154
Total (Dry Wt) Tin (Sn)	mg/kg	ND	ND	ND	ND	0.10	A338154
Total (Dry Wt) Titanium (Ti)	mg/kg	4.14	1.55	1.93	0.93	0.50	A338154
Total (Dry Wt) Uranium (U)	mg/kg	0.0166	0.0064	0.0146	0.0039	0.0020	A338154
Total (Dry Wt) Vanadium (V)	mg/kg	ND	ND	ND	ND	0.20	A338154
Total (Dry Wt) Zinc (Zn)	mg/kg	40.1	16.6	25.7	47.1	0.20	A338154

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - DRY WT (TISSUE)

BV Labs ID		ADR451		ADR453	ADR454		
Sampling Date		2021/08/10		2021/08/10	2021/08/10		
COC Number		644362-06-01		644362-06-01	644362-06-01		
	UNITS	NPT_061_VIBE EDU	QC Batch	NPT_100C_CORN SER	NPT_100C_SALIX SP	RDL	QC Batch

Total Metals by ICPMS							
Total (Dry Wt) Aluminum (Al)	mg/kg	181	A338154	40.1	205	1.0	A358708
Total (Dry Wt) Antimony (Sb)	mg/kg	0.0106	A338154	ND	0.0232	0.0050	A358708
Total (Dry Wt) Arsenic (As)	mg/kg	0.076	A338154	0.051	0.371	0.020	A358708
Total (Dry Wt) Barium (Ba)	mg/kg	130	A338154	17.1	25.4	0.050	A358708
Total (Dry Wt) Beryllium (Be)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Bismuth (Bi)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Boron (B)	mg/kg	17.9	A338154	9.9	17.7	1.0	A358708
Total (Dry Wt) Cadmium (Cd)	mg/kg	0.146	A338154	ND	1.53	0.0050	A358708
Total (Dry Wt) Calcium (Ca)	mg/kg	11400	A338154	13900	19000	10	A358708
Total (Dry Wt) Chromium (Cr)	mg/kg	0.13	A338154	0.16	1.62	0.10	A358708
Total (Dry Wt) Cobalt (Co)	mg/kg	0.157	A338154	0.058	0.844	0.020	A358708
Total (Dry Wt) Copper (Cu)	mg/kg	4.65	A338154	2.94	6.07	0.050	A358708
Total (Dry Wt) Iron (Fe)	mg/kg	76.6	A338154	134	534	5.0	A358708
Total (Dry Wt) Lead (Pb)	mg/kg	0.113	A338154	0.029	0.149	0.010	A358708
Total (Dry Wt) Magnesium (Mg)	mg/kg	2790	A338154	1840	3640	5.0	A358708
Total (Dry Wt) Manganese (Mn)	mg/kg	49.5	A338154	29.3	166	0.050	A358708
Total (Dry Wt) Mercury (Hg)	mg/kg	ND	A338154	ND	ND	0.010	A358708
Total (Dry Wt) Molybdenum (Mo)	mg/kg	0.600	A338154	0.527	1.09	0.020	A358708
Total (Dry Wt) Nickel (Ni)	mg/kg	4.25	A338154	0.978	2.84	0.050	A358708
Total (Dry Wt) Phosphorus (P)	mg/kg	1980	A338154	1830	2130	10	A358708
Total (Dry Wt) Potassium (K)	mg/kg	27100	A338154	9330	9490	10	A358708
Total (Dry Wt) Selenium (Se)	mg/kg	0.070	A338154	0.075	0.212	0.050	A358708
Total (Dry Wt) Silver (Ag)	mg/kg	ND	A338154	ND	0.0089	0.0050	A358708
Total (Dry Wt) Sodium (Na)	mg/kg	20	A338154	ND	17	10	A358708
Total (Dry Wt) Strontium (Sr)	mg/kg	45.3	A338154	54.2	94.5	0.050	A358708
Total (Dry Wt) Thallium (Tl)	mg/kg	ND	A338154	ND	0.0028	0.0020	A358708
Total (Dry Wt) Tin (Sn)	mg/kg	ND	A338154	ND	ND	0.10	A358708
Total (Dry Wt) Titanium (Ti)	mg/kg	1.65	A338154	3.70	21.7	0.50	A358708
Total (Dry Wt) Uranium (U)	mg/kg	0.0182	A338154	0.0113	0.0211	0.0020	A358708
Total (Dry Wt) Vanadium (V)	mg/kg	ND	A338154	ND	1.09	0.20	A358708
Total (Dry Wt) Zinc (Zn)	mg/kg	29.4	A338154	11.3	72.5	0.20	A358708

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR370		ADR371		ADR373		
Sampling Date		2021/08/09		2021/08/09		2021/08/09		
COC Number		644362-04-01		644362-04-01		644362-04-01		
	UNITS	NPT_054_SALIA SP	RDL	NPT_054_VIBE EDU	RDL	NPT_058_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	4.54	0.27	31.2	0.18	5.87	0.26	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0029	0.0013	0.00250	0.00088	0.0013	0.0013	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0161	0.0054	0.0164	0.0035	0.0131	0.0052	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	7.78	0.013	24.4	0.0088	40.8	0.013	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0027	ND	0.0018	ND	0.0026	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0027	ND	0.0018	ND	0.0026	A326677
Total (Wet Wt) Boron (B)	mg/kg	9.39	0.27	1.75	0.18	2.98	0.26	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.646	0.0013	0.0203	0.00088	0.0032	0.0013	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2470	2.7	2340	1.8	5170	2.6	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.027	0.044	0.018	ND	0.026	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.112	0.0054	0.0207	0.0035	0.0116	0.0052	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.87	0.013	1.09	0.0088	1.11	0.013	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	18.0	1.3	28.7	0.88	27.5	1.3	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0353	0.0027	0.0311	0.0018	0.0120	0.0026	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	559	1.3	719	0.88	813	1.3	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	28.8	0.013	11.0	0.0088	8.36	0.013	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0027	ND	0.0018	ND	0.0026	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.110	0.0054	0.0815	0.0035	0.0964	0.0052	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	1.19	0.013	0.718	0.0088	0.646	0.013	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	319	2.7	495	1.8	559	2.6	A326677
Total (Wet Wt) Potassium (K)	mg/kg	3720	2.7	5560	1.8	4570	2.6	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.033	0.013	ND	0.0088	ND	0.013	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0013	ND	0.00088	ND	0.0013	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	4.5	2.7	4.3	1.8	3.7	2.6	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	9.59	0.013	9.55	0.0088	22.1	0.013	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00054	0.00040	0.00035	ND	0.00052	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.027	0.020	0.018	ND	0.026	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.32	0.13	0.693	0.088	0.56	0.13	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00130	0.00054	0.00310	0.00035	0.00140	0.00052	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.054	ND	0.035	ND	0.052	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	37.2	0.054	7.97	0.035	5.54	0.052	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR374		ADR376		ADR377		
Sampling Date		2021/08/09		2021/08/09		2021/08/09		
COC Number		644362-04-01		644362-04-01		644362-04-01		
	UNITS	NPT_058_VIBE EDU	RDL	NPT_055_CON SER	RDL	NPT_055_VIBE EDU	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	37.0	0.23	3.40	0.21	7.43	0.17	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0036	0.0012	0.0014	0.0010	0.00110	0.00086	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0462	0.0046	0.0072	0.0041	0.0056	0.0034	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	46.0	0.012	6.42	0.010	16.4	0.0086	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0023	ND	0.0021	ND	0.0017	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0023	ND	0.0021	ND	0.0017	A326677
Total (Wet Wt) Boron (B)	mg/kg	5.48	0.23	3.45	0.21	4.53	0.17	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.114	0.0012	0.0145	0.0010	0.225	0.00086	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2410	2.3	7800	2.1	3830	1.7	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.090	0.023	ND	0.021	0.019	0.017	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0389	0.0046	0.0072	0.0041	0.0099	0.0034	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.813	0.012	0.957	0.010	0.753	0.0086	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	47.0	1.2	13.9	1.0	10.0	0.86	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0339	0.0023	0.0254	0.0021	0.0072	0.0017	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	411	1.2	858	1.0	600	0.86	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	8.06	0.012	16.2	0.010	9.70	0.0086	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0023	0.0025	0.0021	0.0022	0.0017	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.0359	0.0046	0.0787	0.0041	0.0238	0.0034	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	1.28	0.012	0.247	0.010	0.163	0.0086	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	333	2.3	875	2.1	494	1.7	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4310	2.3	3820	2.1	4810	1.7	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.012	ND	0.010	ND	0.0086	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0012	ND	0.0010	ND	0.00086	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	3.0	2.3	2.8	2.1	2.3	1.7	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	10.8	0.012	8.57	0.010	4.92	0.0086	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00090	0.00046	ND	0.00041	0.00120	0.00034	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.023	ND	0.021	ND	0.017	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	1.37	0.12	0.26	0.10	0.202	0.086	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.0117	0.00046	0.00100	0.00041	0.00080	0.00034	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	0.071	0.046	ND	0.041	ND	0.034	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	10.4	0.046	4.36	0.041	4.41	0.034	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR386		ADR387		ADR389		
Sampling Date		2021/08/06		2021/08/06		2021/08/06		
COC Number		644362-07-01		644362-07-01		644362-07-01		
	UNITS	NPT_003_CORN SER	RDL	NPT_003_VIBE EDU	RDL	NPT_006_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	133	0.21	235	0.23	10.1	0.22	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0148	0.0011	0.0282	0.0011	0.0021	0.0011	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.306	0.0043	0.440	0.0045	0.0132	0.0045	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	15.4	0.011	14.1	0.011	9.41	0.011	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	0.0040	0.0021	0.0072	0.0023	ND	0.0022	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	0.0028	0.0021	0.0057	0.0023	ND	0.0022	A326677
Total (Wet Wt) Boron (B)	mg/kg	2.20	0.21	4.31	0.23	1.92	0.22	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0105	0.0011	0.0508	0.0011	0.0020	0.0011	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	5620	2.1	2670	2.3	4590	2.2	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.393	0.021	0.769	0.023	0.034	0.022	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.140	0.0043	0.293	0.0045	0.0105	0.0045	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.50	0.011	1.97	0.011	0.866	0.011	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	282	1.1	520	1.1	25.9	1.1	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.124	0.0021	0.231	0.0023	0.0152	0.0022	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	645	1.1	531	1.1	690	1.1	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	15.8	0.011	14.3	0.011	6.17	0.011	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	0.0025	0.0021	0.0035	0.0023	ND	0.0022	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.159	0.0043	0.109	0.0045	0.133	0.0045	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.864	0.011	1.20	0.011	0.453	0.011	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	444	2.1	384	2.3	513	2.2	A326677
Total (Wet Wt) Potassium (K)	mg/kg	3130	2.1	4360	2.3	3570	2.2	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.016	0.011	0.023	0.011	ND	0.011	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	0.0033	0.0011	0.0062	0.0011	ND	0.0011	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	11.3	2.1	11.1	2.3	2.9	2.2	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	18.5	0.011	9.39	0.011	15.3	0.011	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00230	0.00043	0.00410	0.00045	ND	0.00045	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.021	ND	0.023	ND	0.022	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	10.3	0.11	17.9	0.11	0.82	0.11	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.0268	0.00043	0.0587	0.00045	0.00150	0.00045	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	0.582	0.043	1.13	0.045	ND	0.045	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	4.40	0.043	6.06	0.045	3.69	0.045	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR390		ADR392		ADR393		
Sampling Date		2021/08/06		2021/08/06		2021/08/06		
COC Number		644362-07-01		644362-07-01		644362-07-01		
	UNITS	NPT_006_VIBE EDU	RDL	NPT_009_CORN SER	RDL	NPT_009_VIBE EDU	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	98.6	0.21	4.69	0.24	21.6	0.20	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0113	0.0011	ND	0.0012	0.0017	0.0010	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.159	0.0043	0.0049	0.0047	0.0160	0.0040	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	14.2	0.011	9.13	0.012	10.7	0.010	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	0.0036	0.0021	ND	0.0024	ND	0.0020	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0021	ND	0.0024	ND	0.0020	A326677
Total (Wet Wt) Boron (B)	mg/kg	4.37	0.21	4.23	0.24	4.22	0.20	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0183	0.0011	0.0022	0.0012	0.0183	0.0010	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2840	2.1	9070	2.4	2970	2.0	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.475	0.021	ND	0.024	0.071	0.020	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.111	0.0043	0.0085	0.0047	0.0245	0.0040	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.27	0.011	0.798	0.012	1.20	0.010	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	216	1.1	17.9	1.2	30.4	1.0	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0861	0.0021	0.0093	0.0024	0.0153	0.0020	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	570	1.1	1150	1.2	742	1.0	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	9.36	0.011	15.2	0.012	15.1	0.010	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	0.0032	0.0021	0.0030	0.0024	0.0057	0.0020	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.131	0.0043	0.0183	0.0047	0.0455	0.0040	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.823	0.011	0.546	0.012	0.899	0.010	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	362	2.1	628	2.4	736	2.0	A326677
Total (Wet Wt) Potassium (K)	mg/kg	5160	2.1	3520	2.4	6920	2.0	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.014	0.011	ND	0.012	ND	0.010	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	0.0019	0.0011	ND	0.0012	ND	0.0010	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	5.3	2.1	ND	2.4	3.2	2.0	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	10.8	0.011	21.1	0.012	7.47	0.010	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00120	0.00043	0.00050	0.00047	0.00090	0.00040	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.021	ND	0.024	ND	0.020	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	8.99	0.11	0.35	0.12	0.96	0.10	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.0203	0.00043	0.00100	0.00047	0.00300	0.00040	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	0.505	0.043	ND	0.047	ND	0.040	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	5.03	0.043	2.82	0.047	4.91	0.040	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR412		ADR413		ADR415		
Sampling Date		2021/08/09		2021/08/09		2021/08/09		
COC Number		644362-05-01		644362-05-01		644362-05-01		
	UNITS	NPT_059A_CORN SER	RDL	NPT_059A_VIBE EDU	RDL	NPT_059B_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	3.42	0.26	35.0	0.21	8.52	0.22	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0017	0.0013	0.0012	0.0010	0.0012	0.0011	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.159	0.0052	0.0053	0.0042	0.0060	0.0044	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	23.5	0.013	33.7	0.010	24.8	0.011	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0026	ND	0.0021	ND	0.0022	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0026	ND	0.0021	ND	0.0022	A326677
Total (Wet Wt) Boron (B)	mg/kg	1.32	0.26	1.68	0.21	1.20	0.22	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0035	0.0013	0.0494	0.0010	0.0049	0.0011	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	3900	2.6	2370	2.1	3760	2.2	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.026	0.044	0.021	0.028	0.022	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0068	0.0052	0.0405	0.0042	0.0160	0.0044	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.949	0.013	0.876	0.010	0.904	0.011	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	13.3	1.3	14.4	1.0	21.9	1.1	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0101	0.0026	0.0154	0.0021	0.0189	0.0022	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	620	1.3	592	1.0	635	1.1	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	5.67	0.013	10.3	0.010	6.15	0.011	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0026	ND	0.0021	ND	0.0022	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.285	0.0052	0.268	0.0042	0.322	0.0044	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.786	0.013	1.26	0.010	0.911	0.011	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	473	2.6	309	2.1	410	2.2	A326677
Total (Wet Wt) Potassium (K)	mg/kg	2800	2.6	4500	2.1	2820	2.2	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.013	0.012	0.010	ND	0.011	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0013	ND	0.0010	ND	0.0011	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	ND	2.6	2.8	2.1	2.7	2.2	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	14.9	0.013	10.6	0.010	14.4	0.011	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00052	0.00100	0.00042	ND	0.00044	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.026	ND	0.021	ND	0.022	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.27	0.13	0.37	0.10	0.80	0.11	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00070	0.00052	0.00300	0.00042	0.00140	0.00044	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.052	ND	0.042	ND	0.044	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	3.56	0.052	5.38	0.042	3.39	0.044	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR416		ADR418		ADR419		
Sampling Date		2021/08/09		2021/08/10		2021/08/10		
COC Number		644362-05-01		644362-05-01		644362-05-01		
	UNITS	NPT_059B_VIBE EDU	RDL	NPT_020A_CORN SER	RDL	NPT_020A_VIBE EDU	RDL	QC Batch

Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	39.6	0.25	10.8	0.29	28.5	0.19	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.0013	0.0013	ND	0.0015	0.00130	0.00093	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	ND	0.0051	ND	0.0058	0.0101	0.0037	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	22.2	0.013	25.9	0.015	17.5	0.0093	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0025	ND	0.0029	ND	0.0019	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0025	ND	0.0029	ND	0.0019	A326677
Total (Wet Wt) Boron (B)	mg/kg	1.66	0.25	1.62	0.29	2.61	0.19	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0387	0.0013	ND	0.0015	0.0359	0.00093	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2380	2.5	4500	2.9	2170	1.9	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.052	0.025	ND	0.029	0.049	0.019	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0254	0.0051	0.0082	0.0058	0.0208	0.0037	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.984	0.013	1.48	0.015	0.955	0.0093	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	13.2	1.3	15.0	1.5	19.5	0.93	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0171	0.0025	0.0124	0.0029	0.0133	0.0019	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	446	1.3	709	1.5	532	0.93	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	7.97	0.013	7.97	0.015	7.53	0.0093	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0025	ND	0.0029	0.0020	0.0019	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.308	0.0051	0.220	0.0058	0.0967	0.0037	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	1.20	0.013	1.10	0.015	0.694	0.0093	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	320	2.5	661	2.9	391	1.9	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4630	2.5	3550	2.9	5750	1.9	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.013	ND	0.015	ND	0.0093	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0013	ND	0.0015	ND	0.00093	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	ND	2.5	ND	2.9	3.9	1.9	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	9.36	0.013	17.5	0.015	8.16	0.0093	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00070	0.00051	ND	0.00058	ND	0.00037	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.025	ND	0.029	ND	0.019	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.30	0.13	0.32	0.15	0.365	0.093	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00310	0.00051	0.00090	0.00058	0.00190	0.00037	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.051	ND	0.058	ND	0.037	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	6.45	0.051	7.05	0.058	4.99	0.037	A326677

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR421		ADR431		ADR433		
Sampling Date		2021/08/10		2021/08/08		2021/08/08		
COC Number		644362-05-01		644362-03-01		644362-03-01		
	UNITS	NPT_060A_CORN SER	RDL	NPT_022A_SALIX SP	RDL	NPT_047_VACC OVA	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	3.86	0.19	5.22	0.32	22.4	0.35	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.00860	0.00097	0.0016	0.0016	ND	0.0017	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0561	0.0039	0.0085	0.0065	ND	0.0069	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	27.8	0.0097	14.8	0.016	9.96	0.017	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0019	ND	0.0032	ND	0.0035	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0019	ND	0.0032	ND	0.0035	A326677
Total (Wet Wt) Boron (B)	mg/kg	2.29	0.19	6.64	0.32	4.58	0.35	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.00350	0.00097	0.764	0.0016	ND	0.0017	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	4490	1.9	4770	3.2	1820	3.5	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.020	0.019	ND	0.032	ND	0.035	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0058	0.0039	0.195	0.0065	ND	0.0069	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.728	0.0097	2.47	0.016	2.85	0.017	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	10.9	0.97	18.2	1.6	12.8	1.7	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.173	0.0019	0.0207	0.0032	0.0040	0.0035	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	612	0.97	881	1.6	977	1.7	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	13.9	0.0097	51.8	0.016	444	0.017	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	0.0023	0.0019	ND	0.0032	ND	0.0035	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.119	0.0039	0.136	0.0065	0.152	0.0069	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.806	0.0097	4.04	0.016	0.253	0.017	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	415	1.9	495	3.2	642	3.5	A326677
Total (Wet Wt) Potassium (K)	mg/kg	1890	1.9	4970	3.2	2330	3.5	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.0097	0.025	0.016	ND	0.017	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.00097	ND	0.0016	ND	0.0017	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	2.8	1.9	3.9	3.2	4.7	3.5	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	19.7	0.0097	18.9	0.016	1.73	0.017	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00039	0.00070	0.00065	ND	0.00069	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.019	ND	0.032	ND	0.035	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.182	0.097	0.34	0.16	ND	0.17	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00070	0.00039	0.00120	0.00065	ND	0.00069	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.039	ND	0.065	ND	0.069	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	4.68	0.039	39.4	0.065	6.49	0.069	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR435		ADR437		ADR438		
Sampling Date		2021/08/08		2021/08/08		2021/08/08		
COC Number		644362-03-01		644362-03-01		644362-03-01		
	UNITS	NPT_040_VACC OVA	RDL	NPT_053_SALIX SP	RDL	NPT_053_CORN SER	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	33.2	0.38	8.03	0.31	7.16	0.29	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	ND	0.0019	0.0443	0.0016	0.0258	0.0015	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	ND	0.0075	0.311	0.0063	0.232	0.0059	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	21.6	0.019	11.6	0.016	18.7	0.015	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0038	ND	0.0031	ND	0.0029	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0038	ND	0.0031	ND	0.0029	A326677
Total (Wet Wt) Boron (B)	mg/kg	3.53	0.38	4.14	0.31	2.37	0.29	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	ND	0.0019	1.56	0.0016	0.0042	0.0015	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2120	3.8	2370	3.1	4700	2.9	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.038	0.040	0.031	0.030	0.029	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	ND	0.0075	0.0441	0.0063	0.0073	0.0059	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	2.40	0.019	3.77	0.016	1.43	0.015	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	14.1	1.9	24.1	1.6	22.5	1.5	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0053	0.0038	0.296	0.0031	0.270	0.0029	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	915	1.9	1150	1.6	1160	1.5	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	613	0.019	13.8	0.016	5.07	0.015	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0038	ND	0.0031	ND	0.0029	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.298	0.0075	0.288	0.0063	0.563	0.0059	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.202	0.019	0.341	0.016	0.228	0.015	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	678	3.8	520	3.1	456	2.9	A326677
Total (Wet Wt) Potassium (K)	mg/kg	2310	3.8	3390	3.1	2610	2.9	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.019	ND	0.016	ND	0.015	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0019	0.0072	0.0016	0.0022	0.0015	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	ND	3.8	4.4	3.1	ND	2.9	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	2.95	0.019	11.3	0.016	19.3	0.015	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00075	ND	0.00063	ND	0.00059	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.038	ND	0.031	ND	0.029	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	ND	0.19	0.48	0.16	0.48	0.15	A326677
Total (Wet Wt) Uranium (U)	mg/kg	ND	0.00075	0.00150	0.00063	0.00230	0.00059	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.075	ND	0.063	ND	0.059	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	8.50	0.075	79.5	0.063	4.94	0.059	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR442		ADR444		ADR445		
Sampling Date		2021/08/07		2021/08/07		2021/08/07		
COC Number		644362-02-01		644362-02-01		644362-02-01		
	UNITS	NPT_029_SALIX SP	RDL	NPT_031_CORN SER	RDL	NPT_031_VIBE EDU	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	4.19	0.28	11.4	0.24	42.9	0.27	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	ND	0.0014	0.0023	0.0012	0.0022	0.0014	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0099	0.0055	0.0219	0.0049	0.0280	0.0055	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	20.7	0.014	49.5	0.012	73.5	0.014	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0028	ND	0.0024	ND	0.0027	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0028	ND	0.0024	ND	0.0027	A326677
Total (Wet Wt) Boron (B)	mg/kg	2.36	0.28	2.59	0.24	5.13	0.27	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.757	0.0014	0.0058	0.0012	0.0976	0.0014	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	4570	2.8	4450	2.4	2280	2.7	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.028	0.031	0.024	0.058	0.027	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.424	0.0055	0.0124	0.0049	0.0252	0.0055	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	1.46	0.014	0.725	0.012	0.817	0.014	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	21.6	1.4	27.4	1.2	33.5	1.4	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0103	0.0028	0.0280	0.0024	0.0270	0.0027	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	542	1.4	674	1.2	404	1.4	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	55.0	0.014	5.18	0.012	5.94	0.014	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0028	ND	0.0024	ND	0.0027	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.136	0.0055	0.209	0.0049	0.117	0.0055	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	2.14	0.014	0.730	0.012	1.39	0.014	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	556	2.8	387	2.4	326	2.7	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4950	2.8	3290	2.4	5700	2.7	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.015	0.014	ND	0.012	ND	0.014	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0014	ND	0.0012	ND	0.0014	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	4.2	2.8	3.2	2.4	3.8	2.7	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	10.8	0.014	18.6	0.012	11.8	0.014	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	0.00110	0.00055	0.00070	0.00049	0.00140	0.00055	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.028	ND	0.024	ND	0.027	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.41	0.14	0.90	0.12	1.13	0.14	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00290	0.00055	0.00210	0.00049	0.00450	0.00055	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.055	ND	0.049	ND	0.055	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	25.6	0.055	4.04	0.049	11.0	0.055	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR447		ADR448		ADR449		
Sampling Date		2021/08/07		2021/08/07		2021/08/10		
COC Number		644362-02-01		644362-02-01		644362-06-01		
	UNITS	NPT_001_CORN SER	RDL	NPT_001_VIBE EDU	RDL	NPT_060A_VACC OVA	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	5.95	0.24	29.8	0.23	34.0	0.21	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	ND	0.0012	0.0018	0.0012	0.0115	0.0011	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0114	0.0047	0.0147	0.0046	0.166	0.0042	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	32.5	0.012	23.3	0.012	36.2	0.011	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0024	ND	0.0023	ND	0.0021	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0024	ND	0.0023	ND	0.0021	A326677
Total (Wet Wt) Boron (B)	mg/kg	1.32	0.24	1.31	0.23	4.91	0.21	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0026	0.0012	0.0122	0.0012	0.0432	0.0011	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	4540	2.4	2350	2.3	2070	2.1	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	ND	0.024	0.026	0.023	0.031	0.021	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0091	0.0047	0.0230	0.0046	0.0338	0.0042	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.877	0.012	0.791	0.012	1.98	0.011	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	18.2	1.2	20.4	1.2	11.5	1.1	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0181	0.0024	0.0101	0.0023	0.169	0.0021	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	798	1.2	570	1.2	712	1.1	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	7.54	0.012	8.13	0.012	270	0.011	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0024	ND	0.0023	0.0041	0.0021	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.135	0.0047	0.260	0.0046	0.0863	0.0042	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.921	0.012	0.652	0.012	1.59	0.011	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	426	2.4	355	2.3	307	2.1	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4390	2.4	4990	2.3	1990	2.1	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	ND	0.012	ND	0.012	ND	0.011	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.0012	ND	0.0012	0.0018	0.0011	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	5.3	2.4	ND	2.3	16.5	2.1	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	17.1	0.012	9.20	0.012	4.61	0.011	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00047	ND	0.00046	ND	0.00042	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.024	ND	0.023	ND	0.021	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.36	0.12	0.45	0.12	0.20	0.11	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00150	0.00047	0.00340	0.00046	0.00080	0.00042	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.047	ND	0.046	ND	0.042	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	3.90	0.047	5.96	0.046	9.99	0.042	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

BV Labs ID		ADR451		ADR453		ADR454		
Sampling Date		2021/08/10		2021/08/10		2021/08/10		
COC Number		644362-06-01		644362-06-01		644362-06-01		
	UNITS	NPT_061_VIBE EDU	RDL	NPT_100C_CORN SER	RDL	NPT_100C_SALIX SP	RDL	QC Batch
Calculated Parameters								
Total (Wet Wt) Aluminum (Al)	mg/kg	32.3	0.18	13.1	0.33	58.5	0.29	A326677
Total (Wet Wt) Antimony (Sb)	mg/kg	0.00190	0.00090	ND	0.0016	0.0066	0.0014	A326677
Total (Wet Wt) Arsenic (As)	mg/kg	0.0136	0.0036	0.0166	0.0065	0.106	0.0057	A326677
Total (Wet Wt) Barium (Ba)	mg/kg	23.2	0.0090	5.60	0.016	7.25	0.014	A326677
Total (Wet Wt) Beryllium (Be)	mg/kg	ND	0.0018	ND	0.0033	ND	0.0029	A326677
Total (Wet Wt) Bismuth (Bi)	mg/kg	ND	0.0018	ND	0.0033	ND	0.0029	A326677
Total (Wet Wt) Boron (B)	mg/kg	3.21	0.18	3.25	0.33	5.06	0.29	A326677
Total (Wet Wt) Cadmium (Cd)	mg/kg	0.0261	0.00090	ND	0.0016	0.437	0.0014	A326677
Total (Wet Wt) Calcium (Ca)	mg/kg	2040	1.8	4550	3.3	5420	2.9	A326677
Total (Wet Wt) Chromium (Cr)	mg/kg	0.023	0.018	0.051	0.033	0.461	0.029	A326677
Total (Wet Wt) Cobalt (Co)	mg/kg	0.0280	0.0036	0.0190	0.0065	0.241	0.0057	A326677
Total (Wet Wt) Copper (Cu)	mg/kg	0.833	0.0090	0.960	0.016	1.73	0.014	A326677
Total (Wet Wt) Iron (Fe)	mg/kg	13.7	0.90	43.7	1.6	152	1.4	A326677
Total (Wet Wt) Lead (Pb)	mg/kg	0.0202	0.0018	0.0096	0.0033	0.0425	0.0029	A326677
Total (Wet Wt) Magnesium (Mg)	mg/kg	499	0.90	602	1.6	1040	1.4	A326677
Total (Wet Wt) Manganese (Mn)	mg/kg	8.87	0.0090	9.57	0.016	47.2	0.014	A326677
Total (Wet Wt) Mercury (Hg)	mg/kg	ND	0.0018	ND	0.0033	ND	0.0029	A326677
Total (Wet Wt) Molybdenum (Mo)	mg/kg	0.107	0.0036	0.172	0.0065	0.311	0.0057	A326677
Total (Wet Wt) Nickel (Ni)	mg/kg	0.762	0.0090	0.320	0.016	0.810	0.014	A326677
Total (Wet Wt) Phosphorus (P)	mg/kg	354	1.8	598	3.3	607	2.9	A326677
Total (Wet Wt) Potassium (K)	mg/kg	4850	1.8	3050	3.3	2700	2.9	A326677
Total (Wet Wt) Selenium (Se)	mg/kg	0.0126	0.0090	0.025	0.016	0.060	0.014	A326677
Total (Wet Wt) Silver (Ag)	mg/kg	ND	0.00090	ND	0.0016	0.0025	0.0014	A326677
Total (Wet Wt) Sodium (Na)	mg/kg	3.7	1.8	ND	3.3	4.7	2.9	A326677
Total (Wet Wt) Strontium (Sr)	mg/kg	8.10	0.0090	17.7	0.016	26.9	0.014	A326677
Total (Wet Wt) Thallium (Tl)	mg/kg	ND	0.00036	ND	0.00065	0.00080	0.00057	A326677
Total (Wet Wt) Tin (Sn)	mg/kg	ND	0.018	ND	0.033	ND	0.029	A326677
Total (Wet Wt) Titanium (Ti)	mg/kg	0.295	0.090	1.21	0.16	6.20	0.14	A326677
Total (Wet Wt) Uranium (U)	mg/kg	0.00330	0.00036	0.00370	0.00065	0.00600	0.00057	A326677
Total (Wet Wt) Vanadium (V)	mg/kg	ND	0.036	ND	0.065	0.311	0.057	A326677
Total (Wet Wt) Zinc (Zn)	mg/kg	5.25	0.036	3.71	0.065	20.7	0.057	A326677
RDL = Reportable Detection Limit								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



PHYSICAL TESTING (TISSUE)

BV Labs ID		ADR370	ADR371	ADR373	ADR374		
Sampling Date		2021/08/09	2021/08/09	2021/08/09	2021/08/09		
COC Number		644362-04-01	644362-04-01	644362-04-01	644362-04-01		
	UNITS	NPT_054_SALIA SP	NPT_054_VIBE EDU	NPT_058_CORN SER	NPT_058_VIBE EDU	RDL	QC Batch

Physical Properties							
Moisture	%	73	83	74	77	0.30	A330296
RDL = Reportable Detection Limit							

BV Labs ID		ADR376	ADR376	ADR377	ADR386		
Sampling Date		2021/08/09	2021/08/09	2021/08/09	2021/08/06		
COC Number		644362-04-01	644362-04-01	644362-04-01	644362-07-01		
	UNITS	NPT_055_CON SER	NPT_055_CON SER Lab-Dup	NPT_055_VIBE EDU	NPT_003_CORN SER	RDL	QC Batch

Physical Properties							
Moisture	%	79	80	83	79	0.30	A330296
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							

BV Labs ID		ADR387	ADR389		ADR390	ADR390		
Sampling Date		2021/08/06	2021/08/06		2021/08/06	2021/08/06		
COC Number		644362-07-01	644362-07-01		644362-07-01	644362-07-01		
	UNITS	NPT_003_VIBE EDU	NPT_006_CORN SER	QC Batch	NPT_006_VIBE EDU	NPT_006_VIBE EDU Lab-Dup	RDL	QC Batch

Physical Properties								
Moisture	%	77	78	A330296	79	79	0.30	A338131
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								

BV Labs ID		ADR392	ADR393	ADR412	ADR413		
Sampling Date		2021/08/06	2021/08/06	2021/08/09	2021/08/09		
COC Number		644362-07-01	644362-07-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_CORN SER	NPT_009_VIBE EDU	NPT_059A_CORN SER	NPT_059A_VIBE EDU	RDL	QC Batch

Physical Properties							
Moisture	%	76	80	74	79	0.30	A338131
RDL = Reportable Detection Limit							

BV Labs ID		ADR415	ADR416	ADR418		
Sampling Date		2021/08/09	2021/08/09	2021/08/10		
COC Number		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_059B_CORN SER	NPT_059B_VIBE EDU	NPT_020A_CORN SER	RDL	QC Batch

Physical Properties						
Moisture	%	78	75	71	0.30	A338131
RDL = Reportable Detection Limit						



PHYSICAL TESTING (TISSUE)

BV Labs ID		ADR419	ADR421		ADR431		
Sampling Date		2021/08/10	2021/08/10		2021/08/08		
COC Number		644362-05-01	644362-05-01		644362-03-01		
	UNITS	NPT_020A_VIBE EDU	NPT_060A_CORN SER	QC Batch	NPT_022A_SALIX SP	RDL	QC Batch
Physical Properties							
Moisture	%	81	81	A330296	68	0.30	A338131
RDL = Reportable Detection Limit							

BV Labs ID		ADR433	ADR435		ADR437	ADR438		
Sampling Date		2021/08/08	2021/08/08		2021/08/08	2021/08/08		
COC Number		644362-03-01	644362-03-01		644362-03-01	644362-03-01		
	UNITS	NPT_047_VACC OVA	NPT_040_VACC OVA	QC Batch	NPT_053_SALIX SP	NPT_053_CORN SER	RDL	QC Batch
Physical Properties								
Moisture	%	66	63	A338131	69	71	0.30	A330296
RDL = Reportable Detection Limit								

BV Labs ID		ADR442	ADR444	ADR445	ADR447		
Sampling Date		2021/08/07	2021/08/07	2021/08/07	2021/08/07		
COC Number		644362-02-01	644362-02-01	644362-02-01	644362-02-01		
	UNITS	NPT_029_SALIX SP	NPT_031_CORN SER	NPT_031_VIBE EDU	NPT_001_CORN SER	RDL	QC Batch
Physical Properties							
Moisture	%	73	76	73	77	0.30	A330296
RDL = Reportable Detection Limit							

BV Labs ID		ADR448	ADR449	ADR451		
Sampling Date		2021/08/07	2021/08/10	2021/08/10		
COC Number		644362-02-01	644362-06-01	644362-06-01		
	UNITS	NPT_001_VIBE EDU	NPT_060A_VACC OVA	NPT_061_VIBE EDU	RDL	QC Batch
Physical Properties						
Moisture	%	77	79	82	0.30	A330296
RDL = Reportable Detection Limit						

BV Labs ID		ADR453	ADR454		
Sampling Date		2021/08/10	2021/08/10		
COC Number		644362-06-01	644362-06-01		
	UNITS	NPT_100C_CORN SER	NPT_100C_SALIX SP	RDL	QC Batch
Physical Properties					
Moisture	%	67	72	0.30	A338131
RDL = Reportable Detection Limit					



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR369	ADR372			ADR372		
Sampling Date		2021/08/09	2021/08/09			2021/08/09		
COC Number		644362-04-01	644362-04-01			644362-04-01		
	UNITS	NPT_054_SOIL	NPT_058_SOILS	RDL	QC Batch	NPT_058_SOILS Lab-Dup	RDL	QC Batch
Physical Properties								
Soluble (2:1) pH	pH	5.89	6.59	N/A	A329989			
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	8810	9460	100	A329976	9920	100	A329976
Total Antimony (Sb)	mg/kg	0.34	0.94	0.10	A329976	0.87	0.10	A329976
Total Arsenic (As)	mg/kg	10.6	15.7	0.20	A329976	16.1	0.20	A329976
Total Barium (Ba)	mg/kg	85.0	373	0.10	A329976	353	0.10	A329976
Total Beryllium (Be)	mg/kg	ND	ND	0.20	A329976	ND	0.20	A329976
Total Bismuth (Bi)	mg/kg	0.16	0.24	0.10	A329976	0.21	0.10	A329976
Total Boron (B)	mg/kg	1.5	1.2	1.0	A329976	ND	1.0	A329976
Total Cadmium (Cd)	mg/kg	0.091	0.263	0.050	A329976	0.284	0.050	A329976
Total Calcium (Ca)	mg/kg	3850	4200	100	A329976	4090	100	A329976
Total Chromium (Cr)	mg/kg	24.8	25.9	0.50	A329976	26.5	0.50	A329976
Total Cobalt (Co)	mg/kg	6.69	8.61	0.10	A329976	8.80	0.10	A329976
Total Copper (Cu)	mg/kg	16.6	36.4	0.50	A329976	37.4	0.50	A329976
Total Iron (Fe)	mg/kg	32300	23700	100	A329976	24300	100	A329976
Total Lead (Pb)	mg/kg	6.21	12.5	0.10	A329976	12.6	0.10	A329976
Total Lithium (Li)	mg/kg	8.28	8.93	0.50	A329976	8.67	0.50	A329976
Total Magnesium (Mg)	mg/kg	5650	6620	100	A329976	6950	100	A329976
Total Manganese (Mn)	mg/kg	276	351	0.20	A329976	362	0.20	A329976
Total Mercury (Hg)	mg/kg	0.102	0.072	0.050	A329976	ND	0.050	A329976
Total Molybdenum (Mo)	mg/kg	1.11	1.65	0.10	A329976	1.62	0.10	A329976
Total Nickel (Ni)	mg/kg	10.9	21.4	0.50	A329976	21.6	0.50	A329976
Total Phosphorus (P)	mg/kg	715	695	10	A329976	707	10	A329976
Total Potassium (K)	mg/kg	1380	1350	100	A329976	1370	100	A329976
Total Selenium (Se)	mg/kg	ND	ND	0.50	A329976	ND	0.50	A329976
Total Silver (Ag)	mg/kg	ND	0.176	0.050	A329976	0.179	0.050	A329976
Total Sodium (Na)	mg/kg	323	321 (1)	100	A329976	319	100	A329976
Total Strontium (Sr)	mg/kg	21.5	24.6	0.10	A329976	24.7	0.10	A329976
Total Thallium (Tl)	mg/kg	0.089	0.112	0.050	A329976	0.106	0.050	A329976
Total Tin (Sn)	mg/kg	0.29	0.29	0.10	A329976	0.27	0.10	A329976
Total Titanium (Ti)	mg/kg	673	758	1.0	A329976	745	1.0	A329976
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable ND = Not Detected at a concentration equal or greater than the indicated Detection Limit. (1) Matrix spike exceeds acceptance limits due to probable matrix interference.								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR369	ADR372			ADR372		
Sampling Date		2021/08/09	2021/08/09			2021/08/09		
COC Number		644362-04-01	644362-04-01			644362-04-01		
	UNITS	NPT_054_SOIL	NPT_058_SOILS	RDL	QC Batch	NPT_058_SOILS Lab-Dup	RDL	QC Batch
Total Tungsten (W)	mg/kg	1.48	0.99	0.50	A329976	1.39	0.50	A329976
Total Uranium (U)	mg/kg	1.67	1.84	0.050	A329976	1.47	0.050	A329976
Total Vanadium (V)	mg/kg	81.8	50.0	1.0	A329976	50.6	1.0	A329976
Total Zinc (Zn)	mg/kg	36.0	65.8	1.0	A329976	68.3	1.0	A329976
Total Zirconium (Zr)	mg/kg	0.91	0.87	0.50	A329976	0.88	0.50	A329976
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR375		ADR378	ADR385	ADR388		
Sampling Date		2021/08/09		2021/08/09	2021/08/06	2021/08/06		
COC Number		644362-04-01		644362-04-01	644362-07-01	644362-07-01		
	UNITS	NPT_055_SOILS	QC Batch	NPT_059A_SOILS	NPT_003_SOILS	NPT_006_SOILS	RDL	QC Batch
Physical Properties								
Soluble (2:1) pH	pH	5.83	A329989	5.36	7.35	6.16	N/A	A330651
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	16700	A329976	7350	14000	10500	100	A330648
Total Antimony (Sb)	mg/kg	7.08	A329976	0.33	0.99	0.59	0.10	A330648
Total Arsenic (As)	mg/kg	14.6	A329976	11.0	18.8	11.0	0.20	A330648
Total Barium (Ba)	mg/kg	84.8	A329976	79.7	228	97.2	0.10	A330648
Total Beryllium (Be)	mg/kg	0.40	A329976	ND	0.30	0.29	0.20	A330648
Total Bismuth (Bi)	mg/kg	0.45	A329976	0.14	0.36	0.18	0.10	A330648
Total Boron (B)	mg/kg	4.6	A329976	1.2	2.4	2.0	1.0	A330648
Total Cadmium (Cd)	mg/kg	1.12	A329976	0.095	0.493	0.169	0.050	A330648
Total Calcium (Ca)	mg/kg	2280	A329976	3440	7540	5570	100	A330648
Total Chromium (Cr)	mg/kg	72.2	A329976	20.5	41.4	40.4	0.50	A330648
Total Cobalt (Co)	mg/kg	7.49	A329976	7.21	13.6	10.6	0.10	A330648
Total Copper (Cu)	mg/kg	13.3	A329976	20.8	52.8	32.7	0.50	A330648
Total Iron (Fe)	mg/kg	37600	A329976	19200	30900	25600	100	A330648
Total Lead (Pb)	mg/kg	35.3	A329976	5.12	13.2	8.35	0.10	A330648
Total Lithium (Li)	mg/kg	9.20	A329976	7.42	12.7	10.1	0.50	A330648
Total Magnesium (Mg)	mg/kg	1820	A329976	5030	10600	9210	100	A330648
Total Manganese (Mn)	mg/kg	184	A329976	276	571	449	0.20	A330648
Total Mercury (Hg)	mg/kg	0.360	A329976	0.101	0.094	0.075	0.050	A330648
Total Molybdenum (Mo)	mg/kg	3.10	A329976	1.51	2.09	1.16	0.10	A330648
Total Nickel (Ni)	mg/kg	28.6	A329976	14.9	44.2	42.5	0.50	A330648
Total Phosphorus (P)	mg/kg	737	A329976	709	925	721	10	A330648
Total Potassium (K)	mg/kg	251	A329976	1090	1420	615	100	A330648
Total Selenium (Se)	mg/kg	ND	A329976	ND	ND	ND	0.50	A330648
Total Silver (Ag)	mg/kg	0.068	A329976	0.073	0.267	0.178	0.050	A330648
Total Sodium (Na)	mg/kg	ND	A329976	262	403	231	100	A330648
Total Strontium (Sr)	mg/kg	8.30	A329976	16.8	41.1	32.9	0.10	A330648
Total Thallium (Tl)	mg/kg	0.107	A329976	0.120	0.152	0.073	0.050	A330648
Total Tin (Sn)	mg/kg	0.66	A329976	0.22	0.38	0.25	0.10	A330648
Total Titanium (Ti)	mg/kg	347	A329976	510	938	648	1.0	A330648
Total Tungsten (W)	mg/kg	0.87	A329976	0.85	0.86	ND	0.50	A330648
Total Uranium (U)	mg/kg	1.63	A329976	1.17	1.83	1.30	0.050	A330648
RDL = Reportable Detection Limit								
N/A = Not Applicable								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR375		ADR378	ADR385	ADR388		
Sampling Date		2021/08/09		2021/08/09	2021/08/06	2021/08/06		
COC Number		644362-04-01		644362-04-01	644362-07-01	644362-07-01		
	UNITS	NPT_055_SOILS	QC Batch	NPT_059A_SOILS	NPT_003_SOILS	NPT_006_SOILS	RDL	QC Batch
Total Vanadium (V)	mg/kg	87.0	A329976	40.8	62.2	53.1	1.0	A330648
Total Zinc (Zn)	mg/kg	107	A329976	30.3	89.2	49.9	1.0	A330648
Total Zirconium (Zr)	mg/kg	ND	A329976	0.64	1.80	1.42	0.50	A330648

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR391		ADR414	ADR417	ADR420		
Sampling Date		2021/08/06		2021/08/09	2021/08/10	2021/08/10		
COC Number		644362-07-01		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_SOILS	QC Batch	NPT_059B_SOILS	NPT_060A_SOILS	NPT_020A_SOILS	RDL	QC Batch
Physical Properties								
Soluble (2:1) pH	pH	5.01	A330651	5.92	4.36	5.50	N/A	A331013
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	14100	A330648	13000	8950	9530	100	A331008
Total Antimony (Sb)	mg/kg	0.74	A330648	0.50	16.6	0.47	0.10	A331008
Total Arsenic (As)	mg/kg	13.7	A330648	14.1	334	16.4	0.20	A331008
Total Barium (Ba)	mg/kg	65.9	A330648	150	180	120	0.10	A331008
Total Beryllium (Be)	mg/kg	0.36	A330648	0.25	ND	ND	0.20	A331008
Total Bismuth (Bi)	mg/kg	ND	A330648	0.30	0.38	0.23	0.10	A331008
Total Boron (B)	mg/kg	3.6	A330648	1.9	1.7	1.1	1.0	A331008
Total Cadmium (Cd)	mg/kg	0.166	A330648	0.217	0.464	0.185	0.050	A331008
Total Calcium (Ca)	mg/kg	5030	A330648	6350	2070	5690	100	A331008
Total Chromium (Cr)	mg/kg	103	A330648	36.6	36.7	26.9	0.50	A331008
Total Cobalt (Co)	mg/kg	15.5	A330648	11.9	7.02	8.72	0.10	A331008
Total Copper (Cu)	mg/kg	36.7	A330648	37.7	32.1	13.2	0.50	A331008
Total Iron (Fe)	mg/kg	29700	A330648	28300	21800	22600	100	A331008
Total Lead (Pb)	mg/kg	8.20	A330648	11.7	73.9	10.4	0.10	A331008
Total Lithium (Li)	mg/kg	12.2	A330648	11.3	5.69	8.10	0.50	A331008
Total Magnesium (Mg)	mg/kg	13800	A330648	9430	5050	6830	100	A331008
Total Manganese (Mn)	mg/kg	531	A330648	501	358	369	0.20	A331008
Total Mercury (Hg)	mg/kg	0.093	A330648	0.078	0.144	0.050	0.050	A331008
Total Molybdenum (Mo)	mg/kg	0.64	A330648	1.99	2.87	1.60	0.10	A331008
Total Nickel (Ni)	mg/kg	92.7	A330648	30.6	13.0	18.3	0.50	A331008
Total Phosphorus (P)	mg/kg	585	A330648	944	405	714	10	A331008
Total Potassium (K)	mg/kg	509	A330648	1530	885	1440	100	A331008
Total Selenium (Se)	mg/kg	ND	A330648	ND	ND	ND	0.50	A331008
Total Silver (Ag)	mg/kg	0.071	A330648	0.160	0.200	0.100	0.050	A331008
Total Sodium (Na)	mg/kg	ND	A330648	473	150	370	100	A331008
Total Strontium (Sr)	mg/kg	21.0	A330648	32.9	14.5	30.0	0.10	A331008
Total Thallium (Tl)	mg/kg	0.131	A330648	0.154	0.115	0.091	0.050	A331008
Total Tin (Sn)	mg/kg	0.29	A330648	0.41	0.67	0.30	0.10	A331008
Total Titanium (Ti)	mg/kg	782	A330648	1070	976	866	1.0	A331008
Total Tungsten (W)	mg/kg	ND	A330648	1.23	0.55	1.76	0.50	A331008
Total Uranium (U)	mg/kg	0.446	A330648	1.82	0.684	1.09	0.050	A331008
RDL = Reportable Detection Limit								
N/A = Not Applicable								
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR391		ADR414	ADR417	ADR420		
Sampling Date		2021/08/06		2021/08/09	2021/08/10	2021/08/10		
COC Number		644362-07-01		644362-05-01	644362-05-01	644362-05-01		
	UNITS	NPT_009_SOILS	QC Batch	NPT_059B_SOILS	NPT_060A_SOILS	NPT_020A_SOILS	RDL	QC Batch
Total Vanadium (V)	mg/kg	66.2	A330648	61.1	73.7	51.7	1.0	A331008
Total Zinc (Zn)	mg/kg	64.1	A330648	60.5	81.9	41.5	1.0	A331008
Total Zirconium (Zr)	mg/kg	1.52	A330648	1.57	0.58	0.80	0.50	A331008
RDL = Reportable Detection Limit								



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR430	ADR432	ADR434	ADR436	ADR441		
Sampling Date		2021/08/08	2021/08/08	2021/08/08	2021/08/08	2021/08/07		
COC Number		644362-03-01	644362-03-01	644362-03-01	644362-03-01	644362-02-01		
	UNITS	NPT_022A_SOILS	NPT_047_SOILS	NPT_040_SOILS	NPT_053_SOILS	NPT_029_SOIL	RDL	QC Batch

Physical Properties								
Soluble (2:1) pH	pH	5.54	4.01	4.48	7.63	5.92	N/A	A331013
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	7890	9120	21900	11700	11700	100	A331008
Total Antimony (Sb)	mg/kg	0.23	0.13	ND	53.2	0.14	0.10	A331008
Total Arsenic (As)	mg/kg	4.97	4.07	0.90	459	3.41	0.20	A331008
Total Barium (Ba)	mg/kg	67.6	28.4	256	374	131	0.10	A331008
Total Beryllium (Be)	mg/kg	ND	ND	0.20	0.24	ND	0.20	A331008
Total Bismuth (Bi)	mg/kg	0.37	0.17	0.25	0.22	0.14	0.10	A331008
Total Boron (B)	mg/kg	ND	ND	ND	2.5	ND	1.0	A331008
Total Cadmium (Cd)	mg/kg	0.111	ND	0.066	3.66	0.150	0.050	A331008
Total Calcium (Ca)	mg/kg	3280	639	570	8440	5770	100	A331008
Total Chromium (Cr)	mg/kg	25.1	39.7	119	62.7	23.9	0.50	A331008
Total Cobalt (Co)	mg/kg	6.61	5.10	4.59	13.3	8.23	0.10	A331008
Total Copper (Cu)	mg/kg	20.4	21.5	61.9	182	24.8	0.50	A331008
Total Iron (Fe)	mg/kg	24900	24000	38700	29800	23700	100	A331008
Total Lead (Pb)	mg/kg	4.89	5.34	6.98	160	3.59	0.10	A331008
Total Lithium (Li)	mg/kg	7.84	7.45	10.9	10.1	9.80	0.50	A331008
Total Magnesium (Mg)	mg/kg	5720	5080	10400	11400	6620	100	A331008
Total Manganese (Mn)	mg/kg	285	193	679	545	294	0.20	A331008
Total Mercury (Hg)	mg/kg	ND	ND	0.072	0.253	ND	0.050	A331008
Total Molybdenum (Mo)	mg/kg	1.08	3.11	12.7	1.06	1.41	0.10	A331008
Total Nickel (Ni)	mg/kg	14.6	19.1	11.1	48.7	12.4	0.50	A331008
Total Phosphorus (P)	mg/kg	646	257	482	699	840	10	A331008
Total Potassium (K)	mg/kg	1180	276	2660	1200	2270	100	A331008
Total Selenium (Se)	mg/kg	ND	0.67	1.29	ND	ND	0.50	A331008
Total Silver (Ag)	mg/kg	0.068	0.315	0.202	1.33	0.105	0.050	A331008
Total Sodium (Na)	mg/kg	240	ND	ND	324	489	100	A331008
Total Strontium (Sr)	mg/kg	18.0	2.99	4.83	50.6	31.1	0.10	A331008
Total Thallium (Tl)	mg/kg	0.090	0.063	0.215	0.127	0.141	0.050	A331008
Total Tin (Sn)	mg/kg	0.24	0.31	0.92	0.53	0.27	0.10	A331008
Total Titanium (Ti)	mg/kg	583	813	1940	728	1070	1.0	A331008
Total Tungsten (W)	mg/kg	ND	ND	ND	1.05	0.66	0.50	A331008
Total Uranium (U)	mg/kg	1.07	0.636	1.24	1.05	3.44	0.050	A331008

RDL = Reportable Detection Limit

N/A = Not Applicable

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR430	ADR432	ADR434	ADR436	ADR441		
Sampling Date		2021/08/08	2021/08/08	2021/08/08	2021/08/08	2021/08/07		
COC Number		644362-03-01	644362-03-01	644362-03-01	644362-03-01	644362-02-01		
	UNITS	NPT_022A_SOILS	NPT_047_SOILS	NPT_040_SOILS	NPT_053_SOILS	NPT_029_SOIL	RDL	QC Batch
Total Vanadium (V)	mg/kg	64.8	56.7	141	57.5	64.3	1.0	A331008
Total Zinc (Zn)	mg/kg	36.6	32.1	49.5	837	43.7	1.0	A331008
Total Zirconium (Zr)	mg/kg	ND	ND	ND	0.85	0.51	0.50	A331008

RDL = Reportable Detection Limit

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR443	ADR446	ADR450	ADR452			ADR452	
Sampling Date		2021/08/07	2021/08/07	2021/08/10	2021/08/10			2021/08/10	
COC Number		644362-02-01	644362-02-01	644362-06-01	644362-06-01			644362-06-01	
	UNITS	NPT_031_SOIL	NPT_001_SOIL	NPT_061_SOILS	NPT_100C_SOILS	RDL	QC Batch	NPT_100C_SOILS Lab-Dup	QC Batch

Physical Properties									
Soluble (2:1) pH	pH	5.12	5.85	5.48	8.28	N/A	A331013	8.22	A331013
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	10400	6250	8400	11400	100	A331008		
Total Antimony (Sb)	mg/kg	0.83	0.20	0.36	0.72	0.10	A331008		
Total Arsenic (As)	mg/kg	16.1	6.03	12.5	10.5	0.20	A331008		
Total Barium (Ba)	mg/kg	404	62.8	97.2	145	0.10	A331008		
Total Beryllium (Be)	mg/kg	0.21	ND	ND	0.37	0.20	A331008		
Total Bismuth (Bi)	mg/kg	0.23	0.11	0.19	0.13	0.10	A331008		
Total Boron (B)	mg/kg	ND	ND	ND	3.6	1.0	A331008		
Total Cadmium (Cd)	mg/kg	0.341	0.060	0.061	0.244	0.050	A331008		
Total Calcium (Ca)	mg/kg	4950	2970	4070	16300	100	A331008		
Total Chromium (Cr)	mg/kg	29.3	16.3	23.1	51.8	0.50	A331008		
Total Cobalt (Co)	mg/kg	8.93	5.49	7.69	12.1	0.10	A331008		
Total Copper (Cu)	mg/kg	35.9	10.3	23.5	36.8	0.50	A331008		
Total Iron (Fe)	mg/kg	24400	20400	23400	29100	100	A331008		
Total Lead (Pb)	mg/kg	19.1	4.52	6.53	7.87	0.10	A331008		
Total Lithium (Li)	mg/kg	9.75	6.21	8.22	11.1	0.50	A331008		
Total Magnesium (Mg)	mg/kg	7260	4090	5820	12700	100	A331008		
Total Manganese (Mn)	mg/kg	363	224	275	526	0.20	A331008		
Total Mercury (Hg)	mg/kg	ND	ND	ND	0.051	0.050	A331008		
Total Molybdenum (Mo)	mg/kg	1.84	0.95	1.62	1.41	0.10	A331008		
Total Nickel (Ni)	mg/kg	21.3	7.71	15.0	64.7	0.50	A331008		
Total Phosphorus (P)	mg/kg	878	442	783	846	10	A331008		
Total Potassium (K)	mg/kg	1430	1090	1350	887	100	A331008		
Total Selenium (Se)	mg/kg	ND	ND	ND	ND	0.50	A331008		
Total Silver (Ag)	mg/kg	0.180	0.131	0.089	0.123	0.050	A331008		
Total Sodium (Na)	mg/kg	368	227	294	264	100	A331008		
Total Strontium (Sr)	mg/kg	27.4	17.4	19.8	76.3	0.10	A331008		
Total Thallium (Tl)	mg/kg	0.114	0.070	0.087	0.089	0.050	A331008		
Total Tin (Sn)	mg/kg	0.38	0.20	0.26	0.29	0.10	A331008		
Total Titanium (Ti)	mg/kg	872	527	658	895	1.0	A331008		
Total Tungsten (W)	mg/kg	1.17	0.93	1.05	ND	0.50	A331008		

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		ADR443	ADR446	ADR450	ADR452			ADR452	
Sampling Date		2021/08/07	2021/08/07	2021/08/10	2021/08/10			2021/08/10	
COC Number		644362-02-01	644362-02-01	644362-06-01	644362-06-01			644362-06-01	
	UNITS	NPT_031_SOIL	NPT_001_SOIL	NPT_061_SOILS	NPT_100C_SOILS	RDL	QC Batch	NPT_100C_SOILS Lab-Dup	QC Batch
Total Uranium (U)	mg/kg	1.64	1.43	1.84	1.84	0.050	A331008		
Total Vanadium (V)	mg/kg	54.0	50.6	53.6	62.3	1.0	A331008		
Total Zinc (Zn)	mg/kg	76.4	25.5	35.1	61.7	1.0	A331008		
Total Zirconium (Zr)	mg/kg	0.95	0.66	1.13	5.01	0.50	A331008		
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									



BV Labs Job #: C158547
Report Date: 2021/09/27

EDI Environmental Dynamics Inc.

GENERAL COMMENTS

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A329976	JBN	Matrix Spike [ADR372-01]	Total Aluminum (Al)	2021/08/24		NC	%	75 - 125
			Total Antimony (Sb)	2021/08/24	94	%	75 - 125	
			Total Arsenic (As)	2021/08/24	94	%	75 - 125	
			Total Barium (Ba)	2021/08/24	NC	%	75 - 125	
			Total Beryllium (Be)	2021/08/24	87	%	75 - 125	
			Total Bismuth (Bi)	2021/08/24	93	%	75 - 125	
			Total Boron (B)	2021/08/24	89	%	75 - 125	
			Total Cadmium (Cd)	2021/08/24	99	%	75 - 125	
			Total Calcium (Ca)	2021/08/24	NC	%	75 - 125	
			Total Chromium (Cr)	2021/08/24	100	%	75 - 125	
			Total Cobalt (Co)	2021/08/24	97	%	75 - 125	
			Total Copper (Cu)	2021/08/24	103	%	75 - 125	
			Total Iron (Fe)	2021/08/24	NC	%	75 - 125	
			Total Lead (Pb)	2021/08/24	96	%	75 - 125	
			Total Lithium (Li)	2021/08/24	84	%	75 - 125	
			Total Magnesium (Mg)	2021/08/24	NC	%	75 - 125	
			Total Manganese (Mn)	2021/08/24	NC	%	75 - 125	
			Total Mercury (Hg)	2021/08/24	91	%	75 - 125	
			Total Molybdenum (Mo)	2021/08/24	95	%	75 - 125	
			Total Nickel (Ni)	2021/08/24	97	%	75 - 125	
			Total Phosphorus (P)	2021/08/24	87	%	75 - 125	
			Total Potassium (K)	2021/08/24	123	%	75 - 125	
			Total Selenium (Se)	2021/08/24	100	%	75 - 125	
			Total Silver (Ag)	2021/08/24	100	%	75 - 125	
			Total Sodium (Na)	2021/08/24	127 (1)	%	75 - 125	
			Total Strontium (Sr)	2021/08/24	100	%	75 - 125	
			Total Thallium (Tl)	2021/08/24	94	%	75 - 125	
			Total Tin (Sn)	2021/08/24	100	%	75 - 125	
			Total Titanium (Ti)	2021/08/24	NC	%	75 - 125	
			Total Tungsten (W)	2021/08/24	97	%	75 - 125	
			Total Uranium (U)	2021/08/24	97	%	75 - 125	
			Total Vanadium (V)	2021/08/24	101	%	75 - 125	
			Total Zinc (Zn)	2021/08/24	98	%	75 - 125	
			Total Zirconium (Zr)	2021/08/24	107	%	75 - 125	
A329976	JBN	QC Standard	Total Aluminum (Al)	2021/08/24	103	%	70 - 130	
			Total Antimony (Sb)	2021/08/24	111	%	70 - 130	
			Total Arsenic (As)	2021/08/24	80	%	70 - 130	
			Total Barium (Ba)	2021/08/24	96	%	70 - 130	
			Total Beryllium (Be)	2021/08/24	96	%	70 - 130	
			Total Cadmium (Cd)	2021/08/24	97	%	70 - 130	
			Total Calcium (Ca)	2021/08/24	94	%	70 - 130	
			Total Chromium (Cr)	2021/08/24	108	%	70 - 130	
			Total Cobalt (Co)	2021/08/24	102	%	70 - 130	
			Total Copper (Cu)	2021/08/24	102	%	70 - 130	
			Total Iron (Fe)	2021/08/24	105	%	70 - 130	
			Total Lead (Pb)	2021/08/24	109	%	70 - 130	
			Total Lithium (Li)	2021/08/24	97	%	70 - 130	
			Total Magnesium (Mg)	2021/08/24	108	%	70 - 130	
			Total Manganese (Mn)	2021/08/24	107	%	70 - 130	
			Total Mercury (Hg)	2021/08/24	105	%	70 - 130	
			Total Molybdenum (Mo)	2021/08/24	106	%	70 - 130	
			Total Nickel (Ni)	2021/08/24	109	%	70 - 130	
			Total Phosphorus (P)	2021/08/24	95	%	70 - 130	
			Total Potassium (K)	2021/08/24	89	%	70 - 130	
			Total Silver (Ag)	2021/08/24	97	%	70 - 130	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A329976	JBN	Spiked Blank	Total Sodium (Na)	2021/08/24		97	%	70 - 130
			Total Strontium (Sr)	2021/08/24		101	%	70 - 130
			Total Thallium (Tl)	2021/08/24		91	%	70 - 130
			Total Tin (Sn)	2021/08/24		112	%	70 - 130
			Total Uranium (U)	2021/08/24		98	%	70 - 130
			Total Vanadium (V)	2021/08/24		109	%	70 - 130
			Total Zinc (Zn)	2021/08/24		106	%	70 - 130
			Total Aluminum (Al)	2021/08/24		96	%	75 - 125
			Total Antimony (Sb)	2021/08/24		98	%	75 - 125
			Total Arsenic (As)	2021/08/24		96	%	75 - 125
			Total Barium (Ba)	2021/08/24		95	%	75 - 125
			Total Beryllium (Be)	2021/08/24		88	%	75 - 125
			Total Bismuth (Bi)	2021/08/24		95	%	75 - 125
			Total Boron (B)	2021/08/24		92	%	75 - 125
			Total Cadmium (Cd)	2021/08/24		99	%	75 - 125
			Total Calcium (Ca)	2021/08/24		100	%	75 - 125
			Total Chromium (Cr)	2021/08/24		101	%	75 - 125
			Total Cobalt (Co)	2021/08/24		101	%	75 - 125
			Total Copper (Cu)	2021/08/24		103	%	75 - 125
			Total Iron (Fe)	2021/08/24		103	%	75 - 125
			Total Lead (Pb)	2021/08/24		99	%	75 - 125
			Total Lithium (Li)	2021/08/24		87	%	75 - 125
			Total Magnesium (Mg)	2021/08/24		100	%	75 - 125
			Total Manganese (Mn)	2021/08/24		101	%	75 - 125
			Total Mercury (Hg)	2021/08/24		93	%	75 - 125
			Total Molybdenum (Mo)	2021/08/24		95	%	75 - 125
			Total Nickel (Ni)	2021/08/24		101	%	75 - 125
			Total Phosphorus (P)	2021/08/24		91	%	75 - 125
			Total Potassium (K)	2021/08/24		96	%	75 - 125
			Total Selenium (Se)	2021/08/24		99	%	75 - 125
			Total Silver (Ag)	2021/08/24		99	%	75 - 125
			Total Sodium (Na)	2021/08/24		105	%	75 - 125
			Total Strontium (Sr)	2021/08/24		94	%	75 - 125
			Total Thallium (Tl)	2021/08/24		94	%	75 - 125
			Total Tin (Sn)	2021/08/24		99	%	75 - 125
			Total Titanium (Ti)	2021/08/24		101	%	75 - 125
			Total Tungsten (W)	2021/08/24		101	%	75 - 125
			Total Uranium (U)	2021/08/24		95	%	75 - 125
			Total Vanadium (V)	2021/08/24		100	%	75 - 125
			Total Zinc (Zn)	2021/08/24		101	%	75 - 125
			Total Zirconium (Zr)	2021/08/24		98	%	75 - 125
A329976	JBN	Method Blank	Total Aluminum (Al)	2021/08/24	ND, RDL=100		mg/kg	
			Total Antimony (Sb)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Arsenic (As)	2021/08/24	ND, RDL=0.20		mg/kg	
			Total Barium (Ba)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Beryllium (Be)	2021/08/24	ND, RDL=0.20		mg/kg	
			Total Bismuth (Bi)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Boron (B)	2021/08/24	ND, RDL=1.0		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Cadmium (Cd)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Calcium (Ca)	2021/08/24	ND, RDL=100		mg/kg	
			Total Chromium (Cr)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Cobalt (Co)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Copper (Cu)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Iron (Fe)	2021/08/24	ND, RDL=100		mg/kg	
			Total Lead (Pb)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Lithium (Li)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Magnesium (Mg)	2021/08/24	ND, RDL=100		mg/kg	
			Total Manganese (Mn)	2021/08/24	ND, RDL=0.20		mg/kg	
			Total Mercury (Hg)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Molybdenum (Mo)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Nickel (Ni)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Phosphorus (P)	2021/08/24	ND, RDL=10		mg/kg	
			Total Potassium (K)	2021/08/24	ND, RDL=100		mg/kg	
			Total Selenium (Se)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Silver (Ag)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Sodium (Na)	2021/08/24	ND, RDL=100		mg/kg	
			Total Strontium (Sr)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Thallium (Tl)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Tin (Sn)	2021/08/24	ND, RDL=0.10		mg/kg	
			Total Titanium (Ti)	2021/08/24	ND, RDL=1.0		mg/kg	
			Total Tungsten (W)	2021/08/24	ND, RDL=0.50		mg/kg	
			Total Uranium (U)	2021/08/24	ND, RDL=0.050		mg/kg	
			Total Vanadium (V)	2021/08/24	ND, RDL=1.0		mg/kg	
			Total Zinc (Zn)	2021/08/24	ND, RDL=1.0		mg/kg	
			Total Zirconium (Zr)	2021/08/24	ND, RDL=0.50		mg/kg	
A329976	JBN	RPD [ADR372-01]	Total Aluminum (Al)	2021/08/24	4.8		%	40
			Total Antimony (Sb)	2021/08/24	7.8		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Arsenic (As)	2021/08/24	2.7		%	30
			Total Barium (Ba)	2021/08/24	5.6		%	40
			Total Beryllium (Be)	2021/08/24	NC		%	30
			Total Bismuth (Bi)	2021/08/24	12		%	30
			Total Boron (B)	2021/08/24	18		%	30
			Total Cadmium (Cd)	2021/08/24	7.6		%	30
			Total Calcium (Ca)	2021/08/24	2.6		%	30
			Total Chromium (Cr)	2021/08/24	2.4		%	30
			Total Cobalt (Co)	2021/08/24	2.2		%	30
			Total Copper (Cu)	2021/08/24	2.8		%	30
			Total Iron (Fe)	2021/08/24	2.3		%	30
			Total Lead (Pb)	2021/08/24	1.3		%	40
			Total Lithium (Li)	2021/08/24	3.0		%	30
			Total Magnesium (Mg)	2021/08/24	4.8		%	30
			Total Manganese (Mn)	2021/08/24	3.1		%	30
			Total Mercury (Hg)	2021/08/24	36		%	40
			Total Molybdenum (Mo)	2021/08/24	1.5		%	40
			Total Nickel (Ni)	2021/08/24	0.94		%	30
			Total Phosphorus (P)	2021/08/24	1.6		%	30
			Total Potassium (K)	2021/08/24	1.6		%	40
			Total Selenium (Se)	2021/08/24	NC		%	30
			Total Silver (Ag)	2021/08/24	1.3		%	40
			Total Sodium (Na)	2021/08/24	0.79		%	40
			Total Strontium (Sr)	2021/08/24	0.082		%	40
			Total Thallium (Tl)	2021/08/24	5.5		%	30
			Total Tin (Sn)	2021/08/24	4.7		%	40
			Total Titanium (Ti)	2021/08/24	1.7		%	40
			Total Tungsten (W)	2021/08/24	34		%	40
			Total Uranium (U)	2021/08/24	22		%	30
			Total Vanadium (V)	2021/08/24	1.2		%	30
			Total Zinc (Zn)	2021/08/24	3.8		%	30
			Total Zirconium (Zr)	2021/08/24	0.62		%	40
A329989	JGD	Spiked Blank	Soluble (2:1) pH	2021/08/24		100	%	97 - 103
A329989	JGD	RPD	Soluble (2:1) pH	2021/08/24	0.36		%	N/A
A330296	LA5	Method Blank	Moisture	2021/08/25	ND, RDL=0.30		%	
A330296	LA5	RPD [ADR376-01]	Moisture	2021/08/25	0.50		%	20
A330648	JLP	Matrix Spike	Total Aluminum (Al)	2021/08/25		NC	%	75 - 125
			Total Antimony (Sb)	2021/08/25		93	%	75 - 125
			Total Arsenic (As)	2021/08/25		96	%	75 - 125
			Total Barium (Ba)	2021/08/25		93	%	75 - 125
			Total Beryllium (Be)	2021/08/25		93	%	75 - 125
			Total Bismuth (Bi)	2021/08/25		94	%	75 - 125
			Total Boron (B)	2021/08/25		95	%	75 - 125
			Total Cadmium (Cd)	2021/08/25		96	%	75 - 125
			Total Calcium (Ca)	2021/08/25		NC	%	75 - 125
			Total Chromium (Cr)	2021/08/25		95	%	75 - 125
			Total Cobalt (Co)	2021/08/25		99	%	75 - 125
			Total Copper (Cu)	2021/08/25		96	%	75 - 125
			Total Iron (Fe)	2021/08/25		NC	%	75 - 125
			Total Lead (Pb)	2021/08/25		97	%	75 - 125
			Total Lithium (Li)	2021/08/25		90	%	75 - 125
			Total Magnesium (Mg)	2021/08/25		NC	%	75 - 125
			Total Manganese (Mn)	2021/08/25		NC	%	75 - 125
			Total Mercury (Hg)	2021/08/25		94	%	75 - 125



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330648	JLP	QC Standard	Total Molybdenum (Mo)	2021/08/25		93	%	75 - 125
			Total Nickel (Ni)	2021/08/25		94	%	75 - 125
			Total Phosphorus (P)	2021/08/25		86	%	75 - 125
			Total Potassium (K)	2021/08/25		88	%	75 - 125
			Total Selenium (Se)	2021/08/25		101	%	75 - 125
			Total Silver (Ag)	2021/08/25		96	%	75 - 125
			Total Sodium (Na)	2021/08/25		102	%	75 - 125
			Total Strontium (Sr)	2021/08/25		95	%	75 - 125
			Total Thallium (Tl)	2021/08/25		93	%	75 - 125
			Total Tin (Sn)	2021/08/25		96	%	75 - 125
			Total Titanium (Ti)	2021/08/25		NC	%	75 - 125
			Total Tungsten (W)	2021/08/25		83	%	75 - 125
			Total Uranium (U)	2021/08/25		95	%	75 - 125
			Total Vanadium (V)	2021/08/25		95	%	75 - 125
			Total Zinc (Zn)	2021/08/25		91	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		102	%	75 - 125
			Total Aluminum (Al)	2021/08/25		93	%	70 - 130
			Total Antimony (Sb)	2021/08/25		105	%	70 - 130
			Total Arsenic (As)	2021/08/25		88	%	70 - 130
			Total Barium (Ba)	2021/08/25		98	%	70 - 130
			Total Beryllium (Be)	2021/08/25		95	%	70 - 130
			Total Cadmium (Cd)	2021/08/25		121	%	70 - 130
			Total Calcium (Ca)	2021/08/25		97	%	70 - 130
			Total Chromium (Cr)	2021/08/25		96	%	70 - 130
			Total Cobalt (Co)	2021/08/25		98	%	70 - 130
			Total Copper (Cu)	2021/08/25		101	%	70 - 130
			Total Iron (Fe)	2021/08/25		100	%	70 - 130
			Total Lead (Pb)	2021/08/25		110	%	70 - 130
			Total Lithium (Li)	2021/08/25		99	%	70 - 130
			Total Magnesium (Mg)	2021/08/25		103	%	70 - 130
			Total Manganese (Mn)	2021/08/25		99	%	70 - 130
			Total Mercury (Hg)	2021/08/25		95	%	70 - 130
			Total Molybdenum (Mo)	2021/08/25		97	%	70 - 130
			Total Nickel (Ni)	2021/08/25		104	%	70 - 130
			Total Phosphorus (P)	2021/08/25		95	%	70 - 130
			Total Potassium (K)	2021/08/25		82	%	70 - 130
			Total Silver (Ag)	2021/08/25		95	%	70 - 130
			Total Sodium (Na)	2021/08/25		90	%	70 - 130
			Total Strontium (Sr)	2021/08/25		99	%	70 - 130
			Total Thallium (Tl)	2021/08/25		90	%	70 - 130
			Total Tin (Sn)	2021/08/25		100	%	70 - 130
			Total Uranium (U)	2021/08/25		96	%	70 - 130
			Total Vanadium (V)	2021/08/25		100	%	70 - 130
			Total Zinc (Zn)	2021/08/25		105	%	70 - 130
A330648	JLP	Spiked Blank	Total Aluminum (Al)	2021/08/25		98	%	75 - 125
			Total Antimony (Sb)	2021/08/25		98	%	75 - 125
			Total Arsenic (As)	2021/08/25		99	%	75 - 125
			Total Barium (Ba)	2021/08/25		96	%	75 - 125
			Total Beryllium (Be)	2021/08/25		99	%	75 - 125
			Total Bismuth (Bi)	2021/08/25		96	%	75 - 125
			Total Boron (B)	2021/08/25		101	%	75 - 125
			Total Cadmium (Cd)	2021/08/25		99	%	75 - 125
			Total Calcium (Ca)	2021/08/25		102	%	75 - 125
			Total Chromium (Cr)	2021/08/25		103	%	75 - 125
			Total Cobalt (Co)	2021/08/25		104	%	75 - 125



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330648	JLP	Method Blank	Total Copper (Cu)	2021/08/25		102	%	75 - 125
			Total Iron (Fe)	2021/08/25		102	%	75 - 125
			Total Lead (Pb)	2021/08/25		98	%	75 - 125
			Total Lithium (Li)	2021/08/25		94	%	75 - 125
			Total Magnesium (Mg)	2021/08/25		100	%	75 - 125
			Total Manganese (Mn)	2021/08/25		99	%	75 - 125
			Total Mercury (Hg)	2021/08/25		95	%	75 - 125
			Total Molybdenum (Mo)	2021/08/25		96	%	75 - 125
			Total Nickel (Ni)	2021/08/25		101	%	75 - 125
			Total Phosphorus (P)	2021/08/25		96	%	75 - 125
			Total Potassium (K)	2021/08/25		97	%	75 - 125
			Total Selenium (Se)	2021/08/25		101	%	75 - 125
			Total Silver (Ag)	2021/08/25		99	%	75 - 125
			Total Sodium (Na)	2021/08/25		106	%	75 - 125
			Total Strontium (Sr)	2021/08/25		95	%	75 - 125
			Total Thallium (Tl)	2021/08/25		95	%	75 - 125
			Total Tin (Sn)	2021/08/25		100	%	75 - 125
			Total Titanium (Ti)	2021/08/25		101	%	75 - 125
			Total Tungsten (W)	2021/08/25		102	%	75 - 125
			Total Uranium (U)	2021/08/25		95	%	75 - 125
			Total Vanadium (V)	2021/08/25		98	%	75 - 125
			Total Zinc (Zn)	2021/08/25		98	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		99	%	75 - 125
			Total Aluminum (Al)	2021/08/25	ND, RDL=100		mg/kg	
			Total Antimony (Sb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Arsenic (As)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Barium (Ba)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Beryllium (Be)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Bismuth (Bi)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Boron (B)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Cadmium (Cd)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Calcium (Ca)	2021/08/25	ND, RDL=100		mg/kg	
			Total Chromium (Cr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Cobalt (Co)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Copper (Cu)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Iron (Fe)	2021/08/25	ND, RDL=100		mg/kg	
			Total Lead (Pb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Lithium (Li)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Magnesium (Mg)	2021/08/25	ND, RDL=100		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330648	JLP	RPD	Total Manganese (Mn)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Mercury (Hg)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Molybdenum (Mo)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Nickel (Ni)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Phosphorus (P)	2021/08/25	ND, RDL=10		mg/kg	
			Total Potassium (K)	2021/08/25	ND, RDL=100		mg/kg	
			Total Selenium (Se)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Silver (Ag)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Sodium (Na)	2021/08/25	ND, RDL=100		mg/kg	
			Total Strontium (Sr)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Thallium (Tl)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Tin (Sn)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Titanium (Ti)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Tungsten (W)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Uranium (U)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Vanadium (V)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zinc (Zn)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zirconium (Zr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Aluminum (Al)	2021/08/25	3.0		%	40
			Total Antimony (Sb)	2021/08/25	NC		%	30
			Total Arsenic (As)	2021/08/25	4.7		%	30
			Total Barium (Ba)	2021/08/25	6.4		%	40
			Total Beryllium (Be)	2021/08/25	NC		%	30
			Total Bismuth (Bi)	2021/08/25	NC		%	30
			Total Boron (B)	2021/08/25	NC		%	30
			Total Cadmium (Cd)	2021/08/25	NC		%	30
			Total Calcium (Ca)	2021/08/25	6.4		%	30
			Total Chromium (Cr)	2021/08/25	2.2		%	30
			Total Cobalt (Co)	2021/08/25	4.5		%	30
			Total Copper (Cu)	2021/08/25	0.77		%	30
			Total Iron (Fe)	2021/08/25	2.2		%	30
			Total Lead (Pb)	2021/08/25	19		%	40
			Total Lithium (Li)	2021/08/25	5.6		%	30
			Total Magnesium (Mg)	2021/08/25	1.6		%	30
			Total Manganese (Mn)	2021/08/25	4.0		%	30
			Total Mercury (Hg)	2021/08/25	NC		%	40
			Total Molybdenum (Mo)	2021/08/25	1.1		%	40
			Total Nickel (Ni)	2021/08/25	1.9		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A330651	JGD	Spiked Blank	Total Phosphorus (P)	2021/08/25	7.4		%	30
			Total Potassium (K)	2021/08/25	9.5		%	40
			Total Selenium (Se)	2021/08/25	NC		%	30
			Total Silver (Ag)	2021/08/25	NC		%	40
			Total Sodium (Na)	2021/08/25	0.35		%	40
			Total Strontium (Sr)	2021/08/25	5.4		%	40
			Total Thallium (Tl)	2021/08/25	22		%	30
			Total Tin (Sn)	2021/08/25	6.8		%	40
			Total Titanium (Ti)	2021/08/25	7.1		%	40
			Total Tungsten (W)	2021/08/25	NC		%	40
			Total Uranium (U)	2021/08/25	1.2		%	30
			Total Vanadium (V)	2021/08/25	2.9		%	30
			Total Zinc (Zn)	2021/08/25	4.7		%	30
			Total Zirconium (Zr)	2021/08/25	2.0		%	40
			Soluble (2:1) pH	2021/08/25		100	%	97 - 103
A330651	JGD	RPD	Soluble (2:1) pH	2021/08/25	0		%	N/A
A331008	JLP	Matrix Spike	Total Aluminum (Al)	2021/08/25		NC	%	75 - 125
			Total Antimony (Sb)	2021/08/25		91	%	75 - 125
			Total Arsenic (As)	2021/08/25		95	%	75 - 125
			Total Barium (Ba)	2021/08/25		98	%	75 - 125
			Total Beryllium (Be)	2021/08/25		94	%	75 - 125
			Total Bismuth (Bi)	2021/08/25		94	%	75 - 125
			Total Boron (B)	2021/08/25		94	%	75 - 125
			Total Cadmium (Cd)	2021/08/25		96	%	75 - 125
			Total Calcium (Ca)	2021/08/25		NC	%	75 - 125
			Total Chromium (Cr)	2021/08/25		97	%	75 - 125
			Total Cobalt (Co)	2021/08/25		99	%	75 - 125
			Total Copper (Cu)	2021/08/25		96	%	75 - 125
			Total Iron (Fe)	2021/08/25		NC	%	75 - 125
			Total Lead (Pb)	2021/08/25		97	%	75 - 125
			Total Lithium (Li)	2021/08/25		88	%	75 - 125
			Total Magnesium (Mg)	2021/08/25		NC	%	75 - 125
			Total Manganese (Mn)	2021/08/25		NC	%	75 - 125
			Total Mercury (Hg)	2021/08/25		93	%	75 - 125
			Total Molybdenum (Mo)	2021/08/25		93	%	75 - 125
			Total Nickel (Ni)	2021/08/25		94	%	75 - 125
			Total Phosphorus (P)	2021/08/25		89	%	75 - 125
			Total Potassium (K)	2021/08/25		109	%	75 - 125
			Total Selenium (Se)	2021/08/25		98	%	75 - 125
			Total Silver (Ag)	2021/08/25		95	%	75 - 125
			Total Sodium (Na)	2021/08/25		113	%	75 - 125
			Total Strontium (Sr)	2021/08/25		99	%	75 - 125
			Total Thallium (Tl)	2021/08/25		92	%	75 - 125
			Total Tin (Sn)	2021/08/25		97	%	75 - 125
			Total Titanium (Ti)	2021/08/25		NC	%	75 - 125
			Total Tungsten (W)	2021/08/25		93	%	75 - 125
			Total Uranium (U)	2021/08/25		94	%	75 - 125
			Total Vanadium (V)	2021/08/25		96	%	75 - 125
			Total Zinc (Zn)	2021/08/25		92	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		109	%	75 - 125
A331008	JLP	QC Standard	Total Aluminum (Al)	2021/08/25		98	%	70 - 130
			Total Antimony (Sb)	2021/08/25		101	%	70 - 130
			Total Arsenic (As)	2021/08/25		88	%	70 - 130
			Total Barium (Ba)	2021/08/25		98	%	70 - 130
			Total Beryllium (Be)	2021/08/25		92	%	70 - 130



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
				Total Cadmium (Cd)	2021/08/25		94	%	70 - 130
				Total Calcium (Ca)	2021/08/25		96	%	70 - 130
				Total Chromium (Cr)	2021/08/25		102	%	70 - 130
				Total Cobalt (Co)	2021/08/25		99	%	70 - 130
				Total Copper (Cu)	2021/08/25		104	%	70 - 130
				Total Iron (Fe)	2021/08/25		102	%	70 - 130
				Total Lead (Pb)	2021/08/25		112	%	70 - 130
				Total Lithium (Li)	2021/08/25		99	%	70 - 130
				Total Magnesium (Mg)	2021/08/25		106	%	70 - 130
				Total Manganese (Mn)	2021/08/25		102	%	70 - 130
				Total Mercury (Hg)	2021/08/25		103	%	70 - 130
				Total Molybdenum (Mo)	2021/08/25		105	%	70 - 130
				Total Nickel (Ni)	2021/08/25		106	%	70 - 130
				Total Phosphorus (P)	2021/08/25		94	%	70 - 130
				Total Potassium (K)	2021/08/25		85	%	70 - 130
				Total Silver (Ag)	2021/08/25		97	%	70 - 130
				Total Sodium (Na)	2021/08/25		94	%	70 - 130
				Total Strontium (Sr)	2021/08/25		100	%	70 - 130
				Total Thallium (Tl)	2021/08/25		86	%	70 - 130
				Total Tin (Sn)	2021/08/25		96	%	70 - 130
				Total Uranium (U)	2021/08/25		102	%	70 - 130
				Total Vanadium (V)	2021/08/25		103	%	70 - 130
				Total Zinc (Zn)	2021/08/25		103	%	70 - 130
	A331008	JLP	Spiked Blank	Total Aluminum (Al)	2021/08/25		97	%	75 - 125
				Total Antimony (Sb)	2021/08/25		100	%	75 - 125
				Total Arsenic (As)	2021/08/25		101	%	75 - 125
				Total Barium (Ba)	2021/08/25		98	%	75 - 125
				Total Beryllium (Be)	2021/08/25		103	%	75 - 125
				Total Bismuth (Bi)	2021/08/25		99	%	75 - 125
				Total Boron (B)	2021/08/25		104	%	75 - 125
				Total Cadmium (Cd)	2021/08/25		100	%	75 - 125
				Total Calcium (Ca)	2021/08/25		103	%	75 - 125
				Total Chromium (Cr)	2021/08/25		101	%	75 - 125
				Total Cobalt (Co)	2021/08/25		105	%	75 - 125
				Total Copper (Cu)	2021/08/25		104	%	75 - 125
				Total Iron (Fe)	2021/08/25		102	%	75 - 125
				Total Lead (Pb)	2021/08/25		102	%	75 - 125
				Total Lithium (Li)	2021/08/25		97	%	75 - 125
				Total Magnesium (Mg)	2021/08/25		101	%	75 - 125
				Total Manganese (Mn)	2021/08/25		100	%	75 - 125
				Total Mercury (Hg)	2021/08/25		98	%	75 - 125
				Total Molybdenum (Mo)	2021/08/25		97	%	75 - 125
				Total Nickel (Ni)	2021/08/25		101	%	75 - 125
				Total Phosphorus (P)	2021/08/25		96	%	75 - 125
				Total Potassium (K)	2021/08/25		99	%	75 - 125
				Total Selenium (Se)	2021/08/25		103	%	75 - 125
				Total Silver (Ag)	2021/08/25		100	%	75 - 125
				Total Sodium (Na)	2021/08/25		105	%	75 - 125
				Total Strontium (Sr)	2021/08/25		97	%	75 - 125
				Total Thallium (Tl)	2021/08/25		98	%	75 - 125
				Total Tin (Sn)	2021/08/25		100	%	75 - 125
				Total Titanium (Ti)	2021/08/25		100	%	75 - 125
				Total Tungsten (W)	2021/08/25		105	%	75 - 125
				Total Uranium (U)	2021/08/25		99	%	75 - 125
				Total Vanadium (V)	2021/08/25		100	%	75 - 125



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A331008	JLP	Method Blank	Total Zinc (Zn)	2021/08/25		100	%	75 - 125
			Total Zirconium (Zr)	2021/08/25		102	%	75 - 125
			Total Aluminum (Al)	2021/08/25	ND, RDL=100		mg/kg	
			Total Antimony (Sb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Arsenic (As)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Barium (Ba)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Beryllium (Be)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Bismuth (Bi)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Boron (B)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Cadmium (Cd)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Calcium (Ca)	2021/08/25	ND, RDL=100		mg/kg	
			Total Chromium (Cr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Cobalt (Co)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Copper (Cu)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Iron (Fe)	2021/08/25	ND, RDL=100		mg/kg	
			Total Lead (Pb)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Lithium (Li)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Magnesium (Mg)	2021/08/25	ND, RDL=100		mg/kg	
			Total Manganese (Mn)	2021/08/25	ND, RDL=0.20		mg/kg	
			Total Mercury (Hg)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Molybdenum (Mo)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Nickel (Ni)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Phosphorus (P)	2021/08/25	ND, RDL=10		mg/kg	
			Total Potassium (K)	2021/08/25	ND, RDL=100		mg/kg	
			Total Selenium (Se)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Silver (Ag)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Sodium (Na)	2021/08/25	ND, RDL=100		mg/kg	
			Total Strontium (Sr)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Thallium (Tl)	2021/08/25	ND, RDL=0.050		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A331008	JLP	RPD	Total Tin (Sn)	2021/08/25	ND, RDL=0.10		mg/kg	
			Total Titanium (Ti)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Tungsten (W)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Uranium (U)	2021/08/25	ND, RDL=0.050		mg/kg	
			Total Vanadium (V)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zinc (Zn)	2021/08/25	ND, RDL=1.0		mg/kg	
			Total Zirconium (Zr)	2021/08/25	ND, RDL=0.50		mg/kg	
			Total Aluminum (Al)	2021/08/25	5.6		%	40
			Total Antimony (Sb)	2021/08/25	1.4		%	30
			Total Arsenic (As)	2021/08/25	4.5		%	30
			Total Barium (Ba)	2021/08/25	5.7		%	40
			Total Beryllium (Be)	2021/08/25	NC		%	30
			Total Bismuth (Bi)	2021/08/25	NC		%	30
			Total Boron (B)	2021/08/25	10		%	30
			Total Cadmium (Cd)	2021/08/25	0.50		%	30
			Total Calcium (Ca)	2021/08/25	3.1		%	30
			Total Chromium (Cr)	2021/08/25	7.9		%	30
			Total Cobalt (Co)	2021/08/25	3.1		%	30
			Total Copper (Cu)	2021/08/25	16		%	30
			Total Iron (Fe)	2021/08/25	5.0		%	30
			Total Lead (Pb)	2021/08/25	6.1		%	40
			Total Lithium (Li)	2021/08/25	4.1		%	30
			Total Magnesium (Mg)	2021/08/25	7.0		%	30
			Total Manganese (Mn)	2021/08/25	1.9		%	30
			Total Mercury (Hg)	2021/08/25	21		%	40
			Total Molybdenum (Mo)	2021/08/25	5.4		%	40
			Total Nickel (Ni)	2021/08/25	8.1		%	30
			Total Phosphorus (P)	2021/08/25	4.2		%	30
			Total Potassium (K)	2021/08/25	4.4		%	40
			Total Selenium (Se)	2021/08/25	NC		%	30
			Total Silver (Ag)	2021/08/25	NC		%	40
			Total Strontium (Sr)	2021/08/25	1.9		%	40
			Total Thallium (Tl)	2021/08/25	13		%	30
			Total Tin (Sn)	2021/08/25	12		%	40
			Total Titanium (Ti)	2021/08/25	5.5		%	40
			Total Tungsten (W)	2021/08/25	NC		%	40
			Total Uranium (U)	2021/08/25	3.9		%	30
			Total Vanadium (V)	2021/08/25	6.8		%	30
			Total Zinc (Zn)	2021/08/25	7.1		%	30
			Total Zirconium (Zr)	2021/08/25	2.9		%	40
A331013	JGD	Spiked Blank	Soluble (2:1) pH	2021/08/25		100	%	97 - 103
A331013	JGD	RPD [ADR452-01]	Soluble (2:1) pH	2021/08/25	0.73		%	N/A
A338131	LA5	Method Blank	Moisture	2021/09/11	ND, RDL=0.30		%	
A338131	LA5	RPD [ADR390-01]	Moisture	2021/09/11	0.51		%	20
A338154	SOM	Matrix Spike [ADR438-01]	Total (Dry Wt) Aluminum (Al)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Antimony (Sb)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Arsenic (As)	2021/09/24		98	%	80 - 120



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	QC Standard	Total (Dry Wt) Barium (Ba)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Beryllium (Be)	2021/09/24		107	%	80 - 120
			Total (Dry Wt) Bismuth (Bi)	2021/09/24		91	%	80 - 120
			Total (Dry Wt) Boron (B)	2021/09/24		109	%	80 - 120
			Total (Dry Wt) Cadmium (Cd)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Calcium (Ca)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Chromium (Cr)	2021/09/24		93	%	80 - 120
			Total (Dry Wt) Cobalt (Co)	2021/09/24		92	%	80 - 120
			Total (Dry Wt) Copper (Cu)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Iron (Fe)	2021/09/24		117	%	80 - 120
			Total (Dry Wt) Lead (Pb)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Magnesium (Mg)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Manganese (Mn)	2021/09/24		119	%	80 - 120
			Total (Dry Wt) Mercury (Hg)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Nickel (Ni)	2021/09/24		92	%	80 - 120
			Total (Dry Wt) Phosphorus (P)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Potassium (K)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Selenium (Se)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Silver (Ag)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Sodium (Na)	2021/09/24		102	%	80 - 120
			Total (Dry Wt) Strontium (Sr)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Thallium (Tl)	2021/09/24		94	%	80 - 120
			Total (Dry Wt) Tin (Sn)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Titanium (Ti)	2021/09/24		NC	%	80 - 120
			Total (Dry Wt) Uranium (U)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Vanadium (V)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Zinc (Zn)	2021/09/24		109	%	80 - 120
			Total (Dry Wt) Aluminum (Al)	2021/09/24		36	%	17 - 93
			Total (Dry Wt) Arsenic (As)	2021/09/24		83	%	42 - 199
			Total (Dry Wt) Boron (B)	2021/09/24		101	%	75 - 125
			Total (Dry Wt) Cadmium (Cd)	2021/09/24		89	%	75 - 125
			Total (Dry Wt) Calcium (Ca)	2021/09/24		86	%	75 - 125
			Total (Dry Wt) Cobalt (Co)	2021/09/24		77	%	75 - 125
			Total (Dry Wt) Copper (Cu)	2021/09/24		81	%	75 - 125
			Total (Dry Wt) Manganese (Mn)	2021/09/24		89	%	75 - 125
			Total (Dry Wt) Mercury (Hg)	2021/09/24		81	%	75 - 125
			Total (Dry Wt) Nickel (Ni)	2021/09/24		73 (2)	%	75 - 125
			Total (Dry Wt) Phosphorus (P)	2021/09/24		97	%	75 - 125
			Total (Dry Wt) Potassium (K)	2021/09/24		90	%	75 - 125
			Total (Dry Wt) Selenium (Se)	2021/09/24		96	%	75 - 125
			Total (Dry Wt) Sodium (Na)	2021/09/24		89	%	75 - 125
			Total (Dry Wt) Strontium (Sr)	2021/09/24		97	%	75 - 125
			Total (Dry Wt) Zinc (Zn)	2021/09/24		84	%	75 - 125
A338154	SOM	Spiked Blank	Total (Dry Wt) Aluminum (Al)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Antimony (Sb)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Arsenic (As)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Barium (Ba)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Beryllium (Be)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Bismuth (Bi)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Boron (B)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Cadmium (Cd)	2021/09/24		96	%	80 - 120
			Total (Dry Wt) Calcium (Ca)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Chromium (Cr)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Cobalt (Co)	2021/09/24		94	%	80 - 120



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	Method Blank	Total (Dry Wt) Copper (Cu)	2021/09/24		94	%	80 - 120
			Total (Dry Wt) Iron (Fe)	2021/09/24		104	%	80 - 120
			Total (Dry Wt) Lead (Pb)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Magnesium (Mg)	2021/09/24		103	%	80 - 120
			Total (Dry Wt) Manganese (Mn)	2021/09/24		98	%	80 - 120
			Total (Dry Wt) Mercury (Hg)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24		100	%	80 - 120
			Total (Dry Wt) Nickel (Ni)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Phosphorus (P)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Potassium (K)	2021/09/24		104	%	80 - 120
			Total (Dry Wt) Selenium (Se)	2021/09/24		101	%	80 - 120
			Total (Dry Wt) Silver (Ag)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Sodium (Na)	2021/09/24		102	%	80 - 120
			Total (Dry Wt) Strontium (Sr)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Thallium (Tl)	2021/09/24		97	%	80 - 120
			Total (Dry Wt) Tin (Sn)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Titanium (Ti)	2021/09/24		103	%	80 - 120
			Total (Dry Wt) Uranium (U)	2021/09/24		102	%	80 - 120
			Total (Dry Wt) Vanadium (V)	2021/09/24		95	%	80 - 120
			Total (Dry Wt) Zinc (Zn)	2021/09/24		99	%	80 - 120
			Total (Dry Wt) Aluminum (Al)	2021/09/24	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Antimony (Sb)	2021/09/24	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Arsenic (As)	2021/09/24	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Barium (Ba)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Beryllium (Be)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Bismuth (Bi)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Boron (B)	2021/09/24	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Cadmium (Cd)	2021/09/24	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Calcium (Ca)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Chromium (Cr)	2021/09/24	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Cobalt (Co)	2021/09/24	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Copper (Cu)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Iron (Fe)	2021/09/24	ND, RDL=5.0		mg/kg	
			Total (Dry Wt) Lead (Pb)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Magnesium (Mg)	2021/09/24	ND, RDL=5.0		mg/kg	
			Total (Dry Wt) Manganese (Mn)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Mercury (Hg)	2021/09/24	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24	ND, RDL=0.020		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	RPD	Total (Dry Wt) Nickel (Ni)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Phosphorus (P)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Potassium (K)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Selenium (Se)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Silver (Ag)	2021/09/24	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Sodium (Na)	2021/09/24	ND, RDL=10		mg/kg	
			Total (Dry Wt) Strontium (Sr)	2021/09/24	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Thallium (Tl)	2021/09/24	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Tin (Sn)	2021/09/24	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Titanium (Ti)	2021/09/24	ND, RDL=0.50		mg/kg	
			Total (Dry Wt) Uranium (U)	2021/09/24	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Vanadium (V)	2021/09/24	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Zinc (Zn)	2021/09/24	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Aluminum (Al)	2021/09/24	NC		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/24	NC		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/24	NC		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/24	NC		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/24	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/24	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/24	NC		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/24	NC		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/24	NC		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/24	NC		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/24	NC		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/24	NC		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/24	NC		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/24	NC		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/24	NC		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/24	NC		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/24	NC		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24	NC		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/24	NC		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/24	NC		%	40
			Total (Dry Wt) Potassium (K)	2021/09/24	NC		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/24	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/24	NC		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/24	NC		%	40
			Total (Dry Wt) Strontium (Sr)	2021/09/24	NC		%	60
			Total (Dry Wt) Thallium (Tl)	2021/09/24	NC		%	40
			Total (Dry Wt) Tin (Sn)	2021/09/24	NC		%	40
			Total (Dry Wt) Titanium (Ti)	2021/09/24	NC		%	40
			Total (Dry Wt) Uranium (U)	2021/09/24	NC		%	40



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A338154	SOM	RPD [ADR438-01]	Total (Dry Wt) Vanadium (V)	2021/09/24	NC		%	40
			Total (Dry Wt) Zinc (Zn)	2021/09/24	NC		%	40
			Total (Dry Wt) Aluminum (Al)	2021/09/24	5.7		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/24	6.0		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/24	5.0		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/24	0.62		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/24	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/24	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/24	2.9		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/24	4.8		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/24	0.29		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/24	3.6		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/24	1.5		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/24	3.0		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/24	2.9		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/24	3.5		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/24	1.7		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/24	1.3		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/24	NC		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/24	0.62		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/24	2.7		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/24	2.9		%	40
			Total (Dry Wt) Potassium (K)	2021/09/24	3.3		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/24	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/24	5.1		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/24	NC		%	40
			Total (Dry Wt) Strontium (Sr)	2021/09/24	1.3		%	60
			Total (Dry Wt) Thallium (Tl)	2021/09/24	NC		%	40
			Total (Dry Wt) Tin (Sn)	2021/09/24	NC		%	40
			Total (Dry Wt) Titanium (Ti)	2021/09/24	4.1		%	40
			Total (Dry Wt) Uranium (U)	2021/09/24	28		%	40
			Total (Dry Wt) Vanadium (V)	2021/09/24	NC		%	40
			Total (Dry Wt) Zinc (Zn)	2021/09/24	1.4		%	40
A358708	SOM	QC Standard	Total (Dry Wt) Aluminum (Al)	2021/09/25		35	%	N/A
			Total (Dry Wt) Arsenic (As)	2021/09/25		54	%	N/A
			Total (Dry Wt) Boron (B)	2021/09/25		100	%	N/A
			Total (Dry Wt) Cadmium (Cd)	2021/09/25		90	%	N/A
			Total (Dry Wt) Calcium (Ca)	2021/09/25		89	%	N/A
			Total (Dry Wt) Cobalt (Co)	2021/09/25		79	%	N/A
			Total (Dry Wt) Copper (Cu)	2021/09/25		85	%	N/A
			Total (Dry Wt) Manganese (Mn)	2021/09/25		89	%	N/A
			Total (Dry Wt) Mercury (Hg)	2021/09/25		91	%	N/A
			Total (Dry Wt) Nickel (Ni)	2021/09/25		76	%	N/A
			Total (Dry Wt) Phosphorus (P)	2021/09/25		96	%	N/A
			Total (Dry Wt) Potassium (K)	2021/09/25		91	%	N/A
			Total (Dry Wt) Selenium (Se)	2021/09/25		102	%	N/A
			Total (Dry Wt) Sodium (Na)	2021/09/25		90	%	N/A
A358708	SOM	Spiked Blank	Total (Dry Wt) Strontium (Sr)	2021/09/25		99	%	N/A
			Total (Dry Wt) Zinc (Zn)	2021/09/25		86	%	N/A
			Total (Dry Wt) Aluminum (Al)	2021/09/25		103	%	80 - 120
			Total (Dry Wt) Antimony (Sb)	2021/09/25		100	%	80 - 120
			Total (Dry Wt) Arsenic (As)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Barium (Ba)	2021/09/25		100	%	80 - 120
			Total (Dry Wt) Beryllium (Be)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Bismuth (Bi)	2021/09/25		103	%	80 - 120



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A358708	SOM	Method Blank	Total (Dry Wt) Boron (B)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Cadmium (Cd)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Calcium (Ca)	2021/09/25		102	%	80 - 120
			Total (Dry Wt) Chromium (Cr)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Cobalt (Co)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Copper (Cu)	2021/09/25		98	%	80 - 120
			Total (Dry Wt) Iron (Fe)	2021/09/25		104	%	80 - 120
			Total (Dry Wt) Lead (Pb)	2021/09/25		103	%	80 - 120
			Total (Dry Wt) Magnesium (Mg)	2021/09/25		104	%	80 - 120
			Total (Dry Wt) Manganese (Mn)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Mercury (Hg)	2021/09/25		101	%	80 - 120
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25		104	%	80 - 120
			Total (Dry Wt) Nickel (Ni)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Phosphorus (P)	2021/09/25		101	%	80 - 120
			Total (Dry Wt) Potassium (K)	2021/09/25		102	%	80 - 120
			Total (Dry Wt) Selenium (Se)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Silver (Ag)	2021/09/25		96	%	80 - 120
			Total (Dry Wt) Sodium (Na)	2021/09/25		105	%	80 - 120
			Total (Dry Wt) Strontium (Sr)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Thallium (Tl)	2021/09/25		102	%	80 - 120
			Total (Dry Wt) Tin (Sn)	2021/09/25		107	%	80 - 120
			Total (Dry Wt) Titanium (Ti)	2021/09/25		103	%	80 - 120
			Total (Dry Wt) Uranium (U)	2021/09/25		106	%	80 - 120
			Total (Dry Wt) Vanadium (V)	2021/09/25		100	%	80 - 120
			Total (Dry Wt) Zinc (Zn)	2021/09/25		99	%	80 - 120
			Total (Dry Wt) Aluminum (Al)	2021/09/25	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Antimony (Sb)	2021/09/25	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Arsenic (As)	2021/09/25	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Barium (Ba)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Beryllium (Be)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Bismuth (Bi)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Boron (B)	2021/09/25	ND, RDL=1.0		mg/kg	
			Total (Dry Wt) Cadmium (Cd)	2021/09/25	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Calcium (Ca)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Chromium (Cr)	2021/09/25	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Cobalt (Co)	2021/09/25	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Copper (Cu)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Iron (Fe)	2021/09/25	ND, RDL=5.0		mg/kg	
			Total (Dry Wt) Lead (Pb)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Magnesium (Mg)	2021/09/25	ND, RDL=5.0		mg/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A358708	SOM	RPD	Total (Dry Wt) Manganese (Mn)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Mercury (Hg)	2021/09/25	ND, RDL=0.010		mg/kg	
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25	ND, RDL=0.020		mg/kg	
			Total (Dry Wt) Nickel (Ni)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Phosphorus (P)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Potassium (K)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Selenium (Se)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Silver (Ag)	2021/09/25	ND, RDL=0.0050		mg/kg	
			Total (Dry Wt) Sodium (Na)	2021/09/25	ND, RDL=10		mg/kg	
			Total (Dry Wt) Strontium (Sr)	2021/09/25	ND, RDL=0.050		mg/kg	
			Total (Dry Wt) Thallium (Tl)	2021/09/25	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Tin (Sn)	2021/09/25	ND, RDL=0.10		mg/kg	
			Total (Dry Wt) Titanium (Ti)	2021/09/25	ND, RDL=0.50		mg/kg	
			Total (Dry Wt) Uranium (U)	2021/09/25	ND, RDL=0.0020		mg/kg	
			Total (Dry Wt) Vanadium (V)	2021/09/25	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Zinc (Zn)	2021/09/25	ND, RDL=0.20		mg/kg	
			Total (Dry Wt) Aluminum (Al)	2021/09/25	NC		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/25	NC		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/25	NC		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/25	NC		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/25	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/25	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/25	NC		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/25	NC		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/25	NC		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/25	NC		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/25	NC		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/25	NC		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/25	NC		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/25	NC		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/25	NC		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/25	NC		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/25	NC		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25	NC		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/25	NC		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/25	NC		%	40
			Total (Dry Wt) Potassium (K)	2021/09/25	NC		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/25	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/25	NC		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/25	NC		%	40



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A358708	SOM	RPD [ADR392-01]	Total (Dry Wt) Strontium (Sr)	2021/09/25	NC		%	60
			Total (Dry Wt) Thallium (Tl)	2021/09/25	NC		%	40
			Total (Dry Wt) Tin (Sn)	2021/09/25	NC		%	40
			Total (Dry Wt) Titanium (Ti)	2021/09/25	NC		%	40
			Total (Dry Wt) Uranium (U)	2021/09/25	NC		%	40
			Total (Dry Wt) Vanadium (V)	2021/09/25	NC		%	40
			Total (Dry Wt) Zinc (Zn)	2021/09/25	NC		%	40
			Total (Dry Wt) Aluminum (Al)	2021/09/25	9.2		%	40
			Total (Dry Wt) Antimony (Sb)	2021/09/25	NC		%	40
			Total (Dry Wt) Arsenic (As)	2021/09/25	8.6		%	40
			Total (Dry Wt) Barium (Ba)	2021/09/25	2.1		%	40
			Total (Dry Wt) Beryllium (Be)	2021/09/25	NC		%	40
			Total (Dry Wt) Bismuth (Bi)	2021/09/25	NC		%	40
			Total (Dry Wt) Boron (B)	2021/09/25	3.0		%	40
			Total (Dry Wt) Cadmium (Cd)	2021/09/25	17		%	40
			Total (Dry Wt) Calcium (Ca)	2021/09/25	1.0		%	60
			Total (Dry Wt) Chromium (Cr)	2021/09/25	NC		%	40
			Total (Dry Wt) Cobalt (Co)	2021/09/25	4.0		%	40
			Total (Dry Wt) Copper (Cu)	2021/09/25	0.65		%	40
			Total (Dry Wt) Iron (Fe)	2021/09/25	0.040		%	40
			Total (Dry Wt) Lead (Pb)	2021/09/25	8.6		%	40
			Total (Dry Wt) Magnesium (Mg)	2021/09/25	0.92		%	40
			Total (Dry Wt) Manganese (Mn)	2021/09/25	1.2		%	40
			Total (Dry Wt) Mercury (Hg)	2021/09/25	5.8		%	40
			Total (Dry Wt) Molybdenum (Mo)	2021/09/25	0.36		%	40
			Total (Dry Wt) Nickel (Ni)	2021/09/25	0.50		%	40
			Total (Dry Wt) Phosphorus (P)	2021/09/25	1.1		%	40
			Total (Dry Wt) Potassium (K)	2021/09/25	0.87		%	40
			Total (Dry Wt) Selenium (Se)	2021/09/25	NC		%	40
			Total (Dry Wt) Silver (Ag)	2021/09/25	NC		%	40
			Total (Dry Wt) Sodium (Na)	2021/09/25	7.8		%	40
			Total (Dry Wt) Strontium (Sr)	2021/09/25	3.0		%	60
			Total (Dry Wt) Thallium (Tl)	2021/09/25	11		%	40
			Total (Dry Wt) Tin (Sn)	2021/09/25	NC		%	40
			Total (Dry Wt) Titanium (Ti)	2021/09/25	3.6		%	40
			Total (Dry Wt) Uranium (U)	2021/09/25	17		%	40
			Total (Dry Wt) Vanadium (V)	2021/09/25	NC		%	40
			Total (Dry Wt) Zinc (Zn)	2021/09/25	0.92		%	40

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Reference material outside acceptance criteria due to digestion limitations.



BV Labs Job #: C158547
Report Date: 2021/09/27

EDI Environmental Dynamics Inc.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

A handwritten signature in black ink, appearing to be "David Huang", written over a horizontal line.

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Page of

INVOICE TO:		Report Information		Project Information	
Company Name	#13524 Canagold Resources Ltd.	Company Name	#43618 HEMMERA ENVIROCHEM INC.	Quotation #	C01293
Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #	
Address	Suite 810-625 Howe Street Vancouver BC V6C 2T6	Address	Suite 230-2237 2nd Avenue Whitehorse YT Y1A 0K7	Project #	
Phone	(604) 685-9700 Fax: (604) 685-9744	Phone	(867) 456-4865 Fax:	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
				Sampled By	
Regulatory Criteria		Special Instructions		Chain Of Custody Record	
				C854362-02-01 Project Manager Nahed Amer	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form		Analysis Requested		Turnaround Time (TAT) Required	
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs		Regulated Drinking Water ? (Y/N) Metals Field Filtered ? (Y/N)		Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number _____ (call lab for R)	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1 NPT-029-Soil	New Polaris	Aug. 7 th 21		Soil	
2 NPT-029-Salixsp	New Polaris	Aug. 7 th 21		Veg	
3 NPT-031-Soil	New Polaris	Aug. 7 th 21		Soil	
4 NPT-031-Cornser	New Polaris	Aug. 7 th 21		Veg	
5 NPT-031-Vibeedu	New Polaris	Aug. 7 th 21		Veg	
6 NPT-001-Soil	New Polaris	Aug. 7 th 21		Soil	
7 NPT-001-Cornser	New Polaris	Aug. 7 th 21		Veg	
8 NPT-001-Viborcha	New Polaris	Aug. 7 th 21		Veg	
9					
10					
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	
		21/08/11	13:30		
				Date: (YY/MM/DD)	Time
				21/08/13	6:15
# Jars used and not submitted		Lab Use Only		Time Sensitive	
				Temperature (°C) on Receipt	
				2. 5/12/8	
Custody Seal Intact on Cooler?		Yes ☒ No ☐		While By/Lab Yellow Chart	
				2. 0/6/7	

Bottle Order #: 64362

RECEIVED IN WHITEHORSE
BY: 133
2021-08-11
TEMP: 21.6 / 9.6

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Page 1 of 1

Bureau Veritas Laboratories
4000 19th N.E. Calgary, Alberta Canada T2E 6P8 Tel: (403) 291-3077 Toll-free 800-563-6266 Fax: (403) 291-9468 www.bvlabs.com

INVOICE TO:

Company Name: #13524 Canagold Resources Ltd.
Contact Name: Accounts Payable
Address: Suite 810-625 Howe Street
Vancouver BC V6C 2T6
Phone: (604) 685-9700 Fax: (604) 685-9744
Email: accounting@canagoldresources.com

Report Information

Company Name: #43618 HEMMERA ENVIROCHEM INC.
Contact Name: Andrew Macphail
Address: Suite 230-2237 2nd Avenue
Whitehorse YT Y1A 0K7
Phone: (867) 456-4865 Fax: (867) 456-4865
Email: andrew.macphail@hemmera.com

Project Information

Quotation #: C01293
P.O. #:
Project #:
Project Name:
Site #:
Sampled By:
Chain Of Custody Record: C8644362-03-01
Bottle Order #: 644362
Project Manager:
Nished Amer:
Barcode: C158547_COC

Regulatory Criteria

Special Instructions:
Regulated Drinking Water? (Y/N)
Metals Field Filtered? (Y/N)
Analysis Requested:
Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required:
Time Required:
Rush Confirmation Number:
(call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Analysis Requested	Turnaround Time (TAT) Required	Comments
1	NPT-022A Soils	Aug 8 th '21		Soil					
2	NPT-022A Salix sp	Aug 8 th '21		Veg					
3	NPT-047 Soils	Aug 8 th '21		Soil					
4	NPT-047-Vacc ova	Aug 8 th '21		Veg					
5	NPT-040 Soils	Aug 8 th '21		Soil					
6	NPT-040-Vacc ova	Aug 8 th '21		Veg					
7	NPT-053 Soils	Aug 8 th '21		Soil					
8	NPT-053 Salix sp	Aug 8 th '21		Veg					
9	NPT-053 Corn ser	Aug 8 th '21		Veg					
10									

RECEIVED IN WHITEHORSE
BY: mduncker@1330
2021-08-11
TEMP: 21.6 °C
9.6 °C

*** RELINQUISHED BY: (Signature/Print)** B. Smith **DATE: (YY/MM/DD)** 21/08/11 **TIME:** 13:30

RECEIVED BY: (Signature/Print) RICHARD STIVENBERG **DATE: (YY/MM/DD)** 21/08/13 **TIME:** 10:15

Jars used and not submitted ☐ **Lab Use Only**

Time Sensitive ☐ **Temperature (°C) on Receipt** 2.5/12/8 **Custody Seal intact on Cooler?** ☒ Yes ☐ No

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*** IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.**

White BV Labs Yellow Client
2.0/6/7 Yes No

Ice: Yes



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INVOICE TO:		Report Information		Project Information	
Company Name	#13524 Canagold Resources Ltd.	Company Name	#43618 HEMMERA ENVIROCHEM INC.	Quotation #	C01293
Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #	
Address	Suite 810-625 Howe Street Vancouver BC V6C 2T6	Address	Suite 230-2237 2nd Avenue Whitehorse YT Y1A 0K7	Project #	
Phone	(604) 685-9700 Fax: (604) 685-9744	Phone	(867) 456-4865 Fax:	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
Regulatory Criteria		Special Instructions		Chain of Custody Record	
				 C158547_COC C#644362-05-01	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs		Analysis Requested		Turnaround Time (TAT) Required Please provide advance notice for rush projects	
		Regulated Drinking Water? (Y/N) Metals Field Filtered? (Y/N)		Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number _____ (call lab for it)	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	
1	NPT-059A - Corn Ser	Aug 9 th '21		Veg	
2	NPT-059A - Vibe edu	Aug 9 th '21		Veg	
3	NPT-059B - Soils	Aug 9 th '21		Soil	
4	NPT-059B - Corn Ser	Aug 9 th '21		Veg	
5	NPT-059B - Vibe edu	Aug 9 th '21		Veg	
6	NPT-020A - Soil	Aug 10 th '21		Soil	
7	NPT-020A - Vibe edu	Aug 10 th '21		Veg	
8	NPT-020A - Corn Ser	Aug 10 th '21		Veg	
9	NPT-060A - Soils	Aug 10 th '21		Soil	
10	NPT-060A - Corn Ser	Aug 10 th '21		Veg	
* RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	
Richard Stulvenberg		31/08/11	13:40	RICHARD STULVENBERG	
				Date: (YYMMDD)	
				21/09/12	
				Time	
				10:15	
				# Jars used and not submitted	
				Time Sensitive	
				Temperature (°C) on Receipt	
				2, 5/12/3	
				Custody Seal Intact on Cooler?	
				Yes No	
				White: BV Labs Yellow: Client	
				Yes No	



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INVOICE TO:		Report Information		Project Information	
Company Name	#13524 Canagold Resources Ltd.	Company Name	#43618 HEMMERA ENVIROCHEM INC.	Quotation #	C01293
Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #	
Address	Suite 810-625 Howe Street Vancouver BC V6C 2T6	Address	Suite 230-2237 2nd Avenue Whitehorse YT Y1A 0K7	Project #	
Phone	(604) 685-9700	Phone	(867) 456-4865	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
				Sampled By	

Regulatory Criteria		Special Instructions		Analysis Requested		Turnaround Time (TAT) Required	
						Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (not lab for #)	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form							
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs							

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Analysis Requested	# of Bottles	Comments
1	NPT-003 Soils	Aug 6 th '21		Soil					
2	NPT-003 Corn ser	Aug 6 th '21		Veg					
3	NPT-003 Vibe edu	Aug 6 th '21		Veg					
4	NPT-006 Soils	Aug 6 th '21		Soil					
5	NPT-006 Corn ser	Aug 6 th '21		Veg					
6	NPT-006 Vibe edu	Aug 6 th '21		Veg					
7	NPT-009 Soils	Aug 6 th '21		Soil					
8	NPT-009 Corn ser	Aug 6 th '21		Veg					
9	NPT-009 Vibe edu	Aug 6 th '21		Veg					
10									

RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)		Date: (YYMMDD)	Time	# Jars used and not submitted	Lab Use Only	
B. Smith BRODIE SMITH		2021/08/11	13:30	RICHARD J. BROWN RJB		21/08/15	12:15		Time Sensitive ☐ 2 Temperature (°C) on Receipt 5/12/8 Custody Seal Intact on Cooler? ☒ Yes ☐ No	

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2. 6/6/17
Lee, yes



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INVOICE TO:		Report Information		Project Information		ly	
Company Name	#13524 Canagold Resources Ltd.	Company Name	#43818 HEMMERA ENVIROCHEM INC.	Quotation #	C01293	C158547_COC	
Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #		Bottle Order #:	
Address	Suite 810-625 Howe Street Vancouver BC V6C 2T6	Address	Suite 230-2237 2nd Avenue Whitehorse YT Y1A 0K7	Project #		644302	
Phone	(604) 685-9700 Fax: (604) 685-9744	Phone	(867) 456-4865 Fax:	Project Name		Chain Of Custody Record	Project Manager
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #		Nashed Amer	
Regulatory Criteria		Special Instructions		Analysis Requested		Turnaround Time (TAT) Required	
						Please provide advance notice for rush projects	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form		Regulated Drinking Water ? (Y/N)				Regular (Standard) TAT	
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs		Metals Field Filtered ? (Y/N)				(will be applied if Rush TAT is not specified)	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix		Standard TAT = 5-7 Working days for most tests.	
1	NPT-060A - Vibe edu	Aug 10 th '21		Veg		Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 7 days - contact your Project Manager for details.	
2	NPT-061 - Soils	Aug 10 th '21		Soil		Job Specific Rush TAT (if applies to entire submission)	
3	NPT-064 - Vibe edu	Aug 10 th '21		Veg		Date Required: _____ Time Required: _____	
4	NPT-100C - Soils	Aug 10 th '21		Soil		Rush Confirmation Number _____ (call lab for #)	
5	NPT-100C - Corn Ser	Aug 10 th '21		Veg		# of Bottles	Comments
6	NPT-100C - Salix sp	Aug 10 th '21		Veg		RECEIVED IN WHITEHORSE	
7						BY: <u>Indun Car</u> 2132	
8						2021-08-11	
9						TEMP: 21.6 11	
10						9.6 8	
* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time
R. Smith Brian Smith		21/08/11	13:30	RICHARD SAUNDERS R. Smith		21/08/11	16:15
						# jars used and not submitted	Lab Use Only
						Time Sensitive	Temperature (°C) on Receipt
						☐	2.5/12/18
						Custody Seal Intact on Cooler?	☒ Yes ☐ No
						White: BV Labs Yellow: Client	2.0/6/17

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Page of

INVOICE TO:		Report Information		Project Information	
Company Name	#13524 Canagold Resources Ltd.	Company Name	#43618 HEMMERA ENVIROCHEM INC.	Quotation #	C01293
Contact Name	Accounts Payable	Contact Name	Andrew Macphail	P.O. #	
Address	Suite 810-625 Howe Street Vancouver BC V6C 2T5	Address	Suite 230-2237 2nd Avenue Whitehorse YT Y1A 0K7	Project #	
Phone	(604) 685-9700 Fax: (604) 685-9744	Phone	(867) 456-4865 Fax:	Project Name	
Email	accounting@canagoldresources.com	Email	andrew.macphail@hemmera.com	Site #	
				Sampled By	
Regulatory Criteria		Special Instructions		Analysis Requested	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form		Regulated Drinking Water? (Y/N)		Metals Field Filtered? (Y/N)	
Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs					
Sample Barcode Label	Sample Location Identification	Date Sampled	Time Sampled	Matrix	
1	NPT-OS4 - Soil	Aug. 9 th '21		Soil	
2	NPT-OS4 - Salix sp	Aug. 9 th '21		Veg	
3	NPT-OS4 - Vibe edu	Aug. 9 th '21		Veg	
4	NPT-OSB - Soils	Aug. 9 th '21		Soil	
5	NPT-OSB - Corn ser	Aug. 9 th '21		Veg	
6	NPT-OSB - Vibe edu	Aug. 9 th '21		Veg	
7	NPT-OS5 - Soils	Aug. 9 th '21		Soil	
8	NPT-OS5 - Corn ser	Aug. 9 th '21		Veg	
9	NPT-OS5 - Vibe edu	Aug. 9 th '21		Veg	
10	NPT-OS1A - Soils	Aug. 9 th '21		Soil	
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	
Richard Dufortello		21/08/11	13:30	RICHARD DUFORTELLO	
# Jars used and not submitted		Date: (YY/MM/DD)	Time	Lab Use Only	
1		20/10/13	10:15	Time Sensitive ☐ 1. 5/12/13	
				Temperature (°C) on Receipt ☐ 2. 0/6/13	
				Custody Seal Intact on Cooler? ☒ Yes ☐ No	
				White: BV Labs Yellow: Client	

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Ice: Yes

APPENDIX D WETLAND DATA

Appendix Table D-1. General field data collected at the surveyed wetlands in the Regional Assessment Area.

Wetland ID	Wetland Class	Plot ID	UTM Coordinates		Mesoslope Position	Hydrogeomorphic System	Structural Stage
			Easting	Northing			
NPWF02	Wm	02	579624	6507717	level	fluvial (C modifier), palustrine	2b
NPWF03	Wm	03	580359	6503784	depression, floodplain	fluvial (C modifier), palustrine	2b
NPWF04	Wf	04	581655	6504315	level, depression	palustrine	2b
		05a	580414	6500637	level, floodplain	lacustrine, fluvial (C modifier)	2b
NPWF05	Wm	05b	581379	6499927	level, floodplain	fluvial (C modifier)	2b
		05c	582572	6500062	level, floodplain	-	3a

Appendix Table D-2. Soil field data collected at the surveyed wetlands in the Regional Assessment Area.

Wetland ID	Plot ID	Soil Texture	Soil Thickness (cm)	Rooting Depth (cm)	Drainage	Seepage Depth (cm)
NPWF02	02	SiL	<2	43	Very poorly	10
NPWF03	03	Si	12	20	Very poorly	1.5
NPWF04	04	Si	31	31	-	-
NPWF05	05a	-	4	35	Very poorly	1
	05b	Si	2	40	Very poorly	4
	05c	Si	20	30	Very poorly	4

Appendix Table D-3. Hydrological field data collected at the surveyed wetlands in the Regional Assessment Area.

Wetland ID	Plot ID	Depth (cm)	Conductivity (µs/cm)	Water Temperature (°C)	pH	Turbidity (NTU)	Water Movement
NPWF02	02	0.3	145.5	12	6.9	0.07	Yes
NPWF03	03	0.5	62.6	9.2	6.7	3.01	Yes
NPWF04	04	0.2	98.8	15.9	6.9	1.6	Yes
NPWF05	05a	-	275	13.9	6.0	2.8	-
	05b	0.25	14.4	13.6	6.2	0.6	Yes
	05c	-	133.3	8.3	6.2	99.7	-



Appendix Table D-4. Wildlife field ranking data collected at the surveyed wetlands in the Regional Assessment Area.

Wetland ID	Plot ID	Habitat Rating						
		Moose	Beaver	Amphibians	Dabbling Ducks	Great Blue Heron	Rusty Blackbird	Songbirds
NPWF02	02	good	moderate	moderate	-	moderate	moderate	moderate
NPWF03	03	good	moderate	moderate	good	moderate	poor	poor
NPWF04	04	good	good	moderate	good	moderate	moderate	moderate
NPWF05	05a	good	moderate	moderate	poor	good	moderate	moderate
	05b	good	moderate	moderate	moderate	poor	poor	poor
	05c	good	poor	poor	poor	poor	poor	poor