Environmental Assessment Worksheet

This most recent Environmental Assessment Worksheet (EAW) form and guidance documents are available at the Environmental Quality Board's website at: https://www.eqb.state.mn.us/. The EAW form provides information about a proposed project's potential environmental effects, and also used as the basis for scoping an Environmental Impact Statement. Guidance documents provide additional detail and links to resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item or can be addressed collectively under EAW Item 21.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1 Project Title:

Tamarack Mining Project

2 Proposer

Contact person: Christopher Wallace, Talon Nickel (USA) LLC
Title: Environmental and Permitting, VP
Address: 165 Warren Street
City, State, ZIP: Tamarack, MN 55787
Phone: 218-768-3292
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3 RGU

Contact person: MN Department of Natural Resources
Title:
Address: 500 Lafayette Road
City, State, ZIP: St. Paul, MN 5515
Phone:
Email:

4 Reason for EAW Preparation

(check one)

Required:	Discretionary:
☒ EIS Scoping	☐ Citizen petition
☐ Mandatory EAW	☐ RGU discretion
	☐ Proposer initiated

If EAW or EIS is mandatory, give EQB rule category subpart number(s) and name(s):

An Environmental Impact Statement (EIS) is mandatory per Minnesota Rules, part 4410.4400, subpart 1 "Threshold Test" and 8.B, "Metallic Mineral Mining and Processing: For the construction of a new facility for mining metallic minerals or for the disposal of tailings from a metallic mineral mine, the" Minnesota Department of Natural Resources (DNR) is the Responsible Government Unit (RGU).

5 Project Location

County: Aitkin County

City/Township: City of Tamarack, Clark Township, PLS Location (¼, ¼, Section, Township, Range): Table 1 summarizes the Public Land Survey (PLS) Location of the Project.

Watershed (81 major watershed scale): Mississippi River – Grand Rapids

GPS Coordinates: Table 2 summarizes the GPS Coordinates for the Project.

Tax Parcel Number: Table 2 summarizes the Tax Parcel Numbers for the Project.

Table 1: Summary of Project PLS Location

Township	Range	Section	¼ ¼ Sections
48	22	3	NENW, SENW, SWNW, NWNE, SWNE, NWSW, NESW, SWSW, SESW, NWSE, SWSE
48	22	4	SENE
48	22	10	NWNW, NENW, SENW, NWNE, SWNE, NESW, SWSW, SESW, NWSE, SWSE
48	22	15	NWNW, NENW, NWNE

Table 2: Summary of Project GPS Coordinates and Tax Parcel Numbers

Tax Parcel Number	Latitude	Longitude
05-0-003400	-93.11416	46.67868
05-0-003500	-93.11153	46.67562
05-0-003700	-93.11942	46.67867
05-0-004000	-93.11936	46.67566
05-0-003900	-93.1244	46.67386
05-0-004600	-93.11139	46.67017
05-0-004500	-93.11912	46.66839
05-0-004400	-93.12418	46.66838
05-0-003901	-93.11924	46.67202
05-0-005300	-93.12994	46.67565
61-0-002100	-93.11395	46.6647
61-0-002200	-93.11403	46.66103
61-0-002400	-93.11911	46.66472
61-0-002500	-93.12415	46.66473
61-0-002600	-93.12168	46.66106
61-0-002800	-93.11928	46.65742
61-0-003000	-93.12459	46.65379
61-0-003100	-93.11935	46.65379
61-0-003300	-93.11407	46.65741
61-0-003400	-93.11413	46.6538
61-0-003700	-93.11478	46.6515
61-0-004100	-93.11964	46.65095
61-0-004200	-93.1248	46.65036
61-0-033000	-93.12005	46.64973

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List of Abbreviations and Acronyms

ANFO	Ammonium Nitrate Fuel Oil
AUID	Assessment Unit Identifier
BNSF	Burlington Northern Santa Fe
CCCL	Center for Corporate Climate Leadership
CFR	Code of Federal Regulation
CRF	Cemented Rockfill
CSAH	County State Aid Highway
DNR	Department of Natural Resources
EAW	Environmental Assessment Worksheet
ECS	Ecological Classification System
eGRID	EPA Emissions & Generation Resource Integrated Database
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GHG	Greenhouse Gas
GPD	Gallons Per Day
GPM	Gallons Per Minute
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
HUC	Hydrologic Unit Code
IPCC	Intergovernmental Panel on Climate Change
MDH	Minnesota Department of Health
MPCA	Minnesota Pollution Control Agency
NHIS	Natural Heritage Information System
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
ORVW	Outstanding Resource Value Waters
OSA	Minnesota Office of the State Archaeologist
PM	Particulate Material
PWI	Public Water Inventory
RCRA	Resource Conservation and Recovery Act
RGU	Responsible Government Unit
SBS	Sites of Biodiversity Significance
SCAQMD EMFAC	South Coast Air Quality Management District Emission Factor
SDS	State Disposal System
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TBM	Tunnel Boring Machine
TIC	Tamarack Intrusive Complex
TMDL	Total Maximum Daily Load
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Carbon
WMA	Wildlife Management Area

6 Project Description

a. Provide the brief project summary to be published in the *EQB Monitor*, (approximately 50 words).

Talon Nickel (USA) LLC ("Talon") is proposing development of a new underground mine near Tamarack, Minnesota, focused on the extraction of a domestic source of high-grade metal ore that contains nickel, copper and iron for use in electric vehicles and other industries. The Project (defined below) would include a rail loadout facility to transport the ore to a separate location outside of Minnesota (Mercer County, North Dakota) for processing and tailings disposal.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities

Project Ownership Status

Talon Nickel (USA) LLC is the majority-owner and has operational control of the Tamarack Mining Project ("Project") through a joint-venture agreement with Kennecott Exploration Company, which is part of the Rio Tinto Group of Companies ("Rio Tinto").

As of September 2023, Talon owns a 51% share of the Project while Rio Tinto owns a 49% share. Talon is currently responsible for funding 100% of project expenditures. Upon completion of certain Project milestones as well as a cash payment of US $10 million to Rio Tinto, Talon may become the owner of up to 60% of the Project at which time Rio Tinto will be responsible for funding 40% of Project expenses on a pro-rata basis, otherwise its ownership share will be progressively diluted (reduced).

At all times, Talon maintains operational control of all project decisions including technical items as well as financial items such as selection of customers for the metal concentrate offtake.

Project Overview

Talon proposes to construct an underground mine and surface facilities at the Project Area near Tamarack, Minnesota (Project) (Figure 1). Graphic 1 shows the co-located surface facilities in gray and the underground facilities in blue, Graphic 2 is a three-dimensional representation of the surface facilities layout.

The total acreage of new plus existing developed surfaces utilized as part of the Project would amount to 83.0 acres.

The total additional surfaces developed for the Project would amount to approximately 79.1 acres (77.6 acres developed/impervious surfaces and 1.5 acres industrial stormwater pond) after construction is complete. This encompasses the buildings, stockpiles, parking areas, and various other facilities for production operations including the railway spur to connect to the existing BNSF railway line.

Approximately 3.9 acres within the Project Area already consists of developed surfaces (encompassing existing residential and agricultural buildings, parking areas, etc.); these features would be replaced with Project-related developed surfaces such as those mentioned above.

The Project Area is defined by the surface boundary and the underground boundary areas, as shown on Figure 2, and together comprise 447.0 acres.

- Long-term facilities, buildings, and developed surfaces for production operations approximately 83.0 acres, (3.9 acres of existing developed/impervious surfaces, 77.6 acres of new developed/impervious surfaces, and 1.5 acres industrial stormwater pond). The 83 acres would be divided between the mine site (60.5 acres) and the railway spur (22.5 acres).

- Areas that may be temporarily utilized during construction for staging of equipment and materials but would not result in a long-term developed surface after construction is complete. The two construction staging areas (temporary) are shown on Figure 3. Together, these areas have approximately 21 acres of uplands within the project boundary that is suitable for use as temporary equipment staging without disrupting other construction activities. This acreage has some overlap with the developed surfaces described above and temporary access surfaces described below. It is expected that not all of this area would ultimately be utilized for temporary staging of construction equipment and supplies.

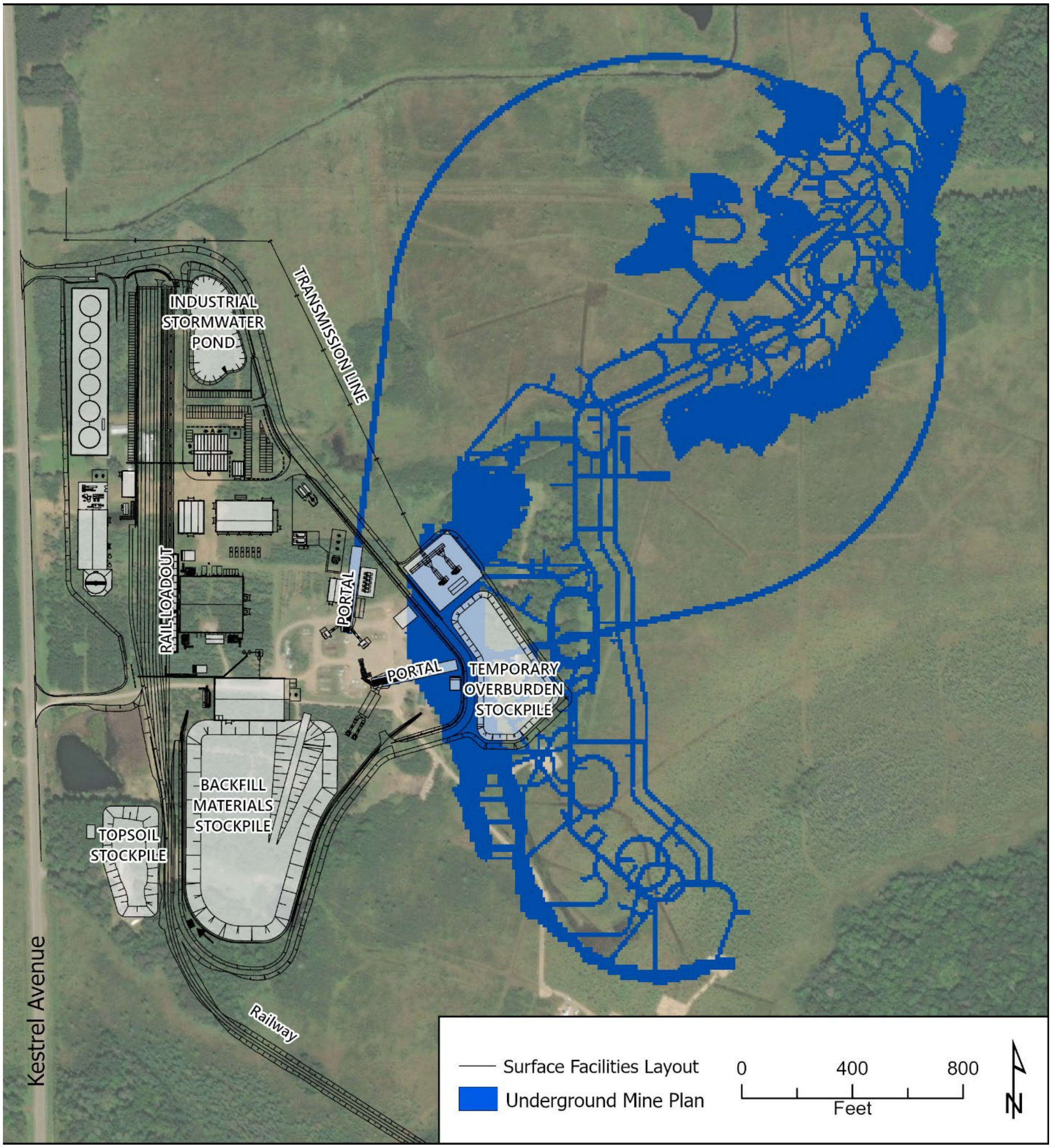
- Areas that may be temporarily utilized during construction for a variety of purposes including gaining temporary access to various areas of the site, maneuvering of equipment, placement of construction cranes, conducting earthwork activities, placement of aerial or underground utility lines, etc. For these activities, an offset distance of approximately 200 feet has been applied between the extent of the developed surface and the project boundary (with variability as appropriate to align with public roadways, certain property boundaries, and other project features). These activities would not result in a developed surface after construction is complete.

The underground boundary area is the area in which mining would occur below the surface and encompasses approximately 224.9 acres and overlaps with the surface boundary area by approximately 41.2 acres.

See table below for a listing and breakdown of the different surface types and acreages discussed in the text above.

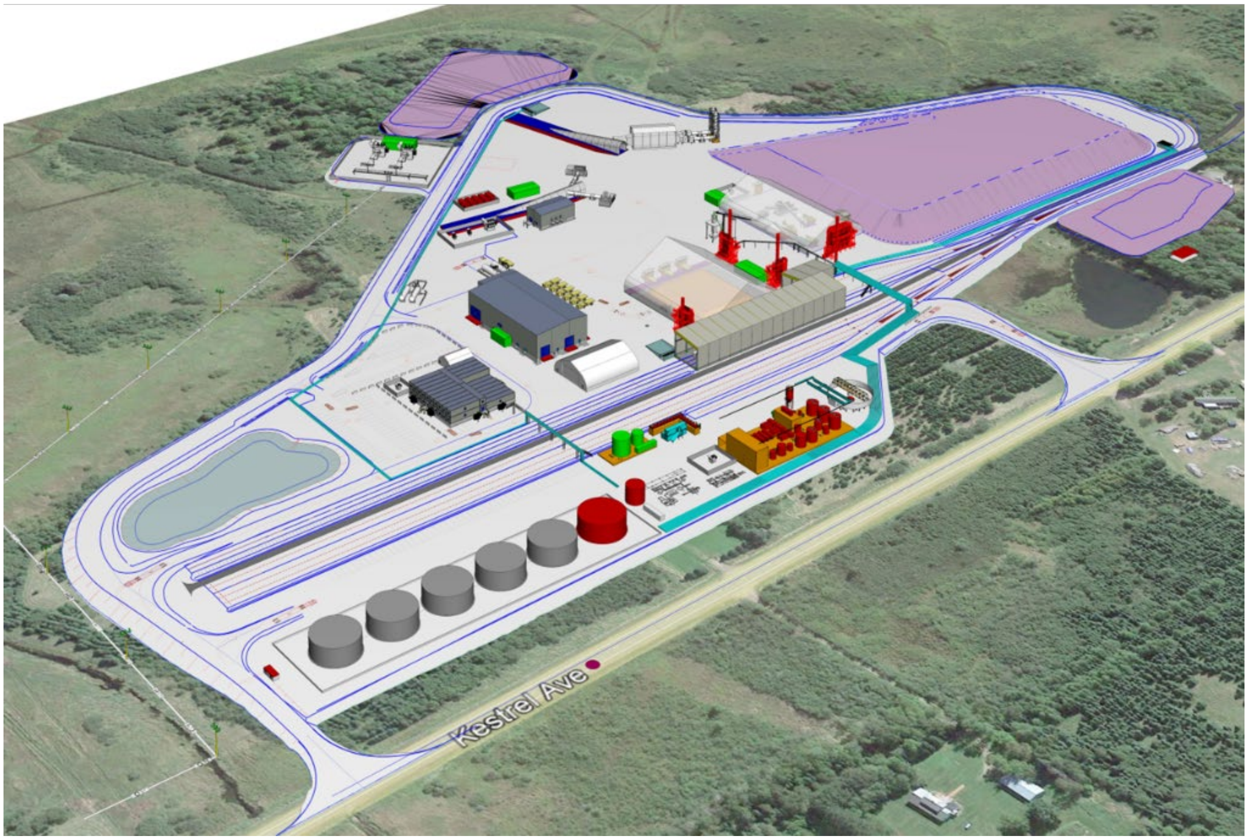
Table 3: Summary of Project Area Acreage

Project Component	Acreage (acres)
Surface Boundary	**263.3**
New Developed Surfaces (77.6 acres)	
New Industrial Stormwater Pond (1.5 acres)	
Existing Developed Surfaces (3.9 acres)	
Temporary Construction Laydowns & Staging Areas (21.0 acres)	
Other Potential Temporary Uses (ex. Construction Access, Equipment Maneuvering) (159.3 acres)	
Underground Boundary (surface acreage above underground workings)	**224.9**
Overlap between the Surface Boundary and Underground Boundary	**-41.2**
Project Area (sum of the above)	**447.0**



(see Figure 2 for project boundary areas)

Graphic 1: Co-located Surface Facilities and Underground Facilities



(see Figure 3 for detail)

Graphic 2: Three-Dimensional Sketch of Surface Facilities Layout

Talon plans to extract ore at a rate of up to 800,000 short tons (2,000 lbs/short ton) per year over an approximately 7- to 10-year period of mine production. The ore, containing nickel, copper, and iron, would be transported by railway to an out-of-state processing facility located in Mercer County, North Dakota, which would produce metal concentrate products.

Ore processing and tailings disposal would take place off-site at a location in Mercer County, North Dakota. This offsite processing facility is not part of the Project.

The Project would involve the construction and operation of several facility elements (Figure 3), including:

- Underground mine, accessed via twin portals;
- Mine ventilation infrastructure (e.g., primary intake fans, mine exhaust stacks);
- Compressor building;
- Backfill material crushers building;
- Rail loadout;
- Ore storage building;

- Contact water treatment plant;
- Sanitary water treatment plant;
- Maintenance shop;
- Industrial stormwater pond;
- Backfill materials stockpile;
- Topsoil stockpile;
- Temporary overburden stockpile;
- Administration and Locker Room Building;
- Electrical substation and transmission line;
- Supplies storage including fuel tanks and materials bins; and
- Utilities, roadways, and minor supporting infrastructure.

An approximately 1.5-mile railway spur would be constructed to connect the ore storage and rail loadout facility to the existing Burlington Northern Santa Fe (BNSF) railway line located immediately north of the City of Tamarack. The Project Area would be accessed from an existing two-lane paved road, County State Aid Highway (CSAH) 31.

Once operational, the Project is expected to employ at least 300 workers during full steady-state production. Staffing levels will be further refined to inform the EIS.

Timing and Duration of Construction

Project construction is anticipated to begin in 2026, with production starting in 2027. The Project would have an approximately 7- to 10-year production life. The proposed mine life for consideration in the EIS will be finalized based on market conditions at the time of EIS data submittal and may vary slightly due to economic factors such as operating costs and prevailing metal prices.

Surface Facilities Construction

Construction would begin by first removing existing buildings, septic systems and/or leach fields, and other structures (e.g., water and electrical services) that would not be re-purposed as part of the mine facility. Existing vegetation would be removed as needed for construction and topsoil would be stockpiled for future reclamation use. The site would be graded, construction stormwater controls would be established, and site access roadways would be installed.

The next phase would include establishing temporary utilities and infrastructure required for construction, such as power, offices, staging areas, support facilities, a mobile or modular water treatment plant for initial tunneling of the loop shaped access tunnel, and maintenance facilities. Then, the excavation of the mine declines would occur concurrently with construction of the remainder of the mine surface facilities.

Construction of the railway spur connection to the existing BNSF railway would also occur during the surface facilities construction phase. The railway spur has been routed to minimize interaction with wetland areas and peat deposits, but some degree of construction in the wetlands is unavoidable in order to connect the existing railway to the main mine site. Areas of shallower peat would be excavated and replaced with fill material, while limited areas of deeper peat would require installation of pilings. The Project is seeking a beneficial reuse for the peat at an offsite location.

The railway spur may be constructed with appropriate materials or features to enable water to flow across and/or under the developed surface to facilitate water movement between each side of the railway spur and address the potential for differences in water levels and/or other hydrological impacts.

Orebody Access

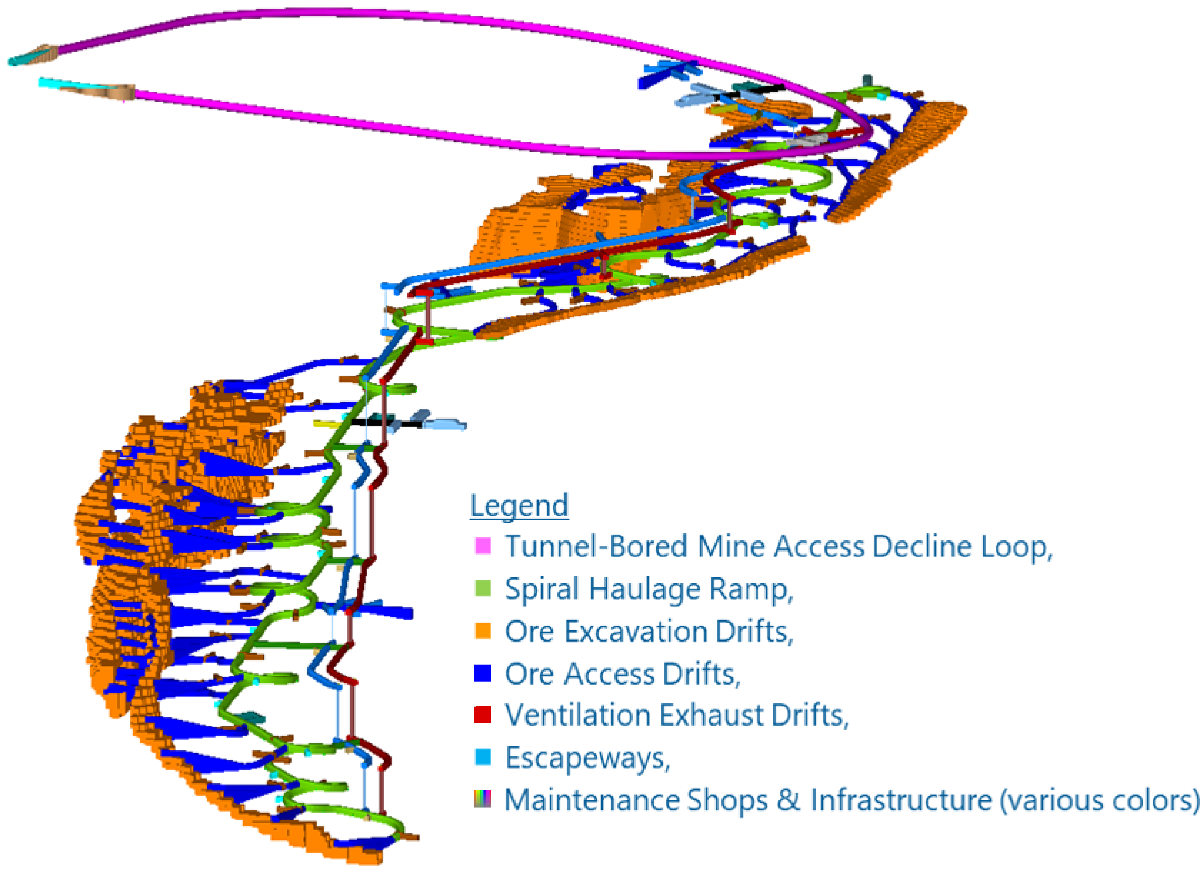
Twin portals (surface openings) and decline ramps (downward-sloping tunnels) would be constructed to transport workers and materials between the surface and the targeted deposit and serve as the fresh air intake and return air exhaust route for the mine. No additional openings to the surface are anticipated. Portal and decline construction methods are described below, and an example portal is shown in Graphic 3, although the final design may vary from the image depicted.

(Eagle Mine, Michigan)

Graphic 3: Example of Mine Portal

The decline ramps would consist of a loop-shaped tunnel constructed using a tunnel boring machine (TBM). A pressurized-face tunnel boring machine was selected because it can excavate through saturated soils without needing to remove water from the surrounding soils or rock formations. An initial portal would be developed, leading to a decline ramp which would extend to the top of the ore body. The tunnel would then turn in a wide arc and loop around, proceeding at an upward angle until reaching the surface and establishing a second portal in proximity to the first.

At the point where the tunnel intersects the ore body, a spiral ramp would be developed using traditional drill-and-blast methods to follow the ore body to depth, along with ventilation raises and escapeways connected to the spiral ramp network. A schematic depiction of the underground mine working is shown in Graphic 4.

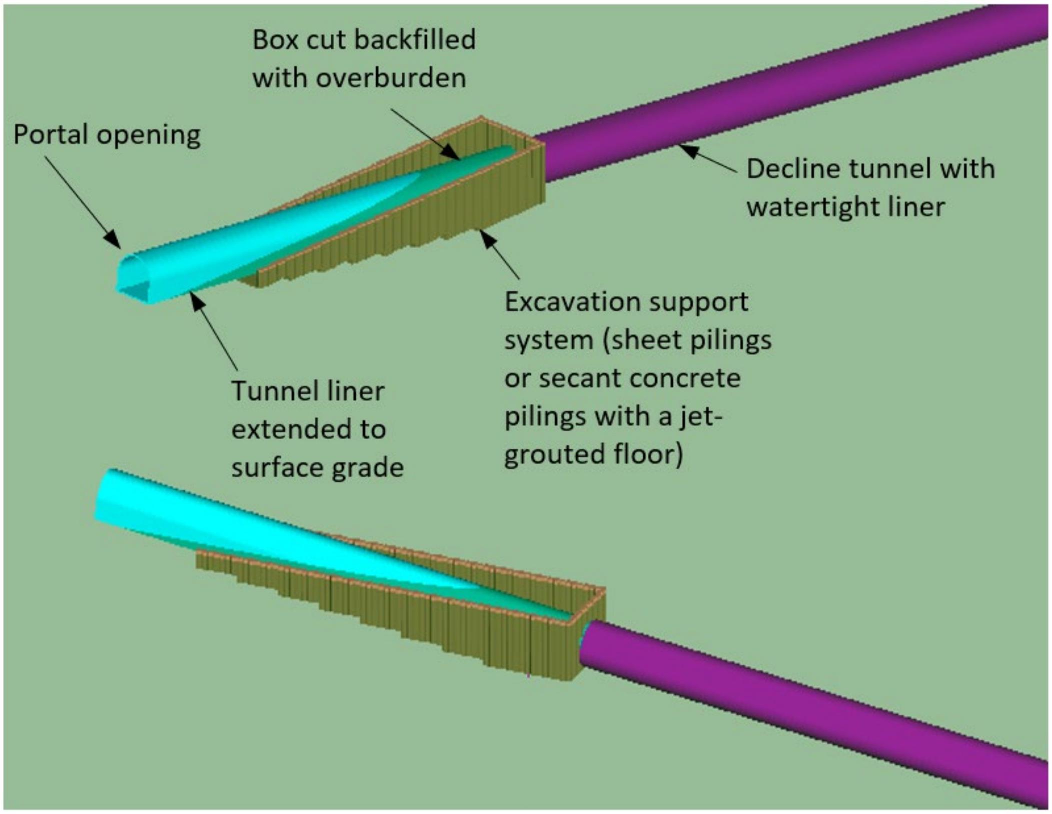


Graphic 4: Three-Dimensional Sketch of Underground Mine Workings

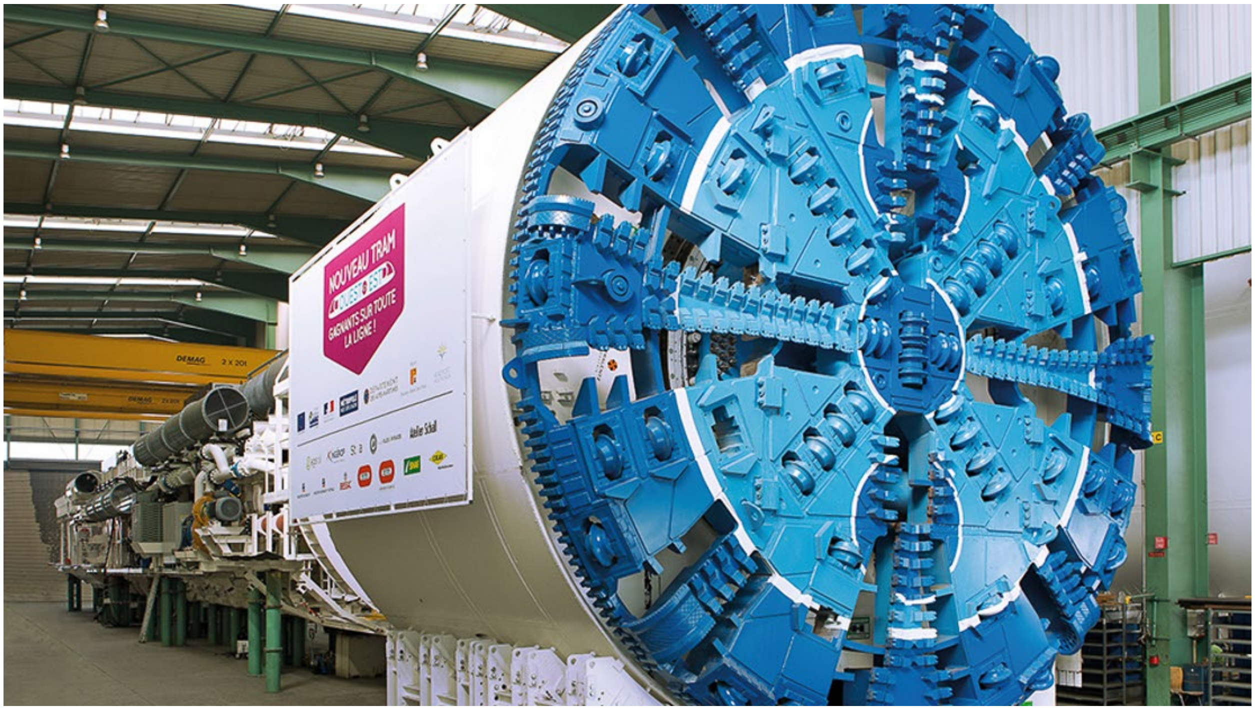
The shallower portions of the decline loop would be developed through overburden consisting of saturated unconsolidated sediments (quaternary deposits) to a depth of approximately 130 feet, with the deeper portion developed through bedrock to a depth of approximately 350 feet. A watertight liner would be installed and progressively extended as the tunnel advances to permanently control ingress of groundwater.

To facilitate the launching and retrieval of the TBM, each portal would begin with excavation of an open "box cut" with approximate dimensions of 310 feet long by 40 feet wide by a maximum 40 feet deep. (Graphic 5). The box cut would provide a vertical face (headwall) for the TBM to initiate excavation (Graphic 6). Before box cut excavation begins, an excavation support system (such as sheet pilings or secant concrete pilings with a jet-grouted floor) will be installed to support the box cut and mitigate groundwater infiltration during tunnel construction.

After the tunnel is complete, the permanent watertight tunnel liner will be extended from each portal to original surface elevation. The box cut would then be backfilled with a portion of the overburden material generated by the box cut and decline excavation.



Graphic 5: Idealized Three-Dimensional Sketch Showing Box Cuts and Tunnel Liner



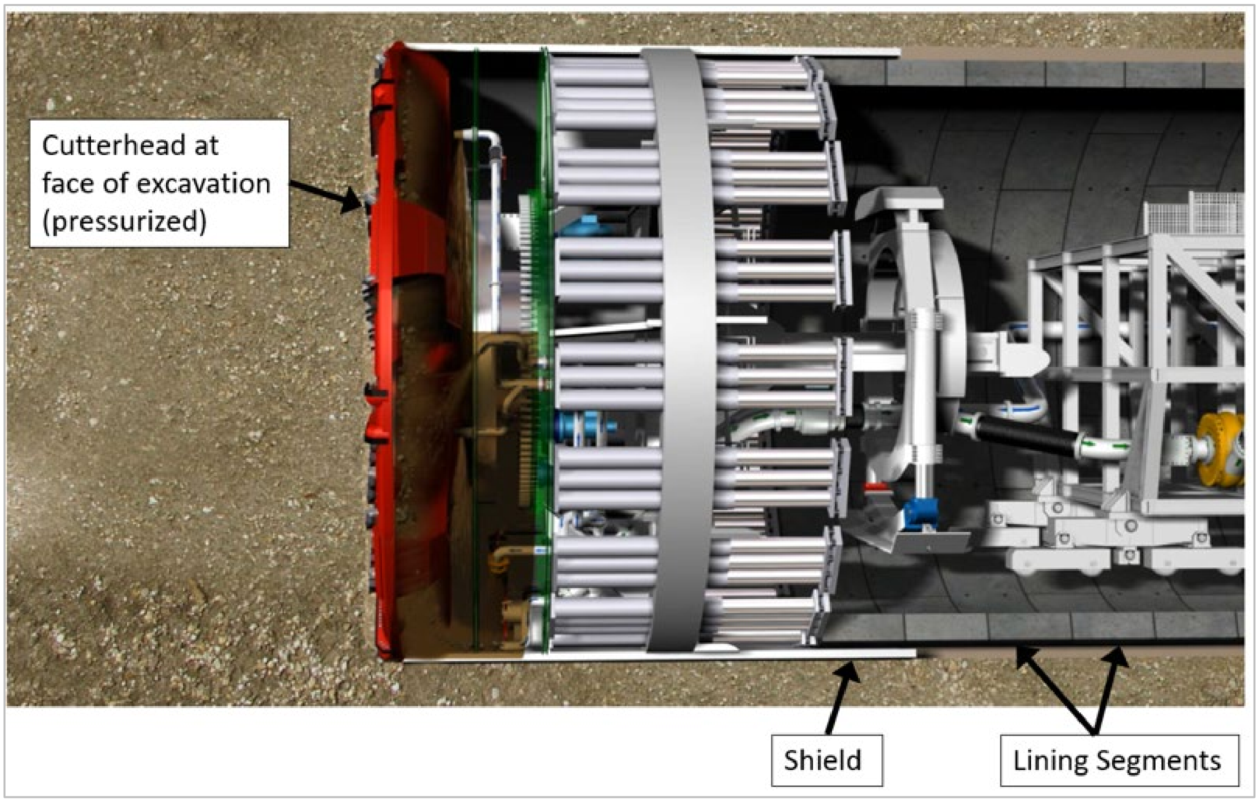
(Image credit: Herrenknecht) (reference (1))

Graphic 6: Example of a Pressurized-Face TBM, Showing the Cutterheads at the TBM Face and the shield Within Which the Watertight Lining is Installed Before the TBM Advances

The circular tunnel excavation is planned to be approximately 21-25 feet in diameter with a gasketed precast concrete liner (segment) approximately 10-12 inches thick, resulting in a final lined tunnel inside diameter of approximately 19–23 feet. The full loop would be developed from a single direction, with the TBM excavating at a decline from one box cut, turning around at the top of the ore body, and then inclining back towards surface, ultimately daylighting by breaking through into the second box cut.

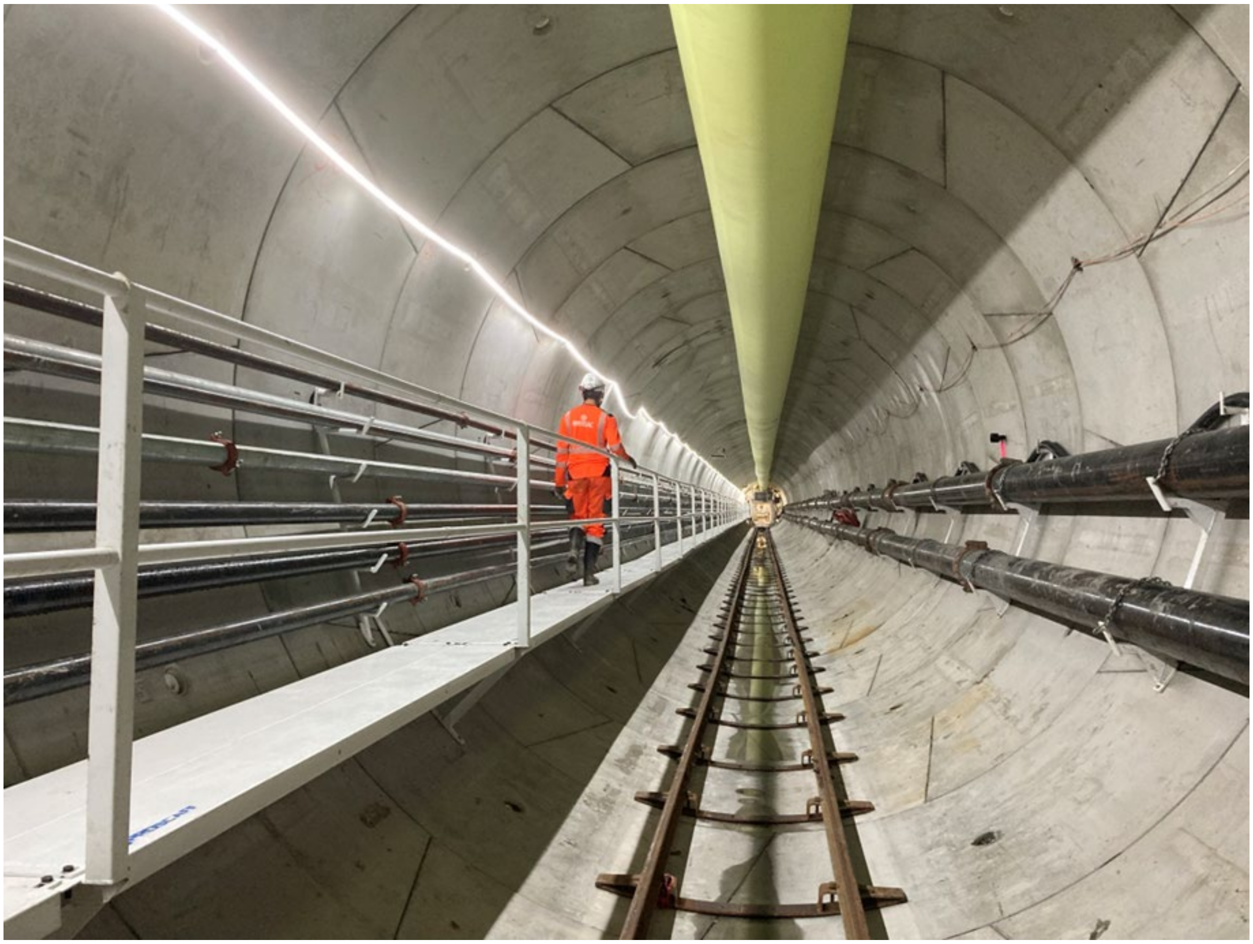
Pressurized-face Tunnel Boring Machines (TBMs) are commonly used in tunnel construction projects in saturated conditions (Graphic 6). They operate within a sealed environment, minimizing the impact on the surrounding area and controlling the flow of groundwater and excavated materials. Unlike open-face TBM systems that require water removal, pressurized-face TBMs excavate within a closed system by using air or water to exert pressure in front of the tunnel face, effectively "pushing back" against the groundwater and overburden pressure (Graphic 7). Mechanical excavation using the TBM cutter-head then occurs under this pressurized condition, controlling against water inflows.

Behind the pressurized face, a watertight shield is used to hold back the groundwater and surrounding soil/rock until the permanent liner is extended. After every excavation cycle of approximately 4 to 5 feet, a precast concrete lining with gasketed seals is installed within the watertight envelope, inside of the shield (Graphic 8). The TBM can then be pushed forward to begin the next excavation cycle. A gasket is utilized between the trailing end of the shield and the forward end of the tunnel lining, enabling a continuous seal along the length of the tunnel from the portal to the pressurized face. After the TBM advances, the lining is then grouted in place to fill any voids between the lining and the surrounding soil/rock.



(Image credit: Bessac)

Graphic 7: Diagram Showing the Pre-Cast Lining Segments Installation Inside the Shield Prior to the TBM Pushing Forward Against the Front-Most Lining Segment to Advance the Excavation



(Image credit: Bessac)

Graphic 8 Example of a TBM Tunnel Showing Pre-cast Lining Segments. Upon completion, temporary utilities and infrastructure would be removed to enable haul truck access.

The decline development with the TBM would generate surface overburden from the shallower portion of the decline excavation, as well as bedrock material (also referred to as “development rock”) once the bedrock contact is reached at depth. The surface overburden would be temporarily stored in the Overburden Stockpile (temporary) until ready for beneficial reuse on site as a construction fill material or underground backfill material. The development rock would be staged at the lined Backfill Materials Storage Area until used as an underground backfill material. See section “Overburden, Development Rock, and Backfill Materials Management” for more detail.

These Materials Storage Areas would be among the first facilities constructed in order to accept materials generated by the TBM operations early in the process. The TBM operations would also require several types of temporary facilities including emergency electrical generators, grout batch plant, materials storage and shop facilities, and other supporting infrastructure.

Temporary water treatment (mobile or modular units) would be used as necessary while the permanent water treatment plant is under construction. Mobile or modular units are available to treat a wide variety of parameters to ensure that water discharged to the local watershed meets water quality standards. The specific design will be defined during the EIS and permitting process. Temporary water treatment will include both the water generated by the TBM as well as runoff from the lined backfill materials stockpile (see the “Management of Contact Water” sections later in this document).

The temporary TBM facilities would be removed from the site once TBM operations are complete, except in certain cases where they are intended to also serve a permanent function for mine operations.

A TBM of similar size was successfully used in the construction of the light rail tunnels for the METRO Blue Line that connects the Minneapolis/St. Paul airport and downtown Minneapolis (reference (2)). Smaller TBM’s are also commonly used in Minnesota to construct sewer lines.

TBMs have also been used for the construction of various tunnels for mining projects for the purpose of access, conveyance of ore and development rock, drainage, exploration, power and water supply, as well as water diversion. Some examples in the 4 to 10m diameter range from the last 25 years are: Stillwater EB (USA, 1998-2001), Mineral Creek (USA, 2001), Los Bronches (Chile, 2009), Stillwater Blitz (USA, 2012-2013), Grosvenor Coal (Australia, 2013-2015), El Teniente (Chile, 2014), Woodsmith Mine (UK, 2019-2021), and Kemano (British Columbia, 2017-2020).

For mining applications, TBM methodology is often not the most economical tunneling approach. Additional key technical considerations that often play an important role in selecting TBM for mining can include: geological issues (rock type, alteration, strength, abrasivity, soil types, ground water inflows), depth of cover and potential for surface settlements, site access, portal locations, minimum tunnel size, tunnel support requirements, safety, environmental impacts, and project schedule. These same aspects have all been evaluated in comparison with conventional tunneling for the Tamarack Project. The TBM approach was selected as the preferred method for the following reasons:

- Safety - With a fully shielded TBM, the workforce is never exposed to the excavated or unsupported ground (particularly risky in saturated soil and mixed soil/rock conditions).
- Excavation below the water table – A pressurized face type of TBM selected for the project can minimize groundwater inflow and surface settlements by constantly keeping active face pressure at the excavation face in the saturated ground ("pushing back" against the groundwater and overburden pressure during advance as well as during standstill). This capability is particularly important in the overburden section but also applies to the bedrock portion.
- Environment - The pressurized face TBM selected for the project has significantly less environmental impacts in the overburden and transition zones compared to conventual tunneling methods such as cut and cover, open cut, soil freezing, or tunneling through areas with soil improvement. These conventual tunneling methods have a much higher risk of groundwater inflow into the excavation and a much larger surface footprint compared to the proposed TBM method.
- Schedule - The TBM methodology can achieve average advance rates greater than with conventional excavation, due to a less fragmented conventual tunneling cycle that doesn't require

temporary ground support. The TBM allows installation of the final lining in one pass (ground support and tunnel sealing).

Mining Cycle

After the completion of the TBM loop to establish initial underground access, two types of underground mining would occur: underground development and ore extraction. Both would utilize conventional drill-and-blast excavation methods to advance the mining "heading" (Graphic 9).

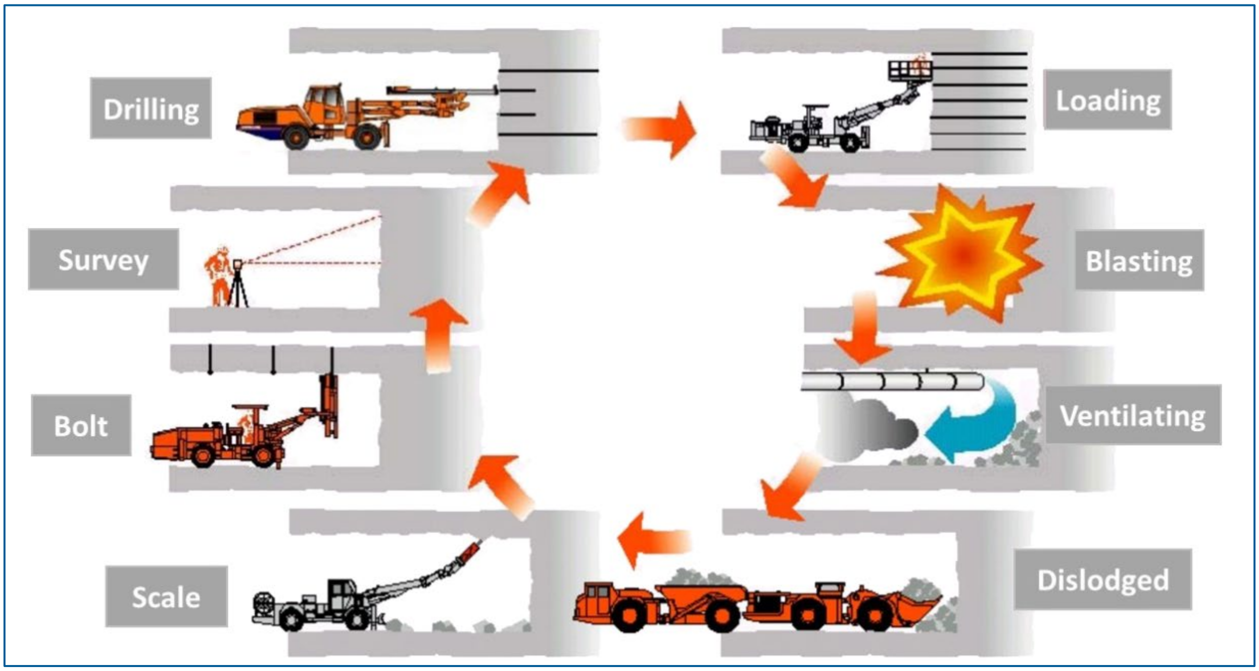


Image Credit: Sandvik (reference (3))

Graphic 9: Underground Drill-and-Blast Mining Cycle

The underground drill-and-blast mining cycle is as follows:

- Drilling – Blast holes are drilled into the rock face using a "jumbo" drill with one or more drill booms. Typical drilling depth is approximately 9-17 feet depending on ground conditions. Longer "probe holes" would also be drilled to check for groundwater conditions ahead (see "Management of Contact Water in the Underground Mine" section below).
- Loading – The blast holes are loaded with explosives, consisting of either ANFO (ammonium nitrate and fuel oil) in prill (pellet) form, or a water-resistant ANFO emulsion (explosive mixture).
- Blasting – The explosives are initiated to break the rock. Typically blasting would be initiated from surface using an electronic control system and would occur at set times (such as shift change) when all personnel are removed from the mine. In certain circumstances (primarily early in the mine life), blasting may occur "on-shift" with enhanced safety protocols.

- Ventilating – Fans and ducting are used to remove dust and blasting gases such as CO and NO_2 from the immediate area, and the primary mine ventilation system would then convey the gases to the mine exhaust circuit. Prior to release, the exhaust air would undergo a filtration or scrubbing process to reduce the amount of suspended dust and particulates.

- Removing Dislodged Material – The broken rock is then removed using a front-end loader. It may be loaded directly into a haul truck for transport to surface or placed in a nearby storage bay if no haul truck is available or if it is to remain in the underground.

- Scaling – Any loose or unstable pieces of rock attached to the tunnel roof or walls are removed using a pneumatic rock pick, a loader bucket, or a long, hand-held bar.

- Bolting – Rock support systems are installed in the blasted area to ensure long term stability of the excavation. Steel bolts 5-16 feet in length are installed at a regular pattern in the mine roof and walls, typically in rows spaced 3-4 feet apart. Wire mesh is also installed to catch any smaller rocks which may be located in between the bolts. Multiple types of bolts may be used, including "friction bolts" (with steel directly in contact with the rock) and "grouted bolts" (where a rebar or cable is grouted to the rock using a cementitious or resin grout). Bolts may be made of galvanized steel where longer-term corrosion resistance is required. During this phase, shotcrete (pneumatically applied concrete) may also be applied to the mine roof and walls, as necessary.

- Surveying – The area is surveyed to document the extents of the area excavated by the blast, and to align the drill in the proper direction for the next set of blast holes.

Talon is exploring the option to utilize battery-electric vehicles, as determined by pending studies considering operational, environmental, and infrastructural factors as well as equipment availability.

Underground Development

Underground development consists of all mining which takes place outside of the ore body. This category includes the spiral ramp which follows the ore body to depth, the "ore access" connector tunnels which link the spiral ramp to the orebody, ventilation excavations to enable airflow, infrastructure excavations such as underground shops and pump stations, storage bays for rock and materials, and various miscellaneous excavations (Graphic 4).

The majority of underground development would consist of horizontal or declined excavations ranging from approximately 15-25 feet wide and 15-25 feet high, with certain areas (such as maintenance shops) requiring larger dimensions. The ventilation and escapeway systems would also require vertical development (raises), which may range from approximately 3-18 feet in diameter and may be excavated using either drill-and-blast or mechanical methods.

The bedrock material generated by development activities is termed "Development rock" and would be primarily utilized for underground backfill. This material is split into three classifications depending on its sulfur content and intended use (see Overburden, Development Rock and Backfill Materials Management section).

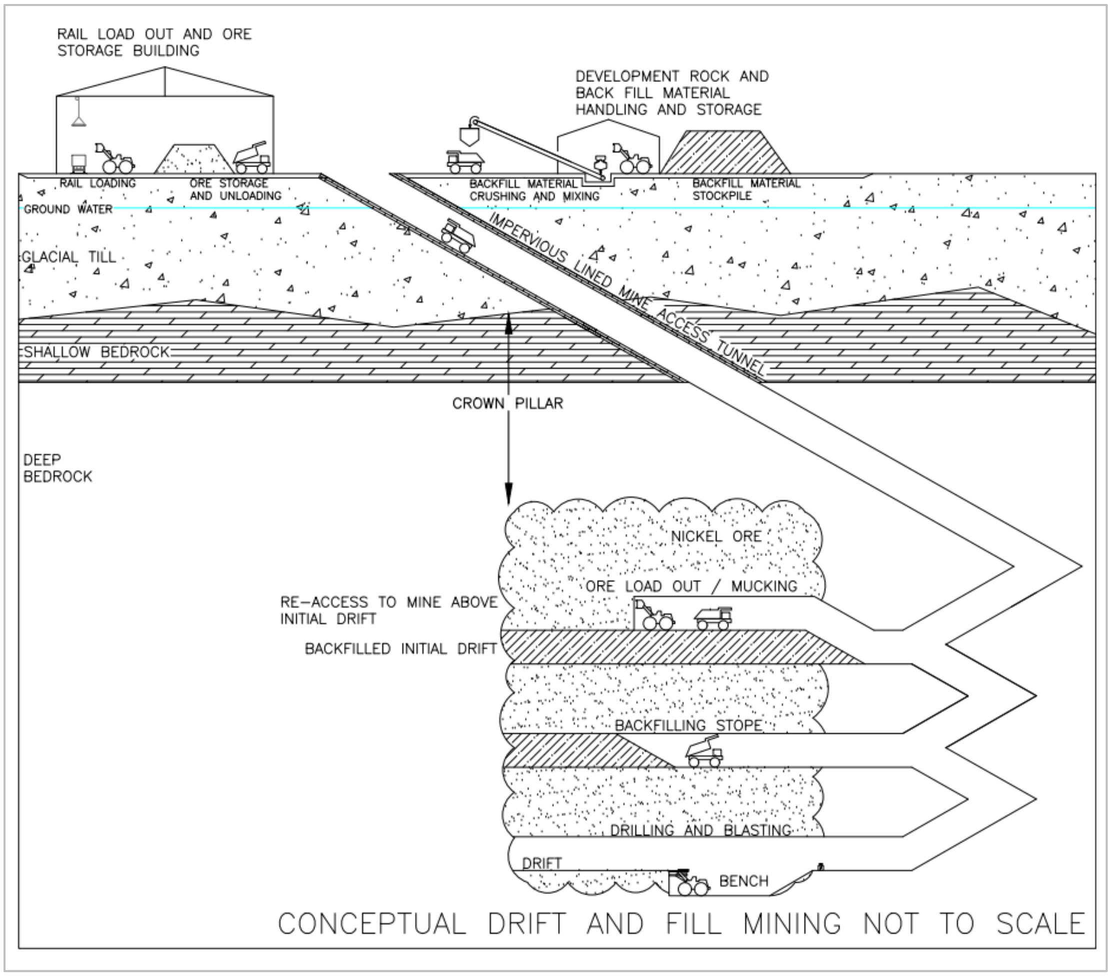
Groundwater inflow would be pumped from the underground mine to keep the workings dry (see "Management of Contact Water in the Underground Mine" section below).

The lower areas of the ore body would be accessed by extending development of the spiral ramp to depth while production begins in shallower ore zones. The great majority of underground development occurs during the first few years of the mine life, concurrently with the early years of production. There would be a lesser residual amount of development activity continuing until the final year of the mine life.

Underground development also includes various types of underground construction activities in addition to excavation work. These activities would extend through the first few years of the mine life, even after production has begun. This includes the assembly of maintenance shop facilities, water filtration and pumping infrastructure, fans and ventilation infrastructure, diesel and lubricant storage areas, battery charging stations, emergency refuge stations, electrical transformers and distribution equipment, explosives storage magazines, and a variety of other fixed infrastructure as typically seen in underground metal mining operations.

<u>Ore Extraction</u>

Ore extraction would be achieved by selective underground mining methods consisting of modified drift-and-fill with benching (Graphic 10). The geometry of the targeted ore within the Tamarack Resource Area is highly variable, ranging in thickness from approximately 6 to >80 feet and ranging in orientation from sub-horizontal (<15-degree dip) to sub-vertical (>75-degree dip). Use of this mining method enables the mining excavations to closely fit the ore geometry, minimizing dilution (unintentional excavation of non-ore rock located adjacent to the targeted ore). This is an important environmental and economic consideration since the ore (along with any co-mingled dilution) must be transported to the out-of-state processing site located in Mercer County, North Dakota.



Graphic 10: Simplified Illustration of Underground Mining Method

A tunnel-like excavation (drift) approximately 16 feet wide and up to 20 feet high would be excavated into the orebody until the far extent of the ore is reached. In areas where the ore is thicker than 20 feet high but less than approximately 40 feet high, the drift would follow the top of the ore and then the floor would also be mined to create an excavation up to approximately 40 feet high prior to backfilling.

In areas where the ore geometry is wider than a single drift, multiple drifts at the same elevation may be utilized, with the first being backfilled prior to beginning the second. Similarly, where the ore geometry is too thick to enable full recovery within the height of a single drift plus bench, multiple drifts at different elevations may be utilized, with the first being backfilled prior to beginning the second.

Underground Backfill

After ore extraction in a drift is complete, the excavation would typically be backfilled using Cemented Rockfill (CRF). In underground mining, the term backfill is used to describe the process of filling voids created by mining with suitable material, and is also the term used for said material, such as rocks or engineered substances (e.g., CRF). CRF would be produced on the surface at the backfill plant and transported to the underground mine by haul trucks.

The CRF would be made from cement mixed with crushed Class 1 or Class 2 development rock (described in the section titled Overburden, Development Rock and Backfill Materials Management) or externally purchased aggregate (crushed gravel). Varying proportions of cement would be added depending on the strength requirement of the area to be backfilled, with higher strengths required when subsequent mining is planned underneath the backfill rather than alongside. Typical cement additions would be in the range of 4%-10% by weight. Final addition rates would be determined during operation based on onsite strength tests. Additional fines may be added as necessary for strength, sourced from overburden material that was previously excavated during decline construction and/or from smaller crushed size fractions of development rock. No tailings usage is proposed within the Project.

The CRF would provide structural support for the subsequently mined drift, which would be located directly alongside, above or below the previous drift once the backfill has cured. At full production, several active drifting areas would be in the mining and backfill phases simultaneously.

After being deposited into the backfill area by a haul truck, the CRF would typically be spread with a bulldozer to create a compacted fill floor. Then, additional CRF would be added and pushed forward and upwards by a front-end loader with a jammer plate attachment. This enables an effective “tight fill” with little to no gap between the top of the backfill and the top extent of the excavation.

The shallowest planned ore mining is located approximately 300 feet below surface, leaving a “crown pillar” (distance between the shallowest orebody excavation and the surface) consisting of approximately 200 feet of bedrock plus approximately 100 feet of overburden. Numerical and empirical analysis of these planned excavations indicates crown pillar (Graphic 10) deflection of less than 0.2 inch at the surface, thus zero to negligible surface subsidence is expected. Additional subsidence analysis and supporting data will be incorporated into the EIS data submission.

Over 90% of the backfill volume is expected to be CRF. In certain instances where no additional mining would take place adjacent to the drift being backfilled, the high level of structural strength provided by CRF is not necessary and drift may be filled with other materials available underground, including uncemented rockfill consisting of Class 1 development rock or suspended solids filtered from the underground water handling system (see the section titled Overburden Development Rock and Backfill Materials Management).

Mine Ventilation

Underground ventilation would be achieved via the twin portals and declines. Propane-fired heaters located near the portals would keep the intake air above freezing temperature during winter months. Ventilation air would be drawn into one portal and down the intake decline, flowing through all the working areas underground and ultimately returning up the exhaust decline to an exhaust stack system near the secondary portal.

Prior to release, the exhaust air would undergo a filtration or scrubbing process to reduce the amount of suspended dust and particulates.

Explosives Storage and Use

Explosives would be stored underground in the underground explosives magazine and underground primer magazine. These excavations would be among the first to be developed after the completion of the TBM loop. During the short period while drill-and-blast excavation of these magazines is ongoing, the necessary explosives would be delivered to site daily and utilized on the same day to avoid the need for a temporary surface explosive storage facility.

Overburden, Development Rock, and Backfill Materials Management

The Project would manage materials such as:

- overburden (unconsolidated sediments and topsoil) excavated during construction of the surface facilities and TBM declines,
- development rock (bedrock) excavated during development of the mine,
- commercial aggregate (crushed gravel),
- fines (small particles) collected from underground settling sumps.

A geochemical materials characterization program is in progress that includes a comprehensive suite of static, kinetic, and mineralogical analyses on the geologic materials that will be moved during mining. These materials include overburden, development rock, Cemented Rockfill, fines, and ore. The geochemical data from this program will be used to support materials management.

Overburden generated during construction of surface facilities, excavation of the box cuts and declines would be stockpiled in the temporary overburden stockpile (Figure 3), separate from the development rock, for storage until use. Potential uses for this material include construction fill (particularly for the railway spur), mine backfill as a component of CRF, and reclamation. Best management practices would be applied to minimize dust generation from this stockpile.

Development rock would be classified into three categories based on sulfur content as a proxy for reactivity. The specific ranges of sulfur values used to differentiate between development rock categories would be based on the results of the material characterization program and determined during the EIS process.

- Class 1 development rock (lowest sulfur) could remain underground to be used as uncemented rockfill or road rock; alternatively, it could be brought to surface and staged in the backfill materials storage area for use as CRF.
- Class 2 development rock (mid-range sulfur) would be stored at the backfill materials storage area until it is combined with cement and deposited back underground as CRF.
- Class 3 development rock (highest sulfur) would be delivered to the ore storage and rail loadout facility, then shipped by railway to the out of state concentrator.

During a short interval when crossing the boundary between the overburden and bedrock, the TBM would generate a mixed material consisting of both overburden and bedrock cuttings. This mixed material would be treated as Class 2 development rock for handling and storage purposes and would be stored in the backfill material storage area.

The tunnel boring machine may generate small quantities of higher-sulfur (Class 3) development rock when passing through bedrock intervals containing elevated sulfur. To ensure minimal impacts, the Project will develop a comprehensive plan for the management of this material. As part of the plan, the small quantity of higher-sulfur rock would be blended with the lower-sulfur rock removed during TBM operation. Preliminary estimates indicate that such blending would result in a mixture that qualifies as Class 2 development rock. Rock excavated with the TBM would be placed in a lined storage area. Moreover, a water collection system would be put in place to gather runoff, which would undergo treatment to comply with relevant water quality standards.

Commercial aggregate would be used to make CRF after the development rock is depleted. Aggregate would be sourced from a nearby existing, permitted, third-party commercial aggregate operation at a rate of approximately 300,000-450,000 tons per year. This material would be delivered to the mine site via over-the-road truck. Provisions may also be made to receive aggregate via railway.

Fines collected from the underground settling sumps could be utilized as backfill in areas of the underground mine where cemented fill is not necessary for structural support. At the underground settling sumps, water pumped from the underground workings is allowed to decant through a filter cloth prior to being pumped to the water treatment plant on surface. Fines that accumulate in the underground settling sumps would typically be silt-sized particles consisting of varying portions of eroded roadbed material, drill cuttings from ore and development rock, blasting fines from ore and development rock, and shotcrete/cement fines. The fines would be analyzed prior to use as backfill, and an appropriate amount of alkaline material would be added if necessary to neutralize any potential acidity that could be generated from the material. This material is anticipated to account for less than 2% of total backfill volume. Fines would be transported directly from the underground settling sumps to the backfill location and would not be brought to surface.

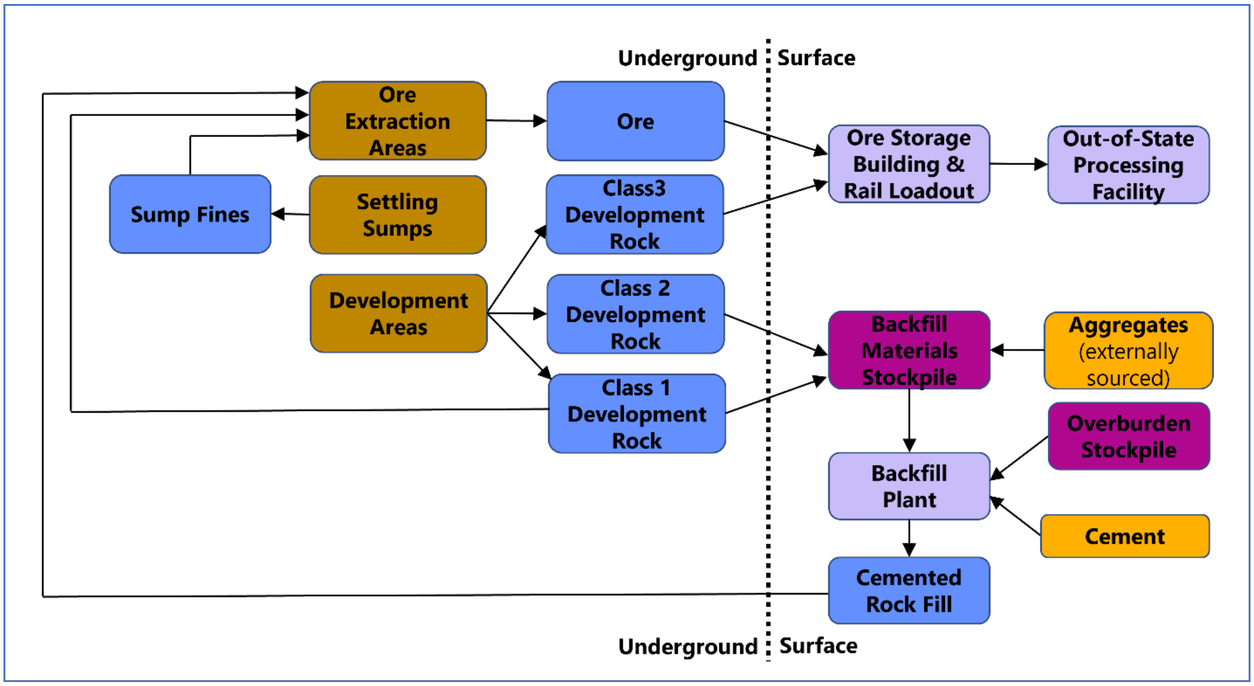
Separately, solids removed at the water treatment plant on surface would be evaluated for potential use as backfill during the EIS.

The materials that would be used to make CRF would be stored on the surface at the backfill materials storage area, located near the portals. The backfill materials storage area would be a lined stockpile pad designed with runoff containment and capture. Dust would be controlled using best management practices in accordance with the Project’s Fugitive Dust Control Plan developed as part of the EIS and permitting process. Material from the backfill materials storage area would be used for CRF. Because all development rock stored at the backfill materials storage area would be placed back underground as CRF, the backfill materials storage area would not host a permanent stockpile. It is estimated that the initial development rock stockpile would be completely utilized within approximately 4-5 years of the start of mining. Though development rock is generated throughout the mine life, the generation would peak early in the mine life and decrease in later years, eventually resulting in a deficit of internally sourced rock for Cemented Rockfill. After the development rock stockpile is depleted, externally sourced commercial aggregate would be needed to overcome this deficit. This aggregate would be staged at a section of the backfill materials storage area separate from the development rock to avoid having the delivery trucks from entering the contact water area (see “Water Management and Use” section below).

Backfill materials would be made into CRF at the backfill plant. The first step in producing CRF would be to crush materials to the appropriate size. The development rock, overburden, or aggregate would be fed into a crusher to produce the smaller particles needed to produce the CRF mix. The crushing facilities would be located in an enclosed building with dust-control systems. The crushed material would then be fed into a mixer where it would be blended with cement and water to make CRF. The blended CRF would be placed into the bed of a haul truck for return underground.

Cement needed to produce CRF would be delivered via trucks and conveyed using a pneumatic system to the cement storage bin adjacent to the backfill plant. The backfill plant may also be used to mix shotcrete for use underground.

Graphic 11 depicts the flow of materials between the underground and the surface.



Graphic 11: Flowchart of Material Transfer between Surface and Underground

<u>Ore Transport</u>

Ore and Class 3 development rock brought to the surface by haul truck would be delivered directly to the ore storage and rail loadout facility. This facility would be an enclosed building with exhaust air scrubbers or fabric filters to control dust emissions. It would be located in close proximity (approximately 450 feet) to the mine portals in order to minimize potential for contact with precipitation or generation of windblown fugitive dust during the brief interval between the haul truck exiting the portal and entering the building. The material would be stockpiled inside the ore storage and rail loadout facility until an ore train arrives.

Ore loaded onto the railcars would be run-of-mine material, meaning it would not be crushed prior to loading. The material in the railcars would be secured by rigid lids or covers, preventing it from coming into contact with wind and precipitation during transport. Inside the ore storage and rail loadout facility, the railcar cover would be removed, then a front-end loader or conveyor would load the ore into the railcar. The cover would be replaced before the railcar exits the ore storage and rail loadout facility.

Empty and loaded railcars would be stored at the railway yard adjacent to the ore storage and loadout facility. The Project would utilize a shuttle locomotive or rubber-tired railcar mover in order to transport the railcars between the ore storage & rail loadout facility and adjacent railway yard. BNSF locomotives would arrive to the site at regular intervals to collect loaded cars and return empty cars. An outgoing shipment of approximately 30-120 railcars would be collected by the BNSF approximately every 2-7 days. The Ore and Class 3 development rock would be transported by railway from the Project Area to a stand-alone processing facility with a concentrator located off-site in Mercer County, North Dakota.

An approximately 1.5-mile railway spur would be constructed to connect the ore storage and rail loadout facility to the existing BNSF railway line located immediately north of the City of Tamarack. The railway spur would primarily consist of a single track. At the location where the spur meets the existing BNSF track, there would be a wye-type intersection enabling train arrival and departure in either an eastern or western direction. There would be railway switches located at each intersection of the wye which would be accessed by a new gravel road for switch operation and maintenance. This road would be an extension of the existing driveway for the Talon-owned property immediately adjacent to the BNSF track (Figure 3).

Categories of Water

The Project would manage the following types of water:

- Contact water – Water that has directly contacted ore and/or development rock. Contact water would be generated both on the surface and in the underground mine and processed at the water treatment plant.
    - Contact water generated on the surface would include stormwater from the portion of the site where ore and development rock could be present. This area is referred to as the "contact water area" and includes the backfill materials storage area and areas with traffic from vehicles that enter the underground mine (Figure 4). This water would be processed at the water treatment plant.
    - Contact water captured in the underground mine would include groundwater inflow (including water that flows through the Cemented Rockfill) and water brought down from the surface for equipment use & dust control. This water would be collected underground and pumped to the surface and processed at the water treatment plant.

- Industrial stormwater – Stormwater that has contacted industrial activities or areas and is not contact water. The “industrial stormwater area” comprises the majority of the Project footprint which is outside the “contact water area” (Figure 4).

- Construction stormwater – Stormwater that has contacted construction activities or surfaces disturbed by construction.

- Construction water – Surface water and groundwater encountered during excavation or construction activities that is removed to dry and/or solidify a localized area to enable construction and water generated through the use of the TBM.

- Non-contact stormwater – Stormwater from natural, stabilized, and reclaimed surfaces that has not contacted ore, development rock, industrial activities, industrial areas, construction activities, or surfaces disturbed by construction activities.

- Non-potable water – Non-potable water would include both contact water that has been treated by the Contact Water Treatment Plant, as well as untreated water sourced from the well that would also feed the Potable Water Treatment Plant (see "Flowchart of Water Types and Handling” graphic below). This water would be used both underground and on surface, in both the contact area and the industrial stormwater area.

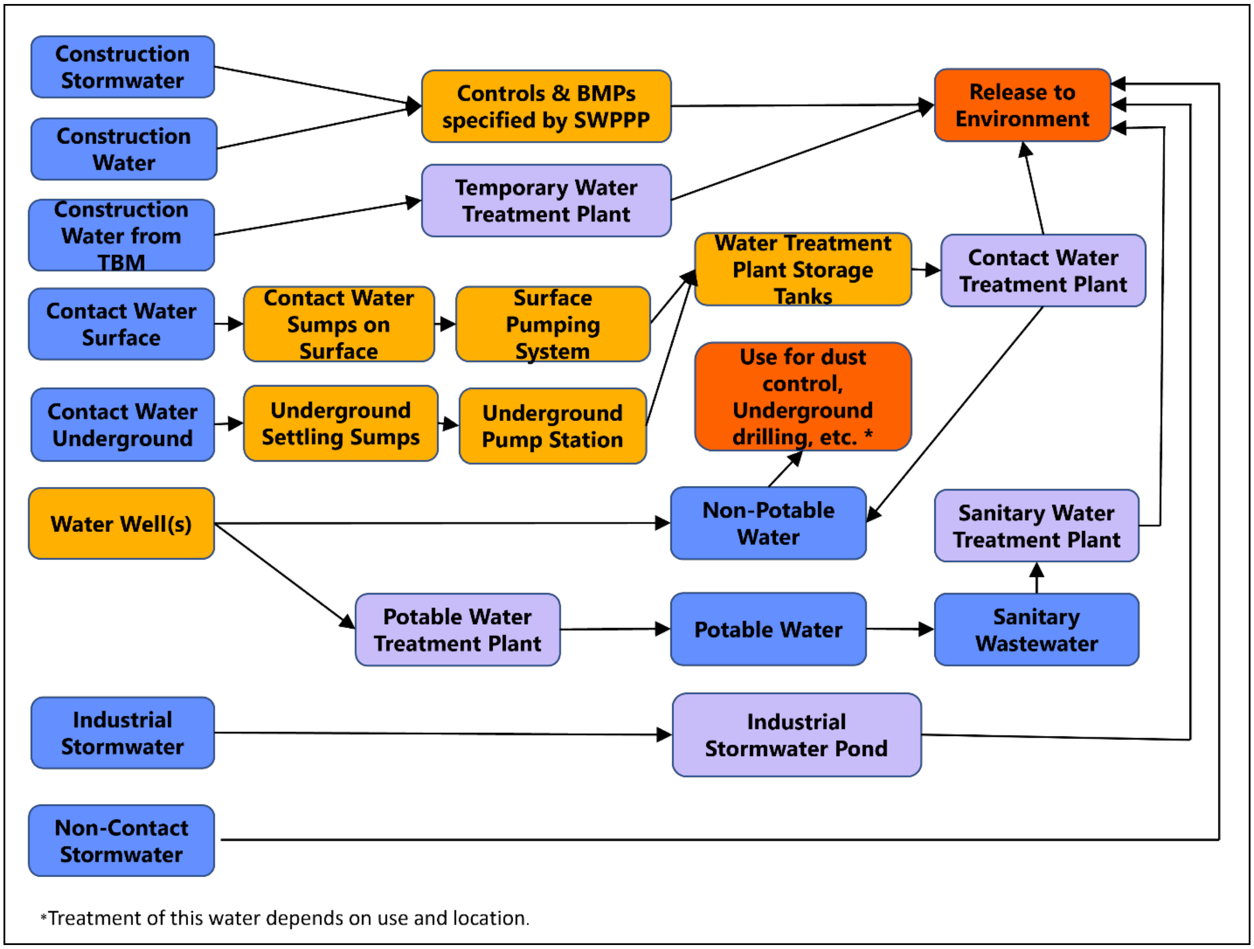
    - On surface, this water would be utilized for dust control on roadways and stockpiles, washing mobile equipment inside the maintenance facility building, washing equipment and surfaces inside various buildings, fire suppression sprinkler systems inside various buildings, batching of Cemented Rockfill at the backfill plant, and other minor uses.

    - Underground, this water would be utilized for cleaning mobile and fixed equipment, dust suppression during materials handling, dust suppression and drill bit cooling during drilling operations, shotcrete batching, and other minor uses.

- Potable water – Water to be used for drinking, showering, and other purposes in the mine offices and locker room areas.

- Sanitary wastewater – Water associated with personal hygiene, food preparation, or cleaning, collected from the mine offices and locker room areas.

Management of each type of water is described in the sections below and summarized in Graphic 12.



Graphic 12: Flowchart of Water Types and Handling

Management of Contact Water on the Surface

Talon recognizes and respects the community's concern about potential environmental impact, particularly as it relates to water quality. Our project team is committed to using advanced, effective, and sustainable technology to ensure that any water discharged from our operations is treated to applicable water quality standards.

Contact water would be managed through Project design and water management activities. Precipitation, stormwater runoff and snowmelt runoff from surface areas with mine traffic (i.e., vehicles traveling from the underground workings that could be in contact with ore) would be managed as contact water. Any vehicle that exits the contact water area would go through a vehicle wash, with wash water collected and managed as contact water.

Generation of contact water would be minimized at the surface facilities by storing ore and Class 3 development rock under cover (in the ore storage and rail loadout facility) and by restricting the area utilized by vehicles that enter the underground mine to as small an extent as is operationally feasible. The contact water area, shown in Figure 4, includes the backfill materials storage area and surface areas that would be trafficked by underground vehicles.

Several facilities, including the fuel storage tank area, the warehouse, and the equipment maintenance shop would be located at the boundary between the contact water area and the industrial stormwater area and would be accessible from both sides, minimizing the need for vehicles to enter or leave the contact area. Most vehicles operating in the contact area would therefore be “captive” and would rarely need to exit the area. A pneumatic cement transfer system would enable cement delivery trucks to offload into the cement bin at the batch plant without entering the contact water area.

Runoff from the contact water area would be transferred via lined ditches and collected in contact water collection sumps from which it would be pumped to above-ground storage tanks for storage prior to treatment. All sumps will include level sensors as well as a remote operation and monitoring system for the associated pumps which move the water from the sump to the contact water tanks at the Contact Water Treatment Plant. This infrastructure will be regularly inspected as part of preventative maintenance operations. The Contact Water Storage Tank Facility features a secondary containment area in the event of a tank leakage or failure. In the event of an extreme storm event (high intensity, short duration), in which the capacity to pump to the contact water storage tanks is exceeded by the rate of inflow into the contact water collection sumps, overflow water from the contact water collection sumps would be routed to the lined footprint of the backfill materials storage area, which would be designed to temporarily accept overflow contact water.

Contact water would be treated at the Contact Water Treatment Plant. The preferred option actively being explored is reverse-osmosis (membrane filtration), a technology that is successfully used by other mining operations and even in municipalities to produce potable water. Other treatment methods being considered include but are not limited to ion exchange, precipitation, nano-filtration, carbon filtration, biological treatment, etc. As responsible stewards of the environment, Talon is resolved to have a water treatment solution that meets or exceeds regulatory standards and safeguards water resources.

The section “Management of Non-Potable Treated Water” describes the management of the discharge from the water treatment plant.

<u>Management of Contact Water in the Underground Mine</u>

Generation of contact water underground would be minimized by actively controlling groundwater inflow to the mine. While most of the bedrock is highly competent with negligible primary permeability, the mine workings are expected to intersect local discrete zones and areas of enhanced permeability. When mining occurs in areas where enhanced permeability zones are expected to be encountered, probe holes would be regularly drilled in front of the advancing mining faces to confirm the extent and boundary of the upcoming permeability zone and evaluate the degree of water inflows.

If a predetermined rate of inflow and duration is detected by the probe hole, additional holes could be drilled which would be pressure-grouted using a resinous or cementitious grout which would reduce groundwater inflow prior to advancing the mine workings through the area. Additional grouting (filling the annular space, or space between the well pipe and external protective casing, with grout) and sealing of discrete zones of enhanced permeability would be conducted as needed to minimize groundwater inflow occurring after the mining excavation has advanced through the area. Minnesota Rules, part

4725.0100, subpart 30 defines grout as "a low permeability material used to fill the annular space around a casing, or to seal a well or boring. Grout is either neat-cement grout, cement-sand grout or bentonite grout."

Contact water from the underground mine would be collected at underground settling sumps where initial solids removal would take place. Contact water will then be pumped directly to the Contact Water Treatment Plant or pumped to the surface storage tanks if necessary.

Management of Industrial Stormwater

Industrial stormwater would be generated from portions of the site where precipitation, stormwater runoff, and snowmelt runoff come in contact with industrial activities or areas, with the exception of the areas where runoff is managed as contact water. The industrial stormwater area, shown on Figure 4, includes industrial surface areas without underground vehicle traffic and where ore and development rock are not being handled or stored.

Industrial stormwater would be managed in accordance with the requirements of a future NPDES/SDS permit and an associated Project-specific industrial stormwater pollution prevention plan (SWPPP). Best management practices (BMPs) would be specified in the industrial SWPPP and implemented to reduce or eliminate contact or exposure of pollutants to stormwater (e.g., material storage and management practices, spill prevention practices) or remove contaminants from stormwater (e.g., stormwater treatment systems) prior to discharge from the site.

Industrial stormwater would be routed through appropriate stormwater treatment systems, prior to discharging to the watershed near the northern boundary of the Project Area in accordance with a future NPDES/SDS permit.

Management of Construction Stormwater and Construction Water

Construction stormwater and any water removed during construction activities would be managed according to requirements of the Minnesota Construction Stormwater General Permit and a Project-specific construction SWPPP. BMPs would be specified in the construction SWPPP and implemented during construction to prevent erosion (e.g., temporary and permanent soil stabilization), control sediment (e.g., silt fences, sediment logs, temporary sediment basins), and otherwise prevent impacts to the environment (e.g., spill prevention practices, material storage and management practices). Construction stormwater and construction water would be treated by and discharged through appropriate BMPs to the watershed near the northern boundary of the Project Area.

Management of Non-Contact Stormwater

Non-contact stormwater encompasses stormwater runoff, snowmelt runoff, and other surface runoff and drainage from natural, stabilized, and reclaimed surfaces that have not contacted ore, development rock, industrial activities, industrial areas, construction activities, or surfaces disturbed by construction activities. Non-contact stormwater would not be actively managed and would continue to follow natural drainage pathways.

Management of Non-Potable Treated Water

Contact water treated at the Contact Water Treatment Plant would become non-potable treated water. This water would be discharged to the watershed near the northern boundary of the Project Area in accordance with a future NPDES/SDS permit. The watershed drains to the Tamarack River through a public drainage system that consists of a ditch and an altered natural stream (Figure 5).

A portion of the non-potable treated water would be utilized on site for dust control, the fire suppression sprinkler system, underground drill bit flushing, equipment washing, backfill mixing, and other uses. It is anticipated that non-potable treated water from the water treatment plant would be sufficient to meet these needs. However, an additional water supply well could be installed to supply the TBM and early mining if non-potable treated water is not sufficient to meet non-potable water demand early in the Project. For clarity, a well is defined in Minnesota Statutes 103I.005, subdivision 21 as an "excavation that is drilled, cored, bored, washed, driven, dug, jetted or otherwise constructed if the excavation is intended for the location, diversion, artificial recharge, monitoring, testing, remediation or acquisition of groundwater."

Management of Potable Water

Potable water would be sourced from a new well located in proximity to the facility and if needed treated at a potable water treatment plant. Potable water would be used for restrooms, showers, food preparation, and drinking water.

Management of Sanitary Wastewater

Sanitary wastewater would be treated at an on-site Sanitary Water Treatment Plant. Design and details of treatment methods for the Sanitary Water Treatment Plant will be provided for the EIS. The Sanitary Water Treatment Plant would be designed to treat water to meet all applicable water quality standards and all the conditions of a future NPDES/SDS permit. Regulatory requirements would be based on the water quality and designated beneficial uses of the receiving and downstream waters.

Treated sanitary water would be discharged to the same local watershed that would receive discharge from the Contact Water Treatment Plant, in accordance with a future NPDES/SDS permit. The decision whether to combine treated sanitary with non-potable treated water before discharging or discharge at two separate locations will be determined during the EIS and permitting process. Residuals from the Sanitary Water Treatment Plant would be evaluated for potential beneficial reuse or disposed of off-site at a licensed landfill.

Utilities

Project utilities would include electrical service, propane, diesel, compressed air, and water pipelines.

Electric power would be sourced from the existing 69kV Great River Energy transmission line that crosses through the north end of the Project Area. The Project would have an average electrical load of approximately 14-17 megawatts and a peak load of approximately 21-33 megawatts when in full production, dependent on the level of battery-electric equipment utilized and the design of the water treatment plants. A new substation would be constructed to accommodate Project power demand during operations. A short overhead branch line would be constructed to connect the substation to the existing transmission line. After the substation is commissioned and online, electrical power would be distributed around the site using a mix of underground conduits, surface raceways, and/or overhead power lines.

Prior to commissioning the substation, temporary construction power would be drawn from an existing substation near Tamarack and supplemented with diesel electrical generators to accommodate the larger power draw of the TBM. During operations, diesel electrical generators would be used as emergency backup power generation for critical systems required to protect life, the environment, and property.

Propane and diesel fuel would be stored in tanks adjacent to the vehicle maintenance shop. The diesel tanks would be situated at the boundary between the contact water area and industrial stormwater area, such that they could be accessed from the Contact Water area by underground equipment, but fuel deliveries could be made from the industrial stormwater side. The fuel storage area will feature a secondary containment structure.

Some of the underground equipment would utilize compressed air. A Compressor Building would be located near the portals which will supply compressed air to the underground workings. Smaller Compressor Stations would be located at the equipment maintenance shop and other locations around site where compressed air is required.

Pipelines for moving the various types of water around the mine site would be buried in underground conduits or placed on surface as appropriate. Where possible, the larger-diameter pipes which transfer contact water to the Contact Water Treatment Plant will be located on surface for rapid detection, repair of any leaks. Measures will be taken to prevent the contents of the pipes from freezing. A pipe bridge would be constructed to enable pipes containing the various types of water to cross over the railway yard.

<u>Support Facilities</u>

A variety of support facilities would be required to sustain the operation. The Maintenance Facility would have multiple heavy-vehicle repair bays sized to be able to accommodate the largest equipment utilized by the Project, including an overhead crane. This facility will also include a welding bay, an electrical repair shop, a light-vehicle repair area, a spare parts storage area, an office and locker room facility for maintenance personnel, and an equipment wash bay. The wash bay will have a “drive-through” configuration and will have doors to enable access from both the contact-water side and the industrial-stormwater side of the building. This enables vehicles leaving the contact area to exit onto the industrial-stormwater side after being washed, rather than needing to re-enter the contact area.

A warehouse will be located adjacent to the Maintenance Facility. This building is designed to be accessible from both the industrial stormwater area and the contact water area.

The Administration and Locker Room Building would include office space for management, administrative and technical personnel. It would also include locker rooms, showers, crew lineout areas, kitchen facilities, and conference rooms. It will also contain a garage facility for emergency response vehicles and gear.

Sufficient parking will be provided to accommodate all personnel expected to be onsite during a shift, plus some additional parking to accommodate the arrival of a limited amount of personnel from the subsequent shift prior to the departure of the previous shift's personnel. Overflow parking will be available near the water treatment plant; employees would access the Administration and Locker Room Building from this area via a pedestrian bridge over the railway yard.

A small security office and gate near the site entrance will control access and provide a location for visitor safety inductions, including a limited amount of parking spaces. This security office and gate will be located a short distance inward from the intersection with Kestrel Ave to prevent queueing delivery trucks from blocking Kestrel Ave while waiting to enter the gate to deliver materials.

<u>Reclamation and Closure</u>

Reclamation would occur during operations and closure. During operations, depleted ore extraction drifts would be backfilled with CRF as mining progresses, as described above. Upon mine closure, if there is no beneficial reuse for the site, surface and underground infrastructure would be removed, and disturbed surfaces would be regraded and revegetated. No stockpiles would remain at the site following closure activities.

Closure of the underground mine would progress in stages. When mining is complete, underground engineering controls such as water-tight barriers called bulkheads, or other controls may be constructed at various locations to minimize interaction between the deeper bedrock water and the shallower bedrock water. Other potential mitigation measures, such as increasing the rate of mine flooding will also be evaluated during the EIS. The mine access declines, and mine development areas excavated outside the orebody would not be backfilled.

Water from the underground mine would be managed to meet regulatory requirements. At the appropriate time, the mine portals would be sealed closed with bulkheads as required by Minnesota rules.

<u>Forthcoming Information</u>

As engineering progresses additional details on project design, construction, operation, and closure will be developed and available to support the development of the EIS. Additional details are anticipated in areas such as:

- Construction of the railway spur and associated surface disturbance;
- Project water balance and estimated discharge quantities;
- Details on the water treatment facilities, including anticipated technologies that would be utilized;
- Closure of the underground mine workings, including the engineering controls that would be employed.

c. Project magnitude:

Project magnitude is described in Table 4.

Table 4: Project Magnitude

Description	Number
Total Project Acreage	447.0 acre
Linear project length	2.13 mile
Number and type of residential units	Not Applicable
Residential building area (in square feet)	Not Applicable
Commercial building area (in square feet)	Not Applicable
Industrial building area (in square feet)	413,070 feet^2
Institutional building area (in square feet)	Not Applicable
Other uses – specify (in square feet)	No other Uses
Structure height(s) (feet)	Ranging from 11-78 feet

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

Objective Statement

Minnesota has led the nation in responding to catastrophic climate change by transitioning to clean, renewable energy. Minnesota has passed legislation to encourage electric vehicle adoption, promote solar, wind, and battery storage projects, and most recently has committed to "100 percent clean energy by 2040." This is a transition from a fossil fuel-centered energy system to a mineral-centered energy system.

Minnesota has in its geology some of the vital raw materials needed in the new mineral-dependent energy system. Through the careful extraction of nickel, copper, and iron, the proposed Tamarack Nickel Project can help Minnesota and the United States achieve a number of goals in the energy transition by producing these minerals with high standards for environmental protection, labor rights, and community engagement. Talon Metals' key objectives for the Tamarack Nickel Project are:

- Incorporate community input into mine design and shaping.
- Safely produce domestic sources of necessary minerals like nickel, copper, and iron required for clean energy systems. Recognizing these systems need to be scaled rapidly to address climate change and reduce fossil fuel consumption.
- Create high-paying, family-sustaining union jobs and ensure that working people are involved in project design and construction.
- Protect the natural environment and cultural resources in the region.

- Plan for closure of mine operations from the beginning. Work with local communities to envision post-mining land use.
- Train and develop a local workforce from the region that includes tribal members.
- Recognize the infinite recyclability of minerals like nickel and copper. Ensure traceability of minerals produced in Minnesota through generations of batteries in coordination with battery manufacturers and battery recycling companies.
- Respect tribal sovereign governments through information sharing to support government-to-government consultations. Incorporate tribal knowledge in project planning.
- Contribute over $100 million to local governments, school districts, and townships through royalty payments on state leases.

Purpose Statement

The purpose of the Project is to extract a domestic source of high-grade metal ore from the Tamarack Resource Area within the larger Tamarack Intrusive Complex containing nickel, copper, and iron. This ore would be shipped by railway and processed at a facility located outside of Minnesota in Mercer County, North Dakota which would generate nickel concentrate and copper concentrate products.

The nickel concentrate would be utilized as a feedstock for electric vehicle battery cathode production pursuant to the terms of Talon's existing offtake agreement with Tesla. The copper concentrate would be sold to a smelter and contribute to the global copper supply chain. Copper is a key component of electric vehicles as well as the equipment required for generation and transmission of renewable energy.

The need for the Project is driven by the growth in electric vehicle adoption and infrastructure improvements in the United States as part of efforts to reduce greenhouse gas emissions. Many of the mainstream electric vehicles use nickel-based battery chemistries. At this time, an efficient method of meeting demand for battery grade nickel via recycling does not exist and may not be for many years to come due to the rapid growth in electric vehicle demand, and there are not yet sufficient decommissioned batteries available to enable a fully "circular supply chain."

According to a report from the White House in 2021, there could be a large shortage of high-quality nickel in the next 3-7 years. Research and development in the EV sector indicate that the nickel content per battery will increase in the coming years as high nickel content in battery cathodes is rapidly being adopted by the EV industry. There is potential for a shortfall in nickel supplies due to this predicted increase in demand that could pose a risk to the global supply chain (reference (4)). As of September 2022, China controlled 68% of the nickel processing capacity (reference (5)). In 2022, estimated global nickel mine production increased by approximately 20%. Almost all of the increased production is attributed to Indonesia, home to one-quarter of the overall global nickel reserves, where China already has multibillion-dollar investments (references (4); (6)). Since the US is import dependent for about half of our domestic refined nickel consumption (reference (7)), the need for this Project is clear.

Alternative battery chemistries that do not require nickel are less frequently utilized in electric vehicles and are typically hampered by reduced energy capacity (vehicle range) and cold-weather performance. In the United States, numerous new electric vehicle battery manufacturing facilities have been announced for construction in the 2023-2028 timeframe, the great majority of which will produce nickel-based batteries.

Beneficiaries of the project would include:

- The citizens of Aitkin County and Central Minnesota, who would gain a new local economic driver and source of family-wage employment;
- The State of Minnesota, which would gain a significant source of revenue from taxes and royalties generated as a result of the Project;
- The United States battery industry, which would gain a stable source of domestic nickel, reducing current dependency on foreign suppliers such as Russia and Indonesia; and
- The United States, which would gain a key driver for the establishment of a domestic battery-materials supply chain, an important component for meeting its long-term goals for increased adoption of electric vehicles and reduction of greenhouse gas emissions.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ Yes ☒ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

None currently planned. There is ongoing exploration activity in the vicinity of the Project Area; however, given the uncertainty of the information that may be learned through exploration, no future development is currently planned. Should exploration yield potential for additional development, such activity would be subject to review under the Minnesota Environmental Policy Act and/or the National Environmental Policy Act as appropriate.

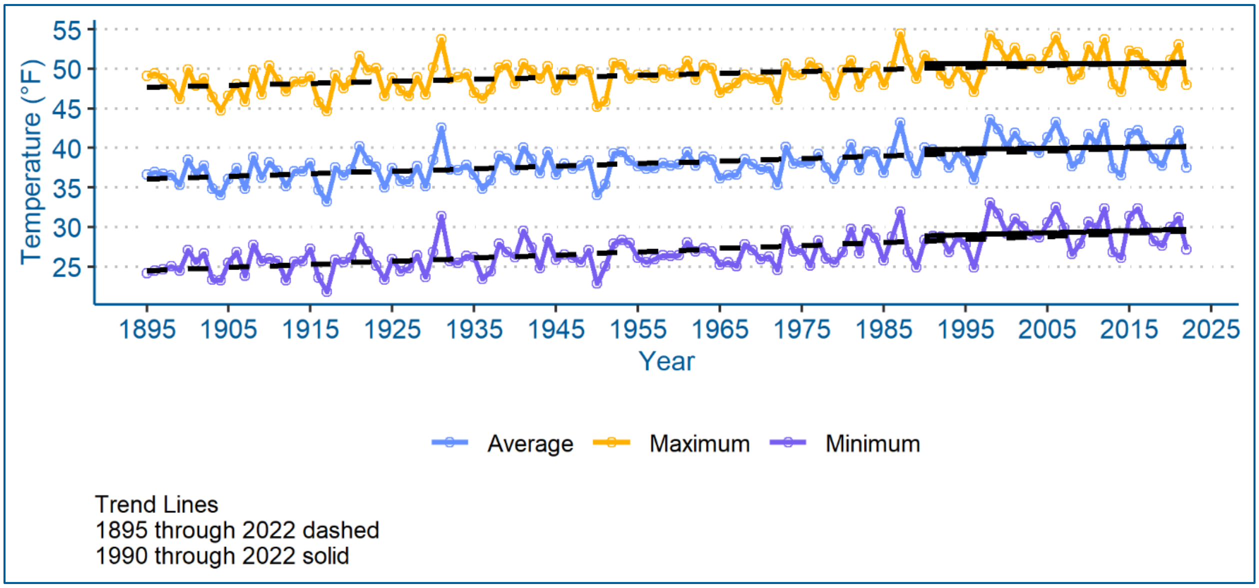
f. Is this project a subsequent stage of an earlier project? ☐ Yes ☒ No
If yes, briefly describe the past development, timeline and any past environmental review.

7 Climate Adaptation and Resilience

a. Describe the climate trends in the general location of the project (see guidance: *Climate Adaptation and Resilience*) and how climate change is anticipated to affect that location during the life of the project.

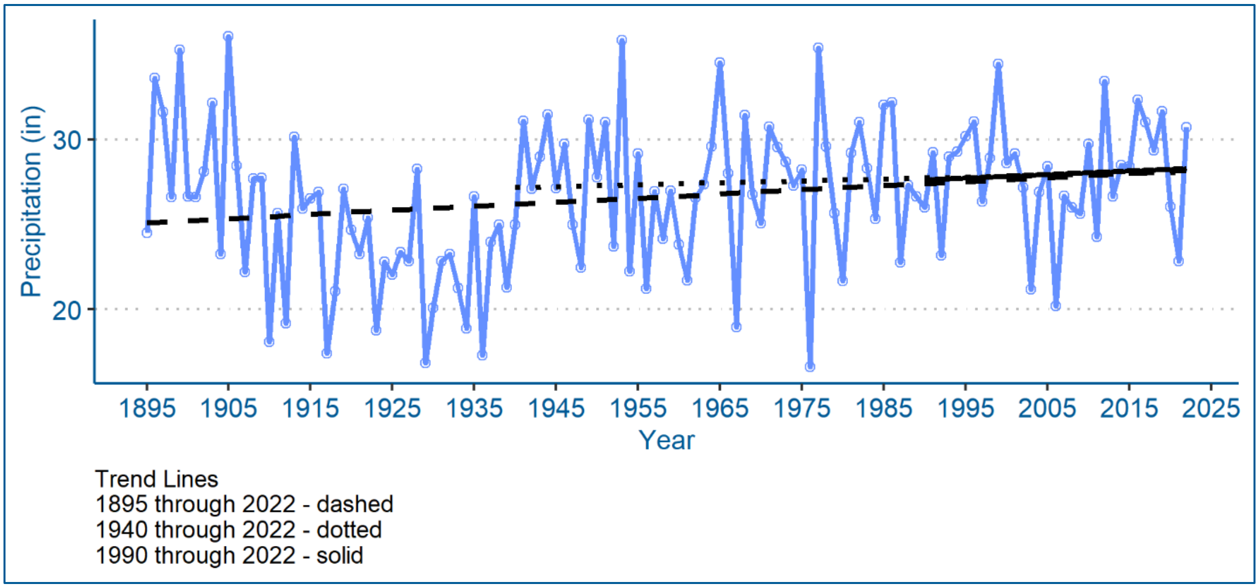
Historical climate trends for the region in which the Project Area is located were obtained from the Minnesota Climate Explorer Tool (reference (8)) and based on data provided by the National Oceanic and Atmospheric Administration (NOAA) National Center for Environmental Information (reference (9)). Historical temperature and precipitation trends for the Mississippi River – Grand Rapids watershed are summarized below.

Graphic 13 summarizes the historical climate trends within the region where the Project Area is located. Historical annual average temperature trends have increased by a rate of approximately 0.32°F/decade from 1895 through 2022 and 0.11°F/decade from 1990 through 2022. Maximum annual temperature trends have increased by a rate of approximately 0.25°F/decade from 1895 through 2022 and stayed nearly constant from 1990 to 2022 (-0.4°F/decade). Historical average minimum temperature trends have increased by a rate of approximately 0.39°F/decade from 1895 through 2022 and by 0.25°F/decade from 1990 through 2022 (reference (8)).



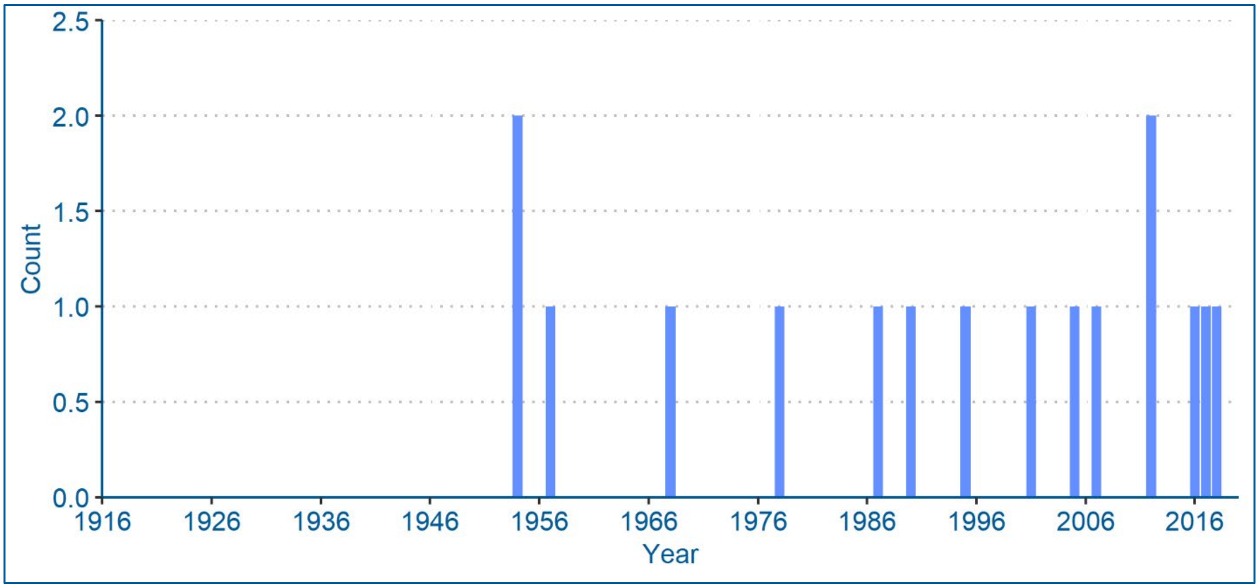
Graphic 13: Annual Temperature for the Mississippi River-Grand Rapids watershed from 1895 through 2022

Graphic 14 summarizes the historical annual precipitation within the region where the Project Area is located. The overall annual historical precipitation trends appear to have increased by approximately 0.24 in/decade from 1895 through 2022. However, the data is skewed by the drought period from 1910 to 1940. If the drought period from 1910-1940 is removed from the dataset, the total annual precipitation trend is approximately 0.11 in/decade from 1940 through 2022. The downward trend in precipitation appears to be increasing, from 1990 through 2022 the trend is 0.21 in/decade.



Graphic 14: Annual Precipitation for Mississippi River – Grand Rapids Watershed from 1895 through 2022

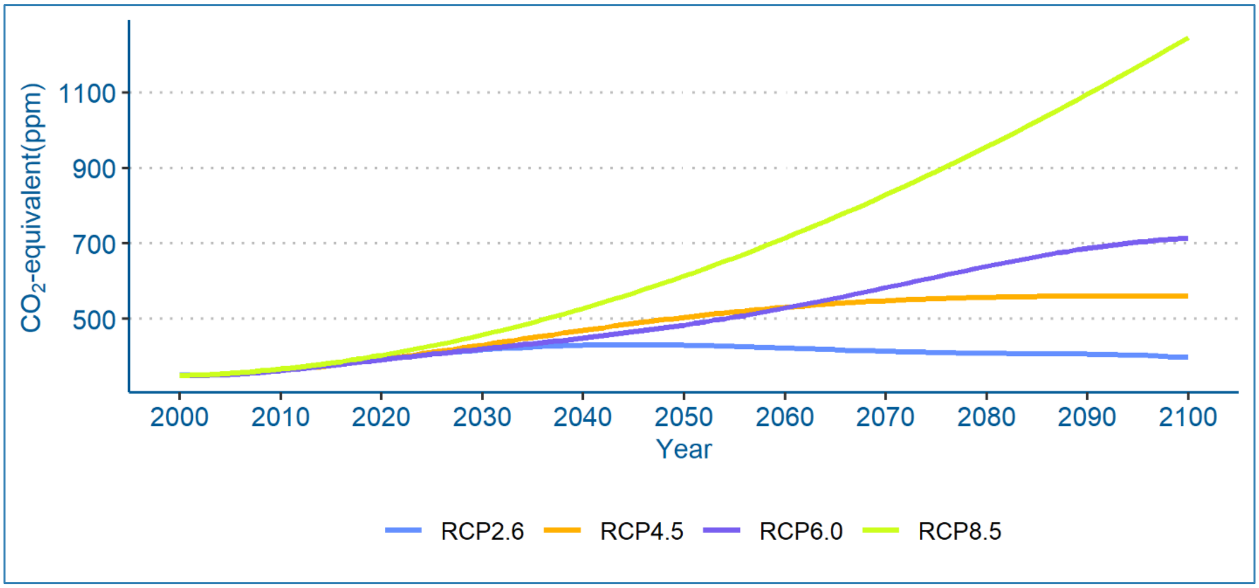
Even though there is a decreasing annual precipitation trend in the Mississippi River – Grand Rapids watershed, the number of severe storm events in northeast Minnesota has increased since 1950 (Graphic 15). The data presented in Graphic 15 represents the number of 100-year storm events from 1916 to 2020 for 38 precipitation stations in Northeast Minnesota.



Graphic 15: Number of 100-year Storm Events from 1916 to 2020 for 38 Stations in Northeast Minnesota

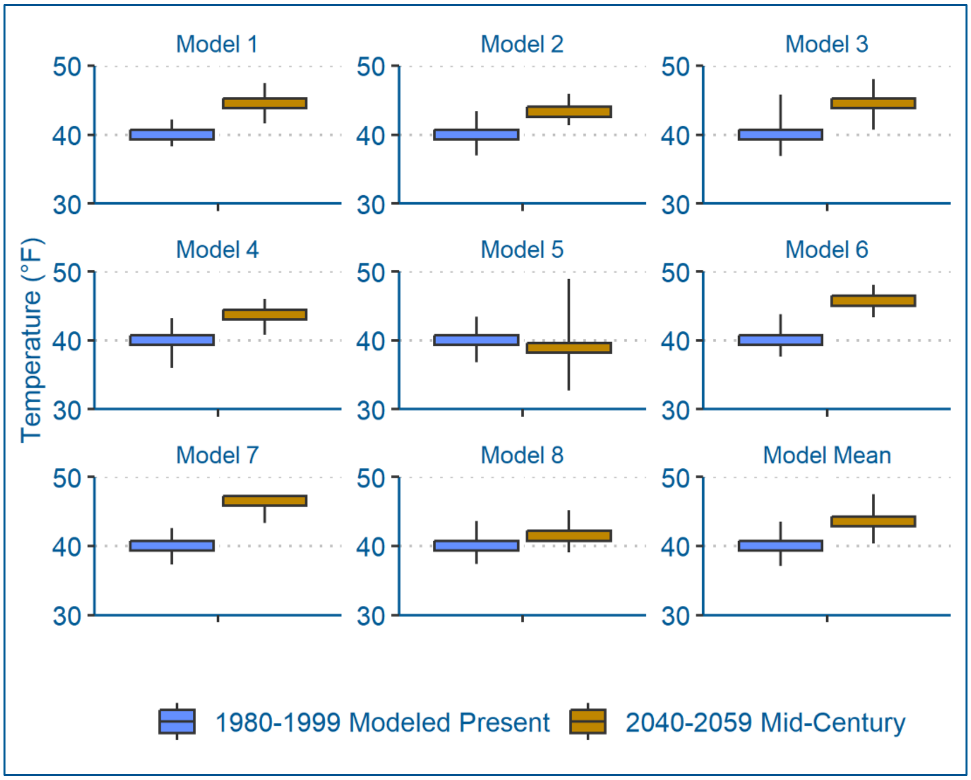
Project Future Climate

The future climate projections are based on a downscaled modeled dataset developed from the University of Minnesota (UMN). A more detailed analysis of the future climate will be addressed in the EIS. The UMN projected climate data summarized in two scenarios, Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP is a measure adopted by the Intergovernmental Panel on Climate Change (IPCC) to represent various greenhouse gas concentration pathways (Graphic 16). The numbers (i.e., 4.5 and 8.5) represent the amount of net radiative forcing the earth receives in watts per meter squared, where a higher RCP signifies a more intense greenhouse gas effect resulting in a higher level of warming. RCP 4.5 represents an intermediate scenario where emissions begin to decrease around 2040 and RCP 8.5 represents a scenario with no emissions reductions through 2100 (reference (10)). Radiative forcing is the term used to describe the impact trapped solar radiation has on earth's climate. The energy from this radiation can force climate change (reference (11)).



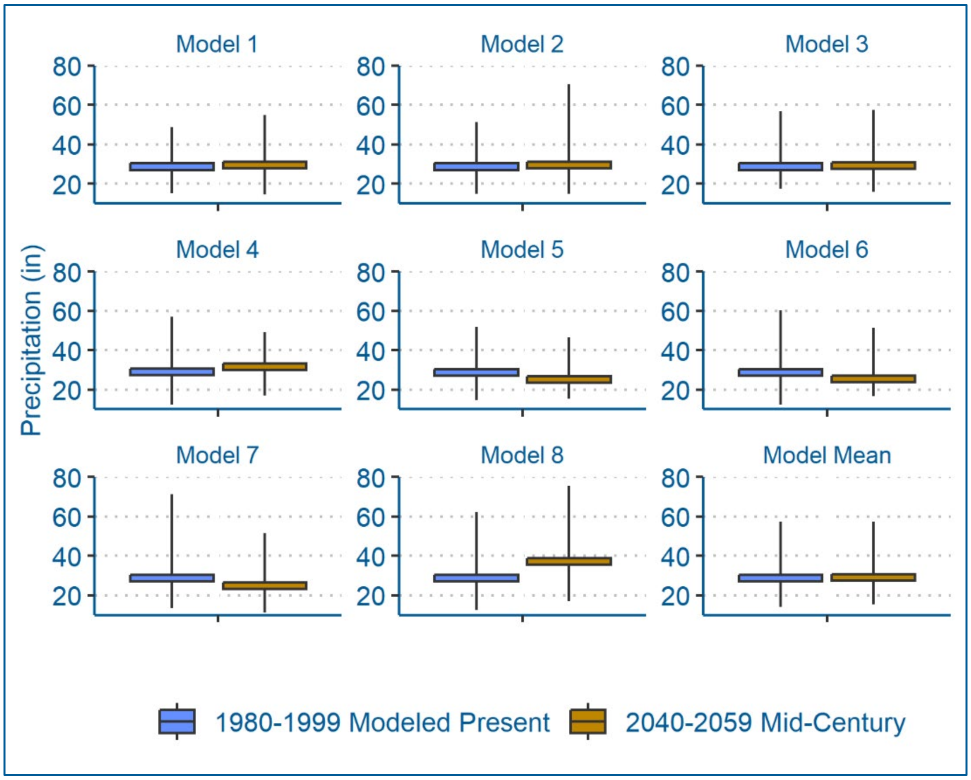
Graphic 16: Intergovernmental Panel on Climate Change Representative Concentration Pathways from the Fifth Assessment Report

The UMN projected data is published for eight different climate models (reference (10)). Graphic 17 shows the projected change in average temperature for the Mississippi River – Grand Rapids watershed. Changes in future annual average temperature projections for the Mississippi River - Grand Rapids watershed vary by climate model from the 1980-1999 30-average baseline. For 2040 to 2059 under RCP 4.5, the temperature is projected to change by -3% (38.9°F) to +16% (46.6°F) across the models with an average increase of +9% (43.6°F) (reference (10)). Graphic 17 shows modeled temperature trends in a different format.



Graphic 17: Projected Annual Temperature Trends in the Mississippi River – Grand Rapids Watershed

Graphic 18 shows the projected annual precipitation trend for the Mississippi River – Grand Rapids watershed. Changes in future annual average precipitation projections for the Mississippi River – Grand Rapids watershed vary by climate model from the 1980-1999 30-average baseline. For 2040 to 2059 under RCP 4.5, annual average precipitation is projected to change by -14% (24.8 in) to +29% (37.1 in) across the models with an average increase of +1% (29.0 in) (reference (10)).



Graphic 18: Projected Annual Precipitation Trends for Mississippi River – Grand Rapids Watershed

The EPA Climate Resilience Evaluation and Awareness Tool anticipates an increase in 100-year storm intensity of 13.5% in 2030 and 26.3% in 2060 (reference (12)). The EPA Streamflow Projections Map anticipates an increase in annual daily average streamflow by a ratio of > 1.2 to 1.4 in 2071 to 2100 (RCP 8.5) compared to baseline historical flow (1976 to 2005) (reference (13)).

Project operations are anticipated to last 7- to 10-years and therefore long-term climate change, with the exception of the already observed increase in extreme rainfall events, will have minimal impact on the location. Because the UMN future climate datasets are presented in 30-year averages that do not include the years of Project life (2040-2059 and 2080-2099), a more detailed analysis of the climate change impacts during the project life will be addressed in the EIS.

b. For each Resource Category in the table below: Describe how the project's proposed activities and how the project's design will interact with those climate trends. Describe proposed adaptations to address the project effects identified.

Given the relatively short project life of 7- to 10-years), long-term climate changes are unlikely to have a major impact on the project. However, the region has experienced more intense rain events in recent years, and this will be incorporated into project design. Table 5 describes adaptations that could be utilized to address future intense rain events.

Table 5: Summary of Climate Considerations and Adaptations

Resource Category	Climate Considerations	Project Information	Adaptations
Project Design	More frequent and intense rain events	The Project would convert an open area to an industrial area. This would result in loss of wetlands and associated flood storage within the Project footprint. In addition, loss of forest cover and wetlands could increase stormwater run-off and decrease carbon sequestration.	Project would be designed to handle extreme rain events. Existing vegetation would be maintained as much as possible Additional buffer strips and vegetation will be planted where feasible
Land Use	[1]	N/A	N/A
Water Resources	[1]	N/A	N/A
Contamination/ Hazardous Materials/Wastes	[1]	N/A	N/A
Fish, wildlife, plant communities, and sensitive ecological resources (rare features)	[1]	N/A	N/A

N/A = not applicable

[1] Due to the small footprint and short duration of the Project, it is not anticipated that there would be any climate associated impacts related to Land Use, Water Resources, Contamination/ Hazardous Materials/Wastes, Fish, wildlife, plant communities, and sensitive ecological resources (rare features).

8 Cover Types

Estimate the acreage of the site with each of the following cover types before and after development:

Cover types in the Project Area before, during and following Project development are summarized in Table 6. Green infrastructure elements before and following Project development are summarized in Table 7. Tree coverage before and following Project development is summarized in Table 8. Slight variations between totals in these tables may occur due to rounding.

Table 6: Existing and Proposed Cover Types

Cover Types within Project Boundary (Surface and Underground)	Before (acres)	Change due to Operations	During Operations (acres)	Change due to Closure	After Closure (acres)
Wetlands, shallow lakes (<2 meters deep) and ditches (public drainage systems)	302.2	-21.7	280.5	1.5	282.0
Deep lakes (>2 meters deep)	0	0	0	0	0
Wooded/forest	57.9	-15.8	42.1	0	42.1
Rivers and/streams	0	0	0	0	0
Brush/Grassland	24.4	-16.5	7.9	81.5	89.4
Cropland	0	0	0	0	0
Livestock rangeland/pastureland	49.1	-25.1	24.0	0	24.0
Lawn/landscaping	0	0	0	0	0
Green infrastructure TOTAL (from Table 7)	0	0	0	0	0
Developed/Impervious surface	13.4	77.6	91	-81.5	9.5
Industrial Stormwater Pond (wet sedimentation basin)	0	1.5	1.5	-1.5	0
Other (created upland)	0	0	0	0	0
TOTAL	447.0	0	447.0	0	447.0

Table 7: Existing and Proposed Green Infrastructure

Green Infrastructure	Before (acres)	After (acres)
Constructed infiltration systems (infiltration basins/infiltration trenches/ rainwater gardens/bioretention areas without underdrains/swales with impermeable check dams)	0	0
Constructed tree trenches and tree boxes	0	0
Constructed wetlands	0	0
Constructed green roofs	0	0
Constructed permeable pavements	0	0
Other (describe)	0	0
TOTAL	**0**	**0**

Table 8: Existing and Proposed Trees

Trees	Percent	Number
Percent tree canopy removed, or number of mature trees removed during development	24.4	Unknown
Number of new trees planted	[1]	Unknown

[1] As potential mitigation measures for visual and noise impacts, the Project is considering augmenting the existing natural buffer with additional trees. However, the quantity and extent have not been determined.

9 Permits and Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rule 4410.3100.*

Anticipated Project permits and approvals are summarized in Table 9.

Table 9: Summary of Required Permits/Approvals

Unit of Government	Type of Permit/Approval	Status
United States Army Corps of Engineers	Clean Water Act Section 404 Permit Includes Section 106 Consultation with the State Historic Preservation Office and Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS)	Pending submittal
United States Fish and Wildlife Service	Section 7 determination of effect concurrence	Pending submittal; issued with Section 404 Permit
United States Environmental Protection Agency	Underground Injection Control Permit*	Pending submittal
Minnesota Department of Natural Resources (DNR)	Permit to Mine	Pending submittal
DNR	Natural Heritage Information System Protected Species Review	Pending submittal
DNR	Work in Public Waters Permit	Pending submittal
DNR	Water Appropriations Permit	Pending submittal
DNR	Wetland Conservation Act Replacement Plan Approval	Pending Submittal
DNR	License to Cross Public Waters	Pending Submittal
DNR	License to Cross Public Lands	Pending Submittal
DNR	Lease/Easements on Public Lands	Pending Submittal
DNR	Aquatic Vegetation Removal Permit	Pending Submittal
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Individual Wastewater Permit	Pending submittal
MPCA	NPDES/SDS Industrial Stormwater General Permit (or combined with Individual Wastewater Permit)	Pending submittal
MPCA	NPDES/SDS Construction Stormwater General Permit	Pending submittal
MPCA	Section 401 Water Quality Certification	Pending submittal; issued with Section 404 Permit
MPCA	Air Permit	Pending submittal

Unit of Government	Type of Permit/Approval	Status
MPCA	Hazardous Waste Generator License	Pending submittal
MPCA	Aboveground Storage Tank Notification	Pending submittal
MPCA	Aboveground Storage Tank Permit	Pending submittal
Minnesota Department of Health (MDH)	Water Supply Well Notification	Pending submittal
Minnesota Department of Transportation (MDOT)	Railroad Warning Signal Operator License	Pending submittal
State Historic Preservation Office (SHPO)	Section 106 concurrence	Pending submittal; issued with Section 404 Permit
Aitkin County	Building Permits	Pending submittal
Aitkin County	Subsurface Sewage Treatment System Permit	Pending submittal

* Note: Final determination of needed permits/approvals will be determined as part of the EIS.

Cumulative potential effects may be considered and addressed in response to individual EAW Item No. 10-20, or the RGU can address all cumulative potential effects in response to EAW Item No. 22. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 21.

Cumulative potential effects are discussed in Section 21.

10 Land Use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks and open space, cemeteries, trails, prime or unique farmlands.

The Project is in Aitkin County on a combination of state and private lands within the 1855 Treaty boundary. There are a handful of structures within the Project Area, including farmsteads and infrastructure associated with Talon's current exploratory drilling program. Existing land use around and within the Project Area consists of industrial development (environmental studies, geophysical surveys, and exploratory drilling), farmsteads and associated pastures/hay fields, areas of upland forest, timber harvesting tree plantations, and large wetland complexes. Some of the land in the area was ditched and drained several decades ago for agricultural purposes.

A snowmobile trail traverses through the southern part of the Project Area (Figure 6) and much of the state land in the area is used for hunting; however, no parks or other recreational resources are present in the Project Area. Additional information regarding the cultural resource potential for the Project is discussed in Section 15 (Historic Properties). There are no cemeteries located in the Project Area. Small areas of prime farmland (6% of the Project Area) and prime farmland if drained (10% of the Project Area) are located in the southern part of the Project Area; however, the majority of the Project Area (84%) is not classified as prime farmland per the United State Department of Agriculture - Natural Resources Conservation Service classifications (reference (14)).

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The Project Area is located just north of the City of Tamarack in Clark Township. The City of Tamarack is currently in the process of developing a comprehensive land use plan. No comprehensive land use plan exists for Clark Township (reference (15)).

The Project Area is located in Aitkin County and falls under the Aitkin County Comprehensive Land Use Management Plan (Aitkin County Plan) (reference (16)). The mining activity associated with the Project would result in a further conversion of land use from open to industrial land use. The Aitkin County Plan discusses mineral resources in the context of commercial and industrial development and promotes continued, but careful, exploration of mineral resources so the location and extent are known. Furthermore, the Aitkin County Plan emphasizes that extraction of minerals should follow state mineral regulations and assures environmental protection for all new non-sand and gravel mining proposals (reference (16)).

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The Project is located in an area zoned by Aitkin County as Open and Farm Residential; the portion of the Project Area located near the City of Tamarack is identified as "City" in the Aitkin County zoning map (Figure 6).

Example land uses in areas zoned as Open include the following: duplex dwelling, dwelling – secondary unit; agricultural and forestry uses; and floodplains, swamp lands, and other areas unsuitable or unsafe for development (reference (17)). Per the Aitkin County Zoning Ordinance, mining in areas zoned as Open or Farm Residential may occur in accordance with the Aitkin County Mining and Reclamation Ordinance.

As stated in the Aitkin County Zoning ordinance, Section 6.01 "the Mining of metallic minerals …", as defined in Minnesota Statutes, sections 93.4-93.51, are regulated under the provisions of the Aitkin County Mining and Reclamation Ordinance (reference (18)).

iv. If any critical facilities (i.e., facilities necessary for public health and safety, those storing hazardous materials, or those with housing occupants who may be insufficiently mobile) are proposed in floodplain areas and other areas identified as at risk for localized flooding, describe the risk potential considering changing precipitation and event intensity.

No critical Project facilities would be located in FEMA-delineated floodplains or areas identified as at risk for localized flooding.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The conversion of land use from open to industrial land use would occur as a result of the Project. The Project would be compatible with current zoning and the Aitkin County Plan. As noted above, the Aitkin County Plan promotes exploration of mineral resources that follow state mineral regulations and assure environmental protection (reference (16)).

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 10b above and any risk potential.

With a conditional or interim use permit, from Aitkin County, the Project would be compatible with current land uses; as such, no land use mitigation measures are incorporated into the Project.

11 Geology, Soils, and Topography/Land Forms

a. Geology – Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

Surficial Geology

Quaternary deposits include glaciolacustrine (glacial lake) sediments, till and re-worked till deposited by glacial ice, outwash and glaciofluvial sands and gravels (Figure 7). The glaciolacustrine deposits in the Project Area appear to be composed of clayey sediment and fine-grained sand with silt and clay layers (reference (19)). Various layers of till, outwash, and glaciolacustrine sediments are present below the surficial sediments. These deposits represent a complex sequence of sediment recording multiple advances and retreats from the last glaciation which spanned 10,000-100,000 years ago. The glacial stratigraphy in the Project Area includes a relatively thick (typically 100-130 feet) package of glacial sediments, with western-sourced pre-Wisconsinan tills and pre-Late Wisconsinan or pre-Wisconsinan Superior lobe tills overlain by the Wisconsinan Rainy Lobe (northeast-sourced) Independence Formation. In turn, the Independence Formation is overlain by the Superior-basin sourced Cromwell Formation, and lastly by the Aitkin Formation. The Aitkin Formation consists of Glacial Lake Aitkin 2, Prairie Lake, Nelson Lake and Alborn members containing sediments deposited from the advance and retreat of the St. Louis-sublobe. The result of this depositional history is a complex layering of coarse and fine-grained sediments, ranging from predominantly sand to predominantly silt/clay, along with mixed layers of diamicton. Individual layers vary in thickness and may or may not be laterally extensive.

Bedrock

Bedrock in the Project Area consists of ultramafic to mafic igneous rock of the Tamarack Intrusive Complex (TIC) related to the early evolutions of the 1.1 billion years ago (Ga) Mid-Continent Rift which intruded into slates and graywackes of the Thomson Formation (Figure 8) (references (20); (21)). The Thomson Formation is part of the of the Paleoproterozoic Animikie Group which consists of metasedimentary rocks that were deposited in a deep-water basin that formed adjacent to a newly forming mountain belt to the south during the Penokean Orogeny (approximately 1.8 Ga) and subsequently was regionally metamorphosed. In the Project area, the Thomson Formation has been subsequently metamorphosed by contact with the TIC in a zone approximately 100-300 feet thick along the TIC contact (reference (21)). The Thomson Formation strata are folded by nearly upright, open regional folds with single, subvertical axial-planar slaty cleavage (reference (21)). Sedimentary rock of the Cretaceous Coleraine Formation is regionally present overlying the Thomson formation though it is not mapped in the Project Area.

The TIC hosts nickel-copper-cobalt sulfide mineralization with associated platinum, palladium, and gold. The intrusion, which is completely buried beneath the Quaternary-age glacial and fluvial (unconsolidated) sediments, consists of a curved, elongated, unit striking north-south to southeast over 11 miles. The configuration resembles a tadpole shape with its elongated, northern tail up to 0.6 miles wide and large ovoid shape body, up to 2.5 miles wide, in the south. The northern portion of the TIC hosts the mineral resources that would be developed as part of the Project. Mineralization within the TIC can be divided into three basic types: a massive sulfide unit hosted in the metamorphosed sediment; a semi-massive sulfide unit composed of net textured sulfides within the intrusion; and a disseminated sulfide unit composed of mostly intrusive rock with discrete sulfide blebs. In general, the intrusive body is massive, competent rock.

Susceptible Geologic Features

No susceptible geologic features are present in the Project Area related to bedrock or unconsolidated deposits. Limestone deposits are not present in the region, and no sinkholes or karst conditions exist. Shallow groundwater is present, and groundwater information is presented in the water resources section (Question 12).

b. Soils and topography – Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 12.b.ii.

Topography

Approximately 85% of the Project area has very low relief with a nearly level 0%-3% slope as the area is within the former lake plain of Glacial Lake Aitkin. A few small hills are locally present with slopes greater than 3% and isolated areas greater than 9% (Figure 9).

Soil Descriptions and Characteristics

Soil description and characteristics data were obtained from the Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey (reference (14)). The soil map is presented as

Figure 10 and soil descriptions and characteristics are presented in Table 10. Approximately 32% of the surficial soil within the Project area is classified as sandy loam to loamy sand, and approximately 10% of the area is classified as silt loam. The remaining portions of the Project area have soil classified as peat, muck, or have standing water. The non-sandy soils are present on slopes of less than 1%.

Table 10: Soil Characteristics

Map Unit Symbol	Map Unit Name	Hydric Status	Percent of Project Site
B147A	Rifle-Rifle, ponded, complex, 0%-1% slopes	Hydric	22.2
1983	Cathro muck, stratified substratum	Predominantly hydric	10.2
502	Dusler silt loam	Predominantly non-hydric	9.5
D458B	Menahga loamy sand, 1%-8% slopes	Predominantly non-hydric	7.8
564	Friendship loamy sand	Predominantly non-hydric	7.3
625	Sandwick loamy sand	Predominantly hydric	6.0
B111A	Markey muck, occasionally ponded, 0%-1% slopes	Hydric	5.7
504B	Duluth fine sandy loam, 1%-6% slopes	Predominantly non-hydric	5.6
531	Beseman muck	Predominantly hydric	5.0
549	Greenwood peat	Predominantly hydric	4.9
540	Seelyeville muck	Predominantly hydric	3.5
1984	Leafriver muck	Predominantly hydric	3.5
628	Talmoon muck, depressional	Predominantly hydric	3.5
1115	Newson loamy sand	Predominantly hydric	3.1
B39A	Meehan loamy sand, 0%-3% slopes	Predominantly non-hydric	2.1
W	Water	Not Applicable	0.2

Impacts to Soils

The Project would use underground mining techniques, which minimize impacts to soils outside of direct construction or operation areas. Topographic slopes in the Project Area are low which minimizes erosion. An engineering evaluation of soils will be conducted as part of Project design for areas that will be impacted for construction and operational purposes. Areas with peat or muck soils would be avoided to the extent possible. Surface facilities would be constructed in areas with sandy soil, to the extent practicable, for both engineering and drainage purposes.

Excavation, Grading, and Cut and Fill Balance

Some excavation and grading will be required to develop the Project infrastructure. Table 11 provides an estimate of the volumes of cut and fill material that could be needed to bring the site to final grade.

Table 11: Estimated Excavation, Grading, and Cut and Fill Balance

Description	Estimated Quantity	Unit of Measure
Site Clearing and Grubbing	79.0	acres
Cut	416,000	yd^3
Fill	553,000	yd^3

yd^3 – cubic yards

12 Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

   i. Surface water – lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, shoreland classification and floodway/floodplain, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include the presence of aquatic invasive species and the water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

The Project is in the Upper Mississippi River Basin. The Project Area is located within the USGS Hydrologic Unit Code (HUC) Water Resource region 7, which is further subdivided by the USGS and DNR into sub-watersheds. The Project Area sits within two sub-watersheds, as delineated by the hydrologic unit code 10 (HUC10) level: the Headwaters to Big Sandy Lake (HUC10 #0701010305) and the Big Sandy Lake Outlet (HUC10 #0701010306) (Figure 11). Watershed delineations aid in identifying areas for potential surface water impacts. The entire Project Area is located within the watershed tributary to Big Sandy Lake. The watersheds generally drain from east to west towards Big Sandy Lake. The HUC10 watersheds are further subdivided into multiple USGS HUC12 and DNR level 8 watersheds (Figure 11). The Project Area is located within two HUC12 watersheds: Mud Lake watershed (HUC12 #070101030603) and Tamarack River watershed (HUC12 #070101030504). The watersheds in the vicinity of the Project Area are characterized by many tributary ditches, stream channels, and lakes (flow through and landlocked). The portion of the Project area within HUC12 Tamarack River watershed (Figure 11) flows north through a ditch network to the Tamarack River then into the Prairie River and discharges into Big Sandy Lake. The portion of the Project area within HUC12 Mud Lake watershed (Figure 11) flows south and west through a ditch network to Minnewawa Creek and the Sandy River.

There are no public waters basins located within one mile of the Project Area (reference (22)). Public waters basins located in HUC12 watersheds that include the Project Area (HUC12 #070101030603 and HUC12 #070101030504) are presented in Table 12. None of the public water basins located in HUC12 watersheds #070101030603 and #070101030504 are classified as trout lakes, wildlife lakes, or migratory waterfowl lakes. Within HUC12 watersheds #070101030603 and #070101030504, Mud Lake (Minnesota Public Water Inventory (PWI# 01-0029-00) and Tamarack Lake (PWI# 09-0067-00) are listed by the DNR as wild rice waters. Big Sandy Lake is also listed as a wild rice water.

The DNR has assigned shoreline classifications of "natural environment" or "recreational development" to some public waters basins in the HUC12 watersheds (Table 12); Big Sandy Lake is assigned a "general development" shoreline classification. DNR shoreline classifications guide development by regulating lot area and width, structure and septic setbacks, and areas where vegetation and land altering activities are limited. Minnesota Rules, part 6120.2600 provides the minimum standards and criteria for the subdivision, use and development of shoreland areas. Aitkin County provides additional shoreline minimum standards and criteria for subdivision in shoreland areas in the Aitkin County Shoreland Ordinance (amended 2017).

Table 12: Public Waters Basins Within Watersheds HUC12 #070101030603 and #070101030504 and Big Sandy Lake

Public Waters ID Number	Resource Name	Public Waters Class	Area (acres)	Shoreline (miles)	DNR Shoreline Classification [1]	Listed MPCA 303d Impaired Waters [2]
01-0006-00	Mud Lake	Lake	14.8	0.6	Natural Environment	Not listed
01-0008-00	Spruce Lake	Lake	18.9	0.8	Natural Environment	Not listed
01-0011-00	Cranberry Lake	Wetland	24.7	0.8	Natural Environment	Not listed
01-0012-00	Louma Lake	Wetland	20.1	0.7	Natural Environment	Not listed
01-0023-00	Round Lake	Lake	553.5	3.7	Recreational Development	Yes Hg-F
01-0029-00	Mud Lake [3]	Lake	588.8	3.9	Natural Environment	Not listed
01-0254-00	Bone Lake	Wetland	14.0	0.6	Not assigned	Not listed
01-0255-00	Unnamed	Wetland	63.3	1.2	Not assigned	Not listed
09-0067-00	Tamarack Lake [3]	Lake	240.2	4.5	Recreational Development	Yes Hg-F; Nutrients
09-0068-00	Cole Lake	Lake	143.8	2.4	Recreational Development	Not listed
01-0062-00	Big Sandy Lake [3] [4]	Lake	6,124	57.0	General Development	Yes Hg-F; Nutrients

[1] DNR assigns shoreline classifications and establishes the minimum standards and criteria for the subdivision, use and development of shorelands.

[2] MPCA maintains a list (303(d)) list of waters not meeting their intended uses (i.e., impaired waters) due to stressors including mercury in fish tissue (Hg-F) and excessive amounts of phosphorus (nutrients). Waters in this table that are classified as not listed may not have been evaluated by the MPCA at the time of completion of this worksheet.

[3] A DNR identified wild rice water.

[4] Water levels in Big Sandy Lake are controlled by Big Sandy Lake Dam.

In Minnesota, the MPCA, as required by the federal Clean Water Act, assesses all waters of the state and creates a list of impaired waters – those that fail to meet water quality standards – every two years (reference (23)). Such waters are classified as "impaired waters" and included on the State's impaired waters 303(d) list. For such waterbodies, the State requires a total maximum daily load (TMDL) study that identifies the allowable pollutant load and/or pollutant reductions necessary to achieve the beneficial use(s) of the waterbody. Development activity upstream of impaired waters may be subject to pollutant loading limits based on applicable TMDL studies. There are no impaired lakes within 1 mile of the Project Area. Impaired lakes located in HUC12 watersheds #070101030603 and #070101030504 are identified in

Table 12. Big Sandy Lake, which is further downstream from the HUC12 watersheds that include the Project Area, is listed as impaired by the MPCA due to excess nutrients and mercury in fish tissue. Sources of excess nutrients to Big Sandy Lake identified in the MPCA's 2011 TMDL (reference (24)) study include internal loading and nonpoint sources including agriculture, stream channel erosion, and developed land use.

Flowering rush, an aquatic invasive species was identified by the DNR (reference (25)) within the Big Sandy watershed.

There are many streams, ditches, and intermittent channels present in the HUC12 watersheds that include the Project Area (HUC12 #070101030603 and #070101030504) (Figure 12). Many of these are unnamed streams and ditches that are delineated in the national hydrography dataset but are not classified as public waters streams (reference (22)). None of the streams located in the HUC12 watersheds that include the Project Area are classified as trout streams or outstanding resource value waters (ORVW). ORVWs are waters identified under Minnesota Rules, part 7050 as having unique or sensitive characteristics (e.g., ecological, recreational) and are subject to extra levels of protection to preserve these characteristics. The nearest downstream ORVW is the Mississippi River; the Sandy River flows into the Mississippi River downstream of Big Sandy Lake. Two reaches of public ditches drain from east to west through the Project Area, including County Ditch 23 (generally draining east to west) and County Ditch 13 (generally draining south to north). Approximately 1.1 miles of delineated public ditches are located within the Project Area (Figure 12). Streams, ditches, and channels in the HUC12 watersheds that include the Project Area (HUC12 #070101030603 and #070101030504) are included in the Public Waters Inventory summarized in Table 13.

As with lakes, the MPCA's Impaired Waters list also identifies streams that do not meet designated beneficial use categories, including supporting aquatic life and aquatic recreation. Impaired streams in the HUC12 watersheds that encompass the Project Area are identified in Table 13. A portion of Minnewawa Creek upstream of its public waters classification is also listed as impaired for Fishes Index of Biological Integrity and Macroinvertebrate Index of Biological Integrity; the MPCA has not yet identified stressors contributing to this impairment.

Table 13 Public Waters Watercourses within watersheds HUC12 #070101030603 and #070101030504

Public Waters ID Number	Assessment Unit Identifier (AUID) [1]	Name	Public Water Inventory (PWI) Classification	Length (miles)	Listed MPCA 303d Impaired Waters [2]
01-020a	07010103-521	Tamarack River	Public Water Watercourse	27.2	Yes E. coli [3]
01-022a	07010103-735	Unnamed Stream	Public Ditch/ Altered Natural Watercourse	1.4	Not listed
01-022a	07010103-735	Unnamed Stream	Public Water Watercourse	0.5	Not listed
01-023a	07010103-999	Unnamed Stream	Public Water Watercourse	1.1	Not listed

[1] Assessment unit identifier assigned by the MPCA to specific reaches of streams.
[2] MPCA maintains a list (303(d)) list of waters not meeting their beneficial use(s) designation(s) due to stressors; stressors present in streams in HUC12 #070101030603 and #070101030504 include poor indices of biological integrity (IBI) for fish and/or macroinvertebrates and bacteria (E. coli). Waters in this table that are classified as not listed may not have been evaluated by the MPCA at the time of completion of this worksheet.
[3] Impaired reach is from Little Tamarack River to Prairie River; E. coli source is not specified in Mississippi River-Grand Rapids Watershed Restoration and Protection Strategies report (reference (26)).

Floodplains have been delineated by the Federal Emergency Management Agency (FEMA) for several areas and resources within the Big Sandy Lake watershed, including the Tamarack River, Prairie River, and Sandy River, as well as several lakes (Figure 13). The floodplains in the Big Sandy Lake watershed were delineated approximately 40 years ago and are “unmodernized” per FEMA standards; unmodernized floodplains are based on quick digitization by FEMA and cannot be used for regulatory purposes. FEMA has not established modern, regulatory floodplains within the Big Sandy Lake watershed. The Project Area is located outside the FEMA-delineated floodplain.

Talon is monitoring surface water flow and surface water quality at numerous locations near and within the Project Area to characterize baseline surface water conditions. Surface water baseline data will be provided for the EIS. The baseline data will be used to develop a conceptual model for surface water flow, which will be presented in the EIS. The conceptual model will form the basis for quantitative models and/or evaluations that will be conducted and presented for the EIS to estimate the potential effects of the Project on water resources.

The Project Area is primarily classified as wetlands (Figure 14). A Level 3 wetland delineation across the Project Area was conducted between June and September 2022. Approximately 302 acres of wetland are present within the Project Area. This delineation report was submitted to the agencies on July 17 2023 and is pending review from the area technical evaluation panel, which consists of members of the local, state, and federal government agencies. All delineated wetland boundaries are considered preliminary until the technical evaluation panel review is complete.

Wetlands, which are shown on Figure 14, are dominated by coniferous and open bogs, shrub swamps (shrub-carr and alder thicket), and hardwood swamps. Additional wetland community types in the Project Area include shallow marsh, deep marsh, fresh (wet) meadow, and sedge meadow wetlands. Six small, excavated ponds, which were excavated over 20 years ago, totaling approximately 3.6 acres, and ranging in size from less than 0.1 acre to 2.3 acres, were documented in the Project Area during the wetland delineation.

Talon is monitoring wetland water levels and water quality within and near the Project Area to characterize baseline wetland conditions. Wetland baseline data will be provided for the EIS. The baseline data will be used to develop a conceptual model of the wetland system within and near the Project Area, which will be presented in the EIS. The conceptual model will form the basis for quantitative models and/or evaluations that will be conducted and presented for the EIS to estimate the potential effects of the Project on water resources.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

There are no mapped springs within approximately 20 miles of the Project Area based on data from the Minnesota Spring Inventory (reference (27)).

The Project Area is not within a Minnesota Department of Health (MDH) wellhead protection area based on data from the Source Water Protection Web Map Viewer (reference (28)). A wellhead protection area is defined in Minnesota Statutes 2022, Section 103I.005, Subdivision 24 as “the surface and subsurface area surrounding a well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field.” The nearest wellhead protection area is in McGregor located approximately 9 miles west of the Project Area.

Water supply wells near and within the Project Area are installed in Quaternary aquifers. The Minnesota Well Index (MWI) identifies 32 water supply wells that are located within 1 mile of the Project Area (Figure 15). The water supply wells are classified in the MWI as domestic wells (24 wells), public supply/non-community-transient wells (5 wells), public supply/non-community wells (2 wells), and irrigation wells (1 well). All the water supply wells identified in MWI that have depth and stratigraphic information are screened within sand or gravel layers in the Quaternary unconsolidated sediments at depths ranging from 28-202 feet below ground surface. Three of the wells are between 28-50 feet deep, 15 wells are 50-100 feet deep, 10 wells are 100-200 feet deep, one well is more than 200 feet deep, and depths are not available for three wells. The sand layers in which the wells are completed are all beneath one or more layers of clay for wells where stratigraphy logs are available. Six of the wells are completed in a deep sand layer below additional layers of sand and clayey sediments. Depth to water in the wells as listed on the MWI logs range from 1-25 feet below ground surface (Figure 16). Information from the MWI indicates that the majority of the water supply wells (28 wells) are installed in a Quaternary buried artesian aquifer, which are buried sand or gravel units with groundwater present under confined conditions. One well is completed in a Quaternary undifferentiated aquifer and no information is available for three wells.

Monitoring wells have been installed in and around the Project Area (Figure 15) to characterize baseline groundwater conditions (groundwater levels and groundwater quality). Groundwater level measurement and groundwater quality monitoring is ongoing, and this baseline data will be provided for the EIS. The baseline data will be used to develop a conceptual model for groundwater flow in and around the Project Area, which will be presented in the EIS. The conceptual model will form the basis for quantitative models and/or evaluations that will be conducted and presented in the EIS to estimate the potential effects of the Project on water resources.

Based on soil data from the Natural Resources Conservation Service, depth to water in surficial soils is less than 1 foot in approximately 77% of the Project Area (Figure 16). Depth to water is greater than 3 feet in approximately 15% of the area, and greater than 5 feet in approximately 8% of the Project Area.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater – For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

The Project would not discharge to a publicly owned treatment facility.

2) If the wastewater discharge is to a subsurface sewage treatment systems, describe the system used, the design flow, and suitability of site conditions for such a system. If septic systems are part of the project, describe the availability of septage disposal options within the region to handle the ongoing amounts generated as a result of the project. Consider the effects of current Minnesota climate trends and anticipated changes in rainfall frequency, intensity and amount with this discussion.

The Project would not discharge to a subsurface sewage treatment system.

3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges, taking into consideration how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects.

The Project would produce two types of wastewater that would be treated before discharge to surface water: contact water and sanitary wastewater. Sources of contact water and sanitary wastewater and their management, treatment, and discharge are described in the Project Description (Question 6). The following paragraphs describe their expected quantity and composition and discuss potential effects to surface water or groundwater. The composition and quantity of contact water will be modeled for the EIS.

One source of contact water is mine inflow. A preliminary estimate of mine inflow is provided here, based on limited bedrock hydrogeological information available in 2020. Conservative simulations indicated that mine inflow rates were calculated to increase over time, with a peak life-of-mine inflow of 800-1,600 gpm. This preliminary estimate, which was designed to provide a higher-end value, does not include inflow mitigation such as grouting or other methods. Significant additional hydrogeological data has been collected since 2020. The inflow estimate will be refined and updated for the EIS to reflect the updated mine plan, additional hydrogeological information from ongoing studies, mitigation methods and refined modeling results.

The other source of contact water is stormwater (infiltration water from stockpiles and stormwater runoff) from the portion of the site where ore and development rock would be present. This area is referred to as the "contact water area" and includes the backfill materials storage area and areas with traffic from vehicles that enter the underground mine. The contact water handling system would be designed to prevent any run-on from adjacent areas, outside of the contact water area. The amount of contact water generated on the surface would be a function of the size of the contact water area and the amount of precipitation. This area is approximately 1,148,000 square feet, and, assuming an average annual rainfall of 28.66 in/year, would produce an average of approximately 40 gpm that would be routed for treatment. This estimate is conservative, as it does not include evaporative losses or residual storage in the Backfill Material Stockpile. The conservative discharge rate (mine inflow and contact stormwater) from the water treatment plant is calculated to be 840-1,640 gpm. These preliminary calculations illustrate that the discharge rate is predominantly dependent on the mine inflow. This estimate will be updated and refined with additional information, data, and models for the EIS.

The composition of the sanitary wastewater would be typical of domestic wastewater. The average volume of sanitary wastewater is estimated to be approximately 7 gpm, but it will be highly variable throughout the day with an estimated peak of approximately 100 gpm arriving to the sanitary water treatment plant storage tank during periods of heavy washroom use at shift change time.

The discharges from the Contact Water Treatment Plant and the Sanitary Water Treatment Plant would increase the flow in the north ditch network above baseline flow levels. The potential effects of this increased flow on hydrology, wetlands, shallow and deep groundwater systems, and aquatic biota in the north ditch network will be evaluated for the EIS. Preliminary evaluation indicates that the ditch has the capacity to handle the currently estimated increased flow due to discharge of treated water based on the following:

- Generally, a stream can adapt to an increase in flow that is up to 20% above its channel forming flow (defined as the 1.5-year recurrence flood flow).
- The channel-forming flow at LV-006 was estimated using the United States Geological Service's (USGS) StreamStats tool to be approximately 13,500 gpm (reference (29)).

- Twenty percent of the channel-forming flow is 2,700 gpm, which is greater than the conservative discharge estimates enumerated above.

Therefore, this preliminary assessment indicates that potential impacts due to increased flow from the Project discharge could be controlled by permit conditions of a future NPDES/SDS permit and water appropriations permit. Additional evaluation of potential effects associated with the flow increase from the water treatment plant discharge and sanitary water treatment plant discharge will be addressed in the EIS.

As described in Question 6, discharges would meet permit conditions established to protect water quality and aquatic biota. The potential effect of discharges on water quality in receiving and downstream waters and surface water-groundwater interactions will be evaluated in the EIS.

Current Minnesota climate trends and anticipated climate change in the general location of the Project are not expected to influence how a discharge of treated water would affect water resources. Limited to no effect is expected because the water balance in the area, and the patterns of large precipitation events are expected to remain in the current range during the timeframe that the Project would be operational, which would be the timeframe with the highest discharge rate. Depending on the duration of discharge after operations, climate trends toward slightly higher temperature and slightly lower precipitation (described in response to Question 7), could affect flows in the receiving waters. However, because the discharge would be treated as described above, and because the NPDES/SDS permit must be renewed every 5 years, permit conditions would control impacts to water resources under future flow conditions. The EIS will provide additional information on the potential influence of current climate trends and anticipated climate change on potential Project effects on water resources.

ii. Stormwater – Describe changes in surface hydrology resulting from change of land cover. Describe the routes and receiving water bodies for runoff from the Project area (major downstream water bodies as well as the immediate receiving waters). Discuss environmental effects from stormwater discharges on receiving waters post construction including how the project will affect runoff volume, discharge rate and change in pollutants. Consider the effects of current Minnesota climate trends and anticipated changes in rainfall frequency, intensity and amount with this discussion. For projects requiring NPDES/SDS Construction Stormwater permit coverage, state the total number of acres that will be disturbed by the project and describe the stormwater pollution prevention plan (SWPPP), including specific best management practices to address soil erosion and sedimentation during and after project construction. Discuss permanent stormwater management plans, including methods of achieving volume reduction to restore or maintain the natural hydrology of the site using green infrastructure practices or other stormwater management practices. Identify any receiving waters that have construction-related water impairments or are classified as special as defined in the Construction Stormwater permit. Describe additional requirements for special and/or impaired waters.

As described in the Project Description (Question 6), stormwater from surface areas without mine traffic would be managed as industrial stormwater. Figure 4 shows the boundaries of the industrial stormwater management and contact water management areas.

Construction of the Project would replace existing pervious surfaces (e.g., vegetation) with new impervious surfaces (e.g., gravel, asphalt) and industrial infrastructure. Project construction would result in greater than one acre of land disturbance, which would require coverage under the Minnesota Construction Stormwater General Permit. A construction SWPPP would be developed and implemented in accordance with the permit requirements. The construction SWPPP would include a range of BMPs to address soil erosion and sedimentation, including erosion prevention practices, sediment control practices, inspection and maintenance requirements, pollution prevention management measures, and permanent stormwater treatment systems, as well as controls to manage water where necessary. The permanent stormwater treatment systems would be as described below.

In accordance with the Minnesota Construction Stormwater General Permit's permanent stormwater treatment requirements, a volume of water equivalent to 1-inch of runoff from impervious surfaces created for the Project would be routed to stormwater treatment systems prior to discharge to the environment. Industrial stormwater treatment systems are primarily passive treatment systems focused on removal of suspended solids and may include a combination of volume reduction practices (e.g., infiltration system(s)) and retention practices (e.g., wet sedimentation basin(s)) as appropriate based on-site conditions and constraints. The environmental effects from industrial stormwater discharges on receiving waters are anticipated to be minor. Further details on stormwater treatment system design will be provided for the EIS.

Stormwater is also generated from the contact water area (Figure 4). This water is collected and sent to the Contact Water Treatment Plant where it would be treated to meet applicable permit requirements prior to discharge. The current stormwater management plan is designed to manage up to the 200-year, 24-hour storm event until such contact water can be routed to the water treatment plant for treatment.

The immediate receiving waters for stormwater discharged from the Project would be the nearby unnamed wetlands and/or ditches. These wetlands and ditches are within either the Headwaters to Big Sandy Lake (HUC10 #0701010305) or Big Sandy Lake Outlet (HUC10 #0701010306) watersheds that are both ultimately tributary to Big Sandy Lake (as described in Item 12.a.i). It is anticipated that the majority of stormwater from the Project would be discharged generally northward from the Project Area to either wetlands or ditches and then follow the north ditch network to the Tamarack River within the Headwaters to Big Sandy Lake (HUC10 #0701010305) watershed.

The effect of changes in land cover from pervious to impervious surfaces and construction of contact water and stormwater management infrastructure on surface hydrology will be evaluated in the EIS. Runoff volumes and rates from impervious surfaces are generally greater than from pervious surfaces; however, the effect of this on the environment would be minimized by collection, treatment, and discharge of contact water via the Contact Water Treatment plant and stormwater via the stormwater treatment systems. Modification of drainage areas as part of managing contact water and stormwater would alter surface hydrology in the immediate vicinity of the Project Area but would be mitigated by the discharge of treated contact water and stormwater to the environment. Non-contact stormwater from pervious natural, stabilized, and reclaimed surfaces would not be actively managed and would continue to follow natural drainage pathways. Further analysis of the effects of changes in land cover will be completed for the EIS.

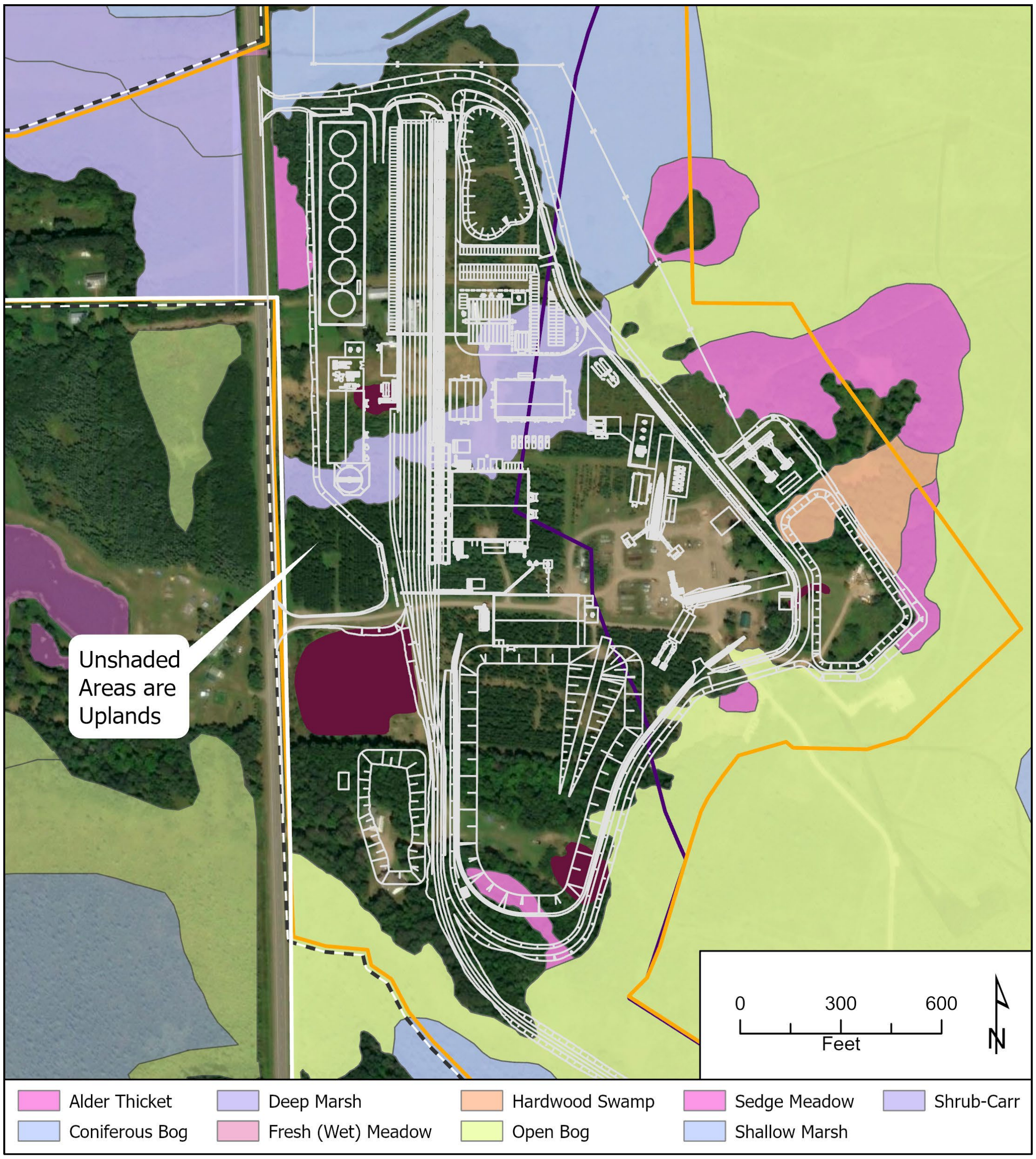
Current Minnesota climate trends and anticipated changes in rainfall frequency, intensity, and amount are not expected to significantly influence the environmental effects from stormwater discharges on receiving waters. Limited to no effect is expected because, as noted in Item 12.b.i.3, the water balance in the area and the patterns of large precipitation events are expected to remain in the current range during the timeframe that the Project would be operational. Any potential effects would be mitigated by the same factors discussed above: control of stormwater discharge volumes and rates, stormwater treatment systems, compliance with industrial stormwater requirements under an NPDES/SDS permit and contact water management.

Based on the MPCA's special and impaired waters search tool (reference (30)), there are no receiving waters that have construction-related water impairments or are classified as special as defined in the Minnesota Construction Stormwater General Permit.

iii. Water appropriation – Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Discuss how the proposed water use is resilient in the event of changes in total precipitation, large precipitation events, drought, increased temperatures, variable surface water flows and elevations, and longer growing seasons. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation. Describe contingency plans should the appropriation volume increase beyond infrastructure capacity or water supply for the project diminish in quantity or quality, such as reuse of water, connections with another water source, or emergency connections.

The Project would appropriate groundwater and DNR water appropriation permits would be required. No water would be directly withdrawn from surface water or wetlands. Groundwater would be withdrawn for four purposes: temporary construction dewatering, potable use, non-potable use, and pumping of groundwater inflow to the underground mine.

Construction activities would temporarily remove groundwater to dry and solidify areas as needed to construct surface facilities and for the box cuts to develop the declines. Surface facilities would be primarily sited in upland areas as illustrated in Graphic 19, which would minimize the amount of water management required. Construction of the declines would use a tunnel boring machine, which is able to develop the declines with minimal groundwater inflow from the surrounding unconsolidated sediments, as described in Question 6. The quantity of water will be estimated for the EIS and permitting; however, preliminary estimates are that the total amount of water would be less than 50 million gallons per year, which is the threshold for coverage under Temporary Projects General Permit No. 1997-0005. Construction activities would be conducted in accordance with conditions of the Minnesota Construction Stormwater General Permit, which requires BMPs to control effects due to the discharge of water from the construction site.



Graphic 19: Project Surface Facilities Overlain on the 2022 Wetland Delineation performed by Talon

For potable use, the Project would install a new well into the Quaternary deposits. The groundwater would be used for drinking water and to support sanitary facilities for the workforce. The potential maximum daily withdrawal from this well for potable water use could be up to approximately 13,200 gpd (4.8 million gallons per year). However, it is expected that potable water usage would be on average closer to 10,000 gpd (3.6 million gallons per year). Groundwater for potable use would be withdrawn during the construction and operations phases of the mine. Based on preliminary site investigations adequate groundwater is available in the Quaternary deposits. The Project's water use of potable water would be resilient with respect to climate trends, because groundwater supply is expected to remain in the current range during the timeframe that the Project would be operational.

For non-potable uses, the Project would primarily rely on the recycling of treated contact water, however it is possible that there would be a need to supplement this source during the early stages of mine development. If needed, supplemental non-potable water would be withdrawn from a new well installed into the Quaternary deposits to supply the TBM and during the early stages of operations when groundwater inflow to the underground mine is expected to be minimal. Groundwater inflow to the underground mine is expected to increase as development and mining progress and it is anticipated to be sufficient to supply non-potable water needs within the first couple of years. The need for a non-potable water supply well, and the potential withdrawal rate, will be determined by water balance studies for the EIS. Recycling of treated contact water for non-potable uses would minimize the amount of water appropriated from the Quaternary deposits.

Groundwater inflow would be pumped from the underground mine to keep the workings dry. Groundwater inflow would originate as seepage from bedrock at depths from approximately 400-1,900 feet below ground. Preliminary mine inflow estimates are discussed in Question 12(b)(i)(3). Groundwater inflow to the underground mine would be combined with other sources of contact water from the underground mine and treated and discharged as described in Question 6. This discharge and potential environmental effects are described in the answer to EAW question 12(b)(i)(3).

An assessment will be completed for the EIS that characterizes the potential impact of withdrawing groundwater inflow from the underground mine on surface water and wetland features and will include both a hydrological and a hydrogeochemical evaluation.

The Project would not appropriate surface water. As a result, there would be no need for contingency plans for alternate supply in the case of a drought suspension of a surface water appropriation permit.

iv. Surface Waters

a. Wetlands – Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed, taking into consideration how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed and identify those probable locations.

The Project would use underground mining techniques, which minimize impacts to wetlands compared to surface mining. Surface facilities to support underground mining are being designed to avoid wetlands to the extent practicable. However, some direct impacts to wetlands would occur in parts of the Project Area where ground disturbance is proposed and wetlands are unavoidable. As a result of grading, excavating, and filling activities associated with the construction of the surface facilities and the railway spur, an estimated 21.7 acres of wetland including existing flooded borrow pits would be permanently impacted. Additional wetlands may be temporarily impacted during construction activities. Potential permanent and temporary wetland impacts will be further evaluated as part of the EIS.

In addition to direct wetland impacts, there is a potential for the Project to result in indirect wetland impacts. Indirect wetland impacts could occur from wetland fragmentation, changes in wetland hydrology, and atmospheric deposition from dust or other air emissions. Potential indirect wetland impacts and proposed monitoring would be further analyzed as part of surface, groundwater, and wetland studies being completed to support the EIS.

Impacts to wetlands could require a permit from the United States Army Corps of Engineers under Section 404 of the Clean Water Act and from the DNR under the requirements of Minnesota's Wetland Conservation Act (WCA). The Section 404 Clean Water Act permit would also include Section 401 Clean Water Act Water Quality Certification, which is coordinated with the MPCA. Unavoidable wetland impacts would be mitigated through compensatory wetland mitigation such as purchasing wetland bank credits from approved wetland banks from the appropriate service area.

b. Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features, taking into consideration how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Potential Project physical impacts to surface waters include direct and indirect impacts to stream channels and ditches. Currently planned physical alterations of surface waters are limited to construction of discharge structures for the water treatment plant and sanitary water treatment plant discharges.

Generally, the use of underground mining would minimize physical impacts to surface water resources. Project features on the land surface would be located to avoid existing ditches where possible. Where avoidance is not possible, existing ditches may be diverted and rerouted around Project features, and/or filled. Approximately 1.1 miles of channelized ditches are present in the Project Area. Much of this length has been previously altered for drainage purposes and is not representative of a natural stream channel.

In addition to direct physical impacts, the Project could result in indirect impacts to downstream hydrology due to discharge of treated water, alteration of upstream tributary watersheds, and stormwater management. These potential effects are described in response to Questions 12(b)(i)(3) and 12(b)(ii). The railway spur will be constructed with appropriate materials and/or features to facilitate water flow between each side of the railway spur and address potential for differences in water level or other hydrological impacts.

The Project does not anticipate impacting the number or type of watercraft usage within or downstream of the Project Area.

13 Contamination/Hazardous Materials/Wastes

This section addresses hazardous material handling and waste management practices that would be employed by the Project.

a. Pre-Project area conditions – (Describe existing contamination or potential environmental hazards on or near the Project area such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-Project area conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.)

A review of the What's in My Neighborhood (reference (31)) web mapping tool was conducted to identify potential areas of concern on or within 1 mile of the Project Area (Figure 17). Features that were searched included, but were not limited to, active and inactive or closed hazardous waste generators, solid waste facilities, remediation sites, leak sites, and locations with above ground storage tanks. The review indicated the following activities:

- Active and inactive industrial stormwater permits;
- Active and inactive aboveground storage tanks;
- The City of Tamarack Wastewater Treatment Plant; and
- Active and inactive hazardous waste generator permits.

No actions associated with the Project are anticipated to disturb these sites.

There are subsurface sanitary wastewater treatment systems (septic systems) located to the north and west of the Project. In and/or near the City of Tamarack, there are several closed leak sites and a closed dump (the Tamarack Dump) which has undergone investigation and cleanup since its closure in 1998 (reference (31)).

In addition to these existing conditions, local activities related to the exploration and definition of the Tamarack Resource Area and associated baseline environmental data collection include waste and material storage and handling. These activities include drilling and surface geophysical exploration, maintenance of access roads and trails, temporary boarding of staff members and/or contractors, and operating various equipment in support of these activities. Site conditions related to these activities include:

- Aboveground tanks (TS0130875) at the laydown area (Figure 17);
- Hazardous waste small quantity generator status (Figure 17);
- Storage and use of hazardous materials and petroleum products associated with drill pad locations and laydown area;
- Refuse related to work at drill pad locations and laydown area;
- Septic system and/or leach fields associated with the house and farmhouse at the site;
- Buried drill cuttings in the laydown area.

Potential environmental effects from existing site conditions that would be caused or exacerbated by Project construction and operation will be discussed in the EIS. The EIS will identify measures to avoid, minimize, or mitigate adverse effects from existing potential environmental hazards. A Contingency or Response Action Plan will be developed as part of the EIS for tanks, wastewater treatment, and any hazardous waste generation associated with the Project.

b. Project related generation/storage of solid wastes – (Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.)

To facilitate a common understanding of the terminology used in this section, the following definitions of solid waste are provided.

Solid Waste – According to the Resource Conservation and Recovery Act (RCRA) of Title 42 of the U.S. Code Chapter 82 § 6903, the term solid waste refers to “any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sanitary wastewater, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 1342 of title 33, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended."

Minnesota Statutes, section 116.06, subdivision 22 and Minnesota Rules, part 7035.0300, subpart 100 define Solid waste as "garbage, refuse sludge from a water supply treatment plant or air contaminant treatment facility, and other discarded waste materials and sludges, in solid, semisolid, liquid, or contained gaseous form, resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include hazardous waste; animal waste used a fertilizer, earthen fill, boulders, rock; sewage sludge; solid or dissolved material in domestic sewage or other common pollutants in water resources, such as silt, dissolved or suspended solids in industrial waste water effluents or discharges which are point sources subject to permits under section 402 of the federal Water Pollution Control Act, as amended, dissolved materials in irrigation return flows; or source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, as amended."

The Project would produce solid waste during construction, operation, and closure. The facilities or activities anticipated to produce solid waste include general construction refuse, the maintenance shop and wash bay, the storage warehouse, general refuse associated with the shops and the locker room facilities, cement storage, use of shotcrete associated with manufacturing paste backfill, and the explosives magazine. Solid waste, as defined in the RCRA, would be disposed of in accordance with federal, state, and local regulations.

Solid industrial wastes anticipated to be generated by the Project include tires, scrap metal, concrete, construction waste, non-salvageable demolition debris, and office waste (paper, utensils etc.). Solid industrial waste generated by the Project would be taken off site by a third party and recycled when available or disposed of.

Potential environmental effects from solid waste handling, storage, and disposal will be discussed in the EIS. The EIS will identify measures to avoid, minimize, or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

c. Project related use/storage of hazardous materials – (Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any new above or below ground tanks to store petroleum or other materials. Indicate the number, location, size and age of existing tanks on the property that the project will use. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.)

To facilitate common understanding of the terminology used in this section, the following definition of hazardous materials is provided.

Minnesota Statutes 115B.02: Subd. 8. Hazardous substance. "Hazardous substance" means:

1) any commercial chemical designated pursuant to the Federal Water Pollution Control Act, under United States Code, title 33, section 1321(b)(2)(A);

2) any hazardous air pollutant listed pursuant to the Clean Air Act, under United States Code, title 42, section 7412; and

3) any hazardous waste.

Hazardous substance does not include natural gas, natural gas liquids, liquefied natural gas, synthetic gas usable for fuel, or mixtures of such synthetic gas and natural gas, nor does it include petroleum, including crude oil or any fraction thereof which is not otherwise a hazardous waste.

Subd. 9. Hazardous waste. "Hazardous waste" means:

1) any hazardous waste as defined in section 116.06, subdivision 11, and any substance identified as a hazardous waste pursuant to rules adopted by the agency under section 116.07; and

2) any hazardous waste as defined in the Resource Conservation and Recovery Act, under United States Code, title 42, section 6903, which is listed or has the characteristics identified under United States Code, title 42, section 6921, not including any hazardous waste the regulation of which has been suspended by act of Congress.

Minnesota Statutes 116.06 Subd. 11. Hazardous waste. "Hazardous waste" means any refuse, sludge, or other waste material or combinations of refuse, sludge or other waste materials in solid, semisolid, liquid, or contained gaseous form which because of its quantity, concentration, or chemical, physical, or infectious characteristics may (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. Categories of hazardous waste materials include, but are not limited to explosives, flammables, oxidizers, poisons, irritants, and corrosives. Hazardous waste does not include source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended."

Like hazardous materials, hazardous wastes are subject to state and federal requirements regarding management, transportation, and disposal. Locally, Minnesota implements regulations for hazardous wastes through the MPCA and the (Minnesota Department of Transportation) MDOT.

The Project would store and use common materials that are considered hazardous during construction and operation. The facilities anticipated to use and/or store hazardous waste include: the explosives magazine, the fuel storage area, propane storage, the maintenance shops, and the locker room facilities. Hazardous materials stored on the Project site would include diesel fuel, gasoline, propane, lubricants, coolant, batteries, explosives, and explosive devices.

The chemicals and/or hazardous materials that would be used and/or stored during construction and operation of the Project, including method of storage, will be discussed in the EIS. The EIS will indicate the number, location, and size of any new above or below ground tanks to store petroleum or other materials. In the EIS, the potential environmental effects from accidental spill or release of hazardous materials will be discussed. Measures to avoid, minimize or mitigate adverse effects from the use and/or storage of chemicals and/or hazardous materials including source reduction and recycling will be identified. Fuel storage and consumption and the use of chemicals will be estimated, a review of product Safety Data Sheets will be conducted, and a spill prevention plan will be developed for the EIS.

d. Project related generation/storage of hazardous wastes – (Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.)

For better understanding of terminology used, Question 13.c defines hazardous substances and hazardous waste per Minnesota Statutes.

The Project would generate and store hazardous waste during construction and operation. The facilities anticipated to generate and store hazardous waste include the fuel storage area and the maintenance shops. To reduce the potential for incidental contact and spills, hazardous waste would be stored on site in facilities that comply with the RCRA regulations prior to being transported off site. Hazardous waste would be transported off site by an EPA licensed transporter in United States Department of Transportation approved containers for disposal at appropriately permitted RCRA hazardous waste treatment, storage, and disposal facility(s). Additionally, the Project would comply with all RCRA waste management regulations including proper labeling, employee training, recycling, and practicing proper documentation of disposal protocols to avoid potential adverse effects. The following is a list of some expected waste streams that will be generated by the project:

- Expired blasting agents: Expired or damaged containers of blasting caps, initiators and fuses, and other high explosives used in blasting. These items would be taken back by the explosive distributor/contractor.

- Waste maintenance products: The operations are expected to generate solvent-contaminated wipes, waste grease, lubricants, anti-freeze, and solvents. Waste maintenance products that cannot be recycled would be properly characterized and disposed of as hazardous waste using appropriately licensed disposal vendors.

- Used oil: Used oil and lubricants would be collected and transported offsite by an appropriately licensed used oil recycling vendor.

Hazardous wastes generated and/or stored during construction and/or operation of the Project, including the methods of disposal, will be described in the EIS. Where possible, the facility will recycle waste. Examples of recyclable waste materials include batteries, coolant and used oil. Recyclable materials will be transported and recycled by appropriately licensed vendors. The EIS will discuss potential environmental effects from hazardous waste handling, storage, and disposal, and will identify measures to avoid, minimize, or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

14 Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources (Rare Features)

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

The DNR, in collaboration with the U.S. Forest Service, developed an Ecological Classification System (ECS) for hierarchical mapping and classification of Minnesota land areas with similar native plant communities and other ecological features. Based on the ECS, the Project Area is located in the Tamarack Lowlands Subsection of the Minnesota Drift and Lake Plains Section of the Laurentian Mixed Forest Province (reference (32)).

As discussed under EAW Question 12 (Water Resources), the Project Area is dominated by open and coniferous bog, shrub-carr, and hardwood swamp wetland communities. Uplands consist of mixed forest, pine plantations, and hay fields associated with farmsteads. The only watercourses in the Project Area are county ditches, which were initially constructed decades ago to drain wetlands for agricultural use; as such, habitat suitable for fish is not present in the Project Area. No DNR identified wild rice lakes are located within the Project Area; however, as shown on Figure 11 several wild rice lakes are located downstream of the Project Area in the Big Sandy Lake Outlet and Headwaters Big Sandy Lake watersheds.

A portion of the wildlife habitat within and near the Project Area is fragmented with roads, railways, and minor development (i.e., farmsteads). However, the wetland and upland areas within and around the Project Area provide habitat for common wildlife, including mammals, such as fox, deer, squirrels, beaver, and muskrats; birds, such as hawks and perching birds; and amphibians, such as frogs, toads, and salamanders.

Natural resources field surveys are currently being conducted within and across the Project Area. Information gathered during these surveys will be included in the EIS.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-_) and/or correspondence number (ERDB_) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) online tool identifies two federally threatened species and one federally endangered species as potentially occurring near and within the Project Area. These species include t*he federally threatened* Canada lynx (*Lynx canadensis*; state special concern) and the gray wolf *(Canis lupus; no state status*) and the federally endangered northern long-eared bat (*Myotis septentrionalis; state special concern)*. IPaC also identified the monarch butterfly (*Danaus plexippus*), a federal candidate species, and the tricolored bat, a federally proposed endangered species, as potentially occurring near and within the Project Area. No designated critical habitat is present within the Project Area.

Canada lynx inhabit boreal forests of northern Minnesota, primarily in the Arrowhead region (reference (33)). Lynx are generally found in association with their primary prey, snowshoe hare, which are typically most abundant in younger regenerating boreal forest patches with a coniferous component. Suitable habitat for Canada lynx is present within the Project Area.

Gray wolves primarily inhabit temperate forests in northern Minnesota (reference (34)). However, gray wolves are habitat generalists and will choose habitats based on where their primary prey species, including white-tailed deer, moose, and beaver, are present. Suitable habitat for gray wolf is present within the Project Area.

The northern long-eared bat inhabits caves, mines, and forests (reference (35)). Suitable forested habitat for northern long-eared bats is present in the forested areas within and near the Project Area. According to the DNR and USFWS, the nearest known hibernacula is located over 80 miles northeast of the Project Area in St. Louis County, and the nearest known maternity roost tree has been documented over 3 miles west of the Project Area in Aitkin County (Township 48N, Range 23W) (reference (36)).

The tricolored bat inhabits similar habitats to the northern long-eared bat but can also roost in road culverts and human-made structures. According to the DNR and USFWS, the tricolored bat can use the same hibernacula as the northern long-eared bat. It is unknown if any tricolored bats utilize the hibernacula referenced above, located 80 miles northeast of the Project Area, but the range of this species includes the Eastern half of the United States, including all of Minnesota. The USFWS has listed the tricolored bat as proposed endangered (reference (37)). However, proposed species are not protected under the Endangered Species Act (ESA).

In December 2020, the USFWS assigned the monarch butterfly as a candidate for listing under the ESA due to its decline from habitat loss and fragmentation; however, candidate species are not protected under the ESA. The monarch butterfly inhabits fields and parks where native flowering plants, including milkweed (Asclepias species) which is required for breeding, are common (reference (38)). Suitable monarch butterfly habitat containing milkweed is present in the vicinity of the Project Area.

Barr Engineering Co. (Barr) has a license agreement (LA-986) with the DNR for access to the Natural Heritage Information System (NHIS) database, which was queried in September of 2022 to determine if any rare species could potentially be affected by the Project. The NHIS database indicates that the state-watchlist and federally endangered rusty patch bumble bee (*Bombus affinis*) was documented within the vicinity of the Project Area in 1939. The NHIS does not indicate documentation of any other state-listed species within 1 mile of the Project Area.

The rusty patched bumble bee inhabits open areas with abundant flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and undisturbed soil for overwintering sites (reference (39)). While some areas of suitable habitat are present in the vicinity of the Project Area, IPaC did not identify the rusty patched bumble bee as a species potentially occurring in the Project Area, and the Project Area is not located in the rusty patched bumble bee high potential zone (reference (40)).

Wild rice (*Zizania palustris*) is a native plant found in area lakes downstream of the Project area and is of particular significance to the local and indigenous communities. This aquatic plant is sensitive to changes in water levels, nutrients, and sulfate, along with other factors. Baseline data collection has been ongoing on or near several MPCA designated wild rice waters since 2008.

Data from the DNR Minnesota Biological Survey were reviewed to determine if any Sites of Biodiversity Significance (SBS), native plant communities, Scientific Natural Areas, or other sensitive ecological resources are present within or near the Project Area. While this is valuable data, it is also important to recognize and acknowledge that to many local and indigenous people, all native plant communities are significant, and measures should be taken to protect them.

As shown on Figure 18, part of a DNR SBS, which has a moderate biodiversity significance rank, is within the Project Area. The DNR describes SBS of moderate biodiversity significance as follows: “sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes” (reference (41)). DNR native plant communities have been mapped near the Project Area, but not within it. No state Wildlife Management Areas (WMAs) are located within the Project Area. The closest WMAs are located approximately 2.5 miles west (Grayling Marsh WMA) and south (Salo Marsh WMA) of the Project Area (Figure 18). No scientific natural areas or other sensitive ecological resources have been mapped within the Project Area.

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project including how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

<u>General Impacts</u>

Construction and operation of the Project would result in the direct impact of approximately 263 acres of upland and wetland wildlife habitat and could further habitat fragmentation in the Project Area. The presence of equipment and associated noise and human activity during construction and Project operation may cause some species, even those accustomed to human proximity, to abandon habitats near the Project Area; however, extensive areas of similar habitat are present outside of the Project Area. Direct impacts to aquatic biota are not anticipated, as Project discharge would meet all applicable water quality standards.

As discussed in EAW Question 7 (Climate Adaptation and Resilience), future climate trends in the area indicate that minimal temperature increases, and minimal precipitation decreases are anticipated by 2030. Given that Project operations are anticipated to last 7- to 10-years, climate change coupled with the project development is anticipated to have little direct effect on fish and wildlife during this time.

Federal and State Listed Species

Although there is suitable habitat for Canada lynx and gray wolf in the Project Area, it is anticipated that similar to other wildlife, during construction and operation these species and their prey would avoid the Project Area for comparable habitat outside of the Project Area. As such, adverse effects on Canada lynx and gray wolf are not anticipated from the Project.

Habitat for northern long-eared and tricolored bats is present within the Project Area, and tree clearing could affect this habitat. Although no maternity roost trees or hibernacula have been documented within the Project Area, tree removal would follow federal laws in relation to the northern long-eared bat; as such, adverse effects on northern long-eared and tricolored bats are not anticipated from the Project.

Some areas of suitable habitat for rusty patched bumble bees are present in the Project Area. However, based on the IPaC results not noting this species as potentially being present, the fact that the Project Area is not located in a high potential zone, and the date of the last documented record (1939), rusty patched bumble bees are not likely to be present in the Project Area. As such, adverse effects on rusty patched bumble bees are not anticipated from the Project.

Clearing and grading activities associated with the Project could impact the habitat for monarch butterflies. However, as previously noted, this species is not legally protected at the federal or state level.

Sensitive Ecological Resources

Construction and operation of the Project would directly impact approximately 79 acres of the DNR SBS that is located within the Project Area. Except for the 1939 record of a rusty patched bumble bee, no state or federally listed species have been documented within the portion of the SBS that is within the Project Area. While impacts to wild rice lakes are not anticipated from the Project, a baseline wild rice habitat delineation is being conducted for the Project in downstream waterbodies. No other sensitive ecological resources have been identified within the Project Area or its immediate vicinity as such no impacts to other sensitive ecological resources are anticipated.

Invasive Species

Invasive species are non-native species that cause or may cause economic or environmental harm or harm to human health; or threaten or may threaten natural resources or the use of natural resources in the state (Minnesota Statutes, 2022, section 84D.01, subdivision 9a). Vegetation clearing and the movement of construction equipment in and out of the Project Area could make it susceptible to the introduction and spread of invasive plant species. To minimize the spread of invasive species, contractors would be required to comply with applicable Minnesota regulations, which could include measures such as cleaning construction equipment prior to arriving on site and upon leaving the site (reference (42)).

d. Identify measures that will be taken to avoid, minimize, or mitigate the adverse effects to fish, wildlife, plant communities, ecosystems, and sensitive ecological resources.

As noted above, direct impacts to aquatic biota are not anticipated because Project discharge would meet all applicable water quality standards. As noted above in EAW Item 17 (Air), the Fugitive Dust Control Plan would include measures to minimize impacts to ecological resources.

The underground mining techniques proposed for the Project would reduce potential impacts to wildlife habitat by decreasing the area of ground disturbance. A portion of the developed surface (excluding the railway spur) will be fenced, but there is ample adjacent undeveloped land available for wildlife to pass through. Current habitat within the Project Area is listed as predominantly upland, with small portions of alder thicket, open bog, shrub carr, hardwood swamp and excavated ponds. These small habitat areas, are near areas that have been disturbed regularly for decades.

As noted above, impacts to northern long-eared and tricolored bats would be minimized by following federal laws in relation to the northern long-eared bat.

15 Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

The Project is located on the traditional, ancestral, and contemporary lands of the Očhéthi Šakówiŋ (Dakota/Lakota), Mdewakanton (Dakota/Sioux), and the Anishinaabe (Ojibwe) peoples. It is important to acknowledge that the Native American nations played a vital role in Minnesota's history and continue to influence its culture today.

Barr requested data from the Minnesota State Historic Preservation Office (SHPO) on May 9, 2022, to identify previously recorded archeological sites and historic architectural resources located near and within the Project Area. The Minnesota Office of the State Archaeologist (OSA) Portal for archeological sites was also reviewed on May 16, 2022. In addition, Barr completed an in-person records check at the Minnesota SHPO on October 11, 2022.

The data provided by SHPO and reviewed through the OSA Portal identified no known archeological sites or historic architectural resources within the Project Area. In the area surrounding the Project Area, two potential precontact archeological site locations have been identified. These sites are both designated "alpha sites," as they have not been confirmed by formal archeological survey. One site (21CLi) represents a potential flat-topped mound as reported in The Aborigines of Minnesota (reference (43)), while the second (21Akbc) represents the potential location of a precontact village site as reported in Kathio (reference (44)). The exact locations and presence of these sites is unknown; however, as they are currently mapped in the OSA Portal, both are located over 1 mile from the Project Area. Eight documented historic architectural resources may be in visual proximity to the Project Area; however, at least three have been demolished since their original documentation (Table 14, Figure 19).

Table 14 Previously Identified Cultural Resources in Visual Proximity to the Project Area

Resource Number	Resource Type	Township	Range	Section	NRHP Eligibility
AK-TMC-001	First State Bank of Tamarack	48	22	16	demolished
AK-TMC-002	Marcus Theater	48	22	15	demolished
AK-TMC-003	Tamarack Cooperative Store	48	22	15	undetermined
AK-TMC-004	Mayhall House	48	22	15	demolished
AK-TMC-005	Tamarack Town Hall	48	22	15	undetermined
AK-TMC-006	Tamarack School	48	22	15	undetermined
AK-TMC-007	Marcus Nelson Barn	48	22	15	undetermined
XX-ROD-153	Trunk Highway 210	48	22	15	not eligible

The majority of the previously recorded historic architectural resources are located in Tamarack, Minnesota. Tamarack began as a railroad town and was founded in 1874 when the Northern Pacific Railroad created a line from Duluth to Brainerd (reference (45)).

The cultural resources records check indicates that the Project Area has not been previously investigated for cultural resources; therefore, it is possible that undocumented archeological sites and/or historic architectural resources persist within the area. The Project would require a permit from the United States Army Corps of Engineers, constituting an undertaking subject to Section 106 of the National Historic Preservation Act. As a result, cultural resources investigations, including tribal cultural resources investigation, an archeological reconnaissance, and a historic architectural survey, will be completed prior to construction to determine whether historic properties eligible for the National Register of Historic Places are located within the Project Area. Information gathered during these surveys will be included in the EIS.

16 Visual

Describe any scenic views or vistas on or near the Project area. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The Project would alter the landscape from a rural setting with tree cover to an industrial setting that, in addition to the underground mine, would include the surface features described in response to EAW Question 6(b).

The Project Area is surrounded by various land ownerships, including private and State of Minnesota owned lands. Two private residences exist in the immediate vicinity of the Project Area. The first residence is located directly west of the Project across CSAH 31. The other private residence is located one half mile north of the Project along CSAH 31 and borders the Project Area's northernmost property boundary. Within the Project's property boundary, there are three farmsteads owned by Kennecott Exploration. One is located on the west side of CSAH 31 and two are located on the east side of CSAH 31 within Project boundaries. The Project's eastern boundary borders the Savanna State Forest and consists of a mixture of wetlands, lowland conifers and lowland deciduous tree types that help protect the aesthetic quality of the landscape. Young to middle-aged coniferous and deciduous tree types provide a natural buffer along the stretch of CSAH 31 that runs adjacent to the Project's western property boundary. There are no scenic vistas within or near the Project Area that require special attention regarding adverse visual impacts.

The Project would be partially visible to anyone traveling on the roadways adjacent to the Project Area during construction and operation. It may also be visible or partially visible to the farmsteads and residences adjacent to the Project, depending on the time of year and persistence of tree cover over time.

Project-related visual effects during construction would consist of large equipment and heavy machinery movement throughout the Project Area and increased traffic along CSAH 31, as well as the introduction of new buildings and facilities within the Project Area, as described in response to Question 6(b). Once constructed, the Project will operate 24 hours a day, seven days a week, 365 days of the year.

During Project operation, visual effects would consist of the presence and use of the above-mentioned surface facilities and buildings, which would be extant at least for the entirety of operations. Upon mine closure, if there is no beneficial reuse for the site, surface infrastructure would be removed as described in response to Question 6(b).

Visual effects would also consist of daily activities for mining operations, including the movement of haul trucks throughout the facilities, delivery, and employee traffic on CSAH 31 and increased railway activity for the loading and shipment of the mined ore to the concentrator.

The City of Tamarack, Minnesota is located in a rural setting. The sky in and around the city has a Class rating of 2 or 3 on the Bortle Dark Sky Scale (reference (46)), which is a qualitative index developed in 2001 to "provide a consistent standard for comparing observations with light pollution" (reference (47)). The Bortle Dark Sky Scale groups the visibility of stars, galaxies, and zodiacal light into 9 classes (reference (47)). A Class rating of 2 describes a truly dark sky and is considered excellent for stargazing (reference (47)). A Class rating of 3 describes rural sky. Under Class 3 skies, there is indication of light pollution on the horizon, but they are still considered ideal for stargazing. The Project is located in a Bortle Class 3 area. Under Bortle Classes 1 through 3, "most observers feel they are in a natural environment, with natural features of the night sky readily visible" (reference (48)).

Screening barriers are also required per the Aitkin County Mining and Reclamation Ordinance (adopted November 17, 2009) (reference (18)). Ordinance 3.6(E) requires a screening barrier between the mining site and adjacent residential and commercial properties, as well as between the mining site and any public road within 500 feet of the mining facility. The screening barrier must be planted with a species of fast-growing trees, and existing trees and ground cover along public road frontage must also be preserved and maintained (reference (18)). The Project intends to maintain the existing screening buffer along the Project's western property boundary adjacent to CSAH 31 to the extent practicable using the pre-established coniferous and deciduous trees. To preserve the natural aesthetics of the surrounding landscapes, the Project also intends to maintain a screening barrier around most of the Project Area and incorporate additional tree plantings in areas where cover is minimal. Additionally, maintaining and improving these screening barriers will create habitat for wildlife and improve ecological diversity while also reducing some of the Project's emissions, such as air pollutants and noise levels from equipment and machinery (reference (49)) the Project is also working to include Bureau of Land Management guidance for lighting and dark sky compliant lights in the design (reference (50)). As outlined by the Bureau of Land Management (reference (50)), some of the controls the Project plans to incorporate into their design include but are not limited to: aiming floodlights down, fully shielding light fixtures to emit light only below the horizon, using vegetation to screen light sources, using the minimum level of illumination necessary, using lighting controls such as motion sensors, and using wildlife friendly light colors such as amber, orange or red lighting where possible. A viewshed analysis will be performed for the EIS.

17 Air

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

The preliminary air pollutants from stationary sources that will be analyzed in the EIS are criteria air pollutants, hazardous air pollutants (HAPs), and greenhouse gas (GHG) emissions. Some of the specific pollutants that will be evaluated in the EIS are as listed below.

- Particulate matter (PM), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Nitrogen oxides (NO_X)
- Carbon monoxide (CO)
- Volatile Organic Compounds (VOC)
- Lead (Pb)
- HAPs (Single HAP [including Elongated Mineral Particles] and Total HAPs)
- Carbon dioxide equivalence (CO_2e)

The list of emission sources and potential pollutants will be updated as additional facility design is completed. The EIS will calculate emissions for all sources and air pollutants. However, anticipated sources are described further below.

Exhaust Stack Sources

Several emission-producing activities would be located underground and would emit exhaust through a stack. Prior to release, the exhaust air would undergo a filtration or scrubbing process to reduce the amount of suspended dust and particulates. Underground excavation activities would consist of drilling holes, blasting using an explosive material, and underground transfer of ore, development rock, and CRF. The explosives would produce emissions, in addition to particulates emitted from the rock and ore.

Aboveground, several sources would exhaust through stacks. Ore would be transferred from the trucks to covered storage areas for staging and then to railcars for additional processing. A backfill plant would be located at the mine surface. The backfill materials crusher building would exhaust through pollution control equipment and eventually vent out stacks. The storage pile is a fugitive particulate source. A propane heater for heating the mine and emergency diesel electrical generators would produce emissions. Propane may also be used to heat buildings.

The Project would install control equipment as needed to meet applicable regulatory requirements for stack, fugitive, and engine emissions. Control equipment would include fabric filters or a scrubber for material handling and loadout operations. Water sprays would be used to minimize emissions from underground mining operations. Details will be provided in the EIS.

Air Regulatory Framework

Under Minnesota Rules, part 7007.0200 and Minnesota Rules, part 7007.0250, an air permit is needed if EPA emission standards from 40 CFR Part 60 or 61 apply. In addition, if the potential emissions are above the air permitting thresholds for stationary sources, then an air permit would also be needed.

The Project expects that Prevention of Significant Deterioration construction permitting requirements would not be triggered, but that either an individual state or Title V facility air permit would be needed for the facility. EPA has an emission standard under 40 CFR Part 60 Subpart LL for Metallic Mineral Processing that establishes a particulate matter limit for rail loadout. Minnesota rules require an air permit if this Metallic Mineral Processing standard applies. The Project plans to obtain an individual facility permit.

Additional EPA emission standards apply to Project equipment. The EPA emission standard under 40 CFR Part 60 Subpart OOO may apply for crushing of aggregate and development rock at the Project Area. The Project may purchase a certified generator engine to meet additional EPA requirements under 40 CFR Part 60 Subpart IIII. Vehicles would meet EPA's Tier 4 mobile diesel engine limits. Tier 2 and 3 certified vehicles would only be used when Tier 4 vehicles are unavailable.

The Project expects to have Hazardous Air Pollutant (HAP) emissions below the Title V thresholds and therefore would be a HAP area source. The emergency electrical generator engine would be subject to 40 CFR Part 63 Subpart ZZZZ but would meet this standard by meeting 40 CFR Part 60 Subpart IIII.

The Project would also include emission sources that generate mercury emissions through combustion of propane. Facilities with mercury emissions of three or more pounds per year are subject to Minnesota Rules, part 7007.0502. The Project does not expect mercury emissions above the 3 pound per year threshold. The MPCA Mercury Risk Estimation Method spreadsheet will be used to assess risks and hazards from the Project mercury emissions.

All federal and state regulations would be evaluated in detail for the EIS once equipment design is finalized.

Class I and II Modeling

To support EIS development, the Project would conduct a modeling analysis for the Class I areas near the Project Area that may include an initial screening, an increment analysis, and particle transport modeling analysis. For these studies, the Project would develop a modeling protocol according to the Federal Land Managers Air Quality Related Values guidance.

Additionally, the Project would complete Class II air dispersion modeling for the EIS to evaluate what modifications may be needed to meet these standards. The Project would follow MPCA's Air Dispersion Modeling Practices and EPA's Guideline on Air Quality Models. A modeling protocol, needing MPCA approval, would be developed. Talon has constructed a meteorological station and will begin using this on-site data to support the modeling once a complete year of data is available. Modeled air concentrations would be compared against the Significant Impact Levels and National and Minnesota Ambient Air Quality Standards for each pollutant and averaging period, as applicable.

Risk Assessment

A health risk assessment per MPCA applicable requirements would be completed for the Project EIS. Potential health effects from inhalation of Project air emissions and through indirect contact of deposited air emissions would be identified using the MPCA Air emissions risk analysis (AERA) Risk Assessment Screening Spreadsheet (RASS) (aq9-22). Sensitive receptors would be assessed as a part of the health risk assessment.

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g., traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Although the goal is to electrify the vehicle fleet as much as possible there would likely still be some mobile tailpipe emissions. The mobile engine emissions would be included in the proposed air dispersion modeling completed for the EIS but would be excluded from emission totals used to evaluate permitting requirements. Electric vehicles would be used for operations, if available. Where electric vehicles are unavailable, vehicles would be equipped with Diesel Emission Fluid (DEF) to minimize NO_X emissions.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 17a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Fugitive Dust

Aboveground paved and unpaved roads at the Project Area would produce fugitive particulate emissions. Aggregate may be received and stored for use as both CRF and unpaved roadbeds. The transfer and outdoor storage of aggregate material would produce particulate emissions. The act of road grading would be used to maintain unpaved roads and it will produce particulate emissions.

Class 2 development rock would be transferred to the backfill material storage area and stored outdoors. The aggregate or development rock would be mixed with additional backfill materials for transfer back to the underground mine.

The Project Area may also store excavated surface overburden and construction-related materials in piles. Storage piles would produce fugitive particulate emissions from wind erosion and material transfer.

The Project's Fugitive Dust Control Plan would include visible emissions checks with mitigation measures in place if emissions are observed. Mitigation measures may include sweeping and spraying of paved surfaces, dust suppressants and water sprays on unpaved surfaces, wind barriers for piles, and water sprays or the use of vegetation.

Odors

Use of explosives and diesel trucks, if necessary, are expected to be the primary sources of odors associated with the Project. Explosives have a distinctive smell that may be detectable in the area immediately surrounding the Project Area. The Project expects to blast daily, and the associated emissions would not be expected to last more than an hour. Diesel engines are recognized odor sources; however electric vehicles would be used if available. All nonelectric vehicles would be EPA Tier 4 certified engines if available. The diesel exhaust fluid and particulate filters used with Tier 4 engines are expected to reduce odors. Underground tailpipe emissions would exhaust via the mine ventilation, and surface tailpipe emissions would exhaust near ground level.

18 Greenhouse Gas (GHG) Emissions/Carbon Footprint

a. GHG Quantification: For all proposed projects, provide quantification and discussion of project GHG emissions. Include additional rows in the tables as necessary to provide project-specific emission sources. Describe the methods used to quantify emissions. If calculation methods are not readily available to quantify GHG emissions for a source, describe the process used to come to that conclusion and any GHG emission sources not included in the total calculation.

The Project's GHG emissions may consist of a combination of both direct and indirect emissions from construction and operational activities. GHG emissions from construction activities would include both on- and off-road mobile equipment, land use change, and potential electrical consumption.

Operational GHG emissions would consist of:

- stationary combustion equipment such as propane heaters and emergency electrical generator engines;

- mobile source emissions;
- fugitive sources from blasting activities;
- land use conversion;
- electrical consumption; and
- offsite waste disposal.

GHG emissions during construction and operations will be calculated for the EIS, as summarized in Table 15 and Table 16.

Table 15: Construction GHG Emission Types and Calculation Methods

Scope	Type of Emission	Emission Sub-type	Calculation Methods
Scope 1	Combustion	Mobile Equipment - On Road	• Calculated using emission factors for fuel usage from EPA 40 CFR Part 98 Subpart C Table C-1 [1] • Calculated using EPA CCCL Emission Factors for Greenhouse Gas Inventories, Table 3 and Table 4 [2]
Scope 1	Combustion	Mobile Equipment - Off Road	• Calculated using emission factors based on South Coast Air Quality Management District, SCAQMD EMFAC 2007 (v2.3) [3] • Calculated using EPA CCCL Emission Factors for Greenhouse Gas Inventories, Table 5 [2]
Scope 2	Purchased Energy	Electrical	• Calculated using emission factors from the EPA Emissions & Generation Resource Integrated Database (eGRID) or from supplier information [4]

[1] Source: reference (51)
[2] Source: reference (52)
[3] Source: reference (53)
[4] Source: reference (54)

Table 16: Operation GHG Emission Types and Calculation Methods

Scope	Type of Emission	Emission Sub-type	Calculation Methods
Scope 1	Combustion	Stationary Equipment	• Calculated using emission factors for fuel usage from EPA 40 CFR Part 98 Subpart C Tables C-1 and C-2 [1]
Scope 1	Combustion	Mobile Equipment - On Road	• Calculated using emission factors for fuel usage from EPA 40 CFR Part 98 Subpart C Tables C-1 and C-2 [1] • Calculated using EPA CCCL Emission Factors for Greenhouse Gas Inventories, Table 3 and Table 4 [2]

Scope	Type of Emission	Emission Sub-type	Calculation Methods
Scope 1	Combustion	Mobile Equipment - Off Road	• Calculated using emission factors based on South Coast Air Quality Management District, SCAQMD EMFACT 2007 (v2.3) [3] • Calculated using EPA CCCL Emission Factors for Greenhouse Gas Inventories, Table 5 [2] • Calculated using emission factors for fuel usage from EPA 40 CFR Part 98 Subpart C Tables C-1 and C-2 [1]
Scope 1	Fugitive	Area	• Calculated using emission factors from AP-42 Section 13.3 Explosives Detonation, Table 13.3-1 • NIOSH "Factors Affecting Fumes Production of an Emulsion and ANFO/Emulsion Blends" • Calculated using emission factor for fuel oil from 40 CFR 98 Subpart C Tables C-1 and C-2 for any ANFO use
Scope 1	Land Use	Conversion	• Calculated using emission factors based on the following: ○ 2020 net CO_2 flux for converted land type and the total US land use change from each converted land type from the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2020 [5] ○ 2006 IPCC Guidelines for National Greenhouse Gas Inventories [6] ○ 2013 Wetlands Supplements for wetlands and sources/sinks for uplands [7]
Scope 1	Land Use	Carbon Sink	• Calculated using emission factors based on the following: ○ 2020 net CO_2 flux for converted land type and the total US land use change from each converted land type from the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2020 [5] ○ 2006 IPCC Guidelines for National Greenhouse Gas Inventories [6] ○ 2013 Wetlands Supplements for wetlands and sources/sinks for uplands [7]
Scope 2	Purchased Energy	Electrical	• Calculated using emission factors from the eGRID or from supplier information [4]
Scope 3	Off-site Waste Management	Area	• Calculated using EPA CCCL Emission Factors for Greenhouse Gas Inventories, Table 9 [2]

[1] Source: reference (51)
[2] Source: reference (52)
[3] Source: reference (53)
[4] Source: reference (54)
[5] Source: reference (55)
[6] Source: reference (56)
[7] Source: reference (57)

b. GHG Assessment

i. Describe any mitigation considered to reduce the project's GHG emissions.

The Project plans to apply appropriate GHG mitigation measures when feasible. Such measures may include:

- Using electric vehicles, if available, to reduce mobile source combustion emissions;

- Hauling of CRF on the return trip from ore being hauled to the surface;
- Maximizing the use of uncemented rockfill;
- Purchasing certified green electricity, as available;
- Maintaining tree canopy and reducing any unnecessary clearing and grubbing to maintain natural carbon sinks;
- Reduce use of off-road mobile construction equipment;
- Practicing good vehicle and equipment maintenance;
- Turning off equipment when not in use;
- Reducing the amount of waste generation;
- Planting trees in buffer zones and to improve habitat; and
- Habitat improvement programs

ii. Describe and quantify reductions from selected mitigation, if proposed to reduce the project's GHG emissions. Explain why the selected mitigation was preferred.

GHG reduction quantifications from selected mitigation measures will be supplied for the EIS. Talon would use electric equipment if available and appropriate to Project needs; this would continue to be evaluated as design advances.

iii. Quantify the proposed projects predicted net lifetime GHG emissions (total tons/# of years) and how those predicted emissions may affect achievement of the Minnesota Next Generation Energy Act goals and/or other more stringent state or local GHG reduction goals.

It is anticipated that the net lifetime GHG emissions for the Project would be small and the GHG effects from the Project will have little impact on achieving the Next Generation Energy Act goals. A comparison of the estimated Project emissions to total statewide and national emissions will be provided in the EIS.

Additionally, the Project would support the achievement of GHG reductions by supplying the necessary metals for electric vehicle manufacturing to support the transition to a net-zero carbon environment.

19 Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Existing noise in the region of the Project Area is typical of a small town, rural setting. Surrounding areas consist of residences, roadways, and railways. Currently, noise is generated primarily by local roadway traffic and the BNSF railway, located along the southern border of the Project Area. Nearby sensitive receptors include rural residences north and west of the Project Area and residences and businesses immediately south of the Project Area in the City of Tamarack.

As discussed in EAW Question 6 (Project Description), noise would be generated during Project construction and operation activities and would result from several sources of equipment, such as but not limited to bulldozers, excavators, front-end loaders, haul trucks, water trucks, ventilation fans, ore conveyors, rock crusher, water intake pumps, air compressors, and other machinery typical of mining operations, as well as the tunnel boring machine (TBM) utilized during construction.

Baseline noise monitoring data would be collected to assess pre-construction conditions for the Minnesota Pollution Control Agency (MPCA) noise standards. These data could also be utilized for future modeling of the Project components within the Project Area. The ambient conditions monitored in this effort will provide a baseline for comparison to future noise levels and for use in modeling projected noise impact from the Project. Modeling analysis of potential future Project noise impacts may consist of modeling the area using standard ISO9613 noise propagation modeling techniques, coupled with Federal Rail Administration and/or Federal Highway Administration noise modeling tools for ore transportation. This information will be provided in the EIS. Noise impacts from the Project would be subject to Minnesota regulations. The Project would be constructed following Minnesota Rules, part 6132.2000, subpart 3; the location will be set back 100 feet from a public roadway and 500 feet from occupied dwellings. An augmented buffer of coniferous and deciduous trees between the western property boundary of the mine site and public structures currently exists and may have the potential to minimize effects of noise generated by the Project by 5 to 8 decibels (reference (49)). The Project is also exploring options to incorporate an additional natural barrier within the pre-established screening barrier. This added barrier could have the potential to reduce the effects of noise produced by machinery and equipment by up to 10 to 15 decibels (reference (49)).

20 Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

During construction and operation, the Project would be accessed from an existing two-lane paved road (CSAH 31). The MDOT traffic mapping application was used to assess annual average daily traffic, a measure of baseline traffic conditions, in vicinity of the Project Area (reference (58)). According to MDOT, the 2021 annual average daily traffic volume was 223 daily trips along CSAH 31 and 474 daily trips along County Highway 6; the data were collected near the intersection of CSAH 31 and County Highway 6, immediately west of the Project Area (Figure 1). Workers accessing the site during construction and operation of the Project would contribute to local traffic volumes. There are currently no designated parking areas at the Project location. Future parking would consist of approximately 160 spaces. It is anticipated that there will be two 12-hour shifts, with approximately 100 to 150 workers on day shifts and approximately 80-90 people on night shifts on a typical day. Peak traffic volumes would occur during shift changes; one in the morning and one in the evening. Using the personnel data provided in Question 6 (Project Description) and assuming all future employees drive their own vehicles to work, it can be estimated that the Project will cause an increase in traffic volumes twice a day. Due to the rural nature of the Project location, alternative transportation modes are not available.

The Project would include construction of a railway spur that would connect the ore storage and rail loadout facility to the existing BNSF railway located immediately north of the City of Tamarack, as described in response to EAW Question 6 (Project Description). Ore would be shipped to the concentrator via railway approximately every 2-7 days.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. *If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW.* Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 *(available at: http://www.dot.state.mn.us/accessmanagement/resources.html)* or a similar local guidance.

Construction and operation of the Project would increase traffic volumes in the area and potentially lead to periods of traffic congestion on local roads. A traffic impact study would be conducted to further assess the Project's impact on the regional transportation system and the need for roadway improvements to accommodate Project traffic and minimize congestion on local roads; the results will be provided for the EIS.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

It is expected that during construction and operation, all Project employees would abide by local load restrictions and speed limits. Additional measures to minimize or mitigate potential Project-related transportation impacts, if necessary, would be developed following a traffic impact study.

21 Cumulative Potential Effects

(Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

The EIS will evaluate the potential for cumulative effects that could result from the project in combination with other present, or reasonably foreseeable future actions. During the public scoping phase of the process, the geographic extent and timeframes that will be discussed in the EIS will be determined.

Some factors that may be considered include air quality, water quality, noise, habitat loss, and impacts on cultural and historical resources. The EIS will comprehensively analyze the project's potential environmental effects and include measures to mitigate the adverse effects identified. As part of the scoping process, the public will have an opportunity to provide input on the geographic scales and timeframes that should be considered in the EIS. The following is a list of potential geographic scales and timeframes that may be discussed:

Geographic scales:

- Local (e.g., immediate project site and surrounding areas)
- Regional (e.g., nearby towns, counties, and watersheds)
- Statewide (e.g., potential impacts on water resources and air quality statewide)

Timeframes:

- Short-term (e.g., construction and operational phase of the project)
- Long-term (e.g., potential impacts over the life of the mine and after closure)

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

A Record of Decision was issued, February 13, 2018, to Premier Horticulture, Inc. for the development of approximately 316 acres of the Wright Bog in Carlton County for horticultural peat extraction. The project is estimated to have a 25-year life. The site would be cleared and ditched, with drained water discharged into Little Tamarack River, which is in the Headwaters Big Sandy Lake watershed. One of the watersheds the Project is located in.

At this time there are no other known projects within the vicinity that may interact with the proposed Project.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

The potential environmental effects resulting from the Project could combine with environmental effects from other projects to produce a significant impact on the environment. However, the Project has been designed to minimize or avoid environmental effects, reducing the potential for significant cumulative effects. The EIS will evaluate these potential cumulative impacts to ensure the Project is environmentally sustainable and socially responsible.

22 Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

Project-related impacts are described in items 1 through 19 above.

RGU CERTIFICATION. (The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature ______________________________ Date ______________________________

Title ______________________________

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(Only references cited in the EAW data submittal were included in the reference list.)

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