Montréal, July 26 2017

Joseph Vidger
Canadian Environmental Assessment Agency
1801 Hollis street
Halifax (Nova Scotia)- B3J 3N4

Subject: Proponent response to IR CEAA 105: update to Howse water management plan

Mr. Vidger,

In response to the Canadian Environmental Assessment Agency's information request 105, and on behalf of HML, please find below the proponent's responses to IR 105, including the follow up information that was requested on June 9 2017.

Please do not hesitate to contact me should your required any additional information,

<Original signed by>

Mariana Trindade
Groupe Hémisphères, Project manager, Howse EIS

1 Infrastructure and design criteria

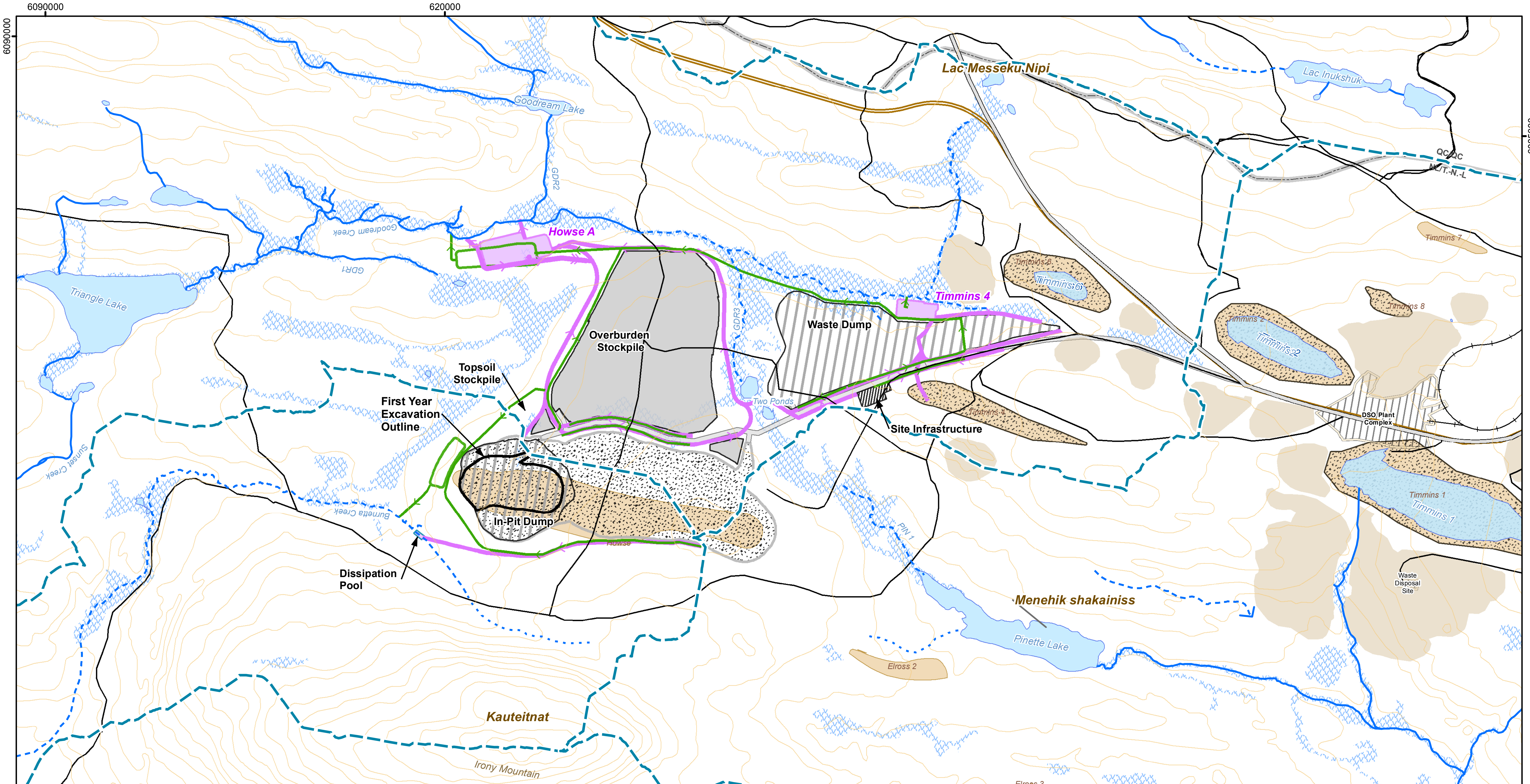
The Howse Property lies on three different watersheds leading to Pinette Lake, Burnetta Creek and Goodream Creek. The water management strategy aims to manage surface runoff and pit dewatering water with as little effects as possible on them. The WMP will avoid construction in sensitive areas like wetlands and will minimize flow variations in existing natural creeks. Further, existing infrastructure will be used, such as the Timmins 4 settling pond 3. Water treatment will consist of removing suspended sediments by means of two (one new) settling ponds.

No water will be discharged into Pinette Lake.

All ditches will be protected against erosion with riprap to avoid any sediment production from the ditches themselves.

The water management strategy is as follows:

- Instead of being treated with mine water, the natural runoff from Irony mountain will be collected by a ditch located north-west from the pit, before reaching the mine site, and leading to a dissipation pool ultimately discharging into Burnetta Creek;
- the west part of the in-pit waste rock dump, the topsoil stockpile and from the surrounding area on the south-west side of the site (formerly directed towards Burnetta Creek) will be collected by a ditch leading to Settling pond HOWSEA and then discharged to Goodream Creek;
- runoff on the waste rock dump, the site infrastructure pad, and the overburden stockpile will be collected by ditches leading to Settling pond HOWSEA and then discharged into Goodream Creek (unchanged from previous WMP); and
- since underground water will seep into the Howse pit as the pit depth reaches the water table, pit dewatering will consist of pumping the water that accumulates into the pit and diverting it to a ditch on the north-east side of the pit, leading to settling pond HOWSEA, and then discharged into Goodream Creek. The portion of the ditch receiving the dewatering water along the pit will be waterproofed to avoid infiltration of water directly back into the pit (unchanged from previous WMP).



LEGEND

Infrastructure and Mining Components

- DSO Haul Road
- Existing Railroad
- Elross Lake Area Iron Ore Mine (ELAIOM) Plant Infrastructure footprint
- Existing Dump
- Deposit
- Proposed Ditch (new version)
- Proposed Ditch (submit on EIE)
- Proposed Howse Pit
- Proposed Topsoil/ Overburden Stockpile
- Proposed Site Infrastructure
- Proposed In-Pit Dump /Waste Dump
- Proposed and Existing Sedimentation Pond
- Proposed Dissipation Pool
- Proposed Mine Haul Road
- First Year Excavation Outline

Basemap

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

*Hydronyms are oriented along the direction of water flow

FILE, PROJECT, DATE, AUTHOR:
GH-0828 , PR185-28-16, 2017-07-28, edickoum

N

0 500 1 000
Meters
SCALE: 1:20 000

UTM 19N NAD 83

SOURCES:

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

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

REQUEST FOR REVIEW:
HOWSE PROPERTY PROJECT

Water Management Plan Comparison

Howse Minerals Limited

GroupeHemispheres

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

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

Figure 1

Table 1. Updated Design Criteria of the Planned Water Management Infrastructure

Type of criteria	Criteria	Value	Comments
Location criteria	Buffer zone between the infrastructure and Irony Mountain	500 m	--
	Buffer strip between the infrastructure and watercourses and wetlands	Minimum of 30 m	--
Environmental criteria	Alteration of Pinette Lake	No alteration in Pinette Lake water quality is accepted	No surface water from Howse mine site can be discharged into Pinette Lake, even after treatment through a settling pond
	General location of the infrastructure	Avoid building infrastructures on wetlands, whenever possible	--
	Quality of runoff water and dewatering water	The only issue is assumed to be total suspended solids	See Water Quality and Treatment section for discussion on this issue.
	Pond and ditch waterproofing	No waterproofing: A permeability of 1 X 10-5 cm/sec is sought	See Water Quality and Treatment section for discussion on this issue. to reduce the possibility of underground water contamination by dissolved metals, the bottom and the dike will be lined with compacted natural soil; to reduce possibility of infiltration into the dike, the dike will be covered with a clay composite geomembrane up to 1 m under natural ground level
Hydrological criteria	Source of meteorological data	Schefferville A meteorological station	
Ditch design criteria	Ditch longitudinal slopes	Minimum 0.5%	--
	Ditch transverse slopes	2H:1V	--
	Ditch excavation	Minimize volume of excavation	--
	Return period of design flow	100 years	--
Pond design criteria	Infiltration	No waterproofing: A permeability of 1 X 10-5 cm/sec is sought	Water quality refers to water discharge and not infiltration. Refer to Section 7.0 on water treatment. to reduce the possibility of underground water contamination by dissolved metals, the bottom and the dike will be lined with compacted natural soil; to reduce possibility of infiltration into the dike, the dike will be covered with a clay composite geomembrane up to 1 m under natural ground level

Type of criteria	Criteria	Value	Comments
	Dead storage for sediment	2.0 m	The frequency at which the sediments will need to be removed from the pond during the life of the mine is once every two years. The design of the two settling ponds, the bypass pipe and truck access to the bottom of the pond will allow for the removal of solids during dry periods.
	Vertical distance between dike crest and spillway invert	1 m	--
	Pond outflow structure	Overflow manhole with peak flow restriction	--
	Ice cover during design flood	1.0 m	The settling ponds will always have 4 m of water and solids to ensure settling of solids and protection of output pipe. The settling pond receives water from pit dewatering operations. Thus, it is assumed that a 1-m ice cover will remain at the peak of the spring freshet.
	Return period of design flood for emergency spillway	100 years	Based on Canadian Dam Safety Guidelines for Significant Dam Class
	Return period of design flood for pond routing and sedimentation	25 years	--
	Design flood for pond routing and sedimentation	The worse of either: A summer-fall 24-hour 25-year return period rainfall; or Combinations of a 24-hour 25-year return period rainfall with the melting of a 25-year return period snowpack over 30 days	--
Sedimentation criteria	Design flow	Average 24-hour inflow during the peak of the design flood	--
	Specific gravity of particle to settle	2.7	--
	Design particle size to settle for settling ponds	0.01 mm (10 microns)	Particle size selected according to assumed particle size analysis for overburden and waste rock. Pond designed to ensure minimum area requirement is met and a minimum settling velocity of 0,334 m/hour.
	Slope of dike of the settling ponds	Minimum 3 horizontal to 1 vertical.	--

1.1 Dissipation pool

The dissipation pool is not designed for special effluent treatment. Water drained into this pool is clean water collected by the ditch along the northwest side of the pit. The pool is designed to dissipate the high velocity (2.7 m/s) at the end of the channel to prevent erosion in the Burnetta Creek. It has been designed for 100-year flood. The high velocity at the entrance of the pool decreases to 0.7 m/s at its exit for 100-years design flood (7.5 m^3/s). For the 25-year design flood (6.1 m3/s), the velocity at the entrance is 2.5 m/s and decreases to 0.7 m/s at the exit.

1.2 Sedimentation pond dimensions

The total surface area drained by the sedimentation pond HowseA is 179 hectares. The design criteria for HOWSEA setting basin at flow 1f/25 years: 10 microns sizing and 2-year sludge accumulation.

Table 1. Dimensions of HOWSEA and TIMMINS 4 settling pond

Description	Dimensions (m)	Total height (m)	Surface area (m^2)	Notes
HOWSEA Basin 1	71 X 96 X 4	6	6816	Settling of solids > 20 microns; Sludge contains: 10 110 m^3 on 2 m depth at the bottom
HOWSEA Basin 2	105 X 220 X 4	6	23 100	Settling of solids > 10 microns Sludge contains: 35 400 m^3 on 2 m depth at the bottom
Timmins 4	75 X 84 X 2.5	3.5	15 550	

2 Discharge values

Under the previous WMP, as described in the Howse EIS, most of the water (overburden stockpile + waste rock dump + site infrastructure + pit dewatering) went to Goodream Creek. Under the new plan, the runoff from the in-pit dump is added to this value. However, runoff from Irony Mountain (which needed to be pumped out of the pit and sent to Goodream in the previous plan) is now diverted to the dissipation Pool towards Burnetta Creek. **In summary, under the new water management plan, in-pit runoff is added to HOWSEA and Irony Mountain runoff is diverted directly to Burnetta Creek before reaching the mine site.**

The total discharge value into Goodream Creek has changed. Two channels direct water to Goodream via the future sedimentation pond (HOWSEA). The channel that flows north along the overburden stockpile has a discharge of 7.1 m^3/s whereas the channel that flows from east of the waste dump/OB stockpile has 8.3 m^3/s. Then the total discharge into the future sedimentation pond can be estimated to 15.4 m3/s. This is more than the discharge drained by the former HOWSEB in the old WMP. More precisely, even considering that the peak flows of these channels do not arrive at the same time into the sedimentation pond because of the difference in their times of concentration, the new discharge can be recomputed with the single longest time of concentration. Retaining the time of concentration of the north of the OB stockpile, the longest, the new discharge into Goodream Creek is 11.0 m^3/s and remains higher than the previous discharge (8.7 m^3/s).

The updated discharge computed for Timmins 4 is 9.9 m^3/s. This new discharge takes into account the new drainage area covering waste dump 2.

The updated discharge from the dissipation pool into Burnetta Creek is the same as in the channel on the northwest of the pit. The discharge doesn't change in the dissipation pool and remains 7.5 m^3/s. Only the output velocity drops from 2.7 m/s to 0.7 m/s to prevent erosion in Burnetta Creek.

2.1 Effluent quality and management

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

The settling ponds will not be lined with any impervious material to prevent or reduce water infiltration into the ground. An additional composite clay geomembrane will be added to all inside dike up to 1 m under the natural ground level. Ammonia and nitrate residues are expected at very low concentrations in the effluent water, and are not expected to necessitate treatment. Regardless, effluent monitoring in accordance with the provincial and federal regulations will be conducted on a regular basis and specific treatment will be considered if ammonia and nitrate blasting residue concentrations are above the criteria. The only parameter of concern is suspended matter. Consequently, if some of the runoff water does infiltrate into the ground, it will not have negative effects on the quality of the underlying groundwater.

An allowance of 2.0 m is provided at the bottom of the settling pond for sediment storage. The frequency at which the sediments will need to be removed from the pond during the life of the mine is once every two years and will follow all applicable regulations during the life of the mine. The first basin will collect the sand up to 25 microns and the second basin fines particles up to 10 microns.

The sediments that are expected to settle out are silt, sand, gravel, grits and a small amount of hydroxide metals. As mentioned above, iron could be a source of contamination, but assuming the water quality will be similar to the one at Timmins 4 ponds B & C, it will be in negligible quantities. Dredging of the sediments will be required during mining operations when the sediment storage areas fill up. Dredging involves excavating or pumping of the accumulated sediments out of the pond and transferring them for final disposal in the in-pit dump.

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

The water quality will remain unchanged at Goodream because the water volumes are similar. For Burnetta Creek since the interception of the water occurs before the mine site, it makes it so that the discharged water will be uncontaminated.

The water treatment settling pond will be designed to treat runoff from road, overburden, waste rock dump and pit dewatering. Water treated will meet the discharge quality criteria following the Environmental Control Water and Sewage Regulations 65/03, 2003, NR, NF and the Metal Mining Effluent Regulations (Canada) SOR/2002-222, section 3 and 19.1 and 20 and Schedule 4. The following table summarizes the discharge criteria specified in the above regulations.

Table 2. Water quality criteria of effluent of settling pond

Parameters	Units	Environmental Control Water and Sewage Regulations, 2003, schedule A	MMER (SOR/2002-222), Schedule 4		
		Max. Concentration	**Max monthly mean**	**Max. composite concentration**	**Max. Concentration in Grab Sample**
pH		5.5 to 9.0	6.0 to 9.5		
Arsenic	mg/L	0.5	0.5	0.75	1.00
Copper	mg/L	0.3	0.3	0.45	0.6
Cyanide	mg/L	0.025	1.0	1.5	2.0
Lead	mg/L	0.2	0.2	0.3	0.4
Nickel	mg/L	0.5	0.5	0.75	1
Zinc	mg/L	0.5	0.5	0.75	1
Total Suspended solids	mg/L	30	15	22,5	30
Radium 226	Bq/L	0.37	0.37	0.74	1.11
Total dissolved solids	mg/L	1000	---	----	----
B.O.D.	mg/L	20	---	----	----
Oil	mg/l	15	---		
Barium	mg/L	5.0	---	----	----
Bore	mg/l	5.0	---		
Cadmium	mg/L	0.05	---	----	----
Chromium (VI)	mg/L	0.05	---	----	----
Chromium (III)	mg/L	1.0	---	----	----
Iron (total)	mg/L	10	---	----	----
Mercury	mg/L	0.005	---	----	----
Nitrates	mg/L	10	---	----	----
Nitrogen (ammoniacal)	mg/L	2.0	---	----	----
Phenol	mg/L	0.1	---	----	----
Phosphate (total as P2O5)	mg/L	1.0	---	----	----
Phosphorus (elementals)	mg/L	0.0005	---	----	----
Selenium	mg/L	0.01	---	----	----
Sulfides	mg/L	0.5	---	----	----
Silver	mg/L	0.05	---	----	----
Coliform feacal	#/100 ml	1000	---	---	---
Coliform total	#/100 ml	5000	---	---	---

3 Water balance

Below are updated water balance tables for HOWSEA, Timmins 4 and the dissipation pool for average, wet and dry years.

Table 3. Water balance HOWSEA average year (118 ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	NetRunoff (m³)	Evapo-transp. (m³)	Pit dewatering (m³)	Pumping from pit (m³)	Inflow (m³)	Inflow (l/s)
Jan	53 100	0	0	0	0	682 000	0	682 000	254.6
Feb	43 660	123	0	123	0	616 000	0	616 123	254.7
Mar	51 920	455	0	455	0	682 000	0	682 455	254.8
Apr	53 100	5 900	0	5 900	0	660 000	0	665 900	256.9
May	28 320	33 040	0	436 600	0	682 000	311 865	1 430 465	534.1
Jun	4 720	81 420	48 852	32 568	32 568	660 000	0	660 000	254.6
Jul	0	119 180	71 508	47 672	40 474	682 000	4 601	693 799	259.0
Aug	1 180	112 100	67 260	44 840	28 910	682 000	10 322	708 252	264.4
Sep	11 800	95 580	57 348	38 232	18 998	660 000	14 916	694 150	267.8
Oct	55 460	33 040	0	33 040	0	682 000	0	715 040	267.0
Nov	76 700	3 540	0	3 540	0	660 000	0	663 540	256.0
Dec	57 820	194	0	194	0	682 000	0	682 194	254.7
Year	**437 780**	**484 573**	**244 968**	**643 165**	**120 950**	**8 030 000**	**341 704**	**8 893 919**	**282.0**

Table 4. Water balance HOWSEA dry year (118 ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	Net Runoff (m³)	Evapo-transp. (m³)	Pit dewatering (m³)	Pumping from pit (m³)	Inflow (m³)	Inflow (l/s)
Jan	20 682	0	0	0	0	260 400	0	260 400	97.2
Feb	2 115	0	0	0	0	235 200	0	235 200	97.2
Mar	11 399	0	0	0	0	260 400	0	260 400	97.2
Apr	24 678	3 407	0	3 407	0	252 000	0	255 407	98.5
May	27 967	50 765	0	229 146	0	260 400	164 236	653 782	244.1
Jun	0	41 303	24 782	16 522	16 522	252 000	0	252 000	97.2
Jul	0	200 755	120 452	80 302	38 504	260 400	27 032	329 230	122.9
Aug	0	50 059	30 036	20 023	20 023	260 400	0	260 400	97.2
Sep	0	79 203	47 521	31 682	18 074	252 000	8 801	274 408	105.9
Oct	16 803	9 165	0	9 165	0	260 400	0	269 565	100.6
Nov	31 963	12 221	0	12 221	0	252 000	0	264 221	101.9
Dec	42 773	0	0	0	0	260 400	0	260 400	97.2
Year	**178 381**	**446 879**	**222 790**	**402 468**	**93 123**	**3 066 000**	**200 069**	**3 575 414**	**113.4**

Table 5. Water balance HOWSEA wet year (118 ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	Net Runoff (m³)	Evapo-transp. (m³)	Pit dewatering (m³)	Pumping from pit (m³)	Inflow (m³)	Inflow (l/s)
Jan	73 326	0	0	0	0	713 000	0	713 000	266.2
Feb	72 388	0	0	0	0	644 000	0	644 000	266.2
Mar	119 744	235	0	235	0	713 000	0	713 235	266.3
Apr	49 590	70 742	0	70 742	0	690 000	0	760 742	293.5
May	30 554	85 900	0	643 020	0	713 000	477 964	1 833 984	684.7
Jun	0	96 712	58 028	38 684	38 684	690 000	0	690 000	266.2
Jul	0	175 679	105 408	70 272	42 485	713 000	17 971	758 758	283.3
Aug	0	90 314	54 188	36 126	30 345	713 000	3 738	722 518	269.8
Sep	2 821	118 098	72 551	48 367	19 942	690 000	18 384	736 809	284.3
Oct	76 146	25 030	0	25 030	0	713 000	0	738 030	275.5
Nov	74 385	0	0	0	0	690 000	0	690 000	266.2
Dec	60 989	0	0	0	0	713 000	0	713 000	266.2
Year	**559 942**	**662 709**	**290 175**	**932 475**	**131 456**	**8 395 000**	**518 057**	**9 714 076**	**308.0**

Table 6. Water balance Timmins 4 average year (70.9ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	NetRunoff (m³)	Evapo-transpiration (m³)	Inflow (m³)	Inflow (l/s)
Jan	31 923	0	0	0	0	0	0.0
Feb	26 248	74	0	74	0	74	0.0
Mar	31 213	274	0	274	0	274	0.1
Apr	31 923	3 547	0	3 547	0	3 547	1.4
May	17 026	19 863	0	262 477	0	262 477	98.0
Jun	2 838	48 948	29 369	19 579	19 579	0	0.0
Jul	0	71 649	42 989	28 660	24 332	4 327	1.6
Aug	709	67 393	40 436	26 957	17 380	9 577	3.6
Sep	7 094	57 461	34 477	22 984	11 421	11 563	4.5
Oct	33 342	19 863	0	19 863	0	19 863	7.4
Nov	46 111	2 128	0	2 128	0	2 128	0.8
Dec	34 760	117	0	117	0	117	0.0
Year	**263 186**	**291 317**	**147 271**	**386 660**	**72 713**	**313 947**	**10.0**

Table 7. Water balance Timmins 4 dry year (70.9ha)

Month	Snowfall (m^3)	Rainfall (m^3)	Infiltration (m^3)	NetRunoff (m^3)	Evapo-transpiration (m^3)	Inflow (m^3)	Inflow (l/s)
Jan	12 427	0	0	0	0	0	0.0
Feb	1 271	0	0	0	0	0	0.0
Mar	6 849	0	0	0	0	0	0.0
Apr	14 828	2 047	0	2 047	0	2 047	0.8
May	16 804	30 502	0	137 682	0	279 686	104.4
Jun	0	24 817	14 890	9 927	9 927	0	0.0
Jul	0	120 623	72 373	48 249	23 135	0	18.0
Aug	0	30 078	18 047	12 031	12 031	0	0.0
Sep	0	47 589	28 553	19 036	10 860	15 786	6.0
Oct	10 096	5 507	0	5 507	0	5 507	2.0
Nov	19 205	7 343	0	7 343	0	7 343	2.8
Dec	25 700	0	0	0	0	0	0.0
Year	**107 180**	**268 506**	**133 863**	**241 822**	**55 953**	**310 369**	**11.2**

Table 8. Water balance Timmins 4 wet year (70.9ha)

Month	Snowfall (m^3)	Rainfall (m^3)	Infiltration (m^3)	NetRunoff (m^3)	Evapo-transpiration (m^3)	Inflow (m^3)	Inflow (l/s)
Jan	44 058	0	0	0	0	0	0.0
Feb	43 494	0	0	0	0	0	0.0
Mar	71 948	141	0	141	0	141	0.1
Apr	29 796	42 505	0	42 505	0	42 505	16.4
May	18 358	51 613	0	386 357	0	567 930	219.7
Jun	0	58 109	34 866	23 243	23 243	0	0.0
Jul	0	105 556	63 334	42 223	25 527	23 522	8.8
Aug	0	54 265	32 559	21 706	18 233	4 892	1.8
Sep	1 695	70 959	43 592	29 061	11 982	24 064	9.2
Oct	45 752	15 039	0	15 039	0	15 039	5.6
Nov	44 694	0	0	0	0	0	0.0
Dec	36 645	0	0	0	0	0	0.0
Year	**336 440**	**398 187**	**174 351**	**560 275**	**78 985**	**678 093**	**21.8**

Table 9. Water balance dissipation pool average year (53 ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	NetRunoff (m³)	Evapo-transpiration (m³)	Inflow (m³)	Inflow (l/s)
Jan	24 075	0	0	0	0	0	0.0
Feb	19 795	56	0	56	0	56	0.0
Mar	23 540	206	0	206	0	206	0.1
Apr	24 075	2 675	0	2 675	0	2 675	1.0
May	12 840	14 980	0	197 950	0	197 950	73.9
Jun	2 140	36 915	22 149	14 766	14 766	0	0.0
Jul	0	54 035	32 421	21 614	18 351	3 264	1.2
Aug	535	50 825	30 495	20 330	13 108	7 223	2.7
Sep	5 350	43 335	26 001	17 334	8 614	8 721	3.4
Oct	25 145	14 980	0	14 980	0	14 980	5.6
Nov	34 775	1 605	0	1 605	0	1 605	0.6
Dec	26 215	88	0	88	0	88	0.0
Year	**198 485**	**219 700**	**111 066**	**291 604**	**54 838**	**236 767**	**7.5**

Table 10. Water balance dissipation pool dry year (53 ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	NetRunoff (m³)	Evapo-transpiration (m³)	Inflow (m³)	Inflow (l/s)
Jan	9 290	0	0	0	0	0	0.0
Feb	950	0	0	0	0	0	0.0
Mar	5 120	0	0	0	0	0	0.0
Apr	11 084	1 530	0	1 530	0	1 530	0.6
May	12 562	22 801	0	102 922	0	209 074	78.0
Jun	0	18 551	11 131	7 421	7 421	0	0.0
Jul	0	90 170	54 101	36 068	17 294	0	13.5
Aug	0	22 484	13 491	8 994	8 994	0	0.0
Sep	0	35 574	21 344	14 230	8 118	11 801	4.5
Oct	7 547	4 117	0	4 117	0	4 117	1.5
Nov	14 356	5 489	0	5 489	0	5 489	2.1
Dec	19 212	0	0	0	0	0	0.0
Year	**80 120**	**200 717**	**100 067**	**180 770**	**41 827**	**232 011**	**8.3**

Table 11. Water balance dissipation pool wet year (53 ha)

Month	Snowfall (m³)	Rainfall (m³)	Infiltration (m³)	NetRunoff (m³)	Evapo-transpiration (m³)	Inflow (m³)	Inflow (l/s)
Jan	32 935	0	0	0	0	0	0.0
Feb	32 513	0	0	0	0	0	0.0
Mar	53 783	105	0	105	0	105	0.1
Apr	22 273	31 774	0	31 774	0	31 774	12.3
May	13 723	38 582	0	288 814	0	424 546	164.2
Jun	0	43 438	26 063	17 375	17 375	0	0.0
Jul	0	78 906	47 344	31 563	19 082	17 583	6.6
Aug	0	40 565	24 339	16 226	13 630	3 657	1.3
Sep	1 267	53 044	32 586	21 724	8 957	17 989	6.9
Oct	34 201	11 242	0	11 242	0	11 242	4.2
Nov	33 410	0	0	0	0	0	0.0
Dec	27 393	0	0	0	0	0	0.0
Year	**251 500**	**297 657**	**130 333**	**418 823**	**59 044**	**506 896**	**16.3**

The results in the previous tables were computed using the following parameters from the previous WMP:

- Water balance computations were made for an average year representative of average hydrological conditions;
- Snow is assumed to accumulate during the months of October to April and completely melt during the month of May;
- It is assumed that pumping can only happen during the summer months. Therefore, runoff from October to May is pumped out of the mine Pit in May;
- Actual evapotranspiration could be limited by water availability in the ground during the summer months. For this reason, actual evapotranspiration is computed as being the minimum between net runoff and evapotranspiration;
- A runoff coefficient of 1.0 is assumed for the months of October to May to take into account frozen or saturated ground conditions. A runoff coefficient of 0.4 is assumed for the months of June to September;
- Drainage areas corresponding to a time period close to the mine end of life are considered as shown on map 4; and
- Pit dewatering occurs year long.

4 Infrastructure design

See section 1 above

5 Discharge locations

See Figure 1

6 Monitoring

The Proponent remains committed to the effluent monitoring program described in Appendix IV of the Howse EIS (Nov 2015, section 9.2) as well section 9.1.5 of the Howse EIS.

6.1 Dissipation pool

In the previous WMP sedimentation pond was designed to treat water having been in contact with the mine activities. In the present WMP dissipation pool receives clean water through the ditch that lies along the northwest portion of the pit. Il is designed to dissipate energy caused by high slope at the end of this channel. But due to slow velocity in the pool, some sediment will stay in and it will be necessary to remove it time to time.

7 Modified watersheds

The changes to watersheds between the 2 (old and new) WMP at the Howse site are indicated in the table below. Since maps changes are inconsequential, map updates are not provided.

Watershed	Sub-watershed	Original area (Ha)	Modified area (Ha)	% change
Goodream Creek	Goodream Creek Sedimentation pond point	1068	1170	9.6
	Triangle Lake out flow	1631	1688	3.5
Pinette Lake	Pinette Lake outflow	237	225	-5.0
Burnetta Creek	Dissipation pool outflow	85	126	48.2
	Burnetta Lake outflow	453	495	9.3

8 Change to Effects on Indigenous people

(copy of response sent in email dated June 1 2017)

There are no changes to the effects assessment to fish, fish habitat (see update below) nor avifauna, as compared to what has been presented in the Howse EIS. Although the new WMP intersects with four less hectares of wetlands, it may result in drying out of the north pond (in the two ponds area) and its associated wetland. This possible loss, the only new potential adverse environmental effect of this new WMP on wetlands, will not affect Indigenous groups as this area is no used for local land use and further, it is nestled between the waste rock dump, the overburden stockpile and the Howse Haul road, and as such could not be used by locals during the Howse activities (under the old or new WMP) for safety reasons. The replacement of sedimentation pond B with the smaller dissipation pool is an aesthetic improvement along the bypass road. In fact, the footprint of the sedimentation ponds under the old WMP was 63 699 m^2 and under the new plan (sedimentation pond + dissipation pool) is 50 740 m^2. As a result, there are no new adverse effects to Indigenous groups as a result of the new WMP.

9 Buffer zone

A response, including a map, was provided to CEAA on behalf of the proponent regarding the buffer zone between site infrastructure and Irony Mountain:

Trough a binding agreement already signed with local communities, an aboriginal environmental advisor will be hired by TSMC and will be part of the environmental team and will monitor TSMC activities to ensure that there are no mining operations in the buffer zone. Of note, TSMC will install a ditch along the south portion of the pit to capture all runoff from Irony Mountain. The construction of this ditch will require an additional disturbance zone (approximately 10 meters) for a short period of time.

10 Wetlands

10.1 Predicted affected area

The predicted surface area of wetlands that will intersect with the new WMP is 12 420 m^2. Under the previous WMP, the intersected area of the WMP and wetlands was 16 562 m^2. This value is based on a ditch width of 5 m. The new WMP does not intersect with water bodies.

10.2 Compliance with Forestry Act and CA

The construction of the ditch in the Two Ponds area will, at minimum, disturb wetlands. The proponent is already applying for a Wetlands Disturbance Permit with the province of Newfoundland and Labrador. Below is a copy of Table 5 from the proponent's Wetland Disturbance Plan describes how the proponent plan to comply with the federal policy on wetlands.

Table 12. Compliancy with Federal Policy on Wetlands

<table>
<tr><th>Policy Goal</th><th>Steps taken</th><th>Conclusion</th></tr>
<tr><td>Maintenance of the functions and values derived from wetlands throughout Canada</td><td rowspan="2">A wetland functions assessment was done during the EIS process. Functions assessment was carried out at the watershed level and considered hydrological, ecological and biogeochemical functions.
Wetlands located along streams were the ones having the most functions.</td><td>No unique type of wetlands will be loss due to the Howse Project.
No unique functions will be loss or affected.</td></tr>
<tr><td>No net loss of wetland functions on all federal lands and waters</td><td>The impact on wetlands will not affect their functions. Locally, no wetlands functions will be lost.</td></tr>
<tr><td>Enhancement and rehabilitation of wetlands in areas where the continuing loss or degradation of wetlands or their functions have reached critical levels</td><td>Howse Project is not located in an area where the loss of wetlands is critical.
TSMC is committed to rehabilitate Howse area. It is currently working on vegetation restoration techniques.</td><td>TSMC is committed to restore the Howse area, including wetlands.</td></tr>
<tr><td>Recognition of wetland functions in resource planning, management and economic decision-making with regard to all federal programs, policies and activities</td><td>TEM was carried out before the EIS in order to have general information of the ecosystems found in the area. A specific wetlands survey was carried out to locate precisely the wetlands.
TSMC has modified its layout as much as it was possible in order</td><td>Wetlands has been taken into account throughout Howse's planning process.</td></tr>
</table>

Policy Goal	Steps taken	Conclusion
	to minimize its impact on wetlands.	
Securement of wetlands of significance to Canadians	Wetland survey was carried out carried out in the Howse area to precisely locate wetlands and to characterize them. Other TEM projects were carried out in the region and made it possible to compare significance of wetlands. Regionally, there are significant wetlands that has high value for fauna and water regulation.	There is no wetlands of significance in the Howse project or in its vicinity.
Recognition of sound, sustainable management practices in sectors such as forestry and agriculture that make a positive contribution to wetland conservation while also achieving wise use of wetland resources	Several mitigation measures will be applied during the site preparation and construction phase, as well as operation phase. These measures respect provincial legislation.	The potential impacts on wetlands have been identified and minimized with appropriate measures.
Utilization of wetlands in a manner that enhances prospects for their sustained and productive use by future generations	No direct use of wetlands is proposed. They will only play a role in water retention downstream of sedimentation ponds outlets.	It is not expected that the use of wetlands during the operation phase will negatively affect the wetlands.

10.3 Sheltering and recreating wetlands

The proponent’s commitment to sheltering and recreating wetlands, as outlined in the October 2016 report, has not changed.

Changes to effects assessment

Fish and fish habitat

No changes are expected to the potential adverse effects at Goodream creek, as the amount of water discharge at Goodream creek will be similar to that calculated for the previous WMP (version of October 2015).

Burnetta Creek is not considered fish habitat. No changes are expected at Burnetta Creek, as the amount of water discharged at Burnetta Creek will be similar to that calculated for the previous WMP. Further, the water that will flow into the dissipation pool and subsequently in Burnetta creek will be natural site runoff water from Irony Mountain. The dissipation pool will serve to allow sediments to settle before being discharged into Burnetta Creek. Effects are not expected to reach Burnetta Lake, as stated in the Howse EIS.

Wetlands

The WMP that is presented in the Howse EIS intersects with 16 562 m^2 of wetlands, whereas the updated WMP intersects with 12 420 m^2, representing a 25% reduction in direct footprint intersection.

The ditch that was to be located on the wetland located northeast of the waste dump under the original WMP will be removed. As such, the adverse effect of building a ditch on this wetland is now non-existent. Rather, an equivalent ditch will cross the Two Ponds area, at the water parting line and follow along the overburden stockpile. This change removes footprint from wetlands at the Howse site and so reduces the amount of wetland destruction. However, the construction of the ditch between the Two ponds and along the north pond might result in a drying out of the pond and its surrounding wetland: the amount of water supplied to the north pond might be diverged to the ditch.

Under the original WMP, the area between the waste dump and the overburden stockpile (the Two Ponds area) was entirely unprotected from runoff. Under the current WMP, the ditch along the overburden stockpile will capture runoff from the pile, thereby providing additional protection to the wetland that is located between the overburden stockpile and the waste dump.

Avifauna

As avifauna depend on wetlands for their habitat, and there are less wetlands affected by the WMP, no changes to the avifauna effects assessment are expected. No Rusty Blackbirds were found in the Two Ponds area, but it was considered a potential habitat for this species.

<Original signed by>

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