APPENDIX 1
GOVERNMENT OF NUNAVUT ATTACHMENTS

GN 12 ATTACHMENT 1: ASSOCIATED TABLES

Table 1: Wind erosion emissions at the Mine Site based on predicted wind at a level of 10 meters.

		Annual emissions (tonnes/year)			
Wind speed (m/s)	**Number of Hours in each bin**	**PM2.5**	**PM10**	**TSP**	
10	22	0.002	0.013	0.025	
11	13	0.005	0.036	0.071	
12	10	0.008	0.053	0.106	
13	0	0.000	0.000	0.000	
14	3	0.005	0.035	0.070	
15	0	0.000	0.000	0.000	
Sum:		0.020	0.137	0.273	
Total emissions at the facility:		**234**	**1987**	**7839**	

Table 2: Wind erosion emissions at the Milne Port based on predicted wind at a level of 10 meters

		Annual emissions (tonnes/year)			
Wind speed (m/s)	**Number of Hours in each bin**	**PM2.5**	**PM10**	**TSP**	
10	4	0.002	0.013	0.025	
11	0	0.000	0.000	0.000	
Sum:		0.002	0.013	0.025	
Total emissions at the facility:		**93**	**291**	**768**	

Table 3: Wind erosion emissions at the Mine Site based on predicted winds at a level of 30 meters.

		Annual emissions (tonnes/year)		
Wind speed (m/s)	**Number of Hours in each bin**	**PM2.5**	**PM10**	**TSP**
10	200	0.017	0.116	0.231
11	110	0.045	0.301	0.602
12	69	0.055	0.367	0.733
13	25	0.031	0.208	0.415
14	32	0.056	0.375	0.750
15	24	0.056	0.373	0.746
16	16	0.047	0.317	0.633
17	4	0.015	0.098	0.196
18	2	0.009	0.059	0.118
19	3	0.016	0.105	0.210
20	0	0.000	0.000	0.000
Sum:		0.348	2.317	4.634
Total emissions at the facility:		**234**	**1987**	**7839**

Table 4: Wind erosion emissions at the Milne Port based on predicted winds at a level of 30 meters

		Annual emissions (tonnes/year)		
Wind speed (m/s)	**Number of Hours in each bin**	**PM2.5**	**PM10**	**TSP**
10	72	0.034	0.229	0.458
11	55	0.124	0.828	1.656
12	9	0.039	0.263	0.526
13	0	0.000	0.000	0.000
Sum:		0.198	1.320	2.640
Total emissions at the facility:		**93**	**291**	**768**

GN 13 ATTACHMENT 1: FULL RESPONSE

GN-IR-13

Info Request:

Provide the following information:

1. The Proponent should compare the current modelling results to data collected as part of the ongoing dustfall monitoring taking place at the Project. This should include an analysis of production rates versus emission rates and inclusion of all Project source and appropriate meteorology (see Information Request #11; Air Quality Model Phase 2 Proposal).

a. If a significant discrepancy exists, the Proponent should calibrate the model with available measured data (e.g., dustfall).

b. Following calibration, the Proponent should:

i. Revise predictions for maximum ground level concentrations for the requested 30 Mtpa of production.

ii. Update the Human Health Risk Assessment and Water Quality Assessment based on the new modelling results if required.

iii. Re-assess the effectiveness of current dust management practices and dust suppression activities.

Response

As discussed in detail below, a comparison was made between modelled dust deposition and measured dust deposition. In general, the comparison shows that the model is providing realistic results, but at locations that are in very close proximity to operations at the port, measured levels were influenced by dust from miscellaneous minor activities at the site (on-site vehicle traffic associated with pick-up trucks, etc.) that were not included in the modelling.

Tables 1 to 3 show a comparison of monitored and modelled dustfall at the Mine Site, Milne Port and the Northern Corridor, respectively. The monitored data available for this comparison were for a period extending from 2013 into 2018. Further details on the monitoring program and specific locations of each monitoring station can be found in Environment Annual Monitoring Reports for 2015, 2016, and 2017, prepared by EDI.

The highlighted red values in the tables below exceed either the annual average criterion (55 g/m^2/year) or the 30-day criterion (5.3 g/m^2-30d) at the specific location.

Operations during the monitoring period (2013-2018) varied from no production (2013-2014) to 5.4 Mtpa in 2018. However, monitoring was not completed for the full years in 2013-2014; 2015-2017 had full years of monitoring, when operations varied from 0.9, 2.7 and 4.5 Mtpa, and in 2018 (5.4 Mtpa) a full year of monitoring data were obtained but not for all monitoring stations. Therefore, it was assumed that the majority (i.e., the average) of the monitoring data represent dustfall levels from operations of approximately 3.5 million tonnes per annum (Mtpa) of iron ore transported to Milne Port by truck along the existing Tote Road for open water shipping.

Mine Site

For the modelling, a mining production of 30 Mtpa was considered (the eventual maximum production rate, with 18 Mtpa eventually being shipped by rail to Steensby).

Table 1: Comparison of Monitored and Modelled Dustfall at the Mine Site

Station ID	Monitored			Modelled	
	Annual Average dustfall ($g/m^2/day$)	Annual Average dustfall ($g/m^2/year$)	30-Day Maximum Dustfall (g/m^2-30d)	Annual Average dustfall ($g/m^2/year$)	30-Day Maximum Dustfall (g/m^2-30d)
DF-M-01	0.29	106	125	25	4.0
DF-M-02	0.20	73	41	286	48.6
DF-M-03	0.16	60	24	261	32.3
DF-M-04	0.01	4	0.3	1	0.2
DF-M-05	0.01	4	0.3	0	0.1
DF-M-06	0.01	4	0.6	11	2.4
DF-M-07	0.01	5	1.4	14	1.8
DF-M-08	0.01	4	0.3	2	0.4
DF-M-09	0.02	7	2.5	2	0.3

The difference in the actual vs modelled production rate would explain why the modelled annual dustfall levels at stations DF-M-02 and DF-M-03 are much higher than the monitoring data. Those two stations are the closest to mining and hauling operations modelled in the 30 million Mtpa scenario. Modelled annual dustfall levels at DF-M-06 and 07 are also much higher than measured values.

Station DF-M-01, which is a station close to the Tote Road, shows the highest measured annual dustfall levels. The modelled results for that station are much lower than the measured values, most likely due to the fact that no ore transport by truck was modelled within the Mine Site model domain in the 30 mtpa scenario, as that scenario represents ore transport by rail.

Monitoring sites DF-M-04, 05, 08 and 09 are all relatively remote sites, more than 3 km away from the disturbed area, and are not significantly impacted by the operations. The measured dustfall levels at these locations are relatively low. The model appears to underestimate at these locations compared to the measurements, but the reality is that the measurements are overestimating the dustfall. At these locations the measured values were below the method detection limit but were reported as equal to the method detection limit. Thus, the model is likely providing realistic values at these locations.

Milne Port

For the more recent modelling scenario, we considered 12 Mtpa of iron ore transiting at this facility. Results from a previous modelling scenario of 3.5 Mtpa were also included in the table for comparison.

Table 2: Comparison of monitored and modelled dustfall at Milne Port

Station ID	Monitored			Modelled at 12 Mtpa		Modelled at 3.5 Mtpa
	Annual Average dustfall ($g/m^2/day$)	Annual Average dustfall ($g/m^2/year$)	30-Day Maximum Dustfall (g/m^2-30d)	Annual Average dustfall ($g/m^2/year$)	30-Day Maximum Dustfall (g/m^2-30d)	Annual Average Dustfall ($g/m^2/year$)
DF-P-01	0.43	155	84.3	273	35.8	25
DF-P-02	0.34	125	18.8	24	3.1	28
DF-P-03	0.01	4	0.4	0	0.0	0
DF-P-04	0.04	13	5.4	1	0.5	2
DF-P-05	0.27	100	32.1	16	2.0	21
DF-P-06	0.03	11	5.5	4	0.6	2
DF-P-07	0.06	23	22.2	206	32.8	92

It should be noted that the 3.5 and 12 Mtpa modelling scenario involved a different layout of dust sources compared to what is actually in place on site at present. Therefore, discrepancies between monitored and modelled dustfall are expected.

At monitoring station DF-P-01, the modelled results are higher than observed in the 12 million Mtpa scenario but lower than observed in the 3.5 Mtpa scenario. At DF-P-07, the modelled results are significantly higher than observed in both model scenarios. DF-P-01 and DF-P-07 are located on the southwest side of the current port operations. In the 12 Mtpa model scenario, they are located close to the proposed Fine Ore Road, which is the likely explanation for why the model results are high at both these locations in that scenario. In the 3.5 Mtpa scenario, DF-P-07 is closer to modelled stockpile operations than DF-P-01, which may explain why the modelled annual dustfall at DF-P-07 is higher than that at DF-P-01 in that scenario. The monitoring data suggests that, in reality, the situation may be the other way around, i.e., DF-P-01 may actually be closer to stockpile operations than DF-P-07, as the measured values at DF-P-01 are significantly higher than those at DF-P-07, and comparable to the modelled levels at DF-P-07. Thus the actual layout of the operations may differ somewhat from what was modelled in the 3.5 Mtpa scenario.

At DF-P-02 and DF-P-05, measured annual dustfall levels are much higher than the modelled levels. This suggests that these monitoring sites are adjacent to a dust source that was not accounted for in the model scenarios (most likely miscellaneous on-site vehicle traffic other than the Tote Road ore transport trucks).

Locations DF-P-03, 04 and 06 are relatively distant from the port operations and the measured levels at these sites are relatively low. The model underestimates at these locations. At DF-P-03, which is on the order of 4 km from the port operations, the problem is actually measurement overestimation rather than model underestimation. It is due to the measured values being below the method detection limit but reported as equal to the detection limit. At DF-P-04 and 06, the measurement detection limit is

partly a factor, but other factors may come into play as well, such as background dustfall and dust from miscellaneous on-site traffic not included in the model.

Northern Transport Corridor

For the Northern Transportation Corridor, an Early Revenue Phase scenario was modelled involving 6 Mtpa or ore transported by truck along the Tote Road, in combination with construction of a railroad parallel to the Tote Road.

For the Northern Transport Corridor scenario, current operations include hauling of 4.2 Mtpa of iron ore on the Tote Road. For the modelled scenario we considered 6 Mpta of iron ore being hauled on the Tote Road.

None of the actual monitoring stations reside within the modelled domain. Therefore, it was not possible to do a direct comparison of observed and model results at specific monitoring locations. However, a general comparison can be made of averaged dustfall at various distances from the Tote road. Table 3 shows average monitored and modelled dustfall as a function of distances.

Table 3: Average monitored and modelled dustfall at various distances from the Tote Road

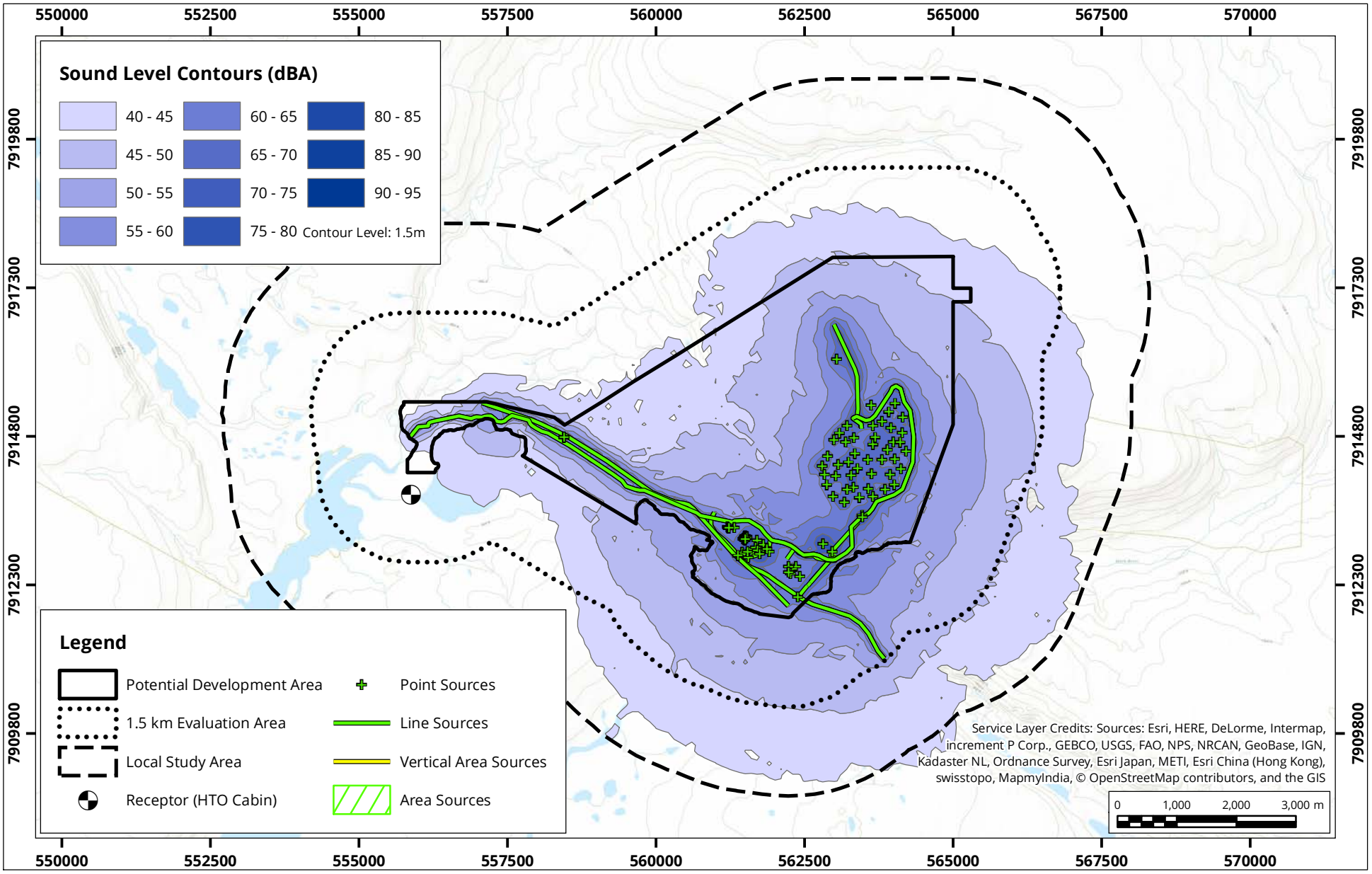
Approximative Distance from the road (m)	Monitored		Modelled	
	Annual dustfall (g/m^2/year)	30-Day Maximum Dustfall (g/m^2/30d)	Annual Dustfall (g/m^2/year)	30-day Maximum Dustfall (g/m^2/30d)
5000	7	7	0.4	0.1
1000	7	3	4	1
100	48	31	93	12
30	229	175	189	23

Overall, there is relatively good agreement between monitoring data and modelling results. The model slightly underpredicts annual dustfall at 30 m from the Tote road but overestimates it at 100 m. At distances of 1000 and 5000m, the measurement values are affected by the method detection limit and are also based on more limited sampling than at the shorter distances. Therefore, the measurements at these locations are overestimating the annual dustfall. The modelled annual dustfall levels are considered to be realistic at these distances.

Conclusion

Overall, based on the information and analysis presented in this response, no significant discrepancy exists between modelled and observed annual average results. It was found that the comparison of model results to monitoring data varies considerably from one monitoring site to another, but there is no clear trend showing that the model either under-predicts or overpredicts dustfall amounts. Therefore, no calibration of the model based on these monitoring results is recommended.

GN 27 ATTACHMENT 1: NOISE FIGURE 5B AND 6B



Noise Contour Plot

Mine Site - Summer Conditions with G=0 absorption over water bodies

Phase 2 Proposal 30 Mtpa North and South Rail Operations

Map Projection: NAD 1983 UTM Zone 17N

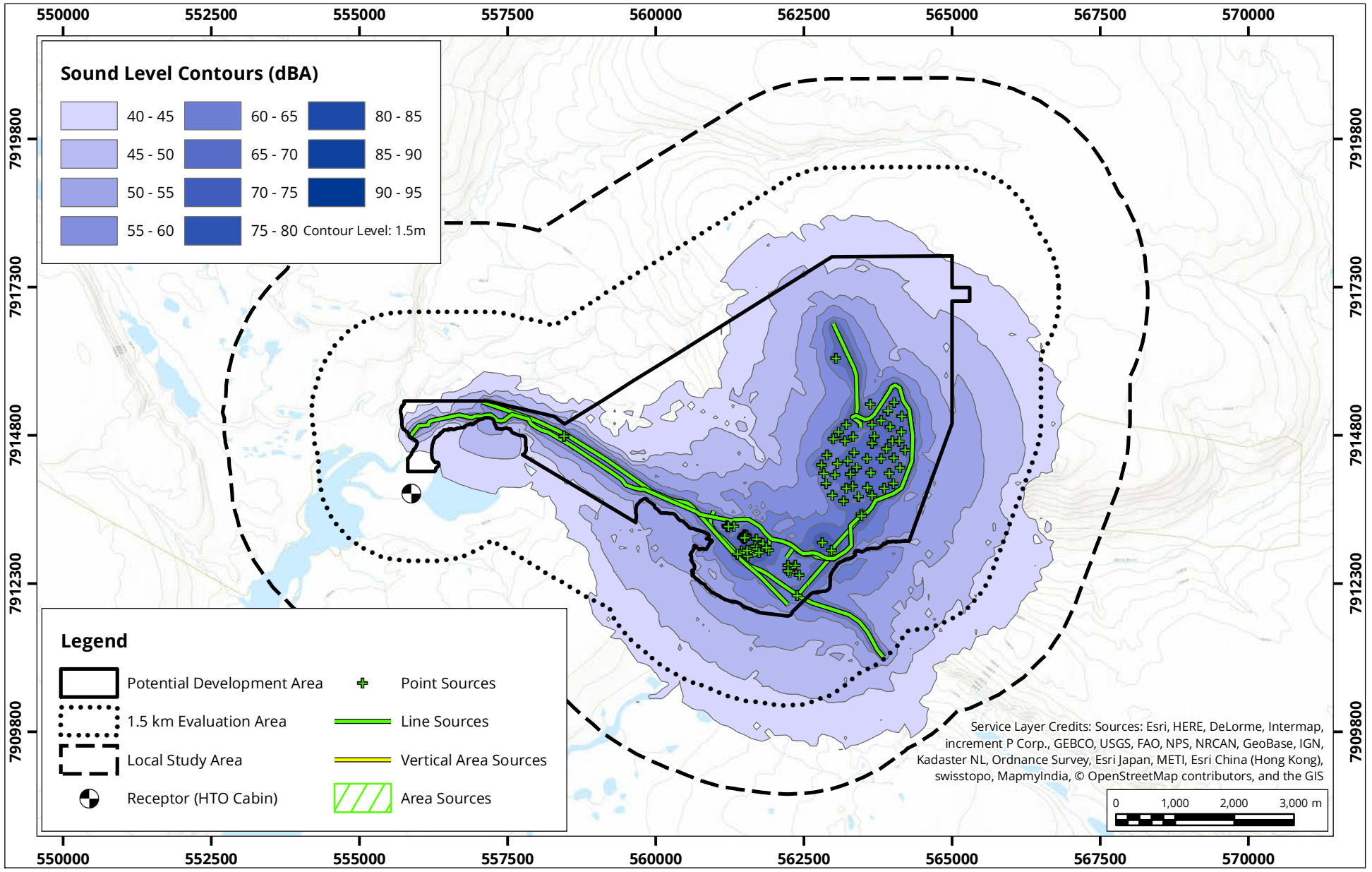
Baffinland Iron Mines Corporation, Mary River Project - Nunavut, Canada

True North

Project #: 1402090

Drawn by: DJH	Figure: 5b
Approx. Scale:	1:90,000
Date Revised:	Jan 11, 2019

Map Document: C:\Users\djh\OneDrive - ROWAN WILLIAMS DAVIES & IRWIN INC-\GIS Temp\1402090\1402090 - Baffinland - Noise Figure 5_170607.mxd



Noise Contour Plot

Mine Site - Winter Conditions with G=0 absorption over water bodies, and G=0.8 elsewhere

Phase 2 Proposal 30 Mtpa North and South Rail Operations

Map Projection: NAD 1983 UTM Zone 17N

Baffinland Iron Mines Corporation, Mary River Project - Nunavut, Canada

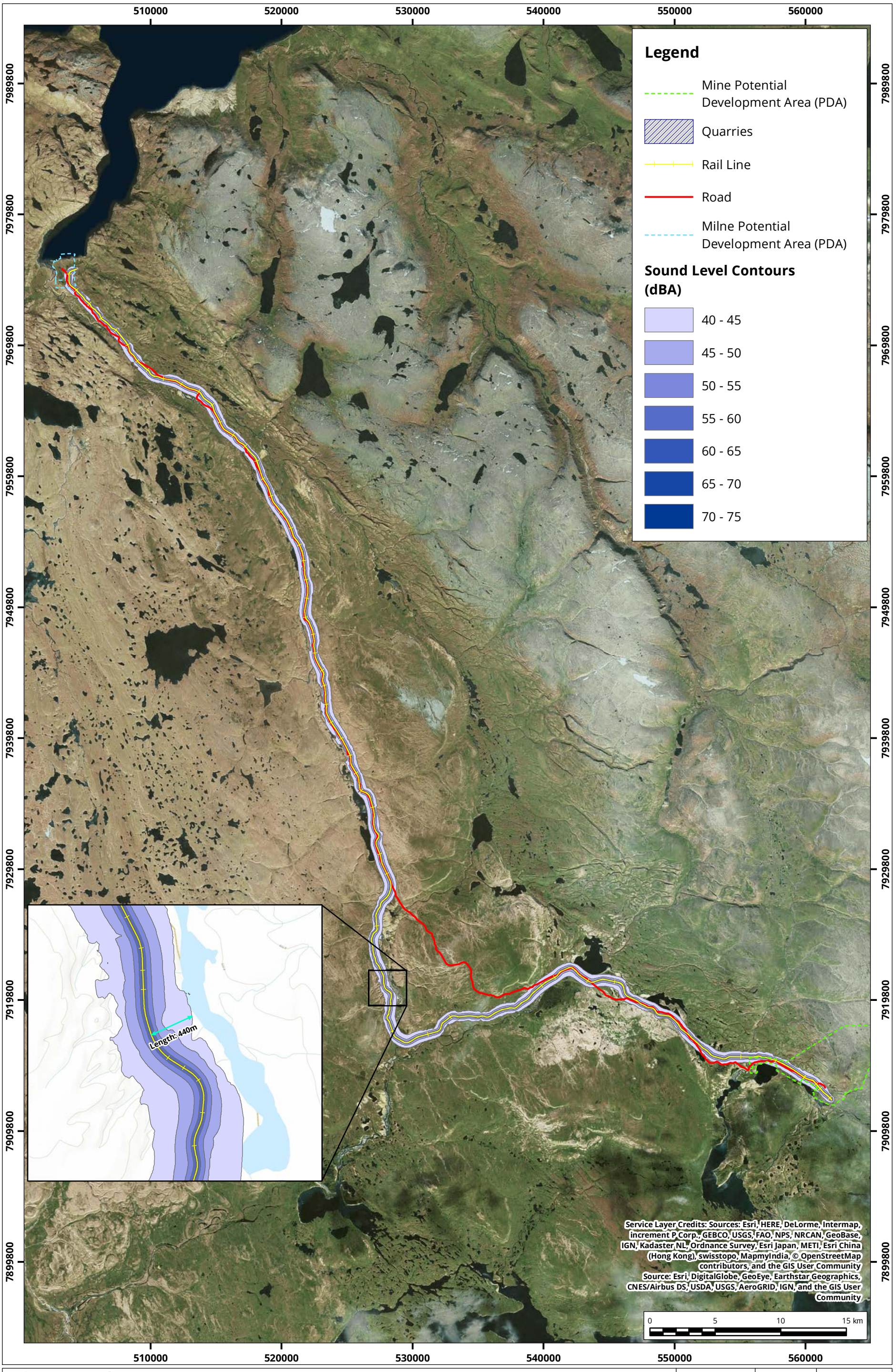
True North

Project #: 1402090

Drawn by: DJH	Figure: 6b
Approx. Scale:	1:90,000
Date Revised:	Jan 11, 2019

Map Document: C:\Users\djh\OneDrive - ROWAN WILLIAMS DAVIES & IRWIN INC-\GIS Temp\1402090\1402090 - Baffinland - Noise Figure 6_170607.mxd

GN 35 ATTACHMENT 1: NOISE FIGURE 3B AND 4B

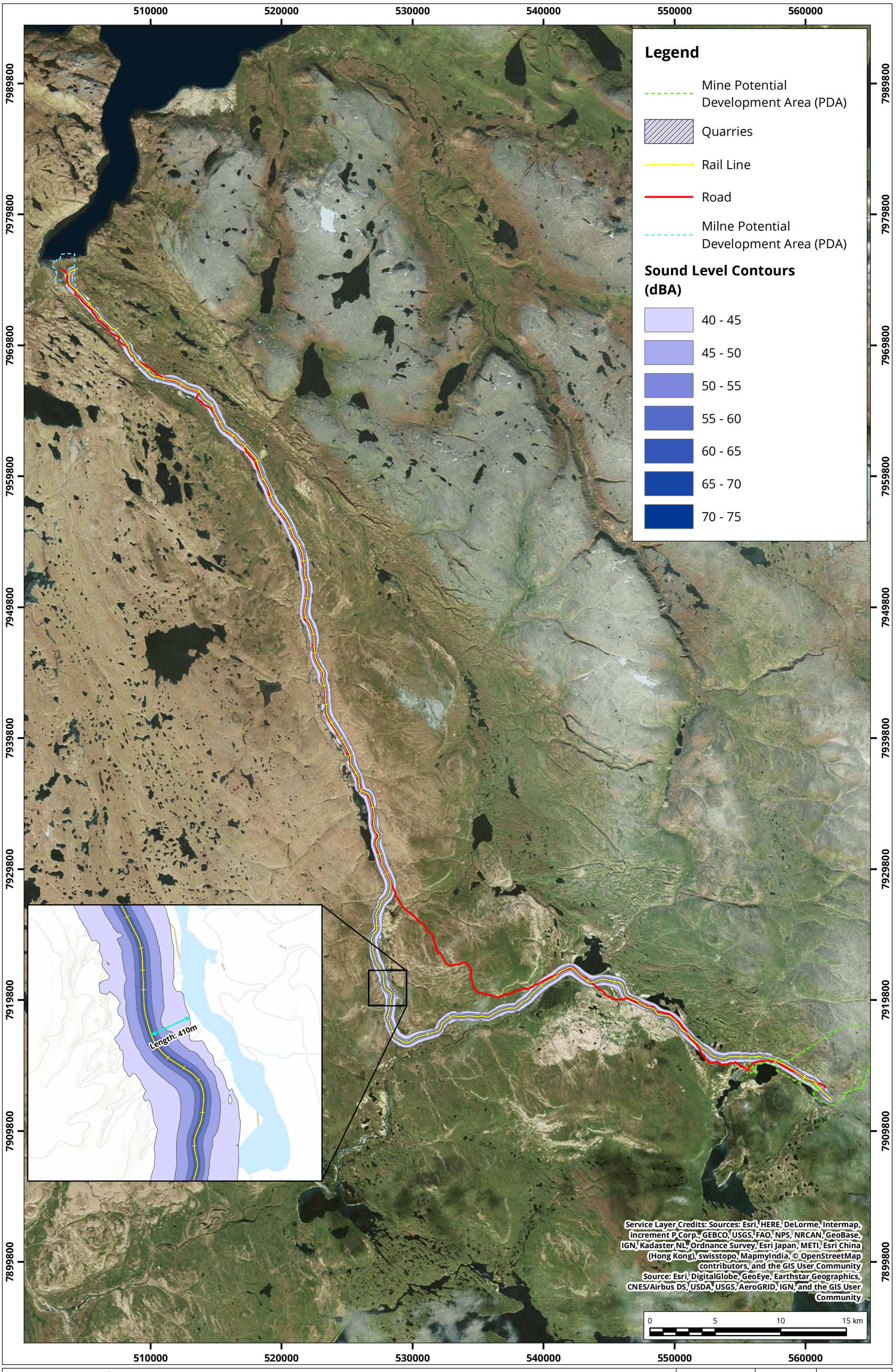


Noise Contour Plot
Northern Transportation Corridor - Summer Conditions, 8 trains per day
Phase 2 Proposal 12 Mtpa North Rail Operations
Mary River Project
Baffinland Iron Mines Corporation - Nunavut, Canada

True North

Map Projection: NAD 1983 UTM Zone 17N
Project #: 1402090

Drawn by: DJH	Figure: 3b
Approx. Scale:	1:275,000
Date Revised: Jan 11, 2019	



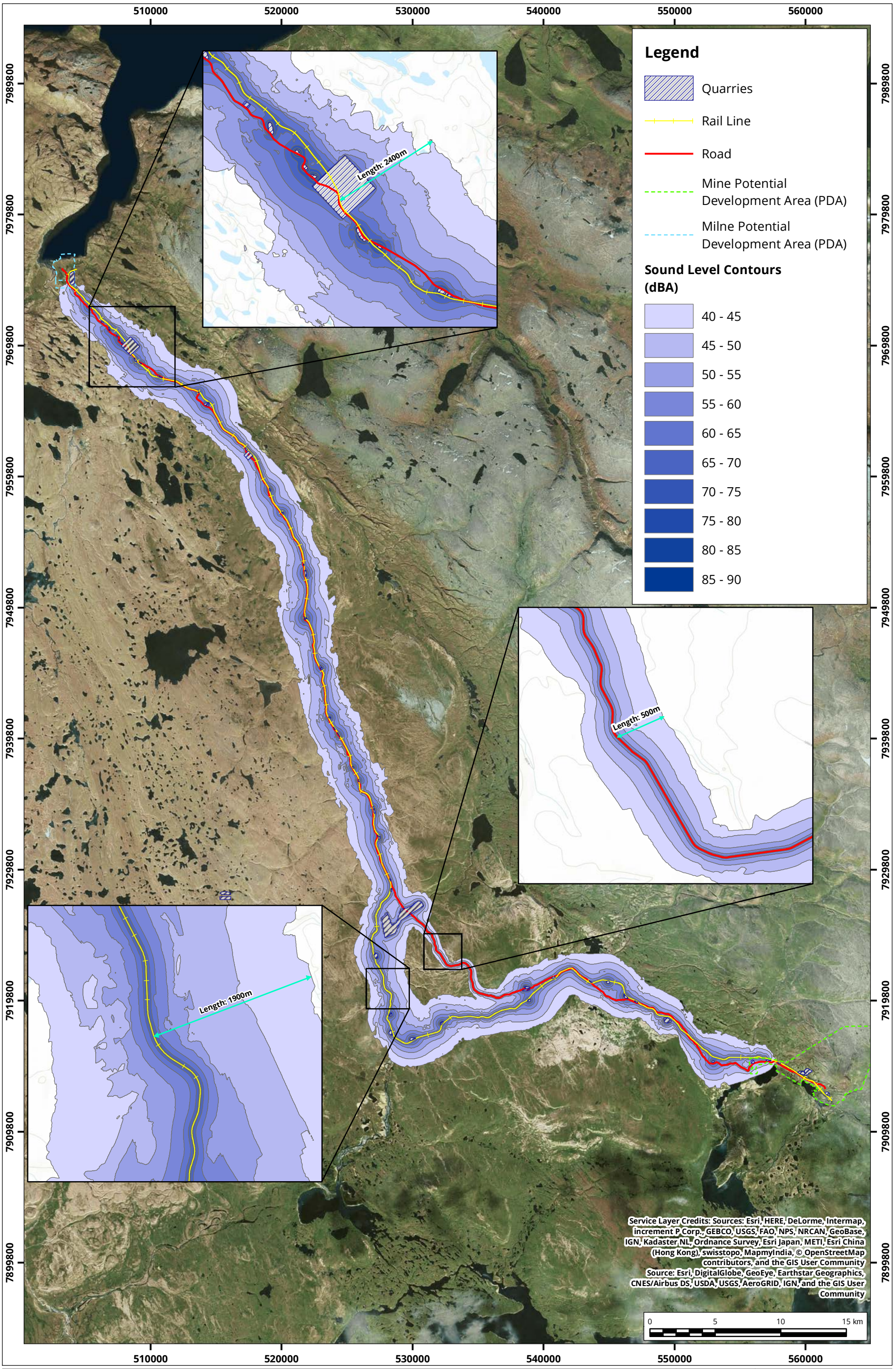
Noise Contour Plot
Northern Transportation Corridor - Winter Conditions, 8 trains per day
Phase 2 Proposal 12 Mtpa North Rail Operations
Mary River Project
Baffinland Iron Mines Corporation - Nunavut, Canada

True North

Map Projection: NAD 1983 UTM Zone 17N
Project #: 1402090

Drawn by: DJH	Figure: 4b
Approx. Scale:	1:275,000
Date Revised: Jan 11, 2019	

GN 39 ATTACHMENT 1: NOISE FIGURE 10 AND 11

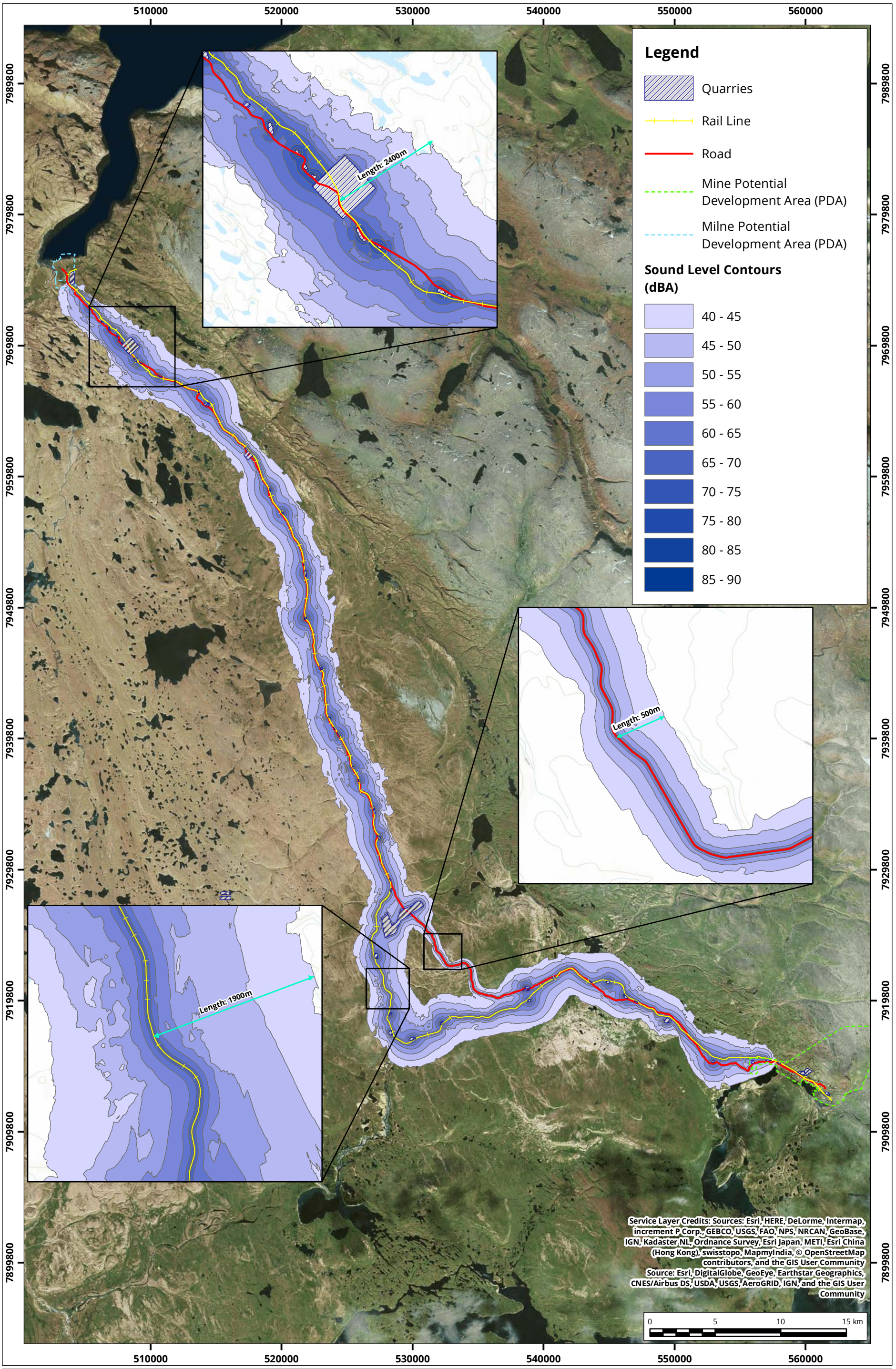


Noise Contour Plot
Northern Transportation Corridor - Summer Conditions
Phase 2 Proposal 12 Mtpa North Rail Construction
Mary River Project
Baffinland Iron Mines Corporation - Nunavut, Canada

True North

Map Projection: NAD 1983 UTM Zone 17N
Project #: 1402090

Drawn by: DJH	Figure: 10
Approx. Scale:	1:275,000
Date Revised:	Jan 11, 2019



Noise Contour Plot
Northern Transportation Corridor - Winter Conditions
Phase 2 Proposal 12 Mtpa North Rail Construction
Mary River Project

Baffinland Iron Mines Corporation - Nunavut, Canada

True North

Map Projection: NAD 1983 UTM Zone 17N
Project #: 1402090

Drawn by: DJH	Figure: 11
Approx. Scale:	1:275,000
Date Revised:	Jan 11, 2019