



ANGUS PROJECT

DETAILED PROJECT DESCRIPTION

**For Submission to the Environmental
Assessment Office (EAO)**

February 5, 2024

Executive Summary

Vitreo Minerals Ltd. (Vitreo) is proposing to advance the Angus Project (the Project), a proposed silica sand operation located within Treaty 8 and approximately 60 kilometres (km) north of Prince George, British Columbia (BC). The Project can be accessed via Highway 97 and the Chuchinka-Log Lake Forest Service Road (FSR) (also called North Olsson FSR); the Mine site is located approximately 19 km east from Highway 97 along this FSR.

Prior to preparing this Detailed Project Description (DPD), Vitreo submitted an Initial Project Description (IPD) to the BC Environmental Assessment Office (EAO) on July 20, 2023. The IPD was shared with potentially affected or interested Indigenous Nations, anticipated members of the Technical Advisory Committee (TAC) and was posted on the EAO's EPIC website. The IPD was subject to a 30-day public comment period, and the EAO prepared a Summary of Engagement (EAO 2023) which summarized feedback received on the IPD for Vitreo to incorporate into a Detailed Project Description (DPD). This feedback informed the preparation of a draft DPD, which was shared with Participating Indigenous Nations and technical advisors on December 13, 2023 so reviewers could evaluate whether their comments on the IPD had been addressed in the draft DPD. Further comments and feedback received on the draft DPD have informed this final DPD.

The DPD includes a description of refinements of the Project, and describes how Vitreo has addressed, or intends to address, the issues raised during the Early Engagement phase and in the Summary of Engagement issued by the EAO (EAO 2023).

The Project, if advanced through the BC environmental assessment process, permitting, construction and operation, would mine and process high-purity quartz arenite to produce Tier 1-quality silica sand, which is an industry description of the highest available quality, and is used as a proppant in natural gas production, including in the Montney and other oil and gas basins of northeastern BC and northwestern Alberta.

The Project meets the definition of an industrial mineral quarry under the BC *Environmental Assessment Act* (EAA) Reviewable Projects Regulation (RPR). With an expected production capacity of greater than 250,000 tonnes per year of quarried product during operation, the Project will require an environmental assessment certificate (EAC) under the EAA prior to proceeding to permitting and construction. This DPD supports the environmental assessment and Vitreo's planned application for an EAC (the Application).

The Project does not meet the threshold to be a designated project under the federal *Impact Assessment Act's* Physical Activities Regulations and does not require a federal environmental impact statement to proceed.

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The Project will require several provincial and federal permits, licenses, and approvals for construction, operation, and reclamation and closure. Key approvals include the following:

- Permit Approving Work System and Reclamation under the *Mines Act*
- Waste Discharge Permits for Air and Effluent under the *Environmental Management Act*
- License of Occupation, Crown Land Tenure Permit, Special Use Permit under the *Land Act*
- Section 9 License and Section 11 Approvals for Changes in and About a Stream under the *Water Sustainability Act*
- Potential for a Request for Review and subsequent Section 35(2) Authorization under the *Fisheries Act*

Project Location

The Project lies within Treaty 8 and the traditional territory of McLeod Lake Indian Band and West Moberly First Nations, adjacent to the traditional territory of Lheidli T'enneh First Nation, and in proximity to the traditional territory of Nak'azdli Whut'en and Nazko First Nation.

The nearest communities to the Project are the unincorporated settlement of Bear Lake to the northwest and the City of Prince George to the south. The Prince George area economy is dominated by resource extraction (oil and gas, logging, mining). Government services, tourism and recreation (e.g., fishing and hunting) are also important sectors within the Prince George area.

Indigenous Nations Engagement

Vitreo has completed initial outreach and engagement activities with Indigenous Nations as described in the Engagement Plan, which has resulted in various levels of engagement with Indigenous Nations.

Vitreo is open and enthusiastic to engaging with Participating Indigenous Nations. To date, McLeod Lake Indian Band, West Moberly First Nations, and Lheidli T'enneh First Nation have self-identified and provided a notice of intent to be a Participating Indigenous Nation in the environmental assessment. Nazko First Nation, and Nak'azdli Whut'en have not self-identified as Participating Indigenous Nations to date.

McLeod Lake Indian Band expressed interest in monitoring activities and provided field monitors for some of Vitreo's environmental baseline data collection and exploration field programs. Vitreo has provided McLeod Lake Indian Band baseline data, two community dinners to communicate the Project to its members, and participation in their Annual General Meeting in 2023. Vitreo has discussed capacity funding requested by McLeod Lake Indian Band for a Treaty Impact Assessment and anticipates further capacity funding discussions associated with McLeod Lake Indian Band's participation in the regulatory process. Vitreo has met with the Chief of McLeod Lake Indian Band and has requested to meet with Chief and Council.

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West Moberly First Nations expressed interest in participating in monitoring activities and provided field monitors for Vitreo's archaeology field data collection programs, groundwater and surface water sampling. West Moberly First Nations received a copy of the baseline data and has expressed interest in negotiating a Relationship Agreement to cover funding requirements to participate in the regulatory process. Vitreo has met with West Moberly First Nations' Chief and Council on two recent occasions to discuss the Project and answer questions.

Vitreo met with Lheidli T'enneh First Nation prior to the Early Engagement phase of the Project to discuss the Project and answer questions. Vitreo has requested meetings more recently including following the filing of the draft DPD with the EAO.

With respect to other Indigenous Nations, Vitreo learned from a phone call with Nak'azdli Whut'en prior to the Early Engagement phase that they do not support fracking and therefore will not support the Project. Vitreo met with the Manager of the Nazko Economic Development Corp. to discuss the Project and answer questions.

Municipalities, Government Agencies, Stakeholders and General Public Engagement

Stakeholders and members of the public were provided with several options to be provided with information about the Project and provide feedback including attendance at in-person and virtual activities, or through the Project website and Project Team contacts. An in-person open house session was hosted by the EAO on August 22, 2023 at the Bear Lake Community Hall in Bear Lake, BC. This was followed by a virtual information session held on August 29, 2023 through an online webinar. A virtual meeting of the Board of the Regional District of Fraser-Fort George took place in November 2023 and was open to the public to attend to hear the presentation by Vitreo and the Q/A session that followed. Vitreo hosted breakfast meetings in Prince George and Chetwynd in November in conjunction with the local chambers of commerce and presented Project information and answered questions.

Project Status and History

Vitreo initially optioned and subsequently purchased the Angus property from Corus Exploration Corp. (CEC) who acquired most of their mineral claims that comprise the property, by staking. Some of the Project area was previously covered by claims owned by Stikine Energy Corp. (Stikine). Stikine previously completed aerial and ground reconnaissance of the Angus property and identified a northwest-trending belt of medium to coarse-grained 'quartzite' (subsequently identified as quartz arenite) belonging to the Proterozoic Misinchinka Group (Averil Trend). The work established that the silica-rich material of the Averil Trend had a total strike length of approximately 8 km.

From 2017 to 2019, CEC completed small programs of outcrop mapping and rock sampling on the property. In addition to adding important surface detail to the Averil Trend, this work identified two belts of northwest-trending Ordovician to Silurian Monkman Formation located 2-2.5 km east of the Averil Trend.

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Vitreo's most recent exploration activities were conducted on the Monkman East belt, which is the target for the proposed mining plan for the Project. In May 2021, Vitreo processed a 500 tonne Monkman trench sample at its Moberly processing plant in Golden, BC for evaluation. The results of the trials confirmed yields and strengths for high quality proppants using tests defined by the American Petroleum Institute (API) for silica sands.

If approved, the Project will be a new operation and, to the best of Vitreo's knowledge, will be the first in Western Canada to deliver Tier 1-quality silica sand in close proximity to BC's Montney Basin.

Vitreo has several permits in place for conducting exploration activities:

- MX-13-301, Multi-Year Area-Based Permit (exploration permit) under the *Mines Act*
- PG22-715279 and PG23-792195 Fish Collection Permits under the *Wildlife Act*
- Heritage Inspection Permit # 2022-0410 under the *Heritage Conservation Act*
- Road Use Permit RUP20-108-OT

Project Components and Schedule

The Project is comprised of the following proposed components:

- Monkman East Pit
- Raw Sand Plant
- Finishing Plant site
- External Waste Rock and Fines Stockpile
- Water management infrastructure (including collection ditches, sediment ponds, Process Water Pond)
- Reclamation Materials Stockpile at the Mine site
- Transmission Line Corridor to the Mine site and Raw Sand Plant
- Explosives Storage at the Mine site
- Upgrades to the existing North Olsson FSR and existing access roads
- Ancillary facilities for both the Mine site (Monkman East Pit and Raw Sand Plant area) and Finishing Plant site
- Natural Gas Pipeline to connect the Finishing Plant site

The anticipated footprint of the Project is approximately 867 hectares. This estimate includes an approximately 200 metre (m) buffer around Project components at the Mine site to account for Project disturbance footprint. It also includes an approximately 100 m engineering corridor around linear infrastructure. Currently, the extent and location of upgrades to the haul route (i.e., along the existing

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FSRs) is unknown and this footprint estimate conservatively estimates that the haul route will need to be upgraded. This footprint estimate will be refined as Project design progresses.

The workforce will be sourced primarily from local communities and will travel to and from the Mine site on a daily basis. The size of the workforce for construction and operation is currently estimated to be approximately 150 persons for the Construction phase, 140 for the Operation phase, and 50 persons for the Reclamation and Closure phase working in shifts on site. Construction and operation will require typical mining industry skills (e.g., explosives handling, maintenance of mining equipment) providing training opportunities for Indigenous Nations and the local workforce. Vitreo is committed to hiring locally and has anticipated limited to no requirement to engage personnel beyond the local area.

Project Schedule

The proposed schedule for the Project is as follows:

- Construction phase – Year 1 to Q2 Year 2 (18 months)
- Operation phase – Q3 Year 2 to Year 21
- Reclamation and Closure phase – Year 22
- Post-closure phase – Year 23+

During the Construction phase, timing constraints include instream works windows for fish and migratory birds.

During the Operation phase, mining will occur over 245 operating days per year, with mining and Raw Sand Plant activities paused during the winter months. Hauling between the two plant areas will occur 335 days per year. Stockpiled material at the Finishing Plant site will be processed at the Finishing Plant 335 days per year.

Project Activities

Construction

The Construction phase is planned to start in Year 1, and will involve the following activities using conventional equipment and construction methods: clearing and grubbing, stripping of topsoil and storing it for later use in Reclamation Material Stockpiles, removal of overburden in the first phase of the Monkman East Pit, construction of the haul road from Monkman East Pit to the Raw Sand Plant, upgrades to the existing access roads, including the North Olsson FSR and construction of the Transmission Line, construction of Raw Sand Plant and Finishing Plant, construction of ancillary facilities, and construction of an approximately 100 m long Natural Gas Pipeline access to the Finishing Plant.

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Operation

The Operation phase is planned to start in Year 2. The Project plans to mine 2.9 million tonnes (Mt) of quartz arenite annually for a period of 20 years with total production of 56.6 Mt from the Monkman East Pit. The Project will also produce an estimated 25 Mt total waste (fines and waste rock) material, the majority of which will be backfilled into the mined-out pit.

The mine is currently planned to be developed in four phases from north to south with the intent of reducing haul distance in the initial years while maximizing the amount of mined waste and fine material that can be backfilled. The proposed mining sequence reduces the areal extent and volume of external mine waste storage areas that would otherwise be required.

The Project will operate two processing facilities: the Raw Sand Plant which is located near the Monkman East Pit, and the Finishing Plant site located near Highway 97. The Raw Sand Plant will crush and process the quartz arenite to liberate the silica sand grains and separate it from the fines component.

Processing and make-up water sources have been identified and prioritized from a) recycled water; b) contact water; c) a groundwater source at or near the Mine site; d) should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV 2016).

During the Raw Sand Plant process, the requirement for make-up water will be limited by recycling water in the process facilities. Blasted rocks will be crushed before being delivered to the Raw Sand Plant for processing, sand liberation and fines removal in a multistage process resulting in a raw sand intermediate product. The Raw Sand Plant has been designed for a target throughput of approximately 2.9 Mt/year.

Silica sand products will be dried at the Finishing Plant site and stored in on-site silos and loaded onto transport trucks for distribution. The Finishing Plant site will be located in proximity to natural gas and power infrastructure to operate the dryer, and adjacent to Highway 97 to facilitate transfer of the product to market. The Finishing Plant has a target production rate of approximately 2 Mt/year with a nominal output of 300 tonnes per hour (t/hour). Vitreo anticipates approximately 150 trucks per day one-way (or approximately six trucks every hour) will travel on Highway 97, transporting proppant from the Finishing Plant site to markets in northeast BC. Annually, assuming full volume of haul traffic for 335 days, this will correspond to approximately 50,280 trucks.

Mine waste will be managed through two waste facilities: an External Waste Rock and Fines Stockpile adjacent to the Monkman East Pit, and an in-pit waste storage area. The External Waste Rock and Fines Stockpile will be required for fines placement early in the Project until sufficient area in the Monkman East Pit is available for in-pit storage (starting in Year 6). The External Waste Rock and Fines Stockpile is expected to contain no more than 11 Mm³ of compacted material. Once a sufficient pit area is available to facilitate in-pit placement, both waste streams (waste rock and fines) will be directed and compacted/co-mingled to in-pit facilities to the greatest extent possible to reduce the Project footprint.

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The in-pit waste storage (waste rock and fines backfill) is expected to contain up to 14.4 Mm³ of waste at the end of the Project.

Reclamation and Closure

The Reclamation and Closure phase will commence in Year 22 once mining operation has ceased; however, progressive reclamation will occur during the life of mine. Progressive reclamation activities include the reclamation of the External Waste Rock and Fines Stockpile once the majority of the waste produced is directed back into the Monkman East Pit, starting in Year 6. Reclamation activities in the mining area will continue in Year 22, after the completion of mining in Year 21, to achieve end land use objectives. In addition to re-sloping, ripping/scarifying of haul roads and platforms will be required, followed by reclamation soil placement. Additionally, Project facilities will be demolished and/or removed from the Mine site.

Post-Closure

Post-closure is planned to commence in Year 23. Dependent on discussion with Indigenous Nations, as well as permit and approvals conditions, Vitreo anticipates requirements to conduct post-closure monitoring including for water quality, revegetation success and wildlife use, and physical stability of Project components remaining in place.

Alternatives to and Alternative Means of Carrying out the Project

High-quality proppants are currently being imported to the natural gas basins in BC and Alberta from the United States, undergoing a long transportation route and multiple transloading to the Montney Basin from mines in Wisconsin. The Project would produce similar high-quality material and is located much closer to the Montney Basin, potentially resulting in a significant reduction in greenhouse gas (GHG) emissions related to transportation. The Project would also provide greater security of supply for industry and create local employment, business, and procurement opportunities. The primary alternative to the Project is the status quo of sourcing and shipping proppant from Wisconsin and other suppliers located outside of BC and Canada.

Vitreo evaluated several alternative means of carrying out the Project including:

- Highway access
- Mining different areas within the mineral claims
- Locations of key infrastructure, such as the Raw Sand Plant and Finishing Plant site
- Primary power source for the Mine site
- Using rail loadout for transportation of silica sand to market
- Use of a construction and/or operation camp to house off-shift workers
- Waste rock and fines storage at the Mine site
- Water treatment systems

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Feedback received during the Early Engagement phase also informed the alternative means analysis. An alternative means assessment will be conducted during the environmental assessment process following the EAO's Effects Assessment Policy (EAO 2020) and will be documented in the Application.

Project Emissions, Discharge and Waste

The majority of Project air emissions will be related to diesel exhaust and GHG emissions from operation of construction machinery and drying activities at the Finishing Plant site. The estimated Project GHG emissions are as follows: 9,900 tonnes carbon dioxide equivalent (t CO₂e) for the Construction phase, 60,860 t CO₂e per year for the Operation phase, and 8,250 t CO₂e during the Reclamation and Closure phase. GHG emissions will be negligible for the Post-closure phase. The direct GHG emissions result primarily from the use of haul trucks and other traffic as well as emissions from the Finishing Plant dryer. During the Operation phase, the Finishing Plant will emit approximately 43,500 t CO₂e per year from natural gas combustion. In addition to direct GHG emissions, the Project will also have indirect GHG emissions from the use of electricity of approximately 100 t CO₂e per year. This volume is well under relevant GHG emissions thresholds in section 4 and 5 of the RPR. However, the direct GHG emissions from the Finishing Plant do meet the 10,000 t CO₂e reporting threshold to be defined as a reporting operation under the *Greenhouse Gas Emission Reporting Regulation*. The potential effects on the Province being able to meet its targets under the *Greenhouse Gas Reductions Targets Act* will be presented in the Application.

While the Project will result in GHG and other emissions from mining operation, processing, and transport (fugitive dust, particulate matter (PM) of various sizes, sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and carbon monoxide [CO]), similar emissions are currently generated in other locations in the United States and Canada to produce proppant for use in the BC and Alberta oil and gas industry. The Project will likely displace those emissions and overall result in a reduction of emissions due to the reduced transport distance. GHG assessment will be provided in the Application to further evaluate the GHG reduction as a result of the Project. Vitreo will also continue to evaluate GHG emission reduction strategies through Project planning. Vitreo does not anticipate that this Project will increase drilling and completions activities in the Montney Basin and other oil and gas basins of northeastern BC and northwestern Alberta. The proppant currently used in natural gas extraction activities in these areas is primarily sourced from Wisconsin, and Vitreo anticipates that the Project will supplement the anticipated proppant supply and demand in the area with a BC product rather than an imported one.

The Project is located in an area with existing and historic industrial activities and infrastructure, such as logging cut blocks and associated FSRs, log processing and sorting facilities, Canadian National (CN) Rail line, a new Natural Gas Pipeline to supply LNG plants, and major power transmission and distribution lines. The emissions expected to be most visible from operations will be fugitive dust associated with mining and trucks travelling along existing gravel roads (as observed now, pre-operations). Vitreo will develop an Air Quality Management Plan for the Project, prior to construction, which will include mitigation and monitoring measures for fugitive dust.

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Noise effects from activities during construction and operation phases will be assessed such that Vitreo can manage or limit the interaction of noise with land users and potential receptors (e.g., residences). Baseline noise monitoring has been conducted at six locations in June and November 2023 to provide baseline sound levels for selected locations prior to Project activities. Noise emissions from the Project, including the Mine site, haul roads, and Finishing Plant site will also be assessed through acoustic modelling. Mitigation measures for potential noise effects will be included in the Application.

Effluent discharge from the Project is only expected from sanitary wastewater at both the Mine site and Finishing Plant site. Contact water will be collected in five sediment ponds within the Mine site (Raw Sand Plant) and one sediment pond near the Finishing Plant site. The ponds are designed to operate up to a 10-year storm over 24 hours. Process water for the Raw Sand Plant will be recycled, limiting the need for make-up water.

At the Finishing Plant site, there will be a sediment pond to catch the run-off in the area. Processing at the Finishing Plant site does not require use of process water; however, the water stored in the sediment pond will be used for Project-related purposes such as dust suppression and fire fighting.

In the event that excess water would have to be managed it would be discharged to ground if it meets applicable guidelines. Vitreo will develop a water balance and water quality model to identify whether excess water could be generated by the Project and whether water quality of that excess water is suitable for discharge into the environment or further mitigation will be required.

Waste materials anticipated to be produced by the Project over its life span include both hazardous wastes (oil, oil filters, empty oil containers) and non-hazardous solid waste (office waste, packaging materials, electronic waste). Vitreo will be required to manage and dispose of waste materials in accordance with the Health, Safety and Reclamation Code for Mines in British Columbia (EMLI 2022) in compliance with various permits and authorizations including those under the *Mines Act* and *Environmental Management Act*. Hazardous waste will be stored and handled in accordance with the BC Hazardous Waste Regulation. Regulatory authorities will include permit conditions that will require Vitreo to develop management and monitoring plans for the disposal of hazardous and non-hazardous wastes. These plans will be developed in consultation with relevant regulators and Indigenous Nations.

Baseline Project Setting

To date, Vitreo has completed desktop studies and field work to characterize the existing bio-physical and human environment conditions in the Project area. Publicly available information regarding plant species of socio-economic or traditional use by Indigenous Nations was used to supplement Vitreo's baseline data collection programs, including for fish and aquatic resources, vegetation and wetlands, and wildlife and wildlife habitat. This publicly available data has not been verified with Participating Indigenous Nations; however, it was included in the baseline program to help Vitreo understand the presence and abundance of species of potential importance to Indigenous Nations during field programs.

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The regional climate of the Project area is northern continental, with cool shoulder seasons, cold winters and short warm summers. Daily average temperature at the Prince George Airport is 4.3 degrees Celsius (°C). January is the coldest month and July is the warmest month (-7.9°C and 15.8°C daily average temperature). The annual precipitation at Prince George Airport is 595 millimetres (mm), of which 71% falls as rain, and the average snowfall is 205 centimetres (cm) annually (ECCC 2023a).

Publicly available air quality monitoring stations are at least 38 km from the Project site and show that criteria air contaminants (PM, NO₂, SO₂, CO) concentrations are consistently below BC Ambient Air Quality Objectives. Vitreo established a solar powered meteorological station on-site in late August 2022 at approximately 997 metres above sea level; this station is currently collecting meteorology data and will do so until it is decommissioned (not currently planned).

The Mine site, including the Raw Sand Plant and Monkman East Pit, is located in the headwaters of the Angusmac Creek, Giggler Creek, and Olsson Creek watersheds. Angusmac Creek and Giggler Creek flow to the Crooked River, a tributary of the Peace River within the Mackenzie River watershed. Olsson Creek flows to the Fraser River within the Fraser River Watershed. The Finishing Plant site is near the Crooked River. Onset of spring freshet generally occurs in April and peak flows typically occur in May or June.

Vitreo established four hydrometric stations in the fall of 2021 and Stantec has completed monthly surface water quality sampling since September 2021. The baseline surface water quality program includes 16 stream sites and two lakes. Surface water quality results showed the streams in the Project area range from acidic to alkaline.

Elevated turbidity and total suspended sediment levels correspond with increased flows during freshet and other seasonal high rainfall events. Metals with concentrations exceeding the BC and/or Canadian Water Quality Guideline for the Protection of Freshwater Aquatic Life (BCWQG-FAL and CWQG-FAL) in one or more instances included aluminum, beryllium, chromium, copper, iron, lead, manganese, mercury, and zinc. Most samples with metal concentrations over the BCWQG-FAL and CWQG-FAL were collected during freshet and were associated with high volume flows and elevated turbidity and suspended solids levels.

Groundwater flow at the Project is expected to occur from upland areas at the boundaries of the Angusmac, Giggler, and Olsson Creek sub-watershed basins towards lower elevations. In general, the groundwater table is expected to be a subdued expression of topography, with groundwater levels farther below ground surface beneath upland areas and ridges than beneath valley bottoms.

A hydrogeological site investigation was completed in September 2022. Twenty monitoring wells were drilled and installed at thirteen locations to support the collection of geological, groundwater level, and groundwater chemistry data and develop an understanding of baseline groundwater conditions at the Project. Quarterly groundwater sampling commenced in December 2022, was conducted in 2023, and is planned for 2024.

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During the collection of fish and fish habitat baseline data in 2022, a total of 372 fish, comprised of nine fish species, were captured. The most abundant species were Rainbow Trout (*Oncorhynchus mykiss*), Redside Shiner (*Richardsonius balteatus*), and Slimy Sculpin (*Cottus cognatus*). Fish were caught in 14 of 24 sites sampled across the three watersheds. There are no fish species on Schedule 1 of the *Species at Risk Act* or red-listed (i.e., extirpated, endangered, or threatened) by the BC Conservation Data Centre in the Project area.

Sediment data collected in August 2022, showed that sand and silt were the most common fine substrates. No metals were found to exceed the Canadian Council of Ministers of the Environment (CCME) Probable Effect Levels (PEL), though some metals exceeded the CCME interim sediment quality guidelines in both lakes and streams. Data collection for fish and fish habitat has continued into the fall of 2023.

The Project is located within the McGregor Plateau Ecosection within the Fraser Basin Ecoregion. The area is largely composed of a rolling upland formed by low ridges. Intrusive bedrock in the ecosection is overlain by deep glacial tills including eskers, drumlins, and deep channels, with exposed bedrock uncommon. Many rivers and lakes are present in the ecosection. Data collection for soils and terrain were conducted in the Spring and Summer of 2023.

Four biogeoclimatic unit variants occur within the Project area: the Mossvale moist cool SubBoreal Spruce variant (SBSmk1), Willow wet cool Sub-Boreal Spruce variant (SBSwk1), very wet cool Sub-Boreal Spruce subzone (SBSvk), and the Misinchinka wet cool Engelmann spruce – Subalpine Fir variant (wk2) (DeLong 1993, DeLong 2003). Commonly occurring upland forest tree species include Douglas-fir (*Pseudotsuga menziesii*), hybrid white spruce (*Picea glauca x engelmannii*), lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), trembling aspen (*Populus tremuloides*) and subalpine fir (*Abies lasiocarpa*). Bogs support black spruce (*Picea mariana*) mixed with lodgepole pine.

The Project has the potential to host plants of management concern and of interest to Indigenous Nations. Forty-one species at risk or of management concern have the potential to occur in the Project area [BC Conservation Data Centre (CDC) 2021a]. A search of the CDC spatial occurrences found no known occurrence of rare plant species within or near the Mine site (Province of BC 2021). Rare plant and invasive plants surveys were undertaken in 2023.

A Wildlife Local Study Area (LSA) and Regional Study Area (RSA) were established as part of the baseline data collection program which represents a sufficiently large area within which potential cumulative effects on wide-ranging species (e.g., grizzly bear [*Ursus arctos*]) can be assessed. The RSA does not overlap with any Ungulate Winter Ranges or Wildlife Habitat Areas but it does overlap the Nation Grizzly Bear Population Unit which supports a viable grizzly bear population of moderate conservation concern. The wildlife baseline data collection program included desktop review of existing information and the following wildlife field studies completed in spring, summer, fall, and winter of 2022: migratory songbird surveys; waterfowl surveys; passive acoustic surveys for birds; northern goshawk surveys; amphibian surveys; passive ultrasonic acoustic surveys for bats; wildlife remote camera surveys; and wildlife habitat suitability surveys. An aerial ungulate survey has been completed in winter 2022 and 2023. Other discipline field crews have also collected incidental detections of wildlife while completing

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fieldwork for their disciplines. In 2024, wildlife habitat modelling species accounts and suitability mapping will be completed to inform the Application for an Environmental Assessment Certificate.

There are 76 wildlife species of management concern that potentially occur in the RSA. These include 15 species listed on the *Species at Risk Act* and/or provincial red-list.

The Project is in the northern portion of the Prince George Forest District in northeastern BC, where archaeological evidence of early human occupation has been recovered from multiple sites. A desktop study of relevant archaeological, ethnographic, historical, and environmental data revealed that the Project area has a high potential for archaeological sites. Starting in the 1970s surveys have been conducted in the general region in support of various industrial development (e.g., forestry and oil and gas) and an archaeological assessment of the Project (Ecofor 2013) identified 69 archaeological sites within 80 km of the Project area. An archaeological impact assessment for the Project was conducted in 2023. Vitreo has an Archaeological Chance Find Procedure in place as part of their exploration activities and will have an Archaeological Chance Find Procedure in place for ground-disturbing activities associated with project construction, operations and closure.

Existing conditions regarding the human health setting and the social determinants of health has been informed by a desktop data collection of the following sources: Canadian Community Health Survey, BC Centre for Disease Control Reportable Disease Dashboard, Gender-based analysis plus (GBA+), Canadian Institute for Substance Use Research, and the Government of BC Coroners Service. In addition to the desktop study, primary data collection through key person interviews will be conducted to inform baseline conditions and further understand interests and concerns related to the Project.

Project Interactions

Key potential positive and adverse effects on the biophysical and human environment that will be explored further during Project design and environmental assessment include effects associated with the following:

- Air quality (including fugitive dust) and GHG emissions
- Employment and economy
- Noise emissions
- Vegetation clearing, the loss of wildlife habitat and wildlife disturbance, erosion, and the transport of sediment
- Infrastructure and Services, including vehicle traffic
- Groundwater and surface water withdrawal on fish and fish habitat
- Potential disturbance of traditional and non-traditional land users

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Cumulative Effects

Project components and activities have the potential to interact temporally or spatially with other projects and activities in the area, including mining, forestry, and linear development (roads, rail lines, oil and gas pipelines). Cumulative effects may occur due to increased disturbance on the landscape, leading to increased effects to ecosystem and wildlife habitat. A preliminary list of past, present, and reasonably foreseeable projects and activities that will be considered in the cumulative effects assessment has been developed and will be further evaluated as the environmental assessment process progresses. Vitreo will further define an appropriate approach to cumulative effects assessment in terms of temporal scope, spatial scope, what projects and activities to consider, as well as consideration of potential cumulative effects, through engagement with Indigenous Nations, the public, stakeholders, and regulators.

Mitigation Measures, Management Plans and Monitoring Plans

The Project will develop and implement a number of management and monitoring plans anticipated to include an Air Quality Management Plan, Water Management Plan, Wildlife Management Plan, Erosion and Sediment Control Management Plan, Traffic Management Plan, Emergency Response Plan, Fuel Management and Spill Control Plan, Reclamation and Closure Plan, and Archaeological Chance Find Procedure. These plans will be developed at a conceptual level for the Application, and a detailed level for permit applications.

Land and Water Use

The Project footprint is situated predominantly on unsurveyed Crown land and the Mine site is located within the Vitreo's MX-13-301, Multi-Year Area-Based Permit boundary for the Angus Property Mineral Claim. The Project footprint is a mixture of undeveloped land and previously developed lands. The Finishing Plant site is located on untitled Crown land. Sections of the proposed haul road are situated on Private land. The remainder of the proposed haul road and proposed Transmission Line right-of-way cross Crown land (surveyed and unsurveyed). There are no federal lands in the vicinity of the Project area. The Mine site is a greenfield site that has been extensively logged.

The Project is located within the Prince George Land and Resources Management Plan, as well as within the Regional District of Fraser-Fort George (RDFFG). The Project overlaps Crown reserve land tenures, including statutory right-of-way (or easement), licenses of occupation (commercial/recreation, quarrying, transportation), a notation of interest (i.e., quarrying for sand and gravel) and special use permits.

Processing and make-up water sources have been identified and prioritized from a) recycled water; b) contact water; c) a groundwater source at or near the Mine site; d) should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV 2016).

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Drinking water sources for Project workers are still being investigated but may include either treatment of site groundwater or trucking potable water to site. The Emerald Lake Recreation Site and the Crystal Lake Recreation Site are the closest recreation sites to the Finishing Plant site. The Project is located within the Prince George Land and Resources Management Plan. The Project is encompassed within the Electoral Area G – Crooked River-Parsnip Official Community Plan (OCP) (RDFFG 2021). General objectives under the OCP includes a Mineral Resource Management Objective.

Public, Worker, and Environmental Safety

Accidents and malfunctions with a potential for effects on public, worker, and environmental safety can occur during all phases of the Project. Possible accidents or malfunctions that may occur during Project construction, operation, reclamation and closure and post-closure, include:

- Pit wall instability or rock fall
- Unplanned fire or explosion
- Motor vehicle accident
- Hydrocarbon spill
- Power failure

The Project will be designed, constructed, operated, reclaimed, and closed in accordance with the Health, Safety and Reclamation Code for Mines in British Columbia (EMLI 2022). Additionally, to mitigate potential effects to public, worker and environmental safety, Vitreo will develop a suite of management and monitoring plans including but not limited to an Emergency Response Plan, a Fuel Management and Spill Control Plan, and a Traffic Management Plan. These management plans will be developed in accordance with relevant legislation, regulations, and best practices, as well as input received from Participating Indigenous Nations and local stakeholders.

During the Early Engagement phase, several concerns were raised regarding road safety, commuting requirements of Project personnel, and the use of Highway 97 to transport silica sand. These concerns have been acknowledged by Vitreo and will be examined further through potential accident scenario analysis, and consideration of the use of a bus or shuttle system to support commuting requirements.

Effects of the Environment on the Project

Natural hazards may impair Vitreo's ability to operate the Project, may affect worker health and safety, and have unintended environmental effects. Project planning will include design considerations and mitigation measures to mitigate the effects of natural hazards on the Project and will develop a suite of management plans to address this risk.

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Potential effects of the environment on the Project include:

- Climate change (e.g., temperature rise, trend of increasing precipitation, drought)
- Extreme weather and weather-related events
- Wildfires

No feedback was received on the potential effects of the environment on the Project during or prior to Early Engagement and on the IPD, and no Indigenous Knowledge has yet been received relevant to this section. Feedback or Indigenous Knowledge received will be incorporated in subsequent environmental assessment phases, including the Application, as appropriate.

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Appendix B Project Issues Tracking Table

Acronyms / Abbreviations

µg/cm ²	micrograms per centimetre squared
Agency	Impact Assessment Agency of Canada
AIA	Archaeological Impact Assessment
ALS	ALS Environmental Limited
AOA	Archaeological Overview Assessment
API	American Petroleum Institute
AQO	Air Quality Objectives
ARD	acid rock drainage
Averil Trend	Proterozoic Misinchinka Group (Averil Trend)
BAT	best available technology
BC	British Columbia
BCWQG-FAL	BC Water Quality Guideline for the Protection of Freshwater Aquatic Life
BEC	Biogeoclimatic Ecosystem Classification
BGAN	Broadband Global Area Network
CABIN	Canadian Aquatic Biomonitoring Network
CCME	Canadian Council of Ministers of the Environment
CDC	Conservation Data Centre
CEC	Corus Exploration Corp.
cm	centimetres
CMT	culturally modified trees
CN	Canadian National Railway Company
CRCP	Conceptual Reclamation and Closure Plan
CSC	Campbell Scientific Canada

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CWQG-FAL	Canadian Water Quality Guideline for the Protection of Freshwater Aquatic Life
dB	decibel
dba	A-weighted decibel
DFO	Fisheries and Oceans Canada
DPD	Detailed Project Description
EAA	<i>Environmental Assessment Act</i>
EAC	environmental assessment certificate
EAO	Environmental Assessment Office
ECCC	Environment and Climate Change Canada
eDNA	Environmental DNA
EMA	<i>Environmental Management Act</i>
EMLI	Ministry of Energy, Mines and Low Carbon Innovation
ENV	British Columbia Ministry of Environment
ESSFwk2	Misinchinka wet cool Engelmann spruce – Subalpine Fir variant
FHAP	Fish Habitat Assessment Protocols
FNLMA	<i>First Nations Land Management Act</i>
FSR	Forest Service Road
GBA+	Gender-based analysis plus
GBV	Gender-Based Violence
GGIRCA	<i>Greenhouse Gas Industrial Reporting and Control Act</i>
GHG	greenhouse gas
ha	hectares
HADD	harmful alteration, disruption or destruction
hPa	hectopascal

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HSRC	Health, Safety and Reclamation Code for Mines in British Columbia
IAA	<i>Impact Assessment Act</i>
IPD	Initial Project Description
ISQG	Interim Sediment Quality Guidelines
km	kilometres
kv	kilovolt
kvA	kilovolt-ampere
LRMP	Land and Resources Management Plan
LSA	Local Study Area
LTLA	Lheidli T'enneh Lands Authority
m	metres
m/s	metres per second
masl	metres above sea level
mbgs	metres below ground surface
ME	Monkman East Pit
Mg/kg	milligrams per kilogram
ML	metal leaching
ML/ARD	metal leaching and acid rock drainage
mm	millimetres
Mm ³	Million cubic metres
MoF	Ministry of Forests
MOU	Memorandum of Understanding
Mt	million tonnes
NHA	Northern Health Area
NIHSDA	Northern Health's Interior Health Service Delivery Area

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OCP	Official Community Plan
PDA	Project Development Area
PEL	Probable Effect Level
PEM	Predictive Ecosystem Mapping
PGAA	Prince George Airport Automated
Pit	Monkman East Pit
PM	particulate matter
Project	Angus Project
QA/QC	quality assurance/quality control
RDFFG	Regional District of Fraser-Fort George
Ref	Reference site
RIC	Resources Inventory Committee
RMS	Reclamation Materials Stockpile
RPR	Reviewable Projects Regulation
RSA	Regional Study Area
RSP	Raw Sand Plant
SAR	species at risk
SARA	<i>Species at Risk Act</i>
SBSmk1	Mossvale moist cool SubBoreal Spruce variant
SBSvk	very wet cool Sub Boreal Spruce subzone
SBSwk1	Willow wet cool Sub-Boreal Spruce variant
SDOH	social determinants of health
SMU	Soil Mapping Unit
SOMC	species of management concern
Stantec	Stantec Consulting Ltd.

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Stikine	Stikine Energy Corp.
t CO _{2e}	tonnes carbon dioxide equivalent
t/hour	tonnes per hour
TAC	Technical Advisory Committee
TBD	To be determined
TEM	Terrestrial Ecosystem Mapping
TLU	Traditional Land Use
TSP	total suspended particulates
TSS	total suspended solids
Vitreo	Vitreo Minerals Ltd.
WLRS	Ministry of Water, Land and Resource Stewardship
WSA	<i>Water Sustainability Act</i>
°C	degrees Celsius

1 General Information and Contacts

1.1 Introduction

Vitreo Minerals Ltd. (Vitreo) is proposing to advance the Angus Project (the Project), a proposed silica sand operation located approximately 60 kilometres (km) north of Prince George, British Columbia (BC) (Figure 1.1). The Project can be accessed via Highway 97 and the Chuchinka Log Lake Forest Service Road (FSR) (also called North Olsson FSR); the Mine site is located approximately 19 km east from Highway 97 along this FSR.

The Project lies within Treaty 8 and the traditional territory of McLeod Lake Indian Band and West Moberly First Nations, adjacent to the traditional territory of Lheidli T'enneh First Nation, and in proximity to the traditional territory of Nak'azdli Whut'en and Nazko First Nation. Based on a literature review conducted by Stantec Consulting Ltd. (Stantec) in 2022, Traditional Land Use (TLU) activities, practices, sites, and areas are believed to occur within the Project area¹. To date, McLeod Lake Indian Band, West Moberly First Nations, and Lheidli T'enneh First Nation have self-identified and provided a notice of intent to be a Participating Indigenous Nation in the environmental assessment.

The nearest communities to the Project are the unincorporated settlement of Bear Lake to the northwest of the Mine site and the City of Prince George to the southwest of the Mine site along Highway 97. The Prince George area economy is dominated by resource extraction (oil and gas, logging, mining). Government services, tourism and recreation (e.g., fishing and hunting) are also important sectors within the Prince George area.

A considerable number of large natural resource-oriented projects are slated for construction across the north.

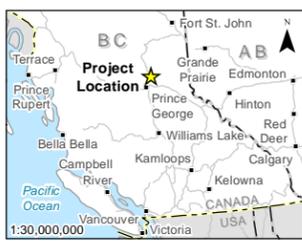
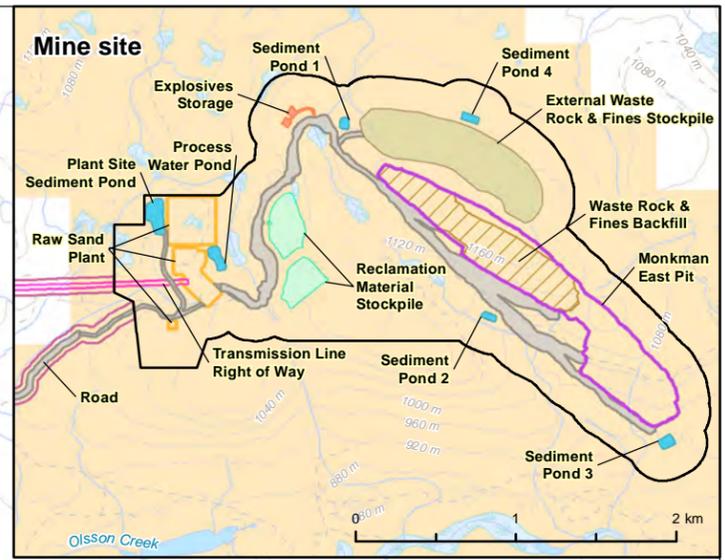
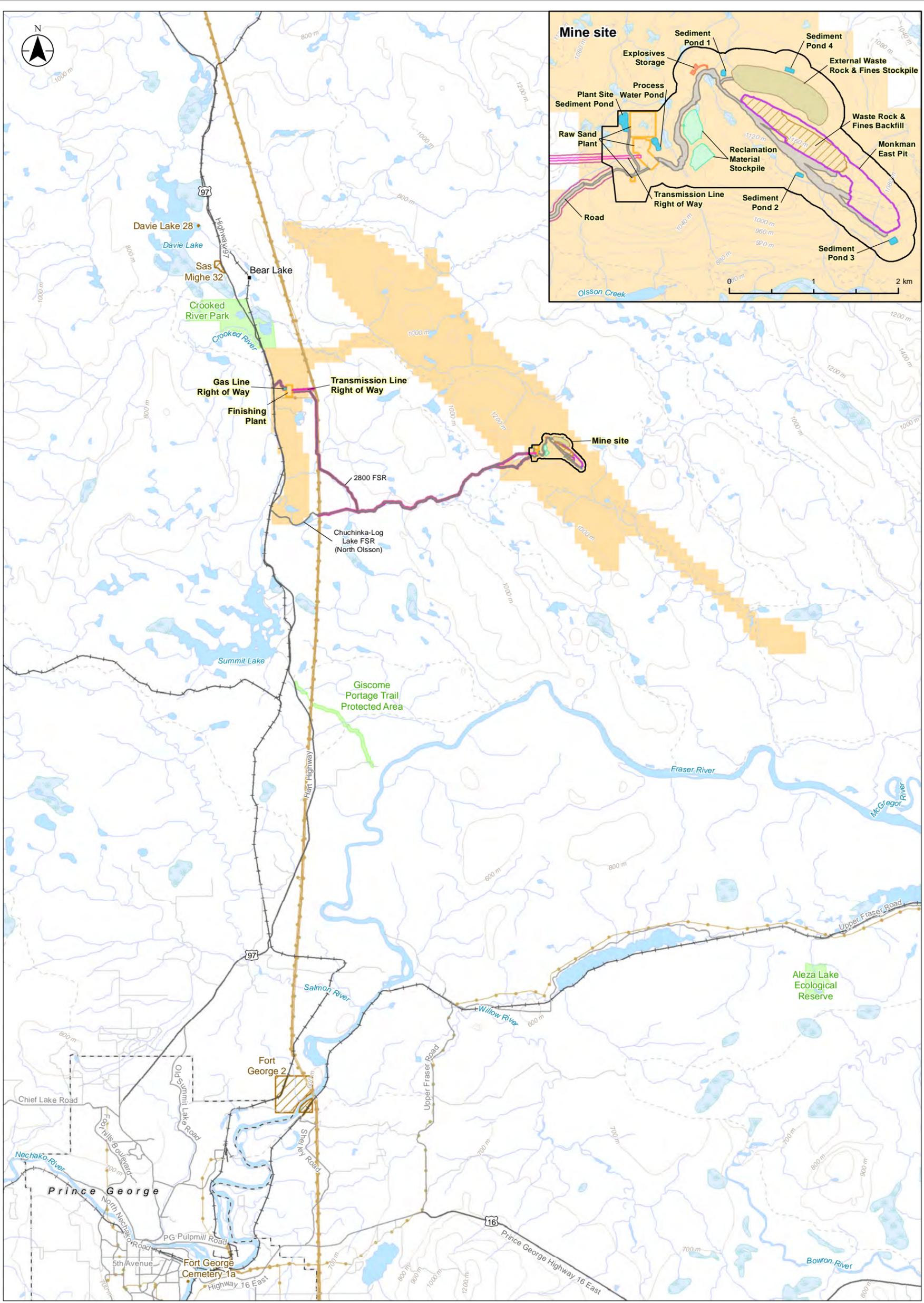
The Project, if advanced through the BC environmental assessment process, permitting, construction and operation, would mine and process high-purity quartz arenite to produce Tier 1²-quality silica sand, which is used as a proppant³ in natural gas production, including in the Montney Basin and other oil and gas basins of northeastern BC and northwestern Alberta.

The Project meets the definition of an industrial mineral quarry under the BC *Environmental Assessment Act* (EAA) Reviewable Projects Regulation (RPR). With an expected production capacity of greater than 250,000 tonnes per year of quarried product during operation, the Project will require an environmental assessment certificate (EAC) under the EAA and subsequent provincial permits under the *Mines Act* and *Environmental Management Act* (EMA).

¹ The Project area encompasses the general area that the Project is located in.

² Tier 1-quality silica sand is an industry description of the highest available quality. Performance based on factors such as compressive strength, size distribution, conductivity and permeability determine the sand quality.

³ A proppant is a material (e.g., sand or ceramic) used to hold open fractures made in the ground.



- | | | | |
|--|--|---|--|
| <ul style="list-style-type: none"> Highway Road Local Street Resource Road Railway Transmission Line Topographic Contour Watercourse Waterbody Wetland | <ul style="list-style-type: none"> Indigenous Nations Reserve Provincial Park, Ecological Reserve, or Protected Area Municipal Boundary | <ul style="list-style-type: none"> Chuchinka-Log Lake FSR (North Olsson) - Site Access Angus Property Mineral Tenure Mine site Corridor | <ul style="list-style-type: none"> Project Footprint Explosives Storage External Waste Rock & Fines Stockpile Sand Plant Gas Line Right of Way Open Pit Pond Reclamation Material Stockpile Road Transmission Line Right of Way Waste Rock & Fines Backfill |
|--|--|---|--|

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Stantec **vitro**

Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231114
 Requested by: LDESANDOLI on 20231108
 Checked by: LDESANDOLI on 20231115

Client/Project/Report: Vitro Minerals Ltd., Angus Project, Detailed Project Description

Figure No.: 1.1
 Title: Project Location

Notes:
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

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Detailed Project Description 1 General Information and Contacts

February 5, 2024

A draft of this Detailed Project Description (DPD) was prepared in consideration of the EAO Early Engagement Policy (EAO 2019) and shared with the EAO, Participating Indigenous Nations, and technical advisors. This DPD has been prepared based on comments and feedback received on the draft DPD from Participating Indigenous Nations, technical advisors, and the Summary of Engagement provided by the EAO (EAO 2023).

Vitreo understands that the DPD must be accepted by the EAO before the Readiness Decision phase begins.

The DPD includes a description of the Project comprising a project overview; the planned activities over the life of the Project and post-closure; the expected emissions, discharges and waste; additional information related to land and water use, and information on anticipated management and monitoring plans. The document also includes information about the existing conditions (e.g., baseline), engagement and consultation with Indigenous Nations, municipalities, government agencies, stakeholders, and the general public, and information about safety plans for the public, workers and the environment. A consultation log of engagement activities completed with Indigenous Nations is provided in Appendix A of this DPD. The Project's Issues Tracking Table including the comments received from Indigenous Nations, technical advisors and the public on the IPD during the Early Engagement phase as well as comments received on the draft DPD and Vitreo's responses are presented in Appendix B.

1.2 Project Overview

The primary target area of the Project is a topographic ridge dominated by quartz arenite trending approximately southeast to northwest. This ridge has been named "Monkman East" and forms a portion of the exposed Monkman formation sedimentary sequence in the Project area (Photo 1.1).

Photo 1.1 West Slope of Monkman East, September 2021 (looking southeast)

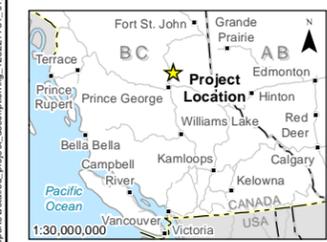
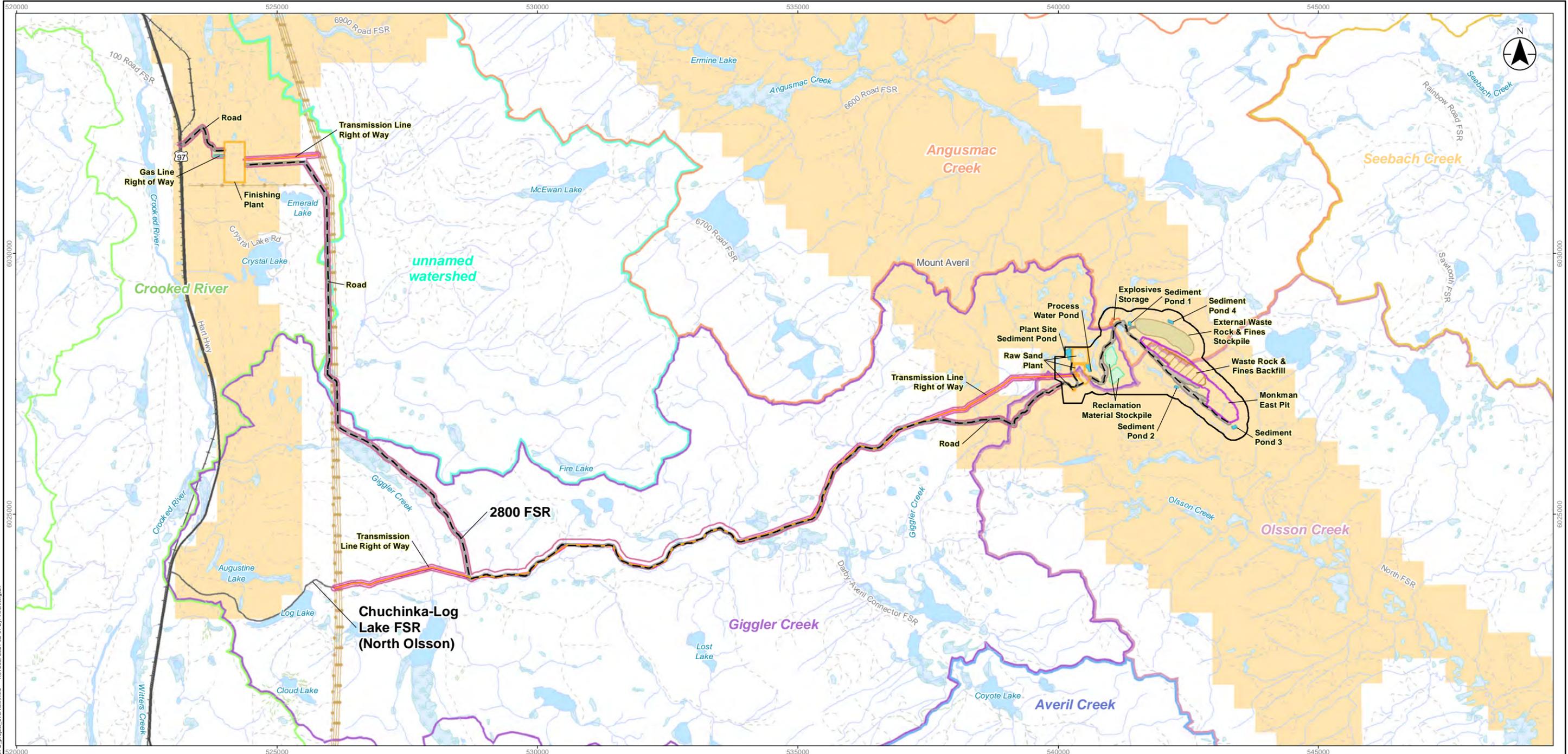


Detailed Project Description
1 General Information and Contacts
February 5, 2024

The key Project components are the Monkman East Pit, the Raw Sand Plant, and the Finishing Plant site. The Project will extract quartz arenite from the Monkman East Pit and transport it to the Raw Sand Plant via a newly constructed haul road. The Raw Sand Plant is located approximately 2 km northwest of the pit and 2 km north of the North Olsson FSR, along a currently unimproved forestry trail (Figure 1.2). The quartz arenite will be mined, crushed and processed seasonally at the Raw Sand Plant and stockpiled next to the plant. Excess materials including fines, waste rock and reclamation materials will be stockpiled separately near the Raw Sand Plant. As mining progresses, new waste and fines materials will be progressively backfilled and compacted into the pit throughout the mine life. Water management infrastructure will be developed at the Mine site and will include ditching and sediment ponds.

A year-round hauling operation will take raw sand to a Finishing Plant site located approximately 9 km north of the North Olsson FSR immediately east of Highway 97 and south of the existing Bear Lake log yard facility. The raw sand will be dried, screened, and stored at the Finishing Plant site prior to being transported via Highway 97 to market locations in northeastern BC.

The Raw Sand Plant and the Finishing Plant site will be connected via portions of the North Olsson FSR and 2800 FSR. Additional Project infrastructure will include a new Transmission Line from a sub-station adjacent to North Olsson FSR. Hydroelectric power feed from an existing BC Hydro transmission line (Figure 1.2) will be provided to substations located at both the Raw Sand Plant and Finishing Plant site. Alternatives for line size, transmission versus distribution voltage and substation requirements are being reviewed with BC Hydro. Approximate installed loads for the Raw Sand Plant and Finishing Plant site are 10 kilovolt-ampere (kVA) and 3 kVA, respectively. Siting and tie-in of the transmission line and substations will be identified as Project design progresses.



Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

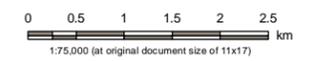
- Highway
- Local Street
- - Resource Road
- - Trail
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Gas Line
- - Road for Project Access
- - Transmission Line
- Chuchinka-Log Lake FSR (North Olsson) - Site Access
- Mine site
- Corridor

- Project Footprint**
- Explosives Storage
 - External Waste Rock & Fines Stockpile
 - Sand Plant
 - Angus Property Mineral Tenure
 - Gas Line Right of Way
 - Open Pit

- Pond
- Reclamation Material Stockpile
- Road
- Transmission Line Right of Way
- Waste Rock & Fines Backfill

- Watersheds Draining into Fraser River Drainage Basin**
- Seebach Creek (191 km²)
 - Olsson Creek (171 km²)
 - Averil Creek (48 km²)

- Watersheds Draining into Mackenzie River Drainage Basin**
- Angusmac Creek (127 km²)
 - Crooked River (285 km²)
 - Giggler Creek (109 km²)
 - unnamed watershed (74 km²)



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231110
 Requested by: LDESANDOLI on 20231108
 Checked by: LDESANDOLI on 20231110

Client/Project/Report: Vitreo Minerals Ltd. Angus Project Detailed Project Description

Figure No.: 1.2
 Title: Angus Project Overview

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Detailed Project Description

1 General Information and Contacts

February 5, 2024

An overview of the Project components is shown in Figure 1.2 and provided in Section 10.2.

The proposed Project facilities and Raw Sand Plant are located at Latitude 54deg 23' 50" N and Longitude 122deg 22' 36" W. The proposed Finishing Plant site is located at Latitude 54deg 26' 08" N and Longitude 122deg 37' 55" W.

Mine production is proposed to be 2.9 million tonnes (Mt) of quartz arenite per year over a 20-year mine life. The mining rate is required to meet an annual sales target of 2 Mt of processed silica sand. Photo 1.2 and Photo 1.3 illustrate the final silica sand product.

The Raw Sand Plant will be designed to produce the following products:

- 30/50 mesh
- 40/70 mesh
- 70/140 mesh
- Fine material <140 mesh

Photo 1.2 Run of Mine Quartz Arenite and 40/70 Mesh Silica Sand⁴



⁴ Note that 40/70 refers to mesh sizes that the silica sand can pass through. The higher the mesh number, the smaller grain sizes.

Detailed Project Description
1 General Information and Contacts
 February 5, 2024

Photo 1.3 40/70 Mesh Silica Sand Under Microscope



1.3 Proponent Information and Contacts

Vitreo is a mining company based in Golden, BC that owns and operates the Moberly Silica Sand operation. The Moberly Silica Sand operation is a similar mine and processing facility to the proposed Angus Project. Moberly Silica Sand is located approximately 12 km north of Golden. Vitreo’s primary contact information is provided in Table 1.1.

Table 1.1 Proponent Contact Information

Project Name	Angus Project
Proponent Name	Vitreo Minerals Ltd.
Proponent Address	1725 Blaeberry River Road East Golden BC, V0A 1H1, Canada
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2 Engagement, Feedback and Integration

Vitreo's engagement activities for the Project capture the time period up to January 31, 2024 and have included emails, in-person and virtual meetings, presentations, open houses, and community meetings. Vitreo has engaged with the following groups through various engagement activities:

- Indigenous Nations including those who have self-identified as Participating Indigenous Nations
- Municipalities
- Government agencies
- Stakeholders
- Under-Represented potentially affected populations
- Other including the Public (as well as guide outfitters and trapline holders)

Details of those engaged in each of these categories are provided in Section 5, Section 6 and Section 7 of this DPD.

As part of the Early Engagement phase of the BC environmental assessment process, Vitreo prepared a draft Engagement Plan (Vitreo 2023b) and shared it with potentially affected Indigenous Nations to be engaged on the Project for their consideration, review, and feedback. No direct comments were received on the draft Engagement Plan; however, comments and feedback received during preliminary engagement with Indigenous Nations, regulatory agencies and stakeholders have been incorporated into the Engagement Plan that has been formally accepted by the EAO.

The EAO invited comments from potentially affected Indigenous Nations, technical advisors (including representatives from Federal and Provincial ministries, the regional health authority, and local governments), and the public on the IPD and Engagement Plan for the Project. The EAO issued the Summary of Engagement document to Vitreo on October 30, 2023 (EAO 2023) which reflects the issues raised by these groups.

Vitreo shared the draft DPD with participating Indigenous Nations on December 13, 2023. The EAO shared the draft DPD with members of the anticipated TAC and Indigenous Nations for feedback.

The Project's Issues Tracking Table includes the comments received from Indigenous Nations, the technical advisors and the public on the IPD during the Early Engagement phase as well as comments received on the draft DPD and Vitreo's responses (Appendix B). The responses provide section references where updates have been made to the DPD in response to feedback received.

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Of the participating Indigenous Nations, Vitreo received comments on the draft DPD from West Moberly First Nations which are incorporated in the tracking table. McLeod Lake Indian Band advised that they would have no comments on the draft DPD other than a typo that was corrected. Lheidli T'enneh First Nation advised that they would provide comments on the draft DPD at the end of February. Vitreo will address their comments once received.

The EAO's recommendations for the DPD outlined in the Summary of Engagement and where these have been addressed in the DPD are presented in Table 2.1 as well as in Appendix B "Issues Tracking Table" Identification numbers (ID#s) IPD-EAO-001 to IPD-EAO-009.

Feedback gathered through engagement, including issues captured in the Summary of Engagement (EAO 2023), have been used to refine the DPD. Updates to the DPD are documented in the responses to the issues as presented in Appendix B as well as in a summary format under the updated sections in this DPD.

Section 5.3 summarizes issues, concerns or questions raised by Indigenous Nations and Section 6.2 summarizes issues, concerns or questions from Municipalities, Government Agencies, Stakeholders, Under-Represented Potentially Affected Populations and the general public. A consultation log of engagement activities completed with Indigenous Nations is provided in Appendix A of this DPD.

McLeod Lake Indian Band, West Moberly First Nations, and Lheidli T'enneh First Nation have self identified and provided a notice of intent to each be a Participating Indigenous Nation. Nazko First Nation, and Nak'azdli Whut'en have not self-identified as Participating Indigenous Nations, however their comments are included in Section 5.3, and records of contact are included in Appendix A.

Vitreo will work with the Participating Indigenous Nations and stakeholders throughout the environmental assessment process to understand the extent to which Indigenous Interests and Traditional Land Use (TLU) as well as other questions may be affected by the Project. Vitreo will also work with Participating Indigenous Nations and stakeholders to find ways to avoid and/or mitigate these potential effects.



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Table 2.1 EAO Recommendations for DPD

Topic	EAO's Recommendation for DPD outlined in Summary of Engagement	Addressed in DPD
Further Information on Fish	Discuss how mine traffic will interact with fish at Emerald and Crystal Lakes. Ensure that recreational users are kept informed of potential impacts and included in discussions relating to mitigations.	<p>Vitreo notes that the road past both Crystal and Emerald Lakes already exists as an active Forest Service Road (FSR). However, Project haul traffic may interact with fish at Emerald and Crystal Lakes through fugitive dust deposition. To evaluate this potential effect, the Application for an Environmental Assessment Certificate (the Application) will contain a dust deposition model, and mitigation measures for the two recreational sites will be developed as appropriate (e.g., a commitment to watering the FSR). It is not anticipated that the Project will affect groundwater or surface water of the two lakes; however, these potential effects will also be considered further in the Application.</p> <p>Text has been added in Section 12.2.6, Fish and Aquatic Resources, of the Detailed Project Description to address fish in the Emerald Lake and Crystal Lake recreation areas which states that the fish in the Emerald Lake and Crystal Lake recreation areas are unlikely to be affected by Mine activities because road dust control measures will be implemented as part of the Air Quality Management Plan.</p> <p>Vitreo is committed to inform stakeholders and the public on the Project. Text has been added in Section 6.3 Ongoing Engagement, of the Detailed Project Description that users of the Emerald Lake and Crystal Lake Recreation Sites will be included in ongoing engagement and discussions about the Project. Section 14, Mitigation Measures, Management Plans, and Monitoring Plans has been updated to include that the mitigation and monitoring plans required as part of the Application, as well as specific mitigation measures and monitoring requirements will be further developed through the environmental assessment process in discussions with Participating Indigenous Nations, regulators and stakeholders including users of the Emerald Lake and Crystal Lake Recreation Sites.</p>
Options for Water Treatment	Provide options for water treatment system(s) if contact water from the Angus Project is anticipated to have contaminants that exceed applicable water quality guidelines. Options for water treatment system(s) must meet EMLI's Technology Readiness Assessment Interim Technical Guidance (August 2022) with a Technology Readiness Level of at least 7. This level is defined as a prototype that is at planned operational level and is ready for demonstration in an operational environment.	<p>Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. At this time, Vitreo plans to use water retention ponds (i.e., sediment ponds) as the primary source of water treatment at the Mine site. These ponds will be used to reduce total suspended solids (TSS) in effluent prior to discharge. If required, additional TSS control methods such as the addition of flocculant will be considered. Early geochemical analyses and water quality baseline studies indicate that additional water treatment, such as pH adjustment or chemical addition will not be necessary to meet water quality objectives in the receiving environment. Vitreo is aware that options for water treatment system(s) must meet the Ministry of Energy, Mines, and Low Carbon Innovation's Technology Readiness Assessment Interim Technical Guidance (August 2022)¹ with a Technology Readiness Level of at least 7.</p> <p>This approach is discussed in Section 10.7.2 Alternative Means of Carrying out the Project of the Detailed Project Description.</p>
Community Trust in Water Quality	Provide options and ideas for holding open dialogues with the local community and stakeholders. Provide potential options for the project's water management measures and be receptive to feedback and suggestions.	<p>Vitreo will present water management measures at future open houses, including in Bear Lake, to provide opportunities to understand the studies completed, the risk and the mitigation plans. Subject matter experts will be on hand to answer questions and explain technical aspects in plain language. Note takers will document feedback, ideas, comments and questions.</p> <p>Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. Information on water treatment alternatives is provided in Table 10.3 in Section 10.7.2 of the DPD. Comments received from water users in the area, including citizens of Bear Lake and Indigenous Nations will be incorporated into Project planning, the Application, and/or subsequent permit applications, as appropriate.</p>
Dust from Trucks and Processing	Provide further information on the increased hauling traffic (e.g., number and type of project specific vehicles, traffic routes, road upgrades, potential new roads etc.) and information regarding the processing of materials that may create dust.	<p>Section 11 of the Detailed Project Description includes updated details about dust emissions from trucks and processing. The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of dust from Project activities. The Project's fugitive dust sources will be described in the Detailed Model Plan that will be reviewed by the Ministry of Environment and Climate Change.</p> <p>The movement of the traffic along unpaved surfaces between the Monkman East Pit, Raw Sand Plant, and the External Waste Rock and Fines Stockpile will create fugitive dust during dry meteorological conditions. Fugitive road dust does not contain the high purity silica that is being mined but rather a mineral clay dust because the surface of the unpaved roads is covered with an aggregate material that is predominantly comprised of a mineral clay.</p> <p>The Raw Sand Plant will crush and process the quartz arenite to liberate the silica sand and separate it from the fines component. Blasted rocks will be crushed before being delivered to the Raw Sand Plant for processing and liberation. At the Raw Sand Plant, material will be crushed further, then slurried and processed in a multistage process resulting in a raw sand intermediate product. These activities have low potential to create dust emissions because the high moisture content for the blasted rock and the crushed material (e.g., a slurry) results in the dust emissions being negligible.</p> <p>Fugitive dust is also expected along the haul route between the Raw Sand Plant and the Finishing Plant. On average approximately 127 trucks per day will travel from the Raw Sand Plant to the Finishing Plant along the North Olsson FSR. On average approximately 127 trucks per day will travel from the Finishing Plant to the Raw Sand Plant along the North Olsson FSR. The trucks travelling along the North Olsson FSR will be 55 tonne side dump trailers operated by a contractor. Hauling between the Raw Sand Plant and Finishing Plant will occur approximately 300 days per year.</p> <p>Upgrades to the haul roads (i.e., the current Forest Service Roads) are currently being evaluated as part of Project planning. Additional detail will be included in the Application for an Environmental Assessment Certificate.</p>



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Topic	EAO's Recommendation for DPD outlined in Summary of Engagement	Addressed in DPD
Community Composition	Provide a description of the nearby community's demographic makeup, ensuring disaggregated data based on key identity factors like ethnicity, gender, income, and educational attainment are noted.	The Application for an Environmental Assessment Certificate will include a socio-economic baseline that will describe the nearby communities and their demographics (see Detailed Project Description Section 12.3.1 Socio-economic Setting). Gender-based analysis plus will be conducted through the assessment. Gender-based analysis plus assesses how different segments of the population may experience disproportionate effects. Data included in the socio-economic baseline and assessment will be disaggregated based on key identity factors, including Indigeneity, gender, ethnicity, income, and education, where available.
Sense of Place and Identity	Identify the project's potential interactions with the existing sense of place and identity within nearby communities through focused group interviews and/or individual interviews while considering the historical, spiritual, and cultural significance of the area to residents.	Vitreo will be working with Participating Indigenous Nations to understand how the Project may affect Indigenous and Treaty rights, which will include historical, spiritual and cultural significance as stated in Section 5.4 of the Detailed Project Description. Vitreo is also open to discuss potential interactions with existing sense of place and identity within nearby communities should these be expressed by members of the public through engagement activities as stated in Section 6.3 of the Detailed Project Description.
Workforce Influx	Describe where workers will come from and how Vitreo will prioritize hiring locally, recognizing that an influx of workforce, especially if non-local, can disproportionately affect certain subpopulations, such as women and First Nations peoples	The Application for an Environmental Assessment Certificate will include a description of where workers will come from and how Vitreo intends to hire locally. Section 10.4, Project Employment, of the Detailed Project Description has been revised to explain that Vitreo believes that the Project will be able to source the workforce from local communities in Project area including Prince George and Bear Lake. The Project does not require specialty skill sets that are not common to the regions industrial base including forestry, lumber milling and pulp, mining, heavy construction and industrial services that are located in Prince George. However, the Application will also provide an assessment of disproportionate effects on distinct human populations, including populations identified by gender and Indigeneity as per Section 25 of the BC <i>Environmental Assessment Act</i> .
Prevention and Response to Gender-Based Violence (GBV)	Provide a description of how the Project could interact with GBV both in nearby communities and within the project's workplace.	Vitreo believes that the Project will be able to source the workforce from local communities including Prince George and Bear Lake. The Project does not require specialty skill sets that are not common to the regions industrial base including forestry, lumber milling and pulp, mining, heavy construction and industrial services that are located in Prince George. However, to acknowledge this comment Section 13 in the Detailed Project Description states that out-of-region workers who are employed by the Project may interact with the communities and have the potential to adversely affect community safety (e.g., gender-based violence) and communicable diseases. Working conditions such as shift work and potential workplace harassment or gender-based violence may contribute to adverse mental health conditions which could place additional strain on family dynamics and adverse coping mechanisms such as substance use. This potential interaction will be evaluated in more detail in the Application for an Environmental Assessment Certificate. Section 12 in the Detailed Project Description provides information about criminal code violation records and states that gender-based violence will be assessed and reference to the National Inquiry for Murdered and Missing Women and Girls (2019) will be included in the Community and Well-being Section of the Application for an Environmental Assessment Certificate.
Transportation of Materials	Provide alternative options to hauling by truck for the transportation of quarried materials.	The Finishing Sand Plant site location has been selected to be in close proximity to an existing CN rail line. A rail load out, currently located on private land not owned by Vitreo, connects to the CN rail line in close proximity to the Finishing Plant site. This rail loadout has the potential to be used to transport silica sand to market, however, as noted above, the rail load out is located on private land and Vitreo would need to negotiate a user agreement with the current land owner. Additionally, Vitreo understands that there is a shortage of rail cars that could be used to transport silica sand to market, which may make the use of rail for transportation unfeasible in the near term. Thus, the use of rail to transport product to market is not feasible at this time; however, Vitreo plans to re-evaluate the use of rail as part of future Project planning. This discussion has been included in Section 10.7.2 Alternative Means of Carrying out the Project of the Detailed Project Description.

Source: Summary of Engagement (EAO 2023).

3 Purpose of and Rationale for the Project

Upon receipt of permits and approvals, the Project would extract and process quartz arenite to produce Tier 1-quality silica sand (an industry description of highest available quality) used as proppants in the natural gas basins in northeastern BC. Natural gas production in this region comes primarily from drilling completions that require proppants. Currently, proppants are imported largely from Wisconsin with some smaller volumes from Alberta; these are typically delivered by rail to terminals in Chetwynd or Dawson Creek, BC. The proximity of the Project to BC's natural gas basins reduces transportation distances throughout the basin and provides a potentially substantial offset to current greenhouse gas (GHG) emissions and long-term economic and employment benefit to the region compared to the import of similar material from Wisconsin.

Potential benefits of the Project include business opportunities, employment, income and other benefits (i.e., tax revenues and contributions to gross domestic product) associated with Project-related capital and operational expenditures and demand for labour, goods and services. Benefits may also include community, organizational, and institutional investments made by Vitreo. Employment and income realized by workers on the Project may also have beneficial effects on individual and household health and well-being through gained employment and increased income. Tax revenues may be realized by governments for use in funding public services and investing in infrastructure. Vitreo also seeks to engage Indigenous-owned businesses in the promotion of economic benefits to the Indigenous Nations from development of the Project. Vitreo will continue its efforts to work together with Indigenous Nations, communities, and local stakeholders in the creation of sustainable social and environmental benefits from the Project.

4 Legislative and Regulatory Context

The Project will require multiple approvals, licenses and permits prior to construction and operation. These include an EAC under the EAA, a *Mines Act* permit, and air and effluent waste discharge permits under the EMA. The following provides a description of the anticipated approvals and permits for the Project as well as the consideration of provincial agreements as applicable to the Project.

4.1 Federal and Provincial Environmental Assessment Requirements

The Project will be considered an “industrial mineral quarry” as defined in the RPR under the EAA. As per the RPR, an industrial mineral definition includes all substances in which silica is the predominant mineral and that are used for an industrial purpose, including massive silica, quartz, and quartzite.

The Project meets specific criteria (“thresholds”) that makes it a “new industrial mineral quarry” under Part 3, Table 6 Mine Projects of the RPR because it is a new quarry facility that: involves the removal of industrial minerals, is regulated as a mine under the *Mines Act*, and during operation, will have a production capacity of > 250,000 tonnes per year of quarried product. As such, the Project will require an EAC (issued by the EAO), which is required prior to construction and operation and before major permits are issued.

The Impact Assessment Agency of Canada (the Agency) has advised Vitreo that the Angus Project does not meet the criteria of the *Impact Assessment Act’s* (IAA) Physical Activities Regulations as a designated project for which the Agency is the responsible authority. As a result, Vitreo is not required to formally submit an IPD or DPD to the Agency that meets the requirements of the Information and Management of Time Limits Regulations under the IAA.

4.2 Other Authorizations Required

Other authorizations (e.g., permits, licenses, approvals) will be required to construct and operate the Project, including permits issued under the *Mines Act* and EMA for air and effluent discharge. A list of anticipated provincial and federal permits, licenses and approvals required for Project construction, operation, and reclamation and closure are listed in Table 4.1 and Table 4.2, respectively. These lists will be confirmed with the appropriate regulatory bodies as the approval process progresses. The table has been updated to include feedback received on the draft DPD regarding anticipated crown land tenure permits.

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Table 4.1 Anticipated Provincial Permits, Licenses and Authorizations

Permit, License or Approval	Legislation	Issuing Authority	Description
Mines Lease	<i>Mineral Tenure Act</i>	EMLI	Possible conversion of mineral claims at the Project site for the long-term production of proppant.
Permit Approving Work System and Reclamation	<i>Mines Act</i>	EMLI	Required prior to construction and operation of the Project.
Waste Discharge Permit - Air	EMA	ENV	Required for air discharge from Raw Sand Plant and Finishing Plant sites.
Waste Discharge Permit - Effluent	EMA	ENV	Approval related to effluent discharge from the Mine site, including sediment ponds. An effluent permit will be required for point and non-point effluent discharge to surface or ground.
License of Occupation	<i>Land Act</i>	MoF	Licence of Occupation may be used as an interim tenure for transmission line construction prior to completion of survey requirements for a Statutory Right-of-Way. A linear utility tenure may remain as a Licence of Occupation depending on the length and any other overlapping tenures.
Crown Land Tenure Permit	<i>Land Act</i>	MoF	Possible Crown Land tenure permit for the Mine site (i.e., occupation).
Crown Land Tenure Permit	<i>Land Act</i>	MoF	Possible road tenure in the form of a Statutory right-of-way for private roads on the Mine site and Finishing Plant site.
Crown Land Tenure Permit	<i>Land Act</i>	MoF	Required to secure tenure for the Finishing Plant site location near Highway 97.
Special Use Permit	<i>Forest Act</i>	MoF	Possible approval for non-exclusive authority to a company or an individual to occupy and use an area of Crown land within the Provincial Forest.
Water Use License	WSA, Section 9	WLRS	Approval related to use of surface water and groundwater, including licenses for: <ul style="list-style-type: none"> • A license for water storage due (sediment ponds and Process Water Pond); • A licence will be required if groundwater seeps into the pond or surface water sources are added; • Water license for water used for dust controls.
Water License	WSA, Section 11	WLRS	Possible approval related to diversion of waterbodies or watercourse crossings.

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Permit, License or Approval	Legislation	Issuing Authority	Description
Petroleum Storage and Distribution Facilities Stormwater Regulation Registration	EMA	ENV	Required for onsite storage of any petroleum products, including waste oil, waste coolant, diesel and gasoline.
Occupant License to Cut	<i>Forest Act</i>	MoF	Required for the harvesting of Crown timber from Crown land or private land, including from the Mine site, Transmission Line Corridor and Finishing Plant site.
Amphibian Salvage Permit	<i>Wildlife Act</i>	WLRS	A permit to undertake amphibian salvage activities if any are identified during Project-related activities within or adjacent to a wetland during the breeding season (mid-April to mid-August).
Explosives Magazine Storage and Use Permit	<i>Mines Act</i>	EMLI	Approval to store, transport and use explosives and maintain an explosives magazine.
Road Use Agreement	-	-	Required agreement with Canfor for use of Forest Service Road for Haul Road.
Waste Discharge Permit – non-hazardous solid waste	EMA	ENV	Potential authorization required for landfilling of non-hazardous solid waste.
Municipal Wastewater Registration	Municipal Wastewater Regulation, EMA	ENV	Potential registration for discharge from a sewage treatment plant(s) if discharge to ground is more than 22.7 cubic metres per day (m ³ /day). No discharge to surface water is planned as part of the Project.
Official Community Plan and Zoning Bylaw amendment	<i>Local Government Act</i>	RDDFG	The Project may require an Official Community Plan and Zoning Bylaw amendment to allow the proposed uses.
Building permit	-	RDDFG	Any proposed building or structure over 10 m ² may require a building permit from the Regional District prior to construction starting.
Notes: EMA- <i>Environmental Management Act</i> ; EMLI-Ministry of Energy, Mines and Low Carbon Innovation; MoF-Ministry of Forests; ENV-Ministry of Environment; WLRS-Ministry of Water, Land and Resource Stewardship; RDDFG-Regional District of Fraser-Fort George; WSA- <i>Water Sustainability Act</i> .			

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Table 4.2 Anticipated Federal Permits, Licenses and Authorizations

Permit, License or Approval	Legislation	Issuing Authority	Description
Section 35(2) Fisheries Act Authorization	<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	May be required if the Project will result in the harmful alteration, disruption or destruction (HADD) of fish habitat following the Request for Review process and receipt of a DFO letter of advice
Explosives Magazine License	<i>Explosives Act</i>	Natural Resources Canada	License required for the storage of explosives on-site
Radio License	<i>Radiocommunication Act</i>	Industry Canada	License required for radiocommunication on-site

No worker accommodation camp or drinking water systems are proposed to be constructed for the Project. Should those plans change during advancement of Project design, Vitreo will work with relevant regulatory authorities to define permit and approval requirements.

4.3 Indigenous Nations Agreement Requirements

Vitreo is taking into consideration the requirements of applicable agreements between the Province of BC and Indigenous Nations. As described in Section 1.1, the Project lies within Treaty 8 and within the traditional territory of McLeod Lake Indian Band and West Moberly First Nations, adjacent to the traditional territory of Lheidli T'enneh First Nation, and in proximity to the traditional territory of Nak'azdli Whut'en and Nazko First Nation.

Treaty 8 is an agreement between the Government of Canada and Cree, Beaver, Chipewyan and other Indigenous Peoples [recognized today as McLeod Lake Indian Band (signatory to adhesion), West Moberly First Nations, Blueberry River First Nations, Doig River First Nation, Fort Nelson First Nation, Halfway River First Nation, Prophet River First Nation (Denetsaa Tse K'Nai), and Saulteau First Nations] which states that Indigenous signatories have specific rights within Treaty 8 in perpetuity. These rights are recognized and affirmed by section 35 of the *Constitution Act, 1982*.

A summary of the agreements between the Province and Participating Indigenous Nations is provided below:

- McLeod Lake Indian Band:** The Province of BC signed the *McLeod Lake Indian Band Treaty No. 8 Adhesion and Settlement Agreement* in 1999 (<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations-negotiations/first-nations-a-z-listing/mcleod-lake-indian-band>). The agreement was amended in 2000. The agreement regulates stumpage fees, fire suppression, forestry roads, and access. Provisions of the agreement will need to be considered in the planning and execution of engagement and of the Project. Several additional agreements specific to different natural resources are also in place but should not affect the Project. Through engagement, Vitreo will work with McLeod Lake Indian Band to determine how the Project may be affected by the Nation's agreements.

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- **West Moberly First Nations:** The West Moberly First Nations is a signatory to Treaty 8 (signed in 1899) and are in discussion with BC on land and resource issues outside the BC treaty process. Several agreements specific to different natural resources are in place but should not affect the Project <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations-negotiations/first-nations-a-z-listing/west-moberly-first-nations1>. Following *Yahey vs. BC* (BCSC 1287 2021) federal and provincial governments have reached a settlement on Treaty Land Entitlement (TLE) claims for lands owed to five signatory Nations to Treaty 8 (Government of BC 2023). West Moberly First Nations is among the Indigenous Nations who received reparations in this settlement. West Moberly First Nations explained to Vitreo that TLE lands, now owned as fee simple by West Moberly First Nations are located within proximity to the Project area around Summit Lake. Vitreo will consider Project effects to these locations during Project planning.
- **Lheidli T'enneh First Nation:** Lheidli T'enneh First Nation are signatories to a Framework Agreement on First Nation Land Management ratified by the federal government through the *First Nation Management Act* on June 17, 1999. The Agreement and legislation enable Lheidli T'enneh First Nation to take over management and administration of their reserve lands from the Department of Indian Affairs by enacting the Lheidli T'enneh Land Code (Lheidli T'enneh n.d.):

“The Land Code gives Lheidli T'enneh jurisdiction over decision making in relation to the on-reserve lands and natural resources, including leasing, developing, managing revenues, and authorizing expenditures. Land management powers only relate to reserve lands. The Framework Agreement does not affect any lands, or any rights in lands, that are not subject to the Land Code. It grants law making powers in respect of the development, conservation, protection, management, use and possession.”

Lheidli T'enneh First Nation has a Natural Resources Referrals Procedure for proposed developments, including mining operations which may have effects on Lheidli T'enneh Rights and Title (see www.lheidli.ca/wp-content/uploads/2020/06/LT_ReferralProceure_2019.pdf).

Several agreements are in place for Lheidli T'enneh First Nation but should not affect the Project ([Lheidli T'enneh First Nation - Province of British Columbia \(gov.bc.ca\)](http://www.lheidli.ca/wp-content/uploads/2020/06/LT_ReferralProceure_2019.pdf)). Through engagement, Vitreo will work with Lheidli T'enneh First Nation to determine how the Project may be affected by the Nation's agreements.

4.4 Policies and Agreements

Known policies applicable to the Project include:

- CleanBC
- Compliance & Enforcement Policy – BC Ministry of Energy, Mines and Low Carbon Innovation (EMLI) (EMLI 2020)
- Policy for Metal Leaching and Acid Rock Drainage (BC Ministry of Energy and Mines & BC Ministry of Environment, Lands and Parks 1998)

Vitreo is of the opinion that the Project is compatible with the above-listed policies and is not aware of relevant government policies that the Project may not be compatible with.

Vitreo is also not aware of applicable international agreements between the Province and state or federal governments with a direct effect on the Project and will continue to work with regulators to identify relevant agreements, should they exist.

Note that Vitreo is aware that the Province of BC is proposing to amend the *Greenhouse Gas Industrial Reporting and Control Act* (GGIRCA) and its regulations to implement a Net-Zero New Industry Policy. The Province of BC published an intention paper for this policy in July 2023; however, the policy is not in effect yet. A net-zero plan, as required by this proposed policy, will be included in the Application if the policy is in effect at that time.

4.5 Proposed Assessment Timing

The proposed timelines for the environmental assessment process and subsequent permit applications are provided in Table 4.3.

Table 4.3 Proposed Assessment Timing

Anticipated Timeline	Activity
Q1-Q3 2023	<ul style="list-style-type: none"> • Shared draft of Engagement Plan and draft IPD with potentially affected Indigenous Nations – completed in Q1 2023 • Revise and update, submit draft to EAO – completed in Q2 2023 • Revise and update, submit final documents to EAO Q3 2023
Q3-Q4 2023	<ul style="list-style-type: none"> • Continue Early Engagement phase, submission of draft DPD in Q1
Q1-Q2 2024	<ul style="list-style-type: none"> • Submission of Final DPD, Q1 • Achieve Readiness Decision Milestone, Q1 • Process Planning Phase Q2
Q3-Q4 2024	<ul style="list-style-type: none"> • Submit draft Application, Q3 • Submission of final Application, late Q4 2024 or early Q1 2025
2025	<ul style="list-style-type: none"> • Receipt of EAC, Q4 • Submission of construction and operation permit applications, including Joint <i>Mines Act</i> / EMA Permit Application, <i>Water Sustainability Act</i> authorizations, Q3/Q4

5 Indigenous Nations Interests

Vitreo recognizes that the Early Engagement phase is an opportunity to create an important foundation for establishing relationships with Indigenous Nations that will carry on throughout the life of the Project. The Early Engagement phase has helped Vitreo begin to understand issues and interests of these Indigenous Nations.

Based on the location of the Project as described in Section 1.1, Vitreo has engaged with the Participating Indigenous Nations, which include McLeod Lake Indian Band, West Moberly First Nations, and Lheidli T'enneh First Nation. Community profiles for the Participating Indigenous Nations are presented in Section 5 of the Engagement Plan (Vitreo 2023b).

Indigenous Interests, as defined by the EAO, refers to “interests related to an Indigenous nation and their rights recognized and affirmed by section 35 of the *Constitution Act*, 1982, including Treaty rights and Aboriginal rights and title, that may be impacted by a proposed project” (EAO 2020). Vitreo understands and supports McLeod Lake Indian Band's interest in conducting a Treaty Impact Assessment. Vitreo looks forward to discussing the cultural assessment requested by West Moberly First Nations. Vitreo would like to discuss the Traditional Land Use study that Lheidli T'enneh First Nation said they are interested in. Vitreo will work collaboratively with the Participating Indigenous Nations to determine how Indigenous Knowledge can be incorporated into the Application. Vitreo is committed to working with the Participating Indigenous Nations to better understand this important information.

5.1 Potential Project Effects on Indigenous Interests

Potential interactions with and effects on Indigenous Interests associated with the Project components and activities described in Section 10 include:

- Effects on traditional practices including hunting, trapping, fishing, and plant gathering
- Effects on access to traditionally harvested resources
- Effects on access to traditional land use (TLU) sites
- Effects on cultural transmission and experience
- Opportunity for training and employment
- Opportunity for business

5.2 Pre-early and Early Engagement

Pre-early engagement included outreach to McLeod Lake Indian Band, West Moberly First Nations, Lheidli T’enneh First Nation, Nak’azdli Whuten, and Nazko First Nation. To date, McLeod Lake Indian Band, West Moberly First Nations, and Lheidli T’enneh First Nation have identified themselves as Participating Indigenous Nations.

During the Early Engagement phase, Vitreo engaged with Participating Indigenous Nations through various activities including virtual and in-person meetings, a site tour, community meetings, and monitoring activities. These engagement activities helped Vitreo to understand preferred methods of engagement (including protocols regarding laws, customs and policies applicable to engagement), collect feedback on the Project and Project-related documents, work collaboratively on addressing issues and concerns, and answer questions regarding the Project. Vitreo met with Lheidli T’enneh First Nation before the Early Engagement phase, provided drafts of Project related documents including a draft of the DPD, and requested meetings. Vitreo hopes to meet with Lheidli T’enneh First Nation in the near future.

Vitreo shared the draft DPD with Participating Indigenous Nations on December 13, 2023. The EAO shared the draft DPD with technical advisors and Participating Indigenous Nations for feedback. Vitreo has addressed comments received on the draft DPD in this final DPD. Vitreo understands that the DPD must be accepted by the EAO before the Readiness Decision phase begins. Table 5.1 below summarizes the engagement activities to date with Participating Indigenous Nations.

Table 5.1 Key Engagement Activities During Pre-Early Engagement and Early Engagement Phase

Participating Indigenous Nations	Key Engagement Activities
McLeod Lake Indian Band	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> • January 2021, Vitreo initiated discussion with Duz Cho, a McLeod Lake Indian Band owned company, regarding economic development opportunities relevant to the Project • Feb 2022, Duz Cho assisted Vitreo in obtaining sand samples • July 2022, introductory letter sent to McLeod Lake Indian Band Chief and Council with Project overview • December 2022, McLeod Lake Indian Band participated in field work (four days) at groundwater and surface water sampling sites. • December 2022, phone call made to McLeod Lake Indian Band to advise of pending draft IPD and draft Engagement Plan and request for feedback. • February 2023, draft IPD and draft Engagement Plan sent to McLeod Lake Indian Band for review and feedback. • April 2023, McLeod Lake Indian Band Monitor accompanied surface water quality and quantity sampling team for fieldwork, 3 days. • April 2023, virtual meeting with McLeod Lake Indian Band to provide Project updates and notice of upcoming fieldwork • June 2023, Vitreo notified McLeod Lake Indian Band that the IPD and Engagement Plan were filed with the EAO • June 2023, draft Technical Data Reports were shared with McLeod Lake Indian Band • June 2023, Vitreo hosted a site tour with McLeod Lake Indian Band, including a Project overview presentation and discussion

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Participating Indigenous Nations	Key Engagement Activities
	<p>Early Engagement:</p> <ul style="list-style-type: none"> • August 2023, Vitreo hosted an in-person community dinner with McLeod Lake Indian Band community members in Prince George, which included an introductory presentation and question/answer session with community members. • August 2023, Vitreo hosted an in-person community dinner in McLeod Lake with McLeod Lake Indian Band community members, which included an introductory presentation and question/answer session with community members. • August 2023, McLeod Lake Indian Band participated in the virtual TAC meeting. • August 2023, Vitreo participated in McLeod Lake Indian Band’s Annual General Assembly Meeting in McLeod Lake • October 2023, Vitreo coordinated a (helicopter) site tour with McLeod Lake Indian Band. McLeod Lake Indian Band cancelled the tour due to low participation • November 2023, Vitreo met with Chief Chingee to provide a Project update • November, 2023, Vitreo began discussions with McLeod Lake Indian Band around a Treaty Impact Assessment • December, 2023, Vitreo sent the draft DPD to McLeod Lake Indian Band for review • December 2023, a field participant from McLeod Lake Indian Band joined the ungulate aerial survey with Stantec and the Ministry of Forests • January 2024, McLeod Lake Indian Band was invited to participate in a Bull Trout Spawning Habitat baseline study • January 2024, McLeod Lake Indian Band was invited to participate in Surface Water Sampling surveys for January and February 2024 • January 2024, McLeod Lake Indian Band noted they had no concerns or comments on the draft Detailed Project Description • February 2024, Vitreo submitted final DPD to McLeod Lake Indian Band

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Participating Indigenous Nations	Key Engagement Activities
West Moberly First Nations	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> • July 2022, introductory letter sent to Chief and Council with Project overview • December 2022, phone call to West Moberly First Nations to advise of pending draft IPD and draft Engagement Plan and request for feedback • February 2023, draft IPD and Engagement Plan sent to West Moberly First Nations for review and feedback • May 2023, virtual Project introductory meeting with Chief and Council • June 2023, draft Technical Data Reports were shared with West Moberly First Nations <p>Early Engagement:</p> <ul style="list-style-type: none"> • August 2023, West Moberly First Nations participated in the virtual TAC meeting. • August 2023, West Moberly First Nations Monitor participated in the Archaeological Impact Assessment (AIA) field work • November 2023, Project update meeting with West Moberly First Nations Chief and Council • November 2023, West Moberly First Nations was invited to participate in a winter ungulate survey • December 2023, Vitro sent draft DPD to West Moberly First Nations for review • December 2023, a field participant from West Moberly First Nations was scheduled to join the ungulate aerial survey with Stantec and the Ministry of Forests but could not arrive on time due to an unforeseen accident on the highway. • January 2024, West Moberly First Nations was invited to participate in a Bull Trout Spawning Habitat baseline study • January 2024, West Moberly First Nations was invited to participate in a Surface Water Sampling survey • January 2024, a field participant from West Moberly First Nations joined the Bull Trout Spawning Habitat Baseline study with Stantec • January 2024, a field participant from West Moberly First Nations joined the Surface Water Sampling Survey with Stantec • January 2024, West Moberly First Nations was invited to participate in a Surface Water Sampling survey taking place in February • January 2024, West Moberly First Nations provided feedback on the draft DPD • January 2024, Vitreo met with Chief and Council to discuss the Project • January 2024, West Moberly First Nations provided a draft Relationship Agreement to discuss • February 2024, Vitreo submitted final DPD to West Moberly First Nations
Lheidli T'enneh First Nation	<p>Pre-early engagement:</p> <ul style="list-style-type: none"> • January 2023, introductory letter sent to Chief and Council with Project overview • March 2023, virtual meeting with Lheidli T'enneh First Nation to share Introductory Project overview. Shapefile provided. • May 2023, Vitreo met with Lheidli T'enneh First Nation to share Introductory Project overview with additional staff • December, 2023, Vitreo sent the draft DPD to Lheidli T'enneh First Nation for review • February 2024, Vitreo submitted final DPD to Lheidli T'enneh First Nation
<p>Notes: Pre-Early Engagement defines the time prior to EAO approving the IPD and Engagement Plan by issuing the Process Order (i.e., prior to July 31, 2023). Early Engagement defines the time the IPD and Engagement Plan were provided for review (i.e., July 31, 2023 – to date).</p>	

5.3 Issues, Concerns, Questions and Interests Received

As described in Section 1.1, Vitreo shared a draft of the DPD with Participating Indigenous Nations for their consideration, review, and feedback. Key issues, concerns, questions and interests raised by Participating Indigenous Nations during pre-Early Engagement, Early Engagement, and on the draft DPD are grouped by Participating Indigenous Nation and provided in this section along with Vitreo's responses. In addition, changes made to the Project based on this feedback are also identified and summarized in each of the corresponding sections in the DPD. The Project's Issues Tracking Table including the comments received from all Indigenous Nations, the TAC and the public on the IPD during the Early Engagement phase as well as comments received on the draft DPD and Vitreo's responses are presented in Appendix B.

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5.3.1 McLeod Lake Indian Band

Key issues, concerns, questions and interests raised by McLeod Lake Indian Band and Vitreo's responses and consideration of feedback are presented in Table 5.2.

Table 5.2 Key Issues, Concerns, Questions and Interests Raised by McLeod Lake Indian Band

Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Capacity Funding	Expressed interest in a Memorandum of Understanding (MOU).	Vitreo is looking forward to continuing our discussions regarding capacity funding and a MOU.
Cumulative Effects	Identified that cumulative effects need to be scoped and assessed.	The Application will contain a cumulative effects assessment where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. A preliminary consideration of cumulative effects is included in Section 13.3 Cumulative Effects, of the DPD.
Air Quality and Dust	Reported concern regarding the impacts from fugitive dust and efficacy of dust management measures.	Fugitive dust dispersion from Project activities will be modelled in the Application and Vitreo will incorporate dust management measures into the Project planning. An Air Quality Management Plan will be developed prior to construction, this plan is described in Section 14 Mitigation Measures, Management Plans and Monitoring Plans, of the DPD.
	Asked how will dust along the North Olsson FSR, particularly where it parallels the Giggler Creek watershed, be managed?	Fugitive dust dispersion from Project activities will be modelled, including from haul truck usage of the North Olsson FSR, as part of the Application. Vitreo will incorporate dust management measures into the Project planning and intends to utilize water trucks or other control measures to manage fugitive dust from road use, as required. An Air Quality Management Plan will be developed prior to construction.
Economic Opportunities and Monitoring	Expressed interest in monitoring opportunities as well as economic opportunities.	Vitreo has contracted Duz Cho Construction for the Diamond Drilling Program and initial exploration activities (2021 to present) and will continue to work with McLeod Lake Indian Band with respect to economic opportunities. Vitreo has engaged McLeod Lake Indian Band in baseline data collection and exploration field programs.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Fish and Fish Habitat	Requested more discussion regarding the 138 kV transmission line proposed to parallel the North Olsson FSR, reporting concern regarding further encroachment upon active fish habitat.	The proposed transmission line will be adjacent to the road and at the stream crossings the power poles will be installed outside of the riparian area. If any riparian vegetation needs to be removed, it will be done by hand clearing only and no instream work will occur.
Traditional Land Use	Expressed interest in a Treaty Impact Assessment.	Vitreo is looking forward to continuing our discussions regarding capacity funding to support a Treaty Impact Assessment.
Traffic	McLeod Lake Indian Band requires continued access to the area east of the Angus Project and expressed concerns about increased traffic on the North Olsson FSR and Highway 97.	Increased Project-related traffic on the Forest Service Road may interfere with existing use and may also increase affects to local wildlife (e.g., vehicle-wildlife collisions) and vegetation (e.g., dust deposition). Management measures may be required to address these effects, including development of a Traffic Management Plan. A high-level overview of the anticipated Traffic Management Plan is included in Section 14 Mitigation Measures, Management Plans and Monitoring Pans, of the DPD. Vitreo anticipates developing this plan in discussions with McLeod Lake Indian Band.
	Requested discussion regarding mitigative measures for increased traffic, including trucking versus railway transport to northeast BC and reported that safety on the highway relative to the increased traffic is a significant concern. McLeod Lake Indian Band identified areas such as Pine Pass that are already heavily inundated with industrial traffic are dangerous, particularly through the winter, and stated that increased traffic resulting from the Project needs to be mitigated.	Vitreo recognizes that the Project will increase highway traffic along Highway 97. Vitreo notes that Highway 97 is a public and well-utilized highway, and Vitreo and its contractors will adhere to traffic management regulations such as speed limits and will communicate with Ministry of Transportation and Infrastructure about the Project. Vitreo anticipates approximately 150 trucks per day one-way (or approximately six trucks every hour) will travel on Highway 97, transporting proppant from the Finishing Plant site to markets in northeast BC. Discussions with CN Rail and evaluation studies related to rail logistics will be required to better understand the potential for rail transportation of product to customers. Vitreo will re-evaluate the development of the rail loadout once the Project is in operations. These concerns have been documented in Section 16.1 Preliminary Identification of Potential Accidents or Malfunctions and Section 10.7.2 Alternative Means of Carrying Out the Project, of the DPD.
	Recommended developing a rail loadout to prevent a significant traffic increase on the highway.	Discussions with CN Rail and evaluation studies related to rail logistics will be required to better understand the potential for rail transportation of the Project's proppant silica sand to customers. Vitreo will re-evaluate the development of the rail loadout once the Project is in Operations.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Traffic (cont'd)	<p>Based on a Finishing Plant target production rate of 300 tonnes per hour (t/hour), requested how many truckloads would be produced hourly, daily, weekly, annually and how many vehicles would be added to the highway over a 22-year mine life, hauling 335 days per year.</p>	<p>As stated in the IPD, hauling between the Raw Sand Plant and Finishing Plant will occur approximately 300 days per year. On average approximately 127 trucks per day will travel from the Finishing Plant to the Raw Sand Plant along the North Olsson FSR. This corresponds to approximately 38,100 trucks annually. Vitreo will develop a Traffic Management Plan, which will describe measures to mitigate effects due to increased traffic, address traffic safety concerns at the Mine site and Finishing Plant site, and along the FSR and from the access of haul trucks to Highway 97.</p> <p>A high-level summary of the anticipated Traffic Management Plan is included in Section 14 Mitigation Measures, Management Plans and Monitoring Plans, of the DPD.</p> <p>Vitreo anticipates approximately 150 trucks per day one-way (or approximately six trucks every hour) will travel on Highway 97, transporting proppant from the Finishing Plant site to markets in northeast BC. Annually, assuming full volume of haul traffic for 335 days, this will correspond to approximately 50,280 trucks annually.</p> <p>This information is included in Table 16.1 - Preliminary Description of Potential Accidents or Malfunctions, of the DPD.</p>
	<p>Asked if the haul road would be upgraded, identifying that the haul road has steep canyon banks and a stream (Giggler) and stated that in general, one or the other would have to be affected throughout the upgrade.</p>	<p>Upgrades to existing forest service and access roads are being considered as a part of Project planning, however the location and extent of any upgrades has not yet been determined. It is currently intended that upgrades to forest service roads will occur above the high-water mark of nearby streams; as well, erosion and sediment control measures will be implemented to mitigate sedimentation effects to streams. Additional detail on upgrades to the existing Forest Service Roads (FSRs), including relevant mitigation measures, will be included in the Application.</p>
	<p>Requested collaborative discussion regarding engineering and construction of road upgrades.</p>	<p>Vitreo acknowledges this comment. The upgrades to existing forest service and access road are being considered as a part of Project planning and Vitreo welcomes further discussion with McLeod Lake Indian Band.</p>

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Traffic (cont'd)	Asked how the workforce would be transported to and from site	The workforce will be sourced primarily from local communities, including McLeod Lake, Bear Lake and Prince George. Crews will muster at a location and take a company-supplied bus to the Finishing Plant site or the Mine site to avoid increased personal vehicle traffic on the FSR. Section 16.1 Preliminary Identification of Potential Accidents or Malfunctions, of the DPD, has been updated to contain this information.
Vegetation	Expressed interest in revegetation and requested collaborative discussion.	Progressive reclamation will occur during the life of mine, including the reclamation of external stockpiles and waste rock storage area once the majority of the waste is being directed back into the Monkman East Pit starting in Year 6. Post-closure monitoring programs will be developed through the approvals process and will include revegetation success. Section 10.3.3 Reclamation and Closure, of the DPD, has been updated to include a summary of the conceptual reclamation and closure plan that will be included in the Application. This plan will include revegetation prescriptions based on an understanding of end land use objectives. Vitreo anticipates working with Indigenous Nations to develop revegetation prescriptions for the Project.
Water	Asked what volume of water is required to run the plant.	Estimated Raw Sand Plant total processing water requirement are 2800 to 3000 cubic metres per hour (m ³ /hr) with approximately 200 m ³ /hr (~0.056 m ³ /second) required as make-up water (i.e., not recycled). Mining and processing the quartz arenite at the Raw Sand Plant are seasonal operations that would take place for approximately 245 days per year during the open-water season of April 1 to November 30. This information is provided in Section 15.2 Project Water Use, of the DPD.
	Asked how will make-up water be sourced from runoff water collected on site during trending seasons of drought.	Vitreo is currently progressing Project planning, including identification of sources of make-up water at the Mine site. Currently, processing and make-up water sources have been preliminarily identified as follows: recycled water, contact water, surface and/or groundwater, excess water from water storage or sediment ponds. Thus, supplemental water sources are available for make-up water in times of drought. This information is provided in Section 15.2 Project Water Use, of the DPD.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Water (cont'd)	<p>Asked how water collection on site will reduce recharge of the receiving environment downstream of the Mine site.</p>	<p>Water collection on site reducing recharge in the receiving environment downstream of the Mine site will be identified and evaluated as part of the integrated water balance and water quality model that will be presented as part of the Application.</p>
	<p>Requested further characterization of the affected watersheds (Angusmac Creek, Giggler Creek and Olsson creek); seasonal flows and climate related changes to seasonal flows needs to be understood relative to available water to facilitate mining activities, as well as reductions in surface water at discharge points that may result in exceedances through the lifespan of the mine.</p>	<p>Vitreo has been conducting an environmental baseline program since 2021 to characterize surface water resources, and since 2022 to characterize groundwater resources in the Project Area. A summary of findings to-date is presented in Section 12.2.4 Groundwater Quantity and Quality and Section 12.2.5 Surface Water Quantity and Quality, of the DPD.</p> <p>A characterization of the affected watersheds including seasonal flows and climate related changes to seasonal flows will be further defined and evaluated as part of the integrated water balance and water quality model that will be presented as part of the Application. Vitreo understands that changes to seasonal flows need to be understood relative to available water to facilitate mining activities, as well as reductions in surface water at discharge points that may result in exceedances through the lifespan of the mine</p>
Wildlife	<p>McLeod Lake Indian Band requested the Wildlife Management Plan when available.</p>	<p>Vitreo will work with McLeod Lake Indian Band to understand concerns around Project effects to wildlife and wildlife habitat, and to incorporate both Indigenous Knowledge and appropriate mitigation measures in the Wildlife Management Plan. Vitreo will also share the draft Wildlife Management Plan with McLeod Lake Indian Band once it has been prepared.</p>
	<p>Stated that wildlife populations should be assessed, as well as their potential displacement regarding proximity and duration as a result of the Project.</p>	<p>As part of the Application, Vitreo will investigate and assess potential Project effects on wildlife. Specific mitigation measures, designed to avoid and reduce project-related displacement of bears and other wildlife, will be developed and implemented through the Construction Environmental Management Plan and the Wildlife Management Plan.</p>

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Wildlife (cont'd)	Commented that the section on noise emissions does not account for wildlife in the area.	The assessment of indirect loss of wildlife habitat due to sensory disturbance (e.g., noise emissions) is assessed in the wildlife section through species-specific sensory disturbance buffers that are applied to the boundary of the project area. The areas of effective wildlife habitat within those sensory disturbance areas are thus quantified through wildlife habitat suitability mapping. The results of the noise assessment will be used to inform the assessment of indirect loss of wildlife habitat due to sensory disturbance.
	Recommended a post-closure wildlife monitoring program to assess return of wildlife to the site (long-term, wildlife monitoring cameras).	Section 10.3.3 Reclamation and Closure, of the DPD has been updated to include a summary of the reclamation and closure plan that will be included in the Application at a conceptual level. This plan will also include a post-closure monitoring plan to evaluate reclamation success. Monitoring requirements will be determined through the assessment and permitting processes, but may include monitoring for revegetation success, metals uptake in vegetation, and wildlife use of reclaimed areas.
	McLeod Lake Indian Band requested baseline environmental data reports.	Vitreo provided draft baseline environmental Technical Data Reports for Fish and Aquatic Resources, Hydrology, Soils and Surficial Geology, Surface Water Quality, Vegetation and Wetlands, Wildlife and Wildlife Habitat following the election in June 2023. Comments received on these draft reports will be incorporated into the final reports, as appropriate.

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5.3.2 West Moberly First Nations

Key issues, concerns, questions and interests raised by West Moberly First Nations and Vitreo’s responses and consideration of feedback are presented in Table 5.3.

Table 5.3 Key Issues, Concerns, Questions and Interests Raised by West Moberly First Nations

Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Capacity Funding	<p>Requested a meeting to discuss a Cultural Assessment Study and capacity funding.</p> <p>Mentioned that more time and capacity are needed to properly address cultural impacts of the project.</p>	<p>Vitreo is committed to discussing and addressing West Moberly First Nation’s request to assess cultural impacts including the associated need for capacity funding.</p>
Cumulative Effects	<p>Expressed concerns related to cumulative effects and the location of the Project being in a highly disturbed area.</p>	<p>The Project has been designed to reduce new disturbance and is using existing infrastructure, including proposed use of the existing FSRs as a haul route between the Raw Sand Plant and the Finishing Plant. Additionally, the Raw Sand Plant area is proposed to be located in an area that is already cleared and the Finishing Plant is proposed to be located in an existing industrial corridor.</p> <p>A cumulative effects assessment will be conducted where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. Reasonably foreseeable projects and activities are currently defined as those that: a) have been publicly announced with a defined project execution period and with sufficient project details that they can be included in the assessment; b) are currently undergoing an environmental assessment; or c) are in a permitting process. Where adverse cumulative effects are predicted, Vitreo will work with Indigenous nations, land users, and government agencies to develop mitigation measures.</p> <p>Section 13.3 Cumulative Effects, of the DPD, provides information regarding cumulative effects assessment.</p>

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Air Quality and Dust	<p>Raised concerns of the potential impacts of dust on nearby communities, wildlife, and vegetation.</p>	<p>Section 13 Project Interactions, of the DPD, includes details of Project interactions and potential effects from traffic, dust and noise.</p> <p>Given the prevailing wind direction at the Crystal Lake monitoring station from south southeast and southerly directions the communities of Bear Lake will likely be downwind of the Project. Within the Project Development Area (PDA) boundary, dust emissions from the Project will be primarily an occupational health and safety concern to Project staff, however outside of the PDA boundary fugitive dust may affect the surrounding vegetation and soils in the immediate area through direct deposition. The presence of dust on vegetation and soils may result in changes to land use, including to Indigenous and non-Indigenous land users, who may avoid areas where dust from the Project has been deposited. Dust deposition may also result in changes to vegetation structure and composition resulting in an indirect effect on wildlife habitats.</p> <p>The Application will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of the human health risks from inhalation of silica dust, with the conclusions of human health risk assumed to extend to ecological health risks.</p> <p>Some of the Project activities during construction and operation phases may produce high-level noise emissions. Land users may experience noise effects from Project activities. Noise emissions from the Project, including the Mine site, haul roads and Finishing Plant site will be used in an acoustic model to predict noise effect within the Local Study Area. Noise effects on the noise sensitive receptors, including the recreation sites near the Finishing Plant and haul road will be evaluated in the noise modelling assessment.</p> <p>Haul traffic for the Project will occur on a public FSR with multiple users, including logging trucks and recreational users. Increased project-related traffic on the FSR may interfere with existing use and may also increase effects to local wildlife (e.g., vehicle-wildlife collisions) and vegetation (e.g., dust deposition). Management measures may be required to address these effects, including development of a Traffic Management Plan.</p>
Economic Opportunities and Monitoring	<p>Expressed interest in economic opportunities and explained that their company, Landsong, is capable of completing AIAs.</p>	<p>Vitreo invited West Moberly First Nations to participate in field programs including the archaeology impact assessment.</p>

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Traditional Land Use	Identified Summit Lake as an area of use and explained that the road leading to the Mine site is an area of use by community members.	Summit Lake is located approximately 14 km from the Finishing Plant site and approximately 21 km from the Mine site. Given the distance of the Project from Summit Lake, it is unlikely that Project components and activities will directly affect Summit Lake. As well, Vitreo is committed to hiring locally to the extent practical, mitigating the potential for an increase of workers to the general area resulting in increased use of Summit Lake. Additionally, Vitreo also intends to shuttle workers to site, rather than having staff use their individual vehicles. This mitigation measure will also reduce staff opportunity to utilize Summit Lake on their way to or from work. Vitreo would like to understand more about the use of the Project area and Summit Lake by West Moberly First Nations to inform the effects assessment of treaty rights.
Treaty Rights	Expressed concerns about the Angus Project's potential impacts on Treaty Rights and West Moberly First Nations' way of life. Mention that a cultural impact assessment will be critical to be able to move forward with the EA.	As discussed in 5.4 of the Detailed Project Description, Vitreo is interested in discussing capacity funding for a cultural assessment and the results of such a study with West Moberly First Nations.
Treaty Boundary	Expressed concern of the map contained in the draft DPD outlining the Treaty 8 and requesting that the map be updated.	Vitreo has removed the Treaty 8 boundary, including the line referenced in the comment, from all figures and resubmitted the Initial Project Description, Engagement Plan and draft Detailed Project Description to the EAO. Figures included in the final Detailed Project Description do not include the Treaty 8 boundary, and Vitreo commits to not including this boundary in any figures going forward. Vitreo is interested in continuing discussions with West Moberly First Nations in a respectful way to help understand potential effects of the Project on West Moberly First Nation's Indigenous and Treaty rights.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Water	Expressed concerns regarding potential impacts to the quantity and quality of both groundwater and surface water.	<p>Vitreo has been conducting an environmental baseline program since 2021 to characterize surface water resources, and since 2022 to characterize groundwater resources in the Project Area. A summary of findings to-date is presented in Section 12.2.4 Groundwater Quantity and Quality and Section 12.2.5 Surface Water Quantity and Quality, of the DPD.</p> <p>A characterization of the affected watersheds including seasonal flows and climate related changes to seasonal flows will be further defined and evaluated as part of the integrated water balance and water quality model that will be presented as part of the Application. Vitreo understands that changes to seasonal flows need to be understood relative to available water to facilitate mining activities, as well as reductions in surface water at discharge points that may result in exceedances through the lifespan of the mine.</p> <p>This information is provided in Section 15.2 Project Water Use, of the DPD.</p>
Water effluent treatment plans	Water effluent treatment plans require more detail: The draft DPD states that there is no planned process for water effluent discharge during operation. WMFN is concerned that there is insufficient detail to assess whether it is reasonable to have no planned water effluent treatment plan. More analysis is necessary and a contingency plan for if treatment is needed should be added.	Text in Table 6.3 and Table 10.3 of the Detailed Project Description discusses water treatment and has been updated to add that Vitreo is completing a comprehensive data collection program and will assess the need for water treatment as part of the Application for an Environmental Assessment Certificate.
Wildlife	Expressed concerns regarding potential impacts to caribou.	<p>Vitreo agrees that it is important to acknowledge historic caribou use in the Project area and this is included in Section 12.2.9.2 Summary of Existing Conditions and</p> <p>Figure 12.12 of the DPD will be included in the Application. Vitreo has completed a multi-year wildlife baseline program and has not detected caribou within the assessment study area.</p>

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Wildlife	<p>Concerns about the potential contribution of the Angus Project on the cumulative impacts to ungulates and the resulting impacts on Treaty Rights. The Draft DPD does not include sufficient baseline data collection and approach to the analysis of the impacts on ungulates.</p> <p>The Existing Conditions section of the Draft DPD indicates that a second round of ungulate surveys are planned for winter 2023. An update on that work should be included in the DPD. Further and ongoing ungulate surveys should be planned and detailed in the DPD to ensure this critical impact is monitored and assessed early and often.</p>	<p>An ungulate aerial survey was completed within the RSA in December 2023. A summary will be included in an update to the wildlife technical data report, which can be provided to West Moberly First Nations for review. Section 12.2.9.1 of the Detailed Project Description has been updated to reflect the completion of the 2023 survey.</p> <p>The Application for an Environmental Assessment Certificate will include an assessment on Indigenous Interests.</p>

5.3.3 Lheidli T'enneh First Nation

Key issues, concerns, questions and interests raised by Lheidli T'enneh First Nation and Vitreo's responses and consideration of feedback are presented in Table 5.4.

Table 5.4 Key Issues, Concerns, Questions and Interests Raised by Lheidli T'enneh First Nation

Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Cumulative Effects	Expressed concern related to cumulative impact of the Project on the area.	The Application will include a cumulative effects assessment where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities.
Air Quality and Dust	Expressed concern about the impact of crystalline silica on human health and the migratory wildlife within the area. As airborne dust particles are quite small, Lheidli T'enneh First Nation are concerned about the air quality and the potential migration of dust particles through the airshed.	The Application will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of the human health risks from inhalation of silica dust, with the conclusions of human health risk assumed to extend to ecological health risks. As documented in Section 14, Mitigation Measures, Management Plans and Monitoring, of the DPD, Vitreo will implement an Air Quality Management Plan which will describe measures to mitigate Project effects to air quality, including from fugitive dust emissions. Mitigation measures related to silica dust emissions include use of baghouses and vacuum systems at the Raw Sand Plant and the Finishing Plant site to reduce particulate matter emissions.
Traditional Land Use	Requested a TLU Study for the Project.	Vitreo would appreciate an opportunity to meet with Lheidli T'enneh First Nation to discuss preparation of a TLU study for the Project.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Water	Expressed concern over tailings ponds, and potential effects on drinking water.	Vitreo indicated that the Project will not generate tailings and no tailings ponds will be constructed as part of the Project. While Vitreo is not currently aware of any drinking water source that would be affected by the Project, Vitreo is aware of concerns that have been raised around this issue during engagement activities conducted for the Project.
	Stated expectation that the Project will be using intercepted groundwater as their primary source for processing. Would additional water supply be needed? From where?	Vitreo is currently progressing Project planning, including identification of sources of processing and make-up water at the Mine site. Currently, processing and make-up water sources have been preliminarily identified as follows: recycled water, contact water, surface and/or groundwater, excess water from water storage or sediment ponds. This information is provided in Section 15.2 Project Water Use, of the DPD.
	Concerns raised about the impacts to groundwater: a). Commented that groundwater in some silica mines can be acidic leading to potential metal leaching from the rock into water ways. Lheidli T'enneh First Nation are concerned that metal leaching may occur which may further lead to health complications of our members practicing their Aboriginal rights on the land. b). Commented that Vitreo should be investigating groundwater-surface water interactions as a result of pit development- how much water is expected and what effect will that have on the surrounding wetlands and watercourses.	The potential effects of pit development on groundwater and on groundwater surface water interactions will be assessed during the environmental assessment and documented in the Application. Vitreo will conduct a water balance and water quality modelling exercise for the Application that will include interactions between groundwater and surface water at the Mine site. Vitreo is undertaking a geochemical characterization program for overburden, waste rock, the quartz arenite deposit, and fines generated from processing. Results to-date indicate these materials are non-potentially acid generating and have limited potential for metal leaching. This program is ongoing and updated results will be included in the Application. A summary of this program is provided in Section 12.2.3 Geochemistry, of the DPD.
	Questioned the impact of the Project on Olsson Creek, a tributary to the Fraser River.	Vitreo acknowledges that a portion of the Project is located within the Fraser River watershed and notes that effects to both surface water and groundwater quality and quantity will be assessed in the Application. However, the Fraser River is 14 km downstream of the Project (as the crow flies) and no to negligible effects are predicted to occur to the Fraser River from the Project.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Wildlife	Expressed concern about impacts to wildlife including wildlife exposure, displacement and or mortality.	The Application will include an assessment of effects to wildlife.
	Questioned the potential impact of noise generated from the Project on migratory species.	The Application will include modelling of noise effects on sensitive human receptors. Mitigation measures for potential noise effects will be included in the Application. The assessment of indirect loss of wildlife habitat due to sensory disturbance (e.g., noise emissions) will be assessed in the wildlife section through species-specific sensory disturbance buffers that are applied to the boundary of the Project area. The areas of effective wildlife habitat within those sensory disturbance areas are thus quantified through wildlife habitat suitability mapping. The results of the noise assessment will be used to inform the assessment of indirect loss of wildlife habitat due to sensory disturbance. This information is included in Section 12.2.9 Wildlife and Wildlife Habitat, of the DPD.

5.3.4 Nazko First Nation

In addition to the Participating Indigenous Nations’ key issues, concerns, questions and interests identified above, Vitreo also received comments from Nazko First Nation as presented in Table 5.5.

Table 5.5 Key Issues, Concerns, Questions and Interests Raised by Nazko First Nation

Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Climate Change	Expressed concern about the implications of climate change on the Project area.	Implications of climate change on the Project and Project area will be assessed in the Application. In particular, the water quality and water balance model will incorporate climate change into predicted future meteorological conditions. Climate change and its potential to affect the Project will also be assessed in the Application, as part of an evaluation of Effects of the Environment on the Project. A preliminary description of these effects is included in the DPD, Section 17 Effects of the Environment on the Project.
Air Quality and Dust	Expressed concern about the potential impact of dust on human health and water quality.	Air quality modelling and a human health assessment will be conducted as part of the Application. Where adverse environmental effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop appropriate mitigation measures to reduce or eliminate effects of dust on human health and water quality.
Water	Expressed concern about usage of water and water diversion	The Application will assess potential effects on surface water and groundwater quantity, including water usage and diversion. Where adverse environmental effects are predicted, Vitreo will work with Participating Indigenous Nations, land users, and government agencies to develop appropriate mitigation measures to reduce or eliminate effects to water. Section 15.2 Project Water Use and Section 10 Project Activities, Locations and Components, of the DPD, includes more information on water use and diversion.
	Expressed concern about the potential impacts to the Fraser River which may cause downstream effects to their community.	Vitreo acknowledges that a portion of the Project is located within the Fraser River watershed and notes that effects to both surface water and groundwater quality and quantity will be assessed in the Application. However, the Fraser River is 14 km downstream of the Project (as the crow flies) and no negligible effects are predicted to occur to the Fraser River from the Project.

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Topic	Key Issues, Concerns, Questions and Interests Raised	Responses and Consideration of Feedback
Wildlife	Expressed interest in habitat offsetting and other mitigation measures.	Where adverse environmental effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop mitigation measures, including offsetting as applicable. Mitigation measures and management plans anticipated to be required for the Project are included in Section 14 Mitigation Measures, Management Plans and Monitoring Plans, of the DPD. This includes a description of the proposed Wildlife Management Plan.
	Expressed concern about Impacts to wildlife, specifically migratory birds and species at risk.	Potential effects to wildlife, migratory birds and migratory birds are described at a high level of detail in the DPD, Section 13.1 Interactions with the Biophysical Environment. A preliminary description of mitigation measures to wildlife is included in Section 14 Mitigation Measures, Management Plans and Monitoring Plans. The Application will assess potential effects on wildlife, including migratory birds and species at risk. Where adverse environmental effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop appropriate mitigation measures to reduce or eliminate Project effects to wildlife, migratory birds and species at risk.

5.4 Ongoing Engagement

Vitreco will continue to engage with Indigenous Nations that have expressed interest in the Project and those identified as Participating Indigenous Nations through the EAO. Vitreco will continue to document all meetings including the list of attendees, topics discussed, actions items, issues raised and-or feedback received.

Vitreco will continue to engage through each Participating Indigenous Nation's preferred method of engagement and will provide accessible, plain-language information through a possible range of outreach options, including, but not limited to, the following:

- Site tours
- Information sessions
- Workshops
- Community meetings
- One-on-one meetings

Outreach will be tailored, as appropriate and possible, to the needs and requests of the Participating Indigenous Nations. Discussions may include question and answer periods and open conversations regarding the Project including potential risks and mitigations, comments and ideas regarding the Project, interest in the Project, concerns about the Project, and opportunities to address issues.

Information gathered through this engagement will be documented in records of contact to track feedback and commitments.

Vitreco will engage Participating Indigenous Nations on Project-specific design changes, commitments, and measures to mitigate potential effects by integrating available Indigenous Knowledge and local information into the environmental assessment as applicable. Vitreco will also be working with Participating Indigenous Nations to understand how the Project may affect Indigenous and Treaty rights, which will include historical, spiritual and cultural significance.

Engagements planned to advance understanding of the Participating Indigenous Nations' interests and develop Project-specific mitigations are presented in Section 14. Additional engagement will be completed as requested by the Participating Indigenous Nations or as required to support the needs of the Project and Indigenous Nations.

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Table 5.6 Planned Engagement Activities

#	Planned Engagement Activities
1.	Meetings to discuss the Project and answer questions
2.	Provide opportunities for monitoring in field studies
3.	Project Site tours
4.	Support capacity funding requests as appropriate including TLU studies
5.	Attend and participate in community Events
6.	Maintain open communication regarding Project updates and respond to feedback
7.	Maintain a log of all communications with Indigenous Nations

Two of the Participating Indigenous Nations have requested capacity funding to support their participation in the environmental assessment process. Designated representatives from each Participating Indigenous Nation have been identified as primary contacts for Vitreo to communicate with for discussions regarding capacity funding and Project updates.

McLeod Lake Indian Band has requested capacity funding for a Treaty Impact Assessment and an agreement to support their review of Project-related materials and further Project participation. McLeod Lake Indian Band has shown an interest in participating in field studies and has participated in Surface Water Sampling, soil field inspection, assessment of terrain, and an ungulate survey. Vitreo looks forward to McLeod Lake Indian Band’s continued participation in field studies in 2024. McLeod Lake Indian Band is interested in discussing Project details with Vitreo, such as the engineering and construction of the haul road.

West Moberly First Nations has requested capacity funding to continue to participate in the regulatory process including the monitoring field work and for a cultural impact assessment. West Moberly First Nations participated in the Archaeological Impact Assessment, bull trout spawning habitat survey, surface water sampling, and groundwater sampling. Vitreo looks forward to West Moberly First Nations’ continued participation in field studies in 2024 and is committed to discussing and addressing West Moberly First Nations’ request for capacity funding to address a cultural impact assessment.

Lheidli T'enneh First Nation has requested a TLU study.

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Meaningful engagement with interested persons who may be affected by or have an interest in the Project is important to Vitreo. Vitreo started engagement on the Project in 2022 and to date, engagement has taken place with multiple organizations and groups. Vitreo has also engaged with under-represented potentially affected populations, detailed in Section 7. This section summarizes engagement with potentially affected municipalities, governmental agencies, stakeholders, and the general public. A summary of engagement with Indigenous Nations is presented in Section 5.

Vitreo has engaged on the Project through in-person and virtual meetings, letters, emails, two EAO-hosted open houses (one in-person and one virtual), and two breakfast meetings/presentations. At these engagement activities, Vitreo has answered many questions regarding the Project and has received support for the related economic opportunities. To date engagement activities suggest to Vitreo that there is support for environmentally responsible economic growth as demonstrated by the Project.

Table 6.1 provides the interested parties that have been engaged for the Project to date which include the following:

- Provincial Agencies
- Local Governments
- Public Groups

Table 6.1 List of Potentially Affected Parties

Provincial Agency	Local Governments	Public Groups and Stakeholders
<ul style="list-style-type: none"> • BC Parks • BC Railway Company • Ministry of Agriculture and Food • Ministry of Energy, Mines and Low Carbon Innovation • Ministry of Environment and Climate Change Strategy • Ministry of Forests • Ministry of Indigenous Relations and Reconciliation • Ministry of Jobs, Economic Development, and Innovation • Ministry of Municipal Affairs • Ministry of Transportation and Infrastructure • Ministry of Water, Lands, and Resource Stewardship • Northern Health Authority • Health Emergency Management BC 	<ul style="list-style-type: none"> • Bear Lake Community Commission • City of Prince George • Regional District of Fraser-Fort George 	<ul style="list-style-type: none"> • BC Timber Sales • Canadian Forest Products • Crystal Lake Recreation Society • Corus Exploration Group • Omineca Mining and Metals • Sentinel Mountain Safaris • Technical Operations, Major Mines Office • Telus • Total Outdoor Adventures • Trapline Holders and Guide Outfitters

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6.1 Pre-Early Engagement and Early Engagement

Engagement methods and activities undertaken with the parties listed in Table 6.1 are summarized below in Table 6.2.

Table 6.2 Summary of Pre-Early and Early Engagement with Potentially Affected Parties

Organization	Engagement Key Activities
Federal Agency	
Impact Assessment Agency of Canada	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> June 2023, Email sent noting that the IPD was currently being revised and would be provided at the same time as being submitted to the EAO July 2023, Email providing the IPD along with an offer to meet and discuss the Project further
Provincial Agency	
BC Environmental Assessment Office	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> November 2022, Introductory email sent providing information on the Project and offering a meeting to discuss further January 2023, Introductory meeting held to discuss the Project, baseline data, engagement taken to date, schedule and milestones March 2023, Meeting held to discuss the draft engagement plan and draft IPD
BC Parks	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
BC Railway Company	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
BC Hydro	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Ministry of Agriculture and Food	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
Ministry of Energy, Mines and Low Carbon Innovation	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> August 2022, Project introductory letter provided through email <p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
Ministry of Environment and Climate Change Strategy	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> August 2022, Project introductory letter provided through email <p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns

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Organization	Engagement Key Activities
Ministry of Forests	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> August 2022, Project introductory letter provided through email <p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
Ministry of Water, Lands, and Resource Stewardship	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> October 2022, Phone call to discuss Project-related wildlife studies November – December 2022, Email correspondence regarding wildlife studies <p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
Ministry of Municipal Affairs	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
Ministry of Transportation and Infrastructure	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns
Local Governments	
Bear Lake Community Commission	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outline ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
City of Prince George	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> August 2022, Project introductory letter provided through email <p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns November 2023, Mayor of Prince George attended a breakfast meeting hosted by Vitreo and the Chamber of Commerce including a presentation and Q/A session
District of Chetwynd	<p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information November 2023, Mayor of the District of Chetwynd and representatives from the Regional District attended a breakfast meeting hosted by Vitreo and the Chamber of Commerce including a presentation and Q/A session
Regional District of Fraser-Fort George	<p>Pre-early Engagement:</p> <ul style="list-style-type: none"> July 2022, Project introductory letter provided through email <p>Early Engagement:</p> <ul style="list-style-type: none"> August 2023, Open House in Bear Lake was hosted by the EAO to provide an overview of the Project and request review of the draft IPD for key issues and concerns November 2023, Vitreo presented to the Board of the Regional District of Fraser-Fort George at a virtual meeting

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Organization	Engagement Key Activities
Public Groups and Stakeholders	
BC Timber Sales	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Crystal Lake Recreation Society	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information November 2023, email was sent to advise of upcoming noise surveys in the area
Corus Exploration Corp	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Canadian Forest Products	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Northern Health Authority	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Omineca Mining and Metals	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Sentinel Mountain Safaris	Pre-early Engagement: <ul style="list-style-type: none"> July 2022, Project introductory letter provided through email
Technical Operations, Major Mines office	Pre-early Engagement: <ul style="list-style-type: none"> July 2022, Project introductory letter provided through email September 2022, Additional Project information was provided upon request along with an offer to meet for further discussion
Telus	Early Engagement: <ul style="list-style-type: none"> August 2023, Introductory email was sent providing information on the Project and outlining ways to comment on the Project, including an in-person open house hosted by the EAO, a virtual information session, Project website, and Project contact information
Total Outdoor Adventures	Pre-early Engagement: <ul style="list-style-type: none"> July 2022, Project introductory letter provided through email
Trapline Holders and guide outfitters	Pre-early Engagement: <ul style="list-style-type: none"> July 2022, Project introductory letter provided through email

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6.2 Issues, Concerns or Questions Received

Stakeholders and members of the public were provided with several options to be provided with information about the Project and provide feedback including attendance at in-person and virtual activities, or through the Project website and Project Team contacts. An in-person open house session was hosted by the EAO on August 22, 2023 at the Bear Lake Community Hall in Bear Lake, BC. This was followed by a virtual information session held on August 29, 2023 through an online webinar. A virtual meeting of the Board of the Regional District of Fraser-Fort George took place in November 2023 and was open to the public to attend to hear the presentation by Vitreo and the Q/A session that followed. Vitreo hosted breakfast meetings in Prince George and Chetwynd in November in conjunction with the local chambers of commerce and presented Project information and answered questions.

The technical advisors were invited to meet with the EAO regarding the Project and given the opportunity to review the draft DPD and provide comments and questions on key issues or concerns. Among the concerns raised include the potential effects of dust on air quality, ecological and human health, effects to traffic, access, and recreational sites, fish and fish habitat, water quality, vegetation, and wildlife. Table 6.3 includes a summary of the key issues and concerns raised by technical advisors and members of the public and how these have been responded to. Further comments received on the draft DPD and Vitreo's responses are presented in Appendix B.

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Table 6.3 Summary of Issues, Concerns, and Questions Received and Responses

Topic	Issues, Concerns, and Questions	Responses and Consideration of Feedback
Air Quality and Dust	Concerns raised regarding air quality around recreation sites from the creation of dust and particulate matter resulting from increased road-use. Concerns were also raised on the impacts of dust on aquatic and human health, with particular emphasis on the effects of silica dust and its ability to travel long distances.	Vitreo is planning to use wet processing at its Raw Sand Plant and enclosed sand drying at its Finishing Plant to mitigate dust dispersion from mining and processing silica. Vitreo also plans to develop a dust management plan to mitigate affects of dust through water and dust suppressant techniques. An Air Quality Management Plan will also be developed that will describe measures to mitigate affects from dust produced by haul trucks.
	Commenters requested an emissions inventory for construction and operations phases as well as a dust management plan for the mining location, haul route, and finishing plant area.	Vitreo will provide a comprehensive emissions inventory for both construction and operations phases, including fugitive emissions and grain sizes, as part of the air quality assessment in the Application.
Community Well-being	Concerns raised regarding employment opportunities and the potential requirement for project-specific specialized skills, leading to an influx of workers from outside the region and project-specific accommodations such as work camps.	The Project workforce will not require specialized skills that exceed the historic requirements for lumber milling operations or gas pipeline installations and mining. These industries are currently supported by a skilled workforce in local communities, particularly in Prince George and are located within a daily commuting distance of the Project. Vitreo does not anticipate an influx of workers or the need to accommodate workers on site.
Fish and Fish Habitat	Concerns raised of the potential effects to fish due to the project located adjacently to a Fisheries Sensitive Watershed.	This comment refers to the Fisheries Sensitive Watershed (Seebach F-7-001 located to the east of the Mine site). The Project is not located within the Seebach watershed and there is no hydraulic connection between the Project area and the Seebach watershed. It is not anticipated that the Project will affect this watershed.
	Concerns raised of the potential effects to fish species, in particular, Bull Trout and Arctic Grayling.	No Bull Trout or Arctic Grayling were observed during Project baseline studies. The fish species observed to date in Project baseline studies include: Rainbow Trout, Redside Shiner, Slimy Sculpin, Burbot, White Sucker, Lake Chub, Prickly Sculpin, Largescale Sucker, and Mountain Whitefish.
Highway Access	Concerns raised regarding access to the highways during construction and operations phases.	Highway traffic affects will be managed through further dialogue with the Ministry of Transportation and Infrastructure.

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Topic	Issues, Concerns, and Questions	Responses and Consideration of Feedback
Recreation Sites	<p>Concerns raised about increased use of road hauling (300+days per year) and from the Processing Plant creating dust and other particulates in air as well as noise and potential effects to fishing for the recreation site and cabin users.</p>	<p>The haul route does not travel through any of the recreation sites or provincial parks in the area (e.g., Emerald Lake Recreation Site, Crystal Lake Recreation Site, Crooked River Provincial Park). The nearest haul route to a recreation area is along the existing 2800 FSR, which is approximately 400 metres east of the Eastern Boundary of the Emerald Lake Recreation Site. Vitreo notes that the road adjacent to the recreation sites is a public Forest Service Road and is already used by logging trucks and other traffic. Vitreo does not plan on moving this road or constructing a new one.</p> <p>Nearby recreation sites have the potential to be affected by dust emissions caused by the Project and will be included as receptors in the air quality modelling and human health assessment during the Application for an Environmental Assessment Certificate. Fugitive dust dispersion from Project activities will be modelled. Vitreo will incorporate dust management measures into the Project planning, including the use of baghouses and vacuum systems at Finishing Plant site. Additionally, water trucks or other control measures will be used to manage fugitive dust from road use, as required. A fugitive dust management and monitoring plan will be developed prior to construction as stated in the Detailed Project Description, Section 11.1 Air Emissions and described in Section 14 Mitigation Measures, Management Plans and Monitoring Plans. The Raw Sand Plant utilizes a wet processing to liberate silica grains from the quartz arenite. Sand drying at the Finishing Plant site will be conducted in an enclosed building system. Dust on roadways outside of both plants will be managed through a dust management plan, including applying water or dust suppressant. The sand transported via trucks will be either tarped or wet.</p> <p>The Application for an Environmental Assessment Certificate will include modelling of noise effects on sensitive receptors including the recreation sites that are in the vicinity of the Finishing Plant site, including Crystal and Emerald Lake Recreation sites. Mitigation measures for potential noise effects will be included in the Application, but will include maintaining mobile equipment in good working order and avoiding idling of vehicles when practical. A discussion of potential noise emissions and receptors, including the recreational sites is included in the Detailed Project Description, Section 11.2 Noise Emissions.</p> <p>Vitreo notes that the road past both Crystal and Emerald Lakes already exists as an active FSR. It is not anticipated that the Project will affect groundwater or surface water of the two lakes; however, these potential effects will also be considered further in the Application.</p> <p>An Erosion and Sediment Control Management Plan will be implemented; this plan will describe how erosion and sediment control will be implemented to prevent erosion and mitigate sediment transport to waterbodies.</p>

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Topic	Issues, Concerns, and Questions	Responses and Consideration of Feedback
Vegetation	Concerns raised regarding vegetation removal required to widen the road corridor. Concerns included the effect vegetation removal would have on wildlife, ground and surface water, fish, and recreation sites.	Upgrades to existing FSRs and access roads are being considered as a part of Project planning, however the location and extent of any upgrades has not yet been determined.
Water Quality	Comment noted that sediment ponds were indicated as the only water treatment site at the Mine site and Finishing Plant site, raising the question of any additional water treatment processes.	Vitreo plans to continue examining and building an understanding of potential drinking water sources and community wells that could be affected by the Project. The Project does not include tailings ponds. Vitreo plans to use sedimentation ponds as the primary treatment measure for Project contact water and Vitreo does not currently plan to construct a water treatment facility. Vitreo is completing a comprehensive data collection program and will assess the need for water treatment as part of the Application for an Environmental Assessment Certificate. The potential addition of flocculant (a chemical substance that is added to a mixture of fine particles, such as minerals or ores in water, to promote the aggregation and settling of these particles) is still being evaluated.
Water Quality (cont'd)	Comment raised regarding potential effects to drinking water and how drinking water quality may be affected by change in ground and surface water quality.	Drinking water sources for Project workers are still being investigated but may include either treatment of site groundwater or trucking potable water to site. The source of drinking water for Project workers will be included in the Application, and evaluated as a Project activity in the Application's effects assessment if the source is determined to be groundwater. While Vitreo is not currently aware of any drinking water source that would be affected by the Project, Vitreo is aware of concerns that have been raised around this issue during engagement activities conducted for the Project. Vitreo is seeking to better understand existing drinking water sources, including community wells, and will include an evaluation of potential Project effects to these sources in the Application.
Wildlife	Comment noted that although the Project footprint does not impinge on current caribou herd boundaries, the area was historically used by caribou.	Vitreo agrees that it is important to acknowledge historic caribou use in the Project area and this is included in Section 12.2.9 Wildlife and Wildlife Habitat. Vitreo is following up with Omineca Region caribou recovery biologist to request any historic records of caribou use within the Regional Study Area (RSA) that the Province can supply, particularly number of caribou, dates, and locations. The Application will include a summary of historic records of caribou.
	Concerns raised that mitigation measures to potential effects to migratory bird nests are insufficient as per the Federal Migratory Birds Regulations and the BC <i>Wildlife Act</i> .	Mitigation measures to address potential Project effects on migratory bird nests will be developed as part of the Application. These will refer to, and be consistent with, regulations under the federal <i>Migratory Birds Convention Act, 1994</i> and associated regulations, and the BC <i>Wildlife Act</i> .

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6.3 Ongoing Engagement

Vitreo plans to continue engagement with the potentially affected communities, municipalities, governmental agencies, stakeholders, and general public, including users of the Emerald Lake and Crystal Lake Recreation Sites in order to identify social, economic, and environmental priorities. The aim is to establish mutually beneficial outcomes and criteria of success for the Project. Vitreo will look for ongoing feedback to contribute to the development of a Project that is socially, environmentally, and economically viable. The company is committed to fostering inclusivity in its engagement activities, reaching out to diverse groups based on factors such as gender, age, educational background, and ethnicity. Vitreo is also open to discuss potential interactions with existing sense of place and identity within nearby communities should these be expressed by members of the public through engagement activities.

Vitreo has initiated this process by disseminating Project information and actively reaching out to various segments of the population. Records of contact will be kept as Project engagement continues.

Vitreo's planned future engagement activities include:

- Open houses: virtual and/or in person
- Participation in community events
- Online communication including social media and website
- Project mailouts: sharing Project updates and milestones are reached

7 Under-Represented Potentially Affected Populations

Vitreo developed the following list of potentially under-represented populations that might be affected by the Project and sent them an email introducing Vitreo, briefly explaining the Project and explaining ways to participate including details of the EAO hosted in-person and virtual open houses in August 2023. Vitreo also invited these groups to the breakfast meeting being held in Prince George in November 2023. The United Way of Northern BC was the only underrepresented group who attended the breakfast in Prince George in November 2023. They did not raise concerns or comments on the Project when attending the breakfast.

The Immigrant and Multicultural Services Society (IMSS) of Prince George has not been engaged to date; however, Vitreo plans on including them in future engagement activities and they have been added to Table 7.1.

The services providers who can provide information about or access to vulnerable groups are listed in Table 7.1.

Table 7.1 Services Providers Who Can Provide Information About or Access to Vulnerable Groups

Service Provider	Rationale
Prince George Native Friendship Center (includes Tse’Koo Huba yoh and Ketso Yoh shelters)	Variety of programs for Indigenous youth, women, men, homeless and victims of domestic violence.
PGNFC Reconnect Youth Village	Youth-centered services and shelter for Indigenous youth in Prince George.
Phoenix Transition Society	Shelter for victims of violence, including women and children in Prince George.
Northern Health	Seniors and people with disabilities.
Prince George Council of Seniors	Non-profit advocacy group for seniors.
Northern Transgender Health Clinic (within Blue Pine Primary Health)	Transgender health clinic.
GenderOutlines Transgender Society	GenderOutlines is a Prince George-based peer support group for anyone under the Trans umbrella or who is questioning their gender identity.
Love knows no gender	Weekly drop-in youth group (under 25), peer support, counselling, information, social activities.
UNBC Northern Undergraduate Student’s Society (NUGSS)	Umbrella society to numerous student-led organizations (SLOs) for vulnerable communities.
City of Prince George - Advisory Committee on Accessibility and Inclusion	The Advisory Committee on Accessibility and Inclusion advises and assists Council, staff, and other committees with formulating and promoting strategies and actions to create and maintain a barrier -free community.
United Way of Northern BC	Works within communities by connecting resources to local needs.
Salvation Army Food Bank	Assists community members in need by providing essential groceries.
Immigrant and Multicultural Services Society of Prince George	Non-profit community serving agency providing settlement and integration services to immigrants and refugees throughout Prince George and the northern region of British Columbia.

8 Project Status and History

Vitreo initially optioned and subsequently purchased the Angus property from Corus Exploration Corp. (CEC) who acquired most of their mineral claims that comprise the property, by staking. Some of the Project area was previously covered by claims owned by Stikine Energy Corp (Stikine). Stikine previously completed aerial and ground reconnaissance of the Angus property and identified a northwest-trending belt of medium to coarse-grained 'quartzite' (subsequently identified as quartz arenite) belonging to the Proterozoic Misinchinka Group (Averil Trend). Later work on the same area by Stikine included diamond drilling, detailed mapping, petrographic thin section studies and the collection of a trench sample in 2011 for processing at a pilot plant located in Abbotsford, BC.

The work established that the silica-rich material of the Averil Trend had a total strike length of approximately 8 km. As market conditions, gas prices and larger natural gas basin exploration waned, Stikine ultimately allowed its claims to lapse.

From 2017 to 2019, CEC completed small programs of outcrop mapping and rock sampling on the property. In addition to adding important surface detail to the Averil Trend, this work identified two belts of northwest-trending Ordovician to Silurian Monkman Formation located 2-2.5 km east of the Averil Trend. The east belt of the Monkman Formation quartz arenite was mapped over a strike length of 1.4 km, and it is open to the northwest and southeast, and is approximately 170 metres (m) thick.

Vitreo's most recent exploration activities were conducted on the Monkman East belt, which is the target for the proposed mining plan for the Project. In May 2021, Vitreo processed a 500 tonne Monkman trench sample at its Moberly Processing Plant in Golden, BC for evaluation. The results of the trials confirmed yields and strengths for high quality proppants using tests defined by the American Petroleum Institute (API) for silica sands.

If approved, the Project will be a new operation and will, to the best of Vitreo's knowledge, be the first in western Canada to deliver Tier 1-quality silica sand in close proximity to BC's Montney Basin. Vitreo has several existing permits for conducting exploration activities as presented in Table 8.1. An overview of Vitreo's mineral tenures is provided in Figure 1.2. Vitreo currently holds 28 active claims that cover approximately 18,703 hectares (ha). The 28 mineral claims are listed in Mineral Titles Online as 100% owned by Vitreo Minerals Ltd.

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Table 8.1 Existing or Current Applications for Provincial Permits and Local Agreements

Permit, License or Approval	Legislation	Issuing Authority	Description	Status
MX-13-301, Multi-Year -Area Based Permit	<i>Mines Act</i>	EMLI	Authorizes exploration permit for Angus property	Current: Issued May 2019, Amended June and July 2022
File: 19545-60/L52305 Mines File: MX-13-301; Occupant License to Cut L52305	<i>Forest Act</i>	MoF	Authorizes to fall and, if permitted, utilize trees that represent a safety hazard	Current: Issued April 24, 2023
PG22-715279, PG23-792195 Fish Collection Permits	<i>Wildlife Act</i>	MoF	Authorizes fish collection for environmental assessment purposes within the Project area	Current: Issued April 2022
Heritage Inspection Permit # 2022-0410*	<i>Heritage Conservation Act</i>	Archaeology Branch, MoF	Authorizes archaeological studies within the permitted area	Current; Issued September 2022
Road Use Permit RUP20-108-OT	-	WLRS	Authorizes road use along North Olsson FSR	Current; Issued December 15, 2020
License of Occupation	<i>Land Act</i>	WLRS	Authorizes use of Finishing Plant site	Application submitted November 22, 2023 (Tracking # 100429406)
Note: * Heritage Investigation Permit/ Site Alteration Permit under Section 12.4 of the Act will be applied for as needed.				

9 Project Schedule

The proposed schedule for the Project is as follows:

- Construction phase – Year 1 – Q2 Year 2 (18 months)
- Operation phase – Q3 Year 2 to Year 21
- Reclamation and Closure phase – Year 22
- Post-closure phase – Year 23+

Project construction will start in Year 1 with commissioning and operations starting in Year 2. Project components will be progressively reclaimed and closed throughout operation; however, the Reclamation and Closure phase is formally defined as commencing once mining operation ceases. The Post-closure phase will commence once reclamation and closure activities are complete and will continue until monitoring results indicate that the Project can be fully closed.

Mining will take place seasonally over approximately 245 operating days per year, with mining and Raw Sand Plant activities paused during the winter months. Hauling between the Raw Sand Plant and the Finishing Plant will occur 335 days per year. Stockpiled material at the Finishing Plant site is the same material as at the Raw Sand Plant, a wet (~3-5% moisture by weight) silica sand. Stockpiled material at the Finishing Plant site will be processed at the Finishing Plant approximately 335 days per year.

With respect to the Construction phase, timing constraints include instream works windows for fish and migratory birds. Two fish species identified in during Project baseline studies, Rainbow Trout (*Oncorhynchus mykiss*) and Mountain Whitefish (*Prosopium williamsoni*), have associated instream work windows as defined by the Ministry of Water, Land and Air Protection for the Omenica Region (2004). For Rainbow Trout, the applicable instream work window is July 15 to April 15, and for Mountain Whitefish, the applicable instream work window is June 01 to September 15. The Project is in nesting zone A4, where the primary nesting period for migratory birds is April 23 to August 10 (ECCC 2023b). Under the *Migratory Birds Convention Act, 1994*, it is prohibited to disturb migratory birds, their nests and eggs. Project activities that may affect nesting migratory birds should be limited during the nesting period to avoid disturbances.

10 Project Activities, Location and Components

The discovery of quartz arenite in a sedimentary formation was initially made on the Angus property in 2009. While the formation is extensive, immediate access to the Monkman area was made using the existing North Olsson FSR and associated logging trails.

The North Olsson FSR provides excellent access to support recent prospecting and exploration campaigns carried out from 2018 to present. Vitreo has made use of the existing access to mobilize drilling and other heavy equipment to evaluate the proposed Mine site at the Monkman East Pit thereby minimizing new disturbances. Similarly, the location of the proposed Raw Sand Plant makes use of a historically disturbed area adjacent to the proposed mine, that offers good topographic opportunities for the plant.

To date, extensive exploration mapping, drilling and sampling has produced a NI43-101 compliant Resource and Reserve estimate, as described in a Pre-Feasibility Study completed by Stantec Consulting Ltd. in November 2022 (Stantec 2022). The study also reviews significant process research on samples recovered from the proposed Monkman East Pit area illustrating high purity silica in particle sizes appropriate for making proppants. All process research and testing were completed at Vitreo's Moberly mine operations, a commercial processing facility, under the supervision of an independent Qualified Professional (as defined by National Instrument [NI] 43-101).

The focus of the exploration and engineering work to date has been at the proposed Monkman East Pit area and is not applicable to other parts of the geologic formation or other areas.

The information presented in the Pre-Feasibility Study (Stantec 2022) forms the basis of this DPD. Vitreo has also conducted environmental baseline data collection as presented in Section 12.1. Project siting and design considerations are further described in Section 10.6. Vitreo has provided Project information and maps to Indigenous Nations and regulators, and outreach was completed to local stakeholders such as trapline holders and guide outfitters as outlined in the Project's Engagement Plan. Issues, concerns, and questions received along with Vitreo's responses are summarized in Section 5.3 and Section 6.2 and in the Engagement Plan (Vitreo 2023b). In addition, the Project's Issues Tracking Table includes the comments received from Indigenous Nations, the technical advisors, and the public on the IPD during the Early Engagement phase as well as on the draft DPD and Vitreo's responses is presented in Appendix B. The responses provide section references where updates have been made to this draft DPD.

Comments received on Project siting and design include questions around location and extent of upgrades to the haul road, concerns over fugitive dust emissions from use of the haul road, questions around water use volumes and source, and questions about access to Highway 97.

Further feedback received on Project scoping and considerations such as access, traffic planning and dust control will be incorporated into ongoing Project planning and design, as appropriate.

Detailed Project Description

10 Project Activities, Location and Components

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Vitreo continues to advance Project planning, including developing feasibility-level engineering of components to support the environmental assessment and permitting processes. Project feasibility-level engineering and design will continue to be informed by feedback received as well as results from environmental studies completed.

The information presented below provides an overview of the Project components, location and activities informed by the engineering, exploration, and environmental studies (see Section 12.1) completed to date.

Since the acceptance of the IPD by the EAO and the start of the Early Engagement phase, Vitreo has made the changes listed below to the Project:

- Removal of the separate Fines Stockpile and the External Waste Rock Facility, and creation of a new Fines and Waste Rock Facility to the west of the Monkman Pit (see Figure 1.2). These waste storage facilities were relocated as a result of environmental studies; the Fines Stockpile was removed from the ridgetop location to mitigate potential effects from wind erosion on the pile, and the External Waste Rock Facility was moved to eliminate effects from that facility on wetland habitat. This change was made as a result of feedback received during the Early Engagement phase regarding concerns expressed about Project-related dust and effects on air quality.
- Processing and make-up water sources have been identified and prioritized from a) recycled water; b) contact water; c) a groundwater source at or near the Mine site; d) should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV 2016). Make-up water volumes and sources are discussed further in Section 15. This work has been advanced based on comments received during the Early Engagement phase regarding use of and effects to water.
- Commitment to fugitive dust (of naturally occurring minerals soils) suppression on the Haul Road. The dust suppression methods, timing and frequency will be developed as part of the Air Quality Management Plan (see Section 14) but will likely involve a combination of water and chemical dust suppressants. This change was made as a result of feedback received during the Early Engagement phase regarding concerns expressed about Project-related dust and effects on air quality.

10.1 Project Location

The Project is located in north central BC, within Treaty 8 and the North Central Region and the RDFFG. The Project is approximately 60 km north of Prince George along Provincial Highway 97 and 19 km east along the North Olsson FSR as described in Section 1.1 and Section 1.2. and illustrated in Figure 1.1.

The Project lies within the Interior Plateau physiographic region of BC. Elevations within the proposed Monkman East Pit and Raw Sand Plant area range from approximately 1,000 to 1,200 metres above sea level (masl). The elevation of the Finishing Plant site, approximately 19 km to the west, is approximately 725 masl.

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The RDFFG has a population 96,979, with most of the population concentrated in the Prince George Census Agglomeration⁵ (92.3%), which has a population of 89,490 (Statistics Canada 2022). The City of Prince George alone makes up 79.2% of the RDFFG, with a population of 76,708 people (Statistics Canada 2022). Prince George is the nearest large centre to the Project located at the intersection of Provincial Highways 97 and 16 and is the hub for much of the industrial activity in northern BC. Vitreo seeks to provide business opportunities to Indigenous Nations, local communities and obtain supplies, services and work force from Prince George and its surrounding communities. Vitreo does not intend to construct and operate a camp at the Project site and assumes a workforce will be sourced primarily from local communities traveling to and from site on a daily basis.

Prince George is serviced by the Prince George Airport with multiple daily flights to Vancouver International Airport and other large airports in western Canada. Prince George's rail service is provided by Canadian National (CN) rail, which provides access to the southeast through Jasper, Alberta and to the northeast through Dawson Creek, BC. The CN rail line parallels Highway 97 north of Prince George and is adjacent to the proposed Finishing Plant site.

The closest community to the Project is the unincorporated settlement of Bear Lake, located approximately 7 km from the Finishing Plant site (see Table 10.1). Bear Lake is an unincorporated settlement with a population of approximately 150 and has limited resources including fuel, meals, and accommodation.

The nearest Wildlife Habitat Area (9-065) is located 74 km northwest of the Raw Sand Plant and Monkman East Pit area near Monkman Provincial Park in the Rocky Mountains (BC Wildlife Habitat Areas Map Service 2023).

The Emerald Lake Recreation Site and the Crystal Lake Recreation Site are the closest recreation sites to the Finishing Plant site. Desktop research for the Recreation Sites and Trails BC website indicates that Crystal Lake is operated by the Crystal Lake Recreation Society and provides three day-use areas (there is no camping provided at this site). There are several cabins located at the south end of the lake, Vitreo currently understands these to be seasonal or temporary residences; there are no permanent residences expected.

Desktop research on Emerald Lake from the Recreation Sites and Trails BC website indicates that Emerald Lake, also operated by the Crystal Lake Recreation Society, provides five camping sites. While Vitreo expects these to be seasonal sites for recreational land users and not permanent resident locations, further follow-up will be made with the Crystal Lake Recreation Society, as part of key person interviews and baseline data collection to inform the socio-economic baseline data collection.

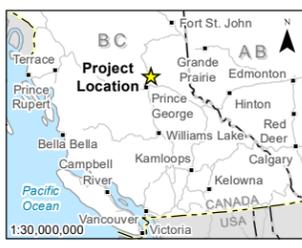
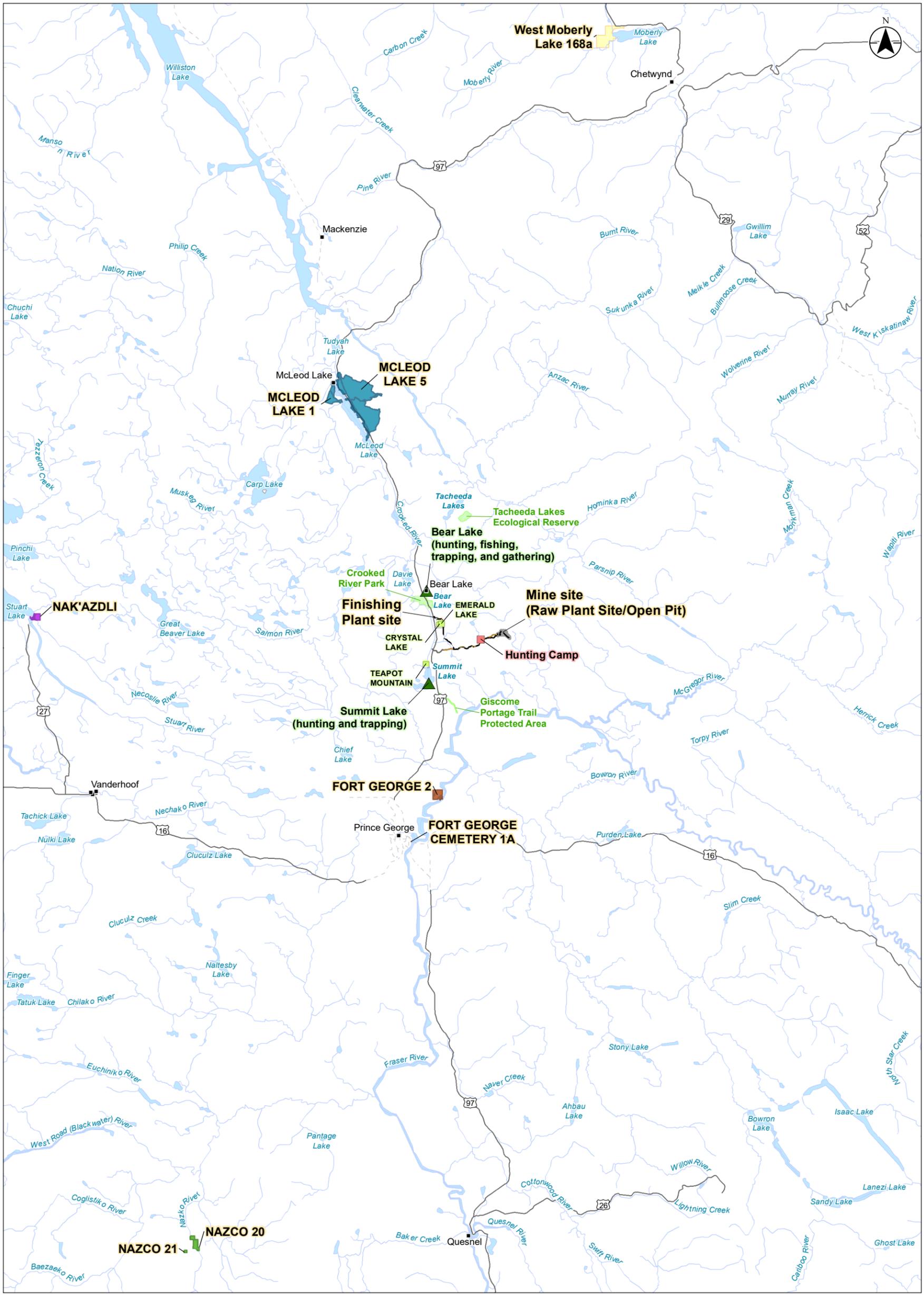
⁵ Includes the following Census Subdivisions: Fort George 2 (Indian Reserve), Fraser-Fort George A (Regional District Electoral Area), Fraser-Fort George C (Regional District Electoral Area), Fraser-Fort George D (Regional District Electoral Area), Fraser-Fort George F (Regional District Electoral Area), and Prince George (City).

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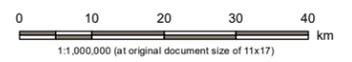
The Project location in relation to local communities and areas of interest are presented in Table 10.1 and illustrated in Figure 10.1. Additional seasonal or temporary residences located in proximity to the Project will be identified through ongoing engagement activities.

Table 10.1 Distance to the Project – Local Communities and Areas of Interest

Nearby Communities and Areas of Importance	Approximate Distance to Finishing Plant Site*	Approximate Distance to Mine Site*
Emerald Lake Recreation Site	1 km	15 km
Crystal Lake Recreation Site	1 km	15 km
Crooked River Provincial Park	3 km	18 km
Unincorporated village of Bear Lake	5 km	21 km
Bear Lake	7 km	22 km
Teapot Mountain Recreation Site	12 km	20 km
Summit Lake Fee Simple Lands	15 km	20 km
Summit Lake	14 km	21 km
Tacheeda Lake	25 km	32 km
Hunting Camp**	13 km	4 km
Giscome Portage Trail Protected Area	19 km	22 km
City of Prince George	43 km	46 km
Fort George 2	45 km	43 km
McLeod Lake Indian Band Indian Reserve #5	50 km	62 km
Unincorporated village of McLeod Lake	57 km	68 km
Fort George Cemetery 1A	59 km	60 km
McLeod Lake Indian Band Indian Reserve #1	62 km	74 km
District of Mackenzie	92 km	102 km
District of Vanderhoof	96 km	109 km
Nak'azdli (Reserve)	104 km	120 km
District of Chetwynd	151 km	149 km
City of Quesnel	156 km	151 km
West Moberly Lake 168A	156 km	155 km
Nazco 20	175 km	178 km
Nazco 21	178 km	182 km
Notes:		
* Approximate distance to Project measured in a straight line (as the crow flies).		
** The hunting camp is located approximately 300 m from the North Olsson FSR.		



- City, Town, Village, or District Municipality
- Highway
- - - Road
- Watercourse
- Waterbody
- Provincial Park, Ecological Reserve, or Protected Area
- ▲ Traditional Use Site Location
- Recreation Site
- Hunting Camp
- - - Road for Project Access
- Transmission Line
- Chuchinka-Log Lake FSR (North Olsson) - Site Access
- Project Footprint
- First Nation Reserve
- Lheidli T'enneh First Nation
- McLeod Lake Indian Band
- Nazko First Nation
- Nak'azdli Whut'en First Nation
- West Moberly Lake 168A



Stantec **vitreo**

Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 123221734
 Prepared by: VWORTHINGTON on 20231110
 Requested by: LDESANDOLI on 20231108
 Checked by: LDESANDOLI on 20231110

Client/Project/Report:
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description

Figure No.
10.1

Project Location in Relation to Indigenous and Community Interests

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10.2 Project Components

A list of the proposed Project components is provided in Table 10.2. The Project components are presented in Figure 1.2 and further described in the activities section below. No offsite components are anticipated to be required for the Project.

Table 10.2 Proposed Project Components

Proposed Project Components	Description
Monkman East Pit	Open pit to extract quartz-arenite from Monkman East belt formation. The open pit will also provide in-pit storage and will contain progressively backfilled waste rock and fines material throughout the mine life. The in-pit waste storage is expected to contain up to 14.4 million cubic metres (Mm ³) of waste at the end of the Project.
Raw Sand Plant	Processing of raw material; the Raw Sand Plant layout includes the processing plant, ancillary buildings, a run of mine materials stockpile, a mobile crusher, temporary stockpiles for raw sands, Process Water Pond, sediment ponds, maintenance shop, office, and fueling stations.
Finishing Plant site	Drying and sizing material before distribution; the Finishing Plant layout includes plant buildings, stockpiles, a truck loadout area, staging area, and maintenance facilities. A sediment pond is proposed for run-off collection and as a water source for dust suppression.
External Waste Rock and Fines Stockpile	Waste rock and fines storage for backfill into the pit or storage in an External Waste Rock Stockpile. The stockpile will have an ultimate capacity of approximately 11 Mm ³ . Previously this material was proposed to be stored separately within a Fines Stockpile (ultimate capacity of approximately 2 Mm ³) and an External Waste Rock Stockpile (ultimate capacity of approximately 11 Mm ³).
Reclamation Materials Stockpile (RMS)	Storage of materials suitable for reclamation.
Transmission/Distribution Line Corridor and substations	A Transmission/Distribution Line corridor, primarily paralleling the North Olsson FSR to provide hydroelectric power to the Mine site and Raw Sand Plant area. The corridor may also be used for a water intake pipeline, dependent upon the results of the ongoing water sourcing investigation.
Water management infrastructure (including collection ditches, sediment ponds, Process Water Pond)	Infrastructure to collect water, manage total suspended solids, and supply water to the Raw Sand Plant and Finishing Plant site.
Upgrades to the existing FSRs	Upgrades to the existing North Olsson and 2800 FSRs for access and transportation of materials to and from the Mine site.
Access roads on site	Upgrades to existing roads and trails, and construction of road infrastructure between the Monkman East Pit and the Raw Sand Plant site, and at the Finishing Plant site.
Explosives Storage	Supporting infrastructure for Project construction and operation; the explosive storage is located at regulated distances from other active areas and close to the Mine site.
Ancillary facilities	Ancillary facilities for both the Raw Sand Plant and Finishing Plant locations include power line infrastructure, water supply, office and other facilities
Natural Gas Pipeline	The Finishing Plant site will be served by a short (approximately 100 m) Natural Gas Pipeline from Enbridge's T-South mainline.

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10.3 Project Activities

The following sections describe the activities proposed for each Project phase. Information about the Project workforce is included in Section 10.4.

10.3.1 Construction

The Construction phase is planned to occur in Year 1, and will involve the following activities using conventional equipment and construction methods:

- Clearing and grubbing
- Stripping of topsoil and storing it for later use in RMS
- Removal of overburden in first phase of Monkman East Pit
- Construction of haul road from Monkman East Pit to Raw Sand Plant
- Upgrades to the existing access roads, including the North Olsson and 2800 FSRs, and construction of the Transmission Line Corridor
- Construction of Raw Sand Plant and Finishing Plant
- Construction of ancillary facilities, such as material storage buildings, offices, equipment and repair shops
- Construction of Natural Gas Pipeline access to the Finishing Plant
- Erosion and sediment control

10.3.2 Operation

10.3.2.1 Mining Activities

The Operation phase is planned to start in Year 2. The Project plans to mine 2.9 Mt of quartz arenite annually for a period of 20 years with total production of 56.6 Mt from the Monkman East Pit. The Project will also produce an estimated 25 Mt total waste material (fines and waste rock), much of which will be backfilled into the mined-out pit. Vitreo is working to limit both the production of these materials and their storage footprint.

The Monkman East Pit has been designed to limit the production of waste material to the extent practical by targeting the quartz arenite formation that outcrops along the top of the Monkman East strike.

The Mine site will be developed using conventional mining techniques including drilling and blasting, the loading of quartz arenite and waste material using hydraulic excavators, and the hauling of quartz arenite and waste material with rigid body off-road haul trucks. The blasted quartz arenite will be hauled to the Raw Sand Plant where it will be crushed and screened to liberate the silica sand.

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Proposed mining at the Monkman East Pit is currently planned to be developed in four phases from north to south with the intent of reducing haul distance in the initial years while maximizing the amount of mined waste and fine material that can be backfilled. The proposed mining sequence reduces the areal extent and volume of external mine waste storage areas that would otherwise be required.

10.3.2.2 Processing Activities

The Project will operate two processing facilities: the Raw Sand Plant located near the Monkman East Pit, and the Finishing Plant located near Highway 97 (Figure 10.1).

The Raw Sand Plant will crush and process the quartz arenite to liberate the silica sand grains and separate it from the fines component. The Raw Sand Plant will require a make-up water supply. Processing and make-up water sources have been identified and prioritized from a) recycled water; b) contact water; c) a groundwater source at or near the Mine site; d) should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV 2016).

Blasted rocks will be crushed before being delivered to the Raw Sand Plant for processing and liberation. At the Raw Sand Plant, material will be liberated in a multistage process resulting in a raw sand intermediate product.

The Raw Sand Plant has been designed for a target throughput of approximately 2.9 Mt/year. The Raw Sand Plant production schedule is based on 245 operating days per year, linked to mining activities.

The Raw Sand Plant will be designed to produce the following products: 30/50 mesh, 40/70 mesh (see Photo 1.2 and Section 1.2), 70/140 mesh, and fine material <140 mesh.

Silica sand products will be dried at the Finishing Plant, stored in on-site silos, and loaded onto transport trucks for distribution. The Finishing Plant will be located in proximity to existing natural gas and power infrastructure required to operate the dryer, and adjacent to Highway 97 to facilitate transfer of the product to market.

The Finishing Plant has a target production rate of approximately 2 Mt/year with a nominal output of 300 t/hour. The Finishing Plant production schedule is based on 335 operating days per year and the daily production rate is approximately 5,970 tonnes per day. Hauling between the two plant areas will occur approximately 335 days per year.

The material stockpiled at the Finishing Plant is the same material as at the Raw Sand Plant, a wet (approximately 3-5% moisture by weight) silica sand. Equipment such as conveyors, front end loaders and dozers will be used to physically manage the stockpile size and location. During warmer months, sprinklers and other equipment will be used to maintain a moisture level required to reduce or eliminate the risk of fugitive dust from the stockpile.

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10.3.2.3 Waste Management and Classification

Mine waste will be managed through two waste facilities: an External Waste Rock and Fines Stockpile adjacent to the Monkman Pit (Figure 1.2), and an in-pit waste storage area. The External Waste Rock and Fines Stockpile will be required for fines placement early in the Project until sufficient area in the Monkman East Pit is available for in-pit storage (starting in Year 6). The External Waste Rock and Fines Stockpile is expected to contain no more than 11 Mm³ of compacted material. Once a sufficient pit area is available to facilitate in-pit placement, both waste streams (waste rock and fines) will be directed and co-mingled to in-pit facilities to the greatest extent possible to reduce the Project footprint. The in-pit waste storage is expected to contain up to 14.4 Mm³ of waste at the end of the Project.

Fines Classification

According to the *Mines Act*, “mineral and coal mine” refers to mines that produce coal and minerals, where as “pit and quarry” means a mine at which mining activities in relation to rock, industrial minerals, limestone, earth, clay, sand and gravel occur (*Mines Act*, Mines Fee Regulation 1(1)). “Tailings”, as defined by the *Mines Act* Health, Safety and Reclamation Code for Mines in BC (HSRC) (EMLI 2022), is defined as the residue remaining from the preparation of a concentrate of minerals or coal. Under the EMA waste discharge regulations “tailings” are defined as fine waste materials from a concentrator or coal preparation plant and remain in a water suspension; whereas “waste rock” means rock and granular residual solids, including those removed from an industrial mineral concentrator. The HSRC has perspective requirements for the design, construction, operation and closure of facilities that store tailings (“tailings storage facilities”). Because placer mines, gravel pits and quarries do not produce a concentrate of minerals, the residue from an industrial mineral quarry processing are considered a fine waste product, not “tailings”.

10.3.2.4 Ancillary Activities

To support mining and processing activities, the Project requires ancillary activities and structures, including:

- Offices, first aid, worker wash and change facilities, including drinking water supply
- Solid waste and sewage management
- Equipment maintenance and repair facilities
- Fuel storage
- Emergency response facilities (medical, fire, spills)
- Environmental monitoring (water flow and quality, wildlife)
- Erosion and sediment control

The siting and operating parameters for the facilities to support ancillary activities will be determined as Project design advances.

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10.3.3 Reclamation and Closure

The Reclamation and Closure phase will commence in Year 22 once mining operation has ceased; however, progressive reclamation will occur during the life of mine. Progressive reclamation activities include the reclamation of external stockpiles and the External Waste Rock and Fines Stockpile once the majority of the waste produced is directed back into the pit, starting in Year 6.

Planned reclamation activities in the mining area will continue in Year 22, after the completion of mining in Year 21, to achieve end land use objectives. In addition to re-sloping, ripping/scarifying of haul roads and platforms will be required followed by soil placement.

In addition to earthworks activities, Project facilities will be demolished and/or removed from the Mine site. Above ground structures will be removed and foundations cut to ground level and covered with appropriate material prior to revegetation. Following the completion of major earthworks activities in Year 23, it is expected that smaller support equipment will be utilized for reclamation maintenance activities and the primary contractor mining fleet will leave the Mine site.

Exposed benched pit slopes remain in place but backfill areas suitable for regrading and soil placement will be revegetated. The current end of mine pit configuration will likely result in the development of a small in-pit lake at the southern end of the Monkman East Pit. It is expected that this portion of the pit will fill with an accumulation of run-off and groundwater inflows and would discharge through a constructed channel into the adjacent natural drainage.

The Application will contain a Conceptual Reclamation and Closure Plan (CRCP), which will document the end land use plan (see below), comparison of pre-mining land and wildlife capability (based on the Terrestrial Ecosystem Mapping (TEM) completed for the Project) to post-closure predicted ecosystems of the reclaimed landscape, and measures used to achieve the requirements for reclamation and closure as defined under the HSRC.

During the Early Engagement phase, McLeod Lake Indian Band expressed interest in working with Vitreo with respect to revegetation and progressive reclamation, which will both contribute to an understanding of the overall reclamation and closure plan, including end land use planning (see below). Vitreo anticipates developing the end land use plan and objectives with McLeod Lake Indian Band as well as other interested Participating Indigenous Nations.

10.3.3.1 End Land Use Planning

End land use and capability objectives for the Project will be developed in consideration of the HSRC and through engagement with Participating Indigenous Nations. The end land use and capability objectives will be based on characterization of pre-development site conditions. As discussed in Section 12, the pre-disturbance landscape is predominantly a forested ecosystem supporting an assortment of values including wildlife habitat, TLU, forestry, and recreation.

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Reclamation will be undertaken with the end land use goals of:

- Re-establishing the average land capability to pre-disturbance conditions
- Fostering the return of appropriate self-sustaining forested ecosystems (ecosystems common in the pre-disturbance local landscape) that provide habitat that supports wildlife

By accomplishing these two primary goals, a variety of other compatible end land uses (such as TLU, forestry, and recreation) will be a secondary benefit.

As noted above, the Application will contain a CRCP. Key principles anticipated to be incorporated into this CRCP that are critical for achieving end land use and capability objectives are:

- Incorporating progressive reclamation into Project planning to the extent practicable
- Creating stable landforms at closure
- Managing water quality and hydrological flow regimes in receiving waterbodies
- Implementing soil salvage and replacement strategies and re-vegetation strategies that will achieve ecological conditions that are similar to pre-mining conditions
- Targeting post-closure ecosystems that re-establish wildlife habitat capable of supporting a diversity of wildlife at various successional stages
- Selecting plant species for revegetation that have Indigenous TLU value and support native plant diversity

As stated in Section 10.3.3 above, during the Early Engagement phase, McLeod Lake Indian Band expressed interest in working with Vitreo with respect to revegetation and progressive reclamation, which will both contribute to an understanding of end land use planning. Vitreo anticipates developing the end land use plan and objectives with McLeod Lake Indian Band as well as other interested Participating Indigenous Nations.

10.3.4 Post-Closure

Post-closure is planned to commence in Year 23. Dependent on discussions with Indigenous Nations, as well as permit and approvals conditions, Vitreo anticipates requirements to conduct post-closure monitoring. Anticipated monitoring programs include:

- Water quality
- Revegetation success and wildlife use
- Physical stability of waste dumps, waste dump covers, conveyances, and other structures in remaining in place

These monitoring programs will be developed through the approvals process and will be refined through the Operation and Reclamation and Closure phases.

10.4 Project Employment

The size of the workforce for construction and operation is currently estimated to be approximately 150 persons for the Construction phase 140 for the Operation phase, and 50 persons for the Reclamation and Closure phase working in shifts on site. Vitreo is committed to hiring locally to the extent possible. Construction and operation will skills typical in the mining industry in BC, e.g., explosives handling, maintenance of mining and process equipment and will provide unique training opportunities for Indigenous Nations, in addition to more generally available skills like heavy equipment operation or vehicle maintenance.

Vitreo believes that the Project will be able to source the workforce from local communities including the Prince George region. The Project does not require specialty skill sets that are not common to the region's industrial base including forestry, lumber milling and pulp, mining, heavy and pipeline construction and industrial services that are located in Prince George.

10.5 Conceptual Construction Phase, Operation Phase and Reclamation and Closure Phase Costs

Conceptual costs have been estimated for the Project in the PFS (Stantec 2022) as follows:

- Construction phase costs of approximately \$300M
- Operation phase, including progressive reclamation, costs of approximately \$97M per annum for mine operations.
- Reclamation and Closure phase (Years 22-23) costs of \$5.2M spread over two years.

10.6 Project Siting and Design Considerations

The Project has incorporated environmental mitigation by design, as described below. However, specific siting of Project components may be flexible and Vitreo will seek to incorporate concerns and interests raised by Indigenous Nations, technical advisors and the public, including community members, into future iterations of Project design and land end use. The location of the Monkman East Pit and processing rates are the only design items that are relatively fixed, as these form the economic basis of the Project.

Some of the key mitigations applied through Project design included:

- Consideration of environmental desktop review and field data information, such as cleared area, existing access, and existing water bodies and wetlands when placing Project components.
- Siting Project components at the Mine site as close as practical to the Monkman East Pit.
- Use of existing access roads, trails and transportation corridors (e.g., North Olsson FSR).
- Aligning the proposed Transmission Line Corridor along an existing right-of-way.

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- Reducing the external waste storage stockpiles from three to the following two: the in-pit backfill, and one combined External Waste Rock and Fines Stockpile to the west of the pit.
- Redirecting mine waste and filtered fines to in-pit facilities to reduce the Project footprint.
- Designing the Monkman East Pit with the intent of reducing haul distance in the initial years while maximizing the amount of mined waste and filtered fines material that can be backfilled.
- Reducing the areal extent and volume of external mine waste storage areas through mine sequencing.
- Limiting make-up water demand during production by using and recycling water at the Raw Plant site to the extent practical.
- Sourcing the Project workforce from local communities and travelling to and from site on a daily basis, eliminating the need for an on-site camp.

Major Project component siting constraints and considerations are further discussed in Section 10.7 below.

10.7 Alternatives To and Alternative Means of Carrying Out the Project

10.7.1 Alternatives to the Project

High-quality proppants are currently being imported to the natural gas basins in BC and Alberta from the United States. These materials typically have a long transportation route to the Montney Basin from mines in Wisconsin. Vitreo has undertaken an extensive review of potential local sources of raw materials to make proppants in closer proximity to the Montney Basin and finds no reasonable alternative to the Angus Project, which is located much nearer to the Montney Basin than sources in Wisconsin. Intuitively, the reduction of such a substantial travel distance will result in a significant reduction in GHG emissions while also providing greater security of supply for industry and creating local employment, business and procurement opportunities. Further, much of the operation, including the drying of final products will be facilitated by the use of CleanBC hydropower and BC gas – a comparison to how these are accomplished in Wisconsin suggests additional benefits. As a result, the primary alternative to the Project described is the status quo of sourcing and shipping proppant from suppliers outside of BC and Canada at greater transportation distances and cost, greater use of non-clean power and fuels, and therefore higher associated GHG emissions.

During the Early Engagement phase, Vitreo received a comment from West Moberly First Nations regarding possible additional alternatives to the Project. However, Vitreo is unaware of additional Tier-1 quality sources of silica sand in close proximity to the Montney Basin that are either in production, environmental assessment, or in exploration phases.

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10.7.2 Alternative Means of Carrying out the Project

Vitreo evaluated several alternative means of carrying out the Project, as highlighted in Table 10.3. As noted in Table 10.3, while Project component locations are currently designed to occupy areas with pre-existing disturbances, component locations may be adjusted based on ongoing studies and engagement feedback.

An alternative means assessment will be conducted during the environmental assessment process, following the EAO's Effects Assessment Policy (EAO 2020), and will be documented in the Application. Evaluation criteria for the alternative means will be presented in the Application and may include:

- Technical, Project design and economic feasibility:
 - Use of best available technology (BAT), where appropriate, such as looking into the most efficient dust control equipment for the Finishing Plant
 - Technical requirements, taking into consideration uncertainties
 - Capital cost
 - Project design constraints
- Environmental, Social, Cultural, Health, and Indigenous Considerations:
 - Limiting environmental effects including those associated with GHG and other air emissions, water use and other potential biophysical effects (e.g., terrestrial footprint)
 - Potential effects to species at risk as per the *Species at Risk Act*
 - Potential social, cultural and health effects
 - The rights or interests of Indigenous Nations
 - Feedback received during engagement activities, as available
- A discussion of changes to the health, social, cultural or economic conditions that have the potential to result in disproportionate effects, based on Gender-Based Analysis Plus (GBA+), where applicable.

The alternatives presented in Table 10.3 will be evaluated using the criteria and a qualitative discussion of each of the criteria above with a rationale as to why a preferred alternative has been chosen.

The evaluation of alternative means of carrying out the Project, including other potential design and siting considerations, will be informed by engagement with Participating Indigenous Nations, the public or members of the TAC, or through advancement of the Project's feasibility study and documented in the Application.

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Feedback received during the Early Engagement phase has informed this alternative means analysis and information presented in Table 10.3 as follows:

- McLeod Lake Indian Band and Northern Health expressed safety concerns regarding the use of Highway 97 to transport silica sand from the Finishing Plant site to markets in the Montney Basin and questioned why rail transport was not selected instead. The Summary of Engagement (EAO 2023) also recommended that Vitreo provide alternative options to hauling by truck for the transportation of quarried materials in the DPD. Using rail loadout for transportation of silica sand to the market is discussed in Table 10.3.
- MOTI requested more information on access considerations from the Finishing Plant site to Highway 97.
- Concerns were raised by McLeod Lake Indian Band, West Moberly First Nations, Lheidli T'enneh First Nation, British Columbia Ministry of Environment (ENV), Ministry of Water, Land and Resource Stewardship (WLRS), Northern Health, EAO and the general public through EAO's EPIC website regarding fugitive dust emissions from the Project. Vitreo has partially addressed these concerns by removing the Fines Stockpile (previously located to the south of the Raw Sand Plant), and co-mingling fines with waste rock in a new External Waste Rock and Fines Stockpile, located to the east of the Monkman Pit.
- The Summary of Engagement (EAO 2023) also suggested that Vitreo provide options for water treatment system(s) if contact water from the Project is anticipated to have contaminants that exceed applicable water quality guidelines. Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. Information on water treatment alternatives is provided in Table 10.3.

This feedback and request for information is incorporated into Table 10.3. Additionally, Table 10.3 has been amended from the IPD to include consideration of primary power sources for the Mine site; this alternative means has been added to describe how Vitreo has incorporated GHG emissions mitigation into Project design.

Table 10.3 Project Alternative Means

Proposed Alternative Means	Rationale/ Potential Effects and Risks
Using rail loadout for transportation of silica sand to market	<p>Comments received on the IPD and in the Summary of Engagement (EAO 2023) have identified that alternative options to hauling by truck for the transportation of quarried materials is of interest to reviewers. The primary concern regarding the use of the rail loadout and subsequent transportation of silica sand to market by rail was related to safety concerns with increased traffic on Highway 97 due to haul traffic.</p> <p>The Finishing Plant site location has been selected to be in close proximity to an existing CN rail line (Figure 1.2). A rail load out, currently located on private land adjacent to the Finishing Plant site, but not owned by Vitreo, connects to the CN rail line. This rail loadout has the potential to be used to transport silica sand to market, however, as noted above, the rail load out is located on private land and Vitreo currently does not have access to it.</p> <p>The use of rail to transport product to market is not feasible at this time; however, Vitreo plans to re-evaluate the use of rail as part of future Project planning.</p>

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Proposed Alternative Means	Rationale/ Potential Effects and Risks
Highway Access	Initial discussions with MOTI highlighted the requirement for well-designed access, deceleration and acceleration zones for traffic joining the highway. These details will be included in the final design to comply with highway safety requirements similar to the many other industrial traffic interchanges that exist along the route.
Waste rock and fines storage at the Mine site	Vitreo evaluated a number of waste rock and fines storage locations during the PFS and during the development of the IPD and this draft DPD. The overall objective for the placement of waste rock and fines was to limit the overall Project footprint, and to promote backfilling material into the pit to the extent practical. The waste storage options shown in the IPD had three locations for the storage of waste rock and fines: ex-pit fines pile to the south the Raw Sand Plant, ex-pit waste rock pile to the west of the Pit, and in-pit storage. To reduce the overall Project footprint, to avoid potential dust dispersion issues from external fines pile, and to avoid potential effects to the wetland ecosystems to the east of the Pit, the Project layout was adjusted to reduce the number of waste storage locations from three to two: the in-pit backfill, and one combined fines and waste rock ex-pit stockpile to the west of the pit. Vitreo notes that concerns about fugitive dust were raised during the Early Engagement phase and the revised layout will assist in avoiding dust dispersion from the fines pile.
Primary power source for Mine site	Electrical power from the BC Hydro power grid has been selected as the primary power source for the Mine site. The Raw Sand Plant, offices and other ancillary infrastructure will be powered through connection to the BC Hydro grid. This power source has been selected over the conventional alternative of diesel generators to reduce Project GHG emissions.
Water treatment	<p>Comments on the IPD noted that sediment ponds were identified as the only water treatment at the Mine Site and Finishing Plant and requested that additional information on any other treatment processes being proposed be included in the DPD. It was also indicated during review of the IPD that a suitable water treatment system would need to be proposed if contact water from the Project is anticipated to have contaminants that exceed applicable water quality guidelines. These concerns were also specifically highlighted in the Summary of Engagement (EAO 2023).</p> <p>Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. At this time, Vitreo plans to use water retention ponds (i.e., sediment ponds) as the primary source of water treatment at the Mine site. These ponds will be used to reduce total suspended solids (TSS) in effluent prior to discharge. If required, additional TSS control methods such as the addition of flocculant will be considered. Early geochemical analyses and water quality baseline studies indicate that additional water treatment, such as pH adjustment or chemical addition, will not be necessary to meet water quality objectives in the receiving environment (see Section 12.2). Vitreo is completing a comprehensive data collection program and will assess the need for water treatment as part of the Application for an Environmental Assessment Certificate. Vitreo is aware that options for water treatment system(s) must meet EMLI's Technology Readiness Assessment Interim Technical Guidance (August 2022)¹ with a Technology Readiness Level of at least 7.</p>
Mining different areas within the mineral claims	The Monkman East Pit is currently the best understood source of quartz arenite within the Project area. The pit can be accessed through existing public roads, reducing the need to develop new linear infrastructure and rights of way and partially mitigating effects to ecosystems, vegetation, wildlife and TLU. Mining this resource also provides an acceptable economic return on the Project and is the preferred alternative.

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Proposed Alternative Means	Rationale/ Potential Effects and Risks
Locations of key infrastructure, such as the Raw Sand Plant and Finishing Plant	The location of Project infrastructure has been selected to limit haul distances. Facility locations have also been designed to limit vegetation clearing and to mitigate affects to wetlands and wildlife. The Finishing Plant location is also proposed adjacent to Highway 97 and the CN rail line that provides access to northeast BC through Chetwynd and Dawson Creek and into the Montney Basin. The plant locations are currently designed to occupy areas with pre-existing disturbances but may be adjusted based on ongoing geotechnical and environmental studies, as well as through engagement with Indigenous Nations.
Use of a construction and/or operation camp to house off-shift workers	The Project workforce is currently planned to be resourced from the existing workforce in local communities. While it is possible to construct and operate a remote camp to house off-shift mine workers, the proximity of the Project to McLeod Lake, Bear Lake and Prince George is anticipated to negate the need for a camp at the Mine site. Mine staff are expected to be able to live in either community and commute daily to site. As a result, the development of a camp is not proposed for the Project.
<p>Note:</p> <p>¹ Available at https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/mining-smelt-energy/guidance-documents/min-21_interim_guidance_on_technology_readiness_assessment.pdf; accessed October 2023.</p>	

11 Project Emissions, Discharges, and Waste

The following sections provide information about expected emissions, discharges, and waste from the Project. Engagement activities and feedback received during the Early Engagement phase has informed the information presented in this section. Additional detail has been added to describe air quality emissions and traffic in relation to the recreation sites and provide information about truck and vehicle use by the Project, as well as provide an estimate of indirect GHG emissions from the Project. The noise emissions section has been updated to provide additional detail about the noise assessment and how noise effects related to wildlife will be addressed in response to comments received during the Early Engagement phase. The waste section has been updated to provide additional detail how waste will be handled by the Project.

11.1 Air Emissions

During the Construction phase, the majority of air emissions on site will be related to diesel exhaust and GHG emissions from operation of construction equipment.

During the Operation phase, multiple sources of emissions will be present, including:

- Diesel exhaust from haul trucks, bulldozers, and loaders used in mining operation and for transporting materials between the Raw Sand Plant and the Finishing Plant site.
- Dust from blasting during mining operation, from mobile equipment movements between the open pit and the Raw Sand Plant, and from drying at the Finishing Plant site.
- GHG emissions from use of natural gas to dry sand at the Finishing Plant site.
- Dust from road traffic on the FSRs.

The estimated direct Project GHG emissions are as follows: 9,900 tonnes carbon dioxide equivalent (t CO₂e) for the Construction phase, 60,860 t CO₂e per year for the Operation phase, and 8,250 t CO₂e during the Reclamation and Closure phase. GHG emissions will be negligible during the Post-closure phase. The direct GHG emissions result primarily from the use of haul trucks and other traffic as well as emissions from the Finishing Plant site. During the Operation phase, the Finishing Plant site will emit approximately 43,500 t CO₂e per year from natural gas combustion. In addition to direct GHG emissions, the Project will also have indirect GHG emissions from the use of electricity of approximately 100 t CO₂e per year. This volume is well under the relevant GHG emissions threshold in sections 4 and 5 of the RPR. However, the direct GHG emissions from the Finishing Plant site do meet the 10,000 t CO₂e reporting threshold to be defined as a reporting operation under the *Greenhouse Gas Emission Reporting Regulation*. The potential effects on the province being able to meet its targets under the *Greenhouse Gas Reductions Targets Act* will be presented in the Application.

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While the Project will result in GHG and other emissions from mining operation, processing, and transport (fugitive dust, particulate matter (PM) of various sizes, sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and carbon monoxide [CO]), similar emissions are currently generated in other locations in the United States and Canada to produce proppant for use in the BC and Alberta oil and gas industry. Once in operation the Project may displace those emissions and therefore result in an overall reduction of emissions due to the reduced transport distance. GHG assessment will be provided in the Application to further evaluate the GHG reduction as a result of the Project. Vitreo will also continue to evaluate GHG emission reduction strategies through Project planning. Vitreo does not anticipate that this Project will increase drilling and completions activities in the Montney Basin and other oil and gas basins of northeastern BC and northwestern Alberta. The proppant currently used in natural gas extraction activities in these areas is primarily sourced from Wisconsin, and Vitreo anticipates that the Project will supplement the anticipated proppant supply and demand in the area with a BC product rather than an imported one.

Fugitive dust associated with mining and crushing during operation will likely be the most visible air emission and potential concern to land users. However, the remoteness of the Monkman East Pit and Raw Sand Plant may limit the interaction of air emissions with potential human receptors. The haul route does not travel through any of the recreation sites or provincial parks in the area (e.g., Emerald Lake Recreation Site, Crystal Lake Recreation Site, Crooked River Provincial Park).

Fugitive dust emissions are those that do not come from a stack. Fugitive dust emissions from drilling and blasting, surface disturbance activities, haul roads, access roads and wind erosion result in PM emissions of various size ranges (e.g., total suspended particulates [TSP], particulate matter [PM]₁₀ and PM_{2.5}) that can also be deposited to off-site ground and water surfaces (i.e., dustfall). TSP includes larger particles, nominally up to 30 µm in diameter. The larger dust particles are removed near the disturbance area by gravitational settling and are the main contributor to dustfall. TSP, PM₁₀ and PM_{2.5} emissions are carried off-site by the wind; the smaller PM_{2.5} and PM₁₀ fractions tend to be transported further downwind than the TSP. The chemical composition of the fugitive dust depends on the chemical composition of the material that is being disturbed. The chemical composition of the fugitive dust from an open pit blast will be the same as the chemical composition of the material being blasted while the chemical composition of the fugitive road dust will be the same as the chemical composition of the surface material for the unpaved road. The largest source of fugitive dust will be a result of traffic along unpaved roads. Fugitive road dust does not contain the high purity silica that is being mined but rather a mineral clay dust because the surface of the unpaved roads is covered with an aggregate material that is predominantly comprised of a mineral clay.

Fugitive dust from mining activities is often visible because the plume contains a wide range of different sizes of PM that appear as a visible plume. Fugitive dust settles to the ground under the influence of gravity and can be a source of concern for land users due to the potential effects the deposited dust may have on vegetation, soils and surface water. These potential sources and effects are based on environmental assessments conducted in BC for open pit mines, including the Giscome Quarry and Lime Plant Project located approximately 38 km south from the Project. The Project's fugitive dust sources, including truck traffic and processing activities, will be described in the Detailed Model Plan that

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will be reviewed by the Ministry of Environment and Climate Change Strategy. The potential effects from fugitive dust on the environment and land users will be assessed in the Application.

Vitreo will incorporate dust management measures into Project planning, including the use of baghouses and vacuum systems at the Finishing Plant, and dust mitigation with water sprinklers at the Finishing Plant site, similar to its Moberly Operations. There will be no silica dust generation at the Finishing Plant itself because it's an enclosed system. The Raw Sand Plant will use a wet process to liberate silica from the quartz arenite, therefore there will be no silica dust emissions during processing. Raw sand stockpiles outside of the Raw Sand Plant may be subject to drying during the summer and water sprinkler systems will be used to suppress dust generation during those times.

The primary mining fleet will consist of a fleet of 55-tonne rigid body haul trucks to haul the ore and waste material. It is expected that five trucks will be required in the first year of mining, but truck numbers will increase as the active mining area moves farther away from the Raw Sand Plant. In the final five years of mining, 10 mining trucks will be required. The support equipment will include one highway tractor sized water truck (20 m³ capacity), one highway capable tractor and lowbed trailer and one highway capable mobile fuel and lube truck.

On average approximately 127 truck movements per day will travel from the Raw Sand Plant to the Finishing Plant site along the North Olsson FSR. On average approximately 127 trucks per day will travel from the Finishing Plant to the Raw Sand Plant along the North Olsson FSR. The trucks travelling along the North Olsson FSR will be 55-tonne side dump trailers operated by a contractor. Hauling between the Raw Sand Plant and Finishing Plant site will occur approximately 300 days per year. The sand transported by truck between the Raw Sand Plant and the Finishing Plant site will be wet and the trucks will make use of retractable cover systems. Additionally, water trucks or other control measures (possibly including the use of environmentally friendly chemical dust suppressants as and when necessary) will be used to manage fugitive dust from naturally occurring mineral soils from road use, as required. Other methods to reduce fugitive road dust from the traffic on unpaved roads includes speed control and natural mitigation (e.g., rain and snow falling on the unpaved road surfaces).

Vitreo will develop an Air Quality Management Plan for the Project, prior to construction, which will include mitigation and monitoring measures for fugitive dust (see Section 14 for more detail).

11.2 Noise Emissions

Some of the Project activities during the construction and operation phases may produce high-level noise emissions. Land users may experience noise effects from Project activities; however, the remoteness of the Mine site may limit the interaction of noise with potential receptors (e.g., residences). There are potential noise sensitive receptors at a closer distance to the Finishing Plant site and the haul road. The Emerald Recreation site is approximately 1.4 km from the Finishing Plant site and a hunting camp is approximately 0.3 km from the haul road (see Section 10.1). The noise assessment at the Mine site and Finishing Plant site will represent the worst-case years during the construction and operation phases with the highest intensity of overall noise emission equipment associated with the Project activities.

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Noise emissions from the Project will be assessed through acoustic modelling. During the construction phase, noise emissions include equipment associated with activities discussed in Section 10. During the operation phase, noise emissions include the operating Mine site, haul road, and Finishing Plant. Noise receptors, including the recreation sites near the Finishing Plant site and a hunting camp near the haul road will be assessed. If required, mitigation measures for potential noise effects will be provided in the Application.

The assessment of indirect loss of wildlife habitat due to sensory disturbance (e.g., noise emissions) will be assessed in the wildlife section of the Application through species-specific sensory disturbance buffers that are applied to the boundary of the Project area. The areas of effective wildlife habitat within those sensory disturbance areas are thus quantified through wildlife habitat suitability mapping. The results of the noise assessment will be used to inform the assessment of indirect loss of wildlife habitat due to sensory disturbance.

11.3 Effluent Discharge

Effluent discharge from the Project is only expected from sanitary wastewater at both the Mine site and Finishing Plant site. Sanitary wastewater will be discharged on-site to a septic field or tank with solids pumped and removed intermittently. As noted in Table 4.1 a registration will be required under the Municipal Wastewater Registration if discharge to ground is more than 22.7 m³/day.

Contact water within the Mine site will be managed with five sediment ponds that catch contact water and allow sediment to settle (Figure 1.2). The ponds are designed to operate up to a 10-year storm over 24 hours. Process water for the Raw Sand Plant will be recycled, limiting the need for make-up water. There is no planned process water effluent discharge during operation.

In the event that excess water would have to be managed it would be discharged to ground if it meets applicable guidelines. Vitreo will develop a water balance and water quality model to identify whether excess water could be generated by the Project and whether water quality of that excess water is suitable for discharge into the environment or further mitigation will be required. Vitreo will also develop a Water Management Plan prior to construction and operation of the Project.

At the Finishing Plant site, there will be a sediment pond to catch the contact water. Processing at the Finishing Plant site does not require use of process water; however, the water stored in the sediment pond will be used for Project-related purposes such as dust suppression and fire fighting. Remaining contact water will discharge to ground.

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11.4 Waste

Waste materials anticipated to be produced by the Project over its life span include:

- Hazardous wastes, including oil, oil filters, empty oil containers
- Non-hazardous solid waste including office waste, packaging materials, electronic waste

Vitreo will be required to manage and dispose of waste materials in accordance with the HSRC (EMLI 2022), as well in compliance with various permits and authorizations including those under the *Mines Act* and EMA. Hazardous waste will be stored and handled in accordance with the BC Hazardous Waste Regulation. Non-hazardous solid waste will be recycled to the extent possible. The remaining non-hazardous solid waste will be burned with the ashes disposed of at one of the waste rock storage facilities. Regulatory authorities will include permit conditions that will require Vitreo to develop management and monitoring plans for the disposal of hazardous and non-hazardous wastes. These plans will be developed in consultation with relevant regulators and Indigenous Nations.

12 Existing Conditions

The following sections provide an overview of available studies, and the Project's setting within the bio-physical environment, and human and community well-being environment.

Project baseline studies to support the description of existing conditions were supported by a review of publicly available literature to understand potential Indigenous Interests and concerns in the Project area. Results of these studies informed the Project's baseline data collection program and included information from the following publicly available environmental assessments and studies:

- Giscome Quarry and Lime Plant Project (Graymont Western Canada 2015a and 2015b)
- Site C Clean Energy Project (BC Hydro 2013)
- Murray River Coal Project (HD Mining 2013)
- Westcoast Connector Gas Transmission Project (WCGTP 2014)
- Mount Milligan Mine, Annual Reclamation Reports (Centerra 2018, 2021)
- Prince Rupert Gas Transmission Project (PRGT 2014)
- Blackwater Gold Project (Newgold 2015)

This review identified that Indigenous Nations, with interests in the area, including those Nations who have self-identified and provided a notice of intent to be a Participating Indigenous Nation, have expressed concerns over effects on wildlife and industrial activities interfering with traditional hunting, fishing, trapping, and gathering activities. Issues include concerns over displacement of activities, safety concerns, and indirect effects to wildlife. Changes to wildlife abundance, distribution and behaviour affect traditional land use. Effects to traditional land use can cause adverse effects on Indigenous culture and on the rights of Indigenous Nations. Culture and rights may also be affected by the destruction or disturbance of archaeological resources. Project-specific understanding of Indigenous Interests and concerns are also being developed through ongoing engagement activities, as outlined in the Engagement Plan (Vitreo 2023b).

Issues and concerns related to the Project and identified through engagement activities with Indigenous Nations and regulators are summarized in Section 5.3 and Section 6.2 and include topics such as wildlife management, fish habitat, traffic and access management, areas of interest for traditional use, dust management, climate change, reclamation, noise, and potential effects on drinking water.

Publicly available information regarding plant species of socio-economic or traditional use by Indigenous Nations was used to supplement Vitreo's baseline data collection programs, including for fish and aquatic resources (Section 12.2.6), vegetation and wetlands (Section 12.2.8) and wildlife and wildlife habitat (Section 12.2.9). The data sources used to include those environmental assessments and other reports related to those projects listed above. This publicly available data has not been ground-truthed with Participating Indigenous Nations, however it was included in this baseline program to

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help Vitreo understand the presence and abundance of species of potential importance to Indigenous Nations during field programs.

During the Early Engagement phase, all Participating Indigenous Nations have requested a cultural assessment or TLU study for the Project. These studies have not yet been initiated, and Vitreo will include the recommendations and findings of the studies in ongoing baseline programs if given permission by the relevant Participating Indigenous Nation to do so.

12.1 Available and Planned Studies

To date Vitreo has completed desktop studies and field work to characterize the existing bio-physical and human environment conditions in the Project area. A list of the ongoing, completed, and proposed baseline studies is presented in Table 12.1, and the preliminary results of these baseline programs are presented in the following sections.

These baseline studies and Vitreo's understanding of the biophysical and socio-economic environment were supported by additional studies, as outlined in the relevant sections below. Baseline studies were also informed by publicly available information regarding potential Indigenous Interests in the Project area as outlined above.

Monitors from McLeod Lake Indian Band and West Moberly First Nations participated in the baseline programs, as described in Table 5.1 (Section 5) and the Engagement Plan.

Study areas defined for the baseline studies and discussed in the subsequent sections are as follows:

- **Project Development Area (PDA):** Will include the Project footprint, or where ground disturbance is expected. It is inclusive of all the Project components listed in Table 10.2.
- **Local Study Area (LSA):** Includes the PDA and a buffer and includes an area within which Project impacts are anticipated to occur outside the PDA (e.g., fugitive dust and noise emissions). The LSA varies by area of study.
- **Regional Study Area (RSA):** Includes the PDA, LSA and a further buffer and provides regional context to the subject area. The RSA varies by area of study.

These study areas are defined and described below for subject areas, where relevant.

Table 12.1 Ongoing, Completed and Proposed Baseline Studies, and Relevant Guidance and Standards

Subject Area	Ongoing, Completed and Proposed Baseline Studies	Guidance and Standards
Air Quality	A meteorological station was installed at the Mine site in August 2022.	<ul style="list-style-type: none"> Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016)
Noise	A noise baseline study has been conducted in 2023.	<ul style="list-style-type: none"> BC Energy Regulator Noise Control Best Practices Guideline (BCER 2021) Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada 2017)
Geochemistry	Geochemistry studies commenced in September 2021 and are ongoing until 2024.	<ul style="list-style-type: none"> Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND 2009) Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (MEM & MOE 1998) Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (MEM 1998) Joint Application Information Requirements for <i>Mines Act</i> and <i>Environmental Management Act</i> Permits (MEMPR & MECCS 2019)
Groundwater Quantity and Quality	Groundwater monitoring wells have been installed on-site in 2022; ongoing monitoring studies are planned until at least August 2024.	<ul style="list-style-type: none"> Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016) BC Field Sampling Manual (MOE 2013) British Columbia Environmental Laboratory Manual and British Columbia Sample Preservation and Hold Time Requirements (ENV 2020)
Surface Water Quantity and Quality	Surface water quantity and quality baseline data collection programs commenced September 2021 and will continue until at least late 2024.	<ul style="list-style-type: none"> Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016) Manual of British Columbia Hydrometric Standards (RISC 2018) BC Field Sampling Manual (MOE 2013) Bathymetric Standards for Lake Inventories. Prepared by Ministry of Environment Ecosystems Branch for the Aquatic Ecosystems Task Force Resources Information Standards Committee (Version 3.0) (MOE 2009) British Columbia Environmental Laboratory Manual and British Columbia Sample Preservation and Hold Time Requirements (ENV 2020)
Fish and Aquatic Resources	Fish and aquatic resources baseline data collection program commenced September 2021 and will continue until 2024.	<ul style="list-style-type: none"> BC Field Sampling Manual (BC ENV 2020) Guidelines for Monitoring Fine Sediment Deposition in Streams (BC MWLAP 2002). Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016) Canadian Aquatic Biomonitoring Network (CABIN) Wadeable Streams Protocol (ECCC 2012) Level 1 Field Assessment from Fish Habitat Assessment Protocols (FHAP) (Johnson and Slaney 1996) Reconnaissance 1:20,000 Fish and Fish Habitat Inventory: Standards and Methods (BC RIC 2001)
Soils and Terrain	Soil and terrain studies have occurred in 2022 and 2023.	<ul style="list-style-type: none"> Guidelines and Standards to Terrain Mapping in BC (Resource Inventory Committee 1996) Terrain Classification System for BC, Revised Edition MOE Manual 10 (Howes and Kenk 1997) Mapping and Assessing Terrain Stability Guidebook, 2nd Edition August 1999 (British Columbia Ministry of Forests, British Columbia Ministry of Environment, Forest Practices Code 1999)
Vegetation and Wetlands	Vegetation and wetland baseline studies have been completed in 2022. Rare plant and invasive plants surveys are currently planned to occur during the growing season in 2024.	<ul style="list-style-type: none"> Standards for Terrestrial Ecosystem Mapping in BC (Province of BC 1998) Field Manual for Describing Terrestrial Ecosystems (BC Ministry of Forests and Range [MOFR] and BC MOE 2010) Canadian System of Soil Classification (SCWG 1998) Land Management Handbook 25 (BC MOFR and MOE 2010) A Field Guide to the Site Identification for the Southeast Portion of the Prince George Forest Region (DeLong 2003) A Field Guide for the Identification and Interpretation of Ecosystems for the Northern Rockies Portion of the Prince George Forest Region (DeLong et al. 1994) Standard for Terrestrial Ecosystem Mapping in BC and Standard for Mapping Ecosystems at Risk in BC (RIC 1998a, MOE 2006) Wetlands of British Columbia (MacKenzie and Moran 2004) Survey Methods for Rare Plants and Lichens (RISC 2018)

Subject Area	Ongoing, Completed and Proposed Baseline Studies	Guidance and Standards
Wildlife and Wildlife Habitat	Wildlife and wildlife habitat studies have been completed in 2022 and 2023.	<ul style="list-style-type: none"> • Inventory Methods for Pond-dwelling Amphibians and Painted Turtle (RIC 1998b) • Inventory Methods for Forest and Grassland Songbirds (RIC 1999a) • Inventory Methods for Woodpeckers (RIC 1999b) • Inventory Methods for Waterfowl and Allied Species (RIC 1999c) • Wildlife Habitat Rating Standards (RIC 1999d) • Inventory Methods for Raptors (RIC 2001) • Aerial-based inventory methods for selected ungulates (RIC 2002) • Moose Composition Surveys in the Southern Omineca Region (Klaczek 2016 Sowers et al. 2020) • Monitoring mammals with camera traps (Burton 2014, Tigner et al. 2014) • Inventory Methods for Bats (RISC 2022) • Song Meter SM3BAT User Guide (Wildlife Acoustics 2018) • Kaleidoscope Pro 5 User Guide and Automatic Bat Identification. Classifier Performance 5.4.0 (Wildlife Acoustics 2022a, b) • Echolocation Call Characteristics of Bats (Lausen et al. 2022, Szewczak 2008)
Socio-economics	A socio-economic desktop overview was completed in 2022 and a baseline study, including primary data from first person interviews, is currently planned for 2023 and 2024.	<ul style="list-style-type: none"> • Socio-economic and Environmental Assessment Guidance for Modernized Land Use Plans (FLNRORD 2022)
Biophysical Determinants of Health	Specific studies related to the biophysical determinants of health have not been conducted; however, the health assessment will utilize baseline data collected from other relevant disciplines to understand baseline conditions such as air quality, noise and water quality.	<ul style="list-style-type: none"> • British Columbia Guidance for Prospective Human Health Risk Assessment. Version 2.0 (BC Ministry of Health 2022)
Social Determinants of Health	A socio-economic desktop overview was completed in 2022 and a baseline study, including an overview of social determinants of health, is currently planned for 2023 and 2024.	<ul style="list-style-type: none"> • Standard Working Group Comments and Recommendations for Provincial Environmental Assessments in Northern British Columbia (Northern Health 2015). • The Social Determinants of health Impacts of Resource Extraction and Development in Rural and Northern Communities: A Summary of Impacts and Promising Practices for Assessment and Monitoring (Northern Health 2018). • Reclaiming Power and Place. The Final Report of the National Inquiry into Missing and Murdered Indigenous Women and Girls (National Inquiry into Missing and Murdered Indigenous Women and Girls 2019). • Understanding Indigenous Health Inequalities Through a Social Determinants Model. National Collaborating Center for Indigenous Health (Loppie, C & Wien, F 2022).
Archaeology and Heritage	An archaeological overview assessment (AOA) was completed in 2022. An archaeological impact assessment (AIA) was completed in 2023.	<ul style="list-style-type: none"> • British Columbia Archaeological Impact Assessment Guidelines (revised October 1998; Archaeology Branch 1998)

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During the Early Engagement phase, multiple reviewers, including West Moberly First Nations, EMLI, ENV, WLRS, and Northern Health requested additional detail on environmental baseline programs, particularly study design, standards and guidance followed, study locations and updates on findings, if available. These comments and questions were directed at a range of disciplines including geochemistry, water, atmospherics, fish and aquatic resources, vegetation, wildlife, terrain and health disciplines. In the interest of clarity and consistency Vitreo has updated the biophysical, human environment, and community well-being information in the following sections to reflect Project-specific study designs and execution, as well as provide a high-level summary of preliminary study results.

Changes to the baseline study programs since the submission of the IPD are listed below. All changes were made as a result of feedback received during the Early Engagement period.

- Baseline noise surveys were conducted at both Crystal Lake and Emerald Lake Recreation Sites as a result of concern raised by ENV about potential effects to these sites from the Project. This survey also included the Finishing Plant site to better understand baseline acoustic environment near to Bear Lake, and a hunting camp located near the North Olsson FSR which had been identified as a seasonal residence by other field crews during ongoing baseline programs.
- Targeted surveys for Bull Trout (*Salvelinus confluentus*) spawning habitat surveys have been conducted by unmanned aerial vehicle in January 2024 and additional surveys are planned using temperature loggers in the open water period of 2024. Environmental DNA (eDNA) surveys are also planned to be conducted in spring 2024 to record presence of Bull Trout in near-field and far-field reaches of Angusmac, Giggler and Olsson Creeks and their tributaries near the Mine site.
- Accommodation of communication protocols recommended by Northern Health in their comments made during Early Engagement to consult with BC Emergency Health Service and Northern Health's Resource Development Department.
- Baseline social determinants of health conditions have been included in Section 12.3.3 which include applying a more holistic definition of health, and discussing the social factors that contribute to health outcomes. Additional health outcomes such as risk behaviours, chronic conditions, communicable diseases, mental health, suicide, sense of belonging and community safety (including gender-based violence) have been included in the summary of existing conditions. Further information on disproportionate effects on segments of the population are planned to be included throughout the environmental assessment provided through additional engagement activities.
- Adjusting the Indigenous and community engagement program to help understand and identify the Project's potential interactions with the existing sense of place and identity within nearby communities. This outreach will be completed through focused group interviews and/or individual interviews while considering the historical, spiritual, and cultural significance of the area to residents. This engagement will be ongoing and will be documented in the Application, as information is available.

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- Adding a second round of ungulate winter survey in 2023 to confirm presence of ungulates in the wildlife study areas. Comments and concerns have been raised during the Early Engagement phase about potential effects on wildlife.
- Adding an additional hydrometric monitoring station in Giggler Creek to support a source evaluation for make-up water.

12.2 Biophysical Environment

The following sections provide a summary of baseline data collection methods and results to date by discipline. Additional detail will be provided in technical data reports and baseline study reports that will be included in the Application.

12.2.1 Atmospheric Environment

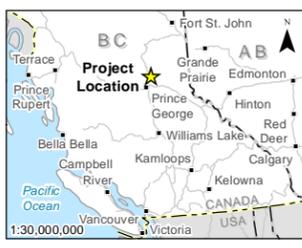
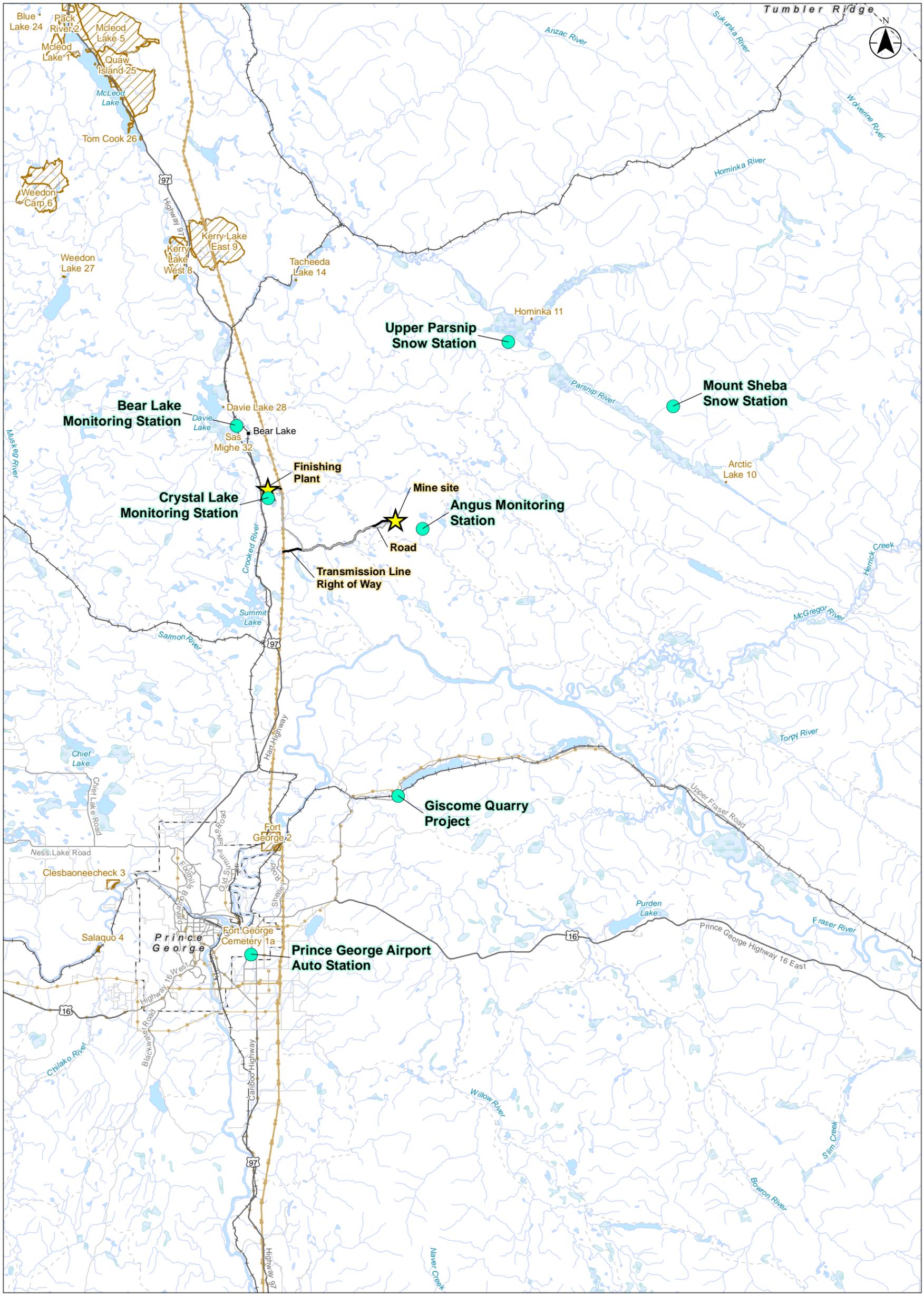
12.2.1.1 Methods

12.2.1.2 Meteorology

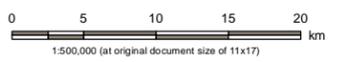
Vitreo established the Angus Monitoring Station on-site in late August 2022 at approximately 997 masl (Figure 12.1), which is currently collecting meteorology data and will do so until decommissioning (not currently planned). The location of the Angus Monitoring Station followed the guidance provided in the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations (MOE 2016). The station is required to be placed in an open level area with unobstructed wind flows.

The BC Wildfire Service maintains the Crystal Lake meteorological station located 883 m east of Highway 97 and 2 km south of the proposed Finishing Plant site. The Crystal Lake meteorological station is 13 km west northwest of the Mine site. The prevailing wind directions at the Crystal Lake monitoring station are south southeast and southerly. Local wind speeds are most often less than 4 metres per second (m/s). Higher wind speeds (i.e., 4-7 m/s) are infrequent from the west southwest and east-northeast directions.

Regional meteorological data are also available from the Bear Lake meteorology station, also operated by the BC Wildfire Service. The Bear Lake meteorology station is located 28 km northwest from the Angus Monitoring Station. Regional data is also available from the Prince George Airport Automated (PGAA) climate station operated by Environment and Climate Change Canada (ECCC) located approximately 60 km southwest from the Angus Monitoring Station. The location of the Angus Monitoring Station and the Crystal Lake and Bear Lake and PGAA meteorology stations is shown in Figure 12.1.



- Highway
- Road
- Local Street
- - - Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Indigenous Nations Reserve
- Municipal Boundary
- Project Location
- Road
- Transmission Line Right of Way
- Meteorology Station



Stantec **vitreo**

Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 123221734
 Prepared by: VWORTHINGTON on 20231012
 Requested by: DJARRATT on 20231010
 Checked by: DJARRATT on 20231012

Client/Project/Report
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description

Figure No.
12.1
 Title
Location of Angus and Regional Meteorology Stations

Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

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Data is scanned every five seconds and recorded to final storage hourly by a Campbell Scientific datalogger. The hourly data are reported weekly via the Inmarsat Broadband Global Area Network (BGAN) satellite network communications system to a password-protected File Transfer Protocol site hosted by Campbell Scientific Canada (CSC). CSC provided the datalogger program and wiring diagram for the Station. A list of the meteorology equipment installed on site is outlined below:

- Measurement and control datalogger to record air temperature and relative humidity (Campbell Scientific CR310)
- Rechargeable 12-volt lead acid battery (BP100-L)
- Solar panel with mount and regulator (SP50R-L10)
- Satellite modem terminal (Inmarsat BGAN Hughes9502)
- BaroVUE10 digital barometric pressure sensor (Campbell Scientific BaroVUE10)
- Probe for air temperature and relative humidity (Rotronics HC2-S3-L)
- Tipping bucket rain gauge (Environmental Measurements Ltd. SBS500-L)
- Alter wind screen for use with the tipping bucket gauge (NovaLynx Corporation Alter Screen 24)
- RM Young wind monitor (05108-L40)

The QA/QC methods used to scrutinize the raw data from the Angus Monitoring Station consist of visually confirming outlier values, investigating the cause of such data and removing outlier values when necessary. In addition, the data from the Angus Monitoring Station are compared to meteorology data from the nearest regional stations with longer periods of record (e.g., Crystal Lake and Bear Lake meteorology stations operated by the BC Wildfire Service and the PGAA climate station operated by ECCC).

12.2.1.3 Air Quality

Within the Project area there are limited continuous emission sources. Influences on air quality in the Project area may include emissions from residential heating, logging operations, traffic along the FSRs and Highway 97 and within the community of Bear Lake; and emissions that are transported from other regions. Natural background sources such as wildfires are also considered. Overall, the existing air quality in the Project area is considered good. Ambient monitoring data from other representative locations will be used to define the existing baseline air quality in the Project area.

Publicly available air quality monitoring stations are at least 38 km away from the Project. Measured concentrations for PM₁₀, PM_{2.5}, NO₂, SO₂ and CO were reviewed at several existing continuous monitoring stations in BC that were deemed representative of the study area by considering similarities in emission sources (i.e., industrial, transportation, residential heating), terrain influence, and meteorology. The monitoring stations reviewed include Farmington Community Hall, Taylor Townsite, Pine River Hasler, Burns Lake Fire Centre and Prince George Plaza 400.

Detailed Project Description

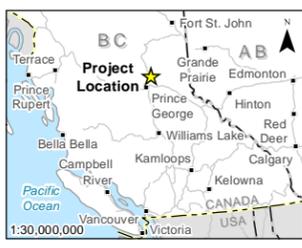
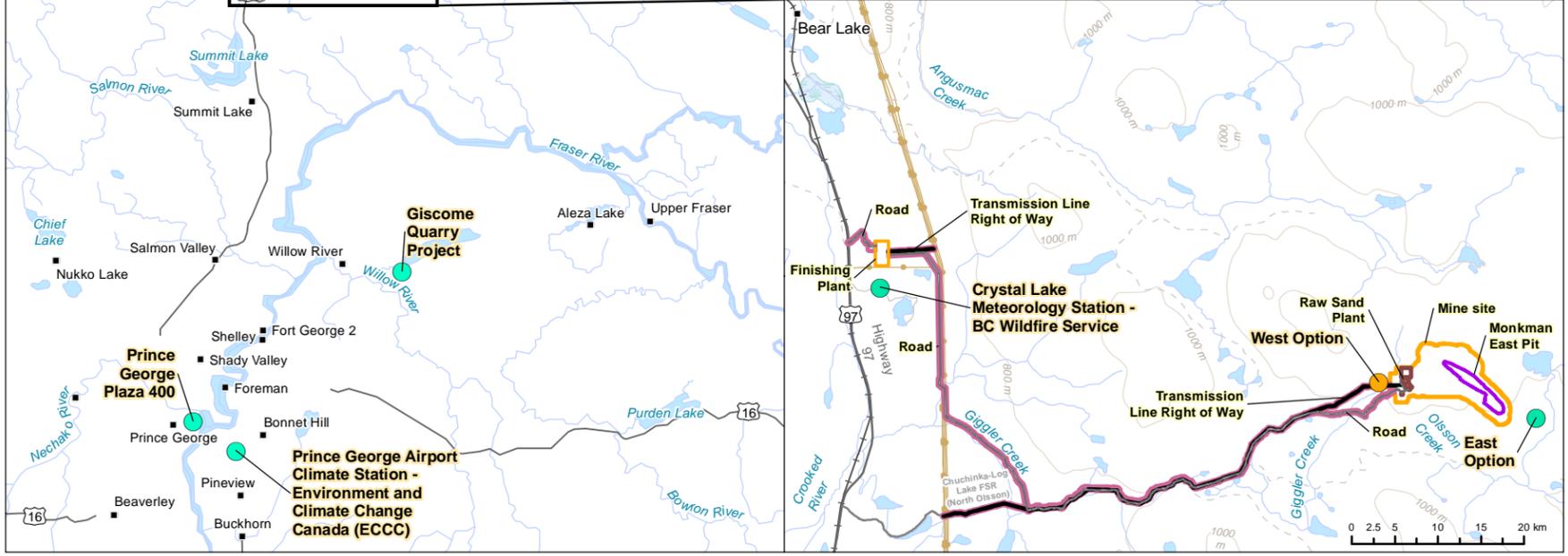
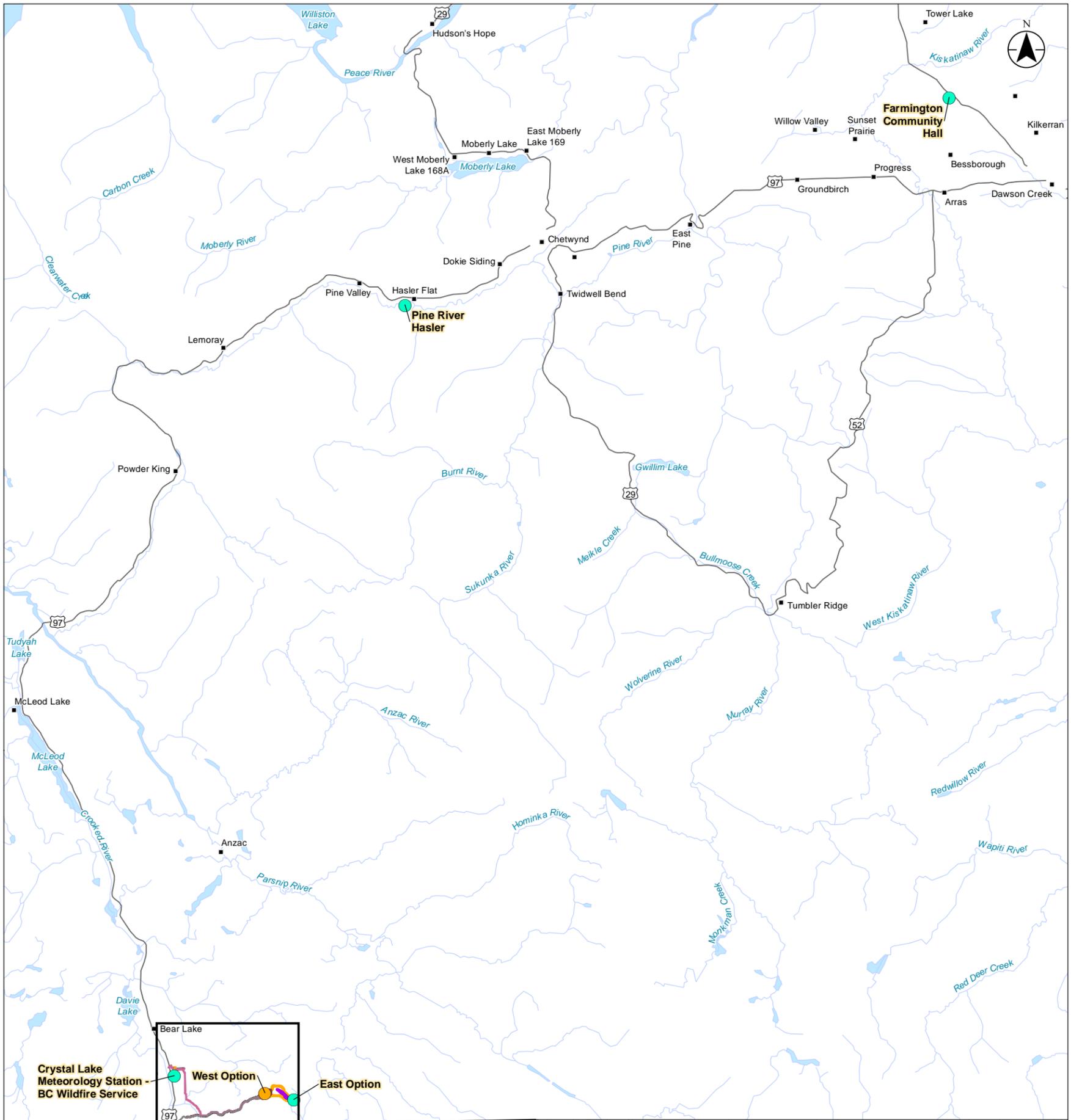
12 Existing Conditions

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These continuous monitoring stations are part of the BC ENV monitoring network and are subject to calibration and maintenance standard operating procedures, which include monthly equipment checks and twice-yearly audits (BC ENV 2022a). Data are validated through review and analysis during a three-month process by the BC ENV air data validation team (BC ENV 2022a).

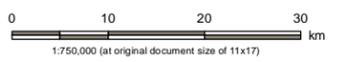
Continuous monitoring data are derived from the most recent and representative years of ambient air quality data in BC ENV's annual summaries of BC ambient air quality data (BC ENV 2023). Data from monitoring stations is used in the baseline determination if the quarterly data is at least 75% complete as required by the Guideline.

A summary of BC monitoring station locations, the Giscome Monitoring Station and substances reviewed are provided in Table 12.2. These stations are shown on Figure 12.2.



- Chuchinka-Log Lake FSR (North Olsson) - Site Access
- Highway
- Watercourse
- Waterbody
- ▭ Project Area
- ▭ Open Pit
- ▭ Raw Sand Plant
- ▭ Road
- ▭ Transmission Line Right of Way
- ▭ Corridor

- Air Quality Monitoring Station
- Existing
- Proposed



Stantec **vitreo**

Project Location: North Central, BC
 Project Number: 123221734
 NTS Mapsheet: 093J08
 Prepared by: VWORTHINGTON on 20211028
 Requested by: DJARRATT on 20211025
 Checked by: KKUNZMANN on 20220302

Client/Project/Report
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description

Figure No.
12.2
 Title
Location of Local and Regional Air Quality Monitoring Stations

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 February 5, 2024

Table 12.2 Summary of Monitoring Stations Locations and Substances Monitored

Monitoring Station	Elevation (m asl)	Location (UTM Zone 10, NAD83)		Data Period	Substances Monitored					
		m E	m N		TSP	PM ₁₀	PM _{2.5}	NO ₂	SO ₂	CO
Farmington Community Hall	696	654,284	6,199,184	2019 to 2021	-	-	-	X	X	-
Taylor Townsite	686	643,736	6,225,252	2019 to 2021	-	-	-	X	X	-
Pine River Hasler	610	564,752	6,162,665	2019 to 2021	-	-	-	-	X	-
Burns Lake Fire Centre	652	319,846	6,012,717	PM ₁₀ : 2019 and 2021 PM _{2.5} : 2019 to 2021	-	X	X	-	-	-
Prince George Plaza 400	601	516,913	5,974,062	PM ₁₀ : 2019 and 2021 PM _{2.5} : 2018 and 2021 NO ₂ and SO ₂ : 2019 to 2021 CO: 2010 and 2011	-	X	X	X	X	X
Giscome Monitoring Station	600	541,227	5,991,493	2008 to 2010	X	X	X	-	-	-

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12.2.1.4 Summary of Existing Conditions

12.2.1.5 Meteorology

The regional climate of the Project area is northern continental, with cool shoulder seasons, cold winters and short warm summers.

The daily average temperature at the PGAA is 4.3°C. January is the coldest month and July is the warmest month (-7.9°C and 15.8°C daily average temperature). The extreme temperatures range from -50°C (January 2, 1950) to 35.6°C (July 13, 2007). The annual precipitation at the PGAA is 595 millimetres (mm), of which 71% falls as rain. June is the wettest month (65.3 mm), and February is the driest month (29.5 mm). The average snowfall is 205 centimetres (cm) annually (ECCC 2023a).

The annual average air temperature at the Angus and Crystal Lake / Bear Lake stations was 3.2 degrees Celsius (°C), and it was 4.2°C at the PGAA during the 2022 to 2023 period of record (12 consecutive months). The long-term PGAA climate normal (30 years, 1981 to 2010) indicates a daily maximum air temperature of 9.7°C and the daily minimum air temperature of -1.1°C.

The annual average relative humidity was 74.2% at the Angus Station, 75% at the Crystal Lake / Bear Lake Station, and 69.9% at the PGAA for the 2022 to 2023 period of record. The annual average relative humidity from the long-term data (1981 to 2010) at the PGAA was 81.9%.

The annual average atmospheric pressure was 1,011.9 hectopascal (hPa) at the Angus Station, 926.7 hPa at the Crystal Lake / Bear Lake Station, and 934.9 hPa at the PGAA for the 2022 to 2023 period of record. The annual average atmospheric pressure from the PGAA long-term data (1981 to 2010) was 1,016 hPa.

The total annual rainfall at the Angus Station was 303.4 mm, 466.2 mm at the Crystal Lake / Bear Lake Station, and 330.3 mm at PGAA for the 2022 to 2023 period of record. The total annual rainfall from the PGAA long-term data (1981 to 2010) was 423.7 mm.

The wind speed and wind direction data were used to create an annual wind rose for the Angus Station. The predominant wind directions were from the east-southeast (11%), with secondary predominant winds from the north-northwest (8%) and southeast (7%).

The hourly snow depth values at the Angus Station ranged from 0 m to 1.85 m. Snow began to accumulate on November 3, 2022 (0.12 m snow depth) and finished melting on May 4, 2023 (0.01 m snow depth). The maximum snow depth occurred on February 21, 2023 (1.85 m snow depth).

12.2.1.6 Air Quality

Section 8.1.4 of the British Columbia Air Quality Dispersion Modelling Guideline (BC ENV 2022b) recommends developing baseline values using high percentile values which characterize baseline as a conservative metric of measured values (i.e., the 98th percentile for hourly and daily averages, and the mean values for annual averages). These values represent the greatest effects of all local industrial sources, natural background concentrations (globally and regionally), plus minor sources (local residential heating, vehicle emissions and road dust).

Table 12.3 provides the 98th percentile of measured concentrations at the considered BC monitoring stations for the most recent three (3) years with complete data record (quarterly completeness greater than 75%). The baseline concentration at each monitoring station was calculated as the average from the three years values. The baseline concentrations for NO₂ and SO₂ were calculated following the Guideline as the 3-year average of the 98th percentile (for NO₂) and 99th percentile (for SO₂) of daily 1-hour maximum (D1HM) concentrations. Table 12.3 shows that the measured NO₂, SO₂ and CO concentrations at the BC monitoring stations are less than the British Columbia Ambient Air Quality Objectives (AQOs), while the PM₁₀ and PM_{2.5} concentrations exceed the (AQOs).

The baseline ambient air concentrations used in the Giscome Project air quality assessment were reviewed and compared with the measurements from the BC monitoring stations. The baseline TSP, PM₁₀ and PM_{2.5} concentrations from the Giscome Project were based on analysis of ambient air quality monitoring data from the air quality baseline monitoring program conducted from 2008 to 2010. The 24-hour baseline levels were calculated as the 98th percentile (7th highest) of the 24-hour (daily) measured concentrations, as required by the Guideline for Level 2 and 3 assessments. The annual baseline levels were calculated as the annual mean of the hourly measured concentrations over a year, as required by the Guideline. The baseline NO₂ and CO concentrations from the Giscome Project were based on 2013 and 2009 monitoring data from Prince George Plaza 400 station, respectively, while baseline SO₂ concentrations were based on 2013 monitoring data from Pine River Hasler station. The 1-hour and 24-hour baseline levels were calculated as the 98th percentile of the hourly and daily measured concentrations.

The baseline TSP, PM₁₀ and PM_{2.5} concentrations from the Giscome Project were considered the most representative for the Project because the Giscome Project is located in a similar remote area with influence from nearby forestry activities, recreation activities, vehicle traffic and space heating. The baseline PM_{2.5} concentrations from the Giscome Project are similar in magnitude to the measured concentrations at Burns Lake Fire Centre monitoring station, which is located in a similar remote area as the Project, in the small community of Burns Lake with low population density.

The Farmington Community Hall monitoring station was considered the most representative of the Project for baseline NO₂ concentrations because the station is located in a similar remote area as the Project, in the small community of Farmington, and is not affected by other industrial emission sources. The measured NO₂ concentrations at the Taylor Townsite monitoring station and Prince George Plaza 400 are influenced by vehicle traffic and other residential emission sources in the Town of Taylor and in Prince George.

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The Pine River Hasler monitoring station was considered the most representative of the Project for baseline SO₂ concentrations because this is the closest monitoring station to the Project that measures SO₂ concentrations and the station is located in a remote area with little or no influence from industrial and residential emission sources. The measured SO₂ concentrations at the Pine River Hasler station are similar in magnitude to the measured SO₂ concentrations at the Farmington Community Hall monitoring station, which is located in a similar remote area with low population density and little or no influence by industrial or residential emission sources. The measured SO₂ concentrations at Prince George Plaza 400 and Taylor Townsite are influenced by urban vehicle traffic in Prince George and the Town of Taylor.

From the monitoring stations considered, only Prince George Plaza 400 monitoring station measures CO concentrations. Urban areas like Prince George tend to have higher CO concentrations proportionally to the volume of vehicle traffic and large stationary combustion sources that are present (ATSDR 2012). On this basis, baseline CO concentrations derived from the Prince George Plaza 400 monitoring station are viewed as conservative.

A summary of the baseline concentrations for the Project air quality assessment are provided in Table 12.3.

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Table 12.3 Summary Statistics for BC Continuous Ambient Air Quality Monitoring Stations and Giscome Project

Substance	Averaging Period	Ambient Air Quality Concentration ($\mu\text{g}/\text{m}^3$) ^a						BC Ambient Air Quality Objectives ($\mu\text{g}/\text{m}^3$) ^d
		Farmington Community Hall	Taylor Townsite	Pine River Hasler	Prince George Plaza 400 ^b	Burns Lake Fire Centre	Giscome Project ^c	
TSP	24-hour	-	-	-	-	-	43.6	120
	Annual	-	-	-	-	-	14.4	60
PM ₁₀	24-hour	-	-	-	61.2	80.6	27.1	50
PM _{2.5}	24-hour	-	-	-	78.2	20.1	16.3	25
	Annual	-	-	-	12.7	7.6	5.5	8
NO ₂	1-hour ^e	35.8	69.8	-	81.8	-	67.5	113
	Annual	4.9	10.2	-	15.6	-	19.2	32
SO ₂	1-hour ^f	21.0	98.5	10.3	88.4	-	2.1	183
	Annual	1.3	1.3	0.79	4.2	-	0.52	13
CO	1-hour	-	-	-	831	-	870	14,300
	8-hour	-	-	-	680	-	815	5,500

Notes:

^a Baseline concentrations are based on the 3-year average of the 98th percentile of 1-hour or 24-hour average concentrations for years 2019, 2020 and 2021, unless otherwise noted. Annual averages are calculated using all hourly measurements for year 2021.

^b PM₁₀ monitoring data from Prince George Plaza 400 is for 2019 and 2021. PM_{2.5} monitoring data is for 2018 and 2021. NO₂ and SO₂ monitoring data is for 2019, 2020 and 2021. CO monitoring data is for 2010 and 2011.

^c Baseline concentrations from the Giscome Project (Graymont Western Canada 2015b). Baseline TSP, PM₁₀ and PM_{2.5} concentrations are based on monitoring data from the Giscome Monitoring Station from 2008 to 2010. Baseline NO₂ and CO concentrations are based on 2013 and 2009 monitoring data from Prince George Plaza 400 monitoring station, respectively. Baseline SO₂ concentrations are based on 2013 monitoring data from Pine River Hasler monitoring station.

^d BC Ambient Air Quality Objectives (BC ENV 2021)

^e Baseline concentration is based on the average of the annual 98th percentile of daily 1-hour maximum concentrations for years 2019, 2020 and 2021.

^f Baseline concentration is based on the average of the annual 99th percentile of daily 1-hour maximum concentrations for years 2019, 2020 and 2021.

Values in **BOLD** and highlighted cells represent the selected representative baseline concentrations for the Project.

12.2.2 Acoustic Environment

Environmental noise assessment of the Project requires the quantification of existing condition or baseline sound level. Project noise has the potential to affect nearby residents, Indigenous Nations, land users, and wildlife. To support the environmental assessment of the Project, a baseline noise monitoring program has been developed and carried out within the Project boundary or near Project components or planned activities. The objective of the noise monitoring program is to quantify the existing acoustic environment or baseline sound levels within the LSA. The monitoring results provided baseline sound levels at the selected locations prior to Project activities.

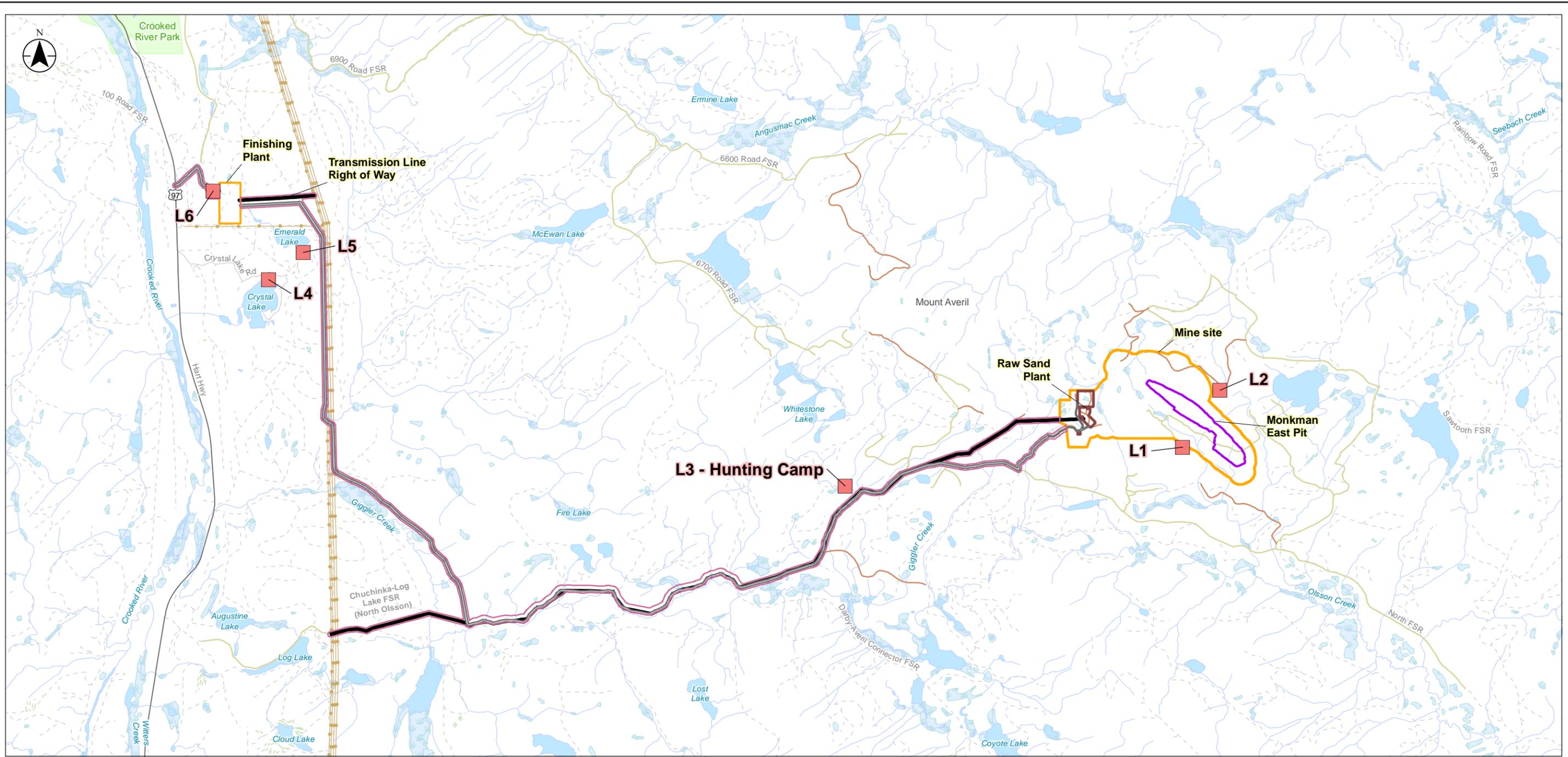
12.2.2.1 Methods

Baseline noise monitoring was conducted at six locations within the LSA (i.e., L1, L2, L3, L4, L5, and L6) in July and November 2023. Figure 12.3 shows the six noise monitoring locations.

A description of the monitoring locations is presented as follows:

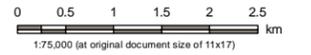
- L1 is a remote location within the LSA of the Mine site approximately 300 m from the Mine boundary
- L2 is a remote location within the LSA of the Mine site approximately 500 m from the Mine boundary
- L3 is an existing hunting camp approximately 0.3 km from the proposed haul road
- L4 is located at the Crystal Lake recreation along the lake, approximately 1 km from the Haul Road and 1.3 km from the Finishing Plant site
- L5 is located within the Emerald Lake recreational site, approximately 0.3 km from the Haul Road and 1.5 km from the Finishing Plant site
- L6 is within the Finishing Plant site

During baseline noise monitoring, a Type 1 integrating sound level metre was used to collect periodic sound level data as well as audio recordings, while a portable weather station was deployed to record the weather data including the temperature, humidity, and wind speeds.



Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Highway
- Local Street
- - - Resource Road
- - - Trail
- Transmission Line
- Watercourse
- Wetland
- Provincial Park, Ecological Reserve, or Protected Area
- Decommissioned FSR
- Vehicle Accessible FSR
- Project Area
- Open Pit
- Raw Sand Plant
- Road
- Transmission Line Right of Way
- Corridor
- Noise Monitoring Location



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231116
 Requested by: LDESANDOLI on 20231115
 Checked by: LDESANDOLI on 20231116

Client/Project/Report:
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description
 Figure No.:
12.3
 Title:
Noise Monitoring Locations

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The sound level metre collects the following data:

- One-minute integrated A-weighted overall sound levels ($L_{eq,1min}$) in A-weighted decibels (dBA).
- One-minute integrated linear sound levels at one third octave band frequency ($L_{eq,1min}$) in decibels (dB).
- Continuous audio sound recording for the duration of the field survey.

Isolation analysis is performed for the measured sound level data to exclude the periods of non-representative weather conditions (e.g., thunderstorm, rain or wind speeds above 15 km/h) and abnormal events (e.g., technician activities and animals). Audio recordings of the measurements are reviewed to identify the abnormal events.

After removal of sound measurement data associated with non-representative weather conditions and abnormal events, the remaining data will be considered as representative of baseline conditions. The daytime (7:00 AM to 10:00 PM) equivalent sound levels (L_d) and nighttime (10:00 PM to 7:00 AM) equivalent sound levels (L_n) will be determined at each measurement location.

In addition to field measurement at a specific location, provincial noise guideline (BC Energy Regulator Noise Control Best Practices Guideline [BCER 2021]) and federal noise guidance (Health Canada Evaluating Human Health Impacts in Environmental Assessment: Noise [Health Canada 2017]) can be used to estimate the baseline noise level, based on a qualitative description of community characteristics and population density. In addition, the provincial noise guideline and federal noise guidance provides recommendations for baseline sound level for rural area.

12.2.2.2 Summary of Existing Conditions

Data analysis for the noise monitoring is currently in process. Results can be shared with the TAC, including Participating Indigenous Nations, when available. Therefore, no summary of existing conditions for acoustic environment at the specific monitoring locations is currently provided.

BCER noise guideline recommends a L_d of 45 dBA and L_n of 35 dBA for a receptor in a rural area. An area with population density of less than eight residential dwellings within a quarter sector is considered as rural. Health Canada recommends a day-night sound level L_{dn} of 45 dBA for quiet rural area. The recommended L_d of 45 dBA and L_n of 35 dB also result in an L_{dn} of 45 dBA. An average census population density of 28 people or less per square km is categorized as a quiet rural area. Health Canada also recommends one conservative (i.e., most protective) approach is to consider a reasonable worst-case scenario and assume L_{dn} baselines of 35 dBA for rural areas and 45 dBA for urban/suburban areas.

12.2.3 Geochemistry

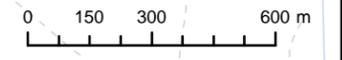
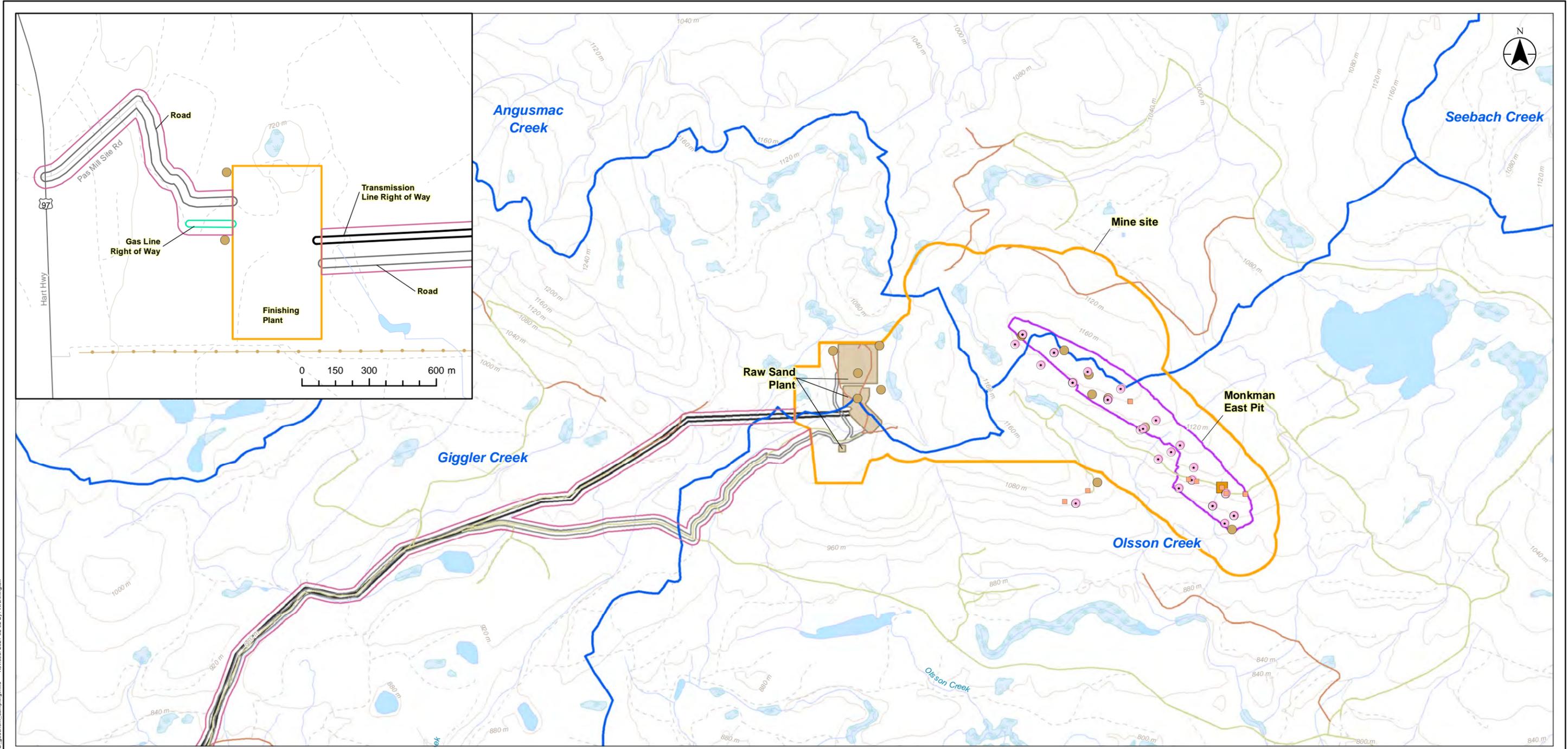
Project geology is composed of meta-sedimentary rocks and sedimentary rocks of the Unnamed Group, Monkman Quartzites, and Kechika Group. The quartz arenite deposit includes the quartz arenite and quartzite-dominated laminated units. These units are dominantly composed of quartz and dolomite. The surrounding rock is composed of limestone, shale, mudstone, conglomerate, shale-dominated laminated unit, breccias, graptolitic mudstone, argillite, and recrystallized fossiliferous dolostone. The waste rock units are dominantly composed of quartz, dolomite, calcite, ankerite, and illite/muscovite, with minor amounts of marcasite and pyrite. Samples were collected from the quartz arenite deposit and surrounding lithologies to evaluate metal leaching and acid rock drainage (ML/ARD) potential and to identify materials that may have higher risk of ML/ARD generation where excavation should be avoided.

12.2.3.1 Methods

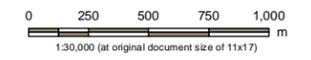
Geochemical characterization of overburden, waste rock, quartz arenite deposit, and fines is being conducted to evaluate the potential for ML/ARD. The program design for the geochemical characterization was conducted in accordance with guidance documents, including:

- Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND 2009)
- Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (MEM & MOE 1998)
- Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (MEM 1998)
- Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits (MEMPR & MECCS 2019)

Samples were collected from the Monkman East Pit, Raw Sand Plant, and Finishing Plant site (Figure 12.4). Overburden samples were collected from each of these three areas where disturbance may occur during construction. Overburden disturbance may also occur during preparation of stockpile areas and additional overburden samples will be collected when the final locations are selected. Quartz arenite deposit samples and the surrounding materials (referred to as waste rock) were collected from the Monkman East Pit. Waste rock excavation is not expected to be required during construction of the Raw Sand Plant and Finishing Plant and samples will be collected prior to disturbance if required for site construction. A quartz arenite processing test was conducted on a trench sample collected from the Monkman East Pit, and geochemical characterization was conducted on fines generated during the processing test.



- Trench Sample Location
- Project Area
- Resource Road
- Decommissioned FSR
- Bore Hole
- Corridor
- Topographic Contour
- Vehicle Accessible FSR
- Overburden
- Open Pit
- Watercourse
- Wetland
- Watershed Boundary
- Rock Sample Location
- Raw Sand Plant
- Road
- Transmission Line Right of Way
- Gas Line Right of Way



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231107
 Requested by: CATHERTON on 20231101
 Checked by: CATHERTON on 20231107

Client/Project/Report:
Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description

Figure No.
12.4
 Title
Geochemical Characterization Sample Locations

Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada; Imagery: Vitreo Orthophotos, ESRI World Imagery

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Static test results are used to evaluate samples at a single point in time and to evaluate variability in the lithologies tested, and kinetic tests are used to evaluate potential metal leaching rates. Consistent with the guidelines for evaluating ML/ARD (MEND 2009), selected static and kinetic test analyses were conducted on the samples as summarized in Table 12.4.

Table 12.4 Summary of Static and Kinetic Tests Conducted for Geochemical Characterization

Type	Analysis	Overburden			Waste Rock	Fines
		Monkman East	Raw Sand Plant	Finishing Plant	Monkman East	
Static test	Particle size distribution	-	-	-	8	1
	X-ray diffraction	-	-	-	8	1
	Whole rock analysis	-	-	-	8	1
	Total metals	11	9	2	103	2
	Acid base accounting	11	9	2	103	2
	Shake flask extraction	11	9	2	103	2
Kinetic test	Humidity cell tests	-	-	-	8	2

Acid base accounting results were screened against criteria for identifying ARD potential presented in the guidance documents (MEND 2009). Total metal results were screened against average crustal abundance estimates (Rudnick and Gao 2014, Price 1997) and shake flask extract results were screened against BC water quality guidelines to identify samples with elevated concentrations. Samples greater than the screening criteria will not necessarily result in elevated concentrations in leachate; however, parameters greater than the screening criteria may need additional investigation.

12.2.3.2 Preliminary Results

Samples were collected for static testing from 2021 to 2023. Kinetic tests were initiated from selected static test samples in 2022 and 2023. Kinetic tests are recommended to be run for a minimum of 40 weeks or until leachate results stabilize (MEND 2009), therefore the kinetic tests are ongoing.

Overall, results indicate the waste rock, quartz arenite deposit, and fines are non-potentially acid generating and have limited potential for metal leaching.

Waste rock and quartz arenite results indicate:

- Limited ARD potential. Solid phase total metals concentrations and leachable metals concentrations from shake flask extraction tests were used to assess metal leaching potential. Solid phase total metal concentrations were elevated above screening criteria for: silver, arsenic, barium, mercury, manganese, nickel, selenium, thallium, and uranium. Results greater than the shake flask extraction screening criteria occurred for the elements: arsenic, chromium, copper, lead, antimony, selenium, silver, uranium. Results were typically not greater than both metals screening criteria in a single sample except for antimony in shale and selenium in recrystallized

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fossiliferous dolostone. The current mine plan is anticipated to excavate limited quantities of shale and avoid the excavation of recrystallized fossiliferous dolostone. Results greater than the screening criteria will not necessarily result in elevated concentrations in leachate, but rather identify parameters requiring further investigation in the kinetic test program to evaluate leaching rates.

- X-ray diffraction results indicates waste rock are dominantly quartz or carbonate, including calcite, dolomite, and ankerite, with some illite/muscovite and minor sulphides including marcasite and pyrite.
- Kinetic tests of selected lithologies are in progress and these data will be used to further evaluate metal leaching potential. Kinetic testing data will be used to develop source terms for the water quality model, which will be used to evaluate discharge and receiving environment water quality.

Fine wastes results indicate:

- Limited neutralization potential, but acid potential below the limit of detection, indicating limited overall ARD potential.
- Limited ML potential.
- The fine wastes are dominantly composed of quartz (96.9%) and aluminosilicates (3.1%) which are minerals with low ML/ARD potential.
- Kinetic tests of fine wastes samples are in progress and these data will be used to further evaluate ML potential. Kinetic testing data will be used to develop source terms for the water quality model, which will be used to evaluate discharge and receiving environment water quality.

Overburden results indicate:

- Limited acid potential may exist in samples collected above 1.0 mbgs; however, excess neutralization potential is available samples collected below 1.0 mbgs. Overall, results indicate the potential for acid generation from overburden is low.
- Limited ML potential.

The results from the geochemical characterization program will be used, along with complementary programs such as the baseline surface water quality investigation, to develop water quality predictions resulting from the Project. The results of the baseline geochemical characterization program and the water quality model will support mine design, development and closure planning to avoid the generation of ML/ARD and limit the need for long term mitigation measures.

12.2.4 Groundwater Quantity and Quality

Baseline groundwater quantity and quality data is collected at the Mine site via a network of 20 monitoring wells at thirteen locations across Vitreco's Multi-year Area Based Permit area and the Finishing Plant site (Figure 12.5).

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The monitoring wells were installed in September 2022. Quarterly groundwater sampling commenced in December 2022 and is planned to continue through to at least 2024. The monitoring well locations were selected to intersect potential groundwater flow-paths between proposed Project components and the downgradient receiving environment. Select monitoring wells were also placed to intersect groundwater flow-paths from areas upgradient of the proposed components. The monitoring well locations and rationale for their selection are summarized in Table 12.5 and illustrated on Figure 12.5.

Table 12.5 Baseline Data Collection Monitoring Well Network

Loc. ID	Monitoring Well ID	Project Component	Watershed	Site Rationale
1	MW22-01	Monkman East Pit	Olsson Creek	Groundwater conditions within the Monkman East Pit footprint.
2 ¹	MW22-02D	Upgradient Reference	Olsson Creek	Interception of groundwater flowpaths originating upgradient of the Mine Site.
	MW22-02S	Upgradient Reference	Olsson Creek	Interception of groundwater flowpaths originating upgradient of the Mine Site.
3	MW22-03D	Monkman East Pit	Olsson Creek	Deep groundwater conditions within the Monkman East Pit footprint.
	MW22-03S	Monkman East Pit	Olsson Creek	Shallow groundwater conditions within the Monkman East Pit footprint.
4	MW22-04D	Reclaim Sediment Ponds	Olsson Creek	Potential deep flowpaths from the Reclaim Sediment Ponds into Olsson Creek Watershed.
	MW22-04S	Reclaim Sediment Ponds	Olsson Creek	Potential deep flowpaths from the Reclaim Sediment Ponds into Olsson Creek Watershed.
5	MW22-05D	External Waste Rock and Fines Stockpile	AngusMac Creek	Deep groundwater flowpaths downgradient of the External Waste Rock and Fines Stockpile and Monkman East Pit.
	MW22-05S	External Waste Rock and Fines Stockpile	AngusMac Creek	Shallow groundwater flowpaths downgradient of the External Waste Rock and Fines Stockpile and Monkman East Pit.
6	MW22-06	Monkman East Pit	Olsson Creek	Deep groundwater flowpaths downgradient of the Monkman East Pit.
7	MW22-07D	External Waste Rock and Fines Stockpile	AngusMac Creek	Deep groundwater conditions underlying the Stockpile.
	MW22-07S	External Waste Rock and Fines Stockpile	AngusMac Creek	Shallow groundwater conditions underlying the Stockpile.
8 ¹	MW22-08D	Baseline groundwater conditions	Olsson Creek	Baseline groundwater conditions far-field from Mine Components.
	MW22-08S	Baseline groundwater conditions	Olsson Creek	Baseline groundwater conditions far-field from Mine Components.
9	MW22-09	Reclaim Sediment Ponds and External Waste Rock and Fines Stockpile	AngusMac Creek	Shallow groundwater flowpaths downgradient of the Reclaim Sediment Ponds and the External Waste Rock and Fines Stockpile.

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Loc. ID	Monitoring Well ID	Project Component	Watershed	Site Rationale
10	MW22-10D	Raw Sand Plant	Giggler Creek	Deep groundwater flowpaths downgradient of the Raw Sand Plant.
	MW22-10S	Raw Sand Plant	Giggler Creek	Shallow groundwater flowpaths downgradient of the Raw Sand Plant.
11	MW22-11	Monkman East Pit	Olsson Creek	Shallow groundwater flowpaths far-field and downgradient Mine Components.
12	MW22-12	Upgradient Reference	Olsson Creek	Upgradient reference groundwater conditions.
13	MW22-13	Finishing Plant site	Crooked River	Shallow groundwater conditions underlying the Finishing Plant site.

12.2.4.1 Methods

Groundwater Quantity

A hydrogeological site investigation program was completed in September 2022. The program included drilling and installing the monitoring well network (Table 12.5) to support the collection of baseline groundwater data and develop an understanding of baseline groundwater conditions at the Mine site. Work completed during the site investigation included advancing 650 metres of borehole through unconsolidated sediment and bedrock and completing airlift testing, logging cuttings, and the installation of 2-inch monitoring wells across the most permeable horizons identified. Paired shallow and deep monitoring wells were installed at seven of the 13 monitoring locations (Table 12.5).

Monitoring wells at the Mine site were developed using a Waterra™ actuator pump and dedicated tubing following Stantec's standard operating procedures and guidance outlined in the (ENV) BC field sampling manual (ENV 2021).

Single well response hydraulic conductivity tests (response tests) were completed to estimate the permeability of geologic material in the immediate vicinity of the monitoring well screens. Falling and rising head response tests were completed at each monitoring well by perturbing the groundwater level in the well using a solid PVC slug, bailer, or shut-in test, and recording the water level response using a pressure transducer. Groundwater level recovery data were analyzed using the Bouwer and Rice (1976); Hyder et al. (1994), and Springer and Gelhar (1991) analytical solutions following the analysis procedure recommended by Butler (2020).

Groundwater levels in each monitoring well are recorded using a pressure transducer collecting data at a 30-minute frequency. Groundwater levels recorded by the transducers are confirmed with manual measurements collected during quarterly groundwater sampling efforts.

Groundwater Quality

Groundwater quality samples have been collected during Q4 2022, Q1 2023, Q2 2023, and Q3 2023 sampling site visits following guidance in the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016), and in the British Columbia Field Sampling Manual (ENV 2021).

Samples were collected using a pneumatic bladder pump and the low-flow sampling method (preferred method) at monitoring wells that screen sufficiently permeable stratigraphy. An inertial lift pumping system (Waterra™ actuator and foot valve) was used to purge and sample monitoring wells where permeability is too low to utilize a bladder pump. Single-use high density polyethylene (HDPE) bailers were used to purge and sample low-permeability monitoring wells with a limited standing water column. In situ water quality parameters (i.e., temperature, pH, specific conductance, dissolved oxygen, oxidation/reduction potential, and turbidity) were measured using calibrated multiparameter meters during the collection of each groundwater sample.

Samples were sent to ALS Environmental Limited, a Canadian Association for Laboratory Accreditation certified laboratory, in Burnaby, BC for analysis. Samples were analyzed for physical parameters, anions, nutrients, organic carbon, and total and dissolved metals. The British Columbia Environmental Laboratory Manual and British Columbia Sample Preservation and Hold Time Requirements (ENV 2020) were used to guide analysis.

The overall data quality objective for the groundwater quality baseline data collection quality QA/QC program is to collect reproducible and representative groundwater quality data and data that is suitable for comparison to the BC Contaminated Sites Regulation (CSR) Schedule 3.2 generic numerical water standards for freshwater aquatic life (AWF).

The groundwater quality QA/QC program followed protocols outlined in the British Columbia Field Sampling Manual (ENV 2021) and British Columbia Environmental Laboratory Manual (ENV 2020) for the field and laboratory activities. QA/QC procedures include using standardized sampling forms, chain of custody forms, the collection of trip, equipment, and ambient field blanks and duplicate samples, and laboratory QA/QC measures. The Project groundwater quality data are stored in an ESDat™ database to maintain data integrity.

12.2.4.2 Summary of Existing Conditions

Groundwater flow at the Mine site is expected to occur radially from upland areas at the junction of the Angusmac, Giggler, and Olsson Creek watersheds towards lower elevations. Groundwater recharge will occur across the upland areas while groundwater discharge will occur predominately in the lowland areas and contribute to streamflow in the valley bottoms. Groundwater may also discharge as seeps at the toe of steep slopes, or in other areas where topography intersects the groundwater table. In general, the groundwater table is expected to be a subdued expression of topography, with groundwater levels farther below ground surface beneath upland areas and ridges than beneath valley bottoms.

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A summary of groundwater flow conditions observed and inferred thus-far at the Mine site include the following:

- The hydraulic conductivity of sediments and bedrock stratigraphy at the Mine site range from less than 1×10^{-8} m/s to 9.8×10^{-4} m/s.
- Seasonal groundwater fluctuations are generally characterized by annual high groundwater levels in either May or June and annual low groundwater levels in either March or September. The magnitudes of the seasonal fluctuations across the Project are, in general, less than 3 m.
- Downward gradients, indicating groundwater recharge conditions, occur at four of the seven paired monitoring well locations.
- Upward gradients occur at three of the seven paired monitoring well locations. Two of these locations are in upland areas where downward gradients were expected.

There are no exceedances of CSR AWF guidelines in the groundwater sample dataset collected to date. At monitoring locations with paired well installations groundwater collected from shallow monitoring wells tend to indicate fresher, more recently recharged water than groundwater collected from deeper monitoring wells.

12.2.5 Surface Water Quantity and Quality

To characterize baseline surface water quantity and quality, a sampling program was initiated in September 2021 and continues to present. The surface water quantity and quality program includes 16 stream sites, two lake sites, and four automated hydrometric monitoring stations. The program incorporates potential exposure sites and reference sites. The sampling sites and the rationales for their selection are summarized in Table 12.6 and illustrated in Figure 12.6.

12.2.5.1 Water Quantity Methods

The hydrometric monitoring program developed to assess local hydrology followed criteria outlined in the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016). The methods used in data collection, analysis, and reporting followed guidance from the Manual of British Columbia Hydrometric Standards (RISC 2018a).

Three hydrometric monitoring locations along streams potentially impacted by the Project, and one reference station outside of the PDA were established during an initial site visit in September 2021, however, due to supply chain issues experienced during the COVID19 pandemic, no automated monitoring equipment was installed at these sites. Site-specific datums, benchmarks, and 1 m staff gauges were established, and stage-discharge measurements were collected. Monthly discharge measurements were completed throughout winter 2021-2022, and the automated monitoring equipment was installed in April 2022. Data collected prior to the installation of automated monitoring station is used for rating development at each station, and to generate annual hydrometric indices for each stream.

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Concurrent water level (stage) and discharge measurements were collected at active streamflow sites beginning in April 2022 to develop stage-discharge relationships (rating curves) at each site. Annual discharge hydrographs were generated by applying the rating curves to the recorded stage records. Stage values recorded in 15-minute increments by the datalogger at each station were corrected relative to the gauge datum established at each station. The corrected stage values were then inserted into the rating equation, resulting in a record of discharge over time in 15-minute increments. The discharge values were then averaged over a 24-hour period to produce the mean daily average discharge (m^3/s).

Rating equations developed for each station were used during the open-water conditions. During winter, ice and snow encroaches in the channel, changing conditions and precluding the application of the rating curve. Therefore, during winter, discharge was extrapolated between manual measurements to estimate flows when the rating curves could not be utilized.

Observed and estimated discharge records were used to calculate several hydrologic indices useful in describing streamflow characteristics and comparing streams of varying magnitudes with differing drainage characteristics. Mean annual discharge (m^3/s), annual runoff (depth of water, mm), and peak and low flows were calculated at each of the stations.

12.2.5.2 Water Quality Methods

Surface water quality samples have been collected following the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016), including the recommended QA/QC protocols, and methods described in the BC Field Manual (MOE 2013). The baseline surface water quality program includes 16 stream sites and two lake sites; these sites include potential exposure sites downstream of the Project and reference sites unaffected by the Project. The sampling sites and the rationales for their selection are summarized in Table 12.6 and illustrated in Figure 12.6.

Water quality samples at stream sites were collected monthly between September 2021 and October 2023. In May 2023, five samples were collected over a 30-day period (i.e., 5-in-30) to characterize water quality during the spring freshet. At each stream site, in situ water quality parameters (i.e., temperature, pH, specific conductance, dissolved oxygen, and turbidity) were measured using hand-held, calibrated multiparameter metres. Surface water quality grab samples were collected in laboratory-supplied clean bottles. Water quality sampling continues monthly at a reduced number of stream sites.

Water quality samples were collected in Lakes AC-L1 and AC-L2 in June, August, and October of 2022 and 2023. Sampling included vertical limnological profiles and water quality sampling at the lake inlets and in the deepest areas of each lake. An e-line bathymetry survey was conducted following BC standard protocols (MOE 2009) to identify the deepest areas for sampling.

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Table 12.6 Surface Water Quality Sampling Sites for Baseline Characterization, Angus Project, 2021 to 2023

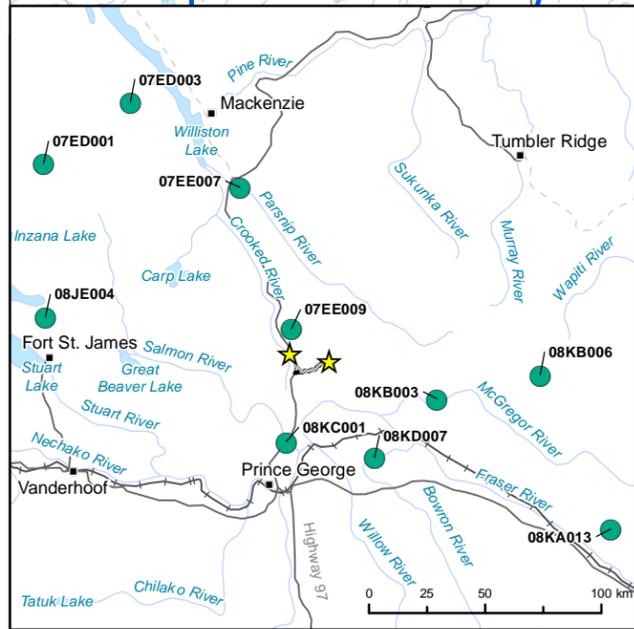
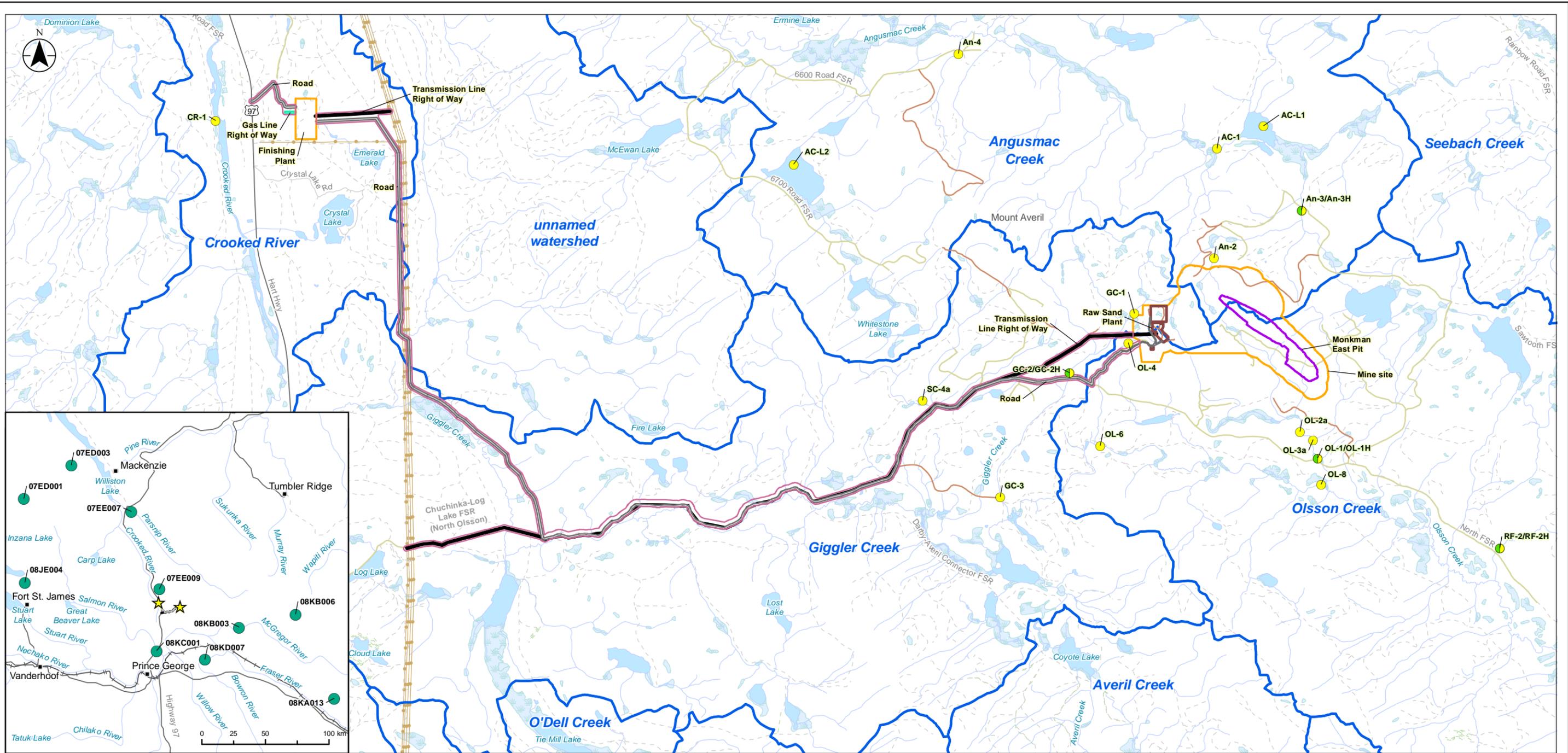
Watershed	Site ID ³	Stream Name	Location ¹		Project Component ²	Site Rationale and Description
			Easting	Northing		
Stream Sites						
Olsson Creek	OL-1/OL-1H	Olsson Creek	543458	6025301	ME	Potential cumulative effects exposure site downstream from Monkman East Pit. Corresponding hydrometric gauging station site. Logging in the watershed.
	OL-2a	Olsson Creek	543118	6025808	ME	Potential exposure site downstream of Monkman East Pit. No apparent surface water connection from proposed pit. Site allows for assessment of potential effects via groundwater. Logging in the watershed.
	OL-3a	Unnamed tributary to Olsson Creek	543369	6025645	ME	Potential exposure site downstream of Monkman East Pit. No apparent surface water flow from the pit to the stream. Site allows for assessment of potential effects via groundwater. Logging in the watershed.
	OL-4	Unnamed tributary to Olsson Creek	539848	6027490	RSP	Potential exposure site downstream from the Raw Sand Plant. Logging in the watershed.
	OL-6	Unnamed tributary to Olsson Creek	539303	6025506	RSP	Potential exposure site downstream of the Raw Sand Plant. Logging in the watershed.
	OL-8	Olsson Creek	543519	6024802	RSP, ME	Olsson Creek downstream of Raw Sand Plant and Monkman East Pit. Logging in the watershed.
	RF-2/RF-2H	Unnamed tributary to Olsson Creek	546924	6023592	Ref	Reference site for Olsson Creek sub-watershed and the Project in general. Corresponding hydrometric gauging station site. Logging in the watershed.

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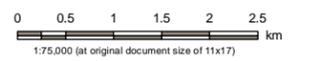
Watershed	Site ID ³	Stream Name	Location ¹		Project Component ²	Site Rationale and Description
			Easting	Northing		
Angusmac Creek	AC-1	Angusmac Creek	541573	6031145	ME	Angusmac Creek baseline water quality downstream of lake. Logging in the watershed.
	AN-2	Unnamed tributary to Angusmac Creek	541411	6028928	ME	Potential exposure site downstream from Monkman East Pit. Adjacent watershed has been logged to an approximately 30 m riparian buffer and seedlings are approximately five years old.
	AN-3/AN-3H	Unnamed tributary to Angusmac Creek	543149	6030016	ME	Potential exposure site downstream from Monkman East Pit. Corresponding hydrometric gauging station site. Logging in the watershed.
	AN-4	Unnamed tributary to Angusmac Creek	536621	6032994	Ref	Angusmac Creek sub-watershed reference site.
Giggler Creek	GC-1	Giggler Creek	539967	6028064	RSP	Potential exposure site in Giggler Creek downstream from proposed Raw Sand Plant. Site allows for assessment of potential effects via effluent discharge if required. Logging in the watershed.
	GC-2/GC-2H	Giggler Creek	538730	6026922	MW, RSP	Potential exposure site in Giggler Creek downstream from proposed Raw Sand Plant. Site allows for assessment of potential effects via effluent discharge if required. Corresponding hydrometric gauging station site. Logging in the watershed.
	GC-3	Giggler Creek	537411	6024561	MW, RSP	Potential exposure site in Giggler Creek downstream from proposed Raw Sand Plant. Upstream of lakes in the watershed. Logging in the watershed.
	SC-4a	Sunburn Creek	535932	6026396	Ref	Giggler Creek sub-watershed reference site. Logging in the watershed.
Crooked River	CR-1	Crooked River	522472	6031721	FP	Potential exposure site in Crooked River associated with the FP. Site allows for assessment of potential effects from effluent discharge if required.

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Watershed	Site ID ³	Stream Name	Location ¹		Project Component ²	Site Rationale and Description
			Easting	Northing		
Lake Sites						
Angusmac Creek	AC-L1	Unnamed Lake	542425.6	6031620	ME	Potential exposure site from Monkman East Pit. Logging in the watershed.
	AC-L1 Inlet	Unnamed Lake	542581.2	6031452	ME	Potential exposure site from upstream Monkman East Pit.
	AC-L2	Grizzly Lake	533478.2	6030894	Ref for AC-L1	Reference lake. Logging in the watershed.
	AC-L2 Inlet	Grizzly Lake	533755.1	6030259	Ref for AC-L1	Reference lake. Logging in the watershed.
Notes:						
¹ All sites are in UTM Zone 10U, Datum: NAD27.						
² Project components: FP = Finishing Plant site; ME = Monkman East Pit; RSP = Raw Sand Plant; Ref = reference site.						
³ Site ID names with "H" denote locations with automated hydrometric monitoring stations.						



- Highway
- Local Street
- - - Resource Road
- - - Trail
- Transmission Line
- Watercourse
- Wetland
- Decommissioned FSR
- Vehicle Accessible FSR
- Watershed Boundary
- Water Quality Sampling Location
- Hydrometric Monitoring Station and Water Quality Sampling Location
- Regional Hydrometric Monitoring Station
- Project Area
- Gas Line Right of Way
- Open Pit
- Raw Sand Plant
- Road
- Transmission Line Right of Way
- Corridor



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 123221734
 Prepared by: VWORTHINGTON on 20231101
 Requested by: PREECE on 20231023
 Checked by: PREECE on 20231102

Client/Project/Report:
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description

Figure No.
12.6

Title
Angus Project Surface Water Baseline Sampling Sites

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Detailed Project Description

12 Existing Conditions

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Vertical limnological profiles included measurement of water temperature, dissolved oxygen concentration, specific conductance, pH, and turbidity at 1 m intervals using a calibrated multiparameter metre. Secchi depth was measured as an indicator of water transparency. Grab samples from the deepest area of the lake were collected from <1 m below the water surface and from 1 m above lake bottom using a Van Dorn sampler.

Samples were sent to ALS Environmental Limited, a Canadian Association for Laboratory Accreditation certified laboratory, in Burnaby, BC for analysis. Samples were analyzed for physical parameters, anions, nutrients, organic carbon, and total and dissolved metals. The British Columbia Environmental Laboratory Manual (ENV 2020) and British Columbia Sample Preservation and Hold Time Requirements (ENV 2020) were used to guide analysis.

The surface water quality QA/QC program followed protocols outlined in the British Columbia Field Sampling Manual (MOE 2013) and British Columbia Environmental Laboratory Manual (ENV 2020) for the field and laboratory activities. QA/QC procedures include using standardized sampling forms, chain of custody forms, collecting field blanks, trip blanks, and duplicate samples, and laboratory QA/QC measures.

Surface water quality data were screened against the BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life (BCWQG-FAL; ENV 2021, 2023) and the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL; CCME 2022).

12.2.5.3 Summary of Existing Conditions

The PDA straddles the Fraser and Peace River watershed divide. The Mine site is in the headwaters of Angusmac Creek and Giggler Creek, tributaries of the Crooked River in the Peace River watershed, and Olsson Creek, a tributary of the Fraser River in the Fraser River watershed. The Finishing Plant site is near the Crooked River.

The spring freshet generally commences in April and peak flows typically occur in May or June. Flows gradually recede through the summer to baseflow in late November. There is extensive historical and active logging in and around the PDA. No existing effluent discharge permits were identified in the creeks or lakes in the PDA.

Streams in the PDA ranged from acidic to alkaline. Alkalinity, pH, and hardness showed similar spatial and temporal trends among all sites sampled. Elevated turbidity and TSS levels corresponded with higher flows during the spring freshet and seasonal rainfall events. This is because it is during this time that melt water brings the highest loads of dissolved and suspended run-off into streams. Average total aluminum, total iron, and dissolved copper concentrations in spring exceeded the long-term (i.e., 30-day) BCWQG-FAL and/or CWQG-FAL. Aluminum and iron are two of the most abundant elements in the Earth's crust and guideline exceedances for these metals in spring are common and not unexpected. Parameters that exceeded the short-term (i.e., 24 hour) BCWQG-FAL were dissolved copper, total and dissolved iron, and total manganese. There were no exceedances of any short-term CWQG-FALs.

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February 5, 2024

Lake AC-L1 and lake AC-L2 are mesotrophic soft water lakes with similar limnological characteristics; they are thermally stratified between June and October and contain terrestrial derived coloured/chromophoric dissolved organic matter (tannins). The coloured/chromophoric dissolved organic matter directly influences the binding of metals and their availability and indirectly affects dissolved oxygen concentrations through biological, chemical, and physical aquatic processes. Low dissolved oxygen concentrations were observed in deeper waters in both lakes along with elevated metal concentrations.

In both Lake AC-L1 and AC-L2 surface water samples, total aluminum and total iron were the only parameters that exceeded long-term BCWQG-FALs and/or CWQG-FALs in the surface water, and there were no short-term water quality guideline exceedances.

Water quality samples collected near the bottom had several metals that exceeded long-term and short-term BCWQG-FAL and/or CWQG-FAL in both lakes. In bottom samples from Lake AC-L1, parameters that exceeded long-term BCWQG-FALs and/or CWQG-FALs more than once were total aluminum, total iron, total manganese, total mercury, and dissolved iron. Parameters that exceeded long-term BCWQG-FALs and/or CWQG-FALs only once in bottom samples from Lake AC-L1 were total cadmium, total chromium, total lead, total silver, and dissolved manganese. Parameters that exceeded short-term BCWQG-FALs and/or CWQG-FALs in bottom samples from Lake AC-L1 were total and dissolved iron and total manganese.

Parameters that exceeded long-term BCWQG-FALs and/or CWQG-FALs in bottom samples from Lake AC-L2 on more than one occasion were total aluminum, total iron, total manganese, total mercury, dissolved iron, and dissolved manganese. Parameters that exceeded long-term BCWQG-FALs and/or CWQG-FALs in bottom samples from Lake AC-L2 only once were total cobalt and dissolved copper. Parameters that exceeded short-term BCWQG-FALs and/or CWQG-FALs were total iron and total manganese, dissolved copper, and dissolved iron.

12.2.6 Fish and Aquatic Resources

The PDA straddles the Fraser and Peace River watershed divide. The Mine site is in the headwaters of Angusmac Creek and Giggler Creek, tributaries of the Crooked River in the Peace River watershed, and Olsson Creek, a tributary of the Fraser River in the Fraser River watershed. The Finishing Plant site is located near the Crooked River.

Vitreo notes that while the Seebach Creek watershed is adjacent to the Angusmac Creek watershed, the Project will not affect fish, fish habitat, or aquatic resources in the fisheries sensitive Seebach Creek watershed (F-7-001), as this watershed is not hydraulically connected to the three watersheds connected to the Mine site.

The fish in the Emerald Lake and Crystal Lake recreation areas are unlikely to be affected by Mine activities because road dust control measures will be implemented as part of the Air Quality Management Plan.

12.2.6.1 Methods

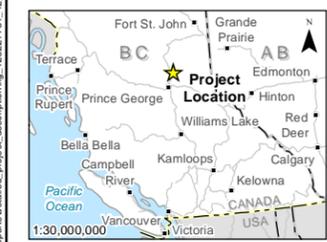
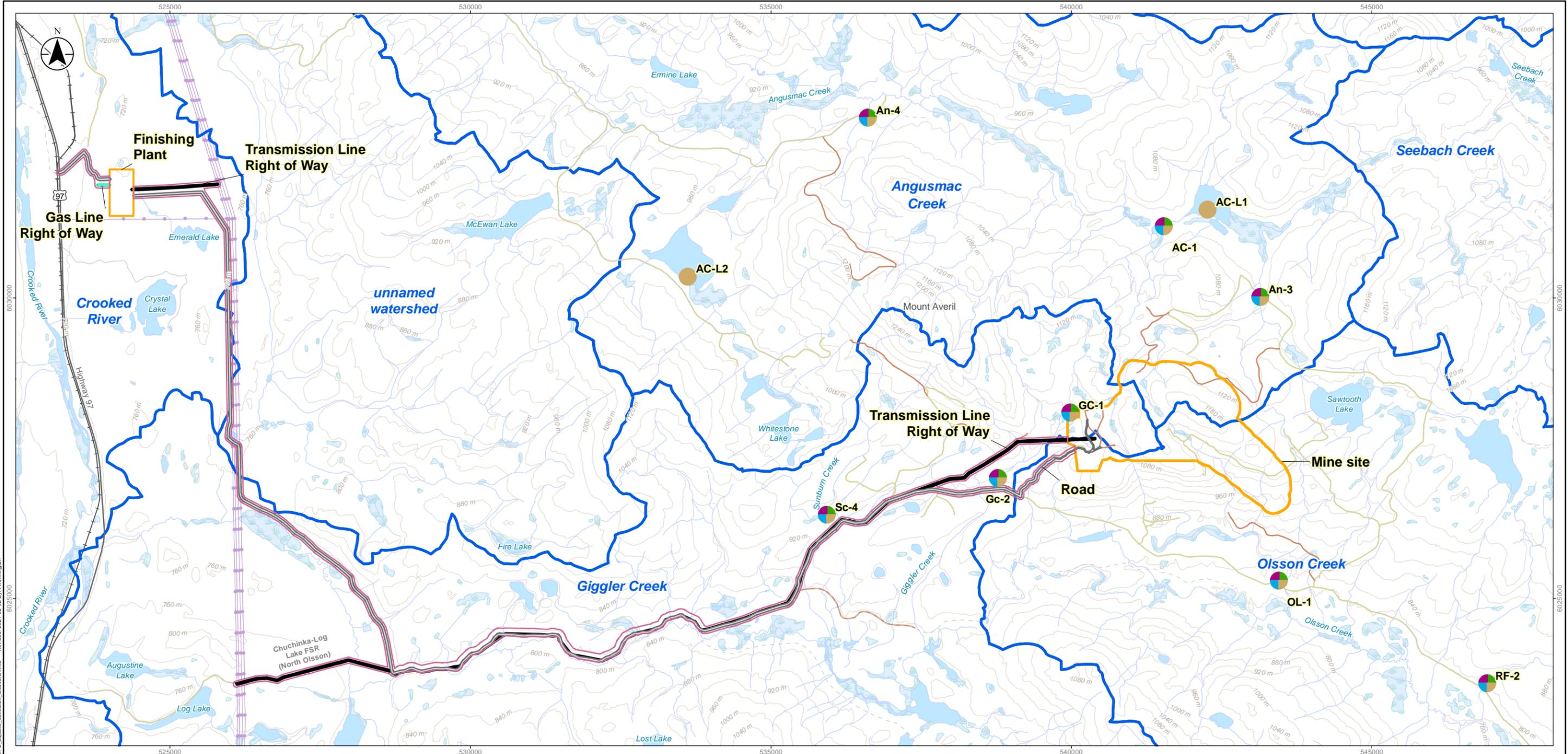
Eight stream sites were sampled for sediment quality, periphyton, benthic invertebrates, and fish tissue in the Angusmac, Giggler, and Olsson Creek watersheds between 2021 and 2023 (Figure 12.7). Sites included one near-field and four far-field exposure sites downstream of the proposed Project infrastructure and three reference sites. Stream sample sites were located at or near the water quality sampling sites so that the sediment, periphyton, benthic invertebrate, and fish tissue data could be compared and correlated to the water quality data. Two lake sites were sampled for sediment quality and phytoplankton in 2021 and 2022; Lake AC L-1, a lake in the Angusmac Creek watershed downstream of the Project and Lake AC L-2, a lake in the Angusmac Creek watershed that will be unaffected by the Project and is therefore sampled as a reference lake.

12.2.6.1.1 Sediment Quality

Sediment quality samples were collected at the eight stream sites and in the two lakes between August 13 and 20, 2022. In streams, sediment was collected from depositional areas where fine particles had settled and had not been exposed to air (e.g., pools). In streams, each sample was comprised of five separate scoops of fine substrate collected using a plastic garden trowel, from three discreet locations within a site. In lakes, sampling was conducted with a Petite Ponar grab sampler from five locations in each lake: four corners and the centre, and each sample was a composite from five grabs. Sediment sampling was conducted following the BC Field Sampling Manual (BC ENV 2020) and Guidelines for Monitoring Fine Sediment Deposition in Streams (BC MWLAP 2002).

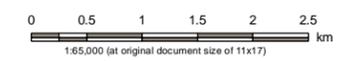
Samples were sent to an accredited laboratory for analysis. Samples were analyzed for particle size distribution, moisture content, total organic carbon, sulphur concentration, and total metal concentrations on the < 63 micrometre (μm) fraction as required by Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016).

The mean concentrations from each site were compared to the BC Working Sediment Quality Guidelines for the Protection of Freshwater Aquatic Life (SQG-FAL; BC ENV 2021), the BC Sediment Quality Guideline for Selenium (BC ENV 2014), and the Canadian Council of Ministers of the Environment (CCME 2022a) Interim Sediment Quality Guidelines (ISQG) and the PELs for the Protection of Freshwater Aquatic Life. The ISQGs represents conservative benchmarks above which potential adverse biological effects may occasionally occur while PELs represent concentrations above which adverse biological effects are likely, but not necessarily certain, to occur.



- Vehicle Accessible FSR
- Decommissioned FSR
- Railway
- Transmission Line
- Topographic Contour
- Watercourse
- Waterbody
- Wetland
- Watershed Boundary
- Project Area
- Gas Line Right of Way
- Road
- Transmission Line Right of Way
- Corridor

- Aquatic Sample Location**
- Benthic Invertebrates
 - Periphyton
 - Fish Tissue
 - Sediment



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231012
 Requested by: SMACKENZIE on 20231009
 Checked by: SMACKENZIE on 20231013

Client/Project/Report:
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description
 Figure No.:
12.7
 Title:
Location of Periphyton, Benthic Invertebrate, Fish Tissue, and Sediment Sampling Sites in Streams and Lakes Near the Project Development Area

Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

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12.2.6.1.2 Periphyton

Ten periphyton samples were collected from ten rocks at each stream site as recommended in the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2016) when no previous periphyton data are available to conduct a power analysis. Samples were collected in the field following methods described in the BC Field Sampling Manual (BC ENV 2020). Each sample was a composite of three 11.4 square centimetres (cm²) scrapings (for a total sample area of 34.2 cm²) from each rock using a brush, syringe, and squirt bottle. Periphyton chlorophyll *a* concentrations were compared to BC water quality guidelines for the protection of freshwater aquatic life (BC WQG-FAL) in streams (10 micrograms per centimetre squared [µg/cm²]) and for recreation in streams (5 µg/cm²) (BC ENV 2023). Periphyton chlorophyll *a* was also compared to the trophic boundaries outlined in Dodds et al. (1998). Periphyton samples were not collected from the lakes.

12.2.6.1.3 Phytoplankton

Phytoplankton samples were collected from the two lakes for chlorophyll *a* concentration (i.e., biomass) in June and August 2022, and taxonomic identification and abundance (i.e., community composition) in June, August, and October 2022. Samples were collected from below the surface and from 1 m above the bottom at the deepest areas of both lakes. Phytoplankton grab samples were collected at the surface by holding the laboratory-supplied bottles just beneath the water and were collected near the lake bottom using a Van Dorn sampler, one sample of each type (deep and surface) was taken from each lake. In the field, chlorophyll *a* samples were poured into dark-coloured bottles and kept cold until they could be filtered later in the day. Samples were filtered using a cellulose ester filter and the volume of water filtered was recorded. Phytoplankton chlorophyll *a* was collected following methods described in the *BC Field Sampling Manual* (BC MOE 2013). Phytoplankton community composition in the lake samples was analyzed using the same indices used for the periphyton community composition in streams. Chlorophyll *a* concentrations, Secchi disc depths, and phosphorus concentrations in the water samples were used to identify the trophic status of the lakes (Wetzel 2001).

12.2.6.1.4 Benthic Invertebrate Community

Benthic invertebrates were sampled only at the eight stream sites; benthic invertebrate samples were not collected from the lakes in any year. Benthic invertebrates in the streams were collected using a 400 µm mesh kick net, following the Canadian Aquatic Biomonitoring Network (CABIN) Wadeable Streams Protocol (ECCC 2012). Streams were sampled in September 2021 and late September/early October 2022 when the insect larva were most developed, and the benthic invertebrate community was most stable.

Benthic invertebrate data were entered into Environment Canada's CABIN database. The CABIN website and database was used to create ordination plots to determine the degree of similarity and level of impairment of the site-specific data to reference sites in the Fraser River 2021 reference model (Reynoldson 2021) at the family level.

12.2.6.1.5 Benthic Invertebrate Tissue

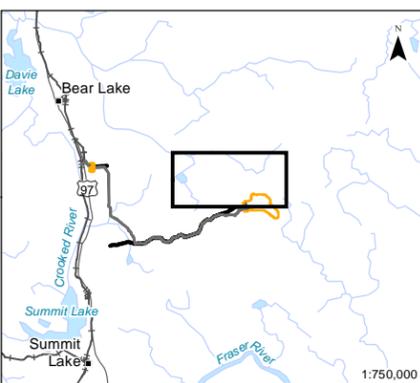
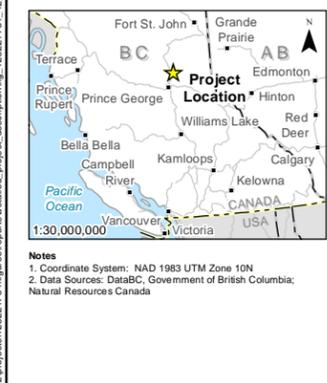
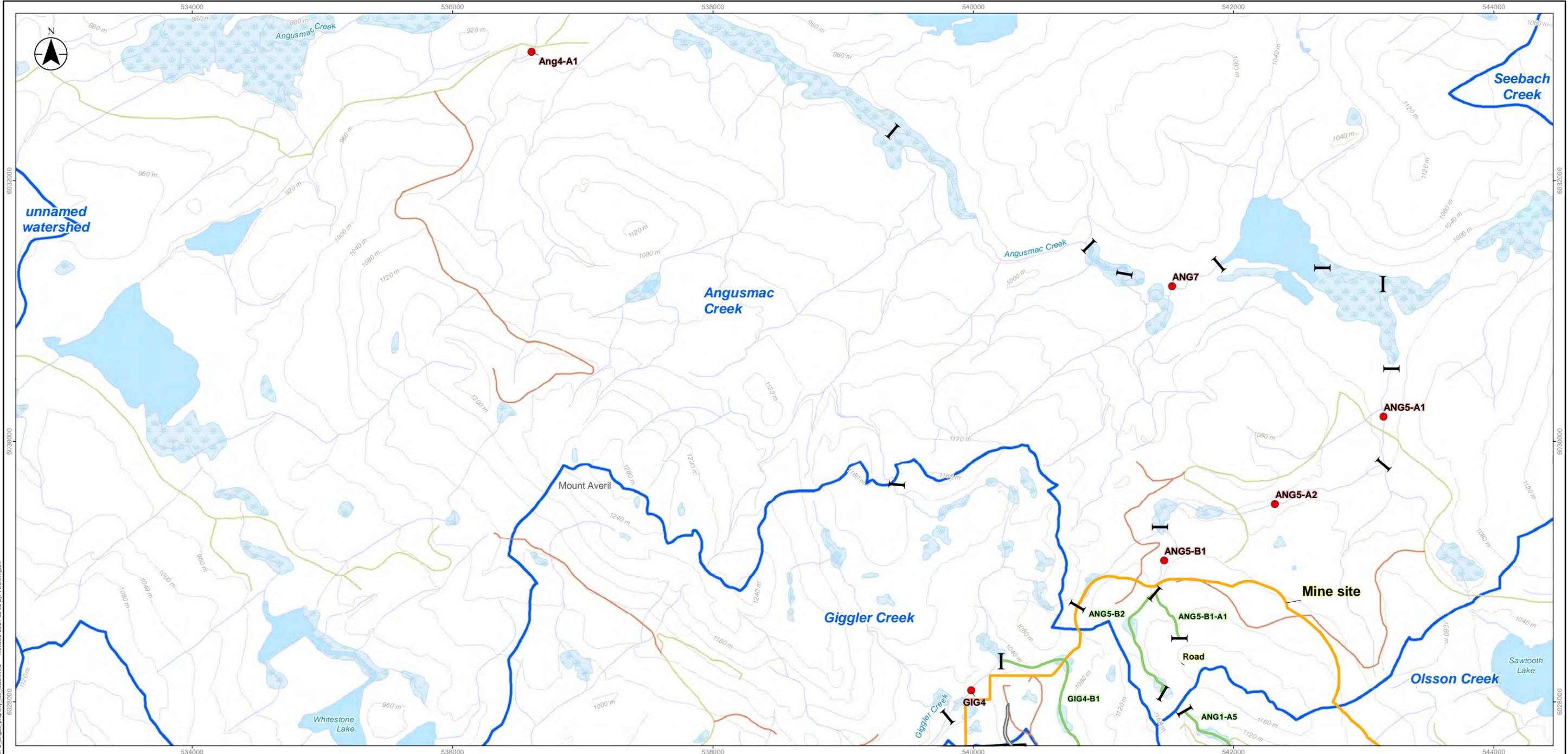
Benthic invertebrate samples for tissue metals analysis were collected in late September/early October 2022 from the same eight stream sites sampled for benthic invertebrate community composition. Samples were collected using a 400 µm mesh kick net. Captured invertebrates were collected as a bulk sample or sorted by family and placed in individually labeled plastic bags, with the priority given to stoneflies (Plecoptera) and mayflies (Ephemeroptera) because they are sensitive to changes in habitat quality and were common across all sites. If the laboratory recommended target mass of 10 grams (g) wet weight could not be achieved using just stoneflies or mayflies, all captured invertebrates were pooled into a single sample regardless of family level classification.

Samples were sent to ALS Environmental Limited and analyzed for the parameters listed in Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (BC MOE 2016). Average and maximum selenium concentrations were compared to the interim dietary selenium guideline for the protection of aquatic life (i.e., 4 milligrams per kilogram [mg/kg] dry weight [dw]) in invertebrate tissue (BC MOE 2014) and the methylmercury Canadian Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota (i.e., 0.033 mg/kg wet weight); total mercury concentrations were assumed to represent total methylmercury concentrations in the samples.

12.2.6.1.6 Fish Habitat Assessment

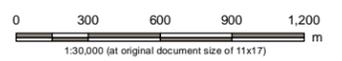
Fish habitat assessments were conducted using two different methods: Level 1 Field Assessment from Fish Habitat Assessment Protocols (FHAP) (Johnson and Slaney 1996) and Reconnaissance 1:20,000 Fish and Fish Habitat Inventory: Standards and Methods (BC RIC 2001). The FHAP method was used in stream reaches under, or immediately downstream of the proposed Project infrastructure, because it allowed quantification and mapping of discreet habitat types, data that will be needed for any potential future paragraph 35(2)(b) *Fisheries Act* Authorization application for any unavoidable HADD of fish habitat. The BC Resources Inventory Committee (RIC) method was used to assess habitat in discreet, 100 m long sites within stream reaches further downstream from the Mine site that may be impacted by sedimentation or changes in water quantity or water quality caused by the Project. The BC RIC method was also used at reference sites.

Seven reaches in the headwaters of Angusmac, Giggler, and Olson Creek were assessed using the FHAP method (Figure 12.8 and Figure 12.9) between September 23 and October 2, 2022. Thirteen sites were assessed using the BC RIC method: 10 sites downstream of the Mine Site and three reference sites, one in each of the Angusmac (Figure 12.8) Giggler, and Olsson creek watersheds (Figure 12.9).



- Vehicle Accessible FSR
- Decommissioned FSR
- Topographic Contour
- Watercourse
- Waterbody
- Wetland
- Watershed Boundary
- Project Area
- Road
- Transmission Line Right of Way

- Reach Break
- 1:20,000 Fish and Fish Habitat Inventory Site Card
- Fish Habitat Assessment Method
- Fish Habitat Assessment Procedure (FHAP)



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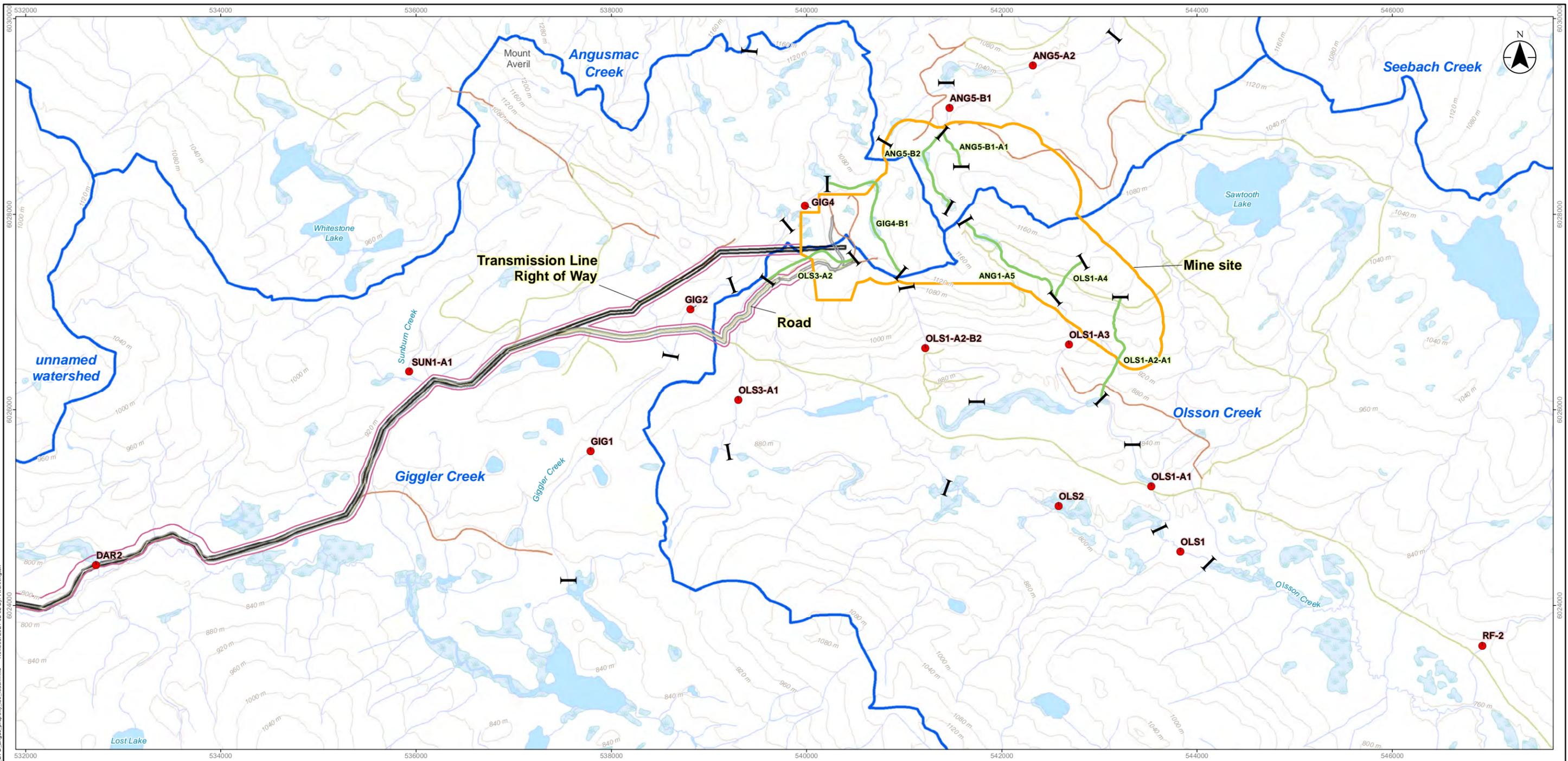
Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231013
 Requested by: SMACKENZIE on 20231010
 Checked by: SMACKENZIE on 20231013

Client/Project/Report: Vitreo Minerals Ltd. Angus Project Detailed Project Description

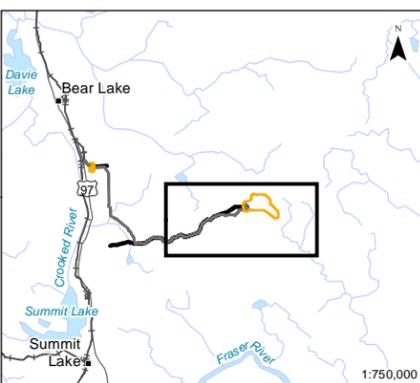
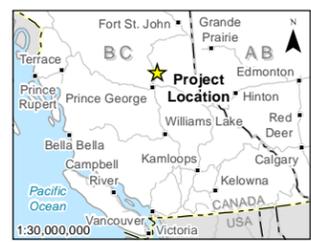
Figure No.: **12.8**

Title: **Reach breaks and Fish and Fish Habitat Sampling Locations in the Angusmac Creek Watershed**

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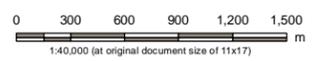


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- Vehicle Accessible FSR
- Project Area
- Decommissioned FSR
- Corridor
- Road
- Transmission Line Right of Way
- Topographic Contour
- Watercourse
- Waterbody
- Wetland
- Watershed Boundary
- Reach Break
- 1:20,000 Fish and Fish Habitat Inventory Site Card
- Fish Habitat Assessment Method
- Fish Habitat Assessment Procedure (FHAP)

Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20231011
 Requested by: SMACKENZIE on 20231010
 Checked by: SMACKENZIE on 20231011

Client/Project/Report:
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description
 Figure No.:
12.9
 Title:
Reach Breaks and Fish and Fish Habitat Sampling Sites in the Giggler Creek and Olsson Creek Watershed

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Detailed Project Description
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12.2.6.1.7 Fish Community Assessment

Fish sampling was conducted in potentially fish-bearing reaches of Angusmac, Giggler, and Olsson creeks between May and September 2022, where water depths were greater than 0.15 m at the time of the survey. Fish sampling was conducted in open 100 m sections using single-pass backpack electrofishing and, where possible, baited wire-mesh cylindrical minnow traps. Pulse frequency and voltage of the electrofisher were adjusted according to water depth, conductivity, and target fish size (i.e., juvenile and adult trout). Minnow traps were baited with cat food and set overnight in pools for approximately 24 hours. Reaches without pools were sampled using only backpack electrofishing.

Captured fish were identified to species and measured for fork length or total length (Burbot [*Lota lota*] and sculpin only) and weighed. Lengths and weights were recorded for up to 50 individuals per sport-fish species (e.g., Rainbow Trout [*Oncorhynchus mykiss*]) and up to 30 non-sport fish species (e.g., Redside Shiner [*Richardsonius balteatus*]). Fish were examined externally for sex and maturity (if possible) and for the presence of any deformities, parasites, or injuries. Fish were released at capture site after data collection.

In June 2023, five reaches in Olsson Creek, four reaches in Angusmac Creek, and one reach in Giggler Creek watersheds were sampled by backpack electrofishing and with overnight minnow trap sets. No other reaches were resampled in 2023 because fish presence had been confirmed in previous sampling periods.

Bull Trout (*Salvelinus confluentus*) spawning habitat surveys have been conducted by unmanned aerial vehicle in January 2024. Additional surveys and temperature loggers will record data in the open water period of 2024. eDNA surveys will also be conducted in spring 2024 to record presence of Bull Trout in near-field and far-field reaches of Angusmac, Giggler and Olsson Creeks and their tributaries near the Mine site.

12.2.6.1.8 Fish Tissue

Two fish species, one non-sport fish species and one sport fish species, were targeted for sampling to determine tissue residue metal concentrations. Slimy Sculpin (*Cottus cognatus*) was selected as the non-sport species because of its high site fidelity. Rainbow Trout was selected as the sport species because it was the most abundance sport fish species in all three creeks and is a popular sport fish in BC.

Eight samples of each species were targeted at each of the eight stream sites. Samples were comprised of individual fish if they were at least eight grams (g), the minimum sample mass required by the laboratory for the analysis. If individual fish captured at a site were less than eight grams, a composite of two or more fish were combined until the minimum sample mass was obtained. Individual fish were photographed, euthanized, weighed, measured, and frozen prior to being shipped to ALS Environmental Limited. A list of analyzed parameters for tissue samples is presented in Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (BC MOE 2016).

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Fish tissue results from whole fish were compared to Canadian Tissue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota for methylmercury (0.033 mg/Kg ww; CCME 2022b), Guidelines for Mercury for the Protection of Human Consumers of Fish (0.5 mg/Kg ww; Health Canada 2007), the BC Whole-body Fish Tissue Guideline for selenium (4 mg/Kg dw; BC MOE 2014) and the BC Screening Values for the Protection of high intake (7.3 mg/Kg dw), moderate intake (14.5 mg/Kg dw), and low intake (75.0 mg/Kg dw) Human Consumers of Fish for selenium (BC MOE 2014).

12.2.6.2 Summary of Existing Conditions

Sand and silt were the most common fine substrate types present in stream sites and lake sites. Mean metal concentrations in sediment samples from each site did not exceed the upper BC SQG-FAL or the CCME PELs. However, mean concentrations of cadmium, iron, manganese, mercury and nickel, exceeded the lower BC SQG-FAL (potential for adverse effects) and the CCME ISQG (concentration that occasionally is associated with adverse biological effects) in the lake and stream samples. The following sediment quality guidelines were exceeded in samples from one or more of the sites:

- Cadmium exceeded the lower BC SQG-FAL and CCME ISQG of 0.6 mg/kg in the two lakes sampled, AC-L1 and AC-L2.
- Iron exceeded the lower BC SQG-FAL of 21,200 mg/kg in one lake sample at AC-L2.
- Manganese exceeded the lower BC SQG-FAL of 460 mg/kg in both lake samples, AC-L1 and AC-L2, and three stream samples, AN-4, GC-1, and GC-2.
- Mercury exceeded the lower BC SQG-FAL and CCME ISQG of 0.17 mg/kg in the two lakes sampled, AC-L1 and AC-L2.
- Nickel exceeded the lower BC SQG-FAL of 16 mg/kg in both lake samples, AC-L1 and AC-L2, and one stream sample, AC-1.

Average chlorophyll *a* concentration across all stream sites was 0.90 µg/cm² in August 2022. Chlorophyll *a* concentrations in all stream reaches were below the BC WQG for aquatic life in streams (10 µg/cm²) and for recreation in streams (5 µg/cm²). Based on chlorophyll *a* concentration, all streams were oligotrophic except for one site, GC-2 (2.0 µg/cm²), which was mesotrophic. Chlorophyll *a* concentration in lake sites ranged from 0.91 µg/L to 6.78 µg/L in surface water and 0.88 µg/L to 6.62 µg/L in bottom water. Lake AC-L2 was also eutrophic in June and meso-eutrophic in August based on solely on total phosphorus concentrations. However, when classified based on TP, chlorophyll *a*, and secchi depth, Lake AC-L2 was oligotrophic (chlorophyll *a* 0.3-4.5 µg/L) to mesotrophic (TP 10.9-95.6 µg/L and secchi depth 1.5-8.1 m) in June and mesotrophic (TP 10.9-95.6 µg/L, chlorophyll *a* 3-11 µg/L and secchi depth 1.5-8.1 m) in August (Wetzel 2001). Taxa richness ranged from 18 taxa at RF-2 to 44 taxa at AC-1. At all sites except GC-2, the genus *Chamaesiphon* sp. Was the 1st dominant taxa. Periphyton taxa belonging to the family Chamaesiphonaceae (cyanobacteria) were present in high proportions at all sites and accounted for more than 50% of the community composition at all sites except GC-2.

Benthic invertebrate taxa richness at stream sites ranged from 21 to 32 taxa per site, with Ephemeroptera, Trichoptera and Plecoptera (EPT) richness ranging between 11 and 16 taxa per site.

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The percentage of EPT taxa at stream sites ranged between 28% and 77%; however, only two sites did not have EPT percentages over 50% (GC-1 and AC-1). Ordination plots showed that six of the eight stream sites sampled were similar to the reference condition in the Fraser River model; one site (GC-2) was mildly divergent while another site (AN-4) was divergent from the reference condition. All benthic invertebrate tissue metal concentrations collected from stream sites were below the BC interim dietary selenium guideline for the protection of aquatic life (4 mg/kg dw) and the Canadian Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota from methylmercury (i.e., 0.033 mg/kg ww).

The primary habitat type in all stream reaches assessed in each creek was riffle. Average bankfull maximum depths and average gradient in the stream reaches assessed using the BC RIC (2001) method ranged from 0.22 m to 0.77 m and from 0.58% to 6.67%, respectively. Small and large gravel and cobble were the dominant substrate types in these streams. The streams at these sites were generally larger, less steep, with larger substrates than the streams assessed using the FHAP method because they were further downstream. Average bankfull maximum depths and average gradients in the stream reaches assessed using the FHAP method ranged from 0.20 m to 0.36 m and from 3.17% to 9.76%, respectively. Fines, small gravel, and cobble were the dominant substrate types.

There are 13 fish species known to occur, or have the potential to occur, near the Project area. These include nine large-bodied fish species understood to be valued by Indigenous Nations and recreational anglers: Bull Trout, Burbot, Chinook Salmon (*O. tshawytscha*), Dolly Varden (*S. malma*), Lake Whitefish (*Coregonus clupeaformis*), Longnose Sucker (*Catostomus commersoni*), Mountain Whitefish (*Prosopium williamsoni*), Rainbow Trout, and White Sucker (*Catostomus commersonii*). The four other species known to occur in the Project area are Lake Chub (*Couesius plumbeus*), Longnose Dace (*Rhinichthys cataractae*), Prickly Sculpin (*C. asper*) and Slimy Sculpin. None of these fish species are listed on Schedule 1 of the federal *Species at Risk Act* or red-listed (i.e., extirpated, endangered, or threatened) by the BC Conservation Data Centre (CDC) in the Project area. The Upper Fraser, Stream, Spring Population of Chinook Salmon is listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Bull Trout are blue-listed (i.e., special concern) by the BC CDC.

A total of 372 fish, representing nine fish species, were captured in Angusmac, Giggler, and Olsson Creek watersheds in 2022 and 2023. These fish species were Rainbow Trout, Mountain Whitefish, Redside Shiner, Slimy Sculpin, Prickly Sculpin, White Sucker, Largescale Sucker (*C. macrocheilus*), Lake Chub, and Burbot. The most abundant species captured were Rainbow Trout, Redside Shiner, and Slimy Sculpin. Fish were captured in 14 of 24 sites sampled across the three watersheds, and no fish were captured in the reaches within the Mine site. Average catch per unit effort was higher in Angusmac Creek than in Giggler Creek or Olsson Creek. Catch per unit effort was higher in fall than in summer or spring in all three creeks in 2022. Fish tissue concentrations in all Rainbow Trout and Slimy Sculpins captured in all three streams, were below the Health Canada mercury guideline, the BC Whole-body Fish Tissue Guideline for selenium, BC Screening Values for the Protection of high to low intake Human Consumers of Fish for selenium, and the CCME Methylmercury Tissue Guideline for the Protection of Wildlife Consumer of Aquatic Biota.

12.2.7 Soils, Terrain and Terrain Stability

12.2.7.1 Methods

Soils and bioterrain mapping for the Project was completed in 2022, and the terrain assessment (surficial materials and terrain stability mapping) was completed in 2023. Additional soils mapping was conducted during the terrain assessment.

Two Soils LSAs were delineated as part of the baseline data collection: the eastern soils LSA (Figure 12.10), which consists of a 500 m buffer around the PDA, and the western soils LSA (Figure 12.11), which consists of a 500 m buffer around the proposed Finishing Plant site. The Terrain LSA serves as the basis for the TEM (see Section 12.2.8 Vegetation and Wetlands). The Terrain LSA includes the Soils LSA as well as an additional area defined by a 100 m buffer extending on either side of the FSR and the proposed Transmission Line, where it deviates from the FSR. Furthermore, in areas where the additional FSR and Transmission Line buffer falls on a slope greater than 15 degrees, the buffer has been adjusted to the height of the land, or at the next major slope break, in order to capture steep slopes in the Terrain LSA.

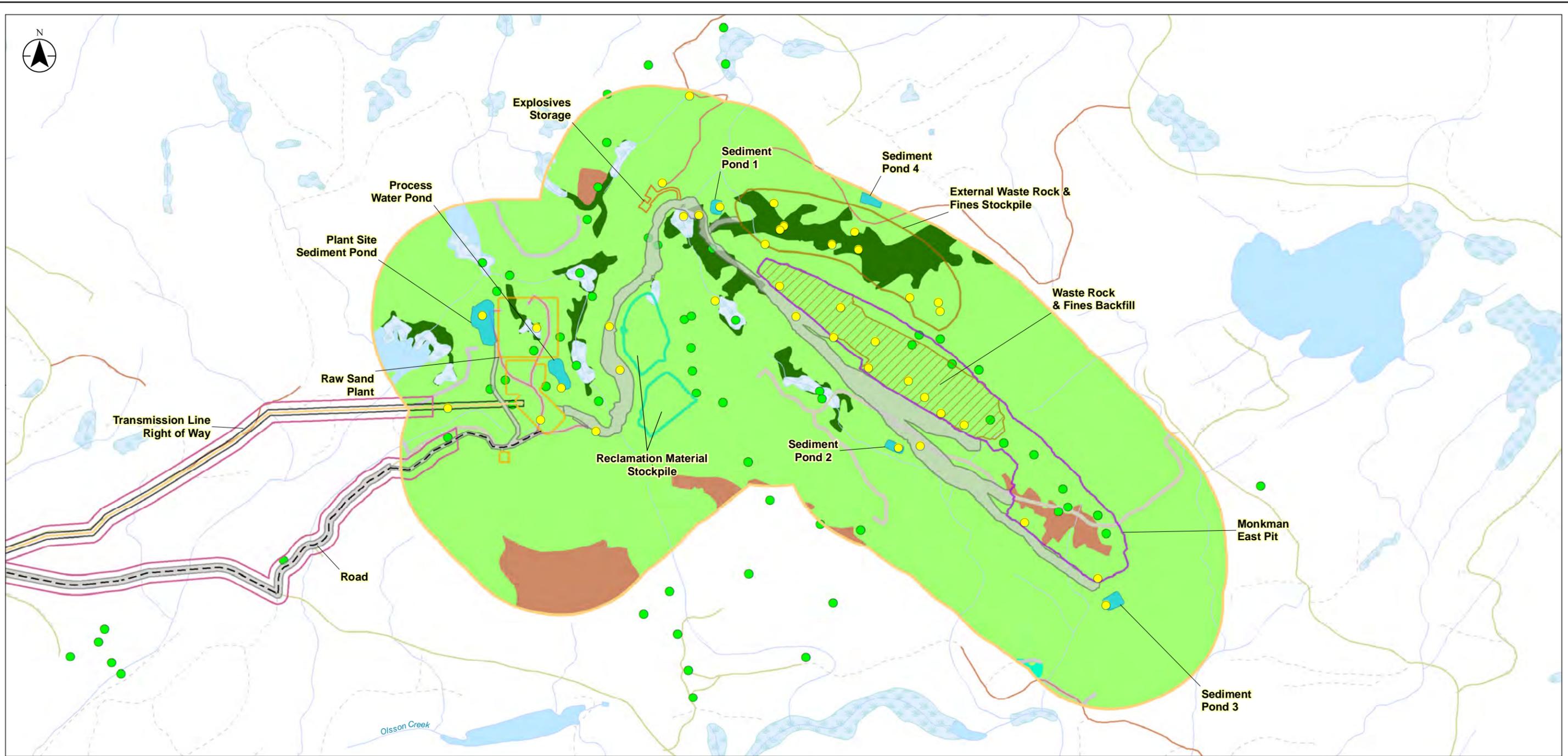
Soils Baseline Program:

For the soils baseline program, existing literature and digital data were reviewed for the two Soils LSAs to support the characterization of soils and terrain baseline conditions from the following sources:

- The 2019 and 2020 orthorectified digital aerial photos
- Digital elevation model (DEM) derived from the 2019 and 2020 Bare Earth Light Detection and Ranging (LiDAR)
- Preliminary Terrestrial Ecosystem Mapping 1:5,000 for the Project footprint and 1:20,000 scale for the LSA
- Soils of the Prince George – McLeod Lake Area, BC Ministry of Environment (MOE 1989) Technical Report 29

Field surveys in 2022 and 2023 collected soil information following the current Standards for Terrestrial Ecosystem Mapping in BC (Province of BC 1998), the Field Manual for Describing Terrestrial Ecosystems (BC Ministry of Forests and Range [MOFR] and BC MOE 2010), and the Canadian System of Soil Classification (SCWG 1998).

A desktop review of secondary sources (e.g., publicly available land use information, Indigenous Interests studies for other developments in the region, and Indigenous Nation websites) was undertaken to gather preliminary Indigenous Knowledge information that could be relevant to the Project as described in the introductory text to Section 12.



Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada; Imagery: Vitreo Orthophotos, ESRI World Imagery

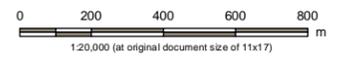
- Resource Road
- Decommissioned FSR
- Watercourse
- Vehicle Accessible FSR
- Wetland
- Road for Project Access
- Transmission Line

- Project Footprint
- Explosives Storage
- External Waste Rock & Fines Stockpile
- Sand Plant
- Open Pit
- Pond

- Reclamation Material Stockpile
- Road
- Transmission Line Right of Way
- Waste Rock & Fines Backfill
- Corridor
- Local Study Area

- Dominant Surficial Material
- Colluvium
- Fluvial
- Glaciofluvial
- Till
- Organic
- Anthropogenic

- DIRTS Soil Inspection Site 2022
- DIRTS Soil Inspection Site 2023



Project Location: NTS Mapsheet: 093J08, North Central, BC
 Project Number: 123221734
 Prepared by: VWORTHINGTON on 20231121
 Requested by: LDESANDOLI on 20231121
 Checked by: MZWIERINK on 20231121

Client/Project/Report: Vitreo Minerals Ltd., Angus Project, Detailed Project Description

Figure No.: 12.10

Title: Surficial Material Distribution in the Eastern Soils Local Study Area

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Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada; Imagery: Vitreo Orthophotos, ESRI World Imagery

- | | | | |
|--------------------------|----------------------------------|-----------------------------|----------------------------------|
| — Highway | — Gas Pipeline | Dominant Surficial Material | ● DIRT Soil Inspection Site 2022 |
| — Local Street | - - Road for Project Access | ■ Glaciofluvial | |
| - - Resource Road | — Transmission Line | ■ Water | |
| - - Trail | Project Footprint | ■ Organic | |
| — Transmission Line | ■ Sand Plant | ■ Anthropogenic | |
| — Watercourse | ■ Gas Line Right of Way | | |
| ■ Wetland | ■ Road | | |
| — Vehicle Accessible FSR | ■ Transmission Line Right of Way | | |
| | ■ Corridor | | |
| | ■ Local Study Area | | |



Project Location: North Central, BC
 Project Number: 123221734
 NTS Mapsheet: 093J08
 Prepared by: VWORTHINGTON on 20231121
 Requested by: LDESANDOLI on 20231121
 Checked by: MZWIERINK on 20231122

Client/Project/Report
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description

Figure No.
12.11

Title
Surficial Material Distribution in the Western Soils Local Study Area

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Soils were analysed to determine whether there were chemical limitations with respect to soil reclamation suitability and to provide confirmation of soil subgroup and field texture classification. Parameters analyzed included particle size (% sand, silt and clay), pH (CaCl₂ solution), electrical conductivity (deciSiemens per metre [dS/m]), sodium adsorption ratio, soluble cations (calcium, magnesium, potassium, and sodium), saturation (%), and available phosphorus. Additionally, total Kjeldahl nitrogen, and total organic carbon analysis was conducted in the topsoil (i.e., A horizon).

Soil mapping was completed within the PDA to meet the requirements of the Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits (BC Ministry of Energy Mines [MEM] and BC ENV 2019). Soils were mapped as per the federal and provincial standards (Agriculture Canada 1981; Coen 1987; Province of BC 1998). Soil types and landscape features are represented by Soil Mapping Units (SMUs). SMUs are individual polygons encompassing areas of similar dominant surficial material, dominant slope gradients, drainage, and soil and topographic assemblages found within the delineation. SMUs are named from soil described in the publication “Soils of the Prince George – McLeod Lake Area” (BC MOE and BC MAF 1989).

Terrain baseline program:

A review of background information was conducted, including bedrock geology maps, surficial geology maps, peer-reviewed reports and journal publications, and Quaternary and glacial history for the Terrain LSA and outlying area. Following this review, a field assessment was conducted between July 17 and 23, 2023; for this program the Terrain Survey Intensity Level (TSIL) was B, with 51 field checks (polygons) per 100 ha of the Terrain LSA.

Terrain mapping was completed at ~1:5,000 scale (average) using ESRI ArcGIS Pro 3.1.2 with a combination of 2019 and 2020 15-20 m provincially-derived LiDAR and 2021 1m LiDAR imagery, in addition to ArcGIS Online imagery, field GPS points, and soils data points. The 2022 soil data points were also utilized to update and edit the base bioterrain mapping into the terrain stability mapping. All mapping adheres to BC’s provincial standards for terrain mapping, including:

- Guidelines and Standards to Terrain Mapping in BC (Resource Inventory Committee 1996)
- Terrain Classification System for BC, Revised Edition MOE Manual 10 (Howes and Kenk 1997)
- Mapping and Assessing Terrain Stability Guidebook, 2nd Edition August 1999 (British Columbia Ministry of Forests, British Columbia Ministry of Environment, Forest Practices Code 1999)

As well, a review of historical aerial photographs from 1949 to 2006 of the Terrain LSA and surrounding area (~22 km west-east by 11 km north-south) was completed to assess the historical stability of the PDA and supplements the terrain field observations.

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12.2.7.2 Summary of Existing Conditions – Soils

The Project is located within the McGregor Plateau Ecosection within the Fraser Basin Ecoregion. The area is largely composed of a rolling upland formed by low ridges. Intrusive bedrock is overlain by deep glacial tills including eskers, drumlins, and deep channels, with exposed bedrock uncommon. Many rivers and lakes are present.

The Monkman East Pit area is at least 2.2 km long and more than 200 m in outcrop width. In the southern part of the Pit area, the Monkman Formation is well-exposed along ridge crests, where it forms resistant and smooth rounded outcrops, and on moderate to steep west-facing slopes where it is responsible for rugged uneven terrain exposing the unit's interpreted bedding.

Soils within the eastern Soils LSA consist of mostly well to imperfectly drained Brunisols and moderately well drained Luvisols developed on till deposits. Imperfectly drained Brunisols developed on fluvial deposits, poorly drained Gleysols developed on till deposits, and very poorly drained Organic Soils were also identified in eastern soils LSA. Soils in the western soils LSA are predominantly well to rapidly drained Brunisols developed on coarse textured glaciofluvial materials.

Soils in the eastern Soils LSA generally have fair topsoil and subsoils reclamation suitability. Reclamation suitability is limited by texture, pH and coarse fragment content. Soils with a Poor reclamation suitability were also limited by texture, pH, and coarse fragment content. Soils in the western Soils LSA have a poor reclamation suitability due to coarse textures and high coarse fragment content.

A majority of the soils in the eastern Soils LSA generally have a Severe or High-water erosion risk rating mostly due to the steep slope gradients. Conversely, soil in the western Soils LSA have a Low water erosion risk mostly due to the near level to gentle slope gradients.

A majority of topsoils in the eastern Soils LSA have Severe wind erosion risk while most subsoils have Moderate wind erosion risk. This difference is due to the higher clay content in many of the subsoils which makes them less susceptible to wind erosion. Soils in the western Soils LSA have a Severe wind erosion risk due to the predominantly loamy sand or sandy loam textures.

Most topsoils in the eastern soils LSA have a Moderate compaction risk rating while most subsoils have a High compaction risk rating. This difference is mostly due to the higher clay content in many subsoils. Both topsoils and subsoils in the western soils LSA have a Low compaction risk due to coarse soil textures and High coarse fragment content.

12.2.7.3 Summary of Existing Conditions – Terrain

Till is the most common surficial material in the Terrain LSA. Till is most commonly sandy and contains a high proportion of subangular to subrounded coarse fragments (e.g., >10%, and approaching 20-30% gravel, cobbles, and mixed fragments) in the majority of the encountered soil pits. Thick till overlying bedrock was exposed in a recent road cut in the lower Monkman East Pit. A short distance upslope, the till was excavated in several places as a thin veneer (<20 cm thick) over weathered bedrock at the top of

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the ridge that comprises the Monkman East Pit. Thick deposits of till over rock can be prone to slumping in high angle road cutslopes, particularly where seepage is concentrated.

Glaciofluvial is the second-most common surficial material in the Terrain LSA. Glaciofluvial material textures were observed to be (in decreasing order by % abundance) pebbles, cobbles, and sand. These sediments were deposited by glacial meltwater, either in front of a glacier or sub-glacially. Extensive glaciofluvial materials were mapped along the 2800 FSR to the Finishing Plant and the Finishing Plant site, and the low-lying plain that is now occupied by the Crooker River (west of Highway 97). In terms of terrain hazards or constraints, the majority of the glaciofluvial is mapped as plains or terraces with no apparent hazard however, deep glaciofluvial deposits with steep cuts along roadsides can be prone to dry ravelling.

The remainder of the dominant mapped surficial materials are fluvial (both active and inactive), colluvium, organics, and anthropogenic. Active floodplains (fluvial) were mapped along the FSR between the Raw Sand Plant and the 2800 FSR junction. Anthropogenic materials, those that are either artificial (e.g., concrete, asphalt) or drastically altered by human modification, occur near to large industrial areas near the Finishing Plant site where fill deposition, excavation, levelling, and compaction have occurred.

The Terrain LSA contains approximately 0.13% Class V (High landslide initiation likelihood) terrain and approximately 4.1% Class IV terrain (Moderate landslide initiation likelihood).

Two landslides were identified within the Terrain LSA. The first landslide area is active rockslides comprising approximately 5 m³ of colluvial blocks and rubble, reaching an access road leading to Monkman East Pit. These blocks and rubble were observed at the toe of the slope in the ditch and are ~0.1-0.5 m in diameter (b-axis) on average. These likely reached the road surface but were moved into the ditch by road maintenance operators.

The second landslide is a relict (post-glacial) debris slide that is ~3.7 ha (~550 m long and 135 m wide) located on a steep slope. The landslide initiated from ~1 km above the FSR and ran out onto a bench situated ~530 m from the FSR, away from any planned Project components and activities. This debris slide is possibly hundreds to thousands of years old, and is centred around a steep, gullied slope.

12.2.8 Vegetation and Wetlands

The Project is located within the McGregor Plateau Ecosection within the Fraser Basin Ecoregion. The area is largely composed of a rolling upland formed by low ridges. Intrusive bedrock in the ecosection is overlain by deep glacial tills including eskers, drumlins, and deep channels, with exposed bedrock uncommon. Many rivers and lakes are present in the ecosection. The area has a cool moist climate resulting from moist Pacific air that arrives from the west and from heating of numerous waterbodies and wetlands present in the ecosection. Winters are cold with extreme cold weather events occurring for long periods because of cold arctic air stalling over the area (Demarchi 2011).

The vegetation and wetlands baseline data collection program included desktop review of existing information and field studies in the summer of 2022 to determine baseline vegetation and wetlands

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conditions and confirm and classify ecosystem mapping. Rare plant and invasive species surveys will occur in the growing season of 2024.

The vegetation and wetlands baseline program conducted in 2022 evaluated plant species of conservation concern, plant species of Indigenous Interest, ecological communities of conservation concern, old forest, and wetland and wetland function. To establish the existing conditions, ecosystem surveys were conducted. Field inspections were focused on completing TEM in areas not currently covered by existing TEM, with an emphasis on sensitive ecosystem inventory of ecological communities of management concern, old forest, and wetlands. Data from these plots was used to classify ecosystems and to compile species lists.

12.2.8.1 Methods

A Vegetation and Wetlands LSA and RSA were established as part of the baseline data collection program, as follows:

- The Vegetation and Wetlands LSA is defined by a 1,000 m buffer on the PDA
- The Vegetation and Wetlands RSA extends approximately 10-20 km from the PDA, following the natural watershed boundaries to the extent possible

A review of publicly available data sources was completed to gather information about vegetation and wetlands resources within the RSA. The review included the following sources:

- BC Species and Ecosystem Explorer (BC CDC 2022)
- E-Flora BC (Klinkenberg 2022)
- Biogeoclimatic Ecosystem Classification (BEC) web (provincial data)
- Land Management Handbooks 24, 29, and 51 (DeLong et al, 1993, DeLong et al. 1994, DeLong 2003)
- HabitatWizard (Province of BC 2022a) and the provincial data catalogue
- Terrestrial Ecosystem Mapping (TEM) of MacGregor Model Forest – Scale 1:20,000 (BC MOE 2001)
- Omineca Predictive Ecosystem Mapping (PEM) – Scale 1:500,000 (BC MOECCS 2016)

A desktop review of secondary sources (e.g., publicly available land use information, Indigenous Interests studies for other developments in the region, and Indigenous Nation websites) was undertaken to gather preliminary Indigenous Knowledge information that could be relevant to the Project as described in the introductory text to Section 12.

A Project-specific TEM was created for the LSA to show the distribution and abundance of ecological communities. The TEM for the Project was completed according to the Standard for Terrestrial Ecosystem Mapping in BC and Standard for Mapping Ecosystems at Risk in BC (RIC 1998a, MOE 2006). Identification and classification of wetlands, floodplain, and estuarine associations followed *Wetlands of*

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British Columbia (MacKenzie and Moran 2004). Terrestrial ecosystems were classified according to the Biogeoclimatic Ecosystem Classification system and three field guides:

- Land Management Handbook 24: A Field Guide to Site Identification and Interpretation for the Southwest Portion of the Prince George Forest Region (DeLong et al. 1993).
- Land Management Handbook 29: A Field Guide to Site Identification and Interpretation for the Northern Rockies Portion of the Prince George Forest Region (DeLong et al. 1994).
- Land Management Handbook 51: A Field Guide to Site Identification and Interpretation for the Southwest Portion of the Prince George Forest Region (DeLong 2003).

Field surveys were completed in June and July 2022 following the methods contained in *Land Management Handbook 25—Field Manual for Describing Terrestrial Ecosystems—2nd Edition* (LMH 25, MOFR and MOE 2010) and were planned to achieve a 1:5,000 scale survey intensity level (SIL) 1 in the Project Footprint and 1:20,000 scale SIL 5 in the LSA.

During field studies, the Project area was traversed on foot. The existing TEM and PEM mapping was used to target a variety of ecosystem types that occur within the Vegetation and Wetlands LSA for field surveys. At each TEM plot, site and vegetation characteristics were recorded digitally in an application that uses the fields in forms described in LMH 25 (MOFR and MOE 2010). Data from these plots were used to classify ecosystems.

Rare plant and invasive plants surveys are currently planned to occur during the growing season in 2024. These will be conducted following Inventory and Survey Methods for Rare Plants and Lichens (RISC 2018b).

12.2.8.2 Summary of Existing Conditions

Four biogeoclimatic unit variants occur within the Project area: the Mossvale moist cool SubBoreal Spruce variant (SBSmk1), Willow wet cool Sub-Boreal Spruce variant (SBSwk1), very wet cool Sub-Boreal Spruce subzone (SBSvk), and the Misinchinka wet cool Engelmann spruce – Subalpine Fir variant (ESSFwk2) (DeLong 1993, DeLong 2003). Commonly occurring upland forest tree species include Douglas-fir (*Pseudotsuga menziesii*), hybrid white spruce (*Picea glauca x engelmannii*), lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), trembling aspen (*Populus tremuloides*) and subalpine fir (*Abies lasiocarpa*). Bogs support black spruce (*Picea mariana*) mixed with lodgepole pine.

The Project area has the potential to host plants of management concern and of interest to Indigenous Nations. Forty-one species at risk or of management concern have the potential to occur in the Project area (BC CDC 2021a).

A search of the BC CDC spatial occurrences found no known occurrence of rare plant species within or near the Mine site (Province of BC 2021). Existing disturbances in the LSA include FSRs and secondary resource roads, forest cut blocks, and a power line and forestry mill immediately east of Highway 97. Forest harvesting activities are very active with cut blocks of varying ages throughout the Project area.

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Ecological communities were documented in 170 TEM field plots. All plots had soil profiles completed alongside.

Ecological communities in the RSA and LSA support a variety of upland, flood, and wetland communities. Upland forest communities make up the majority of the LSA and RSA, with lodgepole pine – feathermoss – cladina (SBSmk1/03) is the most common upland forest community in the LSA while hybrid white spruce – oak fern (SSwk1/01) is the most common community in the RSA. Flood associated communities are restricted to narrow areas near rivers and streams and occupy a small portion of both the LSA and the RSA. The most abundant flood associated community is the low bench mountain alder – red osier dogwood – lady fern (FI02).

There is a long history of industrial development with roads and cut blocks occurring throughout the LSA and RSA. The RSA is within the Prince George Timber Supply Area. The RSA has been heavily logged over the past century and is fragmented by logging roads. As well, the Finishing Plant site is in a disturbed state and is covered with a series of clearcuts and forestry roads and surrounded by linear disturbances from transmission lines and larger forest access roads, with forests in the Finishing Plant site and surrounding area in an early successional state.

Six provincial noxious weeds have been identified in the LSA as well as 16 regionally listed weeds. Two invasive plant species, orange hawkweed (*Hieracium aurantiacum*) and oxeye daisy (*Leucanthemum vulgare*), were identified in the LSA during 2022 field surveys.

Fifty-seven plant species or genera of potential Indigenous Interest were identified in the LSA, including many trees (e.g., lodgepole pine, trembling aspen), shrubs (e.g., saskatoon [*Amelanchier alnifolia*], blueberries [*Vaccinium* spp.]) and forbs (e.g., cow parsnip / wild rhubarb [*Heracleum maximum*], stinging nettle [*Urtica dioica*]). The majority of these species or genera are widely distributed throughout the LSA.

Nine ecological communities of management concern were identified as occurring in the LSA. The most common upland ecological community of management concern in the LSA is lodgepole pine – huckleberry – velvet-leaved blueberry. The most common flood community of conservation concern is the mountain alder – red-osier dogwood – lady fern low-bench floodplain (FI02). Spruce – pink spirea – oak fern is the only red-listed community, with the remaining eight communities all blue-listed.

Thirty-two old forest communities were identified in the LSA and RSA. Upland forest account for most old forest in the LSA and RSA. Lodgepole pine – feathermoss – cladina is the most common old forest community in the LSA.

Twenty-one wetland communities occur in the RSA and 16 in the LSA; wetland classes present include bogs, fens, marshes, swamps, and shallow open water. Seven wetland ecosystems of management concern occur in the RSA and three in the LSA. Within the RSA and LSA Spruce – common horsetail – leafy moss (Ws07) is the most common wetland ecosystem of management concern. No federally-listed wetlands occur in the LSA or have the potential to be affected by the Project.

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12.2.9 Wildlife and Wildlife Habitat

Important ecological factors for wildlife in the Project area are long cold snowy winters and the dominance of dense spruce-subalpine fir and pine forests interspersed with wetland complexes. Wildlife that occurs in this region are adapted to either survive or avoid the severe winters. The wildlife data collection program included desktop review of existing information and the following wildlife field studies completed in spring, summer, fall, and winter of 2022: migratory songbird surveys; waterfowl surveys; passive acoustic surveys for birds; northern goshawk surveys; amphibian surveys; passive ultrasonic acoustic surveys for bats; wildlife remote camera surveys; and wildlife habitat suitability surveys. An aerial ungulate survey has been completed in winter 2022 and 2023. Other discipline field crews have also collected incidental detections of wildlife while completing fieldwork for their disciplines. In 2024, wildlife habitat modelling species accounts and suitability mapping will be completed to inform the Application for an Environmental Assessment Certificate.

12.2.9.1 Methods

A Wildlife LSA and RSA were established as part of the baseline data collection program, as follows:

- The Wildlife LSA is defined by a 1,000 m buffer on the PDA.
- The Wildlife RSA extends approximately 10-20 km from the PDA and represents a sufficiently large area within which potential cumulative effects on wide-ranging species (e.g., grizzly bear) can be assessed.

A review of publicly available data sources was completed to gather information about wildlife and wildlife habitat and their distribution within the RSA, with a focus on species at risk (SAR)⁶ and species of management concern (SOMC)⁷. Publicly available sources included, for example, the BC Species and Ecosystems Explorer Tool (BC CDC 2022a), iMapBC (BC CDC 2022b), DataBC Catalogue (Ungulate Winter Ranges and Wildlife Habitat Areas, Government of British Columbia 2022), Important Bird Areas (IBA Canada 2022), eBird (eBird 2022), BC Breeding Bird Atlas (NatureCounts 2022), General Nesting Periods of Migratory Birds in Canada (ECCC 2023b), Natural History of Canadian Mammals (Naughton 2012), Amphibians and Reptiles of British Columbia (Matsuda et al. 2012), and Ecosystems of British Columbia (Meidinger and Pojar 1991). A desktop review of secondary sources (e.g., publicly available land use information, Indigenous Interests studies for other developments in the region, and Indigenous Nation websites) was undertaken to gather preliminary Indigenous Knowledge information that could be relevant to the Project as described in the introductory text to Section 12.

⁶ SAR are species listed under Schedule 1 of the *Species at Risk Act* (SARA) as endangered, threatened, or special concern, or species listed under the BC *Wildlife Act* as endangered or threatened.

⁷ SOMC are species listed by the COSEWIC but not yet listed under SARA, species blue- or red-listed by the BC CDC, species identified as having socio-economic or traditional interest to Indigenous Nations, or species recognized in provincial wildlife guidelines.

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Breeding bird surveys were completed following provincial standards (RIC 1999a, b) within or near the LSA by qualified bird biologists from June 08, 2022 to June 17, 2022. Point-count stations were pre-selected using satellite imagery to identify broad habitat types for representative sampling of habitats, with a focus on habitats that potentially support bird SOMC. Waterfowl surveys were completed following provincial standards (RIC 1999c) within and up to 1 km of the LSA. The late spring survey was completed by helicopter on May 20 and 21, 2022. In June 2022, water bodies within the LSA that were accessible via truck and hiking were surveyed opportunistically during migratory songbird surveys and amphibian surveys. The early fall helicopter survey was completed on September 21, 2022. Two Song Meter SM3Bat acoustic recording units (ARUs) were deployed in June 2022 for 25 survey nights to record birds that typically call in crepuscular or nocturnal periods. Acoustic data files generated by these ARUs were analyzed using the Kaleidoscope Pro 5.4.8 cluster analysis using a custom classifier for species of interest (i.e., common nighthawk [*Chordeiles minor*] and American bittern [*Botaurus lentiginosus*]) and a qualified bird biologist manually reviewed the data files using Kaleidoscope Pro's Viewer software. Call-playback surveys for northern goshawk (*Accipiter gentilis*) was completed at 31 stations in the LSA from June 10 to June 25, 2022 following BC survey standards (RIC 2001).

Amphibian surveys were completed following provincial standards (RIC 1998b) at wetlands within the LSA from June 8 to June 24, 2022. Survey sites were identified prior to field work using recent ortho-imagery of wetlands and in-field if crews discovered potential amphibian breeding sites opportunistically during the wildlife field program.

Two Song Meter SM3Bat ultrasonic acoustic recording units (UARUs) were deployed to survey for bats following provincial standards (RISC 2022) from May to September 2022, recording a total of 237 survey nights. Recordings from the bat surveys were processed and analyzed using Kaleidoscope Pro Software Version 5.4.8 and Bats of North America 5.4.0 classifier, refined to the central BC region bat species assemblage.

Ten Reconyx HyperFire Professional digital infrared wildlife cameras were deployed at 10 sites from May 19-20, 2022 through June 18-23, 2022. These cameras were re-deployed to 10 new sites from June 20-25, 2022 through September 14-16, 2022. Sites were selected prior to field work using recent ortho-imagery and ecosystem mapping to determine available habitat types for ungulates and furbearers and access constraints. Data processing of images was completed using Reconyx software: MapView. Images were classified to species by a qualified biologist experienced with mammal identification using images.

An aerial ungulate survey completed by helicopter in the RSA on December 15, 2022 following a moose composition survey method. Composition surveys provide information on sex ratios, age class, and calf recruitment. Survey methods were consistent with previous composition surveys completed by the Government of BC in December 2015 (Klaczek 2016). A second aerial ungulate survey was completed on December 12 and 13, 2023, following the same survey methods and with the same observers as the 2022 survey.

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Wildlife habitat suitability surveys following provincial standards (RIC 1999d) were completed in the LSA in conjunction with TEM surveys. Habitat suitability was rated for the following species or species groups; old forest birds, grassland and shrubland birds, wetland birds, northern goshawk, fisher, grizzly bear, moose, and western toad.

Incidental detections of wildlife, wildlife sign, and wildlife habitat features were also recorded during the 2022 and 2023 field studies programs to document wildlife habitat features that may require specific mitigation measures during Project planning and construction.

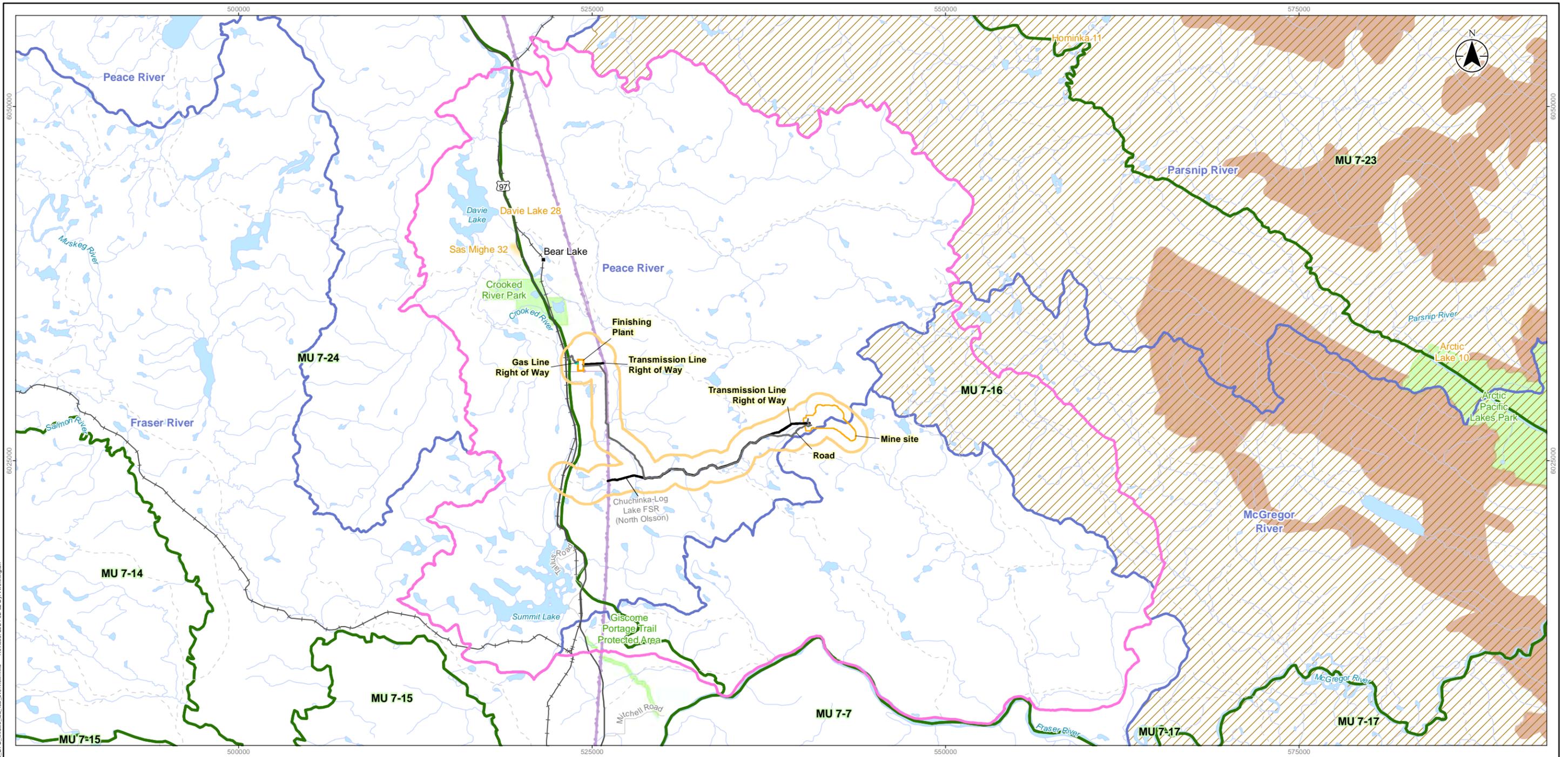
12.2.9.2 Summary of Existing Conditions

The RSA is comprised of various ages of coniferous, mixed wood, and deciduous forests managed under forest harvesting practices, riparian areas with creeks and rivers, and wetland complexes with open water lakes and ponds. The RSA does not overlap with any Ungulate Winter Ranges or Wildlife Habitat Areas, but it does overlap the Nation Grizzly Bear Population Unit which supports a viable grizzly bear population of moderate conservation concern. UWR U-7003 (caribou) is approximately 22 km east of the proposed Project (Figure 12.11). There are no Important Bird Areas located near the Project.

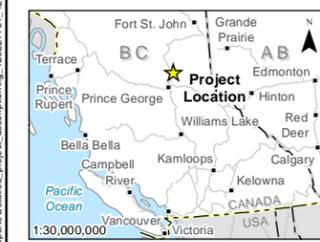
Although caribou historically occurred in the RSA in the 1970s and 1980s, caribou no longer occur in this area (M. Klaczek, WLRS biologist, Omineca Region, pers. comm. February 2022). The Project is located outside of caribou range, approximately 3 km from the most western reach of the Hart Ranges woodland caribou herd (Figure 12.12); an area that is highly disturbed mostly through logging (Muhley 2016). Current collared caribou in the Hart Ranges are further east of the RSA in the mountains (M. Klaczek, WLRS biologist, Omineca Region, pers. comm. February 2022).

Common mammals within the RSA include moose (*Alces alces*), deer (white-tailed [*Odocoileus virginianus*] and mule [*Odocoileus hemionus*]), elk (*Cervus canadensis*), bear (grizzly and black [*Ursus americanus*]), grey wolf (*Canis lupus*), coyote (*Canis latrans*), American marten (*Martes americana*), beaver (*Castor canadensis*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), and bats. Fisher (*Pekania pennanti*) may occur in riparian areas and wolverine (*Gulo gulo*) has been detected within the LSA.

The mature forest supports a diversity of species including hawks, owls, songbirds, woodpeckers, grouse, ungulates, bears, furbearers, bats, and western toad (*Anaxyrus boreas*). Wetlands support a diversity of species including ducks, geese, loons, grebes, bittern, cranes, songbirds, bats, moose, beaver, frogs, and western toad. There are 76 SOMC that potentially occur in the RSA. These include 15 species listed on the SARA and/or provincial red-list.

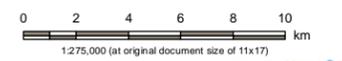


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- | | | | |
|--|------------------------------------|----------------------------------|----------------|
| — Highway | ▨ Caribou Herd Range (Hart Ranges) | ▭ Project Area | ▭ Wildlife RSA |
| — Local Street | ▭ Wildlife Management Units | ▭ Gas Line Right of Way | ▭ Wildlife LSA |
| - - - Resource Road | ▭ UWR U-7003 (Caribou) | ▭ Road | |
| — Railway | ▭ Major Watershed | ▭ Transmission Line Right of Way | |
| — Transmission Line | | | |
| — Watercourse | | | |
| ▭ Waterbody | | | |
| ▭ First Nations Reserve | | | |
| ▭ Provincial Park, Ecological Reserve, or Protected Area | | | |

Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada



Project Location: North Central, BC
 Project Number: 12321734
 Prepared by: VWORTHINGTON on 20221124
 Requested by: BHARPER on 20221123
 Checked by: BHARPER on 20221125

Client/Project/Report:
 Vitreo Minerals Ltd.
 Angus Project
 Detailed Project Description
 Figure No.:
12.12
 Title:
Angus Project in Relation to Hart Range Woodland Caribou Herd

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The RSA occurs within the A4 bird nesting zone (ECCC 2023b); the primary nesting period for zone A4 is from April 26 through August 10. Mitigation measures to address potential Project effects on migratory bird nests will be developed as part of the Application. These will refer to, and be consistent with, regulations under the federal *Migratory Birds Convention Act, 1992* and the *BC Wildlife Act* (see Section 9).

Breeding bird surveys were completed at 113 locations within and adjacent to the LSA. Surveys were distributed across four BEC units and five broad habitat types. Overall, 72 species were detected: 60 species in SBSmk1, 43 species in SBSvk, 52 species in SBSwk1, and 35 species in ESSFwk2. The most detected species during breeding bird surveys was Swainson's thrush (*Catharus ustulatus*).

Waterfowl surveys were completed at 68 wetlands within and up to 1 km of the LSA. There were 18 species of waterfowl and 11 non-passerine wetland-associated species detected; the highest number and diversity of waterfowl occurred in May helicopter survey. The most detected species was Canada goose (*Branta canadensis*) with 79 observations. Mallard (*Anas platyrhynchos*) was detected in the highest numbers in wetlands (27).

No common nighthawk or American bittern vocalizations were detected on the two ARUs and no goshawks responded to the call-playback at the 31 sites surveyed. Common nighthawk and American bittern were detected incidentally during other wildlife surveys in 2022 but no goshawks or nests were detected.

Pond dwelling amphibian surveys were completed at 26 sites within or near the LSA. Three species were detected – Columbia spotted frog (*Rana luteiventris*), wood frog (*Lithobates sylvaticus*), and western toad. Amphibians were detected at 12 wetland sites, and western toad was detected at six sites. Western toads were also detected incidentally at eight other locations within the LSA.

Ultrasonic acoustic surveys for bats at the two sites recorded 10,822 audio files over a combined 237 survey nights from May 19 to September 16, 2022. This included 8,226 audio files that contained identifiable bat echolocation calls, with the first bat pass recorded on June 9 and the last bat pass on July 23. Bats were detected on 76 of the 237 survey nights, with the majority of calls recorded at the end of June and beginning of July. Echolocation calls of 10 bat species were recorded, including five SOMC: northern myotis, little brown myotis, hoary bat, eastern red bat, and silver-haired bat. Of the five SOMC, little brown myotis accounted for the highest percentage of nightly detections (88%), followed by silver-haired bat (2%), eastern red bat (1%), hoary bat (<1%) and northern myotis (<1%).

Remote cameras were deployed in May for 21 to 35 days and relocated in mid-June for an additional 82 to 87 days across the four BEC units within or near the LSA. Nine species were detected on the cameras: six between May and mid-June and nine between mid-June and September. Moose were the most detected species (14 cameras) and black bear was the second most detected species (10 cameras). Grizzly bear was detected in an area of deep snow cover on May 20 and 21, 2022 at approximately 1,100 masl which may suggest denning in the ESSFwk2.

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The one-day aerial ungulate survey was completed in 329 minutes of helicopter surveying time on December 15, 2022. In total, 253 moose were detected with the majority (65%) in the SBSwk1 subzone variant. This reflects the level of survey effort distributed within the RSA and moose preference for habitats in the SBSwk1 subzone variant where snow depths are generally lower. Moose detections were not uniformly distributed, with most moose observed in the southwest portion of the RSA, approximately 8 km south of the haul road and east of Highway 97. Few moose were detected within the LSA, and no moose were detected near the Raw Sand Plant or the Monkman East Pit. Overall calf:cow ratio was 27 (± 4.2 SE⁸) per 100 cows and the bull:cow ratio was 95 (± 2.1 SE) per 100 cows. All early winter moose detections during this survey were at least 4 km from the Finishing Plant site and 10 km from the proposed Mine site.

Wildlife habitat suitability surveys were completed at 164 TEM plots within the LSA from June 21 to July 5, 2022. Habitat suitability ratings for 154 of the 164 TEM plots were summarized by site series and structural stage. Habitat suitability assessments in 2022 suggest moderate to high suitability habitat is present for old forest birds, grassland and shrubland birds, northern goshawk, wetland birds, fisher, grizzly bear, moose, and western toad. Results of these habitat suitability surveys will be used to inform the development of wildlife habitat suitability models that will be developed during the environmental assessment.

Field studies in 2022 confirmed the presence of the following federal or provincially listed species: olive-sided flycatcher (*Contopus cooperi*), common nighthawk, rusty blackbird (*Euphagus carolinus*), barn swallow (*Hirundo rustica*), horned grebe (*Podiceps auratus*), western toad, grizzly bear, wolverine. Other species of management concern that were confirmed present include provincial blue-listed species (e.g., broad-winged hawk [*Buteo platypterus*], great blue heron [*Ardea herodias*], American bittern), species with nests that are protected year-round (e.g., pileated woodpecker [*Dryocopus pileatus*], bald eagle [*Haliaeetus leucocephalus*], osprey [*Pandion haliaetus*]), and species of interest to Indigenous Nations (e.g., black bear, grouse, beaver, waterfowl).

Wildlife habitat features observed in 2022 within the LSA include beaver complexes (40 sites), raptor nests (one broad-winged hawk nest, three osprey nests, one merlin nest, one suspected northern harrier nest), four well-worn ungulate trails with high browsing activity, four potential fisher dens, and one den/cavity of an unknown species. There were no swallow nests (e.g., bank swallow colonies), mineral licks, wallows, pileated woodpecker nests, or bear dens found during baseline field surveys in 2022.

⁸ Standard error.

12.3 Human Environment & Community Well-being

Human Environment and Community Well-being refers to the relationship between the natural or physical environment and social, economic, historic, cultural, and human health and well-being-related components. The Human Environment and Community Well-being section describes the settings for socio-economics including land and resource use, archaeology and heritage, and the biophysical and social determinants of health. These settings are inclusive of the communities, individuals and land most likely to be affected by the development and implementation of the Project.

12.3.1 Socio-Economic Setting

12.3.1.1 Methods

The Socio-economic LSA/RSA includes the City of Prince George, District Municipality of Mackenzie, McLeod Lake 1 (Indian Reserve), McLeod Lake 5 (Indian Reserve), Fort George 2 (Indian Reserve), and the Fraser-Fort George Regional District Areas A, C, D, E, F, and G. The Fraser-Fort George Regional District Area G contains the unincorporated community of Bear Lake. The Socio-economic LSA/RSA is based on anticipated Project components and activities such as the potential for local and regional economic and employment opportunities and the influx of workers to construct and operate the Project who may utilize local and regional infrastructure and services.

The land and resource use LSA includes a 1 km buffer on either side of the PDA and is the same as that used for the existing conditions for Wildlife and Wildlife Habitat. The RSA encompasses a broader area beyond the PDA to provide additional context for land and resource use activities. It follows the boundaries of the Prince George Land and Resource Management Plan boundary and includes the LSA. The land and resource use RSA also incorporates the RSA for Wildlife and Wildlife Habitat (see Section 12.2.9).

Existing conditions on the general state of the local employment, economy, infrastructure, services and community health in the Socio-economic LSA/RSA are based on a review of existing information and secondary baseline data sources. Gender-based analysis plus will be conducted throughout the socio-economic assessment, which includes assessing how different segments of the population may experience disproportionate effects. Populations that will be assessed are inclusive of gender, Indigeneity, 2SLGBTQIIA+ community, age, and low-income status.

Existing conditions for land and resource use is based on existing information and secondary baseline data sources, including relevant spatial data obtained from DataBC. Other discipline data gathered (e.g., Indigenous Knowledge) were incorporated in the existing conditions summaries, as appropriate.

12.3.1.2 Summary of Existing Conditions

The Project lies within Treaty 8 and the traditional territory of McLeod Lake Indian Band and West Moberly First Nations, adjacent to the traditional territory of Lheidli T'enneh First Nation, and in proximity to the traditional territory of Nak'azdli Whut'en and Nazko First Nation.

The nearest communities to the Project are the unincorporated settlement of Bear Lake to the northwest and the City of Prince George to the south. Bear Lake lies within Statistics Canada's Fraser-Fort George Regional District Electoral Area census subdivision and has a population of approximately 152 (Statistics Canada 2022). Bear Lake has limited resources including fuel, meals, accommodations and health services.

Prince George is the administrative and economic centre of the region, often referred to as the capital of northern BC, while Bear Lake and McLeod Lake are unincorporated communities with limited economic activity. The City of Prince George lies within Statistics Canada's Prince George, City census subdivision and has a population of approximately 76,708 (Statistics Canada 2022). The population of Prince George is expected to decrease by 2.0% over the next 20 years while the population of seniors in Prince George is projected to increase by 74.0% (UNBC CDI 2016).

Major employers in Prince George include Canfor Wood Products, City of Prince George, College of New Caledonia, Government of BC, Government of Canada, Northern Health, Save-On-Foods, School District No. 57, Telus, and the University of Northern BC. In January 2023, Canfor announced that the pulp line at its Prince George Pulp and Paper Mill would be phased out by the end of March 2023, which resulted in the loss of about 300 jobs. On November 14, 2023, Canfor announced an extended curtailment at Polar Sawmill in Bear Lake. The Prince George economy has evolved from a mainly forestry-based economy to an economy that has diversified across various sectors. Prince George's five largest employment sectors are healthcare and social assistance, wholesale and retail trade, construction, educational services, and manufacturing (Statistics Canada 2023).

The industries, as defined by the North American Industry Classification System, most likely to supply labour, goods and services directly and indirectly to the Project are mining, quarrying, and oil and gas extraction, power, construction, transportation and warehousing, and professional, scientific and technical services.

Some key findings of a desktop study regarding current socio-economic conditions are:

- Between 2016 and 2021 the population in Prince George increased 3.7% (Statistics Canada 2022).
- In 2021, the total size of the LSA/RSA labour force was 50,410 persons (52.9% men⁹, 47.1% women+) (Statistics Canada 2022).

⁹ Beginning with the 2021 Census, Statistics Canada has begun to publish data on the basis of gender using the variables men+ and women+. Under this system men+ includes men (and/or boys), cisgender and transgender men, as well as some non-binary persons. Women+ includes women (and/or girls), cisgender and transgender women, as well as some non-binary persons.

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- The Indigenous LSA/RSA labour force totalled 6,295 persons (50.3% men+, 49.7 women+) (Statistics Canada 2022).
- In 2021, the unemployment rate in the LSA/RSA was 9.2%, 0.8 percentage points higher than the provincial average of 8.4% (Statistics Canada 2022).
- The unemployment rate for the overall Indigenous population of the LSA/RSA (16.3%) is notably higher than the total population LSA/RSA average (9.2%) (Statistics Canada 2022).
- The major drivers of economic importance to the area relate to employment opportunities provided by mining/aggregates, forestry, agriculture, resource harvesting activities, and recreation and tourism activities (Statistics Canada 2022). The major drivers of social and environmental importance to the area include crime, substance abuse issues, homelessness, extreme environmental events (e.g., prevalence of more intense wildfire seasons), invasive species, and reduced snowpack. Cultural and heritage resources also influence social well-being.
- Provincial Crown land parcels encompass approximately one quarter of the land base within the general Project area with the remainder consisting of federal government, municipal government, Indigenous Nations, mixed ownership, and private land parcels.
- Prince George plays a role as a supply and service hub for local and regional mines in north central and northeast BC focusing on industrial minerals, precious metals, and specialty metals.
- Hunting, outfitting, and trapping occur within the regional Wildlife Management Unit (Region 7A – Omineca) with opportunities (i.e., outfitting areas, trapping areas) available.
- Recreation and tourism are important industries in the region focused on the natural environment. Opportunities relate to various attractions, provincial parks and natural areas, regional parks, recreation sites, recreation and scenic values, and heritage sites.

Two forest recreation sites, Crystal Lake and Emerald Lake, are located within the LSA. The Mine site is 19 km from the nearest highway (Highway 97 John Hart Highway), while the Finishing Plant site is within 1 km of the highway and the CN rail line, adjacent to an existing heavy industrial use area (see Section 10.1). The Project is not in proximity to a school or hospital. Vitreo is currently unaware of temporary or seasonal residences located near the Project beyond those listed in Table 10.1; the location of any such residences will be discussed with Indigenous Nations and local stakeholders during engagement activities. Land and Water Use are further described in Section 15.

12.3.2 Archaeological and Heritage Setting

12.3.2.1 Methods

An archaeological overview assessment (AOA) desktop study of relevant archaeological, ethnographical, historical, and environmental data was completed for the Project and determined that the Project area has a high potential for archaeological sites (Stantec 2021). Further to the recommendations of the AOA, and AIA has been carried out for the Project following the methods listed in the application for *Heritage Conservation Act* Section 12.2 Heritage Inspection Permit 2022-0410.

12.3.2.2 Summary of Existing Conditions

The Project is approximately 60 km north of the City of Prince George in northeastern interior BC, where archaeological evidence of early human occupation has been recovered from many sites. Radiocarbon dates from numerous archaeological sites in the northern interior of BC further suggest this area has been occupied continuously for at least ten thousand years. The first archaeological investigations near the archaeological LSA began in 1962 when Charles Borden surveyed the Peace River Basin and recorded the Fort McLeod trading post site at the north end of McLeod Lake.

Beginning in the 1970s, archaeological surveys have been conducted in the general region in support of various industrial developments (e.g., forestry and oil & gas). These surveys consistently identified archaeological sites. Several sites such as culturally modified trees (CMTs), blazed trails, cache pits, and lithic sites were recorded within proposed forestry blocks near the PDA. The archaeological record of the northern interior of BC reflects established patterns of nomadic hunter and gatherer lifeways. More detailed discussions of regional ethnography and archaeology are presented in the AOA completed for the Project (Stantec 2021).

A previous AOA of the Project (Ecofor 2013) noted that there were at that time 69 recorded archaeological sites within 80 km of the Project area. These sites comprised surface and subsurface lithic scatters, barkstripped CMTs, cultural depressions in the form of cache pits, a fish drying rack, as well as historical log cabins and transportation trails. A search of the Province of BC's Remote Access to Archaeological Data online database of recorded archaeological sites conducted for Stantec's 2021 AOA, and repeated in August 2023, confirmed that one archaeological site (GcRp-1, a small lithic scatter) is recorded within the archaeological LSA (i.e., the Project footprint and a 1 km buffer around it) and that six are recorded within 3 km of the archaeological LSA, all small transitory hunting camps associated with wetlands and small lakes and rivers where local Indigenous groups seasonally hunted, trapped, and fished.

An AIA for the Project under *Heritage Conservation Act* Section 12.2 Heritage Inspection Permit 2022-0410 has been conducted and an interim report is currently in production (Stantec 2023). The AIA involved the pedestrian survey of the entire proposed Project footprint at 5 m to 20 m transect intervals and the shovel testing of 17 areas of high archaeological potential identified in the field. No archaeological sites were identified during the AIA and no further archaeological work was recommended.

Although a thorough attempt was made during the AIA to identify heritage resources within the study area, as with archaeological studies, the possibility exists that unidentified resources are present and when viewing the AIA results it is important to note that low potential does not mean no potential. To address the potential for chance discovery of heritage resources, it is recommended by the AIA that if suspected heritage resources are encountered the proponent inform their personnel and contractors that all development activities near the suspected heritage resources must be suspended immediately and a professional archaeologist contacted. Vitreo has an Archaeological Chance Find Procedure in place as part of their exploration activities and will have an Archaeological Chance Find Procedure in place for ground-disturbing activities associated with project construction, operations and closure.

12.3.3 Biophysical and Social Determinants of Health Setting

The World Health Organization defines “health” as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. This means that there are numerous factors that influence the overall health condition of a person. Although these factors can influence the overall health condition of an individual, the manner in which these factors are assessed or quantified are different. Biophysical health is influenced by exposure to naturally occurring chemicals, environmental pollutants, or non-chemical hazards (e.g., noise) where higher levels of exposure may result in increased health risks or adverse health effects. Social determinants of health (SDOH) include social, cultural, economic, and other factors that could influence overall health and safety outcomes. Different methodologies are used for assessing biophysical determinants of health and social determinants of health. For example, biophysical health is assessed by comparing pollutant or hazard exposures to health-based exposure benchmarks. Social determinants of health are assessed by evaluating the effects of social determinants (e.g., employment, income, housing, education, food security) on the general well-being of a population.

While biophysical and social determinants of health are connected from a holistic perspective, they are assessed separately using the scientific methods and provincial/federal regulatory guidance that are applicable to their respective disciplines. Therefore, the following sections also separate biophysical determinants of health and SDOH.

12.3.3.1 Methods for Biophysical Determinants of Health

Biophysical determinants of health are based on a person’s potential exposure to naturally occurring chemicals, environmental pollutants, and other hazards such as noise. The description of the environmental setting for biophysical health considers existing pollutants in the air, surface water, soil, and existing noise levels.

The concentrations of naturally occurring chemicals (e.g., trace metals) and environmental pollutants (e.g., air pollutants such as nitrogen dioxide, sulphur dioxide, and particulate matter) are compared to environmental guidelines for the protection of human health from federal, provincial, or international health regulatory agencies. This will provide a characterization of the existing conditions for biophysical health risks, which will be used as a benchmark for comparison of predicted future environmental conditions associated with Project construction, operation, and decommissioning. Examples of health-based environmental guidelines include the Canadian Ministers of the Environment (CCME) soil quality guidelines for the protection of human health, Canadian Drinking Water Guidelines for health-based parameters, and the World Health Organization air quality guidelines. Existing levels of noise near the Project are measured to determine whether existing noise levels may pose an annoyance risk or sleep disturbance risk. These comparisons provide an overall characterization on the existing state of the environment near the Project as it relates to the biophysical determinants of health.

The assessment of biophysical health will apply the scientific methodology that is consistent with a Human Health Risk Assessment (HHRA). Health Canada and the BC Ministry of Health provides separate federal and provincial guidance on the recommended methods to be used in a HHRA. For the purposes of this environmental assessment, the provincial HHRA guidance provided by the BC Ministry of

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Health will be used (Ministry of Health 2022), as requested by the BC Ministry of Health and Northern Health.

12.3.3.2 Summary of Existing Conditions for Biophysical Health

Air Quality

Existing biophysical health conditions related to air quality is based on air quality monitoring station data described in Section 0. Publicly available air quality monitoring stations are at least 38 km from the Project and show that criteria air contaminants concentrations – TSP, fine particulate matter (PM_{2.5} and PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and carbon monoxide (CO) – are consistently below BC Air Quality Objectives. Therefore, baseline ambient air quality in the vicinity of the Project is conservatively characterized as good most of the time.

Soil Quality

Surface soil samples were collected from overburden material at the Project site in 2022 and 2023 as described in Section 12.2.3. These soil samples were submitted for laboratory analysis of metals and the results compared to the CCME soil quality guidelines from the protection of human health for parkland use soils. Based on this comparison, the maximum measured concentration of antimony, arsenic, barium, beryllium, cadmium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, tin, uranium, vanadium, and zinc in overburden samples were below the applied CCME soil quality guideline. The maximum and average concentration of chromium (total) was above the applied soil quality guideline, indicating that chromium may be naturally present in the overburden material at concentrations greater than the CCME soil quality guideline for the protection of human health. These chromium concentrations are assumed to be natural, and no specific human activity has been identified that could be a source of chromium in the environment.

Surface Water Quality

Surface water samples were collected from multiple stream and lake sites near the Project throughout 2021 to 2023, as described in Section 12.2.5 and Section 12.2.5.2. These baseline surface water quality samples were submitted for laboratory analysis of metals and anions, and the results were compared to the Canadian Drinking Water Guidelines for health-based and taste-based (i.e., aesthetic) parameters. It was assumed that people access local streams and lakes for potable drinking water.

When comparing the maximum measured concentration of metals and anions among the surface water samples, metals and anions were present at concentrations below the Canadian Drinking Water Guideline for health-based parameters. This included the metals aluminum, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, strontium, and uranium. When comparing the maximum measured concentration of metals and anions among the surface water samples to taste-based aesthetic guidelines, the concentrations were below the guidelines for aluminum, chloride, nitrite, nitrate, sodium, sulphate, and total dissolved solids. Iron concentrations were frequently above the

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aesthetic guideline of 0.3 mg/L. This indicates that the metal and anion concentrations in surface waters around the Project are considered to be at safe levels for human use.

Acoustic Environment

Baseline noise monitoring was conducted at six locations within the acoustic LSA as described in Section 12.2.2 (Acoustic Environment – Method). Baseline noise levels were measured in July and November of the 2023. Data analysis is currently in process, and the results will be updated when available. After the removal of sound measurement data associated with non-representative weather conditions and abnormal events, the baseline sound level can be quantified for the monitoring locations.

12.3.3.3 Methods for Social Determinants of Health

The spatial boundaries resemble what is in the socio-economic setting where the LSA is the same as the RSA (Section 12.3.1.1) which is broad in order to capture the potential socio-economic project-related effects due to social, cultural and economic changes to the environment, and therefore contribute to health and safety outcomes.

The SDOH are the interrelated social, political and economic circumstances in which people are born, grow up, live, work and age (NCCDH 2022). Examples of SDOH include:

- Employment, unemployment, working conditions
- Housing
- Income and income inequality
- Community safety and crime
- Education and education attainment
- Food Security
- Social relationships and family dynamics
- Indigenous determinants of health such as self-determination, connections to land and water, environmental stewardship

These SDOH do not work in isolation and may evolve over time (NCCDH 2022). Many of the SDOH are described in other sections of this draft DPD such as the socio-economic setting (Section 12.3.1) which describes employment and economic conditions (e.g., income, income distribution, employment and education; infrastructure and services (e.g., housing, education services, childcare facilities); community health describes health services (described in this section); and the demographic profiles (e.g., geography, race, gender, and Indigenous ancestry) is described in Section 12.3. These determinants influence living conditions, which can influence risk behaviours and mental health, which ultimately contribute to health outcomes such as diseases, illness and mortality.

The summary of existing conditions in the DPD have been informed by:

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- Guidance and resource documents that will guide the understanding of existing conditions including those listed in Table 12.1.
- Desktop data collection which includes using the most recent available data to inform health and social conditions and potential project-related effects. Examples of sources of data include Canadian Community Health Survey, BC Centre for Disease Control Reportable Disease Dashboard, Government of BC Coroners Service, and Canadian Institute for Substance Use Research.

In the Application, existing conditions and the effects assessment will include:

- Primary data collection which includes information through key person interviews. Interviews are intended to inform baseline conditions and further understand interests and concerns related to the Project.
- Incorporation of secondary data includes reports and documents produced by Northern Health, Health Canada, Statistics Canada, National Collaborating Centre for Determinants of Health, National Collaborating Centre for Indigenous Health, the National Inquiry into Murdered Missing and Indigenous Women and Girls and grey and academic literature to inform the existing conditions and effects assessment.
- Gender-based analysis plus (GBA+).
 - This process will be conducted throughout the health assessment which includes assessing how different segments of the population may experience disproportionate effects. Populations that will be assessed are inclusive of gender, Indigeneity, 2SLGBTQIIA+ community, age, and low-income status.
- Integration of the results from a human health risk assessment which evaluates biophysical health factors from exposure to environmental pollutants and hazards.
- Integration of social, environmental and cultural information from other sections (e.g., socio-cultural setting, Indigenous Nation Interests) to discuss how potential residual and cumulative effects holistically contribute to and influence health outcomes.

12.3.3.4 Summary of Existing Conditions for Social Determinants of Health

The Project location falls within Northern Health, Northern Interior Health Service Delivery Area (NIHSDA). The University Hospital of Northern BC in Prince George is the largest acute care facility in the region and provides ambulatory care, laboratory and medical imaging services, outpatient services, surgery and visiting clinics (Northern Health 2023a). Prince George also has an Urgent and Primary Care Centre which provides after-hours care to people with urgent (but not emergency) medical needs and for people who do not have a regular family doctor or nurse practitioner (Northern Health 2023b).

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The following describe key health findings based on preliminary community health data collected in the region:

- In 2016, the Community Well-being (CWB) index scores¹⁰ for Indigenous Nations in BC was 62.9 and 79.4 for non-Indigenous communities (Government of Canada 2019). In 2016, the City of Prince George had a CWB score of 81 which is greater than the BC score for the non-Indigenous communities. Fraser-Fort George C Regional District Area had the highest score of 84 (Government of Canada 2023).
- In 2019/2020, the percentage of perceived life stress, most days quite a bit or extremely stressful; body mass index, adjusted self-reported, adult (18 years and over), obese; current smoker, daily or occasional; and heavy drinking was higher in the NIHSDA when compared to the BC rates. Males had greater rates of higher blood pressure and risky drinking in the NIHSDA and females had greater rates of perceived stress and obesity (Statistics Canada 2022b).
- In 2019 in the NIHSDA, chlamydia, gonorrhea, syphilis and HIV rates per 100,000 were lower than the national rates (BCCDC 2023).
- Mood disorders and perceived mental health as fair or poor was greater in the NIHSDA compared to the provincial rate. Females had greater rates of perceived poor mental health and mood disorders (Statistics Canada 2022).
- In the Northern Health Area (NHA), there were 60 suicides in 2021 (Government of British Columbia Coroners Service 2021).
- Substance use hospitalization rates (per 100,000) are greater in the NIHSDA compared to the provincial rates. In 2019, the rate of hospitalizations for opioid use in the NIHSDA was 80.4 per 100,000 compared to the provincial rate of 40.3 per 100,000. Hospitalization rate for stimulants in the NIHSDA was 76.8 per 100,000 compared to the provincial rate of 34.2 per 100,000, and hospitalizations for cocaine was 30.26 per 100,000 in the NIHSDA compared to 12.9 per 100,000.
- Hospitalization rate (per 100,000) for alcohol and cannabis is greater in the NIHSDA compared to the provincial rates. In 2019, the hospitalization rate for alcohol was 428.6 per 100,000 compared to the provincial rate of 352.0 per 100,000. Cannabis hospitalizations in the NIHSDA were 42.24 per 100,000 compared to the provincial rate of 24.0 per 100,000 (Canadian Institute for Substance Use Research 2022).
- The unregulated drug death rate in the NIHSDA is greater than the provincial rate. While there is not a consistent upward trend, unregulated drug deaths have increased in the NIHSDA and across the provincial since 2018 (Government of British Columbia Coroners Service 2023).

¹⁰ The CWB index measures socio-economic wellbeing for communities across Canada over time. The scores are derived from Statistics Canada Census of Population data and are composed of the following four indicators: education, labour force activity, income, and housing.

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12 Existing Conditions

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- In 2019/2020, life satisfaction and sense of belonging to a local community in the NIHSDA had similar rates to the province. Females reported a greater sense of belonging to a local community compared to males (Statistics Canada 2022).
- From 2019 to 2022, total criminal code violations, violent crime violations and sexual assault violations are higher in Mackenzie (rural) and Prince George (municipal) compared to the provincial rates (Statistics Canada 2023). Women, women who live in rural areas, Indigenous peoples, Indigenous women, Indigenous women with a disability or who have experienced homelessness, and Indigenous 2SLGBTQIA+ communities are disproportionately affected by gender-based violence (Government of British Columbia n.d.; Allen 2020; Heidinger 2022; Perreault 2022). The National Inquiry into Murdered Missing Indigenous Women and Girls (2019) indicated that violence, including sexual violence towards Indigenous women and girls, is observed with transient workforces associated with resource extraction projects and potential increases in substance abuse can contribute to domestic violence in Indigenous communities. Gender-based violence will be assessed and reference to the National Inquiry for Murdered and Missing Women and Girls (2019) will be included in the Application.

13 Project Interactions and Potential Effects

An assessment of potential environmental, social, economic, heritage or health effects will be conducted during the environmental assessment. Valued components will be determined through engagement with Indigenous Nations, stakeholders, and regulatory agencies, as well as through understanding of key Project interactions with the environment. This section provides a high-level overview of known or likely Project interactions and potential effects. Anticipated mitigation measures, management plans and monitoring plans to address potential effects are summarized in Section 14.

The biophysical environment setting of the Project is summarized in Section 12.2 and has informed the determination of Project interactions. To date the biophysical baseline studies indicate that the Project is located in a highly disturbed landscape, with ongoing use including forest harvesting and road construction. The Mine site is in the headwaters of Angusmac Creek and Giggler Creek, tributaries of the Crooked River in the Peace River watershed, and Olsson Creek, a tributary of the Fraser River in the Fraser River watershed. The Finishing Plant site is near the Crooked River.

13.1 Interactions with and Potential Effects on the Biophysical Environment

The Project has the potential to interact with the biophysical environment as highlighted in Table 13.1, with key potential interactions and potential effects described below.

Table 13.1 Biophysical Environment Interactions Matrix

Physical Activities	Potential Valued Components				
	Atmospheric Environment	Acoustic Environment	Groundwater	Aquatic Environment ¹	Terrestrial Environment ²
Construction					
Vegetation clearing and grubbing, and soil and overburden removal and storage	✓	✓	✓	✓	✓
Construction of water management infrastructure	✓	✓	✓	✓	✓
Construction of access road and upgrades to FSR	✓	✓	✓	✓	✓
Construction of Raw Sand Plant and Finishing Plant	✓	✓	✓	✓	✓
Construction of additional facilities, including Explosives Storage Area, Natural Gas Pipeline and Transmission Line	✓	✓	-	-	✓
Vehicle traffic	✓	✓	-	✓	✓
Emissions, discharges, and wastes	✓	✓	✓	✓	✓
Employment and expenditures	-	-	-	-	-

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Physical Activities	Potential Valued Components				
	Atmospheric Environment	Acoustic Environment	Groundwater	Aquatic Environment ¹	Terrestrial Environment ²
Operation					
Drilling and blasting in the pit	✓	✓	✓	✓	✓
Storage of waste rock and fines, including backfilling of material into the pit	✓	✓	✓	✓	✓
Vehicle traffic (includes traffic along FSR to Finishing Plant Road)	✓	✓	-	✓	✓
Collection, storage and discharge of contact water	-	-	✓	✓	-
Crushing of rock at Mine site	✓	✓	-	-	✓
Processing of materials at Raw Sand Plant and Finishing Plant	✓	✓	-	-	-
Water withdrawal for Raw Sand Plant make-up water	-	-	✓	✓	-
Progressive reclamation	✓	✓	-	-	✓
Emissions, discharges, and wastes	✓	✓	✓	✓	✓
Employment and expenditures	-	-	-	-	-
Reclamation and Closure					
Waste dump resloping	✓	✓	-	-	✓
Soil replacement and re-vegetation	✓	✓	-	-	✓
Collection, storage and discharge of contact water	-	-	✓	✓	✓
Emissions, discharges and waste	✓	-	✓	✓	✓
Employment and expenditures	-	-	-	-	-
Post-Closure					
Collection, storage and discharge of contact water, pit water	-	-	✓	✓	-
Notes: ✓ = Potential interaction – = No or negligible interaction 1 – Aquatic Environment includes Surface Water Quantity and Quality and Fish. 2 – Terrestrial Environment includes Soils, Terrain and Terrain Stability; Vegetation and Wetlands; Wildlife and Wildlife Habitat.					

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13.1.1 Atmospheric Environment

Potential effects on the Atmospheric Environment include increased concentration of ambient air pollutants and increased dust deposition (dustfall).

The Project has the potential to adversely affect local air quality due to the combustion emissions from the open pit mining equipment and the truck hauling between the Raw Sand Plant and the Finishing Plant site. There may also be fugitive dust emissions at certain times of year from the open pit blasting and the movement of mobile equipment between the Monkman East Pit, Raw Sand Plant and the External Waste Rock and Fines Stockpile. The crushing activities are not expected to be a substantial source of dust due to the high moisture content for the material coming from the open pit. Fuel combustion and dust emissions will be reduced through a variety of mitigation measures which will be described in the Air Quality Management Plan. Given the prevailing wind direction at the Crystal Lake monitoring station from south southeast and southerly directions the communities of Bear Lake will likely be downwind of the Project. Within the PDA boundary, dust emissions from the Project will be primarily an occupational health and safety concern to Project staff, however outside of the PDA boundary fugitive dust may affect the surrounding vegetation and soils in the immediate area through direct deposition. The presence of dust on vegetation and soils may result in changes to land use, including to Indigenous and non-Indigenous land users, who may avoid areas where dust from the Project has been deposited. Dust deposition may also result in changes to vegetation structure and composition resulting in an indirect effect on wildlife habitats.

Fugitive dust emissions from open pit mining and hauling are common issues in BC operating mines during extended dry periods. Well understood management measures can be employed to mitigate the fugitive dust emissions including watering roads, applying dust suppressant agents, covering haul tucks, and installing dust collection systems and baghouses on fixed equipment. The environmental assessment will include an air dispersion model, which will be used to evaluate the fugitive dust and other air emissions from the Project.

Additionally, the Project will produce GHGs primarily through operation of the Finishing Plant dryer and haul trucks used to deliver the raw sand. However, the Raw Sand Plant area will be powered by hydroelectric power, mitigating total Project emissions. The Project is expected to result in an overall reduction in total GHG emissions currently associated with proppant production and shipping, due primarily to the proximity of the Project to the natural gas basins of northeast BC and Alberta compared to Wisconsin, which is the current primary source of high-quality proppant.

13.1.2 Acoustic Environment

Potential effects on the acoustic environment include increase in noise levels.

Some of the Project activities during construction and operation phases may produce high-level noise emissions. Land users may experience noise effects from Project activities. Noise emissions from the Project, including the Mine site, haul roads and Finishing Plant site will be used in an acoustic model to predict noise effects. Noise effects on the noise sensitive receptors, including the recreation sites near the

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Finishing Plant site and haul road will be evaluated in the noise modelling assessment (see Section 11.2 and 12.2.2 for further details).

13.1.3 Groundwater

Potential effects on groundwater include change in groundwater quantity and change in the chemical and/or physical composition of groundwater beyond the range of natural variability.

Vegetation clearing and overburden removal and stockpiling during construction may affect groundwater by changing the rate and fraction of precipitation that infiltrates and recharges the groundwater system. Baseline data collection currently under way will identify areas susceptible to these effects.

Mining operations at the Monkman East Pit will result in an excavation that will cause groundwater to flow towards the Pit. Groundwater that enters the Monkman East Pit must be removed (pumped out) to provide safe working conditions. As a result, groundwater levels near the excavation may decline and groundwater discharge to wetlands, streams, or lakes that are hydraulically connected to the groundwater system may decrease. The potential to reduce groundwater discharge to these receiving environments by dewatering the Monkman East Pit will be evaluated in the Application using analytical and numerical modelling.

The make-up water supply for the Raw Sand Plant will be prioritized from recycled water, contact water, groundwater at or near the Mine site, and surface water from a nearby creek (see Section 15.2). Groundwater withdrawal may result in a decline in groundwater levels and a reduction in groundwater discharge to hydraulically connected wetlands, streams, or lakes. The potential to reduce groundwater discharge to these receiving environments by groundwater withdrawal for water supply will be evaluated in the Application using analytical and numerical modelling.

Effluent discharge from the Project to ground has the potential to adversely effect groundwater quality. Management of effluent and its potential effects on groundwater and the downgradient receiving environment will be considered in the Application.

13.1.4 Aquatic Environment

Potential effects on the aquatic environment include change in hydrological regime beyond the range of natural variability, change in the chemical and/or physical composition of surface water and changes to fish and fish habitat as well as aquatic resources.

Mining and stockpiling of fines, waste rock or overburden has the potential to result in erosion and transport of sediment into streams. The primary sediment control measure for the Project will be runoff collection ditches and sediment ponds that collect contact water and run-off. Additional erosion control measures range from siting and designing facilities, to timing of clearing activities, to active sediment management (e.g., silt fencing). Baseline data collection currently under way will identify areas susceptible to erosion.

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The proposed haul road will involve upgrades to stream crossings may be required to raise the standards for the intended use. To mitigate effects to fish and fish habitat associated with the stream crossing upgrades, the construction window may be limited to the least-risk windows for fish (see Section 9).

The Raw Sand Plant will require a water supply, which will primarily be sourced from a combination of recycled water, contact water and groundwater (see Section 15.2). Baseline studies currently underway will establish the location, depth, and available volume of groundwater sources.

Vitreo will conduct a water balance and water quality modelling in the environmental assessment that will include interactions between groundwater at the Mine site. The Application will also include an evaluation of downstream effects to wetlands and watercourses.

The implications of groundwater and surface water withdrawal on fish and fish habitat will be analyzed during feasibility studies and the environmental assessment.

It is possible that an authorization for the unavoidable HADD of fish habitat under Section 35(2) of the *Fisheries Act* will be needed. Such a HADD of fish habitat may occur due to direct losses of fish habitat under Project infrastructure or changes to the availability. If an authorization is required, Vitreo will develop an offsetting plan that includes habitat restoration, enhancement, or creation measures that are commensurate with the unavoidable losses and consistent with local fisheries management objectives, if available.

Effluent discharges from the Project has the potential to adversely alter surface water quality and, therefore, the potential to adversely affect the health, growth, and survival of fish. As described in Section 11.3, sediment ponds will be used to manage contact water. Management of effluent, and its potential effects on surface water and fish and fish habitat, will be considered in the Application.

13.1.5 Terrestrial Environment

Potential effects on the terrestrial environment include changes to soils and terrain, wildlife and wildlife habitat, vegetation and wetlands.

Vegetation will be removed during Project construction, and vegetation and wetlands in proximity to the Project will experience indirect effects during Project construction and operation, particularly from fugitive dust deposition.

Vegetation clearing will remove wildlife habitat and Project operation at the Mine site and transportation of raw sand between the between the two plants will result in wildlife disturbance, potentially at a level greater than currently experienced with existing logging truck traffic. The Finishing Plant is located near an existing heavily disturbed industrial use area and thus less likely to have effects on wildlife. As described in Section 12.2.9, the PDA is approximately 3 km from the western boundary of the Hart Ranges woodland caribou herd (BC CDC 2021b). A direct disturbance effect on caribou is therefore unlikely. Baseline data collection currently underway will identify wildlife species or wildlife habitat that have the potential to be affected by the Project.

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Vegetation clearing can also cause the destruction of bird nests if carried out during the nesting season. Possible mitigations include limiting clearing to outside the nesting season or conducting nest surveys and avoiding areas with nests if clearing during the nesting season cannot be avoided.

13.2 Interactions with and Potential Effects on the Human Environment

The Project has the potential to interact with the human environment as highlighted in Table 13.2, with key potential interactions and potential effects described below.

Human environment baseline studies conducted to date have found that the nearest communities to the Project are the unincorporated settlement of Bear Lake to the north and the City of Prince George to the south. While Bear Lake has limited resources, Prince George is the administrative and economic centre of the region, often referred to as the capital of northern BC. Major employers in Prince George include forestry; municipal, provincial and federal governments; education; and service industries. In 2023, Canfor has announced that the pulp line at its Prince George Pulp and Paper Mill would be phased out as well as an extended curtailment at the Polar Sawmill in Bear Lake.

Table 13.2 Human Environment Interactions Matrix

Physical Activities	Potential Valued Components				
	Heritage	Land Use	Employment and Economy	Infrastructure and Services	Human Health and Community Well-being
Construction					
Vegetation clearing and grubbing, and soil and overburden removal and storage	✓	✓	-	-	✓
Water management infrastructure construction	✓	✓	-	-	✓
Access road construction and upgrades to FSR	✓	✓	-	✓	✓
Construction of Raw Sand Plant and Finishing Plant	✓	✓	-	-	✓
Construction of additional facilities, including Explosives Storage Area, Natural Gas Pipeline and Transmission Line	✓	✓	-	-	✓
Vehicle traffic	-	✓	-	✓	✓
Emissions, discharges, and wastes	-	✓	-	-	✓
Employment and expenditures	-	-	✓	-	✓

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Physical Activities	Potential Valued Components				
	Heritage	Land Use	Employment and Economy	Infrastructure and Services	Human Health and Community Well-being
Operations					
Drilling and blasting in the pit	-	✓	-	-	✓
Storage of waste rock and fines, including backfilling of material into the pit	✓	✓	-	-	-
Vehicle traffic (includes traffic along FSR to Finishing Plant Road)	-	✓	-	✓	✓
Collection, storage and discharge of contact water	-	✓	-	-	✓
Crushing of rock at Mine site	✓	✓	-	-	✓
Processing of materials at Raw Sand Plant and Finishing Plant	✓	✓	-	-	-
Water withdrawal for Raw Sand Plant make-up water	-	✓	-	-	-
Progressive reclamation	✓	✓	-	-	✓
Emissions, discharges, and wastes	-	✓	-	-	✓
Employment and expenditures	-	-	✓	-	✓
Reclamation and Closure					
Waste dump resloping	-	✓	-	-	-
Soil replacement and re-vegetation	-	✓	-	-	-
Collection, storage and discharge of contact water	-	✓	-	-	✓
Emissions, discharges and waste	-	✓	-	-	✓
Employment and expenditures	-	-	✓	-	✓
Post-Closure					
Collection, storage and discharge of contact water, pit water	-	✓	-	-	✓
Notes: ✓ = Potential interaction - = No or negligible interaction					

The Project is not expected strain public infrastructure or affect human capital in the region beyond a level that can be reasonably managed. Its effects, including to infrastructure and services and changes in TLU or non-traditional land use, may be of concern to Indigenous Nations and residents of nearby small communities including Bear Lake. However, specific interactions and potential effects are discussed below.

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13.2.1 Heritage

Potential effects on heritage include loss of access to, information about, or alteration to site contents or context.

Heritage studies conducted to-date have identified one archaeological site recorded within the LSA and six recorded within 3 km of the LSA. None of these recorded sites are expected to be affected by the Project. However, there is the potential for unidentified sites may be encountered during Project execution. To address the potential for chance discovery of heritage resources, Vitreo will implement an Archaeological Chance Find Procedure, as documented in Section 14.

13.2.2 Land Use

Potential effects on land use include change in tenured and non-tenured land and resource use as well as to TLU.

In a review of public literature and through ongoing engagement activities, Indigenous Nations with interests in the Project area have expressed concerns over effects on wildlife and over industrial activities interfering with traditional hunting, fishing, trapping and gathering activities. Issues include concerns over displacement of activities, safety concerns, and indirect effects due effects on wildlife. Changes to wildlife abundance, distribution, and behaviour affect TLU. Effects to TLU can cause adverse effect on Indigenous culture and on the rights of Indigenous Nations. Culture and rights may also be affected by the destruction or disturbance of archeological resources (see Section 13.2.1).

Haul traffic for the Project will occur on a public FSR with multiple users, including logging trucks and recreational users. Increased Project-related traffic on the FSR may interfere with existing use and may also increase effects to local wildlife (e.g., vehicle-wildlife collisions) and vegetation (e.g., dust deposition), which may in turn affect land use (e.g., if land users avoid areas of high traffic or dust deposition). Management measures may be required to address these effects, including development of a Traffic Management Plan.

Aside from potential dust emissions, the Project is not expected to interact adversely with the existing recreation sites or provincial parks in the area (i.e., Emerald Lake Recreation Site, Crystal Lake Recreation Site, Crooked River Provincial Park). The nearest haul route to a recreation area is along the existing 2800 FSR, which is approximately 400 m east of the Emerald Lake Recreation Site and there will be no spatial overlap or increased traffic through the recreation areas or provincial parks in the area. Mining and processing have the potential to disturb TLU and non-traditional land users, e.g., through noise and fugitive dust deposition. As outlined in Section 10.1 the Project is not near a settlement, schools, hospital, or other sensitive use areas. The main effects pathways for disturbance of TLU are haul traffic and dust, which are addressed separately. Non-indigenous hunters and recreational users of the vicinity of the Mine site will likely be affected and may be displaced from an area around the Mine site. The effects pathways will be similar to those for land use and mitigations designed to limit effects on traditional land use will be investigated in discussions with Indigenous Nations.

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13.2.3 Employment and Economy

The Project is expected to generate economic effects during construction, operation, and closure through the generation of employment, expenditures on goods and services, and the generation of revenues for local, territorial, and federal government. Potential Project effects will be direct (e.g., employment at the mine) through the major activities with each Project phase, indirect (e.g., jobs at suppliers of services to the mine) through the linkages that exist with suppliers and other sectors, and induced (e.g., direct and indirect employee expenditure) through shifts in spending on goods and services as a consequence of changes to the payroll of the directly and indirectly affected businesses.

13.2.4 Infrastructure and Services

As the majority of the Project workforce is expected to come from local communities, and in some cases off-setting job losses from other industries that have or are shutting down indefinitely, the Project is likely to have limited incremental effects to infrastructure and services in the LSA and RSA (e.g., schools, local roads). Project-related effects may occur as a result of use of emergency and health services in case of an accident and malfunction at the Project site (see Section 16.1 for more detail).

13.2.5 Human Health and Community Well-being

Human health is defined as the bio-physical health of people resulting from their exposure to chemicals and environmental pollutants. Potential environmental pollutants are those that are directly attributable to physical activities or processes associated with the construction or operation of the Project.

This exposure may come from inhalation of air pollutants (e.g., silica dust, vehicle and equipment exhaust), drinking water and consuming country foods containing potential pollutants, and dermal contact with materials (e.g., soil) containing potential pollutants. In the environmental assessment, human health will be assessed for nearby residents and temporary land users (e.g., Indigenous Nations land users, recreational land users, country food harvesters).

The Project has the potential to adversely and positively affect community health and well-being for workers and their families and residents in the LSA/RSA. Working conditions such as shift work and potential workplace harassment or gender-based violence may contribute to adverse mental health conditions which could place additional strain on family dynamics and adverse coping mechanisms such as substance use. Changes to the environment and perceived changes to the environment can affect traditional food harvesting activities and connection to the land which can adversely affect health and well-being conditions for Indigenous Peoples. For those successful securing project-related income (directly and indirectly), positive effects may result in having more income to spend on necessities such as food and housing, and mental health may improve with potential reduced financial pressure. Positive and adverse effects may be disproportionately realized by segments of the populations; for example, adverse effects may be disproportionately experienced by women and Indigenous women and girls, who may be at greater risk of community safety concerns such as gender-based violence.

13.3 Cumulative Effects

A cumulative effects assessment will be conducted where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. Reasonably foreseeable projects and activities are currently defined as those that: a) have been publicly announced with a defined project execution period and with sufficient project details that they can be included in the assessment; b) are currently undergoing an environmental assessment; or c) are in a permitting process.

Project components and activities have the potential to interact temporally or spatially with other projects and activities in the area, including forestry, mining, and linear development (roads, rail lines, transmission lines, oil and gas pipelines). A preliminary list of past, present and reasonably foreseeable projects and activities that will be considered in the cumulative effects assessment is presented in Table 13.3. These projects and activities will be further evaluated as the environmental assessment process progresses, and this list is subject to change.

Engagement activities during the Early Engagement phase included questions and concerns about cumulative effects that the Project might have. Cumulative effects may result from increased disturbance on the landscape, leading to increased effects to ecosystem and wildlife habitat. Cumulative effects may also arise from overlapping demands on infrastructure and services, such as increased traffic on the North Olsson FSR or increased demand in regional services such as health and education. Project mining and processing activities have the potential to disturb both traditional and non-traditional land users, e.g., through noise and fugitive dust deposition and may interact cumulatively with other activities such as forestry in the area. Cumulative effects may also occur on Indigenous Interests such as where residual effects on traditional practices including hunting, trapping, fishing, and plant gathering interact spatially and temporally with residual effects from other projects and activities.

Vitreo will further define an appropriate approach to cumulative effects assessment in terms of temporal scope, spatial scope, what developments to consider, as well as consideration of potential cumulative effects, through engagement with Indigenous Nations, the public, stakeholders and regulators.

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Table 13.3 Preliminary List of Past, Present, and Reasonably Foreseeable Projects and Activities

Project or Activity Type	Description	Status
Mining	Giscome Quarry and Lime Plant Project (Graymont Western Canada Incorporated)	Future
Transmission Lines	Existing transmission lines including BC Hydro's transmission and distribution system	Present
Forestry	Forest harvesting	Past/Present/Future
	Log processing and sorting facility (Winton Global)	Present
	Sawmills (e.g., Carrier Lumber, Timberspan Wood Products, Canfor)	Present
Pulp and Paper	Existing pulp and paper mills (Canfor)	Present
Water licenses	Water licenses in the area	Past/Present/Future
Linear Transportation	Highway 97	Present
	Forest Service Roads	Past/Present/Future
	CN Rail line	Present
Oil and Gas Pipelines	T-South Mainline (Enbridge)	Present
	Coastal GasLink pipeline (Coastal GasLink Pipeline Limited)	Present
	Trans Mountain Expansion (Trans Mountain Pipeline ULC)	Present
	Prince Rupert Gas Transmission Project (TC Energy)	Future
Recreational Land Use	Recreational Land Use, including hunting, fishing and snowmobiling.	Past/Present/Future

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14 Mitigation Measures, Management Plans and Monitoring Plans

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14 Mitigation Measures, Management Plans and Monitoring Plans

Vitreo intends to develop a suite of management and monitoring plans prior to construction, operation or reclamation and closure, as appropriate. These plans will be presented at a conceptual level in the Application and will be included at a detailed level for the Joint *Mines Act*/EMA Permit Application. These plans will be a part of the Project's Environmental Management System and will be prepared by and executed under the guidance of Qualified Professionals. At a minimum, the plans will include relevant regulatory requirements, including those under the *Mines Act* and HRSC, EAC and permit conditions, best management practices and standards, training requirements, and roles and responsibilities.

Northern Health provided feedback during the Early Engagement phase that a Health and Medical Services Plan and Social Effects Management Plan are recommended for the Project. Given that the Project is located in close proximity to Prince George and their medical facilities, and the anticipated capacity of nearby communities to supply Project staff from existing populations, Vitreo does not anticipate either of these plans being required to mitigate Project effects. During the environmental assessment process, Vitreo will evaluate in more detail the potential effects meant to be mitigated by these plans and will consider their inclusion in the Application if determined to be necessary.

Vitreo has received a comment from McLeod Lake Indian Band stating that post-closure wildlife monitoring will be required to assess wildlife return to the Project. This comment is acknowledged within the description of the Reclamation and Closure Plan, below.

Vitreo also received multiple comments regarding mitigation and monitoring of fugitive dust emissions, which have been incorporated into the description of the Air Quality Management Plan, below. These comments were received from McLeod Lake Indian Band, West Moberly First Nations, Lheidli T'enneh First Nation, Northern Health, ENV, WLRS, EAO and the general public through EAO's EPIC website.

Vitreo also received a request from the RDFFG to review and provide comment on the Project's Emergency Response Plan. This comment is acknowledged in the description of that plan, below.

This section has also been updated from the IPD to reflect the EAO Early Engagement Policy Guidance (EAO 2019) specific to the DPD.

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14 Mitigation Measures, Management Plans and Monitoring Plans

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At a minimum, management and monitoring plans are anticipated to include the following:

- Air Quality Management Plan, which will describe measures to mitigate Project effects to air quality, including from fugitive dust, fuel combustion emissions and GHG emissions. The Plan is anticipated to include monitoring activities at the Mine site, the Haul Route and the Finishing Plant site. Mitigation and monitoring measures contained within the Plan are anticipated to include:
 - Summary of industry best management practices to reduce air and GHG emissions
 - Summary of Project-specific mitigations to reduce fuel combustion emissions, fugitive dust and GHG emissions
 - Use of baghouses and vacuum systems at the Raw Sand Plant and the Finishing Plant site to reduce particulate matter emissions.
 - Use of water trucks or other control measures (possible use of chemical dust suppressants) to manage fugitive dust from road use
 - Measures to reduce GHG emission such as no-idling policies and proper maintenance of Project vehicles
 - Monitoring ambient air quality to compare against the air dispersion model predictions and the BC Ambient Air Quality Objectives
 - An adaptive management strategy that will include a trigger-action-response-plan (TARP) to identify what additional mitigation measures could be applied if the measured ambient air quality approaches or exceeds the trigger (threshold) limits
 - Meteorology monitoring
- Water Management Plan, which will describe water withdrawal and use, the water management system (e.g., diversion ditches and sedimentation ponds), and how the Project will achieve effluent discharge standards and permit conditions including a description of any water treatment determined to be necessary. Currently, the only water treatment anticipated to be necessary for the Project are sedimentation ponds to manage TSS concentrations in effluent; however, this Plan will describe any other treatment methods determined to be necessary through development and review of the Application and subsequent permit applications with reference to EMLI's Technology Readiness Assessment Interim Technical Guidance (August 2022). This Plan will also contain compliance monitoring requirements, including monitoring objectives, relevant standards and compliance conditions, locations, methods, frequency and parameters.
- Wildlife Management Plan, which will describe how wildlife and wildlife habitat will be protected through the phases of the Project. The Wildlife Management Plan will be a living document that will be updated periodically and will provide the framework for understanding and effectively implementing wildlife mitigation measures (i.e., regulatory context, roles and responsibilities, communication strategy, monitoring and reporting, linkages to other plans in the Project's Environmental Management System). The Plan will be guided by best management practices, regulatory requirements, and engagement with Indigenous Nations. The Plan is expected to address the following topics: roles and responsibilities, general restrictions, habitat protection,

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14 Mitigation Measures, Management Plans and Monitoring Plans

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wildlife movement, mortality risk and incidental take, wildlife health and safety, communication strategy, and reporting wildlife observations and incidents. The Plan will also contain compliance and mitigation effectiveness monitoring, including monitoring objectives, targets, frequency, duration, and reporting.

- Traffic Management Plan, which will describe measures to address traffic safety concerns at the Mine site and Finishing Plant site, and along the FSR and the access of haul trucks to Highway 97. These mitigation measures are anticipated to include communication protocols, including radio frequencies and timing, signage, speed limits, driver training requirements and driver fatigue management measures. The Plan will be developed with current users of the haul route, including Indigenous Nations and stakeholders, including Canfor and interested recreation groups.
- Erosion and Sediment Control Management Plan, which will describe how erosion and sediment control is implemented through all phases of the Project to prevent erosion on Project slopes and mitigate sediment transport into waterbodies. The objectives of this Plan are anticipated to include assisting in maintaining environmental compliance with operating permits, reduction in potential adverse effects to receiving water bodies from sediment that could harm fish and fish habitat, reduction in potential adverse effects on land surface that could impact wildlife or their habitat, and mitigation of potential adverse effects on undisturbed areas and the receiving environment. This Plan will identify areas of high erosion potential, as well as define related management implications. Standard industry practices anticipated to be included in the Plan are:
 - Identify and avoid areas with highly erodible soils
 - Identify and, where possible, limit activities that cause erosion and cause the migration of sediment prior to them occurring
 - Reduce the amount of exposed soils, and topsoil and reseed as soon as possible after a disturbance
 - Convey water around construction areas
 - Implement use of physical erosion control measures such as sediment logs, erosion control matting and straw mulching
- Emergency Response Plan, which will describe Vitreo's emergency response protocols and procedures for all Project phases. It will describe roles and responsibilities; communication methods and protocols; emergency identification, prevention and protection; access control during emergency situations; and mine rescue equipment inventory. This plan will be developed in consultation with Indigenous Nations and relevant emergency responders and local health resources including the RCMP, Northern Health, the BC Emergency Health Services, the Regional District of Fraser-Fort George, and the Prince George Fire Department or Bear Lake Volunteer Fire Department.

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14 Mitigation Measures, Management Plans and Monitoring Plans

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- Fuel Management and Spill Control Plan, which will outline procedures for designing, handling, storage, dispensing and transportation of all fuel on-site to prevent or limit effects on the receiving environment for all Project phases. It will also describe spill prevention procedures and operational controls, as well as record keeping and reporting requirements. The Plan will be compliant with various regulatory instruments including the EMA and Spill Reporting Regulation, *Transportation of Dangerous Goods Act*, and BC Fire Code (BC 2018). The Plan will contain control and mitigation measures such as requirements for spill kits, refueling procedures including setback distances from waterbodies, contingency requirements, and training and reporting requirements for staff.
- Reclamation and Closure Plan will describe reclamation measures and prescriptions for site preparation, soil replacement and revegetation, as well as water management activities, site remediation (if required), contingency and monitoring plans, and research opportunities to meet objectives. The Plan will also contain an end land use plan, which describes end land use and capability objectives for the Project (see Section 10.3.3.1). The Plan will be developed in concordance with the *Mines Act* and HSRC. End Land Use Planning objectives, and other aspects of the plan as requested, will be developed in discussions with interested Participating Indigenous Nations. The Plan will also include a monitoring plan to guide the evaluation of reclamation performance and success. Monitoring requirements will be determined through the assessment and permitting processes, but may include monitoring for revegetation success, metals uptake in vegetation, and wildlife use of reclaimed areas.
- Archaeological Chance Find Procedure. Although the AIA aimed to identify heritage resources within the study area (See Section 12.3.2), as with all archaeological studies, the possibility exists that unidentified resources are present and when viewing the AIA results it is important to note that low potential does not mean no potential. To address the potential for chance discovery of heritage resources, it is recommended by the AIA that if suspected heritage resources are encountered the proponent inform their personnel and contractors that all development activities near the suspected heritage resources must be suspended immediately and a professional archaeologist contacted. Vitreo has an Archaeological Chance Find Procedure in place as part of their exploration activities and will have an Archaeological Chance Find Procedure in place for ground-disturbing activities associated with Project construction, operations and reclamation and closure.

The mitigation and monitoring plans required as part of the Application, as well as specific mitigation measures and monitoring requirements will be further developed through the environmental assessment process in discussions with Participating Indigenous Nations, regulators and stakeholders including users of the Emerald Lake and Crystal Lake Recreation Sites.

15 Land and Water Use

15.1 General Land Use

The anticipated footprint of the Project is approximately 867 ha. This estimate includes an approximately 100 m buffer around Project components at the Mine site and the Finishing Plant site. It also includes an approximately 100 m wide engineering corridor to account for linear infrastructure. Currently, the extent and location of upgrades to the haul route (i.e., along the existing FSRs) is unknown and this estimated footprint conservatively assumes that the haul route will need to be upgraded. This footprint estimate will be refined as the upgrades to the haul route are determined.

The Project footprint is situated predominantly on unsurveyed Crown land (lands with no ownership status). The Mine site is located within the Vitreo's MX-13-301, Multi-Year Area-Based Permit boundary for the Angus Property Mineral Claim. The Finishing Plant site is located on untitled Crown land. Sections of the proposed haul road are situated on Private land. The remainder of the proposed haul road and proposed Transmission Line right-of-way cross Crown land (surveyed and unsurveyed). There are no federal lands in the vicinity of the Project area.

The Project footprint is a mixture of undeveloped land and previously developed lands. The Mine site is a greenfield site that has been extensively logged. Existing linear disturbances between the Mine site and the Finishing Plant include: the 2800 FSR, the Chuchinka-Log Lake FSR (North Olsson), the Darby North FSR, several electric power lines, a pipeline, and a telecommunication line. Other disturbances along the proposed haul road (i.e., existing FSRs) include gravel pits/quarry sites, sand and gravel sites, and a dryland sort site. Highway 97 and an existing CN rail line are located just west of the Finishing Plant site. The Finishing Plant site is located within an existing industrial developed area between existing transmission lines and highway and rail rights-of-way, although the Finishing Plant site itself is undeveloped.

15.1.1 Land Use Planning

The Project is located within the Prince George Land and Resources Management Plan (LRMP). The LRMP is a strategic land use plan that provides direction for land use and resource development on Crown land within the plan area. The Project is also located within the RDFFG. The Project is encompassed within the Electoral Area G – Crooked River-Parsnip OCP (RDFFG 2021). General objectives under the OCP includes a Mineral Resource Management Objective. The purpose of the Objective is to support opportunity for mineral resource industry in a manner reflecting the importance of environmental protection, complementary to other industry in the region, Lands within the Project area covered by the OCP are designated primarily as “AG/RES – Agricultural/Resource”. The Project area is also encompassed by the RDFFG Zoning By-law No. 2892 (2014) which regulates land use and development within electoral areas of the RDFFG in accordance with the provisions of the *Local Government Act*. Lands in the Project area covered by the Zoning By-law are zoned primarily as “Ru3 – Rural 3” and “M3 – Industrial 3”.

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Within the “AG/RES – Agricultural/Resource” designation, one primary use of land consists of forestry and resource extraction uses. Additional activities, such as the preliminary processing of resource products, may be permitted within the “AG/RES – Agricultural/Resource” designation subject to evaluation through a rezoning process where necessary, through the RDFFG.

15.1.2 Land Use Plans

The Project area is subject to the Prince George LRMP. The Project is located within a designated Enhanced Resource Management area, which is designed to manage “for development of resources such as timber and minerals while minimizing the impact on other resource values” (Government of British Columbia 1993). No changes to zoning or land designations are anticipated to be required for the Project.

In addition to the Prince George LRMP three OCPs apply within the general Project area. The purpose of an OCP is to state general land use objectives and policies and guide future direction on land use decisions within electoral areas. The Project is subject to the Crooked River Parsnip OCP. The location of the Finishing Plant site is just outside a designated heavy industrial use area in an agricultural reserve (which represents the majority of land in the OCP). The Monkman East Pit and Raw Sand Plant also are located within an agricultural reserve (Regional District Fraser-Fort George, 2007).

The RDFFG Zoning By-law No. 2892 (2014) regulates land use and development in accordance with the provisions of the *Local Government Act*. Within the area covered by the LRMP are also reserve lands of Lheidli T’enneh First Nation which are subject to the *Lheidli T’enneh Land Use Plan* (LTLA 2017) and the Lheidli T’enneh Land Code (2000 [Amended 2003, 2009]). The City of Prince George regulates development within its boundaries through zoning bylaws.

Since 2003, the *McLeod Lake Indian Band Land Code, 2002* has provided McLeod Lake Indian Band with jurisdiction and authority to manage McLeod Lake Indian Band reserve lands. The *McLeod Lake Indian Band Land Code, 2002* acts in accordance with the *Framework Agreement on First Nations Land Management*, which was ratified under the *First Nations Land Management Act, S.C. 1999, c.24* (FNLMA) and McLeod Lake Indian Band is an Operational First Nation under the FNLMA.

Lheidli T’enneh First Nation is also signatory to the *Framework Agreement on First Nations Land Management*, which recognizes First Nations’ inherent right to govern their reserve lands. Signatory communities to the Framework Agreement assume the administration and full law-making authority of their reserve lands, environment, and natural resources, when they ratify their land code.

The Project footprint does not overlap with reserve land or the Lheidli T’enneh Land Use Plan.

15.1.3 Crown Land Tenures

The Project overlaps Crown reserve land tenures, including statutory right-of-way (or easement), licenses of occupation (commercial/recreation, quarrying, transportation), a notation of interest (i.e., quarrying for sand and gravel) and special use permits (see Table 15.1). Guiding/outfitting areas and trapping areas encompass the area around the Project. There is one Tree Farm Licence #30 to Canfor Corporation which encompasses the Project footprint. Forest land use activities in the Project area are represented by several active and pending harvest authority tenures, forest cover reserves, and cut block tenures.

Table 15.1 Crown Land Tenures and Notations of Interest the Overlap the Project Footprint

Tenure No.	Tenure Purpose	Tenure Sub-type
700617	Guide Certificate	Guiding
701184	Guide Certificate	Guiding
TR0716T006	Trapline Area	Trapping
TR0716T005	Trapline Area	Trapping
TR0716T004	Trapline Area	Trapping
TR0716T007	Trapline Area	Trapping
Tree Farm Licence #30	Forest Resources	Timber Harvesting
7409677	Licence of Occupation	Sand and Gravel
7410136	Licence of Occupation	Sand and Gravel
7410137	Licence of Occupation	Roadway
S26144	Special Use Permit	Dryland Sort
0256833	Statutory Right-of-Way	Electric Power Line
0254383	Statutory Right-of-Way	Electric Power Line
REC1299	Recreation	Recreation Site
0276079	Statutory Right-of-Way	Telecommunication Line
S24104	Special Use Permit	Gravel Pit, Rock Quarry
S23994	Special Use Permit	Gravel Pit, Rock Quarry
7409689	Notation of Interest	Sand and Gravel

15.2 Project Water Use

The estimated Raw Sand Plant total processing water requirement is 2800 to 3000 cubic metres per hour (m^3/hr) with approximately $200 \text{ m}^3/\text{hr}$ (~ 0.056 metres cubed per second [m^3/s]) required as make-up water (i.e., not recycled). Mining and processing the quartz arenite at the Raw Sand Plant are seasonal operations that would take place for approximately 245 days per year during the open-water season of April 1 to November 30. Processing and make-up water sources have been identified and prioritized as follows:

1. *Recycled water:* At the end of the Raw Sand Plant process, sand will be dewatered using filter presses, and fines will be filtered to recover and recycle water back to the process.
2. *Contact water:* Contact water will be collected in five sediment ponds within the Mine site and one sediment pond near the Finishing Plant site.
3. *Groundwater:* A groundwater resource at or near the Mine site will supplement make-up water supply.
4. *Surface water:* Should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV2016).

In addition to process water, the Project will require drinking water for office facilities. A reliable, steady water source is also required for emergency response (e.g., firefighting) and for dust control. Drinking water sources are still being investigated but may include treatment of site groundwater or trucking potable water to site.

Vitreo is not aware of other water users in the vicinity of the Monkman East Pit and Raw Sand Plant. No existing effluent discharge permits were identified in the creeks or lakes draining the Project area including the Crooked River downstream from the community of Bear Lake. Winton Global Lumber Ltd. holds a water withdrawal license from the Crooked River and 100 Road FSR, (Licence C121921, $40.0 \text{ m}^3/\text{day}$ for water delivery) and has a groundwater well for a water supply system at a facility at 35178 Hart Highway. Residential and recreational water use occurs in a corridor along the highway in residences and provincial parks. These users are unlikely to be affected by water use at the Project.

During Early Engagement activities, Vitreo was informed that drinking water to the community of Bear Lake is supplied from a nearby groundwater well. Vitreo has been unable to confirm the location of this well but anticipates working with the community during the environmental assessment to better understand this well's location and management. However, as water withdrawal and effluent discharge will primarily occur at the Mine site, it is unlikely that the Project will affect the drinking water source for the community of Bear Lake.

16 Public, Worker, and Environmental Safety

The Project will be designed, constructed, operated, reclaimed, and closed in accordance with the HSRC (EMLI 2022). Additionally, to mitigate potential effects to public, worker, and environmental safety, Vitreo will develop a suite of management and monitoring plans including but not limited to an Emergency Response Plan, a Fuel Management and Spill Control Plan, and a Traffic Management Plan (see Section 14). These management plans will be developed in accordance with relevant legislation, regulations, and best practices, as well as input received from Participating Indigenous Nations and local stakeholders.

The Project will also be subject to a number of provincial and federal permits with their associated legally-binding conditions, including those issues under the *Mines Act*, EMA, *Water Sustainability Act* and potentially under the federal *Fisheries Act*. More information on potentially applicable permits are included in Table 4.1 and Table 4.2.

As well, occupational health and safety of Project workers will be under the direction of the Workers Compensation Board and the *Workers Compensation Act*.

During the Early Engagement phase, McLeod Lake Indian Band and Northern Health raised concerns regarding road safety and the use of Highway 97 to transport silica sand to market from the Finishing Plant site, and safety considerations for the commuting requirements of Project personnel. With respect to the use of Highway 97 for transportation of silica sand, particular concern was expressed about the use of Pine Pass in the winter. While the use of a public highway for transportation of material is an authorized activity under the *Transportation Act*, and use of the highway for transportation of silica sand will comply with applicable legislation, Vitreo acknowledges this concern and has incorporated potential accident scenarios regarding use of Highway 97 and has included it as an Accident or Malfunction scenario in Table 16.1. With respect to the safety considerations for the commuting requirements of Project personnel, Vitreo is considering use of a bus or shuttle system from key communities to the Mine site to reduce the risk of driver fatigue and the associated safety concern. This consideration has been incorporated into Table 16.1.

This section has been updated from the IPD to reflect the EAO Early Engagement Policy Guidance (EAO 2019) specific to the DPD.

Future public, worker and environmental safety issues will be considered and addressed as they are raised with Vitreo through ongoing engagement activities, as outlined in the Engagement Plan.

16.1 Preliminary Identification of Potential Accidents or Malfunctions

Accidents and malfunctions with the potential to affect public, worker and environmental safety could occur during all phases of the Project. A preliminary description of credible accidents or malfunctions that may occur during Project construction, operation, reclamation and closure and post-closure are listed in Table 16.1. The Application will contain a detailed analysis of Project accidents and malfunctions, which will evaluate a range of scenarios, including those listed below, the relevant failure mechanism(s), the controls and response procedures Vitreo will employ to prevent and address any risk, and an evaluation of residual risk including likelihood of the accident or malfunction occurring and the consequence to human and environmental components. Guidance material, including the Risk Management Guideline for the BC Public Sector (Province of British Columbia Risk Management Branch and Government Security Office, April 2019) will be used to support the risk assessment.

Vitreo will communicate information about possible accidents and malfunctions and associated mitigation measures during engagement activities to help landowners, land users, Indigenous Nations, and nearby community members (up to and including Bear Lake) better understand the potential risks of Project activities, and to engage them in developing mitigations, including emergency response procedures, associated with the Project. These engagement activities may include mailouts, meetings and presentations to discuss identification of and potential effects associated with accidents and malfunctions as well as mitigation measures and emergency response planning. In the event of an accident or malfunction Vitreo will immediately notify Indigenous Nations landowners, land users and nearby community members (including Bear Lake), as appropriate.

Table 16.1 Preliminary Description of Potential Accidents or Malfunctions

Potential Accidents or Malfunctions	Description
Pit wall instability or rock fall	<p>A failure or slumping of a pit wall, or rock fall, would result in the deposition of pit wall material into the bottom of the pit. The worst-case scenario is a pit wall failure or rock fall that results in a fatality to one or more Project personnel. This scenario is applicable during the Operation and the Reclamation and Closure phases. A failure or slumping of the pit wall may result in environmental effects to air quality through dust emissions. These scenarios are considered unlikely as Vitreo will implement a pit wall stability monitoring program, and the pit will be evacuated if a danger to personnel is detected. Project design will adhere to requirements in the <i>Mines Act</i> and the HSRC, and Project facilities will be constructed and operated under the direction of a Qualified Professional.</p> <p>The risk of these scenarios is expected to be moderate but will be further estimated during the Project risk assessment process.</p>

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Potential Accidents or Malfunctions	Description
Unplanned fire or explosion	<p>A fire or explosion at the surface may be caused by a number of failure modes, including explosion or malfunction of equipment, improper use or storage of explosives, or smoking. An explosion may cause a localized fire or damage to Project infrastructure, as well as short-term environmental effects (e.g., noise and air emissions). The worst-case scenario is an unplanned fire or explosion resulting in one or more fatalities. However, this type of event occurring is considered very unlikely. Vitreo will employ industry-standard management measures to mitigate the risk of this accident or malfunction scenario, including adherence to the HSRC, the Explosives Regulation, and the BC Fire Code; certification of the explosives contractor by Natural Resources Canada; establishment of a strict non-smoking policy near equipment or explosives; proper equipment maintenance; and establishment of a non-vegetated buffers around infrastructure and equipment.</p> <p>The risk of this scenario is expected to be low but will be estimated as part of the Project risk assessment process.</p>
Motor vehicle accident at the Project	<p>During the Construction, Operation, Reclamation and Closure phases material and personnel will be transported to and from the Project by motor vehicle. Additionally, haul trucks will transport liberated quartz arenite between the Raw Sand Plant and the Finishing Plant along FSRs. A motor vehicle accident may occur under a range of conditions including road conditions, driver fatigue, collisions with wildlife, vehicle malfunctions, and radio malfunctions. These accidents could occur during all Project phases but are most likely to occur during construction and operation when Project traffic would be the highest. Effects of a motor vehicle collision may include injury or fatality of Project workers or members of the public, wildlife mortality, or effects to the environment from a fuel or chemical spill into water or land. Multiple serious injured workers or dozens of workers requiring examination at the same time may place strains on the Northern Health health care facilities and affect other residents.</p> <p>Vitreo will design, construct and maintain all Project roads to meet or exceed requirements as outlined in the HSRC (EMLI 2022). Drivers and personnel will receive appropriate training. Vitreo will also implement a Traffic Management Plan, which will outline additional mitigation and management measures to mitigate risk (likelihood and consequence) of a vehicle collision.</p> <p>The risk of this scenario is expected to be low to moderate but will be estimated as part of the Project risk assessment process.</p>
Motor vehicle accident off the Project	<p>During the Operation phase, silica sand will be transported along Highway 97 from the Finishing Plant to markets in the Montney Basin. While use of public infrastructure (i.e., Highway 97) for transportation is not proposed as part of the Project scope, Vitreo acknowledges the concerns received during the Early Engagement phase regarding this activity. Particular concern was expressed over the hauling of silica sand through Pine Pass during winter months. As well, a question was raised during the Early Engagement phase regarding safety of staff commuting to and from site.</p> <p>Vitreo anticipates approximately 150 trucks per day one-way (or approximately six trucks every hour) will travel on Highway 97, transporting proppant from the Finishing Plant site to markets in northeast BC. Annually, assuming full volume of haul traffic for 335 days, this will correspond to approximately 50,280 trucks. A motor vehicle accident may occur as a result of road conditions, driver fatigue, collisions with wildlife, and vehicle malfunctions. As the use of Highway 97 involves driving over a high mountain pass (i.e., Pine Pass) weather conditions may be a more substantive contributor to motor vehicle accidents than it is with hauling along the FSRs. A motor vehicle collision could include injury or fatality of Project workers or members of the public, wildlife mortality, or effects to the environment from a fuel or chemical spill into water or land.</p>

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Potential Accidents or Malfunctions	Description
Motor vehicle accident off the Project (cont'd)	<p>While maintenance of Highway 97 is the responsibility of MOTI, Vitreo or their contractors will monitor highway and weather conditions prior to leaving their homes or site and will adjust to the current road conditions. Project vehicles, including trucks hauling silica sand to market, will be appropriately maintained. Drivers and personnel will receive appropriate training (e.g., safe driving practices such as maintaining appropriate distances between vehicles, adjusting driving styles to suit road conditions). For staff traveling to and from site for their shifts, crews will muster at a location and take a bus to the Mine site or Finishing Plant site. The use of group transportation will mitigate accidents caused by driver fatigue before or after their shifts.</p> <p>The risk of this scenario is expected to be low to moderate but will be estimated as part of the Project risk assessment process.</p>
Hydrocarbon spill	<p>The Project will be using and storing a variety of hydrocarbon fuels and lubricants throughout the Construction, Operation, Reclamation and Closure phases. The transport, storage, and use of hydrocarbons have associated risks for the unintended release of these compounds in the environment. Failure modes include vehicle accidents, failures of tanks and containment systems, and spills during maintenance or fueling operations resulting in a release of hydrocarbons to land or water. Depending on the material spilled, location of the spill and amount of material spilled, environmental effects may occur (e.g., affecting waterbodies), which may also affect drinking water quality for local residents. Small spills are likely to occur but would likely be contained within the immediate area, however a large spill that could result in environmental effects on the surrounding area are considered unlikely.</p> <p>Design and operation of fuel facilities will conform to the applicable regulatory requirements and accepted industry best practice. As well, spill containment will be installed to prevent environmental contamination, and Vitreo will implement a Fuel Management and Spill Control Plan, maintain appropriate spill kits, and train personnel in safe spill response and prevention.</p> <p>The risk of this scenario is expected to be low but will be estimated as part of the Project risk assessment process.</p>
Power failure	<p>A 138-kilovolt Transmission Line, primarily paralleling the North Olsson FSR, will provide hydroelectric power to the Mine site. A power failure at the Mine site may cause temporary shut down of the Raw Sand Plant. A power failure is considered unlikely. Vitreo will attempt to mitigate disruptions in employment for plant staff by redeploying them elsewhere at the Mine. Vitreo will conduct regular inspections of the Transmission Line with inspection frequency to be determined through permitting. Vitreo will also investigate back-up power options.</p> <p>The risk associated with power failure is expected to be very low, but further risk assessment will be completed in support of the Application.</p>

17 Effects of the Environment on the Project

Natural hazards (explored more below) may impair Vitreo’s ability to operate the Project, may affect worker health and safety and have unintended environmental effects. Project planning will include design considerations and mitigation measures to avoid or limit the effects of natural hazards on the Project and Vitreo will develop a suite of management plans to address this risk. Potential effects of the environment on the Project are presented in Table 17.1 and will be fully assessed during the environmental assessment process.

No feedback was received on effects of the environment on the Project during or prior to Early Engagement, and no Indigenous Knowledge has yet been received relevant to this section. Feedback or Indigenous Knowledge received will be incorporated in subsequent environmental assessment phases, including the Application, as appropriate.

Table 17.1 Potential Effects of the Environment on the Project

Potential Effects of the Environment on the Project	Description
Climate change (e.g., temperature rise, trend of increasing precipitation, drought)	Overall changes in climatic conditions in the Project area are expected to include an increase in annual mean temperature, leading to an increased number of frost-free days. Also expected is more rain (winter and summer months), and more snow in the winter but less snow in the spring months. Potential effects from climate change on the Project include damage to infrastructure from extreme weather events, access roads that may be affected by freeze-thaw cycles, and changes in site hydrology affecting the site water balance. Therefore, as the Project design progresses, future effects of climate change will be incorporated into design and management of infrastructure (e.g., consideration of allowances for the effects of climate change in water management structures as recommended by EGBC 2018).
Extreme weather and weather-related events	Besides changes in long-term climate variables, mines are also affected by extreme weather events, such as extreme precipitation events (rain and snow), flooding, drought, heatwaves, and storms (ICMM 2013). Effects of extreme weather events such as extreme precipitation over a short timeframe can overwhelm the hydrologic regime and mine drainage systems through excess runoff and flooding of pits. It can also wash out roads or decrease slope stability, which can affect the stability of mine infrastructure. These effects also apply if large amounts of water are expected from a sudden snow melt due to an unusual warm spell. Therefore, as the Project design progresses, conservatism will be incorporated into Project design so that mine infrastructure is designed, constructed and operated to withstand extreme events.
Wildfires	Wildfires have the potential to affect the Project by delaying or bringing mine operation to a stop as well as by damaging Project infrastructure, haul roads, or local highways and other access routes. Smoke from wildfires can affect visibility and hence safe work conditions, on site as well as on the access roads. Vitreo will mitigate potential effects to the Project from wildfires by maintaining an unvegetated buffer around infrastructure, maintaining onsite fire response and fire prevention equipment, and potentially adjusting work schedules and activities in case of severe fire danger.

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The consultation logs present consultation activities up to January 31, 2024.

Table A.1 Engagement Records of Contact with McLeod Lake Indian Band

Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
11-Jan-21	Vice President, Operations	Telephone call	Duz Cho Construction	Discussed diamond drilling program wrap up, and a high-level discussion including general Project overview, economic development ideas.
4-Feb-21	Vice President, Operations	Text message	Duz Cho Construction	Discussed a potential alternative sand source, Duz Cho Construction to send sample.
28-Feb-21	Vice President, Operations	Telephone call	Duz Cho Construction	Discussed 2022 drilling program.
12-Apr-21	Vice President, Operations	Email	Duz Cho Construction	Discussed the sand sample results and meeting request.
20-Oct-21	Vice President, Operations	Telephone Call (Sent)	Duz Cho Construction	Discussed diamond drilling program, potential areas and timing of work.
28-Oct-21	Vice President, Operations	Telephone call	Duz Cho Construction	Discussed diamond drilling program and set up call with driller.
8-Nov-21	Vice President, Operations	Telephone call	Duz Cho Construction	Discussed diamond drilling program and set up call with driller.
November – December 2021	Vice President, Operations	Telephone call, email and text message	Duz Cho Construction	Discussed day to day drilling program operations.
16-Feb-22	President, CEO	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band confirming dates for March field work and requested availability of monitor.
23-Feb-22	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing Vitreo's Angus project drafts IPD and Engagement Plan for review and feedback. Request for input from McLeod Lake Indian Band by March 24th, 2023, noting schedule to submit updated versions to the BC EAO in Q1 2023. Meeting offered to answer any questions.
18-Jul-22	Community Engagement Lead Facilitator Project Manager Facilitator Regulatory Specialist	Email and Letter/Document (Sent)	Chief	Introductory email sent to McLeod Lake Indian Band Chief and Council and Land Use Manager including Project introductory letter and map and a request to meet.
29-Jul-22	Vice President, Operations	Telephone Call (Received)	Traditional Land Use Coordinator	Telephone call received from McLeod Lake Indian Band inquiring about field scheduling and interest in having a monitor join field work team.

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14-Sep-22	Vice President, Operations President, CEO	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band providing the name and contact details of the new monitor on site, along with the meeting location for September 15, 2022.
28-Sep-22	Vice President, Operations President, CEO	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band requesting weekly summary of time spent by the McLeod Lake Indian Band monitor on the Project.
April – September 2022	Vice President, Operations	Telephone call, text message	Duz Cho Construction	Ongoing discussions regarding 2022 programs.
21-Oct-22	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing details for upcoming field surveys and specific details regarding the ungulate survey in December 2022.
21-Oct-22	Vice President, Operations	Telephone Call (Sent)	Traditional Land Use Coordinator	Text message sent to McLeod Lake Indian Band providing updates about field work tentative schedule and supplied radio.
24-Oct-22	Vice President, Operations	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band confirming proposed field survey crew members and requested a copy of the Project hydrology reports.
26-Oct-22	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent indicating that groundwater crews had already mobilized, but could arrange for a monitor to join, and indicated that hydrology reports would be provided when available. Also discussed logistics regarding equipment pick up.
3-Nov-22	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing details for upcoming field surveys and specific details for November and December field activities.
30-Nov-22	Vice President, Operations	Email (Received)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing fieldwork dates for December. McLeod Lake Indian Band confirmed availability of a monitor for the shifts.
30-Nov-22	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band confirming monitor availability and providing some field details and logistics regarding helicopter flight planning.
1-Dec-22	Vice President, Operations	Email and Letter/Document (Received)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing paperwork for their field monitor, and Vitreo provided further clarification and shift details.
5-Dec-22	Community Engagement Lead	Telephone Call (Sent)	Traditional Land Use Coordinator	Call to McLeod Lake Indian Band notifying draft IPD and Engagement Plan would be sent for review and feedback soon.

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6-Dec-22	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing contact and logistics details for the ungulate survey.
10-Dec-22	Aquatic Scientist	Field Work	Wildlife Biologist	Email sent to McLeod Lake Indian Band Stewardship monitor completed snow mobile training, and field work on surface and groundwater sampling sites from December 12- 16, 2023.
5-Jan-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band in follow up on a call held that same day, providing dates for water field work and inquiring if a McLeod Lake Indian Band monitor would be joining.
5-Jan-23	Vice President, Operations	Meeting (Virtual)	Traditional Land Use Coordinator	Call with McLeod Lake Indian Band about updates to field work.
12-Jan-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band inquiring if a monitor would be able to join field crews from January 15- 19, 2023.
18-Jan-23	Vice President, Operations	Email (Received)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing initial details regarding upcoming fieldwork and schedule.
23-Jan-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band providing tentative field dates, and inquired if a monitor would be available.
22-Feb-23	Community Engagement Lead	Telephone Call (Sent)	Land Stewardship Director	Call to McLeod Lake Indian Band to update on forth coming draft IPD and draft Engagement Plan.
23-Feb-23	Community Engagement Lead President, CEO	Email (Sent)	Traditional Land Use Coordinator; Lands Stewardship Director	Email sent to McLeod Lake Indian Band providing draft IPD and draft Engagement Plan for review and feedback.
3-Mar-23	Community Engagement Lead President, CEO Vice President, Operations	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band requesting an extension for submission of feedback on draft IPD and draft Engagement Plan and request for a potential fieldwork date so they can have a monitor available. Email in response included list of fieldwork dates and suggested a meeting to discuss upcoming Project activities.
6-Mar-23	Community Engagement Lead President CEO Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator; Lands Stewardship Director	Email sent to McLeod Lake Indian Band requesting draft IPD and draft Engagement Plan feedback by April 6.
30-Mar-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band with an update of the upcoming field activities.

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4-Apr-23	Community Engagement Lead	Text Message (Sent)	Traditional Land Use Coordinator	Text message sent to McLeod Lake Indian Band asking to get feedback on drafts IPD and Engagement Plan.
5-Apr-23	Vice President, Operations	Text Message (Sent)	Traditional Land Use Coordinator	Call to McLeod Lake Indian Band, voicemail left requesting to discuss the upcoming field activities.
5-Apr-23	Vice President, Operations	Telephone Call (Sent)	Traditional Land Use Coordinator	Call received inquiring about upcoming field programs, potential for project to fall into Critical Minerals Strategy and future Project introductions to the community.
6-Apr-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email follow up to April 5, 2023 phone call, sent to McLeod Lake Indian Band, with logistics, field planning and sampling schedule for the upcoming Surface Water Quality and Hydrology activities.
12-Apr-23	Vice President, Operations	Telephone Call (Sent)	Traditional Land Use Coordinator	Call to McLeod Lake Indian Band following up on April water sampling field work.
12-Apr-23	Community Engagement Lead	Telephone Call (Sent)	Land Stewardship Director	Call to McLeod Lake Indian Band, voice mail left regarding interest in meeting to discuss the project and requested comments on draft Engagement Plan and draft IPD.
12-Apr-23	President CEO Vice President, Operations	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band, in response to email on upcoming field work activities and included contact information of McLeod Lake Indian Band's monitor for the field work.
17-Apr-23	Vice President, Operations	Telephone Call (Sent)	Traditional Land Use Coordinator	Call to McLeod Lake Indian Band regarding field work monitor arrival at the Prince George airport.
19-Apr-23	President, CEO Vice President Operations	Email (Sent)	Traditional Land Use Coordinator; Land & Stewardship director	Email sent to McLeod Lake Indian Band following up on requested comments on the drafts IPD and Engagement Plan. The email offered an Introductory Project meeting.
April 16-19, 2023	Aquatic scientist	Meeting (In-person)	Monitor	McLeod Lake Indian Band monitor accompanied surface water quality and quantity sampling team for fieldwork on April 16, 18 and 19.
20-Apr-23	President, CEO Vice President Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band stating a notification from MOF should be coming in relation to an Occupant License to Cut (OLTC) that Vitreo had applied for. The email indicated the OLTC is required to complete the process of timber removal. Finally, the email noted that Vitreo has been in contact with Duz Cho Group regarding completing the timber clearing.

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21-Apr-23	President, CEO Vice President Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band, providing information for upcoming Archaeological Impact Assessment field schedule, logistics and field planning, as well as crew members contact information.
26-Apr-23	President, CEO Vice President Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band following up on April 19, 2023 email, indicating communication method to discuss Project updates.
27-Apr-23	President, CEO Vice President Operations	Email (Sent)	Traditional Land Use Coordinator; Land & Stewardship Director; Senior Land Referral Office	An email was sent to McLeod Lake Indian Band following meeting. The email included the draft IPD, draft Engagement Plan and introductory presentation and a summary of the main topics discussed during the meeting. The summary included comments about draft IPD and request for feedback. The summary also noted additional topics for discussion in future meetings.
27-Apr-23	President, CEO Vice President Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	An email was sent to McLeod Lake Indian Band, following up meeting, with schedule and logistic on the water quality and quantity sampling field programs for May and June and groundwater quantity and quality Q2 2023 logistics for June. The email requested McLeod Lake Indian Band field work monitor availability.
27-Apr-23	President, CEO Vice President Operations	Meeting (Virtual)	Traditional Land Use Coordinator Land & Stewardship director	A teams meeting took place between Vitreo and McLeod Lake Indian Band to discuss Project updates and upcoming field work.
3-May-23	President, CEO	Email (Sent)	Traditional Land Use Coordinator; Land & Stewardship director	Email sent to McLeod Lake Indian Band, following up on April 27, 2023, email, checking on draft IPD and draft Engagement Plan review and feedback.
4-May-23	President, CEO	Email (Received)	Traditional Land Use Coordinator; Land & Stewardship director	Email received from McLeod Lake Indian Band indicating the review and feedback of the draft IPD and Engagement Plan are almost done and requested data set for the attached Project areas and proposed backfill areas.

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4-May-23	President, CEO	Email (Received)	Traditional Land Use Coordinator; Land & Stewardship director	An email was received from McLeod Lake Indian Band indicating Community Engagement for the Project can proceed and should include community dinners for both Prince George and McLeod Lake Indian Band, with discussion of TLU study and Council presentation after June elections. McLeod Lake Indian Band requested Wildlife Management Plan when available. Vitreo responded indicating they will provide a proper answer soon.
10-May-23	Regulatory Specialist	Email (Sent)	Traditional Land Use Coordinator; Land & Stewardship director	Email sent to McLeod Lake Indian Band, to discuss community dinners. McLeod Lake Indian Band responded indicating that Chief and Council meeting is on hold until after the election.
12-May-23	Associate, Archaeologist	Email (Received)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band, providing information for the upcoming Archeological Impact Assessment. McLeod Lake Indian Band responded indicating Land Steward requests should be sent to provided contacts. Email sent to Land Steward contacts, with planned schedule and logistic of upcoming archaeological fieldwork and memo.
31-May-23	Regulatory Specialist	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band indicating community dinner meetings can resume after the second week of June. Email noted a Memorandum of Understanding and earth work projects with Duz Cho should be discussed soon.
8-Jun-23	President, CEO	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band in response to May 31, 2023 email. Vitreo asked McLeod Lake Indian Band about election results and noted planning for community dinners should commence.
8-Jun-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band noting filing of the IPD and Engagement Plan for the Project with EAO. At 12:11 pm, McLeod Lake Indian Band responded indicating they would like to do a site tour before they submit comments on the IPD and Engagement Plan. McLeod Lake Indian Band noted a 10-day review might be unreasonable for their Treaty Rights and their harvester and hunter seasonal windows. At 12:25 pm, Vitreo responded clarifying that the 10 days is for EAO to review and that McLeod Lake Indian Band can submit comments during the Early Engagement phase.

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9-Jun-23	Vice President, Operations President, CEO	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band, indicating dates and descriptions for upcoming field work activities in June and July. Hydrogeology - June 17-27 (tentative, dates to be confirmed). Noise Baseline Survey - June 3-7 (tentative, dates to be confirmed)
9-Jun-23	President, CEO	Email (Sent)	Chief and Council	Email sent to McLeod Lake Indian Band congratulating on Chief re-election. Vitreo provided an introductory slide deck for the Project with information including timelines. Vitreo indicated they filed application documents with EAO on June 7, 2023 and they are waiting for the review to formally enter the process. Vitreo also noted the environmental assessment has a critical path timeline and they continue to perform various baseline programs to collect specific data, with the assistance of a number of McLeod Lake Indian Band monitors.
9-Jun-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email was sent to McLeod Lake Indian Band in response to June 8 email. Email indicated previous draft documents (IPD and Engagement Plan) were sent in February and March. Documents are now being reviewed by EAO and once accepted the Early Engagement phase will initiate. EAO will notify McLeod Lake Indian Band when documents are final and once the Early Engagement phase starts.
12-Jun-23	Community Engagement Lead	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email was received from McLeod Lake Indian Band requesting copies of IPD and Engagement Plan sent to EAO. An email was sent in response, providing both documents attached and noting the same documents were sent to McLeod Lake Indian Band on June 8, 2023.
12-Jun-23	Vice President, Operations President, CEO	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band in response to June 9 field activities, indicating they will check on monitors availability. Vitreo responded providing details on the hydrogeology/groundwater field work for June 17, 2023 and on the soils program for July. Vitreo invited McLeod Lake Indian Band on a site tour.

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13-Jun-23	Vice President, Operations President, CEO	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email was received from McLeod Lake Indian Band indicating monitor's ATV availability will be confirmed for June 17 to 27, 2023. McLeod Lake Indian Band also indicated potential availability to go on a site tour with Vitreo.
14-Jun-23	Vice President, Operations President, CEO	Email and Letter/Document (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band indicating ATV might be required for one day only. McLeod Lake Indian Band reported that ATV may be available, but alternate arrangements can also be made if necessary.
15-Jun-23	Community Engagement Lead	Email (Sent)	Chief and Council	An email was sent to McLeod Lake Indian Band providing draft Technical Data Reports.
15-Jun-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band following up on site tour availability. McLeod Lake Indian Band responded confirming availability.
16-Jun-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band indicating availability for site tour is Thursday 22nd.
16-Jun-23	Vice President, Operations	Email (Received)	Land Referral Office Receptionist	Email received from McLeod Lake Indian Band indicating field work monitor is not available for June 17, 2023 field work. Vitreo responded thanking for the update.
19-Jun-23	Community Engagement Lead	Telephone Call (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Call sent to McLeod Lake Indian Band. Voice message left explaining Vitreo is looking for opportunities to engage with McLeod Lake Indian Band regarding the Project.
19-Jun-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band to schedule a time to discuss the Project, answer questions, listen to comments and ideas and also schedule the suggested community dinner. Email requested if it is appropriate to schedule a presentation to Chief and Council now that McLeod Lake Indian Band election is complete.
20-Jun-23	Vice President, Operations	Telephone Call (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Phone call with McLeod Lake Indian Band to plan site visit.

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20-Jun-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band to confirm site visit date on Thursday June 22.
20-Jun-23	Community Engagement Lead	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band following up on June 19 email. McLeod Lake Indian Band provided guidance and timelines for meeting with Chief and Council. McLeod Lake Indian Band also proposed dates for meeting to discuss the Project. Email sent to McLeod Lake Indian Band in response indicating that a brief Project information package can be put together to request a presentation to Chief and Council.
20-Jun-23	Associate, Archaeologist	Email (Sent)	Land Stewards Program	Email sent to McLeod Lake Indian Band requesting a monitor for the Archaeological Impact Assessment and noted field work has been shifted to August 9-18 and August 23-September 1.
21-Jun-23	Community Engagement Lead	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band indicating that the earliest community dinners available is week after July 25. Email offered to have call to coordinate it.
21-Jun-23	Vice President, Operations	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band confirming date for site visit - Thursday June 22.
22-Jun-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band following up on June 21 at 7:17pm, indicating they look forward to meet-up later.
22-Jun-23	Vice President, Operations	Meeting (In-person)	Traditional Land Use Coordinator Senior Land Referral Officer	Site tour with McLeod Lake Indian Band. Meeting discussed high-level criteria for the site selection and other different topics. McLeod Lake Indian Band indicated a community meeting should be set up and asked if MOU had been signed. It was also mentioned that a Business development Officer would be getting involved and that there was no specific concern over the Engagement plan and IPD. TDRs are available now. McLeod Lake Indian Band requested access to raw data.

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23-Jun-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band following the site tour. Email provided a copy of the slide deck presentation.
23-Jun-23	Community Engagement Lead	Telephone Call (Sent)	Traditional Land Use Coordinator	Telephone call with McLeod Lake Indian Band to discuss details to upcoming Community Meetings on August 1st in Prince George and August 2 in McLeod Lake. McLeod Lake Indian Band indicated they will conduct their own Treaty Impact Assessment and they wish to discuss it with the Capacity Funding as well. They also requested hydrology and weather station data.
23-Jun-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band requesting an opportunity to present the Project to Chief and Council at a date that is convenient for McLeod Lake Indian Band. Email indicated Vitreo is preparing to file an IPD and Engagement Plan with EAO and if accepted, Early Engagement phase will begin.
7-Jul-23	President, CEO	Email (Received)	AGA Coordinator	An email was received from McLeod Lake Indian Band requesting sponsorship for AGA 2023.
7-Jul-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band regarding the community meetings on August 1 and 2 in Prince George and McLeod Lake. Email indicated Vitreo to introduce the Project to the community during the community meetings, as well as the meeting on Monday, July 31 in Prince George. Email requested McLeod Lake Indian Band to provide details on invoicing and payment.
14-Jul-23	Project Manager	Email (Sent)	Land Referral Office Receptionist	Email sent to McLeod Lake Indian Band regarding the soil and terrain program for the Project. Email indicated field work team plan to start working on site on July 15 and the program is scheduled to run until July 24. Email provided details and contact information. Email requested McLeod Lake Indian Band to provide monitor's details and availability. Email received from McLeod Lake Indian Band providing the monitor's contact details. Email sent to McLeod Lake Indian Band indicating a text message was sent to monitor.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
17-Jul-23	Project Manager	Email (Received)	Land Referral Office Receptionist	Email received from McLeod Lake Indian Band regarding details of soil and terrain field work. Several emails were sent back and forth regarding this topic.
18-Jul-23	Community Engagement Lead	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band with costs for community dinners, noting Vitreo would be invoiced directly.
18-Jul-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band regarding the upcoming community dinner. Email received in response noted that McLeod Lake Indian Band's Finance Coordinator will send an invoice next week.
19-Jul-23	Project Manager	Email (Sent)	Land Referral Office Receptionist	Email sent to McLeod Lake Indian Band with a summary of monitor's hours for soil and terrain fieldwork.
20-Jul-23	Project Manager	Email (Received)	Land & Stewardship director	Email received from McLeod Lake Indian Band indicating field work updates would be appreciated.
20-Jul-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band inquiring about participant availability for upcoming AIA.
21-Jul-23	Project Manager	Email (Sent)	Land & Stewardship director	Email sent to McLeod Lake Indian Band regarding field work updates. Email indicated that McLeod Lake Indian Band's monitor was unavailable to participate in the field work.
21-Jul-23	Vice President, Operations	Email (Received)	Traditional Land Use Coordinator Land & Stewardship director	Email received from McLeod Lake Indian Band indicating two potential field participant names and noted availability for August 9-18 and August 23-September 1st will be confirmed. Email cc McLeod Lake Indian Band Land Stewardship Director to help coordinate upcoming AIA.
21-Jul-23	Vice President, Operations	Email (Received)	Land Referral Office Receptionist	Email received from McLeod Lake Indian Band indicating field work monitor will be tentatively booked for upcoming field work and confirmation to be sent soon.
24-Jul-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator Land & Stewardship director	Email sent to McLeod Lake Indian Band regarding availability of AIA field participant. Email noted, as per direction communications will now be sent directly sent to Land Referral Office Receptionist.
24-Jul-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band requesting a call to discuss upcoming community dinner and make sure it is properly prepared.

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24-Jul-23	Community Engagement Lead	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band confirming hotel for the night of July 31st to meet with Vitreo. Email included planned activities and times for the upcoming community dinner. Email attached dinner meeting posters.
26-Jul-23	Associate, Archaeologist	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations noting crew member will likely be available for AIA. Email requested details regarding the fieldwork. Email sent to West Moberly First Nations with fieldwork details. Additional email sent with further details regarding the upcoming AIA.
26-Jul-23	Vice President, Operations	Email (Received)	Land Referral Office Receptionist	Email received from McLeod Lake Indian Band indicating that field work monitor will not be able to participate until August 12 since it is the Annual General Assembly and Land Stewards are to be in attendance.
26-Jul-23	Associate, Archaeologist	Email (Sent)	Land Referral Office Receptionist	Email sent to McLeod Lake Indian Band, introducing the scheduled AIA. Email included further information regarding the field work, dates and schedules.
28-Jul-23	Vice President, Operations	Email (Sent)	Land Referral Office Receptionist	Email sent to McLeod Lake Indian Band confirming July 26 email regarding field work monitor.
1-Aug-23	Community Engagement Lead	Letter/Document (Sent)	Traditional Land Use Coordinator	A hard copy of the IPD and Engagement Plan was delivered to McLeod Lake Indian Band.
1-Aug-23	Community Engagement Lead	Meeting (In-person)	5 community members, 3 staff	In person community dinner with members of McLeod Lake Indian Band in Prince George, including Introductory presentation and question and response period.
2-Aug-23	Vice President, Operations	Email (Received)	Land Referral Office Receptionist	Email received from McLeod Lake Indian Band requesting Vitreo to confirm field work starting date for monitor.
2-Aug-23	Community Engagement Lead	Meeting (In-person)	15 members, 2 elders, 3 staff	McLeod Lake Indian Band Community Dinner including Introductory presentation and question and response period.
3-Aug-23	Vice President, Operations	Email (Sent)	Land Referral Office Receptionist	Email sent to McLeod Lake Indian Band indicating monitor can start field work on August 12. Email received from McLeod Lake Indian Band indicating monitor will be advised of the starting date.
NA	Associate, Archaeologist	Telephone Call (Sent)	Land Referral Office Receptionist	Call with McLeod Lake Indian Band to discuss AIA details.

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8-Aug-23	Associate, Archaeologist	Email (Sent)	Land Referral Office Receptionist	Stantec sent an email to McLeod Lake Indian Band requesting a monitor to join the Project AIA.
9-Aug-23	Community Engagement Lead	Email (Sent)	Land Referral Office, Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band with Project introduction and invite to participate in Open House & Virtual Information Session during the Pre-Engagement phase.
11-Aug-23	Associate, Archaeologist	Email (Sent)	Land Referral Office Receptionist	Email sent to McLeod Lake Indian Band requesting a monitor to join the AIA field work.
11-Aug-23	President, CEO Vice President, Operations Environmental Scientist	Annual General Assembly Meeting (in-person)	Chief and Council Members of McLeod Lake Indian Band	Vitreo participated in-person in McLeod Lake Indian Band Annual General Assembly Meeting and provided information about the Project.
31-Aug-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band requesting a meeting to discuss next steps for the Project.
6-Sep-23	Community Engagement Lead	Email (Received)	Band Administrator	Email received from McLeod Lake Indian Band indicating a text message was received from Vitreo noting Vitreo was in Bear Lake and requested a date for Chief and Council and Elders to visit the Angus site. Email requested confirmation of site tour details for September 13-14.
6-Sep-23	Community Engagement Lead	Text Message (Sent)	Traditional Land Use Coordinator	Text message sent to McLeod Lake Indian Band requesting time to discuss next steps for the Project. McLeod Lake Indian Band suggested 3:30 pm. Call sent to McLeod Lake Indian Band without answer. Text message received from McLeod Lake Indian Band suggesting to try next day.
11-Sep-23	Community Engagement Lead	Telephone Call (Sent)	Traditional Land Use Coordinator	Call sent to McLeod Lake Indian Band to discuss next steps of the Project. The next step is a Treaty Impact Study. A budget and workplan will be sent to Vitreo. The process will take approximately one month and then a couple of weeks to write the report. Call mentioned the upcoming site visit and McLeod Lake Indian Band suggested to have BBQ in the community hall in Bear Lake due to high bear activity. Dates were not discussed.
11-Sep-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band following up on call, indicating that a work budget and plan will be sent by the end of the day. Email included a part of the engagement process steps. Email sent indicating the process will be reviewed.

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13-Sep-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band requesting to set up a meeting to discuss an agreement that would cover all items under one agreement. Email received from McLeod Lake Indian Band indicating it's all in the work plan they will send tomorrow.
18-Sep-23	President, CEO	Email (Sent)	Chief and Council	Email sent to McLeod Lake Indian Band with letter attached. Letter followed up with helicopter site tour for Chief and Council, requesting McLeod Lake Indian Band to confirm date. Letter mentioned the Engagement phase and Capacity funding for the EA process as well as land-leasing for Vitreo's Finishing Plant site.
20-Sep-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Follow up email sent to McLeod Lake Indian Band regarding work plan and budget previously discussed.
25-Sep-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band requesting a field participant, if available, to complete the remaining of the AIA from October 5 to 7.
26-Sep-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Follow up email sent to McLeod Lake Indian Band regarding the work plan and budget discussed.
4-Oct-23	President, CEO	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band regarding the Community Engagement Dinners and the Treaty 8 Impact Assessment. Email included information regarding Community Engagement Dinners. Email also indicated that a Treaty 8 Impact Assessment is conducted after the dinner meetings and the document is submitted for reviews and comments upon completion. Email sent to McLeod Lake Indian Band requesting clarification as the community dinners were already held. Email received from McLeod Lake Indian Band clarifying the dinner meetings and dates were for their team and that the Budget Work Plan is being reviewed to get done before the EAO table.

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11-Oct-23	President, CEO	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band indicating that Oct 25th would work best for the helicopter tour and possible lunch. Email sent in response from Vitreo indicating that date will be confirmed soon. Email requested list of passengers and approximate weights for the helicopter tour and number of people available for the lunch. Email sent from Vitreo indicating that the helicopter is booked for Oct 25 at 8:30 am and requested if the gym space could be used to put story board and have lunch.
12-Oct-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band following up on September 13 email on workplan.
13-Oct-23	President, CEO	Email (Sent)	Traditional Land Use Coordinator	Follow up email sent to McLeod Lake Indian Band requesting to confirm details regarding the helicopter tour and lunch for Oct 25. Email received from McLeod Lake Indian Band indicating response will be sent before the end of the day. Email received from McLeod Lake Indian Band requesting date for info session as it will have to be booked. Email sent to McLeod Lake Indian Band from Vitreo indicating that info sessions have been done but if there is interest in discussing the Project after the helicopter tour, coffee or lunch can be set up.
16-Oct-23	President, CEO	Email (Received)	Traditional Land Use Coordinator	Email received from McLeod Lake Indian Band indicating that the helicopter tour will need to be cancelled and could be put off to the Spring since it is getting cold. Email noted that the tour will still be marked as part of ongoing engagement. Email sent from Vitreo indicating the helicopter booking has been cancelled and will look forward to next spring.
18-Oct-23	President, CEO	Meeting (In-person)	Chief and Council	Vitreo met with Chief of Council.
26-Oct-23	President, CEO	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band indicating that the EAO hopes to receive comments regarding the Project IPD. Email received in response from McLeod Lake Indian Band indicating that some email comments were sent last week to EAO. Email sent to McLeod Lake Indian Band indicating Vitreo will follow up with the EAO.

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26-Oct-23	President, CEO	Email (Received)	Lands & Stewardship Manager	Email received from McLeod Lake Indian Band regarding IPD comments indicating many referrals are received and more time is needed to respond.
26-Oct-23	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Email sent to McLeod Lake Indian Band indicating an ungulate survey is planned between December 11-15 subject to weather and helicopter availability. Email requested if McLeod Lake Indian Band had any participants available.
2-Nov-23	President, CEO	Meeting (in-person)	Chief	Vitreo met with Chief Chingee to provide a Project update.
22 Nov 23	President, CEO Vice President Operations, Community Engagement Lead	Meeting (in-person)	Traditional Land Use Coordinator	Vitreo met with McLeod Lake Indian Band to discuss a Treaty Impact Assessment and next steps for the Project.
08-Dec-23	Senior Principal, Technical Discipline Leader	Email (Sent)	Field Work Participant	Stantec provided details of the ungulate survey scheduled for December 13 th and included details on Personal Protective Equipment and meeting locations.
09-Dec-23	Senior Principal, Technical Discipline Leader	Email (Sent)	Field Work Participant	Stantec noted that the helicopter meet-up location had changed for the ungulate survey and included a map of the updated location.
13-Dec-23	Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator Lands & Stewardship Manager	Vitreo sent the draft DPD to McLeod Lake Indian Band for review.
13-Dec-23	Senior Principal, Technical Discipline Leader	Meeting (in-person)	Field Work Participant	A field participant from McLeod Lake Indian Band joined the aerial ungulate survey along with a representative from the Ministry of Forests.
15-Dec-23	President, CEO Vice President Operations	Email (Sent)	Land Referral Office Receptionist	Vitreo responded to McLeod Lake Indian Band with the requested timesheet details of the field participant for the ungulate survey.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
21-Dec-23	Community Engagement Lead, President, CEO, Vice President Operations	Email (Sent)	Chief	Stantec emailed to inform McLeod Lake Indian Band that Vitreo's President and CEO and Vice President of Operations, would be attending the BC Natural Resources Forum in Prince George from January 16-18 and offered to arrange a meeting at the convenience of the McLeod Lake Indian Band. Stantec stated a meeting could also be arranged as an alternative, in Vancouver at the AME Roundup from January 22-25th, if the Chief planned on attending this event. Stantec provided a brief summary of the Angus Project to provide a refresher and stated they looked forward to a response.
03-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Sent)	Field Staff Coordinator	Stantec notified McLeod Lake Indian Band of the opportunity to participate in a Bull Trout Spawning Habitat Survey over 5 days from January 10th to 14th. Stantec provided details of the field activity, crew contact information, and Vitreo contact information for booking accommodations. Stantec requested that they be informed of any interest in participating at the earliest convenience of McLeod Lake Indian Band.
11-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Sent)	Land Stewardship Director, Traditional Land Use Coordinator, Senior Land Referral Officer	Stantec followed up on an email sent on December 13th requesting review and feedback of the draft Detailed Project Description (DPD). Stantec reattached the draft DPD stating they looked forward to receiving comments by January 19th and offered arranging a meeting with Vitreo if there were any questions or if this was of interest.
11-Jan-24	Vice President, Operations	Email (Sent)	Traditional Land Use Coordinator	Vitreo emailed to inquire if the Traditional Land Use Coordinator would be attending the BC Resource Forum the following week and that they hoped to meet up with them if so.
15-Jan-24	Vice President, Operations	Email (Received)	Traditional Land Use Coordinator	McLeod Lake Indian Band emailed to respond to Vitreo's inquiry as to whether they would be attending the BC Resource Forum, noting that they would not be attending as the highway was dangerous in winter conditions. McLeod Lake Indian Band stated they were reviewing the draft Detailed Project Description and preparing an outline for the Treaty Impact Assessment.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
15-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Received)	Traditional Land Use Coordinator	McLeod Lake Indian Band inquired as to who the Technical Advisory Committee was and what their responsibilities were.
15-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Sent)	Traditional Land Use Coordinator	Stantec responded to McLeod Lake Indian Band's email stating that the Technical Advisory Committee is formed and facilitated by the BC Environmental Assessment Office (EAO) and is often referred to as the TAC. Stantec noted the purpose of the TAC and included a link to this information on the EAO website. Stantec stated that the EAO had a TAC meeting on August 2, 2023 to discuss the Angus Project and that McLeod Lake Indian Band had also been in attendance. Stantec noted that representatives of the EAO were cc'd on this email and could provide further information if of interest.
15-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Received)	Traditional Land Use Coordinator	McLeod Lake Indian Band emailed to thank Stantec for providing clarification on the Technical Advisory Committee and noted they were currently reviewing the draft Detailed Project Description.
15-Jan-24	Project Manager, President, CEO, Vice President Operations	Email (Sent)	Land Referral Office Receptionist	Stantec extended an invitation to McLeod Lake Indian Band to participate in the Bull Trout Spawning Habitat survey taking place from January 22 – 26, and a Surface Water Sampling survey scheduled for January 23 – 25. Stantec provided details of the surveys and requested confirmation of interest at the earliest convenience.
16-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Sent)	Traditional Land Use Coordinator	Vitreo thanked McLeod Lake Indian Band for their attention to the DPD and the Treaty Impact Assessment and stated they looked forward to travelling up there for community dinners in the near future.
22-Jan-24	Community Engagement Lead, President, CEO, Vice President Operations	Email (Sent)	Executive Assistant to Chief and Council	Stantec noted they left a voicemail earlier that day and were emailing to note Vitreo's interest in meeting with Chief and Council to discuss the Angus Project. Stantec stated they had inquired about a meeting to discuss the Project in June 2023 but had not heard back. Stantec stated Vitreo had recently connected with a McLeod Lake Indian Band Councillor and other staff member at the Resource Forum in Prince George and were advised to reach out to request a meeting with Chief and Council

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24-Jan-24	President, CEO, Vice President Operations, Community Engagement Lead	Email (Sent)	Traditional Land Use Coordinator	Stantec followed up on McLeod Lake Indian Band's review of the draft Detailed Project Description, noting their availability to meet if there were any questions.
25-Jan-24	President, CEO, Vice President Operations, Community Engagement Lead	Email (Received)	Traditional Land Use Coordinator	McLeod Lake Indian Band responded to Stantec stating they had no questions on the draft Detailed Project Description yet and would set aside time the following week to review and provide any feedback.
26-Jan-24	President, CEO, Vice President Operations, Community Engagement Lead	Email (Received) Email (Sent)	Traditional Land Use Coordinator	McLeod Lake Indian Band advised that all comments submitted on the Initial Project Description have been incorporated into the DPD in section 5.3.1. and that most items noted can be deferred to future discussions. Vitreo responded thanking McLeod Lake Indian Band for their review.
30-Jan-24	President, CEO, Vice President, Operations, Project Manager	Email (Sent) Email (Received)	Land Referral Office Receptionist	Stantec extended an invitation and provided details on the Surface Water Quality Field Program scheduled to take place February 13–15. McLeod Lake Indian Band responded confirming receipt of the invitation and stating they would follow up.
31-Jan-24	President, CEO, Vice President, Operations, Project Manager	Email (Received)	Land Referral Office Receptionist	McLeod Lake Indian Band followed up on the invitation to participate in the Surface Water Quality Field Program noting that they would be unable to participate as their Land Stewards were not licensed to drive snowmobiles, required for the field program. McLeod Lake Indian Band also advised that McLeod Lake Indian Band, at this time will not be able to participate in any projects that require our Land Stewards to operate a snowmobile.

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Table A.2 Engagement Records of Contact with West Moberly First Nations

Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
18-Jul-22	Community Engagement Lead	Email and Letter/Document (Sent)	Chief and Council;	Introductory email sent to West Moberly First Nations Chief and Council and Land Use Manager including Project introductory letter and map within Treaty 8 and a request to meet.
22-Feb-23	Community Engagement Lead	Text Message (Sent)	Land Use Manager	Text to West Moberly First Nations to update on forthcoming draft IPD and draft Engagement Plan.
23-Feb-23	Community Engagement Lead	Email (Sent)	Land Use Manager	Email sent to West Moberly First Nations providing draft IPD and Engagement Plan for review and feedback. Request for input from West Moberly First Nations by March 24, 2023, noting schedule to submit updated versions to the BC EAO in Q1 2023. Meeting offered to answer any questions.
29-Mar-23	Community Engagement Lead	Telephone Call (Sent)	Land Use Manager	Call received by West Moberly First Nations to get an update on the requested feedback on draft IPD and Engagement Plan.
31-Mar-23	Vice President, Operations	Email (Received)	Chief and Council	Email sent to Vitreo by West Moberly First Nations with an attached correspondence, with invite for follow-up meeting.
5-Apr-23	Vice President, Operations	Email (Sent)	Chief and Council	Email sent to West Moberly First Nations, with invite for meeting to discuss the Project. The email provided a map with information on approximate distances of the Project relative to Summit Lake and Tacheeda Lake. It also provided communication records from Vitreo to West Moberly First Nations and had attached the draft IPD and draft Engagement Plan. West Moberly First Nations responded requesting shapefiles.
12-Apr-23	President, CEO Community Engagement Lead Facilitator, Traditional Knowledge	Email (Sent)	Chief and Council	Email sent to West Moberly First Nations, providing requested shapefiles.
18-Apr-23	Facilitator Indigenous Services, Senior Associate	Email (Sent)	Senior Environmental Planner	Email sent to West Moberly First Nations, following up on shapefiles provided on April 12, 2023.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
18-Apr-23	Facilitator Indigenous Services, Senior Associate	Email (Received)	Chief and Council	An email was received from West Moberly First Nations indicating they are waiting for technical review of the shapefiles but are open to an introductory meeting.
18-Apr-23	President, CEO Vice President Operations	Email (Sent)	Chief and Council	An email was sent to West Moberly First Nations requesting a potential date for Introductory meeting.
26-Apr-23	President, CEO Vice President Operations	Email (Sent)	Chief and Council	Email sent to West Moberly First Nations requesting to provide potential dates for Project update meeting. West Moberly First Nations indicated they will check on Council's assistant response on dates and availabilities.
27-Apr-23	President, CEO Vice President Operations	Email (Received)	Chief and Council	Email received by West Moberly First Nations indicating availability for a meeting on May 10 at 3:00 p.m. or May 31 and June 1. Meeting was scheduled for May 10 at 3:00 p.m.
27-Apr-23	President, CEO Vice President Operations Project Manager Regulatory Specialist Community Engagement Lead Associate, Archaeologist	Email (Sent)	Land Use Manager	Email sent to West Moberly First Nations providing details on an Archaeological Impact Assessment that will be conducted in August 2023, under Section 12.2 Heritage Inspection Permit 2022-0410. The email included an invite for West Moberly First Nations to provide one field participant for field work. West Moberly First Nations responded providing field staff coordinator contact information and requesting a job posting for field position. An email was sent to West Moberly First Nations indicating information could be provided to contact member provided. West Moberly First Nations responded providing a list of questions regarding the field work logistics.
3-May-23	President, CEO	Email (Sent)	Legal Counsel	Email sent to West Moberly First Nations, requesting time, date and platform of preference for upcoming meeting.
8-May-23	President, CEO Vice President Operations Project Manager Regulatory Specialist Community Engagement Lead	Email (Sent)	Chief and Council	A teams meeting invitation sent to West Moberly First Nations for May 10, to discuss Project updates progress and permitting.

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10-May-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations providing information for upcoming Archaeological Impact Assessment field work. West Moberly First Nations responded indicating they will get back soon with a field participant.
10-May-23	Regulatory Specialist	Meeting (Virtual)	Chief and Council; Councillor; Legal Counsel	Virtual meeting with West Moberly First Nations to introduce the Project. Vitreo noted opportunities for Indigenous Nations participation and employment. Vitreo plans to submit the IPD and Engagement Plan in Q2 2023 and a draft Application in Q2/Q3 2023 with receipt of EAC Q2/Q3 2025. West Moberly First Nations asked that Sage Legal work with Vitreo/Stantec on an agreement for a better engagement and that a TLU study will be needed as well as a site tour.
9-Jun-23	Community Engagement Lead	Email (Sent)	Land Use Manager	Email sent to West Moberly First Nations indicating Vitreo filed the IPD and Engagement Plan for the Project with the EAO. Vitreo attached both files to the email and noted it will take the EAO up to 10 days to review then the EAO will commence the Early Engagement phase for the Project.
15-Jun-23	Community Engagement Lead	Email (Sent)	Chief and Council	An email was sent to West Moberly First Nations providing a draft Technical Data Report.
20-Jun-23	Community Engagement Lead	Email (Sent)	Chief and Council	Email sent to West Moberly First Nations providing the meeting minutes from May 20, 2023 meeting.
20-Jun-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations regarding the Archaeological Impact Assessment. Email indicated that West Moberly First Nations don't require any training or tickets in advance of field work. An attached memo was provided with the proposed work details. Email requested West Moberly First Nations to provide contact information of field participant to coordinate meeting times and places.
21-Jun-23	Community Engagement Lead	Email (Sent)	Council	Email sent to West Moberly First Nations confirming that the proppant will be going to the northeast for natural gas development rather than Prince George. Email attached corrected notes and slide deck.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
22-Jun-23	Associate, Archaeologist	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations indicating they are still looking for a monitor for the Archaeological Impact Assessment.
5-Jul-23	Community Engagement Lead	Email (Sent)	Legal counsel	Email sent to West Moberly First Nations to set up a call to discuss engagement process.
17-Jul-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations requesting monitor for the Project AIA in August. Email received from West Moberly First Nations noting a monitor will be assigned closer to the fieldwork date.
26-Jul-23	Associate, Archaeologist	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations noting crew member will likely be available for AIA. Email requested details regarding the fieldwork. Email sent to West Moberly First Nations with fieldwork details. Additional email sent with further details regarding the upcoming AIA.
28-Jul-23	Vice President, Operations	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations indicating flexibility of payment method for the AIA.
1-Aug-23	Vice President, Operations	Email (Received)	Field Staff Coordinator	Email received by West Moberly First Nations indicating new field work participant and requesting information regarding accommodation, transportation and food details. West Moberly First Nations provided field work participant contact information.
3-Aug-23	Vice President, Operations	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations regarding AIA field participant accommodation details.
4-Aug-23	Associate, Archaeologist	Telephone Call (Sent)	Field Staff Coordinator	Call with West Moberly First Nations AIA participant regarding accommodation details.
8-Aug-23	Vice President, Operations	Email (Sent)	Field work participant	Email sent to West Moberly First Nations with accommodation booking details. Email indicated call will be made later in the morning to follow up. Email received from West Moberly First Nations indicating another location was given and requested whether the new location has a kitchenette. Email sent to West Moberly First Nations indicating that the Prestige Treasure Cove has a discounted rate and that a room with a kitchenette will be looked into.

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8-Aug-23	Vice President, Operations	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations regarding disbursements for AIA field work. Email included the attached rate sheet. Vitreo responded that West Moberly First Nations should invoice accordingly.
8-Aug-23	Vice President, Operations	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations confirming which disbursements on the rates sheet Vitreo is being asked to cover.
9-Aug-23	Vice President, Operations	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations requesting AIA field work dates. Email sent in response, indicating field work will run from Aug 9 to 18, with 4 days off and then will run Aug 23 to Sept 1st.
10-Aug-23	Vice President, Operations	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations confirming Vitreo will be paying for meal rate. Email received from West Moberly First Nations confirming receipt of email.
14-Aug-23	Vice President, Operations	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations requesting monitor's approved timecard by August 15 at 3:00 pm.
14-Aug-23	Associate, Archaeologist	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations requesting monitor's approved time by August 15 at 3:00 pm. Email sent in response providing the hours from the Aug 9 to 14 AIA shift. Email noted that hours for the August 23-Sept 1 shift will be sent on a weekly basis.
17-Aug-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations with AIA monitor's hours from the August 14 to 18 shift. Email noted hours for the August 23 to Sept 1 shift will be sent on a weekly basis.
25-Aug-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations with AIA monitor's hours.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
29-Aug-23	Associate, Archaeologist	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations requesting the approved time for a monitor from Aug 14 to the 27. Email sent in response providing monitor's hours and indicating that the current AIA shift has been completed. Email noted that another 3 days will be needed in October to complete shovel testing in an area with high amount of bear activity and requested monitor again. Email received from West Moberly First Nations indicating monitor will be consider for future job with Stantec.
29-Aug-23	Associate, Archaeologist	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations requesting monitor's rates for per diem for meals to invoice.
29-Aug-23	Vice President, Operations	Email (Received)	Field Staff Coordinator	Email received from West Moberly First Nations requesting if monitor would be paid a set amount for meals each day in order to invoice Vitreo.
13-Sep-23	Community Engagement Lead	Email (Sent)	Sage Legal Counsel	Email sent to West Moberly First Nations regarding meeting with EAO and comments on the IPD and Engagement Plan. Email requested an informal update meeting.
25-Sep-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations indicating that a small second shift will be completed from October 5 to 7 to complete the 2023 AIA. Email noted that transportation will be provided between Prince George and work area. Email requested West Moberly First Nations to provide a field participant, if available.
5-Oct-23	Community Engagement Lead	Meeting (Virtual)	Sage Legal Counsel	Meeting with West Moberly First Nations legal counsel to discuss regulatory process and meeting with Chief and Council.
12-Oct-23	Community Engagement Lead	Email (Sent)	Sage Legal Counsel	Email sent to West Moberly First Nations requesting a meeting between Chief and Council and Vitreo team in Prince George and Chetwynd for the week of November 20. Email received from West Moberly First Nations indicating to be in touch soon.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
17-Oct-23	Indigenous Engagement Specialist	Email (Received)	Sage Legal Counsel	Email received from West Moberly First Nations confirming Chief and Council open availability for Nov 20th or Nov 22nd at 1:00 pm or 3:30 pm. Email sent in response indicating that the Vitreo team will be in Prince George on the 21st and Chetwynd on the 22nd and that the 1:00 pm slot on Nov 22nd would work best. Email received from West Moberly First Nations confirming the 1:00 pm slot for Nov 22nd.
20-Oct-23	Associate, Archaeologist	Email (Sent)	Field Staff Coordinator	Email sent to West Moberly First Nations indicating that a winter ungulate survey is going to take place in collaboration with the Ministry of Forests. Email noted that one participant from West Moberly First Nations is invited to participate. Email indicated that the survey is scheduled to occur on one day during the week of December 11-15 and the meeting place will be at the heli-base at the Prince George airport, location to be confirmed. Email requested West Moberly First Nations to confirm participant availability.
26-Oct-23	Vice President Operations	Email (Sent)	Field Staff Coordinator	Email sent inviting one monitor from West Moberly First Nations to participate in a winter ungulate survey
30-Oct-23	Community Engagement Lead, Vice President, Operations, President	Email (Sent)	Legal Counsel	Stantec sent an email to West Moberly First Nations confirming meeting with Vitreo and Chief and Council on November 22 at 1:00 pm. Stantec requested confirmation of the location.
01-Nov-23	Community Engagement Lead, Vice President, Operations, President	Email (Received)	Legal Counsel	West Moberly First Nations sent an email confirming meeting on Nov 22 at the Chief and Council offices at 1:00 pm.
02-Nov-23	Community Engagement Lead	Email (Sent)	General	Stantec sent an email to West Moberly First Nations indicating that Vitreo is hosting a breakfast to introduce the Project to the business community in the District of Chetwynd. An invitation to the breakfast is attached.
03-Nov-23	President, CEO	Email (Sent)	Chief and Council	Vitreo send a follow up email to West Moberly First Nation indicating they look forward to the meeting on November 22.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
13-Nov-23	Associate Archaeologist	Email (Received)	Field Staff Coordinator	West Moberly First Nations sent an email in response to October 20 email, indicating they have someone to participate in the upcoming field work.
14-Nov-23	Community Engagement Lead, Vice President, Operations, President	Email Exchange	Legal Counsel	West Moberly First Nations sent an email requesting permission to send around a virtual meeting invite for an upcoming meeting with their legal counsel. Stantec responded providing affirmation and noting that Vitreo would be attending in person.
14-Nov-23	Associate Archaeologist	Email (Sent)	Field Staff Coordinator	Stantec sent an email to West Moberly First Nations providing information about the upcoming field work for Surface Water Sampling (December 4 to 6) and Groundwater Survey (Early December, Weather dependent). Stantec requested if there is any monitor available to join in.
22-Nov-23	President, CEO Vice President Operations Project Manager Regulatory Specialist Community Engagement Lead	Meeting (in-person)	Chief and Council Land Use Manager Sage Legal Council Policy Advisor	Vitreo presented an update on the Project and responded to questions.
23-Nov-23	Associate Archaeologist	Email Exchange	Field Staff Coordinator	Stantec sent an email to West Moberly First Nations providing an updated detailed schedule for the groundwater sampling program to assist coordination. West Moberly First Nations responded indicating there might be a participant available for the field work. West Moberly First Nations will get back tomorrow to confirm participant. West Moberly First Nations requested if there any requirements like tickets the participant will need.
24-Nov-24	Associate Archaeologist	Email Exchange	Field Staff Coordinator	West Moberly First Nations sent an email indicating a possible participant for the groundwater sampling survey for December 13-21. West Moberly First Nations requested information on compensation and equipment ticket requirements. Stantec responded with information on snowmobile safety training and compensation. Stantec pointed that the dates for the ungulate surveys have not been confirmed.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
27-Nov-23	Associate Archaeologist	Email (Sent)	Field Staff Coordinator	Stantec sent an email to West Moberly First Nations requesting that their participant in the planned surface water survey program reach out on December 4 to coordinate meet-up times and places. Stantec requested participant's name and phone number.
28-Nov-23	Vice President, Operations	Email (Sent)	Field Staff Coordinator	Vitreo sent an email to West Moberly First Nations requesting information for the individual(s) that will join the field crew to get accommodations booked. Vitreo asked if the rate sheet sent previously is still valid.
28-Nov-23	Associate Archaeologist	Email Exchange	Field Staff Coordinator	West Moberly First Nations sent an email confirming field work participant name and asked if participant needs a snowmobile. Stantec and West Moberly First Nations exchanged emails around expectations regarding snowmobiles for this work.
28-Nov-23	Associate Archaeologist	Email Exchange	Field Staff Coordinator	West Moberly First Nations sent an email asking what the monitor will need for the Ungulate Survey Dec 11-15. Stantec and West Moberly First Nations exchanged emails to confirm compensation for mileage and meals.
30-Nov-23	Vitreo Vice President, Operation	Email (Received)	Field Staff Coordinator	West Moberly First Nations sent an email to Vitreo confirming that one monitor will be participating from Dec 13-21 and the other one from Dec 5-7 and the Ungulate survey on Dec 11.
30-Nov-23	Vice President, Operations	Telephone Call (Sent)	Field Staff Coordinator	Vitreo had a call with West Moberly First Nations to discuss upcoming field work updates, accommodations, monitors available, field staff rates, and other details.
30-Nov-23	Vice President, Operations	Email (Sent)	Field Staff Coordinator	Vitreo sent an email to West Moberly First Nations following up on call and confirming logistics around hotels, safety, and compensation.
01-Dec-23	Community Engagement Lead	Email (Sent)	Legal Counsel	Stantec sent an email to West Moberly First Nations' legal counsel indicating that the schedule of the EAO process for the Project over the next 12 months will be sent shortly. Stantec noted the focus on the last weeks has been on finalizing the draft Detailed Project Description for their review.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
04-Dec-23	Vice President, Operations	Email Exchange	Field Staff Coordinator	West Moberly sent an email to Vitreo indicating that monitor for Water Sampling Survey won't be able to make it anymore. West Moberly First Nations responded indicating that one monitor will join for Dec 11 Ungulate survey and other monitor for Dec 13-21. Vitreo sent an email confirming change.
04-Dec-23	Community Engagement Lead, Vitreo Vice President, Operation	Email (Received)	Legal Counsel	The legal counsel for West Moberly First Nations emailed suggested setting up arrangements for field work and capacity funding.
06-Dec-23	Vice President, Operations	Email Exchange	Field Staff Coordinator	Vitreo sent an email to West Moberly First Nations indicating that due to weather, it seems like the survey will now take place on December 12, rather than the 11. Vitreo requested if that still works. West Moberly First Nations responded indicating monitor should be available but will confirm shortly.
07-Dec-23	Vice President, Operations	Email Exchange	Field Staff Coordinator	West Moberly First Nations confirmed that a monitor would join the ungulate survey on Dec 12. Vitreo responded with hotel and contact information. West Moberly First Nations responded providing monitor's contact information. Vitreo responded indicating that the hotel reservation has been updated with the same confirmation code.
07-Dec-23	Technical Lead	Email (Sent)	Field Staff Coordinator	Stantec provided details of the ungulate survey scheduled for December 12th including the meeting location and required Personal Protective Equipment.
09-Dec-23	Vice President, Operations	Email (Received)	Field Staff Coordinator	West Moberly First Nations sent an email to Vitreo requesting if monitor will have a room Dec 11 and 12 as monitor will have to drive a fair distance to Prince George.
11-Dec-23	Technical Lead	Email (Received)	Field Staff Coordinator	Update provided stating that the field survey participant would not be able to attend the winter water sampling survey due to an accident that shut down highway access.
11-Dec-23	Technical Lead	Email (Sent)	Field Staff Coordinator	Stantec responded back to West Moberly First Nations acknowledging that the field participant would be unable to join the water sampling survey due to the highway incident.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
13-Dec-23	President, CEO, Community Engagement Lead, Vice President, Operation	Email (Sent)	Land Use Manager	Stantec provided the draft Detailed Project Description (DPD) for review stating Vitreo would be seeking to submit the draft DPD with the EAO in January 2024. Stantec said they looked forward to receiving any comments or feedback on the DPD by January 19, 2024 and offered availability if there were any questions. Stantec offered to set up a meeting between West Moberly First Nations and Vitreo to discuss the draft DPD if of interest.
21-Dec-23	President, CEO, Community Engagement Lead, Vice President, Operation	Email (Sent)	Chief	Stantec emailed to inform West Moberly First Nations that Vitreo's President and CEO and Vice President of Operations, would be attending the BC Natural Resources Forum in Prince George from January 16-18 and offered to arrange a meeting at the convenience of the West Moberly First Nations. Stantec stated a meeting could also be arranged as an alternative, in Vancouver at the AME Roundup from January 22-25th, if the Chief planned on attending this event. Stantec provided a brief summary of the Angus Project to provide a refresher and stated they looked forward to a response.
21-Dec-23	Vice President, Operation, President, CEO	Email (Sent)	Legal Counsel	Stantec emailed the legal counsel for West Moberly First Nations stating that Vitreo valued West Moberly First Nations' participation in the field work and the environmental assessment process, and that Vitreo looked forward to discussing a Relationship Agreement in the new year.
22-Dec-23	Regulatory Specialist, Community Engagement Lead, President, CEO, Vice President, Operation	Email (Sent)	Chief and Counsel, Legal Counsel	Stantec provided meeting notes to West Moberly First Nations for their review from a meeting held on November 22, 2023.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
03-Jan-24	Project Manager, Vice President, Operation, President, CEO	Email (Sent)	Field Staff Coordinator	Stantec notified West Moberly First Nations of the opportunity to participate in a Bull Trout Spawning Habitat Survey over 5 days from January 10th to 14th. Stantec provided details of the field activity, crew contact information, and Vitreo contact information for booking accommodations. Stantec requested that they be informed of any interest in participating at the earliest convenience of West Moberly First Nations.
03-Jan-24	Project Manager, Vice President, Operation, President, CEO	Email (Received)	Field Staff Coordinator	West Moberly First Nations responded to Stantec confirming interest in field participation of the January 2024 Bull Trout Spawning Habitat Survey and provided the contact information of the field participant.
04-Jan-24	Project Manager, Vice President, Operation, President, CEO	Email (Sent)	Field Staff Coordinator	Stantec informed West Moberly First Nations that the Bull Trout Spawning Habitat Survey would be postponed to mid-January due to the weather forecast. Stantec stated they would inform them of dates once confirmed.
08-Jan-24	Vice President, Operation, President, CEO	Email (Received)	Land Use Manager	West Moberly First Nations emailed Vitreo stating that West Moberly First Nations leadership would be in Vancouver in January, and inquired if a meeting could be arranged and offered several dates and times.
08-Jan-24	Vice President, Operation, President, CEO	Email (Sent)	Land Use Manager	Vitreo relayed their interest in meeting with West Moberly First Nations leadership in Vancouver on January 23rd and asked what meeting place was most convenient.
08-Jan-24	Vitreo Vice President, Operation, President, CEO	Email (Received)	Land Use Manager	West Moberly First Nations confirmed meeting with Vitreo on January 23rd and stated they would send out a calendar invitation.
11-Jan-24	Community Engagement Lead, Vice President, Operation, President, CEO	Email (Sent)	Legal Counsel	Stantec followed up on an email sent on December 13th requesting review and feedback of the draft Detailed Project Description (DPD). Stantec reattached the draft DPD stating they looked forward to receiving comments by January 19th and offered arranging a meeting with Vitreo if there were any questions or if this was of interest.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
11-Jan-24	Community Engagement Lead, Vice President, Operation, President, CEO	Email (Received)	Legal Counsel	The legal counsel of West Moberly First Nations responded to Stantec stating a letter of response on the draft Detailed Project Description should be expected within the next week.
15-Jan-24	Project Manager, Vice President, Operation, President, CEO	Email (Sent)	Field Staff Coordinator	Stantec provided details on the Bull Trout Spawning Habitat Baseline Study, tentatively scheduled for January 23 – 27 and the Surface Water Quality Field Program scheduled for January 23-25, extending an invitation for West Moberly First Nations to join each of the field programs. Stantec requested confirmation about interest in participating to reserve accommodation and provided a table of details including PPE, meeting time and place, and contact details.
15-Jan-24	Project Manager, Vice President, Operation, President, CEO	Email (Received)	Field Staff Coordinator	West Moberly First Nations confirmed field participation for the Bull Trout Spawning Habitat Survey.
19-Jan-24	Community Engagement Lead, Vice President, Operation, President, CEO	Email (Received)	Legal Counsel	The legal counsel of West Moberly First Nations provided a letter of comments following their review of the draft Detailed Project Description, which are contained in this document.
23-Jan-24	President, CEO Vice President Operations	Email (Received)	Legal Counsel	The legal counsel for West Moberly First Nations provided a draft Engagement Protocol for Vitreco's review and comments to support a Relationship Agreement between West Moberly First Nations and Vitreco.
23-Jan-24	President, CEO Vice President Operations	Meeting (in-person)	Chief and Council	Vitreco presented an update on the Project and responded to questions.
26-Jan-24	Community Engagement Lead, President, CEO Vice President Operations	Email (Sent)	Legal Counsel	Stantec followed up on the draft engagement protocol and offered to arrange a meeting with Vitreco to discuss a Relationship Agreement.
29-Jan-24	Project Manager, Vice President, Operations	Email (Sent)	Field Staff Coordinator	Stantec thanked West Moberly First Nations for participating in the Bull Trout Habitat Spawning survey and the Surface Water Sampling survey and provided a summary of the hours per day of field work for both field participants.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
30-Jan-24	Project Manager, Vice President, Operations, President, CEO	Email (Sent)	Field Staff Coordinator	Stantec extended an invitation and provided details to participate in the Surface Water Quality Field Program scheduled for February 13-15.
31-Jan-24	Project Manager, Vice President, Operations, President, CEO	Email (Received)	Field Staff Coordinator	West Moberly First Nations confirmed field participation for the February Surface Water Quality Field Program.

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Table A.3 Engagement Records of Contact with Lheidli T'enneh First Nation

Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
16-Jan-23	Community Engagement Lead	Email and Letter/Document (Sent)	Land Manager	Introductory email sent to Lheidli T'enneh First Nation Chief and Council and Land Use Manager Project introductory letter and map of the Project within Treaty 8.
13-Mar-23	Community Engagement Lead	Email (Sent)	Land Manager	Email sent to Lheidli T'enneh First Nation, following up January 16, 2023, introductory email to the Project, including offer to meet to answer questions or provide updates.
15-Mar-23	Community Engagement Lead	Meeting (Virtual)	Project Analyst	Call to Lheidli T'enneh First Nation providing information about the Project. Lheidli T'enneh First Nation noted they did not receive the introductory email with the attachment due to internal firewall. Email was resent during the meeting. Lheidli T'enneh First Nation confirmed they had received the information and would confirm if the Project was within their traditional territory, if so, they will forward the email to their referrals department, who would determine how Lheidli T'enneh First Nation would like to be engaged. Lheidli T'enneh First Nation asked if the Project is upstream of primary drinking water sources. Lheidli T'enneh First Nation asked if the Project is upstream of primary drinking water sources.
20-Mar-23	Community Engagement Lead	Email (Sent)	Senior Manager, Capital Project & Asset Management	Email sent to Lheidli T'enneh First Nation, thanking for their time to discuss the Project and provided them with Project spatial data.
21-Mar-23	Community Engagement Lead President, CEO Vice President, Operations	Email (Received)	Senior Manager, Capital Project & Asset Management	Email received from Lheidli T'enneh First Nation confirming receipt of information provided and included the Assistant Manager of Natural Resources in the email for further correspondence on the Project.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
5-Apr-23	Vice President, Operations	Email (Sent)	Assistant Manager, Natural Resources	Email sent to Lheidli T'enneh First Nation following up on email received on March 21, 2023. Introduction letter sent in January 2023 was attached.
11-Apr-23	Vice President, Operations	Email (Sent)	Assistant Manager, Natural Resources;	Email sent to Lheidli T'enneh First Nation with meeting invitation for April 25, 2023, and email confirming the dates.
18-Apr-23	Facilitator Indigenous Services, Senior Associate	Email (Sent)	Assistant Manager, Natural Resources	Email sent to Lheidli T'enneh First Nation, following up on April 5, 2023, to confirm proposed meeting on April 25.
20-Apr-23	Facilitator Indigenous Services, Senior Associate	Telephone Call (Sent)	Office Administrator	Call to Lheidli T'enneh First Nation to confirm attendance at upcoming meeting on April 25, 2023.
20-Apr-23	Facilitator Indigenous Services, Senior Associate	Email (Sent)	Assistant Manager, Natural Resources	Email sent to Lheidli T'enneh First Nation, following up on April 5, 2023, to confirm proposed meeting on April 25, 2023.
24-Apr-23	Facilitator Indigenous Services, Senior Associate	Email (Received)	Assistant Manager, Natural Resources	Email received from Lheidli T'enneh First Nation requesting to reschedule the meeting. Meeting rescheduled for May 3, 2023.
3-May-23	Regulatory Specialist Facilitator Indigenous Services, Senior Associate	Email (Sent)	Assistant Manager, Natural Resources	Email sent to Lheidli T'enneh First Nation, as follow-up from May 3 meeting, with pdf of meeting presentation. The email noted meeting with Chief and Council would be organized soon.
3-May-23	Facilitator Indigenous Services, Senior Associate Regulatory Specialist President, CEO Vice President, Operations	Meeting (Virtual)	Assistant Manager, Natural Resources;	Meeting with Lheidli T'enneh First Nation to introduce the Project.
5-May-23	Regulatory Specialist	Email (Received)	Assistant Manager, Natural Resources	Email received from Lheidli T'enneh First Nation, following up on email from May 3, including confirmation of receipt of presentation pdf and noted Lheidli T'enneh First Nation will follow up with dates for next meeting with Chief and Council.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
2-Jun-23	Regulatory Specialist	Email (Sent)	Assistant Manager, Natural Resources	Email sent to Lheidli T'enneh First Nation with May 3, 2023 meeting minutes. Email requested to confirm available dates to present Project to the Chief and Council.
2-Nov-23	Community Engagement Lead	Email (Sent)	Assistant Manager, Natural Resources	Stantec sent an email to Lheidli T'enneh First Nation indicating that Vitreo is hosting a breakfast to introduce the Project to the business community in Prince George. An invitation to the breakfast is attached.
13-Dec-23	Community Engagement Lead	Email (Sent)	Assistant Manager, Natural Resources	Stantec provided the draft Detailed Project Description (DPD) for review stating Vitreo would be seeking to submit the draft DPD with the EAO in January 2024. Stantec said they looked forward to receiving any comments or feedback on the DPD by January 19, 2024 and offered availability if there were any questions. Stantec offered to set up a meeting between Lheidli T'enneh First Nation and Vitreo to discuss the draft DPD if of interest.
14-Dec-23	Community Engagement Lead	Email (Sent)	Chief	Stantec provided a copy of the draft Detailed Project Description to the Chief of Lheidli T'enneh First Nation noting that it was provided to Lheidli T'enneh First Nation staff the previous day.

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Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
21-Dec-23	Vitreo Vice President, Operation, President, CEO, Community Engagement Lead	Email (Sent)	Chief	Stantec emailed to inform Lheidli T'enneh First Nation that Vitreo's President and CEO and Vice President of Operations, would be attending the BC Natural Resources Forum in Prince George from January 16-18 and offered to arrange a meeting at the convenience of the Lheidli T'enneh First Nation. Stantec stated a meeting could also be arranged as an alternative, in Vancouver at the AME Roundup from January 22-25th, if the Chief planned on attending this event. Stantec provided a brief summary of the Angus Project to provide a refresher and stated they looked forward to a response.
11-Jan-23	Community Engagement Lead	Email (Sent)	Assistant Manager, Natural Resources	Stantec followed up on an email sent on December 13, 2023 requesting review and feedback of the draft Detailed Project Description (DPD). Stantec reattached the draft DPD stating they looked forward to receiving comments by January 19th and offered arranging a meeting with Vitreo if there were any questions or if this was of interest.

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Table A.4 Engagement Records of Contact with Nak'azdli Whut'en

Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
16-Jan-23	Community Engagement Lead	Email and Letter/Document (Sent)	Land Manager	Email sent to Nak'azdli Whut'en providing an introduction and map of the Project.
13-Mar-23	Community Engagement Lead	Email (Sent)	Chief and Council	An email was sent to Nak'azdli Whut'en following up a phone call made earlier on the same day.
13-Mar-23	Community Engagement Lead	Telephone Call (Sent)	Chief and Council	Phone call to Nak'azdli Whu'ten to confirm introductory email was received. Nak'azdli Whu'ten reported they do not support fracking.
14-Mar-23	Regulatory Specialist	Email (Sent)	GIS technician	An email was sent by Nak'azdli Whut'en requesting a Project shapefile.
21-Mar-23	Community Engagement Lead	Email (Sent)	GIS Technician	Email sent to Nak'azdli Whut'en providing requested spatial data information from March 14, 2023.

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Table A.5 Engagement Records of Contact with Nazko First Nation

Date	Proponent Team Member	Communication Method	Communication With	Description of Engagement Activity
16-Jan-23	Community Engagement Lead	Email and Letter/Document (Sent)	Referrals	Email sent to Nazko First Nation introducing the Project.
1-Aug-23	President, CEO	Email (Received)	Manager	Introductory email received from Nazko First Nation with an invitation to set up a meeting and learn more about the Project and explore opportunities to work together. Email indicated availability by Teams most days round 3 pm.
15-Aug-23	President, CEO	Email (Sent)	Manager	Email sent in response to Nazko First Nation introduction, requesting dates to set up a Teams meeting. Email provided Nazko First Nation details to an open house at the Bear Lake Community Hall on August 22nd. Email received from Nazko First Nation requesting a time to meet Vitreo in Prince George that week. Email sent in response requesting a Teams meeting on August 25. Email received from Nazko First Nation indicating August 25 works.
25-Aug-23	President, CEO Vice President, Operations Community Engagement Lead	Meeting (Virtual)	Manager	Virtual meeting with Nazko First Nation to introduce the Project.
8-Sep-23	President, CEO	Email (Received)	Manager	Email received from Nazko First Nation providing a list of Nazko industry partners for any potential opportunities to work together.
12-Sep-23	Regulatory Specialist	Email (Received)	Natural Resources Manager	Email received from Nazko First Nation's Natural Resource Manager demonstrating interest in learning more about the Project. Email requested a possible short introductory meeting.
13-Sep-23	Community Engagement Lead	Email (Sent)	Natural Resources Manager	Email sent to Nazko First Nation indicating that the Project is in the EAO's Early Engagement phase. Email requested Nazko First Nation to provide dates and suggest online platform for meeting.



Detailed Project Description
Appendix B Project Issues Tracking Table
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Appendix B Project Issues Tracking Table

**Angus Project
Vitreo Minerals Ltd.
Issues Tracking Table**

ID#	Stage	Subject - EA Topic	Comment/Issue Date	Comment Author	Comment Organization	Application/Document	Participant Issues, Description or Comment	Response Date	Vitreo Response	Status	Response
IPD-MLIB-001	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	What cubic volume of water is required per hour/day/year to run plant operations?	29-Nov-23	Estimated Raw Sand Plant total processing water requirement are 2800 to 3000 cubic metres per hour (m3/hr) with approximately 200 m3/hr (~0.056 m3/second) required as make-up water (i.e., not recycled). Mining and processing the quartz arenite at the Raw Sand Plant are seasonal operations that would take place for approximately 245 days per year during the open-water season April 1 to November 30. This information is provided in the Detailed Project Description, Section 15.2 Project Water Use.		
IPD-MLIB-002	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	How will make-up water be sourced from runoff water collected on site during trending seasons of drought?	29-Nov-23	Vitreo is currently progressing Project planning, including identification of sources of make-up water at the Mine site. Currently, processing and make-up water sources have been preliminarily identified as follows: recycled water, run-off/contact water, surface and/or groundwater, excess water from water storage or sediment ponds. Thus, supplemental water sources are available for make-up water in times of drought. This information is provided in the Detailed Project Description, Section 15.2 Project Water Use.		
IPD-MLIB-003	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Will this water collection on site reduce recharge in the receiving environment downstream of the mine site?	29-Nov-23	Water collection on site reducing recharge in the receiving environment downstream of the Mine site will be identified and evaluated as part of the integrated water balance and water quality model that will be presented as part of the Application for an Environmental Assessment Certificate.		
IPD-MLIB-004	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Follow-up information regarding discharge points to the receiving environment will be necessary to understand the potential effects.	29-Nov-23	Vitreo agrees that follow-up information regarding discharge points to the receiving environment will be necessary to understand potential effects. Project planning, including the water management plan, are still in progress and information about the discharge points to the receiving environment will be identified and evaluated as part of the integrated water balance and water quality model that will be presented as part of the Application for an Environmental Assessment Certificate.		
IPD-MLIB-005	Early Engagement	Surface Water	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Further characterization of the affected watersheds (Angusmac Creek, Giggler Creek and Olsson creek) to be defined; seasonal flows and climate related changes to seasonal flows needs to be understood relative to available water to facilitate mining activities, as well as reductions in surface water at discharge points that may result in exceedances through the lifespan of the mine.	29-Nov-23	Vitreo has been conducting an environmental baseline program since 2021 to characterize surface water resources, and since 2022 to characterize groundwater resources in the Project Area. A summary of findings to-date is presented in the Detailed Project Description in Section 12.2.4 Groundwater Quantity and Quality and Section 12.2.5 Surface Water Quantity and Quality. A characterization of the affected watersheds including seasonal flows and climate-related changes to seasonal flows will be further identified and evaluated as part of the integrated water balance and water quality model that will be presented as part of the Application for an Environmental Assessment Certificate. Vitreo understands that changes to seasonal flows need to be understood relative to available water to facilitate mining activities, as well as reductions in surface water at discharge points that may result in exceedances through the lifespan of the mine.		
IPD-MLIB-006	Early Engagement	Air Quality	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Fugitive dust along the haul road through the duration of mining activities and the efficiency of dust management measures will need to be better understood to characterize potential effects.	29-Nov-23	Fugitive dust dispersion from Project activities will be modelled in the Application for an Environmental Assessment Certificate, and Vitreo will incorporate dust management measures into the Project planning. An Air Quality Management Plan will be developed prior to construction, this plan is described in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans and Monitoring Plans.		
IPD-MLIB-007	Early Engagement	Air Quality	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	How will dustfall along the North Olsson FSR, particularly where it parallels the Giggler Creek watershed be managed?	29-Nov-23	Fugitive dust dispersion from Project activities will be modelled, including from haul truck usage of the North Olsson FSR, as part of the Application for an Environmental Assessment Certificate. Vitreo will incorporate dust management measures into the Project planning, and intends to utilize water trucks or other control measures to manage fugitive dust from road use, as required. An Air Quality Management Plan will be developed prior to construction, this plan is described in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans and Monitoring Plans.		
IPD-MLIB-008	Early Engagement	Consultation and Engagement	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	MLIB would need to conduct a Treaty Impact Assessment (formerly TLUS); this will require capacity funding.	29-Nov-23	Vitreo is looking forward to continuing our discussions regarding capacity funding for a Treaty Impact Assessment.		
IPD-MLIB-009	Early Engagement	Consultation and Engagement	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Further discussion required regarding capacity funding and an MOU.	29-Nov-23	Vitreo is looking forward to continuing our discussions regarding capacity funding and a memorandum of understanding.		
IPD-MLIB-010	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Increased traffic on FSR and discussions regarding mitigative measures ongoing.	29-Nov-23	Increased Project-related traffic on the FSR may interfere with existing use and may also increase effects to local wildlife (e.g., vehicle-wildlife collisions) and vegetation (e.g., dust deposition). Management measures may be required to address these effects, including development of a Traffic Management Plan. A high level overview of the anticipated Traffic Management Plan is included in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans and Monitoring Plans. Vitreo anticipates developing this plan in discussions with McLeod Lake Indian Band.		
IPD-MLIB-011	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Progressive reclamation will require further characterization.	29-Nov-23	Vitreo would appreciate an opportunity to discuss the overall closure plan, including progressive reclamation and end land use planning with McLeod Lake Indian Band.		
IPD-MLIB-012	Early Engagement	Community Wellbeing	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Trucking vs railway transport to NEBC needs to be discussed. The safety on the highway relative to the increased traffic is a significant concern.	29-Nov-23	Vitreo understands that there are concerns related to traffic safety on Highway 97. The public highway is within the jurisdiction of the Ministry of Transportation (MoTI). Vitreo will develop driver protocols and training and safety standards for all haul traffic, including traffic on Highway 97. Discussions with CN Rail and evaluation studies related to rail logistics will be required to better understand the potential for rail transportation of product to customers. Vitreo will re-evaluate the development of the rail loadout once the Project is in operations. These concerns have been documented in the Detailed Description, in section 16.1 Preliminary Identification of Potential Accidents or Malfunctions and section 10.7.2 Alternative Means of Carrying Out the Project.		
IPD-MLIB-013	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	It is the same distance to the railway as it is the highway; why is there no plan to develop a rail loadout to prevent a significant traffic increase on the highway?	29-Nov-23	Discussions with CN Rail and evaluation studies related to rail logistics will be required to better understand the potential for rail transportation of Angus proppant silica sand to customers. Vitreo will re-evaluate the development of the rail loadout once the Project is in operations.		

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IPD-MLIB-014	Early Engagement	Community Wellbeing	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Areas like the Pine Pass, already heavily inundated with industrial traffic are dangerous as it is, particularly through the winter; this proposed increase to that traffic needs to be mitigated.	29-Nov-23	Vitreo recognizes that the Project will increase highway traffic along Highway 97. Vitreo notes that Highway 97 is a public and well-utilized highway, and Vitreo and its contractors will adhere to traffic management regulations such as speed limits and will communicate with Ministry of Transportation and Infrastructure about the Project. Vitreo anticipates approximately 150 trucks per day one-way (or approximately six trucks every hour) will travel on Highway 97, transporting proppant from the Finishing Plant site to markets in northeast BC. These concerns have been documented in the Detailed Description, in section 16.1 Preliminary Identification of Potential Accidents or Malfunctions.		
IPD-MLIB-015	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	If the Finishing Plant target production rate is 300 t/hour, how many truckloads will that produce hourly, daily, weekly, annually?	29-Nov-23	As stated in the Initial Project Description, hauling between the Raw Sand Plant and Finishing Plant will occur approximately 300 days per year. On average approximately 127 trucks per day will travel from the Finishing Plant site to the Raw Sand Plant along the North Olsson Forest Service Road (FSR). This corresponds to approximately 38,100 trucks annually. Vitreo will develop a Traffic Management Plan, which will describe measures to mitigate effects due to increased traffic, address traffic safety concerns at the Mine site and Finishing Plant site, and along the FSR and from the access of haul trucks to Highway 97. A high level overview of the anticipated Traffic Management Plan is included in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans and Monitoring Plans.		
IPD-MLIB-016	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	How many vehicles will that add to the highway over a 22 year mine life, hauling 335 days per year?	29-Nov-23	During Project operations, approximately 150 trucks will use Highway 97 for transportation of silica sand to market. Annually, assuming full volume of haul traffic for 335 days, this will correspond to approximately 50,280 trucks annually. This information is included in the Detailed Project Description, Table 16.1 Preliminary Description of Potential Accidents or Malfunctions.		
IPD-MLIB-017	Early Engagement	Surface Water	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	How will the upgrading of the haul road be conducted in relation to the affected stream (Giggler)?	29-Nov-23	Upgrades to existing forest service and access roads are being considered as a part of Project planning, however the location and extent of any upgrades has not yet been determined. It is currently intended that upgrades to forest service roads will occur above the high water mark of nearby streams; as well, erosion and sediment control measures will be implemented to mitigate sedimentation effects to streams. Additional detail on upgrades to the existing Forest Service Roads (FSRs), including relevant mitigation measures, will be included in the Application for an Environmental Assessment Certificate.		
IPD-MLIB-018	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	This road has steep canyon banks and a stream; in general, one or the other would have to be affected throughout the upgrade.	29-Nov-23	Upgrades to existing forest service and access roads are being considered as a part of Project planning, however the location and extent of upgrades has not yet been determined. Additional information about road alignment will be included in the Application for an Environmental Assessment Certificate.		
IPD-MLIB-019	Early Engagement	Consultation and Engagement	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	More collaborative discussion regarding engineering and construction of road upgrades required.	29-Nov-23	Comment is acknowledged. The upgrades to existing forest service and access road are being considered as a part of Project planning and Vitreo welcomes further discussion with McLeod Lake Indian Band.		
IPD-MLIB-020	Early Engagement	Consultation and Engagement	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	More discussion regarding the 138kv powerline proposed to parallel the North Olsson FSR, as this will further encroach upon this active fish habitat.	29-Nov-23	Vitreo is currently progressing Project planning, and final routing of the transmission line has not been determined. However, for any stream crossings, the power poles will be installed outside of riparian areas. If any riparian vegetation needs to be removed, it will be done by hand clearing only and no instream work will occur. Further details can be shared with McLeod Lake Indian Band as Project planning progresses.		
IPD-MLIB-021	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Cumulative effects to be scoped and assessed.	29-Nov-23	Comment is acknowledged. As outlined in Section 10.3 of the Initial Project Description, the Application for an Environmental Assessment Certificate will contain a cumulative effects assessment where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. A preliminary consideration of cumulative effects are included in the Detailed Project Description, Section 13.3.		
IPD-MLIB-022	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	How will the workforce be transported to and from site?	29-Nov-23	The workforce will be sourced primarily from local communities, including Bear Lake and Prince George. Crews will muster at a location and take a company-supplied bus to the Finishing Plant site or the Mine site to avoid increased personal vehicle traffic on the FSR. Section 16.1 Preliminary Identification of Potential Accidents or Malfunctions of the Detailed Project Description has been updated to contain this information.		
IPD-MLIB-023	Early Engagement	Consultation and Engagement	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	To-date, no issues have been raised about public and environmental safety during engagement activities with Indigenous Nations. See above	29-Nov-23	Comment acknowledged, the concerns regarding safety are included in section 16.1 Preliminary Identification of Potential Accidents or Malfunctions in the Detailed Project Description.		
IPD-MLIB-024	Early Engagement	Consultation and Engagement	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	3.3 Indigenous Nations Agreement Requirements – this will require further internal and collaborative discussion.	29-Nov-23	Vitreo is looking forward to continuing discussions regarding a Project agreement with McLeod Lake Indian Band.		
IPD-MLIB-025	Early Engagement	Vegetation	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Revegetation – no plans identified in the Initial Project Description; further collaborative discussion required.	29-Nov-23	Progressive reclamation will occur during the life of mine, including the reclamation of external stockpiles and waste rock storage area once majority of the waste is being directed back into the Monkman East Pit starting in Year 6. Post closure monitoring programs will be developed through the approvals process and will include revegetation success. The Detailed Project Description has been updated to include a summary of the reclamation and closure plan that will be included in the Application for an Environmental Assessment Certificate at a conceptual level (See Section 10.3.3 Reclamation and Closure). This plan will include revegetation prescriptions based on an understanding of end land use objectives. Vitreo anticipates working with McLeod Lake Indian Band to develop revegetation prescriptions for the Project.		
IPD-MLIB-026	Early Engagement	Wildlife	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Post-closure monitoring: wildlife monitoring program to assess return of wildlife to the site (long-term, wildlife monitoring camera program will need to be developed).	29-Nov-23	The Detailed Project Description has been updated to include a summary of the reclamation and closure plan that will be included in the Application for an Environmental Assessment Certificate at a conceptual level (See Section 10.3.3 Reclamation and Closure). This plan will also include a post-closure monitoring plan to evaluate reclamation success. Monitoring requirements will be determined through the assessment and permitting processes, but may include monitoring for revegetation success, metals uptake in vegetation, and wildlife use of reclaimed areas.		

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IPD-MLIB-027	Early Engagement	Other	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Section 8.1.2 on noise emissions does not account for wildlife in the area, only human receptors.	29-Nov-23	The assessment of indirect loss of wildlife habitat due to sensory disturbance (e.g., noise emissions) is assessed in the wildlife section through species-specific sensory disturbance buffers that are applied to the boundary of the Project area. The areas of effective wildlife habitat within those sensory disturbance areas is thus quantified through wildlife habitat suitability mapping. The results of the noise assessment will be used to inform the assessment of indirect loss of wildlife habitat due to sensory disturbance.		
IPD-MLIB-028	Early Engagement	Wildlife	27-Oct-23		McLeod Lake Indian Band	Initial Project Description	Wildlife populations should be assessed, as well as their potential displacement regarding proximity and duration as a result of the project.	29-Nov-23	As part of the Application for an Environmental Assessment Certificate, Vitreo will investigate and assess potential Project effects on wildlife. As well, specific mitigation measures, designed to avoid and reduce Project-related displacement of bears and other wildlife, will be developed and implemented through the Construction Environmental Management Plan and the Wildlife Management Plan.		

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IPD-WMFN-001	Summary of Engagement	Other	3-Oct-23		West Moberly First Nations	Initial Project Description	Concerns related to cumulative effects and the location of the proposed project being in a highly disturbed area	29-Nov-23	<p>As stated in Section 7 of the Initial Project Description, the Project has been designed to reduce new disturbance and is using existing infrastructure, including proposed use of the existing Forest Service Roads as a haul route between the Raw Sand Plant and the Finishing Plant. Additionally, the Raw Sand Plant area is proposed to be located in an area that is already cleared and the Finishing Plant is proposed to be located in an existing industrial corridor.</p> <p>As outlined in Section 10.3 of the Initial Project Description, a cumulative effects assessment will be conducted where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. Reasonably foreseeable projects and activities are currently defined as those that: a) have been publicly announced with a defined project execution period and with sufficient project details that they can be included in the assessment; b) are currently undergoing an environmental assessment; or c) are in a permitting process. Where adverse cumulative effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop mitigation measures.</p> <p>This information is already in the Initial Project Description and no changes are proposed for the Detailed Project Description.</p>		
IPD-WMFN-002	Summary of Engagement	Wildlife	3-Oct-23		West Moberly First Nations	Initial Project Description	Potential impacts to Caribou and concern that the area was once used for Caribou habitat	29-Nov-23	<p>Vitreo agrees that it is important to acknowledge historic caribou use in the Project area and this acknowledgement is included in section 12.2.9 Wildlife and Wildlife Habitat of the Detailed Project Description. Vitreo is seeking to better understand historic caribou use of the Project area.</p> <p>Vitreo has completed a comprehensive baseline program and has not detected caribou within the assessment study area.</p>		
IPD-WMFN-003	Summary of Engagement	Wildlife	20-Oct-23		West Moberly First Nations	Initial Project Description	Potential impacts, including cumulative impacts, to caribou and concern that the project area was once used by caribou since the historical baseline habitat was much broader	29-Nov-23	<p>Vitreo agrees that it is important to acknowledge historic caribou use in the Project area and this is included in section 12.2.9 Wildlife and Wildlife Habitat and figure 12-10 of the Detailed Project Description and will be included in the Application for an Environmental Assessment Certificate.</p>		
IPD-WMFN-004	Summary of Engagement	Other	20-Oct-23		West Moberly First Nations	Initial Project Description	Proximity of the proposed project to Summit Lake, and associated impacts to treaty rights, including hunting, berry picking, and cultural use	29-Nov-23	<p>Summit Lake is located approximately 14 km from the Finishing Plant site and approximately 21 km from the Mine site. Given the distance of the Project from Summit Lake, it is unlikely that Project components and activities will directly affect Summit Lake. As well, Vitreo is committed to hiring locally to the extent practical, mitigating the potential for an increase of workers to the general area resulting in increased use of Summit Lake. Additionally, Vitreo also intends to shuttle workers to site, rather than having staff use their individual vehicles. This mitigation measure will also reduce staff opportunity to utilize Summit Lake on their way to or from work.</p> <p>Vitreo would like to understand more about the use of the Project area and Summit Lake by West Moberly First Nations to inform the effects assessment of treaty rights.</p>		
IPD-WMFN-005	Summary of Engagement	Air Quality	20-Oct-23		West Moberly First Nations	Initial Project Description	Potential impacts from traffic, dust, and noise on nearby communities, wildlife, and vegetation	29-Nov-23	<p>Section 13 of the Detailed Project Description includes details of Project interactions and potential effects from traffic, dust and noise.</p> <p>Given the prevailing wind direction at the Crystal Lake monitoring station from south southeast and southerly directions the communities of Bear Lake will likely be downwind of the Project. Within the Project Development Area (PDA) boundary, dust emissions from the Project will be primarily an occupational health and safety concern to Project staff, however outside of the PDA boundary fugitive dust may affect the surrounding vegetation and soils in the immediate area through direct deposition. The presence of dust on vegetation and soils may result in changes to land use, including to Indigenous and non-Indigenous land users, who may avoid areas where dust from the Project has been deposited. Dust deposition may also result in changes to vegetation structure and composition resulting in an indirect effect on wildlife habitats.</p> <p>The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of the human health risks from inhalation of silica dust, with the conclusions of human health risk assumed to extend to ecological health risks.</p> <p>Some of the Project activities during construction and operation phases may produce high-level noise emissions. Land users may experience noise effects from Project activities. Noise emissions from the Project, including the Mine site, haul roads and Finishing Plant site will be used in an acoustic model to predict noise effect within the Local Study Area. Noise effects on the noise sensitive receptors, including the recreation sites near the Finishing Plant and haul road will be evaluated in the noise modelling assessment.</p> <p>Haul traffic for the Project will occur on a public FSR with multiple users, including logging trucks and recreational users. Increased project-related traffic on the FSR may interfere with existing use and may also increase effects to local wildlife (e.g., vehicle-wildlife collisions) and vegetation (e.g., dust deposition). Management measures may be required to address these effects, including development of a Traffic Management Plan.</p>		
IPD-WMFN-006	Summary of Engagement	Surface Water and Groundwater	20-Oct-23		West Moberly First Nations	Initial Project Description	Potential Impacts to water, including contamination and how that may affect treaty rights	29-Nov-23	<p>Vitreo is interested in reviewing the potential effects from the Project to water with West Moberly First Nations to understand their potential effect on Indigenous and Treaty Rights. Vitreo is interested in working with West Moberly First Nations to discuss and implement appropriate mitigation measures.</p>		
IPD-WMFN-007	Summary of Engagement	Other	20-Oct-23		West Moberly First Nations	Initial Project Description	The need for a better rationale to determine if the proposed benefits of the project (e.g., providing a local source of proppant that would reduce greenhouse gas emissions) would outweigh the negative impacts the project would have on the environment and Treaty 8 rights	29-Nov-23	<p>The Application for an Environmental Assessment Certificate will discuss Project benefits and include an evaluation of alternative means of carrying out the Project which will include environmental, social, cultural, health and Indigenous considerations as described in Section 10.7 Alternatives To and Alternative Means of Carrying Out the Project of the Detailed Project Description.</p>		
IPD-WMFN-008	Summary of Engagement	Other	20-Oct-23		West Moberly First Nations	Initial Project Description	Recommendation that a cultural assessment be conducted, and that sufficient funding is provided to support West Moberly First Nations' participation in the environmental assessment process	29-Nov-23	<p>As discussed in 5.4 of the Detailed Project Description, Vitreo is interested in discussing capacity funding for a cultural assessment and the results of such a study with West Moberly First Nations.</p>		
IPD-WMFN-009	Early Engagement	Community wellbeing	15-Nov-23		West Moberly First Nations	Initial Project Description	WMFN is concerned about the impact the additional traffic, dust and noise will have on the region including the impact to wildlife, vegetation and the local communities who will be employed on the Project. The IPD states at page 47 that dust will be "primarily an occupational health and safety concern to Project staff", and that "fugitive dust may affect surrounding vegetation and soils... and may result in changes to land use, including to Indigenous and non-Indigenous land users". WMFN requires more detail about these potential impacts.	29-Nov-23	<p>Section 13 of the Detailed Project Description includes details of Project interactions and potential effects from traffic, dust and noise.</p> <p>Given the prevailing wind direction at the Crystal Lake monitoring station from south southeast and southerly directions the communities of Bear Lake will likely be downwind of the Project. Within the Project Development Area (PDA) boundary, dust emissions from the Project will be primarily an occupational health and safety concern to Project staff, however outside of the PDA boundary fugitive dust may affect the surrounding vegetation and soils in the immediate area through direct deposition. The presence of dust on vegetation and soils may result in changes to land use, including to Indigenous and non-Indigenous land users, who may avoid areas where dust from the Project has been deposited. Dust deposition may also result in changes to vegetation structure and composition resulting in an indirect effect on wildlife habitats.</p> <p>The Application for an Environmental Assessment Certificate will include a fugitive dust dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of the human health risks from inhalation of silica dust, with the conclusions of human health risk assumed to extend to ecological health risks.</p> <p>Some of the Project activities during construction and operation phases may produce high-level noise emissions. Land users may experience noise effects from Project activities. Noise emissions from the Project, including the Mine site, haul roads and Finishing Plant site will be used in an acoustic model to predict noise effect within the Local Study Area. Noise effects on the noise sensitive receptors, including the recreation sites near the Finishing Plant site and haul road will be evaluated in the noise modelling assessment.</p> <p>Haul traffic for the Project will occur on a public Forest Service Road (FSR) with multiple users, including logging trucks and recreational users. Increased Project-related traffic on the FSR may interfere with existing use and may also increase effects to local wildlife (e.g., vehicle-wildlife collisions) and vegetation (e.g., dust deposition). Management measures may be required to address these effects, including development of a Traffic Management Plan and an Air Quality Management Plan (see the Detailed Project Description Section 14). Vitreo anticipates developing these plans in discussions with West Moberly First Nations.</p>		

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IPD-WMFN-010	Early Engagement	Wildlife	15-Nov-23		West Moberly First Nations	Initial Project Description	WMFN is also concerned about the impacts to wildlife and the associated cultural impacts. The IPD notes 73 species, 16 of which are Species at Risk, that will be impacted by this Project. While the IPD states that the Project is 3km away from the nearest caribou range, WMFN believes that it will nevertheless have a detrimental impact on herds. Further, WMFN questions whether this boundary includes all caribou herds or just the Hart Ranges Woodland caribou. WMFN also questions whether this reflects the current range the Caribou have been limited to as a result of cumulative effects of industrial development. The historical baseline habitat was much broader. WMFN requires more detail about this project's contribution to cumulative impacts, particularly in relation to Caribou.	29-Nov-23	The Application for an Environmental Assessment Certificate will include an assessment of potential Project effects to wildlife and wildlife species at risk. Vitreo agrees that it is important to acknowledge historic caribou use in the Project area and this is included in the Summary of Existing Conditions of the Detailed Project Description and will be included in the Application for an Environmental Assessment Certificate. Although there are historical records of caribou in the area, the Project is located outside of the boundary of all caribou herd ranges and is approximately 3 km from the most western reach of the Hart Ranges woodland caribou herd, an area that is highly disturbed mostly through logging (Muhley 2016). The cumulative effects assessment that will be developed as part of the Application for an Environmental Assessment Certificate will address Project-specific residual effects and those of other reasonably foreseeable future physical activities, and will include potential interactions with caribou range, as appropriate. Reference: Muhley, T. 2016. Simulated Effects of Forest Harvest on Caribou Habitat Disturbance in the Prince George Timber Supply Area. Forest Analysis and Inventory Branch, BC Ministry of Forest, Lands and Natural Resource Operations, Victoria, BC. 22 pp.		
IPD-WMFN-011	Early Engagement	Surface Water and groundwater	15-Nov-23		West Moberly First Nations	Initial Project Description	WMFN is concerned about the impacts to water and the associated cultural impacts. When water sources are contaminated or flows limited it impairs our members' ability to be on the land and to exercise their Treaty rights. WMFN awaits the baseline data for tests that have begun on the impact to water in the area.	29-Nov-23	Vitreo is undertaking an aquatics baseline data collection program for the Project, including water quality laboratory analysis and tests that will inform the assessment of effects to water quality. In addition, Vitreo is willing to support West Moberly First Nations in undertaking a traditional land use study. Vitreo is interested in discussing the baseline data and the traditional land use study information that is not confidential to better understand the potential effects of the Project on West Moberly First Nations activities, land users, and government agencies to develop appropriate mitigation and/or avoidance measures to reduce or eliminate effects to water. The Application for an Environmental Assessment Certificate will include an assessment of Indigenous Interests of West Moberly First Nations. The Application will assess potential effects on surface water and groundwater quality and quantity. Vitreo also shared Project Technical Data Reports (TDRs), including the surface water hydrology and surface water quality reports on June 15, 2023. Vitreo is currently updating these TDRs and preparing a groundwater TDR and can share those with West Moberly First Nations when complete. A summary of these reports is provided in the Detailed Project Description, Section 12 Existing Conditions.		
IPD-WMFN-012	Early Engagement	Other	15-Nov-23		West Moberly First Nations	Initial Project Description	WMFN questions whether the rationale for the project: "[a reduction in] transportation distances throughout the basin and ...a potentially substantial offset to current greenhouse gas (GHG) emissions compared to the import of similar material from Wisconsin. In addition, the Project has the potential to provide long-term local business and employment opportunities", sufficiently outweighs the negative impact it may have on the environment and Treaty 8 rights.	29-Nov-23	Vitreo is interested in meeting with West Moberly First Nations to understand their perspective on how the Project may affect the environment and Treaty 8 rights. Vitreo would like to discuss possible avoidance and/or mitigation opportunities and strategies that would minimize and/or eliminate these potential effects. Once discussed, Vitreo will include the mitigation and/or avoidance measures in the Application for an Environmental Assessment Certificate.		
IPD-WMFN-013	Early Engagement	Other	15-Nov-23		West Moberly First Nations	Initial Project Description	The IPD does not provide sufficient information to determine whether the GHG emission reductions are substantial enough to support the negative impact the Angus Project will have on the environment. There is no indication in the IPD that the Wisconsin-based mine will reduce its current production levels. Accordingly, the Angus Project may reduce negative impacts caused by importing silica sand, but the construction of a second basin will increase the amount of GHG emission levels overall. The IPD suggests that the alternative to the Angus Project is status quo. WMFN would like to see greater justification for this Project and whether alternatives not included in the IPD exist.	29-Nov-23	Comment acknowledged. Vitreo will provide further detail by presenting an assessment of greenhouse gas emissions (GHG) from the Project in the Application for an Environmental Assessment Certificate. Section 10.7 Alternatives To and Alternative Means of Carrying Out the Project in the Detailed Project Description has been updated to provide additional rationale for the Project from that that was presented in the Initial Project Description.		
IPD-WMFN-014	Early Engagement	Other	15-Nov-23		West Moberly First Nations	Initial Project Description	As noted at prior meetings with Vitreo, WMFN would like to ensure that a Cultural Assessment is completed and that WMFN receives sufficient capacity funding to participate in the EA process.	29-Nov-23	Vitreo would appreciate an opportunity to meet with West Moberly First Nations to discuss completion of a Cultural Assessment and associated capacity funding.		

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IPD-LTFN-001	Early Engagement	Air Quality	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	Lheidli T'enneh First Nation are concerned about the impact of crystalline silica on human health and the migratory wildlife within the area. As airborne dust particles are quite small, we are concerned about the air quality and the potential migration of dust particles through the airshed	29-Nov-23	The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of the human health risks from inhalation of silica dust, with the conclusions of human health risk assumed to extend to ecological health risks. As documented in Section 14, Mitigation Measures, Management Plans and Monitoring of the Detailed Project Description, Vitreo will implement an Air Quality Management Plan which will describe measures to mitigate Project effects to air quality, including from fugitive dust emissions. Mitigation measures related to silica dust emissions include use of baghouses and vacuum systems at the Raw Sand Plant and the Finishing Plant site to reduce particulate matter emissions.		
IPD-LTFN-002	Early Engagement	Groundwater	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	Water Sources: We expect that the Angus Project will be using intercepted groundwater as their primary source for processing. Would additional water supply be needed? And from where?	29-Nov-23	Vitreo is currently progressing Project planning, including identification of sources of processing and make-up water at the Mine site. Currently, processing and make-up water sources have been preliminarily identified as follows: recycled water, run-off water, surface and/or groundwater, excess water from water storage or sediment ponds. This information is provided in the Detailed Project Description, Section 15.2 Project Water Use.		
IPD-LTFN-003	Early Engagement	Groundwater	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	Lheidli T'enneh First Nation are concerned about the impact to groundwater. a. Groundwater in some silica mines can be acidic leading to potential metal leaching from the rock into water ways. We are concerned that metal leaching may occur which may further lead to health complications of our members practicing their aboriginal rights on the land b. Vitreo minerals should be investigating groundwater-surface water interactions as a result of pit development- how much water is expected and what effects will that have on the surrounding wetlands and watercourses	29-Nov-23	The potential effects of pit development on groundwater and on groundwater surface water interactions will be assessed during the environmental assessment, and documented in the Application for an Environmental Assessment Certificate. Vitreo will conduct a water balance and water quality modelling exercise for the Application that will include interactions between groundwater and surface water at the Mine site. The Application will also include an evaluate downstream effects to wetlands and watercourses. Vitreo is undertaking a geochemical characterization program for overburden, waste rock, the quartz arenite deposit, and fines generated from processing. Results to-date indicate these materials are non-potentially acid generating and have limited potential for metal leaching. This program is ongoing and updated results will be included in the Application for an Environmental Assessment. A summary of this program is provided in the Detailed Project Description Section 12.2.3 Geochemistry.		
IPD-LTFN-004	Early Engagement	Other	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	Lheidli T'enneh First Nation are concerned about the impact of the project on Olsson Creek which is a tributary to Fraser River	29-Nov-23	Vitreo acknowledges that a portion of the Project is located within the Olsson Creek watershed which is a tributary Fraser River, and notes that effects to both surface water and groundwater quality and quantity will be assessed in the Application. The Fraser River is 14 km downstream of the Project (as the crow flies) and no to negligible effects are expected to occur to the Fraser River from the Project.		
IPD-LTFN-005	Early Engagement	Wildlife	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	Lheidli T'enneh First Nation are concerned about the potential impact of noise generated from the project on migratory species	29-Nov-23	The Application for an Environmental Assessment Certificate will include modelling of noise effects on sensitive human receptors. Mitigation measures for potential noise effects will be included in the Application. The assessment of indirect loss of wildlife habitat due to sensory disturbance (e.g., noise emissions) is assessed in the wildlife section through species-specific sensory disturbance buffers that are applied to the boundary of the Project area. The areas of effective wildlife habitat within those sensory disturbance areas are thus quantified through wildlife habitat suitability mapping. The results of the noise assessment will be used to inform the assessment of indirect loss of wildlife habitat due to sensory disturbance. This information is included in the Detailed Project Description, Section 13 Project Interactions.		
IPD-LTFN-006	Early Engagement	Wildlife	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	Lheidli T'enneh First Nation are concerned about the impact to wildlife which may include wildlife exposure, displacement and or mortality.	29-Nov-23	The Application for an Environmental Assessment Certificate will include an assessment of effects to wildlife, including changes in habitat use (e.g., sensory disturbance effects), changes in movement, and changes in mortality risk.		
IPD-LTFN-007	Early Engagement	Other	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	What is the cumulative impact of the project on the area?	29-Nov-23	The cumulative effects assessment will be presented in the Application for an Environmental Assessment Certificate. As described in the Detailed Project Description, Section 10 Project Activities, Location and Components, the Project has been designed to reduce new disturbance and utilizes existing infrastructure, including the existing Forest Service Roads (FSR) for hauling silica sand between the Mine site and the Finishing Plant site. Additionally, the Raw Sand Plant area and the Finishing Plant site are located in cleared and highly disturbed areas. Limiting new disturbance will mitigate some potential cumulative effects from the Project. As outlined in the Draft Project Description, Section 13.3 Cumulative Effects, the Application for an Environmental Assessment Certificate will include a cumulative effects assessment where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. As noted in the Detailed Project Description, cumulative effects may result from increased disturbance on the landscape, leading to increased effects to ecosystem and wildlife habitat. Cumulative effects may also arise from overlapping demands on infrastructure and services, such as increased traffic on the North Olsson FSR or increased demand in regional services such as health and education. Project mining and processing activities have the potential to disturb both traditional and non-traditional land users, e.g., through noise and fugitive dust deposition and may interact cumulatively with other activities such as forestry in the area. Cumulative effects may also occur on Indigenous Interests such as where residual effects on traditional practices including hunting, trapping, fishing, and plant gathering interact spatially and temporally with residual effects from other projects and activities.		
IPD-LTFN-008	Early Engagement	Other	15-Nov-23		Lheidli T'enneh First Nation	Initial Project Description	We want to see a traditional Land Use Study conducted for the project area	29-Nov-23	Vitreo would appreciate an opportunity to meet with Lheidli T'enneh First Nation to discuss the preparation of a traditional land use study for the Project.		

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IPD-NFN-001	Summary of Engagement	Surface Water and Ground Water	3-Oct-23		Nazko First Nation	Initial Project Description	Potential impacts to the Fraser River watershed which may cause downstream effects to Nazko First Nation.	29-Nov-23	Vitreo acknowledges that a portion of the Project is located within the Fraser River watershed and notes that effects to both surface water and groundwater quality and quantity will be assessed in the Application for an Environmental Assessment Certificate. However, the Fraser River is 14 km downstream of the Project (as the crow flies) and no negligible effects are predicted to occur to the Fraser River from the Project.		
IPD-NFN-002	Summary of Engagement	Surface Water and Ground Water	3-Oct-23		Nazko First Nation	Initial Project Description	Concerns around usage of water and water diversion	29-Nov-23	The Application will assess potential effects on surface water and groundwater quantity, including water usage and diversion. Where adverse environmental effects are predicted, Vitreo will work with Participating Indigenous Nations, land users, and government agencies to develop appropriate mitigation measures to reduce or eliminate effects to water. The Detailed Project Description, Section 15.2 Project Water Use and Section 10 Project Activities, Locations and Components for more information on water use and diversion.		
IPD-NFN-003	Summary of Engagement	Wildlife	3-Oct-23		Nazko First Nation	Initial Project Description	Impacts to wildlife, specifically migratory birds and any species at risk	29-Nov-23	Potential effects to wildlife, migratory birds and migratory birds are described at a high level of detail in the Detailed Project Description, Section 13.1 Interactions with the Biophysical Environment. A preliminary description of mitigation measures to wildlife is included in Section 14 Mitigation Measures, Management Plans and Monitoring Plans. The Application will assess potential effects on wildlife, including migratory birds and species at risk. Where adverse environmental effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop appropriate mitigation measures to reduce or eliminate Project effects to wildlife, migratory birds and species at risk.		
IPD-NFN-004	Summary of Engagement	Climate Change	3-Oct-23		Nazko First Nation	Initial Project Description	Implications of climate change on the project and project area	29-Nov-23	Implications of climate change on the Project and Project area will be assessed in the Application for an Environmental Assessment Certificate. In particular, the water quality and water balance model will incorporate climate change into predicted future meteorological conditions. Climate change and its potential to affect the Project will also be assessed in the Application, as part of an evaluation of Effects of the Environment on the Project. A preliminary description of these effects is included in the Detailed Project Description, Section 17 Effects of the Environment on the Project.		
IPD-NFN-005	Summary of Engagement	Air Quality	3-Oct-23		Nazko First Nation	Initial Project Description	Potential impacts of dust on human health and water quality	29-Nov-23	Air quality modelling and a human health assessment will be conducted as part of the Application for an Environmental Assessment Certificate. The application will also contain a surface water quality model and associated effects assessment. Where adverse environmental effects are predicted, Vitreo will work with Participating Indigenous Nations, land users, and government agencies to develop appropriate mitigation measures to reduce or eliminate effects of dust on human health and water quality.		
IPD-NFN-006	Summary of Engagement	Wildlife	3-Oct-23		Nazko First Nation	Initial Project Description	Interest in habitat offsetting and other future mitigation measures	29-Nov-23	Where adverse environmental effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop mitigation measures, including offsetting as applicable. Mitigation measures and management plans anticipated to be required for the Project are included in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans and Monitoring Plans. This includes a description of the proposed Wildlife Management Plan.		

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IPD-EAO-001	Summary of Engagement	Water	30-Oct-23		EAO	Initial Project Description	Further Information on Fish - Discuss how mine traffic will interact with fish at Emerald and Crystal Lakes. Ensure that recreational users are kept informed of potential impacts and included in discussions relating to mitigations.	29-Nov-23	<p>Vitreo notes that the road past both Crystal and Emerald Lakes already exists as an active Forest Service Road (FSR). However, Project haul traffic may interact with fish at Emerald and Crystal Lakes through fugitive dust deposition. To evaluate this potential effect, the Application for an Environmental Assessment Certificate (the Application) will contain a dust deposition model, and mitigation measures for the two recreational sites will be developed as appropriate (e.g., a commitment to watering the FSR). It is not anticipated that the Project will affect groundwater or surface water of the two lakes; however, these potential effects will also be considered further in the Application.</p> <p>Text has been added in Section 12.2.6, Fish and Aquatic Resources, of the Detailed Project Description to address fish in the Emerald Lake and Crystal Lake recreation areas which states that the fish in the Emerald Lake and Crystal Lake recreation areas are unlikely to be affected by Mine activities because road dust control measures will be implemented as part of the Air Quality Management Plan.</p> <p>Vitreo is committed to inform stakeholders and the public on the Project. Text has been added in Section 6.3 Ongoing Engagement, of the Detailed Project Description that users of the Emerald Lake and Crystal Lake Recreation Sites will be included in ongoing engagement and discussions about the Project. Section 14, Mitigation Measures, Management Plans, and Monitoring Plans has been updated to include that the mitigation and monitoring plans required as part of the Application, as well as specific mitigation measures and monitoring requirements will be further developed through the environmental assessment process in discussions with Participating Indigenous Nations, regulators and stakeholders including users of the Emerald Lake and Crystal Lake Recreation Sites.</p>		
IPD-EAO-002	Summary of Engagement	Water	30-Oct-23		EAO	Initial Project Description	Options for Water Treatment - Provide options for water treatment system(s) if contact water from the Angus Project is anticipated to have contaminants that exceed applicable water quality guidelines. Options for water treatment system(s) must meet EML's Technology Readiness Assessment Interim Technical Guidance (August 2022) level and a Technology Readiness Level of at least 7. This level is defined as a prototype that is at planned operational level and is ready for demonstration in an operational environment.	29-Nov-23	<p>Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. At this time, Vitreo plans to use water retention ponds (i.e., sediment ponds) as the primary source of water treatment at the Mine site. These ponds will be used to reduce total suspended solids (TSS) in effluent prior to discharge. If required, additional TSS control methods such as the addition of flocculant will be considered. Early geochemical analyses and water quality baseline studies indicate that additional water treatment, such as pH adjustment or chemical addition will not be necessary to meet water quality objectives in the receiving environment. Vitreo is aware that options for water treatment system(s) must meet the Ministry of Energy, Mines, and Low Carbon Innovation's Technology Readiness Assessment Interim Technical Guidance (August 2022)¹ with a Technology Readiness Level of at least 7.</p> <p>This approach is discussed in Section 10.7.2 Alternative Means of Carrying out the Project of the Detailed Project Description.</p>		
IPD-EAO-003	Summary of Engagement	Water	30-Oct-23		EAO	Initial Project Description	Community Trust in Water Quality - Provide options and ideas for holding open dialogues with the local community and stakeholders. Provide potential options for the project's water management measures and be receptive to feedback and suggestions.	29-Nov-23	<p>Vitreo will present water management measures at future open houses, including in Bear Lake, to provide opportunities to understand the studies completed, the risk and the mitigation plans. Subject matter experts will be on hand to answer questions and explain technical aspects in plain language. Note takers will document feedback, ideas, comments and questions.</p> <p>Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. Information on water treatment alternatives is provided in Table 10.3 in Section 10.7.2 of the DPD. Comments received from water users in the area, including citizens of Bear Lake and Indigenous Nations will be incorporated into Project planning, the Application, and/or subsequent permit applications, as appropriate.</p>		
IPD-EAO-004	Summary of Engagement	Air Quality	30-Oct-23		EAO	Initial Project Description	Dust from Trucks and Processing - Provide further information on the increased hauling traffic (e.g., number and type of project specific vehicles, traffic routes, road upgrades, potential new roads etc.) and information regarding the processing of materials that may create dust.	29-Nov-23	<p>Section 11 of the Detailed Project Description includes updated details about dust emissions from trucks and processing. The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of dust from Project activities. The Project's fugitive dust sources will be described in the Detailed Model Plan that will be reviewed by the Ministry of Environment and Climate Change.</p> <p>The movement of the traffic along unpaved surfaces between the Monkman East Pit, Raw Sand Plant, and the External Waste Rock and Fines Stockpile will create fugitive dust during dry meteorological conditions. Fugitive road dust does not contain the high purity silica that is being mined but rather a mineral clay dust because the surface of the unpaved roads is covered with an aggregate material that is predominantly comprised of a mineral clay.</p> <p>The Raw Sand Plant will crush and process the quartz arenite to liberate the silica sand and separate it from the fines component. Blasted rocks will be crushed before being delivered to the Raw Sand Plant for processing and liberation. At the Raw Sand Plant, material will be crushed further, then slurried and processed in a multistage process resulting in a raw sand intermediate product. These activities have low potential to create dust emissions because the high moisture content for the blasted rock and the crushed material (e.g., a slurry) results in the dust emissions being negligible.</p> <p>Fugitive dust is also expected along the haul route between the Raw Sand Plant and the Finishing Plant. On average approximately 127 trucks per day will travel from the Raw Sand Plant to the Finishing Plant along the North Olsson FSR. On average approximately 127 trucks per day will travel from the Finishing Plant to the Raw Sand Plant along the North Olsson FSR. The trucks travelling along the North Olsson FSR will be 55 tonne side dump trailers operated by a contractor. Hauling between the Raw Sand Plant and Finishing Plant will occur approximately 300 days per year.</p> <p>Upgrades to the haul roads (i.e., the current Forest Service Roads) are currently being evaluated as part of Project planning. Additional detail will be included in the Application for an Environmental Assessment Certificate.</p>		
IPD-EAO-005	Summary of Engagement	Community Wellbeing	30-Oct-23		EAO	Initial Project Description	Community Composition - Provide a description of the nearby community's demographic makeup, ensuring disaggregated data based on key identity factors like ethnicity, gender, income, and educational attainment are noted.	29-Nov-23	<p>The Application for an Environmental Assessment Certificate will include a socio-economic baseline that will describe the nearby communities and their demographics (see Detailed Project Description Section 12.3.1 Socio-economic Setting). Gender-based analysis plus will be conducted through the assessment. Gender-based analysis plus assesses how different segments of the population may experience disproportionate effects. Data included in the socio-economic baseline and assessment will be disaggregated based on key identity factors, including Indigeneity, gender, ethnicity, income, and education, where available.</p>		
IPD-EAO-006	Summary of Engagement	Community Wellbeing	30-Oct-23		EAO	Initial Project Description	Sense of Place and Identity - Identify the project's potential interactions with the existing sense of place and identity within nearby communities through focused group interviews and/or individual interviews while considering the historical, spiritual, and cultural significance of the area to residents.	29-Nov-23	<p>Vitreo will be working with Participating Indigenous Nations to understand how the Project may affect Indigenous and Treaty rights, which will include historical, spiritual and cultural significance as stated in Section 5.4. of the Detailed Project Description.</p> <p>Vitreo is also open to discuss potential interactions with existing sense of place and identity within nearby communities should these be expressed by members of the public through engagement activities as stated in Section 6.3 of the Detailed Project Description.</p>		
IPD-EAO-007	Summary of Engagement	Community Wellbeing	30-Oct-23		EAO	Initial Project Description	Workforce Influx - Describe where workers will come from and how Vitreo will prioritize hiring locally, recognizing that an influx of workforce, especially if non-local, can disproportionately affect certain subpopulations, such as women and First Nations peoples	29-Nov-23	<p>The Application for an Environmental Assessment Certificate will include a description of where workers will come from and how Vitreo intends to hire locally. Section 10.4, Project Employment, of the Detailed Project Description has been revised to explain that Vitreo believes that the Project will be able to source the workforce from local communities in Project area including Prince George and Bear Lake. The Project does not require specialty skill sets that are not common to the regions industrial base including forestry, lumber milling and pulp, mining, heavy construction and industrial services that are located in Prince George.</p> <p>However, the Application will also provide an assessment of disproportionate effects on distinct human populations, including populations identified by gender and Indigeneity as per Section 25 of the BC Environmental Assessment Act.</p>		

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IPD-EAO-008	Summary of Engagement	Community Wellbeing	30-Oct-23		EAO	Initial Project Description	Prevention and Response to Gender-Based Violence - Provide a description of how the Project could interact with GBV both in nearby communities and within the project's workplace.	29-Nov-23	<p>Vitreo believes that the Project will be able to source the workforce from local communities including Prince George and Bear Lake. The Project does not require specialty skill sets that are not common to the regions industrial base including forestry, lumber milling and pulp, mining, heavy construction and industrial services that are located in Prince George.</p> <p>However, to acknowledge this comment Section 13 in the Detailed Project Description states that out-of-region workers who are employed by the Project may interact with the communities and have the potential to adversely affect community safety (e.g., gender-based violence) and communicable diseases. Working conditions such as shift work and potential workplace harassment or gender-based violence may contribute to adverse mental health conditions which could place additional strain on family dynamics and adverse coping mechanisms such as substance use. This potential interaction will be evaluated in more detail in the Application for an Environmental Assessment Certificate.</p> <p>Section 12 in the Detailed Project Description provides information about criminal code violation records and states that gender-based violence will be assessed and reference to the National Inquiry for Murdered and Missing Women and Girls (2019) will be included in the Community and Well-being Section of the Application for an Environmental Assessment Certificate.</p>		
IPD-EAO-009	Summary of Engagement	Community Wellbeing	30-Oct-23		EAO	Initial Project Description	Transportation of Materials - Provide alternative options to hauling by truck for the transportation of quarried materials.	29-Nov-23	<p>The Finishing Sand Plant site location has been selected to be in close proximity to an existing CN rail line. A rail load out, currently located on private land not owned by Vitreo, connects to the CN rail line in close proximity to the Finishing Plant site. This rail loadout has the potential to be used to transport silica sand to market, however, as noted above, the rail load out is located on private land and Vitreo would need to negotiate a user agreement with the current land owner. Additionally, Vitreo understands that there is a shortage of rail cars that could be used to transport silica sand to market, which may make the use of rail for transportation unfeasible in the near term. Thus, the use of rail to transport product to market is not feasible at this time; however, Vitreo plans to re-evaluate the use of rail as part of future Project planning.</p> <p>This discussion has been included in Section 10.7.2 Alternative Means of Carrying out the Project of the Detailed Project Description.</p>		
IPD-EMLI-001	Early Engagement	Other	2-Aug-23	K.Norlund (on behalf of MMO)	EMLI	Initial Project Description	EMLI notes that Vitreo asserts in the IPD that the Project will not generate tailings. The Health, Safety and Reclamation Code for Mines in BC (the Code) defines "tailings" as "the residue remaining from the preparation of a concentrate of minerals or coal". The fines waste produced during mineral processing as described in the IPD may be considered "tailings". Vitreo should provide additional information in the Detailed Project Description, prepared by a Qualified Professional, to support the assertion that the Project will not generate tailings in consideration of the definition in the Code. EMLI is available to discuss this issue should Vitreo want further clarification.	29-Nov-23	Vitreo indicated that the Project will not generate tailings and no tailings ponds will be constructed as part of the Project. Vitreo is aware of the definitions of tailings in the Health, Safety and Reclamation Code for Mines in BC, a Qualified Professional has provided additional relevant information in section 10.3.2.3 Fines Classification of the Detailed Project Description.		
IPD-EMLI-002	Early Engagement	Other	2-Aug-23	K.Norlund (on behalf of MMO)	EMLI	Initial Project Description	EMLI notes that any facility that stores tailings is a "tailings storage facility" and sections of the Code pertaining to TSFs would apply. Depending on the determination regarding the fines waste, both the fines stockpile and the in-pit storage area may be TSFs. In that case, please ensure that an up-to-date TSF Alternatives Assessment is carried out per the Application Information Requirements Template – Tailings Management Requirements for Mining Projects Undergoing an Environmental Assessment and in general accordance with the Guidelines for the Assessment of Alternatives for Mine Waste Disposal. The TSF Alternatives Assessment should include long term physical and geochemical stability as well as closure aspects. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/environmental-assessments/guidance-documents/eao-guidance-tailings-management.pdf https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal.html	29-Nov-23	Vitreo is aware of the definitions of tailings in the Health, Safety and Reclamation Code for Mines in BC and the requirement to provide a tailings storage facility alternatives assessment should a tailings storage facility be part of the Project. The Project as designed and described in the Initial Project Description, will not generate tailings and no tailings ponds will be constructed as part of the Project. Additional information, as relevant, is provided in section 10.3.2.3 - Fines Classification of the Detailed Project Description.		
IPD-EMLI-003	Early Engagement	Other	2-Aug-23	K.Norlund (on behalf of MMO)	EMLI	Initial Project Description	EMLI is interested in information on the End Land Use Plan, including reclamation and closure objectives, in the Detailed Project Description.	29-Nov-23	Information regarding End Land Use Planning, including reclamation and closure objectives are provided in section 10.3.3.1 End Land Use Planning of the Detailed Project Description.		
IPD-EMLI-004	Early Engagement	Other	2-Aug-23	K.Norlund (on behalf of MMO)	EMLI	Initial Project Description	EMLI is interested in updated information on the status of, and key findings from, baseline programs, including geochemistry, wildlife, vegetation, soils, and terrain stability, in the Detailed Project Description.	29-Nov-23	Vitreo has provided updated information on the baseline programs in section 12.2 Biophysical Environment of the Detailed Project Description. Vitreo is available to meet with the Ministry of Energy, Mines and Low Carbon Innovation to provide baseline study updates upon their request and interest.		
IPD-ENV-001	Early Engagement	Greenhouse Gas Emissions	2-Aug-23	Daisy Lilley	ENV	Initial Project Description	Project is subject to the Net-Zero New Industry Policy, which should be identified in s3.4 Policies & Agreements. This policy requires that the project achieve net-zero emissions in 2050, and develop a plan (to be approved by CAS and updated every 5-years) for how net-zero emissions will be achieved. Approval of this net-zero plan is required before an EAC can be issued.	29-Nov-23	Vitreo is aware that the Province of British Columbia is proposing to amend the Greenhouse Gas Industrial Reporting and Control Act (GGIRCA) and its regulations to implement a Net-Zero New Industry Policy. The Province of BC published an intention paper for this policy in July 2023; however, the policy is not in effect yet. As stated in section 4.4 Policies and Agreements of the Detailed Project Description, a net-zero plan, as required by this proposed policy, will be included in the Application for an Environmental Assessment Certificate if the policy is in effect at that time.		
IPD-ENV-002	Early Engagement	Air Quality	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Concerns with Air Quality for the Recreation Site and Cabin Users from the creation of dust and other particulates in air from both the increased use of road hauling (300+days per year) and from the processing plant. How will this be monitored and addressed? Comments in document indicate that the levels would be under required level for the province. However, these activities might still result in a noticeable increase for the recreational users in the area? How can this be mitigated? Can the road be re-routed farther away from the Recreation Site Camping areas?	29-Nov-23	<p>Nearby recreation sites have the potential to be affected by dust emissions caused by the Project and will be included as receptors in the air quality modelling and human health assessment during the Application for an Environmental Assessment Certificate. Fugitive dust dispersion from Project activities will be modelled. Vitreo will incorporate dust management measures into the Project planning, including the use of baghouses and vacuum systems at Finishing Plant. Additionally, water trucks or other control measures will be used to manage fugitive dust from road use, as required. A fugitive dust management and monitoring plan will be developed prior to construction as stated in the Detailed Project Description, Section 11.1 Air Emissions and described in Section 14 Mitigation Measures, Management Plans and Monitoring Plans.</p> <p>Vitreo notes that the road adjacent to the recreation sites is a public Forest Service Road and is already used by logging and other traffic. Vitreo does not plan on moving this road or constructing a new one.</p>		
IPD-ENV-003	Early Engagement	Community Well-being	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Concerns with Sound Impacts for the Recreation Site and Cabin Users from both the increased use of road hauling (300+days per year) and from the processing plant. Was mitigation to impacts by noise from plants and hauling proposed (I did not see anything in my review of the document). Can the road be moved? Will sound impact testing and mitigation be in place for the facility in terms of the impact to Emerald Lake?	29-Nov-23	<p>The Application for an Environmental Assessment Certificate will include modelling of noise effects on sensitive receptors including the recreation sites that are in the vicinity of the Finishing Plant site, including Crystal and Emerald Lake Recreation sites. Mitigation measures for potential noise effects will be included in the Application, but will include maintaining mobile equipment in good working order and avoiding idling of vehicles when practical.</p> <p>A discussion of potential noise emissions and receptors, including the recreational sites is included in the Detailed Project Description, Section 11.2 Noise Emissions.</p> <p>Vitreo notes that the road adjacent to the recreation sites is a public Forest Service Road and is already used by logging and other traffic. Vitreo does not plan on moving this road or constructing a new one.</p>		
IPD-ENV-004	Early Engagement	Freshwater Fish	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Concerns with environmental impacts for the fishery at both the Recreation Sites Emerald and Crystal (stocked lakes heavily used by recreational anglers) from both the increased use of road hauling (300+days per year) and from the processing plant. Impacts to ground water and surface water entering the stocked lakes. Technical requirements information to be reviewed by biologists.	29-Nov-23	Vitreo notes that the road past both Crystal and Emerald Lakes already exists as an active Forest Service Road (FSR). A dust deposition model will be included as part of the Application for an Environmental Assessment Certificate, and mitigation measures for the two recreational sites will be developed as appropriate (e.g., a commitment to watering the FSR). It is not anticipated that the Project will affect groundwater or surface water of the two lakes; however, these potential effects will also be considered further in the Application.		

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ID#	Stage	Subject - EA Topic	Comment/Issue Date	Comment Author	Comment Organization	Application/Document	Participant Issues, Description or Comment	Response Date	Vitreo Response	Status	Response
IPD-ENV-005	Early Engagement	Wildlife	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Concerns with impacts to wildlife in area and human wildlife interactions increasing with displacement of wildlife (bears specifically) from the industrial areas into the Recreational Area. This location already has some wildlife human interaction concerns and a busy hauling corridor on the backside of the site and the Hwy on the other side may result in increased traffic through the recreation area. How will impacts to bears be mitigated?	29-Nov-23	There will be no "increased traffic through the recreation area" since the haul route does not travel through any of the recreation sites or provincial parks in the area (i.e., Emerald Lake Recreation Site, Crystal Lake Recreation Site, Crooked River Provincial Park). The nearest haul route to a recreation area is along the existing 2800 Forest Service Road, which is approximately 400 m east of the Emerald Lake Recreation Site. As part of the Application for an Environmental Assessment Certificate, Vitreo will investigate current traffic patterns on the 2800 Forest Service Road and assess potential project effects on wildlife of increased traffic on this haul route. As well, specific mitigation measures designed to avoid and reduce Project-related displacement of bears and other wildlife will be developed and implemented through the Wildlife Management Plan. Vitreo would be interested to know specifically what human-wildlife interactions are currently occurring at these recreation sites, so we can better plan our mitigation measures. Any information you can provide on this matter would be greatly appreciated. Vitreo looks forward to working with local communities to develop wildlife mitigation strategies designed to avoid and reduce potential Project effects on wildlife and wildlife habitats.		
IPD-ENV-006	Early Engagement	Community Well-being	10-Aug-23	Karen Mohr	ENV	Initial Project Description	A local cabin owner association is based on Crystal Lake and should be consulted as they have long-term leases and a vested interest in the 20 year impacts this project might have on their cabin usage/ enjoyment. Contact info: crystallakerecreationsociety@gmail.com; rmartin@slrconsulting.com	29-Nov-23	Comment noted. An invitation for the Open House and Virtual Information Session was sent to crystallakerecreationsociety@gmail.com on August 18, 2023 and to rmartin@slrconsulting.com on August 31, 2023. A summary of engagement methods and activities is provided in section 6.1 Pre-Early Engagement and Early Engagement of the Detailed Project Description.		
IPD-ENV-007	Early Engagement	Vegetation	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Vegetation removal and widening of the road corridor (as suggested it is planned for) will encroach on the established recreation site (Emerald Lake) and require a s. 16 Authorization under the Forest Recreation Regulations. Removal of vegetation will impact the wildlife, ground and surface water and fisheries concerns already listed. The work may impact the vegetation buffer in place for the recreational camping area.	29-Nov-23	Upgrades to existing forest service and access roads are being considered as a part of Project planning, however the location and extent of any upgrades has not yet been determined. This information will be included in the Application for an Environmental Assessment Certificate.		
IPD-ENV-007	Early Engagement	Air Quality	8-Aug-23	Gavin King	ENV	Initial Project Description	Please provide a map identifying the location the Meteorological station	29-Nov-23	Vitreo has included figure 12.1 in the Detailed Project Description showing the location of the Project's meteorological station along with the Initial Project Description Issues Tracking Table responses.		
IPD-ENV-008	Early Engagement	Surface water	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Concerns with environmental impacts for the fishery at both the Recreation Sites Emerald and Crystal (stocked lakes heavily used by recreational anglers) from both the increased use of road hauling (300+days per year) and from the processing plant. Impacts to ground water and surface water entering the stocked lakes.	29-Nov-23	The Application for an Environmental Assessment Certificate will include an evaluation of interactions of Project components and activities, including the use of the Forest Service Road for hauling activities and the components and activities at the Finishing Plant. Where adverse environmental effects are predicted, Vitreo will work with Indigenous Nations, land users, and government agencies to develop mitigation measures.		
IPD-ENV-009	Early Engagement	Community Well-being	10-Aug-23	Karen Mohr	ENV	Initial Project Description	Large industrial projects in the vicinity of Recreation Sites have often resulted in unauthorized use for temporary residence by commercial or industrial operators; contractors etc... causing conflict with local residents and local recreational users.	29-Nov-23	Comment noted. The Application for an Environmental Assessment Certificate will assess potential effects on land use, including on the recreation sites located close to the Project and within the study area for the effects assessment. The Project, once constructed, will comply with approval conditions and applicable regulations. Vitreo is interested in understanding how local residents and local recreational users would like to be engaged and kept informed of the Angus Project. Vitreo will keep schedules and contact information available publicly on its website vitreominerals.com.		
IPD-ENV-010	Early Engagement	Permitting	10-Aug-23	Karen Mohr	ENV	Initial Project Description	A section 16 under the Forest recreation regulation is required for any works overlapping a Recreation Site and any consultation occurring should include this fact when speaking with First Nations or other stakeholders.	29-Nov-23	Comment is acknowledged. The Project is not expected to overlap with a Recreation Site.		
IPD-ENV-011	Early Engagement	Consultation and Engagement	10-Aug-23	Karen Mohr	ENV	Initial Project Description	A section 16 under the Forest recreation regulation is required for any works overlapping a Recreation Site and any consultation occurring should include this fact when speaking with First Nations or other stakeholders. The Crystal Lake Community Association should be contacted for direct engagement as the Partnership Agreement group that works with Recreation Sites and Trails on the management of this site.	29-Nov-23	The Project is not expected to overlap a Recreation Site. Vitreo has contacted the Crystal Lake Community Association to provide information about the Project, ways to learn more about the Project, and to provide feedback. Project information will be available publicly on the vitreominerals.com website. Unless otherwise advised, Vitreo will provide the Crystal Lake Community Association Project information, updates, schedules and contact information through emails to crystallakerecreationsociety@gmail.com.		
IPD-ENV-012	Early Engagement	Culture	10-Aug-23	Karen Mohn	ENV	Initial Project Description	The recreation sites located in this vicinity are heavily used by the recreating public for fisheries; berry picking; boating (motorized and non- restrictions on Emerald); camping; picnicking; wildlife viewing etc... The impacts of dust, noise etc.. that may occur due to the close proximity of the road is of concern.	29-Nov-23	The Application for an Environmental Assessment Certificate will assess potential effects on land use, including on the recreation sites located close to the Project and within the study area for the effects assessment. The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of dust from Project activities as well noise modelling that will assess noise effects from the Project. Vitreo appreciates the local knowledge provided in this comment and will provide Crystal Lake Community Association Project information, updates, schedules and contact information through emails to crystallakerecreationsociety@gmail.com.		
IPD-ENV-013	Early Engagement	Surface Water	3-Aug-23	Nicole Obee	ENV	Initial Project Description	Please provide a map showing the surface water quality sampling locations (n=16 stream sites and n=2 lake sites), the benthic invertebrate sampling locations, the sediment sampling locations, and the fish survey locations.	29-Nov-23	Vitreo has included figures 12.5 to 12.10 in the Detailed Project Description showing surface water quality sampling locations, the benthic invertebrate sampling locations, the sediment sampling locations, and the fish survey locations.		
IPD-ENV-014	Early Engagement	Surface Water	3-Aug-23	Nicole Obee	ENV	Initial Project Description	Please describe the lake sampling methodology as well as timing and frequency.	29-Nov-23	Vitreo has provided details of the lake sampling methodology, including timing and frequency, in section 12.2.5 Surface Water Quantity and Quality of the Detailed Project Description. These details will also be included in the Technical Data Report that will be submitted with the Application for an Environmental Assessment Certificate.		
IPD-ENV-015	Early Engagement	Other	3-Aug-23	Nicole Obee	ENV	Initial Project Description	Was CABIN sampling methodology used for the benthic invertebrate sampling? If not, please describe and justify the alternate method chosen.	29-Nov-23	The CABIN sampling methodology was used for benthic invertebrate sampling. This information has been included in section 12.2.6.1 Fish and Aquatic Resources Methods of the Detailed Project Description.		
IPD-ENV-016	Initial Project Description	Freshwater Fish	3-Aug-23	Nicole Obee	ENV	Initial Project Description	Was fish tissue sampled for metals analysis? If so, please describe the location, number of samples, and species. If not, please consider sampling this endpoint as per the Water and Air Baseline Monitoring Guidance Document for Mining Proponents and Operators	29-Nov-23	Yes, fish tissue was sampled from Rainbow Trout and Slimy Sculpin. Rainbow Trout were sampled at seven sites, with eight samples per site at six sites and four and six samples at the other two sites. Slimy Sculpin were sampled at two sites (n=8 and n=1). Two sites in Olsson Creek watershed, two sites in Angusmac Creek watershed and three sites in Giggler Creek watershed. This information has been included in Section 12.2.6.1.8 Fish Tissue in the Detailed Project Description.		
IPD-ENV-018	Early Engagement	Air Quality	8-Aug-23	Gavin King	ENV	Initial Project Description	Please provide a map identifying any sensitive receptors around the project location, this includes but it not limited to: Homes, recreational areas, sensitive environments and traditional gathering areas	29-Nov-23	Vitreo has included figure 10.1 with the Detailed Project Description showing the location of known sensitive receptors around the Project location, including recreational areas.		
IPD-ENV-019	Early Engagement	Air Quality	8-Aug-23	Gavin King	ENV	Initial Project Description	Please provide details on the meteorological station including: instrumentation, siting considerations and QA/QC methodology including data capture by quarter	29-Nov-23	The information requested regarding the meteorological station and associated instrumentation, siting considerations and QA/QC methodology is included in the Detailed Project Description, Section 12.2.1 Atmospheric Environment.		
IPD-ENV-020	Early Engagement	Air Quality	8-Aug-23	Gavin King	ENV	Initial Project Description	Please provide a complete emissions inventory for both construction and operations phases, including fugitive emissions, grain sizes should also be identified for particulate matter emissions. Additionally, discuss any potential environmental or health risks.	29-Nov-23	Vitreo is currently advancing Project planning, and the requested detail is not yet available. An emissions inventory for the construction and operation phases, including fugitive emissions and grain sizes, will be included in the Application for an Environmental Assessment Certificate. A preliminary understanding of environmental and health effects of fugitive dust emissions is included in the Detailed Project Description, Section 13 Project Interactions.		

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IPD-ENV-021	Early Engagement	Air Quality	8-Aug-23	Gavin King	ENV	Initial Project Description	Please provide a complete description of the facilities and any pollution control works that will be constructed at either the mine site and finishing plant area. A preliminary understanding of pollution control works is included in the Detailed Project Description, Section 11.1 Air Emissions and Section 14 Mitigation Measures, Management Plans and Monitoring Plans.	29-Nov-23	Vitreo is currently advancing Project planning, and the requested detail is not available at this time. A description of the facilities and pollution control works that will be constructed for the Project, will be included in the Application for an Environmental Assessment Certificate.		
IPD-ENV-022	Early Engagement	Air Quality	8-Aug-23	Gavin King	ENV	Initial Project Description	Please provide a completed fugitive dust management plan for the proposed project, this should include both the mining location, the haul route and the finishing plant area.	29-Nov-23	Vitreo is currently advancing Project planning and is still evaluating how fugitive dust will be managed. Details surrounding fugitive dust management will be included in the Application for an Environmental Assessment Certificate. A detailed Fugitive Dust Management Plan will be developed during the Project's permitting phase. An Air Quality Management Plan is included in section 14 Mitigation Measures, Management Plans and Monitoring Plans of the Detailed Project Description.		
IPD-ENV-023	Early Engagement	Permitting	8-Aug-23	Chris Garda	ENV	Initial Project Description	Table 3.1 identifies that a waste discharge permit for effluent may be required. Effluent discharged to the environment (to surface water or groundwater) via point or non-point source discharge will require authorization under the Environmental Management Act (EMA).	29-Nov-23	Comment is acknowledged. Table 4.1 Anticipated Provincial Permits, Licenses and Authorizations has been updated in the Detailed Project Description to clarify that an authorization under the Environmental Management Act will be required for effluent discharged to the environment (to surface water or groundwater) via point or non-point sources.		
IPD-ENV-024	Early Engagement	Other	8-Aug-23	Chris Garda	ENV	Initial Project Description	Please ensure that the future submission of the detailed project description includes information on how sewage and non-hazardous solid waste will be handled and disposed of. This information is required to determine if EMA authorization is required for the landfilling of waste or registration under the Municipal Wastewater Regulation.	29-Nov-23	Vitreo is currently progressing Project planning, and is still evaluating how sewage and non-hazardous solid waste will be handled and disposed of for the Project. Vitreo is aware of potential need for authorizations under the <i>Environmental Management Act</i> for landfilling of waste, as well as registration under the Municipal Wastewater Regulation. Vitreo looks forward to working with BC Ministry of Environment to define these requirements during the permitting phase of the Project, and has updated Table 4.1 Anticipated Provincial Permits, Licenses and Authorizations in the Detailed Project Description to include these potential authorizations and registrations.		
IPD-ENV-025	Early Engagement	Other	8-Aug-23	Chris Garda	ENV	Initial Project Description	Throughout the project hazardous waste must be stored and handled in accordance with the BC Hazardous Waste Regulation.	29-Nov-23	Comment is acknowledged. This information is included in section 11.4 Waste of the Detailed Project Description.		
IPD-ENV-026	Early Engagement	Surface Water	8-Aug-23	Chris Garda	ENV	Initial Project Description	The initial project description identifies sediment ponds as the only water/effluent treatment at the Mine Site and Finishing Plant locations and that some sediment ponds may have periodic discharge to surface water. Please provide information if any other effluent treatment process is being proposed, i.e. flocculant addition, water treatment plant. If effluent/contact water being discharge to the environment is anticipated to have concentrations of parameters that meet the threshold of a Parameter of Concern, typically those that exceed a BC Water Quality Guideline or BC working water quality guideline, a suitable effluent treatment system should be proposed with the project. Refer to the ENV Parameters of Concern Fact Sheet, February 2019, for further information.	29-Nov-23	Water management system design for the Project is currently being progressed. At this time, the primary effluent treatment / mitigation measure for Project contact water is the use of sedimentation ponds. The implementation of additional mitigation measures, including the potential addition of flocculant, is still being evaluated. Vitreo does not anticipate that a water treatment plant will be required to meet relevant receiving water quality guidelines. This information is included in Table 10.3 Project Alternative Means of the Detailed Project Description.		
IPD-ENV-027	Early Engagement	Groundwater	15-Aug-23	Johanna Wick	ENV	Initial Project Description	Non-point source discharge to ground should be considered and included as a component.	29-Nov-23	Non-point discharge to ground will be assessed as a pathway to the receiving environment as part of the groundwater valued component in the Application for an Environmental Assessment Certificate.		
IPD-ENV-028	Early Engagement	Surface Water	2-Aug-23	Anna Akkerman	ENV	Initial Project Description	IPD sufficient for this stage in the process. Looking forward to receiving more information about the climate and hydrology baseline monitoring programs in the DPD, specifically the location of monitoring stations, parameters monitored and frequency of monitoring.	29-Nov-23	Comment is acknowledged. More information on the Project's baseline monitoring programs, including the climate and hydrology baseline monitoring programs is provided in section 12.2.1 Atmospheric Environment and section 12.2.5 Surface Water Quantity and Quality of the Detailed Project Description. This information includes the location of monitoring stations, parameters monitored and the frequency of monitoring.		
IPD-ENV-029	Early Engagement	Modelling	10-Oct-23	Johanna Wick	ENV	Initial Project Description	The primary purpose of implementing a numerical groundwater model is to enhance the understanding of the groundwater system dynamics and facilitate the prediction of changes at the project site. This understanding allows the proponent to assess potential risks and impacts and provides mitigative strategies. Provided the Angus team can develop an understanding of the groundwater system and successfully fulfill the modelling objectives through alternative means, it is reasonable to proceed without a numerical model. However, at a minimum, a robust conceptual model needs to be developed. The conceptual model should include all essential elements typically found in such models, including analytical techniques to quantify pit inflows/dewatering rates, seepage analysis (if relevant), and groundwater fluxes, as well as characterization of the groundwater surface water interactions. Additionally, the model should include uncertainties and recommendations about how future monitoring will address the uncertainties.	29-Nov-23	Comments are acknowledged. As Stantec continues to develop the conceptual model of groundwater baseline conditions at the Project, we will evaluate, including consideration of your comments, whether numerical or analytical models will be most appropriate to predict the potential affect of various mine components.		
IPD-FOR-001	Early Engagement	Other	18-Aug-23	SRacicot	FOR	Initial Project Description	Run-off water will be collected in four sediment ponds for use in processing. If the sediment ponds will collect any water from groundwater sources or diverted from streams or wetlands, a water authorization will be required. Often sediment ponds/dugouts require groundwater authorizations as they easily intercept groundwater unless lined with impermeable material.	29-Nov-23	Comment is acknowledged. While the design of the sediment ponds is currently being advanced, this information on a potential permitting requirement for the Project has been included in section 4.2 Other Authorizations Required of the Detailed Project Description.		
IPD-FOR-002	Early Engagement	Other	18-Aug-23	SRacicot	FOR	Initial Project Description	(Page 55 of IPD, 11.2 Project Water Use) Bullet #3 (Groundwater) describes "Surface water, water recycling and run-off water may not provide sufficient water for the process..." Surface water was not previously listed in this section as a source of water for processing. If surface water (i.e. from streams, lakes or wetlands) is proposed to be used a water authorization will be required.	29-Nov-23	Comment is acknowledged, this potential authorization is included in the Detailed Project Description, Table 4.1 Anticipated Provincial Permits, Licenses and Authorizations.		
IPD-FOR-003	Early Engagement	Surface Water	18-Aug-23	SRacicot	FOR	Initial Project Description	More information on possible diversion of waterbodies and watercourse crossings is needed for me to provide comment. From the maps in the IPD I can see that proposed infrastructure overlaps a number of streams and waterbodies. In general, avoiding streams and waterbodies reduces regulatory requirements such as offsetting.	29-Nov-23	Comment is acknowledged. Vitreo is currently advancing Project planning; mitigating potential effects to existing water bodies is a key consideration in the planning process.		
IPD-FOR-004	Early Engagement	Surface Water	18-Aug-23	SRacicot	FOR	Initial Project Description	Table 10.1 "Construction of additional facilities, including Explosives Storage Area, Natural Gas Pipeline and Transmission Line" could have potential to impact aquatic resources. The pipeline may have stream crossings that will need to be planned.	29-Nov-23	Comment is acknowledged. Vitreo is currently advancing Project planning; mitigating potential effects to existing water bodies is a key consideration in the planning process.		
IPD-FOR-005	Early Engagement	Surface Water	18-Aug-23	SRacicot	FOR	Initial Project Description	Table 10.1 note that "Vehicle traffic" under Construction is rated as not impacting Aquatic Resources and "Vehicle traffic" under Operations is rated as impacting Aquatic Resources. This may be an error.	29-Nov-23	Comment is acknowledged and this update is incorporated in Table 13.1 Biophysical Environment Interactions Matrix of the Detailed Project Description.		
IPD-FOR-006	Early Engagement	Permitting	17-Aug-23	Erin Lindberg	FOR	Initial Project Description	Additionally to the RUP you hold for use of the Forest Service Road (FSR) 5506 03, you will require a Road Use Agreement (RUA) with Canfor for Road permits (RP) off the end of the FSR - R08925A/R06943AA/BB etc.	29-Nov-23	Comment is acknowledged. A Road Use Agreement (RUA) with Canfor for Road Permits is identified in Table 4.1 Anticipated Provincial Permits, Licenses and Authorizations of the Detailed Project Description as required.		
IPD-FOR-007	Early Engagement	Permitting	17-Aug-23	Erin Lindberg	FOR	Initial Project Description	Will require an OLTC for the Raw Sand Plant & Finishing Plant sites, and the Transmission RoW(s) for the removal of any brush, regen or merchantable timber. The OLTC issued in 2023 (L52305) only provides cutting within the Mines Permit area for a total of 7.24 ha for exploration purposes. First right of refusal for timber must be offered to Canfor from area within their Tree Farm Licence (TFL30). Follow the Spruce Beetle hauling and storage monitoring plan. Please provide 6 months advance application for this licence to cut.	29-Nov-23	Comment is acknowledged. The requirement to obtain an Occupant License to Cut (OLTC) for the Mine site, Finishing Plant site and other areas to be cleared as part of the Project is clarified in Table 4.1 Anticipated Provincial permits, Licenses and Authorizations of the Detailed Project Description. Vitreo intends to submit the application for the OLTC as a consolidated package along with other Project permit applications including the Joint <i>Mines Act / Environmental Management Act</i> Permit application.		
IPD-FOR-008	Early Engagement	Community Well Being	17-Aug-23	Erin Lindberg	FOR	Initial Project Description	Safety consideration for the commuting requirement of staff.	29-Nov-23	Comment is acknowledged. Vitreo will use a shuttle bus to transport workers to and from the Project. Information regarding safety considerations for commuting staff is included in section 16 Public, Worker, and Environmental safety of the Detailed Project Description.		
IPD-FOR-009	Early Engagement	Vegetation	17-Aug-23	Erin Lindberg	FOR	Initial Project Description	Proximity to classifiable wetlands in the project area; is this where the water will be sourced from; are there remediation plans?	29-Nov-23	Classifiable wetlands, including those that are blue-listed by the British Columbia Conservation Data Centre, exist in the proximity to the Mine site and Access Road areas and may have the potential to be affected by the Project. No federally-listed wetlands occur in proximity to the Project or have the potential to be affected by the Project. Additional information on wetlands, including listed wetlands, is included in section 12.2.8 Vegetation and Wetlands of the Detailed Project Description. Vitreo is currently progressing Project planning, including an evaluation of water sources for Project needs, although currently there is no plan to source water from wetland sources. If it is ultimately determined that Project water was to be sourced from wetlands, effects to those wetlands would be evaluated and potential remediation plans considered at that time. Information on Project water sourcing is included in section 15.2 Project Water Use of the Detailed Project Description.		

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IPD-FOR-010	Early Engagement	Other	17-Aug-23	Erin Lindberg	FOR	Initial Project Description	Communication will be required with forest tenure holder (Canfor) regarding disturbance of regenerating cutblocks and impacts to wildlife tree retention areas within the project area.	29-Nov-23	Comment is acknowledged.		
IPD-MAF-001	Early Engagement	Other	16-Oct-23	Karen Tabe	AF	Initial Project Description:	A preliminary review of the proposal identified that the proposed development and infrastructure are outside of the Agriculture Land Reserve. There is no apparent evidence of adjacent agriculture. Project is planned on drumlinized landscape. Soils are Averil and Dominion, occurring on bedrock ridges and steep slopes covered by a shallow mantle of glacial till. The land forms are NE trending glacial grooves and ridges associated with basal till drumlines. At this preliminary stage of review, there are no apparent or identified impacts to agriculture. However, a thorough assessment from a QP (Professional Agrologist) may be necessary at a later date to identify potential impacts to agriculture. The Ministry of Agriculture and Food do not have the capacity or resources to complete such an assessment.	29-Nov-23	Comment is acknowledged.		
IPD-MOTI-001	Early Engagement	Infrastructure and Services	28-Sep-23	Shaun Holahan	MOTI	Initial Project Description	Interested in the plan for accessing on/off the highway both during construction and after. Items like vehicled per day, for both phases would help MoTI understand if there's operational concerns where the FSR meets the highway.	29-Nov-23	As part of advancing engineering and Project design, Vitreo will look at traffic and different options for the highway intersection. Vitreo is committed to work with MoTI to discuss these options and to incorporate MoTI's guidance into the Project design. The Detailed Project Description contains preliminary information on access and Project vehicle volume in section 10.7 Alternatives To and Alternative Means of Carrying Out the Project in the Detailed Project Description.		
IPD-MUNI-001	Early Engagement	Consultation and Engagement	3-Aug-23	Catherine Lee	MA	Initial Project Description	Pages 3, 17 and 18 mention outreach and engagement with municipalities. Will outreach and engagement be extended to the Regional District of Fraser-Fort George also? If not, why not? And if yes, please note that in the IPD. Suggest either adding in "regional district" or using the term "local governments" to encompass both municipalities and regional districts.	29-Nov-23	Vitreo has completed outreach and a meeting with the Regional District of Fraser-Fort George (RDFFG) as outlined in Section 8.3.3 of the Engagement Plan. As stated in Section 4.4 of the Initial Project Description, Vitreo will also engage municipalities, government agencies, stakeholders, and the general public during the Early Engagement phase. Reference to engaging with local government agencies including the RDFFG is included in section 6.0 Municipalities, Government Agencies, Stakeholders and General Public of the Detailed Project Description.		
IPD-NH-001	Early Engagement	Human Health	18-Aug-23	A. Huang	NH	Initial Project Description	We attach a document titled "Northern Health Cover Letter" which describes the purpose of Northern Health's participation in the Environmental Assessment, summarizes our areas of interest, and provides the documents we expect Vitreo to read and follow throughout the Environmental Assessment application process.	29-Nov-23	Vitreo has noted the information provided in the cover letter, including the recommended guidance documents. Vitreo looks forward to engaging Northern Health on the Project and is open to meet with Northern Health to provide further information about the baseline data collection and methodology for the assessment as the Project progresses.		
IPD-NH-002	Early Engagement	Air Quality	18-Aug-23	A. Huang	NH	Initial Project Description	The raw sand will be stockpiled next to the Raw Sand Plant; the raw sand will be trucked from the Raw Sand Plant to the Finishing Plant year-around; the final sand will be stored in on-site silos at the Finishing Plant before being trucked to market locations. Please describe the estimated emissions and impacts on the environment/human health of fugitive dust emitted from transport truck (road dust, raw sand and final sand in the trucks on the roads), raw sand stockpiles, and final sand silo storage as well as the practices planned to be used to manage fugitive dust. Since Vitreo has been operating Moberly Mine and plant for years, it would be beneficial for us to know the scale of fugitive dust emitted from the operations of Moberly Mine and plant (how much it may be at the scale of the Angus Project), how the fugitive dust has been managed, how do you monitor fugitive dust and how do you manage and whether the same practices or part of these practices will be applied for the Angus Project. Lastly, I understand a Fugitive Dust Management Plan and an Air Quality Assessment Report will be developed for the Angus Project if it proceeds successfully. I'd like to clarify that I'm not requesting a full plan nor assessment report at this stage but want to gather more information to facilitate the review.	29-Nov-23	Air quality emissions will be assessed as part of the Application for and Environmental Assessment Certificate. Additional information about the expected emissions from different Project components will be provided as part of the air quality dispersion modelling and human health risk assessments. The air quality dispersion modelling will follow the latest available version of the BC Air Quality Dispersion Modelling Guideline. In addition, it is standard practice to submit a draft Dispersion Modelling Plan to the Ministry of Environment and Climate Change for review and comment before the modelling begins. This information is forthcoming as part of the assessment and will be shared for comment and review at that time. At the Moberly operation, a GRIMM EDM-180 air quality monitoring station is used to continuously collect measurements on total suspended solids and particulate matter less than 10 microns (PM10). This data is managed by a third party and submitted annually to the Ministry of Environment and Climate Change. Vitreo anticipates implementing a similar program for the Angus project utilizing current best practice as directed by the Ministry of Environment and Climate Change. Dust fall monitoring is not currently being implemented because the BC Ministry of Environment and Climate Change has deemed that the dust fall monitoring method is outdated, and no longer recommends it as part of environmental baseline studies. Information pertaining to Project air quality emissions is included in section 11.1 of the Detailed Project Description. Additionally, an Air Quality Management Plan is included in section 14 Mitigation Measures, Management Plans and Monitoring Plans of the Detailed Project Description.		
IPD-NH-003	Early Engagement	Other	18-Aug-23	A. Huang	NH	Initial Project Description	Could you describe what does "40/70" mean, what are the size (in millimeter or micrometer) of "40/70 mesh silica sand" and "Tier 1-quality silica sand"? Are "40/70 mesh silica sand" and "Tier 1-quality silica sand" the same type of silica sand? Will the Angus Project produce other types of silica sand and what are their sizes? Excess materials include "fines", what is "fine" and its size?	29-Nov-23	Please see responses to your comment as follows: 1. Tier 1 is an industry term to identify top quality sand. Performance based on factors such as compressive strength, size distribution, conductivity and permeability determine the sand quality. 2. 40/70 are mesh sizes, a chart indicating size is attached (file name: 0056_mesh_size_chart.pdf). For reference, a sand to produce concrete would be mesh sizes 3 through 200. 3. The plant is designed to produce the following products: a. 30/50 mesh b. 40/70 mesh c. 70/140 mesh d. Fine material <140 mesh This information is included in section 1.2 Project Overview and shown in photos 1.2 and 1.3 of the Detailed Project Description		
IPD-NH-004	Early Engagement	Consultation and Engagement	18-Aug-23	A. Huang	NH	Initial Project Description	I'd like to remind Vitreo that you will need approval/permit/authorization from Northern Health Authority if you conduct certain activities (e.g., operate an industrial camp, install and use a sewage holding tank, construct and operate a drinking water system, and so on). It may be too early to think of and decide on these operational details but I recommend you to connect with us when you doubt whether you need any approval/permit/authorization from Northern Health Authority. We can provide more information or direct you to the right team/person.	29-Nov-23	Comment is acknowledged. As Project planning advances, Vitreo anticipates working with Northern Health to better determine approval, permit and authorization requirements.		
IPD-NH-005	Early Engagement	Other	18-Aug-23	A. Huang	NH	Initial Project Description	"Stockpiled material at the Finishing Plant site will be processed at the Finishing Plant 335 days per year." What is the "stockpiled material at the Finishing Plant"? Is it the raw sand hauled from the Raw Sand Plant and then stockpiled near the Finishing Plant? Will you use the same practices of managing raw sand stockpiles at the Raw Sand Plant to manage stockpiled material at the Finishing Plant? Could you also describe these practices briefly?	29-Nov-23	Yes, the material stockpiled at the Finishing Plant site is the same material as at the Raw Sand Plant, a wet (~3-5% moisture by weight) silica sand. Equipment such as conveyors, front end loaders, dozers, etc. will be used to physically manage the stockpile size and location. During warmer months, sprinklers and other equipment will be used to maintain a moisture level required to reduce or eliminate the risk of fugitive dust from the stockpile.		
IPD-NH-006	Early Engagement	Community Wellbeing	18-Aug-23	A. Huang	NH	Initial Project Description	"Vitreo does not intend to construct and operate a camp at the Project site and assumes a workforce will be sourced primarily from local communities traveling to and from site on a daily basis." We appreciate the local hiring policy, but expect you can explain what resources (e.g., interview, survey, literature review etc.) used to support the conclusion that workforce can be sourced primarily from local communities, especially whether workers with specialized skills can also be sourced from local communities. In addition, could you clarify what are the local communities you refer to? Though we also hope all workforce can be from local (e.g., Prince George, Bear Lake) but there is chance some workers may be from other areas (e.g., other areas of BC, other provinces or even other countries). Therefore, you may need to provide accommodation for non-local workers and we'd like to hear your thoughts on the type of accommodation you plan to provide. In addition, please provide your estimated number and ratio of local workers and non-local workers; for non-local workers, what are the areas of origin (i.e., regional health authority, the province, Canada, and out of country) they may come from. Please also provide the estimated number and ratio of temporary and permanent workforce and the number and ratio of contractors and direct employees. All this information is important to consider when assessing impacts on health and emergency services, community well-being, human health and identifying applicable mitigations.	29-Nov-23	As stated in section 10.4 Project Employment in the Detailed Project Description, the size of the workforce for construction and operation is currently estimated to be approximately 150 persons for the Construction phase, 140 for the Operation phase, and 50 persons for the Reclamation and Closure phase. The Project is currently in the planning phase and further details regarding the workforce composition will become available and described in the Application for an Environmental Assessment Certificate. Human Health and Wellbeing is proposed as Valued Component in the assessment. At this point and time, Vitreo is not planning to accommodate workers onsite but assumes workers are employed along the Project transportation route and are transported to site on a daily basis.		

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IPD-NH-007	Early Engagement	Community Wellbeing	18-Aug-23	A. Huang	NH	Initial Project Description	"The Emerald Lake Recreation Site and the Crystal Lake Recreation Site are the closest recreation sites to the Finishing Plant area." Have you done any ground truth to verify whether there are permanent residents living in either site or just seasonal, recreational land users? If not, do you plan to do ground truth? Are both sites close enough to be affected by any potential dust events originating from the Finishing Plant?	29-Nov-23	As stated in Section 10.1 Project Location in the Detailed Project Description, the Emerald Lake Recreation Site and the Crystal Lake Recreation Site are located approximately 1 km from the Finishing Plant location (measured as a straight line). Fugitive dust emissions from the Finishing Plant and use of the access road have the potential to affect users of these two recreational sites. Within the Application for an Environmental Assessment Certificate, the air quality modelling and air quality effects assessment will include these two recreation sites as receptors. A site visit has been conducted to review the recreation sites in August 2023. Land use baseline data collection is ongoing and information about residential users of the recreational sites will be included in the baseline reporting as available. Desktop research for the Recreation Sites and Trails BC website indicates that Crystal Lake is operated by the Crystal Lake Recreation Society and only provides three day-use areas (there is no camping provided at this site), so there are no permanent residences expected. Desktop research on Emerald Lake from the Recreation Sites and Trails BC website indicates that Emerald Lake, also operated by the Crystal Lake Recreation Society, provides five camping sites. While Vitreo expects these to be seasonal sites for recreational land users and not permanent resident locations, further follow up will be made with the Crystal Lake Recreation Society, as part of key person interviews and baseline data collection.		
IPD-NH-008	Early Engagement	Community Wellbeing	18-Aug-23	A. Huang	NH	Initial Project Description	"Mine staff are expected to be able to live in either community and commute daily to site." For non-local workers who don't live in either community originally but have to re-locate to either community (if you decide not to house them in any camp), your assessment needs to consider the potential impacts to local housing market, rental market and health and emergency services as well as how some sub-populations (e.g., new immigrants, women) can be disproportionately affected through Gender-based analysis plus. Lastly, since workers are expected to commute daily, the potential impacts on the transportation infrastructure as well as health and emergency services (due to potential vehicle accidents) should also be considered.	29-Nov-23	Comment is acknowledged. The Application for an Environmental Assessment Certificate will consider potential effects on infrastructure and services, which will include potential effects on the local housing market, rental market, health and emergency services, and transportation infrastructure. The Application will also consider disproportionate effects on distinct human populations, including populations identified by Indigeneity and gender.		
IPD-NH-009	Early Engagement	Air Quality	18-Aug-23	A. Huang	NH	Initial Project Description	Four sources of dust are listed: blasting during mining operation, crushing at the Raw Sand Plant, drying at the Finishing Plant, and road traffic on the FSRs. Except these sources, how about dust from stockpiles near the Raw Sand Plant and Finishing Plant and dust from road traffic on the highway? Could you explain why both dust sources are not listed? Lastly, what type of air pollutants (e.g., PM2.5, PM10, NO2) will be emitted from the construction and operations and will be included in the air quality assessment?	29-Nov-23	Fugitive dust from the Project stockpiles near the Raw Sand Plant, drying at the Finishing Plant and traffic along unpaved Forest Service Roads (FSRs) will be included in the air quality dispersion modeling and assessment in the Application for an Environmental Assessment Certificate. The full list of dust sources will be included in the Project's Dispersion Modelling Plan that will be submitted to BC Ministry of Environment and Climate Change Strategy for review and comment before the modelling begins. The Dispersion Modelling Plan will follow the guidance listed in the latest version of the BC Air Quality Dispersion Modelling Guideline. The Dispersion Modelling Plan will include the list of air pollutants (Criteria Air Contaminants or CACs) that will be emitted during construction and operation of the Project. The CACs will include TSP, PM10, PM2.5, NO2, SO2 and CO. This information has been included in section 11.1 Air Emissions of the Detailed Project Description.		
IPD-NH-010	Early Engagement	Air Quality	18-Aug-23	A. Huang	NH	Initial Project Description	"Fugitive dust associated with mining and crushing during operation will likely be the most visible air emission and potential concern to land users, however, the remoteness of the Monkman East Pit and Raw Sand Plant may limit the interaction of air emissions with potential receptors." Could you explain why fugitive dust associated mining and crushing during operation will likely be the most visible air emission and potential concern to land users? What are the resources and rationales you use to make such a statement, for example, operations experience of Moberly Mine and Plant? Meanwhile please explain why fugitive dust associated with drying at the Finishing Plant, stockpiles near both plants, and road traffic on the FSRs and highway are not considered as the most visible air emissions? Lastly, Monkman East Pit and Raw Sand Plant are relatively remote but Finishing Plant is close to communities and receptors. Please provide more details about fugitive dust emission and other emissions from the Finishing Plant as well as their impacts on the environment and land users.	29-Nov-23	Fugitive dust from mining activities is often visible because the plume contains a wide range of different sizes of particulate matter (PM) that appear as a visible plume. Fugitive dust settles to the ground under the influence of gravity and can be a source of concern for land users due to the potential effects the deposited dust may have on vegetation, soils and surface water. These potential sources and effects are based on environmental assessments conducted in British Columbia for open pit mines. One of those recent examples is the Giscome Quarry and Lime Plant Project located approximately 38 km south from the Angus Project. The Giscome Project received its Environmental Assessment Certificate #M16-02 on December 16, 2016. A description of the various sources of fugitive dust for the proposed Angus Project is included in section 11.1 Air Emissions of the Detailed Project Description. The Angus Project fugitive dust sources will be described in the Detailed Model Plan that will be reviewed by BC ENV. The potential effects from fugitive dust on the environment and land users will be assessed in the Application for an Environmental Assessment Certificate.		
IPD-NH-011	Early Engagement	Other	18-Aug-23	A. Huang	NH	Initial Project Description	"Noise effects from the transportation activities and Raw Sand Plant will be assessed such that Vitreo can manage or reduce potential noise annoyance issues." Please explain why noise effects from Finishing Plant is not included in the acoustic assessment. "Vitreo plans to conduct a noise monitoring program to quantify the existing (baseline) acoustic environment at potential noise sensitive receptors and within the Project area." Since two recreation sites are 1km away from the Finishing Plant, will both sites be included in the acoustic assessment?	29-Nov-23	Clarification is provided in section 11.2 Noise Emissions, of the Detailed Project Description that the Application for an Environmental Assessment Certificate will include modelling of noise effects on sensitive receptors including the recreation sites that are in the vicinity of the Finishing Plant site.		
IPD-NH-012	Early Engagement	Surface Water	18-Aug-23	A. Huang	NH	Initial Project Description	"Most ponds would only discharge if the water level exceeds pond storage during storm events that exceed the 10-year storm design and the water is not needed as process water." Do you need any permit/approval/authorization to discharge pond water and what is the water quality criteria of the pond water before being discharged? Will the pond water affect the quality and quantity of surface water and groundwater and will the potential effects assessed? Lastly, you also need to consider the treatment of the sewage created by workers on-duty. Will you install a sewage disposal system or a sewage holding tank or use other methods?	29-Nov-23	It is anticipated that discharge from the sediment ponds to surface water or to ground will require authorization under the British Columbia <i>Environmental Management Act</i> and this will need to be confirmed with the British Columbia Ministry of Environment and Climate Change Strategy. If discharge from the sediment ponds is to surface water, the water quality will need to meet British Columbia water quality guidelines for the protection of aquatic life at the edge of an initial dilution zone. The water quality of discharge to ground will be assessed against the British Columbia Contaminated Sites Regulation Schedule 3.2 numerical water standards for the protection of drinking water and aquatic life. The effect of discharge of sediment pond discharge on surface and groundwater quality and quantity will be assessed as part of the environmental assessment. Sanitary wastewater (sewage) generated in-site will be considered as part of the Raw Sand Plant and Finishing Plant design as well as the treatment and disposal. Disposal of the sanitary wastewater is in the planning phase, and it will be discharged to a septic field, or it will be hauled to an authorized disposal facility.		
IPD-NH-013	Early Engagement	Surface Water	18-Aug-23	A. Huang	NH	Initial Project Description	For groundwater/surface water/fish/soils baseline studies, please include a map to indicate the wells and sample collection locations and label the major project components on the map. Please also describe the parameters that are tested.	29-Nov-23	Additional information, including figures 12.4 to 12.10 of sampling and well locations, about the groundwater, surface water, fish and soils baseline programs, including a map to indicate the well and sample locations, and an outline of parameters tested are included in sections 12.2.4 to 12.2.7 of the Detailed Project Description. Details are also included in the Technical Data Report that will be submitted with the Application for an Environmental Assessment Certificate.		
IPD-NH-014	Early Engagement	Consultation and Engagement	18-Aug-23	A. Huang	NH	Initial Project Description	Since a socio-economic desktop overview was in 2022, could you describe what has been discussed and achieved through the desktop study? As for the baseline study planned for 2023, we recommend you connect with BC Ambulance as Northern Health relies on BC Ambulance to transport patients to and between Northern Health care facilities. Office of Health and Resource Development represents Northern Health Authority in the Environmental Assessment. All the engagement with Northern Health should be done through our office (resource.development@northernhealth.ca). We will connect you and project assessors with appropriate local and program leads. You shouldn't reach out to local Northern Health representative directly. A separate document titled "Baseline information for consultants" is attached to provide you some resources and context.	29-Nov-23	The socio-economic desktop overview in 2022 provided a basis for the baseline study planned for 2023. It identified the areas where there are information gaps or where primary data can support the baseline study. Vitreo will engage with BC Emergency Health Services and Northern Health as part of the baseline data collection and Project planning processes, using the contact information provided here. This information is included in section 12.1 Available and Planned Studies in the Detailed Project Description.		
IPD-NH-015	Early Engagement	Water Quality	18-Aug-23	A. Huang	NH	Initial Project Description	As requested in a comment above, we'd like to know the locations of four hydrometric stations, baseline surface water quality sampling sites (i.e., 16 stream sites and 2 lakes). Please also explain why those sites were chosen over other locations, describe the time when samples were taken and why choosing the time.	29-Nov-23	Additional information about the hydrometric stations and surface water quality sampling sites, including why they were selected and sampling timing/frequency, is included in section 12.2.5 Surface Water Quantity and Quality in the Detailed Project Description. Details will also be included in the Technical Data Report that will be submitted with the Application for an Environmental Assessment Certificate.		
IPD-NH-016	Early Engagement	Water Quality	18-Aug-23	A. Huang	NH	Initial Project Description	As requested in a comment above, we'd like to know the locations of 21 monitoring wells. Please also explain why those sites were chosen over other locations and describe the sampling results.	29-Nov-23	Additional information about the monitoring wells is included in section 12.2.4 Groundwater Quantity and Quality of the Detailed Project Description, including site selection rationale. Information will also be included in the Technical Data Report that will be submitted with the Application for an Environmental Assessment Certificate.		

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IPD-NH-017	Early Engagement	Freshwater Fish	18-Aug-23	A. Huang	NH	Initial Project Description	Did you test the metals, particularly mercury in fish tissue? If so, what are the results? If not, why fish tissues are not tested? As requested in a comment above, we'd like to know the locations of fish captured and the length of fish.	29-Nov-23	Yes, fish tissue metals were tested, including mercury. Results of the tissue metal analyses and fish community sampling results, including length and location, will be included in the baseline technical report, which will be shared when it is complete. Information available to-date is summarized in section 12.2.6 Fish and Aquatic Resources, of the Detailed Project Description.		
IPD-NH-018	Early Engagement	Freshwater Fish	18-Aug-23	A. Huang	NH	Initial Project Description	Please explain the difference between CCME probable effect limits and CCME interim sediment quality guidelines, describe what are "some metals" exceeding the CCME interim sediment quality guidelines and explain the potential impacts on the environment and human health.	29-Nov-23	Canadian Council of Ministers for the Environment (CCME) probable effects levels are the concentrations at which an effect is likely to be observed. CCME interim sediment quality guidelines are the limits at which effects are unlikely to be observed. Some sites have naturally occurring, higher than recommended levels of some metals. These will be included in the baseline report that will be shared when it is complete. A water quality and water balance model will be included in the Application for an Environmental Assessment Certificate, which will also include the effects assessment of predicted changes in water quality to potential receptors, including aquatic resources, fish and fish habitat, and human health.		
IPD-NH-019	Early Engagement	Soil	18-Aug-23	A. Huang	NH	Initial Project Description	Please explain why both soil LSAs use a 500 buffer. Did you take any soil samples and test metals and PAHs? If so, please include a map to indicate sampling locations and describe the result of tests. If not, please explain why soil samples are not taken or why metals/PAHs are not tested.	29-Nov-23	The standard buffer for a soil LSA is 500 metres. Soil samples were collected and analyzed for the standard suite of parameters to access for reclamation suitability. Figures of the soil sampling locations were included in the Detailed Project Description, Section 12.2.7 Soils, Terrain and Terrain Stability. Soil metals and PAHs have not been analyzed, and may be included in future baseline programs once traditional land use is better understood and if supporting studies (e.g., fugitive dust dispersion model, geochemical analysis results) are further advanced and demonstrate a human or wildlife health risk.		
IPD-NH-020	Early Engagement	Consultation and Engagement	18-Aug-23	A. Huang	NH	Initial Project Description	"Vitreo is currently unaware of temporary or seasonal residences located near the Project beyond those listed in Table 7.1; the location of any such residences will be discussed with Indigenous Nations and local stakeholders during engagement activities." In addition to ongoing engagement activities with Indigenous Nations and local stakeholders to find out other residences, do you plan to do any ground truth?	29-Nov-23	In addition to ongoing engagement activities with Indigenous Nations and local stakeholders to find out other residences, a site visit has been conducted to the Crooked River and Crystal Lake Recreation sites in August 2023. Baseline data collection for environmental disciplines is ongoing and the field crews would capture information on temporary residences if detected in the field. A hunting camp located near the North Olsson Forest Service Road (FSR) was identified during ongoing baseline studies and is noted in table 10.1 Distance to the Project - Local Communities and Areas of Interest in the Detailed Project Description. Further, orthophotos are used to identify information within the land use study areas. This information is included in section 12.3.1 Socio-Economic Setting, of the Detailed Project Description		
IPD-NH-021	Early Engagement	Consultation and Engagement	18-Aug-23	A. Huang	NH	Initial Project Description	As mentioned in some comments above, regarding the baseline data on health settings, we recommend you connect with BC Ambulance to get the latest information on the ambulance and paramedic capacities. All the engagement with Northern Health should be done through our office (resource.development@northernhealth.ca). If you want to have a first person interview with any Northern Health representative, please reach out to us first. You shouldn't reach out to local Northern Health representative directly. A separate document titled "Baseline information for consultants" is attached to provide you with some resources and context. You can also find our expectations on baseline studies in the Standard Working Group Comments at https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/standard-working-group-comments.pdf	29-Nov-23	Comment acknowledged. The Project will engage with Northern Health, using the contact information provided.		
IPD-NH-022	Early Engagement	Groundwater	18-Aug-23	A. Huang	NH	Initial Project Description	Please explain why construction and reclamation and closure don't interact with groundwater.	29-Nov-23	Groundwater interactions during construction and closure will be considered in the Application for an Environmental Assessment Certificate. Further detail is provided in section 13.1 Interactions with Biophysical Environment of the Detailed Project Description.		
IPD-NH-023	Early Engagement	Infrastructure and Services	18-Aug-23	A. Huang	NH	Initial Project Description	"The Project is comparable in size to other mining and industrial operations in the Prince George area, and is not expected strain public infrastructure or affect human capital in the region beyond a level that can be reasonably managed." I don't necessarily disagree with this statement. I'd like to point out that a single small or medium scale of industrial project may not strain public infrastructure but if all or most projects don't consider nor manage their impacts, the collective impacts can strain public infrastructure beyond a manageable level. This is why Northern Health is actively working with each EA project (as best as we can) in the North to mitigate adverse impacts and improve positive outcomes. We appreciate the opportunity to work with Vitreo to manage impacts from the Angus project and support any positive outcomes.	29-Nov-23	Comment acknowledged. Vitreo looks forward to continuing to work with Northern Health to assess the potential cumulative effects associated with the Project and to enhance its positive effects.		
IPD-NH-024	Early Engagement	Human Health	18-Aug-23	A. Huang	NH	Initial Project Description	"Human Health is defined as the bio-physical health of people from their exposure to chemicals and environmental pollutants. Potential environment ... In the environmental assessment, human health will be assessed for nearby residents and temporary land users (e.g., Indigenous ... harvesters)." Based on the definition of "human health", it only represents part of "health" defined by WHO and recognized by Northern Health, which is that health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." NH believes that health outcomes are most determined by the socio-economic determinants of health and access to health services and less so by biology and environmental factors. Therefore, when you select valued components to be assessed, human health shouldn't be the single VC related to "health" in the EA application and Human Health Risk Assessment shouldn't be the single document. You also need to assess socio-economic determinants of health, community health, health status and outcomes and general well-being and so on. Again, I recommend you to read the Standard Working Group Comments at https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/standard-working-group-comments.pdf Lastly, since the Standard Working Group Comments was published in 2015 before the publication of Ministry of Health's BC Guidance for Prospective Human Health Risk Assessment (April 2022), NH document didn't include the BC HHRA guidance. Now, we recommend proponents to use the BC HHRA guidance as the primary guidance over the Health Canada HHRA guidance (can be a secondary guidance) when you conduct a HHRA. We also urge you to consider all the environmental media, receptors, and pathways in the problem formulation stage of the HHRA. Sound rationale must be provided to explain why certain environmental medium, receptors, or pathway is not carried forward into the following assessment.	29-Nov-23	Vitreo understands and recognizes that health is influenced by social, cultural, economic and environmental factors and should be discussed from a holistic perspective. With this in mind, Vitreo will select VCs appropriately to encompass human health and wellbeing indicators. Vitreo acknowledges the BC HHRA 2022 guidance. Section 12.3.3 Biophysical and Social Determinants of Health Setting in the Detailed Project Description contains preliminary baseline data with respect to both biophysical health as well as social determinants of health.		
IPD-NH-025	Early Engagement	Human Health	18-Aug-23	A. Huang	NH	Initial Project Description	"In addition to process water the Project will require drinking water for office facilities. A reliable, steady water source is also required for emergency response (e.g., firefighting). Drinking water sources are still being investigated but may include either treatment of site groundwater or trucking potable water to site." Drinking water source for the workplace should be considered when assessing water quality because change in water quality (surface water and/or groundwater) can affect the source water quality. In addition, you will need approval/permits from Northern Health to construct and operate a drinking water system.	29-Nov-23	Acknowledgement of this potential approval is included in the Detailed Project Description, Section 4.2 Other Authorizations Required. Vitreo is currently advancing Project planning and has not yet determined the source of drinking water for the Project. Vitreo anticipates working with Northern Health regarding necessary approvals if a local source of drinking water is ultimately selected (i.e., groundwater or surface water).		

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IPD-NH-026	Early Engagement	Human Health	18-Aug-23	A. Huang	NH	Initial Project Description	You should consider, assess and manage the impacts of accidents and malfunctions to public health. For example, multiple serious injured workers or dozens of workers requiring examination at the same time may place strains on the Northern Health health care facilities and affect other residents. Hydrocarbon spills may affect drinking water sources for other residents. Please read the Emergency Response Roles and Responsibilities at https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/emergency-response-roles-responsibilities-contacts.pdf Lastly, if accidents/malfunctions occur and affect human health, please consider this kind of situation when you may need to fund a HHRA.	29-Nov-23	Comment is acknowledged, and the concerns around strain on local health resources and potential effects to drinking water have been incorporated into the Detailed Project Description, Table 16.1 Preliminary Description of Potential Accidents or Malfunctions. Accidents and malfunctions with a potential for effects on the public, worker and environmental safety, including human health and related affects to infrastructure and services will be assessed as part of the Application for an Environmental Assessment Certificate.		
IPD-RDFFG-00	Early Engagement	Permitting	20-Nov-23		RDFFG	Initial Project Description	The proposed mine site and processing plant will require an Official Community Plan and Zoning Bylaw amendment to allow the proposed uses. These processes include referral agency comment period, Indigenous Government engagement, public consultation and consideration by the Regional District Board. Generally these processes can take 6 – 12 months; however, depending on the complexity of the proposal can take longer. There are no guarantees of approval. Should the proponent wish to discuss this process in more detail, they can reach out to the Regional District for further information.	29-Nov-23	Vitreo acknowledges this comment. Vitreo would appreciate a meeting with the Regional District of Fraser-Fort George in the near future to discuss this issue further and to gain a better understanding of the procedures for an Official Community Plan and Zoning Bylaw Amendment.		
IPD-RDFFG-00	Early Engagement	Permitting	20-Nov-23		RDFFG	Initial Project Description	Should an Official Community Plan and Zoning Bylaw amendment be successful, any proposed building or structure over 10m2 will require a building permit from the Regional District prior to construction starting. Should the proponent wish to discuss this process, the Regional District can provide more information regarding the building permit process.	29-Nov-23	Vitreo acknowledges this comment. Vitreo would appreciate a meeting with the Regional District of Fraser-Fort George to discuss the process for issuing a building permit, subject to receipt of an Official Community Plan and Zoning Bylaw Amendment.		
IPD-RDFFG-00	Early Engagement	Consultation and Engagement	20-Nov-23		RDFFG	Initial Project Description	It is encouraged to include engagement with the residents of the unincorporated area of Bear Lake and the area within the vicinity of the project into the scope of this assessment process and to listen to socio, environmental and economic concerns raised through engagement.	29-Nov-23	Vitreo acknowledges this comment. Vitreo will continue to engage with residents of the unincorporated area of Bear Lake and the area within the vicinity of the Project and listen to socio, environmental and economic concerns raised during the course of engagement. Previous and ongoing engagement with Bear Lake residents is described in the Detailed Project Description, Section 6 Municipalities, Government Agencies, Stakeholders, and General Public.		
IPD-RDFFG-00	Early Engagement	Other	20-Nov-23		RDFFG	Initial Project Description	The Regional District would be interested to see emergency response plans to mitigate emergency events that can occur with this type of facility.	29-Nov-23	Vitreo acknowledges this comment. An Emergency Response Plan has not been developed at this stage of the Project. The Regional District of Fraser-Fort George will be given an opportunity to review and comment on such a plan when it is developed. Vitreo acknowledges this comment. An Emergency Response Plan has not been developed at this stage of the Project. The Regional District of Fraser-Fort George will be given an opportunity to review and comment on such a plan when it is developed. This comment is acknowledged in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans Monitoring Plans.		
IPD-RDFFG-00	Early Engagement	Other	20-Nov-23		RDFFG	Initial Project Description	The Regional District would be interested in understanding what materials would be generated that may require disposal through the Regional District's solid waste facilities. Currently any refuse generated from the site would need to be transported to the Foothills Boulevard Regional Landfill for disposal and may trigger additional evaluation and/or cost charges prior to be accepted.	29-Nov-23	Vitreo acknowledges this comment. Details on what kinds of materials would be generated at the site that would require disposal through the Regional District of Fraser-Fort George's solid waste facilities are not firmly known at this time. Vitreo would be pleased to meet with the Regional District of Fraser-Fort George to discuss this issue and to gain a better understanding of what additional evaluation and/or cost charges would apply to the Project.		
IPD-WLRS-001	Early Engagement	Unique Geologic Landforms	17-Aug-23	L Turcotte	WLRS	Initial Project Description	Will acid rock drainage (ARD) be generated?	29-Nov-23	A comprehensive geochemistry baseline program is underway at the Angus Project. The Project is located in the Ketchika Group consisting of siltstone, sandstone, limestone, phyllite, and dolostone, and the target lithology is the Monkman Quartzite. Petrographic assessment of the ore indicates it is dominantly composed of quartz and sulphide mineral occurrence is rare. Results of static testing to date indicate the sampled rock and processed fines are not potentially acid generating and have limited potential for metal leaching. Ongoing kinetic testing will be used to further evaluate the potential for metal leaching and acid rock drainage and develop long term leaching rates of any potential parameters of interest. Updated information on these studies and available results are provided in section 12.2.3 Geochemistry of the Detailed Project Description		
IPD-WLRS-002	Early Engagement	Freshwater Fish	17-Aug-23	L Turcotte	WLRS	Initial Project Description	This project is adjacent to a Fisheries Sensitive Watershed (Seebach F-7-001 located to the east), please incorporate.	29-Nov-23	The Project is not in the Seebach watershed so there is no hydraulic connection between the Project and the Seebach watershed, and it is not anticipated that the Project will affect this watershed. This information is included in section 12.2.6 Fish and Aquatic Resources of the Detailed Project Description.		
IPD-WLRS-003	Early Engagement	Environmental Assessment Process	17-Aug-23	L Turcotte	WLRS	Initial Project Description	Please provide spatial layers used to generate Angus project overview in figure 1.2 so that these can be integrated with layers internal and external to BC gov for assessment and polygon overlaps.	29-Nov-23	A zipfile containing the Project spatial files will be sent to the reviewer.		
IPD-WLRS-004	Early Engagement	Air Quality	17-Aug-23	L Turcotte	WLRS	Initial Project Description	How far will fine dust travel? Has dust fall monitoring been implemented? There is potential for aquatic and human health effects.	29-Nov-23	Air dispersion modelling will be completed for the Application for an Environmental Assessment Certificate, which will determine how far the dust will disperse. Dust fall monitoring is not currently being implemented because the BC Ministry of Environment and Climate Change has deemed that the dust fall monitoring method is outdated, and no longer recommends it as part of environmental baseline studies.		
IPD-WLRS-005	Early Engagement	Freshwater Fish	17-Aug-23	L Turcotte	WLRS	Initial Project Description	Please list all fish species observed during baseline data collection, currently only three are listed, Rainbow Trout, Redside Shiner, and Slimy Sculpin - this is 3 of 9 observed. Of additional interest are Bull Trout and Arctic grayling	29-Nov-23	The fish species observed to-date in Project baseline studies are as follows: Rainbow Trout, Redside Shiner, Slimy Sculpin, Burbot, White Sucker, Lake Chub, Prickly Sculpin, Largescale Sucker and Mountain Whitefish. No Bull Trout or Arctic Grayling were observed during Project baseline studies. The Project baseline studies are described in section 12.2.6 Fish and Aquatic Resources of the Detailed Project Description.		
IPD-WLRS-006	Early Engagement	Soil	17-Aug-23	L Turcotte	WLRS	Initial Project Description	Eastern soils LSA severe or high water erosion risk rating due to steep slopes - how will this be addressed, sediment inputs from soil erosion and mining activities are detrimental to fish and aquatic life.	29-Nov-23	Vitreo is currently advancing Project planning, and will incorporate mitigation by design (e.g., avoidance) for these high-risk rating areas, wherever practical. Vitreo will also develop and implement an Erosion and Sediment Control Plan during all Project phases. This Plan will include appropriate mitigation measures for areas of severe or high-water erosion risk, as identified through the Soils Baseline Study. An Erosion and Sediment Control Management Plan is included in section 14 Mitigation Measures, Management Plans and Monitoring Plans in the Detailed Project Description.		
IPD-WLRS-007	Early Engagement	Editorial	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Map on page 5. Please add stream names, lake names, and clearly identify resource roads, labeling relevant and connecting FSRs using different symbology than the minor roads.	29-Nov-23	Figure 1-2 included in the Detailed Project Description has been updated to include additional information and labels for roads and streams.		
IPD-WLRS-008	Early Engagement	Editorial	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Map on page 5. Add the current Hart Ranges caribou herd boundary < 5 km away from project footprint.	29-Nov-23	Figure 12.12, showing the current boundary of the Hart Ranges caribou herd, is included in the Detailed Project Description.		
IPD-WLRS-009	Early Engagement	Consultation and engagement	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Send the comprehensive GIS shapefile with all attributes to the TAC and also make public as part of engagement and consultation.	29-Nov-23	Vitreo will coordinate with the EAO to provide the shapefile information to the TAC.		
IPD-WLRS-010	Early Engagement	Wildlife	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Include how many km and hectares of new road, including the new increase in width of roads in current use, and the number of hectares of mature and old forest cleared for the entire project footprint. The BC Data Warehouse has publically available layers to assist: the Vegetation Resources Inventory (VRI) will enable an analysis by stand, of leading tree age-class X hectares removed for the footprint, using the layer WHSE_LAND_USE_PLANNING.RMP_OGMA_NON_LEGAL_CURRENT_SVW, and 2) use the WHSE_LAND_USE_PLANNING.RMP_OGMA_NON_LEGAL_CURRENT_SVW, which will provide Old Growth Management Areas which would potentially be affected by the footprint, or be included in the LSA or the RSA.	29-Nov-23	Further details about the new roads and the number of hectares of mature and old forest cleared will be provided and assessed as part of the Application for an Environmental Assessment Certificate. Vitreo is aware of the information available on the BC Data Warehouse.		

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IPD-WLRS-011	Early Engagement	Wildlife	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Although the project footprint even if including a 500m buffer (caribou) would not impinge on current Hart Ranges herd boundaries, it is important to acknowledge that this area was used by caribou in spring and fall, with observations made by Provincial staff up to the early 1980's, and has since been abandoned because of disturbance.	29-Nov-23	Vitreo agrees that it is important to acknowledge historic caribou use in the Project area and this is included in section 12.2.9 Wildlife and Wildlife Habitat of the Detailed Project Description and will be included in the Application for an Environmental Assessment Certificate. Vitreo would very much appreciate any historic records of caribou use within the Regional Study Area (RSA) that the Province can supply, particularly number of caribou, dates, and locations.		
IPD-WLRS-012	Early Engagement	Wildlife	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Page 48. Insufficient commitment regarding the mitigation of effects on migratory bird nests and related to the Federal Migratory Birds Regulations and the BC Wildlife Act. Ensure this is developed further.	29-Nov-23	Mitigation measures to address potential Project effects on migratory bird nests will be developed as part of the Application for an Environmental Assessment Certificate. These will refer to, and be consistent with, regulations under the federal <i>Migratory Bird Convention Act</i> and the BC <i>Wildlife Act</i> .		
IPD-WLRS-013	Early Engagement	Wildlife	29-Aug-23	B. Anderson	WLRS	Initial Project Description	Specific to cumulative effects, please address effects of an increase in recreational forest use brought about by the construction of new projects, and with it the arrival of project crews, and/or increased recreation interest in the area, which can impact wildlife, particularly if it is naïve (un-informed or un-aware) about regional wildlife issues.	29-Nov-23	The cumulative effects assessment that will be developed as part of the Application for an Environmental Assessment Certificate will address Project-specific residual effects and those of other reasonably foreseeable future physical activities. This will include potential effects associated with an increase in recreational forest use.		
IPD-WLRS-014	Early Engagement	Wildlife	30-Aug-23	B. Anderson	WLRS	Initial Project Description	Section 10.3. The IPD proposes only to include present and near-term future (1-10 years). What is the rationale for not including long term scenarios (10 - 200 years), since the project life is 20+ years and it is expected, given the LNG development in Prince Rupert, that this industry will grow, along with continued developments in other resource industries in the region and over this time frame?	29-Nov-23	A cumulative effects assessment will be conducted where there is potential for residual effects of the Project to interact spatially and temporally with the residual effects associated with past, present or reasonably foreseeable projects and activities. The cumulative effects assessment for the Project will include the closure phase of the Project (year 22) and post-closure (planned to commence in Year 23). Temporal boundaries for the assessment encompass the periods of time during which the Project is expected to have residual effects on valued components and during which Project activities are taking place.		
IPD-WLRS-015	Early Engagement	Air Quality	30-Aug-23	B. Anderson	WLRS	Initial Project Description	Insufficient preliminary information on silica dust and silica and clay/silt dust and their effects both on human health (proximal and local airshed), effects on terrestrial and aquatic ecosystems.	29-Nov-23	The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of the human health risks from inhalation of silica dust, with the conclusions of human health risk assumed to extend to ecological health risks.		
IPD-WLRS-016	Early Engagement	Air Quality	30-Aug-23	B. Anderson	WLRS	Initial Project Description	Insufficient preliminary information on silica dust and clay/silt/loam dust mitigations.	29-Nov-23	More information about mitigation of silica dust emissions will be provided in the Application for an Environmental Assessment Certificate. The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of effects of that dust to human health, including to residents and land users. An Air Quality Management Plan is included in section 14 Mitigation Measures, Management Plans and Monitoring Plans in the Detailed Project Description. Vitreo would like to seek inputs on mitigation measures and details of the concern expressed in this comment.		
IPD-WLRS-017	Early Engagement	Groundwater	30-Aug-23	B. Anderson	WLRS	Initial Project Description	Please provide information on vegetation clearing and it's relationship to groundwater at the stand scale.	29-Nov-23	Vegetation clearing, as well as overburden removal and stockpiling, may potentially have an effect on groundwater by changing the rate and fraction of precipitation that infiltrates and recharges the groundwater system. This interaction is acknowledged in Section 13.1 - Interactions with the Biophysical Environment of the Detailed Project Description and will be discussed in more detail in the Application for an Environmental Assessment Certificate.		
IPD-WLRS-018	Early Engagement	Groundwater	30-Aug-23	B. Anderson	WLRS	Initial Project Description	Table 10.1 Provide a rationale for the current IPD check boxes regarding the effect if the "collection, storage and discharge of run-off water" on groundwater.	29-Nov-23	The collection, storage and discharge of run-off water may potentially have an effect on groundwater. The collection and storage of run-off water may cause increased groundwater recharge underlying the storage pond. Similarly, discharge of run-off water may cause increased groundwater recharge at the discharge location. These Project interactions will be considered in the Application for an Environmental Assessment Certificate. Further detail is provided in section 13.1 Interactions with the Biophysical Environment of the Detailed Project Description.		

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IPD-EPIC-001	Early Engagement	Air Quality	11-Aug-23	Initial Project Description	Silica is known to be hazardous to human health, and silica dust can travel significant distance when airborne. Given the proximity of this proposed project to Bear Lake, I have concerns how the air quality in and around community will be impacted. Will the mine be mandated to do air quality monitoring in the community? Or better yet, will the mine pay for independent third party monitoring of the air quality?	29-Nov-23	The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of effects of that dust to human health, including to residents and land users. Vitreo will implement an Air Quality Management Plan for the Project, which is described in the Detailed Project Description, Section 14 Mitigation Measures, Management Plans and Monitoring Plans. Detailed environmental monitoring requirements, such as for silica dust deposition, will be determined during the subsequent permitting phase, in consultation with regulators, Indigenous Nations, and stakeholders.		
IPD-EPIC-002	Early Engagement	Community Wellbeing	18-Aug-23	Initial Project Description	If all precautions are taken for this mine, I see no problem. As it will bring employment an infrastructure To the area.	29-Nov-23	Comment is acknowledged.		
IPD-EPIC-003	Early Engagement	Other	22-Aug-23	Initial Project Description	I am in favor of this.	29-Nov-23	Comment is acknowledged.		
IPD-EPIC-004	Early Engagement	Other	22-Aug-23	Initial Project Description	Well put together presentation. I am in favor as it will bring jobs to the community.	29-Nov-23	Comment is acknowledged.		
IPD-EPIC-005	Early Engagement	Other	23-Aug-23	Initial Project Description	This proposed project will affect the drinking water that many travelers and surrounding communities rely on . There is a natural spring off the high way within a few kilometers of the proposed mining site that the residents of summit lake rely on for drinking water . Most of our streams and lakes are connected to each other and any leak in sediment ponds will be devastating for our area . The dust from silica is highly dangerous to health of our fish animals and surrounding communities as dusk can travel very far distances. We experience high winds in this area and It will be a major factor in affecting bear lakes residents. I strongly oppose this project	29-Nov-23	The Application for an Environmental Assessment Certificate will include an air dispersion model that will evaluate the deposition of silica dust from Project activities. The Application will also include a consideration of effects of that dust to human health, including to residents and land users. Environmental monitoring requirements, such as for silica dust deposition, will be determined during the subsequent permitting phase, in consultation with regulators, Indigenous Nations, and stakeholders. The Application will also include an assessment of effects of the Project on groundwater and current groundwater users. The potential effects of interactions between the Project and groundwater, such as seepage from sediment ponds, will be included in the effects assessment.		
IPD-EPIC-006	Early Engagement	Other	23-Aug-23	Initial Project Description	I found the open house and information session very informative and responsive to questions and the attendants. Being from the mining sector I was quite happy with there approach to the region, the people and community as a whole all environmental questions asked where covered with good sound facts. I fully support the Angus Project and look forward to what they bring to the region and local economy.	29-Nov-23	Comment is acknowledged.		
IPD-EPIC-007	Early Engagement	Other	3-Sep-23	Initial Project Description	This is a good industrial project for a much needed resource as the silica sand is unique. As long as the dust is contained and the workers use proper protection, I believe this project could be beneficial to the economy and to establish a resource that is integral in the expanding energy demands of the Province.	29-Nov-23	Comment is acknowledged.		

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DPD-MLIB-001	Early Engagement	Editorial	31-Jan-24	Eran Spence	MLIB	DPD	Section 5.3.1	<p>Noting that all comments submitted on the Initial Project Description have been incorporated into the DPD in section 5.3.1.</p> <p>At this stage, geological, environmental, socio-economic, and other interests are only beginning to be modelled and assessed, and most of the items can be deferred to future collaborative discussions with MLIB, EAO and the Proponent.</p> <p>There is a type-o in the section title, though. It should be spelled 'McLeod Lake Indian Band'.</p> <p>MLIB has no further concerns or comments on the Detailed Project Description at this time.</p>	New	2-Feb-24	Comment acknowledged. Section 5.3.1 has been revised with the correct spelling of McLeod Lake Indian Band.		

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DPD-WMFN-001	Early Engagement	Aboriginal Title, Rights and Int	19-Jan-24	Tamara Dokkie	WMFN	DPD	Figure 10.1	Erroneous map of WMFN territory. Figure 10.1 is a map entitled "Project Location in Relation to Indigenous and Community Interests" which indicates two separate areas of WMFN territory labelled "West Moberly First Nations – T8 Area East" and "West Moberly First Nations – T8 Area West". WMFN objects to this delineation between east and west. This line was not developed with WMFN and we do not consent to its use. The line does not track with our understanding of our Treaty or consultative rights. We request that Vitreo (and the EAO) cease and desist using the line between east and west and any terminology suggesting there is a difference in treatment between the east and west.	New	2-Feb-24	Vitreo has removed the Treaty 8 boundary, including the line referenced in the comment, from all figures and resubmitted the Initial Project Description, Engagement Plan and draft Detailed Project Description to the EAO. Figures included in the final Detailed Project Description do not include the Treaty 8 boundary, and Vitreo commits to not including this boundary in any figures going forward. Vitreo is interested in continuing discussions with West Moberly First Nations in a respectful way to help understand potential effects of the Project on West Moberly First Nation's Indigenous and Treaty rights.		
DPD-WMFN-002	Early Engagement	Water	19-Jan-24	Tamara Dokkie	WMFN	DPD		Water use impacts require clarity. The Draft DPD does not include sufficient information on the impacts of water use by the Angus Project will impact ground water and surface water quality and quantity. For example, the Draft DPD states that the raw sand plant will use 2800-3000 m3 per hour for processes and that the water sources will include: recycled water, run-off water, surface water, ground water and excess water from storage pond. It then states that Vitreo does not believe its water use will impact local water users. However, it does provide any analysis or approach to baseline assessment and monitoring of the potential impacts of that water use on ground water levels, surface water levels, water quality implications due to reduced volumes and potential impacts on the environment and wildlife. WMFN is not only concerned with human users of water and a more expansive consideration of water use impacts needs to be included in the baseline and impact assessment.	New	2-Feb-24	Processing and make-up water sources have been identified and prioritized from a) recycled water; b) contact water; c) a groundwater source at or near the Mine site; d) should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV 2016). Section 13.1.3, Groundwater, of the Detailed Project Description has been revised to state that potential to reduce groundwater discharge to these receiving environments by groundwater withdrawal for water supply will be evaluated in the Application using analytical and numerical modelling. Section 13.1.4., Aquatic Environment, of the Detailed Project Description has been revised to state that Vitreo will conduct a water balance and water quality modelling exercise for the Application that will include interactions between groundwater and surface water at the Mine site. The Application will also include an evaluate downstream effects to wetlands and watercourses. Section 10.3.2.2., Processing Activities, of the Detailed Project Description states that the Raw Sand Plant will crush and process the quartz arenite to liberate the silica sand grains and separate it from the fines component. Processing will not include use of hazardous chemicals as it is a liberation process.		
DPD-WMFN-003	Early Engagement	Water	19-Jan-24	Tamara Dokkie	WMFN	DPD		Water effluent treatment plans require more detail. The Draft DPD states that there is no planned process for water effluent discharge during operation. WMFN is concerned that there is insufficient detail to assess whether it is reasonable to have no planned water effluent treatment plan. More analysis is necessary and a contingency plan for if treatment is needed should be added.	New	2-Feb-24	Text in table 6.3 and Table 10.3 of the Detailed Project Description discusses water treatment and has been updated to add that Vitreo is completing a comprehensive data collection program and will assess the need for water treatment as part of the Application for an Environmental Assessment Certificate.		
DPD-WMFN-004	Early Engagement	Wildlife	19-Jan-24	Tamara Dokkie	WMFN	DPD		Update on ungulate surveys should be added: WMFN has concerns about the potential contribution of the Angus Project on the cumulative impacts to ungulates and the resulting impacts on Treaty Rights. The Draft DPD does not include sufficient baseline data collection and approach to the analysis of the impacts on ungulates. The Existing Conditions section of the Draft DPD indicates that a second round of ungulate surveys are planned for winter 2023. An update on that work should be included in the DPD. Further and ongoing ungulate surveys should be planned and detailed in the DPD to ensure this critical impact is monitored and assessed early and often.	New	2-Feb-24	An ungulate aerial survey was completed within the RSA in December 2023. A summary will be included in an update to the wildlife technical data report, which can be provided to West Moberly First Nations for review. Section 12.2.9.1 of the Detailed Project Description has been updated to reflect the completion of the 2023 survey. The Application for an Environmental Assessment Certificate will include an assessment on Indigenous Interests.		
DPD-WMFN-005	Early Engagement	Aboriginal Title, Rights and Int	19-Jan-24	Tamara Dokkie	WMFN	DPD		More time and capacity is needed to assess cultural impacts so they can be included in the environmental assessment process. The Draft DPD includes reference such as that outreach will be completed to assess "spiritual and cultural significance of the area to residents". Vitreo needs to work with WMFN to develop how this will be done and insure it is implemented properly. The Current Condition section of the Draft DPD is largely focused on bio-physical values and traditional Western social values and fails to properly address cultural impacts. More work time and capacity are needed for WMFN to be able to contribute a cultural impacts assessment. Prior to this critical component being completed it is very difficult for WMFN to fully engage in this process and provide fulsome commentary.	New	2-Feb-24	Table 5.3 has been revised to state that Vitreo is committed to discussing and addressing West Moberly First Nation's request to assess cultural impacts including appropriate study and communication protocols, and the associated need for capacity funding. Section 5.4, Ongoing Engagement, of the Detailed Project Description has been updated to state that Vitreo looks forward to West Moberly First Nation's continued participation in field studies in 2024 and is committed to discussing and addressing West Moberly First Nation's request for capacity funding to address a cultural impact assessment.		
DPD-WMFN-006	Early Engagement	General	19-Jan-24	Tamara Dokkie	WMFN	DPD	General	Overall, WMFN has ongoing concerns about the Angus Project's potential impacts on our member's Treaty Rights and way of life. A cultural impacts assessment is a critical component to be able to move forward with this environmental assessment process.	New	2-Feb-24	Table 5.3 has been updated to state that Vitreo is committed to discussing and addressing West Moberly First Nation's request to assess cultural impacts including the associated need for capacity funding. Section 5.4, Ongoing Engagement, of the Detailed Project Description has been revised to state that Vitreo looks forward to West Moberly First Nation's continued participation in field studies in 2024 and is committed to discussing and addressing West Moberly First Nation's request for capacity funding to address a cultural impact assessment.		

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DPD-EAO-001	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Executive Summary Page ii	"Nazko First Nation, and Nak'azdli Whut'en have not expressed being a Participating Indigenous Nation to date" Reword "...have not self-identified as a participating Indigenous nation to date"	New	2-Feb-24	The Executive Summary and text presented in Section 2 has been revised to address this comment.		
DPD-EAO-002	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Executive Summary Page ii	"Vitreo understands that McLeod Lake Indian Band have applied to and been accepted by the EAO as a Participating Indigenous Nation" Reword "...McLeod Lake Indian Band has self-identified as a participating Indigenous nation"	New	2-Feb-24	The Executive Summary has been revised to address this comment.		
DPD-EAO-003	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Executive Summary Page vi	"During Project operations, approximately 150 trucks will use..."	New	2-Feb-24	The Executive Summary as well as text in Table 5.2 and Table 16.1 has been updated to state that		
DPD-EAO-004	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 1.1 Page 1	"To date McLeod Lake Indian Band, West Moberly First Nations and Lheidli T'enneh First Nation have declared to be Participating Indigenous Nations in the environmental assessment." Suggest rewording "have declared to be Participating Indigenous Nations" to "have self-identified and provided a notice of intent to be a participating Indigenous nation"	New	2-Feb-24	The Executive Summary, Section 1.1, Section 2 and Section 12 of the Detailed Project Description have been revised to address this comment.		
DPD-EAO-005	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 1.1 Page 1	p.1 footnote 3 "A proppant is a material (e.g. sand or ceramic) used to hold open fracture made in the ground Fracture missing an s (or a)"	New	2-Feb-24	The footnote has been updated to address this comment.		
DPD-EAO-006	Early Engagement	Other	17-Jan-24		EAO	DPD	Section 1	General Information and Contacts Did not see any reference to "Anticipated cost for construction and decommissioning as well as projected annual operating costs"	New	2-Feb-24	Information about anticipated cost for construction, reclamation and closure as well as projected annual operating costs is presented in Section 10.5 of the Detailed Project Description.		
DPD-EAO-007	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Table 4.1 Page 12	Issuing authority for the WSA is now WLRS, not FOR	New	2-Feb-24	Table 4.1 has been updated to address this comment that WLRS is issuing authority for the WSA.		
DPD-EAO-008	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 4.3 Page 14	"Treaty 8 lands is an agreement..." Remove lands	New	2-Feb-24	All references to "Treaty 8 lands" have been changed to "Treaty 8" in the Detailed Project Description.		
DPD-EAO-009	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 4.3 Page 14	"West Moberly First Nation is a signatory to Treaty 8 lands." Remove lands	New	2-Feb-24	All references to "Treaty 8 lands" have been changed to "Treaty 8" in the Detailed Project Description.		
DPD-EAO-010	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 4.3 Page 14	"Following Yahey vs. BC...to five signatory Nations to Treaty 8 lands" Remove lands	New	2-Feb-24	All references to "Treaty 8 lands" have been changed to "Treaty 8" in the Detailed Project Description.		
DPD-EAO-011	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 4.5 Page 16	Proposed Assessment Timing Assessment timing, not project timing	New	2-Feb-24	Text and heading in the Detailed Project Description refers to assessment timing. No changes made.		
DPD-EAO-012	Early Engagement	Consultation and Engagement	17-Jan-24		EAO	DPD	Section 5 Page 17	Indigenous Nation Interests "Once these Indigenous Knowledge studies are complete, Vitreo will work collaboratively with the Participating Indigenous Nations to determine how this Indigenous Knowledge affects the Project and will work to avoid, limit and/or mitigate these effects." Suggest rewording (what effects?)	New	2-Feb-24	The text in Section 5 has been revised to state: Once these Indigenous Knowledge studies are complete, Vitreo will work collaboratively with the Participating Indigenous Nations to determine how Indigenous Knowledge is incorporated into the Application.		
DPD-EAO-013	Early Engagement	Permitting	17-Jan-24		EAO	DPD	Table 5.1 Page 19	Update when draft DPD was sent to Nations	New	2-Feb-24	Table 5.1 has been updated to address this comment.		
DPD-EAO-014	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Section 5.3.1 Page 21	"MacLeod Lake Indian Band" Correct spelling of McLeod Lake Indian Band	New	2-Feb-24	Section 5.3.1 has been revised with the correct spelling of McLeod Lake Indian Band.		
DPD-EAO-015	Early Engagement	Editorial	17-Jan-24		EAO	DPD	Table 5.2 Page 23	"During Project operations, approximately 150 trucks will use..."	New	2-Feb-24	The Executive Summary as well as text in Table 5.2 and Table 16.1 has been updated to state that		
DPD-EAO-016	Early Engagement	Other	17-Jan-24		EAO	DPD	General	The DPD does not specifically address: -A description of how this engagement and information was considered in the DPD, and corresponding changes that were made with justification for these changes; -A description of how information contained in the EAO's Summary of Engagement provided by the EAO was addressed in the DPD I think this is probably because Vitreo did not make substantive changes to the project design based on feedback.	New	2-Feb-24	Section 2, Engagement, Feedback and Integration of the Detailed Project Description provides information how feedback has been addressed in the Detailed Project Description. Reference is made to Appendix B "Issues Tracking Table" which provides responses to comments received on the Initial Project Description and Detailed Project Description along with a section reference where comments were addressed in the document. Section 2 has further been updated to add Table 2.1 that brings the summary of engagement responses into the main body of the Detailed Project Description in addition to presenting them in the Issues Tracking Table. References to feedback received on the Initial Project Description and to issues raised in the Summary of Engagement are also provided throughout the Detailed Project Description. As an example, Section 10.7.2 of the Detailed Project Description makes references to the recommendations in the Summary of Engagement about water treatment and alternative options to truck hauling.		
DPD-EAO-017	Early Engagement	Community Well-being	17-Jan-24		EAO	DPD	Table 6.3 Page 42	Table row "Community Well-being" Amend the term "foreign workers" to "influx of workers from outside the region"	New	2-Feb-24	Table 6.3 has been revised to remove reference to "foreign workers".		
DPD-EAO-018	Early Engagement	Other	17-Jan-24		EAO	DPD	Table 6.3 Page 42	Table row "Highway access" Remove 2nd point on accommodation structures as it is not relevant to impacts to highways.	New	2-Feb-24	The text in Table 6.3 has been revised as suggested.		
DPD-EAO-019	Early Engagement	Vegetation	17-Jan-24		EAO	DPD	Table 6.3 Page 43	Table row "Vegetation" Remove point on recreation sites as it is not relevant to impacts on vegetation.	New	2-Feb-24	Table 6.3 has been updated to address this comment.		
DPD-EAO-020	Early Engagement	Surface water	17-Jan-24		EAO	DPD	Table 6.3 Page 43	Table row "Water Quality" remove point on recreation sites as it is not relevant to impacts on WQ.	New	2-Feb-24	Table 6.3 has been updated to address this comment. Concerns raised regarding potential water quality effects related to increase haul traffic and fishing at the recreation sites have been addressed under the topic "recreation sites" in Table 6.3.		
DPD-EAO-021	Early Engagement	Consultation and Engagement	17-Jan-24		EAO	DPD	Section 7 Page 46	To date only the United Way of Northern BC has responded to Vitreo and will attend the breakfast meeting in Prince George in November 2023. Please update with information gathered from this meeting.	New	2-Feb-24	Section 7, Under-represented Potentially Affected Populations of the Detailed Project Description has been updated to present that the United Way of Northern BC was the only underrepresented group who attended the breakfast in Prince George in November 2023. They did not raise concerns or comments on the Project when attending the breakfast.		
DPD-EAO-022	Early Engagement	Other	17-Jan-24		EAO	DPD	Table 7.1 Page 46	This is a good list of under-represented potentially affected populations. Please consider including groups identified by ethnicity and recent immigrants as a target population. A group worth considering notifying is the Immigrant and Multicultural Services Society (IMSS) of Prince George.	New	2-Feb-24	Section 7, Under-represented Potentially Affected Populations of the Detailed Project Description has been updated to state that the Immigrant and Multicultural Services Society (IMSS) of Prince George has not been engaged to date; however, Vitreo plans on including them in future engagement activities and they have been added to Table 7.1.		
DPD-EAO-023	Early Engagement	Other	17-Jan-24		EAO	DPD	Section 13.1	Interactions with the Biophysical Environment This section needs to consider potential project effects rather than "interactions". Per the DPD guidelines, the EAO requires that Vitreo consider potential project effects on identified values in the DPD and indicate whether these are positive or negative effects.	New	2-Feb-24	Section 13.1 of the Detailed Project Description has been revised to discuss potential effects on the Biophysical Environment.		
DPD-EAO-024	Early Engagement	Consultation and Engagement	17-Jan-24		EAO	DPD	Section 14	Mitigation Measures, Management Plans, and Monitoring Plans How has this section been updated from the IPD to reflect input received? This is not clear.	New	2-Feb-24	No further changes were made as Section 14 provides a detailed description of how feedback received during the Early Engagement phase has been incorporated into management and monitoring plans.		

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DPD-EAO-026	Early Engagement	Land and Resource Use	17-Jan-24		EAO	DPD	Section 15	Land and Water Use Water impacts and use have been raised as key issues during Early Engagement. It appears that Vitreo has yet to determine the source of water for the Angus Project (e.g., surface water vs. groundwater). The EAO expects project design, including water sources, to be finalized in the DPD. Not having this information will lead to difficulty when scoping the project during Process Planning.	New	2-Feb-24	Section 15.2, Project Water Use, in the Detailed Project Description has been edited to provide more information on the make-up water sources. Processing and make-up water sources have been identified and prioritized from a) recycled water; b) contact water; c) a groundwater source at or near the Mine site; d) should there be not enough water from the first three sources, surface water from a nearby creek will be sourced to supply Mine operations. Surface water withdrawal will be compliant with the Environmental Flow Needs Policy (FLNRO and ENV 2016).		
DPD-ENV-001	Early Engagement	Other	20-Dec-23	Anna Akkerman	ENV	DPD	Section 12.2.1.1	Section 12.2.1.1 lists meteorology equipment installed at the Angus Monitoring Station shown on Figure 12.1 and I note that the only rainfall data appears to have been collected to date. ENV's Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2016) recommends collecting precipitation data and snowpack information (Section 3.4) to support hydrologic modelling. Does Vitreo plan to collect this information in the near future or do they have a plan to address this baseline data gap?	New	2-Feb-24	The average density (%) of snow reported at regional stations (Mount Sheba and Parsnip Upper) will be used to convert recorded snow depth at the Angus met station to SWE.		
DPD-ENV-002	Early Engagement	Other	20-Dec-23	Anna Akkerman	ENV	DPD		Please indicate the elevation of the Angus Monitoring Station.	New	2-Feb-24	The Executive Summary and Section 12.2.1 in the Detailed Project Description have been revised to indicate that the Angus Meteorological Station is located at approximately 997 metres above sea level.		
DPD-ENV-003	Early Engagement	Surface water	20-Dec-23	Anna Akkerman	ENV	DPD	Figure 12.5	It would be useful to see regional hydrometric stations presented on Figure 12.5 that will be used to inform long-term baseline characterization of surface water quantity.	New	2-Feb-24	Figure 12.5 will be updated to include regional hydrometric monitoring stations used to inform long-term baseline characterization.		
DPD-ENV-004	Early Engagement	Surface water	20-Dec-23	Anna Akkerman	ENV	DPD	Table 12.4 Page 95-97	Table 12.4 indicates that none of the baseline hydrometric stations are sited to support characterization around the Finishing Plant. I also note that a discharge to surface water is proposed from a sediment pond at the Finishing Plant. Without details about proposed effluent quality, quantity or location (which are not expected at this stage), I encourage Vitreo and their QPs to ensure they have sufficient baseline information to characterize potential impacts from the proposed discharge.	New	2-Feb-24	The Finishing Plant has no planned surface water effluent discharges or water withdrawals. Contact water collected on site will be used for dust suppression. Sanitary water use will be discharged to ground. Section 11.3 has been updated to reflect this information.		
DPD-ENV-005	Early Engagement	Air Quality	4-Jan-24	Gavin King	ENV	DPD		Please provide baseline air quality monitoring. There is a proposal to use an air quality model for the project but no implementation of any baseline air quality monitoring at the project site. There is reference to a meteorological station in proximity to the proposed mine location and a government meteorological station at the Crystal Lake Recreational site. However, there is a notable absence of actual air quality data collection at these locations. Although there is indirect reference to monitoring in Prince George, it is not deemed a suitable baseline for the project area.	New	2-Feb-24	Section 12.2 of the Detailed Project Description has been updated to include a description of baseline air quality data that will be used to support the air quality dispersion model. Baseline air quality data follows the recommendation of the BC Dispersion Modelling Guideline (2022) to use the high-percentile (i.e., 98th, 99th) values of monitoring data from representative monitoring locations. The baseline TSP, PM10 and PM2.5 concentrations will be based on monitoring data collect by the nearby Giscome Project that is located in a similar remote area with similar emissions from forestry activity, outdoor recreation and Highway 97. The baseline NO2 and SO2 concentrations will be based on monitoring data from the Farmington Community Hall which is conservatively representative of remote Project site. The air quality monitoring program at Farmington is managed by ENV. This information will also be included in the Dispersion Modelling Plan for the Application which will be shared for review and approval by ENV.		
DPD-ENV-006	Early Engagement	Recreation Sites	5-Jan-24	Karen Mohr	ENV	DPD	Page 43	My main concern is the companies response to the Rec Site Topic (Pg. 43). They respond that they do not increase disturbance because they are not building a new haul road. However the concern was never the building of a new road, rather the increased traffic on the haul road and the close proximity to the finishing plant. So therefore their response/ consideration does not address the issue raised.	New	2-Feb-24	Table 6.3 provides a summary of issues and Vitreo's responses and the response in the table has been revised to address the concern about increased traffic. Appendix B "Project Issues Tracking Table", ID numbers ENV-002 to ENV-012 provides responses to comments received on the Initial Project Description, with ENV-002 and ENV-003 address sound and air quality/increased use of road hauling.		
DPD-ENV-007	Early Engagement	Air Quality	17-Jan-24		ENV	IPD		Comment received August 8, 2023 on the IPD: Please provide a complete emissions inventory for both construction and operations phases, including fugitive emissions, grain sizes should also be identified for particulate matter emissions. Additionally, discuss any potential environmental or health risks. Comment received January 17, 2024: Comment on the IPD was not addressed by Vitreo	Follow up ENV-020	2-Feb-24	An emissions inventory for both construction and operations phases, including fugitive emissions, grain sizes should also be identified for particulate matter emissions, will be included in the Application for an Environmental Assessment Certificate. This information will also be included in the Angus Project Dispersion Modelling Plan, which will be submitted for approval to ENV. Potential environmental and health risks of particulate matter emissions are discussed in Section 13 of the DPD, and will be evaluated further in the Application.		
DPD-ENV-008	Early Engagement	Air Quality	17-Jan-24		ENV	IPD		Comment received August 8, 2023: Please provide a complete description of the facilities and any pollution control works that will be constructed at either the mine site and finishing plant area. Comment received January 17, 2024: Comment on the IPD was not addressed by Vitreo	Follow up ENV-021	2-Feb-24	A description of the facilities and pollution control works that will be constructed for the Project, will be included in the Application for an Environmental Assessment Certificate. This information will also be included in the Angus Project Dispersion Modelling Plan, which will be submitted for approval to ENV. A preliminary understanding of pollution control works is included in the Detailed Project Description, Section 11.1 Air Emissions and Section 14 Mitigation Measures, Management Plans and Monitoring Plans.		
DPD-ENV-009	Early Engagement	Air Quality	17-Jan-24		ENV	IPD		Comment received August 8, 2023: Please provide a completed fugitive dust management plan for the proposed project, this should include both the mining location, the haul route, and the finishing plant area. Comment received January 17, 2024: Comment on the IPD was not addressed by Vitreo	Follow up ENV-022	2-Feb-24	The Air Quality Management Plan, as described in Section 14 of the Detailed Project Description contains a preliminary description of fugitive dust mitigation measures that will be included in the plan. These measures include: - Use of baghouses and vacuum systems at the Raw Sand Plant and the Finishing Plant site to reduce particulate matter emissions. - Use of water trucks or other control measures (possible use of chemical dust suppressants) to manage fugitive dust from road use. Fugitive dust management and monitoring measures will be included within the Air Quality Management Plan, rather than a Fugitive Dust Management Plan. This plan will be included at a conceptual level in the Application and at a detailed level in subsequent permit applications.		
DPD-ENV-010	Early Engagement	Air Quality	17-Jan-24		ENV	IPD		Comment received August 8, 2023: Please ensure that the future submission of the detailed project description includes information on how sewage and non-hazardous solid waste will be handled and disposed of. This information is required to determine if EMA authorization is required for the landfilling of waste or registration under the Municipal Wastewater Regulation. Comment received January 17, 2024: Comment on the IPD was not addressed by Vitreo	Follow up ENV-024	2-Feb-24	Sanitary wastewater will be discharged on-site to a septic field or tank with solids pumped and removed intermittently. Non-hazardous solid waste will be recycled to the extent possible. The remaining waste will be burned with the ashes disposed of at one of the waste rock dumps.		
DPD-NH-001	Early Engagement	Employment and Economy	17-Jan-24	S.P.H	NH	DPD	Project Components and Schedule, pg. 5 (iv)	Great to see jobs will be committed to local population. Has an assessment been completed on the demographics of the local area to determine if there is an available workforce?	New	2-Feb-24	A change in local and regional employment will be assessed in the Employment and Economy chapter of the Application for an Environmental Assessment Certificate. This will include estimates of Project-related direct, indirect, and induced employment and qualified labour supply, participation, employment and unemployment rates.		
DPD-NH-002	Early Engagement	Other	17-Jan-24	S.P.H	NH	DPD	Mitigation Measures, Management Plans and Monitoring Plans, pg 14 (xiii)	Will the Emergency Management Plan include an Accident and Malfunctions section, or will this be a separate plan?	New	2-Feb-24	The Emergency Response Plan would be the main management plan that addresses emergency protocols for the accidents and malfunctions listed in the Detailed Project Description. The plan may be supplemented by other management plans such as a Spill Response Plan which would address spills. A proposed list of management plans will be provided as part of the Application for an Environmental Assessment Certificate.		

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DPD-NH-003	Early Engagement	Other	17-Jan-24	S.P.H	NH	DPD	Public, Worker, and Environmental Safety, pg 15 (xiv)	"During the Early Engagement phase, several concerns were raised regarding road safety, commuting requirements of Project personnel, and the use of Highway 97 to transport silica sand. These concerns have been acknowledged by Vitreo and will be examined further through potential accident scenario analysis, and consideration of the use of a bus or shuttle system to support commuting requirements." Thank you for acknowledging this. Please refer to Northern Health documents NH Emergency Roles and Responsibilities: https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/emergency-response-roles-responsibilities-contacts.pdf & Health and Medical Services Plan https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/industrial-camps-BMG.pdf	New	2-Feb-24	These resources will be referred to upon further development of the environmental assessment process. Section 14.0 of the DPD makes reference to the Health and Medical Services Plan.		
DPD-NH-004	Early Engagement	Other	17-Jan-24	S.P.H	NH	DPD	Table 6.1 List of Potentially Affected Parties, pg 61	Northern Health Authority and Health Emergency Management BC (separately) should be listed under "Provincial Agency" not "Public Groups and Stakeholders".	New	2-Feb-24	The text has been updated to reflect this comment.		
DPD-NH-005	Early Engagement	Community Well-being	17-Jan-24	S.P.H	NH	DPD	12.3 Human Environment & Community Wellbeing, pg 149 (125)	Please ensure you refer to Northern Health documents for all matters relating to Human Environment & Community Wellbeing, including Health and Medical Services Management Plan. See "Guidance Documents": https://www.northernhealth.ca/services/programs/office-health-and-resource-development/guidance-documents	New	2-Feb-24	"Incorporation of reports and documents produced by Northern Health" has been included in Section 12.3.3.3 in the Detailed Project Description. Specific reference to the Health and Medical Services management Plan has been mentioned in Section 14.0.		
DPD-NH-006	Early Engagement	Human Health	17-Jan-24	S.P.H	NH	DPD	DPD, 12.3.1.2 Summary of Existing Conditions, pg 150 (126)	"Bear Lake has limited resources including fuel, meals, and accommodations" Please note these limited resources also includes limitations to health services.	New	2-Feb-24	Section 12.3.1.2 Summary of Existing Conditions has been updated to include health services within Bear Lake.		
DPD-NH-007	Early Engagement	Human Health	17-Jan-24	S.P.H	NH	DPD	12.3.3 Biophysical and Social Determinants of Health Setting, pg 153 (129)	A good reference document for this section is "Indicators for Monitoring SDOH Related to Resource Development in Northern BC" https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/nh-unbc-indicators-report.pdf	New	2-Feb-24	Consideration of the indicators presented in this resource will be used to inform selected indicators outlined in the Application Information Requirements and assessment of Human Health and Community Well-being.		
DPD-NH-008	Early Engagement	Human Health	17-Jan-24	S.P.H	NH	DPD	12.3.3.3 Methods for Social Determinants of Health, pg 156 (132)	Please refer to the "Guidance on Human Health Risk" document found on NH website: https://www2.gov.bc.ca/assets/gov/health/keeping-bc-healthy-safe/healthy-communities/bc-hhra-guidance.pdf .	New	2-Feb-24	This document does not belong in the Methods for Social Determinants of Health as it is directly related to the biophysical determinants of health and is the HHRA process.		
DPD-NH-009	Early Engagement	Editorial	17-Jan-24	S.P.H	NH	DPD	12.3.3.4 Summary of Existing Conditions for Social Determinants of Health	"Northern Health's Interior Health Service Delivery Area (NIHSDA). Please reword to clarify the location falls within Northern Health, Northern Interior Health Service Delivery Area.	New	2-Feb-24	Section 12.3.3.4 Summary of Existing Conditions for Social Determinants of Health has been updated to reflect this comment.		
DPD-NH-010	Early Engagement	Editorial	17-Jan-24	S.P.H	NH	DPD	12.3.3.4 Summary of Existing Conditions for Social Determinants of Health	"In the NIHSDA in 2019/2020 the percentage of perceived life stress, obesity, current or occasional smoking and heavy drinking was higher compared to the BC rates." - Please use wording in line with Statistics Canada 2022b reference cited.	New	2-Feb-24	Section 12.3.3.4 Summary of Existing Conditions for Social Determinants of Health has been updated to reflect the Statistics Canada categories, as referenced.		
DPD-WLRS-001	Early Engagement	Permitting	18-Jan-24		WLRS	DPD	table 4.1 (p. 12)	A Licence of Occupation for the transmission line – For linear utility tenures the Licence of Occupation is typically used as an interim tenure before completing survey requirements for a Statutory Right of Way. There are situations where it remains a LoO, but I would need more information about the length and any overlapping tenures to inform.	New	2-Feb-24	Text in Table 4.1 has been revised to include that a Licence of Occupation may be used as an interim tenure for transmission line construction prior to completion of survey requirements for a Statutory Right-of-Way. A linear utility tenure may remain as a Licence of Occupation depending on the length and any other overlapping tenures.		
DPD-WLRS-002	Early Engagement	Permitting	18-Jan-24		WLRS	DPD	table 4.1 (p. 12)	They list a "Crown Land Tenure Permit" required for the finished plant – that should be a Licence of Occupation as well.	New	2-Feb-24	Table 4.1 has been revised to include this text and that Vitreo has applied for a Licence of Occupation in November 2023 for construction and operation of the Finishing Plant site.		
DPD-WLRS-003	Early Engagement	Permitting	18-Jan-24		WLRS	DPD	table 4.1 (p. 12)	Special Use Permit for occupying area within the Provincial Forest. This is not a tool under the land act (we don't issue SUPs) – this might be under the Forest Act, or perhaps need to be a Licence of Occupation depending on the purpose of use.	New	2-Feb-24	Table 4.1 text on special use permit has been revised to refer to the Forest Act.		
DPD-WLRS-004	Early Engagement	Permitting	18-Jan-24		WLRS	DPD	table 4.1 (p. 12)	Will there be a need for any other Land Act tenures for the mine area? Is that all covered under the Mineral Lease? Usually, sand and gravel falls are under the Land Act, but this is significant project, so I am unsure. As far as we know, a mineral tenure does not include sand, so it might need to be a Land Act tenure for occupation with the Mine Act tenure for the activity.	New	2-Feb-24	Table 4.1 has been revised include a possible Crown Land tenure permit for the Mine site (i.e., occupation) may be required.		
DPD-WLRS-005	Early Engagement	Permitting	18-Jan-24		WLRS	DPD	table 4.1 (p. 12)	Will there be any roads that need Land Act tenures? I see that they're planning for a RUA with Canfor for the FSR; will the Mineral Lease cover all roads for and within the mine site? Any road tenures will between Lands and Forests.	New	2-Feb-24	Table 4.1 has been revised to include text that a possible road tenure in the form of a Statutory right-of-way for private roads on the Mine site and Finishing Plant site may be required.		
DPD-WLRS-006	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-007	2-Feb-24	Comment acknowledged.		
DPD-WLRS-007	Early Engagement	Other	19-Jan-24	B. Anderson	WLRS	DPD	Figure 12-11	Fig 12-11 in the Draft Detailed Project Description. Add the UWR U-7003 M-RATA (caribou) on this map. It lies roughly 22 km to the east of the project footprint.	Follow up WLRS-008	2-Feb-24	Figure 12-11 has been updated to include UWR U-7003.		
DPD-WLRS-008	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-009	2-Feb-24	Comment acknowledged.		
DPD-WLRS-009	Early Engagement	Other	19-Jan-24	B. Anderson	WLRS	DPD		Hectares removed from BC OGMAs (all current legal and all non-legal) should be included for offset consideration.	Follow up WLRS-010	2-Feb-24	OGMA (legal and/or non-legal) spatial location and areas will be included in the Application for an Environmental Assessment Certificate.		
DPD-WLRS-010	Early Engagement	Other	17-Jan-24	B. Anderson	WLRS	DPD		Please contact directly, the Caribou (Habitat) Recovery Biologist in the Omineca Region for more information on historical observations.	Follow up WLRS-011	2-Feb-24	Vitreo is following up with Omineca Region caribou recovery biologist to request historic records of caribou within the RSA. The Application for an Environmental Assessment Certificate will include a summary of historic records for caribou. Table 6.3 is updated to reflect this. In addition, section 12.2.9.2 is revised to include communications in February 2022 with Omineca Region wildlife biologist, Mike Klaczek, on caribou occurrences. Although caribou historically occurred in the RSA in the 1970s and 1980s, caribou no longer occur in this area. Current collared caribou in the Hart Ranges are further east of the RSA in the mountains.		
DPD-WLRS-011	Early Engagement	Other	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-012	2-Feb-24	Comment acknowledged.		
DPD-WLRS-012	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-013	2-Feb-24	Comment acknowledged.		
DPD-WLRS-013	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-014	2-Feb-24	Comment acknowledged.		
DPD-WLRS-014	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-015	2-Feb-24	Comment acknowledged.		
DPD-WLRS-015	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-016	2-Feb-24	Comment acknowledged.		
DPD-WLRS-016	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-017	2-Feb-24	Comment acknowledged.		
DPD-WLRS-017	Early Engagement	General	19-Jan-24	B. Anderson	WLRS	DPD		No further comment	Follow up WLRS-018	2-Feb-24	Comment acknowledged.		

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DPD-WLRS-018	Early Engagement	Other	23-Jan-24	Jilian Martin	WLRS	DPD		The Executive Summary repeatedly mentions "run-off water," which isn't defined until Section 15.2.	New	2-Feb-24	The Executive Summary and Detailed Project Description has been updated to refer to contact water rather than runoff water.		
DPD-WLRS-019	Early Engagement	Water	23-Jan-24	Jilian Martin	WLRS	DPD		Is Vitreo referring to both overland flow (from precipitation before it forms a stream) and (groundwater) drainage water when using the term "run-off water"? As mentioned previously, groundwater will likely seep into the pits/ponds unless they are lined. This will necessitate licensing. Note that there is an exemption for mine drainage water from requiring a licence (Water	New	2-Feb-24	Run-off refers to overland flow. Groundwater seepage into the Monkman East Pit or water management infrastructure that is subsequently used for process water supply will be licensed as required under the Water Sustainability Act.		
DPD-WLRS-020	Early Engagement	Water	23-Jan-24	Jilian Martin	WLRS	DPD		The executive summary mentions make-up water will be sourced from: mine run-off water collected in ponds, groundwater wells and surface water such as streams. Surface water is only mentioned on page v of the exec summary and after that only run-off water and groundwater wells are mentioned (in rest of exec summary).	New	2-Feb-24	The Executive Summary has been updated to include surface water as potential make-up water source as follows: "Four water uses have been identified for processing, including recycled water, run-off water, groundwater and surface water."		
DPD-WLRS-021	Early Engagement	Water	23-Jan-24	Jilian Martin	WLRS	DPD		In addition to diversion and use of water, licensing will likely need to include storage due to four sediment ponds and process water pond.	New	2-Feb-24	Table 4.1 in the Detailed Project Description has been revised to include potential need of a water license for water storage.		
DPD-WLRS-022	Early Engagement	Water	23-Jan-24	Jilian Martin	WLRS	DPD		It is mentioned there will be a sediment pond at the finishing plant to catch run-off. It is unlikely runoff alone will be sufficient for any purpose. Like the sediment ponds in the mining area, a licence will be required if groundwater seeps into the pond or surface water sources are added.	New	2-Feb-24	Table 4.1 in the Detailed Project Description has been revised to include potential need of a water license in the event of groundwater seeping into the pond or addition of surface water sources.		
DPD-WLRS-023	Early Engagement	Permitting	23-Jan-24	Jilian Martin	WLRS	DPD		Dust control is its own water licensing purpose which will need to be added to licenses likely.	New	2-Feb-24	Table 4.1 of the Detailed Project Description has been updated to include potential need of a water license for water used for dust control.		