

Information requests directed to the proponent

**Howse Property Project
EIS Technical Review: Part I
June 3, 2016**

IR Number	Dept Number	Effects Link to CEEA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
General						
CEAA 1	CEAA	5(1)(a)(i) Fish and Fish Habitat 5(1)(a)(ii) Aquatic Species (marine plans) 5(1)(a)(iii) Migratory Birds 5(1)(b) Federal Lands /Transboundary 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions 5(1)(c)(ii) Aboriginal Physical and Cultural Heritage 5(1)(c)(iii) Current Use of Lands and Resources for traditional purposes 5(1)(c)(iv) any Structure, Site or Thing of Historical, Archaeological,	3.3.3	7.1, table 7-1 7.4.3.4, Page 7-212 7.3.4.1, Page 7-73	<p>The EIS Guidelines require that spatial boundaries be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community and Aboriginal traditional knowledge, current land and resource use by Aboriginal groups, ecological, technical and social and cultural considerations.</p> <p>Accurate definition of the Local Study Area (LSA) is important in enabling reviewers to understand the maximum extent of potential effects on valued components.</p>	<ul style="list-style-type: none"> Confirm that LSAs are the maximum distances for all potential effects from the Project on valued components or re-define boundaries, as appropriate. For example: <ul style="list-style-type: none"> For avifauna, the LSA was defined by the watershed (based on potentially effected food sources). State whether the LSA boundary also reflects the maximum distances of other potential effects on birds (e.g. noise, dust, light), recognizing, for example, that the light assessment indicates that project lighting would extend 25 km. Although individual micromammals may not move outside the operations sector/project area, could effects of the Project occur on populations located further away (i.e. could air quality or light changes affect micromammals located outside of the footprint)? If yes, identify the species affected, their location, and the effects/cause of the effects (and provide maps showing the area where affected species are located). If no, provide rationale for concluding there would be no effects on micromammals populations located farther away. Provide a rationale that the effects of noise from blasting would be limited to the 15 km radius zone for perceived effects on caribou or update the analysis, as appropriate.

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		Paleontological or Architectural Significance				The light assessment indicates that Howse project lighting would extend beyond the LSA (25km). Although the assessment for caribou indicates they are sensitive to noise and light, the EIS (i.e. LSA) also states effects of the Project on caribou would only have an effect within 15 km of the project. What is the maximum extent of effects on caribou? Refine the LSA accordingly. Clarify the maximum extent of effects on caribou, provide associated rationale, and redefine the LSA for the species, as appropriate.
<p>HML Answer</p> <p>In the Howse EIS, the LSA was defined for all components and valued components and this LSA was revised and justified using scientific literature and depicted for each component, as per CEAA’s request. For each component, the justification for the LSA was supported with scientific literature, in consultation with scientific experts, and by applying logic. This analysis is complete and paints a fair picture of the effects of the Howse Project on environmental and socioeconomic components. Although the CEAA’s concerns are comprehensible, in the present text, we provide further justification that the LSAs for caribou and avifauna are supported by the scientific literature, whereas CEAA’s suggestion of extending the LSAs for these components is not.</p> <p>Light</p> <p>Light effects resulting from the Howse Project are minimal. Within the context where Howse lies (surrounding projects and communities, daylight hours, ...) the effects of light on avifauna and caribou from the Howse Project cannot be confirmed beyond the proposed LSAs. As stated in the Ambient Light Technical Report (Appendix G), the Howse Mining Project will have limited impact on ambient light levels since:</p> <ul style="list-style-type: none"> • no permanent light fixtures will be installed on sight; • most site activities will occur during the day; and • limited mining activities will occur during the winter months. <p>In addition, the Proponent is committed to implementing the following Measures proposed by the International Dark-Sky Association in the document Light Pollution and Wildlife (IDA, 2008), including:</p> <ul style="list-style-type: none"> • 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 structures’, this measure considers the 65 m 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 						

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- when possible, LED lights will be used.

The Howse Project lighting is expected to extend beyond the LSA, but will not be the predominant source of illumination due to the presence of the DSO3 processing plant nearby. Further, at distances of more than 15 km of the Howse mining site, the contribution of artificial sky radiance is approximately equal between the towns of Schefferville/Kawawachikamach and the activities of the DSO3 complex and Howse (Appendix G). Howse will have nighttime activities, but will have limited winter activities. The table below describes the number of nighttime hours observed at Schefferville.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Nighttime Hours/day	16:06	14:24	12:14	9:56	7:54	6:48	7:18	9:06	11:20	13:38	15:39	16:32

Noise

At a distance of 15 km from the blast site, the Sound Pressure Level (SPL) would be roughly 105 dBL (receptor in front of quarry face) and 108 dBL (receptor behind quarry face) from a blast with 1092 kg charge mass per delay (Note: The front and back of the quarry face is just whether the receptor is facing the quarry face or is behind the quarry face during a blasting event. At 15 km away it does not seem to make a large difference). These values are in dBL and not dBA (A-weighting adjusts the SPL according to how the human ear perceives SPL loudness at different frequencies), so it's expected that humans won't perceive this sound level as being as high as the calculated value. The noise from a blast will also be very short in duration. Since blasting has large low frequency energy, it's expected to have be significantly lower level than 108 dBA when perceived by the human ear, as we don't perceive low frequency noise to be as loud. This 108 dB level also does not factor in potential shielding from ground terrain and ground absorption across the 15 km distance. Unfortunately, a more accurate prediction number can't be determined without sound measurement data of the blast.

It is not possible to know for sure whether an animal would be startled or not by the noise. It depends on the animal's current activity and mood, local environment, etc. We conclude that there is a lack of knowledge on the noise levels as they may be perceived by wildlife at a distance of 15 km from the Howse Project site.

Caribou

Scientific evidence is provided which supports the fact that caribou appear to avoid mining infrastructure up to 14 km (Nellemann and Cameron, 1998; Wolfe et al., 2000; Cameron et al., 2005; Boulanger et al., 2012) and that their perceptive abilities reach 15 km (Mayor et al., 2009). Therefore, a 15 km radius zone surrounding the Howse Project area footprint is defined as the LSA for the migratory tundra ecotype. We feel that this analysis is appropriate, adequate, and reflects the effects of the Howse Project on caribou.

We argue that these studies were conducted on mine sites with similar noise and light levels, yet caribou maintained a 15 km distance. Suggesting that, even if some effects (i.e. light and noise) are predicted to reach longer distances, presumably these effects are not perceived by caribou.

Although the Proponent understands CEAA's comment about the light effects reaching 25 km and so should the caribou LSA be extended to 25 km, this modification is not supported by the scientific literature and so it is suggested that the LSA for caribou remain at 15 km.

Avifauna

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					<p>Studies have shown that construction activities, including blasting and operation of heavy equipment, did not adversely affect behavior or productivity of falcons that nested at least 50 m above and at distances 550-1000 m from blasting and operation of heavy equipment (Holthuijzen et al, 1990), perhaps because of their short duration. Falcons and raptors are considered to be more sensitive to human disturbance than songbirds and other smaller birds as their recommended setback distances are longer (1000 m for raptors if level of disturbance is considered high compared to 100 m for smaller birds). Therefore, these conclusions may apply to all Howse avifauna in general. The more important setback distance proposed in the literature in Canada for high disturbance is for Greater Sage Grouse in Alberta and is 3,2 km. (Government of Alberta, 2011). For a Bald Eagle nest, the US Fish and Wildlife Service proposed a buffer zone of 1 mile in open area from using explosive (U.S. Fish and Wildlife Service, 2007). Therefore, it appears that the actual LSA includes all potential adverse effects on avifauna, including noise pollution.</p> <p>Short-term impacts of blasting on occupancy of raptor nest sites have been documented (Stahlecker and Alldredge 1976). Ellis (1981), based on a 2-year study of simulated sonic boom noise, implied that both adverse short-term and long-term impacts of such activities were probably negligible on nesting raptors within 4.6 km and outside 4.6 km (comparison of reproductive success).</p> <p>Seabird colonies and raptors shows periods of extreme sensitivity during the breeding period more than other groups of birds. (Knight and Skagen 1988). Environment Canada (2016) propose buffer zones and setback distances of up to 1 km on larger birds to minimize the risk of disturbance caused by industrial operations. This setback distance is for the “highest level of disturbance” and includes blasts. The calculated background noise from the natural environment includes presence of birds and wind and reaches 35,5 dBA according Ambient Background Measurement from TecSult (2006). There were no predicted noise impact exceedances for any receptors in Quebec except for Innu - Uashat - Mani-Utenam Camp 3 (4,76 km from the Howse deposit with an exceedance of 1,4 dBA.). Background noise levels when the Howse Project is in the Operations phase will not affect avifauna. The literature demonstrates that blast effect will be short lived and rare and will not have adverse effects on avifauna located further then 1 km from the blast site. Although the Proponent understands CEEA’s comment about the light effects reaching 25 km and so should the avifauna LSA be extended to 25 km, this modification is not supported by the scientific literature and so it is suggested that the LSA for avifauna remain at 5 km.</p> <p>References: Website : https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1 Ellis, D. H. 1981. Responses of raptorial birds to low level military jets and sonic booms. Unpubl. m.s., Institute for Raptor Studies, Oracle, Arizona. 59 pp. Government of Alberta, 2011. Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta. 5 p. Holthuijzen, A. M., Eastland, W. G., Ansell, A. R., Kochert, M. N., Williams, R. D., & Young, L. S. (1990). Effects of blasting on behavior and productivity of nesting prairie falcons. Wildlife Society Bulletin, 270-281. Knight, R. L., AND S. K. Skagen. 1988. Effects of recreational disturbance on birds of prey: a review. Pages 355-359 in Proc. Southwest raptor management symposium and workshop. Inst. Wildl. Res., Natl. Wildl. Fed. Sci. Tech. Ser. No. 11. Stahlecker, D. W., and A. W. Alldredge. 1976. The impact of an underground nuclear fracturing experiment on cliff-nesting raptors. Wilson Bull. 88:151- 154. U.S. Fish and Wildlife Service. 2007. National Bald Eagle Guidelines. 23 p</p>	
					<p>Micromammals</p> <p>The term micromammal refers to terrestrial mammals of a very small size. These animals play an important ecological role, being one of the first links in the food chain of carnivorous mammals and birds of prey. Micromammals include several taxonomic groups, such as rodents (mice and voles) and insectivores (shrews and moles) (Desrosiers et al., 2002). In general, they are active night and day, all year long. In winter, they rarely come out into the open, moving through tunnels that they dig under the snow to protect themselves from predators. This latter winter behavior will shield micromammals from the winter light effects (when sky brightness effects are expected to be at their maximum) of the Howse Project.</p>	

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<p>The LSA for micromammals is <u>the area within 25 km² of the Howse Project</u>. This area is estimated as the distance at which artificial lighting from the project could be visible. It corresponds to areas that will likely be directly affected by disturbances associated with Project activities. There is no need to define a RSA, as micromammals have a home range of less than 5 ha (radius 56 meters) (Desrosiers et al., 2002). Micromammals are not considered as a VC. Surveys carried out nearby showed that the population density is low. Few species are present in the LSA, and no species at risk were found in the LSA or its vicinity and this is not a significant species group for the First Nations.</p>															
CEAA 2	CEAA	5(1) and 5(2)	6.4	Throughout EIS	<p>Mitigation measures should be specific, measurable, attainable, relevant, and time-bound. Many of the mitigation measures included in the EIS do not conform to these requirements, which creates a challenge in understanding potential effects on valued components.</p> <p>Furthermore, mitigation measures should be environmentally-focused, with respect to reducing an environmental effect. A commitment to developing plans or establishing/maintaining committees is not considered a mitigation measure. Though important in following up on the efficiency of a mitigation measure, It does not contribute directly at mitigating an environmental effect or measuring the efficiency of a measure at reducing a potential effect.</p>	<ul style="list-style-type: none"> Review proposed mitigation measures in relation to all valued components and provide updated lists of mitigation measures that are specific, measurable, attainable, relevant, time-bound for each valued component. Update analysis and determinations of significance, as appropriate, based on revised mitigation measures. 									
<p>HML Answer</p> <p>The Proponent has reviewed the mitigation measures to ensure that they comply with CEAA's criteria. The table below describes those changes. However, it is noted that if the Proponent removes those mitigation measures that CEAA would like to remove because they are not 'focused on reducing an environmental effect', then there will be no change in effect, and so there will be no change in the determination of significance, as per CEAA'S definition. We can remove these mitigation measures, but to conduct a determination of analysis would be redundant.</p> <p>Appendix I lists all of the updated specific mitigation measures that the proponent is committed to implementing for the Howse Project. Please note that the Proponent is still committed to implementing the activities that have been removed from the table below.</p>															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #1a3d4d; color: white;">COMPONENT</th> <th style="background-color: #1a3d4d; color: white;">SPECIFIC MITIGATION MEASURE</th> <th style="background-color: #1a3d4d; color: white;">MEASURABLE EFFECT</th> </tr> </thead> <tbody> <tr> <td>Air Quality</td> <td> <ul style="list-style-type: none"> TSMC will develop a plan for the prevention and management of blast generated NOx (Volume 1 Appendix XXI). </td> <td style="text-align: center;">-</td> </tr> <tr> <td>Light</td> <td>Measures proposed by the International Dark-Sky Association in the document Light Pollution and Wildlife (IDA, 2008)</td> <td> <ul style="list-style-type: none"> All of the measures listed to attenuate the light effect will reduce the amount of light effect on the environment. </td> </tr> </tbody> </table>							COMPONENT	SPECIFIC MITIGATION MEASURE	MEASURABLE EFFECT	Air Quality	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> All of the measures listed to attenuate the light effect will reduce the amount of light effect on the environment.
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					<ul style="list-style-type: none"> ▪ 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 measure 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. 	
					<ul style="list-style-type: none"> ▪ riprap will be installed on both sides of Burnetta Creek from the discharge point to 600 m downstream. 	<ul style="list-style-type: none"> ▪ Riprap will be installed within Burnetta Creek littoral and lower shore up to where water flow increase is expected to stay below 20%, thereby nearly eliminating erosion risks in that stream (Section 3.2.5 of the WMP for more details). Those ripraps will therefore eliminate the risk flooding of new channel formation in that section of stream.
					<ul style="list-style-type: none"> ▪ riprap will be installed on both sides of Burnetta Creek from the discharge point to 600 m downstream; and ▪ divert sedimentation pond HowseA into the pit. 	<ul style="list-style-type: none"> ▪ Riprap will be installed within Burnetta Creek littoral and lower shore up to where water flow increase is expected to stay below 20%, thereby nearly eliminating erosion risks in that stream (Section 3.2.5 of the WMP for more details). This will ensure that suspended matter is not generated in Burnetta Creek, which will keep suspended solids concentrations to a minimum. ▪ Diverting sedimentation pond HowseA after decommissioning of the mine will ensure no more suspended solids (or other contaminants) are discharged into Burnetta Creek. Also, since this stream is not a fish habitat and is mainly fed by resurgences, its water flow should get back to previous levels once the pit is filled with water.
					<ul style="list-style-type: none"> ▪ stripping the entire area all at once rather than progressively, whenever possible; 	<ul style="list-style-type: none"> ▪ The first two mitigation methods will reduce overall surface area of wetland destruction as a result of the Howse Project by promoting their development elsewhere. This measure

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					<ul style="list-style-type: none"> ■ 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. 	<p>can be assessed by measuring the surface area of the wetland that is successfully transplanted.</p> <ul style="list-style-type: none"> ■ The last mitigation measure will protect those portions of wetlands that are not directly affect (destroyed) by the Project footprint, but rather that may be disturbed by activities. This measure can be assessed by comparing the surface area of wetlands that will be destroyed VS the measuring the surface area of the wetland that is actually destroyed.
		Caribou - Migratory Tundra ecotype			<ul style="list-style-type: none"> ■ 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. 	<ul style="list-style-type: none"> ■ Avoidance of wildlife in general will reducing the amount of human disturbance (largely due to noise) experienced by wildlife.
		Boreal Forest ecotype			<ul style="list-style-type: none"> ■ the measures proposed for the GRCH will apply to the Boreal Forest caribou. 	<ul style="list-style-type: none"> ■ Avoidance of wildlife in general will reducing the amount of human disturbance (largely due to noise) experienced by wildlife.
					<p>Migratory and ground nesting migratory birds:</p> <ul style="list-style-type: none"> ■ 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; 	<ul style="list-style-type: none"> ■ All of the Avifauna mitigation measures proposed aim to reduce the amount of habitat loss experienced by avifauna as a result of the Howse Project.

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					<ul style="list-style-type: none"> ▪ 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 ▪ 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. 	
					<p>Species at risk – Rusty Blackbird:</p> <ul style="list-style-type: none"> ▪ 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. 	

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					<p>Species at risk – Grey-cheeked Thrush:</p> <ul style="list-style-type: none"> ▪ 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. 	
					<p>Species at risk Bank Swallow</p> <ul style="list-style-type: none"> ▪ 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. 	
					<p>For all species:</p> <ul style="list-style-type: none"> ▪ 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. 	

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		Aquatic Fauna			<ul style="list-style-type: none"> ▪ 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. 	<ul style="list-style-type: none"> ▪ According to guidelines, this measure will prevent fish mortality in the closest fish habitat which is Pinette Lake, and hence in all other farther water bodies.
		Infrastructure and Services			<ul style="list-style-type: none"> ▪ 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. 	<ul style="list-style-type: none"> ▪ Within the component Infrastructure and Services, the valued components Access to Local Transportation Network and Access to Land and Road Safety are included here. ▪ All of the mitigation measures described will improve road safety while locals are in route to their local harvesting groups (i.e. access to land). ▪ Additional safety measures and monitoring of speed limits and promoting road paving and providing additional road signs and raising awareness will all reduce the number of road accidents ▪ The upgrading of an access road will provide access to land.
		Economy: Employment, Businesses and Labour			<ul style="list-style-type: none"> ▪ 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); 	<ul style="list-style-type: none"> ▪ All of the mitigation measures described will have for an effect to increase and/or maintain the aboriginal community labor force in the Howse Project.

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		Force Characteristics			<ul style="list-style-type: none"> ■ 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 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; 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; 	<ul style="list-style-type: none"> ■ Other measures promote local aboriginally-run businesses in the area.
		Land Use and Aboriginal Traditional Knowledge			<ul style="list-style-type: none"> ■ 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 	<ul style="list-style-type: none"> ■ These measures will promote land use by locals by preserving the environment (e.g. caribou) and provide financial help to buy food so that locals can continue to have access to healthy food (if they choose to reduce their land use practices as a result of the Project)

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					<p>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;</p> <ul style="list-style-type: none"> ■ 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; ■ 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. 	
CEAA 3	CEAA	5(1)(c)(i) Aboriginal Peoples Health/	6.3.4	Section 7.5.2.1.3	The Canadian Environmental Assessment Agency (Agency) received a letter from New Millennium Iron Corp with its position on information presented in the EIS. The EIS states that mining claims covering Irony Mountain would be	Clarify mineral claims surrounding Irony Mountain and confirm plans for future management or protection of the area.

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
		socio-economic conditions 5(1)(c)(ii) Aboriginal Physical and Cultural Heritage 5(1)(c)(iii) Current Use of Lands and Resources for traditional purposes 5(1)(c)(iv) any Structure, Site or Thing of Historical, Archaeological, Paleontological or Architectural Significance			transferred to the local communities by the government of Newfoundland and Labrador and designated as a no-mining area. However, New Millennium Iron Corp stated that it is not planning to transfer the claims to the communities but will ask the government of NL what options are available for the long-term protection, should New Millennium Iron Corp divest itself of its claims.	
<p>HML Answer</p> <p>TSMC has three claims, 021314M, 021315M, and 019954M bordering the Irony mountain claim (016581M). All infrastructure for the Howse project will be contained within these claims and there will be a buffer zone of 500 meters from the base of Irony mountain that will remain untouched.</p> <p>The EIS statement, “the claims covering the Irony Mountain (which are under the possession of New Millennium Iron Corp) will be transferred to the local community” was based on the information known to TSMC at the time of preparing the EIS. In their subsequent deliberations, New Millennium Iron Corp is of the opinion that it may be more pertinent to divest their claims back to the Government of Newfoundland and Labrador after ensuring that these claims will be protected and their sanctity maintained. To this extent, New Millennium has sought opinion from the Government of Newfoundland and Labrador. The final decision to divest the claims to the Government of Newfoundland and Labrador or any alternate action that serves most appropriate for ensuring protection of the Irony Mountain claims can be taken by New Millennium after it receives a response from the government.</p> <p>TSMC/HML on its part is taking all measures to ensure that the activities in Howse do not impact the Irony Mountain.</p>						
<p>Water Quality & Quantity, Fish & Fish Habitat</p>						
CEAA 4	ECCC-IR-12	5(1)(a)(i) Fish and Fish Habitat	6.2.2, 6.3.1	Appendix IV - Technical Note,	<u>Water Balance Model</u> The water balance model is used to characterize the existing stream flow regime in local streams, to assess the project’s effects on surface water	Review analysis and confirm if water balances were underestimated or provide a rationale on why they are appropriate. Provide additional references or sources of information if needed to support rationale. If the balances were

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
				<p>Water Management Plan- Conceptual Engineering for Howse Water Management Plan. Section 8</p>	<p>quantity (and hence fish habitat), as well as to quantify the volume of monthly mine-drainage water to be treated by the sedimentation ponds.</p> <p>In the water balance model, water losses appear to be overestimated, possibly underestimating the monthly volumes of mine-drainage water to be treated, and the estimates of existing and post-development flows in the local streams.</p> <p>The results of the water balance model for Sedimentation Pond Howse A are examined. Based on the water balance model methodology (Section 8.1) runoff is obtained by multiplying total precipitation by a runoff coefficient, in this case 1.0 for months where the ground is generally frozen, and 0.4 for the months of June to September. The precipitation that does not run-off is referred to as "infiltration" (refer to the 4th column of Table 8-2). The above method to estimate runoff volume is current practice, as combining all water abstractions (sublimation, evaporation, transpiration, etc.) into a single parameter (i.e. the runoff coefficient) minimizes the complexity and hence errors associated with estimating several hydrologic components. The part of the methodology that is questionable is the abstraction of evapotranspiration (6th column) from runoff, as this water abstraction would be already accounted for in the "infiltration" column. As such, there seems to be a double-counting of water losses, which would result in an underestimation of the runoff quantities. Indeed, the estimated annual inflow (7th column, 271,610 m³ / year) appears to be on the low side. The estimated volume translates to a runoff depth of 460 mm, which is about 30% lower than the value quoted from the 1997 regional analysis by K. Rollings "The Hydrology of Labrador", i.e. 650 mm (reported on page 11, Section 2.5). We note that in a more recent regional analysis by Statistics Canada "The Water Yield for Canada as a Thirty-year Average (1971 to 2000)", even larger runoff volumes are estimated for the area, for instance approximately 700 mm (refer to Map 13).</p>	<p>underestimated, revise and update the analysis and determination of significance.</p>

ANSWER SENT TO CEAA August 3 2016

HML Answer

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
<p>Request from EC June 30 2016:</p> <ol style="list-style-type: none"> 1. Add a new column to the water balance tables that will provide the «all-encompassing” runoff coefficients, i.e. runoff coefficients that incorporate all water abstractions including evapotranspiration. This new column could be inserted between column 6 (Evapotranspiration) and column 7 (Inflow). Using Table 8-2 as an example, the runoff coefficients would be of 1.0 and 0.0 for the months of May and June respectively. The new column should provide all twelve monthly runoff coefficients and the average annual runoff coefficient. 2. Support and validate the observation that local hydrology differs from the regional hydrology using data obtained during the local monitoring campaign. We understand that the local monitoring campaign included measurements of flows (i.e. runoff) at different sites as well as measurement of precipitation. We are not certain what was the duration of the monitoring period, but for the purpose of this example, we are assuming that the proponent has monitoring data from 2011 and 2014. An acceptable method to validate this observation could be to compare the local runoff coefficients observed during the local monitoring period with the regional coefficient. For example: <ol style="list-style-type: none"> a. determine the total depth (or volume) of precipitation for each year at the site, e.g. for 2011 and for 2014. b. determine the total depth (or volume) of runoff based on the local monitoring campaign for each year c. compute the two annual runoff coefficients for the site (one for each year) d. based on historical precipitation data, determine if 2011 and 2014 were dry, average or wet years e. compare qualitatively the local runoff coefficients to the regional coefficient taking into consideration the information from point “d”. 3. Sensitivity analysis: assuming that the average long-term inflows estimated by HML as having a total depth of 460 mm per year could be 50% larger (up to 700mm/year as suggested by ECCC), how would the assessment of the project’s effects and infrastructure sizing vary should the estimated inflows be augmented by 50%? <p>Email sent from HML to EC on July 11 2016:</p> <p>Prior to commencing the work on water balance modelling at the Howse mine site, can you please consider the following points:</p> <ol style="list-style-type: none"> 1 With respect to the 700 mm runoff volume suggested in CEAA 4, we would like to point out that the 66-year average for precipitation in Schefferville is 780 mm. As such, it would be impossible, even in the absence of infiltrations and thus simplifying the water balance tremendously, for the runoff volume to be 700 mm, as suggested (precipitation = runoff + infiltrations + evapotranspiration = 700 + 0 + 240 = 940mm). We suggest that a much smaller runoff would be more realistic under the circumstances. 2 We would also like to clarify that, with respect to impact on infrastructures, design considerations were based on both the type / life of structure and on a determined return period of design storm and not on water balance computations. Adopted design storm return periods are 100 years for ditches and sedimentation ponds emergency spillways, and 25 years for design particle sedimentation in sedimentation ponds. The design storm event is typically mathematically generated from intensity-duration-frequency (IDF) data for a specific project location. Therefore the two calculation methods are not related. This methodology is standard in the mining industry. <p>We believe that these two points may impact your request for follow-up items 2 and 3 below. Can you provide comment?</p> <p>Email from EC July 11 2016:</p>						

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IR Number	Dept Num ber	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
<p>Point 1: This point illustrates well how the precipitation and runoff vary in time and how “reference values” also vary with the period on which they are based. The 700 mm runoff volume (taken from the 2005 study by Statistics Canada) is a value derived from data observed during the 1971 to 2000 period, while the 240 mm evapotranspiration value (taken from the 1978 Hydrologic Atlas) is a value based on observations made during the 1941 to 1970 period. In our view, including the two reference values in the same equation would require that the difference in climate conditions between the two 30-yr periods be factored in. (note: in case this is not clear, as discussed in our meeting, the consultant is retaining the current methodology, i.e. both infiltration and evapotranspiration losses will be accounted for separately. Question CEAA 5 is therefore moot and evapotranspiration remains at 111 mm/yr for the analysis, not 240 mm/yr as suggested in CEAA 5.)</p> <p>In our view, a better approach is to compare hydrologic parameters within the same period. If we go back to the two studies we referred to in CEAA 4, we have the following parameters:</p> <ul style="list-style-type: none"> • 1997 Rollings, which is based on data from the 1948 to 1996 period: Prec = 800 mm, Runoff=650 mm. Hence the runoff coefficient is 0.8 • 2005 Statistics Canada, which is based on data from the 1971 to 2000 period: Prec = 823 mm*, Runoff=700 mm. Hence the runoff coefficient is 0.85 (* Climate normal 1971-2000 for Schefferville) • Table 8-2 (SNC-Lavalin), which is based on data from the 1949 to 2013 period: Prec = 780 mm, Runoff (named “inflow”)=460 mm. Hence the runoff coefficient is 0.59. (Note: if we were to exclude the evapotranspiration losses, the runoff coefficient would be 0.72) <p>The average annual precipitation values (800 mm and 823 mm) associated with the two reference studies are consistent with the average annual precipitation from the Schefferville station (780 mm) although slightly higher (i.e. 2.5% to 5.5% higher, respectively). However the local runoff coefficient (0.59) based on the Schefferville station data is considerably smaller (26% to 31% smaller) compared to the regional analyses. If indeed local hydrology is different than the regional hydrology, a runoff coefficient of 0.59 could be reasonable. Data obtained during the local monitoring campaigns could therefore be used to validate this difference. We therefore retain our follow-up item no. 2.</p> <p>Response from EC July 13 2016: Thank you for clarifying that the results of the water balance model are not used in sizing of the infrastructure. Please include this explanation in your official response to CEAA. The sensitivity analysis can therefore focus only on the assessment of the project’s effects on the environment (e.g. fish habitat, water quality, as applicable).</p> <p>HML sent Report to EC on July 20 to validate that the local hydrology (at the Howse site) differs from the regional hydrology. Please see appended document:</p> <p>Hemis PR185-19-14 Howse IR Appendix II Answer to CEAA 4-5 Part 1 160712</p> <p>Response from EC on July 22 2016: This analysis of three years of data measured at two WSC local stations actually provides more evidence than we had anticipated possible. Considering this new information, the long-term average value for a typical average year of 460 mm that was estimated with the water balance model now appears to be conservative when compared with the runoff observed (approx. 200 mm) at the two stations in 2012 and 2014 (using these years as a proxy for average conditions). For that reason, we will not require a sensitivity analysis to be conducted, as we requested in my email dated July 11.</p> <p>Additional note from Proponent: The Proponent wishes to note that the work to date is conceptual in nature and that the data used was limited, simplified and conservative. This includes, for example, that snow melt was complete by the month of June in most years according to the 39 year of data used for the analyses. The Proponent therefore believes that this analysis is therefore representative of the long-term average. During the next phase of the project, additional data will be available, which will allow for a more complete calibration of the modelling. This will allow for the Proponent to eliminate the hypotheses made on the conceptual engineering to date, and therefore obtain more precise results on a daily/monthly basis.</p>						
CEAA 5	ECCC-IR-13	5(1)(a)(i) Fish and Fish Habitat	6.2.2, 6.3.1	Appendix IV -	Hydrologic Parameter:	Review analysis and confirm whether evapotranspiration was underestimated or if it remains adequate, and provide associated

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				Technical Note, Water Management Plan- Conceptual Engineering for Howse Water Management Plan. Section 2.4	<p>The evapotranspiration is one of the hydrologic parameters used in the water balance model to estimate the quantity of mine-drainage water and flow rates in local streams. The estimated evapotranspiration values appear to be underestimated, which could affect validity of the model results.</p> <p>The evapotranspiration is assumed to be equal to 35% of lake evaporation (i.e. 111 mm/yr). This estimation is based on the proponent's experience with similar projects; however, no references or data are given to support this estimation. Based on the Hydrological Atlas of Canada, the annual evapotranspiration (Plate 25) in the vicinity of the mine site is approximately 240 mm and the mean annual lake evaporation (Plate 17) is around 290 mm (which corroborates well with lake evaporation estimates for Churchill Falls the proponent provided in Table 2-10). Using the Atlas values, the ratio of evapotranspiration to lake evaporation would be around 83%, which is more than twice the value considered in Section 2.4.</p>	rationale. Provide additional references or sources of information if needed to support rationale. If the rate was underestimated, revise and update the analysis and determination of significance.
<p>ANSWER SENT TO CEAA August 3 2016</p> <p>HML Answer</p> <p>Please see Proponent's response to CEAA 4 above that validate that the local hydrology (at the Howse site) differs from the regional hydrology.</p>						
CEAA 6	ECCC-IR-14	5(1)(a)(i) Fish and Fish Habitat	6.2.2, 6.3.1	Appendix XVIII Surface Water Modelling Climate Variability - Water Balance Computations for Typical Wet and	<p>Data from specific years were used as inputs to the water balance model to estimate wet and dry years. However, the data do not present extreme (i.e. maximum) wet/dry years, they represent average wet/dry years. There is considerable inter-annual variability in snow cover and precipitation in the study area, related to long term atmospheric circulation patterns (see Brown (2010) and Vincent et al (2015)).</p> <p>References:</p> <p>1. Brown, R. D., 2010: Analysis of snow cover variability and change in Quebec, 1948-2005. Hydrol. Processes, 24, 1929–1954, doi:10.1002/hyp.7565.</p>	<ul style="list-style-type: none"> • Provide variability analysis and modelled results for extremely wet or dry years, not typical wet or dry years. Based on results and as required, update the analyses of environmental effects including: <ol style="list-style-type: none"> a. the effects of the environment on the project, b. accidents and malfunctions, and c. fish and fish habitat.

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				Dry Years. Section 3.0 Methodology	2. Vincent, L. A., X. Zhang, R. D. Brown, Y. Feng, E. Mekis, E. J. Milewska, H. Wan, and X. L. Wang, 2015: Observed Trends in Canada’s Climate and Influence of Low-Frequency Variability Modes. J. Climate, 28, 4545-4560, doi: 10.1175/JCLI-D-14-00697.1.	
<p>HML Answer</p> <p>Following a meeting between Brigitte Thomas, Climate Change expert, and the Proponent in Ottawa on June 27 2016, this request was removed from consideration. Rather the proponent has agreed to clarify the terms ‘extreme’ and ‘typical’ in the WMP and chapter 6 of the EIS.</p> <p>The Proponent wishes to clarify that in Chapter 6, the term ‘extreme’ refers to an event with a return period of 20 years or more, whereas typical is less than 20 years.</p>						
CEAA 7	CEAA	5(1)(a)(i) Fish and Fish Habitat 5(1)(c)(iii) Current Use of Lands and Resources for traditional purposes 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	6.3.1 6.3.4	7.4.9.4, 7-278	<p>The effects analysis must focus on the effect as opposed to the source of the effect. An effect may persist long after the source of the effect has ceased.</p> <p>In relation to aquatic fauna, effects were determined to be <i>partially reversible</i> as water quality was predicted to return to normal within a few months from the end of operations. However, <i>reversibility</i> needs to also address the reversibility of effects on species not just water quality (e.g. water quality may be returned to baseline, but fish may no longer be present).</p>	<ul style="list-style-type: none"> • Provide an assessment of the <i>reversibility</i> of environmental effects on fish and update the significance determination, as appropriate.
<p>HML Answer</p> <p>Once the water quality is back to normal, the extreme spring thaws that are common regionally, will carry the fine sediments that will have (potentially) accumulated in the stream bed downstream to settle in the lakes. Further, the fish habitats that are present in the LSA are mainly nursery areas with limited spawning grounds and fish populations of the LSA are mainly supported by colonization from downstream fish populations.</p> <p>Therefore, if fish were to evacuate the LSA while the project is ongoing, which is unlikely based on observations in Elross Creek downstream of DSO3, the recovered habitat would be quickly recolonized by fresh specimens from the larger unaffected downstream populations.</p> <p>The effects of the Project on aquatic fauna and water quality are therefore expected to be reversible.</p>						

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CEAA 8	CEAA	5(1)(a)(i) Fish and Fish Habitat	6.3.1	7.4.9.3, 7-275 Table 7-99	Table subtitle: "management of ore, rock piles, waste rock, <u>tailings</u> and overburden". Mitigation measures also address tailings management. It is unclear why this information was provided as tailings facilities are not included in the project.	Confirm that no tailings management is proposed and remove mitigation measures related to tailings management from the list of mitigation measures. If tailings management is proposed, contact the Agency as soon as possible for guidance for additional assessment requirements.
<p>HML Answer</p> <p>No tailings will be produced as a result of the Howse Project.</p>						
CEAA 9	DFO-IR-02	5(1)(a)(i) Fish and Fish Habitat	6.3.1	Ex. Summ. page 34 (table 5) and EIS page 7-181 (table 7-68).	The "proposed specific mitigation measure" under "water quality" states "divert sedimentation pond HowseA into the pit".	Explain what is meant by the statement and how this would mitigate the effects of the Project.
<p>HML Answer</p> <p>Since the effective watershed area of Burnetta Creek will be increased due to interceptions by the peripheral ditches (increase water flow), diverting water from HowseA sedimentation pond into the pit, together with the cessation of dewatering, will restore Burnetta Creek watershed to close to its former size and hence its water flow back to nearly normal values. Also, since the main contaminant is expected to be TSS, diverting flow into the pit will allow a very long settling time as water will probably never exit the pit through surface flow. Therefore, since Burnetta Creek is not a fish habitat and is mainly fed by resurgences, it should be back to its natural water flow once the pit is filled with water.</p>						
CEAA 10	DFO-IR-04	5(1)(a)(i) Fish and Fish Habitat	6.3.1	7.3.9.4.1, Page 7-168	The document states "An inflow decrease is beneficial from an ecosystemic perspective, because an oligotrophic lake like Pinette Lake could benefit from a longer water renewal time."	Provide an analysis to support the prediction that Pinette Lake would benefit from a longer water renewal time/decrease in inflow. The analysis should include consideration of applicable environmental components (e.g. fish and fish habitat, wetlands).
<p>HML Answer</p>						

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<p>Simply stated, lower inflow translates into longer residence time and lower dilution of nutrients, hence higher concentrations of nutrients and is one of the important variables in eutrophication problematics (Schindler, 2006). In an oligotrophic lake such as Pinette, this translates into higher primary productivity on which the lake food web rests. Therefore, longer residence time of the water in Pinette lake, if significant, would increase the productivity of the lake and of its fish population.</p> <p>Source: Schindler, D.W. (2006) <i>Recent advances in the understanding and management of eutrophication</i>. Limnol. Oceanogr., 51(1, part 2): 356-363.</p> <p>A visit from DFO officials to the Howse site occurred on August 10. HML's perspective on the visit is that DFO found that Pinette Lake was an optimal fish habitat the lake was.</p>						
CEAA 11	DFO-IR-09	5(1)(a)(i) Fish and Fish Habitat	6.3.1	EIS page 7-127 Summary 2.1.1, page 7	Final pit dimensions are not consistently presented in the EIS and EIS summary. It is important to have clarity on this aspect as it impacts understanding of dewatering, and water balance.	State final pit depth – 160m or 195m, and provide revisions to analysis of dewatering and water balance, as appropriate.
<p>HML Answer</p> <p>The final pit depth is 195 m. A review of the ground water modelling and dewatering is provided.</p>						
CEAA 12	DFO-IR-10	5(1)(a)(i) Fish and Fish Habitat	6.3.1	Page 7-278	Potential effects on fish and fish habitat related to the timing of discharge from sedimentation ponds were not accurately characterized. The release of sediments in Spring is not beneficial for the receiving environment as eggs and fry would still reside in the substrate.	Update the analysis, mitigation measures, and determination of significance with consideration of the adverse effects of sediment releases on the receiving environment.
<p>HML Answer</p> <p>When the effects of the timing of discharge from sedimentation ponds on eggs and fry in the substrate in the spring, the timing of the effect should be reevaluated to Unfavorable timing. Although the effect's magnitude remains low for the reasons stated in the EIS. However, this changes the residual effects significance assessment value to High (value of 14). The effect is now likely and with a low degree of uncertainty. None the less, mitigation measures are believed to be sufficient.</p> <p>This significance change does not however change the cumulative effect assessment. Indeed, although the effect significance is now assessed as high, the effect is still not believed to reach beyond the LSA whereas potential cumulative interactions are only possible farther downstream in the Howells River.</p>						

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
CEAA 13	DFO-IR-11	5(1)(a)(i) Fish and Fish Habitat	6.3.1	9.1.4, Page 9-32/33	It is important to measure and monitor both the water quality and water quantity in order to determine any potential effects on fish and fish habitat.	<ul style="list-style-type: none"> • Present a strategy for monitoring water quality and quantity and explain how resulting information would be used to determine potential effects on fish and fish habitat. State whether (1) all water monitoring stations would be updated to real time water quality monitoring stations or (2) a robust schedule for visual monitoring of water quantity would be developed and presented. <p>For station NF03OB0040, state whether the proponent intends to either move this station downstream of the HowseB sedimentation pond final discharge point or replicate this station downstream of HowseB sedimentation pond final discharge point. Provide a rationale for selecting the preferred monitoring point.</p>
<p>HML Answer</p> <p>The Proponent wishes to note that the real time water quality monitoring stations do not belong to TSMC but to the Government of Newfoundland and Labrador (GNL), as well as Environment Canada. Therefore, the location/relocation of stations is solely at the government's discretion. However, the Proponent would like to state that it is in favor of relocating a station to Goodream Creek.</p> <p>As for the monitoring of the final discharge points, a robust schedule for visual monitoring of water quantity will be developed and presented. The schedule will mirror that already in place at DSO3 (e.g. daily inspection, weekly sampling of the sedimentation pond discharge, quarterly monitoring of all streams as is current practice for Goodream and Elross) as well as following the MMER guidelines. It will be integrated to the routine already in place for the DSO3 Project monitoring, and will be run by the full time environmental personnel that is on site.</p> <p>Because of the sometimes-sporadic nature of the water flow and the extreme winter climate, an instant water quality monitoring is not recommended as, per our experience, its functioning is unreliable and therefore not consistent. The Proponent therefore suggests that physical monitoring by on-site personnel is more appropriate. As for quantity, an instant water quantity monitoring station will be installed at each final discharge points, as is the case for DSO3. As per the Proponent's experience at DSO3 and DSO4, the overflow of the discharge occurs at spring thaw. The Proponent is open to implementing additional monitoring if the government requires it.</p> <p>As for explaining how the resulting information will be used to determine potential effects on fish and fish habitat, an Environmental Effect Monitoring (EEM) program such as the one deployed for DSO3 under the Metal Mining Effluent Regulations (MMER) will be deployed for the Howse Project.</p>						
CEAA 14	NRCa n IR 1	Information and data	7.3.8	Appendix K (Oct. 2014)	The latest assessment of permafrost occurrence seems to only consider elevation, historical and current data of ground temperature (for the Howse deposit only) to infer the absence of permafrost for the Howse project. For	<ul style="list-style-type: none"> • Explain how the permafrost potential map (Fig. 6.20, Volume 1) was produced and clarify if the map is still valid according

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
				<p>Vol. 1 (section 6.7.8 and Fig. 6.20, Feb. 2015) Chapter 7 Effects Assessment Physical Environment (section 7.3.8) Appendix J-1 (Oct. 2015) Appendix J-2a (Nov. 2015), J-2b, J-2c (2005)</p>	<p>other areas, other than the Howse deposit, the proponent indirectly infers that permafrost should not exist below the surface elevation of 660 m based on the fact that the terrain is less exposed (to winds) and partly forested or if small remnants of permafrost exist, they would occur deep within the bedrock and have low ice contents (Chapter 7, 7.3.8). Natural Resources Canada has advised that it agrees that based on elevation only (below the threshold of 660 m) and ground temperatures, permafrost is probably absent in the Howse deposit. However, it remains uncertain about the presence or absence of permafrost, as vegetation/type of soil (wetlands/forest/ organic material) can suggest its occurrence (observed elsewhere in northern Canada under similar conditions, e.g., Morse et al., 2015). In fact, the proponent did provide a permafrost potential map (very low to very high permafrost potential) in their earlier assessment (Volume 1, Fig. 6.20); the map was based on topography, vegetation (related to snow cover), and historical data. It is unclear if this map is still valid. In addition, the proponent mentions that there are some ecotypes/types of terrain (Appendix K) where permafrost could occur. For instance, it is mentioned that relic permafrost may be present at high elevation beneath areas of thick sphagnum moss. These organic terrain are associated with ecotype MSF10 (upgrade of the mine haul road) and MSF14 (proposed ditch). In Fig. 6.20 (Volume 1), the waste dump (ecotypes MSF05 and MSF08) was mapped as having medium permafrost potential and the overburden stockpile (ecotype MSF05) as having high permafrost potential. Especially for ecotypes associated with fine-grained sediments and organics (MSF08, 10, 14) permafrost can exist at shallow depths and it is not restricted to the deep bedrock layer (e.g., Morse et al., 2015). Because the occurrence of permafrost and its ground ice content might have impacts on the project (see below), it is important to confirm with direct field validation its presence or absence.</p> <p>Reference: Morse, P.D., Wolfe, S.A., Kokelj, S.V, and Gaanderse, A.J.R. 2015. Permafrost occurrence in subarctic forests of the Great Slave region, Northwest Territories, Canada. In the proceedings of GEOQuébec 2015, 68th Canadian Geotechnical Conference and 7th Canadian Permafrost Conference, September 20-23, 2015, Québec city.</p>	<p>to the latest assessment of permafrost (Chapter 7, 7.3.8, and Appendix J-1). If not valid, please explain why.</p> <ul style="list-style-type: none"> • Provide information on whether direct field validation (e.g. ground stratigraphy, ground temperatures) is available to infer the absence of permafrost under areas such as the waste dump, the overburden stockpile, and the upgrade of the mine haul road. <ul style="list-style-type: none"> - If direct validation is available, provide ground temperature and ground ice conditions, if permafrost is present. - If direct validation is not available, explain why if small remnants of permafrost exist, it would only occur deep within the bedrock and have low ice contents.

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<p>HML Answer</p> <p>The permafrost potential map, which was presented in the draft Howse EIS, was produced based on the available data at the time: a literature review coupled with photointerpretation. This map was subsequently removed from the EIS once more appropriate field data were made available. We suggest that only the map that is presently in the Final EIS should be consulted. The Proponent wishes to highlight that the permafrost potential map, although based on field validation, continues to be conceptual in nature. The Proponent is committed to implementing specific activities (refer to answer to CEAA 16 below) should permafrost be unexpectedly found on site.</p> <p>The Permafrost potential map from the final EIS:</p> <p>The predictive 'permafrost potential mapping' was completed prior to more current, field-based data becoming available from a combination of (i) recent, project-specific measurements of ground temperature data (e.g., from thermistors installed by Golder Associates in the Howse Deposit); (ii) a study completed by Journeaux Assoc (2015) that reveals the important local relationship between elevation and permafrost occurrence, based on both historic and current data; and (iii) additional field observations made by Journeaux Assoc (2015) and Gilles Fortin (pers. comm., 2015). While the general spatial trends predicted in the original mapping are still valid - that is, permafrost is most widespread on windswept hill crests - the new information indicates that ground temperatures in the woodlands in the area are insufficient to maintain permafrost. Accordingly, permafrost (if present) is likely restricted to windswept highs above about 660 m elevation.</p> <p>The ground temperature of the thermistor HW 1008 CC published by Granberg (1983) is presented in the EIS. As it can be noticed the ground temperatures available from this thermistor are not very reliable due to the limited data collected. Thermistor HW 1008CC data shows in general no frozen ground with all temperatures above or around zero except in 18/8/81 a year later the surface ground temperature is still positive but much lower. This data shown in Figure 3 confirms that there is no frozen ground at the middle of the permafrost map therefore this map is in error. Therefore the potential permafrost map presented or questioned by the NRCan does not reflect the present observations and data collected on site.</p>						
CEAA 15	NRCa n IR 2	Information and data	7.3.8	Volume 2 (all sections) Volume 3 (all sections) Appendix V (WMP, Jan, 2015, sections 5.0, 7.0 and Appendix C)	<p>If road sections, the waste dump or the overburden stockpile happen to be on permafrost (with excess ice at shallow depths) then its thawing can cause settlement and movement of stockpiles, waste, and containment facilities. Design parameters, monitoring, and mitigation strategies are not specified in case permafrost is encountered.</p> <p>The installation of thermistor cables in the areas noted above (i.e. waste rock dump, overburden stockpile, roads) is suggested. If the presence of permafrost is confirmed at the waste dump and/or stockpiles, the installation of monitoring instruments / devices to measure and monitor the instability (e.g., inclinometers) of these areas is recommended.</p>	<p>a. Provide information on the design parameters for roads (e.g., mine haul road, the new sections of the bypass roads – alternative 2) that could be built on warm permafrost.</p> <ul style="list-style-type: none"> - Describe the mitigation measures that would be in put in place if the permafrost thaws and road damage occurs. <p>b. Specify if there is a plan to use a liner under the waste dump. If yes, describe mitigation measures that would be put in place if the permafrost thaws (e.g., if the performance of the liner is compromised by thaw settlement).</p> <ul style="list-style-type: none"> - Describe the monitoring and mitigation strategy that would be put in place if ground

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						<p>thawing causes the movement of stockpiles, waste, and containment facilities.</p> <p>c. State whether the proponent commits to installing thermistor cables in recommended areas (i.e. water rock dump, overburden stockpiles, roads), and if so, when cables would be installed and how monitoring would occur.</p> <p>State whether monitoring instruments / devices to measure and monitor the instability (e.g. inclinometers) of these areas would be installed if the presence of permafrost were to be confirmed at the waste dump and/or stockpiles.</p>
<p>HML Answer</p> <p>The Proponent has decided to withdraw Bypass Road Alternative 2 from consideration.</p> <p>a) Road construction will follow standard industry practices. Control points will be regularly surveyed to determine if any subsidence occurs. In the event of a road failure due to permafrost thawing this area will be excavated and filled with waste rock suitable for road construction. In the event of an extreme failure grouting methods will be employed to ensure long term stability in the area that had failed and any other high risk zones.</p> <p>b) There is no liner planned. The approach to minimize or eliminate the melting of permafrost and the protection of overburden or waste dumps and stockpiles is to prepare the base of each dump during the winter months so this material will freeze and further insulate any permafrost layers from any warm material deposited on the dumps in the summer months. This frozen layer of rock will increase the depth that heat will need to penetrate into the ground to thaw permafrost that may potentially have an impact on the overlying wetlands. It is further clarified that the overburden will primarily be mined in winter months, so the chances of thawing permafrost will be significantly lower. In the rare event, should the thawing of permafrost below the dumps and stockpiles becomes visible, they will be protected by retaining wall.</p> <p>c) The Proponent will install thermistor cables at a depth up to 20 meters in locations identified as the highest potential for permafrost.</p> <p>d) The Proponent will install inclinometers if the presence of permafrost is confirmed at the waste dump and/or stockpiles. Inclinometers will be installed to monitor the stability of the dumps and stockpiles, should thermistor readings indicate a potential for thawing of permafrost below these dumps.</p>						
CEAA 16	NRCa n IR 3	Information and data	7.3.6	Chapter 7, section 7.3.6	The following questions related to information required for a basic understanding of the hydrogeology of the area have major implications for assessing the impacts of open pit dewatering:	<ul style="list-style-type: none"> Provide additional evidence and better explain the presence of lakes, streams, and wetlands in the Howse region (i.e. LSA/RSA).

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				<p>Appendix B GEOFOR Hydrogeology and MODFLOW Modelling</p> <p>Appendix XVII Ground Water Modelling Climate Variability</p> <p>Nicholson, F.H. 1979. Permafrost spatial and temporal variations near Schefferville, Nouveau-Québec, Géographie Physique et Quaternaire, volume XXXIII, no</p>	<p>- How can lakes, streams and swampy areas be so frequent in the Howse region if groundwater is only present at depths greatly below lake and wetland levels?</p> <p>-How can groundwater levels be only found at these depths (between 40 to 90 m below the surface in the future open pit) if surficial sediments are composed of relatively permeable sandy till and if annual precipitation is on the order of 700 mm?</p> <p>In such a context, lakes and swampy areas cannot be disconnected from groundwater. Their presence suggests that there is another shallower water table, much closer to the surface than the one observed in the deep boreholes.</p> <p>Two hypotheses could explain this context: the presence of either permafrost underneath the planned open pit or that of a much lower permeability unit within the surficial sediments (i.e. overburden) or in the Sokoman (iron) Formation. This would allow water to infiltrate down to this nearly impermeable unit, and then flow horizontally at its surface to “feed” lakes and wetlands. However, available data does not point to either of these hypotheses. On one hand, thermal sensors seem to indicate that temperature is above 0°C below the planned open pit. Nonetheless, Nicholson et al. (1979), who has extensively studied this region for a number of years, had indicated that, there is widespread permafrost just north of Schefferville . Vertical temperature profiles from these regions presented in Nicholson (1979) and Granberg (1989) show that negative temperatures are much more common than positive ones. On the other hand, borehole logs, although not detailed, do not report the presence of a nearly impermeable stratum that could underlie a large area and hydraulic conductivity values do not seem to be available for the Sokoman Formation, except near its bottom which was found to be the most fractured and thus permeable zone.</p>	<ul style="list-style-type: none"> Confirm whether the Sokoman Formation (whose thickness ranges from 110 to 120 m) is less fractured and thus less permeable between its top (interface with the surficial sediments) and bottom (its interface with the Wishart Formation)? The hydraulic conductivity (K) values provided by fieldwork (9×10^{-6} m/s on average) appear to make it a rather permeable unit. Provide additional information to support information and conclusions on the Sokoman Formation from these statements.

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				<p>3-4, Special issue on permafrost in Quebec – Labrador, les Presses de l’Université de Montréal, p. 265-277.</p> <p>Grandberg, H.B. 1989. Permafrost mapping at Schefferville, Quebec, <i>Physical Geography</i>, 1989,10, 3, pp. 249-269.</p>	<p>The fact that a groundwater level was found in one of the wells drilled into surficial sediments (HW-RC-15-WE01B) and close to the top of bedrock, is a good indication that a shallower “aquifer” is present and that a much less permeable horizon within the Sokoman Formation could be present somewhere between its top and bottom. Indeed, almost no fractures were reported above the zone close to the interface between the Sokoman and Wishart formations. Granberg (1989) noted that iron formations in the Schefferville area are poorly cemented and “can be crumbled by hand”, but maybe iron formations can be much less permeable when located well below ground surface. In addition, the aquifer within the Wishart Formation appears to be confined, the piezometric surface being higher than the fractured horizon and mostly above the roof of the Wishart Formation (page 7-108 of Chapter 7 “The observed groundwater table shown in Figure 7-14 is everywhere over the water bearing fractures indicating a confined aquifer in artesian condition.”), supporting the hypothesis of the presence of a much less permeable unit above.</p> <p>Contrary to what is written on p. 39 of Appendix B (“wetland do not have a link with groundwater”), NRCan does believe that wetlands and lakes are fed by shallow groundwater, not by groundwater from a “deep” formation (the Wishart Formation and its interface with the Sokoman Formation).</p>	
Meet with NRCAN						
CEAA 17	NRCan IR 4	Information and data	7.3.6	Chapter 7, section 7.3.6	<p>Even if the “lower aquifer” located in the Wishart Formation is confined, dewatering of the open pit will likely create a link with the upper aquifer. Shallow groundwater could circulate through faults or percolate through lake</p>	<ul style="list-style-type: none"> Conduct tests and provide information on more wells, both in the surficial deposits (or first few meters of bedrock) to investigate on the potential shallow aquifer and in the

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				Appendix B GEOFOR Hydrogeology and MODFLOW Modelling	<p>and wetland bottoms as well as through the Sokoman Formation, as a very large hydraulic gradient will be created, especially when the open pit floor reaches its lowest level (160 m below the ground surface).</p> <p>Contrary to what is written on p. 39 of Appendix B (“The dewatering will have a null effect on those wetlands.”), Natural Resources Canada has advised that it believes that open pit dewatering, while drawing from the “deep” confined aquifer, would have an impact on wetlands and lakes. The maximum drawdown obtained during pumping tests performed for this environmental assessment is on the order of 10 m, while the maximum drawdown during dewatering will be on the order of 70 m. There may also be impacts on lands around the site, since this intensive pumping in a confined aquifer could result in compaction.</p>	<p>unfractured part of the Sokoman Formation to identify a potential confining unit. Hydraulic tests in these wells should be performed, with other available wells used as observation wells. Water levels in lakes and creeks should also be monitored during these tests. The unfractured part of the Sokoman Formation could also be tested using available wells with packers if they are not cased all along.</p> <p>Redraw the piezometric map of Figure 8 in Appendix B (showing values from the deep aquifer) close to Irony Mountain, which is considered a recharge area (p. 7-100 of Chapter 7); hence piezometric contours would be perpendicular to flow coming from the Mountain).</p>
Meet with NRCAN						
CEAA 18	NRCa n IR 5	Information and data	7.3.6	Chapter 7, section 7.3.6 Appendix B GEOFOR Hydrogeology and MODFLOW Modelling	<p>Recharge is considered to be 20% of the precipitation minus evapotranspiration and sublimation, based on a reference for a similar area (p. 7-101 from Chapter 7: “The runoff value of 80 % of the total precipitation has been taken from the waste management plan section of SNC-Lavalin”). The basis for this estimate is not provided and no other justification is presented. Recharge could likely be larger than 109 mm/y (Table 7-40, Chapter 7) given the composition of the surficial deposits, generally described as sandy or even gravelly (likely till, although not described that way). However, given the widespread occurrence of lakes and wetlands, it is probable that most of the infiltrated water supplies these features in topographic lows and that recharge in the deeper formations (in the Wishart Formation and its interface with the Sokoman Formation) is limited to areas where the Wishart Formation outcrops or lies directly below surficial sediments (see geological map of Figure 7-13 from Chapter 7).</p> <p>While the EIS (p. 35 Appendix B) states that: “In summary, the groundwater recharge is occurring in the Fleming 7 deposit area where the highest groundwater elevations are found and from the high elevation terrains along</p>	<ul style="list-style-type: none"> • Provide a water budget based on values acquired in the study area that would take into account the possibility for recharge to the shallow and deeper aquifers. • Appendix B (p.35) also states that: “Groundwater probably discharges through a southwest set of fractures southwest of Triangle Lake.” Please explain how the proponent came to this conclusion and provide supporting documentation or references if applicable.

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					the Quebec-Labrador boundary”, NRCAN wishes to remind the proponent that recharge is not restricted to where piezometric levels are high. These zones often indeed correspond to preferential recharge areas, but it also depends on the permeability of the surficial sediments and underlying geological formations.	
Meet with NRCAN						
CEAA 19	NRCAN IR 6	Information and data	7.3.6	Chapter 7, section 7.3.6 Appendix B GEOFOR Hydrogeology and MODFLOW Modelling Appendix XVII Ground Water Modelling Climate Variability	<p><i>General</i> There are a few things that are not clear about the current numerical model. Figures 3-2 and 3-5 of Appendix B show that surficial sediments do not cover the entire model and that they are absent from the future open pit. The absence of cover is surprising since all the well logs provided in Appendix I (Well diagrams with simplified geology) and Appendix II (Geology of overburden wells) of Appendix B show a thickness of surficial sediments ranging from 6 (HW-RC-15-WE08R) to 54 m (HW-RC-15-WE05R). Is it because this area will eventually be excavated? However, the model needs to be calibrated with present conditions to be able to match measured hydraulic heads.</p> <p><i>Recharge</i> Recharge of the deep aquifer within the Wishart Formation cannot come from the surface at the location of the open pit through the thick Sokoman Formation. The “deep” aquifer is likely being recharged where 1) the Wishart Formation is at or near the surface or just below the surficial sediment cover and 2) the overlying Sokoman Formation is thin and therefore, likely quite permeable. Recharge of the Wishart Formation could be larger than 100 mm/y, but over a much smaller area.</p> <p><i>Model boundaries</i> In the report, the Attikamagen Formation is said to be impermeable and to act as a barrier to groundwater flow (p. 23 of Appendix V in Appendix B). However, the calibrated hydraulic conductivity values provided in Table 4-1 from Appendix V in Appendix B show that between the overlying Wishart</p>	<ul style="list-style-type: none"> a. Based on new knowledge that will be acquired to better understand and assess the hydrogeological context, provide a revised numerical model. b. Provide a map of the thickness of surficial sediments, along with the available control points. c. Provide rationale to justify the choice made for the model base. d. In Figure 3-5, explain what the gray color corresponds to. e. In Figure 4-1 which shows the results of the calibration process (Appendix V in Appendix B), explain how well HW-RC-15-WE08R can be located in layer #6, as indicated in the legend. It is only 73 m deep, while most other wells are much deeper and seem to be located in layer #5? f. Appendix V in Appendix B states the Attikamagen Formation is said to be impermeable and to act as a barrier to groundwater flow (p. 23 of Appendix V in Appendix B). However, the calibrated hydraulic conductivity values provided in Table 4-1 from Appendix V in Appendix B show that between the overlying Wishart Formation (8×10^{-7} m/s) and the Attikamagen Formation (1×10^{-7} m/s), the difference is less than one order of magnitude, which is not enough to consider it an impermeable base. Explain whether this means that at lower depths, this formation is considered to be more permeable; otherwise, the model needs to be extended deeper and analysis revised accordingly.

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					<p>Formation (8×10^{-7} m/s) and the Attikamagen Formation (1×10^{-7} m/s), the difference is less than one order of magnitude, which is not enough to consider it an impermeable base. Does that mean that at lower depths, this formation is considered to be more permeable? Otherwise, the model should be extended deeper. In addition, it is not clear why the Wishart Formation is not present at the base in Figures 3-4 and 3-5? It looks as though the base of the model corresponds to a given (constant) depth, not to the base of the Wishart Formation (or top of the Attikamagen shale Formation).</p> <p>The surface area of the modelled domain appears to be too small because drawdown curves provided in the reports (Chapter 7, Appendix B and Appendix XVII) show that a 10 m drawdown is obtained very close to the model limits to the east and west, where a constant head boundary has been assigned, suggesting that a larger domain should have been modelled. Indeed, a constant head boundary forces drawdown to be zero at these limits. A much larger domain would not “force” the results and would likely show even larger drawdowns in the lakes. However, the introduction of a much less permeable layer (if relevant and applicable, based on the acquisition of new information) in the model would likely reduce this drawdown.</p> <p>These really restricted constant head boundaries might also be the reason why, although assigning K values that are not very low, the model is able to reproduce the very low “water table” found in the Wishart Formation.</p> <p><i>Faults</i> The numerical modelling report (page 24 of Appendix V in Appendix B) states that “Fault zones with intermediate permeable values [were] assigned due to low permeability materials” . However, the role of the faults is not well known. Some seem to be more permeable and others less permeable than the surrounding formation (p. 11</p>	<p>g. Clarify why the Wishart Formation is not present at the base in Figures 3-4 and 3-5? It looks as though the base of the model corresponds to a given (constant) depth, not to the base of the Wishart Formation (or top of the Attikamagen shale Formation).</p>

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					<p>of Appendix B). The K value assigned to these features (close to the other K formation values) does not, in any case, significantly influence groundwater flow.</p> <p><i>Upper and lower aquifers</i></p> <p>It appears that the model was not built to take into account both the upper water table observed in HW-RC-14-WE10B (in surficial deposits) and the deeper piezometric surface observed in the other wells of the future open pit. The modelled piezometric map obtained for mine dewatering shows drawdowns on the order of 10 to 20 m in the areas of the two lakes (Triangle and Pinette), indicating that there is a direct link between the surface and deeper formations in the numerical model. The hydraulic conductivity values assigned for the different formations do not allow the presence of a confining layer. However, the Wishart Formation appears to be, at least in part, a unit under confined conditions.</p>	
Meet with NRCAN						
CEAA 20	NRCan IR 7	Information and data	7.3.6	<p>Chapter 7, section 7.3.6</p> <p>Appendix B GEOFOR Hydrogeology and MODFLOW Modelling</p> <p>Appendix XVII Ground Water Modelling Climate Variability</p>	<p><i>Model calibration</i></p> <p>In Figure 4-1 of Appendix V in Appendix B, only 21 data points are presented (that can be seen at least), while 28 groundwater elevation values are provided in Table 2-3 (Piezometric results) of the same document. None of the values are above elevation 610 m in the Howse area (HW-RC-14-WE10B), while Figure 4-1 shows 9 points (from the Timmins area). It is unclear whether some of these points (boreholes) are missing from the figure.</p> <p>In addition, the borehole drilled into surficial sediments for which a water table value is available has been disregarded. It should be used in the next version of the model. The proponent should provide modeled values for all observed values.</p> <p><i>Sensitivity scenarios</i></p> <p>The scenarios for the sensitivity analysis should have used a much larger coefficient for the variation of K, as this parameter is known to vary quite</p>	<ol style="list-style-type: none"> Explain why some data points (boreholes) are missing from Figure 4-1 of Appendix V or provide a rationale for not including them on the figure. Provide modeled values in a table similar to Table 2-3 of the same document (or Table 7-38 of Chapter 7), for all observed values (including the well HW-RC-WEo10B drilled into surficial sediments). Given that flow rates are available at different sites, use these for model calibration, in addition to hydraulic heads. Provide scenarios using a factor of 10 to increase and decrease K values in the next version of the model.

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					significantly within a given area, especially in fractured bedrock formations. At least one order of magnitude (coefficient of 10) should have been used for “extreme” scenarios instead of only a factor of 2 to get a better range of potential pumping rates.	
Meet with NRCAN						
Birds						
CEAA 21	CEAA	5(1)(a)(iii) Migratory Birds	6.3.2	7.4.8.2, 7-246, 250	<p>The EIS refers to waterfowl surveys conducted by helicopter in spring and fall 2011.</p> <p>The EIS also states that concerns were expressed by Indigenous communities on effects of helicopters on wildlife.</p>	<ul style="list-style-type: none"> Describe potential limitations, if any, of using helicopters to carryout bird studies for birds that are noise sensitive and how this may have affected survey results and effects predictions.
ANSWER SENT TO CEAA July 19 2016						
<p>The Canadian Wildlife Service itself publishes annual reports on the populations status of birds across Canada, and their data is largely based on helicopter surveys. The proponent therefore concludes that Waterfowl surveys by helicopter is an approved method by Environment Canada. In Eastern Canada, breeding waterfowl populations are monitored annually through the Eastern Waterfowl Breeding Ground Survey (hereafter referred to as the Eastern Waterfowl Survey). The Canadian Wildlife Service carries out systematic helicopter surveys over the Boreal Shield region from northeastern Ontario to Newfoundland and Labrador, and the Atlantic Highlands region from the Gaspé Peninsula in Quebec to Nova Scotia (CWS, 2013). This accepted method disturbs waterfowl for a very short period of time and does not prevent ducks for raising brood and attempt successful breeding.</p> <p>Source: Canadian Wildlife Service Waterfowl Committee. 2013. Population Status of Migratory Game Birds in Canada: November 2013. CWS Migratory Birds Regulatory Report Number 40.</p>						
CEAA 22	CEAA	5(1)(a)(iii) Migratory birds	6.3.2	Appendix XVI, Volume 1, Section 7.4.8.2, Page 7-250	<p>The EIS states “removal of overburden and stockpiling of waste rock and other wastes will result in some loss of habitat, including some loss of wetlands that are important for certain at-risk migratory birds.</p> <p>Wetlands will be inspected in this area at least annually to ensure that the loss of wetland habitat does not exceed what was committed.”</p> <p>Wetlands are particularly important for staging and breeding waterfowl. It is not clear how wetland inspections would be undertaken.</p> <p>The EIS mitigation measures state that 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.</p>	<ul style="list-style-type: none"> Clarify whether traffic and heavy equipment would be permitted to enter wetlands or other areas not designated for traffic outside of the breeding season (i.e. September to April). Provide information on when and how wetlands would be inspected, and on proposed mechanisms for adaptive management in the event that wetland habitat loss exceeds what was predicted.

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ANSWER SENT TO CEAA July 19 2016						
<p>HML Answer</p> <p>Traffic and heavy equipment will not travel outside of roads. Even during the construction of these roads and the base of the dumps, the traffic will be either on known stable grounds. The majority of roads for Howse will be historic roads that will be upgraded to accommodate heavy equipment. There will be no need for traffic to enter any wetlands outside of the project footprint.</p> <p>The Proponent is currently preparing a wetland management plan (final version to be ready in the Fall 2016) and a submetric delineation of the wetlands that are in the vicinity of the proposed Howse Project infrastructures. The plan will include specific mitigation measures to minimize the effects of the project on wetlands, such as limit the encroachment. In addition, Section 9.2.1 of the Howse EIS states: Although it is not expected that wetlands be affected by pit dewatering, (Section 7.4.2), the Proponent is committed to monitoring of wetlands during the routine site inspections and a wetland disturbance survey will also be conducted every five years.</p> <p>Section 9.2.1 of the Howse EIS provides detail on the Proponent’s commitment to wetland monitoring: Water table monitoring wells, consisting of perforated pipe should be installed before the beginning of the construction phase in order to obtain some measures before pit dewatering begins. Measurement should be taken once a month, but once every two week from the beginning of operation phase until dewatering ends. Transects of wells should be positioned in CMH-04, CMH-05 and CMH-06 (see Figure 7 30 for the location of these wetlands). The wells should be spaced 50 m apart.</p> <p>The Proponent is committed to restoring the Howse Project site to the pre-project condition during its decommissioning and reclamations phase. As such, wetland areas will be restored to their original state following operations.</p>						
CEAA 23	ECCC-IR-01	5(1)(a)(iii) Migratory Birds	6.3.2	Volume 1, Section 7.4.8.2, Page 7-250	<p>The EIS states "loss of habitat and disturbance associated with the project activities will mostly affect the LSA, and effects in the Regional Study Area (RSA) will be negligible or nonexistent. Disturbance in the LSA might result in bird avoidance of the LSA."</p> <p>Direct mortality of ground-nesting birds may occur if construction proceeds during the migratory bird breeding season in absence of appropriate mitigation.</p> <p>Environment and Climate Change Canada has advised that all migratory bird mitigation measure should be codified in an avifauna management plan. Prior to preparing a plan, the following document should be consulted: <i>"Planning ahead to reduce the risk of detrimental effects to migratory birds and their nests and eggs"</i> https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=1B16EAFB-1#_001</p>	<ul style="list-style-type: none"> Identify mitigation measures to address potential effects on ground-nesting migratory birds. Explain whether an avifauna management plan would be prepared in accordance with the following document: <i>"Planning ahead to reduce the risk of detrimental effects to migratory birds and their nests and eggs"</i> https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=1B16EAFB-1#_001 . If so, describe the proposed review and approval process for an avifauna management plan.
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IR Number	Dept Number	Effects Link to CEEA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
<p>The Proponent has committed to removing vegetation only outside the breeding season. This commitment will lower the number of species that could potentially breed on altered soil will be considerably. The Semipalmated Plover and the Spotted Sandpiper have been identified as the only potential species likely to nest directly on the ground or on altered soil. The Proponent is also commitment to removing all vegetation debris (in September or October) to ensure that no other species will attempt to breed on ground where construction activities will be planned.</p>						
<p>As proposed by Environment Canada, nest surveys will be carried out by an environmental technician in previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil, for instance). As stated in the EIS, if a nest is located, a small fence with wooden stakes and galvanized metal T-posts with colored nylon rope along the posts will be installed to identify it and prevent the machinery destroying the eggs.</p>						
CEAA 24	ECCC-IR-09	5(1)(a)(iii) Migratory Birds	6.3.2, 8.1.	Volume 1, Section 9.2.3, Page 9-40	<p>The EIS states “the proponent is committed to surveying the Howse Pit vertical walls in early and mid-summer every year that the mine is in the operations phase. Should the Bank Swallow be detected, deterrence measures will be taken to render the site inhospitable (noise, plastic covering of pit walls, etc.) for nesting.”</p> <p>If Bank Swallows are detected through surveys, it is very likely that they have already begun nesting and thus too late to initiate deterrence. The deployment of physical deterrence methods after the arrival of birds would have a high probability of destroying nests.</p> <p>The scaring of migratory birds through the use of noise is only authorized for situations where the “birds are causing or likely to cause damage to crops or other property”. As this is not the case in this situation, targeted use of noise to scare birds attempting to nest would be considered disturbance and thus prohibited by regulations.</p> <p>Environment and Climate Change Canada has advised that:</p> <ul style="list-style-type: none"> • Physical deterrence measures to render the site inhospitable to Bank Swallows should only be used outside of the Bank Swallow breeding period. • The use of noise to render the site inhospitable to Bank Swallow during the nesting season should be prohibited. 	<p>Explain whether the proponent would to commit to the following mitigation measures:</p> <ul style="list-style-type: none"> • Physical deterrence measures to render the site inhospitable to Bank Swallows would only be used outside of the Bank Swallow breeding period. • The use of noise to render the site inhospitable to Bank Swallow during the nesting season would be prohibited.
<p>ANSWER SENT TO CEEA July 19 2016</p>						

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IR Number	Dept Num ber	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
<p>Section 9.2.3 of the Howse Project EIS reads as such: <i>The proponent is committed to surveying the Howse Pit vertical walls in early and mid-summer every year that the mine is in the operations phase. Should the Bank Swallow be detected, deterrence measures will be taken to render the site inhospitable (noise, plastic covering of pit walls, etc.) for nesting.</i></p> <p>The text should be modified to: <i>The proponent is committed to surveying the Howse Pit vertical walls in early and mid-summer every year that the mine is in the operations phase. Should the Bank Swallow be detected, deterrence measures will be taken to render the site inhospitable (noise, plastic covering of pit walls, etc.) outside of the breeding season, which, in northern latitudes, could go from mid-June to mid-August.</i></p> <p>TSMC is already committed to develop a management plan for this specific issue. This plan will be submitted as soon as possible.</p>						
CEAA 25	ECCC-IR-10	5(1)(a)(iii) Migratory Birds	6.3.2, 8.1.	Volume 1, Section 9.2.3, Page 9-40	<p>Bank Swallows can re-use their burrows/nests from year-to-year, although they can re-nest when nests and burrows are destroyed. The destruction of nests outside of the breeding season could have negative impacts on future breeding success.</p> <p>Environment and Climate Change Canada has advised that Bank Swallow colonies not have physical deterrents installed in years during which work is not expected to be undertaken on the rock stockpile/bank in question.</p>	<ul style="list-style-type: none"> Explain whether the proponent commits to not installing physical deterrents for Bank Swallow colonies in years during which work is not expected to be undertaken on the rock stockpile/bank in question.
ANSWER SENT TO CEAA July 19 2016						
<p>The proponent is committed not to install physical deterrents for Bank Swallow colonies in years during which work is not expected. It's already the case in one of the DSO4 pit and the proponent has installed a set-back fence to prevent any human disturbance to the colony.</p>						
CEAA 26	ECCC-IR-05	5(1)(a)(iii) Migratory Birds	6.3.2	Volume 1, Section 7.4.8.2, Page 7-254	<p>The EIS states "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 bank swallow be detected, then deterrence methods or measures should be taken to render the site inhospitable 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."</p>	<ul style="list-style-type: none"> Explain whether the proponent commits to using deterrence methods in the form of plastic sheeting and fine meshed nets <u>prior to</u> (i.e. not during) the Bank Swallow breeding season. Explain whether surveys for Bank Swallows would be undertaken prior to utilization of deterrence measures, to ensure that no early nesting is occurring and, if yes what surveys would entail.

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
					If Bank Swallows are detected through surveys, it is very likely that they have already begun nesting and thus too late to initiate deterrence. The deployment of physical deterrence methods after the arrival of birds would have a high probability of destroying nests.	
<p style="background-color: #ffcccc; margin: 0;">ANSWER SENT TO CEAA July 19 2016</p> <p>Please see answer to CEAA 24 above.</p> <p>If the proponent has to install deterrence methods (in the form of plastic sheeting, fine meshed nets or Irri-tape ©), it will only be <u>prior to</u> the Bank Swallow breeding season.</p> <p>The proponent has a trained environmental technician who is committed to survey the pits in early June to detect Bank Swallow arrival before nesting begins. First birds to arrive spend first 2–3 wk mostly foraging, and probably do not begin pair formation immediately; later-arriving birds visit colonies and start forming pairs immediately upon arrival (Garrison and Barret, 1999). Thus, if swallows surveys are carried out during their early arrival, it allows the proponent to install deterrence measures before the birds starts to nest. No deterrence measures will be taken if the swallows have already started breeding.</p> <p>Source: Garrison, Barrett A. 1999. Bank Swallow (<i>Riparia riparia</i>), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online:http://bna.birds.cornell.edu/bna/species/414 doi:10.2173/bna.414</p>						
CEAA 27	ECCC-IR-03	5(1)(a)(iii) Migratory Birds	6.3.2	Volume 1, Section 7.4.8.2, Page 7-251	<p>The EIS states “the summer 2015 study on Pinette Lake confirmed this hypothesis, as a simulation of the water regime for Pinette Lake predicted slight changes in water level of only 2mm should not, in any case, affect breeding success in waterfowl.”</p> <p>If larger than predicted water level changes occur during the waterfowl breeding season, destruction of nests and eggs could occur.</p>	<ul style="list-style-type: none"> • Identify mitigation measures to address adverse effects on waterfowl if water levels fluctuate beyond predicted parameters.
<p style="background-color: #ffcccc; margin: 0;">ANSWER SENT TO CEAA July 19 2016</p> <p>Under no scenario is the Pinette Lake water level expected to increase. If the lake water level decreases by more than 2 mm, this will not affect breeding success of any waterfowl species. Indeed, although about 25% of the watershed of the lake is diverted to Howse infrastructures to eliminate the possibility of Pinette Lake contamination, most of Pinette Lake inflow is believed to come from groundwater. Therefore, lake hydrology will probably not change. In any case, prolonged stabilization of water levels usually leads to a reduction of emergent plants (Markham, 1982) which are needed for duck brood rearing. Consequently, a more important water decrease than expected could potentially induce an increase of emergents which could have beneficial effects on waterfowl breeding success.</p> <p>Source: Markham, B. J. (1982). Waterfowl production and water level fluctuation. Canadian water resources journal, 7(4), 22-36.</p>						

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
CEAA 28	ECCC-IR-04	5(1)(a)(iii) Migratory Birds	6.3.2	Volume 1, Section 7.4.8.2, Page 7-253	<p>The EIS states “if a nest is located, a small fence with wooden stakes and galvanized metal T-posts with colored nylon rope along the posts will be installed to identify it and prevent the machinery destroying the eggs.”</p> <p>Environment and Climate Change Canada has advised that additional measures may improve the effectiveness of the above mitigation.</p> <p>For example, a nest itself should never be marked using flagging tape or other similar material as this increases the risk of nest predation. If necessary, flagging tape can be placed at the limits of a buffer zone.</p> <p>The proponent should refer to: https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1 for setback ranges for different types of birds. Please note that these general examples should serve as a general starting point and be adjusted after assessing relevant factors, such as the risk of disturbance caused by industrial operations, for species at risk, ground nesting species, or the highly mobile chicks of species.</p>	<ul style="list-style-type: none"> Confirm that a nest itself would never be marked using flagging tape or other similar material. If necessary, flagging tape can be placed at the limits of a buffer zone. <p>Explain whether and how Environment and Climate Change Canada’s Avoidance Guidelines and associated technical information would be followed to help reduce the risk of incidental take of migratory birds, nests and eggs - https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1.</p>
<p>ANSWER SENT TO CEAA July 19 2016</p> <p>Nest itself would never be marked using flagging tape to avoid attract any potential predators. Flagging tape will only mark the wooden stakes and/or the small fence that would be placed at a setback distance (different, depending of the species) to reduce to a maximum any potential harm to the birds and their breeding success.</p> <p>Environment and Climate Change Canada’s Avoidance Guidelines and associated technical information will be followed and have already inspired the Proponent to reduce the risk of incidental take of migratory birds, nests and eggs. The proponent is well aware of and understands the relevant provisions of laws and regulations pertaining to the protection of birds, nests and eggs. Notably: the <i>Migratory Birds Convention Act, 1994</i>, the <i>Migratory Birds Regulations</i> and, where applicable, the <i>Species at Risk Act</i> and has completed a thorough risk assessment in a timeframe suitable to balance project needs with risk of incidental take of migratory birds. By avoiding vegetation removal during the breeding season, establishing a policy if a nest is randomly found during construction or operation activities, the proponent has committed to be in accordance with the proposed Guidelines of Environment and Climate Change Canada.</p>						
CEAA 29	ECCC-IR-06	5(1)(a)(iii) Migratory Birds	6.3.2	Volume 1, Section 7.4.8.2, Page 7-254	<p>The EIS states “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.”</p>	<p>Explain whether the following additional mitigation would be implemented:</p> <ol style="list-style-type: none"> The minimum amount of pilot warning and obstruction avoidance lighting would be used on tall structures. Warning lights would flash and completely turn off between flashes. Only strobe lights would be used at

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
					<p>Attraction to lights at night or in poor visibility conditions during the day may result in collision with lit structures or their support structures, or with other migratory birds. Disoriented migratory birds are prone to circling light sources and may deplete their energy reserves and either die of exhaustion or be forced to land where they are at risk of depredation.</p> <p>Environment and Climate Change Canada has advised that it supports the measure of reducing lighting by half during the migration period.</p>	<p>night, at the lowest intensity and smallest number of flashes per minute allowable by Transport Canada.</p> <p>b. The fewest number of site-illuminating lights possible would be used in the project area.</p> <p>c. Lighting for the safety of the employees would be shielded to shine down and only to where it is needed.</p> <p>LED lights would be used where possible instead of other types of lights. LED light fixtures are less prone to light trespass (i.e. are better at directing light where it needs to be, and do not bleed light into the surrounding area), and this property reduces the incidence of migratory bird attraction.</p>
<p>ANSWER SENT TO CEAA July 19 2016</p> <p>The Proponent provided answer to the same question to CEAA (CEAA 47) in April 2016:</p> <p>Upon review of applicability to the project. The following list of specific mitigation measures for light is included in the EIS. The selected mitigation measures combine recommendations by Environment Canada and by the International Dark-Sky Association in the document Light Pollution and Wildlife (IDA, 2008):</p> <ul style="list-style-type: none"> ▪ Shield your outdoor lighting; ▪ Only use the light when you need it; ▪ Shut off the lights when you can; ▪ 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; ▪ Lighting for the safety of employees should be shielded to shine down and only to where it is needed, without compromising safety; ▪ When possible, LED lights will be used. 						
CEAA 30	CEAA	5(1)(a)(iii) Migratory Birds 5(1)(c)	6.3.2 6.3.4	Table 4-7	The EIS states that elders have noted that Irony Mountain is an important nesting site	Provide information on species potentially occurring on Irony Mountain and the predicted effect of the Project on these species. Discuss proposed mitigation measures, if any.

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IR Number	Dept Number	Effects Link to CEEA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
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<p>Irony Mountain biotope consists mostly of tundra with dwarf birch, lichen and exposed rock surface. The following species use the site for breeding: American Pipit, Horned Lark, Willow Ptarmigan, American Tree Sparrow, White-crowned Sparrow, Savannah Sparrow and Common Redpoll. The proponent will not conduct any activities on Irony Mountain and the area will remain wild and undisturbed.</p>						
CEAA 31	ECCC-IR-07	5(1)(a)(iii) Migratory Birds	6.3.2, 8.1.	Volume 1, Section 9.2.3, Page 9-40	<p>The EIS states “the Proponent will engage in breeding birds and species at risk monitoring surveys every five years. Surveys with point count methods will allow HML to stay informed on avifauna in the area. In order to keep track of possible changes in bird populations, these surveys will be conducted in every habitat present in the Howse area, after the end of the construction phase.”</p> <p>One of the main purposes of post-construction surveys is to verify the prediction of no significant adverse effects upon avifauna. The frequency of surveys stated in this section is too low to obtain adequate data for an effects assessment.</p> <p>If surveys at the current frequency show that the prediction of no significant adverse effects is incorrect, there may be insufficient time to undertake adaptive management to mitigate adverse effects.</p> <p>Following the initial three year post-construction period, monitoring as proposed by the proponent should be implemented to assess long-term effects.</p>	<ul style="list-style-type: none"> • Present a strategy for monitoring effects and explain how resulting information would be used to determine potential effects on migratory birds. Explain whether the following would be implemented/committed to: <ul style="list-style-type: none"> - Undertaking post-construction monitoring every year for the first three years of post-construction in order to assess initial effects. Monitoring of migratory birds would also include monitoring for landbirds (i.e. songbirds, etc.) Methods would be comparable to those used in pre-construction surveys. - Submitting all monitoring protocols for migratory birds in the form of an Avifauna Management Plan to Environment and Climate Change Canada for review prior to implementation. • Provide information on if- and how Indigenous Traditional Knowledge would be considered in follow-up surveys for avifauna and how local communities would be involved.
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<p>The follow-up purposes will be to:</p> <ul style="list-style-type: none"> • Conduct a quantitative breeding bird survey; • Conduct a qualitative breeding bird survey; • Carry out an in depth species at risk survey. <p>The breeding bird survey will consist of point counts distributed randomly in the study zone and in order to cover all the different biotopes that are found in the LSA. These surveys will help monitoring changes in intensely used or altered sites, in moderately used or altered sites and in unaltered sites in order to evaluate the impacts of the mining project in the Howse area.</p>						

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<p>Surveys of breeding birds target principally passerines and woodpeckers. They are conducted by means of point counts. The technique is derived from a combination of that of counting within a limited radius (Bibby et al 1992) and that of site-specific indices of abundance (Blondel et al 1981). The latter technique involves noting all birds detected during a 10-minute period regardless of their distance from the observer. It has the advantage of enabling the coverage of a larger area, thereby improving the chances of detecting rare species. The survey by counting within a limited radius started after a settling-down period of approximately five minutes allows the birds to recover from the disturbance caused by the movements of the observers. Birds within a 50-m radius are distinguished from those situated further away. Although the survey by point counts targeted predominantly passerines and woodpeckers, observations of other bird species are also noted. Point counts survey started at sunrise and lasted for approximately four hours.</p> <p>Many lakes, ponds and wetlands are present in the study area. These habitats will be visited after points counts in order to survey all the species present but also to detect aquatic birds, raptors and species at risk (Rusty Blackbird and Red-necked Phalarope).</p> <p>The richness of the study area (number of bird species) will be calculated on the basis of all the available data, including the data collected during movements.</p> <p>As stated in Section 9.3: HML has put in place various communication and socioeconomic monitoring mechanisms collaboratively with affected Aboriginal communities, which will be maintained for the Howse Project. Any species sightings can be reported to TSMC and records will be updated and preserved.</p>						
CEAA 32 -	ECCC-IR-08	5(1)(a)(iii) Migratory Birds	6.3.2, 8.1.	Volume 1, Section 9.2.3, Page 9-40	<p>The EIS states “uses of playback in proper habitat will be part of an adapted protocol...”</p> <p>Playback is generally a tool to use to determine absence of a species. The use of playbacks has the potential to disrupt natural bird behaviour. If a species is located during regular survey efforts, then there is no need to add stress to migratory birds by using playbacks.</p> <p>Confirm that playback would be used only if regular survey effort is resulting in no observations of a species, and it is necessary to confirm its absence from the area.</p>	<ul style="list-style-type: none"> Explain under circumstances playback would be used. Confirm that playback would be used only if regular survey effort is resulting in no observations of a species, and it is necessary to confirm its absence from the area.
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<p>Playback will not be used if the regular survey effort (point counts) has already allow to confirm the presence of any searched species. It will only be used to confirm the absence of a species from the area.</p>						
CEAA 33	CEAA	5(1)(a)(iii) Migratory Birds	6.1.6, 6.3.2	7.4.8.4, page 7-256	<p>The definition of the <i>frequency</i> criterion refers to timing considerations as opposed to frequency of effect: birds are more vulnerable during the breeding season or 25% of the year.</p>	<ul style="list-style-type: none"> Review and revise the definition of <i>frequency</i> in accordance with the Agency’s OPS <i>Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012</i>.

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IR Number	Dept Number	Effects Link to CEAA 2012	Link to EIS guidelines	EIS Reference	Context and Rationale	Specific Question/ Request for Information
					<p>As per the Agency's OPS <i>Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012</i>, <i>frequency</i> is intended to describe <u>how often an environmental effect occurs</u> within a given time period (e.g., alteration of aquatic habitat will occur twice per year).</p> <p><i>Geographic extent</i> is intended to describe the spatial area over which an environmental effect is predicted to occur. Prediction of the geographic extent should be quantitative whenever possible (e.g. hectares of habitat change).</p>	<ul style="list-style-type: none"> Provide additional explanation for how geographic extent determinations were made, including the maximum spatial extent of effect (e.g. light, noise (including blasting), habitat loss). Also include any temporary or permanent habitat loss with respect to bird habitat.

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The Proponent agrees that the frequency criteria, as the highlighted sentence suggests, seems to refer to timing. However, the intent was to assess frequency as it is defined in the Agency's OPS *Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012*. As such, the sentence should read as follows: birds are more vulnerable during the breeding season or 25% of the year, which is occasional/intermittent. The rest of the assessment remains the same.

LSA and RSA are defined as such in the EIS: The LSA is considered as being limited to the watersheds within which the Project takes place (e.g., Triangle Lake, Pinette Lake and Burnetta Lake watersheds). It includes areas that will be affected by habitat loss, as well as lakes and streams that are part of the watershed affected by the Project, as changes in water quality could affect food distribution for aquatic birds. The LSA is limited to the above-mentioned watersheds since habitat integrity and food distribution for birds rely heavily of the proximity of water bodies.

In order to take into consideration the cumulative effects on bird populations such as habitat fragmentation and changes in behavior traits, both of which could lead to population-wide effects, the RSA has conservatively been designated as the area within a 30-km radius of the Howse Project. Notably, this area will include every any species that spend a part of their life cycle regionally and on which the Howse project could be effected. The 30-km radius is arbitrary but deemed sufficient to encompass all potential past, present and foreseeable future effects of the Howse Project on avifauna. Bird populations will continue to interact with the landscapes for the duration of the Project and beyond for some species, and so we set the avifauna temporal boundaries at the operations phase and decommissioning and abandonment phases. Bird avoidance due to disturbances will be mostly restricted to the operation phase while breeding birds will avoid nesting in unsuitable (altered) habitats and will not recolonize until previous habitats are restored. It is noted that given the sensitive nature of the breeding season, the period between June and mid-August is of particular importance.

Avifauna habitat loss is limited to the Project Footprint, as the Proponent is committed to respecting buffer zones to preserve avifauna habitat around the project footprint. The Proponent expects to rehabilitate the site to pre-project conditions during the decommissioning phase.