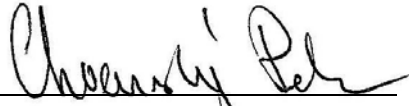


NOISE IMPACT ASSESSMENT CHILD'S PIT AND QUARRY EXTENSION MUSKOKA, ONTARIO

Prepared for

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HGC Engineering Project No. 02000329

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1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by Fowler Construction to assess the noise impact from the proposed extension of their Child's Pit and Quarry in Muskoka, Ontario. The study is required to support an application for a Category 1 & 2 - Class 'A' Pit and Quarry Below Water application to the Ministry of Natural Resources and Forestry ("MNR"), under the Aggregate Resources Act and its regulations, and for the Town of Bracebridge Zoning By-law amendment, under the Planning Act.

The analysis was based on a review of the operational site plan of the proposed extension prepared by MHBC, dated June 2020, a digital terrain model of the existing quarry and the surrounding area, equipment sound levels measured by HGC Engineering at the site, and additional information regarding the operation of the site received via email.

The assessment considers all operations of the quarry, including extraction activities in the proposed extension areas and material processing equipment, which can be located either within the existing licensed area or the proposed extension. Overall sound levels from the future activities following the extension were assessed against the noise limits stipulated in guideline NPC-300 of the Ontario Ministry of the Environment, Conservation and Parks ("MECP"). The results of the analysis indicate that, with the benefit of noise control measures integral to the site design and operation, the sound emissions from the site will comply with the MECP noise limits. Details of the analysis are outlined below.

2 DESCRIPTION OF SITE AND SURROUNDING AREA

The Child's Pit and Quarry is located at 1255 Bonnie Lake Road, Town of Bracebridge, Muskoka. A key plan of the area is included as Figure 1.

The site is an open aggregate pit/quarry employing various mobile equipment to extract and transport raw materials to processing equipment. The processed aggregate products are shipped off-site via aggregate transport trucks. Fowler Construction currently proposes to open new extraction areas to the south. Figure 2 shows the existing quarry and the proposed extension.

Noise from blasting is subject to assessment under MECP guideline NPC-119, and is therefore excluded from this assessment.

The extraction activities and processing of aggregate will primarily occur during daytime hours, from 7:00 to 19:00. However, some activities, such as loading and shipping of materials, or processing of aggregate, can occasionally occur on a 24-hour basis.

The nearest noise-sensitive points of reception are residential properties along Bonnie Lake Road, to the north, east, and south. A total of 41 assessment locations have been selected to represent the most-potentially impacted points of reception on these properties, including the building façades, outdoor amenity areas within 30 metres of homes, or vacant lots where zoning allows for residential (or other noise-sensitive) uses. The assessment locations are shown in Figure 2 as locations R01 through R41.

The background sound in the area is dominated by natural sounds, such that the acoustical environment is best characterized as a Class 3 area, in accordance with the MECP guidelines.

3 CRITERIA FOR ACCEPTABLE SOUND LEVELS

The applicable noise criteria for this assessment are set out in MECP Publication NPC-300 [1].

The guideline draws a distinction between sound produced by traffic sources and that produced by industrial or commercial activities, which are classified as *stationary sources*. According to NPC-300, sound level limits for stationary sources apply at noise-sensitive points of reception, and are set as the greater of either the exclusion limits of 45 dBA during daytime hours (7:00 – 19:00), and 40 dBA during evening/night-time hours (19:00 – 07:00), or the minimum background sound level that occurs during the time period corresponding to the operation of the source under assessment.

The background sound levels can be typically determined through automated long-term noise monitoring, or by predictive analysis based on road traffic volume counts. Observations and measurements during the site visit by HGC Engineering suggest that background sound levels in the vicinity of the nearest points of reception can be as low as the exclusion limits, which are therefore the applicable sound level limits at all assessment locations.



4 DESCRIPTION OF QUARRY OPERATIONS

After initial stripping of the overburden, the extraction will proceed from the existing licensed area to the Phase A of the extension, in a southerly/easterly direction. Next, the extraction will proceed to Phase B of the extension, also progressing in a southerly/easterly direction. The sequence of extraction is presented graphically in the site plan, dated June 2020. The raw materials will be extracted in up to four lifts, each 15 metres deep. The following table summarizes the number of lifts needed and the final height of the pit/quarry floor in each phase.

Table 1: Depth of Extraction

Phase	Number of Lifts	Elevation of Pit/Quarry Floor
A1	4	270 m Above Sea Level
A2	2	300 m Above Sea Level
B1	1	310 m Above Sea Level
B2	1	320 m Above Sea Level

A rock drill will operate either on the top of the terrain or atop the lift where extraction is taking place, boring holes in the rock into which explosives will be packed, and the rock blasted from the working face. Following a blast, a front-end loader will transfer loosened rock to a primary crushing plant operating near the working face. From the primary crushing plant, the processed materials will be transferred via a series of belt conveyors to the main processing area within the existing pit, which includes a series of crushers, screeners, and a wash plant. Finished products will be loaded by a front-end loader into highway trucks, and shipped off-site, via the main entrance on Bonnie Lake Road.

The main processing plant is currently located within the existing licensed area where it will remain during the initial stages of extraction in the proposed extension. As extraction in the extension progresses, the main processing plant may be relocated to within the southern portion of Phase A1, as shown in Figure 2.

Additional details of the on-site operations considered for the purposes of this study are included as Appendix A.

5 NOISE CONTROL MEASURES

The distances between the equipment that will operate in the various extraction phases within the proposed extension and the neighbouring receptors will vary significantly throughout the life of the pit/quarry, as will the depth of extraction. Therefore, the noise control requirements vary depending on the locations and intensity of extraction activities that are to take place at any given time.

Generally, more extensive noise control measures will be required during maximum production, and when extraction occurs on the upper benches. Somewhat lesser noise control measures will be required when the equipment operates deeper in the quarry, due to the greater amount of acoustical shielding afforded by intervening terrain.

In general, physical noise control measures, in the form of localized acoustical shielding, will be required for the rock drill, primary crusher, and the main processing plant. Additional noise control measures will be required in the form of operating restrictions during extraction in areas where attenuation afforded by intervening terrain or other physical noise control measures will be limited.

The noise control measures are detailed in tabular form and in the graphics included as Appendix B, and have been incorporated into the site plan. In addition, while extraction activities (e.g. drilling or loading material onto conveyors) and/or operation of the primary crushing plant are occurring within the existing licenced area, no extraction or crushing may take place within the extension during the same hour of operation.

The main processing plant can operate within the alternative operating area within Phase A1, shown in Figure 2, when the plant is located on the floor of the second, third, or fourth lift (at 300 metres ASL or lower).

In order for the site to comply with the MECP noise limits, the sound emission levels of the equipment employed at the site must not exceed the sound levels listed in Appendix A. All mobile construction equipment used for preparation and rehabilitation on-site shall produce sound levels which comply with MECP Guideline NPC-115 [2].

It is recognized that advancements of equipment or different configurations may allow additional equipment or equipment to be substituted for certain activities while still meeting MECP guidelines.



Variations may be permitted to these noise controls, provided that the revision still meets MECP guidelines as confirmed through documentation by a professional engineer. Prior to modification, notification shall be given to MECP.

6 ASSESSMENT METHODOLOGY

The predictive model used for this study (*CadnaA, version 2020 MRI*) is based on the methods from ISO Standard 9613-2.2 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation” [3] which accounts for reductions in sound levels due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures and topography. The ISO method tends to be conservative, as it assumes a moderate downwind condition (favorable for the propagation of sound from the source to a receiver) in all directions, at all times.

7 ASSESSMENT RESULTS

The overall sound levels from the site during operations within the proposed extension were predicted to range from 15 dBA to 45 dBA during daytime hours (7:00 – 19:00), and from 11 to 40 dBA during evening/night-time hours (19:00 – 7:00).

These sound levels are within the applicable MECP noise criteria.

The sound levels at the surrounding points of reception will vary throughout the lifetime of the pit/quarry, depending on the extent of operation at any given time and the location of extraction activities. Appendix C summarizes the predicted sound levels at the points of reception during the worst-case hour of operation in each phase of extraction.

8 CONCLUSIONS

The results of the acoustical analysis indicate that, with the benefit of the noise control measures described in Section 5 and Appendix B, the sound levels of the Child's Pit and Quarry Extension will comply with the limits set out in MECP guideline NPC-300.

The noise control measures specified in Section 5 and Appendix B should be incorporated into the operational plans for the extension. Any changes proposed for the plans that may affect offsite sound levels should be reviewed by a qualified acoustical consultant, and any necessary modifications to the noise control measures be incorporated into the operational plans.



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REFERENCES

1. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning*, August, 2013.
2. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-115, *Sound Levels due to Construction Equipment*, Not dated.
3. International Organization for Standardization, *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation*, ISO-9613-2, Switzerland, 1996.
4. Google Maps and Aerial Imagery, Internet application: maps.google.com



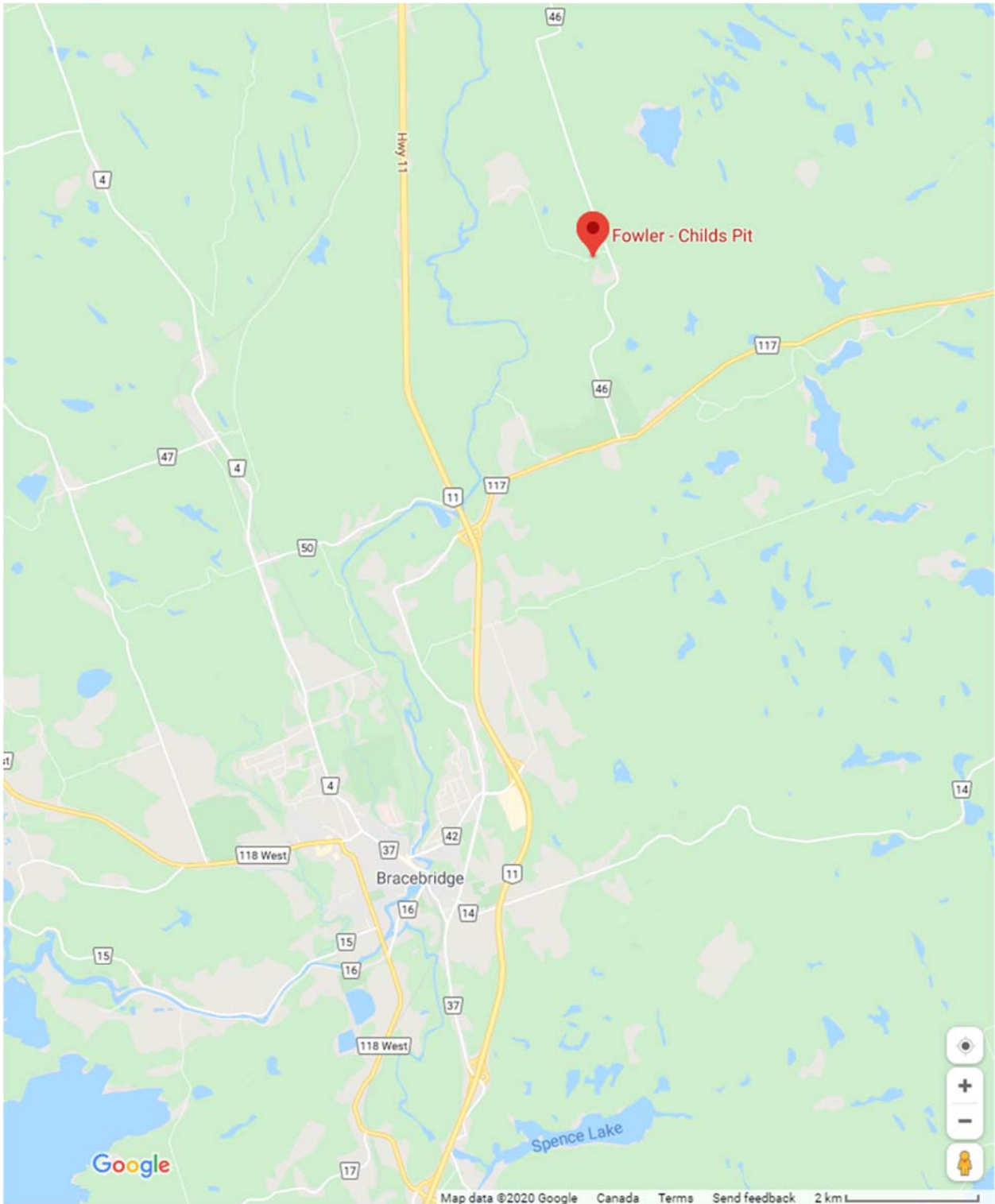


Figure 1: Location Map

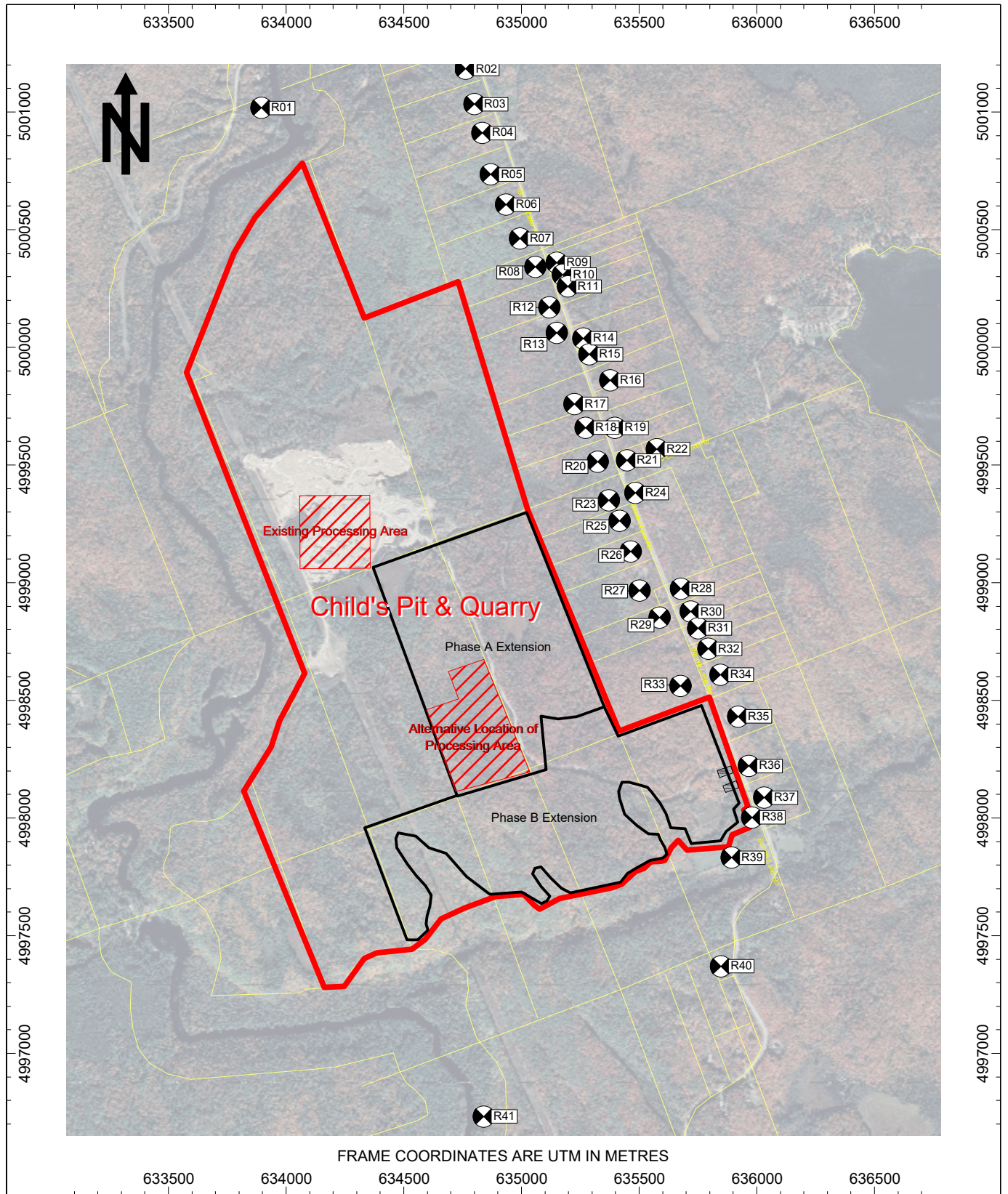


Figure 2: Locations of Points of Reception



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APPENDIX A

Summary of Assessed Operations



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The following on-site operations were considered for the purposes of this study, based on input from Fowler Construction personnel:

- The extraction activities and processing of extracted materials will occur during both daytime (7:00 – 19:00) and night-time hours (19:00 – 7:00);
- Drilling will occur during daytime hours only (7:00 – 19:00);
- The sound power levels assumed for the purposes of this assessment are summarized in the following table. The sound levels from the equipment were measured at the site in August 2012 by HGC Engineering. Sound levels from highway trucks were based on measurements of similar equipment at other sites conducted by HGC Engineering for past projects. As part of the noise control measures required in some phases of extraction, use of a drill with lower sound emissions will be required as an alternative to the drill currently employed at the site. The sound power level of the “quiet” rock drill was assumed based on manufacturer’s sound data.

Table B1: Source Sound Power Levels [dBA re: 10⁻¹² W]

Source	Sound Power Level
Primary Crushing Plant & Front-End Loader	121
Main Processing Plant (two front-end loaders, secondary and tertiary crushing plant, screener, wash plant, power generator)	122
Existing Rock Drill	124
“Quiet” Rock Drill*	110

*A quieter drill is required as a noise control measure in some areas of extraction as an alternative to the existing drill

- Up to 50 and 30 highway trucks may visit the pit/quarry under predictable worst-case operating conditions during daytime (7:00 – 19:00) and night-time (19:00 – 7:00) hours, respectively. The trucks were assumed to travel along the access route between the main processing area and the site entrance on Bonnie Lake Road. The trucks were assumed to move at an average onsite speed of 60 km/hr, as that is the posted speed limit applicable to trucks on the access road.

APPENDIX B

Summary of Noise Control Measures



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Table A1-D: Noise Control Recommendations for Extraction in the 1st Lift of Phase A - Daytime Hours (7:00 - 19:00)

Physical Noise Control Measures	
Rock Drill	Option 1: Localized barrier: eight 40-foot shipping containers stacked two high and four long, in a "D" shape, providing shielding to north, east and south
	Option 2: Use quieter drill with maximum sound power level of 110 dBA
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 35 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Phase A1-1	No restrictions, any equipment can operate
Phase A1-2	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
	Option 3: Primary crusher and drill only
Phase A1-3	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
Phase A2-1	No restrictions, any equipment can operate
Phase A2-2	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
	Option 3: Primary crusher and drill only
Phase A2-3	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
Phase A2-4	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
	Option 3: Primary crusher and drill only
Phase A2-5	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
Phase A2-6	Option 1: Primary crusher and main processing plant only
	Option 2: Drilling only, using quieter drill and localized noise barrier

Note: Loading & shipping activities can operate simultaneously with any other operation



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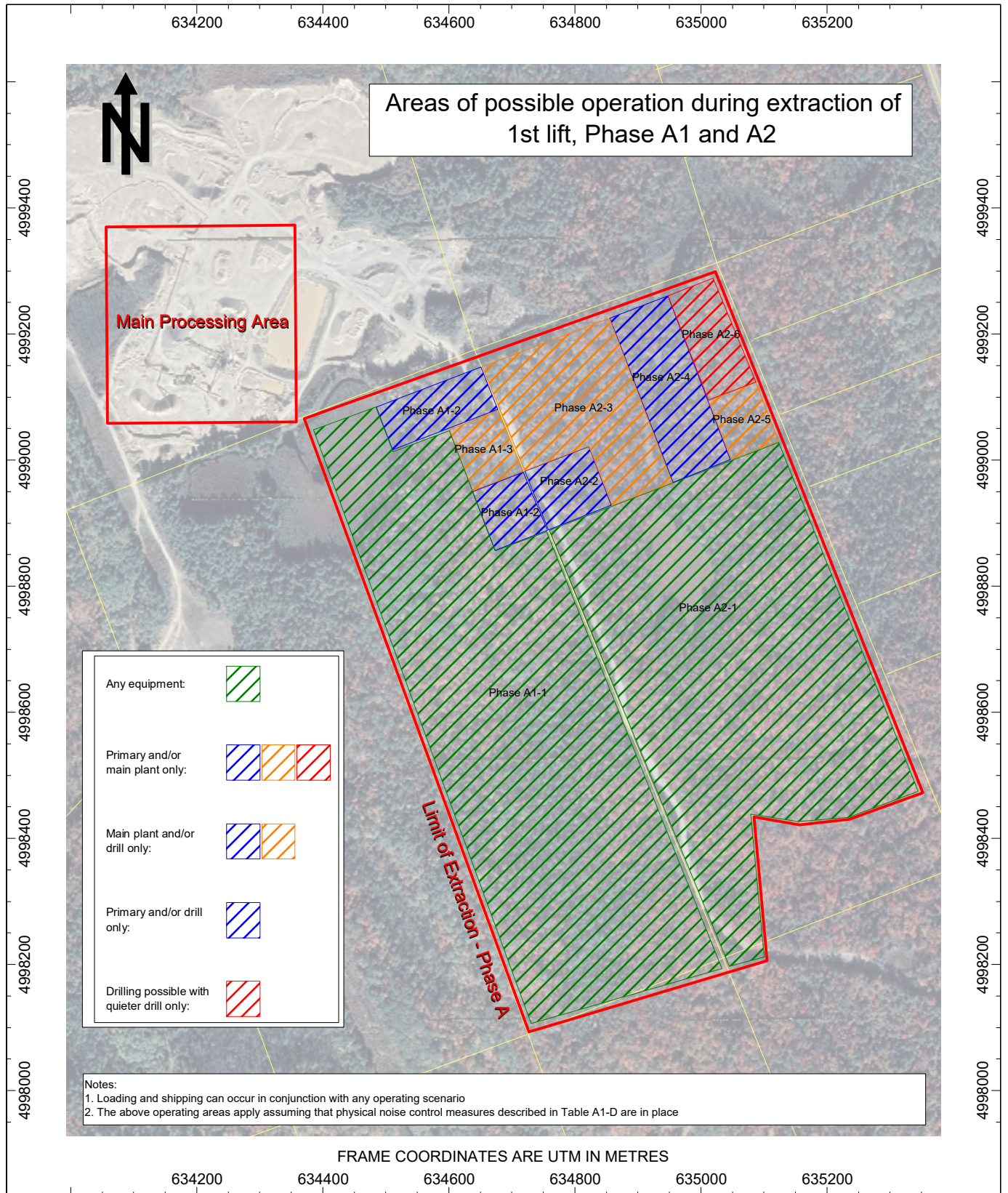


Figure A1-D: Proposed Operating Restrictions
Daytime Hours (7:00 - 19:00)

**Table A2-D: Noise Control Recommendations for Extraction in the 2nd Lift of Phase A -
Daytime Hours (7:00 - 19:00)**

Physical Noise Control Measures	
Rock Drill	Option 1: Localized barrier: eight 40-foot shipping containers stacked two high and four long, in a "D" shape, providing shielding to north, east and south
	Option 2: Use quieter drill with maximum sound power level of 110 dBA
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 35 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Phase A1-1	No restrictions, any equipment can operate
Phase A1-2	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
	Option 3: Primary crusher and drill only
Phase A2-1	No restrictions, any equipment can operate
Phase A2-2	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
	Option 3: Primary crusher and drill only
Phase A2-3	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
Phase A2-4	Option 1: Primary crusher and main processing plant only
	Option 2: Main processing plant and drill only
	Option 3: Primary crusher and drill only

Note: Loading & shipping activities can operate simultaneously with any other operation



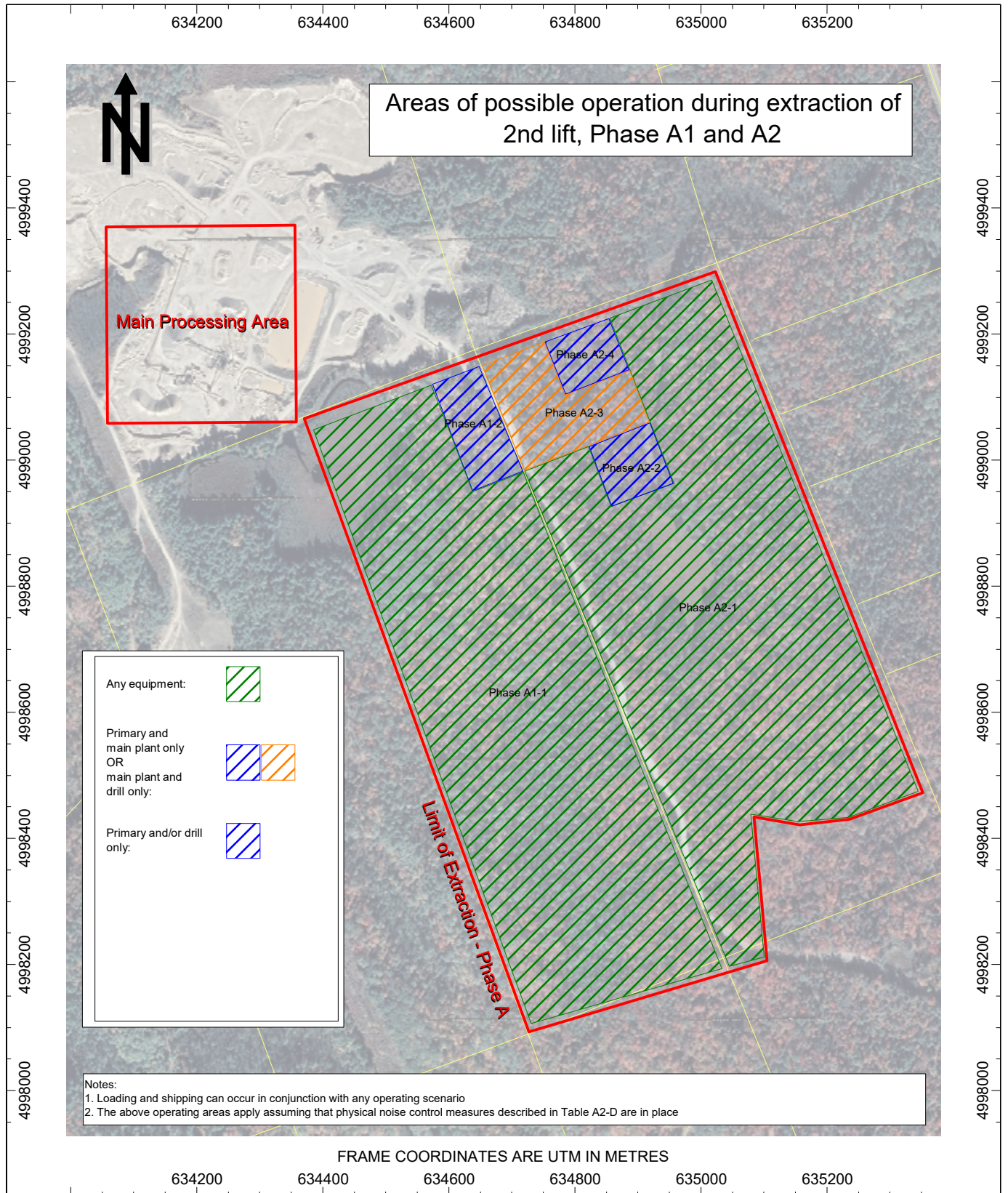


Figure A2-D: Proposed Operating Restrictions
Daytime Hours (7:00 - 19:00)

**Table A3-D: Noise Control Recommendations for Extraction in the 3rd Lift of Phase A -
Daytime Hours (7:00 - 19:00)**

Physical Noise Control Measures	
Rock Drill	Option 1: Localized barrier: eight 40-foot shipping containers stacked two high and four long, in a "D" shape, providing shielding to north, east and south
	Option 2: Use quieter drill with maximum sound power level of 110 dBA
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 35 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Phase A1-1	No restrictions, any equipment can operate with physical measures in place
Phase A1-2	Option 1: No restrictions, any equipment can operate with physical measures in place
	Option 2: No physical measures required when drill operates only
Phase A1-3	Option 1: No restrictions, any equipment can operate with physical measures in place
	Option 2: No physical measures for drill required when drill and main plant operate only
Phase A1-4	Option 1: No restrictions, any equipment can operate with physical measures in place
	Option 2: No physical measures for drill required when drill and main plant operate only
	Option 3: No physical measures for drill required when drill and primary crusher operate only

Note: Loading & shipping activities can operate simultaneously with any other operation

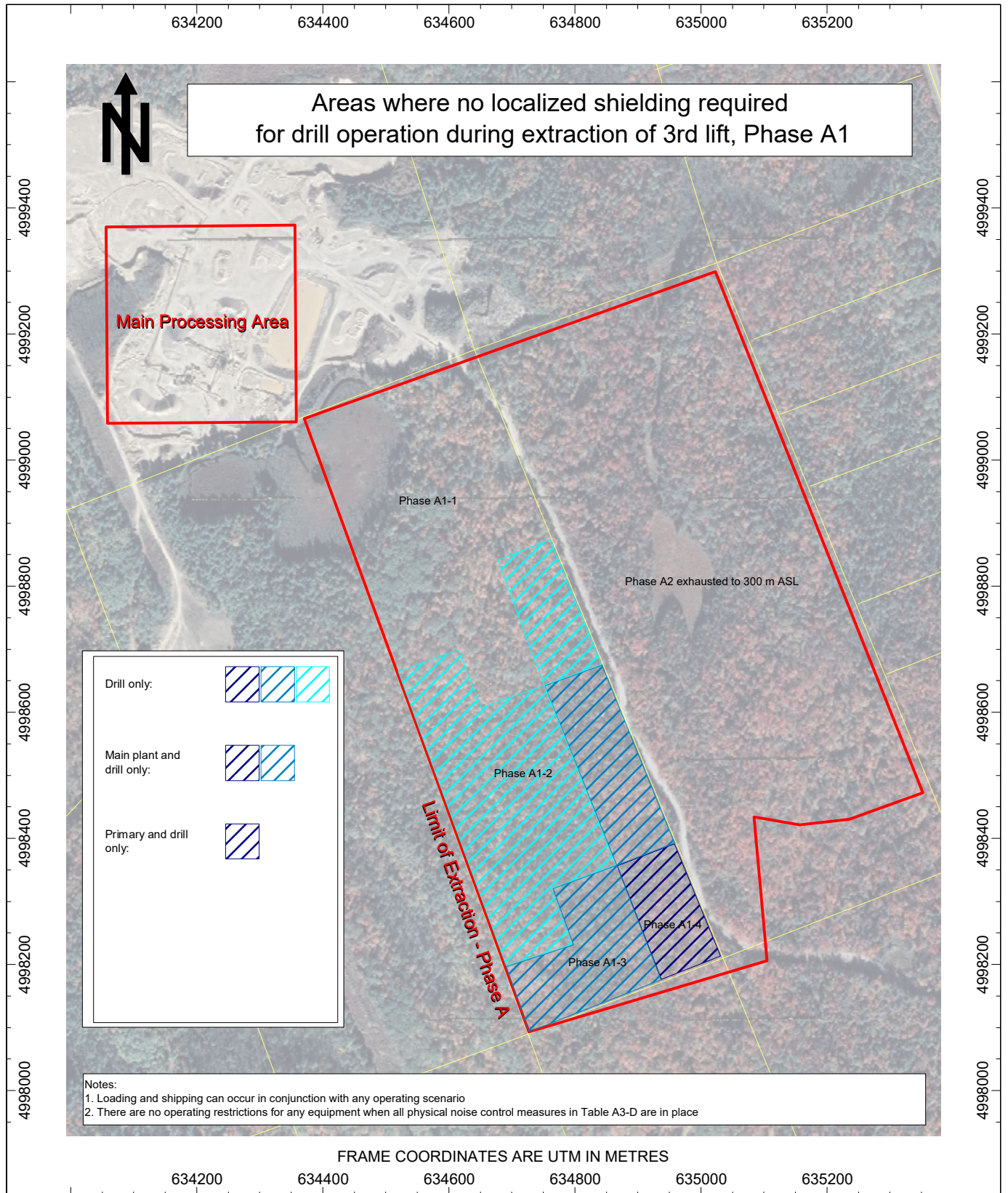


Figure A3-D: Proposed Operating Restrictions
Daytime Hours (7:00 - 19:00)

**Table A4-D: Noise Control Recommendations for Extraction in the 4th Lift of Phase A -
Daytime Hours (7:00 - 19:00)**

Physical Noise Control Measures	
Rock Drill	Option 1: Localized barrier: eight 40-foot shipping containers stacked two high and four long, in a "D" shape, providing shielding to north, east and south
	Option 2: Use quieter drill with maximum sound power level of 110 dBA
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 35 trucks visit the site per hour, the site entrance will be relocated and a 5 metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Phase A1-1	No restrictions, any equipment can operate with physical measures in place
Phase A1-2	Option 1: No restrictions, any equipment can operate with physical measures in place
	Option 2: No physical measures required when drill operates only
Phase A1-3	Option 1: No restrictions, any equipment can operate with physical measures in place
	Option 2: No physical measures for drill required when drill and main plant operate only
Phase A1-4	Option 1: No restrictions, any equipment can operate with physical measures in place
	Option 2: No physical measures for drill required when drill and main plant operate only
	Option 3: No physical measures for drill required when drill and primary crusher operate only

Note: Loading & shipping activities can operate simultaneously with any other operation

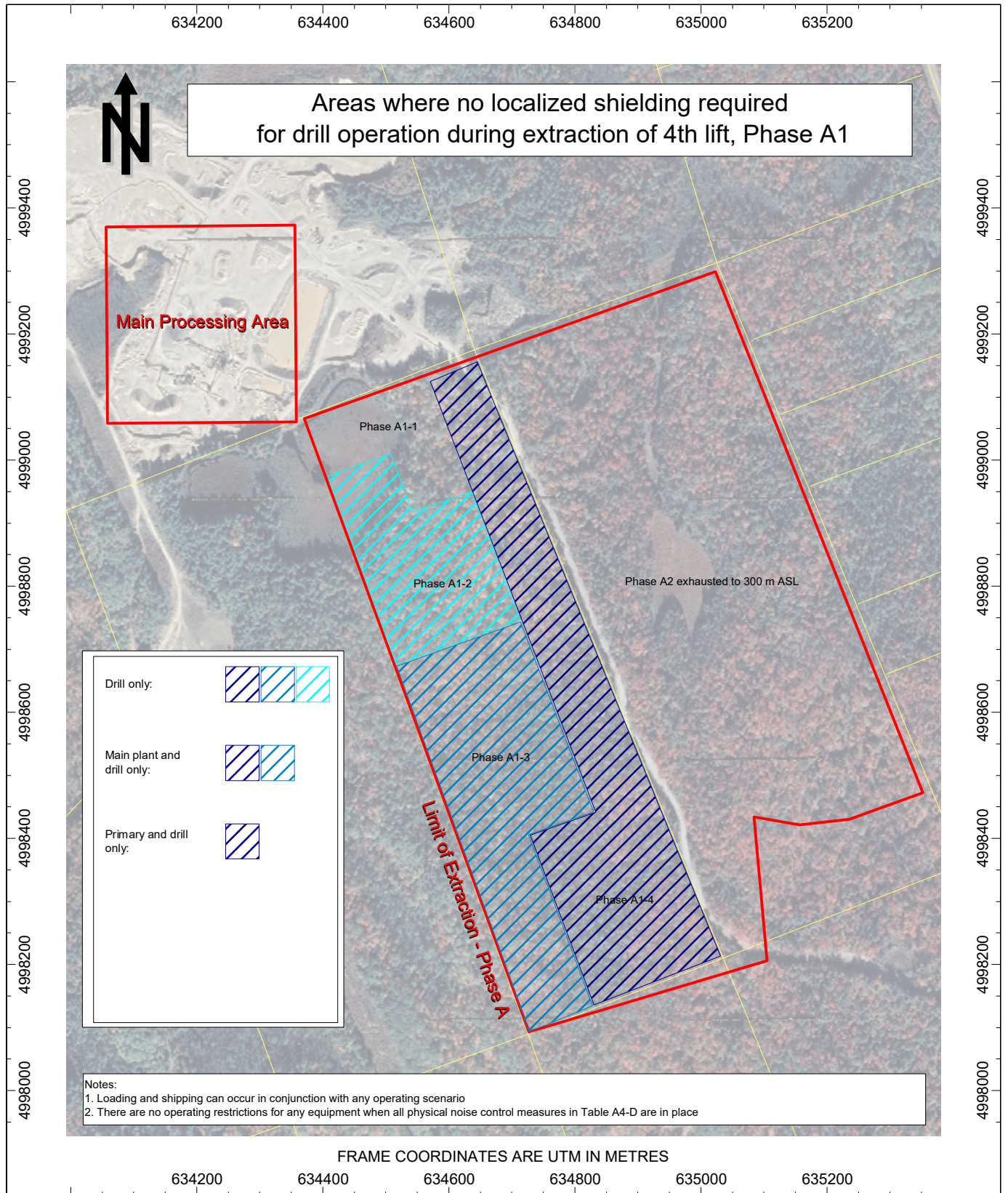


Figure A4-D: Proposed Operating Restrictions
Daytime Hours (7:00 - 19:00)

**Table B-D: Noise Control Recommendations for Extraction in Phase B -
Daytime Hours (7:00 - 19:00)**

Physical Noise Control Measures	
Rock Drill	Localized barrier: Phase B1 - eight 40-foot shipping containers stacked two high and four long, in a "D" shape, providing shielding to north, east and south. Phase B2 - twelve 40-foot shipping containers stacked two high and six long, with equal-length sections providing shielding to north, east and south. Drill with maximum sound power level of 110 dBA in addition to localized barrier.
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 12 metres, located within 20 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 35 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Phase B1	No restrictions, any equipment can operate
Phase B2-1	No restrictions, any equipment can operate
Phase B2-2	Option 1: Main processing plant and drill only Option 2: Main processing plant and primary crusher only
Phase B2-3	Main processing plant and drill only

Note: Loading & shipping activities can operate simultaneously with any other operation



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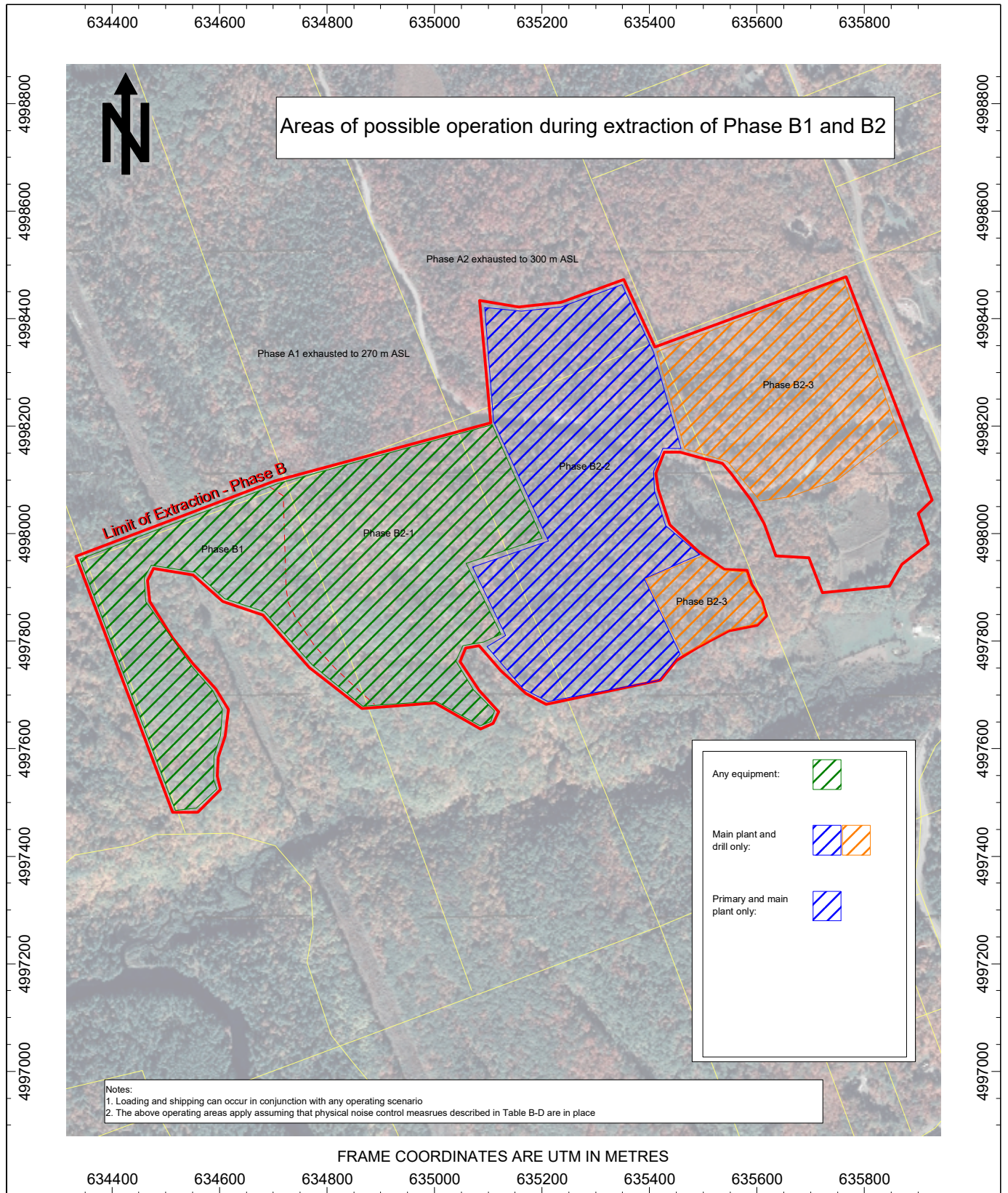


Figure B-D: Proposed Operating Restrictions
Daytime Hours (7:00 - 19:00)

**Table A1-N: Noise Control Recommendations for Extraction in the 1st Lift of Phase A -
Night-time Hours (19:00 - 7:00)**

Physical Noise Control Measures	
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 12 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Option 1:	Operation of main processing plant and shipping only
Option 2:	Operation of primary crusher only in areas shown in Figure A1-N
No drilling during night-time hours	

**Table A2-N: Noise Control Recommendations for Extraction in the 2nd Lift of Phase A -
Night-time Hours (19:00 - 7:00)**

Physical Noise Control Measures	
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 12 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Option 1:	Operation of main processing plant and shipping only
Option 2:	Operation of primary crusher only in areas shown in Figure A2-N
No drilling during night-time hours	



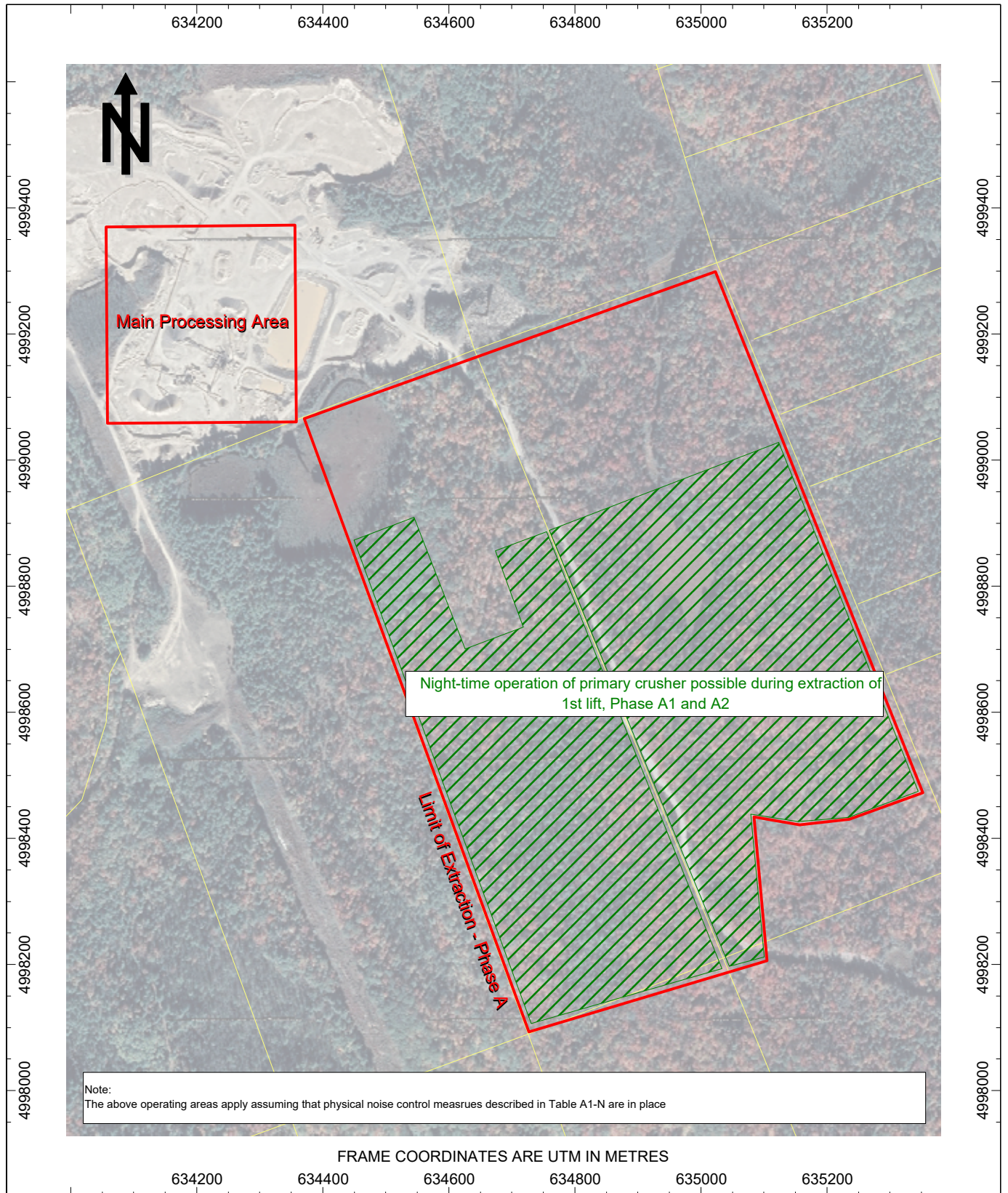


Figure A1-N: Proposed Operating Restrictions
Night-time Hours (19:00 - 7:00)



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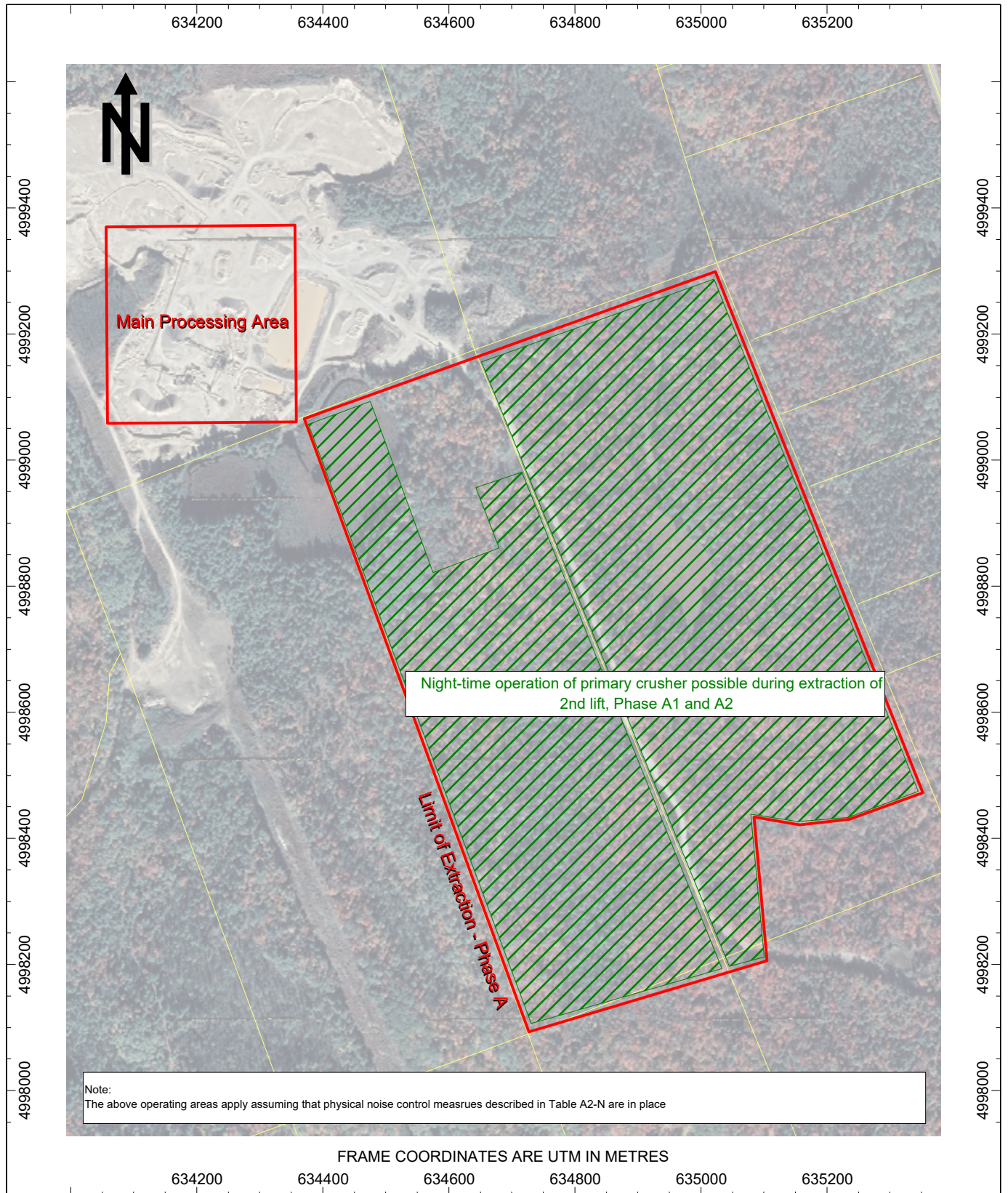


Figure A2-N: Proposed Operating Restrictions
Night-time Hours (19:00 - 7:00)

**Table A3-N: Noise Control Recommendations for Extraction in the 3rd and 4th Lift of Phase A -
Night-time Hours (19:00 - 7:00)**

Physical Noise Control Measures	
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 15 metres, located within 40 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more than 12 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Option 1:	Operation of main processing plant and shipping only
Option 2:	Operation of primary crusher only, no area restrictions apply
No drilling during night-time hours	

**Table B-N: Noise Control Recommendations for Extraction in Phase B -
Night-time Hours (19:00 - 7:00)**

Physical Noise Control Measures	
Primary Crusher & Loader	Localized shielding to north, east and south. Can be achieved by working face or supplemental noise barriers with a height of 12 metres, located within 20 metres of the primary crusher
Main Processing Plant	Localized shielding: 17-metre high stockpile on the east side of the processing area as shown in Figure B1
Loading & Shipping	When more that 12 trucks visit the site per hour, the site entrance will be relocated and a 5-metre high noise berm erected as shown in Figure B2
Additional Operational Restrictions	
Option 1:	Operation of main processing plant and shipping only
Option 2:	Operation of primary crusher only in areas shown in Figure B-N
No drilling during night-time hours	



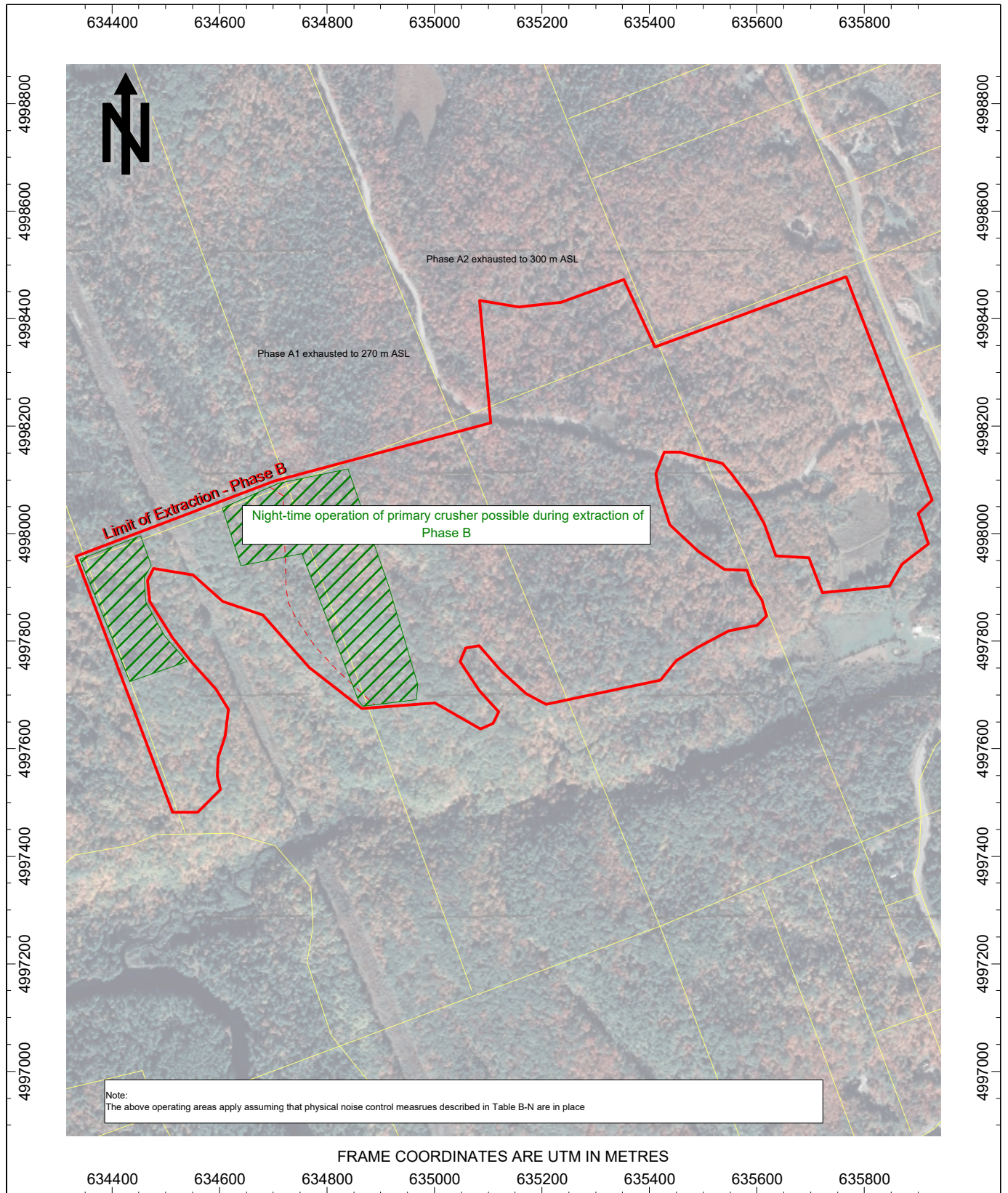


Figure B-N: Proposed Operating Restrictions
Night-time Hours (19:00 - 7:00)



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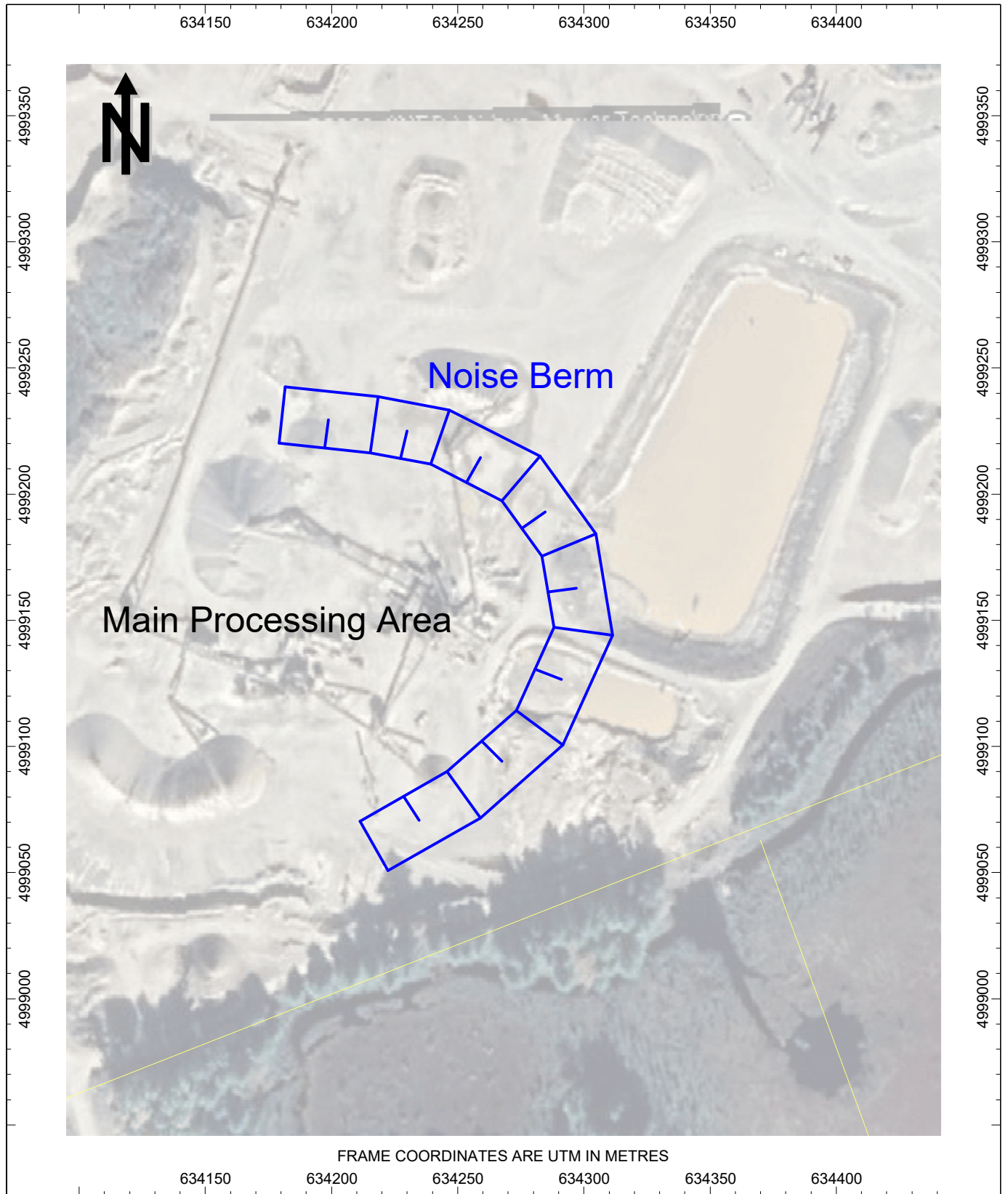


Figure B1: Layout of Noise Berm at Main Processing Area

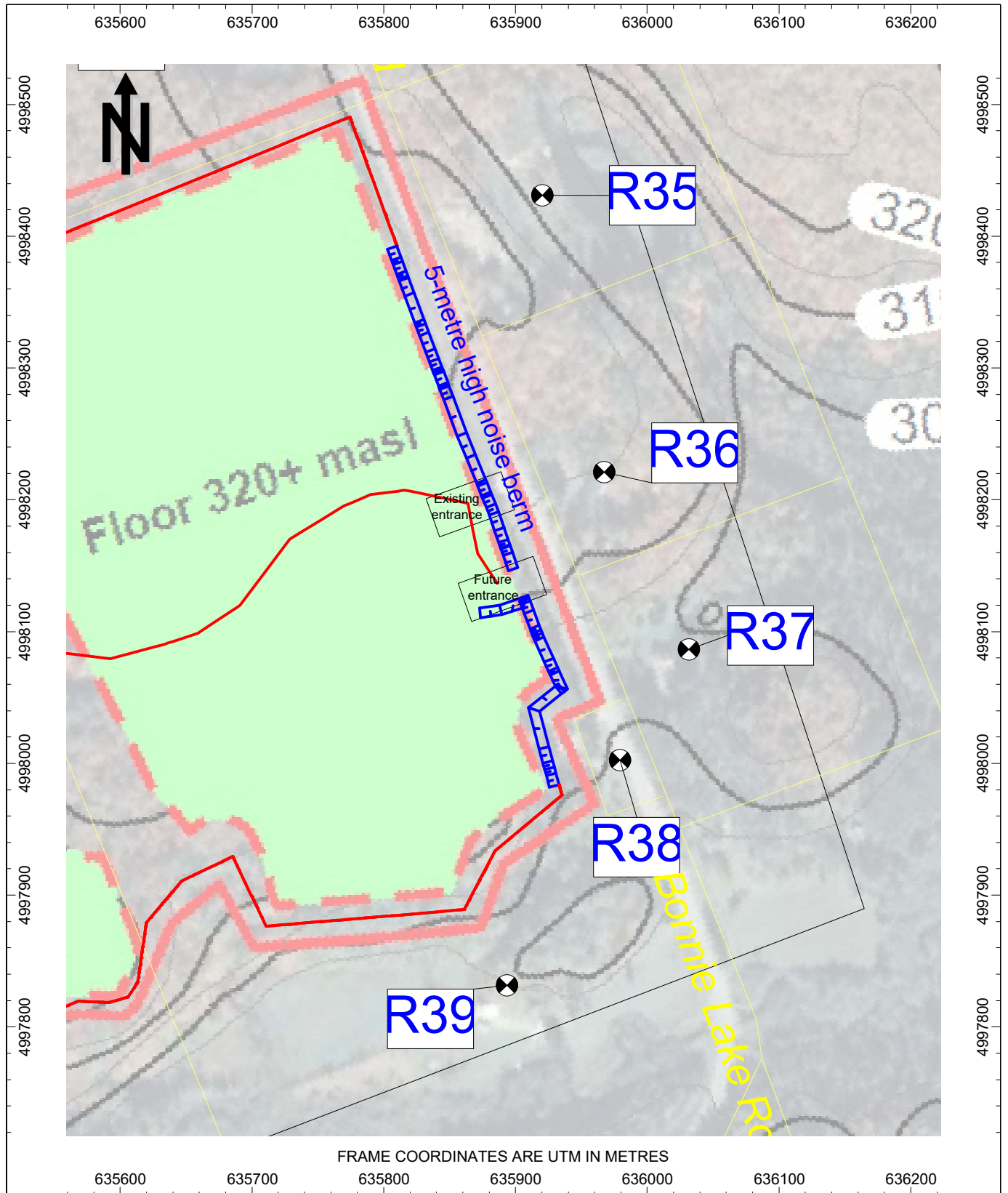


Figure B2: Noise Barrier at Property Line

APPENDIX C

Summary of Results



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Table C1: Maximum Predicted Sound Levels in Each Phase, Daytime Hours (7:00 - 19:00)

Point of Reception		Phase A				Phase B	Noise Limit	Within Limit?
ID	Description	Lift 1	Lift 2	Lift 3	Lift 4			
R01	Two-Storey Residential Home	29	29	29	29	29	45	Yes
R02	Single-Storey Residential Home	31	31	15	15	15	45	Yes
R03	Single-Storey Residential Home	32	32	30	29	28	45	Yes
R04	Two-Storey Residential Home	35	35	39	34	29	45	Yes
R05	Single-Storey Residential Home	34	34	36	34	27	45	Yes
R06	Two-Storey Residential Home	41	40	41	40	31	45	Yes
R07	Two-Storey Residential Home	45	43	43	42	39	45	Yes
R08	Single-Storey Residential Home	44	41	43	42	40	45	Yes
R09	Single-Storey Residential Home	38	37	37	36	34	45	Yes
R10	Two-Storey Residential Home	39	38	40	36	34	45	Yes
R11	Two-Storey Residential Home	38	37	36	35	34	45	Yes
R12	Two-Storey Residential Home	45	45	45	45	42	45	Yes
R13	Two-Storey Residential Home	45	43	44	43	40	45	Yes
R14	Two-Storey Residential Home	45	44	43	43	39	45	Yes
R15	Single-Storey Residential Home	45	44	42	42	39	45	Yes
R16	Two-Storey Residential Home	44	43	42	42	41	45	Yes
R17	Single-Storey Residential Home	44	40	40	40	37	45	Yes
R18	Two-Storey Residential Home	45	45	43	43	44	45	Yes
R19	Two-Storey Residential Home	45	45	43	44	43	45	Yes
R20	Vacant Lot	45	44	42	42	41	45	Yes
R21	Single-Storey Residential Home	45	44	42	42	44	45	Yes
R22	Single-Storey Residential Home	44	41	40	41	43	45	Yes
R23	Two-Storey Residential Home	45	42	42	42	42	45	Yes
R24	Single-Storey Residential Home	41	40	39	36	42	45	Yes
R25	Two-Storey Residential Home	41	39	37	35	43	45	Yes
R26	Two-Storey Residential Home	44	39	37	35	42	45	Yes
R27	Single-Storey Residential Home	40	38	36	33	39	45	Yes
R28	Single-Storey Residential Home	40	38	37	34	39	45	Yes
R29	Two-Storey Residential Home	41	39	37	35	39	45	Yes
R30	Two-Storey Residential Home	42	40	39	36	41	45	Yes
R31	Single-Storey Residential Home	37	36	35	32	40	45	Yes
R32	Two-Storey Residential Home	41	39	37	36	39	45	Yes
R33	Two-Storey Residential Home	41	39	38	36	43	45	Yes
R34	Two-Storey Residential Home	39	38	36	35	38	45	Yes
R35	Single-Storey Residential Home	38	34	32	31	33	45	Yes
R36	Single-Storey Residential Home	45	41	41	40	45	45	Yes
R37	Single-Storey Residential Home	44	40	40	39	44	45	Yes
R38	Single-Storey Residential Home	45	40	40	40	45	45	Yes
R39	Single-Storey Residential Home	44	38	36	35	44	45	Yes
R40	Two-Storey Residential Home	45	40	42	42	45	45	Yes
R41	Two-Storey Residential Home	43	39	42	42	44	45	Yes



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Table C2: Maximum Predicted Sound Levels in Each Phase, Night-time Hours (19:00 - 7:00)

Point of Reception		Main Processing and Shipping	Primary Crusher Only					Noise Limit	Within Limit?
ID	Description		Phase A				Phase B		
			Lift 1	Lift 2	Lift 3	Lift 4			
R01	Two-Storey Residential Home	29	--	--	--	--	--	40	Yes
R02	Single-Storey Residential Home	15	28	28	--	--	--	40	Yes
R03	Single-Storey Residential Home	28	29	28	17	11	--	40	Yes
R04	Two-Storey Residential Home	29	31	31	29	25	--	40	Yes
R05	Single-Storey Residential Home	27	31	30	29	28	--	40	Yes
R06	Two-Storey Residential Home	30	34	32	30	30	--	40	Yes
R07	Two-Storey Residential Home	39	35	34	32	31	--	40	Yes
R08	Single-Storey Residential Home	39	35	34	32	31	--	40	Yes
R09	Single-Storey Residential Home	32	34	33	32	31	--	40	Yes
R10	Two-Storey Residential Home	32	34	33	31	31	28	40	Yes
R11	Two-Storey Residential Home	32	34	33	31	30	29	40	Yes
R12	Two-Storey Residential Home	40	40	38	35	34	--	40	Yes
R13	Two-Storey Residential Home	34	40	36	34	33	30	40	Yes
R14	Two-Storey Residential Home	34	38	36	34	33	29	40	Yes
R15	Single-Storey Residential Home	34	39	36	34	33	28	40	Yes
R16	Two-Storey Residential Home	38	37	37	33	32	30	40	Yes
R17	Single-Storey Residential Home	33	40	34	33	32	31	40	Yes
R18	Two-Storey Residential Home	40	39	20	35	34	34	40	Yes
R19	Two-Storey Residential Home	40	38	40	36	35	32	40	Yes
R20	Vacant Lot	39	36	34	34	32	31	40	Yes
R21	Single-Storey Residential Home	40	37	36	35	34	33	40	Yes
R22	Single-Storey Residential Home	39	37	35	33	32	33	40	Yes
R23	Two-Storey Residential Home	40	37	35	34	32	33	40	Yes
R24	Single-Storey Residential Home	33	37	36	34	27	33	40	Yes
R25	Two-Storey Residential Home	32	36	34	32	25	34	40	Yes
R26	Two-Storey Residential Home	32	35	33	31	24	35	40	Yes
R27	Single-Storey Residential Home	31	34	32	30	21	35	40	Yes
R28	Single-Storey Residential Home	33	35	33	31	23	34	40	Yes
R29	Two-Storey Residential Home	33	36	34	32	27	35	40	Yes
R30	Two-Storey Residential Home	34	37	36	35	29	34	40	Yes
R31	Single-Storey Residential Home	31	33	32	29	23	32	40	Yes
R32	Two-Storey Residential Home	33	36	34	32	29	30	40	Yes
R33	Two-Storey Residential Home	33	36	34	32	29	32	40	Yes
R34	Two-Storey Residential Home	32	35	34	31	28	29	40	Yes
R35	Single-Storey Residential Home	27	32	28	23	21	26	40	Yes
R36	Single-Storey Residential Home	40	35	33	28	25	38	40	Yes
R37	Single-Storey Residential Home	39	32	31	27	24	35	40	Yes
R38	Single-Storey Residential Home	39	31	29	25	22	33	40	Yes
R39	Single-Storey Residential Home	33	32	29	26	23	34	40	Yes
R40	Two-Storey Residential Home	32	34	33	32	31	37	40	Yes
R41	Two-Storey Residential Home	24	33	32	32	31	38	40	Yes



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APPENDIX D

Sample Calculations



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R21 Single-Storey Residential Home		635449	4999520	328.9														
Src ID	Src Name	Band	X	Y	Z	LxD	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahou	CmetD	RefID	LrD	Band
Rock Drill		31.5	634897	4998648	325.0	68	71.3	0	0.0	-5.8	8.1	0.0	0.7	0.0	0.0	0.0	--	31.5
Rock Drill		63	634897	4998648	325.0	79	71.3	0	0.0	-5.8	10.0	0.1	0.7	0.0	0.0	0.0	3	63.0
Rock Drill		125	634897	4998648	325.0	96	71.3	0	0.0	-5.8	12.3	0.4	1.0	0.0	0.0	0.0	17	125.0
Rock Drill		250	634897	4998648	325.0	106	71.3	0	0.0	-5.8	14.9	1.1	1.3	0.0	0.0	0.0	23	250.0
Rock Drill		500	634897	4998648	325.0	114	71.3	0	0.0	-5.8	17.7	2.0	1.7	0.0	0.0	0.0	27	500.0
Rock Drill		1000	634897	4998648	325.0	121	71.3	0	0.0	-5.8	20.6	3.8	2.0	0.0	0.0	0.0	29	1000.0
Rock Drill		2000	634897	4998648	325.0	118	71.3	0	0.0	-5.8	23.6	10.0	2.7	0.0	0.0	0.0	17	2000.0
Rock Drill		4000	634897	4998648	325.0	110	71.3	0	0.0	-5.8	25.0	33.8	3.0	0.0	0.0	0.0	--	4000.0
Rock Drill		8000	634897	4998648	325.0	101	71.3	0	0.0	-5.8	25.0	120.6	4.0	0.0	0.0	0.0	--	8000.0
Primary Crusher A2 - Floor		31.5	634863	4998540	303.0	79	72.2	0	0.0	-5.6	10.3	0.0	0.7	0.0	0.0	0.0	2	31.5
Primary Crusher A2 - Floor		63	634863	4998540	303.0	97	72.2	0	0.0	-5.6	12.7	0.1	0.7	0.0	0.0	0.0	17	63.0
Primary Crusher A2 - Floor		125	634863	4998540	303.0	109	72.2	0	0.0	-5.6	15.4	0.5	1.0	0.0	0.0	0.0	26	125.0
Primary Crusher A2 - Floor		250	634863	4998540	303.0	113	72.2	0	0.0	-5.6	18.2	1.2	1.4	0.0	0.0	0.0	25	250.0
Primary Crusher A2 - Floor		500	634863	4998540	303.0	117	72.2	0	0.0	-5.6	21.1	2.2	1.7	0.0	0.0	0.0	25	500.0
Primary Crusher A2 - Floor		1000	634863	4998540	303.0	114	72.2	0	0.0	-5.6	24.0	4.2	2.1	0.0	0.0	0.0	18	1000.0
Primary Crusher A2 - Floor		2000	634863	4998540	303.0	112	72.2	0	0.0	-5.6	25.0	11.0	2.8	0.0	0.0	0.0	7	2000.0
Primary Crusher A2 - Floor		4000	634863	4998540	303.0	107	72.2	0	0.0	-5.6	25.0	37.4	3.1	0.0	0.0	0.0	--	4000.0
Primary Crusher A2 - Floor		8000	634863	4998540	303.0	99	72.2	0	0.0	-5.6	25.0	133.5	4.1	0.0	0.0	0.0	--	8000.0
Processing Plant		31.5	634239	4999156	303.7	81	73.0	0	0.0	-5.6	5.2	0.0	0.0	0.0	0.0	0.0	8	31.5
On-Site Truck Movements		31.5	635260	4998310	317.1	--	73.6	0	0.0	-5.7	15.3	0.0	0.7	0.0	0.0	0.0	0	31.5
Front-End Loader		31.5	634863	4998447	302.5	67	72.8	0	0.0	-5.7	7.1	0.0	0.7	0.0	0.0	0.0	--	31.5
Processing Plant		63	634239	4999156	303.7	99	73.0	0	0.0	-5.6	5.7	0.2	0.0	0.0	0.0	0.0	26	63.0
On-Site Truck Movements		63	635260	4998310	317.1	81	72.6	0	0.0	-5.7	5.0	0.1	0.5	0.0	0.0	0.0	9	63.0
Front-End Loader		63	634863	4998447	302.5	87	72.8	0	0.0	-5.7	8.4	0.2	0.7	0.0	0.0	0.0	10	63.0
Processing Plant		125	634239	4999156	303.7	105	73.0	0	0.0	-5.6	6.4	0.5	0.0	0.0	0.0	0.0	31	125.0
On-Site Truck Movements		125	635260	4998310	317.1	90	72.6	0	0.0	-5.7	5.3	0.5	0.7	0.0	0.0	0.0	17	125.0
Front-End Loader		125	634863	4998447	302.5	92	72.8	0	0.0	-5.7	10.2	0.5	1.1	0.0	0.0	0.0	13	125.0
Processing Plant		250	634239	4999156	303.7	107	73.0	0	0.0	-5.6	7.6	1.3	1.0	0.0	0.0	0.0	30	250.0
On-Site Truck Movements		250	635260	4998310	317.1	92	72.7	0	0.0	-5.7	5.4	1.3	1.0	0.0	0.0	0.0	17	250.0
Front-End Loader		250	634863	4998447	302.5	95	72.8	0	0.0	-5.7	12.4	1.3	1.4	0.0	0.0	0.0	13	250.0
Processing Plant		500	634239	4999156	303.7	115	73.0	0	0.0	-5.6	9.3	2.4	1.0	0.0	0.0	0.0	35	500.0
On-Site Truck Movements		500	635260	4998310	317.1	99	72.7	0	0.0	-5.7	5.6	2.3	1.1	0.0	0.0	0.0	23	500.0
Front-End Loader		500	634863	4998447	302.5	99	72.8	0	0.0	-5.7	14.9	2.4	1.8	0.0	0.0	0.0	13	500.0
Processing Plant		1000	634239	4999156	303.7	118	73.0	0	0.0	-5.6	11.4	4.6	1.0	0.0	0.0	0.0	33	1000.0
On-Site Truck Movements		1000	635260	4998310	317.1	103	72.6	0	0.0	-5.7	5.7	4.4	1.3	0.0	0.0	0.0	25	1000.0
Front-End Loader		1000	634863	4998447	302.5	103	72.8	0	0.0	-5.7	17.6	4.5	2.1	0.0	0.0	0.0	12	1000.0
Processing Plant		2000	634239	4999156	303.7	117	73.0	0	0.0	-5.6	13.9	12.2	1.0	0.0	0.0	0.0	22	2000.0
On-Site Truck Movements		2000	635260	4998310	317.1	103	72.4	0	0.0	-5.7	5.3	12.0	1.7	0.0	0.0	0.0	17	2000.0
Front-End Loader		2000	634863	4998447	302.5	101	72.8	0	0.0	-5.7	20.4	11.9	2.9	0.0	0.0	0.0	--	2000.0
Processing Plant		4000	634239	4999156	303.7	111	73.0	0	0.0	-5.6	16.7	41.4	2.0	0.0	0.0	0.0	--	4000.0
On-Site Truck Movements		4000	635260	4998310	317.1	98	71.7	0	0.0	-5.7	6.6	36.7	2.8	0.0	0.0	0.0	--	4000.0
Front-End Loader		4000	634863	4998447	302.5	96	72.8	0	0.0	-5.7	23.3	40.2	3.2	0.0	0.0	0.0	--	4000.0
Processing Plant		8000	634239	4999156	303.7	100	73.0	0	0.0	-5.6	19.5	147.7	3.0	0.0	0.0	0.0	--	8000.0
On-Site Truck Movements		8000	635260	4998310	317.1	91	70.6	0	0.0	-5.6	9.0	117.6	5.9	0.0	0.0	0.0	--	8000.0
Front-End Loader		8000	634863	4998447	302.5	89	72.7	0	0.0	-5.7	24.9	143.0	4.3	0.0	0.0	0.0	--	8000.0

Where: Lr = Lx + Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl



APPENDIX E

Consultant's Curriculum Vitae



ACOUSTICS



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VIBRATION

Petr Chocensky, Project Consultant, PhD

Education	Czech Technical University in Prague (CTU), Prague, Czech Republic, PhD, Civil Engineering
	Czech Technical University in Prague (CTU), Prague, Czech Republic, Masters Degree in Civil Engineering
Professional History	2010 to Present Project Engineer, HGC Engineering, <i>Mississauga</i>
	2003 to 2004 Project Engineer, EKOLAgrou, <i>Czech Republic</i>
	and 2006 to 2010
	2004 to 2005 Noise Review Engineer, Ministry of Health, <i>Czech Republic</i>
Experience	Dr. Chocensky's area of expertise covers acoustic assessments and solutions for a variety of industries – industrial and commercial facilities, aggregate pits, mines, renewable energy projects, road and rail infrastructure project, as well as projects related to building acoustics. He is an expert in computerized noise modeling and the use of CadnaA modeling software.
Selected Projects	The Bay Adelaide Centre, Toronto, Ontario One York, Toronto, Ontario Lafarge Canada Inc., various sites, Ontario G.E. Booth Wastewater Treatment Facility, Mississauga, Ontario Petro-Canada, Mississauga, Ontario Vale & Kelly Mine, Sudbury, Ontario Bunge, Hamilton, Ontario Dufferin Concrete, various sites, Ontario Dufferin Construction, various sites, Ontario NOVA Chemicals, Corunna, Ontario Kellogg Canada Inc., London, Ontario Morrison-Hershfield Energy Centre, Windsor, Ontario Chapman's Ice Cream, Markdale, Ontario Strategic Noise Maps for Roads, Prague, Czech Republic

Corey D. Kinart, Senior Associate, MBA, PEng

Education	University of Waterloo, Bachelor of Applied Science, 2001 Schulich School of Business, York University, Master of Business Administration, 2015
Professional Memberships	Professional Engineers Ontario (PEO)
Professional History	2009 to present Senior Engineer/Associate, HGC Engineering, <i>Mississauga</i> 2006 to 2009 Project Engineer, HGC Engineering, <i>Mississauga</i> 2001 to 2006 Mechanical Engineer, Magellan Aerospace, <i>Mississauga</i> 2000 to 2001 Contract Engineer, HGC Engineering, <i>Mississauga</i>
Experience	Mr. Kinart has extensive experience in the assessment and mitigation of noise emissions from industrial and commercial facilities, and specializes in the use of advanced sound intensity measurement equipment and techniques. He has conducted feasibility studies, acoustic assessments and audits for government approvals, as well as noise complaint investigations for hundreds of facilities across Ontario and abroad. His experience spans a wide variety of industrial and commercial sectors and is highlighted by natural gas fired power generation facilities, natural gas transmission and distribution facilities, electrical transformer stations, petrochemical refineries, mineral mines, hot mix asphalt, ready-mix concrete and cement plants, aggregate pits and quarries and myriad of other sites and facilities of varying size and complexity.
Selected Projects	Union Gas Ltd., <i>Numerous sites throughout Ontario</i> General Dynamics Land Systems, <i>London, Ontario</i> Vale, <i>Copper Cliff & Garson, Ontario</i> Suncor Energy Products Inc., <i>Mooretown, Ontario</i> Lafarge Canada Inc., <i>Numerous sites throughout Ontario</i> National Gas Company of Trinidad & Tobago, <i>Trinidad & Tobago</i> General Motors, <i>St. Catharines, Ontario</i> Petro-Canada, <i>Mississauga, Ontario</i> TransCanada Pipelines Ltd., <i>Numerous sites in Ontario and Western Canada</i> Canada Building Materials, <i>Numerous sites throughout Ontario</i> DeBeers Victor Mine Project, <i>Northern Ontario</i> Staatsolie, <i>Tout Lui Faut, Suriname</i> Owens Corning, <i>Guelph, Ontario</i> Dufferin Concrete, <i>Numerous sites throughout Ontario</i> NOVA Chemicals, <i>Corunna, Mooretown & St. Clair, Ontario</i> Hydro One, <i>Numerous sites throughout Ontario</i> Xstrata Strathcona Mine, <i>Levack, Ontario</i>