COMMUNIQUÉ – DSO PROJECT

Wachiya,

We hope that you have been enjoying your summer in the beautiful Schefferville/Kawawachikamach region!

Tata Steel Minerals Canada is pleased to announce that the end of construction of the iron ore process plant under the dome is nearing, which will bring some calm to the area. Mining in the Kivivic area began in May and the process plant is expected to be operational this Fall/Winter.

TSMC remains committed to seeing the DSO Project advance, and is proud of the benefits flowing to the community by way of :

- Numerous jobs on the Project, with TSMC and its contractors, occupied by First Nation women and men;
- Important contracts awarded to local Aboriginal contractors and suppliers;
- Financial contributions managed by your Council for training and economic development activities, including Security Officer training, Essential Skills Training, Heavy Equipment Operator training, Process Plant training, the Fiber Optic Project and the Naskapi Heavy Machinery Light Vehicle Mechanics Project; and
- Sponsorship of community projects including Innu Meshkenu, the First Nations Angeliss supper in Ste-Anne-de-Beaupré, numerous other community events.

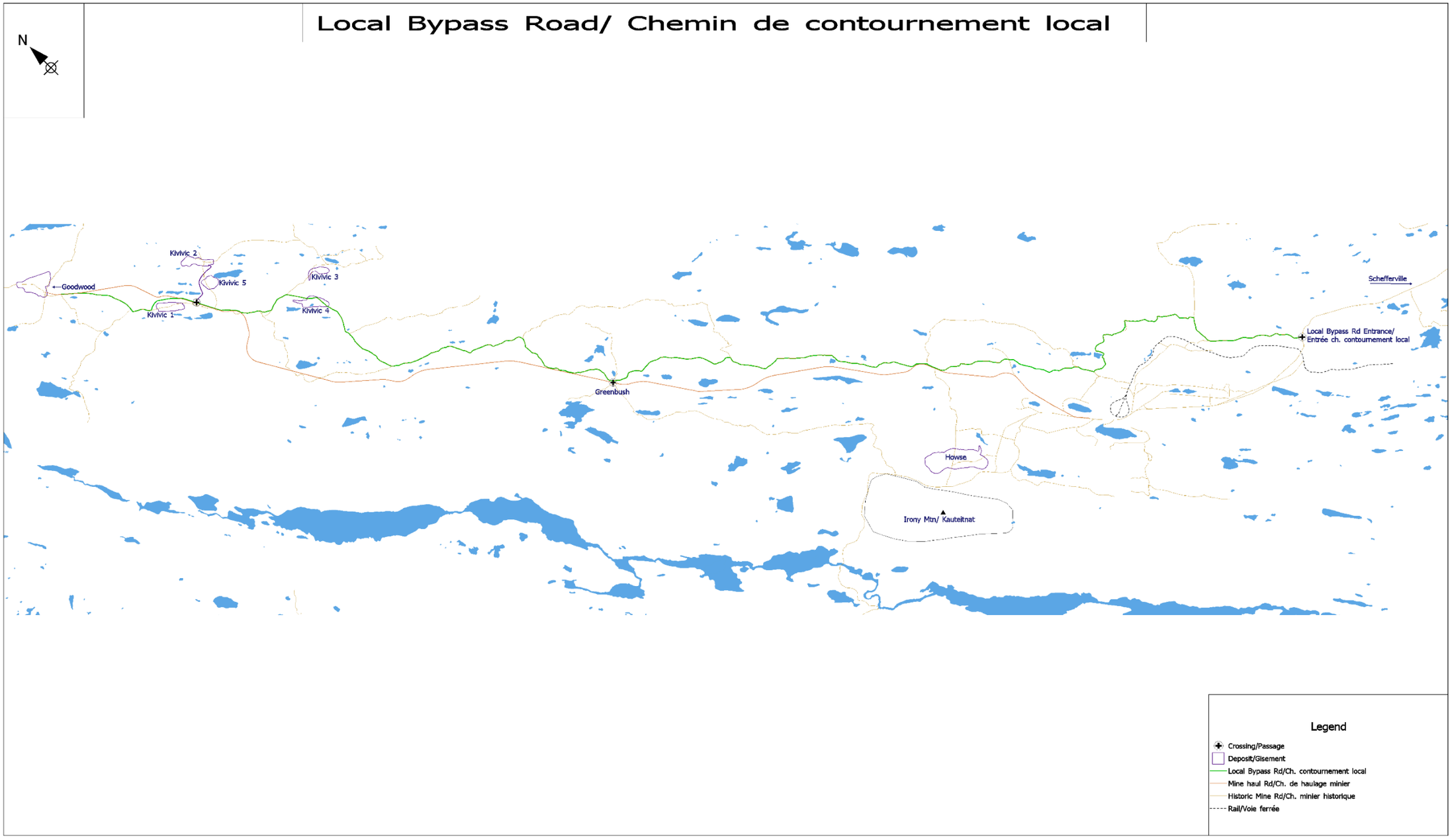
Regarding access to the land around our facilities, we wish to assure the population that local land users continue to have access to their traditional lands including Irony Mountain, Greenbush, Kivivik and Goodwood. In order to address concerns raised by local residents, and to ensure people's safety while travelling near mining operations, the company has invested significantly to complete a secondary road that allows local residents to completely bypass the Timmins site, including the security gate. This bypass road is now complete (please see the enclosed map) and local land users can travel on the new bypass road to the Goodwood area.

Finally, TSMC is happy to sponsor the 60th anniversary of the Town of Schefferville being organized at the end of August by the Town of Schefferville in collaboration with the First Nation communities. This celebration of friendship between nations, highlighted by music and song by local artists, is an opportunity to mark the cooperation between stakeholders, who have a common goal to ensure respectful economic development of the local communities and their environment.

We wish you an enjoyable rest of the summer.

Coco Calderhead, Community Affairs
(514-258-9116 or coco.calderhead@tatasteelcanada.com)

Local Bypass Road/ Chemin de contournement local



COMMUNIQUÉ – PROJET DSO

Kué!

Nous espérons que vous passez un été agréable dans la belle région de Schefferville!

Tata Steel Minerals Canada est heureuse d'annoncer que la fin de la construction de l'usine de traitement dans le dôme tire à sa fin, ce qui devrait ramener bientôt un peu de calme dans le village. L'exploitation minière dans la région de Kivivic a débuté en mai, et il est prévu que l'usine de traitement entrera en fonction cet automne/hiver.

Entretemps, nous avons dédié un camion d'eau qui arrosera durant les périodes sèches, le chemin entre le dépotoir de Schefferville et le chemin de la Gare, pour contrôler la poussière.

TSMC demeure engagée à l'avancement de Projet DSO, et elle est fière des retombées qui touchent la communauté locale par :

- De nombreux emplois sur le Projet, avec TSMC et ses sous-traitants, occupés par des femmes et des hommes des Premières Nations du Québec;
- Des contrats importants avec des entreprises autochtones locales;
- Des enveloppes financières gérées par votre Conseil pour le développement économique et pour les activités traditionnelles, telles que la construction de l'hôtel Innutel, le rassemblement des aînés, et les redevances d'essence aux membres;
- Des commandites de projets communautaires tels que l'aréna de Schefferville, Innu Meshkenu, le souper Angeliss à Ste-Anne-de-Beaupré, et plusieurs événements communautaires.

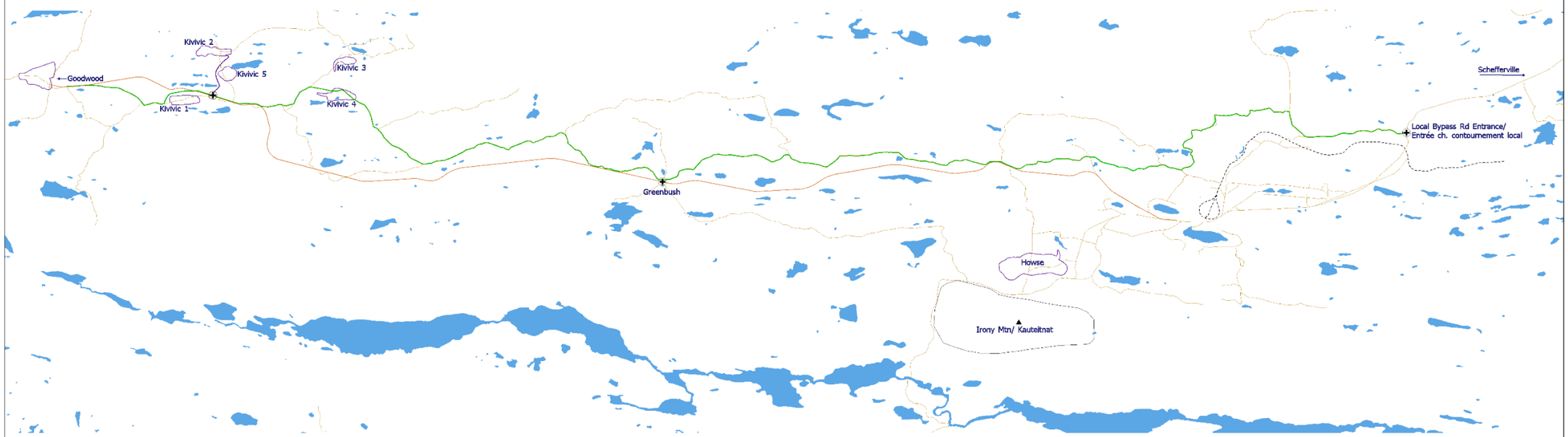
Concernant l'accès au territoire situé autour des installations de la compagnie, nous désirons rassurer la population que les utilisateurs du territoire continuent d'avoir accès à leurs terres traditionnelles, y compris Kauteitnat, Greenbush, Kivivik et Goodwood. Afin de répondre aux préoccupations soulevées par les résidents locaux, et d'assurer la sécurité de ceux qui se déplacent près des opérations minières, la compagnie a investi de façon importante dans un chemin secondaire qui permet aux résidents locaux d'éviter complètement le chantier Timmins, y compris le poste de sécurité. Ce chemin est maintenant complété (veuillez consulter la carte en annexe) et les utilisateurs peuvent voyager sur le nouveau chemin jusqu'à Goodwood.

TSMC est également heureuse de souligner sa contribution financière du 60e anniversaire de Schefferville, qui sera organisé conjointement par la Ville de Schefferville et les communautés autochtones à la fin août. Cette célébration d'amitié entre les peuples, agrémentée de chanson et de musique d'artistes de chez nous, est une occasion de marquer la coopération entre parties prenantes, qui ont un objectif commun d'assurer un développement économique respectueux des Communautés locales et de leur environnement.

Nous vous souhaitons une très bonne fin d'été.

Coco Calderhead, Affaires communautaires
(514-258-9116 ou coco.calderhead@tatasteelcanada.com)

Local Bypass Road/ Chemin de contournement local



Infolettre / *Newsletter*

Été / *Summer* 2014

Le Projet

Tata Steel Minerals Canada Ltd. (TSMC) poursuit la construction du Projet DSO dans la région des fosses Timmins. Nous avançons, en collaboration avec nos entrepreneurs, avec la construction de l'usine de traitement et l'installation des usines temporaires et le séchoir, alors que le Kérail est complété depuis juin.

The Project

Tata Steel Minerals Canada Ltd. (TSMC) is continuing with the construction of the DSO Project in the Timmins area. We are progressing, in collaboration with our contractors, with the construction of the process plant, and the installation of the two temporary process plants and dryer, while the Kérail was completed in June.

La réalisation mécanique de l'usine de traitement dans le dôme est prévue pour décembre 2014 et sa mise en service est pour mars 2015.

Mechanical completion of the process plant inside the dome is expected to take place in December 2014 and its commissioning is planned for March 2015.

Chemin Goodwood

TSMC poursuit son plan de construction durant l'été et l'automne 2014 de sections d'un chemin qui connecte les regions de Timmins et Goodwood. Des mesures sont prises de construire le chemin en se servant de matériaux recyclés et ce sans déranger les habitats de poisson qui se retrouvent près du chemin.

Goodwood Road

TSMC is continuing with its plan to construct during the summer and fall of 2014 sections of a road connecting Timmins and Goodwood. Steps are being taken to build the road using recycled materials and without impacting fish habitats encountered along the route.

Emplois

Depuis 2011, des centaines d'emplois à court- et à long-terme ont été occupés par des Autochtones dans divers domaines allant de la géologie aux opérations d'équipements, et de la cuisine et l'entretien, à la haute direction. Le taux d'embauche autochtone est de 20% de la totalité de main d'œuvre au site Timmins.

Jobs

Since 2011, hundreds of short-term and long-term jobs have been filled by Aboriginals in a variety of fields from geology to heavy equipment operations, and from food preparation and maintenance to senior management. The rate of Aboriginal hiring is 20% of the entire workforce at the Timmins site.

Contrats / *Contracts*

- Pimi Naskinnuk
- Naskapi Heavy Machinery
- Béton Naskinnu
- Air Inuit
- Tshiuetin
- Innu Municipal
- Nirinnu
- Mamu Construction
- Naskapi Imuun
- Rail Cantech
- Sodexo
- Et d'autres / *and more*

TSMC a octroyé de nombreux contrats aux entreprises et partenariats autochtones, représentant des sommes importantes transférées aux entreprises qui favorisent le développement économique des communautés autochtones

TSMC has awarded numerous contracts to Aboriginal businesses and partnerships, representing significant sums of money transferred to businesses to promote the economic development of Aboriginal communities.

Dans la communauté… *In the community...*

Aréna

Dans l'esprit des principes du fondateur du Groupe Tata, Tata Steel Minerals Canada est un fier commanditaire, en collaboration avec les responsables locaux et gouvernementaux, dans la réfection et la réouverture de l'aréna de Schefferville, 30 ans après sa fermeture initiale.

Arena

In the spirit of the principles of Tata Group's founder, Tata Steel Minerals Canada is a proud sponsor, in collaboration with government and local officials, in the renovation and reopening of the Schefferville Arena, thirty years after its original closing.

Plantation d'arbres

Le 5 juin dernier, afin de souligner la Journée mondiale de l'environnement, TSMC et l'école Kanatamat ont tenue une activité de plantation d'arbres avec les élèves de la 3e année. 100 épinettes blanches ont été plantées autour de l'école par les enfants et les employés.

Tree planting

On June 5th, to celebrate World Environment Day, TSMC and Kanatamat school held a tree-planting activity with Grade 3 students. 100 white spruce saplings were planted around the school by students and staff.

Feu de forêt à Kawawachikamach

Le 22 juin dernier, un feu de forêt a atteint les portes de Kawawachikamach. TSMC et ses fournisseurs ont rapidement collaboré avec les autorités locales pour fournir de l'assistance sous forme d'équipements, d'hébergement, et de repas.

Forest Fire in Kawawachikamach

On June 22nd, a forest fire reached the doorstep of Kawawachikamach. TSMC and its suppliers collaborated swiftly with local authorities to provide assistance in the form of equipment, accommodation, and meals.

Coordonnateur en affaires communautaires

TSMC est fier d'annoncer l'embauche de **M. Edward Mameanskum** qui agira à titre d'agent de liaison de la compagnie au site Timmins et dans la région.

Community Affairs Coordinator

*TSMC is proud to announce the hiring of **Mr Edward Mameanskum** who will act as company liaison at the Timmins site and in the region.*

Information to Inform the Determination of EA Requirements
Please respond by: May 7, 2014

Howse Property Iron Mine – Howse Minerals Ltd.
Agency File No.: 005486

Nation / Band / Government:	NUNATUKAVUT		
EA Contact Name:	GEORGE RUSSELL JR	Telephone:	709 896 0592, EXT 229
Address:	370 HAMILTON RIVER ROAD GOOSE BAY, NL A0P 1C0	Fax:	896 0594
Email:	GRUSSELL@NUNATUKAVUT.CA		

1. Does the project description accurately identify the potential adverse environmental effects of the Project that would be of importance to your group or community? ☐ Yes ☑ No

   Please attach additional information that your group or community considers relevant.

2. In your opinion, could the potential changes to the environment caused by the Project result in changes to your community's:

   (a) health and socio-economic conditions? ☑ Yes ☐ No
   (b) physical and cultural heritage? ☑ Yes ☐ No
   (c) current use of lands and resources for traditional purposes? ☑ Yes ☐ No
   (d) structure, site or thing that is of historical, archaeological, paleontological or architectural significance? ☐ Yes ☐ No

   Specify as appropriate:

3. Does the Project have the potential to impact on your potential or established Aboriginal or Treaty rights? ☑ Yes ☐ No

   Specify as appropriate:

GEORGE RUSSELL JR
Print Name of responder

Signature

ENV AND RESOURCE MANG
Title of responder

MAY 8th / 2014
Date

Please respond to the above questions by **May 7, 2014** via email at mailto:Howse@ceaa-acee.gc.ca or fax at (902) 426-6550. Thank you.

Comments on Determination of EA Requirements;

DSO – Howse Project

May 8/2014; Nunatukavut Community council

Howse Property Project

The NunatuKavut Community Council (NCC) has reviewed Howse Minerals LTD's DSO – Howse Project Summary issued to and distributed to all parties March 2014 and prepared the following comments. The comments are presented in the following text and attempt to reflect the questions and inquiries posed from CEAA in the letter to the NCC dated March, 2014.

1) The Project description does not articulate many of the concerns that NCC members share, for example; Through existing Land Use Studies it is evident that our people interviewed use this land and some people, in various ways, will be affected by any future mining activities in this area. Some of our major concerns include; (1) general adverse effects on wildlife caused by loss of habitat, (2) effects on air quality from silica dust, (3) adverse effects from tailings ponds, (4) loss of Habitat in the mine site area, (5) effects on accessibility to other areas due to loss of trail routes, (6) effects on affordable housing in the area, and (7) they expressed concerns regarding hiring.

2) The NCC has a variety of concerns relating to the adverse environmental impacts of this project, including but not limited to;

- The added noise, dust, water contamination, habitat loss for various species, population increase, etc. must be considered in cumulative effects.
- We have many concerns regarding impacts on George River Caribou
- Ongoing projects and exploration will add to the number of flights to the Schererville and Wabush Airports and general traffic in the Area.
- How will the need for extra power affect the local communities in a region that is already strapped for available electrical power.
- Also it is not clear to the NCC how the water table, groundwater in this region will be affected by this project and we would like to see further science work.

3) This Project will have a variety of impacts on our people and communities, their rights, titles and interests within the boundaries of the Project. The impacts on the NCC communities as a result of this Project are a part of a vast array of developments and government decision making that has had and continues to have dramatic and negative impacts. The Project will add significantly to these "cumulative effects." The Project Guidelines need to address the issues of cumulative

effects and cumulative impacts on the NCC communities and the general area in a detailed and substantial manner.

The NCC assertion of rights is, in law, no different and potentially of greater priority and "depth" than that of Innu claims, or Quebec North Shore Innu. All three claims are asserted (as opposed to established) claims. The fact that the NCC claim has yet to be responded to by the Federal government does not in any way colour the legal nature of that asserted right in relation to the obligation of Crown agents to consult and accommodate those rights.

NunatuKavut
our ancient land

P. O. Box 460, Station C
Happy Valley – Goose Bay, NL
A0P 1C0
Tel: 709-896-0592 Fax: 709-896-0594
1-877-896-0592

To: SHANNAN MURPHY **From:** GEORGE RUSSELL

Fax: 902 426 6550 **Pages:** 5 (Including this cover page)

Ph: 902 426 7789 **Date:** MAY 9/2014

Re: _____ **CC:** _____

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Original to Follow

- **Comments**

Howse Property Iron Mine Project

Project Description

REVIEW AND COMMENTS

Submitted on behalf of the Naskapi Nation of Kawawachikamach to:

Canadian Environmental Assessment Agency
Howse Property Iron Mine Project
Shannan Murphy, Project Manager
1801 Hollis Street, Suite 200
Halifax, NS, B3J 3N4
Tel.: (902) 426-7789
Fax: (902) 426-6550
shannan.murphy@ceaa-acee.gc.ca and Howse@ceaa-acee.gc.ca

and

Environmental Assessment Division
Department of Environment and Conservation
Brent Keeping, Environmental Scientist
PO Box 8700
St. John's NL, A1B 4J6
Telephone: 709-729-4223
Fax: 709-729-5518
bkeeping@gov.nl.ca

16 May, 2014

Context

Howse Minerals Limited ("HML") is proposing to develop an iron ore deposit on the Howse Property, located in western Labrador, approximately 25 kilometres northwest of Kawawachikamach, Quebec, with support from adjacent infrastructure. The extracted iron ore will be crushed and screened on-site, hauled by truck to the existing Tata Steel Minerals Canada's Direct Shipping Ore Project rail loop loading area and then shipped by train to Sept-Iles, Quebec. The mine is expected to extract approximately 30 million tonnes of iron ore at a rate of up to 10,000 tonnes per day, over an approximate mine life of 12 years.

The construction period is scheduled to begin in 2016 followed immediately by the operation phase. The mine is expected to be in operation until 2027 with decommissioning and rehabilitation to begin prior to the end of mining operations.

The main objective of this Project Description review and comment by the Naskapi Nation of Kawawachikamach (the "Nation"), is to check the quality of the impact statements, to determine whether their conclusions are realistic and objective and to suggest any corrective methods that may be necessary.

Preliminary Consultation

On 29 January, Ms Coco Calderhead, Community Affairs for HML, sent a draft Project Description to the Nation to initiate open communications and to answer any initial questions or concerns of the Nation.

Below are the Nations comments submitted to HML, along with HML's responses embedded in the text in blue. The comments in red are those that the Nation believes to be outstanding.

Additionally, in Section 6.1.2. of the Project Description, it is mentioned the Joint Venture Agreement provides for Labrador Iron Mines continual assumption of Impact-Benefit Agreement ("IBA") obligations and liabilities. The validity of such an arrangement is currently being questioned by the Nation. Given the IBA's are confidential, the nature of the exchanges cannot be shared without the consent of all parties. The Nation is expecting from HML answers to specific questions and, as of even date, has not obtained satisfaction that the agreements are being respected or that the Joint Venture Agreement does not cause prejudice to the Nation.

Finally, the other outstanding concern held by the Nation is the level of activity on the railway lines. The Nation is concerned that priority is being given to the extracted ore cars rather than the passenger cars. Naskapis have experienced frustrating delays while using the Tshiuetin passenger service. The train ride to Sept-Iles is already exceptionally long in duration (10-12 hours) and if ore extraction continues to increase, this will have to be addressed and ensured that the appropriate measures are implemented to avoid such delays for passengers.

Howse Minerals Limited ("HML")

Project Description for the DSO Howse Property Project

Comments by the Naskapi Nation of Kawawachikamach

13 March, 2014
23 April, 2014

1) SOCIAL
a) page xxi – "As per the Benefits Plan agreement signed with the Government of Newfoundland and Labrador, residents from this province will continue to make-up a majority of the workforce, while Newfoundland and Labrador businesses, particularly Labrador West businesses, and will continue to supply goods and services to support the mining industry in the region."
Does this mean that its takes precedent over Aboriginal residents and businesses?

No it does not. NNK, NIMLJ, and ITUM members and businesses, and Newfoundland and Labrador residents and businesses, are given preference over other groups.

b) page xviii- "…as per its contractual obligations under Impact Benefit Agreements (IBA) signed with Aboriginal communities, the proponent will develop a rehabilitation and closure plan which will achieve the following objectives:…create a landscape compatible with surrounding areas while taking into account that previous disturbances caused by former IOC mining operations occurred in the vicinity of the site prior to TSMCs developments;"
What does this mean exactly? What previous disturbances will be taken into account?

After operations, HML will return to the extent possible the Howse Property site to the same level as today, (actual environmental stage) as planned and approved by the provincial government (closure plan will be defined as per regulations during the permit process) and in consultation with Aboriginal groups.

2) HISTORY / TRADITIONS:
a) page xx - "Archeological work was carried out in the vicinity of the LSA and resulted in the discovery of some prehistoric sites as well as numerous Aboriginal sites from contemporary periods."
This should be taken very seriously throughout the life of the project. The proponent should train all of its employees working on site to be able to identify what a historical artifact might look like and/or regular inspections should be undertaken. What is the process if an archeological site or artifacts are found?

The protection of cultural resources is also very important to HML. There are federal and provincial laws in place that aim to protect archaeological and historical resources, while HML, through its operator TSMC, has a Cultural Property Protection Plan in place (see attached document – the NNK contact person in case of discovery of cultural property was provided by the NNK in 2012). All workers receive an environmental induction which includes a summary of the Cultural Protection Plan and steps to follow in the event that potential cultural property is encountered. Furthermore, TSMC's Environmental team members conduct ground reconnaissance prior to works in previously undisturbed work zones.

b) page xxii – "After they began to reside in the Schefferville area more permanently during the twentieth century, Naskapi land use and harvesting activities focused increasingly upon areas adjacent to the community, and the most concentrated land use currently occurs within a radius of between approximately 30 and 50 km around Kawawachikamach. Recent studies have indicated that the NNK members undertake traditional activities such as hunting (large and small game), fishing and gathering and associated travel and camping throughout an overall region that encompasses the lands and waters

to the north and west of their community, including areas that are accessible through existing access road networks and adjacent areas in Quebec and Labrador. In particular, the Howells River Valley and the hills on both sides of it are reportedly used extensively by Naskapi throughout the year."
page 69- "Some plant harvesting is done by the Naskapi and the Innu in the vicinity of the Project (Weiler, 2009; Clément, 2009). Different varieties of berries, including blueberry, bilberry, cranberry, cloudberry and crowberry, are harvested. Plants harvested for medicinal purposes are Labrador tea and tamarack bark. White spruce, black spruce and tamarack are harvested for firewood."
page 71-"A 2006 survey of Naskapi land- and resource-use in the Howells River valley shows extensive caribou hunting therein"
page 127 "… Recent studies have indicated that the NNK members undertake traditional activities such as hunting (large and small game), fishing and gathering and associated travel and camping throughout an overall region that encompasses the lands and waters to the north and west of their community, including areas that are accessible through existing access road networks and adjacent areas in Quebec and Labrador (Weiler, 2009). In particular, the Howells River Valley and the hills on both sides of it are reportedly used extensively by Naskapi throughout the year for hunting, fishing and for gathering plants."
Naskapis have been known to use this area, or the areas closeby, extensively, therefore what does the proponent propose be done to compensate the Naskapis for this potential loss of traditional hunting and gathering grounds?

As referenced in Section 2.8.12 of the Final Project Description, the Project footprint area comprises an area to the east of the Howells River Valley and the hills on both sides of it. Harvesting activities are known to take place in these areas; however we do not have evidence of harvesting activities occurring in the Project footprint area itself, based on previous land use studies, and more recent consultations held with the NNK and the NIMLJ. Furthermore, the IBA signed with LIM is intended to address matters of compensation for the mining of the Howse deposit in the event of potential impacts.

c) page 75 - It appears as though there is not very much Naskapi traditional knowledge presented in this document. Particularly when compared to Clement's literature, on the Inuu which is quoted frequently.
When was the last time someone from the Naskapi Nation was taken to view the site, (Elders, youth, Council?) Is this part of the consultation process? Or is it all based on Weiler's literature (from 2006 and 2009)?

HML is familiar with previous studies on traditional ecological knowledge (i.e. Weiler and Clément), as referenced in previous environmental impact statements on mining projects in the Schefferville area (NML, Century Iron, LIM) (see Table 2.1 of the final project Description for the full list of EISs conducted).
HML made attempts to conduct a site visit in Fall 2013, through Chief Swappie. Unfortunately, due to reasons of timing, the site visit did not take place before the closing of the road to the Howse Project site for the winter months. Once road access is restored in Spring 2014, Naskapi leadership and land users will be invited to assess the area and provide feedback on the Project area.

d) page 173 – "As a way to mitigate the impacts the Project may have on Aboriginal harvesting activities, the Proponent has provided through IBAs community funds for the support of traditional activities."
Who's IBA in particular? Will the IBA be updated to include this additional project?

Funds for community programs vary within each IBA – which are confidential documents – based on the priorities identified by each party at the time of negotiation. Development of the Howse deposit is addressed in LIM's IBA with the NNK.

e) page 173 – "… As another measure to accommodate local Aboriginal harvesting, the Proponent has already in place a fund for the support of traditional activities of the local Aboriginal communities most

impacted by the Project."
Please elaborate.

As established during IBA negotiations, a specifically designated traditional activities fund has been created in the case of certain IBAs in order to contribute to the traditional activities of First Nation members who use the LIM Project area for these purposes.

3) BIODIVERSITY
a) page xxiv – "Noise disturbance, mostly caused by transportation and traffic, will affect the caribou, the wolverine and possibly the presence of geese."
page 69- "… migratory caribou that might be found in the vicinity of the Project belong to the George River herd (GRCH). The most recent census of this population was carried out in 2001, at which time the size of the herd was estimated at 440,000 individuals (Couturier et al., 2004). The herd has since declined, and comprised an estimated 74,000 individuals in 2010 and 27,600 in 2012 (CARMA, 2013).
In general, the Project is contained within the migratory corridor of the George River herd that links their calving and wintering grounds. Much less clearly defined than calving areas, the caribou wintering grounds are thought to have shifted toward eastern Labrador early in the 2000s (Schmelzer and Otto, 2003)… They have adapted to the formerly mined area by using old mining roads should they happen to be heading in the same direction as the route along which they are migrating (Brown, 2005).
Since the LSA supports Ecotype MSF05 (Black Spruce-Lichen-Woodland) (see Section 4.2.1) and Ecotype HST04 (Large-leaved Goldenrod-Alpine Shrub- Seepage), food for caribou is readily available, as it is elsewhere in the region."
Caribou populations have decreased significantly in the past decade. Caribou are of utmost importance to the Naskapi Nation's diet and culture. It is acknowledged that the decrease is not necessarily directly linked to the mining industry but the fact remains that the proposed project lies within their migratory corridor, with bountiful amounts of food for them in this area, therefore the impacts on this species should be considered very seriously.

Yes, there will be an unavoidable destruction of habitat for caribou. However, this loss of habitat will be very marginal compared to the vast territory traveled by the migratory caribou during migration.

The potential effects of the Project on caribou will be more related to noise disturbance. As described in the Environmental Impact Statement (EIS) for the Elross Lake Area Iron Ore Mine (ELAIOM) submitted to the Government of Newfoundland and Labrador in 2009, standard mitigations regarding drilling and blasting, construction equipment and restoration will be implemented to reduce noise. In this EIS, other special mitigation measures are also proposed. The same mitigation measures will be applied for the Howse Property Project. For example, if a caribou (monitored by satellite collars) is located within 100 km of the project area, the on-site Project managers are notified and operations continue with caution. If data from the radio collars indicate that caribou have moved within 5 km of a pit in operation or the processing complex, all blasting, crushing and ore-transport activities are suspended. More details are provided in Section 8.1.7 of the ELAIOM EIS.
Also, with TSMC and HML's current partnership with Caribou Ungava, the Environmental Team on site will be notified via e-mail when a caribou is in the Project vicinity.

b) page 158 – Table 7.5
Why were all the other animals excluded? What criteria were used for this selection? Just because they have a low population density and no socio-cultural value to the Naskapis or Innu, doesn't necessarily mean that they are not essential to the food chain, or to the surrounding environment.

The species that have been selected are the ones that were considered more susceptible of being affected by disturbances in the area. Moreover, the species selected play an essential role in maintaining ecological

integrity and equilibrium. In ecological terms, these kinds of species are referred as "keystone species". Studying the effects of a project on a keystone species is therefore also an indicator of the potential effects of the project on the other species in the area.
Numerous data have been collected on other species in the area of the Project for the EIS of ELAIOM and for the Howse Project environmental evaluation. However, when performing an environmental evaluation of the area, efforts are concentrated at focusing on specific issues rather than on the larger spectrum. It is essential when performing an environmental evaluation to concentrate on key issues rather than trying to cover every single component, thus increasing the study clarity and overall quality.

It is understandable to focus on keystone species, but the other species should at least be included in an appendix.

c) page xxiv - "Mining and dewatering are the main activities that could potentially have a significant effect on the aquatic fauna or its habitat while operations and maintenance are ongoing. Indeed, blasting near water bodies may injure or kill fish from all life stages. By limiting charges to 4,400 kg between August and January, the impact on fish eggs should not be significant since it will ensure the protection of fish eggs in Goodream Creek, which is a known spawning ground."
This should be monitored and reported.

Yes, it is monitored and reported. Fish monitoring surveys have been performed on Goodream Creek twice per year since 2012. Also, in collaboration with NL government, DFO and Environment Canada, TSMC and HML recognized Goodream Creek as a sensitive area. Therefore TSMC has implemented a long term effect program part of the Federal Metal and Mining Regulations, a specific DFO program regarding fish habitats and aquatic life and participates in the provincial government real time water monitoring program. The real-time quality/quantity monitoring network was installed on Goodream Creek in 2012 and near-real time data on the status of water quality of Goodream Creek is available on the Newfoundland and Labrador's Department of Environment and Conservation website
at: http://www.env.gov.nl.ca/wrmd/ADRS/v6/Template_Station.asp?station=NF03OB0040

HML and TSMC are also planning to measure the extent of the low water level of the water courses of the Howse Property study area before this year's snow melt in order to ascertain the potential spawning habitat of fish in the area. These measurements will be taken at the end of April 2014.
According to regulations and the Environmental Protection Plan (EPP) of TSMC (which will also include the Howse Property Project when it will be operation), the following procedure regarding blasting activities in close proximity to water bodies has been implemented on-site:

- No explosives will be used directly in or near water. In the event that blasting is considered absolutely necessary within a water body, it shall be undertaken in compliance with the required Water Resources permits from the NLDEC and DFO's guidelines (Wright and Hopky 1998);
- Shortly before a detonation in the vicinity of a watercourse, small "scare charges" must be detonated to scare off fish;
- Blasting activities shall be undertaken in a manner that ensures that the magnitude of explosions is limited to that which is absolutely necessary. A blasting plan shall be reviewed with the local DFO officers in advance of work in close proximity to water bodies;
- Detonations producing an instantaneous pressure change of more than 100 kPa in fish air bladder are prohibited in or close to fish habitat;
- After blasting activities, visual inspection of nearby watercourses will ensure no post-blasting fish mortality has occurred. According to TSMC plans, blasting activities during operations are not expected to result in fish mortality.

Also, pertaining to TSMC's EPP, work will be avoided when possible during critical periods for fish (e.g., spawning, incubation, fry rearing), as well as critical areas (e.g., spawning). Between Sept 1st and June

15th, stream crossing construction activities taking place within fish habitat will be undertaken under direct supervision of the Environment Representative

page 159- "To prevent any loss of broods, clearing and stripping should not be carried out during the breeding bird season (from June through August)."
This should be monitored and reported. Construction is supposed to be finished by late 2014, therefore how would they avoid clearing from June through August?

It is important to mention that the project schedule has changed since the submission of the draft Project Description. HML is now planning to start the construction phase for the Howse Property in 2016, subject to regulatory and environmental approvals and start extracting iron ore by 2016. Since these mitigation measures are part of TSMC DSO 3 EPP and policy, this measure will have to be integrated in the construction and mining plan and monitored by the HML environmental team.

2016 sounds like a more realistic schedule. Months of the year will be important to specify in order to avoid breeding bird season.

4) CUMULATIVE EFFECTS:
a) page 160 – "Several other projects operate in the same sector, increasing the probability of cumulative environmental effects. The increased disturbances and loss of habitat could be significant for the caribou. It could eventually drive the caribou to avoid the region. The increased number of trains on the Schefferville–Sept-Îles railway might cause additional disturbances to the sedentary caribou."
page 169 – "As production will increase over the previous project, ore train traffic will increase from one train every second day to one train per day during a period of 7-8 months per year (April to October). In addition, truck traffic will increase to 12 trucks per hour at the mine site."
This is needs to be analyzed in depth. The number of trains has/is increasing with every new project.

The number of trains increases or decreases, as the case may be, with the addition or reduction in mining activities in the Schefferville/Labrador City region. A study has recently being performed by SNC-Lavalin on the impact of the increase in railroad traffic on caribou along the entire railroad footprint. This study will be reviewed and taken into consideration for the Howse Property Project.

b) page xxvi- "The construction phase for the Howse Property is expected to start in late 2014,"
page 11 - "Pit development is expected to be completed late 2014 to allow for ore production to begin by June 2015."
page 30 – "The pit is expected to be fully operational by June 2015 and run for 13 years. Once mining activities start at the Howse Property, 56 people, split into 4 crews of 14 operators, will be required to operate the mine. Other workers such as foremen, engineers and geologists will be dividing their time between the TSMC's DSO Project and Howse."
page 152 – "The exploitation of Timmins 4 during the TSMC DSO Project would cause a cumulative environmental effect since there are plans to discharge dewatering and sump water into Goodream Creek. Therefore, if both pits operate at the same time, water and contaminants in Goodream Creek would originate from two different projects and levels could reach undesirable values without proper management. According to TSMC, this scenario is unlikely since operations at Timmins 4 should end before the Howse Property starts."
page 167 "The presence of several other projects in operation in the area increases the probability of cumulative environmental effects. The exploitation of Timmins 4 of the TSMC's DSO Project 1a would cause a cumulative environmental effect since dewatering and sump water are planned to be discharged at the same location, i.e. into Goodream Creek. Therefore, if both pits are operated at the same time, contaminants in Goodream Creek would originate from two different projects and concentrations of

contaminants could reach high enough levels to significantly degrade aquatic habitat. According to TSMC, this scenario is unlikely since operations at Timmins 4 should end before the Howse Property starts"
Is this a fact that they both will not be in operation at the same time?

It is a fact. Timmins 4 and Howse pits will never be in operation at the same time.

c) page 171 – "Cumulative infrastructure effects such as those on regional transportation are being addressed by government and organizations such as the Labrador West Regional Task Force, which was formed to support sustainable development of the region and communities from Wabush to Schefferville. The Task Force has a special interest in the cumulative effects of increased mining activity on infrastructure."
Is there Nation involvement in this Task Force?

No, the Labrador West Regional Task force is an initiative from Iron Ore Company of Canada supported by the Newfoundland and Labrador government. The Task Force was formed to address the challenges associated with the economic boom related to the mining industry in Labrador West. The Task Force includes representatives from industry, municipalities, provincial and federal governments. Therefore, HML invites the Nation to be in touch with the appropriate authorities of the Task Force. To find out more about the Task Force, please consult the following links:

- http://www.assembly.nl.ca/business/electronicdocuments/LAOAnnualReport2012-13.pdf
- http://newenergynl.ca/news-piece/20130613-1/

5) WATER BODIES and WATER QUALITY:
a) page xxiii – "The construction activities will have an effect on water quality since the project infrastructures will be located close to some water bodies and, given the local topography, suspended matter may be generated by surface run-off. Some coloration of the water might also occur at this stage. Surface run-off will be intercepted by a ditch network and directed to a sedimentation pond before reaching the natural environment."
page 165-"...only coloration is expected to reach natural water bodies. Since Goodream Creek offers a decent dilution at the discharge point, coloration is expected to be minimal and significant effect on fish and fish habitat is unlikely"
page 166 – "The only probable change to water is its coloration"
Coloration of the water? What will be done to avoid this? How can this be cleaned up?

The coloration will be measured before construction in the Spring. Also, protection procedures to avoid negative effects due to runoff and erosion are included in the current EPP for the TSMC DSO 3. Protection measures related to storm water management to ensure sedimentation and related contamination does not enter any water bodies are part of TSMC's EPP (sediment barriers, ditches, buffer zone, etc.). HML is aware that Goodream Creek is fed by water from a wetland connected at the base of Timmins 6, an old IOC pit. It is therefore possible that coloration is due to past mining activities. If issues arise regarding coloration, specific measures will be implemented.

b) page xxiii - "Seepage from waste rock piles is another potential effect on water quality. ...Dewatering the pit will lower the water table. Some water bodies have a risk of drying out locally, particularly around the pits. Since the hydrogeological study has not yet been completed..."
page 42 – "the pending hydrogeological report will be completed early in 2014."
I assume these claims may change once the hydrogeological report is submitted. Please keep the Nation updated.

Yes. HML is targeting to have the hydrogeological report by August 2014.

The hydrogeological report will be of significance.

c) page 31 - Ammonium nitrate residue generated by blasting has the potential to contaminate surface waters and groundwater. Ore extraction also has the potential to generate noise, dust and suspended solids."
page 151 - "Sump water pumped from the pit might be contaminated by hydrocarbons and oils from machinery and by nitrogen compounds derived from the incomplete combustion of explosives…some chemicals from explosives (ammonium nitrates and some metals) could be pumped with sump water or leach into the groundwater through the bottom of the Howse pit."
What will be done to avoid this? And monitor this?

All the water from the pit (runoff and dewatering) will be pumped out to sedimentation ponds via a drainage system. Water quality is monitored at the discharge point to the environment for nitrates, ammonium, hydrocarbon and others metals.

How frequently will monitoring take place?

On a regular basis, TSMC will perform tests at the pump discharge and if necessary an oil separator will be installed. Regular site inspections will be performed and all workers shall report abnormal situations such as unusual smell, unusual color (sign of hydrocarbon) to the environmental team. The concentration of ammonium is low and it is unlikely that this product concentration will be higher than regulation criteria. If hydrocarbon or petroleum are observed or identified, HML will take necessary measures to solve the issue.

Why is it not mandatory to install an oil separator?

d) page 52 – "… the IOC's mining operations dried out sections of watercourses further east and thus reduced drainage density. Developments from that period also resulted in a disappearing stream which flows near the Fleming 7 deposit. Nevertheless, the most recent LSA update conducted by Groupe Hémisphères (In Progress b) currently reveals a terrain that is rather undisturbed apart from a few trails left by previous geological exploration, but with a drainage density that is still lower than anticipated…"
What will be done to ensure IOCs mistakes are not repeated?

Unfortunately, some areas of the Howse Property site have been altered due to past mining activities. Since the IOC era, the Canadian mining industry today has sets strict environmental standards.

The Canadian Environmental Protection Act (1999) sets out regulations to ensure protection of the environment and sustainable development through pollution prevention. Examples of implementation of such regulations on TSMC's current installations, which would also apply to the Howse Property Project in the future, includes the implementation of an Environmental Protection Plan (EPP) and Environmental Response Plan (ERP). Also, the preparation of a Mining Site Rehabilitation Plan is now mandatory. Another example of environmental regulations on mining sites includes the Metal Mining Effluents Regulations (MMER) in which HML, Environment Canada and the Water Resource Management Division of the Department of Environment and Conservation of the Newfoundland and Labrador Government work in collaboration to overview designs, discharge points and environmental monitoring programs.

Moreover, TSMC and HML focus on raising environmental and cultural awareness on site. To do so, TSMC currently has in place a Community Health, Safety and Environment Committee (HSE) which meets on a quarterly basis to discuss matters relating to the communities health, safety and environment

pertaining to TSMC's (and HML's in the future) activities, planned works, impacts and mitigations measured. When starting work, each worker on site receives information and training on environmental and safety procedures (sensitive species, bear action plan, water management, forbidden areas, etc.). TSMC also has in place a procedure for when cultural property is found on site.

Before the start of construction and operations, a Certificate of Approval from the provincial government is required. Federal authorizations presenting site specific conditions regarding the environment and local communities also needs to be granted.

It is also important to keep in mind that since the establishment of the Canadian Environmental Assessment Act in 1992 (which was amended in 2012) any designated project is subjected to review and study by the Canadian Environmental Agency before it can be realized.

e) page 81 – Benthos - "It should also be noted that a high proportion of taxons (mainly in the Ephemeroptera, Plecoptera and Trichoptera orders) intolerant to pollution were always caught within LSA. This is indicative of a generally good water quality since those species are the first to disappear when water quality degrades. This data thus provides good background information, since it will allow rapid monitoring of water-quality-related environmental effects on aquatic biota."
This is good to know. Please include a regular analysis of benthos in the reports on water quality monitoring.

Monitoring of benthos is part of the MMER monitoring program.

f) page 151 – "…dewatering the ore body will require substantial efforts because it is located in a groundwater recharge area. Water from the dewatering and sump pumps will be piped to the existing Timmins 4- Sedimentation Pond-3."
How far away is this?

Timmins 4 sedimentation pond is 1.85 km from the center of the Howse deposit.

g) page 151 - "Oil and fuel will be captured by a separator before the dewatering water reaches the Timmins 4- Sedimentation Pond-3. It will not be possible for these substances to infiltrate and contaminate the settling ponds. Only nitrogen compounds present a risk, but dilution from precipitation, and at the point of entry to the receiving environment, should ensure meeting of the criteria for the protection of aquatic life."
Will this be monitored?

Yes it will be monitored and is part of TSMC EPP monitoring program. As per conditions on the Certificate of Approval, weekly monitoring is required by law and criteria are also defined by provincial and federal regulations. The criteria are set for Ammonia nitrogen (N-NH3), Nitrates (N-NO3-) and petroleum products. Visual inspections are also performed and if petroleum products are observed, measures are taken to remove it and are immediately reported. Also, all vehicles and equipment on site are equipped with a spill kit as per TSMC's regulations.

h) page 151 - "Dewatering the pit will lower the water table…Some water bodies run a high risk of drying out locally, particularly around the pits. Since the hydrogeological study has not yet been completed, it is impossible at this time to know the water table's drawdown radius inside which the water bodies could dry out. …The drying out of Two Ponds and the upstream sections of GDR3, PIN1 and Burnetta Creek are therefore probable. None of these water bodies are considered as fish habitat. Recent photo-interpretation of the areas formerly used by the IOC revealed that watercourses are more likely to dry out than wetlands. Therefore, Two Ponds might be less affected than the streams. … In the end, the pumped

water will be returned to the environment through Goodream Creek and will stay in the Howells River watershed, so overall water balance will not be modified."
Can the water be pumped into the water bodies that will likely dry out?

As soon as the hydrogeological report is available, HML will look at all options to maintain the water bodies as much as possible. In some cases, maintaining a flow to a water body is possible and HML will consider this option for the pit development and water management plan. As per regulations, water should be diverted to sedimentation ponds before being discharged to the environment. Depending on the size and the localization of the sedimentation pond, it might not be possible to maintain flow in all water bodies. HML will try to avoid these situations during the elaboration of the water management plan.

The hydrogeological report will be of significance.

i) page 156- "pit dewatering may alter the moisture regime of wetlands adjacent to the Howse pit, considering the drawdown of the water table that will be created by the pit dewatering"
page 156 - "However, all effects on wetland related to dewatering are temporary and reversible."
How are they reversible? What is the proponent going to do to make sure that it is reversed?

When dewatering stops, water will refill the pit and will eventually return to its initial state (the initial level of the groundwater table). Hydrological and hydrogeological conditions will also return to their initial states. These initial conditions will be confirmed by the hydrogeological report released in August 2014.

The hydrogeological report will be of significance.

6) PERMAFROST:
a) page 51 "The study area is comprised in a discontinuous permafrost zone (Nicholson and Lewis, 1976). Nicholson (1978) conducted research on permafrost distribution at various sites in the Schefferville area, including Timmins 4 and Fleming 7, at an elevation of 700 m asl, and concluded that extensive, deep permafrost underlies those areas that are higher in elevation, exposed, and where tundra vegetation covers the ground. … Signs of permafrost were also observed during 2013 fieldwork in the LSA (Groupe Hémisphères, In Progress a). On less exposed and lower-lying ground, which is covered by woodland, no permafrost is present (Nicholson and Lewis, 1976)."
What does this mean for the project? Will the proponent be digging into the permafrost layer?

HML is expecting a geotechnical report of the Howse Property by August 2014 to determine areas of instability as well as the breadth and depth of permafrost. At this stage, permafrost zones were only identified from a historic map (1976) and observed while conducting other fieldwork (2013). The geotechnical report will confirm the areas of permafrost. With this information, HML will be in a better position to revise the project layout, if needed. Since permafrost is part of the overburden, if it is located in the pit area, permafrost will be stripped off before digging.

The geotechnical report will be of significance.

7) INFRASTRUCTURE:
a) page xvii – "…some of the required infrastructures…are already in place at the nearby TSMC's DSO Project complex"
"The approved facilities at the TSMC's DSO Project plant complex, which are currently under construction, and which HML is planning to use include…"
Some are constructed and some are not? Was this infrastructure planned to handle both mines? Landfill, camps, etc?

HML is planning to use some existing facilities at TSMC DSO 3 site. The only new infrastructures needed for the Howse Property Project will be the open pit, stockpiles, waste rock dump, a crushing and screening facility, access and haul road and water management facilities.

Precision regarding the use of exisiting facilities at TSMC DSO 3 site have been added to Section 2.2, Section 1.5, Table 1.1 and Section 2.6.1 of the final Project Description.

8) GENERAL COMMENTS:
a) page xviii and page 34 - "…keep potential sources of pollution , fire hazards and public liability at an acceptable level and develop mitigation measures, if required"
What is considered to be an 'acceptable level'? According to whose standards? Government? Industry best practices?
If a fire starts at the mine and spreads to the community (only 25 km away), what happens? Who is liable?

The "acceptable level" is set out by federal and provincial governments, TSMC and HML policies; TSMC also follows industry standards including those of the Quebec Mining Association, Canadian Mining Association, International Mining Association and international concepts including the Equator Principles. Fire accidents are not common on mining sites and it is quite unlikely that a fire will spread 25 km away from the mining site since the forest area of the region is very limited and old mining pits and old perturbed sites will act as firewalls. However, TSMC and HML are planning to have their own fire truck and emergency response team on site. In case of an incident, TSMC and HML will cooperate with governments and take the necessary measures.

b) page xix – "A portion of the study area has been disturbed by previous mining activity, which ended in 1982, in some cases to such an extent that the original condition of the landscape is no longer recognizable. Mining-related alterations to the landscape include numerous test pits and trenches, survey cut-lines, access roads and yards, and abandoned camps, infrastructure and equipment."
Is this from IOC's previous mining operations? Will it be reused or cleaned up?

As much as possible HML will reuse past infrastructure (roads, railways, stockpile pits) and already disturbed areas in order to minimize new disturbances; all areas disturbed by TSMC operations will be cleaned up after operations.

c) page 29 – "The electricity required to run the facility will be provided by generators"
Where will the fuel storage be located?
It says that one of the major potential accidents is due to the transportation of fuel, but they also say that the trucks will be refueled at TSMCs camp, therefore what fuel are they transporting? For the generators?

The fuel will be stored in the fuel storage area, on the TSMC DSO 3 site. Precisions concerning storage area and refueling have been added to Section 2.6.5.

d) page 39 - A lot of the data was taken in 2006, therefore is this data still valid given LIM and TSMC mines are now there?

HML estimates that most of the data (baseline data) are still relevant. HML also has some new available data regarding environmental monitoring due to the DSO project operations. In most cases, data will be updated frequently as required.

e) page 141-142 NNK Environment Representative(s), Community Health Safety and Environment Committee (Established in Spring, 2013)

Who is this?
page 143 – "An Implementation Committee …beginning in 2011, and which meets jointly since Summer 2013"
Who is on this Committee?

Community Health, Safety and Environment Committee (HSEC) : As per communications with the NNK in May 2013 and January 2014, the NNK participates in HSEC meetings which take places approximately every quarter. George Guanish and Noah Swappie were originally named as the NNK representatives (May 2013). Subsequent to Chief Swappie assuming his position as Chief, Peter Swappie was named (January 2014) as his replacement for the time being.

Implementation Committee: Implementation Committees have been established for the oversight of the LIM and the TSMC IBAs with the NNK. A joint Implementation Committee meeting was held in August 2013 with the 5 Aboriginal groups who have an agreement with LIM and with TSMC. Although John Mameanskum was named in 2012 as the NNK representative on the NNK-TSMC Steering Committee, Paul Mameanskum represented the NNK on the August 2013 Implementation Committee at both LIM and TSMC meetings.

f) page 146 – "TSMC is an active player in a number of different environmental initiatives, including in wildlife protection (Ungava project) and in vegetation restoration (program with Université Laval).
Interesting, which ones?
page 160 "In cooperation with GNL and Government of Québec, TSCM and HML will participate actively to the Caribou Ungava Research Program"
How? Has this already been discussed with Caribou Ungava?

TSMC has entered into a 5-year partnership with the Ungava Research Project, a program focusing on the ecology and population dynamics of migratory caribou of the Quebec-Labrador peninsula in a context of climate change. This research program was launched in 2009 and is supervised by researchers of the Université Laval, Université de Sherbrooke and the Ministère des Resources Naturelles et de la Faune du Québec.

In order to improve the effectiveness of its reclamation plan after the closure of the Howse Property Project, TSMC is financing a 3-year research program through the Université Laval to investigate the optimal vegetative species to be prescribed. It is planned that monitoring of experiments in greenhouses will start in Fall 2014 and that experiments will be conducted on-site in the Summer of 2015.

TSMC is also an active member of the following environmental initiatives:

- ROLES project, a clean-up project of old disturbances from old exploration companies. In 2014, TSMC will participate in a series of site assessments. A report will be prioritizing old exploration site clean-up.
- Canadian Boreal Initiative, which brings together partners from governments, industry, Aboriginal communities, conservation groups, retailers, financial institutions and scientists to discuss issues on Caribou, potential impacts, and mitigation measures.

g) What do they do with the wood they cut down? Or with the berries and medicinal plants?

The wood that is cut down is available to First Nations to pick up, if requested. The berries and medicinal plants that are removed with the top soil are stockpiled. All vegetation and top soil are kept on site for closure plan purposes.

It would be beneficial if the Nation were notified as to when they could pick up any spare wood, as it could be distributed to the Elders in the community.

h) If a wolverine, (or caribou, lynx, etc.) is spotted, is there a process in place to report it? The Nation and the Government both need to have this information.

All sightings of wildlife on site have to be reported immediately to TSMC's Environment Representative and included in TSMC's monthly environment report submitted to the provincial government. A copy of the monthly report has previously been provided to the HSEC and is available to the Nation upon request.

INNU NATION

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May 15, 2014

SENT VIA E-MAIL AND MAIL

Proposed Howse Property Iron Mine
Canadian Environmental Assessment Agency
200-1801 Hollis Street
Halifax, NS B3J 3N4
howse@ceaa-acee-gc.ca

Attn: Shannan Murphy

Dear Ms. Murphy:

Re: Determination of the Requirement for an Environmental Assessment for Proposed Howse Property Iron Mine Consultation and Accommodation

We thank the Agency for its letter to Innu Nation inviting us to provide comments regarding the need for an Environmental Assessment of Howse Minerals Limited ("HML") proposed Iron Mine near Schefferville, Quebec (the "Proposed Project").

Given that we have not yet been provided funding to properly assess the potential adverse effects of the Proposed Project on the Innu of Labrador and to consider mitigation measures, our comments in this letter are only our preliminary concerns about the Proposed Project. We submit that the preliminary concerns and the potential impacts on our Aboriginal rights, culture, and heritage merit a decision by the Agency that a federal Environmental Assessment is required for the Proposed Project.

NEED TO LOOK AT THE EFFECTS OF ALL CHANGES TO THE ENVIRONMENT ON THE INNU OF LABRADOR

As is required under s. 5(1)(c) of the *Canadian Environmental Assessment Act, 2012* ("*CEAA 2012*"), in order to assess the effects of environmental changes caused by the Proposed Project on Aboriginal peoples, the Agency must first assess any changes that may be caused to the "environment" as that term is defined in *CEAA 2012*. Changes in the environment are broader than the more narrowly defined "environmental effects" in ss. 5(1)(a) and (b), and encompass all changes to the components of the earth and natural systems, not just those aspects of the environment that fall under federal jurisdiction. Therefore, the Agency must assess the effects of the Proposed Project on the environment, without limitation, before you can assess the environment effects of the Proposed Project under s. 5(1)(c), being the effects of the Proposed Project on the Innu of Labrador.

Innu Nation submits that an Environmental Assessment is required in order to ensure that a comprehensive assessment of the possible changes to the environment caused by the Proposed

Project is done, the impact of those environmental changes on the Innu of Labrador is adequately assessed by the Agency, and mitigation measures imposed.

INNU NATION'S CONCERNS ABOUT THE PROPOSED PROJECT

Based on our preliminary review of HML's March/April 2014 Description of the Proposed Project, Innu Nation is concerned about the environmental changes the Proposed Project may cause and the effect of those changes on the Innu of Labrador's health and socio-economic conditions, heritage, exercise of our rights, and archaeological sites. Innu Nation is also concerned about several potential environmental effects that are within federal jurisdiction and fall under s. 5(1)(a) of the *CEAA 2012,* including impacts on fish and fish habitat and migratory birds.

Below we have summarized our preliminary concerns about the Proposed Project that found our submission that a federal Environmental Assessment ought to be required for the Proposed Project:

(a) As the March/April 2014 Description of the Proposed Project notes at 4.3.1.1, the Project would fall within the migratory corridor of the George River Caribou herd (GRCH) between calving and wintering grounds. Also noted is the decline in the GRCH – 440,000 (2001), 74,000 (2010), 27,600 (2012). Given the dramatic declines in the caribou herd and the location of the project the Innu Nation is deeply concerned that this project could have serious negative effects on the GRCH. An Environmental Assessment is crucial to protect the caribou. The proposed mitigation measures do not adequately address the gravity of the situation.

(b) The Proposed Project is one of numerous mining projects concentrated in western Labrador that the Innu of Labrador believe have affected caribou migration throughout all of Labrador. The cumulative impact of one more such mining-related project on the cultural heritage of the Innu of Labrador, which is intimately tied to the hunting of caribou, must be properly assessed in an Environmental Assessment.

(c) HML has documented 41 species of migratory birds in the area of the Proposed Project and Innu Nation is concerned about the adverse impact of the Proposed Project on those species, particularly given how few natural areas there are left in the vicinity for those birds.

(d) Unfortunately, Innu Nation has not had the resources to complete a comprehensive study of Innu burial sites and land use in Western Labrador. An up to date and comprehensive assessment of the Innu of Labrador's historic use in the area should be investigated further as part of an Environmental Assessment of the Proposed Project. An Environmental Assessment is required to ensure that proper archaeological assessments are done with the involvement of the Innu Nation and that proper mitigation measures are in place to protect our archaeological sites.

(e) It is a definite possibility that some Innu of Labrador will move to the vicinity in order to secure employment with the Proposed Project. Therefore, the potential for impacts on health and socio-economic conditions of the Innu of Labrador is clear and this needs to be fully understood, particularly given the abundance of projects that are being proposed in the geographic area of the Proposed Project.

(f) Innu Nation is concerned about the watershed impacts the dewatering will have on the watersheds and ecosystems in which the Innu of Labrador exercise Aboriginal rights. The cumulative impact of the numerous mining projects in Western Labrador on water quality in the region and with reference to areas where the Innu Nation exercises rights needs to be examined thoroughly.

Given the potential adverse impacts of the Proposed Project on fish and fish habitat, migratory birds, and the Innu of Labrador's health and socio-economic conditions, heritage, exercise of our rights, and archaeological sites, our opinion is that there is a need for the Agency to conduct an Environmental Assessment of the Project.

NEED TO CONSIDER CUMULATIVE IMPACTS

The cumulative effects of changes to the environment associated with the Proposed Project on the Innu of Labrador must be assessed. As HML states in its March/April 2014 Description of the Proposed Project, the Proposed Project is being undertaken in an area with existing industrial development in which prior projects did not undergo an environmental effects assessment. The Agency must consider how additional environmental changes in the area will have cumulative effects on the Innu of Labrador's Aboriginal rights, health, socio-economic conditions, heritage, and archaeological sites.

Recent court rulings suggest that cumulative impacts are essential to seeing the whole picture of impacts. For example, in *West Moberly,*[1] the court held that the historical context is essential to understanding the seriousness of the impacts from a current decision, thereby affirming the core principles of cumulative effects assessment of the impacts of a Crown decision on Aboriginal rights.

We submit that an Environmental Assessment of the Project is required to adequately assess potential cumulative effects on the Innu of Labrador and required mitigation measures.

DUTY TO CONSULT AND FUNDING

Canada owes the Innu of Labrador a duty to consult with us and accommodate our rights with respect to the potential impacts of the Proposed Project on our rights. In the past, Canada has used the Environmental Assessment process to meet its duty to consult and accommodate us. If there is no Environmental Assessment of the Proposed Project, then there will be no clear process through which Canada will carry out the duty to consult and accommodate Innu Nation. Also, if there is no Environmental Assessment, how will Canada properly be able to assess the impacts of the Proposed Project on our asserted Aboriginal rights?

Innu Nation insists on a fully funded consultation plan with Canada to assess the impacts of the Proposed Project on our asserted Aboriginal rights, regardless of whether or not Canada decides that an Environmental Assessment of the Proposed Project is required. In order to properly understand the adverse effects of the Proposed Project on Innu Aboriginal rights and to consider mitigation measures, funding is required.

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[1] *West Moberly First Nations v. British Columbia (Chief Inspector of Mines)*, 2011 BCCA 247, leave to appeal denied, 2012 CanLII 8361 (SCC)

Should you have any questions or require clarification or any further information, please contact me or Richard Nuna at the Innu Nation's office ((709) 497-8398, rjnuna@innu.ca and preid@innu.ca).

Yours truly,

Paula Reid

Innu Nation

cc: Vanessa Rodrigues, CEAA Project Manager, vanessa.rodrigues@ceaa-acee.gc.ca

cc: Richard Nuna, Innu Nation, rjnuna@innu.ca

Encl.

BLG

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May 7, 2014

BY EMAIL

Mike Atkinson
Regional Director, Atlantic Region
Canadian Environmental Assessment Agency
1801 Hollis Street
Halifax, Nova Scotia
B3J 3N4

Subject: Determination of whether an environmental assessment is required for the Howse Property Iron Mine Project, located 24 km from Schefferville, Quebec

Dear Mr. Atkinson:

As the legal counsel for the Nation Matimekush-Lac John Council (and the members of the band represented by this Council), we have been instructed by the Council to inform you, herein, of its position on the above-mentioned subject.

1. ENVIRONMENTAL ASSESSMENT PROCESS

The *Canadian Environmental Assessment Act, 2012*[1] (hereafter referred to as the 2012 Act) prescribes that a project is subject to the federal environmental assessment process if it is designated by the *Regulations Designating Physical Activities*.[2] A designated project is defined as one or more physical activities carried out in Canada or on federal lands designated by the *Regulations Designating Physical Activities*. The list of physical activities set out in the Regulations includes the construction, operation, decommissioning and abandonment of a new metal mine with a production capacity of 3,000 t/day or more requiring an environmental assessment under the 2012 Act.

According to the 2012 Act, the proponent of a designated project must provide the Canadian Environmental Assessment Agency with a description of the project.[3] Once a description of the

[1] S.C. 2012, c. 19.
[2] SOR/2012-147.
[3] 2012 CEAA, s. 8.

designated project has been provided by the proponent, the project must be subject to screening to determine whether an environmental assessment is required under the 2012 Act.

The 2012 Act also prescribes that the proponent of a designated project must not do any act or thing in connection with the carrying out of the designated project if the environmental effects of the project have not been assessed.[4]

These environmental effects are: (1) a change that a designated project may cause to certain components of the environment that are within the legislative authority of the Parliament of Canada; (2) a change that could be caused on federal lands; (3) with respect to Aboriginal peoples, any change that may be caused to the environment and that has health, socio-economic, cultural, heritage or archaeological effects.

In addition, the 2012 Act expressly states that the purpose of the Act is to promote communication and cooperation with Aboriginal peoples with respect to environmental assessments.[5] As a result, the environmental effects taken into account during the assessment of the designated project are broader when they affect an Aboriginal people. Furthermore, the Act specifically states that the environmental assessment of a designated project may take into account Aboriginal traditional knowledge.[6]

That being said, when the Canadian Environmental Assessment Agency conducts screening for a designated project, it must take into account, among other things, the description of the project, possible negative environmental effects and specific environmental effects relating to Aboriginal peoples and their observations.

2. THE CONSTITUTIONAL DUTY OF THE CROWN TO CONSULT AND ACCOMMODATE ABORIGINAL PEOPLES

The Supreme Court of Canada has interpreted the constitutional duties of the Crown to consult and accommodate Aboriginal peoples many times in a series of decisions. In *Haida*,[7] the Court declared the following:

> *The government's duty to consult with Aboriginal peoples and accommodate their interests is grounded in the principle of the honour of the Crown, which must be understood generously. While the asserted but unproven Aboriginal rights and title are insufficiently specific for the honour of the Crown to mandate that the Crown act as a fiduciary, the Crown, acting honourably, cannot cavalierly run roughshod over Aboriginal interests where claims affecting these interests are being seriously pursued in the process of treaty negotiation and proof. The duty to consult and accommodate is part*

[4] 2012 CEAA, s. 6.
[5] 2012 CEAA, s. 4.
[6] 2012 CEAA, s. 19.
[7] *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511.

> *of a process of fair dealing and reconciliation that begins with the assertion of sovereignty and continues beyond formal claims resolution. The foundation of the duty in the Crown's honour and the goal of reconciliation suggest that the duty arises when the Crown has knowledge, real or constructive, of the potential existence of the Aboriginal right or title and contemplates conduct that might adversely affect it. Consultation and accommodation before final claims resolution preserve the Aboriginal interest and are an essential corollary to the honourable process of reconciliation that s. 35 of the Constitution Act, 1982, demands.*
>
> *The scope of the duty is proportionate to a preliminary assessment of the strength of the case supporting the existence of the right or title, and to the seriousness of the potentially adverse effect upon the right or title claimed. The Crown is not under a duty to reach an agreement; rather, the commitment is to a meaningful process of consultation in good faith. The content of the duty varies with the circumstances and each case must be approached individually and flexibly. The controlling question in all situations is what is required to maintain the honour of the Crown and to effect reconciliation between the Crown and the Aboriginal people with respect to the interests at stake. The effect of good faith consultation may be to reveal a duty to accommodate. Where accommodation is required in making decisions that may adversely affect as yet unproven Aboriginal rights and title claims, the Crown must balance Aboriginal concerns reasonably with the potential impact of the decision on the asserted right or title and with other societal interests.*
>
> *… The honour of the Crown cannot be delegated, and the legal responsibility for consultation and accommodation rests with the Crown. This does not mean, however, that third parties can never be liable to Aboriginal peoples.*

In March 2011, the Government of Canada published a document entitled *Aboriginal Consultation and Accommodation*, which sets out how federal officials are to consult and accommodate Aboriginal peoples. One of the guiding principles listed in the document states that the Government of Canada will use and rely on, where appropriate, existing consultation mechanisms, processes and expertise, such as the environmental assessment process in which Aboriginal consultation will be integrated.[8] That being said, the consultation guide specifically provides a framework for federal government consultation with Aboriginal peoples.

3. THE INNU OF MATIMEKUSH-LAC JOHN (MLJ INNU)

The MLJ Innu are part of the Great Innu Nation, which in 1979 officially filed a comprehensive land claim on land that it calls Nitassinan, over which it has ancestral rights, including Aboriginal title and treaty rights. This claim was accepted by the Government of Canada.

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[8] Consultation guide available online: http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/intgui_1100100014665_eng.pdf.

The MLJ Innu in particular have ancestral rights, including Aboriginal title and treaty rights to their traditional land covered by the provinces of Quebec and Newfoundland and Labrador. They never ceded, yielded or surrendered their ancestral rights, including their Aboriginal title.

To this day the MLJ Innu possess Aboriginal title on their traditional land covered by the provinces of Quebec and Newfoundland and Labrador. They also exercise modern practices, traditions and customs on their traditional land that are in keeping with the practices, traditions and customs that their ancestors had exercised since time immemorial and that never ceased to be an integral part of their distinctive culture even though they have evolved.

More specifically, the MLJ Innu have occupied, used and possessed their traditional land in the exercise of the following practices, customs and traditions, which have formed an integral part of their distinctive culture: (1) resource extraction activities such as hunting, trapping, fishing and gathering for subsistence, social, ritual and commercial purposes; (2) forest, plant, water and mineral resource extraction activities for subsistence, social, ritual and commercial purposes; (3) the construction of camps, hideouts, dwellings and other infrastructure necessary to their way of life; (4) the holding of spiritual and cultural ceremonies; (5) the use of the land, waterways and bodies of water, including rivers and lakes, for transportation purposes; and (6) the exclusive or shared control and management of the land.

4. THE HOWSE PROJECT

Howse Minerals Limited (hereafter referred to as HML) is planning to develop the Howse Project iron ore deposit. This project is for the extraction of up to 30 million tons of iron ore at a rate possibly reaching 10,000 tons per day over a period of 12 years. The main infrastructure of this complex includes the following elements: a processing plant, piles of processed ore covered by a dome, a freight loading system, a railway track from the former operations of the Iron Ore Company (IOC), a camp for workers, offices, a warehouse, workshops, garages, a laboratory, a landfill and wastewater treatment facilities.

The Howse Project iron ore deposit is located less than 24 kilometres from the MLJ Innu community and on their ancestral land.

The MLJ Innu recognize the Howse Project as a designated project under the *Regulations Designating Physical Activities* and the 2012 Act. They also think that an environmental assessment is required for this project given its environmental impact on the fish and their habitat,[9] aquatic species[10] and migratory birds,[11] on the Matimekush-Lac John community (Indian reserve) and on the ancestral rights of the MLJ Innu.

[9] *Fisheries Act*, R.S.C. (1985), c. F-14.
[10] *Species at Risk Act*, S.C. 2002, c. 29.
[11] *Migratory Birds Convention Act*, S.C. 1994, c. 22.

It should be mentioned first that during the construction, operation and decommissioning and abandonment phases, the potential sources of pollutants and emissions are and will be noise, vibrations, dust, suspended solids, exhaust gases and greenhouse gases from the heavy machinery and vehicle traffic.

Furthermore, these environmental effects will cause changes that are significant to the community and the MLJ Innu's rights. The dust in particular is having major repercussions on the MLJ Innu. They are complaining of the poor air quality due to the large quantity of dust from the work and mining activities. Their domestic animals are also affected by the dust. The MLJ Innu are also negatively affected by the noise from the vehicle and air traffic.

In addition, they have restricted or no access to their ancestral land in order to exercise their traditional activities given the work being conducted on the railway track and the blasting periods. Furthermore, the paths they use to access the areas where they exercise their traditional activities are completely inaccessible owing to the mud.

Also of note, the Howse Project is located in the George River caribou herd's migratory corridor, which links their calving grounds and their wintering grounds. Given the significant population decline of this species, the MLJ Innu are greatly concerned about the survival of the species. Protective and management measures should be taken to mitigate the impact of the Howse Project on this species and thus ensure its survival. Subsistence caribou hunting is a practice, custom and tradition that forms an integral part of the distinctive culture of the MLJ Innu.

Most migratory birds could be found along the Howells River, three kilometres from the Howse Project. However, the environmental impact of the project has been driving the migratory birds away and greatly affecting their reproduction and the traditional practice of wild goose hunting.

Lastly, given that the Project will have an impact on the water quality, the MLJ Innu are concerned about the presence of heavy metals in any fish caught near the Howse Project.

CONCLUSION

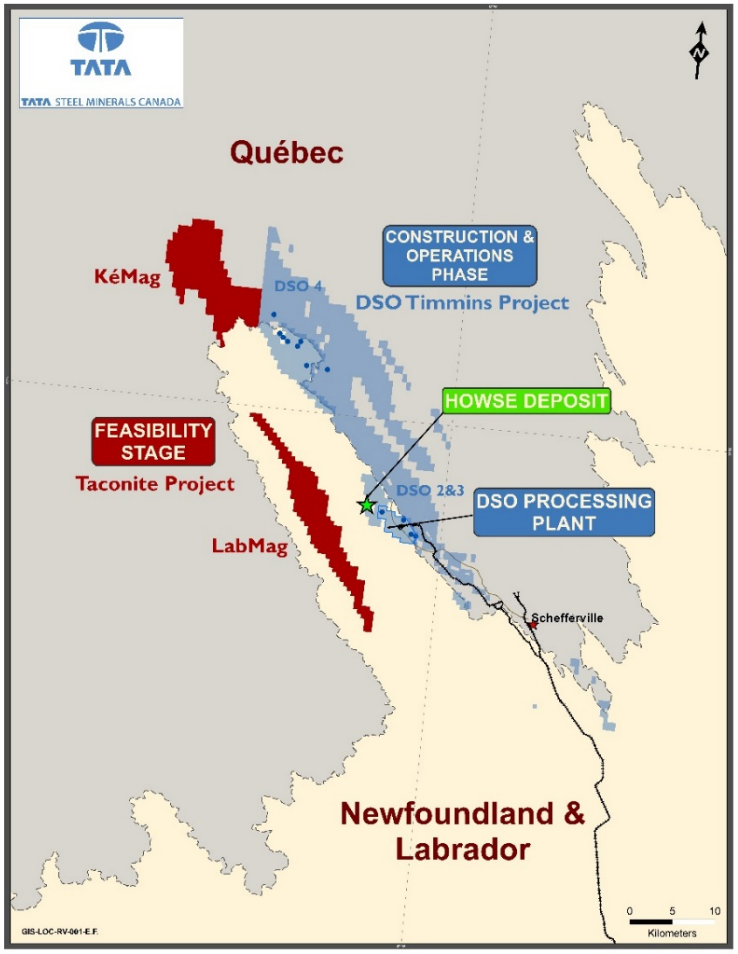
In light of the above, conducting an environmental assessment of the Howse Project is necessary. The Howse Project will have environmental effects. More specifically, this project will cause changes to certain components of the environment within the Parliament of Canada's legislative authority, within the Matimekush-Lac John community's competence and within the MLJ Innu's ancestral rights. An environmental assessment process will guarantee real and significant participation for the MLJ Innu and allow for the adoption of adequate accommodation measures in response to their concerns about the Howse Project.

BLG-AG S.E.N.C.R.L.
(Signature)
Marie-Christine Gagnon

TATA STEEL MINERALS CANADA LIMITED

DSOP & HOWSE UPDATE – MEETING W/ INNU NATION, ENVIRONMENT
OCTOBER 28th 2015

TATA STEEL MINERALS CANADA:



SR	Description
Partners	Tata Steel and New Millennium Iron
Resource	~ 150 MT (including Howse)
Volume Plan DSO	**6 MTPA** **6 million tons per annum** - 4.2 MTPA sinter and super fines with 64.5% Fe - 1.8 MTPA crushing and screening with 60% Fe **(commissioned).**
Initiatives	**Taconite Feasibility Study** - Resource 8.0 billion tonnes - Reserves 5.3 billion tonnes **Howse Deposit** (100% TSMC) - Annual Production 2-3 MTPA

Investment	C $ Million
DSO Project	900 - 1000
Taconite Feasibility Study	~ 50
Others (NML, LIM, infrastructure) – Approx.	150 - 200
Total Investment	**1.1 – 1.2 Billion**

RECENT HIGHLIGHTS

Area	Progress
Engineering & Procurement Effort	99 %
Construction	97 %

Construction Highlights
• Various Environmental and Regulatory approvals received. • Mining Operations for FY15-FY16 have commenced from the new deposits 25 kms from plant in Kivivic Area and planned mining development on the Quebec side with Goodwood Mine (Sept. 2016).. • Over 20 major mining equipment successfully deployed. Dry Processing secondary facilities commissioned and operational. • Wet Process construction has been completed and now in commissioning mode (Q3/2015 – Q1/2016). • Regular train dispatched from Mine to Port thru FNs-owned TSH train and IOC Port. Fe: $54.93

Genset and Electrical Room

Wet Plant Thickener Area

PROGRESS

Sizing Stations & Dry Circuit Commissioned

Mobile Crushing, Screening & Drying Commissioned

Ore Stockpiles

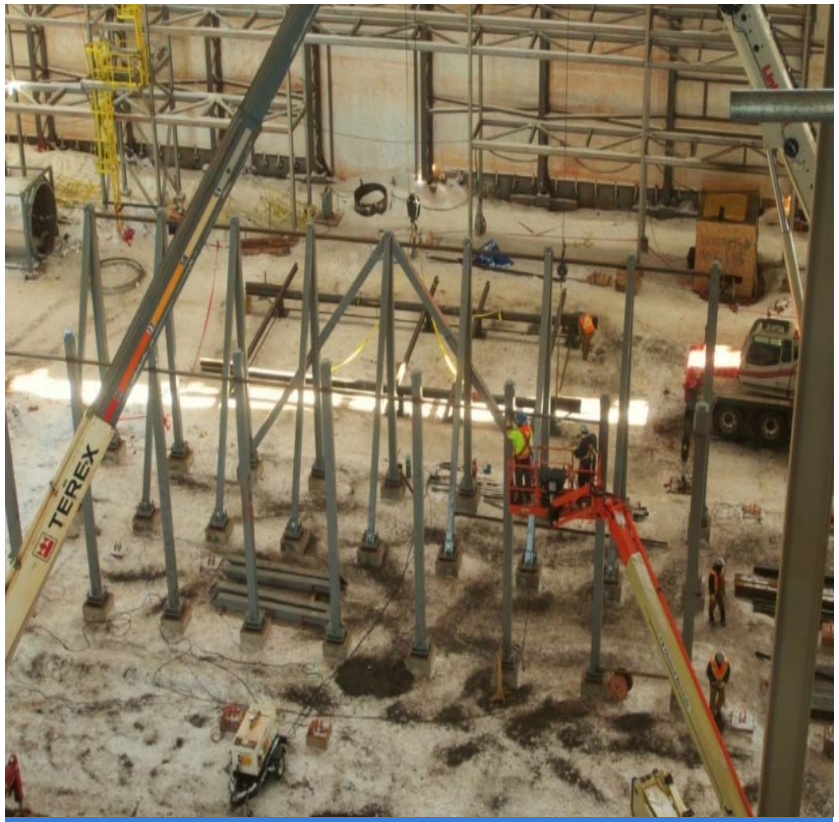
Rail Loop

CONSTRUCTION NEARLY COMPLETED

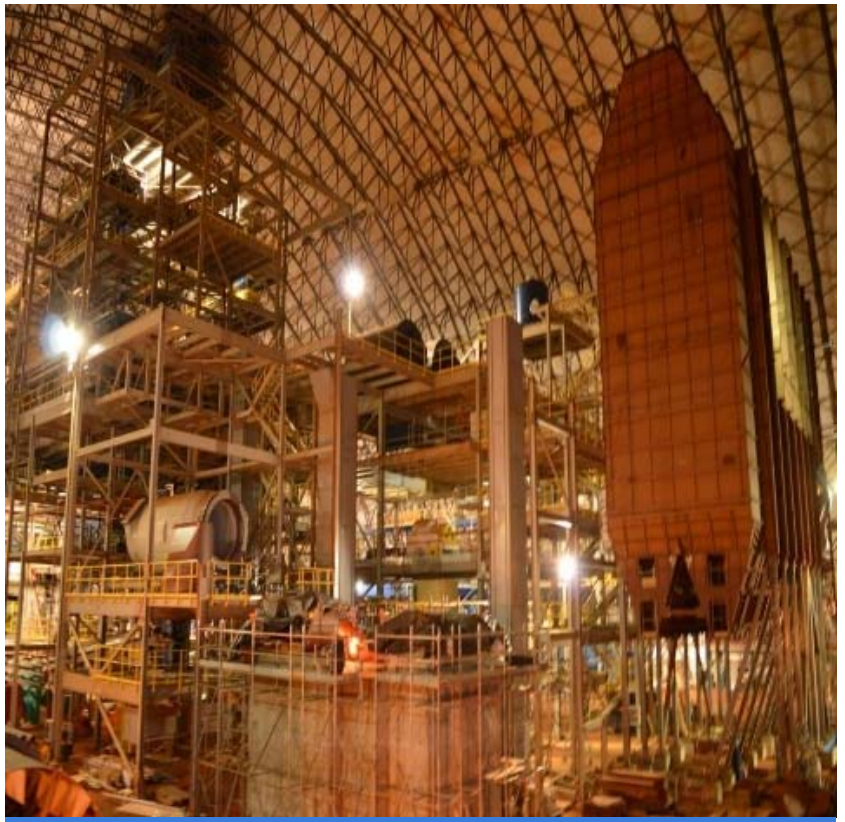
Débourbeur – Thickener Area

Salle électrique et Generatrice – Gensets + E House + Fire Protection Area

STATE OF THE ART BENEFICIATION PLANT



Équipement de traitement (Avril 2014) –
Process Equipment (April 2014)

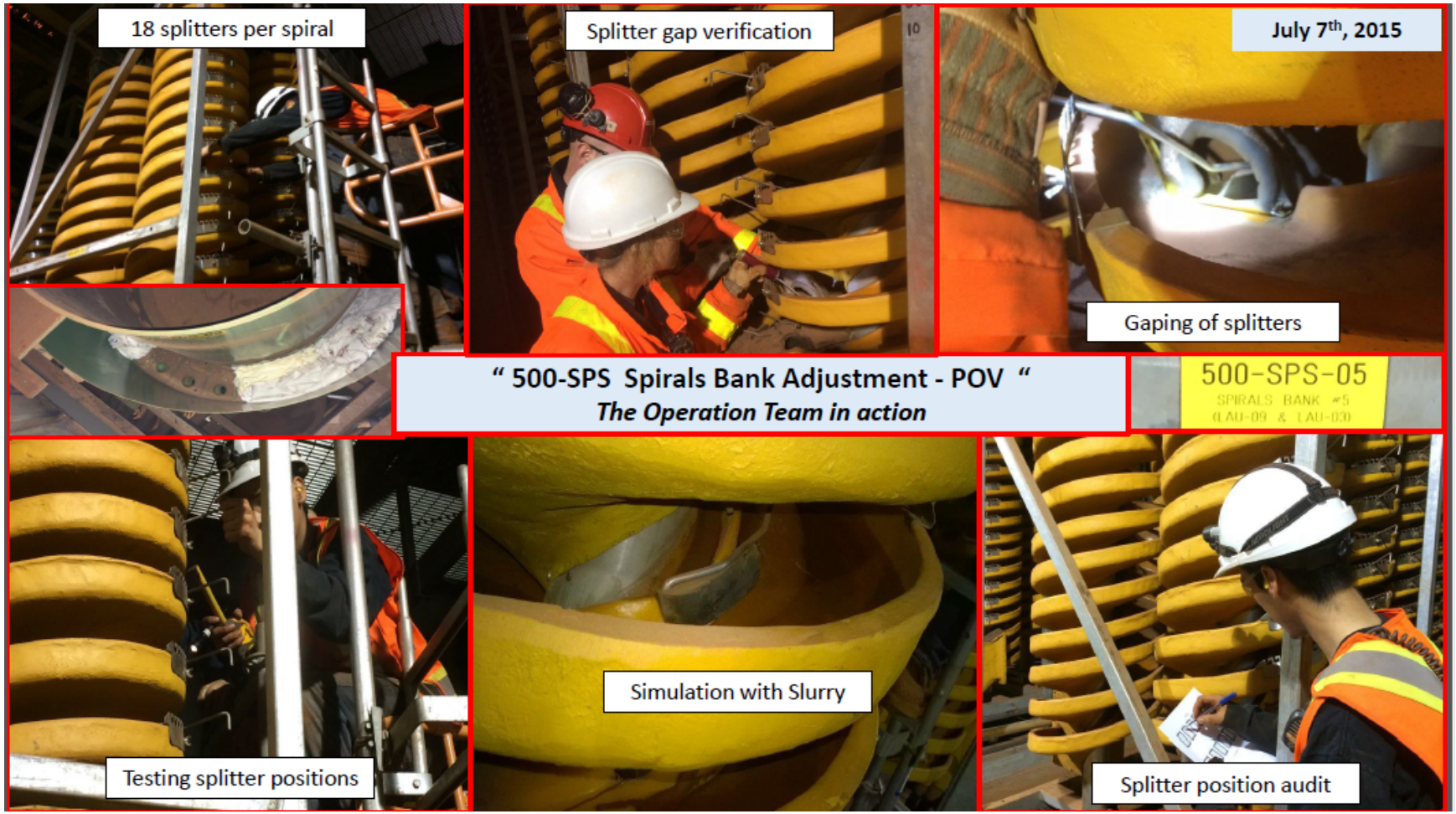


Équipement de traitement (Juin 2015) –
Process Equipment (June 2015)

COMMISSIONING ADVANCED

COMMISSIONING ADVANCED

COMMISSIONING ADVANCED



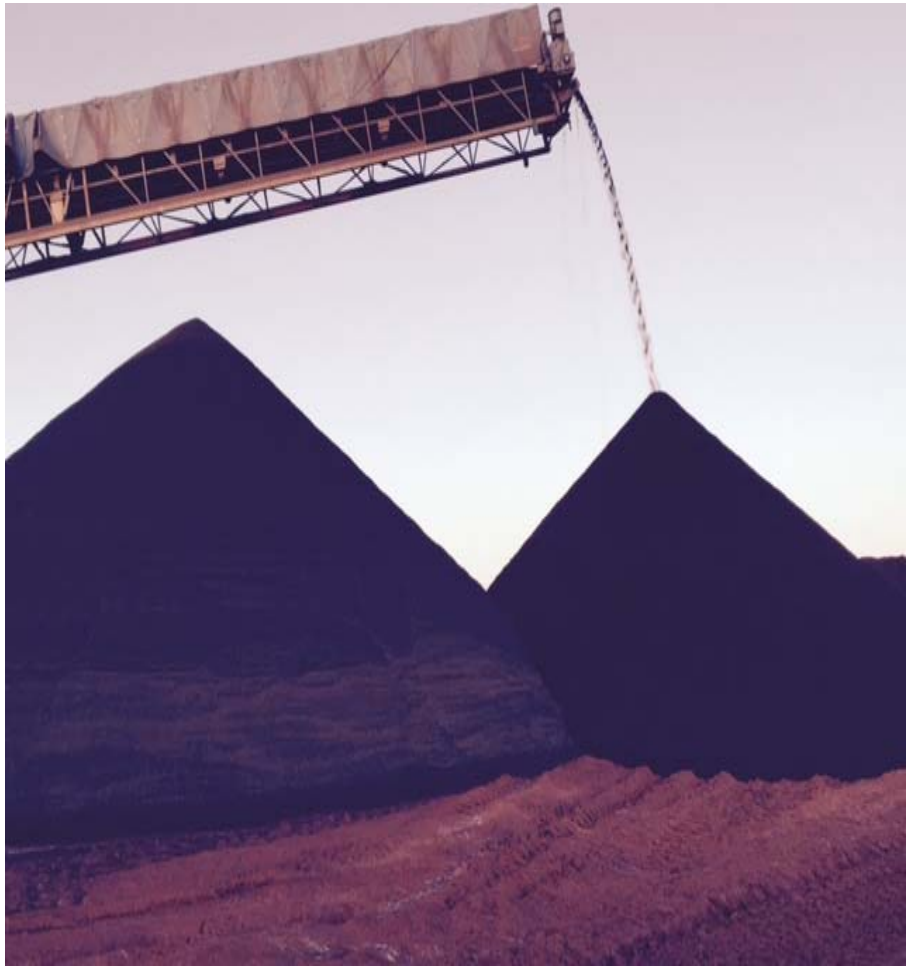
COMMISSIONING ADVANCED

ORE ON THE GROUND

"Ore on the Ground: 23rd August 2015"
The Commissioning and Operations Teams in action.

PROCHAINE ETAPE – PRODUCTION CONTINUE / NEXT MILESTONE – SUSTAINABLE FEED

TOWARDS SUSTAINABLE FEED



~ 65% Fer

WET PLANT AND LOAD OUT CONVEYOR

AERIAL VIEW

Dôme – Dome Completion

Route d'accès aux gisements Kivivic & Goodwood – Road to new deposits in 2015 completed

MINING OPERATIONS

Area 4 Mining Operations with HE CAT 789

Dry processing facilities Commissioned

MULTI-USER DEEP SEA TERMINAL – SEPT-ÎLES

STRONG COMMITMENT TO THE REGION…

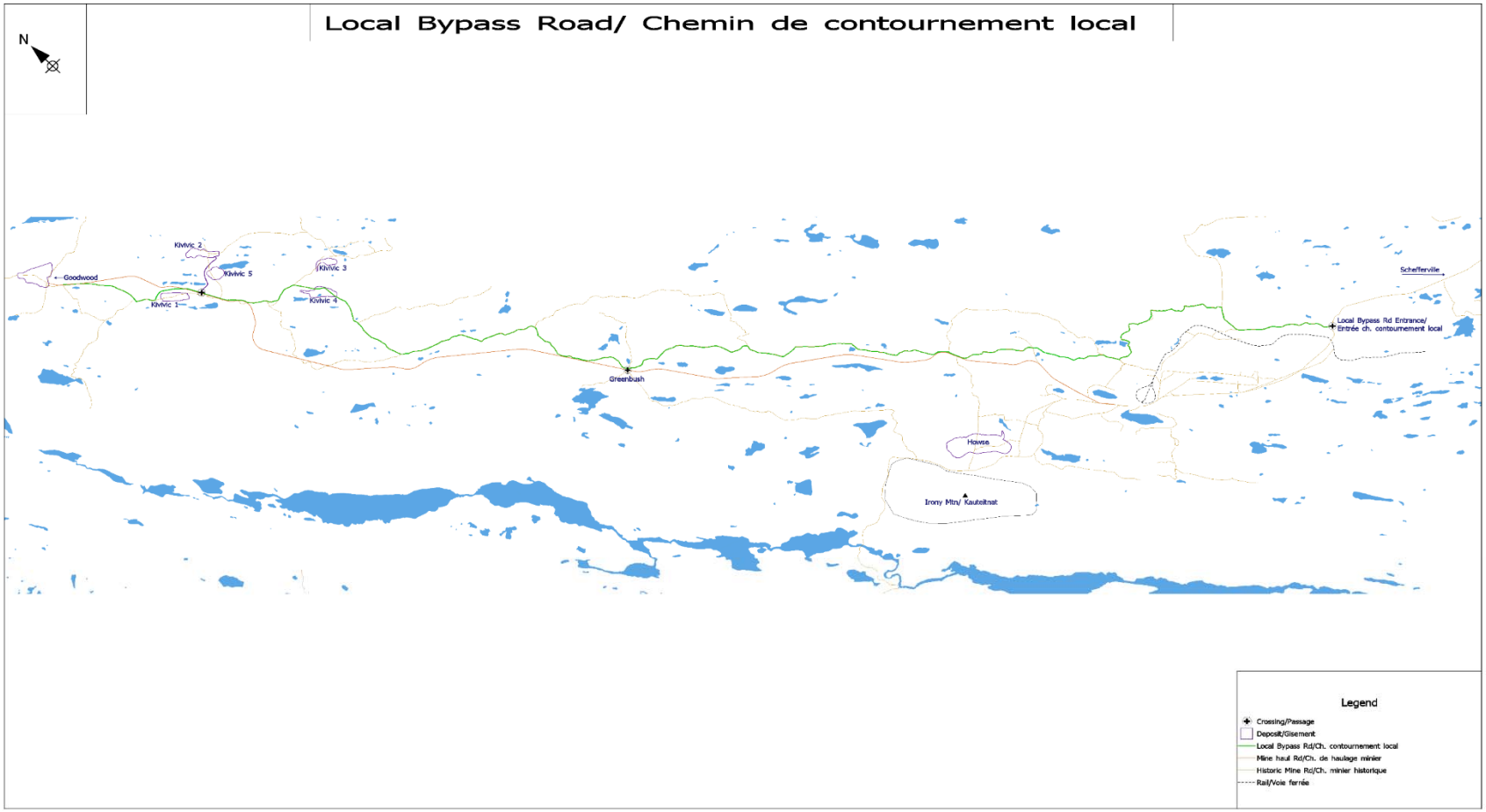
Arena Re-Opening in Schefferville

Caribou Research Project with Laval University.

Softball Team at Site

On-the-Job Training for Aboriginal Peoples

Bypass Road


Local Bypass Road/ Chemin de contournement local
N
Kivivic 2
Kivivic 5
Kivivic 3
Goodwood
Kivivic 1
Kivivic 4
Greenbush
Howse
Irony Mtn/ Kauteitnat
Schefferville
Local Bypass Rd Entrance/
Entrée ch. contournement local
Legend
Crossing/Passage
Deposit/Gisement
Local Bypass Rd/Ch. contournement local
Mine haul Rd/Ch. de haulage minier
Historic Mine Rd/Ch. minier historique
Rail/Voie ferrée

Howse Project

- **February 2013:** *Acquisition by TSMC of 51% shares from LIM on Howse deposit*
- ***March* 2014:** *Project Notice to develop the Howse Deposit by HML submitted to the Canadian Environmental Assessment Agency (CEAA)*
- ***July* 2014:** *Release by CEAA of guidelines for the preparation of an Environmental Impact Assessement*
- ***February* 2015:** *Submission to CEAA and Aboriginal groups a draft Environmental Impact Study*
- ***March* 2015:** *TSMC acquires the remaining the shares and obtains 100% of title to the Howse deposit*
- ***May* 2015:** *Receipt, as part of the environmental assessment process comment documents from Innu Nation, NNK et NIMLJ*
- ***Summer* 2015 :** *The samples will allow TSMC to measure environmental effects from the Project and determine the requirements for mitigating measures.*
- ***November* 2015** - *Responses to all questions and EIA submission*

WORKING WITH ABORIGINAL COMMUNITIES

- A significant source of employment for Aboriginals in the region.
- **More than 150 Aboriginals working on the Project in such roles as:**
  - Senior Director
  - Supervisor
  - Coordinator – Materials / Warehouse
  - Plant Operators
  - Director & Bus Driver
  - Rigger
  - Sampler
  - Housekeeping
  - Delivery
  - Labourer
  - Equipment Operator
  - Driver
  - Maintenance
  - Food prep
  - Driller
  - Carpenter
  - Health & Safety
  - Administration
  - Locomotive Mechanic, etc.

ABORIGINAL CONTRACTING

More than a dozen Aboriginal businesses large and small providing various services. These include:

- Air Inuit
- ASC Innu
- Autobus Tshiuetin
- Béton Naskinnu
- Construction Tshiuetin
- Innu Municipal
- Innutel
- Mamu Construction
- Naskapi Heavy Machinery
- Naskapi Imuun
- Pétroles Naskinnuk
- Provincial Airlines – Innu Mikun
- Transport Ferroviaire Tshiuetin

TSHI NASHKUMITINAN – MERCI – THANK YOU!

Environmental and Social Impact Assessment

Direct Shipping Ore - Howse Property Project

HML
Howse Minerals Limited

September 2014

Agenda

- Objective of the meeting
- Presentation of the proponent
- Presentation of the Project
- Environmental assessment process
- Ongoing consultations

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Direct Shipping Ore Howse Property Project

HML
Howse Minerals Limited

The Proponent: Howse Minerals Limited (HML)

- Wholly-owned subsidiary of TSMC created in August 2013
- TSMC is currently developing the DSO Project in Quebec and Newfoundland & Labrador
- Before the Agreement with HML, LIM owned Howse Property and was targetting to develop it in 2017
- IBA obligations remain the responsibility of LIM under its Unincorporated Joint Venture Agreement with TSMC

TATA STEEL MINERALS CANADA

LIM

HML
Howse Minerals Limited

Howse Property
Project owner's

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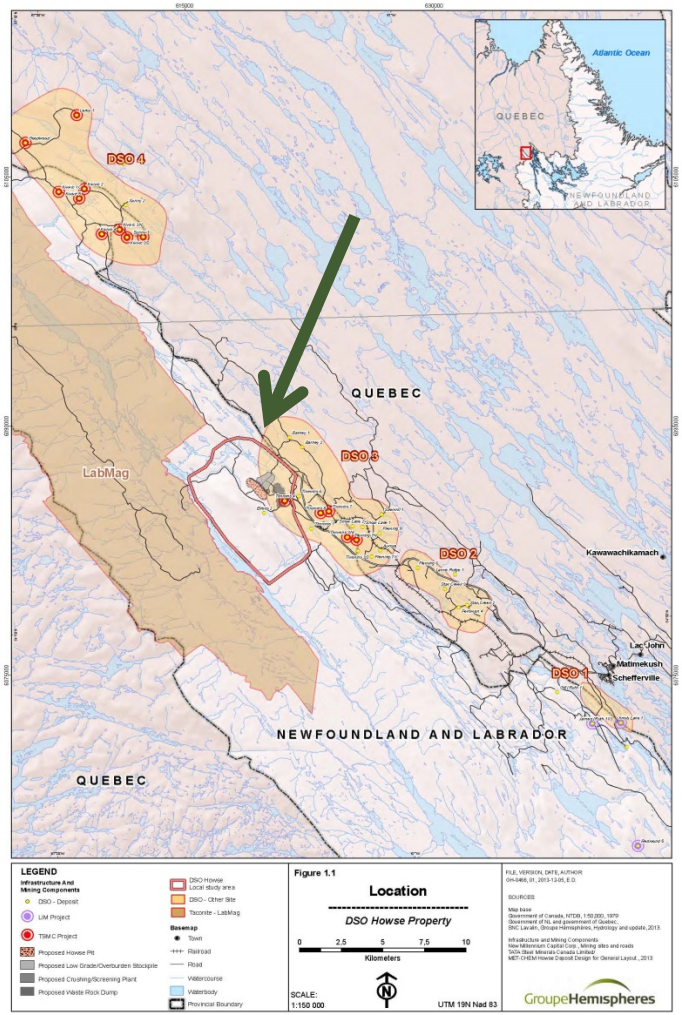
Howse Project



- Howse Property is located along the Labrador Trough, between Irony Mountain (Kauteitinat), Pinette Lake and Timmins 4 (TSMC current site of operation)
- Will be developed with the support of adjacent mining infrastructures (camps, roads, railway, mining equipement).

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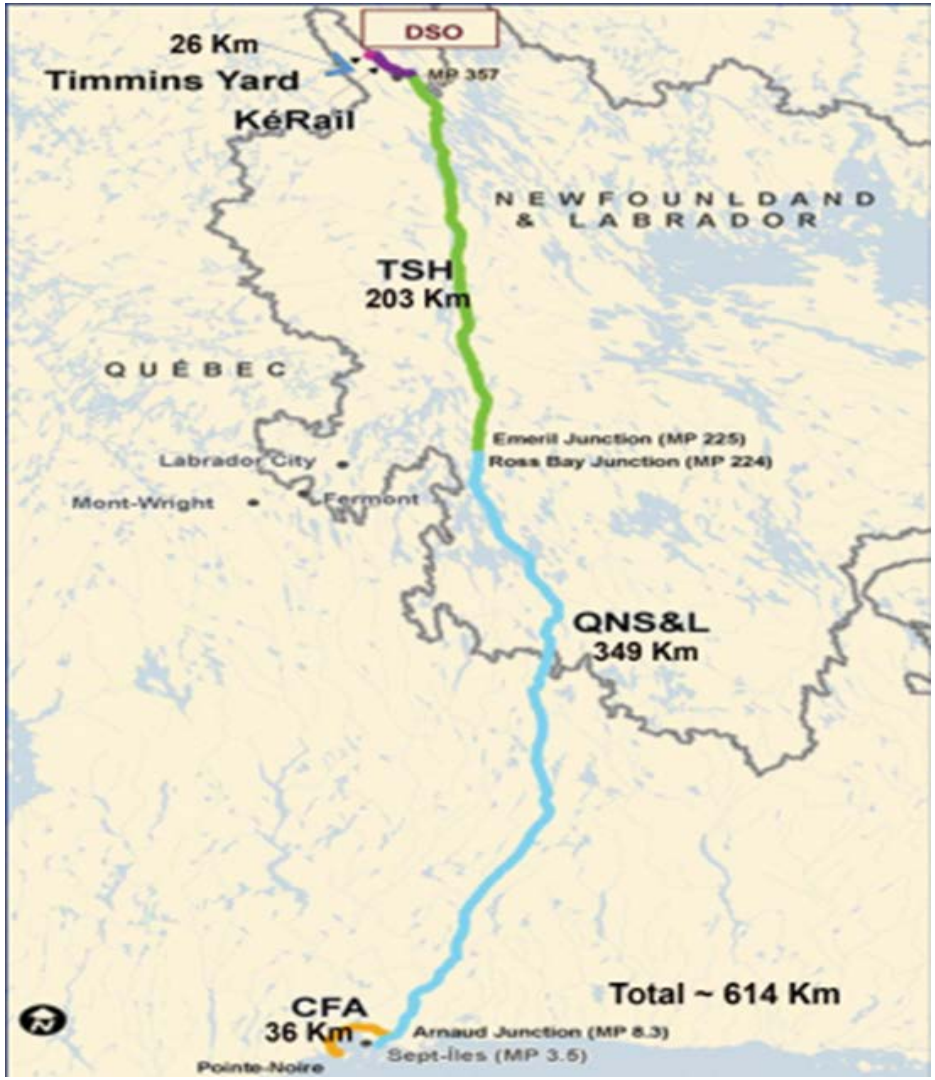
Howse Project

- The extracted iron ore will be crushed and screened, hauled by truck to the TSMC's DSO Project loading area
- The ore will then be transported by train to Sept-Îles and shipped by boat



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Howse Project

Objectives of the Project:

- Maintain TSMC operations: Project 2a and 2b (Goodwood and Sunny and Kivivic deposits) were postponed due to delays in road construction
- Howse Property Project can be brought into production in a relatively short period due to proximity to TSMC's DSO Project and infrastructures in construction

Allows to extend the life-of-mine of the DSO Project and to maintain jobs and contracts

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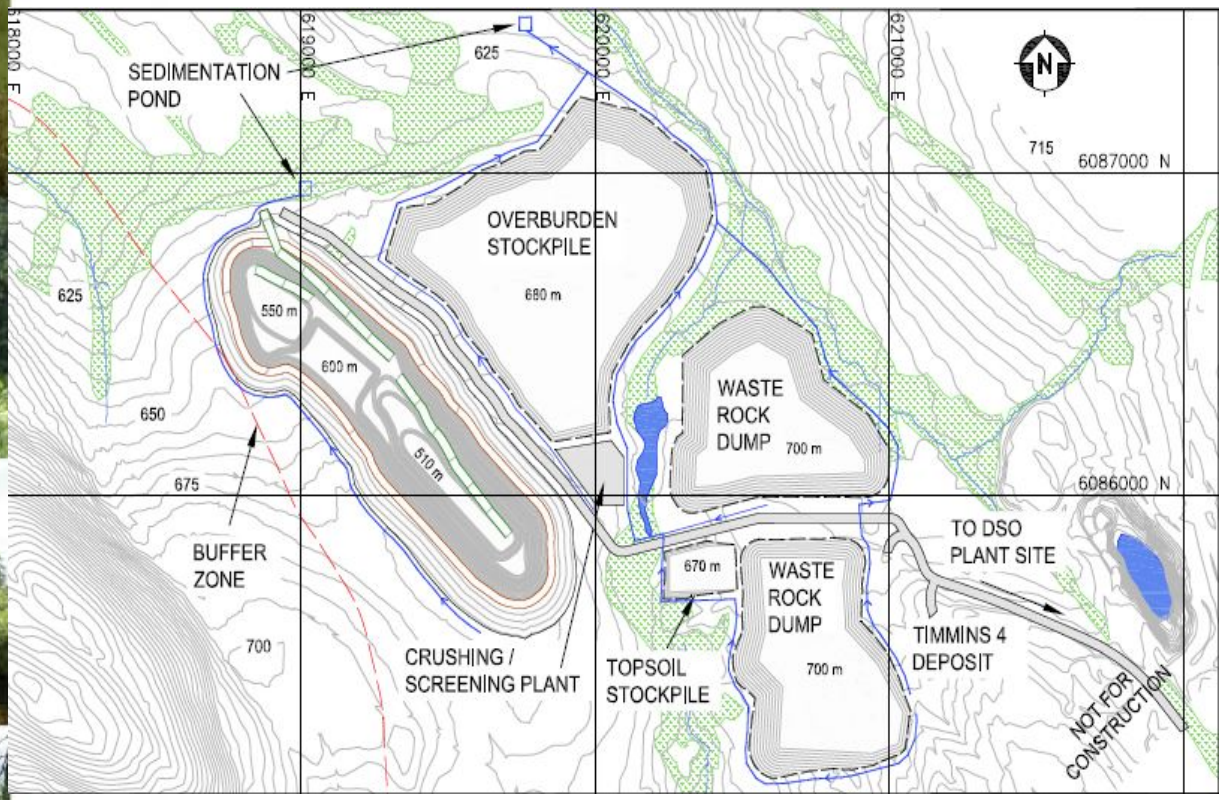
Howse Project



- Open pit + related infrastructure
- Road
- Total footprint: 224 ha

Estimated total production rate of 21,1 MT over **13 years**

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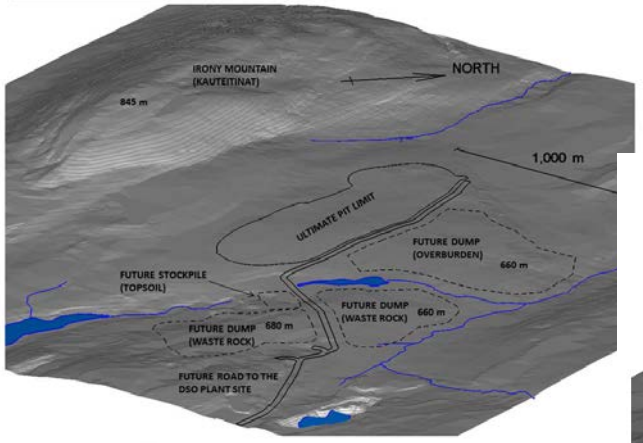
Howse Project

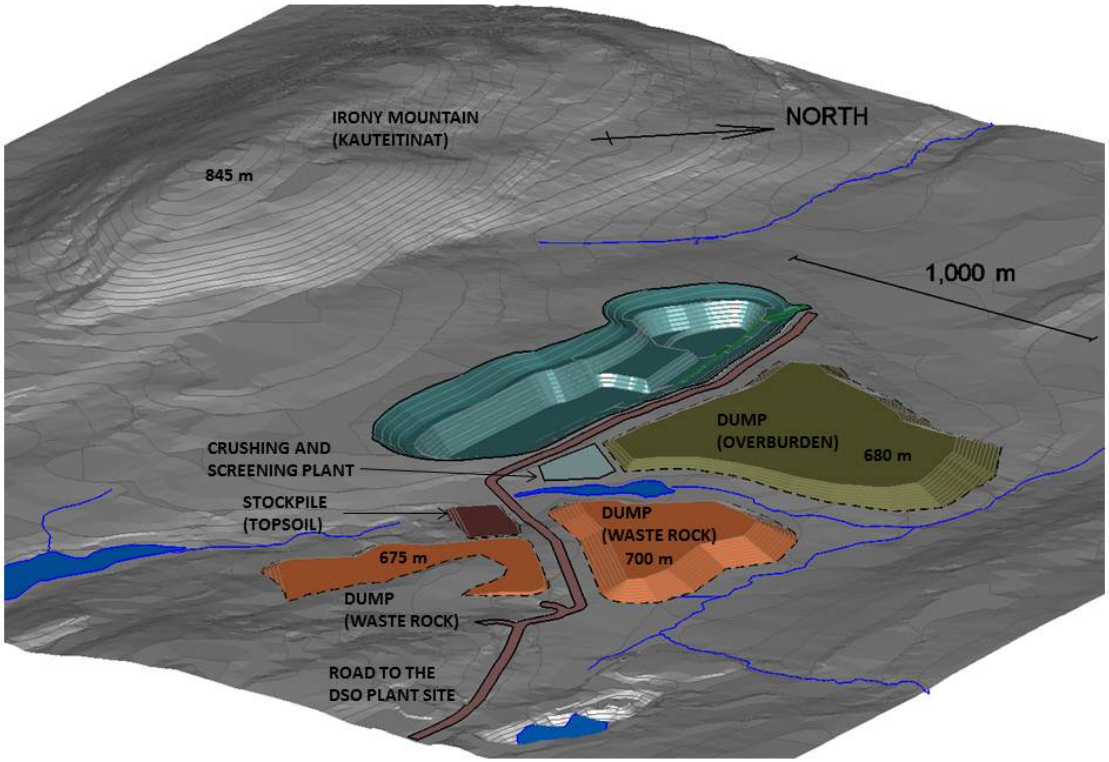




CURRENT SITUATION



AFTER 7 YEARS



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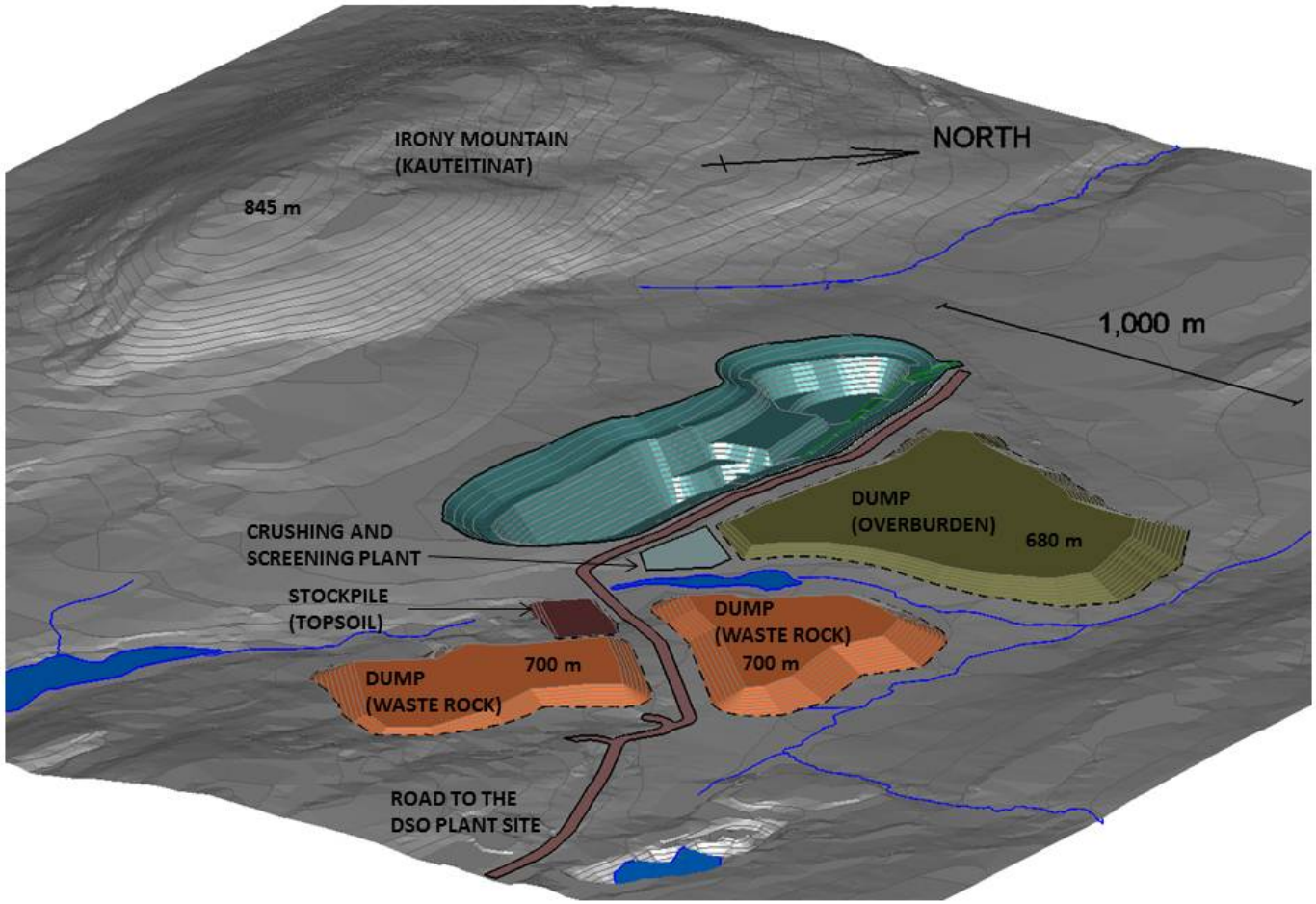
Howse Project





AFTER 14 YEARS



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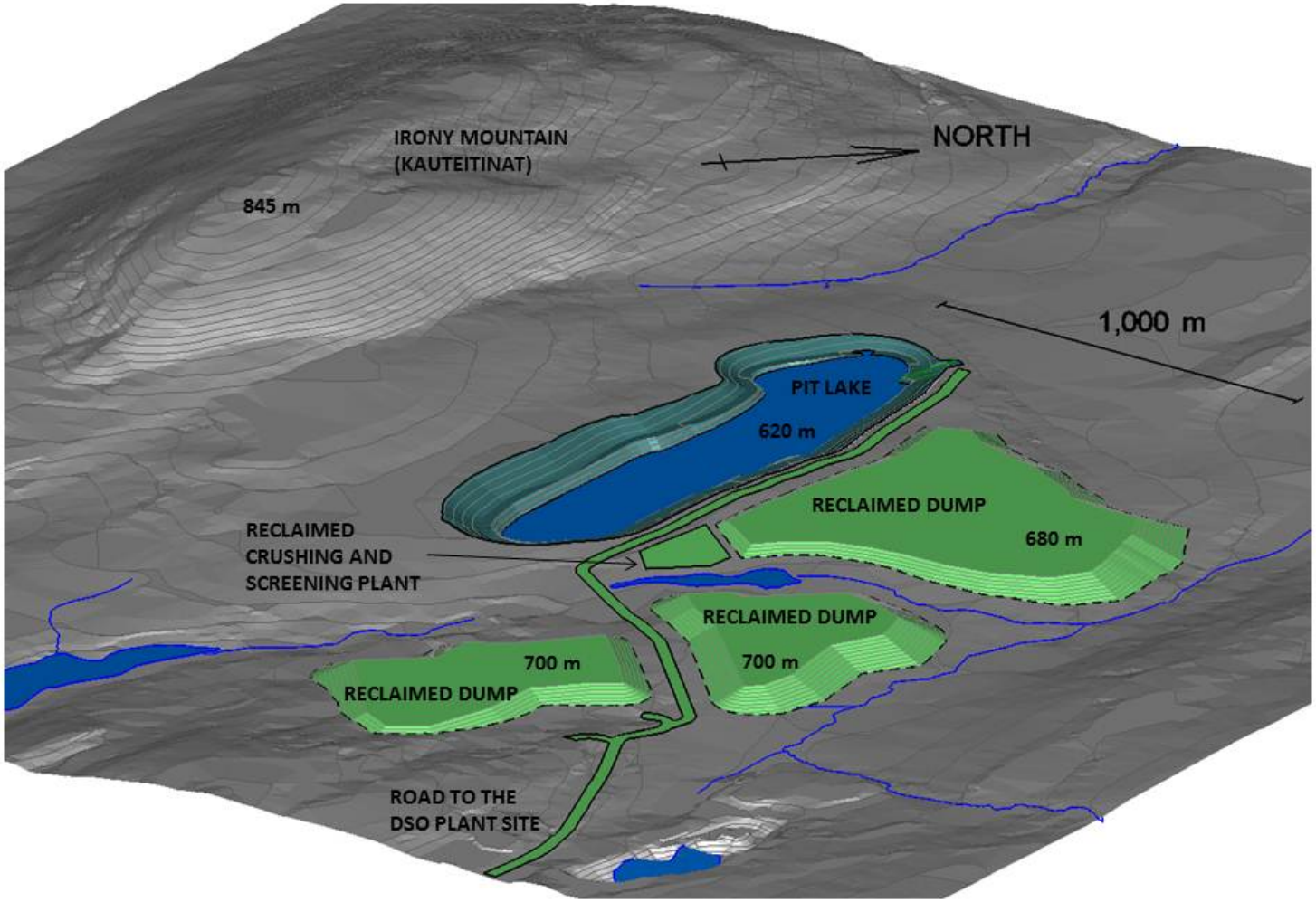
Howse Project





CLOSURE



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Project Schedule

Phases	Expected dates
Beginning of the Environmental and Social Impact Assessment (ESIA)	June 2014
Consultation for the ESIA	September 2014
Submission of the ESIA to the federal and provincial environmental agencies	January - February 2015
Beginning of construction	June 2016
Operation	September 2016-2028
Site restoration, decommissioning and rehabilitation	Ongoing during the project – 2018-2033

Environmental and social Impact Assessment

Process to predict environmental effects of proposed initiatives before they are carried out:

- Potential adverse environmental effects;
- Measures to mitigate adverse environmental effects;
- Significant adverse environmental effects, after mitigation measures are implemented;
- Follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures.

Environmental and social Impact Assessment

Environment

+

PROJECT

=

IMPACTS

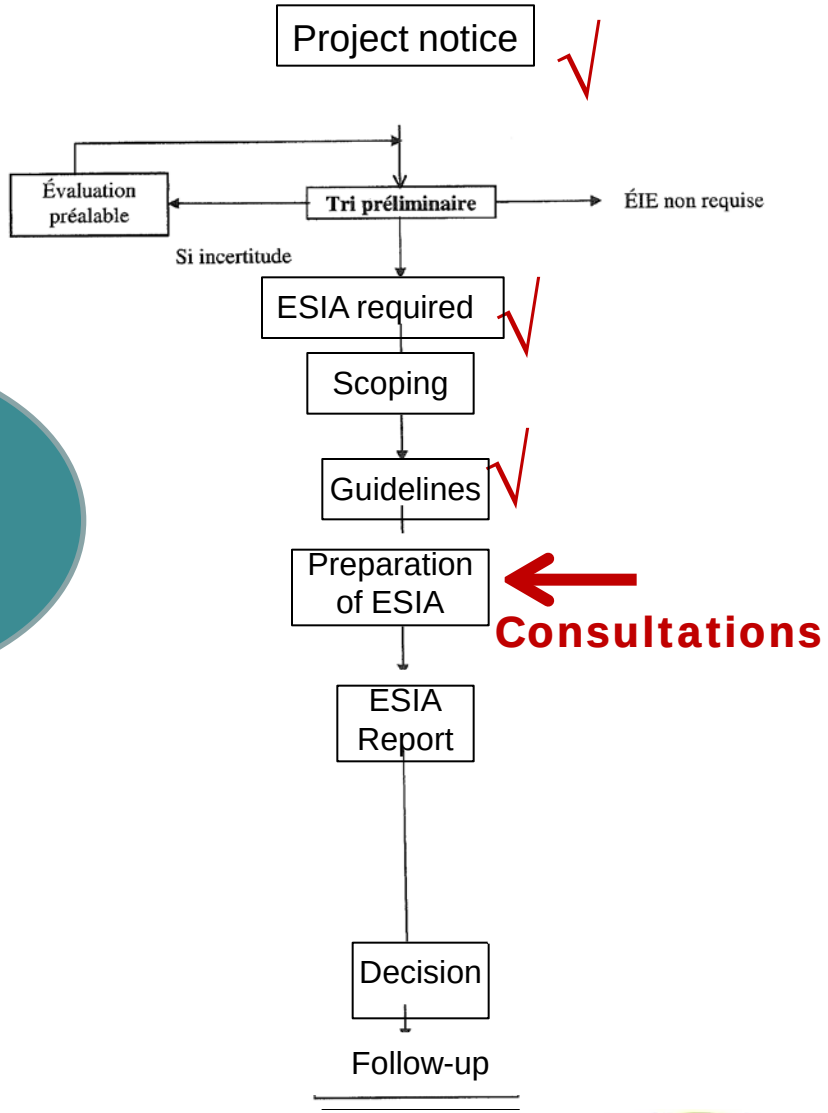
-

MITIGATION

=

PROJECT ACCEPTABILITY

Decision-making tool



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Potential Impacts

- Socio-economic effects
- Water quality and aquatic life
- Effects on fauna/flora and on harverts
- Air Quality
- Noise

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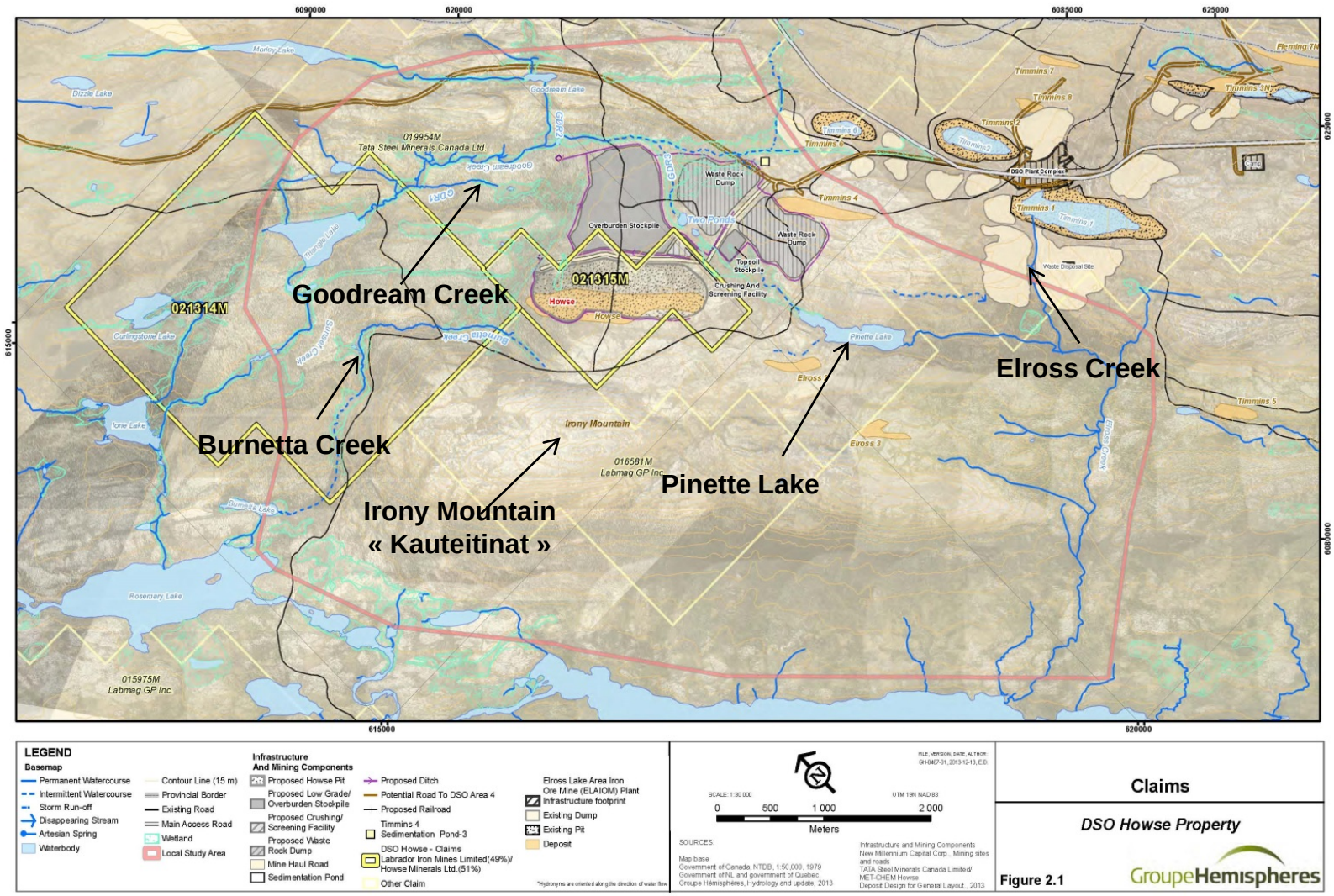
Identified Sensitive Areas





LEGEND

Basemap
- Permanent Watercourse
- Intermittent Watercourse
- Storm Run-off
- Disappearing Stream
- Artesian Spring
- Waterbody
- Contour Line (15 m)
- Provincial Border
- Existing Road
- Main Access Road
- Wetland
- Local Study Area

Infrastructure And Mining Components
- Proposed Howse Pit
- Proposed Low Grade/ Overburden Stockpile
- Proposed Crushing/ Screening Facility
- Proposed Waste Rock Dump
- Mine Haul Road
- Sedimentation Pond
- Proposed Ditch
- Potential Road To DSO Area 4
- Proposed Railroad
- Timmins 4 Sedimentation Pond-3
- DSO Howse - Claims Labrador Iron Mines Limited(49%)/ Howse Minerals Ltd.(51%)
- Other Claim
- Elross Lake Area Iron Ore Mine (ELAIOM) Plant Infrastructure footprint
- Existing Dump
- Existing Pit
- Deposit

*Hydronyms are oriented along the direction of water flow

SCALE: 1:30 000
0 500 1 000 2 000
Meters
UTM 19N NAD 83

SOURCES:
Map base
Government of Canada, NTDB, 1:50,000, 1979
Government of NL and government of Quebec,
Groupe Hémispheres, Hydrology and update, 2013

Infrastructure and Mining Components
New Millennium Capital Corp., Mining sites and roads
TATA Steel Minerals Canada Limited/ MET-CHEM Howse
Deposit Design for General Layout., 2013

Claims

DSO Howse Property

Figure 2.1

GroupeHemispheres

GroupeHemispheres

Consultations

- We invite your comments on the potential environmental and socio-economic effects of the Project – will be integrated to the study.
- Discussion will focus on:
  - Potential impacts (negative and positive)
  - Mitigation / avoidance mesures
  - Potential cumulative impacts
- A specific study focusing on issues related to land and resource-use and to aboriginal traditional knowledge is being prepared.

Questions?

Contact HML: coco.calderhead@tatasteelcanada.com

(514) 764-6716

Tshinashkumitinan
Thank you!

GroupeHemispheres

Minimizing Impacts/ᐋᒍᓇᑲᓄᑦ ᒐᐃᕐ ᒪᑕᐃᑖᑦ

- **Pit Optimization/ᐊᔅᒋᔾ ᐊᒧᓇᐃᑲᓄᑦ :**

  Activities will be adapted to minimize visual and environmental negative effects /ᓄᑎᒻ ᒐᐃᕐ ᓇᑐᔅᒐᐃᑕᑲᓄᑦ ᐊᓐᑕ ᒐᐃᕐ ᒪᑕᐃᑕᑦ ᐊᑐᔅᒐᐅᓐ ᑭᔾ ᓇᔅᒐ ᒐᐊᑲ ᒥᔅᑎᒪᑕᐃᑖᑦ ᐊᓐᑕ ᐋᔅᑲ ᐊᔅᒋᑦ ᐋᑐᔅᑲᔅᑕᑲᓄᑦ

- **Project layout/ᐊᑐᔅᒐᐅᓐ ᒐᐃᓯᓇᑖᑦ :**

  Redesigned to respect Aboriginal interests and to protect Pinette Lake / ᒐᒋ ᑲᐤ ᒋᑕᐸᑕᑲᓄᑦ ᐃᔦᑦ ᐊᓯᒋᑕᐸᑕᑦ ᐊᓐᑕ ᐋᔅᑲ ᐊᔅᒋᔦᐤ ᒥᒋᒪ ᑲᐅᑕᐃᑎᓇᑦ ᑭᔾ ᐊᓐᑕ ᐋᔅᑲ ᒐᒋ ᓇᑲᑐᐋᐃᑕᑲᓄᑦ

- **Environmental Protection Plan and Dust Control Policy will be implemented /** ᐊᔅᒋᔾ ᒐᐃᕐ ᓇᑲᑐᐋᐃᑕᑲᓄᑦ ᑭᔾ ᔾᑲᐤ ᐊᑯᐋᐸᑕᑦ ᒐᐃᕐ ᓇᔅᐃᑲᓄᑦ ᒐᐱᒧᑯᑕᑦ

- **Up to 30% of stockpiles will be re-used (restoration and road)/** ᐊᔅᒋᔾ ᒐᐃᕐ ᓇᑲᑐᐋᐃᑕᑲᓄᑦ ᑭᔾ ᔾᑲᐤ ᐊᑯᐋᐸᑕᑦ ᒐᐃᕐ ᓇᔅᐃᑲᓄᑦ ᒐᐱᒧᑯᑕᑦ

- **Identification of sensitive zones/ᐋᒥᓇᒋᑕᑲᓄᒋ ᐊᔅᒋᔾ :**

Pinette Lake/ᐱᓇᑦᓴᑲᐃᑲᓐ

Goodream Creek/ᓰᐱᕐ

Rusty Black bird/ᐱᔾᓯᐤ

Grey-cheeked thrush nest /ᐱᔾᓯᐤ

Frequently Asked Questions/ᐊᓯᑯᑳᒋᒐᒧᓇᓄᒋ ᑯᑳᒋᒐᒧᐅᓇ :

What infrastructures will be constructed for the Howse Property Project?/ᒑᑳᓐ ᐊᓐᑕ ᒐᒋᒥᑕᑲᓄᑦ ᐊᓐᑕ ᓯᓂᔾ ᐊᑐᔅᒐᐅᓐ ᐋᑐᑕᑲᓄᑦx?

Apart from the Project components listed above in the brochure, the Project will optimize the use of existing infrastructures (e.g. the railway, access road, camps, mining equipment and explosive factory) at the nearby TSMC's DSO Project complex. /ᐊᓐᑕ ᑎᐸᓐ ᒪᓯᓇᑕᐃᑲᓄᑦ ᐊᑐᔅᒐᐅᓇ ᒐᑐᑕᑲᓄᒋ, ᐊᓐᑕ ᒑᑳᓐ ᐊᒋᒥᑕᑦ ᒑᐃᔾᐱᒋᑕᑲᓄᑦ ᐊᑲᓇᐤ ᑲᓂᑲᑕᑦ (ᐃᔅᑯᑕᐅᑕᐸᓐ, ᒪᔅᑲᓄᐋ, ᑯᔅᒐᐅᒍᐋᐸ, ᑎᐸᓐ ᑯᑎᑉ ᒑᑳᓐ) ᐊᓐᑕ ᐊᒋᒥᑕᑦ TSMC's DSO ᐅᑎᐸᐃᑎᒧᐅᓂᔦᐤ ᐊᑎᒋᒥᑕᑦ ᒑᑳᓐx

What will be the height of the stockpiles?/ᑕᐊᓐ ᒐᐃᔅᐱᔅᑦ ᓯᓂᔾ ᐊᑎᐸᓂᔅᑕᑲᓄᑦ?

The maximum height of the 3 stockpiles will be 50 m., significantly lower than Irony Mountain/ᔅᓯᑲᓐ ᓂᔅᑐ ᑕᑎᐸᓐ ᒐᐃᑕᑎᓂᒋ ᐃᔅᒌᔅᑕᐤ 50 m

Do the existing IBAs apply to this project?/ᐊᓄᑦ ᐊᓐᑕ ᓂᔅᑯᒧᐅᓐ ᑲᑐᑕᑲᓄᑦ ᐊᔅᑕᐱᑎᓇ ᐊᑐᔅᒐᐅᓐ ᑭᔾ ᐋᔅᑲ ᐊᔅᒋᔾ ᒐᒋ ᐊᐱᒋᑕᑲᓄᑦ?

IBA obligations remain the responsibility of LIM under its Joint Venture agreement/ ᓂᔅᑯᒧᐅᓐ ᑲᑐᑕᑲᓄᑦ ᐊᓐᑕ ᑎᐸᐃᑎᒧᐅᓐ ᐊᑏᑳᑦ ᑲᓄᑎᓯᓇᑦ ᓇᐱᑖᐤ ᑲᐱᓂᔾ ᑭᔾ ᒪᒧ ᑲᓂᔅᑯᒧᐅᑦ ᐊᓂᔾ

Will I have continued access to the land surrounding Howse Property?/ᑭᒋᔾᐱᒋᑕᓇ ᐋᔅᑲ ᐊᔅᒋᔾ ᐊᓐᑕ ᐊᑐᔅᒐᐅᓐ ᐊᑐᑕᑲᓄᑦ ᐊᓐᑕ ᐊᑎᑯᓂᑦ ᐅᑎᐸᐃᑎᒧᐅᓐ ?

Yes. Road access to areas including Pinette Lake, Irony Mountain (Kauteitinat), Triangle Lake and the Howse River Valley will be maintained. /ᓂᔾ, ᒪᔅᑲᓄᐤ ᐊᓐᑕ ᒐᑏᑖᑦ ᒐᒋ ᐊᐱᒋᑕᑲᓄᑦ ᑲᐅᑕᐃᑎᓇᑦ ᑭᔾ ᑯᑎᑲ ᔅᑲᐃᑭᓇ ᐊᑎᑯᓂᒋx

How many jobs will be created by this project and in what areas?/ᑕᐊᓐ ᒐᐃᑕᑎᓂᒋ ᐊᑐᔅᒐᐅᓇ ᑭᔾ ᑕᓐᑕ?

Approximately 40 jobs will be maintained/created in the following sectors: mining, services and geology./ᔅᓯᑲᓐ ᓇᐅᐃᔦᐤ ᐃᔅᐱᔅ ᐱᑕᑕᑦᑕᑐᔦᐤ ᐊᑐᔅᒐᐅᓇ ᑭᔾ ᐊᑐᔅᒐᐅᓐ ᒐᑐᑕᑲᓄᑦx

Will this impact harvesting activities such as goose-hunting? /ᒋᑭᒪᒪᓯᑕᑲᓄᑦ ᐊ ᒐᓐᑐᔅᒐᓄᑦ?

Based on the topography of the area, harvesting activities should not be impacted; mining activities will be adapted if required. /ᐊᓐᑕ ᐊᔅᒋᔦᐤ ᓯᓇᐃᑭᓂᑦ ᑭᔾ ᐊᓐᑕ ᐊᑐᔅᒐᐅᓐ ᐊᑏᑳᑦ ᐊᑲ ᐃᓯᓈᑦ ᒐᒋ ᒪᒪᓯᔾᑲᓄᑦ ᐱᔾᓯᑦ ᐊᓐᑐᐋᔅᒐᓄᒐ ᑭᔾ ᐃᔅᓈᑲᒐ ᒐᒋ ᒪᑕᐃᑖᑦ ᑲᐤ ᒐᒋᑕᐸᑕᑲᓄᑦ ᒐᒋ ᒥᔦᔅᑕᑲᓄᑦx

How will this project impact dust in my community?/ᑕᐊᓐ ᒐᐃᕐ ᒪᑕᐃᑎᒪᑦ ᔾᑲᐤ ᐊᑳᐸᑕᑦ?

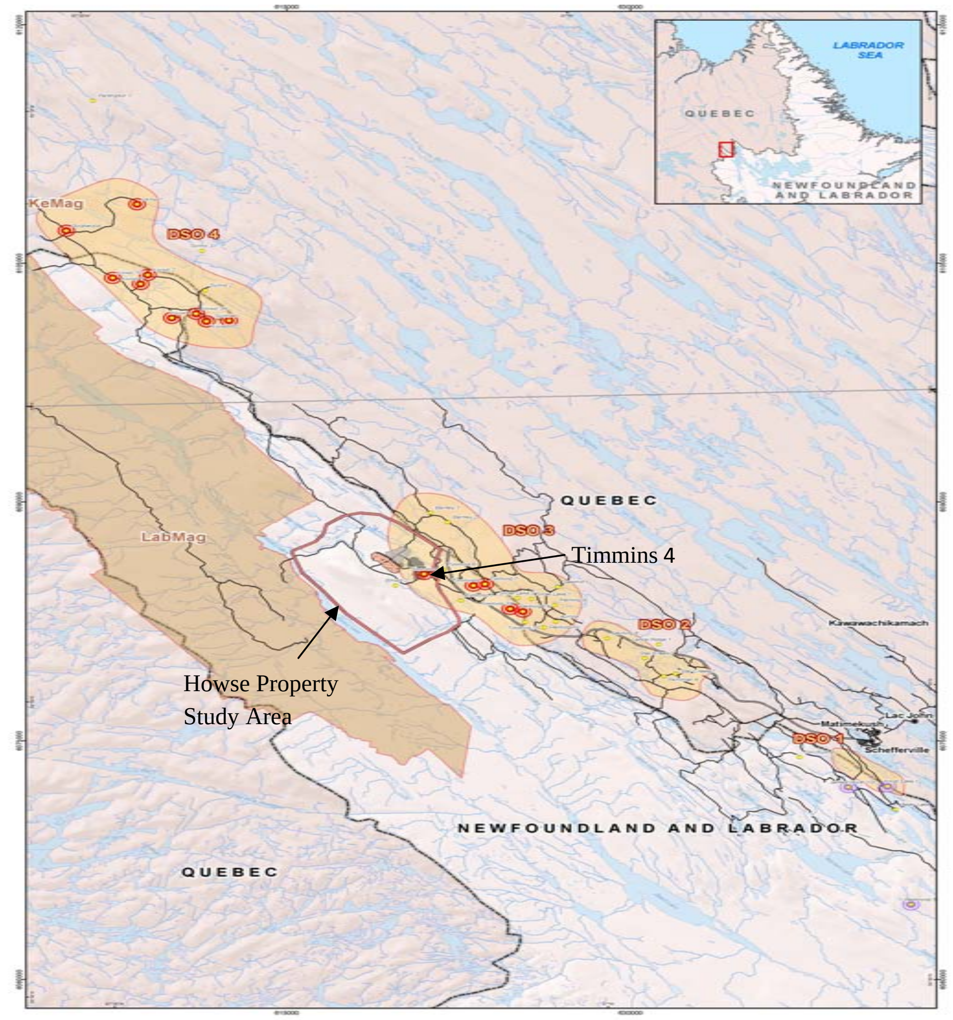
HML will apply a Dust Control Policy and will continue to implement innovative solutions./ᑲᓄᑎᓯᓇᑦ HML ᐊᓐᑕ ᒐᑐᑕᑦ ᒐᐃᓯᓇᔅᐃᑲᓄᑦ ᒐᐊᑲ ᐱᔅᑏᑲᐸᑕᐃᑦ ᑭᔾ ᑎᐸᓐ ᒑᑲᔦᐤ ᒐᒋ ᐊᐱᒋᑕᑦ ᒐᒋ ᒍᓇᑲᓄᑦ ᐊᑰᑲᐸᑕᑦ ᔾᑲᐤx

What is your company policy if a cultural property is found ?/ᒑᑳᓐ ᒐᑐᑕᑲᓄᑦ ᐅᑕᑦ ᐃᔦᑦ ᐊᓐᑕ ᑲᓂᑲᑕᑦ ᒑᑳᓐ ᐃᔦᐤ ᑎᐸᐃᑎᒧᐅᓐ ᒥᔅᑲᑲᓄᐃᑦ?

All work is stopped, the area is cordoned off and local and provincial authorities are contacted, as per our Cultural Policy Property Plan. /ᓄᑎᒻ ᐊᑐᔅᒐᐅᓐ ᒐᓂᑲᐱᐃᑦ ᑭᔾ ᒑᐃᑕᑲᓄᑦ ᑭᔾ ᐃᔦᐤ ᑎᐸᐃᑎᒧᐅᓐ
ᐊᒋᑕᐸᑕᑲᓄᑦ ᐊᓇᑲᑐᐋᐃᑕᑲᓄᑦ ᒐᒋᑕᐸᑕᑲᓄᑦx

How can I voice my concerns?/ᑕᓐᑕ ᐸᔾᓯᐱᔅᑎᓇᓐ ᒑᑳᓐ ᐊᔾᐃᒪᐃᑎᒥᑯᔾᓐ?

Through your community Health, Safety and Environment (HSE) Committee representatives or contact HML: /ᒐᐱᔅᑎᓂᒧᑦ ᑯᐸᓇᕐ ᐊᓯᑐᔅᒐᑦ ᐋᑯᓯᐅᓐ ᑭᔾ ᒐᐊᑲ ᐅᓯᑯᑦ ᐊᐋᓐ ᐊᓇᑲᑐᐋᐃᑕᑲᓄᑦ ᑭᔾ ᐊᔅᒋᔾ ᑲᒪᒧᐃᓇᓄᐃᑦ ᐊᐱᔅᑕᑦ ᑭᔾ ᒪᑉ ᑲᓄᑎᓯᓇᑦ ᑯᐸᓇᕐ



DIRECT-SHIPPING ORE HOWSE PROPERTY PROJECT
ᑲᔾᐅᑕᑲᓄᑦ ᓯᓂᔾ ᐊᑐᔅᒐᐅᓐ - ᑲᓄᑎᓯᓇᓄᑦ ᐊᑐᔅᒐᐅᓐ

Howse Minerals Limited

Why are you receiving this brochure? ᑯᒑᑲᓐ ᐅᐋ ᐃᐹᒧᐅᓐ ᐋᒋᑲᕐᑎᓂᒪᑦ?

This brochure aims to inform the communities and organizations regarding Howse Property Project (exploration, operations, rehabilitation).

ᐅᐋ ᐃᐹᒧᐅᓐ ᐊᒋᑕᐸᑕᑲᓄᒃ ᐃᐋᕐᒋᔅ ᑭᔅ ᐊᑐᕐᑲᕐᑕᒃ ᐊᑐᕐᑲᐅᓇ ᑲᒋ ᐊᕐᑲᐃᑖᒃ ᐊᓂᔅ ᑲᓄᑎᓯᓇᓄᒃ ᐊᑐᕐᑲᐅᓐ (ᐊᓇᑐᕐᑲᐃᑕᑲᓄᒃ ᑭᔅ ᐊᑐᕐᑲᕐᑕᑲᓄᒃ ᓯᓂᔅ ᑭᔅ ᑲᐤ ᑲᒋ ᒥᐋᓇᑯᑕᑲᓄᒃ ᐊᕐᒋᔅ)

Tata Steel Minerals Canada (TSMC):

Joint Venture between Tata Steel Ltd. and New Millennium Iron Corp. established in October 2010. TSMC is part of Tata Steel Group. TSMC is currently developing its DSO Project in Quebec and Labrador.

ᑲᓄᑎᓯᓇᒃ TSMC ᓯᓂᔅ ᐊᑐᕐᑲᐅᓐ ᒪᒧ ᐋᒋᑐᕐᑲᒪᒃ ᐊᓂᔅ ᑯᑎᑲ ᑲᓄᑎᓯᓇᐃᒋ New Millennium ᐊᓐᑕ ᐐᓴᑯᐱᓯᒪ, 2010 ᐱᐳᓐᕽ ᑲᓄᑎᓯᓇᒃ TSMC ᐋᕐᑕᐱᓯᓐᑦ ᐊᓐᑕ ᐊᕐᒋᑯᒪᓐ ᑲᐱᓂᔅᕽ TSMC ᐊᓄᒃ ᐊᒋᒥᑕᑦ ᐊᓐᑕ ᓯᓂᔅ ᑲᒧᓇᐃᑲᓄᒃ ᑭᔅ ᑲᔅᐅᑕᑲᓄᒃ ᐊᑐᕐᑲᐅᓐ ᐊᓐᑕ ᑯᐸᑊ

Howse Property Owners /ᑕᐸᐃᑕᒃ ᐊᓂᔅ ᐊᑐᕐᑲᐅᓂᐊᐤ

Howse Minerals Limited (HML):

wholly-owned subsidiary of TSMC) based in St.-John's, Newfoundland signed an unincorporated joint venture agreement with LIM, TSMC and Labrador Iron Mines Holdings Limited to develop Howse Property. HML is responsible to manage and operate Howse Property.

HMLᑲᓄᑎᓯᓇᓄᒃ ᐊᑐᕐᑲᐅᓐ, ᐊᑎᑳᒃ ᑎᐸᐃᑎᒧᐅᓐ Tata Steel ᑲᓄᑎᓯᓇᒃ (TSMC) ᐊᓐᑕ ᐅᒥᓯᓇᐃᑭᓐᒍᐋᐱᒧᐋᐤ ᐊᑎᑯᓂᒃ ᒥᕐᑎᒥᕐᑎᑦ ᐊᕐᒋᒃ (St.-John's, Newfoundland) ᑲᒥᓯᓇᑕᐅᑎᓯᒃ ᐊᑐᕐᑲᐅᓐ ᓂᕐᑯᒧᐅᓂᐊᐤ ᒪᒧ ᑲᒋ ᐅᒃ ᐊᑐᕐᑲᒪᒃ ᓇᐱᑖᐤ ᑲᓄᑎᓯᓇᒃ ᑲᒻᐱᓂᔅ LIM ᑭᔅ ᑲᔅᔅᑎᓂᒥᒋ ᐊᑐᕐᑲᐅᓂᐊᐤ Howse Propertyᕽ ᑲᓄᑎᓯᓇᒃ ᑲᒻᐱᓂᔅ ᑲᔅᔅᑎᓇᒃ ᑭᔅ ᑲᑐᕐᑲᕐᑕᒃ ᐊᓂᔅ ᓯᓂᔅ ᐊᑐᕐᑲᐅᓂᐊᐤ (Howse Property)

Labrador Iron Mines (LIM):

Canada's newest and only independently owned iron ore producer. LIM focuses on the development and production of its 20 direct shipping iron ore deposits located in the historic Schefferville area of the Labrador Trough.

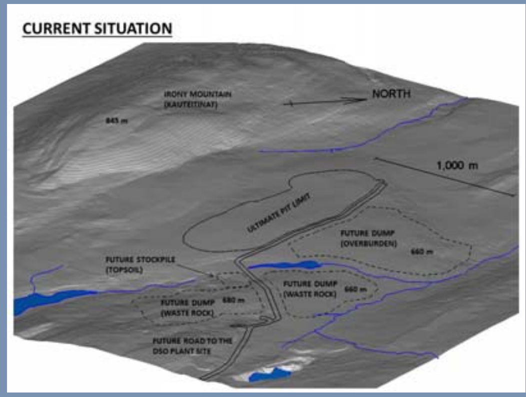
ᓇᐱᑖᐤ ᑲᓄᑎᓯᓇᒃ ᑲᒻᐱᓂᔅ ᐅᑕ ᑲᓇᑕ ᓄᒋᑲ ᑲᐧᐃᑲᐳᐧᐃᑕᑲᓄᒃ ᓯᓂᔅ ᐋᒧᓇᐃᑲᓄᒃ ᐊᑐᕐᑲᐅᓐᕽ ᓇᐱᑖᐤ ᑲᓄᑎᓯᓐᒃ ᑲᒻᐱᓂᔅ ᑲᒋᑕᐸᑕᒃ ᓂᓯᐋᐤ ᑕᑐᐧᐃᒃ ᐊᓐᑕ ᓯᓂᔅ ᐋᓇᑐᕐᑲᐃᑕᑲᓄᒃ

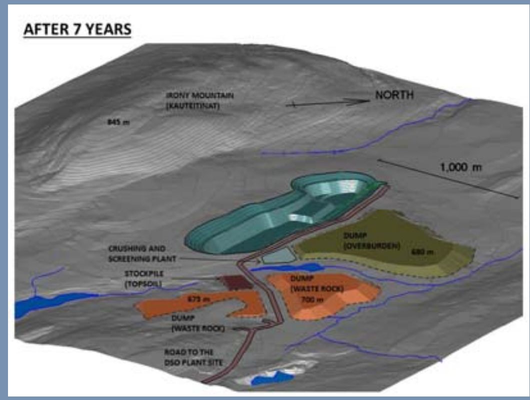
HML is planning to develop the iron ore deposit at the Howse Property (estimated production of 20 million tonnes), located between Irony Mountain (Kauteitinat), Pinette Lake and Timmins 4 .

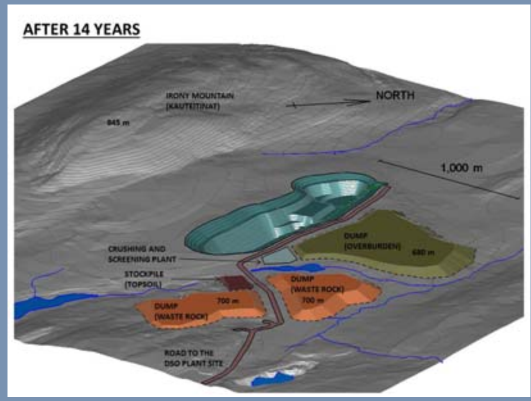
ᑯᑎᑲᒃ ᑲᓄᑎᓯᓇᒃ ᐋᒋᒥᑕᒃ ᐊᓐᑕ ᓯᓂᐋᐤ ᑲᒧᓇᐃᑲᓄᐃᒃ ᐊᓐᑕ Howse Property (ᓴᓯᑲᓐ 21 ᓯᓂᐋᐤ ᑲᒧᓇᒧᒃ ᐊᔅᐱᓴᐃᔅ) ᐊᓐᑕ ᐊᑎᑳᒃ ᑲᐅᑕᐃᑎᓇᑦ ᑭᔅ ᐱᓇᑦ ᓴᑲᐃᑭᓐ ᑭᔅ ᑎᒥᓐᔅ

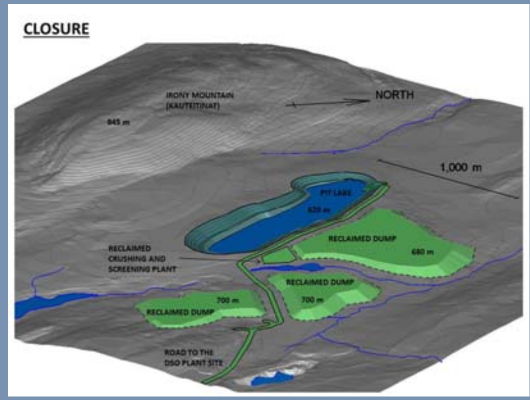
The Project will consist of/ᐊᓐᑕ ᐊᑐᕐᑲᐅᓐ ᑲᐃᓯᓇᑳᒃ :

- A 3.5 km haul road /3ᕽ5 ᒪᔅᑲᓄᐤ ᑲᐃᔅᐱᔅᒃ
- An open pit /ᑲᒧᓇᐃᑲᓄᒃ ᑲᐃᔅᐱᔅᒃ ᑭᔅ ᑲᐃᑭᔅᑲᒃ
- A crushing and screening facility (the ore will then be hauled to the TSMC's DSO Project loading area and then shipped by train to Sept -Îles to be sent overseas/ ᑲᐱᓯᐱᑕᑲᓄᒃ ᓯᓂᔅ ᑭᔅ ᑲᔅᐅᑕᑲᓄᒃ ᐃᔅᑯᑕᐅᑕᐸᓂᒃ ᐊᓐᑕ ᐋᔅᒃ ᑭᔅ ᑲᐃᑎᓴᐃᑲᓄᒃ ᑲᒥᔅᒋᒃᕽ
- Stockpiles (overburden and waste rock dumps)/ ᓯᓂᔅ ᐊᑲ ᐊᐱᒋᑕᑲᓄᒃ ᑲᑐᑕᑲᓄᒃᕽ
- Water management facilities and general site drainage works. / ᒧᑲᐳ ᑭᔅ ᓂᐱᔅ ᑲᐃᓯᑯᑕᑲᓄᒃ









Timeline/ᓇᐤ ᐊᑎᕐᑕᒃ ᐊᓐᑕ ᑲᔅ ᑲᒧᓇᐃᑲᓄᒃ :

- Beginning of Environmental and Social Impact Assessment (ESIA): June 2014

  ᑲᐱᒧᑯᑕᒃ ᑲᓇᑐᕐᑲᐃᑕᑲᓄᒃ ᑭᔅ ᑲᒪᒧᕐᑕᑲᓄᒃ ᐃᐹᒧᐅᓐ ᐊᕐᒋᔅ ᑲᐃᔅ ᒪᑕᐃᑖᒃ: ᒍᓐᐱᓯᒻ 2014 ᐱᐳᓐᕽ
- Consultation for the ESIA: September 2014

  ᐃᐧᐁᒃ ᑲᓂᕐᑯᐋᑲᓄᒃ ᐃᐹᒧᐅᓐ ᑲᐱᕐᑎᓇᑲᓄᒃ: ᐅᕐᑲᐅᐱᓯᒻ, 2014
- Submission of the ESIA to the federal and provincial Environmental Agencies: January—February 2015

  ᑲᐱᕐᑎᓇᑲᓄᒃ ᐃᐹᒧᐅᓐ ᑲᒪᒧᕐᑕᑲᓄᒃ ᐊᕐᒋᔅ ᐋᕐᑲ ᑲᐃᔅ ᒪᑕᐃᑖᒃ ᐊᓐᑕ ᐊᑐᐋ ᑭᔅ ᑯᐸᑊ ᒋᓴᐅᒋᒪᑲᓂᒃ: ᐅᑲᒥᑐᓇᓂᐱᓯᒪ - ᑲᑖᑲᐸᒋᑦᐱᓯᒪ, 2015 ᐱᐳᓐ
- Beginning of construction: June 2016

  ᑲᐱᒧᑯᑕᒃ ᐊᑐᕐᑲᐅᓐ: ᒍᓐᐱᓯᒻ, 2016
- Operations: September 2016-2028

  ᑲᐱᒧᑯᑕᒃ ᐊᑐᕐᑲᐅᓐ: ᐅᕐᑲᐅᐱᓯᒻ 2016-2028 ᐱᐳᓐ
- Progressive site restoration, decommissioning and rehabilitation: 2018-2033

  ᑲᔅᕐᑯᑕᑲᓄᒃ ᐊᕐᒋᔅ ᑲᐤ ᑲᒋ ᒥᐋᓇᑯᑕᑲᓄᒃ ᑭᔅ ᐊᑲ ᐊᑐᕐᑲᐋᑲᓄᒃ ᑭᔅ ᐋᕐᑲ ᒥᐋᓈᑳᒃ ᐊᕐᒋᔅ

Socioeconomic Impacts of the Project/ᐊᓐᑕ ᐊᑐᕐᑲᐅᓐ ᑭᔅ ᐱᒪᑎᓯᐋᐅᓐ ᐊᒋᑕᐸᑕᑲᓄᒃ ᐊᑐᕐᑲᐅᓂᒃ:

- Presence of temporary workforce in the Region/ᐋᐹᐱᕐᒋᔅ ᑲᑕᒃ ᑲᑐᕐᑲᓯᒃ
- Increased rail traffic/ᐊᒥᕐᑕᐱᒋᑕᑲᓄᒃ ᐃᕐᑯᑕᐅᑕᐸᓐ ᒪᔅᑲᓄᐤ
- Employment/ᐊᑐᕐᑲᐅᓐ
- On-the-job- Training/ᐊᑐᕐᑲᐅᓂᒃ ᐊᕐᑯᑎᒪᑲᓄᒃ
- Business Opportunities /ᐊᑐᕐᑲᐅᓐ ᐃᒋᒥᑕᑲᓄᒃ

  Investment in local infrastructures (airport, sports and commercial facilities)/ ᓱᓇᔅᐤ ᐊᓐᑕ ᑲᕐᑕᑲᓄᒃ ᑲᑳᓐ ᐊᓐᑕ ᐊᒋᒥᑕᒃ ᐊᑐᕐᑲᐅᓂᒃ (ᐊᑖᐅᓇᓂᒃ, ᒪᑐᐋᐅᒍᐋᐱᒃ, ᑕᐋᐅᒍᐋᐱᒃ)
- Revenue sharing/ᓱᓇᔅᐤ ᐊᑕᑎᐸᓇᑲᓄᒃ

Irony Mountain /Kauteitinat/ᑲᐅᑕᐃᑎᓇᑦ:

This mountain has spiritual and historical significance for the local population. To help address this concern, HML will/ᐊᕐᐱᑕᐃᑕᒃ ᑲᐅᑕᐃᑎᓇᑦ ᐱᕐᑯᑎᓇᐤ ᑭᔅ ᑲᒋ ᐋᐃᑕᑲᓄᒃ ᐊᓐᒃ ᑲᓄᑎᓯᒃ ᐊᓐᑕ ᐊᑐᕐᑲᐅᓐ ᑲᑐᑕᑲᓄᒃ HML :

- establish and maintain a buffer zone for long-term protection of Irony Mountain (Kauteitinat) from the Project activities;/ ᑲᑐᑕᒃ ᐊᓐᑕ ᑲᐃᑎᓯᓇᑕᐃᑲᓄᒃ ᑭᔅ ᑲᐊᑲ ᒪᒪᓯᑕᑲᓄᒃ ᐊᕐᒋᔅ ᑭᔅ ᐱᕐᑯᑎᓇᐤ ᑲᒥᔦᓇᑲᑐᐋᐃᑕᑲᓄᒃᕽ
- maintain and open an on-going dialogue with the Aboriginal groups and other local land users in the planning and the development of the Project./ ᓇᑎᒻ ᑲᒋ ᑎᑳᒃ ᐃᐹᒧᐅᓐ ᐊᓯᐱᕐᑎᓂᒪᑐᓇᓄᒃ ᑭᔅ ᐃᐧᐁᒃ ᑭᔅ ᑯᑎᑲᒃ ᐊᐋᓐᒋ ᔅᐱᒋᑕᒃ ᐊᓂᔅ ᐊᕐᒋᐋᐤ ᑭᔅ ᐊᑐᕐᑲᐅᓐ ᐋᑐᑕᑲᓄᒃ ᑲᐃᑎᑯᑕᒃ ᑭᔅ ᑲᐃᔅᐱᐃᒃᕽ

Ms. Anastasia Qupee
Grand Chief
Box 1106, Stn C
Goose Bay, NL
A0P 1C0

October 14th, 2014

RE: Information and Consultation - Environmental Assessment: Howse Property Project

Dear Chief Qupee,

As you are aware, Howse Minerals Limited (HML) (a wholly-owned subsidiary of Tata Steel Minerals Canada Ltd (TSMC), signatory to an unincorporated joint venture with TSMC and Labrador Iron Mines (LIM)) proposes to develop the Howse Property Project (the Project) in the Millennium Iron Range. The deposit is located 25 km northwest of Schefferville, Québec (see attached map). The Canadian Environmental Assessment Agency (CEAA) has required an environmental assessment (EA) of the Project, and final guidelines were issued in July 2014[1].

TSMC is currently building and operating the Direct Shipping Ore Project, adjacent to the Project, and will be the operator of the Project to carry-out all technical, management and administrative operations. The construction and operation of the Howse Deposit will rely on existing infrastructure and facilities that were built (or that will soon be built) for the purposes of the DSO Project. Infrastructure already in place includes:

- workers' camp;
- crusher;
- railway;
- mining equipment;
- explosives storage area.

Undertaking the Project will bring about changes to the environment, including one open pit and its related overburden stockpile and waste rock dump and will require the construction of a new road between Timmins 4 pit and the planned Howse deposit, and the installation of crushing facilities.

The Project will also secure continuity of mining projects undertaken by TSMC and LIM respectively, thus allowing the continuation of economic development in the greater Schefferville region, including

[1] Information relative to the Howse Property Project's environmental evaluation process may be found on the CEAA website: http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=80067

TATA STEEL MINERALS CANADA LIMITED
1000 Sherbrooke West, Suite 1120, Montreal, Quebec, H3A 3G4, Canada
Tel: 001 514 764 6700, Fax: 001 514 764 6725
Registered Office: Suite 1700, Park Place, 666 Burrard Street, Vancouver, BC V6C 2X8, Canada

employment, business opportunities, and other economic spin-offs such as revenue-sharing with Aboriginal groups.

Groupe Hémisphères has been given the mandate by HML to conduct the required environmental assessment (EA). They have been informed of your *Comments on Determination of the Requirement for an Environmental Assessment for Proposed Howse Property Iron Mine Consultation and Accommodation* that were communicated to the CEAA and to the Proponent in May, 2014. The concerns expressed in this letter will be addressed in the EA.

The consultation process for the EA has recently begun and any other comments or concerns that your organization may have regarding the Project are sought. Your comments will be included in the EA. Of particular interest are comments regarding potential project effects (negative or positive), ideas for mitigation measures, or views on cumulative effects.

We respectfully request that you provide your comments and questions by **November 17th, 2014**, to:

Ms. Geneviève Dionne
Project Manager, Social issues and Community Engagement
genevieve.dionne@snclavalin.com

550 Sherbrooke West,
Montréal | Québec | Canada | H3A 1B9

514-393-8000 ext. 53600

Best regards,

Rajesh Sharma
CEO and Managing Director

Encl.: Information Pamphlet - Howse Property Project

c.c
Ms Paula Reid, Environmental Analyst, Innu Nation

Mr. Todd Russell
President, NunatuKavut Community Council
370 Hamilton River Road P.O. Box 460, Stn. C.
Happy Valley-Goose Bay NL
A0P 1C0

October 15th, 2014

RE: Information and Consultation - Environmental Assessment: Howse Property Project

Dear Mr. Russell,

As you are aware, Howse Minerals Limited (HML) (a wholly-owned subsidiary of Tata Steel Minerals Canada Ltd (TSMC), signatory to an unincorporated joint venture with TSMC and Labrador Iron Mines (LIM)) proposes to develop the Howse Property Project (the Project) in the Millennium Iron Range. The deposit is located 25 km northwest of Schefferville, Québec (see attached map). The Canadian Environmental Assessment Agency (CEAA) has required an environmental assessment (EA) of the Project, and final guidelines were issued in July 2014[1].

TSMC is currently building and operating the Direct Shipping Ore Project, adjacent to the Project, and will be the operator of the Project to carry-out all technical, management and administrative operations. The construction and exploitation of the Howse Deposit will rely on existing infrastructure and facilities that were built (or that will soon be built) for the purposes of the DSO Project. Infrastructure already in place includes:

- workers' camp;
- crusher;
- railway;
- mining equipment;
- explosives storage area.

Undertaking the Project will bring about changes to the environment, including one open pit and its related overburden stockpile and waste rock dump and will require the construction of a new road between Timmins 4 pit and the planned Howse deposit, and the installation of crushing facilities.

The Project will also secure continuity of mining projects undertaken by TSMC and LIM respectively, thus allowing the continuation of economic development in the greater Schefferville region, including

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employment, business opportunities, and other economic spin-offs such as revenue-sharing with Aboriginal groups.

Groupe Hémisphères has been given the mandate by HML to conduct the required environmental assessment (EA). We have been informed of your *Comments on Determination of EA Requirements, DSO - Howse Project* that were communicated to the CEAA and to the Proponent in May, 2014. The concerns expressed in this letter will be addressed in the EA.

The consultation process for the EA has recently begun and any other comments or concerns that your organization may have regarding the Project are sought. Your comments will be included in the EA. Of particular interest are comments regarding potential project effects (negative or positive), ideas for mitigation measures, or views on cumulative effects.

We respectfully request that you provide your comments and questions by **November 17th, 2014**, to:

Geneviève Dionne
Project Manager, Social issues and community engagement
Genevieve.dionne@snclavalin.com

550 Sherbrooke West,
Montréal | Québec | Canada | H3A 1B9

514-393-8000 ext. 53600

Best regards,

Rajesh Sharma
CEO and Managing Director

Encl.: Information Pamphlet - Howse Property Project

c.c. Mr. George Russell, Environment and Resource Manager, NunatuKavut Community Council

INTRODUCTION

This appendix presents a compilation of the specific mitigation measures presented for biophysical components in the Howse EIS. Specific mitigation measures were chosen based on their proven effectiveness in the literature, and in consultation between professionals and the Proponent.

This document presents brief descriptions of the specific mitigation measures to which the Proponent is committed, and the reader is directed to the main text for further details.

COMPONENT	SPECIFIC MITIGATION MEASURE
Air Quality	▪ TSMC will develop a plan for the prevention and management of blast generated NOx (Volume 1 Appendix XXI).
Light	Measures proposed by the International Dark-Sky Association in the document Light Pollution and Wildlife (IDA, 2008) ▪ shield outdoor lighting; ▪ only use the light when needed; ▪ shut off the lights when possible; ▪ use only enough light to get the job done; ▪ use long wavelength light with a red or yellow tint to minimize effects; ▪ staff will be informed to turn off lights on top of trucks at night, when not necessary; ▪ the minimum amount of pilot warning and obstruction avoidance lighting should be used on tall structures. Although Howse does not have any 'tall structure', this measures considers the 65m stack located near the dome; ▪ lighting for the safety of employees should be shielded to shine down and only to where it is needed, without compromising safety; and ▪ when possible, LED lights will be used.
Hydrology	▪ riprap will be installed on both sides of Burnetta Creek from the discharge point to 600 m downstream.
Water quality	▪ riprap will be installed on both sides of Burnetta Creek from the discharge point to 600 m downstream; and

COMPONENT	SPECIFIC MITIGATION MEASURE
	▪ divert sedimentation pond HowseA into the pit.
Terrestrial ecosystems (WETLANDS)	▪ stripping the entire area all at once rather than progressively, whenever possible; ▪ the top layer of the stripped organic matter (the 40-50 cm layer that includes the roots) should be preserved. To the extent possible, the organic matter will be excavated in blocks, without disturbing the various horizons. It will then be deposited in, for example, a disturbed area. The area selected will be an isolated depression (far from any watercourse, so as to avoid increasing suspended matter), which will promote revegetation and, eventually, the regeneration of a wetland; and ▪ if an access road has to be built, it is recommended to do it during the winter season. In the event that no road is built and only a temporary access is necessary, a temporary protection mat will be used where machinery will operate.
Caribou - Migratory Tundra ecotype	▪ where possible, operation activities will avoid areas of wildlife concentration, as traffic would disturb wildlife during critical periods; ▪ under an agreement with the Ungava project and CARMA, TSMC's Environmental Specialist / Permit Manager will be notified when migratory tundra caribou, which are monitored via satellite collars, come within 100 km of the Howse Project. Upon receipt of such a notice, operations will continue with caution. If data from the radio collars indicate that some of the caribou have moved to within 20 km of the Howse Project, TSMC will institute surveys within that radius to monitor their movements in greater detail; ▪ activities will cease if caribou are seen within 5 km of an active pit or the processing complex; ▪ whenever activity ceases pursuant to the foregoing, TSMC will contact the NLDEC to discuss any further steps to be taken; ▪ work activities will be re-scheduled where necessary to avoid wildlife encounters; ▪ equipment and vehicles will yield the right-of-way to wildlife; and ▪ firearms are prohibited in the workers' camp, except for two that may be used by security personnel in the case of an emergency.
Boreal Forest ecotype	▪ the measures proposed for the GRCH will apply to the Boreal Forest caribou.
	Migratory and ground nesting migratory birds: ▪ to avoid destroying nests, vegetation clearing will be avoided during the breeding season (May 1 to August 7); ▪ construction activities will take place during the breeding season but only in already cleared areas; ▪ if nests are found outside the breeding season, they will be protected with a buffer zone determined by a setback distance appropriate to the species, the level of the disturbance and the landscape context, until the young have permanently left the vicinity of the nest; ▪ for ground nesting migratory birds, in case a nest is located, a small fence with wooden stakes and galvanized metal T-posts with colored nylon rope along the posts could be installed to identify it and prevent the machinery destroying the eggs; and

COMPONENT	SPECIFIC MITIGATION MEASURE
	▪ the proponent is committed to inspect wetlands in this area at least annually to ensure that the loss of wetland habitat does not exceed what was predicted. During breeding season from mid-May to mid-August, traffic including heavy equipment shall not be permitted to enter wetlands or any area that is not designated for traffic.
	Species at risk – Rusty Blackbird: ▪ to avoid destroying nests, vegetation clearing will be avoided during the breeding season (May 1 to August 7); ▪ construction activities will take place during the breeding season but only in already cleared areas; ▪ if nests are found outside the breeding season, they will be protected with a buffer zone determined by a setback distance appropriate to the species, the level of the disturbance and the landscape context, until the young have permanently left the vicinity of the nest; ▪ for ground nesting migratory birds, in case a nest is located, a small fence with wooden stakes and galvanized metal T-posts with colored nylon rope along the posts could be installed to identify it and prevent the machinery destroying the eggs; ▪ the proponent is committed to inspect wetlands in this area at least annually to ensure that the loss of wetland habitat does not exceed what was predicted. During breeding season, traffic including heavy equipment shall not be permitted to enter wetlands or any area that is not designated for traffic; ▪ the proponent is committed to apply the TSMC/NML Plan for the Protection of the Rusty Blackbird (Groupe Hémisphères, 2011c); and ▪ the protection of a riparian strip adjacent to riparian and non-riparian wetlands for the protection of the Rusty blackbird and, to a lesser extent, the Gray-cheeked Thrush.
	Species at risk – Grey-cheeked Thrush: ▪ to avoid destroying nests, vegetation clearing will be avoided during the breeding season (May 1 to August 7); ▪ construction activities will take place during the breeding season but only in already cleared areas; ▪ if nests are found outside the breeding season, they will be protected with a buffer zone determined by a setback distance appropriate to the species, the level of the disturbance and the landscape context, until the young have permanently left the vicinity of the nest; and ▪ the protection of a riparian strip adjacent to riparian and non-riparian wetlands for the protection of the Rusty blackbird and, to a lesser extent, the Gray-cheeked Thrush.

COMPONENT	SPECIFIC MITIGATION MEASURE
	Species at risk Bank Swallow ▪ the proponent is committed to surveying the Howse Pit area in early and mid-summer every year that the mine is in the operations phase (where vertical walls exist). Should the swallow be detected, then deterrence methods or measures will be taken to render the site inhospitable (noise, plastic covering of pit walls, etc) for nesting; ▪ any nest found will be protected with a buffer zone determined by a setback distance appropriate to the species, the level of the disturbance and the landscape context, until the young have permanently left the vicinity of the nest. Setback distance suggested by Environment Canada (Environment Canada, 2015) is up to 50 m or more for swallow colonies; and ▪ regular blasting should naturally deter the swallow to use the pit as a breeding site. If not, additional measures will be taken to deter the birds from using the large piles of unattended/unvegetated soil or the vertical banks in the mining pits if none of the previous mitigation measures can be provided. In this case, additional measures will be taken to cover the banks during the breeding season. Swallows can be excluded from potential nest sites with barriers made from plastic sheeting, or fine-mesh wire. Nets or other barriers must be installed before swallows arrive on their breeding ground.
	For all species: ▪ specific mitigation measures proposed will benefit birds. These measures will ensure that night-time illumination will be minimal. It will benefit the nocturnal migrants; and ▪ lighting of the mine will be reduced by half when weather forecasts are extreme (thick fog and snowstorms). This measure will be considered during the migration period (in May and from August to October) where migrating birds are more vulnerable to being entrapped by artificial lighting during harsh weather conditions.
Aquatic Fauna	▪ limit the maximum charges of explosives to be used so that the blast vibration and overpressure limits respect the NPC-119 guidelines (MOE, 1985). The smallest distance between the pit and a water body (Pinette Lake) is 900 m, which limits the charges to 3,128 kg per delay to protect fish eggs from vibration and to 1,092 kg to protect the fish from overpressure.

COMPONENT	SPECIFIC MITIGATION MEASURE
Infrastructure and Services	▪ blasting announcements will be made on the radio 48 hours in advance of blast periods, and band councils will also be notified. Prior to any blasting, security vehicles will be present on the bypass road to protect the local population. These methods mirror those currently in place for DSO project; ▪ access to the mine road network will continue to be controlled for safety reasons. The mine roads should not be used by the land users since a bypass road is available. If a land user needs to use the mine road network to access a specific area not accessible with the bypass road, HML will provide a safety escort to the land users; ▪ speed limit will be maintained at 70 km/hour on the main mining road north of the Schefferville landfill, and at 50 km/hour between the Schefferville landfill and the town of Schefferville. The speed limit will apply to all road users. Respect of applicable speed limits will be monitored by HML and by the Sûreté du Québec; ▪ HML will raise awareness among workers on the importance of safe driving. Measures are taken for detractors who are caught disobeying traffic laws and witnesses of road safety violations are asked to report details of observations; ▪ additional road safety signs will be installed in the Spring of 2016. HML and the Town of Schefferville will install speed limit and safe driving road signs between Schefferville and Timmins work site to reinforce driving laws. The signs will clearly indicate the speed limits, and will remind users of the necessity to drive carefully, to turn off safety lights when in town; ▪ a new bypass road for land-users was completed by HML in 2015, which provides access to lands to the northwest of the DSO and Howse sites. While more time is required, using the bypass road, to access certain areas of the territory (Rosemary Lake and Pinette Lake, for example). HML is assessing a way to improve access to this part of the land; and ▪ collaborate with responsible authorities for local road infrastructure within the Government of Québec (Secrétariat au Plan Nord, Ministère des Affaires municipales et Occupation du territoire, Ministère des Transports) and the Town of Schefferville regarding paving of streets, including chemin de la Gare.
Economy: Employment, Businesses and Labour Force Characteristics	▪ continue to support the essential skills training and other technical training according to job needs, via on-the-job training and institutional training, as per IBA and government funding available; ▪ provide mechanisms through which Aboriginal workers may access qualified positions and obtain promotions (in progress); ▪ work with communities to support the delivery of early training in areas that will be required. When the construction and operation phases begin, these workers will be fully prepared and trained; ▪ offer an alternate schedule to local workers when operational schedules ~~can~~ allow it; ▪ continue to provide on-the-job training equitably for both male and female staff; ▪ continue to address issues relating to project construction and operation, including employment, training and contracting, via each individual community IBA Implementation Committee; ▪ continue to provide Cultural Awareness and Respectful Workplace training program for workers ;

COMPONENT	SPECIFIC MITIGATION MEASURE
	HML will ensure that all new employees have their beginner's handbook and appropriate health and safety training; ▪ deliver a custom-designed training in Process Plant Operations to three Québec First Nations in Spring 2015, which included English classes for Innu students. Many graduates have since been hired to work on the DSO Site; ▪ continue to employ women at a rate of over 10% of its Project Workforce and continue to favour women who have the required skills and qualifications; ▪ continue to employ Aboriginal women in non-traditional roles including heavy equipment operators, plant operators, security officers; ▪ continue to support Innu staff in improving their English skills on-the-job, given that the worksite is in Labrador and primarily English-speaking. English language courses will be offered on-site (to come); ▪ continue to prioritize Aboriginal and local contractors as much as possible; ▪ continue to adapt the bidding process to the size of some of the local businesses, where possible divide big contracts into smaller ones; ▪ continue to provide support the creation of local businesses;
Land Use and Aboriginal Traditional Knowledge	▪ HML will continue to contribute to a fund as specified in certain IBAs for traditional activities. The Aboriginal leadership determines how the funds are allocated and used. First Nation leadership determines how the funds are allocated and used. This fund contributes to alleviating the financial burden for families who count on subsistence harvesting for its economic and nutritive value, in an area where store-bought food is expensive, such as for a fuel allocation for all members; ▪ HML/TSMC will pursue its financial participation in Caribou Ungava to advance research on caribou and on the effects of mining activities on the George River herd decline, and on other factors that may play a role in this decline or in the change of migratory paths, for example. Within the framework of the program, researchers will involve the concerned Aboriginal communities in its research initiatives by considering their views, their traditional indigenous knowledge in the studies and by involving them in the research activities held on their traditional territories; ▪ caribou sightings will be reported to the HSE Committee. Blasting activities are announced on the radio two days ahead of time. Measures to be taken when there are caribou sightings are explained in Caribou Section; ▪ the Proponent recognizes that the GRCH can, one day, return to its original grounds and includes, in its mitigation measures, a commitment to be aware of any caribou seen within a 100 km radius of Howse activities, conduct surveys if collared caribou are found within 20 km of Howse and cease all activities if caribou are known to be within 5 km of the active pit or the processing complex; ▪ the mandate of the HSE Committee, which acts as an environmental monitoring committee and collaborates with TSMC to oversee and assess the effectiveness of the relevant mitigation measures (dust control, vegetation, for example), will include the Howse Project once the construction begins (already planned by HML). For instance, in collaboration with the HSE Committee, and in some cases with local authorities, mining activities will be adapted if needed to minimize the effects on traditional activities;

COMPONENT	SPECIFIC MITIGATION MEASURE
	▪ continue to contribute to a compensation fund as specified in each IBAs that would help harvesters go elsewhere for subsistence and traditional activities, in accordance with local land use and inter-family agreements. The Aboriginal leadership determines how the funds are allocated. This fund contributes to alleviating the financial burden for families who count on subsistence harvesting for its economic and nutritive value, in an area where store-bought food is expensive; ▪ wildlife sightings (Wolverine, Caribou or Lynx, etc.) will be reported to the HSE Committee. Furthermore, monthly TSMC Environmental reports are made available to the HSE Committee members on the shared drive; ▪ even during the decommissioning and reclamation phase, HML will maintain ongoing communication on activities with the local population through radio programs and bulletins, and via the HSE Committee, including environmental updates and reports; ▪ with respect to vegetation stripping, any usable wood will be made accessible to the local communities in a secure location near the site; and ▪ maximize the presence of Aboriginal personnel for all security shifts to facilitate communication in Innu with local lands users. Work with the local communities to hold a Security course for its members, so that there are additional Innu personnel at the security post.

SNC-Lavalin GEM Québec inc.
5955 Saint-Laurent Street, Suite 300
Lévis, Québec Canada G6V 3P5
418.837.3621 418.837.2039

March 24, 2016

Mrs. Mariana Trindade, Biologist, Ph.D.
Groupe Hémisphères
1453 Beaubien Street East, Suite 301
Montréal, Québec H2G 3C6

Sent by email: mtrindade@hermis.ca

Subject: Technical Memorandum
Hydrogeology modeling for the Howse deposit
Scenarios of wet and dry years
Howse Minerals Limited
Our file n°: 636981

Dear Madam:

SNC-Lavalin GEM[1] Québec inc. (further referred to as "SNC-Lavalin Environment and Geoscience") is pleased to provide you with the hydrogeology modeling update results for the Howse deposit regarding the open pit dewatering activities.

We trust that this technical report is to your satisfaction. Do not hesitate to communicate with the undersigned should you have further questions regarding the content of this report.

Regards,

Abdelmounem Benlahcen, geo., Ph.D.
Senior Hydrogeologist

Environment and geoscience
Infrastructure

AB/lh

p.j.

[1] GEM: Géotechnique – Environnement – Matériaux

1 Introduction

A numerical model update for the Howse pit dewatering was conducted by SNC-Lavalin (2015) using complementary hydrogeological program conducted in the fall of 2015 by Geofor and on water balance calculation made for an average year.

To study the effect of wetter and dryer years on the water regime, two new modeling scenarios were conducted to represent these conditions. The following sections present the results of these new scenarios.

2 Modeling scenarios

Accurate values of recharge at the site requires a large amount of data of several complete years of stream flow, data infiltration and runoff volumes, and hydrological modeling of one or more representative watersheds in the Howse area. Therefore, estimated recharge may vary depending on the theoretical methods and hypothesis used.

The statistic results on precipitation and evapotranspiration summarized in Table 1 show that the evapotranspiration rate is relatively higher for a dry year in comparison to a wet year, and it represents 20% of the total precipitation. If the annual recharge rate is considered to be 20% of the net water depth available as was considered in previous modeling report, it would be estimated to 85 mm and 185 mm for a dry year and a wet year respectively. For a security factor, the annual recharge rate was decreased to 15% of net water depth available (equivalent to 60 mm) for a dry year, and increased to 27% (equivalent to 250 mm) for a wet year.

Table 1 Summary of statistic results on precipitation and evapotranspiration (from the Water Management Plan update report, SNC-Lavalin, 2016)

	Precipitation[1] (mm)	Evapotranspiration (mm)	Evapotranspiration (%)	Recharge[2] (mm)
Average year	782	111	14%	134
Dry year	532	106	20%	85
Wet year	1041	117	11%	185

[1] Precipitation includes rainfall and snowfall

[2] Recharge = 20% of net water depth available (Following the same method for recharge estimation in SNC-Lavalin report (2015) and Hydrogeology report of Geofor (2015))

Previous modeling of the Howse deposit included one base case scenario and sensitivity analyses by the modeling of three scenarios. The sensitivity analysis includes the increasing of the recharge and hydraulic conductivity of the hydrogeological units in the model. In case for the recharge, the scenarios were achieved by increasing the recharge from 100 to 200 mm/yr (case 2 of Table 2). For the hydraulic conductivity, it was multiplied by two for the overburden and Sokoman formation (case 5 of Table 2) and for all hydrogeological units (case 7 of Table 5).

Four new modeling scenarios are using the new recharge values for dry and wet years (Table 2). These scenarios are:

› Scenarios of cases 1 and 3 using the base case scenario and recharge values of 60 mm/yr and 250 mm/yr for a dry year and a wet year respectively;
› Scenarios of cases 4 and 6 using the base case scenario for which hydraulic conductivities for overburden and Sokoman were doubled, and recharge values of 60 mm/yr and 250 mm/yr for a dry year and a wet year respectively.

The scenarios of case 1 and 6 are considered respectively, minimal and maximal pumping scenarios for dry and wet years in the water management plan. The scenario 7 was not modeled with a recharge of 250 mm/y and was considered not representative due to the fact that the hydraulic conductivities are overestimated in this scenario.

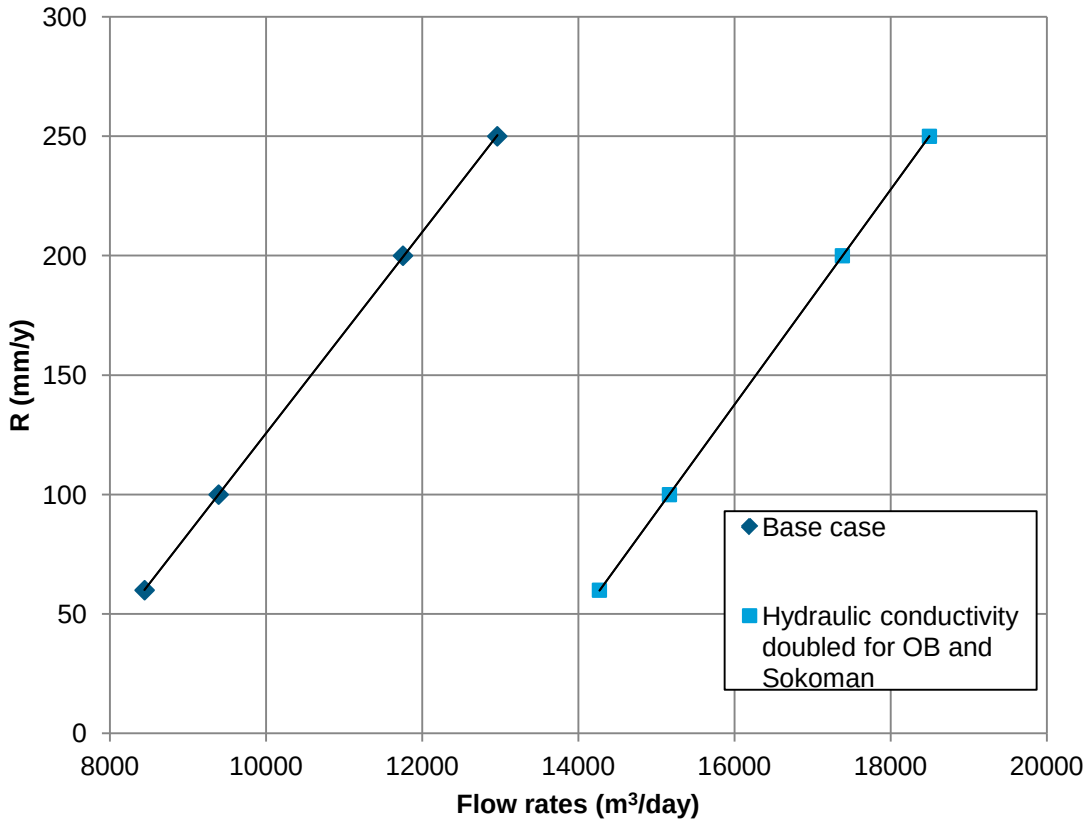
All the scenario results are summarized in Table 2. The new scenarios' results are presented in detail in Appendix A. A graph of the recharge versus the generated flow rate is presented in Figure 1, and shows a good correlation between these two parameters. In fact, the flow rate is proportional to the recharge, and the data follow a good straight line.

Table 2 Dewatering Simulation Results

Scenario	Flow rates (m^3/day)		Note (see Appendix A on sensitivity analysis for more details)	Pumping rate increase
	Model	Safety factor of 1.25		
Base case: Calibrated model	9393	11741	Kx, Ky, Kz; Recharge : 100 mm/y	
Sensitivity analysis Case 1	**8445**	-	Kx, Ky, Kz; Recharge decreased to 60 mm/y	0.9
Sensitivity analysis Case 2	11754	14693	Kx, Ky, Kz; Recharge increased to 200 mm/y	1.3
Sensitivity analysis Case 3	12962	16203	Kx, Ky, Kz; Recharge increased to 250 mm/y	1.4
Sensitivity analysis Case 4	14270	17838	Kx, Ky and Kz multiplied by 2 for OB and Sokoman, Recharge decreased to 60 mm/y	1.5
Sensitivity analysis Case 5	17382	**21728**	Kx, Ky and Kz multiplied by 2 for OB and Sokoman, Recharge increased to 200 mm/y	1.9
Sensitivity analysis Case 6	18497	**23121**	Kx, Ky and Kz multiplied by 2 for OB and Sokoman, Recharge increased to 250 mm/y	2.0
Sensitivity analysis Case 7	18752	23440	Kx, Ky and Kz multiplied by 2 for all five units (OB, Sokoman, Wishart, Shale and Fault zones), Recharge increased to 200 mm/y	2.0

- Base case scenario and scenarios of cases 2, 5 and 7 are conducted in previous model (SNL-Lavalin, 2015).
- Scenarios of cases 1, 3, 4 and 6 are new scenarios for which the results are presented in details in Appendix A
- Highlighted in bold are flow rates considered for dry, average and wet years for the Water Management Plan.

Figure 1 Simulated Recharge and Dewatering Rate Results (Kx, Ky and Kz of base case scenario are maintained constant)



3 Conclusions

The current groundwater flow modeling has allowed for the evaluation of dewatering flow rates of the Howse deposit for a dry year and a wet year. The main conclusions from the modeling results are:

For a dry year scenario with a recharge of 60 mm, the estimated dewatering rate is about 8,500 m³/day;

For a wet year scenario with a recharge of 250 mm and conductivity hydraulic multiplied by 2 for overburden and Sokoman units, the estimated dewatering rate is about 23,200 m³/day.

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SNC-Lavalin (2015). Hydrogeology Numerical Modeling for the Howse Deposit – Update. Howse Property Project. Howse Minerals Limited. Preliminary Report.

SNC-Lavalin (2014) Conceptual Engineering for Howse Water Management Plan. Technical Note. 622834-4000-40ER-0005. November 2014.

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The findings, conclusions and recommendations in this report (i) have been developed in a manner consistent with the level of skill normally exercised by professionals currently practicing under similar conditions in the area, and (ii) reflect SNC-Lavalin GEM's best judgment based on information available at the time of preparation of this report. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our original contract and included in this report. The findings and conclusions contained in this report are valid only as of the date of this report and may be based, in part, upon information provided by others. If any of the information is inaccurate, new information is discovered, site conditions change or applicable standards are amended, modifications to this report may be necessary. The results of this assessment should in no way be construed as a warranty that the subject site is free from any and all contamination.

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Appendix A

Modeling Results

Case 1 Kxyz of initial calibration + Recharged reduced to 60 mm/yr

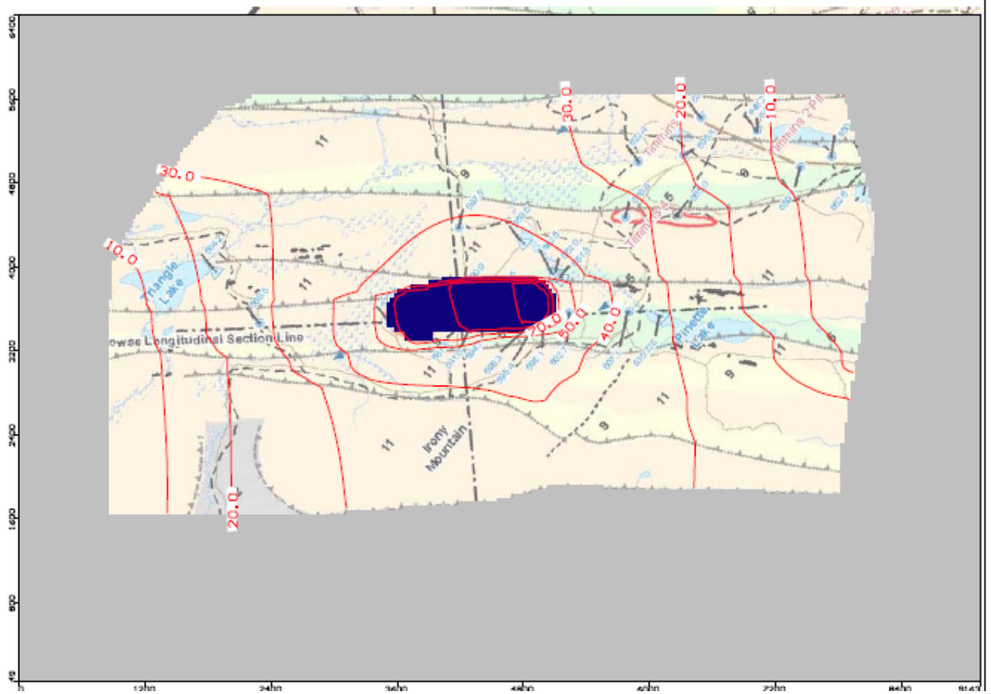
Table Sensitivity analysis – Case 1

Zone	Kx (m/s)		Ky (m/s)		Kz (m/s)	
	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis
Overburden	1,00E-05	1,00E-05	1,00E-05	1,00E-05	1,00E-05	1,00E-05
Sokoman	9,40E-06	9,40E-06	9,40E-06	9,40E-06	9,40E-06	9,40E-06
Wishart	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07
Shale	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07
Faults zones	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07

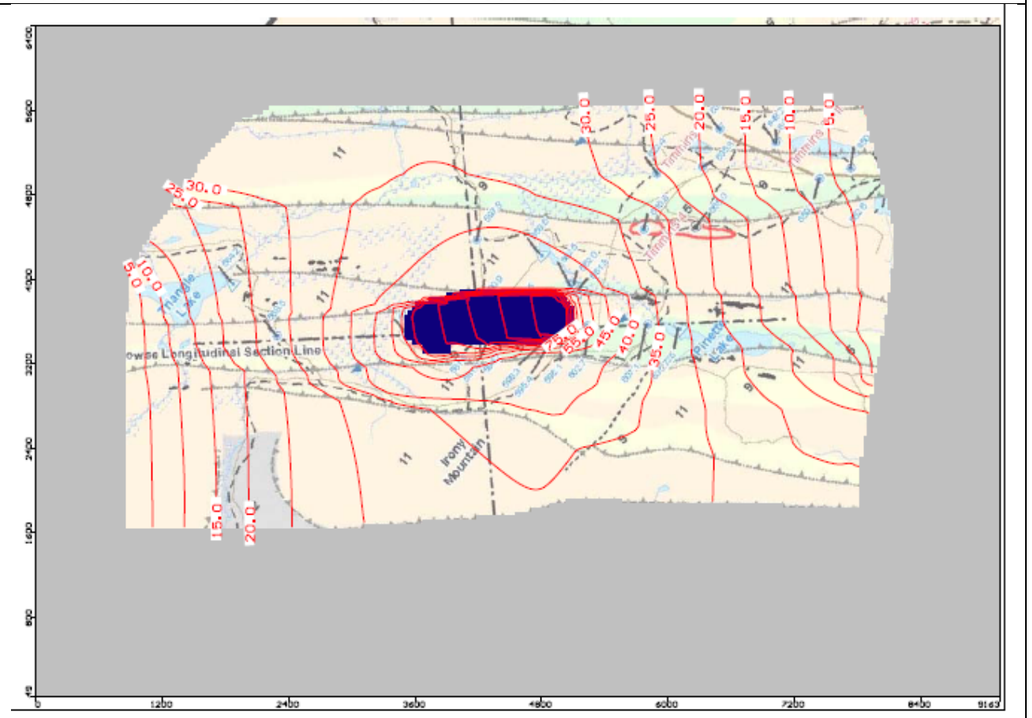
Recharge (mm/year)	Calibrated	Sensitivity analysis
R(1)	100	60

Highlighted values were modified)

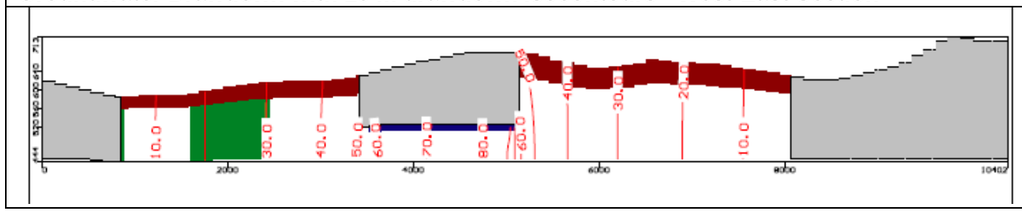
Groundwater Drawdown – 10 m drawdown isocontours



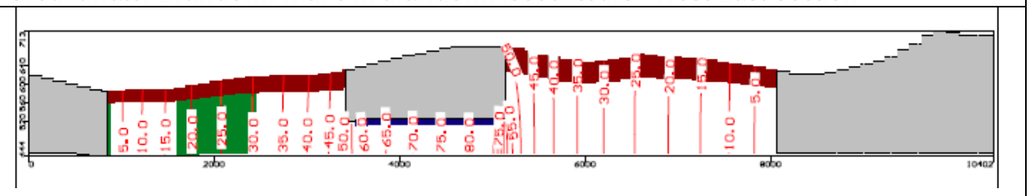
Groundwater Drawdown – 5 m drawdown isocontours



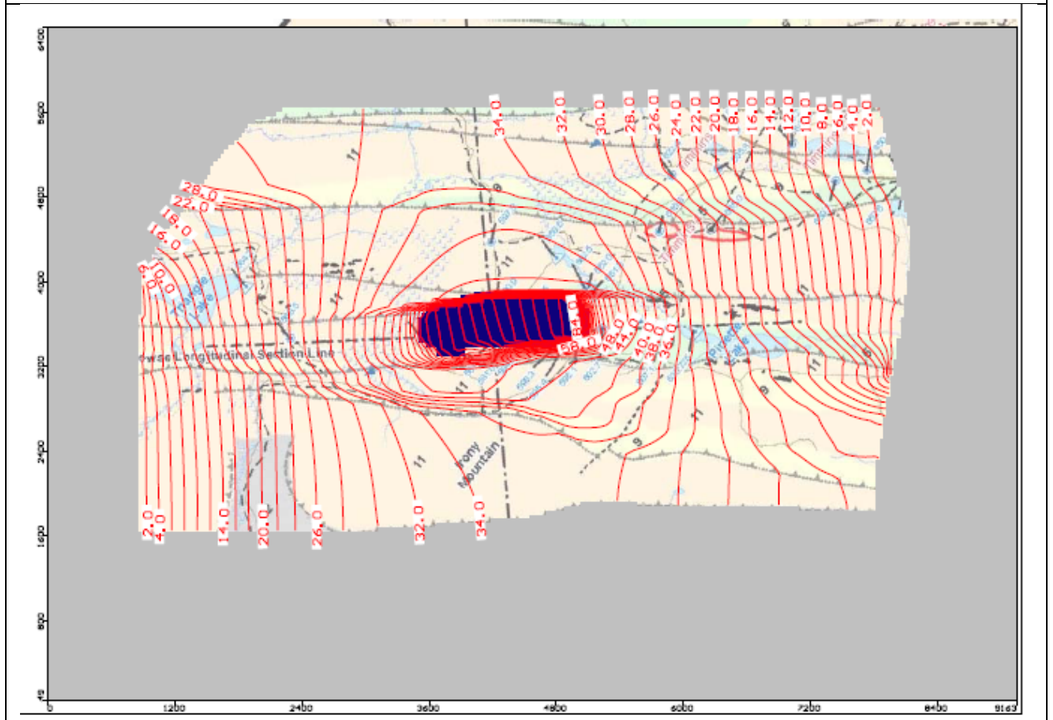
Groundwater Drawdown with 10 m drawdown isocontours - West-East Section



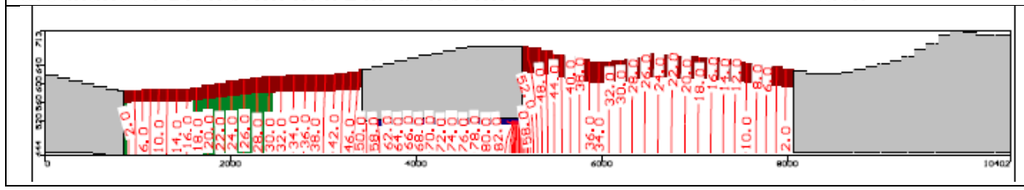
Groundwater Drawdown with 5 m drawdown isocontours - West-East Section



Groundwater Drawdown – 2 m drawdown isocontours



Groundwater Drawdown with 2 m drawdown isocontours - West-East Section



Case 3 Kxyz of initial calibration + Recharged increased to 250 mm/yr

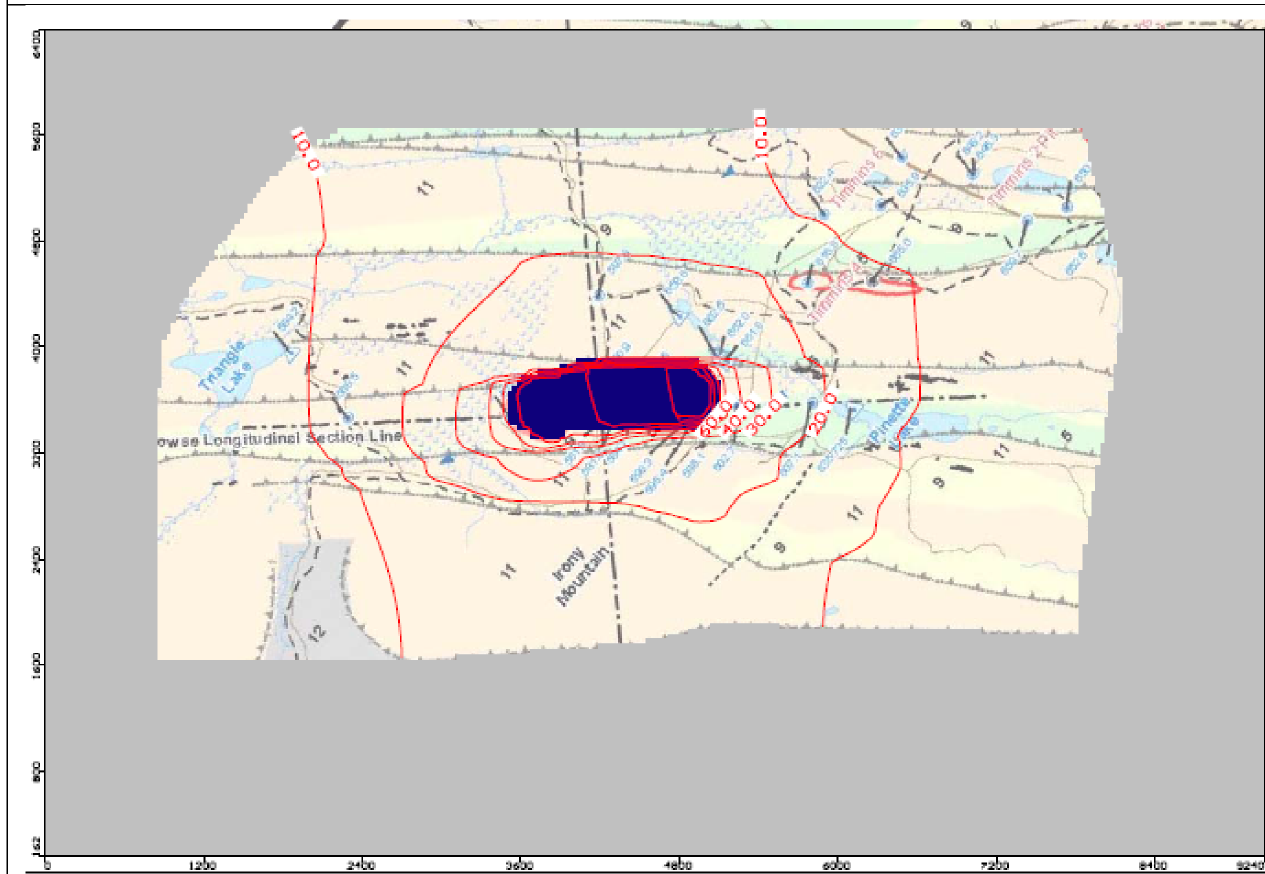
Table Sensitivity analysis – Case 3

Zone	Kx (m/s)		Ky (m/s)		Kz (m/s)	
	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis
Overburden	1,00E-05	1,00E-05	1,00E-05	1,00E-05	1,00E-05	1,00E-05
Sokoman	9,40E-06	9,40E-06	9,40E-06	9,40E-06	9,40E-06	9,40E-06
Wishart	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07
Shale	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07
Faults zones	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07

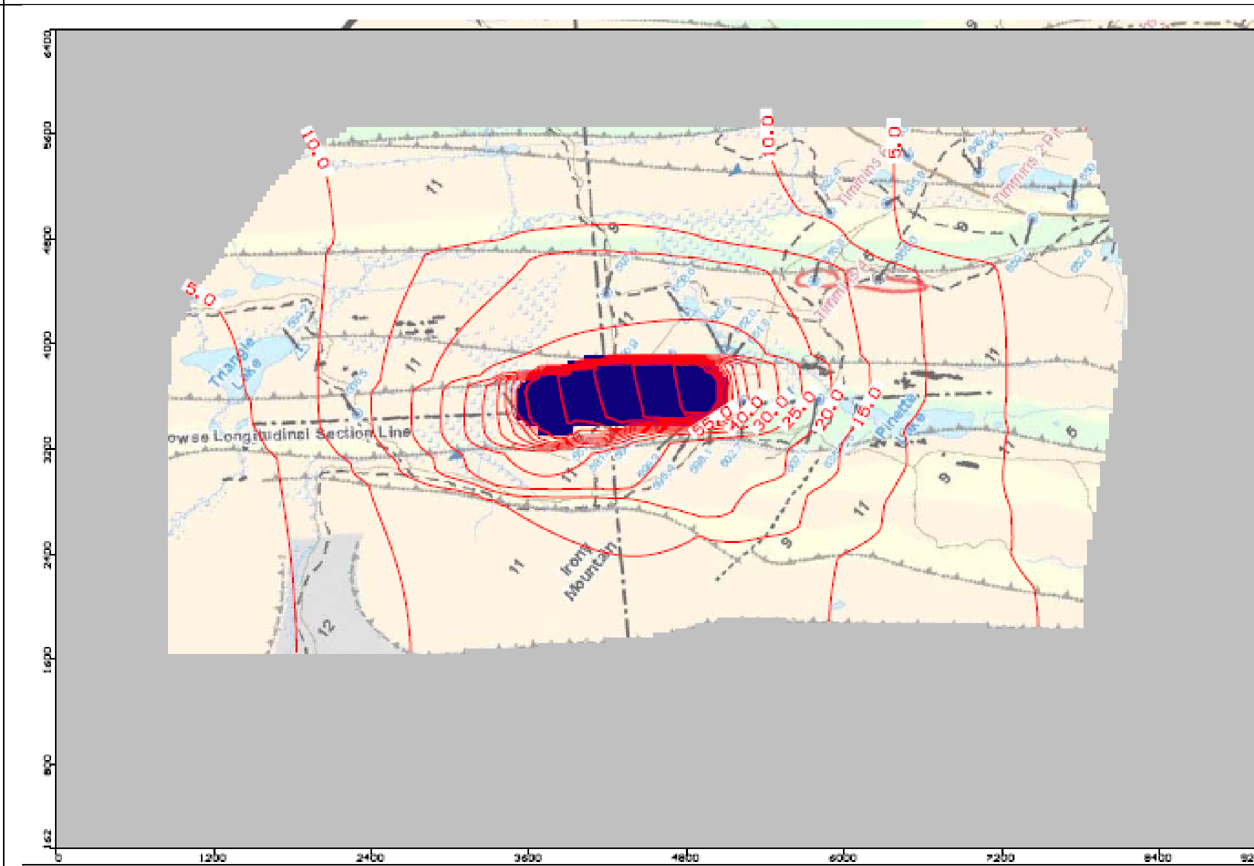
Recharge (mm/year)	Calibrated	Sensitivity analysis
R(1)	100	250

Highlighted values were modified)

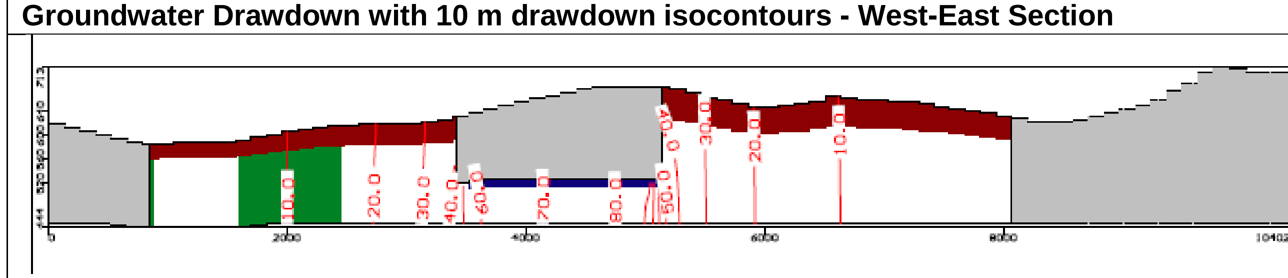
Groundwater Drawdown – 10 m drawdown isocontours



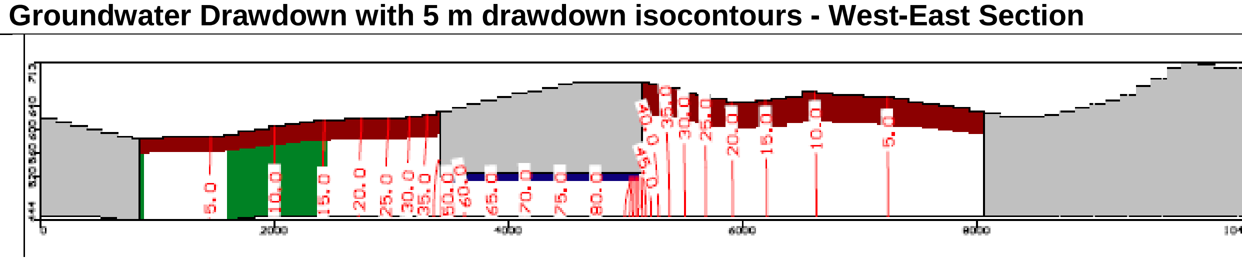
Groundwater Drawdown – 5 m drawdown isocontours



Groundwater Drawdown with 10 m drawdown isocontours - West-East Section



Groundwater Drawdown with 5 m drawdown isocontours - West-East Section



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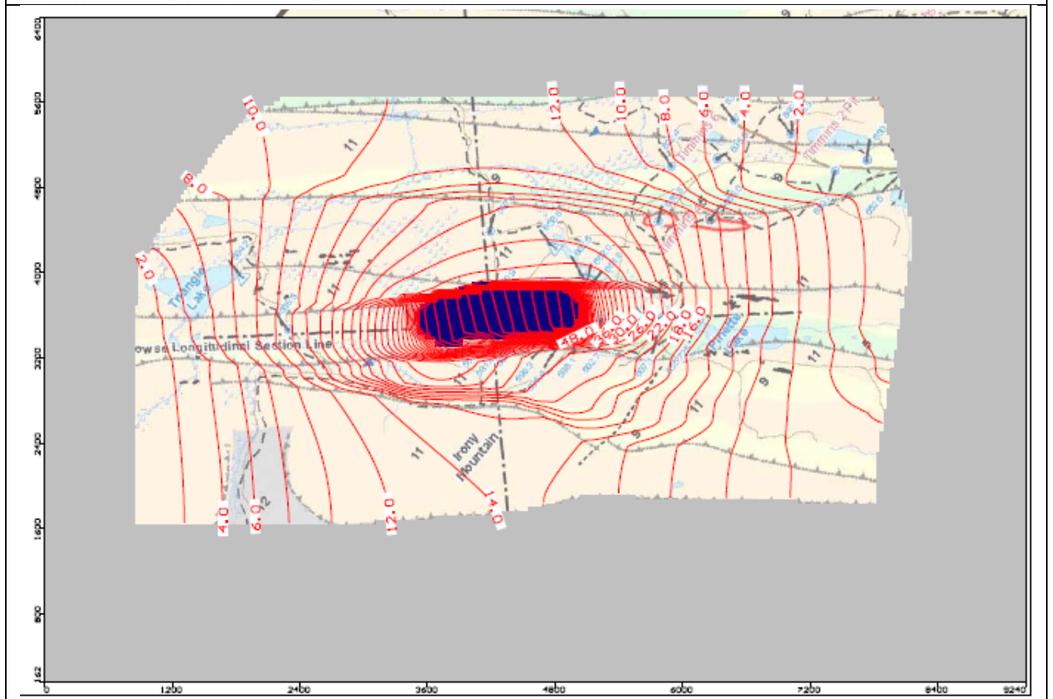
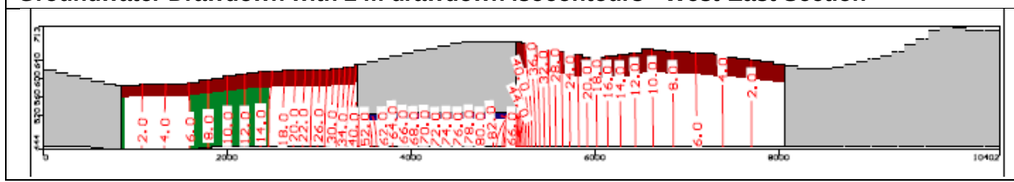


Groundwater Drawdown with 2 m drawdown isocontours - West-East Section



Case 4: Increase Kxyz for the Sokoman and Overburden (x2) + Recharged decreased to 60 mm/yr

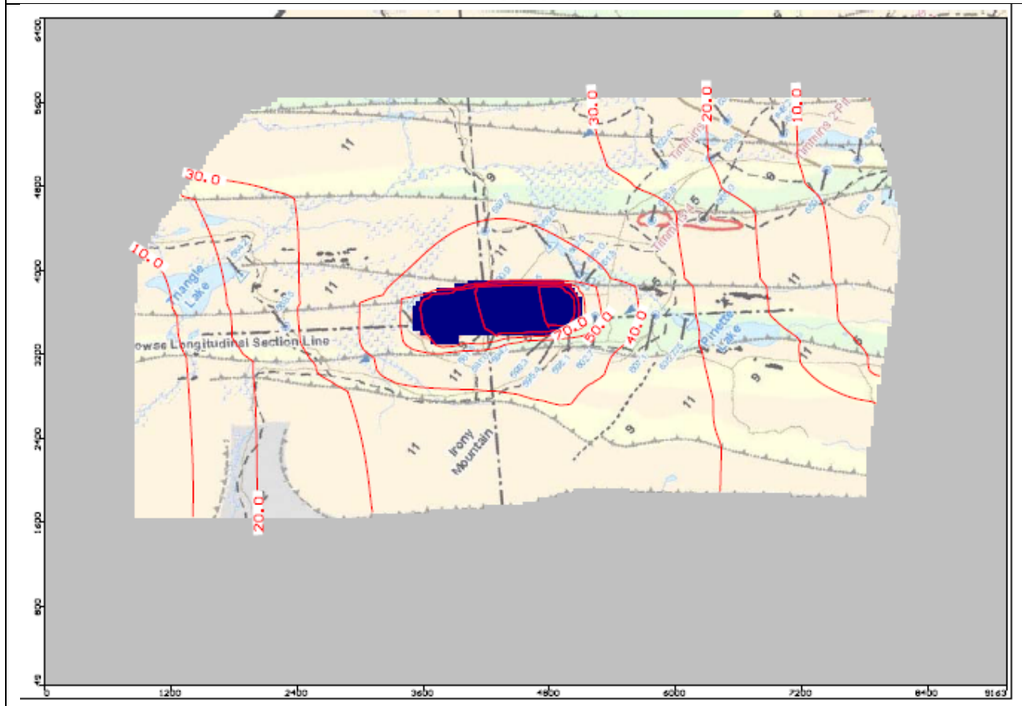
Table Sensitivity analysis – Case 4

Zone	Kx (m/s)		Ky (m/s)		Kz (m/s)	
	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis
Overburden	1,00E-05	2,00E-05	1,00E-05	2,00E-05	1,00E-05	2,00E-05
Sokoman	9,40E-06	1,88E-05	9,40E-06	1,88E-05	9,40E-06	1,88E-05
Wishart	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07
Shale	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07
Faults zones	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07

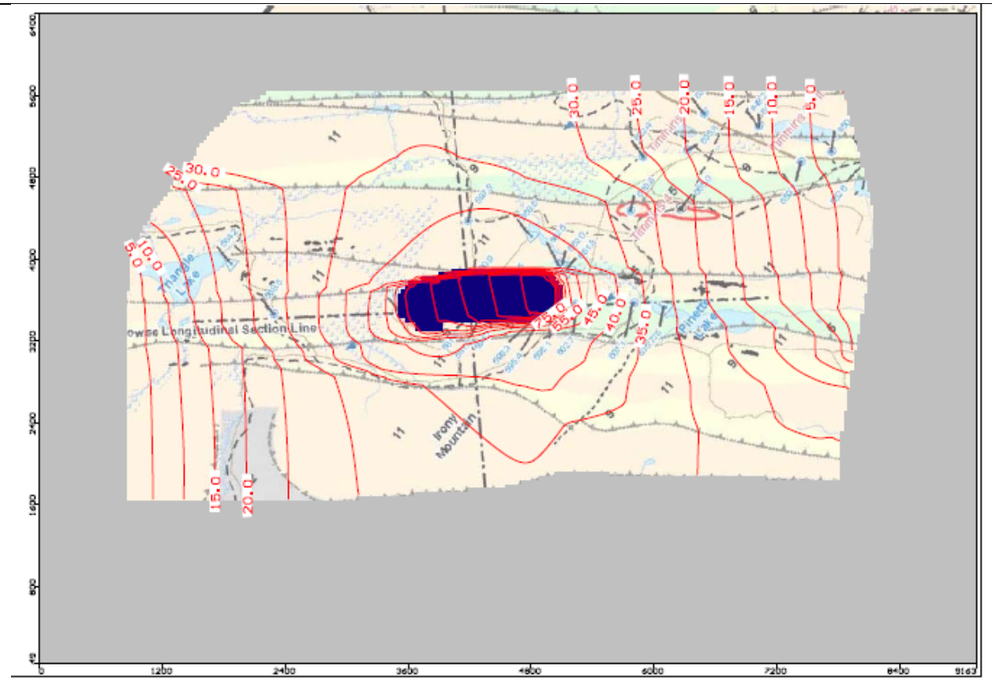
Recharge (mm/year)	Calibrated	Sensitivity analysis
R(1)	100	60

Highlighted values were modified)

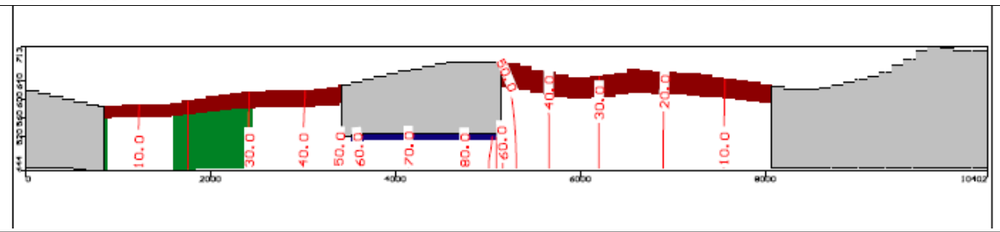
Groundwater Drawdown – 10 m drawdown isocontours



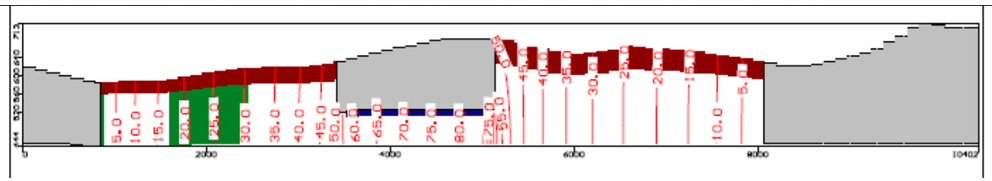
Groundwater Drawdown – 5 m drawdown isocontours



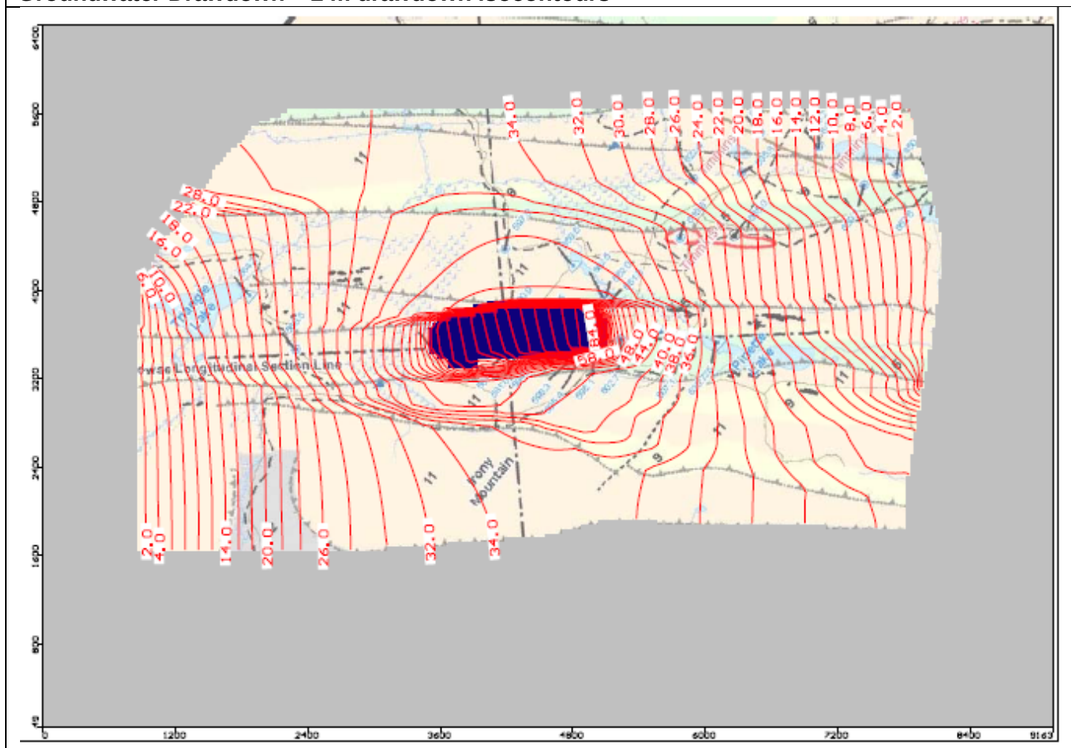
Groundwater Drawdown with 10 m drawdown isocontours - West-East Section



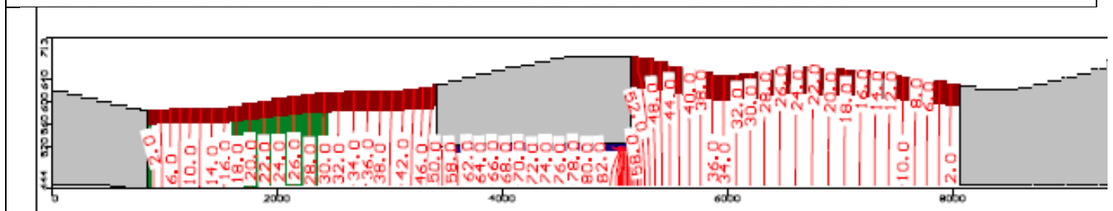
Groundwater Drawdown with 5 m drawdown isocontours - West-East Section



Groundwater Drawdown – 2 m drawdown isocontours



Groundwater Drawdown with 2 m drawdown isocontours - West-East Section



Case 6: Increase Kxyz for the Sokoman and Overburden (x2) + Recharged increased to 250 mm/yr

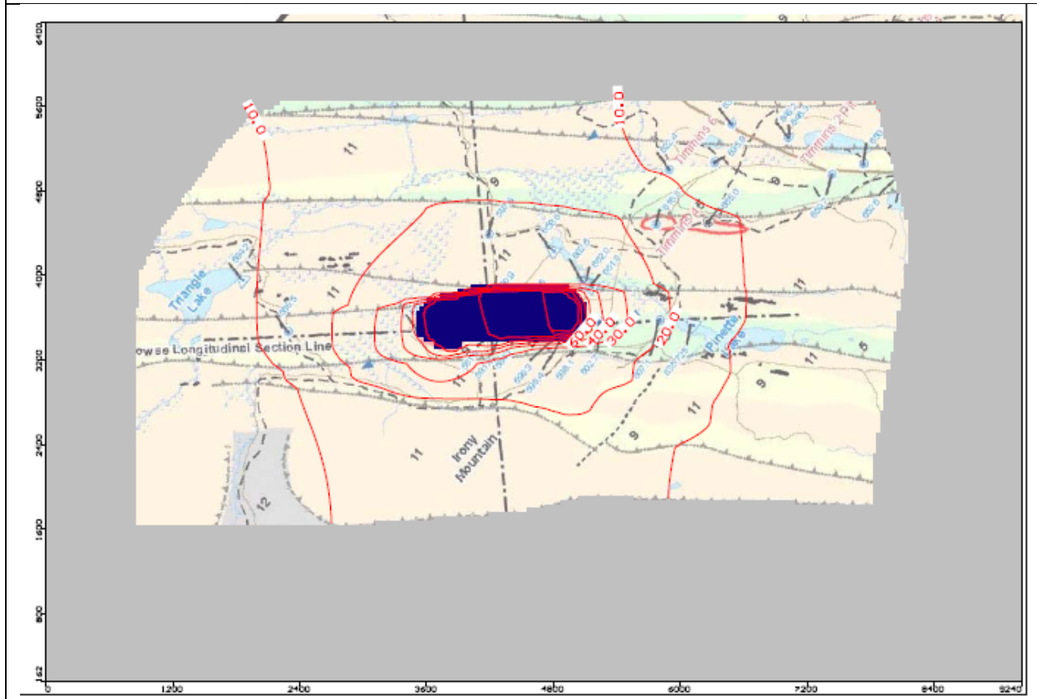
Table Sensitivity analysis – Case 6

Zone	Kx (m/s)		Ky (m/s)		Kz (m/s)	
	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis	Calibrated	Sensitivity analysis
Overburden	1,00E-05	2,00E-05	1,00E-05	2,00E-05	1,00E-05	2,00E-05
Sokoman	9,40E-06	1,88E-05	9,40E-06	1,88E-05	9,40E-06	1,88E-05
Wishart	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07	8,00E-07
Shale	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07	1,00E-07
Faults zones	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07	2,60E-07

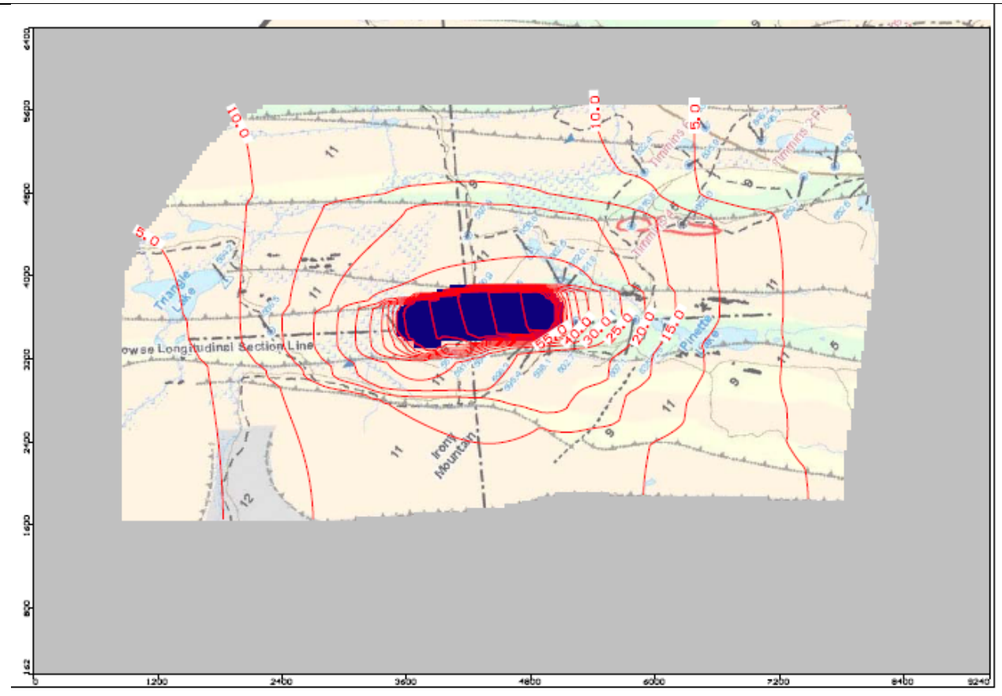
Recharge (mm/year)	Calibrated	Sensitivity analysis
R(1)	100	250

Highlighted values were modified)

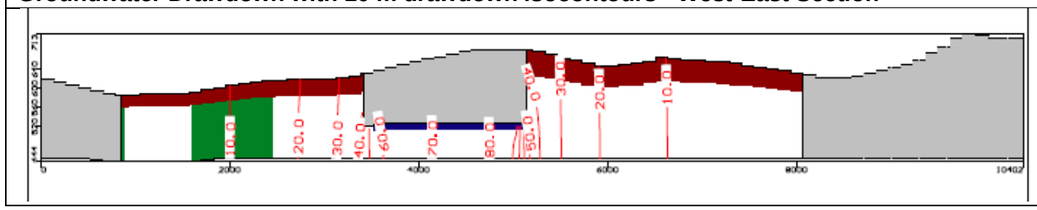
Groundwater Drawdown – 10 m drawdown isocontours



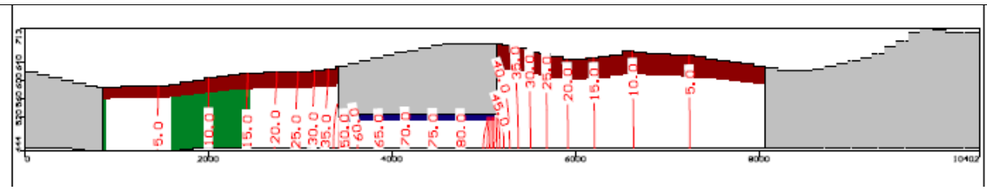
Groundwater Drawdown – 5 m drawdown isocontours



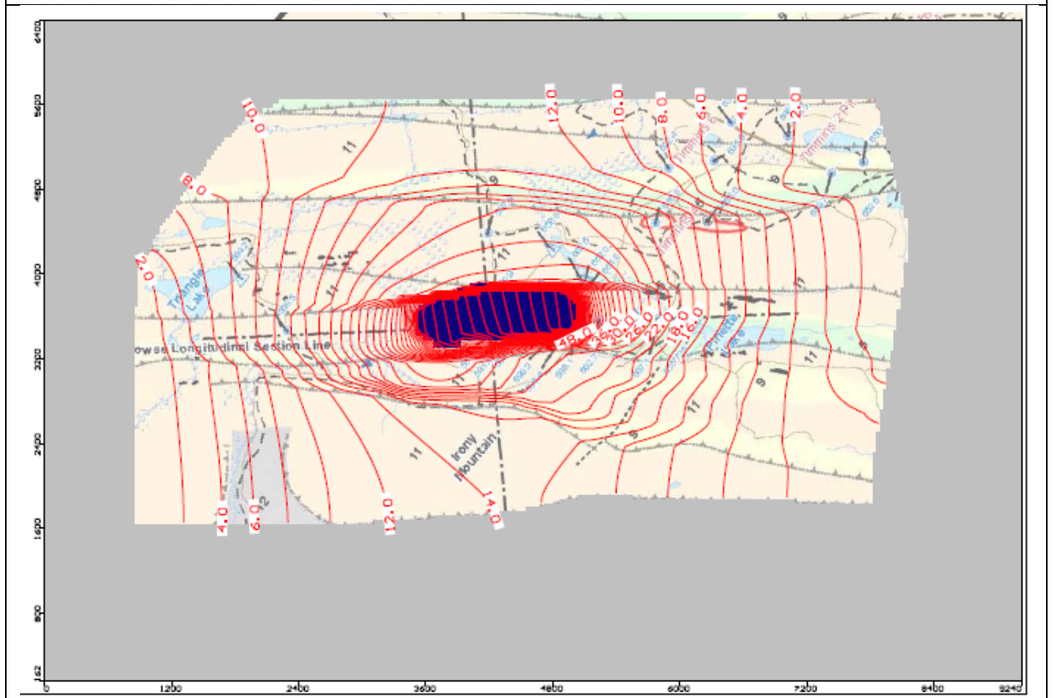
Groundwater Drawdown with 10 m drawdown isocontours - West-East Section



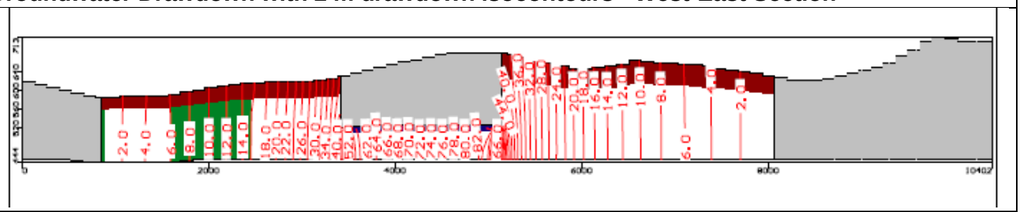
Groundwater Drawdown with 5 m drawdown isocontours - West-East Section



Groundwater Drawdown – 2 m drawdown isocontours



Groundwater Drawdown with 2 m drawdown isocontours - West-East Section



Title of document: **Water Balance Computations for Typical Wet and Dry Years**

Client: **GROUPE HÉMISPHÈRES**

Project: **HOWSE**

Prepared by: Patrick Scholz, Eng., M.Eng.

Reviewed by: Marie-Hélène Paquette, Eng. M. Env.

REVISION INDEX

Revision #	Prep.	App.	Date	Pages Revised	Remarks
PA	PS	MHP	24 Mar 16	All	For internal review
PB	PS	MHP	24 Mar 16	All	For Client comments
00	PS	MHP	1 Apr 16	All	Final version

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LIST OF TABLES

1.0 INTRODUCTION

In 2015, SNC-Lavalin (SNC-Lavalin, 2015) developed a water management plan for the Howse project at a conceptual engineering level. Elements of this plan were used by Groupe Hémisphères to prepare an environmental impact study (EIS), including the results of water balance computations for a typical average year.

Following the EIS submission, a request from the EIS revision agency was to obtain additional water balance computations for wetter and drier years. In this context, Groupe Hémisphères mandated SNC-Lavalin to perform water balance computations for wetter and drier years.

2.0 DATA

The same data used for the development of Howse project Water Management Plan (SNC-Lavalin, 2015) was used for the present study.

Daily hydro-meteorological data time series, representative for the Howse project site, covering a period of up to 66 years (1948-2014), were obtained from Environment Canada nearby meteorological stations Schefferville A, Schefferville, and Fermont. This data consisted of:

- Temperature
- Precipitation
- Rainfall
- Snowfall
- Snow cover

Monthly lake evaporation values, compiled from measurements made during the period 1951 to 1980 for the Schefferville meteorological station (Rollings, 1997), are also used in the present study.

3.0 METHODOLOGY

The following methodology was used to determine typical wet and dry years representative for the Howse project site:

- The amount of annual runoff was used to determine if a particular year is a wet or a dry year.
- Hydrological years, starting October 1st, just before snow cover starts to accumulate, and ending September 30st are used.
- Available snow cover data from meteorological station Schefferville A, covering the period 1955 to 1993, was used with concomitant temperature and precipitation data to setup and calibrate a snowmelt model.
- This model was then applied to the whole period for which precipitation and temperature data is available (66 hydrological years) and daily runoff was computed.

- Runoff was computed using a runoff coefficient of 0.4 during the summer months (June-September) and 1.0 during the rest of the year (SNC-Lavalin, 2015). Then, a frequency analyses was performed on annual runoff, using a Log-Pearson type III probability distribution.
- Hydrological year 1978-1979 was selected as typical wet year because it resulted in an annual runoff of 794 mm, which is more than the runoff corresponding to a 100 years wet year return period (776 mm).
- Hydrological year 1996-1997 was selected as typical dry year because it resulted in an annual runoff of 343 mm, which is less than the runoff corresponding to a 100 years dry year return period (350 mm).

Typical wet and dry years monthly temperature, rainfall and snowfall values are used as inputs for the corresponding water balance computations The following steps were used to estimate evaporation corresponding to typical wet and dry years:

- Monthly temperature and precipitation data for typical average, wet, and dry years was used to compute potential evapotranspiration based on the Thornthwaite equation (Maidment, 1993).
- Annual potential evapotranspiration percentage differences between typical years were determined and applied to monthly lake evaporation values adopted for the typical average water balance computations (SNC-Lavalin, 2015) to obtain an estimation of typical wet and dry monthly lake evaporation values.

The following tables present the monthly data adopted for typical wet and dry years.

Table 3-1 : Monthly Data – Wet Year

Month	Rainfall [mm]	Snowfall [mm]	Snow sublimation [mm]	Runoff [mm]	Lake evaporation [mm]	Evapo-transpiration [mm]
Jan	0.0	62.4	0.0	0.0	0.0	0.0
Feb	0.0	61.6	0.0	0.0	0.0	0.0
Mar	0.2	101.9	0.0	0.2	0.0	0.0
Apr	60.2	42.2	0.0	60.2	0.0	0.0
May	73.1	26.0	0.0	547.2	0.0	0.0
Jun	82.3	0.0	0.0	32.9	109.6	38.4
Jul	149.5	0.0	0.0	59.8	103.3	36.2
Aug	76.9	0.0	0.0	30.7	73.8	25.8
Sep	100.5	2.4	0.0	41.2	48.5	17.0
Oct	21.3	64.8	0.0	21.3	0.0	0.0
Nov	0.0	63.3	0.0	0.0	0.0	0.0
Dec	0.0	51.9	0.0	0.0	0.0	0.0
Year	**564.0**	**476.5**	**0.0**	**793.5**	**335.2**	**117.3**

Table 3-2 : Monthly Data – Dry Year

Month	Rainfall [mm]	Snowfall [mm]	Snow sublimation [mm]	Runoff [mm]	Lake evaporation [mm]	Evapo-transpiration [mm]
Jan	0.0	17.6	0.0	0.0	0.0	0.0
Feb	0.0	1.8	0.0	0.0	0.0	0.0
Mar	0.0	9.7	0.0	0.0	0.0	0.0
Apr	2.9	21.0	0.0	2.9	0.0	0.0
May	43.2	23.8	0.0	195.0	0.0	0.0
Jun	35.1	0.0	0.0	14.1	99.4	34.8
Jul	170.8	0.0	0.0	68.3	93.6	32.8
Aug	42.6	0.0	0.0	17.0	66.9	23.4
Sep	67.4	0.0	0.0	27.0	43.9	15.4
Oct	7.8	14.3	0.0	7.8	0.0	0.0
Nov	10.4	27.2	0.0	10.4	0.0	0.0
Dec	0.0	36.4	0.0	0.0	0.0	0.0
Year	**380.3**	**151.8**	**0.0**	**342.5**	**303.8**	**106.3**

Pit dewatering values of 23 000 m^3/day and 8 400 m^3/day were adopted for typical wet and dry years respectively.

Then, water balance computations for typical wet and dry years were performed based on the same computations made for a typical average year in SNC-Lavalin (2015).

4.0 RESULTS

The following tables present monthly water balance computation results, for typical wet and dry years, for the three natural watersheds (Goodream Creek, Burnetta Creek, and Pinette Lake) impacted by the project. Existing and modified conditions are representative of site conditions before and after Howse project construction. Indicated drainage areas correspond to the drainage areas from SNC-Lavalin (2015).

Table 4-1 : Wet Year – Goodream Creek – Existing Conditions at Junction with Timmins 4 Sedimentation Pond 3 Outflow (316 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	197 059	0	0	0	0	0	0.0
Feb	194 533	0	0	0	0	0	0.0
Mar	321 800	632	0	632	0	632	0.2
Apr	133 268	190 112	0	190 112	0	190 112	73.3
May	82 108	230 850	0	1 728 058	0	1 728 058	645.2
Jun	0	259 903	155 942	103 961	103 961	0	0.0
Jul	0	472 121	283 273	188 848	114 174	74 674	27.9
Aug	0	242 711	145 627	97 085	81 553	15 532	5.8
Sep	7 579	317 379	194 975	129 983	53 592	76 391	29.5
Oct	204 638	67 265	0	67 265	0	67 265	25.1
Nov	199 901	0	0	0	0	0	0.0
Dec	163 900	0	0	0	0	0	0.0
Year	**1 504 787**	**1 780 973**	**779 816**	**2 505 944**	**353 280**	**2 152 664**	**68.3**

Table 4-2 : Wet Year – Goodream Creek – Modified Conditions at Junction with Timmins 4 Sedimentation Pond 3 Outflow (304 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pumping from Pit [m³]	Inflow [m³]	Inflow [l/s]
Jan	189 696	0	0	0	0	0	0	0.0
Feb	187 264	0	0	0	0	0	0	0.0
Mar	309 776	608	0	608	0	0	608	0.2
Apr	128 288	183 008	0	183 008	0	0	183 008	70.6
May	79 040	222 224	0	1 663 488	0	210 000	1 873 488	699.5
Jun	0	250 192	150 115	100 077	100 077	0	0	0.0
Jul	0	454 480	272 688	181 792	109 908	7 896	79 780	29.8
Aug	0	233 642	140 185	93 457	78 506	1 642	16 594	6.2
Sep	7 296	305 520	187 690	125 126	51 589	8 077	81 614	31.5
Oct	196 992	64 752	0	64 752	0	0	64 752	24.2
Nov	192 432	0	0	0	0	0	0	0.0
Dec	157 776	0	0	0	0	0	0	0.0
Year	**1 448 560**	**1 714 426**	**750 678**	**2 412 308**	**340 080**	**227 615**	**2 299 844**	**72.9**

Table 4-3 : Wet Year – Goodream Creek – Existing Conditions at Junction with HOWSEB Outflow (1068 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	666 370	0	0	0	0	0	0.0
Feb	657 826	0	0	0	0	0	0.0
Mar	1 088 190	2 136	0	2 136	0	2 136	0.8
Apr	450 654	642 876	0	642 876	0	642 876	248.0
May	277 654	780 635	0	5 843 549	0	5 843 549	2 181.7
Jun	0	878 882	527 329	351 553	351 553	0	0.0
Jul	0	1 596 511	957 906	638 604	386 087	252 517	94.3
Aug	0	820 746	492 447	328 298	275 777	52 522	19.6
Sep	25 630	1 073 240	659 321	439 548	181 225	258 323	99.7
Oct	691 999	227 463	0	227 463	0	227 463	84.9
Nov	675 981	0	0	0	0	0	0.0
Dec	554 240	0	0	0	0	0	0.0
Year	**5 088 544**	**6 022 487**	**2 637 004**	**8 474 026**	**1 194 642**	**7 279 384**	**230.8**

Table 4-4 : Wet Year – Goodream Creek – Modified Conditions at Junction with HOWSEB Outflow (1162 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pit dewatering [m³]	Inflow [m³]	Inflow [l/s]
Jan	725 338	0	0	0	0	713 000	713 000	266.2
Feb	716 038	0	0	0	0	644 000	644 000	266.2
Mar	1 184 486	2 325	0	2 325	0	713 000	715 325	267.1
Apr	490 533	699 765	0	699 765	0	690 000	1 389 765	536.2
May	302 224	849 714	0	6 360 653	0	713 000	7 073 653	2 641.0
Jun	0	956 655	573 993	382 662	382 662	690 000	690 000	266.2
Jul	0	1 737 788	1 042 673	695 115	420 253	713 000	987 862	368.8
Aug	0	893 375	536 025	357 350	300 181	713 000	770 169	287.5
Sep	27 898	1 168 212	717 666	478 444	197 262	690 000	971 182	374.7
Oct	753 235	247 591	0	247 591	0	713 000	960 591	358.6
Nov	735 799	0	0	0	0	690 000	690 000	266.2
Dec	603 286	0	0	0	0	713 000	713 000	266.2
Year	**5 538 836**	**6 555 425**	**2 870 357**	**9 223 905**	**1 300 357**	**8 395 000**	**16 318 548**	**517.5**

Table 4-5 : Wet Year – Burnetta Creek – Existing Conditions at Junction with HOWSEA Outflow (83 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	51 854	0	0	0	0	0	0.0
Feb	51 190	0	0	0	0	0	0.0
Mar	84 679	166	0	166	0	166	0.1
Apr	35 068	50 026	0	50 026	0	50 026	19.3
May	21 606	60 746	0	454 723	0	454 723	169.8
Jun	0	68 391	41 035	27 357	27 357	0	0.0
Jul	0	124 235	74 541	49 694	30 044	19 650	7.3
Aug	0	63 867	38 320	25 547	21 460	4 087	1.5
Sep	1 994	83 516	51 306	34 204	14 102	20 102	7.8
Oct	53 849	17 700	0	17 700	0	17 700	6.6
Nov	52 602	0	0	0	0	0	0.0
Dec	43 129	0	0	0	0	0	0.0
Year	**395 972**	**468 647**	**205 202**	**659 417**	**92 963**	**566 455**	**18.0**

Table 4-6 : Wet Year – Burnetta Creek – Modified Conditions at Junction with HOWSEA Outflow (143 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Total Inflow [m³]	Inflow [l/s]
Jan	88 982	0	0	0	0	0	0.0
Feb	87 842	0	0	0	0	0	0.0
Mar	145 309	285	0	285	0	285	0.1
Apr	60 177	85 845	0	85 845	0	85 845	33.1
May	37 076	104 241	0	780 307	0	780 307	291.3
Jun	0	117 360	70 416	46 944	46 944	0	0.0
Jul	0	213 187	127 912	85 275	51 555	33 719	12.6
Aug	0	109 597	65 758	43 839	36 825	7 013	2.6
Sep	3 422	143 313	88 041	58 694	24 199	34 495	13.3
Oct	92 405	30 374	0	30 374	0	30 374	11.3
Nov	90 266	0	0	0	0	0	0.0
Dec	74 009	0	0	0	0	0	0.0
Year	**679 489**	**804 201**	**352 127**	**1 131 563**	**159 524**	**972 039**	**30.8**

Table 4-7 : Wet Year – Pinette Lake – Existing Conditions at Pinette Lake Outlet (237 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	147 888	0	0	0	0	0	0.0
Feb	145 992	0	0	0	0	0	0.0
Mar	241 503	474	0	474	0	474	0.2
Apr	100 014	142 674	0	142 674	0	142 674	55.0
May	61 620	173 247	0	1 296 864	0	1 296 864	484.2
Jun	0	195 051	117 031	78 020	78 020	0	0.0
Jul	0	354 315	212 589	141 726	85 685	56 041	20.9
Aug	0	182 149	109 289	72 860	61 203	11 656	4.4
Sep	5 688	238 185	146 324	97 549	40 219	57 330	22.1
Oct	153 576	50 481	0	50 481	0	50 481	18.8
Nov	150 021	0	0	0	0	0	0.0
Dec	123 003	0	0	0	0	0	0.0
Year	**1 129 305**	**1 336 576**	**585 233**	**1 880 648**	**265 128**	**1 615 520**	**51.2**

Table 4-8 : Wet Year – Pinette Lake – Modified Conditions at Pinette Lake Outlet (228 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	142 397	0	0	0	0	0	0.0
Feb	140 571	0	0	0	0	0	0.0
Mar	232 536	456	0	456	0	456	0.2
Apr	96 300	137 376	0	137 376	0	137 376	53.0
May	59 332	166 814	0	1 248 710	0	1 248 710	466.2
Jun	0	187 809	112 685	75 123	75 123	0	0.0
Jul	0	341 159	204 695	136 464	82 503	53 960	20.1
Aug	0	175 386	105 231	70 154	58 931	11 223	4.2
Sep	5 477	229 341	140 891	93 927	38 726	55 201	21.3
Oct	147 874	48 607	0	48 607	0	48 607	18.1
Nov	144 451	0	0	0	0	0	0.0
Dec	118 436	0	0	0	0	0	0.0
Year	**1 087 373**	**1 286 948**	**563 503**	**1 810 818**	**255 283**	**1 555 535**	**49.3**

Table 4-9 : Dry Year – Goodream Creek – Existing Conditions at Junction with Timmins 4 Sedimentation Pond 3 Outflow (316 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	55 581	0	0	0	0	0	0.0
Feb	5 684	0	0	0	0	0	0.0
Mar	30 633	0	0	0	0	0	0.0
Apr	66 318	9 158	0	9 158	0	9 158	3.5
May	75 160	136 426	0	615 810	0	615 810	229.9
Jun	0	110 996	66 598	44 399	44 399	0	0.0
Jul	0	539 508	323 705	215 803	103 477	112 326	41.9
Aug	0	134 531	80 718	53 812	53 812	0	0.0
Sep	0	212 849	127 710	85 140	48 571	36 569	14.1
Oct	45 159	24 632	0	24 632	0	24 632	9.2
Nov	85 898	32 843	0	32 843	0	32 843	12.7
Dec	114 951	0	0	0	0	0	0.0
Year	**479 384**	**1 200 944**	**598 731**	**1 081 598**	**250 259**	**831 338**	**26.4**

Table 4-10 : Dry Year – Goodream Creek – Modified Conditions at Junction with Timmins 4 Sedimentation Pond 3 Outflow (304 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pumping from Pit [m³]	Inflow [m³]	Inflow [l/s]
Jan	53 504	0	0	0	0	0	0	0.0
Feb	5 472	0	0	0	0	0	0	0.0
Mar	29 488	0	0	0	0	0	0	0.0
Apr	63 840	8 816	0	8 816	0	0	8 816	3.4
May	72 352	131 328	0	592 800	0	164 236	757 036	282.6
Jun	0	106 849	64 109	42 740	42 740	0	0	0.0
Jul	0	519 350	311 610	207 740	99 611	27 032	135 161	50.5
Aug	0	129 504	77 702	51 802	51 802	0	0	0.0
Sep	0	204 896	122 938	81 958	46 756	8 801	44 003	17.0
Oct	43 472	23 712	0	23 712	0	0	23 712	8.9
Nov	82 688	31 616	0	31 616	0	0	31 616	12.2
Dec	110 656	0	0	0	0	0	0	0.0
Year	**461 472**	**1 156 071**	**576 359**	**1 041 183**	**240 908**	**200 069**	**1 000 344**	**31.7**

Table 4-11 : Dry Year – Goodream Creek – Existing Conditions at Junction with HOWSEB Outflow (1068 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	187 950	0	0	0	0	0	0.0
Feb	19 222	0	0	0	0	0	0.0
Mar	103 586	0	0	0	0	0	0.0
Apr	224 259	30 969	0	30 969	0	30 969	11.9
May	254 160	461 333	0	2 082 405	0	2 082 405	777.5
Jun	0	375 342	225 205	150 137	150 137	0	0.0
Jul	0	1 824 386	1 094 632	729 754	349 916	379 838	141.8
Aug	0	454 925	272 955	181 970	181 970	0	0.0
Sep	0	719 765	431 859	287 906	164 246	123 660	47.7
Oct	152 710	83 296	0	83 296	0	83 296	31.1
Nov	290 469	111 062	0	111 062	0	111 062	42.8
Dec	388 716	0	0	0	0	0	0.0
Year	**1 621 072**	**4 061 078**	**2 024 651**	**3 657 499**	**846 269**	**2 811 230**	**89.1**

Table 4-12 : Dry Year – Goodream Creek – Modified Conditions at Junction with HOWSEB Outflow (1162 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pit dewatering [m³]	Inflow [m³]	Inflow [l/s]
Jan	204 582	0	0	0	0	260 400	260 400	97.2
Feb	20 923	0	0	0	0	235 200	235 200	97.2
Mar	112 753	0	0	0	0	260 400	260 400	97.2
Apr	244 104	33 710	0	33 710	0	252 000	285 710	110.2
May	276 651	502 157	0	2 266 680	0	260 400	2 527 080	943.5
Jun	0	408 557	245 134	163 423	163 423	252 000	252 000	97.2
Jul	0	1 985 829	1 191 497	794 331	380 881	260 400	673 851	251.6
Aug	0	495 182	297 109	198 073	198 073	260 400	260 400	97.2
Sep	0	783 458	470 075	313 383	178 781	252 000	386 602	149.2
Oct	166 223	90 667	0	90 667	0	260 400	351 067	131.1
Nov	316 173	120 890	0	120 890	0	252 000	372 890	143.9
Dec	423 114	0	0	0	0	260 400	260 400	97.2
Year	**1 764 523**	**4 420 449**	**2 203 815**	**3 981 157**	**921 157**	**3 066 000**	**6 125 999**	**194.3**

Table 4-13 : Dry Year – Burnetta Creek – Existing Conditions at Junction with HOWSEA Outflow (83 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	14 626	0	0	0	0	0	0.0
Feb	1 496	0	0	0	0	0	0.0
Mar	8 061	0	0	0	0	0	0.0
Apr	17 451	2 410	0	2 410	0	2 410	0.9
May	19 778	35 899	0	162 045	0	162 045	60.5
Jun	0	29 208	17 525	11 683	11 683	0	0.0
Jul	0	141 967	85 180	56 787	27 229	29 558	11.0
Aug	0	35 401	21 240	14 160	14 160	0	0.0
Sep	0	56 009	33 606	22 404	12 781	9 623	3.7
Oct	11 883	6 482	0	6 482	0	6 482	2.4
Nov	22 603	8 642	0	8 642	0	8 642	3.3
Dec	30 248	0	0	0	0	0	0.0
Year	126 146	316 018	157 551	284 613	65 854	218 759	6.9

Table 4-14 : Dry Year – Burnetta Creek – Modified Conditions at Junction with HOWSEA Outflow (143 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Total Inflow [m³]	Inflow [l/s]
Jan	25 098	0	0	0	0	0	0.0
Feb	2 567	0	0	0	0	0	0.0
Mar	13 832	0	0	0	0	0	0.0
Apr	29 946	4 135	0	4 135	0	4 135	1.6
May	33 939	61 603	0	278 070	0	278 070	103.8
Jun	0	50 121	30 072	20 048	20 048	0	0.0
Jul	0	243 616	146 170	97 446	46 725	50 721	18.9
Aug	0	60 748	36 449	24 299	24 299	0	0.0
Sep	0	96 112	57 667	38 445	21 932	16 513	6.4
Oct	20 392	11 123	0	11 123	0	11 123	4.2
Nov	38 787	14 830	0	14 830	0	14 830	5.7
Dec	51 906	0	0	0	0	0	0.0
Year	216 467	542 288	270 358	488 397	113 005	375 392	11.9

Table 4-15 : Dry Year – Pinette Lake – Existing Conditions at Pinette Lake Outlet (237 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	41 712	0	0	0	0	0	0.0
Feb	4 266	0	0	0	0	0	0.0
Mar	22 989	0	0	0	0	0	0.0
Apr	49 770	6 873	0	6 873	0	6 873	2.7
May	56 406	102 384	0	462 150	0	462 150	172.5
Jun	0	83 300	49 980	33 320	33 320	0	0.0
Jul	0	404 888	242 933	161 955	77 657	84 298	31.5
Aug	0	100 962	60 577	40 385	40 385	0	0.0
Sep	0	159 738	95 843	63 895	36 451	27 444	10.6
Oct	33 891	18 486	0	18 486	0	18 486	6.9
Nov	64 464	24 648	0	24 648	0	24 648	9.5
Dec	86 268	0	0	0	0	0	0.0
Year	**359 766**	**901 279**	**449 333**	**811 712**	**187 813**	**623 899**	**19.8**

Table 4-16 : Dry Year – Pinette Lake – Modified Conditions at Pinette Lake Outlet (228 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	40 163	0	0	0	0	0	0.0
Feb	4 108	0	0	0	0	0	0.0
Mar	22 135	0	0	0	0	0	0.0
Apr	47 922	6 618	0	6 618	0	6 618	2.6
May	54 312	98 582	0	444 990	0	444 990	166.1
Jun	0	80 207	48 124	32 083	32 083	0	0.0
Jul	0	389 854	233 912	155 942	74 774	81 168	30.3
Aug	0	97 213	58 328	38 885	38 885	0	0.0
Sep	0	153 807	92 284	61 523	35 098	26 425	10.2
Oct	32 633	17 800	0	17 800	0	17 800	6.6
Nov	62 070	23 733	0	23 733	0	23 733	9.2
Dec	83 065	0	0	0	0	0	0.0
Year	**346 408**	**867 813**	**432 649**	**781 573**	**180 840**	**600 733**	**19.0**

The following tables summarize spring, summer and fall monthly maximum flow differences between existing and modified conditions for typical wet, average, and dry years.

Table 4-17 : Monthly Maximum Flow Differences - Goodream Creek at Timmins 4 SP3 Outflow

Month	Discharge Before Howse [l/s]			Discharge After Howse [l/s]			Percentage Difference [%]		
	Wet	Average	Dry	Wet	Average	Dry	Wet	Average	Dry
May	645	453	230	699	515	283	8%	14%	23%
Jun	0	0	0	0	0	0	0%	0%	0%
Jul	28	7	42	30	8	50	7%	12%	20%
Aug	6	16	0	6	18	0	7%	12%	0%
Sep	29	25	14	31	27	17	7%	12%	20%

Table 4-18 : Monthly Maximum Flow Differences - Goodream Creek at HOWSEB Outflow

Month	Discharge Before Howse [l/s]			Discharge After Howse [l/s]			Percentage Difference [%]		
	Wet	Average	Dry	Wet	Average	Dry	Wet	Average	Dry
May	2182	1533	777	2641	1923	944	21%	25%	21%
Jun	0	0	0	266	255	97	Infinity	Infinity	Infinity
Jul	94	25	142	369	282	252	291%	1037%	77%
Aug	20	56	0	288	315	97	1366%	467%	Infinity
Sep	100	83	48	375	345	149	276%	316%	213%

Table 4-19 : Monthly Maximum Flow Differences - Burnetta Creek at HOWSEA Outflow

Month	Discharge Before Howse [l/s]			Discharge After Howse [l/s]			Percentage Difference [%]		
	Wet	Average	Dry	Wet	Average	Dry	Wet	Average	Dry
May	170	119	61	291	205	104	72%	72%	72%
Jun	0	0	0	0	0	0	0%	0%	0%
Jul	7	2	11	13	3	19	72%	72%	72%
Aug	2	4	0	3	7	0	72%	72%	0%
Sep	8	6	4	13	11	6	72%	72%	72%

Table 4-20 : Monthly Maximum Flow Differences – Pinette Lake at Pinette Lake Outlet

Month	Discharge Before Howse [l/s]			Discharge After Howse [l/s]			Percentage Difference [%]		
	Wet	Average	Dry	Wet	Average	Dry	Wet	Average	Dry
May	484	340	173	466	328	166	-4%	-4%	-4%
Jun	0	0	0	0	0	0	0%	0%	0%
Jul	21	5	31	20	5	30	-4%	-4%	-4%
Aug	4	12	0	4	12	0	-4%	-4%	0%
Sep	22	18	11	21	18	10	-4%	-4%	-4%

Note that monthly maximum flow differences are the same for each type of typical year for Burnetta Creek and Pinette Lake because only drainage areas differences are applied for each typical year runoff. For Goodream Creek, these differences are not constant because pit dewatering values change and pit runoff is treated in priority in the existing Timmins 4 sedimentation pond 3.

The following tables present monthly water balance computation results, for typical wet and dry years, for the project infrastructures.

Table 4-21 : Dry Year – Sedimentation Basin HOWSEA (59 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	10 366	0	0	0	0	0	0.0
Feb	1 060	0	0	0	0	0	0.0
Mar	5 713	0	0	0	0	0	0.0
Apr	12 369	1 708	0	1 708	0	1 708	0.7
May	14 018	25 445	0	114 855	0	114 855	42.9
Jun	0	20 702	12 421	8 281	8 281	0	0.0
Jul	0	100 624	60 374	40 250	19 300	20 950	7.8
Aug	0	25 091	15 055	10 037	10 037	0	0.0
Sep	0	39 699	23 819	15 879	9 059	6 820	2.6
Oct	8 423	4 594	0	4 594	0	4 594	1.7
Nov	16 021	6 126	0	6 126	0	6 126	2.4
Dec	21 440	0	0	0	0	0	0.0
Year	**89 410**	**223 989**	**111 670**	**201 729**	**46 676**	**155 053**	**4.9**

Table 4-22 : Wet Year – Sedimentation Basin HOWSEA (59 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	36 754	0	0	0	0	0	0.0
Feb	36 282	0	0	0	0	0	0.0
Mar	60 019	118	0	118	0	118	0.0
Apr	24 856	35 458	0	35 458	0	35 458	13.7
May	15 314	43 056	0	322 301	0	322 301	120.3
Jun	0	48 475	29 085	19 390	19 390	0	0.0
Jul	0	88 056	52 833	35 222	21 295	13 928	5.2
Aug	0	45 268	27 161	18 107	15 210	2 897	1.1
Sep	1 414	59 195	36 365	24 243	9 995	14 248	5.5
Oct	38 167	12 546	0	12 546	0	12 546	4.7
Nov	37 284	0	0	0	0	0	0.0
Dec	30 569	0	0	0	0	0	0.0
Year	**280 659**	**332 170**	**145 444**	**467 385**	**65 890**	**401 494**	**12.7**

Table 4-23 : Dry Year – Sedimentation Basin HOWSEB (178 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pit dewatering [m³]	Pumping from Pit [m³]	Inflow [m³]	Inflow [l/s]
Jan	31 363	0	0	0	0	260 400	0	260 400	97.2
Feb	3 208	0	0	0	0	235 200	0	235 200	97.2
Mar	17 285	0	0	0	0	260 400	0	260 400	97.2
Apr	37 422	5 168	0	5 168	0	252 000	0	257 168	99.2
May	42 412	76 982	0	347 490	0	260 400	0	607 890	227.0
Jun	0	62 633	37 580	25 053	25 053	252 000	0	252 000	97.2
Jul	0	304 434	182 661	121 774	58 390	260 400	0	323 783	120.9
Aug	0	75 913	45 548	30 365	30 365	260 400	0	260 400	97.2
Sep	0	120 107	72 064	48 043	27 408	252 000	0	272 635	105.2
Oct	25 483	13 900	0	13 900	0	260 400	0	274 300	102.4
Nov	48 470	18 533	0	18 533	0	252 000	0	270 533	104.4
Dec	64 865	0	0	0	0	260 400	0	260 400	97.2
Year	**270 508**	**677 670**	**337 853**	**610 325**	**141 217**	**3 066 000**	**0**	**3 535 109**	**112.1**

Table 4-24 : Wet Year – Sedimentation Basin HOWSEB (178 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pit dewatering [m³]	Pumping from Pit [m³]	Inflow [m³]	Inflow [l/s]
Jan	111 197	0	0	0	0	713 000	0	713 000	266.2
Feb	109 771	0	0	0	0	644 000	0	644 000	266.2
Mar	181 586	356	0	356	0	713 000	0	713 356	266.3
Apr	75 200	107 276	0	107 276	0	690 000	0	797 276	307.6
May	46 332	130 264	0	975 110	0	713 000	267 964	1 956 074	730.3
Jun	0	146 659	87 995	58 663	58 663	690 000	0	690 000	266.2
Jul	0	266 409	159 845	106 564	64 426	713 000	10 075	765 213	285.7
Aug	0	136 957	82 174	54 783	46 019	713 000	2 096	723 860	270.3
Sep	4 277	179 091	110 021	73 347	30 241	690 000	10 307	743 413	286.8
Oct	115 474	37 957	0	37 957	0	713 000	0	750 957	280.4
Nov	112 801	0	0	0	0	690 000	0	690 000	266.2
Dec	92 486	0	0	0	0	713 000	0	713 000	266.2
Year	**849 123**	**1 004 970**	**440 036**	**1 414 057**	**199 349**	**8 395 000**	**290 442**	**9 900 149**	**313.9**

Table 4-25 : Dry Year –Timmins 4 Sedimentation Pond 3 (82 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pumping from Pit [m³]	Inflow [m³]	Inflow [l/s]
Jan	14 372	0	0	0	0	0	0	0.0
Feb	1 470	0	0	0	0	0	0	0.0
Mar	7 921	0	0	0	0	0	0	0.0
Apr	17 149	2 368	0	2 368	0	0	2 368	0.9
May	19 435	35 277	0	159 237	0	164 236	323 473	120.8
Jun	0	28 702	17 221	11 481	11 481	0	0	0.0
Jul	0	139 507	83 704	55 803	26 757	27 032	56 078	20.9
Aug	0	34 787	20 872	13 915	13 915	0	0	0.0
Sep	0	55 039	33 023	22 016	12 560	8 801	18 257	7.0
Oct	11 677	6 369	0	6 369	0	0	6 369	2.4
Nov	22 212	8 493	0	8 493	0	0	8 493	3.3
Dec	29 724	0	0	0	0	0	0	0.0
Year	**123 960**	**310 542**	**154 821**	**279 681**	**64 712**	**200 069**	**415 037**	**13.2**

Table 4-26 : Wet Year – Timmins 4 Sedimentation Pond 3 (82 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Pumping from Pit [m³]	Inflow [m³]	Inflow [l/s]
Jan	50 956	0	0	0	0	0	0	0.0
Feb	50 303	0	0	0	0	0	0	0.0
Mar	83 212	163	0	163	0	0	163	0.1
Apr	34 461	49 159	0	49 159	0	0	49 159	19.0
May	21 232	59 693	0	446 844	0	210 000	656 844	245.2
Jun	0	67 206	40 324	26 882	26 882	0	0	0.0
Jul	0	122 082	73 249	48 833	29 523	7 896	27 205	10.2
Aug	0	62 761	37 656	25 104	21 088	1 642	5 658	2.1
Sep	1 960	82 068	50 417	33 611	13 858	8 077	27 831	10.7
Oct	52 916	17 394	0	17 394	0	0	17 394	6.5
Nov	51 691	0	0	0	0	0	0	0.0
Dec	42 382	0	0	0	0	0	0	0.0
Year	**389 110**	**460 527**	**201 646**	**647 990**	**91 352**	**227 615**	**784 254**	**24.9**

Table 4-27 : Dry Year –Howse Mine Pit (76 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	13 376	0	0	0	0	0	0.0
Feb	1 368	0	0	0	0	0	0.0
Mar	7 372	0	0	0	0	0	0.0
Apr	15 960	2 204	0	2 204	0	2 204	0.9
May	18 088	32 832	0	148 200	0	148 200	55.3
Jun	0	26 712	16 027	10 685	10 685	0	0.0
Jul	0	129 837	77 902	51 935	24 903	27 032	10.1
Aug	0	32 376	19 426	12 950	12 950	0	0.0
Sep	0	51 224	30 734	20 490	11 689	8 801	3.4
Oct	10 868	5 928	0	5 928	0	5 928	2.2
Nov	20 672	7 904	0	7 904	0	7 904	3.0
Dec	27 664	0	0	0	0	0	0.0
Year	**115 368**	**289 018**	**144 090**	**260 296**	**60 227**	**200 069**	**6.3**

Table 4-28 : Wet Year – Howse Mine Pit (76 ha)

Month	Snowfall [m³]	Rainfall [m³]	Infiltration [m³]	Net Runoff [m³]	Evapo-transpiration [m³]	Inflow [m³]	Inflow [l/s]
Jan	47 424	0	0	0	0	0	0.0
Feb	46 816	0	0	0	0	0	0.0
Mar	77 444	152	0	152	0	152	0.1
Apr	32 072	45 752	0	45 752	0	45 752	17.7
May	19 760	55 556	0	415 872	0	415 872	155.3
Jun	0	62 548	37 529	25 019	25 019	0	0.0
Jul	0	113 620	68 172	45 448	27 477	17 971	6.7
Aug	0	58 411	35 046	23 364	19 626	3 738	1.4
Sep	1 824	76 380	46 922	31 282	12 897	18 384	7.1
Oct	49 248	16 188	0	16 188	0	16 188	6.0
Nov	48 108	0	0	0	0	0	0.0
Dec	39 444	0	0	0	0	0	0.0
Year	**362 140**	**428 607**	**187 670**	**603 077**	**85 020**	**518 057**	**16.4**

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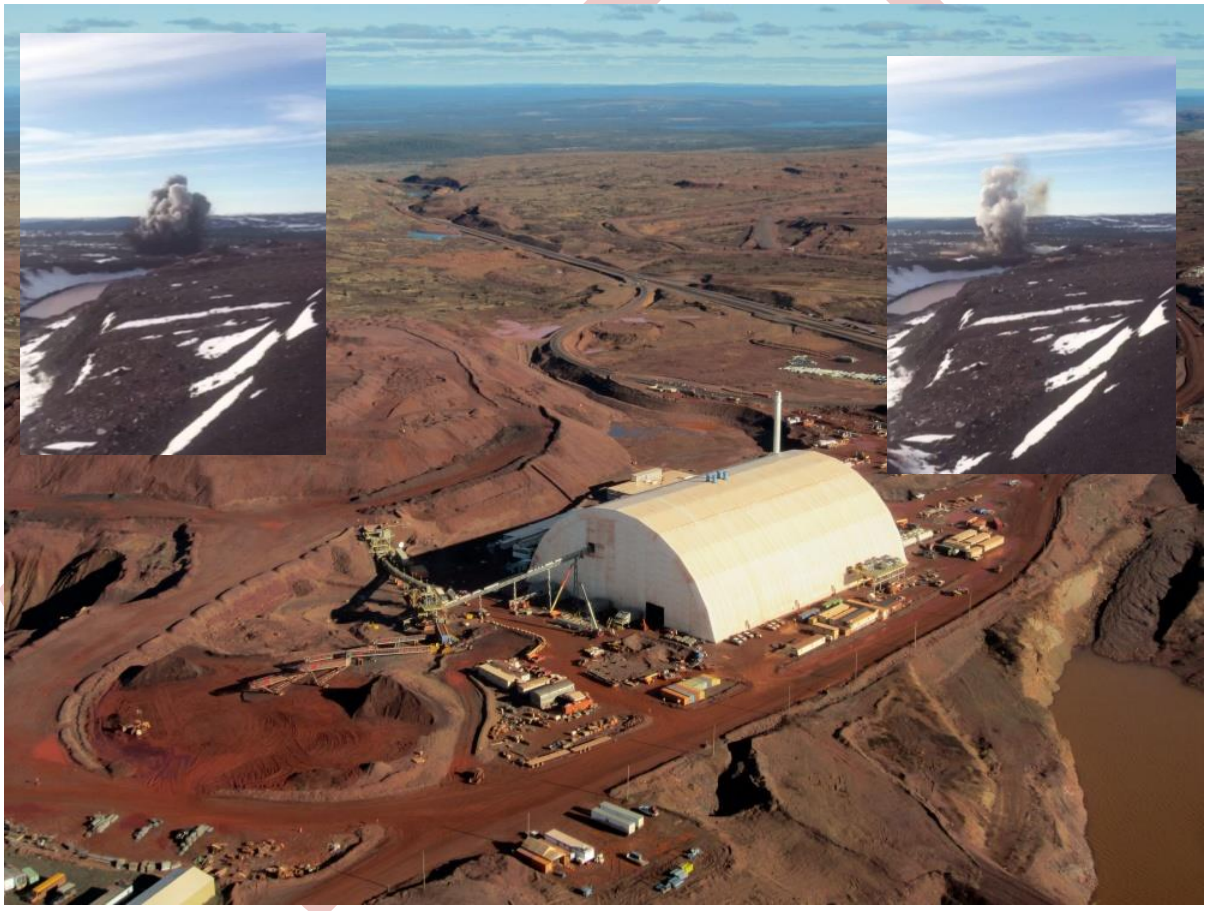
MANAGEMENT PLAN

PREVENTION AND MANAGEMENT OF BLAST GENERATED NOx

Tata Steel Minerals Canada Ltd.

Direct Shipping Ore Project



November 2015

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Appendices

1. Purpose

This procedure outlines responsibilities and guidelines for manage and assist in the minimisation and management of blast fumes, in particular oxides of nitrogen (NOx) at the Direct Shipping Ore (DSO) Project operated by Tata Steel Minerals Canada Ltd., near Schefferville, QC.

2. Scope

Those involved in blasting operations need to be aware of the causes, risks and consequences of the oxide of nitrogen (NOx) gases that may emanate from their blasting activities. The aim of this Plan is to provide information and recommended guidelines to assist in the prevention and management of blast generated NOx gases from surface blasting operations. The Plan is specific to NOx gases and covers the following areas:

- the likely causes of NOx gases from blasting
- possible control measures to prevent or minimise blast generated NOx gases
- management of NOx gases from blasting should they occur

This document provides a mitigation strategy based on the Code of Practice for Prevention and Management of Blast Generated NOx Gases in Surface Blasting established by the Australian Explosives Industry and Safety Group (AEISG) (Edition 2, August 2011)[1].

3. Background

3.1 Requirement for a Blast Generated NOx Management Strategy

Air quality studies conducted by TSMC in the context Environmental Impact Assessments for Provincial and Federal authorities show that air emissions (such as dust, NOx, CO and SO_2) generated during blasting events can negatively affect the air quality in the vicinity of the pits where blasting is conducted.

As part of an EIA submitted to the Canadian Environmental Assessment Agency (CEAA) in the fall of 2015 for the Howse Property Project (HPP), TSMC has committed to the development and implementation of a Plan for the prevention and management of blast generated NOx. This Plan will be put into effect when blasting at the HPP starts. This plan is applicable to blasting at the following pits: Howse, Fleming 7N and Timmins 3N. However, its application will be extended to other active pits as deemed necessary.

3.2 Theory – NOx in Blast Fumes

The group of gases known as Oxides of Nitrogen or NOx, of which the most common are nitric oxide (NO) and nitrogen dioxide (NO2), are often found as by-products in the post-blast gases of ammonium nitrate-based explosives. Together, these gases are loosely referred to as “NOx”. Nitric oxide is invisible, but nitrogen dioxide ranges from yellow to dark red depending on the concentration and size of the gas cloud. These gases are pollutants. NOx from blasting constitutes only a small proportion of the total NOx emissions from human activities

[1] http://www.aeisg.org.au/images/stories/aeisg_cop_nox_edition_02aug2011.pdf

(primarily power generation and motor vehicles) and natural sources. However blasting produces a sudden localised release of gases with potentially high concentrations of NOx. Such gas emissions pose a health risk if people are exposed to them before the plumes can dissipate.

Despite a long history of blast-related NOx emissions, very few quantitative studies have been done under realistic field conditions. The underlying causes of high NOx are fuel-deficiency in the explosive or detonation reactions that do not continue to completion. There are many ways in which these conditions may arise.

In the absence of a single general cause or general solution, this Plan was developed by TSMC as an aid to identifying the local cause of NOx and as a prompt for possible ways to address those causes. It should be understood that, given the complexity of the problem and the inherent variability in the blasting environment, NOx events may still occur even after prevention and mitigating actions have been put in place. The Plan therefore include advice on managing blasts that could produce NOx gases.

3.3 Causes of NOx Gases in Blasting

The post-blast gases and fumes are generated as a result of the ammonium nitrate-based explosive detonation at the blast site. The factors that trigger the formation of the NOx are various but the following factors are among the main contributors in the generation of post-blast fumes during the mining process:

- Explosive formulation and quality assurance;
- Geological Conditions;
- Climate/seasonality;
- Blast design;
- Explosive product selection;
- Contamination of explosive in the blast-hole;
- On-bench practices.

Section 5 of the Code of Practice for Prevention and Management of Blast Generated NOx Gases in Surface Blasting should be consulted as an aid to identifying causes and mitigation measures.

As a result, the formation of the toxic fumes can be managed through some preventive controls considering the geological conditions during the design phase, designing an appropriate design for the blast, selecting an appropriate product formulation for the detonation, considering the weather condition during the time of loading; implementing on-bench practiced to minimise the potentials for water ingress into blasting area; minimising the contamination of explosives in blast holes.

4. Management Procedures

4.1 Blast Design by Explosives/Precursor Manufacturer/Supplier

The manufacturer and/or supplier of the precursors or bulk explosives must ensure products are formulated appropriately to prevent/minimise the generation of NOx gases during blasting. The products should be authorised, with quality control systems in place to ensure that the manufactured/supplied products meet specifications.

For each blast, a copy of the Blast Design datasheet must be forwarded to TSMC on-site Environmental team. An example "Blast Design" datasheet is provided in Appendix A of this Plan.

The explosives manufacturer/supplier must provide documentation for modification and alterations to explosive and/or precursor formulations. Documentation must be provided to TSMC on-site Environmental team and must cover the following aspects:

1. recording any modification/alteration and updating relevant authorisations, Technical Data Sheets, Material Safety Data Sheets, work procedures, and training programs as and where relevant;
2. ensuring changes continue to meet the requirements of this Code;

4.2 Pre-Blast Environmental Assessment

In collaboration with the blasting manager, TSMC on-site Environmental team will complete a Pre-Blast Environmental Assessment. A copy of the Pre-Blast Environmental Assessment list is provided in Appendix B.

The assessment covers 6 criteria:

- Explosive Formulation and Quality Assurance
- Geological conditions
- Blast Design
- Explosive product selection
- On bench practices
- Contamination of explosives in the blast hole

The assessment may be conducted days before a blasting event is scheduled.

4.3 Pre-Blast and Post-Blast Checklist

Appendix C contains an example of the Pre-Blast / Post-Blast checklist, currently in use at the site. The Pre-Blast / Post-Blast checklist

The following parameters will be added to the Pre-Blast section of the checklist:

a) Acknowledgement of the Environmental Assessment by the responsible for drilling and blasting
b) Meteorological conditions: wind speed, wind direction, temperature, precipitation
c) For pits located in the vicinity of the Workers' camp (ex.: Howse, Fleming 7N, Timmins 3N) , blasting must be conducted while the wind is NOT blowing in direction of the Workers' camp

The following parameters will be added to the Post-Blast section of the checklist:

a) Visual Rating Scale: Assessment of the Post-Blast fume should using the AEISG visual NOx fume rating scale.
b) duration of any post-blast NOx gas event;
c) direction of movement of any post-blast NOx plume;
d) movement of any post-blast NOx gas plume relative to the established exclusion zone and any established management zone;
e) results/readings of any NOx monitoring equipment employed for the blast;
f) video results of blasts where relevant

4.4 Blast Log

Appendix D contains an example of the Blast Log used for recording blasting events. This information log will continue to be used at the site for all blasts.

VISUAL NOX FUME RATING SCALE

Level	Typical Appearance
Level 0 No NOx gas	
Level 1 Slight NOx gas	
1A Localised	
1B Medium	
1C Extensive	
Level 2 Minor yellow/orange gas	
2A Localised	
2B Medium	
2C Extensive	
Level 3 Orange gas	
3A Localised	
3B Medium	
3C Extensive	
Level 4 Orange/red gas	
4A Localised	
4B Medium	
4C Extensive	
Level 5 Red/purple gas	
5A Localised	
5B Medium	
5C Extensive	

Assessing the amount of NOx gases produced from a blast will depend on the distance the observer is from the blast and the prevailing weather conditions. The intensity of the NOx gases produced in a blast should be measured on a simple scale from 0 to 5 based on the table above. The extent of the NOx gases also needs to be assessed and this should be done on a simple scale from A to C where:-

A = Localised (ie NOx Gases localised across only a few blast holes)

B = Medium (ie NOx Gases from up to 50% of blast holes in the shot)

C = Extensive (ie Extensive generation of NOx Gases across the whole blast)

Pantone colour numbers have been included in the following Field Colour Chart to ensure colours will be produced correctly thereby ensuring a reasonable level of standardisation in reporting NOx gas events across the blasting industry.

Level	Colour	Pantone Number
Level 0 No NOx gas		Warm Grey 1C (RGB 244, 222, 217)
Level 1 Slight NOx gas		Pantone 155C (RGB 244, 219, 170)
Level 2 Minor yellow/orange gas		Pantone 157C (RGB 237, 160, 79)
Level 3 Orange gas		Pantone 158C (RGB 232, 117, 17)
Level 4 Orange/red gas		Pantone 1525C (RGB 181, 84, 0)
Level 5 Red/purple gases		Pantone 161C (RGB 99, 58, 17)

5. Documentation and Retroaction

5.1 Documentation

For each blast, the following documents will be reviewed and filed by TSMC on-site environmental team:

a) Blast Design by blasting company or responsible
b) Pre-Blast Environmental Assessment
c) Pre-Blast and Post-Blast Checklist
d) Blast Log

5.2 Retroaction

Any reported significant NOx event or trends should be investigated to minimize the potential for ongoing generation of NOx gases and to mitigate the potential impacts of any such event. Such investigation should involve the explosives manufacturer and/or supplier.

The fault tree (see Section 6 Code of Practice for Prevention and Management of Blast Generated NOx Gases in Surface Blasting) should assist any investigation and ensure all relevant factors are considered and adequately addressed. The results of any investigation of post-blast NOx gases should then be factored into the site specific procedures to minimize their production and to mitigate impacts.

Appendix A

Blast Design Datasheet

Example Datasheet Currently in Use. To Be Amended As Per This Plan.

BLAST DESIGN

GREY ROCK MINING

Layout Date #: May 2/15

Planned Blast Date #: MAY. 01, 2015

Project: KIVIVIC 1C - PHASE 1 Job #: 1474 429 Client: TATA Steel Minerals Canada Blast #: DE-K1C-730_7&8

# of Holes:	134	Bottom Primer Type:	Spartan 350
Diameter:	165.1mm	Bottom Detonator Type:	NonEL Det 25-500 18m
Pattern:	5.18m x 5.18m	Column Primer Type:	Spartan 200
Row 1 Burden:		Column Detonator Type:	NonEL Det 25-500 12m
Target Drilling Elevation:	730.0 m	Total Drilling - no sub:	m
Sub-Drill:	1.0 m	Total Drilling - with sub:	m
Primary Explosive:	BlastGel 1070	Estimated Volume:	22,571 m³
Explosive Density:	g/cm³	Rock Density:	g/cm³
Collar:	2.1 m	Tonnage:	t
Approx. Explosive Qty:	14,671 kg	Design Powder Factor:	0.65 kg/m³

GUARDING LOCATIONS (show number on Blast Area Plan)

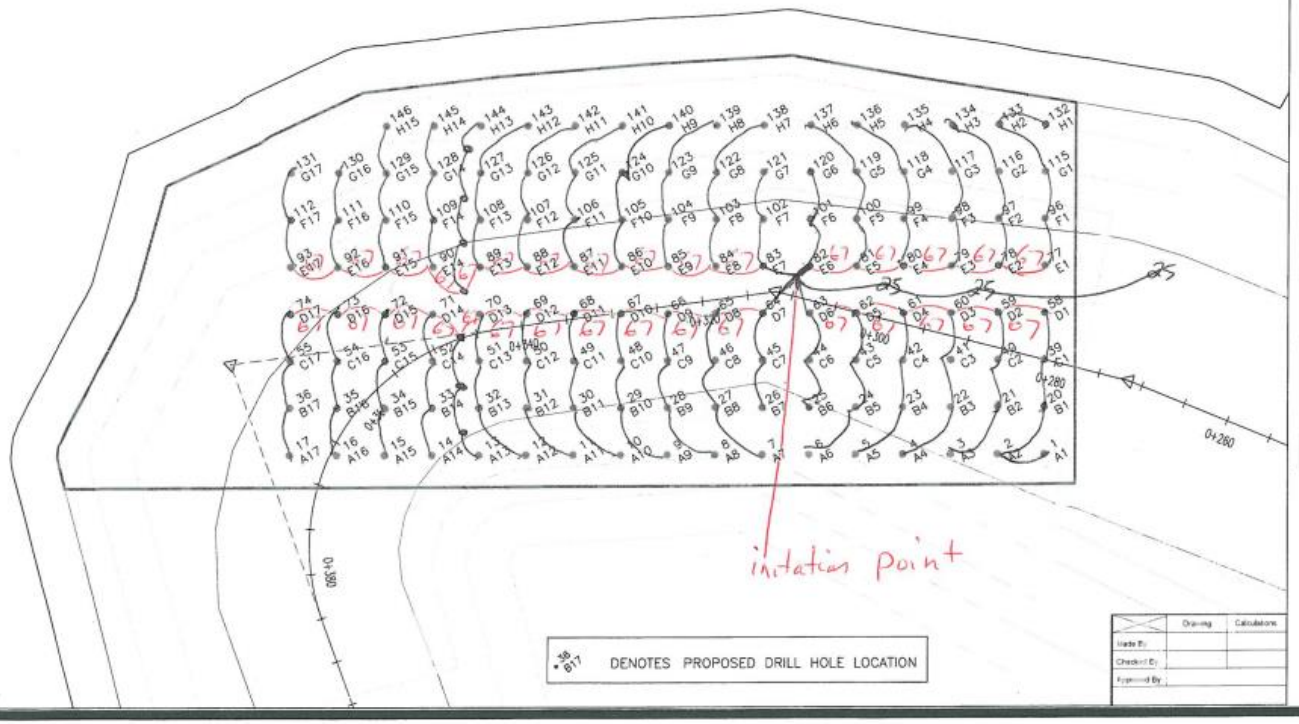
1:			6:		
2:			7:		
3:			8:		
4:			9:		
5:			10:		

Geographic Coordinates of Blasting Area:

N54° 58' 28.91"
W62° 46' 14.92"

PROPOSED DESIGN

BLAST PLAN



	Drawing	Calculations
Made By:		
Checked By:		
Approved By:		

BLAST AREA PLAN

Blast Design by: Roderick Loger

Blaster-in-Charge: Roderick Loger

Appendix B

Pre-Blast Environmental Assessment List

Pre-Blast Environmental Assessment
TSMC DSO - SCHEFFERVILLE

Blast #: **Pit ID:**	**Scheduled Blast Date:**
Assessed by:	**Assessement Date:**

Assessment Criteria	**Likelihood**	**Notes**
PB 1: Explosive Formulation and Quality Assurance		
Explosive product incorrectly formulated		
Explosives product change		
Inadequate mixing of raw materials		
Delivery system metering incorrectly		
Delivery system settings for explosive product delivery overridden		
Explosive precursors not manufactured to specification		
Precursor degradation during transport and storage		
Raw material changes		
Other:		
PB 2: Geological conditions		
Lack of relief in weak/soft strata		
Inadequate confinement in soft ground		

Explosive product seeping into cracks		
Dynamic water in holes		
Moisture in clay		
Blast hole wall deterioration between drilling and loading eg cracks, voids, hole contraction		
Chemistry of rock type e.g. limestone		
Other:		
PB 3: Blast Design		
Explosive desensitisation due to the blast hole depth		
Inappropriate priming and/or placement		
Mismatch of explosives and rock type		
Inter-hole explosive desensitisation		
Intra-hole explosive desensitisation in decked blast holes		
Initiation of significant explosive quantities in a single blast event		
Other:		
PB 4: Explosive product selection		
Non water-resistant explosive products loaded into wet or dewatered holes		
Excessive energy in weak/soft strata desensitising adjacent explosive product columns		
Primer of insufficient strength to initiate explosive column		
Desensitisation of explosive column from in-hole cord initiation		
Inappropriate explosive product for application		
Other:		
PB 5: On bench practices		
Hole condition incorrectly identified		

Blast not drilled as per plan		
Dewatering of holes diverts water into holes previously loaded with dry hole explosive products		
Blast not loaded as per blast plan		
Other:		
PB 6: Contamination of explosives in the blast hole		
Explosive product mixes with mud/sediment at bottom of hole.		
Interaction of explosive product with drilling muds.		
Penetration of stemming material into top of explosive column (fluid/pumpable explosive products only)		
Water entrainment in explosive product		
Moisture in ground attacking explosive product		
Contamination of explosives column by drill cuttings during loading		
Rainfall on a sleeping shot.		
Other:		

Appendix C

Pre-Blast / Post-Blast Checklist

Example checklist Currently in Use. To Be Amended As Per This Plan.

ScotiaBlast Ltd.
DRILLING & BLASTING

MUNICIPAL GROUP OF COMPANIES
NORTHERN OPERATIONS

Pre-Blast Checklist / Liste à Cocher Avant-Sautage

Date / Date : May 3/15

General Contractor / Entrepreneur Général : Grey Rock

Project / Projet : Goodwood Quarry

Blaster-in-charge / Boutefeu en charge : Roderick Lodo

Inspect immediate and surrounding area for structures and roads leading into the affected area / Inspectez la zone immédiate et environnante pour les structures et les routes menant à la zone touchée ☑

Inspect work area for any hazards or dangerous conditions / Inspectez la zone de travail pour tous les dangers ou des conditions dangereuses ☑

Conduct tailgate meeting - Review all hazards, safety equipment required and job descriptions / Effectuez réunion sur chantier - Examiner tous les dangers, l'équipement de sécurité requis et les procédures de travail ☐

Ensure locates for utilities are completed / Assurez-vous de localiser les services ☑

Review blast design and adjust according to site conditions as required before loading / Revoyez la conception du tir et ajustez selon les conditions du site avant le chargement au besoin ☑

Ensure required blast protection is in place / Assurez-vous que le contrôle des projections nécessaire est en place
i.e. : bell covering, protective measures for structures, blasts mats, collart control /
C'est-à-dire : couvre fils, des mesures de protection pour les stuctures, matelas, contrôle des collets ☑

Notify owner, general contractor and local residents of the blasts / Avertissez propriétaire, entrepreneur général et les habitants des sautage ☑

Ensure the guarding procedures are reviewed, including the following: / Assurez-vous que les procédures d'évacuation sont examinées, y compris ce qui suit:
- Confirm guard locations and assign guards as per blast area plan / Confirmez la zone d'évacuation et attribuez des gardes selon la zone sur le plan ☑
- Check radios for group communication / Vérifiez radios pour la communication de groupe ☑
- Review clearing procedure and site specific guarding procedure with all personnel / Revisez la procédure d'évacuation et les zones de garde avec l'ensemble du personnel ☑

Program and install seismographs at nearest structure / Programmez et installez des sismographes où la structure la plus proche N/A ☐

Check blast area and remove all equipment and materials / Vérifiez que tous les équipements et matériaux à l'intérieur de la zone d'évacuation soient enlevé ☑

Put video tape blast / Installez caméra pour sautage N/A ☐

Post-Blast Checklist / Liste à Cocher Après-Sautage

Review blast area / Révisez la zone de dynamitag
- Visually and physically confirm blast has completely fired / Visuellement et physiquement confirmez que le sautage a bien détoné. ☑
- (If misfire occurred, refer to Accident Prevention Program) / (Si sautage raté, reportez-vous au programme de prévention des accidents). ☑

Investigate surroundings for possible damage / Vérifiez les alentours si dommage causé ☑

Retrieve seismographs / Récupérez les sismographes N/A ☐

Ensure before leaving site all materials and explosives have been picked up / Assurez-vous avant de quitter les lieux tous les matériaux et des explosifs ont été ramassés ☑

*****Note: Abandoning explosives is a criminal offence*** / ***Remarque: L'abandon d'explosifs est une infraction pénale*****

Ensure all explosives counted and properly stored with amount returned on bill of lading / Assurez-vous que tous les explosifs stockés balance avec le montant utilisé ☑

Return blast report completed to office / Retournez le rapport de sautage complété au bureau ☑

Return video to office / Retournez le vidéo au bureau. ☑

Wildlife and environment survey conducted / Enquête de l'environnement et de la faune mené ☑

Comments / Commentaires

Blaster-in-charge sign / Signature Boutefeu en charge : Roderick Lodo

Form 28601

Appendix D

Blast Log

Example Datasheet Currently in Use.

CONSBEC INC.
MINING+CONSTRUCTION

BLAST LOG

DESIGN ☐
REPORT ☑

№ 019507

DATE Sunday, May 3rd TIME
CONTRACT / JOB # XLC-730-06a
LOCATION Kirwick Pit

BLASTER Randall Fraser (Please Print)
SIGNATURE

DESIGN:

BLAST TYPE Non Electric, Open Face
SIZE OF HOLES 8"
NO. OF HOLES 79
NO. OF DELAYS
MAX. LOAD PER DELAY
HOLES PER SERIES
POWDER FACTOR

LOADING:

COLLAR 2.4m - 3.0m
COLUNM LOAD Bulk emulsion
TOE LOAD Spartan 200g. boosters
SUBGRADE 1m

EXPLOSIVES:

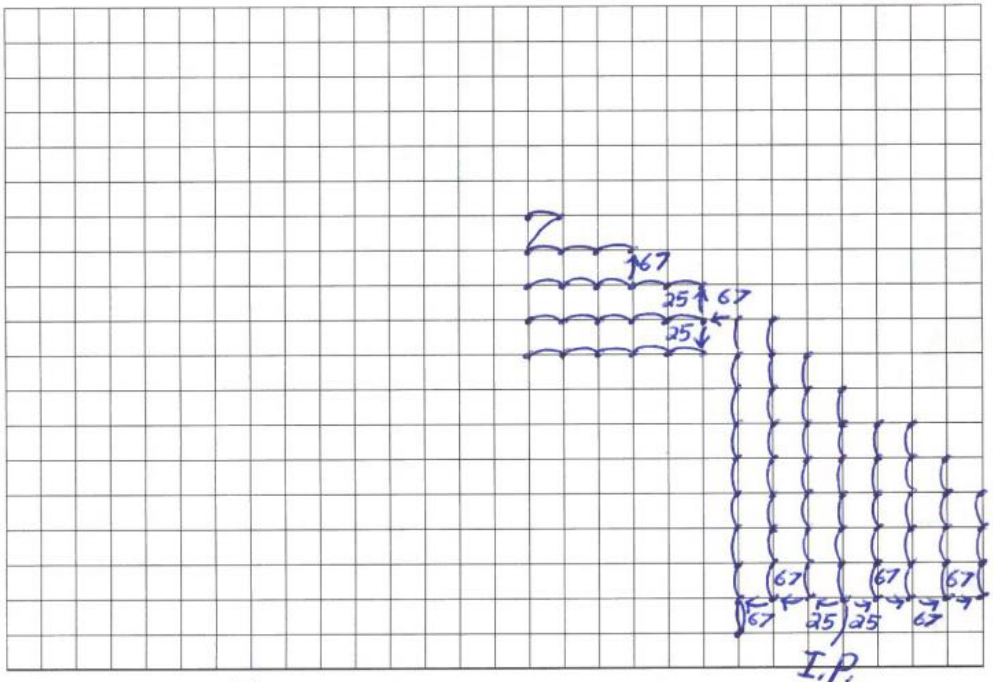
	TYPE/BLEND	kgs/ # units
1)	Emulsion 80/20	
2)	Spartan 200g.	149
3)		

DETONATORS / INITIATORS:

	TYPE	LENGTH	# UNITS
1)	Nonel EZ det 25/500	18m	79
2)	EZ det 25/500	24m	74
3)	EZ det 67m	9m	17
	E-Electric	3.5m	1

DIMENSIONS: 0m

WIDTH
LENGTH
AVE CUT AVE. DRILL DEPTH
PATTERN : BURDEN 7 SPACING 7



PRE BLAST DESIGN ☒

NOTES / REMARKS: No misfires were seen before blast and no misfires were seen after blast
HAZARDS & DISTANCE : none

IS THERE A GARDING PLAN & PROCEDURE? (YES) NO
ARE GARDS IN PLACE? (YES) NO
WAS THERE A CUT SHEET PROVIDED BY THE DRILLER? (YES) NO
CUT SHEET #'s

POST BLAST REPORT ☒

FLYROCK DAMAGE: None

MISFIRE: YES (NO)
IF YES, REPORT TO DEPT. OF LABOUR

SEISMIC DATA: N/A UNIT #'s
WIND DIRECTION VELOCITY: Calm
ATMOSPHERIC CONDITIONS: Clear / sunny
BULK USED? (YES) NO
BULK TRUCK NUMBER's 121
BULK TRUCK DRIVER Tim Silva

Total Plant Richness for Howse Pit Study Area					
				Species Status	
Latin Name	English Name	French Name	WA*	Canada	Province
TREE					
Larix laricina	Tamarack	Mélèze laricin	FMH		
Picea glauca	White spruce	Épinette blanche			
Picea mariana	Black spruce	Épinette noire	FMH		
SHRUB					
Arctous rubra	Red bearberry	Busserole rouge			
Betula glandulosa	Glandular birch	Bouleau glanduleux	FMH		
Empetrum nigrum	Black crowberry	Camarine noire			
Kalmia polifolia	Pale bog laurel	Kalmia à feuilles d'Andromède	OMH		
Myrica gale	Sweetgale	Myrique baumier	OMH		
Phyllodoce caerulea	Purple mountain heather	Phyllodoce bleue			
Rhododendron groenlandicum	Common Labrador tea	Thé du Labrador	OMH		
Ribes glandulosum	Skunk currant	Gadellier glanduleux	FMH		
Rubus chamaemorus	Cloudberry	Chicouté	FMH		
Rubus pubescens	Dewberry	Ronce pubescente	FMH		
Salix arctophila	Northern willow	Saule arctophile			
Salix bebbiana	Bebb's willow	Saule de Bebb	FMH		
Salix pellita	Satiny willow	Saule satiné	OMH		
Salix planifolia	Tea-leaved willow	Saule à feuilles planes			
Vaccinium angustifolium	Early lowbush blueberry	Bleuet à feuilles étroites			
Vaccinium corymbosum	Highbush blueberry	Bleuet en corymbe	FMH		
Vaccinium oxycoccos	Small cranberry	Canneberge commune	OMH		
Vaccinium uliginosum	Alpine bilberry	Airelle des marécages			
Vaccinium vitis-idaea	Mountain cranberry	Airelle rouge			
Viburnum edule	Squashberry	Viorne comestible	FMH		
HERB					
Achillea millefolium	Common yarrow	Achillée millefeuille			
Agrostis sp.	Bentgrass	Agrostide			
Bromus ciliatus	Fringed brome	Brome cilié	FMH		

*WA= Wetland Affinity (OMH=Obligatory, FMH=Facultative) (MDDEP, 2010)

Total Plant Richness for Howse Pit Study Area					
				Species Status	
Latin Name	English Name	French Name	WA*	Canada	Province
Calamagrostis canadensis	Bluejoint reedgrass	Calamagrostide du Canada	FMH		
Carex aquatilis	Water sedge	Carex aquatique	OMH		
Carex bigelowii	Bigelow's sedge	Carex de Bigelow	FMH		
Carex grayii	Gray's sedge	Carex de Gray	FMH		
Carex leptalea	Bristlystalked sedge	Carex à tiges grêles	OMH		
Carex limosa	Mud sedge	Carex des bourbiers	OMH		
Carex oligosperma	Few-feeded sedge	Carex oligosperme	OMH		
Carex rostrata	Swollen beaked sedge	Carex rostré	OMH		
Carex sp.	Sedge	Carex			
Carex trisperma	Three-seeded sedge	Carex trisperme	OMH		
Chamerion angustifolium	Fireweed	Épilobe à feuilles étroites			
Coptis trifolia	Goldthread	Savoyane			
Cornus canadensis	Bunchberry	Quatre-temps			
Danthonia spicata	Poverty oatgrass	Danthonie à épi			
Deschampsia cespitosa	Tufted hairgrass	Deschampsie cespiteuse	FMH		
Eleocharis sp.	Spikerush	Éléocharide			
Equisetum sylvaticum	Woodland horsetail	Prêle des bois	FMH		
Eriophorum russeolum	Russet cottongrass	Linaigrette rousse			
Eurybia radula	Low rough aster	Aster rude	OMH		
Geum rivale	Water avens	Benoîte des ruisseaux	OMH		
Heracleum maximum	Common cow parsnip	Berce laineuse			
Huperzia selago	Northern firmoss	Lycopode sélagine			
Lycopodium annotinum	Stiff clubmoss	Lycopode innovant			
Petasites frigidus var. palmatus	Palmate coltsfoot	Pétasite palmé			
Rhinanthus minor	Little yellow rattle	Petit rhinanthe			
Solidago altissima	Tall goldenrod	Verge d'or très élevée			
Solidago macrophylla	Large-leaved goldenrod	Verge d'or à grandes feuilles			
Symphyotrichum puniceum	Purple-stemmed aster	Aster ponceau	FMH		
Trichophorum cespitosum	Tufted clubrush	Trichophore cespiteux			

*WA= Wetland Affinity (OMH=Obligatory, FMH=Facultative) (MDDEP, 2010)

Total Plant Richness for Howse Pit Study Area					
				Species Status	
Latin Name	English Name	French Name	WA*	Canada	Province
Viola sp.	Violet	Violette			
BRYOPHYTE					
Cladina rangiferina	Grey reindeer lichen	Cladonie des rennes			
Cladina stellaris	Star-tipped reindeer lichen	Cladonie étoilée			
Pleurozium schreberi	Schreber's big red stem moss	Hypne de Schreber			
Polytrichum sp.	Hollyfern	Polytric			
Scorpidium scorpioides	Scorpion feather moss	Scorpidie scorpion			
Sphaerophorus sp.	Coral lichen	Shérophore			
Sphagnum compactum	Compact sphagnum	Sphaigne compacte			
Sphagnum sp.	Sphagnum	Sphaigne	FMH		

*WA= Wetland Affinity (OMH=Obligatory, FMH=Facultative) (MDDEP, 2010)

1 METHODOLOGY

1.1 Wetlands Functions

Wetland functions assessment was carried out based on the approach presented by Tiner (2003, 2011). The approach enables to assess wetland functions at the watershed level. Functions were chosen based on knowledge of the RSA ecology and hydrology and literature review (Hanson et al., 2008; Tiner; 2003; OWES, 2013). OWES (2013) includes the evaluation of functions in the ecological value assessment and the functions determined for wetlands in northern Ontario can be applied to western Labrador.

The terrestrial ecosystem classification carried out for Howse Project (Groupe Hémisphères, 2014, See Volume 3, Appendix J) and the wetland classification based on the Canadian Wetland Classification System (NWWG, 1997) were also used to determine wetland functions. Wetland functions were attributed to wetlands, whether or not they are located in a complex.

1.1.1 Position in the Watershed

Wetlands or wetland complexes were first attributed a position in the watershed based on the Strahler stream order (Tarborton et *al.*, 1991). The headwaters are the first order and downstream segments are defined at confluences (two streams running into each other). At a confluence, if the two streams are not of the same order, the highest numbered order is maintained on the downstream segment. At a confluence of two streams with the same order, the downstream segment gets the next highest numbered order. Figure 1 shows a representation of the Strahler stream order.

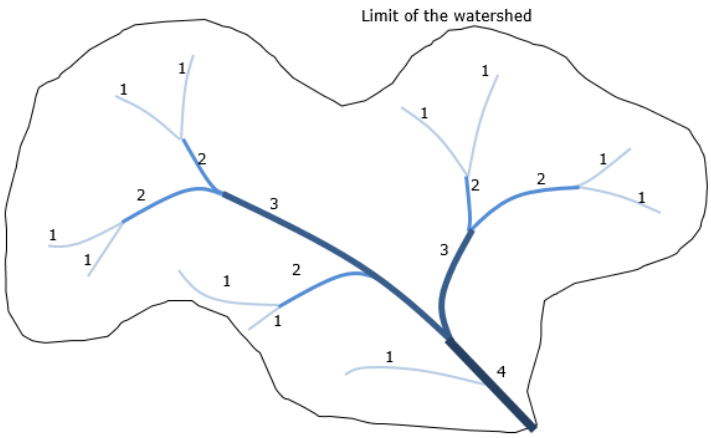


Figure 1 Representation of the Strhaler stream order

1.1.2 Water Flow Path

The water flow path indicates the type of directional flow of water associated with wetlands. Table 1 presents the type and definitions of the water flow path used in the assessment. Figure 2 shows a representation of the water flow paths.

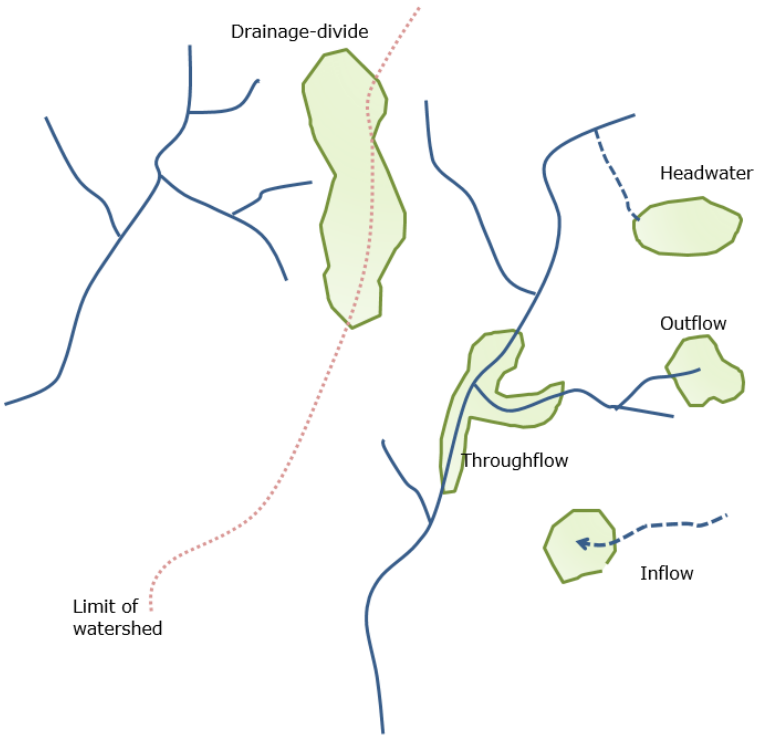


Figure 2 Representation of the Water Flow Paths

Table 1 Water Flow Path Identified Regionally

NAME	DEFINITION
Drainage-divide	Wetlands that have outflow in two directions to two separate drainage systems.
Headwater	Sources of streams or wetlands along first-order intermittent streams.
Inflow	Sinks where no surface water outlets exist, yet water is entering via a stream or river or upslope wetland
Isolated	Closed depressions or flats where water comes from direct precipitation, localized surface runoff and/or groundwater discharge
Outflow	Have water leaving and moving downstream via a watercourse or a slope wetland
Throughflow	Water flows though due to presence of a watercourse or other wetland above and below these wetlands

1.1.3 Wetlands Late-seral Ecotype

Several terrestrial ecosystem mapping (TEM) were carried out in the Schefferville area, including the Howse local study area. Table 2 presents the wetland ecotypes that are found locally and regionally. The TEM report for Howse Project is available in Volume 3, Appendix J.

Table 2 Late-Seral Wetland Ecotypes

LATE-SERAL ECOTYPE		DESCRIPTION
CODE	**COMMON NAME**	
Mid Subarctic Forest (MSF)		
MSF07	Fluvial White Spruce / Sedge	White spruce-moss stand; thin-thick deposits; fine soil texture; riparian; flooded sites imperfectly to poorly drained
MSF08	Black Spruce/ Tamarack Forested Swamp	Forested swamp; denser stand than Ecotype MSF10; organic deposits; Sphagnum-dominated; poorly drained
MSF09	Black Spruce/ Tamarack Fluvial Spruce Fen	Forested fen; fluvial or organic deposits; sedge-dominated; poorly drained
MSF10	Black Spruce Bog	Uniform forested bog; organic deposits; forest floor dominated by sedge and grass; poorly drained
MSF11	Structured Herb Fen	Structured non-forested herb fen; organic deposits; vegetation dominated by sedge and grass; very poorly drained
MSF12	Uniform Herb Fen	Uniform non-forested herb fen; organic deposits; vegetation cover dominated by sedge and grass; poorly drained
MSF13	Non-Uniform Herb Fen	Random non-forested herb fen; organic deposits; vegetation cover dominated by sedge and grass; poorly drained
MSF14	Uniform Shrub Fen	Uniform non-forested shrub fen; organic deposits; vegetation cover dominated by sedge and grass; poorly drained
MSF15	Uniform Fluvial Shrub Fen	Uniform non-forested shrub fen; fluvial or rich organic deposits; vegetation cover dominated by sedge and grass; soil richer and more diverse plant community than Ecotype MSF14; imperfectly to very poorly drained
High Subarctic Tundra (HST)		
HST05	Riparian Artic Alpine Shrub	Riparian fen; fluvial or organic deposits; ground cover dominated by sedge and grass; imperfect to poor drainage
HST06	Uniform Sedge Fen	Uniform herb fen; organic deposits; ground cover dominated by sedge and grass; poor to very poor drainage
HST07	Uniform Shrub Fen	Uniform shrub fen; dominated by diverse shrub species of the Ericaceae family; ground cover dominated by sedge and grass; poor drainage

Absent from Howse LSA

1.1.4 Defining Key Functions for Wetlands

Functions were chosen from the literature (See section 1.1) and based on the knowledge of the regional area. Information concerning hydrology, fish and fish habitat, as well as bird habitat that were used for the wetland functions assessment were selected based on the different surveys carried out locally and regionally.

Functions are classified as hydrological, ecological or biogeochemical. Table 3 presents the functions with its correlation to watershed position and water flow path. Functions were attributed to ecotypes.

Table 3 Wetland Functions and Correlation to Characteristics

FUNCTION	TYPICAL WATERSHED POSITION	WATER FLOW PATH	WETLAND TYPES DESCRIPTION AND REQUIREMENTS	WETLANDS TYPES THAT ACCOMPLISH THE FUNCTION	
				High	Moderate
Hydrological					
H1. Flood control	3 or higher	Throughflow	Wetlands along rivers and lakes	Any	–
H2. Stream flow regulation	1	Headwater Outflow	Any wetlands along first order streams	MSF15 HST05	Any other
	2	Throughflow	Wetlands along ponds and lakes	–	Any
	Any	Throughflow	Floodplain	–	MSF07, MSF09, MSF15 HST05
H3. Recharge of regional local supply aquifer	Any	Outflow	Wetlands classified as discharge swamps or fens	MSF08 (only type locally present)	–
H4. Surface water detention	1	Headwater Outflow	Dominated by trees or dense stands of shrubs	MSF07, MSF08, MSF09, MSF15 HST05	MSF10, MSF14 HST07
Ecological					
E1. Highly productive habitat	Any	Any	Known productive wetland based on survey	MSF07	MSF09, MSF15
E2. Potential species at risk habitat	Any	Any	Potential habitat for Grey-cheeked Thrush and Rusty Blackbird	MSF08, MSF09, MSF10	MSF15, HST05
E3. Fish habitat protection	Any	Any	Any wetland along a stream, pond or lake with fish habitat	MSF07, MSF09, MSF10, MSF15, HST05	–

FUNCTION	TYPICAL WATERSHED POSITION	WATER FLOW PATH	WETLAND TYPES DESCRIPTION AND REQUIREMENTS	WETLANDS TYPES THAT ACCOMPLISH THE FUNCTION	
				High	Moderate
E4. Waterfowl and waterbird significant stopover habitat	Any	Any	Known stopover based on survey	MSF11, MSF12 MSF13, MSF14	–
Biogeochemical					
B1. Shoreline protection	Any	–	Wetlands along waterbodies	Any	–
	Any	–	Wetlands along streams	MSF07, MSF15 HST05	
	Any	–	Wetlands along ponds	–	Any
B2. Contaminant control	Any	Throughflow	Wetlands downstream of Anthropogenically altered landscapes	Forested wetland MSF07, MSF08, MSF09, MSF10	Non-forested wetland MSF11, MSF12, MSF14, MSF15 HST05, HST06
B3. Sediment control	Any	Throughflow	Seasonnally flooded wetlands (except bogs) and wetland along ponds	Forested wetland MSF07, MSF09	Non-forested wetland MSF11, MSF12, MSF14, MSF15 HST05, HST06
	Any	Throughflow	Flat wetlands less frequently flooded (periodically and short time of high water level)	–	Forested wetland MSF08, MSF10
	Any	Outflow	Wetlands along ponds	–	Forested wetland MSF07, MSF08, MSF09, MSF10
	Any	Throughflow	Wetlands downstream of Anthropogenically altered landscapes	–	Any

1.2 Wetland Ecological Value Assessment

The assessment is based on the criteria used for assessing the ecological value of wetlands (Joly et al., 2008; OWES, 2013). A total of 6 criteria were used, all complementary with the ecological function assessment.

The assessment of the ecological value is carried out at a wetland polygon-scale. This encounters the fact that complexes of wetland are so vast that parts of a same complex may be several kilometres away and thus have a very different ecological value as their characteristics and functions differ.

Ecological value assessment of wetland wetland complexes, has been made for comparison purposes. A complex is actually a group of adjacent wetlands hydrologically connected. Wetlands distant of 30 meters or less are considered part of a complex. Figure 3 illustrates a wetland complex.

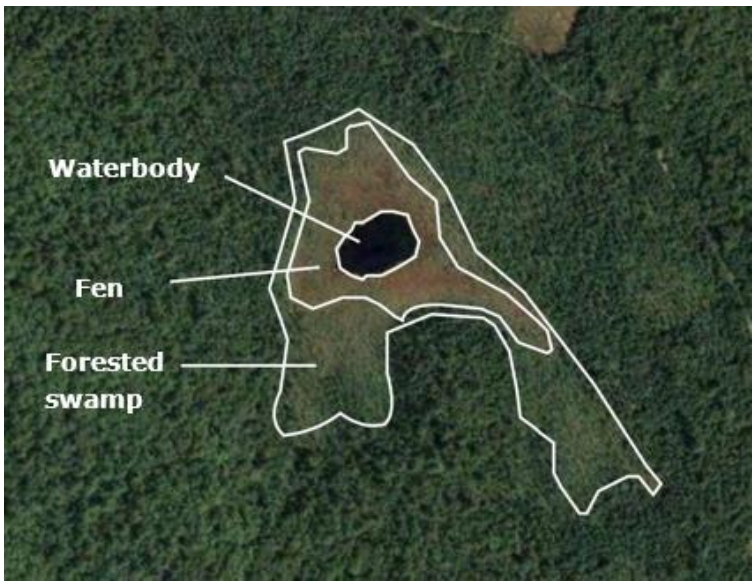


Figure 3 Example of a wetland complex

1.2.1 Wetland Area /10

The value is assessed comparing the area of a wetland to the largest wetland present within the RSA. Classes of areas were therefore determined to take into account the average area of wetlands present in the RSA.

More than 20 ha	10
10 to 20 ha	8
5 to 10 ha	6
1 to 5 ha	4
Less than 1 ha	2

1.2.2 Complexity /6

The complexity refers to the number of ecosystems within a wetland or a complex. A high number of different ecosystems brings a high diversity of habitats and therefore of wildlife and plant species. For guidance, two types of treed swamps characterized by different populations represent two different ecosystems.

Maximum 6 points, 2 points per different ecosystem

1.2.3 Hydrological Connectivity /10

Hydrological connectivity also takes into account the proximity of other wetlands. The method is based on the Ontario Wetland Evaluation system (OWES, 2013). The proximity analysis is done on wetlands outside of a wetland complex (more than 30 m distance). Hydrological connectivity is essential to ensure exchanges between ecosystems and ensure the sustainability of wetlands.

Hydrologically connected by surface water to other wetlands (different dominant wetland type), or open lake or deep river within 1.5 km	10
Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km	9
Hydrologically connected by surface water to other wetlands (different dominant wetland type), or open lake or deep river from 1.5 to 4 km away	7
Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away	5
Within 0.75 km of other wetlands (different dominant wetland type) or open lake or deep river, but not hydrologically connected by surface water	3
Within 1 km of other wetlands, but not hydrologically connected by surface water	1
No wetland within 1 km	0

1.2.4 Scarcity /20

The scarcity of wetland is defined by its uniqueness and its relative rarity, within the LSA and compared to the RSA. The scarcity of a wetland indicates the fragility and the vulnerability of its various habitats to disappear. The scarcity is thereby calculated crossing the rank values obtained for the relative rarity and uniqueness of each ecotype in a bidimensional relational matrix, as presented at Table 4. A relatively rare and unique ecosystem thus obtain maximum points.

The relative rarity of an ecosystem is defined by the proportion that this ecosystem occupies within the LSA compared to the proportion of the same ecosystem outside the LSA. If the proportion is higher in the LSA than in the RSA, its vulnerability is increased because a disturbance in the LSA can cause a substantial decline of an ecosystem and habitat it supports.

The uniqueness defines the global rarity of an ecosystem. The smaller the area occupied by a wetland is, the more it is unique. An ecosystem unique in the RSA obtain maximum points.

Table 4 Scarcity Relational Matrix Between Uniqueness and Relative Rarity

			RELATIVE RARITY					
			1	2	3	4	5	6
			Proportion is higher in the LSA compared to the RSA		Proportion is similar in the LSA compared to the RSA		Proportion is smaller in the LSA compared to the RSA	
UNIQUENESS	1	Regionally unique	20	18	16	14	12	10
	2		18	16	14	12	10	8
	3	Regionally uncommon	16	14	12	10	8	6
	4		14	12	10	8	6	4
	5		12	10	8	6	4	3
	6	Regionally common	10	8	6	4	3	2

Table 5 Final Score for Each Ecosystem

ECOTYPE	UNIQUENESS	RELATIVE RARITY	POINTS
MSF07	4	3	10
MSF08	6	2	8
MSF09	1	1	20
MSF10	4	3	10
MSF11	2	6	8
MSF12	6	3	6
MSF13	1	1	20
MSF14	5	4	4
MSF15	3	3	12
HST05	5	5	4
HST06	3	4	10
HST07	2	5	10

The evaluation of scarcity value of wetlands is calculated with the proportion of each ecosystem within a delineated polygon. Thus, if 30% of a polygon is covered with an ecotype that scores 16 points and 70% is covered with an ecotype that scores 6 points, the evaluation will be made with the following equation:

$$Scarcity = (0{,}3 \times 16) + (0{,}7 \times 6)$$

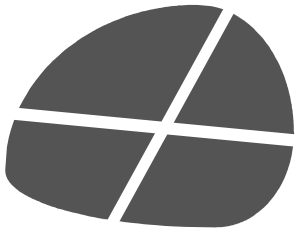
1.2.5 Fragmentation /10

Fragmentation is the division of an ecosystem in several pieces. This is generally attributed to the presence of roads, power lines or other human disturbance.

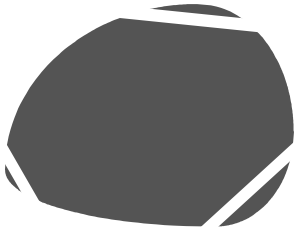
Fragmentation results in a loss of surface area and an alteration of the hydraulic connectivity between the fragments. The most observed effect is the edge effect. Indeed, the opening of the ecosystem at the edge of fragments can lead to change in the floristic composition and thereby animal communities (Fonseca, 2008). Some species are more sensitive to fragmentation and require large areas connected to the natural environment.

The number and size of residual fragments are the factors to consider in assessing the effect of fragmentation (Figure 4). In terms of assessment of the ecological value of wetlands, the remaining size of the main fragment compared to the total area is used.

Recent exploration work has not been considered as aerial photographs dated from 2008.



Four fragments of similar size important impact



Four fragments with one bigger impact less noticeable

Figure 4 Examples of fragmentation

No fragmentation	10
The most important fragment represents 76 to 99 % of the initial area	8
The most important fragment represents 51 to 75 % of the initial area	5
The most important fragment represents 26 to 50% of the initial area	2
The most important fragment represents 0 to 25% of the initial area	0

1.2.6 Wetland Functions /44

Functions for wetland were classified as "High" or "Moderate". It is based on the capacity of a specific ecotype to fulfill a function, as seen in Table 3.

Points are attributed based on this capacity: 7 points for each "High" and 4 points for each "Moderate".

In case of a complex that has 2 wetlands fulfilling a same function with different capacities, the maximum score is considered.

This criteria has a higher ponderation since several characteristics are encountered in the function assessment.

1.2.7 Ecological Value Assessment

The ecological value is evaluated using six criteria. Each one has a predefined score in the calculation of the final value. The maximum score is 100 points. Table 6 summarizes the weighting of criteria.

Table 6 Summary of Criteria for Ecological Value Assessment

CRITERIA	VALUE
Wetland area	/10
Complexity	/6
Hydrological connectivity	/10
Scarcity	/20
Fragmentation	/10
Wetland functions	/44
Ecological value **Low :** **0-25** **Medium :** **26-50** **High** **51-75** **Very High :** **76-100**	**/100**

2 RESULTS

Table 1 presents a summary of the wetland functions and ecological value assessment. Table x presents the complete ecological value assessment.

Table 1 Summary of Wetland Functions

WETLAND NUMBER	ECOTYPE	CWC CLASSIFICATION	FUNCTIONS - HIGH	FUNCTIONS - MODERATE
H-MH-01	MSF08	Discharge Swamp	H3 E2	
H-MH-02	MSF12/10	Basin Fen		
H-MH-03	MSF12/10	Basin Fen		
H-MH-04	MSF10/12	Veneer Bog	E2	H4
H-MH-05	MSF08/12/10	Discharge Swamp	H3 H4 E2	
H-MH-06	MSF12/10	Basin Fen		
H-MH-07	MSF14	Riparian Fen		B3
H-MH-08	MSF15	Riparian Fen	E3 B1	H2 E1 E2
H-MH-09	MSF15/09	Riparian Fen	B1	H2 E1 E2
H-MH-10	MSF08/10	Flat Swamp	E2 H4	
H-MH-11	MSF10/12/14	Veneer Bog	E2	H4
H-MH-12	MSF15/08	Riparian Fen	B1	H2 E1 E2 B3
H-MH-13	MSF12	Channel Fen		B3
H-MH-14	MSF12/10	Spring Fen		B3
H-MH-15	MSF15	Riparian Fen	B1	H2 E1 E2 B3
H-MH-16	MSF14/12	Riparian Fen	E3	B3
H-MH-17	MSF14/12	Riparian Fen		B3
H-MH-18	MSF10/12	Flat Bog	E2	H2 H4
H-MH-19	MSF12/10	Basin Fen		H2
H-MH-20	MSF12/10	Basin Fen		
H-MH-21	MSF08	Discharge Swamp	H3 E2 H4	H2
H-MH-22	MSF10	Riparian Bog	E2 E3 B1	H2 H4
H-MH-23	MSF12	Basin Fen		
H-MH-24	MSF10/12	Basin Bog	E2	
H-MH-25	MSF10	Riparian Bog	E2 E3 B1	H2 H4
H-MH-26	MSF12	Riparian Fen	B1	B3

WETLAND NUMBER	ECOTYPE	CWC CLASSIFICATION	FUNCTIONS - HIGH	FUNCTIONS - MODERATE
H-MH-27	MSF08	Flat Swamp	E2 H4	H2
H-MH-28	MSF08	Discharge Swamp	H3 E2 H4	H2
H-MH-29	MSF15/07/12	Riparian Fen	H1 E3 B1	H2 E1 E2 B3
H-MH-30	MSF08	Riparian Swamp	E2 B1	B3
H-MH-31	MSF12/10	Basin Fen		
H-MH-32	MSF12/10	Basin Fen		
H-MH-33	MSF12	Basin Fen		
H-MH-34	MSF12	Basin Fen		
H-MH-35	MSF12/10	Basin Fen		
H-MH-36	MSF12/08	Spring Fen		
H-MH-37	MSF08	Flat Swamp	E2	
H-MH-38	MSF08	Flat Swamp	E2 H4	H2
H-MH-39	MSF08/12	Slope Swamp	E2 H4	
H-MH-40	MSF12/08	Channel Fen		B3
H-MH-41	MSF12/08	Channel Fen		
H-MH-42	MSF08	Slope Swamp	E2 H4	
H-MH-43	MSF08/14	Discharge Swamp	H3 E2 H4	
H-MH-44	MSF14	Basin Fen		
H-MH-45	MSF10/12/14	Riparian Bog	E2	H2 H4
H-MH-46	MSF12	Riparian Fen		H2
H-MH-47	MSF14	Riparian Fen		B3
H-MH-48	MSF08	Riparian Swamp	E2 H4	H2
H-MH-49	MSF08	Riparian Swamp	E2	B3
H-MH-50	MSF12	Basin Fen		
H-MH-51	MSF13/12	Channel Fen		
H-MH-52	MSF12	Basin Fen		
H-MH-53	MSF12	Channel Fen		
H-MH-54	MSF14/08	Spring Fen		H4
H-MH-55	MSF15/10	Riparian Fen	E3 B1	H2 E1 E2 B2 B3
H-MH-56	MSF12/14	Basin Fen		

WETLAND NUMBER	ECOTYPE	CWC CLASSIFICATION	FUNCTIONS - HIGH	FUNCTIONS - MODERATE
H-MH-57	MSF10/12	Veneer Bog	E2	
H-MH-58	MSF14/12	Basin Fen		
H-MH-59	MSF14/10/12	Basin Fen		
H-MH-60	MSF14/12	Basin Fen		
H-MH-61	MSF14	Basin Fen		
H-MH-62	MSF15	Riparian Fen	E3 B1	H2 E1 E2 B3
H-MH-63	MSF08	Slope Swamp	E2 H4	
H-MH-64	MSF08	Slope Swamp	E2 H4	
H-MH-65	MSF08	Slope Swamp	E2 H4	
H-MH-66	HST06	Horizontal Fen		H2
H-MH-67	HST05/06	Riparian Fen		E2
H-MH-68	HST05	Riparian Fen	H2 H4 B1	E2 B2
H-MH-69	HST05	Riparian Fen	B1	H2 E2 B3
H-MH-70	HST05/06	Riparian Fen	H2 H4 B1	E2
H-MH-71	HST06	Channel Fen		H2 B1
H-MH-72	HST05/06	Riparian Fen	H2 H4	E2 B1
H-MH-73	HST05	Riparian Fen	B1	E2 B3
H-MH-74	HST05	Channel Fen		E2
H-MH-75	MSF07	Basin Fen		
H-MH-76	MSF06	Basin Fen		
H-MH-77	MSF07/15	Riparian swamp	E1 E3 B1 B2 B3	H2
H-MH-78	MSF07/15	Riparian swamp	E1 E3 B1 B3	H2
H-MH-79	MSF07/15	Riparian swamp	H1 E1 E3 B1 B2 B3	H2
H-MH-80	MSF07/15	Riparian swamp	E1 E3 B1 B3	H2
H-MH-81	MSF07/15	Riparian swamp	H1 E1 E3 B1 B2 B3	H2
H-MH-82	MSF07	Riparian swamp	E1 E3 B1 B2 B3	H2
H-MH-83	MSF07	Riparian swamp	H1 E1 E3 B1 B2 B3	H2

Table 2 Wetland's Ecological Value Assessment

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-01	MSF08	22.90	Intermittent Watercourse	Discharge Swamp	1	Drainage-divide	H3 E2		10	10	2	8.0	10	6	High
H-MH-02	MSF12/10	1.53	None	Basin Fen	1	Isolated			4	3	4	6.8	10	0	Medium
H-MH-03	MSF12/10	1.91	None	Basin Fen	1	Outflow		.	4	3	4	6.8	10	2	Medium
H-MH-04	MSF10/12	5.37	None	Veneer Bog	1	Outflow	E2	H4	6	3	4	8.6	10	7	Medium
H-MH-05	MSF08/12/10	16.78	None	Discharge Swamp	1	Drainage-divide	H3 H4 E2		8	3	6	7.8	10	6	High
H-MH-06	MSF12/10	3.33	None	Basin Fen	1	Isolated			4	3	4	6.8	10	0	Medium
H-MH-07	MSF14	1.10	Intermittent Watercourse	Riparian Fen	1	Throughflow		B3	4	10	2	4.0	10	1	Medium
H-MH-08	MSF15	1.27	Permanent Watercourse	Riparian Fen	2	Throughflow	E3 B1	H2 E1 E2	4	10	2	12.0	10	11	High
H-MH-09	MSF15/09	3.38	Permanent Watercourse	Riparian Fen	2	Throughflow	B1	H2 E1 E2	4	10	4	15.2	10	6	High
H-MH-10	MSF08/10	16.54	Intermittent Watercourse	Flat Swamp	1	Outflow	E2 H4		8	10	4	8.4	10	6	High
H-MH-11	MSF10/12/14	5.36	None	Veneer Bog	1	Outflow	E2	H4	6	3	6	8.0	10	7	Medium
H-MH-12	MSF15/08	11.88	Intermittent Watercourse	Riparian Fen	1	Throughflow	B1	H2 E1 E2 B3	8	10	4	10.0	10	6	High
H-MH-13	MSF12	3.55	Intermittent Watercourse	Channel Fen	1	Throughflow		B3	4	10	2	6.0	10	1	Medium
H-MH-14	MSF12/10	1.84	Permanent Watercourse	Spring Fen	1	Throughflow		B3	4	10	4	6.8	10	1	Medium
H-MH-15	MSF15	1.15	Intermittent Watercourse	Riparian Fen	2	Throughflow	B1	H2 E1 E2 B3	4	10	2	12.0	10	6	High
H-MH-16	MSF14/12	2.78	Permanent Watercourse	Riparian Fen	2	Throughflow	E3	B3	4	10	4	4.6	10	4	Medium
H-MH-17	MSF14/12	26.81	Intermittent Watercourse	Riparian Fen	2	Throughflow		B3	10	10	4	5.6	10	1	Medium

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-18	MSF10/12	6.78	Permanent Watercourse	Flat Bog	1	Outflow	E2	H2 H4	6	10	4	8.4	10	7	High
H-MH-19	MSF12/10	5.00	Permanent Watercourse	Basin Fen	1	Outflow		H2	6	10	4	6.8	10	2	Medium
H-MH-20	MSF12/10	9.74	None	Basin Fen	1	Outflow			6	3	4	6.8	10	2	Medium
H-MH-21	MSF08	12.71	Intermittent Watercourse	Discharge Swamp	1	Outflow	H3 E2 H4	H2	8	10	2	8.0	10	10	High
H-MH-22	MSF10	4.74	Water Body	Riparian Bog	1	Outflow	E2 E3 B1	H2 H4	4	10	2	10.0	10	13	High
H-MH-23	MSF12	0.90	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-24	MSF10/12	2.83	None	Basin Bog	1	Isolated	E2		4	3	4	9.6	10	3	Medium
H-MH-25	MSF10	3.21	Water Body	Riparian Bog	1	Outflow	E2 E3 B1	H2 H4	4	10	2	10.0	10	13	High
H-MH-26	MSF12	5.70	Water Body	Riparian Fen	1	Throughflow	B1	B3	6	10	2	6.0	10	4	Medium
H-MH-27	MSF08	5.15	Intermittent Watercourse	Flat Swamp	1	Outflow	E2 H4	H2	6	10	2	8.0	10	6	High
H-MH-28	MSF08	1.60	Permanent Watercourse	Discharge Swamp	1	Outflow	H3 E2 H4	H2	4	10	2	8.0	10	10	High
H-MH-29	MSF15/07/12	11.56	Permanent Watercourse	Riparian Fen	3	Throughflow	H1 E3 B1	H2 E1 E2 B3	8	10	6	10.4	10	12	Very High
H-MH-30	MSF08	7.71	Water Body	Riparian Swamp	1	Throughflow	E2 B1	B3	6	10	2	8.0	10	9	High
H-MH-31	MSF12/10	1.05	None	Basin Fen	1	Isolated			4	3	4	6.8	10	0	Medium
H-MH-32	MSF12/10	1.84	None	Basin Fen	1	Isolated			4	3	4	7.6	10	0	Medium
H-MH-33	MSF12	0.66	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-34	MSF12	0.66	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-35	MSF12/10	0.86	None	Basin Fen	1	Isolated			2	3	4	6.8	10	0	Medium
H-MH-36	MSF12/08	14.12	None	Spring Fen	2	Isolated			8	3	4	4.6	10	0	Medium
H-MH-37	MSF08	2.34	None	Flat Swamp	2	Isolated	E2		4	3	2	8.0	10	3	Medium
H-MH-38	MSF08	0.82	Permanent Watercourse	Flat Swamp	1	Outflow	E2 H4	H2	2	10	2	8.0	10	7	Medium
H-MH-39	MSF08/12	4.22	None	Slope Swamp	1	Outflow	E2 H4		4	3	4	7.4	10	7	Medium
H-MH-40	MSF12/08	5.26	Permanent Watercourse	Channel Fen	1	Throughflow		B3	6	10	4	6.4	10	1	Medium

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-41	MSF12/08	5.23	None	Channel Fen	2	Isolated			6	3	4	6.4	10	0	Medium
H-MH-42	MSF08	4.15	None	Slope Swamp	1	Outflow	E2 H4		4	3	2	8.0	10	7	Medium
H-MH-43	MSF08/14	3.49	None	Discharge Swamp	1	Outflow	H3 E2 H4		4	3	4	6.8	10	10	Medium
H-MH-44	MSF14	0.59	None	Basin Fen	1	Isolated			2	3	2	4.0	10	0	Low
H-MH-45	MSF10/12/ 14	2.30	Permanent Watercourse	Riparian Bog	1	Outflow	E2	H2 H4	4	10	6	8.2	10	7	High
H-MH-46	MSF12	0.32	Water Body	Riparian Fen	1	Outflow		H2	2	10	2	6.0	10	5	Medium
H-MH-47	MSF14	1.13	Permanent Watercourse	Riparian Fen	1	Throughflow		B3	4	10	2	4.0	10	1	Medium
H-MH-48	MSF08	2.74	Permanent Watercourse	Riparian Swamp	1	Outflow	E2 H4	H2	4	10	2	8.0	10	7	High
H-MH-49	MSF08	5.35	Permanent Watercourse	Riparian Swamp	1	Throughflow	E2	B3	6	10	2	8.0	10	6	Medium
H-MH-50	MSF12	0.43	None	Basin Fen	1	Isolated			2	3	2	6.0	10	0	Low
H-MH-51	MSF13/12	0.81	None	Channel Fen	1	Outflow			2	3	4	14.4	10	2	Medium
H-MH-52	MSF12	3.32	None	Basin Fen	1	Outflow			4	3	2	8.0	10	2	Medium
H-MH-53	MSF12	1.36	None	Channel Fen	1	Isolated			4	3	2	6.0	10	0	Low
H-MH-54	MSF14/08	4.29	None	Spring Fen	1	Outflow		H4	4	3	4	4.8	10	2	Medium
H-MH-55	MSF15/10	6.58	Permanent Watercourse	Riparian Fen	1	Throughflow	E3 B1	H2 E1 E2 B2 B3	6	10	4	11.6	10	10	High
H-MH-56	MSF12/14	1.29	None	Basin Fen	1	Isolated			4	3	4	5.2	10	0	Medium
H-MH-57	MSF10/12	1.80	None	Veneer Bog	1	Isolated	E2		4	3	4	8.8	10	3	Medium
H-MH-58	MSF14/12	1.11	None	Basin Fen	1	Isolated			4	3	4	4.4	10	0	Low
H-MH-59	MSF14/10/ 12	2.53	None	Basin Fen	1	Isolated			4	3	6	5.4	10	0	Medium
H-MH-60	MSF14/12	0.57	None	Basin Fen	1	Isolated			2	3	4	4.4	10	0	Low
H-MH-61	MSF14	1.05	None	Basin Fen	2	Isolated			4	3	2	4.0	10	0	Low
H-MH-62	MSF15	3.37	Water Body	Riparian Fen	2	Throughflow	E3 B1	H2 E1 E2 B3	4	10	2	12.0	10	10	High
H-MH-63	MSF08	1.78	None	Slope Swamp	1	Outflow	E2 H4		4	3	2	8.0	10	6	Medium
H-MH-64	MSF08	2.76	None	Slope Swamp	1	Outflow	E2 H4		4	3	2	8.0	10	6	Medium

WETLAND NUMBER	ECOTYPE	AREA (HA)	CONNECTIVITY	CWC CLASSIFICATION	POSITION IN WATERSHED	WATERFLOW PATH	FUNCTIONS HIGH	FUNCTIONS MODERATE	ECOLOGICAL VALUE ASSESSMENT (POINTS)						ECOLOGICAL VALUE
									Area	Connectivity	Complexity	Scarcity	Fragmentation	Functions	
H-MH-65	MSF08	2.07	None	Slope Swamp	2	Outflow	E2 H4		4	3	2	8.0	10	6	Medium
H-MH-66	HST06	1.48	Permanent Watercourse	Horizontal Fen	1	Outflow		H2	4	3	2	10.0	10	2	Medium
H-MH-67	HST05/06	6.46	None	Spring Fen	1	Isolated		E2	6	10	4	5.2	10	4	Medium
H-MH-68	HST05	6.05	Intermittent Watercourse	Riparian Fen	1	Headwater	H2 H4 B1	E2 B2	6	10	2	4.0	5	10	High
H-MH-69	HST05	5.82	Permanent Watercourse	Riparian Fen	1	Throughflow	B1	H2 E2 B3	6	9	2	4.0	10	6	Medium
H-MH-70	HST05/06	9.95	Intermittent Watercourse	Riparian Fen	1	Headwater	H2 H4 B1	E2	6	10	4	5.2	10	10	High
H-MH-71	HST06	7.35	Permanent Watercourse	Channel Fen	1	Outflow		H2 B1	6	9	2	10.0	10	2	Medium
H-MH-72	HST05/06	4.12	Permanent Watercourse	Riparian Fen	1	Outflow	H2 H4	E2 B1	4	7	4	6.4	10	7	High
H-MH-73	HST05	1.10	Permanent Watercourse	Riparian Fen	1	Throughflow	B1	E2 B3	4	9	2	4.0	10	5	Medium
H-MH-74	HST05	1.02	None	Channel Fen	1	Isolated		E2	4	3	2	10.0	10	1	Medium
H-MH-75	MSF07	0.53	None	Basin Fen	1	Isolated			2	3	2	10.0	10	0	Medium
H-MH-76	MSF06	0.58	None	Basin Fen	1	Isolated			2	3	2	10.0	10	0	Medium
H-MH-77	MSF07/15	7.99	Intermittent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B2 B3	H2	6	10	4	10.8	10	18	Very High
H-MH-78	MSF07/15	5.43	Permanent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B3	H2	6	10	4	10.2	10	18	High
H-MH-79	MSF07/15	2.86	Permanent Watercourse	Riparian swamp	3	Throughflow	H1 E1 E3 B1 B2 B3	H2	4	10	4	10.2	10	19	Very High
H-MH-80	MSF07/15	1.32	Permanent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B3	H2	4	10	4	10.2	10	18	High
H-MH-81	MSF07/15	24.54	Permanent Watercourse	Riparian swamp	3	Throughflow	H1 E1 E3 B1 B2 B3	H2	10	10	4	10.2	10	19	Very High
H-MH-82	MSF07	4.67	Permanent Watercourse	Riparian swamp	1	Throughflow	E1 E3 B1 B2 B3	H2	4	10	2	10.0	10	18	High
H-MH-83	MSF07	2.25	Waterbody	Riparian swamp	3	Throughflow	H1 E1 E3 B1 B2 B3	H2	4	10	2	10.0	10	20	Very High

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Nitassinan, 5 novembre 2014 - Suite aux recommandations de La Table ronde autochtone sur le caribou de la péninsule Ungava (TRACPU) la Nation Innue demande à ses membres et chasseurs de **diminuer** les efforts de **chasse** sous les mêmes niveaux que l'automne 2013 et l'hiver 2014, - sur le troupeau de la **rivière George**. Nous suggérons que **chaque conseil** propose à ses membres d'envisager la récolte du caribou seulement dans un **cadre communautaire** et dans un contexte de transmission du **savoir.**

Mushuau Atikᵘ CARIBOU DE LA RIVIÈRE GEORGE	
1993	**776 000**
2001	385 000
2010	74 000
2012	27 600
2014	**14 200**

TROUPEAU DE LA RIVIÈRE AUX FEUILLES

À nous de prévenir le déclin!

De plus, la Nation Innue reste préoccupée par la situation du troupeau de la rivière aux Feuilles et craint que celui-ci puisse éventuellement se retrouver dans la même situation que celui du troupeau de la rivière George. La Nation Innue travaille sur des solutions avec les Cris, Inuits et Naskapis afin de poursuivre les discussions politiques et techniques concernant l'accès d'Atikᵘ (celui de la rivière aux Feuilles) pour les Innus. Il est recommandé aux membres de la Nation Innue **de ne pas se rendre en territoire Cris/Inuits** pour la chasse au caribou de la rivière aux Feuilles **avant la signature finale d'un protocole** entre nos nations.

Chef Réal Mckenzie - Matimekush Lac-John, porteur du dossier pour la Nation Innue
Chef Jean-Charles Piétacho - Ekuanitshit, co-porteur du dossier caribou pour la Nation Innue
Conseiller Pako Vachon - Matimekush Lac-John, représentant de la Nation Innue à la TRACPU
Serge Ashini Goupil – représentant de la Nation Innue au comité technique à la TRACPU

Pour plus d'informations, contactez vos autorités politiques locales.

Table 1. List of Mammals Recorded in the Schefferville area

ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	ABORIGINAL KNOWLEDGE
American Beaver	*Castor canadensis*	X	X
American Marten	*Martes americana*		X
American Mink	*Mustela vison*	X	X
Arctic Fox	*Alopex lagopus*	X	
Arctic Hare	*Lepus arcticus*		X
Black Bear	*Ursus americana*	X	X
Canada Lynx	*Lynx canadensis*		
Cinereus Shrew	Sorex cinereus	X	
Common Muskrat	*Ondatra zibethicus*	X	X
Ermine	*Mustela erminea*	X	X
Grey Wolf	*Canis lupus*	X	X
Little Brown Bat [F]	*Myotis lucifugus*		
Meadow Jumping Mouse	*Zapus hudsonius*	X	
Meadow Vole	*Microtus pennsylvanicus*	X	
Moose	Alces americana	X	X
North American Porcupine	*Erethizon dorsatum*		X
Northern Bog Lemming	*Synaptomys borealis*	X	
Northern Flying Squirrel	*Glaucomys sabrinus*		X
Northern River Otter	*Lontra canadensis*	X	X
Pygmy Shrew	*Microsorex hoyi*	X	
Red Fox	*Vulpes vulpes*	X	X
Red Squirrel	*Tamiasciurus hudsonicus*	X	X
Rock Vole	*Microtus chrotorrhinus*	X	
Snowshoe Hare	*Lepus americanus*	X	X
Southern Red-backed Vole	*Clethrionomys gapperi*	X	
Star-nosed Mole	*Condylura cristata*		
Ungava Collared Lemming	*Dicrostonyx hudsonius*		
Water Shrew	*Sorex palustris*		
Western Heather Vole	*Phenacomys intermedius*	X	
Wolverine [P, F]	*Gulo gulo*		
Woodchuck	*Marmota monax*		X
Woodland Caribou, Boreal Forest Ecotype	*Rangifer tarandus caribou*	X	X
Woodland caribou, Migratory Tundra Ecotype	*Rangifer tarandus caribou*	X	X
Woodland Jumping Mouse	*Napaeozapus insignis*	X	

Species highlighted in light blue were observed in the Local study area (LSA).
[Species at risk pursuant to provincial (P) or federal (F) legislation]

Table 3. List of Herptiles Recorded in the Schefferville area

ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	ABORIGINAL KNOWLEDGE
American Toad	*Bufo americanus americanus*	X	
Blue-spotted Salamander	*Ambystoma laterale*		
Mink Frog	*Lithobates septentrionalis*	X	
Northern Green Frog	*Lithobates clamitans melanota*	X	
Northern Spring Peeper	*Pseudacris crucifer crucifer*	X	
Northern Two-lined Salamander	*Eurycea bislineata*		
Wood Frog	*Lithobates sylvatica*	X	
Northern Dusky Salamander	*Desmognathus fuscus*		

Species highlighted in light blue were observed in the Local study area (LSA).

Table 2. List of Birds Recorded in the Schefferville area

ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	BREEDING (N)*	ABORIGINAL KNOWLEDGE
Snow Goose	*Chen caerulescens*	x		X
Canada Goose	*Branta canadensis*	X	N	X
Green-winged Teal	*Anas crecca*	X	N	X
American Black Duck	*Anas rubripes*	X	N	X
Mallard	*Anas platyrhynchos*	X		
Northern Pintail	*Anas acuta*	X	N	X
Greater Scaup	*Aythia marila*	X		
Lesser Scaup	*Aythya affinis*	X	N	
Ring-necked Duck	*Aythia collaris*	X	N	
Harlequin Duck	*Histrionicus histrionicus*	X	N	X
Long-tailed Duck	*Clangula hyemalis*	X		X
Black Scoter	*Melanitta americana*	X		X
White-winged Scoter	*Melanitta fusca*	X	N	X
Surf Scoter	*Melanitta perspicillata*	X	N	X
Bufflehead	*Bucephala albeola*	X	N	
Common Goldeneye	*Bucephala clangula*	X	N	X
Hooded Merganser	*Lophodytes cucullatus*	X		
Common Merganser	*Mergus merganser*	X	N	X
Red-breasted Merganser	*Mergus serrator*	X	N	X
Common Loon	*Gavia immer*	X	N	X
Red-throated Loon	*Gavia stellate*			X
Double-crested Cormorant	*Phalacrocorax auritus*			X
Osprey	*Pandion haliaetus*	X	N	X
Bald Eagle	*Haliaeetus leucocephalus*	X	N	X
Northern Harrier	*Circus cyaneus*	X		
Sharp-shinned Hawk	*Accipiter striatus*	X	N	
Northern Goshawk	*Accipiter gentilis*	x	N	X
Red-tailed Hawk	*Buteo jamaicensis*	X	N	
Rough-legged Hawk	*Buteo lagopus*	X		
Golden Eagle	*Aquila chrysaetos*	X	N	X
American Kestrel	*Falco sparverius*	X		
Merlin	*Falco columbarius*	X	N	
Gyrfalcon	*Falco rusticolus*	X		
Ruffed Grouse	*Bonasa umbellus*		N	X
Spruce Grouse	*Falcipennis Canadensis*	X	N	X
Rock Ptarmigan	*Lagopus mutus*			X
Willow Ptarmigan	*Lagopus lagopus*	X	N	X

ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	BREEDING (N)*	ABORIGINAL KNOWLEDGE
Black-bellied Plover	*Pluvialis squatarola*	X		
Semipalmated Plover	*Charadrius semipalmatus*	X	N	
Greater Yellowlegs	*Tringa melanoleuca*	X	N	
Lesser Yellowlegs	*Tringa flavipes*	X	N	
Solitary Sandpiper	*Tringa solitaria*	X	N	
Spotted Sandpiper	*Actitis macularius*	X	N	
Semipalmated Sandpiper	*Calidris pusilla*	X		
Least Sandpiper	*Calidris minutilla*	X	N	
Short-billed Dowitcher	*Limnodromus griseus*	X	N	
Wilson's Snipe	*Gallinago delicate*	X	N	X
Red-necked Phalarope	*Phalaropus lobatus*	X	N	
Herring Gull	*Larus argentatus*	X	N	X
Iceland Gull	*Larus glaucoides*			X
Glaucous Gull	*Larus hyperboreuse*	X		
Great Black-backed Gull	*Larus marinus*	X		
Arctic Tern	*Sterna paradisea*	X	N	X
Mourning Dove	*Zenaida macroura*	X		
Great Horned Owl	*Bubo virginianus*		N	X
Snowy Owl	*Bubo scandiacus*			X
Northern Hawk-Owl	*Surnia ulula*	X	N	X
Boreal Owl	*Aegolius funereus*	X	N	X
Short-eared Owl	*Asio flammeus*	X	N	
Belted Kingfisher	*Megaceryle alcyon*	X	N	X
Hairy Woodpecker	*Picoides villosus*	X	N	
American Three-toed Woodpecker	*Picoides dorsalis*	X	N	
Black-backed Woodpecker	*Picoides arcticus*	X	N	
Northern Flicker	*Colaptes auratus*	X	N	
Olive-sided Flycatcher	*Contopus cooperi*	X	N	
Alder Flycatcher	*Empidonax alnorum*	X	N	
Yellow-bellied Flycatcher	*Empidonax flaviventris*	X	N	
Horned Lark	*Eremophila alpestris*	X	N	
Tree Swallow	*Tachycineta bicolor*	X	N	
Bank Swallow	*Riparia riparia*	X	N	
Gray Jay	*Perisoreus canadensis*	X	N	X
American Crow	*Corvus brachyrynchos*	X	N	
Common Raven	*Corvus corax*	X	N	X
Boreal Chickadee	*Poecile hudsonicus*	X	N	
Red-breasted Nuthatch	*Sitta canadensis*	X	N	

ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	BREEDING (N)*	ABORIGINAL KNOWLEDGE
Winter Wren	*Troglodytes hiemalis*	X	N	
Brown Creeper	*Certhia americana*	X	N	
Golden-crowned Kinglet	*Regulus satrapa*	X	N	
Ruby-crowned Kinglet	*Regulus calendula*	X	N	
Northern Wheatear	*Oenanthe oenanthe*	X		
Gray-cheeked Thrush	*Catharus minimums*	X	N	
Hermit Thrush	*Catharus guttatus*	X	N	
Swainson's Thrush	*Catharus ustulatus*	X	N	
American Robin	*Turdus migratorius*	X	N	X
Bohemian Waxwing	*Bombycilla garrulus*	X	N	
American Pipit	*Anthus rubescens*	X	N	
Gray Catbird	*Dumetella carolinensis*	X		
European Starling	*Sturnus vulgaris*	X	N	
Northern Shrike	*Lanius excubitor*	X	N	
Lapland Longspur	*Calcarius lapponicus*	X		
Snow Bunting	*Plectrophenax nivalis*	X		X
Tennessee Warbler	*Oreothlypis peregrina*	X	N	
Orange-crowned Warbler	*Leiothlypis celata*	X	N	
Nashville Warbler	*Oreothlypis ruficapilla*	x		
Yellow Warbler	*Setophaga petechia*	X	N	
Yellow-rumped Warbler	*Setophaga coronata*	X	N	
Palm Warbler	*Setophaga palmarum*	X	N	
Blackpoll Warbler	*Setophaga striata*	X	N	
Northern Waterthrush	*Parkesia noveboracensis*	X	N	
Wilson's Warbler	*Cardellina pusilla*	X	N	
American Tree Sparrow	*Spizella arborea*	X	N	
Chipping Sparrow	*Spizella passerina*	X	N	
Savannah Sparrow	*Passerculus sandwichensis*	X	N	
Fox Sparrow	*Passerella iliaca*	X	N	X
Lincoln's Sparrow	*Melospiza lincolnii*	X	N	
White-throated Sparrow	*Zonotrochia albicolis*	X	N	
White-crowned Sparrow	*Zonotrichia leucophrys*	X	N	
Dark-eyed Junco	*Junco hyemalis*	X	N	
Rusty Blackbird	*Euphagus carolinus*	X	N	
Pine Grosbeak	*Pinicola enucleator*	X	N	X
White-winged Crossbill	*Loxia leucoptera*	X	N	X
Pine Siskin	*Spinus pinus*	X	N	
American Goldfinch	*Spinus tristis*	X	N	

ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	BREEDING (N)*	ABORIGINAL KNOWLEDGE
Common Redpoll	*Carduelis flammea*	X	N	X

Species highlighted in light blue were observed in the Local study area (LSA).

Table 2. List of fish species Recorded in the Schefferville area

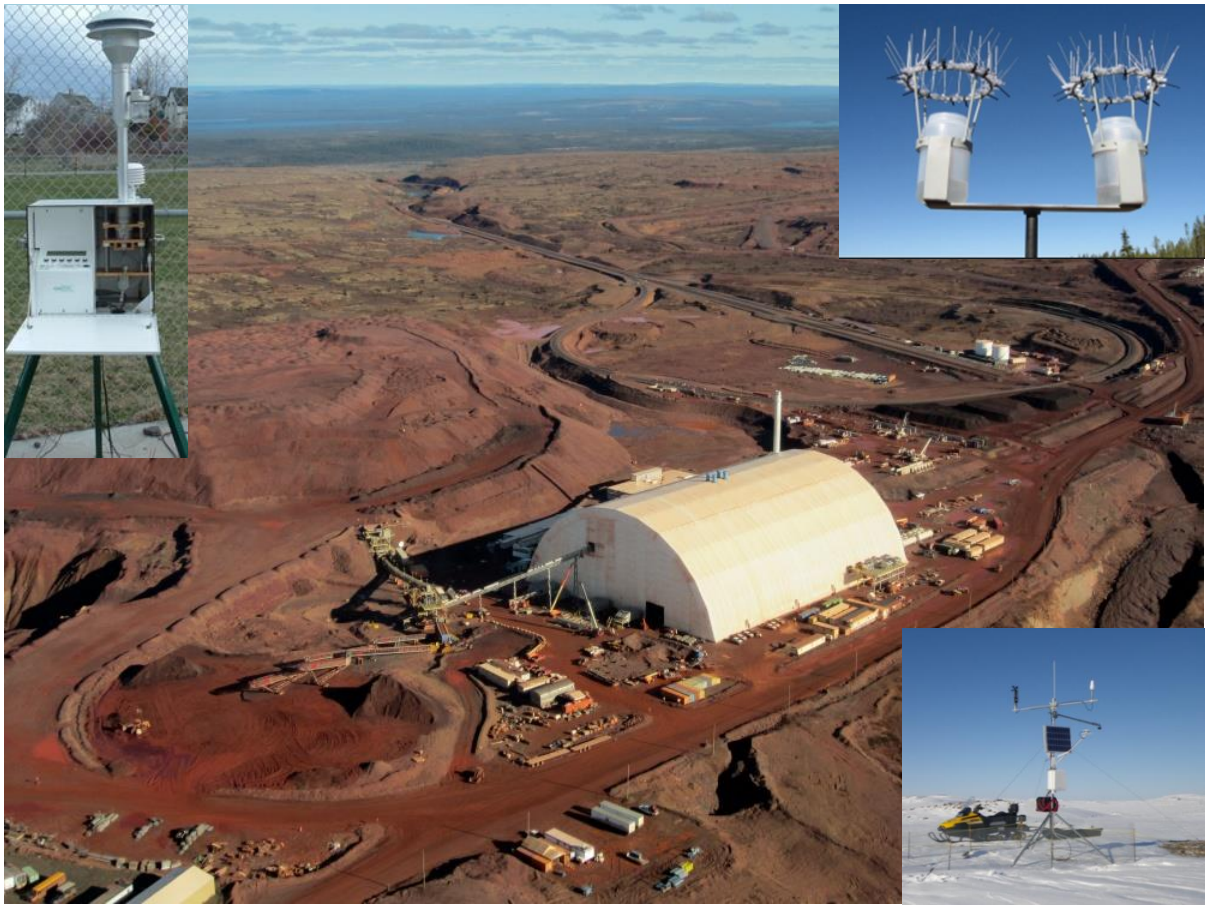
ENGLISH NAME	SCIENTIFIC NAME	REGIONAL STUDY AREA	ABORIGINAL KNOWLEDGE
Brook Trout	*Salvelinus fontinalis*	X	X
Burbot	*Lota lota*	X	X
Lake Chub	*Couesius plumbeus*	X	X
Lake Trout	*Salvelinus namaycush*	X	X
Lake Whitefish	*Coregonus clupeaformis*	X	X
Landlocked Atlantic Salmon (Ouananiche)	*Salmo salar*	X	
Longnose Sucker	*Catostomus catostomus*	X	X
Mottled Sculpin	*Cottus bairdii*	X	
Northern Pike	*Esox lucius*	X	X
Round Whitefish	*Prosopium cylindraceum*	X	
Slimy Sculpin	*Cottus cognatus*	X	
White Sucker	*Catostomus commersoni*	X	X

Species highlighted in light blue were observed in the Local study area (LSA).

AMBIENT AIR QUALITY MONITORING PLAN

Tata Steel Minerals Canada Ltd.

Direct Shipping Ore Project



March 2015

DRAFT

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1. Name of Undertaking

Proposed Ambient Air Quality Monitoring Plan
Tata Steel Minerals Canada Ltd.
Direct Shipping Ore (DSO) Project

1.1 Proponent

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2. Project Information

2.1 Overview

Tata Steel Minerals Canada Ltd. (TSMC) is completing construction of its iron ore processing plant and associated infrastructure. The plant, located in Labrador approximately 25 km NW of Schefferville, Quebec, is the core of the Direct Shipping Ore (DSO) Project and is scheduled to be operational in 2015. Ore is and will be mined from a series of open pits located both in the provinces of Quebec and Newfoundland & Labrador. Figure 1 shows the location of the different open pits areas (from DSO1 to DSO4). To monitor air quality, TSMC will implement an Air Quality Monitoring (AQM) Program.

For DSO4, Assessment Group 2a (referred to as Goodwood/Sunny), TSMC had submitted to the province of Quebec two documents related to air quality monitoring in the vicinity of this project:

- Air Sampling Program – DSO Project 2A, prepared by AECOM, August 2013; and
- Environmental Monitoring Program - DSO Project 2A. Section 1 – Dust Dispersion, prepared by WSP, April 2014.

Since that time, mining and operation plans have evolved rapidly. For example, an environmental registration and impact statement is currently under review for the Howse Property project; this project is located in NL and is expected to start in 2016, pending approval. Also, the Joan Lake Project (DSO4, 2b) also located in NL started in 2015. Consequently, TSMC conducted an overall review of current and upcoming mining activities and a revised Air Quality Monitoring (AQM) Plan.

This AQM plan will then be used as the basis to develop a detailed AQM Program, which will include detailed Standard Operating Procedures, Quality Control sections and elements listed in Section 2.5.2 of the Air Sampling Program – DSO Project 2A, prepared by AECOM, August 2013. In addition, the AQM Program will be developed in cooperation with the First Nations to include their knowledge of the territory and meet their expectations.

2.2 Conditions of the Certificate of Authorization issued by the MDDELCC for Project 2A

Following submission of the environmental impact study and assessment of the environmental and social impacts by the Kativik Environmental Quality Commission, the Quebec government issued TSMC a certificate of authorization (CA) to mine the Goodwood and Sunny 1 deposits (DSO Project 2a) in Nuvavik, Quebec. The certificate of authorization contains 21 conditions with which TSMC must comply.

Condition 4 specifically contains conditions pertaining to dust and reads as follows:

> *"Within six months of project signoff, the proponent must submit to the Administrator for approval an environmental monitoring program for dust emissions around its facilities and at certain stations whose locations are to be determined according to prevailing winds and the receiving environment. This monitoring program must make it possible to ensure that surrounding bodies of water will not be contaminated by this dust in Quebec and verify whether the activities being carried out in Quebec have an impact in Labrador."*

On November 20, 2014, MDDELCC transmitted a letter to TSMC with a list of questions and comments on the CA conditions. Some of these questions and comments are linked to Condition 4 of the CA and were incorporated in this AQM Plan. A copy of these questions and comments on Condition 4 is provided in Appendix C and under each, TSMC answer is provided.

2.3 Objectives of the AQM Plan

While conducting the overall review of air quality monitoring, the following objectives were set:

1. **The Air Quality Monitoring (AQM) Plan covers DSO3 and DSO4 areas**

   DSO3 and DSO4 areas can be seen on Figure 1. DSO3 and DSO4 are joined by the Goodwood Road and the distance between them is approximately 13 km. Note that for the purpose of this AQM Plan, the Howse project, for which an Environmental Impact Statement was submitted in early 2015[1], is considered part of DSO3. Also note that all ore mined from the different deposits is hauled to the main processing plant located in the DSO3 area, where it is processed and/or shipped by rail.

   Starting in 2015, mining and processing activities will be concurrent in both DSO3 and DSO4 projects. Consequently, the AQM Plan and associated monitoring schedule must encompass both projects anticipated production schedule.

2. **Compatibility with previous Air Monitoring Plans for the DSO4 Project 2a (Goodwood/Sunny) presented to the province of Quebec**

   As indicated in Section 2.1, two reports were already presented to the province of Quebec:
   - Air Sampling Program – DSO Project 2A, prepared by AECOM, August 2013; and
   - Environmental Monitoring Program - DSO Project 2A, Section 1 – Dust Dispersion, prepared by WSP, April 2014.

   Both these reports contained explanations on air monitoring site selection and sampling methods to be used. Air monitoring site selection was based on dispersion modeling results, site accessibility and environmental conditions. The AQM Plan must :

   - combine the two programs from DSO Project 2A and avoid duplication
   - consider the fact that mining at the Joan Lake Project (DSO4, Project 2b, Kivivic pits) has started in 2015 and the deposits are in fairly close proximity (1 to 3 km) to those of the DSO Project 2A (Goodwood/Sunny mining expected to start in 2016/2017)
   - use a similar procedure to identify acceptable air monitoring sites for DSO3 and the deposits nearby Joan Lake (DSO4, Project 2b).

3. **The AQM Plan should meet provincial requirements of both Quebec and Newfoundland and Labrador**

   Some DSO3 and DSO4 deposits are located in Quebec, while others are located in Newfoundland and Labrador. All deposits are located within 5 km from the border between the two provinces. Consequently, activity at any of the work sites has the potential to affect air quality in either province. Each province has its own regulations and procedures pertaining to ambient air quality monitoring, and the sampling approach will be compliant with requirements from both provinces.

4. **Consistent sampling methods and procedures should be used regardless of whether the monitoring point is in Quebec or Newfoundland and Labrador**

   Selected sampling methods and procedures must be chosen to ensure compatibility and consistency of the AQM Plan, whether the monitoring point is located in Quebec or Newfoundland and Labrador. This way, equipment purchase and training of the staff in charge of the monitoring program will be facilitated. Note that sampling methods and procedures applicable in both provinces are usually identical as they are typically issued by Environment Canada or the USEPA; consequently methodology discrepancies are not expected.

[1] *http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=80067, Accessed March, 2015.*

5. **Sampling methods and equipment must take into account extreme cold weather conditions AND the remoteness of sampling locations**

   The sampling approach must consider the extended periods of very low ambient temperatures that the site experiences in the winter months, as well as the availability of grid electricity. All electricity at the site is produced by diesel powered generators operated by TSMC. These two factors must be considered when selecting sampling methods and equipment for monitoring ambient air quality of the DSO Complex. Additionally, except for the workers' camp owned by TSMC, there are no immediate permanent inhabited settlements in close proximity to the DSO Complex: Schefferville and Kawawachikamak are located approximately 25 km from the DSO3 Area.

6. **Monitoring equipment must be portable and easily modified as site activities change**

   Mining sites will vary over time. Depending on available ore volumes, mining at some deposits can be completed in two years while at other deposits it may take several years. Selected sampling approach and equipment will have to be moved so that mining operations can be followed.

2.4 Mining Plan - TSMC's DSO projects (including Howse Property)

Table 1 shows the years of operation of the different DSO areas, as currently planned. An "X" in the table indicates that ore is scheduled to be mined during that year.

Table 1: Mining Plan TSMC's DSO projects, including Howse Property (2012-2027)

Project/ Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Howse Property	--	--	--	--	X	X	X	X	X	X	X	X	X	X	X	X
DSO 3 (1a)	X	X	X	X	X	--	--	--	--	--	--	--	--	--	--	--
DSO 4 (2a)	--	--	--	--	(X)	X	X	X	X	X	X	X	X	--	--	--
DSO 4 (2b)	--	--	--	X	X	X	X	X	X	--	--	--	--	--	--	--

Howse Property main deposit is : Howse
DSO3 (1a) main deposits are: Timmins 3N, 4, 7, Fleming 7N
DSO4 (2a) main deposits are: Goodwood, Sunny 1. In 2016, it is possible that preparation and/or mining activities occur at Goodwood.
DSO4 (2b) main deposits are: Kivivic 1C, 2, 3N, 4, 5 (also referred to as Joan Lake Project)

2.5 Provincial Ambient Air Quality Standards (PAAQS)

Table 2 lists QC and NL Ambient Air Quality Standards for parameters included in the AQM Plan.

Table 2: Provincial Ambient Air Quality Standards (PAAQS) – QC and NL

Parameter	Averaging Period	NL Air quality standards[2] (µg/m^3, unless otherwise indicated)	QC Air quality standards[3] (µg/m^3)
Particulate Matter (Total) TPM	1 yr	60	--
	24 hr	120	120
Particulate Matter less than 10µm PM_{10}	24 hr	50	--
Fine Particulate $PM_{2.5}$	1 yr	8.8	--
	24 hr	25	30
Dustfall	30 days	7.0 g/m^2	--
	1 yr	4.6 g/m^2	--
NO_2	1 yr	100	103
	24 hr	200	207
	1 hr	400	414
Metals			
Antimony (Sb)	1 yr	--	0.17
Arsenic (As)	1 yr	--	0.003
	24 hr	0.3	--
Barium (Ba)	1 yr	--	0.05
Beryllium (Be)	1 yr	--	0.0004
Cadmium (Cd)	1 yr	--	0.0036
	24 hr	2	--
Chromium (Cr)	1 yr		0.004
Copper (Cu)	24 hr	50	2.5
Lead (Pb)	1 yr	--	0.1
	30 days	0.7	--
	24 hr	2.0	--
Mercury (Hg)	1 yr	--	0.005
	24 hr	2	--
Nickel (Ni)	1 yr	--	0.014
	24 hr	2	--
Silver (Ag)	1 yr	--	0.23
Thallium (Tl)	1 yr	--	0.25
Vanadium (V)	1 yr	--	1
	24 hr	2	
Zinc	24 hr	120	2.5

[2] *Air Pollution Control Regulations, 2004, NLR 39/04, <http://canlii.ca/t/527dm> retrieved on 2015-03-25*
[3] *Clean Air Regulation, CQLR c Q-2, r 4.1, <http://canlii.ca/t/525tb> retrieved on 2015-03-25*

3. Project Maps and AQM Stations Locations

Three figures are included in this section:

Figure 1: Locations of DSO Projects. This figure shows the general location of all DSO Projects as they were identified for the Howse Property Environmental Impact Assessment

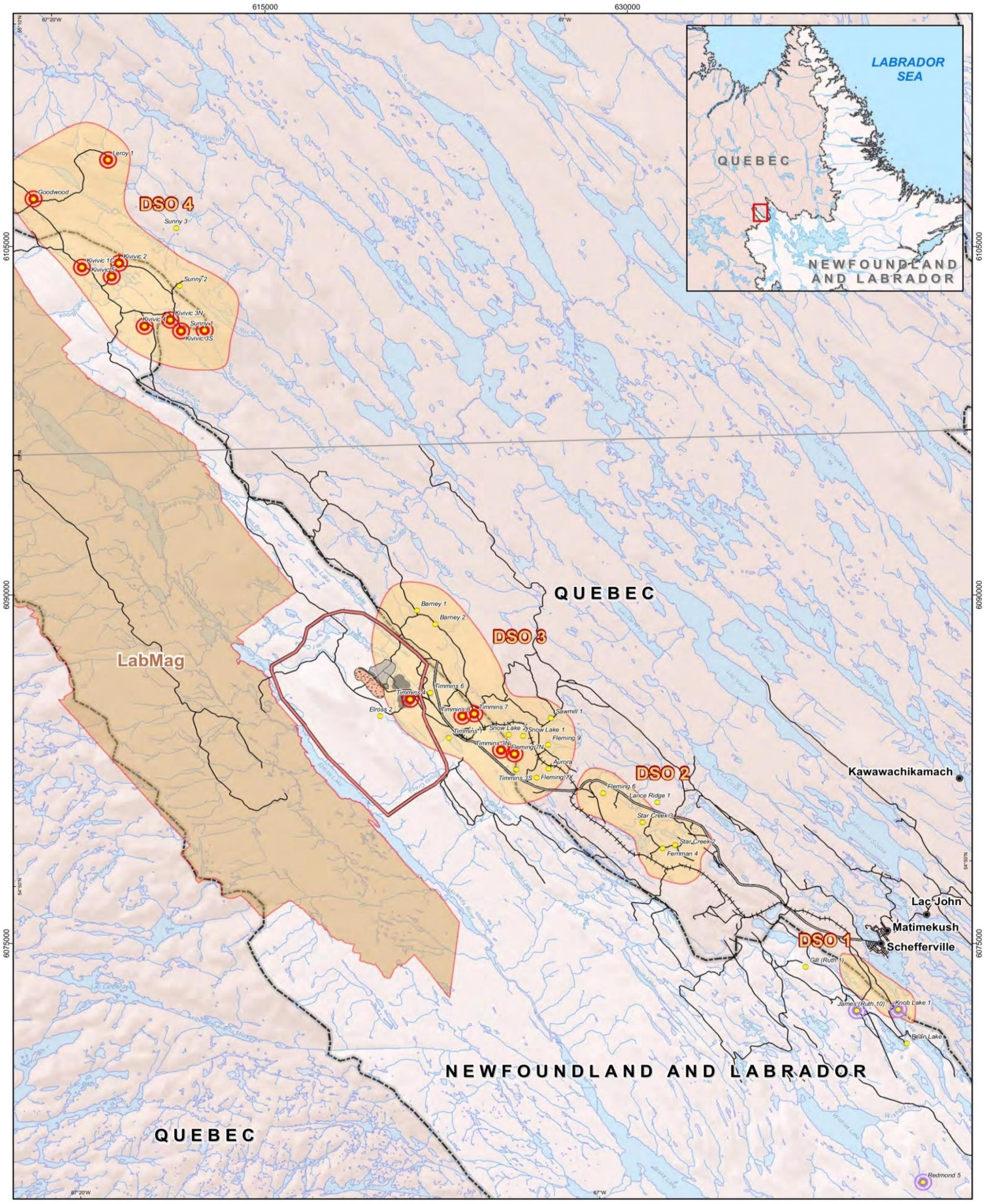
Figure 2: DSO3 Air Quality Monitoring Stations. This figure shows the planned locations of AQM stations in the vicinity of the DSO3 Area.

Figure 3: DSO4 Air Quality Monitoring Stations. This figure shows the planned locations of AQM stations in the vicinity of the DSO4 Area.

Figure 2 and Figure 3 also show the following items:

- Planned location of the meteorological stations;
- Processing plants, workers' camp and offices; and
- Sensitive receptors. Included in the Howse Property Environmental Impact Statement, a list of sensitive receptors was identified (see Appendix B for list of sensitive receptors). These receptors are shown on the figures.

Figure 1: Locations of DSO Projects



LEGEND

Infrastructure And Mining Components

- DSO - Deposit
- LIM Project
- TSMC Project
- Proposed Howse Pit
- Proposed Low Grade/Overburden Stockpile
- Proposed Crushing/Screening Facility
- Proposed Waste Rock Dump
- DSO Howse Local study area
- DSO - Other Site
- Taconite - LabMag

Basemap

- Town
- Railroad
- Road
- Watercourse
- Waterbody
- Provincial Boundary

Figure 1

Location

DSO Howse Property

0 2,5 5 7,5 10

Kilometers

SCALE:
1:150 000

FILE, VERSION, DATE, AUTHOR:
GH-0466, 03, 2014-01-14, E.D., J.T.

SOURCES:

Map base
Government of Canada, NTDB, 1:50,000, 1979
SNC Lavalin, Groupe Hémisphères, Hydrology update, 2013.

Infrastructure and Mining Components
New Millennium Capital Corp., Mining sites and roads
TATA Steel Minerals Canada Limited/ MET-CHEM, Howse Deposit Design for General Layout., 2013

GroupeHemispheres

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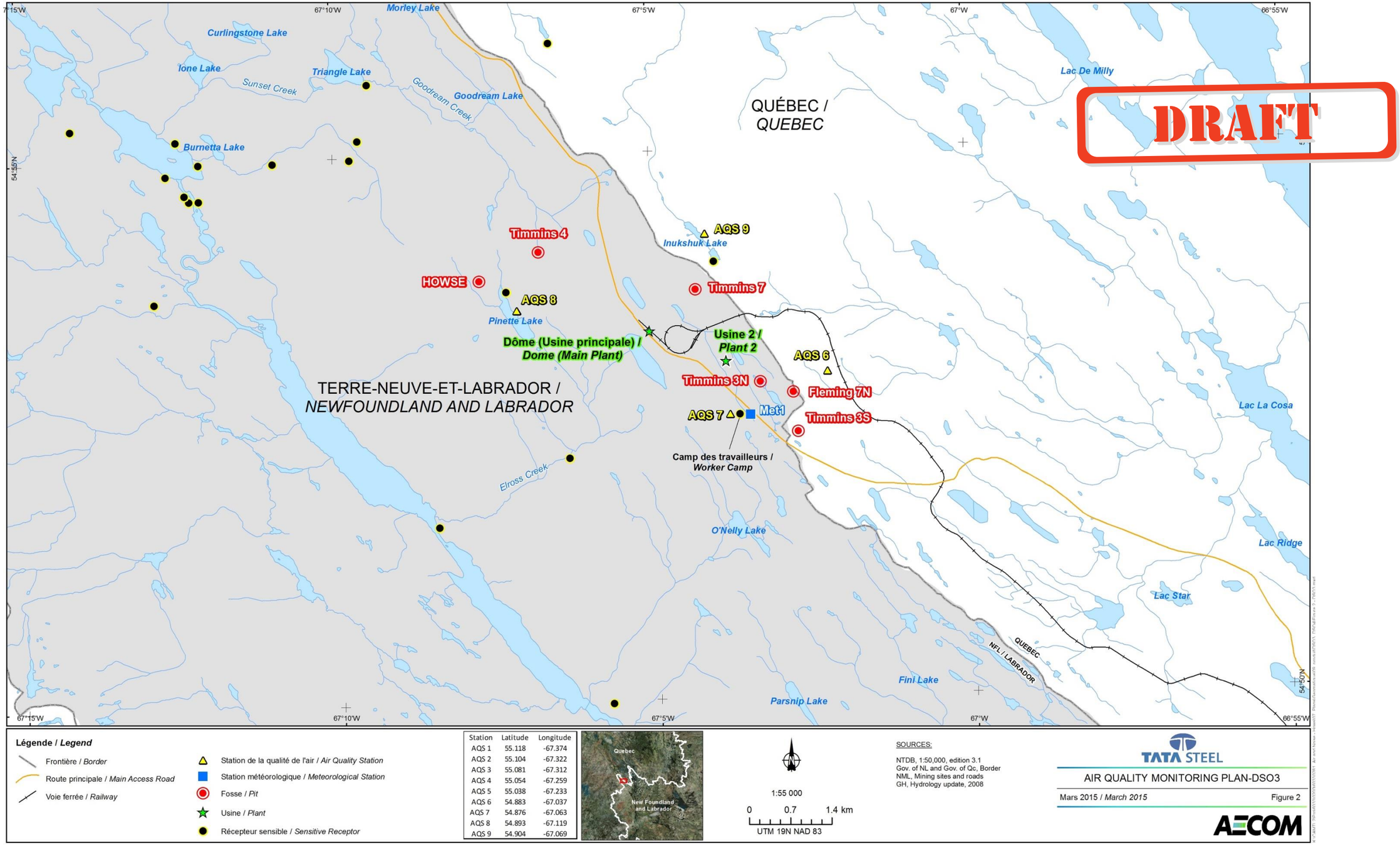
Figure 2: Location of Air Quality Monitoring Stations – DSO3



Légende / *Legend*

- Frontière / *Border*
- Route principale / *Main Access Road*
- Voie ferrée / *Railway*
- Station de la qualité de l'air / *Air Quality Station*
- Station météorologique / *Meteorological Station*
- Fosse / *Pit*
- Usine / *Plant*
- Récepteur sensible / *Sensitive Receptor*

Station	Latitude	Longitude
AQS 1	55.118	-67.374
AQS 2	55.104	-67.322
AQS 3	55.081	-67.312
AQS 4	55.054	-67.259
AQS 5	55.038	-67.233
AQS 6	54.883	-67.037
AQS 7	54.876	-67.063
AQS 8	54.893	-67.119
AQS 9	54.904	-67.069

1:55 000

0 0.7 1.4 km

UTM 19N NAD 83

SOURCES:

NTDB, 1:50,000, edition 3.1
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

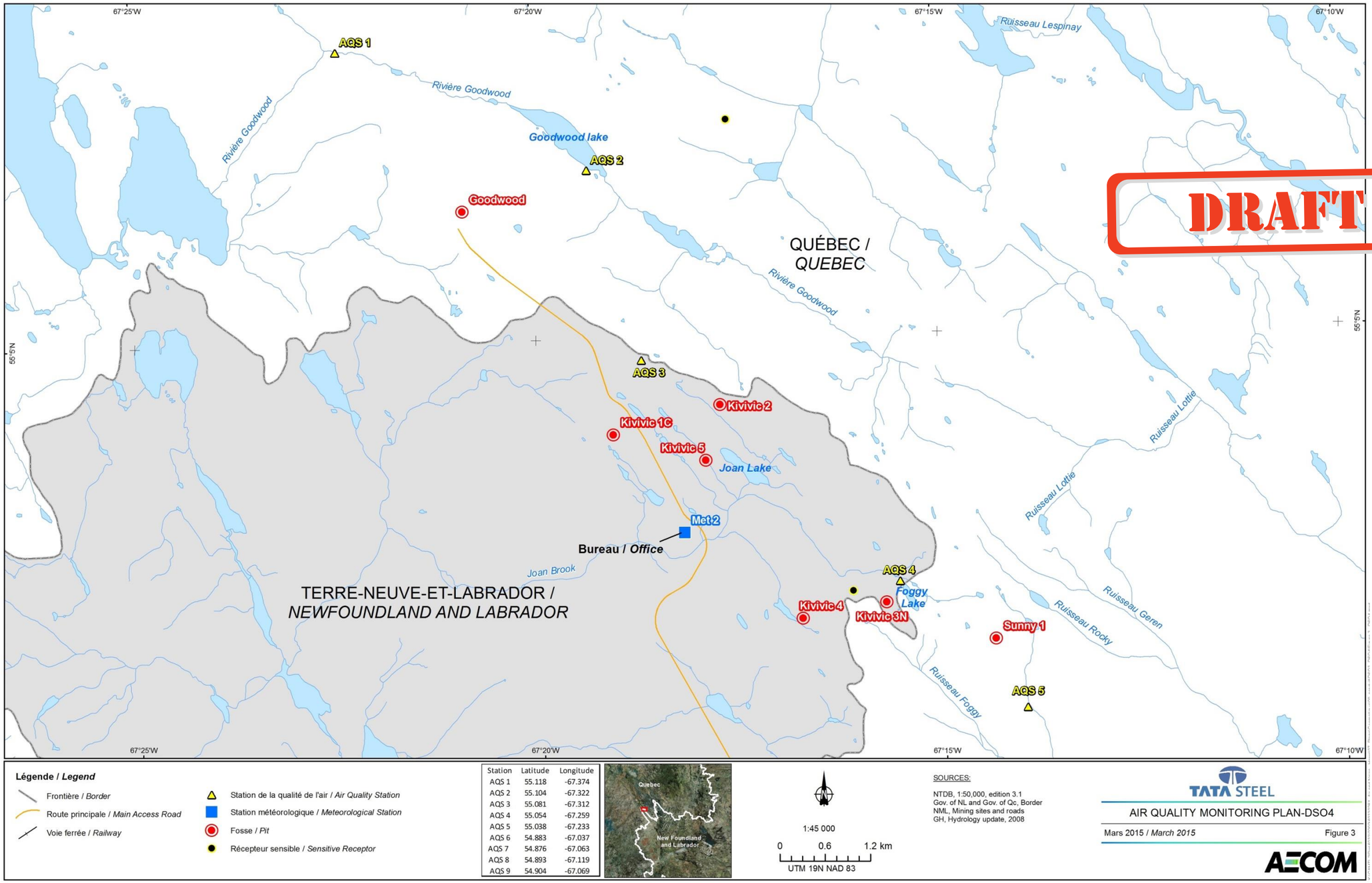
TATA STEEL

AIR QUALITY MONITORING PLAN-DSO3

Mars 2015 / *March 2015* Figure 2

AECOM

Figure 3: Location of Air Quality Monitoring Stations – DSO4



4. Air Quality Monitoring Matrix

Table 3 shows the DSO Ambient Air Quality Monitoring Matrix. This matrix includes the list of monitoring stations, parameters to be measured and measurement frequency. The parameters and frequency vary according to season (winter or summer) to account for equipment limitations and environmental conditions.

Table 3 contains three notes, defined below:

(A) Due to remote location and unavailability of electrical power, operation of sampling equipment at cold temperature is not possible during winter;

(B) During the winter period (7 months), snow sample will be taken at the end of winter/early spring;

(C) Metals analyses will be performed on TPM and dustfall samples. Metals analysis frequency is described in Section **Erreur ! Source du renvoi introuvable.**.

(D) In the comming weeks, equipement type and monitored parameters at station AQS-7 (Workers' camp) may be revised according to specific requireemnts by the Government of TNL (currently in discussion).

* DustTrak (or equivalent portable equipment) to be operated simultaneously to measure $PM_{2.5}$/TPM sampling for calibration and verification purposes. When/if additional immediate short-term measurements are required for assessment purposes or other reasons; the portable equipment will be used.

Sampling methods for each parameter are summarized in Table 4 and a detailed description of each sampling method is provided in Section 5.

Table 3: DSO Ambient Air Quality Monitoring Matrix

Station ID #	Name	Province	Closest pit Closest water body Closest Sensitive Receptor	DSO Project	Assessment Group (Operation Year)	Coordinates		Summer 5 months: May-June-July-August-September					Winter 7 months: Oct-Nov-Dec-Jan-Feb-March-Apr				
						Lat	Long	$PM_{2.5}$	TPM[(C)]	NO_2	Dustfall[(C)]	DustTrak	$PM_{2.5}$	TPM[(C)]	NO_2	Dustfall[(C)]	DustTrak
AQS-1	**Goodwood River** *(Previous ID #: P1 by WSP)*	NL	Goodwood (2.6km) and Kivivic 1C (6.2km) Goodwood River (<100 m) R9 Naskapi Camp (5.2 km)	DSO4	2b (2015) 2a (2016/2017)	55.1182	-67.3737	--	--	--	5	--	--	--	--	(B)	--
AQS-2	**Goodwood Lake** *(Previous ID #: S-R9 by AECOM and ID #: P2 by WSP)*	QC	Goodwood (1.5km) and Kivivic 1C (3.5km) Goodwood Lake (<100 m) R9 Naskapi Camp (2 km)	DSO4	2b (2015) 2a (2016/2017)	55.1035	-67.3221	5	5	5	5	5*	(A)	(A)	3	(B)	(A)
AQS-3	**Between Goodwood pit and Joan Lake** *(Previous ID #: P3 by WSP)*	NL-QC border	Kivivic 1C (1.0 km) and Kivivic 2 (1.4km) Joan Lake (1.5 km) R9 Naskapi Camp (3.3 km)	DSO4	2b (2015) 2a (2016/2017)	55.0808	-67.3115	--	--	--	5	--	--	--	--	(B)	--
AQS-4	**Foggy Lake** *(Previous ID #: S-R1 by AECOM and ID #: P5 by WSP)*	NL-QC border	Sunny 1 and Kivivic3&4 (0.3-1 km) Foggy Lake (<100 m) R1 Innu Camp (1 km)	DSO4	2b (2015) 2a (2016/2017)	55.0538	-67.2589	5	5	5	5	5*	(A)	(A)	3	(B)	(A)
AQS-5	**Sunny 1** *(Previous ID #: P6 by WSP)*	QC	Sunny 1 (1km) and Kivivic3S (1.6 km) Foggy Brook (<100 m) R1 Innu Camp (2.8 km)	DSO4	2b (n/a) 2a (2016/2017)	55.0383	-67.2330	--	--	--	5	--	--	--	--	(B)	--
AQS-6	**Fleming 7N** *(Previous ID #: S-Cl1 by AECOM)*	QC	Fleming 7N (800m) --- Workers' camp (1.6 km)	DSO3	1a (operational)	54.8797	-67.0466	5	5	5	5	5*	(A)	(A)	3	(B)	(A)
AQS-7	**Workers' Camp (D)** (New station, no previous ID #)	NL	Timmins and Fleming 7N (1km) --- Rec17 – Workers' camp (<100m)	DSO3	1a (in operation)	54.8764	-67.0601	10	10	5	5	10*	(A)	(A)	7	(B)	(A)
AQS-8	**Pinette Lake** (New station, no previous ID #)	NL	Howse (500 m) Pinette Lake (<100m) Rec1 - Pinette Lake (<100m)	DSO3	Howse (2016)	54.8930	-67.1190	5	5	5	5	5*	(A)	(A)	3	(B)	(A)
AQS-9	**Inukshuk Lake** (New station, no previous ID #)	QC	Timmins 7 (800 m) InukShuk Lake (<100m) Rec9 - Pinette Lake (<100m)	DSO3	1a (in operation)	54.9040	-67.0690	5	5	5	5	5*	(A)	(A)	3	(B)	(A)
--	~~Joan Lake~~ ~~*(Previous ID #: P4 by WSP)*~~		*In WSP Dustfall monitoring plan, this station (P4) was identified as temporary until mining at the Kivivic Deposits start. Kivivic mining should start in 2015; therefore this station is located within the administrative boundary of the Kivivic site and is not required anymore. Dust effect on water quality will be evaluated via the water quality monitoring plan.*														

SEE PREVIOUS PAGE FOR NOTES (A), (B) and *

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5. Air Monitoring Methods

5.1 Selection of Monitoring Methods and Equipment

Sampling equipment and test methods selected to meet the objectives of the AQM Plan are summarized in Table 4.

The following sections describe in more details the sampling equipment and analytical methods to be used for each parameter. Sample analyses will be performed either by TSMC's on-site laboratory or by outside accredited laboratories. Analyses frequency is also described for each type of sample.

Table 4: Summary - Test Methods and Sampling Equipment - DSO AQM Plan

Parameter	Equipment	Test Method	Duration of a test [1]	Comments
TPM and Metals	BGI PQ-200	High Volume Method, EPS 1-AP-73-2 (Environment Canada), modified (see comments)	24 hours	Due to multiple remote locations and unavailability of grid electricity, an alternative portable battery powered equipment was selected. Sampling flow rate is 16.7 lpm, instead of 1.4 m^3/min for the Hi-Vol method. Metals analysis to be performed by certified lab
$PM_{2.5}$	BGI PQ-200 with Very Sharp Cut Cyclone (VSCC)	Equivalent Method CCME PN1456 Ambient Air Monitoring Protocol for the Canada-wide Standards (CWS) for PM2.5 and Ozone / USEPA, Appendix L to Part 40 CFR Part 50 - Reference Method for the Determination of Fine Particulate Matter as PM2.5 in the Atmosphere	24 hours	Due to multiple remote locations and unavailability of grid electricity, a USEPA approved portable battery powered equipment was selected.
Dustfall and Metals (Summer)	Dustfall jar	ASTM D1739-98 Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter)	30 days	This simple method has no moving parts and does not require electricity. Widely used for monitoring dust at remote locations. Metals analysis to be performed by certified lab
Dustfall and Metals (Winter)	Snow Sampling	Site-specific Method	1 per season	Snow samples will be taken at the end of winter/early spring. Metals analysis to be performed by certified lab.
NO_2	Passive sampler	Developed by Maxxam, Registered with the Standards Council of Canada (SCC)	30 days	Passive samples analyzed by Maxxam.
Surrogate Dust Monitoring	TSI DustTrak (or equivalent)	Portable laser photometer by TSI Inc. (or equivalent)	Simultaneous to TPM sampling and as required	DustTrak is a portable analyzer that can be used to evaluate if TPM or PM10 or PM2.5 exceed pre-determined thresholds and if more precise measurement is required. The analyzer provides instantaneous and continuous readings

[1] Refer to Table 3: DSO Ambient Air Quality Monitoring Matrix for monitoring frequency at each station

5.2 Total Particulate Matter (TPM) & Metals

Total Particulates Matter (TPM) & Metals	
Air Quality Standards (particulate; standards for individual metals vary)	NL: 120 µg/m^3 (24 hours) and 60 µg/m^3 (1 year)
	QC: 120 µg/m^3 (24 hours)
Sampling Duration (each sampling event)	24 hours
Sampling Frequency	Varies with season and test location - See Table 3 Monitoring Matrix

Sampling Method

Modified 40 CFR Part 50, Appendix B: Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method) + USEPA IO-3 Chemical Species Analysis Of Filter-Collected Suspended Particulate Matter (SPM) and Modified Method for the Measurement of Suspended Particulate in the Atmosphere (High Volume Method) EPS 1-AP-73-2 (Environment Canada).

Equipment

BGI Incorporated PQ200 (or equivalent). http://bgi.mesalabs.com/pq200-particulate-sampler/

Summary Description

This air sampling unit is composed of an air mover (diaphragm vacuum pump), a flow controller and timer and a filter holder; the flow rate can be audited with an EPA approved calibration tool. The unit draws air through a Teflon filter at a flow rate of approximately 16.7 L/min. The mass of the collected particulate is the difference between the weight of the filter prior to sampling and the weight following sample collection. The concentration of TPM, expressed in µg/m^3, is determined by dividing the mass of the collected particulate by the volume of air sampled. Similarly, the concentration of any metal present on a filter is determined by dividing the mass of the metal analyzed on the filter by the volume of air sampled.

The sampler can be battery operated for up to 30 hours, which is ideal for remote sampling locations. Battery power can be optionally augmented by solar panels.

The photo shows an example of the BGI PQ200 sampling unit with a PM10 selection attachment; this head is replaced with a non-fractionating inlet for TPM sampling.

Laboratory Analytical Method

The method to determine the concentration of TPM consists in the weight of the filter prior to sampling and the weight following sample collection. The gravimetric weighing is performed by a certified laboratory. Periodically, filters will be analyzed for metal contents.
For the first year (2 seasons), all filters will be analyzed for a selected list of metals (Sb, Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Tl, V, Zn).
For subsequent years and depending on results obtained, metal analysis frequency will be re-evaluated.

Sampling procedures and quality control

The "*Operations Manual for Air Quality Monitoring in Ontario*" will be used as a reference to establish the sampling procedures and quality control methods for this type of sampler. The quality control program will include at a minimum:

- Sampling rate calibration procedure and frequency
- Verification of the timer (duration)
- Frequency of field blank
- Frequency of laboratory blanks
- Best practices for location of sampling equipment: height, distance from potential disturbances and water bodies

5.3 Fine Particulate Matter ($PM_{2.5}$)

Fine Particulate Matter ($PM_{2.5}$)	
Air Quality Standards	NL: 25 µg/m^3 (24 hours) and 8.8 µg/m^3 (1 year)
	QC: 30 µg/m^3 (24 hours)
Sampling Duration (each sampling event)	24 hours
Sampling Frequency	Varies with season and test location - See Table 3 Monitoring Matrix

Sampling Method

Designated Manual Reference Method[4]: USEPA, Appendix L to 40 CFR Part 50 - Reference Method for the Determination of Fine Particulate Matter as $PM_{2.5}$ in the Atmosphere and CCME PN1456[5].

Equipment

BGI Incorporated PQ200 (or equivalent). http://bgi.mesalabs.com/pq200-particulate-sampler/

Summary Description

This air sampling unit is composed of an air mover, a flow controller and timer, a filter holder and a Very Sharp Cut Cyclone (VSCC) to select $PM_{2.5}$ only. The flow rate can be audited with an EPA approved calibration tool. The unit draws air through the Teflon filter at a flow rate of approximately 16.7 L/min. Particles that are collected by the filter have an aerodynamic diameter measuring up to 2.5 micron. The mass of the collected particulate is the difference between the weight of the filter prior to sampling and the weight following sample collection. The concentration of $PM_{2.5}$, expressed in µg/m^3, is determined by dividing the mass of the collected particulate by the volume of air sampled.

The sampler can be battery operated for up to 30 hours, which is ideal for remote sampling locations. Battery power can be optionally augmented by solar panels.

The photo shows an example of the BGI PQ200 sampling unit.

Laboratory Analytical Method

The method to determine the concentration of $PM_{2.5}$ consists in the weight of the filter prior to sampling and the weight following sample collection. The gravimetric weighing is performed by a certified laboratory.

Sampling procedures and quality control

The "*Operations Manual for Air Quality Monitoring in Ontario*" will be used as a reference to establish the sampling procedures and quality control methods for this type of sampler. The quality control program will include at a minimum:

- Sampling rate calibration procedure and frequency
- Verification of the timer (duration)
- Frequency of field blank
- Frequency of laboratory blanks
- Best practices for location of sampling equipment : height, distance from potential disturbances and water bodies

[4] *http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf, retrieved on 2015-03-25*

[5] *http://www.ccme.ca/files/Resources/air/pm_ozone/pm_oz_cws_monitoring_protocol_pn1456_e.pdf, retrieved on 2015-03-25*

5.4 Dustfall (Summer - May-June-July-August-September)

Dustfall – Summer	
Air Quality Standards	NL: 7.0 g/m^2 (30 days) and 4.6 g/m^2 (1 year)
	QC: n.a.
Sampling Duration (each sampling event)	30 days
Sampling Frequency	Once per month

Sampling Method

ASTM D1739-98: Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter) & MA. 101 – R.P. 1.0 Détermination des retombées de poussières dans l'air ambiant : méthode gravimétrique (CEAEQ 2010)

Equipment

Plastic Jar(s) – typically 47 cm height and 15, 55 cm of interior diameter. The mounting post is typically 2 m high.

Summary Description

Containers of a standard size and shape are prepared (eg. partially filled with liquid) and sealed and then opened and set up at appropriately chosen sites so that particulate matter can settle into them for periods of about 30 days. The containers are then closed and returned to the laboratory. The masses of the water-soluble and -insoluble components of the material collected are determined.

The deposition rate, D, is calculated in grams/square metre/30 day period, g/m^2/30d, for the two masses of material obtained (insoluble and total soluble matter)

SummerDR = ((wd/as)/nd)/30.4

where:
wd = weight of dust per sample, in g
nd = number of days in the summer sampling period
as = area sampled (176.72 cm 2 for a cylindrical sampler with a 15 cm interior diameter)
30.4 = annual average number of days per month

The photo shows an example of a dual jar setup. TSMC will prepare its own design according to ASTM D1739-98.

Laboratory Analytical Method

After 1 mm sieving, evaporate and desiccate jar contents. Weigh to the nearest 0.1 mg.
TSMC laboratory on-site will conduct the analysis. Once per season and per station, samples will be sent to an outside certified laboratory for analysis. For the first year, one sample per monitoring station will be analyzed for a selected list of metals (Sb, Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Tl, V, Zn)
For subsequent years and depending on results obtained, metal analysis frequency will be re-evaluated.

Sampling procedures and quality control

The "*Operations Manual for Air Quality Monitoring in Ontario*" and ASTM D1739-98 will be used as a reference to establish the sampling procedures and quality control methods for this type of sampler. The quality control program will include at a minimum:

- Container/jar cleanup procedure
- Frequency of laboratory blanks
- Best practices for location of sampling equipment : height, distance from potential disturbances and water bodies

5.5 Dustfall (Winter - Oct-Nov-Dec-Jan-Feb-March-Apr)

Dustfall – Winter	
Air Quality Standards	NL: 7.0 g/m^2 (30 days) and 4.6 g/m^2 (1 year)
	QC: N/A
Sampling Duration (each sampling event)	1 sample collected
Sampling Frequency	Once per season

Sampling Method
Not available. A site-specific method is to be developed.

Equipment
Core tube (diameter approx. 15 cm), shovel and container

Summary Description

Snow samples will be taken at each station, ideally at the end of winter or in the spring if snow depth permits. For comparative purposes, the same volume of snow—equivalent to a 3 m by 15 cm diameter core sample—will be taken at each station. The volume of snow and water, the weight of the TPM, and concentrations of target elements will be determined. This data will be used to establish dust and target pollutant deposition rates (in g/m^2/30 days). Three samples will be taken at stations AQS-1 and AQS-4 to measure the consistency of the sampling method. If the standard deviation between three samples at the same station is too high and snow conditions are roughly the same, a problem with the sampling method or with some other factor is indicated. If this occurs, a review of the cause of the discrepancy will be conducted and the procedure adjusted accordingly. Winter deposition rates (WinterDR), based on the samples, will be calculated using the following formula:

WinterDR = [(wd/as)/nd]/30.4

where:
wd = weight of dust per sample, in g
as = area sampled (78.54 cm2 for a cylindrical sampler with a 10 cm interior diameter)
nd = number of days in the winter sampling period
30.4 = annual average number of days per month

The result will be converted to g/m^2/30 days

Laboratory Analytical Method
After 1 mm sieving, evaporate and desiccate melted snow. Weigh to the nearest 0.1 mg.
TSMC laboratory on-site will conduct the analysis for total dust. For the first year, one sample per monitoring station will be analyzed for a selected list of metals (Sb, Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Tl, V, Zn) by an outside laboratory. For subsequent years and depending on results obtained, metal analysis frequency will be re-evaluated.

Sampling procedures and quality control
The "*Operations Manual for Air Quality Monitoring in Ontario*" will be used as a reference to establish the sampling procedures and quality control methods for this type of sampler. The quality control program will include at a minimum :

- Frequency of field and laboratory blanks
- Best practices for location of sampling site: distance from potential disturbances and water bodies

5.6 Nitrogen Dioxide (NO_2)

Nitrogen Dioxide (NO_2)	
Air Quality Standards	NL: 400 µg/m^3 (1 hour), 200 µg/m^3 (24 hours) and 100 µg/m^3 (1 year)
	QC: 414 µg/m^3 (1 hour), 207 µg/m^3 (24 hours) and 103 µg/m^3 (1 year)
Sampling Duration (each sampling event)	30 days
Sampling Frequency	Varies with season and test location - See Table 3 Monitoring Matrix

Sampling Method

Ambient air monitoring stations are typically installed from 1 to 3 metres in height with sample inlets installed at angles of less than 30° to the top of any obstacle. The sampler will be installed in the chosen site, by strapping and secure the unit to a support and then, left in place for the required duration to collect the sample. After exposure, the cassettes or "puck" will be shipped to the lab in air tight shipping containers for analysis.

Equipment

Sampler Cover holding an NO2 specific cassette (also called "puck") and post.

Summary Description

Maxxam's proprietary Passive Air Sampling System (PASS) units are compact, portable, require no electricity and very little maintenance. The all-weather PASS has a durable top cover to shelter against rain, snow and wildlife. Passive air samplers accurately and cost-effectively measure trace levels of atmospheric pollutants in ambient air. When monitoring air quality for passive sampling allows for the physical uptake of a gas or vapour sample via a permeative or diffusive process. Passive sampling is preferred for use in remote and wilderness locations and for large-scale and regional air quality assessments. It provides low level detection limits equal to 0.1 ppb for NOx.

Laboratory Analytical Method

Maxxam Proprietary, Registered with the Standards Council of Canada (SCC)

Sampling procedures and quality control

Maxxam recommendations in Technical Bulletin "Passive Air Monitoring Overview" will be used as a reference to establish the sampling procedures and quality control methods for this type of sampler. The quality control program will include at a minimum:

- Frequency of blanks
- Cassettes/pucks handling
- Best practices for location of sampling site: distance from potential disturbances and water bodies

5.7 Surrogate Dust Monitoring

Surrogate Dust Monitoring	
Air Quality Standards	There are no regulatory air quality standards for Surrogate Dust. A site-specific action level in µg/m^3 will be established by TSMC during the first year of operation.
Sampling Duration (each sampling event)	As required. The monitor can record on a continuous basis
Sampling Frequency	Varies with season and test location - See Table 3 Monitoring Matrix

Sampling Method

The DustTrak is used for a variety of applications. It can measure $PM_{2.5}$, PM_{10} and TPM using specific size selective inlets. TSMC plans on using the PM_{10} inlet and establish a site-specific action level in µg/m^3. When sampling for TPM and $PM_{2.5}$ using the BGI PQ200 samplers (see Sections 5.2and 5.3), a DustTrak will be will operated simultaneously to establish a correlation. Subsequently, it will be possible to use the DustTrak as a screening tool for short-term monitoring at sites of interest to determine if more precise measurements are necessary.

Equipment

DustTrak 8530 and environmental enclosure (or equivalent)

Summary Description

The DustTrak DRX desktop monitor is a battery operated, data-logging, light-scattering laser photometers that gives real-time aerosol mass readings. It uses a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance. The DustTrak desktop model come with USB (device and host), Ethernet, and analog and alarm outputs. The monitor will be placed in a waterproof environmental enclosure in order to protect the equipment without affecting the accuracy and precision of measures

Laboratory Analytical Method

Not applicable

Sampling procedures and quality control

The TSI DustTrak user manual provides all necessary instructions for obtaining valid results. QA/QC Forms will be prepared and filled-in by personnel responsible for operating the equipment. Quality control will include as a minimum:

- Calibration of the sampling rate
- Periodic zero checks
- Periodic checks of electronic operating parameters as recommended by the manufacturer

6. Meteorological Data

6.1 Meteorological Stations

TSMC will install two meteorological stations: one at DSO3 (nearby the workers' camp) and one at DSO4 (nearby the Kivivic Office Site). The meteorological stations planned locations are shown on Figure 2 and Figure 3.

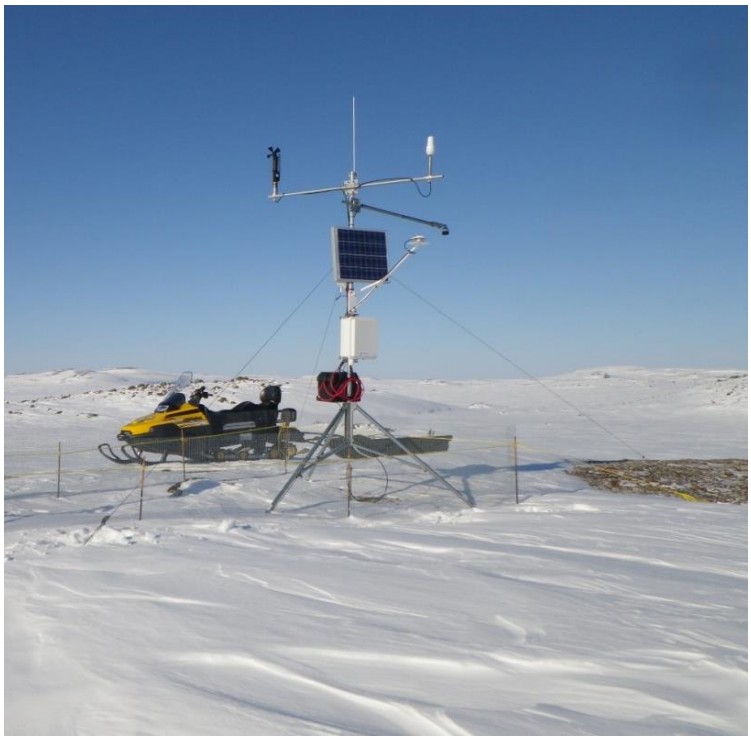
Parameters to be monitored are:

- Wind direction (in degrees);
- Wind speed (in m/s);
- Temperature (in °C);
- Humidity (in %); and
- Barometric Pressure.

It is anticipated that the stations will be tripod mounted. The exact location of each station will be determined based on site characteristics (accessibility, disturbances, vegetation).

Figure 4 shows an example of a tripod mounted meteorological station.

Figure 4: Example of Meteorological Stations Setup



6.2 Climate Data and Wind Roses

When selecting the location of each AQM stations described in this report, the climate and wind conditions were taken into account.

Table 5 is an excerpt of the recent Environmental Impact Statement for the Howse Project and shows the regional climate normal (Schefferville airport).

Appendix A contains 5 years of wind roses for DSO4 Project 2a (Goodwood/Sunny). These wind roses were taken from the report *Air Sampling Program – DSO Project 2A*, prepared by AECOM and dated August 2013.

Table 5: 1981-2010 Climate Normals from the Schefferville A Weather Station

PARAMETERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Monthly average record*													
Daily Average Temperature (˚C)	-24.5	-22.8	-15.9	-7.2	1.0	8.2	12.2	11.4	5.9	-1.4	-9.8	-20.5	-5.3
Total Precipitation (mm)	49.7	29.7	49.8	56.4	50.3	75.2	96.2	82.5	114.6	74.7	63.5	48.1	790.8
Rainfall (mm)	0.3	0.3	1.4	9.0	26.1	69.5	96.1	81.9	103.0	24.5	4.5	0.7	417.3
Snowfall (cm)	53.7	33.3	54.7	50.5	22.4	5.8	0.2	0.4	11.1	50.8	62.8	53.0	398.4
Average Snow Depth (cm)	58.2	57.9	62.0	59.7	14.4	0.1	0.0	0.0	0.1	5.6	21.0	44.6	27.0
Evaporation (mm/d)						3.3	3.4	2.7					
Wind Speed (km/h)	15.4	15.2	16.3	16.0	15.1	15.5	14.0	14.6	16.3	16.4	16.3	15.1	15.5
Most Frequent Direction	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
Extreme Statistics**													
Extreme Maximum Temp. (˚C)	5.1	5.1	9.4	13.1	28.3	**34.3**	31.7	28.7	26.7	20.6	9.8	5.0	34.3
Extreme Minimum Temp. (˚C)	-48.3	**-50.6**	-45.0	-36.1	-23.3	-7.8	0	-3.3	-9.4	-19.4	-35.6	-47.2	-50.6
Extreme Daily Precipitation (mm)	29.0	29.0	36.8	32.8	33.8	51.3	**54.4**	48.5	49.0	41.2	35.8	24.6	54.4
Extreme Daily Rainfall (mm)	24.6	2.8	10.6	23.4	29.5	51.3	**54.4**	48.5	45.2	34.3	34.8	5.8	54.4
Extreme Daily Snowfall (cm)	30.6	29.0	**36.4**	30.2	33.2	23.7	9.0	23.9	28.4	35.6	29.0	25.4	36.4
Extreme Snow Depth (cm)	163	188	**190**	163	132	38	0	18	18	53	89	115	190
Maximum Hourly Speed (km/h)	85	**97**	83	77	66	97	65	61	80	89	84	80	97
Maximum Gust Speed (km/h)	134	148	148	130	101	126	103	117	137	137	142	**153**	153

* Most of the averages are calculated using data from 1981 to 1993, except for the wind, which is calculated using data between 1981 and 2009. Some records were missing, but no less than 98.9% of possible observations are available.

** The extremes were found between 1949 and 1993 for the temperature and precipitation. Wind extremes are from 1953 to 2009.

Appendix A:

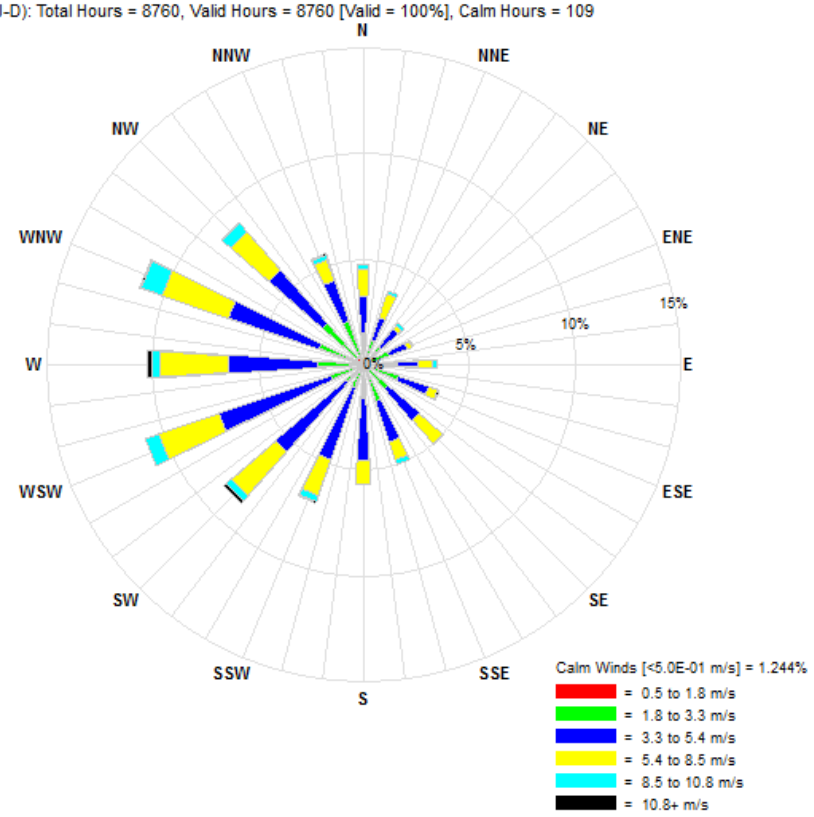
Wind Roses - DSO4 Project 2a (Goodwood / Sunny)

Excerpt from Air Sampling Program – DSO Project 2A, prepared by AECOM and dated August 2013

Projet 2a - Sunny 1 2006

CALMET.DAT: (X,Y) = (612.303km, 6101.578km), Height = 10.0 m

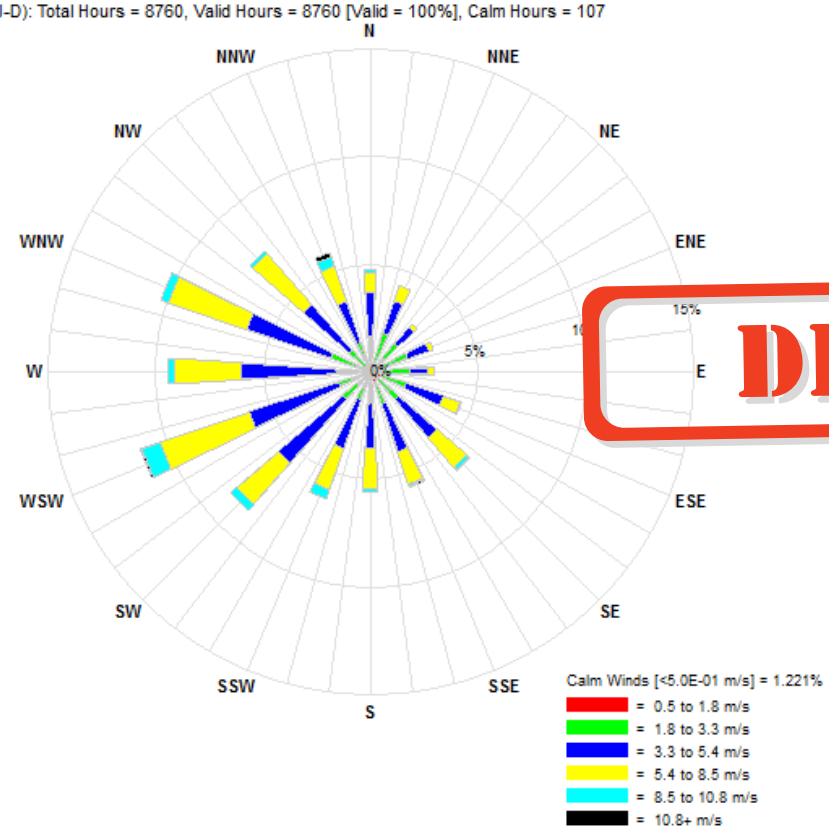
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 109



Projet 2a - Sunny 1 2005

CALMET.DAT: (X,Y) = (612.303km, 6101.578km), Height = 10.0 m

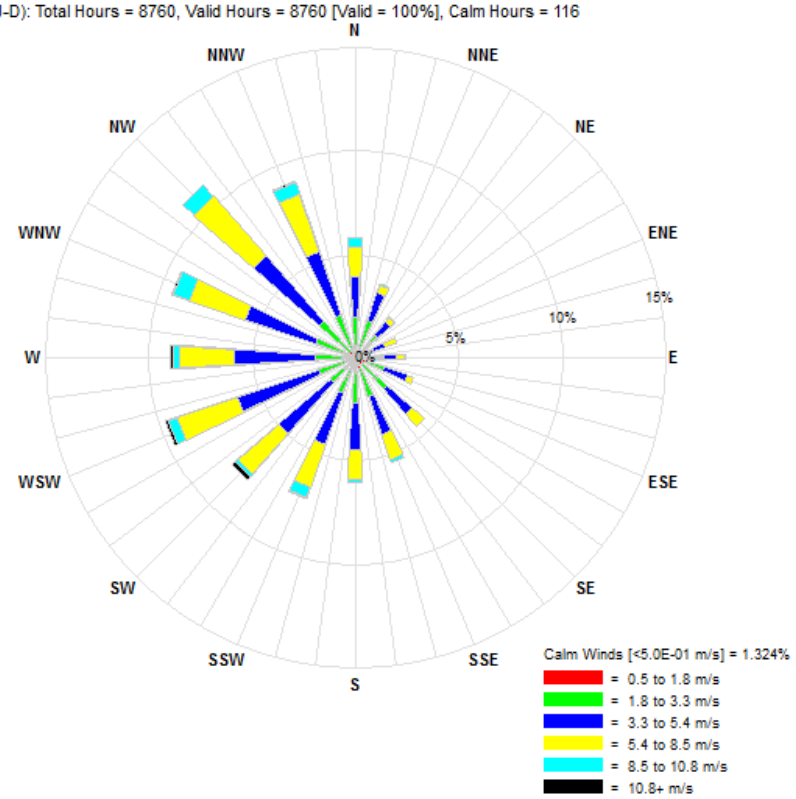
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 107



Projet 2a - Sunny 1 2007

CALMET.DAT: (X,Y) = (612.303km, 6101.578km), Height = 10.0 m

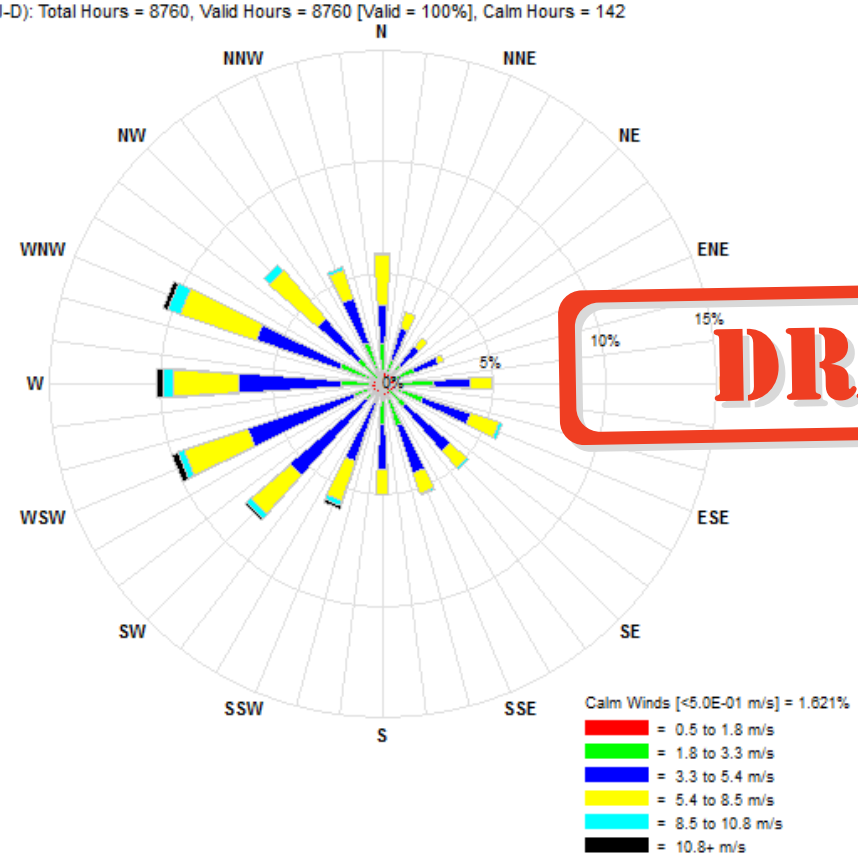
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 116



Projet 2a - Sunny 1 2009

CALMET.DAT: (X,Y) = (612.303km, 6101.578km), Height = 10.0 m

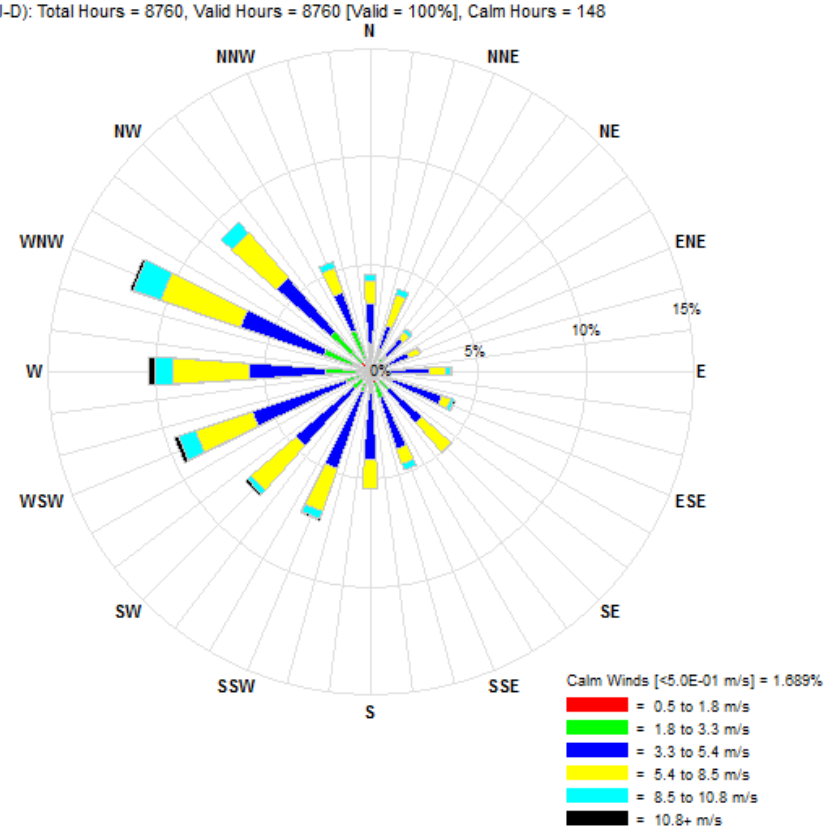
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 142



Projet 2a - Goodwood 2006

CALMET.DAT: (X,Y) = (605.426km, 6107.086km), Height = 10.0 m

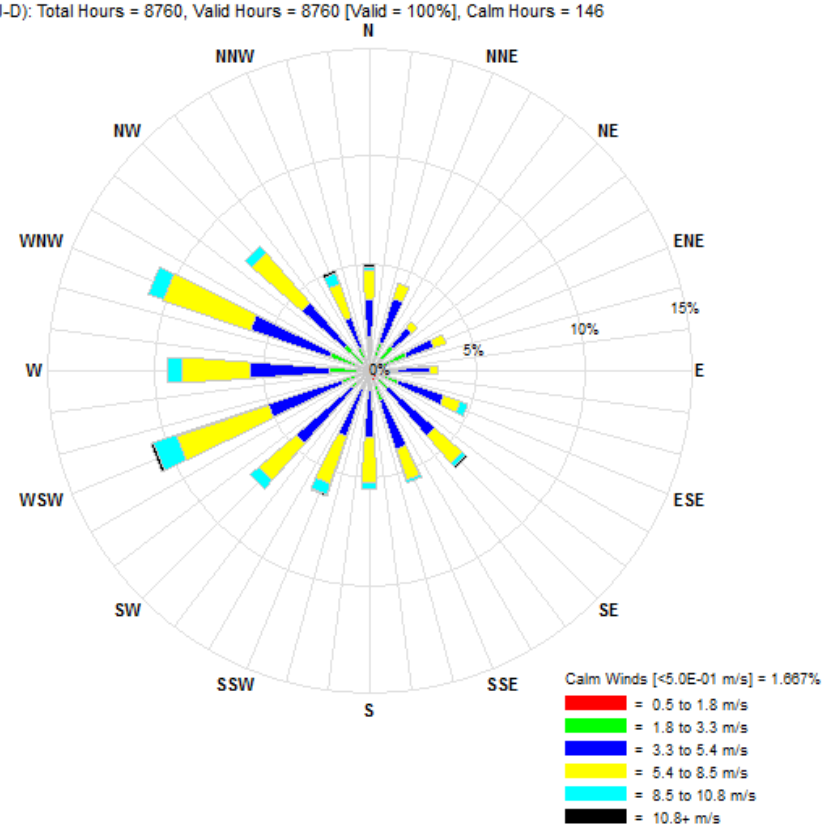
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 148



Projet 2a - Goodwood 2005

CALMET.DAT: (X,Y) = (605.426km, 6107.086km), Height = 10.0 m

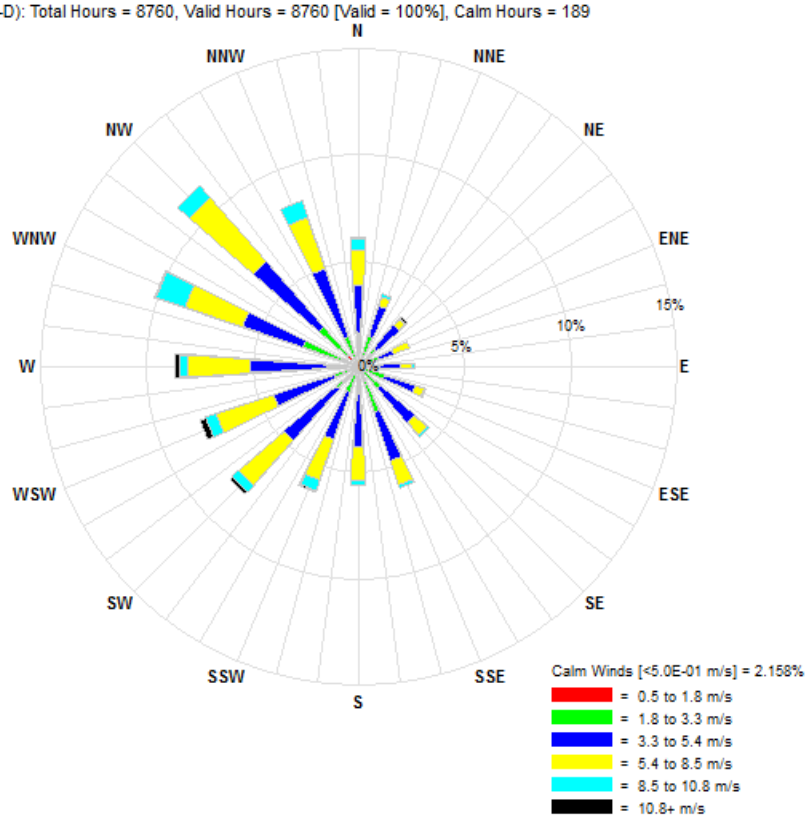
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 146



Projet 2a - Goodwood 2007

CALMET.DAT: (X,Y) = (605.426km, 6107.086km), Height = 10.0 m

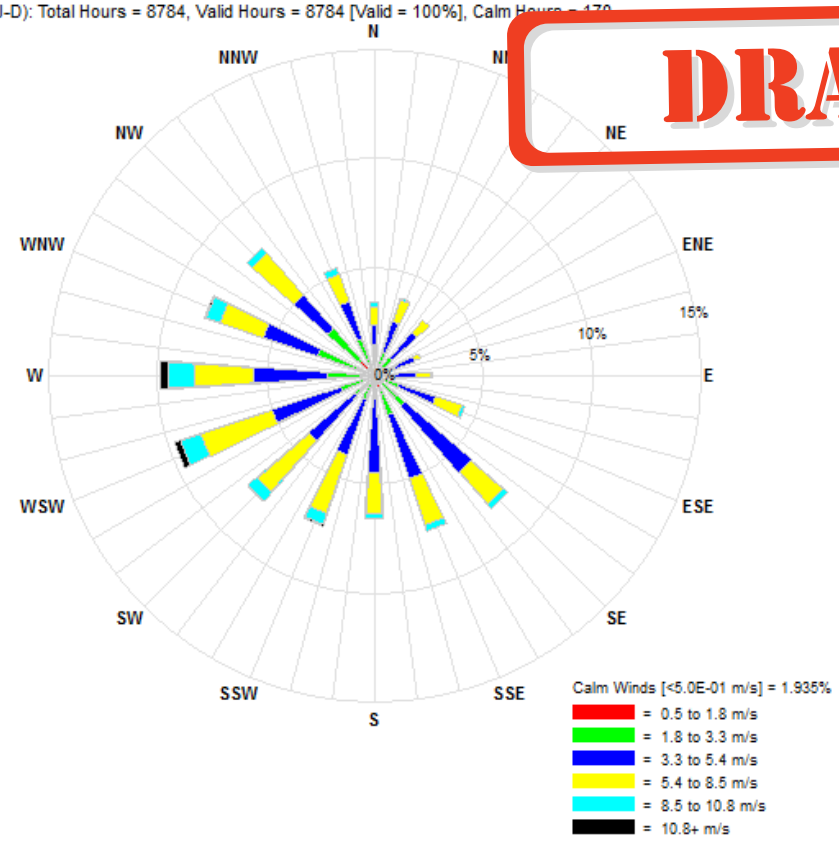
Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 189



Projet 2a - Goodwood 2008

CALMET.DAT: (X,Y) = (605.426km, 6107.086km), Height = 10.0 m

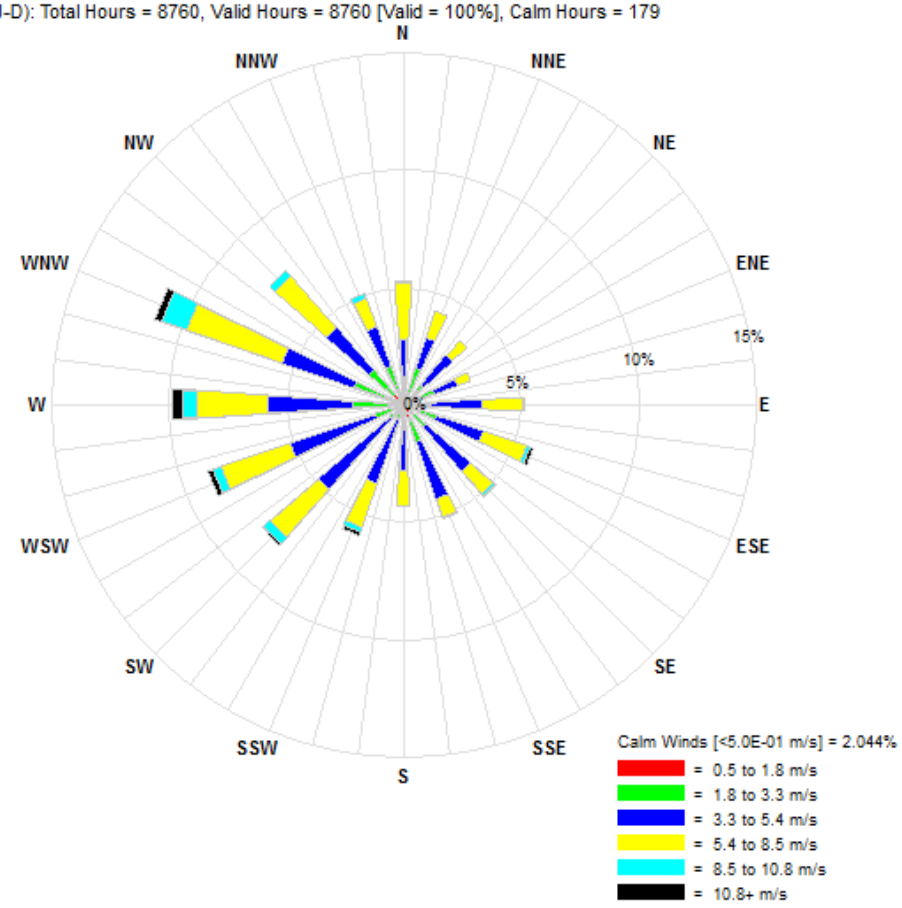
Annual(J-D): Total Hours = 8784, Valid Hours = 8784 [Valid = 100%], Calm Hours = 170



Projet 2a - Goodwood 2009

CALMET.DAT: (X,Y) = (605.426km, 6107.086km), Height = 10.0 m

Annual(J-D): Total Hours = 8760, Valid Hours = 8760 [Valid = 100%], Calm Hours = 179



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Appendix B:

Sensitive Receptors - List

Excerpt from the Howse Property Environmental Impact Statement (January 2015)

Newfoundland & Labrador Discrete Sensitive Receptors

Receptor ID	Receptor Type	First Nations Group	YLatitude	XLongitude	X (UTM)	Y (UTM)
7	Camp	Young Naskapi	54.895831	-67.121703	620455.6998	6084815.2043
8	Camp	Young Naskapi	54.919330	-67.160036	617928.9597	6087364.4443
9	Trailer/Tent	Young Naskapi	54.927852	-67.157177	618087.2402	6088317.3089
10	Camp	Young Naskapi	54.910715	-67.204832	615082.7708	6086331.3418
11	Camp	Young Naskapi	54.911581	-67.205978	615006.7869	6086425.8103
14	Camp	Young Naskapi	54.870395	-67.106019	621537.9537	6082012.4298
19	Camp	Young Naskapi	54.921755	-67.235789	613067.4317	6087509.2149
30	Camp	Young Naskapi	54.832928	-67.095975	622295.7103	6077861.4211
17	Uashat people's camp 2	Naskapi, Uashat	54.916418	-67.162227	617797.0637	6087036.6741
32	Camp	Innu, Uashat - Mani-Utenam	54.916127	-67.182537	616496.1910	6086970.4067
5	Tent	Innu	54.860284	-67.140808	619335.6239	6080827.6953
6	Tent – (exact location unclear)	Innu	54.895126	-67.214676	614495.9907	6084580.8491
36	Camp	Innu	54.919750	-67.208004	614853.6581	6087331.4093
37	Camp	Innu	54.9[illegible]	[illegible]	[illegible]	[illegible].9679
38	Camp	Innu	54.9[illegible]0687	-6[illegible]	[illegible]	608633[illegible].3878
39	Camp	Innu	54.9[illegible]4558	-67.210855	614685.7138	60867[illegible].0031
--	Workers' camp	n/a	54.876435	-67.060101	624465.5000	6082765.0000

Quebec Discrete Sensitive Receptors

Receptor ID	Receptor Type	First Nations Group	YLatitude	XLongitude	X (UTM)	Y (UTM)
31	Camp	Innu, Uashat - Mani-Utenam	54.9335268	-67.1090056	621156.5726	6089031.0605
33	Camp	Innu, Uashat - Mani-Utenam	54.8997266	-67.0667883	623964.9742	6085344.4900
--	Kawawachikamach	n/a	54.8656529	-66.7639825	--	--
--	Schefferville / Lac John	n/a	54.8115 80	-66.8214443		

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Appendix C:

Questions and Comments – Certificate of Authorization Conditions
Excerpts November 20, 2014 letter from MDDELCC and answers from TSMC

Appendix C :

On November 20, 2014, MDDELCC transmitted a letter to TSMC with a list of questions and comments on the CA conditions. Some of these questions and comments are linked to Condition 4 of the CA and were incorporated in this AQM Plan. A copy of these questions and comments on Condition 4 is provided below. Under each, TSMC's answer is provided.

Condition n° 4 (Modification de CA délivrée le 15 décembre 2013)

Le promoteur devra présenter à l'Administrateur, pour approbation au moins six mois avant le début de l'exploitation de l'une ou l'autre des fosses à ciel ouvert un programme de suivi environnemental de la dispersion des poussières autour de ses installations et à certaines stations localisées selon les vents dominants et le milieu récepteur. Ce programme de suivi devra permettre de s'assurer que les plans d'eau environnants ne seront pas contaminés par ces poussières au Québec en plus de vérifier si les activités réalisées au Québec ont un impact au Labrador.

[TSMC : Le présent plan de suivi de la qualité de l'air (SQA) répond aux exigences listées dans ce paragraphe.]

Lors de l'analyse du programme de suivi des émissions atmosphériques, déposé en décembre 2013, le MDDELCC et la Commission avaient demandé au promoteur de s'engager à compléter son programme de suivi en prévoyant l'analyse des métaux et de préciser comment il envisageait de récolter les données de vitesse et de direction du vent.

[TSMC : Le présent plan de SQA prévoit que des analyses de métaux seront effectuées sur des échantillons de poussières totales et de retombées de poussières (réf.: **Erreur ! Source du renvoi introuvable.** et Section **Erreur ! Source du renvoi introuvable.** du Plan de SQA): De plus, l'installation de deux stations météorologiques est prévue et permettra de récolter les données de vitesse et de direction du vent ainsi que d'autres paramètres (réf.: Section **Erreur ! Source du renvoi introuvable.** du plan SQA du Plan de SQA).]

Le promoteur répond qu'il réalisera le suivi des métaux, qu'il prendra les mesures de vents et des conditions météorologiques. Il précise que les équipements de suivi de la qualité de l'air seront installés en 2015.

[TSMC : Suite à l'approbation du présent plan de SQA par le MDDELCC, TSMC procédera à l'achat et l'installation des équipements requis, en 2015.]

QC - 21. Par son programme de suivi des émissions atmosphériques et ses réponses aux questions du MDDELCC et de la Commission, le promoteur répond adéquatement aux conditions n° 4 et 5.

Suivi de la dispersion des poussières dans l'air et de la contamination des plans d'eau.

Dans le programme de suivi environnemental que le promoteur propose en juin 2014, il présente un suivi de la dispersion des poussières autour des sites miniers Goodwood et Sunny 1. Ce suivi permettra dans un premier temps d'établir un état de référence l'année précédant le début de l'exploitation. Il aura ensuite pour but d'évaluer l'ampleur et l'étendue de la dispersion des poussières dans 1'air et conséquemment dans les milieux aquatiques environnants tout au long de 1'exploitation des gisements. Les stations seront situées à proximité de la rivière Goodwood, des lacs Goodwood, Joan, et Foggy, entre le site Goodwood·et le lac Joan et enfin une station sera située au sud-est du site Sunny 1. Pour ce suivi, les matières particulaires totales seront considérées. Un échantillonnage sera réalisé en hiver, par récolte de carottes de neige, une fois dans l'année à la fin de l'hiver ou au printemps. Un autre sera réalisé en été, grâce à des jarres à poussières, dont le contenu sera récolté environ tous les 30 jours, entre le début de mai et la fin d'octobre.

[TSMC : Le présent plan de SQA répond aux exigences listées dans ce paragraphe.]

QC - 22. Est-ce que ce programme de suivi de la dispersion des poussières dans les milieux aquatiques est bien un programme qui vient s'ajouter à celui déjà présenté par le promoteur et produit par AECOM?

[TSMC : Le présent plan de SQA consolide les deux programmes listés, en un seul.]

QC - 23. Quand seront mises en place les stations pour caractériser l'état de référence?

[TSMC : En 2015, Suite à l'approbation du présent plan de SQA par le MDDELCC.]

QC - 24. Le MDDELCC et la Commission souhaitent rappeler que le Règlement sur l'assainissement de l'atmosphère ne contient aucune norme pour la déposition des particules ou des métaux. Les résultats de ce programme de suivi ne pourront donc pas être utilisés pour s'assurer de la conformité du projet à la réglementation en vigueur en ce qui a trait à la qualité de 1'air. Par contre, cette méthodologie peut tout de même fournir des informations intéressantes sur l'impact du projet en comparant les résultats obtenus lors de l'exploitation avec ceux obtenus avant projet et en suivant l'évolution des taux de déposition tout au long de la durée de vie du projet.

[TSMC : D'accord. Il est à noter que la réglementation de la province de TNL contient une norme de déposition des poussières.]

QC - 25. Afin d'être en mesure de mieux évaluer l'emplacement des stations de mesure, le promoteur devra donner davantage de détails quant aux distances de celles-ci par rapport à des cours d'eau ou plans d'eau, des arbres ou tout autre obstacle, ainsi que leur élévation exacte à cet endroit.

[TSMC : Les emplacements prévus des stations de mesure sont montrés dans le plan de SQA (réf.: Figure 2 et Figure 3). Après l'installation des équipements de SQA, les coordonnées et distances par rapport aux cours d'eau, arbres ou tout autre obstacle seront colligées et incluses dans le programme de SQA. De plus, ces informations seront acheminées à l'Administrateur, tel que requis par QC-26.]

Également, tel que recommandé par la norme D1739 intitulé *Standard method for collection and analysis of dustfall (settleable particulates)* publiée par l'American Society for Testing and Materials (ASTM), certaines distances devraient être respectées lors de l'installation de jarres à poussières :

- à l'intérieur d'un rayon de 20 m, aucun objet de plus de 1 rn de haut ne devrait y être retrouvé;
- à une distance de 20 m, l'objet le plus haut ne devrait pas excéder 30° de l'horizontale.

[TSMC : La méthode ASTM D1739 sera la méthode de référence utilisée pour le suivi des retombées de poussières (réf.: **Erreur ! Source du renvoi introuvable.**, Sections **Erreur ! Source du renvoi introuvable.** et **Erreur ! Source du renvoi introuvable.**).]

QC - 26. Afin de s'assurer de l'efficacité de la méthode utilisée, les résultats obtenus ainsi que les emplacements adéquats des stations de mesure devront être acheminés à l'Administrateur avant le début des opérations. Par la suite, les résultats du suivi de la dispersion des poussières devront être présentés dans le rapport annuel exigé à la condition n° 3.

[TSMC : Oui.]

QC - 27. Le promoteur devra démontrer que les stations sont situées dans les zones les plus sensibles par exemple en superposant la localisation des stations avec les résultats des modélisations atmosphériques les plus à jour.

[TSMC : La méthodologie de sélection des emplacements des stations tiens en ligne de compte les zones les plus sensibles, la direction des vents et les zones d'activités identifiées dans les résultats des modélisations atmosphériques les plus récentes. Le type d'équipements utilisés dans le cadre du SQA (eg. portables) permettra une adaptation à l'évolution des activités minières.]

Le promoteur indique que les stations P4 et P5 sont des stations témoins temporaires étant donné qu'elles seront exposées lors de 1'exploitation des gisements Kivivic prévue à partir de 2016.

[TSMC : Les noms de stations ont été révisés. La station P4 est maintenant exclue, car elle se trouvait directement dans la zone d'activité d'un des gisements du projet Joan Lake (eg. Kivivic) dont

l'exploitation débutera en 2015; dans ce cas, un suivi directe de la qualité de l'eau du lac Joan sera préféré. La station P5 située près du lac Foggy et dont le nouveau nom est AQS-4, est toujours prévue. Par ailleurs, d'autres stations ont été rajoutées afin de complémenter le SQA du Projet DSO; ainsi un total de neuf stations est prévu, dont cinq pour le secteur DSO4 (réf.: **Erreur ! Source du renvoi introuvable.**)]

QC - 28. Étant donné que 1'exploitation prévue des gisements Kivivik, Goodwood et Sunny 1 semble finalement simultanée (2016), le promoteur doit justifier l'emplacement des stations P4 et P5 dans ce contexte. En effet, le MDDELCC et la Commission sont d'avis que le promoteur pourrait déplacer les stations P4 et P5 dès la planification de son programme de suivi afin qu'elles servent de stations témoins pour toute la durée de l'exploitation des gisements Goodwood et Sunny 1.

[TSMC : Il est maintenant prévu que l'exploitation des gisements Kivivic débute avant celle de Goodwood et Sunny. La station P4 est maintenant exclue du plan SQA, car elle se trouvait directement dans la zone d'activité d'un des gisements du projet Joan Lake (eg. Kivivic) dont l'exploitation débutera en 2015; dans ce cas, un suivi direct de la qualité de l'eau du lac Joan sera préféré. Les cinq stations du secteur DSO4 permettront un suivi adéquat de la qualité de l'air du secteur. De plus, l'utilisation de moniteur de type DustTrak (indicateur de poussières) permettra de préciser la localisation des échantillonneurs, au besoin (réf.: Figure 2, Figure 3 et **Erreur ! Source du renvoi introuvable.**).]