3 PROJECT DESCRIPTION

3.1 PROJECT UPDATE

A preliminary Environmental Impact Statement for the Howse Project was submitted in February 2015 to CEAA. Following this submission, information requests were submitted to the Proponent, and which are adressed in the present document. This section outlines the improvements that were made to the Howse Project since February 2015, and since the project description submission. These improvements were made following regular meeting with federal experts and First Nations and primarily focused on, but not limited to, air quality, human health, permafrost and water quality.

The Howse Project footprint was improved overall, largely due to the Proponent's decision to conduct an in-pit mining technique (see Sections 2.5.2 and 3.2.1). This method reduces the out-of-pit waste rock dump footprint by approximately 27 ha, allows the Proponent to apply progressive restoration at the site while the mining operations are ongoing. This new project design was decided following consultations with First Nations. The Howse Project layout has also been adjusted to improve it's footprint characteristics; that is, the new footprint avoids wetlands and is entirely outside of the Pinette Lake watershed.

At the request of local First Nations Communities, the proponent has upgraded an existing IOCC road and therefore made available the Timmins-Kivivik bypass road. In addition to providing access to the land above the Howse Project site, the Timmins-Kivivik bypass road allows users to avoid the DSO haul road entirely, thus providing a safer alternative to access the land. With this mitigation measure, the proponent is also on the same breath providing will provide additional access to the Howells River and Pinette Lake via aa bypass road, as discussed in Section 2.5.3.

The WMP has been adjusted to minimize impact on the Pinette Lake watershed. Following discussions with the Department of Fisheries and Oceans and expressions of concern from First Nations, the watershed variation on Pinette Lake was reduced from 61 ha to 9 ha.

The Proponent will no longer need a low-grade stockpile. Rather, the remaining 20% low-grade ore will be mixed with higher-grade material to achieved desired grade, and shipped.

Numerous supporting studies were added to assist in the analysis of the environmental effects of the Howse Project, and are presented in Volume 2 of the present document. A focused study, including three field visits, on the common nighthawk confirmed its absence from the Howse Project site. A thorough literature review, field work and new data provided evidence for the absence of permafrost and field studies were able to confirm that the Project will not have adverse environmental effects on Pinette Lake. The results of a country food survey conducted in June 2015 were used to support a human health risk assessment and confirmed that the Howse Project poses no risk to human health, as it relates to country foods.

New field studies provided data on water levels and quality at Pinette Lake and Burnetta Creek, permafrost, hydrogeology and avifauna. In addition, monitoring equipment was installed to provide information on Pinette Lake and Burnetta Creek, light and soil quality. All of the new data acquired from field activities was cascaded into the effects assessment of all the components.

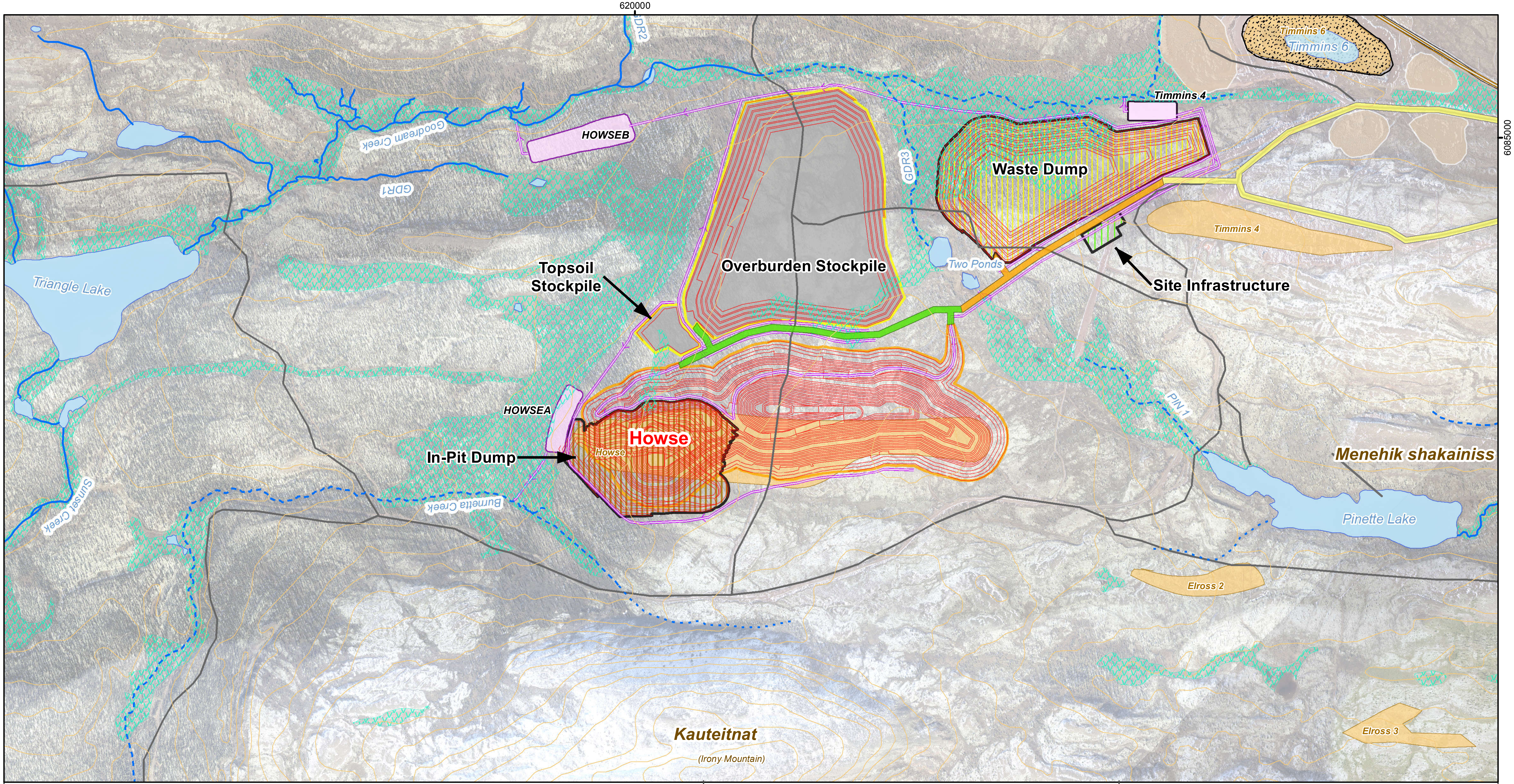
3.2 PROJECT COMPONENTS AND LAYOUT

Figure 3-1 shows the major physical features of the Project. The new physical works associated with the development of the Howse Property include:

- open pit;
- stockpiles (topsoil and overburden) and waste rock dumps;

- Howse haul road;
- bypass road;
- water management facilities and general site drainage works;
- diesel, light fuel oil and gasoline; and
- existing facilities.

Details of these Project components are provided in the following sections.



LEGEND

Infrastructure and Mining Components

- Proposed Howse Pit
- Proposed Topsoil/Overburden Stockpile
- Proposed Site Infrastructure
- Proposed In-Pit Dump
- Proposed Waste Dump
- Proposed Sedimentation Pond
- Proposed Infrastructure Contour Line (10m)
- Proposed Ditch and Outlet
- DSO Haul Road
- Existing Dump
- Existing Pit
- Deposit
- Existing Sedimentation Pond

Haul Roads

- Upgrade
- New Construction
- DSO Project Truck Road

Basemap

- Permanent Watercourse
- Intermittent Watercourse
- Storm Runoff
- Disappearing Stream
- Artesian Spring
- Water Body
- Contour Line (50 ft)
- Provincial Border
- Existing Road
- Main Access Road
- Wetland

*Hydronyms are oriented along the direction of water flow

FILE, PROJECT, DATE, AUTHOR:
GH-0572b , PR185-19-14, 2016-03-23, edickoum

N

0 200 400 600 800
Meters

UTM 19N NAD 83

SCALE: 1:15 000

SOURCES:
Basemap
Government of Canada, NTDB, 1:50,000, 1979 Government of NL and government of Quebec, Boundary used for claims
SNC Lavalin, Groupe Hémisphères, Hydrology update, 2013

Infrastructure and Mining Components
New Millennium Capital Corp., Mining sites and roads
Howse Minerals Limited/ MET-CHEM Howse Deposit Design for General Layout, 2015

ENVIRONMENTAL IMPACT ASSESSMENT
HOWSE PROPERTY PROJECT

HML Infrastructure and Layout

Howse Minerals Limited

GroupeHemispheres

5731, rue Saint-Louis,
Bureau 201, Lévis (QC)
Canada, G6V 4E2

1453, rue Beaubien est,
Bureau 301, Montréal (QC)
Canada, H2G 3C6

Figure 3-1

3.2.1 Open Pit

The Proponent will apply a Mixed Conventional and In-Pit technique to mining. This method will allow for the Proponent to accumulate a large portion of the waste material inside the mined portion of the Howse pit, resulting in an out-of-pit footprint of approximately 100 ha (namely a footprint of 39 ha for the waste rock). The remainder will be accumulated in nearby waste piles. Waste pile heights vary between 60-70 m in height.

The final dimensions for the proposed open pit are approximately 1,600 m long and 450 m wide at the top, with a maximum depth of 195 m. The anticipated footprint of the pit is approximately 78 ha projected surface area. Material from the pit will be drilled and blasted and subsequently extracted (Figure 3-2). Blasting at the Howse Property will occur approximately once per week during summer and infrequently during winter (the Proponent will blast infrequently in winter, and only if frozen ground or hard rock are encountered during winter overburden removal).

The optimal pit design for Howse is expected to contain 46 Mt of high-grade iron ore (@62.7% Fe), 50 Mt of overburden, 57 Mt of waste rock and 5 Mt of low-grade material. Depending on the final mine design and market value of the ore, the mine's service life is estimated at 15 years. The deposit has a strip ratio of 3.3:1 (calculated based on high-grade ore only).

The high-grade iron ore, which represent around 80% of the mineral resource, will be crushed and screened at the screening and crushing facility which will be located at the rail loop at a rate of 1.304 ROM Mt in 2018, 3.0 Mt per year between 2019 and 2022, 9.13 Mt per year between 2023 and 2031 and 5.55 in 2032. The finished product will be transported by haul trucks to the DSO product stockyard, where it will be loaded by loaders onto product reclaiming conveyors for subsequent loading onto rail cars. The remaining 20% low-grade ore will be mixed with higher-grade material to achieved desired grade, and shipped.

The mine design meets industry standards and complies with applicable provincial and federal legislation. For safety, environmental and economic reasons, the pit walls have been designed at a 35° slope throughout the overburden layer, at a 45° slope through the iron deposit above the water table and at a 40° slope through the iron deposit below the water table. As shown in Figure 3-2, overburden depth varies between 21 m and >50 m, with an average thickness of 25 m. For stability, 10-m high benches will be built through the iron deposit, with a minimum width of 6.5 m (Volume 2 Appendices A and B).

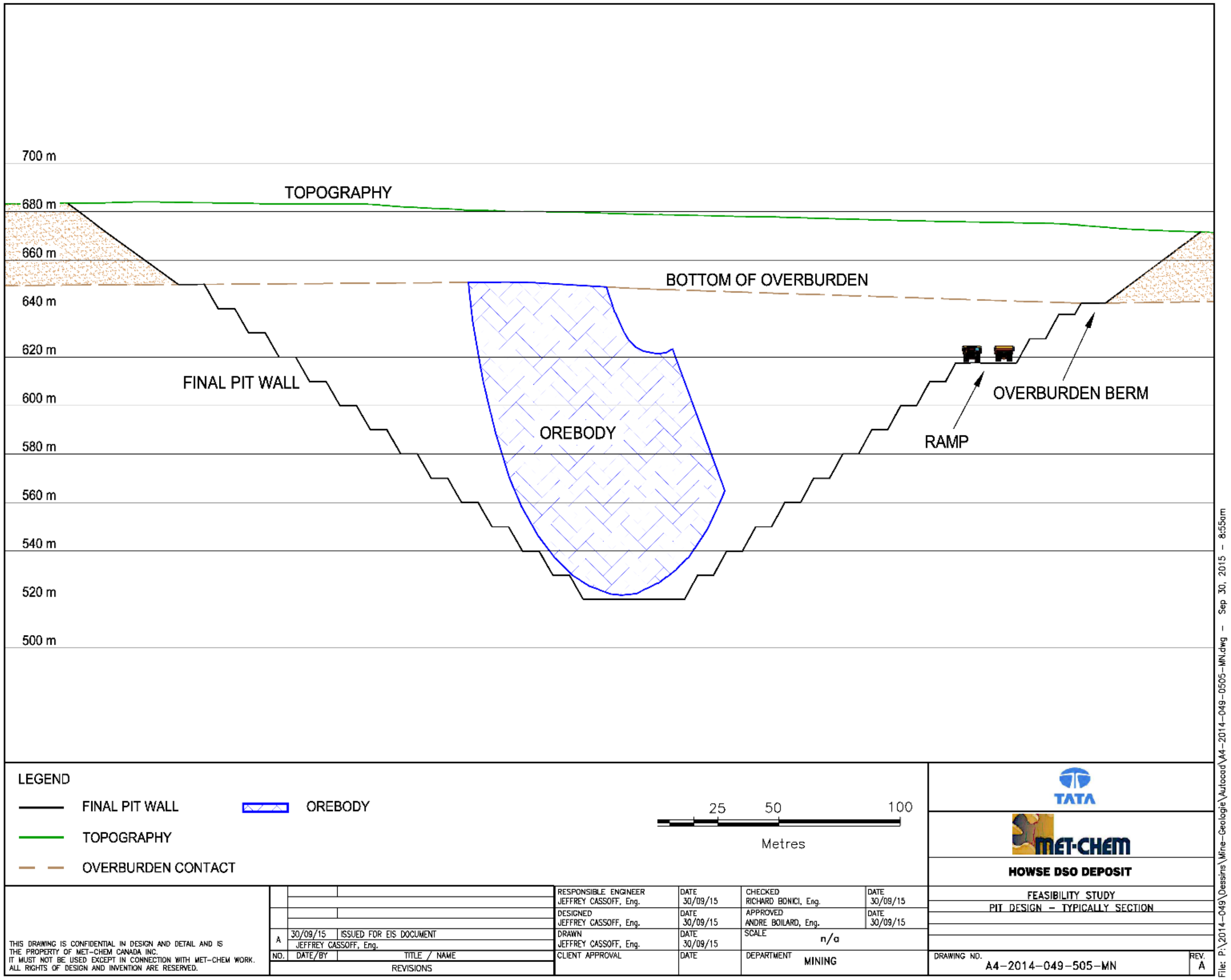


Figure 3-2 Typical Cross Section, Open Pit

3.2.2 Stockpiles and Waste Rock Dumps

As per mining regulations, organic material and topsoil from the pit and any disturbed area (waste rock dump, overburden stockpile, crushing and screening facility and roads) will be stripped and stockpiled for future site reclamation. This material will be stored in stockpiles around the property (see location in Figure 3-1). The overburden, consisting of surficial soil deposits and loose rock, will be piled in a single stockpile to ensure stability. The proposed location and footprint of the dump and stockpiles are shown in Figure 3-1.

All of the waste rock disposal area and stockpiles will have a perimeter ditch to capture water runoff that will be directed to sedimentation ponds. This drainage ditch network will be designed to direct the water for appropriate treatment before it is discharged into the environment (Section 3.1 for details). The dumps and stockpiles will be located within the claims, but outside of the ore boundary. As discussed in Section 7.3.5, acid rock drainage issues are not expected, but water quality monitoring will be done by HML to tests for PH changes. Further, regular testing will be done on the waste rock and waste stockpile to monitor for acid in rocks. If a potential risk is uncovered during monitoring, the material will be identified and specific monitoring will be implemented. As a result of this monitoring, HML will stockpile any problematic rock material separately.

Some of the waste rock and overburden materials will likely be salvaged for the bypass road upgrading and road maintenance, thereby proportionally reducing the corresponding dump/stockpile footprints. Measures will be taken to deter birds from nesting in piles of unattended soil (Section 7.4.8.3).

At the final stage, the maximum height of the dumps/stockpiles will be 60 m for the overburden, 70 m for the waste rock and 12 m for the topsoil.

The design parameters for the waste rock piles are as follows:

- face angle of 45º;
- bench height of 18 m;
- berm width of 15 m; and
- overall slope of 29°.

At the end of the fiscal year 2025, pile and dump volumes are predicted to be:

- Overburden: 15,816,000 m^3
- Waste dump: 8,326,000 m^3
- Top Soil: 192,000 m^3

At the end of the mine life, pile and dump volumes are predicted to be:

- Overburden: 18,308,000 m^3
- Waste dump: 14,768,000 m^3
- Top Soil: 234,000 m^3
- In-Pit: 12,923,000 m^3

3.2.3 Howse Haul Road

The Howse haul road configuration will take environmental, economic and safety factors into account. The amount of new road construction for the Howse haul road is 1.2 km and will be done on a disturbed area. In addition, 0.95 km of road will be upgraded to complete the road. These roads were built by the IOCC in the 1980s and so the Proponent assumes that ownership belongs to IOCC. The material used for the road construction will initially be tested for acid generating potential, as only materials showing no acid generating potential or metal leachate potential will be used. The Howse haul road location is presented in Figure 3-1.

Temporary ramps will be required in order to maintain accessible benches in the advancing wall. These ramps will either be cut with shovels or backfilled with waste rock. The ramps will be built with a maximum grade of 10%.

The road outside of the pit will have longitudinal ditches to collect the roadside surface water runoff and to convey the water affected by mining operations to a settling pond (Section 3.2.5 for more details).

Approximately 950 m of existing road from past IOCC mining operations will be upgraded and 1.2 km of new road will be built on disturbed land to connect the Howse deposit with the existing road near the Timmins 4 deposit, as shown in Figure 3-1. The road, which will be shared by mining trucks and light vehicles, will be designed for 64-tonne (CAT775) and 100-tonne (CAT777) haul trucks. For double lane traffic, HML has authorization to build the running surface width to two-times the width of the largest truck (rather than the standard three). The overall width of a 100-tonne haul truck is 6.2 m, resulting in a running surface of 12.4 m. The overall width of the haul road must account for safety berms and ditches.

The safety berm height will be a minimum of one half the height of the largest truck tire. The diameter of a 100-tonne haul truck's tires is 2.70 m. The safety berm slopes are 1.35 m high and 2.70 m wide with 45° angles (triangular shape). The maximum road grade will be 10% and the design will include a crown of 1% (minimum). The berms will be interrupted every 25 m in length to allow water to run into the ditches. Figure 3-3 shows a typical road section of 42 m including berms and ditches, which is wider than necessary but accounts for variations in topography.

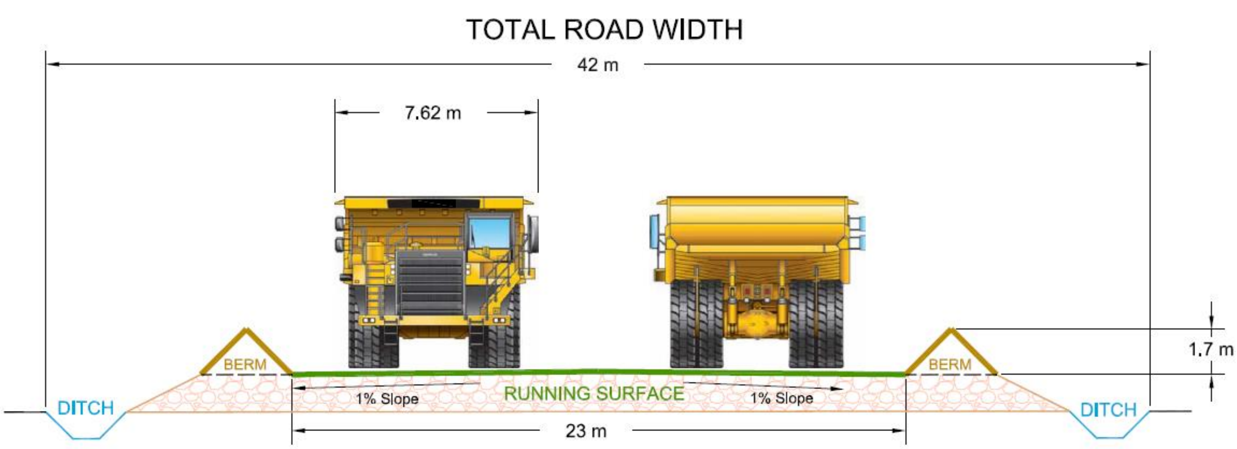


Figure 3-3 Typical Road Cross Section

3.2.4 Bypass Road

The proponent is committed to providing First Nations with access to the land throughout the Howse Project activities to compensate for the loss of a road as a result of the Howse Project location. Access will be provided via a new route to Pinette Lake and Kauteitnat. The exact specifications of the final route are currently being considered and full details are provided in section 2.5.3. In either case, the Proponent plans to conduct upgrades to existing roads and has no plans to build new roads.

Both bypass alternatives are located on Crown Land, were built by IOCC and have been used by First Nations for several decades. Neither TSMC nor HML assume ownership of the road upgrades. However, at the request of the community, the Proponent will maintain the chosen road twice per year during the project duration.

3.2.5 Water Management Facilities and General Site Drainage Works

The complete WMP is available in Volume 1 Appendix IV. A summary of the WMP is provided in the sections below. The WMP will use three sedimentation ponds, two of which will be built by the Proponent, and one which is existing (Timmins 4 sedimentation pond 3).

Water use requirements

The proponent plans to recycle water by pumping water from the sedimentation ponds if the quality satisfies the truck requirements. Potable water for office will come from the potable water treatment unit of the DSO camp.

3.2.5.1 Water Management Strategy

The Howse Property sits on three different watersheds leading to Pinette Lake, Burnetta Creek and Goodream Creek.

Figure 3-5 shows the general WMP layout. The water management strategy aims to manage surface runoff and pit dewatering water with as little effects as possible on these three watersheds. The WMP will avoid construction in sensitive areas like wetlands and will minimize flow variations in existing natural creeks. Further, existing infrastructure will be used, such as the Timmins 4 sedimentation pond 3. Water treatment will consist of removing suspended sediments by means of three (two new) sedimentation ponds.

In order to address the concerns of local stakeholders, no water will be discharged into Pinette Lake. All ditches will be protected against erosion with riprap to avoid any sediment production from the ditches themselves. The water management strategy is as follows:

- runoff from the west part of the in-pit waste rock dump, the topsoil stockpile and from the surrounding area on the south-west side of the site will be collected by a ditch leading to sedimentation pond HOWSEA and then discharged to Burnetta Creek;
- runoff on the waste rock dump, the site infrastructure (Figure 3-1) pad, and the overburden stockpile will be collected by ditches leading to sedimentation pond HOWSEB and then discharged to Goodream Creek;
- since underground water will seep into Howse pit as the pit depth reached the water table, pit dewatering will consist of pumping the water that accumulates into the pit and diverting it to a ditch on the north-east side of the pit, leading to sedimentation pond HOWSEB, and then discharged into Goodream Creek. The portion of the ditch receiving the dewatering water along the pit will be waterproofed to avoid infiltration of water directly back into the pit; and
- approximately 2/3 of the surface runoff from the Howse pit will be pumped into existing Timmins 4 sedimentation pond 3, to take advantage of its full sedimentation capacity, and then discharged into Goodream Creek. The remaining third, like the underground water, will be pumped to a ditch on the north-east site of the pit leading to sedimentation pond HOWSEB and then discharged into Goodream Creek.

The following schematic describes the WMP infrastructures and water fluxes between them (Figure 3-4).

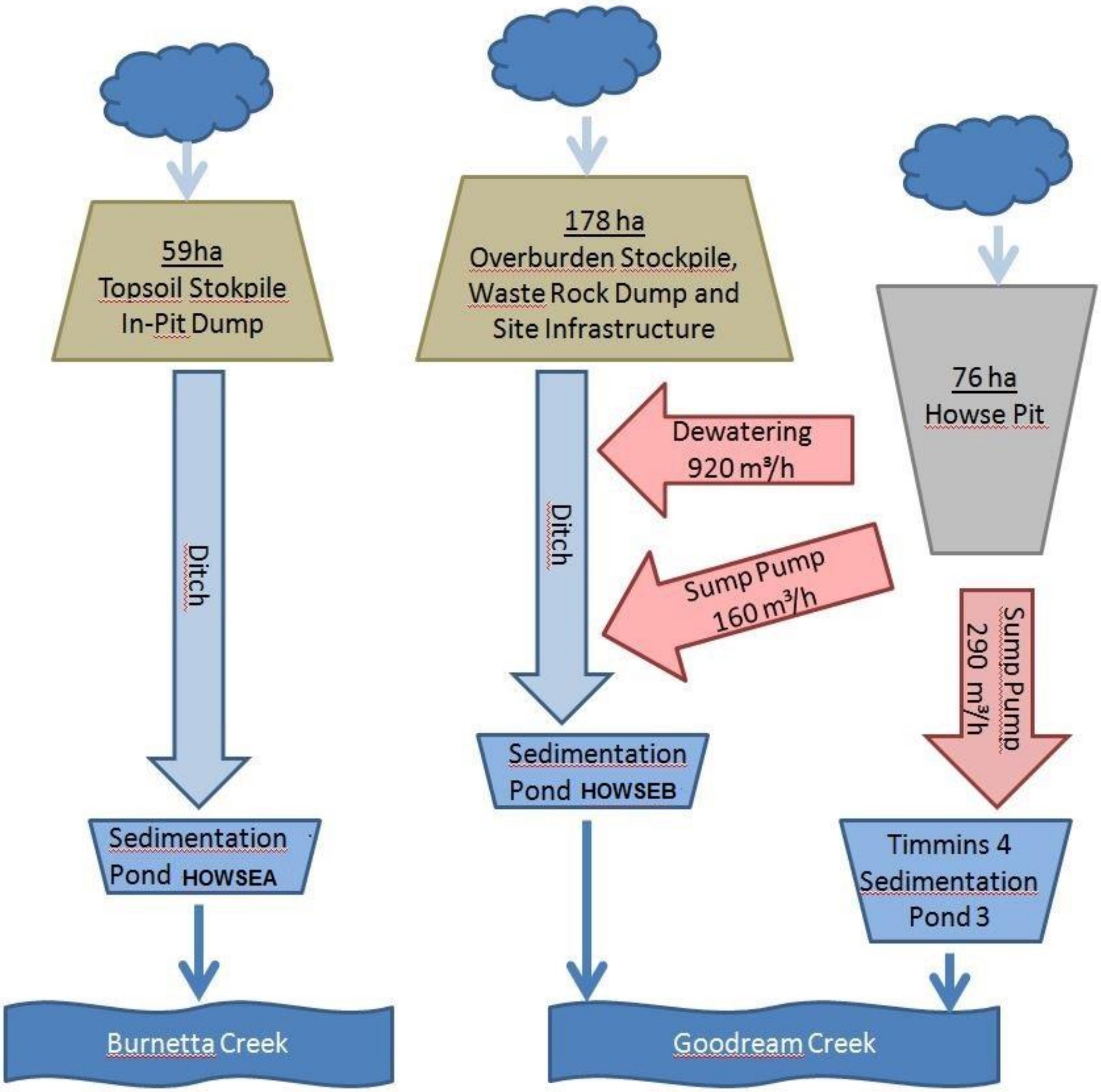


Figure 3-4 Water Management Plan Schematic

Table 3-1 Design Criteria of the Planned Water Management Infrastructure

TYPE OF CRITERIA	CRITERIA	VALUE	COMMENTS
Location criteria	Buffer zone between the infrastructure and Irony Mountain	500 m	--
	Buffer strip between the infrastructure and watercourses and wetlands	Minimum of 30 m	--

TYPE OF CRITERIA	CRITERIA	VALUE	COMMENTS
Environmental criteria	Alteration of Pinette Lake	No alteration in Pinette Lake water quality is accepted	No surface water from Howse mine site can be discharged into Pinette Lake, even after treatment through a sedimentation pond
	General location of the infrastructure	Avoid building infrastructures on wetlands, whenever possible	--
	Quality of runoff water and dewatering water	The only issue is assumed to be total suspended solids	See Water Quality and Treatment section for discussion on this issue.
	Pond and ditch waterproofing	No waterproofing	See Water Quality and Treatment section for discussion on this issue
Hydrological criteria	Source of meteorological data	Schefferville A meteorological station	
Ditch design criteria	Ditch longitudinal slopes	Minimum 0.5%	--
	Ditch transverse slopes	2H:1V	--
	Ditch excavation	Minimize volume of excavation	--
	Return period of design flow	100 years	--
Pond design criteria	Infiltration	No infiltration is taken into account	Pond bottom and sides assumed to be frozen during the spring freshet
	Dead storage for sediment	0.5 m	The frequency at which the sediments will need to be removed from the pond during the life of the mine will be evaluated in the next phase of the project. If sediment removal is required, it will be managed according to all applicable regulations
	Vertical distance between dike crest and spillway invert	1 m	--
	Pond outflow structure	Permeable rockfill dike	--
	Ice cover during design flood	0.5 m	The sedimentation ponds will naturally drain by gravity at the end of fall. Thus, there will be no significant build-up of ice cover during winter. Sedimentation pond HOWSEB receives water from pit dewatering operations. Thus, it is assumed that a 1-m ice cover will remain at the peak of the spring freshet.
	Return period of design flood for emergency spillway	100 years	Based on Canadian Dam Safety Guidelines for Significant Dam Class

TYPE OF CRITERIA	CRITERIA	VALUE	COMMENTS
	Return period of design flood for pond routing and sedimentation	25 years	--
	Design flood for pond routing and sedimentation	The worse of either: A summer-fall 24-hour 25-year return period rainfall; or Combinations of a 24-hour 25-year return period rainfall with the melting of a 25-year return period snowpack over 30 days	--
Sedimentation criteria	Design flow	Average 24-hour inflow during the peak of the design flood	--
	Specific gravity of particle to settle	2.7	--
	Design particle size to settle for sedimentation ponds	0.01 mm (10 microns)	Particle size selected according to assumed particle size analysis for overburden and waste rock. Pond designed to ensure minimum area requirement is met and a minimum residence time of approximately 5 h.
	Length to width ratio of the sedimentation ponds	Minimum 3 to 1	--

3.2.5.2 Dewatering

The conceptual dewatering rate for the Howse pit was estimated based on historical dewatering data from other similar mines in the area and using conservative assumptions.

An overview of historical mine dewatering at Knob Lake is given in Stubbins & Munro (1965). The Wishart, Gagnon, French and Ruth mines were studied. It was found that dewatering was significantly correlated with pit depth. Table 3-2 summarizes these results. The range of dewatering rates varied from approximately 16, 900 to 86, 500 m^3/d for those mines. This wide range of dewatering rates is due to several factors, such as pit dimensions, hydraulic conductivities of geological units, fault zones, proximity to water bodies, permafrost, and mining and dewatering operations, for which data is unavailable.

Results from measurements taken at the Timmins 3 and LabMag sites were used to create an estimate. Dewatering simulations were conducted for Timmins 3 and located about 5 km northeast from Howse deposit, and LabMag, located west of the Howse deposit. Dewatering rates (Table 3-2) for these two mines are similar to the ones measured at Wishart and Gagnon mines (between 13, 000 and 23, 000 m^3/d). Hydraulic conductivities for Howse iron ore units were estimated from pumping tests by Geofor in 2015 (Volume 2 Supporting Study B). Very similar results were obtained for Howse, Timmins 3 and LabMag deposits. Therefore, Howse dewatering rate is expected to be similar to Timmins 3 and LabMag dewatering rates.

Groundwater flow modelling results for the Howse deposit (Volume 1 Appendix V) further confirmed the similar dewatering rates between Howse, Timmins 3 and LabMag as a dewatering rate of approximately

14, 000 m³/d was estimated for a base case scenario considering a safety factor of 1.5. However, this flow rate could reach higher values, ranging between 17, 700 to 31, 000 m³/d, when considering slightly higher hydraulic conductivities values for the geological units surrounding the pit, and a slightly higher recharge rate. At the time of writing, field work is ongoing to obtain a more precise estimation of Howse dewatering rate.

Consequently, a dewatering rate of 22, 000 m³/d was adopted for the present study. This value is relatively conservative and corresponds to an average value between 14, 000 and 31, 000 m³/d.

The Howse deposit water table was found to be between 64 and 90 m deep (Volume 2 Appendices A and B). The dewatering rate is expected to be lower during the first years of mining operations as it will be limited to water from direct precipitation and infiltration through the unsaturated geological units. Later, when the pit depth reaches water table depth, dewatering rate will increase gradually, and reach a maximum value when the pit reaches its final depth. Dewatering will be ongoing all year long once the water table depth will be reached.

Table 3-2 Summary of Hydrogeological Data

TYPE OF DATA	MINE SITE	FLOOR DEPTH (M)	DEWATERING (M³/D)	DATA REFERENCES
Historical DSO mine data	Wishart	69	16,874	Stubbins, J. B. and P. Munro. 1965. Historical information on mine dewatering of DSO (Knob Lake). The Canadian Institute of Mining and Metallurgy Bulletin, 58:814-822.
	Gagnon	83	20,412	
	French	116	84,370	
	Ruth	144	86,547	
Simulation results for new mines	Timmins 3	80	12,960	Groupe Hémisphères, March 2010. Hydrological and hydrogeological study: survey season 2009, DSOP. Final technical report.
	LabMag	150	22,262	SNC-Lavalin, in preparation. Hydrogeology and mine pit dewatering modelling - LabMag site. New Millenium Iron – TATA Steel
Assumption	Howse	160	22 000(*)	Geofor, personal communication, 2015
(*) Average value of the expected possible range.				

Water management infrastructures are designed based on the assumed dewatering flow rate of 22 000 m³/d.

3.2.5.3 Water Quality and Treatment

Effluent Quality

Results from water quality analysis at the Timmins 4 mining operation were used to anticipate the water quality of the Howse Property based on their proximity to each other. The water quality results from sedimentation ponds B and C (samplings COA-SW11 and COA-SW12) were reviewed since they are the most representative of the effluent that is expected from the Howse Property.

Results from ponds B and C indicate good water quality that generally meets the requirements of the certificate of approval (GNL, 2012) for all parameters except for suspended solids, where the concentration in the water tested is slightly above 30 mg/L. The certificate of approval is based on the MMER, 2002 (Government of Canada, 2002). The concentration of total iron, which is not currently regulated by the MMER, was tested once and the result was high. This parameter will be closely monitored in the future, but it is assumed that iron is present in suspended solid form and should settle out in the sedimentation pond, thus lowering the concentration to acceptable limits. It is important to note that the MMER is currently under review and iron could be included in its next edition.

Consequently, for the purpose of this study, and assuming that any effluent collected on the Howse Property will have similar water quality as that observed at the Timmins 4 site, the main parameter of concern is assumed to be limited to suspended solids.

Types of Effluent

There are three types of effluent that will need to be managed on the Howse Property:

1) **Natural site runoff:** The main parameter of concern for natural site runoff will be suspended matter, specifically during heavy rainfall and snowmelt events. It is assumed that suspended solids will mainly consist of silt, sand and grit.

2) **Runoff from overburden and waste rock dump:** The overburden at the Howse Property is expected to be mainly composed of silt, sand and gravel. The waste rock is expected to be composed of fine rock particles. The waste rock is also expected to be non-acid generative. The main parameter of concern is assumed to be fine suspended matter.

3) **Pit dewatering:** The pit dewatering water will occur as a result of groundwater infiltration into the pit as well as surface runoff that flows into the pit:

    a. Groundwater: The groundwater is expected to be of similar quality to the natural site runoff. The groundwater pumped from the wells around the pit is expected to have very few suspended solids.

    b. Sump water: The main parameter of concern in the sump water from the pit is expected to be fine suspended matter. Total suspended solids in the sump water are expected to be high due to the mining activity in the pit.

    c. The sump water could also be contaminated with ammonia, nitrate, and diesel from unexploded explosive residues, and oil and hydrocarbon spills from machinery. In order to minimize the load of ammonia and nitrate that could migrate into the sump water, proper explosive management will be implemented, with the objective of limiting the leaching of ammonia and nitrate from the explosive into the water column. The explosive management could include the following:

        i. Proper selection of a water resistant based emulsion explosive.

        ii. Monitoring blasting performance based on explosive quantities, blast design and surface water quality.

        iii. Proper explosive handling in combination with proper spillage control in order to promptly remove explosive spills around the blast holes.

        iv. Proper blast design to minimize incomplete detonation of explosive.

To manage any oil and hydrocarbon spills from the machinery, once a spill is detected, it will be promptly contained and removed through the use of absorbing pads. Furthermore, to manage any diesel that could be present in the sump water, an oil/water separator system could be used to remove the diesel before the surface runoff is transferred to the sedimentation pond.

Two pumps will be used for mine dewatering, one in the north end and one in the south end. Godwin HL160M diesel powered centrifugal pumps were chosen based on the flow rates, heads and piping lengths. The pumps are 475 hp each.

Treatment Strategy

Sedimentation ponds will remove the suspended solids before the water is returned to the natural receiving streams. All the sedimentation ponds are sized to provide the required settling area to allow for the smallest design particle size to settle out in the pond.

The sedimentation ponds will not be lined with any impervious material to prevent or reduce water infiltration into the ground. Ammonia and nitrate residues are expected at very low concentrations in the effluent water, and are not expected to necessitate treatment. Regardless, effluent monitoring in accordance with the provincial and federal regulations will be conducted on a regular basis and specific treatment will be considered if ammonia and nitrate blasting residue concentrations are above the criteria. The only parameter of concern is suspended matter. Consequently, if some of the runoff water does infiltrate into the ground, it will not have a negative effects on the quality of the underlying groundwater.

An allowance of 0.5 m is provided at the bottom of the sedimentation pond for sediment storage. The frequency of sediment removal and management will be assessed in the next phase of the project and will follow all applicable regulations during the life of the mine.

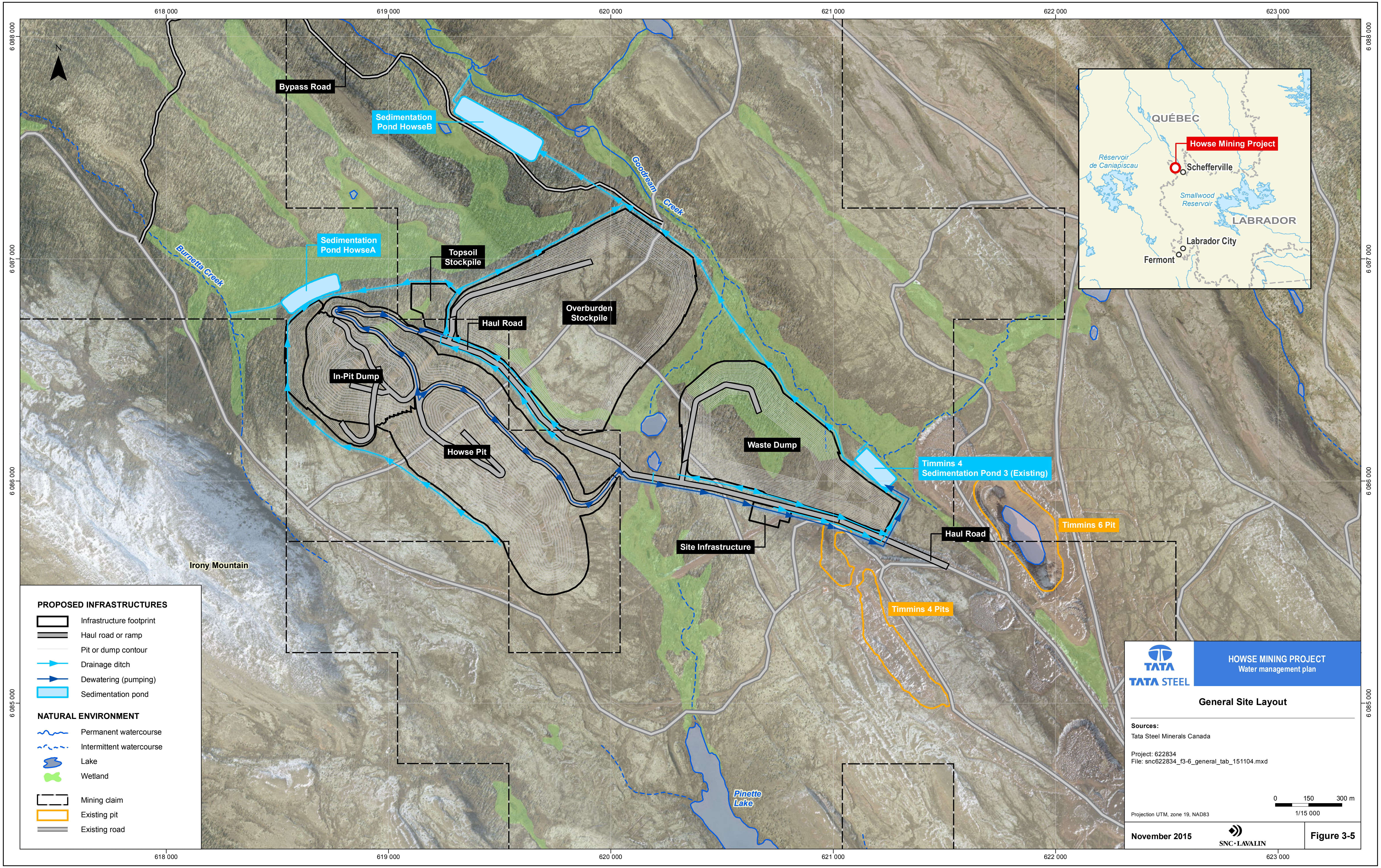
The sediments that are expected to settle out are silt, sand, gravel, grits and a small amount of hydroxide metals. As mentioned above, iron could be a source of contamination, but assuming the water quality will be similar to the one at Timmins 4 ponds B & C, it will be in negligible quantities. Dredging of the sediments may be required during mining operations if the sediment storage area fills up. Dredging involves excavating or pumping of the accumulated sediments out of the pond and transferring them for final disposal in the in-pit dump. However, based on the current information available from site, no dredging is anticipated since the quantity of sediments to be managed during the life of mine should fit in the sedimentation pond. At closure, the sedimentation pond will be covered to avoid any leaching of iron.

Based on the surface runoff water quality from the Timmins 4 site, a chemical treatment dosing system is not required. If runoff water from the overburden, waste rock dumps, or pit exhibits water quality issues (other than suspended solids), such as color issues due to the presence of fine iron oxide and hydroxide particles, treatment chemicals, such as a coagulant, could be added as a contingency measure at the entrance of sedimentation ponds with manual dosing pumps, and mixed naturally by the turbulence action of the incoming flow. The inorganic coagulant could be aluminum sulfate, iron salts or lime. The treatment chemicals will help destabilize the fine particles and help them co-precipitate out with the floc formed by the addition of a coagulant. Alternatively, an organic polyamide cationic flocculant could also be used to destabilize the fine iron oxide particles. An anionic flocculant could be added to enhance the settling rate of the coagulated particles if required.

3.2.5.4 Water Management Infrastructure

The proposed site layout is shown in Figure 3-5. The layout was designed to minimize the effects on the natural watersheds in which the project will be constructed and to distribute the pit runoff and pit dewatering water in the most suitable watershed. Figure 3-6 shows the natural watersheds limits and Figure

3-7 presents the modified watershed boundaries. The planned infrastructure and watershed areas are shown Figure 3-8 and Table 3-3.



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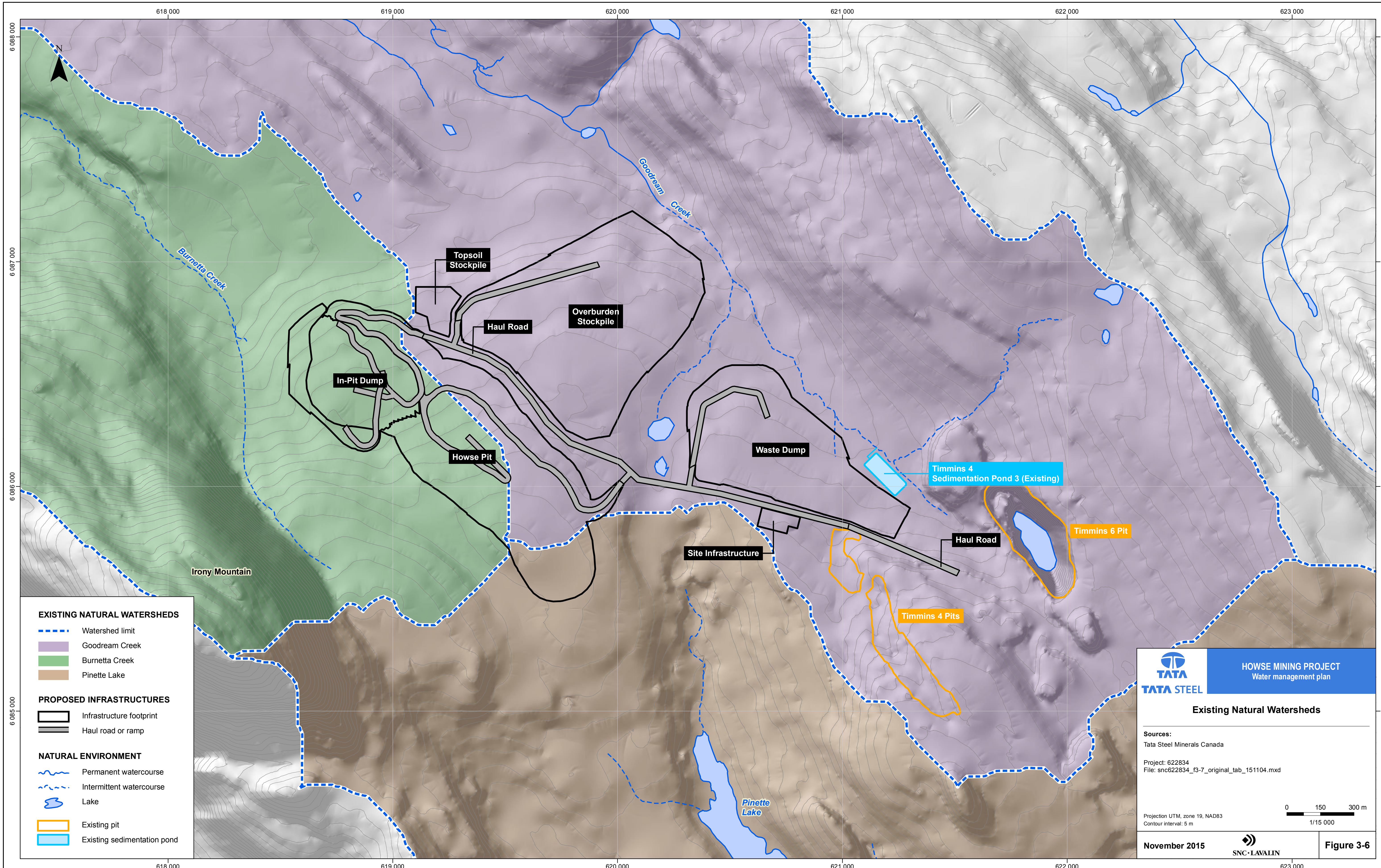

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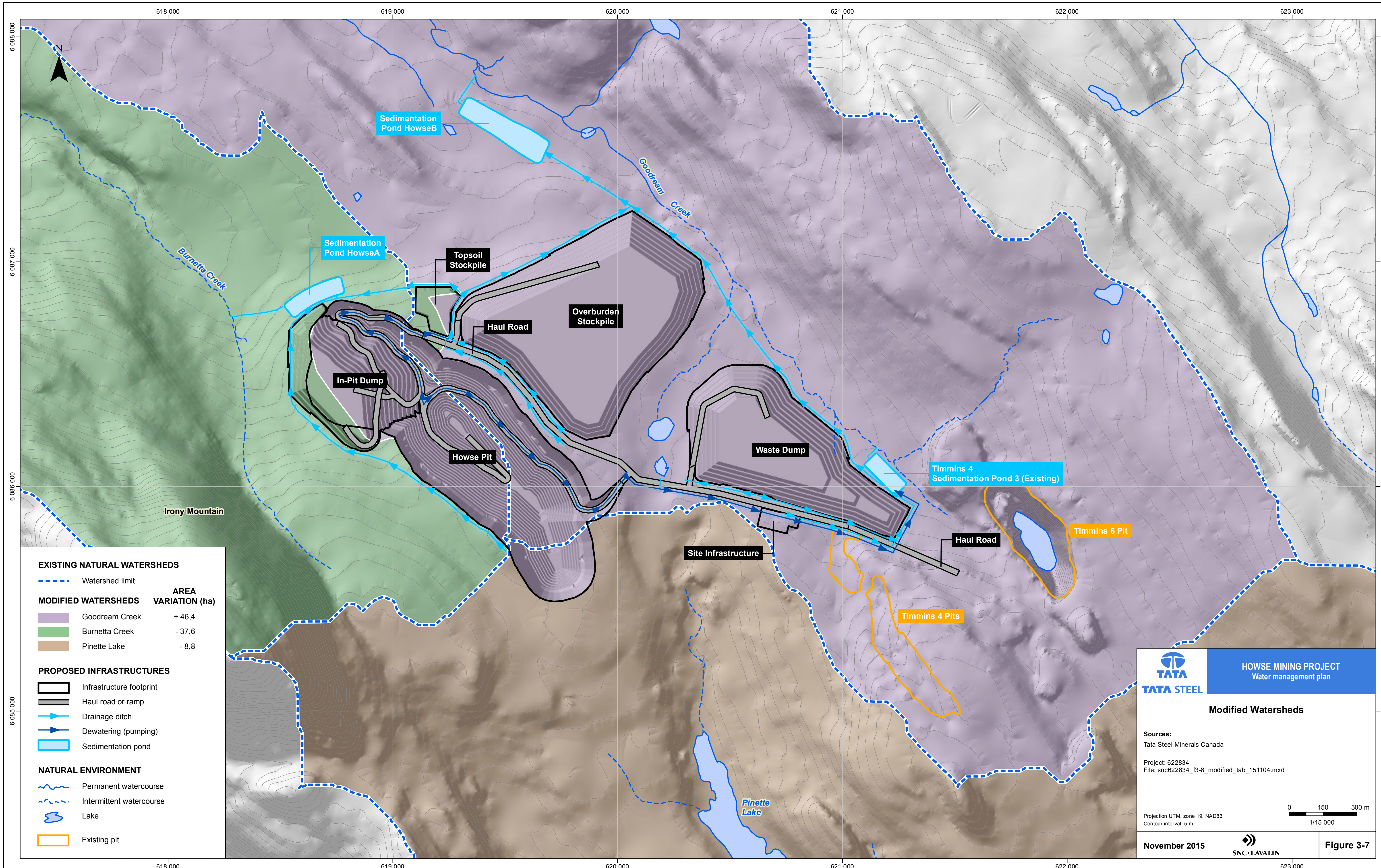

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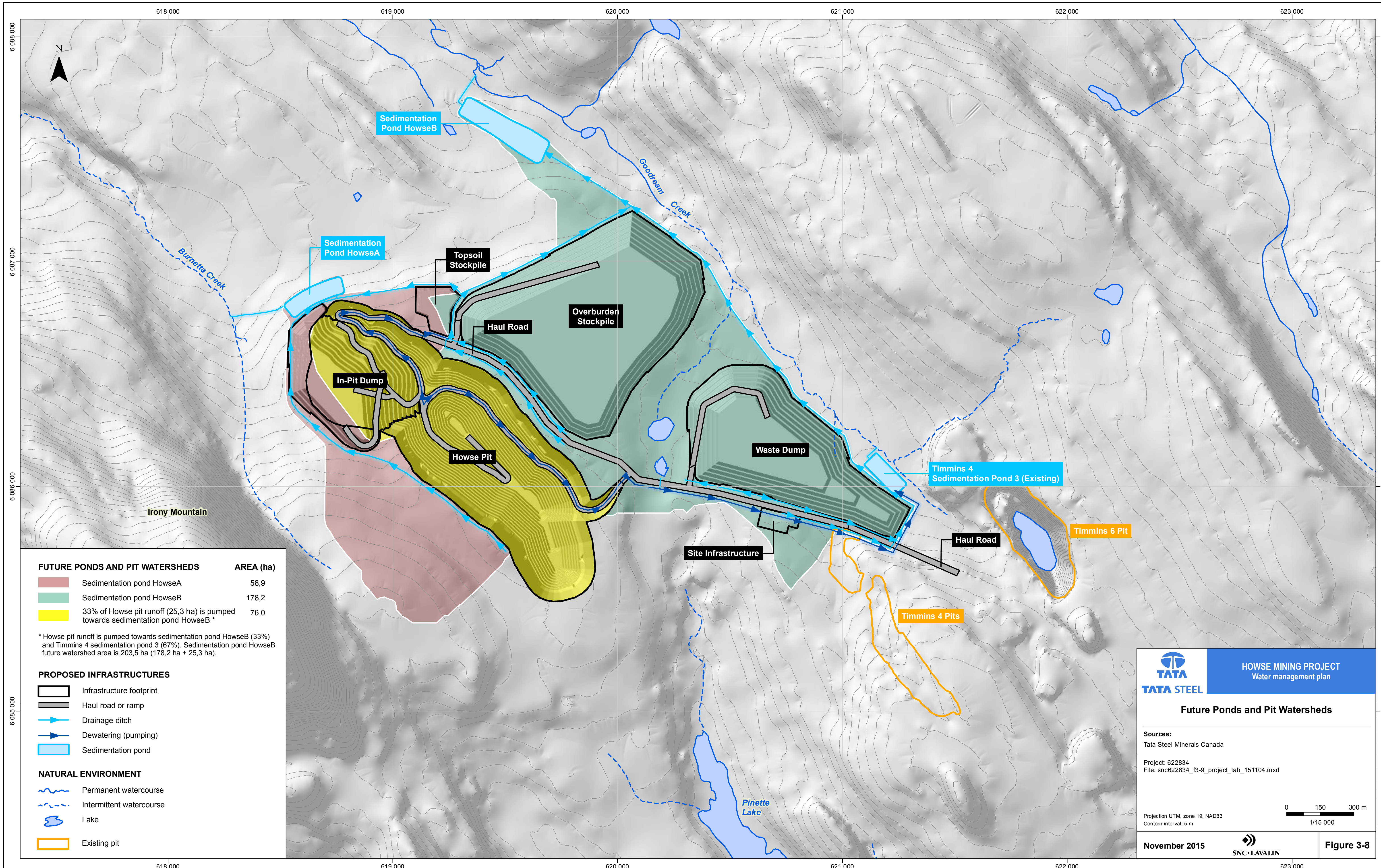


Sedimentation Pond HowseB
Sedimentation Pond HowseA
Goodream Creek
Burnetta Creek
Topsoil Stockpile
Overburden Stockpile
Haul Road
In-Pit Dump
Howse Pit
Waste Dump
Timmins 4 Sedimentation Pond 3 (Existing)
Timmins 6 Pit
Haul Road
Site Infrastructure
Timmins 4 Pits
Irony Mountain
Pinette Lake
N
618 000
619 000
620 000
621 000
622 000
623 000
6 088 000
6 087 000
6 086 000
6 085 000
FUTURE PONDS AND PIT WATERSHEDS
AREA (ha)
Sedimentation pond HowseA 58,9
Sedimentation pond HowseB 178,2
33% of Howse pit runoff (25,3 ha) is pumped towards sedimentation pond HowseB * 76,0
* Howse pit runoff is pumped towards sedimentation pond HowseB (33%) and Timmins 4 sedimentation pond 3 (67%). Sedimentation pond HowseB future watershed area is 203,5 ha (178,2 ha + 25,3 ha).
PROPOSED INFRASTRUCTURES
Infrastructure footprint
Haul road or ramp
Drainage ditch
Dewatering (pumping)
Sedimentation pond
NATURAL ENVIRONMENT
Permanent watercourse
Intermittent watercourse
Lake
Existing pit
TATA
TATA STEEL
HOWSE MINING PROJECT
Water management plan
Future Ponds and Pit Watersheds
Sources:
Tata Steel Minerals Canada
Project: 622834
File: snc622834_f3-9_project_tab_151104.mxd
Projection UTM, zone 19, NAD83
Contour interval: 5 m
0 150 300 m
1/15 000
November 2015
SNC·LAVALIN
Figure 3-8

Table 3-3 Planned Infrastructure and Watershed Area (Mine End of Life)

INFRASTRUCTURE	WATERSHED AREA
Sedimentation pond HOWSEA	59 ha
Sedimentation pond HOWSEB	178 ha

Detailed information on infrastructure design is available in Volume 1 Appendix IV. A short description of the main water management infrastructure is provided in the following paragraphs.

Sedimentation Pond HOWSEA

Sedimentation pond HOWSEA is used to treat runoff water from the topsoil stockpile, part of the in-pit dump not flowing into the pit, and from the natural area located on the south-west side of Howse pit. This pond will be located on the west side of Howse pit and treated water will be discharged into Burnetta Creek. The pond will be located in a natural slope of about 5% and the downstream side of the pond will have to be confined with a dike. Runoff from the natural areas located on the south-west side of Howse pit will be collected and treated in HOWSEA to avoid the construction of any ditch and/or sedimentation basin outside of the claim limit, and to avoid having this water flow into the Pit, resulting into more pumping towards HOWSEB and increasing the release of water between different natural watersheds.

Sedimentation Pond HOWSEB

Sedimentation pond HOWSEB will receive runoff from the overburden stockpile, the waste rock dump, the site infrastructure (Figure 3-1) pad, water pumped from the peripheral wells used for Howse pit dewatering, and approximately 1/3 of the pit runoff. This pond will be located on the north-west side of the overburden stockpile, in a natural slope, and the downstream side of the pond will have to be confined with a dike. Treated water will be discharged into Goodream Creek.

Timmins 4 Sedimentation Pond 3 (Existing)

Timmins 4 sedimentation pond 3 is an existing sedimentation pond located on the east side of the Howse Project. It will be used to treat approximately 2/3 of the pit runoff water that will be pumped from the bottom of the pit.

Ditches

A network of collection ditches is used to collect contaminated runoff from the whole mine site, including the Howse haul road, the site infrastructure (Figure 3-1) pad, the topsoil stockpile, part of In-Pit waste dump, the waste dump, and the overburden stockpile. The collected contaminated water will be conveyed into sedimentation ponds HOWSEA and HOWSEB.

It was chosen to include the relatively small wetland area located between the overburden stockpile and waste dump in the area collected by the collection ditches and treated into sedimentation pond HOWSEB. This decision was based on the facts that:

- it will not be possible to avoid contamination of this area due to its close location between two stockpiles; and
- it would be technically difficult to cross the outlet of this area with the collection ditch necessary to collect runoff from the most eastern part of the mine site.

Inlet and Outlet Structures

The water inlet structures of sedimentation ponds HOWSEA and HOWSEB will be designed to promote an even distribution of the flow over the pond width. Ditches will be widened at the sedimentation pond entrance, and water will flow into the pond via an impervious ditch section with the use of a HDPE plastic membrane. This impervious section will avoid the formation of preferential channels at the pond entrance.

The outflow structure for all sedimentation ponds will be made of a permeable rockfill dike sized to avoid any spill over the emergency spillway during the sedimentation ponds design flood. The emergency spillway will be integrated within the rockfill in a way allowing for the passage of vehicles when the spillway is not in use.

The outlet structure of existing Timmins 4 sedimentation pond 3 will have to be modified into a permeable rockfill dike and an emergency spillway similar to those for sedimentation ponds HOWSEA and HOWSEB. This is necessary to ensure the good functioning of the pond with the additional pumped discharge from the pit, based on the same design criteria as the new ponds.

Downstream of the permeable rockfill dike, treated water from the sedimentation ponds will be collected and conveyed toward the receiving stream with ditches. These ditches will have a small longitudinal slope to ensure low flow velocities at the entrance of the receiving streams. If needed, energy dissipation measures could also be put in place before the junction with natural streams to avoid unwanted disturbance to the existing creeks.

Dike Construction Material

For this stage of the Project, it is assumed that the dikes on the downstream side of sedimentation ponds HOWSEA and HOWSEB will be built with compacted material, using overburden available on site (cut and fill). The suitability of this material for construction will be confirmed in the next phase of engineering, based on more detailed sieve analyses of the material and its percentage of fines. Permeable rockfill dikes and riprap will be built using non-acid-generating material.

3.2.5.5 Annual Water Balance

Water balance computations were made for an average year consisting of average hydrological conditions. Monthly average values for snowfall, rainfall, lake evaporation and evapotranspiration were used with the considered drainage areas to determine the corresponding monthly average volumes of water. The following assumptions were made:

- snow accumulates from October to April and melt completely during the month of May;
- pumping can only happen during the summer months. Therefore, runoff from October to May is pumped out of the Pit in May;
  - this condition will change when the pit depth reaches the water table, at which point pit dewatering will be conducted year-round.
- actual evapotranspiration could be limited by water availability in the ground during the summer months. For this reason, actual evapotranspiration is computed as being the minimum between net runoff and evapotranspiration;
- a runoff coefficient of 1.0 is assumed for the months of October to May, to take into account frozen or saturated ground conditions. A runoff coefficient of 0.4 is assumed for the months of June to September;
- drainage areas corresponding to a time period close to the mine end of life are considered; and
- pit dewatering occurs year long.

Water balance computations were made, for an average year, for the Howse mine pit (76 ha), sedimentation ponds HOWSEA (59 ha), HOWSEB (178 ha), and Timmins 4 sedimentation pond 3 (82 ha). Water balance Tables are available in the WMP Technical note in Volume 1 Appendix IV.

3.2.6 Diesel, Light Fuel Oil and Gasoline

Fuel for the crushing and screening facility generators and pumps will be stored at the DSO project complex facilities. The Proponent estimates the average amount to be approximately 13,500 L/day, excluding the generator for the plant, which will be part of the dome. Refueling will be done according to standard practice on the Howse Property Project site: by fuel trucks equipped with fuel spill kits. All of the mining equipment dedicated to the Howse operations (excavators, haul trucks, production drill, dozer and grader) will be diesel-powered. Heavy machinery in will be refueled on site, and light vehicles and trucks will be refueled at the DSO project, at the approved TSMC DSO project facility.

The EPP (Volume 1 Appendix Ia) provides guidelines on:

- petroleum products and waste oil – Section 3.2.4;
- fuel farm – Section 4.5;
- fueling trucks – Section 4.6;
- fuel reservoirs – Section 4.7; and
- spill management plan – Section 7.3.

3.2.7 Existing Facilities

The proponent will use the approved facilities at TSMC's DSO project plant complex for certain activities (NML and PFWA, 2009). DSO infrastructure is not considered in the scope of the Howse EIS as it was previously assessed under ELAIOM (Project 1a) by the GNL (Section 2.2). The DSO infrastructure that may be used by the Howse Project includes:

- processing plant. The ELAIOM processing complex comprises five main areas: the mineral sizing station, the fine crushing plant, the wash plant building, the dryer and the product storage area. The last three areas may be used to process the low-grade ore from Howse Project activities (20% of the mineral resource) during the end-stages of the Project;
- crushing and screening and drying facilities;
- rail loop loading system. Under the SF and SPF stockpiles, three belt feeders in a tunnel will reclaim the material for loading into rail cars. One product can be loaded at a time. The system is designed to load at a capacity of 4,000 tph. It takes approximately six hours to load a 240-car train;
- existing railway track;
- camp to accommodate the workers maximum capacity is 192. All sewage treatment is managed at the camp;
- administration building, housing office space for all departments, wash facilities, laboratory and a small cafeteria;
- warehouse;
- workshops;
- garages. The mine equipment maintenance garage building is included in the wash plant building. It includes a wash bay, four major equipment maintenance bays, a tire shop and service bay, a drill repair area and a small-vehicle service area;
- landfill. Solid waste is collected around the site in animal-resistant containers. A contractor disposes of the contents of the containers in a waste management site near Timmins 1. This site meets or exceeds relevant GNL regulatory standards.

Apart from the increase in vehicle traffic, the Howse Project is not likely to put any additional pressure on the management of DSO project plant complex activities. No tailings or process water will be generated during the processing of the high-grade product. The capacity of the workers' camp will never exceed its limit of 192 workers, and no increase in domestic waste is therefore expected from the Howse Project.

The ROM ore from the Howse Property pit will be hauled by truck to the DSO rail loop to produce a final product consisting of 15% lumps and 85% sinter fines (Figure 3-9). The Proponent anticipates using one primary jaw crusher and two secondary cone crushers (see Volume 1 Appendix II for crusher specification sheets). Because it will be located at the DSO rail loop, the water management for the crushing and screening facility will be under the DSO3 WMP. A peripheral ditch will be built around the mobile crushing and screening facility to collect runoff water. Power for the crushing and screening facility will be provided by diesel generators (power and emissions details available in Section 7.3.2), and will not create any increase in capacity, as the generators are already in continuous operation. Dryers are 4.3 m in diameter and 26 m long, and dryer burners are rated for a maximum capacity of 166 GJ/hour. A complete list of the equipment that the Proponent expects to use in the crushing plant is available in Volume 1 Appendix II.

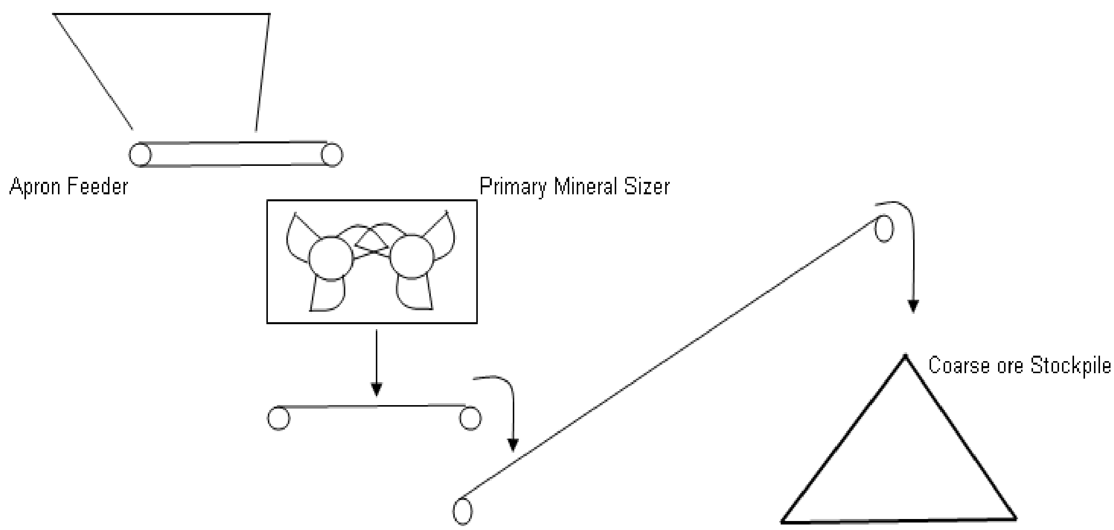
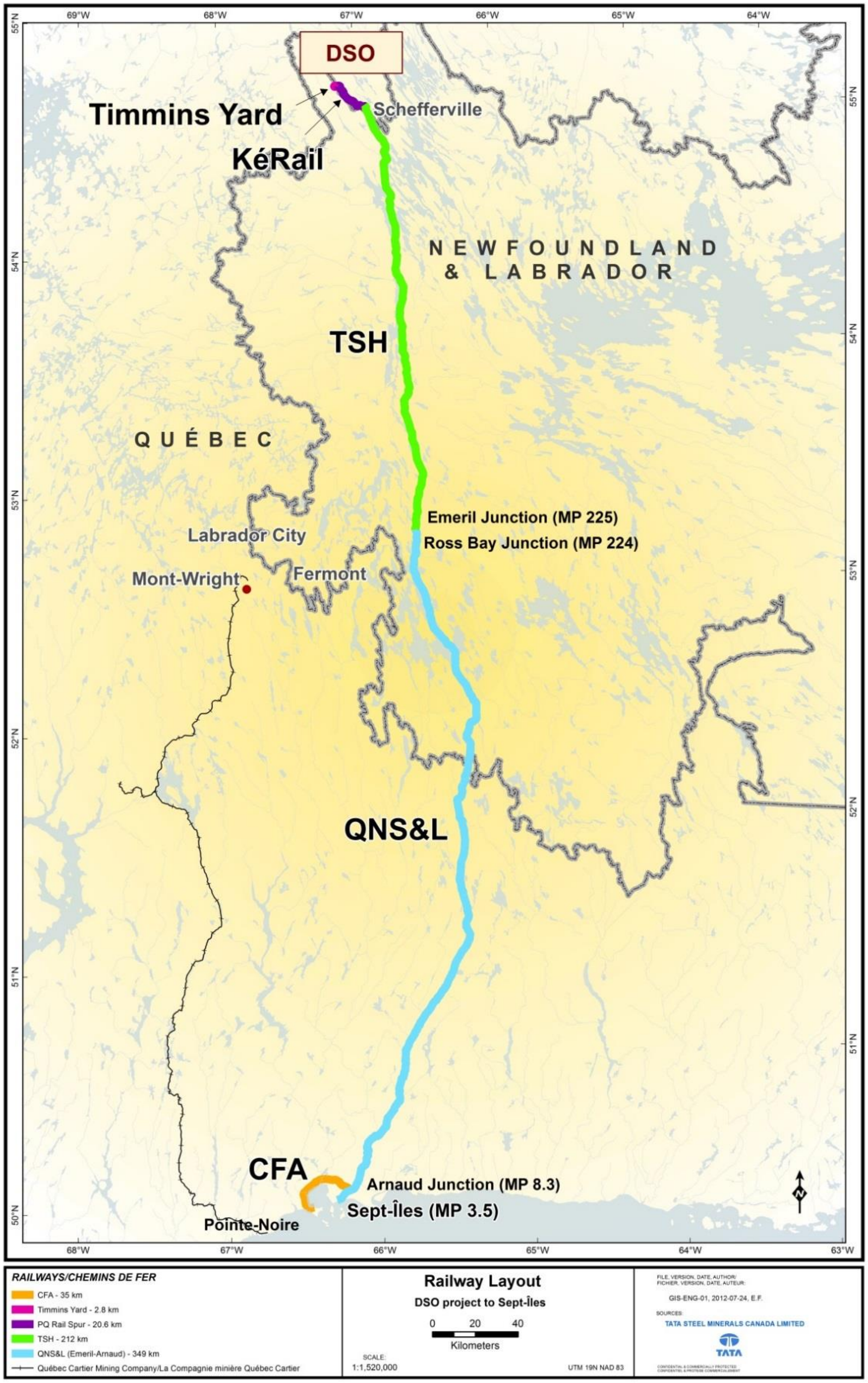


Figure 3-9 Crushing and Screening Facility Flowchart

Once at the rail loop loading area, the ore will then be transported by train to Sept-Îles and then by ship to markets in Europe, India and Asia. On average, two trains per day will depart from the TSMC loading facility from April to November, when iron ore is being mined simultaneously at the Howse Property and TSMC DSO projects. For the rest of the year, when iron ore is extracted only at DSO 3, one train every other day (three to four trains per week) will depart from the TSMC loading facility. There are five different companies operating the rail lines between the TSMC loading facility and Sept-Îles (Figure 3-10):

- KeRail: From the TSMC loading facility to French Mine (QC / NL border);
- WLR2013: From French Mine to TSH;
- TSH Rail: From TSH Junction to Emeril;
- QNSL Rail: From Emeril to Arnaud Junction; and
- CFA Rail: From Arnaud Junction to Pointe Noire (Port of Sept-Îles).



Source: Tata Steel Minerals Canada Ltd. (2014)

Figure 3-10 Train Companies Operating between DSO and Sept-Îles

Ore from the Howse Property would be unloaded at the Port of Sept-Îles and stockpiled at the Pointe Noire ore handling facilities and would then be reclaimed and conveyed to the multi-user dock and ship-loaded. It is expected that during the Howse Property Project operation phase (2017 to 2032), 10 to 15 more Capesize vessels will load per year at the multi-user dock. Tata Steel and its joint venture partner New Millennium Iron Corp. have jointly contributed $50 million for the construction of the new multi-user port, scheduled to be operational by summer 2015. The Québec Government is currently making installations at the site.

3.3 PROJECT ACTIVITIES

Activities are described in the sections below by project phase and associated sources of effects.

3.3.1 Site Preparation and Construction Phase

The construction phase involves the following activities:

- uupgrading/construction of the Howse haul road and upgrade of a bypass road;
- pit development; and
- transportation and traffic.

HML will ensure that all permits and authorizations from appropriate regulatory agencies are obtained prior to the start of construction in order to comply with laws and regulations from both governments. Mobile toilets will be installed at the work sites, and sewage will be transferred to the existing treatment unit at the worker's camp. All vehicle repairs and maintenance will be carried out at the DSO processing complex near Timmins 1.

In general, potential sources of effects associated with general site preparation and construction phase activities include:

- light emission from the Howse Property site lighting system;
- noise, vibration, emission of air contaminants and dust from heavy machinery use and light vehicle traffic; and
- stripping of vegetation, excavation and sediment runoff from construction activities.

3.3.1.1 Construction/upgrading of the Howse Haul Road and Bypass Road

Road upgrades will not occur during snowmelt. The stripping of vegetation will occur outside the migratory bird breeding season. In the event that a permanent watercourse crossing cannot be avoided, a properly sized culvert will be installed in such a way that connectivity, fish passage and fish habitat will be preserved. This will be achieved by installing an arched culvert anchored at the high watermark or a clear-span bridge on fish-bearing streams.

Potential sources of effects associated with road construction include:

- stripping of vegetation, excavation, sediment runoff; and
- noise, vibration, emission of air contaminants and dust from heavy machinery use and light vehicle traffic.

3.3.1.2 Pit Development

Pit development includes: vegetation clearing, stripping and grubbing of the open pit area, the creation of a waste rock dump, stockpile area and water management infrastructures (sedimentation and transfer ponds, drainage ditches). As required, equipment will be used to push the resulting debris into piles, the location of which will be determined at that time. All timber material will be piled and made available for removal in compliance with commercial cutting regulations. Erosion and sediment control measures will be applied and maintained as required for the duration of the Project to reduce the amount of sediment discharged into the water bodies. All of these standard mitigation measures and good practices are presented in the Water Quality effects assessment (Section 7.3.10) as well as in Volume 1 Appendix VI. One excavator and three 64-tonne haul trucks will be required during the pit development phase. Truck traffic during the construction phase is anticipated to be 3.2 one-way trips per hour. Including other vehicles, total traffic could reach four one-way trips per hour.

Part of the overburden and waste rock at the open pit area will be removed/blasted during pit development. A portion of this material (6,004,000 tonnes of overburden) will be used in the preparation of the Howse haul road and pad for the crushing and screening facility.

Potential sources of effects associated with pit development include stripping of vegetation, excavation, minimal use of explosives, sediment runoff, and emission of air contaminants, dust, noise, vibration and light.

3.3.1.3 Crushing and Screening and Dryer Facility

The crushing and screening facility will consist of two units and will be located at least 100 m away from any watercourse or water body. The electricity required to run the facility will be provided by generators located at the main plant.

Potential sources of effects associated with transportation and installation of facilities include stripping of vegetation, and noise, vibration, dust, suspended solids and exhaust gases from heavy machinery and other vehicles.

3.3.1.4 Transportation and Traffic

Workers will commute on a daily basis from the workers' camp near Timmins 1. The Howse haul road will be used to transport all equipment, fuel and personnel. An average of 70 trips will be made on a daily basis by trucks and other light vehicles, causing moderate levels of noise and atmospheric pollution.

Potential sources of effects associated with transportation and traffic include emission of air contaminants, dust, noise, vibration and light and handling of petroleum products.

3.3.1.5 Accidents and Failures

A complete assessment of possible accidents and failures associated with the Howse Project activities is provided in Section 6-6.

3.3.1.6 Standard Environmental Management Procedures

The proponent is familiar with the industry's Best Management Practices and Standard Environmental Management Procedures (Section 6.2). An EPP was prepared for DSO project activities (Volume 1 Appendix Ia).

Throughout the entire Project, compliance monitoring will be done to ensure that requirements stemming from applicable legislation, permits and/or approvals are met, and the EPP will be reviewed and updated on an ongoing basis.

HLM will adapt and apply the environmental management practices developed by TSMC for their other properties to the Howse Property Project. These practices cover any chemical spills that might occur during construction activities, including fuel spills. Other spills are related to the release of particles in water (suspended solids) and dust.

A specific health and safety program will be developed by HML for their subcontractors, which will include specific environmental management procedures relating to subcontractor activities. The current document is an initial version and is being introduced to staff and training sessions are being planned (See Draft Program in Volume 1 Appendix VII).

3.3.1.7 Approximate Total Construction Period and Proposed Start Date

Construction/upgrading of the Howse haul road is scheduled to begin in 2017, followed immediately by pit development and the start of overburden removal. The duration of the construction phase will be roughly seven to 10 months, based on 12-hour shifts.

3.3.2 Operation Phase

The operation phase involves the following activities:

- removal and storage of remaining overburden and topsoil;
- operation of waste rock dumps;
- blasting and ore extraction;
- mineral processing;
- dewatering;
- transportation of ore and other traffic;
- solid waste disposal;
- hazardous waste management;
- explosives waste management;
- treatment of sanitary wastewater; and
- ongoing site restoration.

Potential sources of effects associated with operation phase activities in general include:

- light emission from the Howse Property site lighting system;
- noise, vibration, and emission of air contaminants and dust from the usage of heavy machinery and generators for dewatering, drilling, crushing facility operation and light vehicle traffic;
- stripping of vegetation, excavation and sediment runoff from operation activities.

3.3.2.1 Removal and Storage of Remaining Overburden and Topsoil

The quantity of overburden to be stripped at the Howse Property is substantial. It will be placed in a separate pile from the waste rock and will be partially re-used when restoring the site (Figure 3-1).

During pit development, which is expected to be operational for 15 years, overburden and waste rock will be removed/blasted on an annual basis in order to maintain ore production throughout the mine's service life. An average of 3,123 Mt/yr of overburden and 3,583 Mt/yr of waste rock will be removed/blasted over 15 years, sporadically. These averages will vary each year according to pit operation requirements. This material will also be used for temporary road access and any other site work at the Howse Property or TSMC's DSO project complex.

Potential sources of effects associated with removal and storage of overburden and waste rock management include stripping of vegetation, excavation, emission of air contaminants, dust, noise, vibration, and light and sediment runoff. Water and soil contamination from pile runoff is also a potential source of effects.

3.3.2.2 Operation of Waste Rock Dumps

Waste rock that is mined will be placed in the dump to be located on the northeast side of the pit. The waste dump is designed to have a footprint of 67 ha and reach a maximum height of 70 m. Once complete, the waste rock dump will reach an elevation of 660 m. A ditch will be established at the base of the waste dump to capture all runoff water. This ditch will be connected to the main surface water network and directed to a sedimentation pond for treatment.

Potential sources of effects associated with the operation of waste rock dumps include sediment runoff and emission of air contaminants, dust, noise, vibration and light.

3.3.2.3 Blasting and Ore Extraction

Mining technique

Iron ore will be extracted by conventional and in-pit mining techniques:

- rotary, diesel-driven drills will drill 160-mm diameter holes for blasting;
- blasting will be done using a bulk emulsion;
- 64-tonne-capacity trucks will be loaded by hydraulic excavators fitted with a 6 m^3 bucket and will transport the iron ore to the crushing and screening facility; and
- one tracked bulldozer and one road grader will maintain the roads and assist each front-end loader.

Given the softness of the ore found at the Howse Property, it is estimated that only 50% of the material will require blasting. Explosive consumption is estimated at about 22,000 kg per week. It is proposed that the entire drilling and blasting operation be outsourced to an explosives supplier, and explosives manufacturing will occur outside the mining lease, at the ELAIOM DSO site.

Potential sources of effects associated with blasting and ore extraction include excavation, use of explosive, sediment runoff, and emission of air contaminants, dust, noise, vibration and light. Moreover, nitrate residue generated by blasting has the potential to contaminate the surface water and groundwater.

Currently, the Proponent has no plans to use Ironsorb for the Howse Project, but considerations on its use are detailed, below, for potential future use.

Mining sequence

A mine production schedule is presented in Figure 3-11. Because of the severe weather conditions in winter, ore cannot be transported by train to Pointe-Noire unless it is dried, since undried ore will freeze in the rail cars and will be impossible to unload.

During the pre-production period, which corresponds to the site preparation/construction phase, sufficient waste rock will be mined to build the ROM pad and for other general construction work, such as upgrading access roads. The ROM pad will be located near the ELAIOM primary sizer and will serve as a temporary ROM ore stockpile on the rare occasions when the primary sizer is out of operation for maintenance.

Generally, the deposit areas with the least waste rock will be mined first, as this will minimize the stripping ratio. However, some areas with a larger volume of waste rock may be mined in the early years to meet blending requirements, resulting in a higher stripping ratio. As a general rule, every effort will be made to maintain a constant stripping ratio.

MET-CHEM

PROJECT : Howse FS
CLIENT : TSMC
PROJECT No : 2014-049
DATE : November 2nd, 2015
REVISION : H

YEARLY PRODUCTION SCHEDULE →

MINE PRODUCTION SCHEDULE

Description	Units	PRE PROD	FY - 2018		FY - 2019		FY - 2020		FY - 2021		FY - 2022		FY	FY	FY	FY	Total
			Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	2023 - 25	2026 - 28	2029 - 31	2032 - 33	
Target (Wet Tonnage)	kt	0	1,304	0	3,043	0	3,043	0	3,043	0	3,043	0	9,130	9,130	9,130	5,225	46,094
Ore to Dry Plant	kt	0	1,304	0	3,043	0	3,043	0	3,043	0	3,043	0	9,130	9,130	9,130	5,225	46,094
Fe	%	0.0	64.1	0.0	64.7	0.0	63.0	0.0	62.0	0.0	62.1	0.0	63.0	61.7	62.3	63.2	62.7
SiO_2	%	0.0	4.7	0.0	3.8	0.0	5.9	0.0	7.1	0.0	6.9	0.0	6.1	7.6	7.0	6.4	6.5
Al_2O_3	%	0.0	0.9	0.0	0.9	0.0	0.9	0.0	1.0	0.0	1.2	0.0	1.0	1.1	1.1	0.9	1.0
MnO	%	0.00	0.16	0.00	0.15	0.00	0.15	0.00	0.13	0.00	0.15	0.00	0.16	0.13	0.11	0.07	0.13
LOI	%	0.0	2.9	0.0	3.0	0.0	3.0	0.0	2.9	0.0	2.7	0.0	2.7	2.4	2.3	1.5	2.5
Total Waste	kt	6,004	146	4,629	776	5,725	2,990	0	2,504	0	1,760	5,625	27,050	28,341	14,605	7,141	107,296
Overburden	kt	6,004	0	4,629	0	5,725	0	0	0	0	0	5,625	16,219	11,773	0	0	49,975
Waste Rock	kt	0	146	0	776	0	2,990	0	2,504	0	1,760	0	10,831	16,569	14,605	7,141	57,322
Total Material Moved	kt	6,004	1,450	4,629	3,819	5,725	6,034	0	5,548	0	4,803	5,625	36,180	37,472	23,736	12,366	153,391
Daily Tonnage	t/d	32,896	6,776	30,657	17,848	37,912	28,195	0	25,925	0	22,446	37,254	33,041	34,221	36,971	33,660	
Stripping Ratio		n/a	0.1	n/a	0.3	n/a	1.0	n/a	0.8	n/a	0.6	n/a	3.0	3.1	1.6	1.4	2.3

Note: Run of mine tonnages are on a wet basis.

Figure 3-11 Detailed mine production schedule

3.3.2.4 Mineral Processing

Primary Treatment

In light of the high quality of the resource at the Howse Property, ROM ore will only go through a primary treatment, consisting of crushing and screening to produce a final product containing 15% lumps and 85% sinter fines. It is estimated that 5 to 20% of the ROM ore is lower-grade iron and will require mixing with higher-grade material to produce an acceptable grade, and shipped. HML will have to temporary stockpile (7-10 days of material) the lower-grade material on site until it can be processed.

The crusher and mobile equipment operators will be in cabins equipped with high-efficiency particulate absorption (HEPA) air filters in order to ensure that there is no exposure to airborne silica particles. Dust emissions will be controlled through the application of water mists/sprays at material transfer points. Stockpiles will be wetted down with water sprays as required. Employees working outside of equipment enclosures will be equipped with appropriate dust masks. There will be no brushing or cleaning of the ore.

Addition of Polymers

Due to the unique nature of the material on site and conditions in the area, measures must be taken by the Proponent in order to ship ore throughout the year in a cost-effective manner. The material being shipped must be below the transportable moisture limit (TML) prior to being shipped, as required by Transport Canada. The TML is 90% of the flow moisture point and can be determined by three recognized methods. In addition, because of the low temperatures encountered in the area, winter shipping is not possible, as the stockpile excavation rates are not sufficient.

Polymers have been known to increase the TML of iron ore by forming bonds with the free water within the ore, so that the material acts like lower moisture material, and the moisture is absorbed by the polymer when the material is subject to forces during shipping and transport, making it less likely to compress and liquefy. As a result of the bonds being formed with the free water, the material is more friable during freezing temperatures.

The polymer Ironsorb can absorb up to 240 times its weight in water, and treated material looks and handles as if it were much dryer. The material safety data sheet for Ironsorb is listed in Volume 1 Appendix VIII. Over the past two years, a variety of tests have been performed on DSO with polymers to determine their effectiveness in three areas:

- polymer utilization during the summer months to modify the TML of iron material;
- polymer utilization to replace or supplement the need for drying wet ore prior to screening; and
- polymer utilization during winter months as a freezing inhibitor.

Currently, large-scale modelling is ongoing for presentation to Transport Canada and the International Maritime Organisation for the use of polymers to modify the TML. The current plan is to use Ironsorb in a proportion of 0.5-1% of the ROM ore after crushing and screening of the ore.

Potential sources of effects associated with mineral processing include emission of air contaminants, dust, noise, vibration, and light and handling of petroleum products.

3.3.2.5 Dewatering

Dewatering will be carried out as required by means of diesel-powered pumps, as the Howse Property will not be supplied with electricity. Details on dewatering are provided in Section 3.2.5.2, within the Water Management Facilities and General Site Drainage Works (Section 3.1).

Before any pit dewatering occurs on the Howse Property, appropriate authorization/permits will be obtained from the Water Resources Management Division of the Department of Environment and Conservation of the GNL. Dewatering will eventually become continuous as the pit level goes under the water table level. However, dewatering will not affect migratory birds as water should never accumulate in the pit, and the only expected drawdown expected is in Pinette Lake, and it will be non-significant (see section 7.4.8)

Potential sources of effects associated with dewatering include noise, vibration, and emission of air contaminants from diesel generators. Water discharged into the environment will also increase the local flow of nearby streams. Water contamination by petroleum product is another potential source of effects.

3.3.2.6 Transportation of Ore and Other Traffic

The following is a list of major mobile mining equipment needed to mine the Howse deposit; the remaining support and service equipment required will be shared with DSO mining operation and will come from its existing fleet:

- 2 hydraulic excavators – 6 m^3 bucket (Komatsu PC1250 Class);
- 8 haul trucks – 64/100 tonne payload (CAT 775 / CAT 777 Class);
- 1 production drill – 160 mm diameter holes (CAT MD5125 Class);
- 1 track dozer – 250 kW (CAT D8 Class);
- 1 road grader – 200 kW (CAT 14M Class).

During the operation phase, truck movement is expected to be 12 one-way trips per hour and could reach a total of 16 one-way trips per hour when other vehicles are considered. The distance between the mine and the DSO complex is 3 km and average truck speed is 30 km/h.

Increased rail traffic along the five rail lines between TSMC's facilities and the Port of Sept-Îles is also expected at a rate of 0.42 trains per day, for a total of one train per day, including the DSO project.

Potential sources of effects associated with transportation include emission of air contaminants, dust, noise, vibration and light from loading/unloading of ore, ore transportation (haul truck, train and boat) and other traffic. Soil contamination from the handling of petroleum products is another possible effect.

3.3.2.7 Solid Waste Disposal

Domestic solid waste generated by mine operation will be disposed of at the TSMC approved landfill site. Although there are potential environmental effects associated with the production and management of this waste, these are likely to be minimal or non-existent because no new facilities are being built, staffing is not expected to increase, and the waste will be disposed of at the TSMC DSO project facilities, which have the planned and approved capacity to treat such waste. Section 4.1 of the EPP (Volume 1 Appendix Ia) refers to the camp area and related environmental protection measures, including solid waste disposal. A specific waste management plan is also available (TSMC, 2013b).

Potential sources of effects associated with solid waste disposal include emission of air contaminants, noise and vibration from trucks used to transport the solid waste. Air quality might also be affected by landfill fumes.

3.3.2.8 Hazardous Waste Management

Hazardous waste, including used oil, will be labelled and stored at TSMC's ELAIOM complex in an appropriate receptacle, with adequate separation where necessary, and will be disposed of as per TSMC's hazardous waste management program and policies. Although there are potential environmental effects associated with the production and management of these wastes, these are likely to be minimal or non-existent, since the waste will be disposed of at the TSMC ELAIOM facilities, which have the planned and approved capacity to treat such waste. Section 3.2 of the EPP (Volume 1 Appendix Ia) refers to hazardous material. A specific waste management plan is also available (TSMC, 2013b).

Potential sources of effects associated with hazardous waste management include emission of air contaminants, noise and vibration from hazardous waste transportation. Water and soil contamination is another possible effect.

3.3.2.9 Explosives Waste Management

The emulsion used for blasting, which is a solution consisting mainly of water, diesel fuel and ammonium nitrate, will be the only explosives waste found on site. The emulsion will be made by a third party off the TSMC property and delivered on site by truck to the explosives storage area on an as-needed basis. Residual waste such as boxes will be burned at TSMC's DSO project complex as per federal regulations. Section 5.13 of the EPP (Volume 1 Appendix Ia) refers to the safe blasting control plan. Environmental protection measures regarding blasting and drilling are also described in the EPP.

Potential sources of effects associated with explosives waste management include emission of air contaminants, noise and vibration from trucks used to transport the explosives waste, leaching of explosives waste and possible water and soil contamination.

3.3.2.10 Treatment of Sanitary Wastewater

Mobile toilets will be installed near the facility during the construction phase and will remain in place until the decommissioning and reclamation of the mine. Sewage will be transferred to the existing wastewater treatment unit at the TSMC work camp. Although there are potential environmental effects associated with the production and management of this waste, these are likely to be minimal or non-existent, since the waste will be disposed of at the TSMC workers' camp/dormitory facility, which has the planned and approved capacity to treat such waste. Section 4.1 of the EPP (Volume 1 Appendix Ia) refers to the camp area and related environmental protection measures, including wastewater and sewage disposal.

Potential sources of effects associated with treatment of sanitary wastewater include emission of air contaminants, noise and vibration from trucks used to transport the sanitary waste, leaching of sanitary waste and possible water and soil contamination.

3.3.2.11 Ongoing Site Restoration

TSMC is currently in talks with the Québec government on an international research program related to lichen as a proxy for air quality as well as with NRCAN on water management improvement (related to decommissioning). These two programs will be confirmed and defined and developed spring 2016. The progressive restoration of disturbed sites (piles, open pit and haul road) will be undertaken where possible. The overburden stockpile and waste rock dumps will be stabilized and revegetated as soon as their operation is completed. Topsoil stockpile will be used and its size will reduce as the restoration activities are progressing.

The ditch network will be minimal to avoid long-term maintenance. The goal will be to minimize slope erosion to prevent suspended particles from getting into the surface runoff and into the environment.

Any demolition debris and residues will be recycled or disposed of at TSMC's DSO project authorized landfill site.

Restoration will generate modest levels of noise and atmospheric pollution for a short period of time.

The restoration of work areas will be an ongoing process at the site. For example, if a road is upgraded to access a certain area of the Project for a limited amount of time, it will be restored as soon as the work is done in this area. Whenever possible, temporary work sites will be restored to pre-construction conditions. Compensation will be determined with the authorities and First Nation communities.

Potential sources of effects associated with ongoing site restoration include excavation, and emission of air contaminants, noise and vibration from heavy machinery and other vehicles. However, once completed, restoration will be beneficial for most biophysical components by contributing to soil decontamination, plantation, seeding, and habitat and ecosystem creation.

3.3.2.12 Accidents and Failures

A complete assessment of possible accidents and failures associated with the Howse Project activities is provided in Section 6-6.

During the operation and maintenance phase, the potential for accidents will stem from the transportation of fuel, explosives and overburden/waste rock/ore, the use of heavy equipment and explosives, blasting operations and mine wall stability issues. The implementation of the EPP (Volume 1 Appendix Ia) use of safety equipment and observation of safe working procedures will greatly reduce the risk of accidents with environmental effects.

A protocol for mining and blasting operations has been developed by TSMC for its other mining operations in Labrador and will also be adopted by HML for the Howse Property Project. This protocol will be followed at all times to reduce the risk of accidents.

Measures will be taken to mitigate the risk of accidents related to pit wall stability. Horizontal holes will be drilled to drain confined groundwater exerting pressure on the pit walls. In some circumstances, a berm could be built on every second bench to provide further stability.

Furthermore, the final pit wall slope will be designed according to the recommendations of an ongoing geotechnical study (Volume 2 Supporting Study A).

Lastly, the final pit wall will be independently drilled and blasted to carve out clean, precise pit edges. Once mining operations cease, the measures put in place to prevent access to the pit will render the risk of accidents occurring in the pit negligible.

Apart from the precautions described above, the stability of the pit walls will be monitored with instruments that accurately measure any wall movement.

Section 7.0 of the EPP (Volume 1 Appendix Ia) contains contingency plans as listed in Section 3.2.1.5. Sections 7.2 and 7.3 of the EPP refer to the Landfill Emergency Plan and to the Spill Management Plan respectively. An ERP is also available (Volume 1 Appendix Ib).

Potential sources of effects associated with accidents and failures include water, soil and air contamination.

3.3.2.13 Anticipated Size and Production Capacity

In the final stage, the area affected by the Project is estimated as follows (Table 3-4):

Table 3-4 Estimated Footprint of the Howse Property Project

INFRASTRUCTURE	FOOTPRINT FROM JANUARY 2015 EIS	FOOTPRINT FROM JANUARY 2016 EIS
	(ha)	(ha)
Open Pit	72	78
Overburden Stockpile	66	63.5
Waste Rock Dumps	66	39 (out of pit)
Topsoil Stockpile	4	3
Crushing and Screening Facility	3	1.5
Howse Haul Road	12	4.8
Sedimentation Ponds	4	9.25
Site Infrastructure (new)		1.35
Total	227	200.4

Once the mine is in operation, iron ore will be mined 24 hours a day, seven to eight months per year, depending on weather conditions, to produce 1.3 Mt of ROM ore during the first year and 3.0 Mt per year between 2019 and 2022. The maximum planned production is 9.13 Mt per year (25, 000 t/day), which will be reached in 2023, and will last until the end of the mine's service, in 2032. The incidental low-grade ore (approximately 5 Mt), generated by the excavation of high-grade ore will be temporarily stockpiled near the Howse deposit and will be mixed with higher-grade material, to produce the desired grade, and shipped.

In comparison, TSMC's DSO projects will produce a maximum of 11,667 tonnes/day throughout the year with the following estimated footprint at the final stage (Table 3-5).

Table 3-5 Estimated Footprint for TSMC's DSO Projects

PROJECT	1A (ELAIOM)	2A	2B	TOTAL
Infrastructure	**Footprint (ha)**	**Footprint (ha)**	**Footprint (ha)**	**Footprint (ha)**
Open Pit	33	43	31	107
Overburden Stockpile	10	15	12	38
Waste Rock Dumps	36	37	52	125
Topsoil Stockpile	2	2	2	6
Primary Sizer and Plant Site	2	0	0	2
Howse Haul Road	128			128
Low-grade Material	4	0	0	4

PROJECT	1A (ELAIOM)	2A	2B	TOTAL
Infrastructure	**Footprint (ha)**	**Footprint (ha)**	**Footprint (ha)**	**Footprint (ha)**
Camp Site	6	0	0	6
Sedimentation Ponds	11	3	NA	14
			Total	**430**

3.3.2.14 Standard Environmental Management Procedures

The applicable standard environmental management procedures for the operation and maintenance phase will include:

- storage, handling and transfer of fuel;
- storage, handling and transfer of hazardous materials;
- blasting and drilling;
- dewatering of work areas;
- solid waste disposal;
- dust control;
- noise control;
- pumps and generators;
- equipment and vehicle use and maintenance;
- vehicular traffic;
- road maintenance;
- quarrying and removal of aggregate;
- waste rock piles;
- laydown and storage areas;
- erosion protection;
- vegetation and wildlife control;
- protected species control;
- trenching; and
- excavation, embankments and grading.

Refer to the following sections of the EPP (Volume 1 Appendix Ia) for more details:

- Permits, approvals, and compliance monitoring – Section 3.0 of the EPP;
- Site-Specific Environmental Protection Measures – Section 4.0 of the EPP; and
- Environmental Control Plans – Section 5.0 of the EPP.

3.3.2.15 Operation Schedule

Commissioning of the mine is scheduled for 2017. Mining activities at the Howse Property are expected to be ongoing until 2032. The mine will be operational year-round; however, the ore will only be extracted, crushed, screened and shipped by train from April to mid-October or November, depending on the weather. For the remaining months, crews will work on restoring the overburden and waste rock stockpiles/dumps.

The mine is expected to be operational from 2017 to 2032, for a total of 15 years.

3.3.3 Decommissioning and Reclamation Phase

As per the GNL's *Mining Act*, 1999, and commitments undertaken under the IBAs, the proponent of a mining project will submit a rehabilitation and closure plan and provide financial assurance to cover the costs associated with completing the work set out in the plan.

The rehabilitation and closure plan will be developed to achieve the following objectives:

- provide a balanced and maintenance-free environment for existing fish and wildlife;
- create a landscape compatible with surrounding areas while taking into account the fact that previous disturbances caused by former IOCC mining operations occurred in the vicinity of the site prior to work by TSMC;
- keep potential sources of pollution, fire hazards and public liability at an acceptable level and develop mitigation measures, if required; and
- provide a safe environment for long-term public access.

The site will be progressively rehabilitated prior to mine closure

The decommissioning and reclamation phase involves the following activities:

- transportation and traffic;
- demobilization of Howse facilities and heavy machinery;
- final site restoration.

Potential sources of effects associated with the decommissioning and reclamation phase in general are:

- light emission from the Howse Property site lighting system;
- emission of air contaminants, dust, noise and vibration from heavy machinery use and light vehicle traffic.

3.3.3.1 Transportation and Traffic

As stated above, access to the pit will be limited, and no additional environmental effects is therefore anticipated. At the end of mining operations, only maintenance work, if any, will be performed on site.

The potential sources of effects associated with transportation and traffic are emission of air contaminants, dust, noise, vibration and light from heavy machinery and other vehicles. Soil contamination from the handling of petroleum products is also a possible effect.

3.3.3.2 Demobilization of Crushing and Screening Facility and Heavy Machinery

Once the mine ceases to operate, the crushing and screening facility will be relocated to another DSO project, as needed.

The potential sources of effects associated with equipment demobilization are emission of air contaminants, dust, noise, vibration and light from heavy machinery and transportation.

3.3.3.3 Final Site Restoration

Techniques applied during mining operations, such as the in-pit mining method, will facilitate the restoration process. The characterization of potentially contaminated sites in the vicinity of the complex will be undertaken when the mine closes. Old spills and other mining activities could require soil rehabilitation in some locations.

The proponent is committed to restoring the Howse area to its original form and that it be revegetated with suitable local indigenous plant species. As such, special consideration will be given to selecting species to avoid contamination from invasives. The sedimentation ponds will be in operation until water quality is within regulatory limits.

The closure plan will also include the vegetation and stabilization of disturbed areas. The top, horizontal benches and slopes of the waste rock dump will be revegetated. Access to the open pit by people and wildlife will be restricted via a barrier, and the access ramps and benches will be vegetated.

The potential sources of effects associated with site restoration are excavation and emission of air contaminants, dust, noise, vibration from heavy machinery and other vehicles. However, once completed, restoration will be beneficial for most biophysical components by contributing to soil decontamination, plantation, seeding, and habitat and ecosystem creation. Site restoration should be more significant during decommissioning and reclamation in terms of duration and area affected than during previous project phases.

3.3.3.4 Accidents and Failures

A complete assessment of possible accidents and failures associated with the Howse Project activities is provided in Section 6-6.

3.3.3.5 Decommissioning and Reclamation

The decommissioning and reclamation phase will begin before the closure of the mine (progressive reclamation) and is expected to last for five years following the end of the Operations phase. A preliminary reclamation and closure plan is described in Section 10.4.