HGC ENGINEERING

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

NOISE IMPACT ASSESSMENT

LCP Quarry Limited Brechin Quarry

Township of Ramara, County of Simcoe, Ontario

Prepared for

LCP Quarry Limited
145 Adelaide Street West, Suite 500
Toronto, Ontario
M5H 4E5

Prepared by

Corey Kinart, MBA, PEng

Reviewed by

Bill Gastmeier, MASc, PEng

December 14, 2023

HGC Engineering Project No. 02000638

Table of Contents

1 Introduction and Summary 1

2 Description of Site and Surrounding Area 1

3 Criteria for Acceptable Sound Levels 2

4 Description of Quarry Operations 4

5 Assessment Methodology 5

6 Assessment Results 6

7 Conclusions & Recommendations 8

References 9

Figures 1 to 8

Appendix A: Details of Modelling Assumptions
Appendix B: Noise Control Recommendations
Appendix C: Sample Calculations
Appendix D: Consultant Curriculum Vitae

1 Introduction and Summary

HGC Engineering was retained by LCP Quarry Limited (LCPQL) to undertake an analysis of the potential impact of noise from the proposed Brechin Quarry at neighbouring noise sensitive receptors (i.e. residential dwellings) in accordance with the guidelines of the Ministry of Natural Resources and Forestry (MNRF) and the Ministry of the Environment, Conservation and Parks (MECP).

The analysis was based on consideration of the pertinent MNRF and MECP guidelines, quarry plans prepared by MHBC, equipment sound emission levels from the files of HGC Engineering, and discussions with MHBC and agents of LCPQL regarding the proposed quarry.

Sound levels resulting from the proposed quarry were predicted at the selected receptor locations and compared to criteria established in accordance with MECP publication NPC-300 [1]. The results of the analysis indicate that sound levels from the proposed quarry, predicted under worst-case operating scenarios and with the noise control measures recommended herein, comply with the MECP guideline limits at surrounding sensitive receptors. Details of the analysis are included herein.

2 Description of Site and Surrounding Area

The proposed quarry is to be located approximately 3.5 kilometers south of Brechin, Ontario, southwest of the intersection of Highway 12 and Concession Road 2. A scaled location map is included as Figure 1. The proposed licence area is 151.4 hectares, and the extraction area is 91.5 hectares with a maximum annual extraction of two million tonnes. Aggregate extraction, processing, and shipping within and from the quarry is proposed to take place Monday to Friday between 07:00 and 18:00, Saturday between 07:00 and 12:00, with no operations on Sundays or statutory holidays. Processing and shipping activities will also take place between Monday to Friday 05:30 and 07:00.

Existing, potential points of reception surrounding the site are labelled in Figure 2 and designated as locations R01 through R13 for consistency with other technical reports. Locations R01 through R05 and R07 through R13 represent residential homes; the outdoor living areas of the two most potentially impacted homes are represented by locations R07A and R09A (each located within 30 metres of the respective dwelling, in the direction of the proposed quarry). Location R06

represents a commercial property that is not noise sensitive and is therefore not assessed. Also considered herein are currently vacant lots surrounding the proposed quarry on which noise sensitive uses are permitted by the Township of Ramara Zoning By-law, labelled as locations VL1 through VL6 in Figure 2. The specific locations of VL1 through VL6 were selected in accordance with the guidance provided in MECP guideline NPC-300, and with consideration to the existing built form.

Based on observations by HGC Engineering personnel during various visits to the site and surrounding area, the background sound in the vicinity of points of reception located near Highway 12 (i.e. R01 through R05, R07, VL2, VL3, and VL6) is dominated by road traffic during daytime hours and is thus best categorized as a Class 2 acoustical environment under MECP noise assessment guidelines. The remaining points of reception (R08, R09 through R13, VL1, VL4, and VL5) are located further from Highway 12, in areas more representative of a Class 3 acoustic environment.

3 Criteria for Acceptable Sound Levels

MECP publication NPC-300 is the pertinent guideline for developing sound level limits for the assessment of aggregate operations, which are classified as *stationary sources of sound*. The acceptability limits for stationary sources are based on the existing background sound levels in the area of the subject site. In essence, sound from the stationary source is evaluated against (i.e. compared to) the typical background sound at neighbouring noise sensitive points of reception (e.g., residences). Background sound is considered to include road traffic sound, natural sound and other typical sounds; but excludes the sound of the site under assessment.

NPC-300 stipulates the sound level limits applicable at a point of reception are the greater of the minimum one-hour energy-equivalent ($L_{EQ,1\text{-}hr}$) background sound level or the exclusionary minimums of the daytime (07:00 – 19:00), evening (19:00 – 23:00) and nighttime (23:00 – 07:00) periods. As the subject quarry will operate between 05:30 and 18:00, the relevant exclusionary minimums are as follows:

Table 1: Exclusionary Minimum Sound Level Limits, $L_{EQ,1\text{-}Hr}$ [dBA]

Acoustical Class	Early Morning (05:30 to 07:00)	Daytime (07:00 to 18:00)
Class 2	45	50
Class 3	40	45

The most potentially impacted facade of the home represented by R04 is directly exposed to traffic sound from Highway 12, as are locations VL2 and VL3 (which are similar distances from Highway 12 as R04). To quantify background sound from Highway 12, HGC Engineering deployed a Brüel & Kjær model 2238 Integrating Sound Level Meter to record $L_{EQ,1\text{-}Hr}$ sound levels between October 28 and November 4, 2020. The monitor was deployed north of Concession Road 1, approximately 55 metres west of Highway 12; it was within its laboratory calibration period and field checks of correct calibration were made before and after the deployment. The results of the monitoring and the distance-corrected sound levels at locations R04/VL2/VL3 are summarized below:

Table 2: Minimum Background Sound Levels, $L_{EQ,1\text{-}Hr}$ [dBA]

Location	Distance to Hwy 12, m	Early Morning (05:30 to 07:00)	Daytime (07:00 to 18:00)
Monitor	55	48	56
R04/VL2/VL3	100	45	53

The minimum background sound level during the daytime period was greater than the exclusionary minimum and is thus the applicable limit at locations R04/VL2/VL3 during that period: 53 dBA. During the early morning period, the minimum background sound level was equal to the exclusionary minimum and is thus the limit at locations R04/VL2/VL3 during that period: 45 dBA.

Based on observations during the site visits, background sound in the vicinity of all other receptor locations could fall as low as the exclusionary minimum limits of the respective acoustical classifications, which are therefore the applicable criteria. (Note that, although locations R02, R03, R05, and VL6 are located close to Highway 12, sound from the quarry will be greatest at the west facades of these homes, which are fully shielded from traffic sound by the dwellings themselves.)

The following table summarizes the applicable limits at all receptor locations:

Table 3: Applicable Sound Level Limits, $L_{EQ,1\text{-}Hr}$ [dBA]

Points of Reception	Acoustical Class	Early Morning (05:30 to 07:00)	Daytime (07:00 to 18:00)
R04, VL2, VL3	Class 2	45	53
R01, R02, R03, R05, R07, VL6	Class 2	45	50
R08 – R13, VL1, VL4, VL5	Class 3	40	45

Note: Receptors R07A and R09A are not noise sensitive during the Early Morning period.

Compliance with MECP criteria generally results in acceptable levels of sound at residential receptors, although there may be residual audibility during periods of low background sound. Guideline NPC-300 applies to sound from the ongoing day-to-day operations of the subject site, but not to the temporary sound produced during the preparation and rehabilitation of extraction areas, or to the sound produced by highway trucks on public roadways, or by auditory warning devices required or authorized by law or in accordance with good safety practices (including 'back up beepers'). Within each phase of extraction, the initial operations of building access roadways, stripping topsoil, building noise berms and/or localized shielding, as well as the final operations of rehabilitation (and removal of noise berms/localized shielding) are defined as construction activity. In order to satisfy Provincial Standards, the sound emission levels of equipment involved in those construction activities must comply with MECP Guideline NPC-115 [2].

4 Description of Quarry Operations

The proposed Brechin Quarry Site Plans are submitted under separate cover. The simplified operation schematic included as Figure 3 was used to evaluate sound emissions from the proposed quarrying operations. The site will be operated in two phases, with each phase split into two sub-phases. Materials will be extracted in three lifts, each approximately +/-12-metres in depth, to final elevations ranging between approximately 202 and 207 metres above sea level. In all phases, a rock drill will be used to establish the blast pattern, and finished product will be shipped from the site by highway trucks via the main entrance on Concession Road 2. Material will be transported between the working face and the processing area by conveyors. The following subsections describe the planned operations in each phase, which are depicted graphically in Figure 4.

Phase 1A

Operations will commence at grade at the north end of Phase 1A, with the processing area (including the primary crusher) established at/near the location noted in Figure 4. Extraction will take place throughout the northern notch of Phase 1A while the processing area remains at grade.

Once Bench 1 material in the northern notch of Phase 1A has been removed, the processing area will be relocated to the top of Bench 2 at/near the location noted in Figure 4, while extraction takes place throughout the balance of Phase 1A, proceeding in a southerly direction. During this and all subsequent extraction, the primary crusher will move throughout the quarry with the working face (while the secondary crusher and screening/wash plant will remain in the established processing area). Once Bench 3 material has been removed from Phase 1A, the processing area will move to and remain on the quarry floor at/near the location noted in Figure 4 for the life of the quarry.

Phases 1B, 2A and 2B

Material extraction within Phase 1B will take place in a westerly direction. Extraction within Phase 2A will begin at the east end, initially in a southerly direction before turning westward and proceeding the full length of Phase 2A. Extraction within Phase 2B will primarily be in the southerly direction, with the far east end removed in an easterly progression.

5 Assessment Methodology

The predictive model used for this study (*CadnaA, version 2023, build 197.5343*) is based on the methods from ISO Standard 9613-2.2 [3] which accounts for reductions in sound levels due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures, including the extraction face, topographic features, and foliage, where applicable. 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. This modelling technique is acceptable to the MNRF and MECP.

Details of the acoustical modelling assumptions are included as Appendix A. The recommended noise control measures are included as Appendix B.

6 Assessment Results

Using the simplified operation schematic included in Figure 3 and described in Section 4, the modelling assumptions detailed in Appendix A, along with the noise control recommendations detailed in Appendix B and Figures 4 through 8, the sound levels of the Brechin Quarry were predicted at each of the selected receptors under predictable worst-case conditions. The results are summarized in the table below, with sample calculations provided in Appendix C.

Table 4: Predicted Quarry Sound Levels at Selected Receptors, $L_{EQ,1\text{-}Hr}$ [dBA]

Point of Reception	Worst-Case Sound Level (Worst-Case Phase)		Sound Level Limit		Within Limit?	
	Early Morning	Daytime	Early Morning	Daytime	Early Morning	Daytime
R01	36 (1B)	46 (2B)	45	50	Yes	Yes
R02	42 (1B)	46 (2B)	45	50	Yes	Yes
R03	43 (1B)	47 (2B)	45	50	Yes	Yes
R04	43 (1A-AG)	52 (1A)	45	53	Yes	Yes
R05	45 (1B)	48 (1B)	45	50	Yes	Yes
R07	45 (1A)	49 (1A-AG)	45	50	Yes	Yes
R07A	44 (1A)	49 (1A-AG)	--	50	N/A	Yes
R08	37 (1B)	43 (2B)	40	45	Yes	Yes
R09	40 (1A-AG)	45 (1A-AG)	40	45	Yes	Yes
R09A	39 (1A)	45 (2A)	--	45	N/A	Yes
R10	35 (1A-AG)	40 (2A)	40	45	Yes	Yes
R11	31 (1A-AG)	36 (2A)	40	45	Yes	Yes
R12	33 (1A-AG)	37 (1A-AG)	40	45	Yes	Yes
R13	29 (2A)	35 (2A)	40	45	Yes	Yes
VL1	41 (1A)	46 (1A-AG)	40	45	No*	No*
VL2	54 (1A-AG)	58 (1A-AG)	45	53	No*	No*
VL3	39 (1B)	65 (2B)	45	53	Yes	No*
VL4	33 (1A)	49 (2B)	40	45	Yes	No*
VL5	31 (1A)	40 (2B)	40	45	Yes	Yes
VL6	68 (1A)	73 (1A-AG)	45	50	No*	No*

* See Section 6.2, below, for a discussion of vacant lots.

Notes: 1. Early Morning is 05:30 to 07:00, Daytime is 07:00 to 18:00.
2. "1A-AG" refers to Phase 1A, At Grade.

6.1 Existing Receptors

The analysis results summarized above indicate that the predicted sound levels of the Brechin Quarry comply with MECP guideline limits at all existing points of reception receptors under worst-case operating scenarios.

6.2 Vacant Lots

The predicted sound levels of the Brechin Quarry are within MECP guideline limits at vacant lot VL5. Although the predicted sound levels at VL1 through VL4 and VL6 exceed the MECP limits, these locations represent potential future homes conservatively assessed in close proximity to the quarry, whereas future points of reception could be located anywhere on these lots, which range in size from approximately 2 to 162 hectares. Given this uncertainty, it is not practical to develop noise control measures at this time. Rather, an updated Noise Impact Assessment, prepared by a Professional Engineer qualified to provide Acoustical Engineering services in the Province of Ontario, will be submitted to the MNRF within 12 months following the quarry operator receiving notification of a building permit issued for a noise-sensitive use on the properties designated herein as VL1 through VL4 and/or VL6. If the updated study concludes that the sound levels of the quarry may not comply with the applicable limits, the report must include the following:

- Details regarding the noise control measures required to reduce the sound levels of the quarry to comply with the applicable limits;
- A timetable for implementation of the noise control measures, including dates for achieving compliance with specific milestones;
- A timetable for submitting further assessments to demonstrate compliance with the applicable sound level limits at the properties designated herein as VL1 through VL4 and/or VL6.

Note that the above is reiterated in Appendix B, as a noise control recommendation.

7 Conclusions & Recommendations

The acoustical analysis indicates that sound levels from the proposed Brechin Quarry, predicted under worst-case operating scenarios and with the noise control measures recommended herein, will comply with MECP guideline limits at the existing, most potentially impacted neighbouring receptors.

The noise control measures specified in Appendix B should be incorporated into the operational plans for the quarry. Any changes proposed for the quarry plans that may affect offsite sound levels should be reviewed by a Professional Engineer qualified to provide Acoustical Engineering services in the Province of Ontario, and any necessary modifications to the noise control measures be incorporated into the quarry plans if/as appropriate.

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, "Construction Equipment", August, 1978.

3. International Organization for Standardization, "Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation", ISO-9613-2, Switzerland, 1996.

LIMITATIONS

This document was prepared solely for the addressed party and titled project or named part thereof, and should not be relied upon or used for any other project without obtaining prior written authorization from HGC Engineering. HGC Engineering accepts no responsibility or liability for any consequence of this document being used for a purpose other than for which it was commissioned. Any person or party using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm their agreement to indemnify HGC Engineering for all loss or damage resulting therefrom. HGC Engineering accepts no responsibility or liability for this document to any person or party other than the party by whom it was commissioned.

Any conclusions and/or recommendations herein reflect the judgment of HGC Engineering based on information available at the time of preparation, and were developed in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

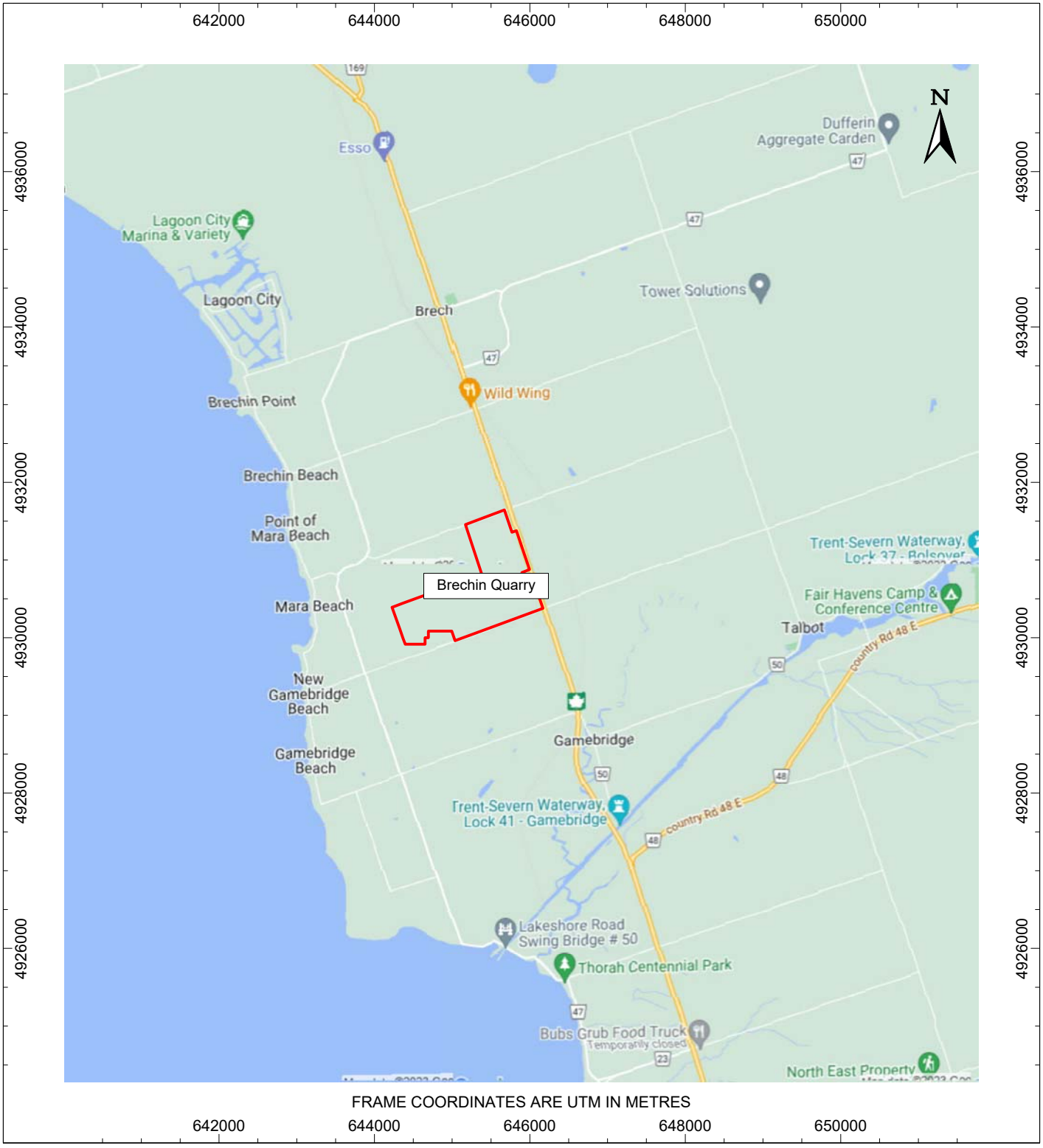

Figure 1: Location Map

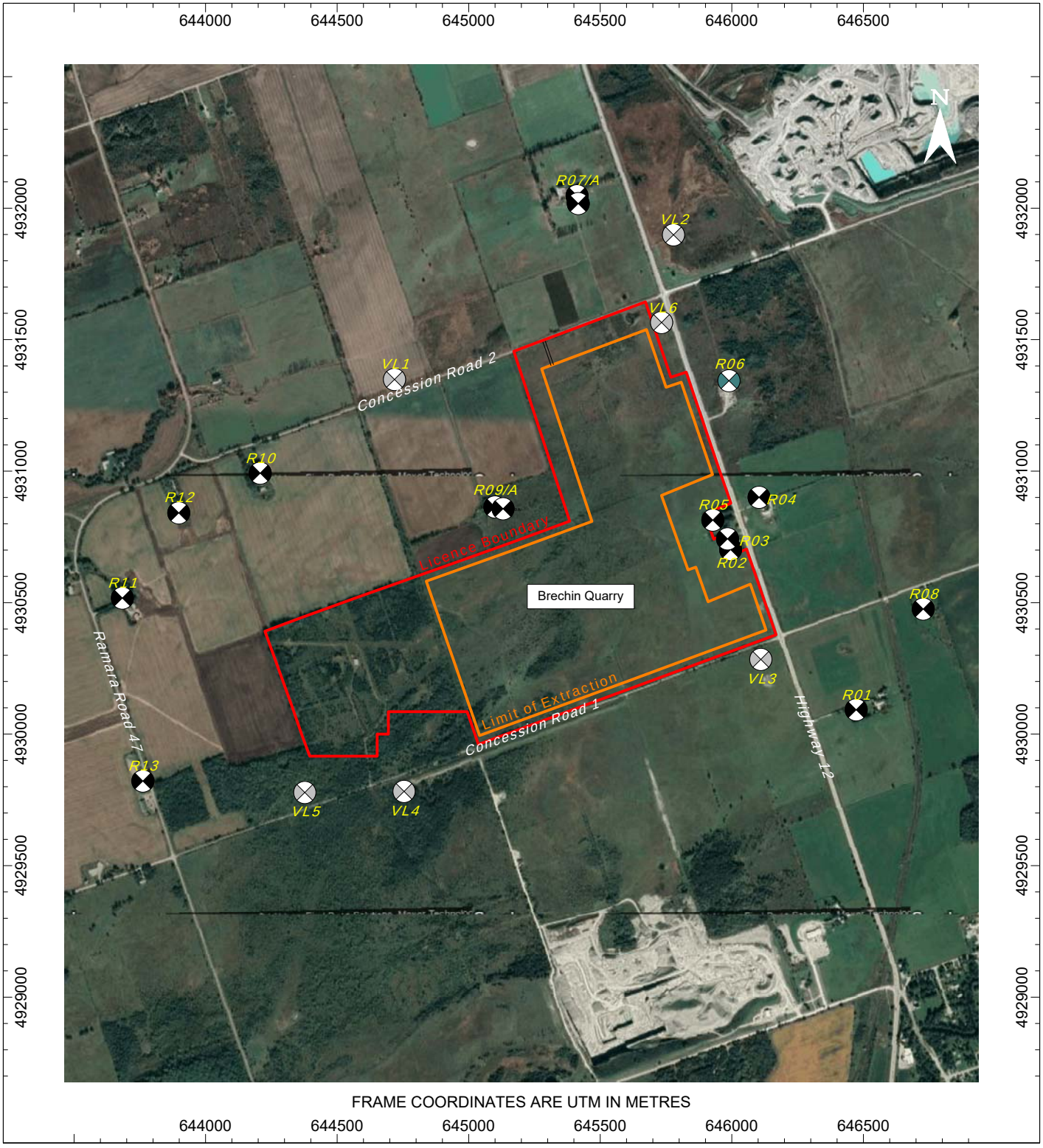

Figure 2: Brechin Quarry & Points of Reception

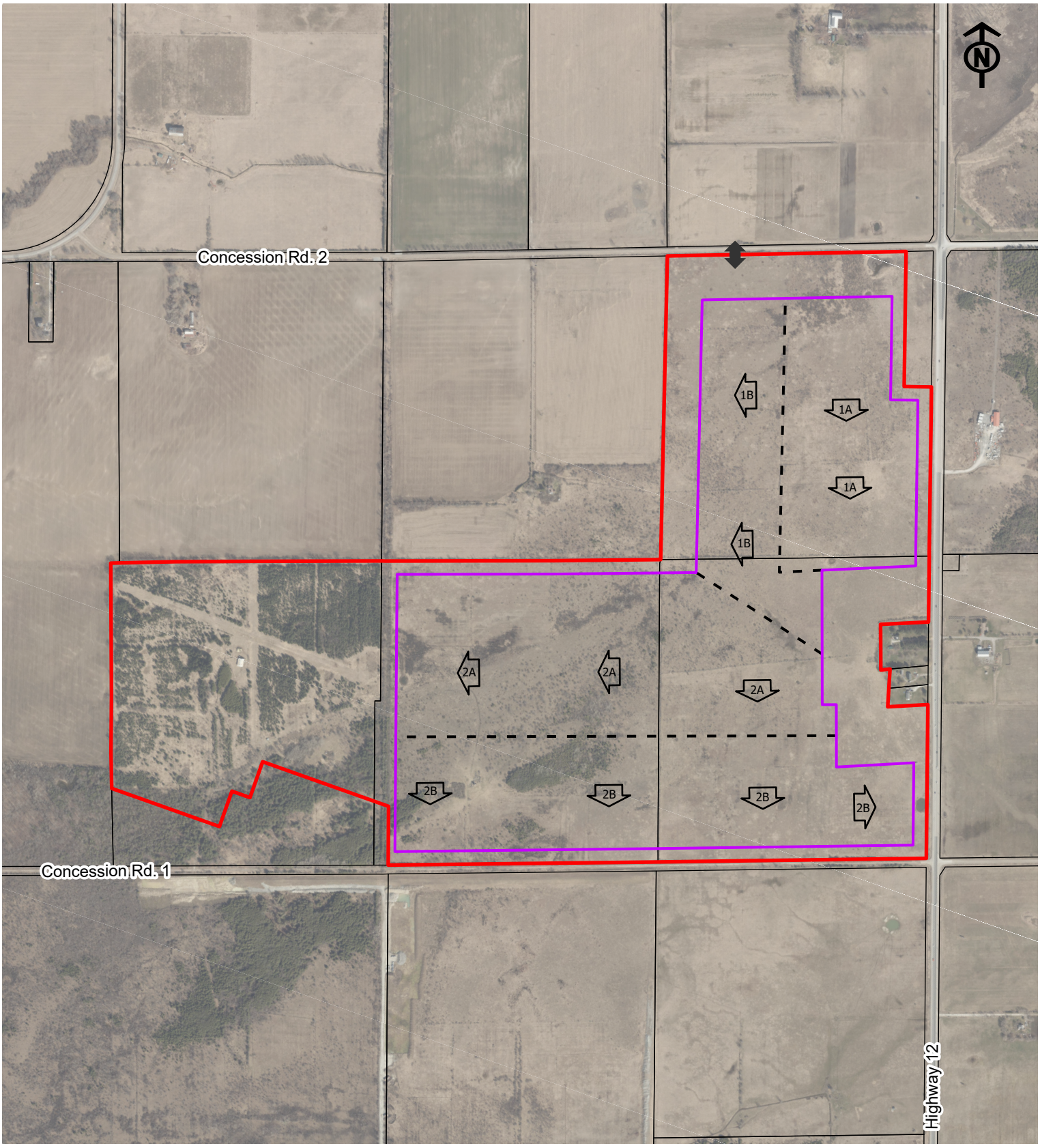

FIGURE 3:
BRECHIN QUARRY SIMPLIFIED OPERATION SCHEMATIC

Proposed Brechin Quarry

Part of Lots 11&12, Concession 1
Township of Ramara
County of Simcoe

LEGEND

- Subject Lands and Proposed Licence Boundary
- Proposed Limit of Extraction
- Phasing Area
- Proposed Entrance / Exit
- Parcel Fabric

DATE: December 2023

SOURCES: 2022 Ortho Photography County of Simcoe GIS

0 75 150 300
Meters

12135B - Planning Report Figures

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

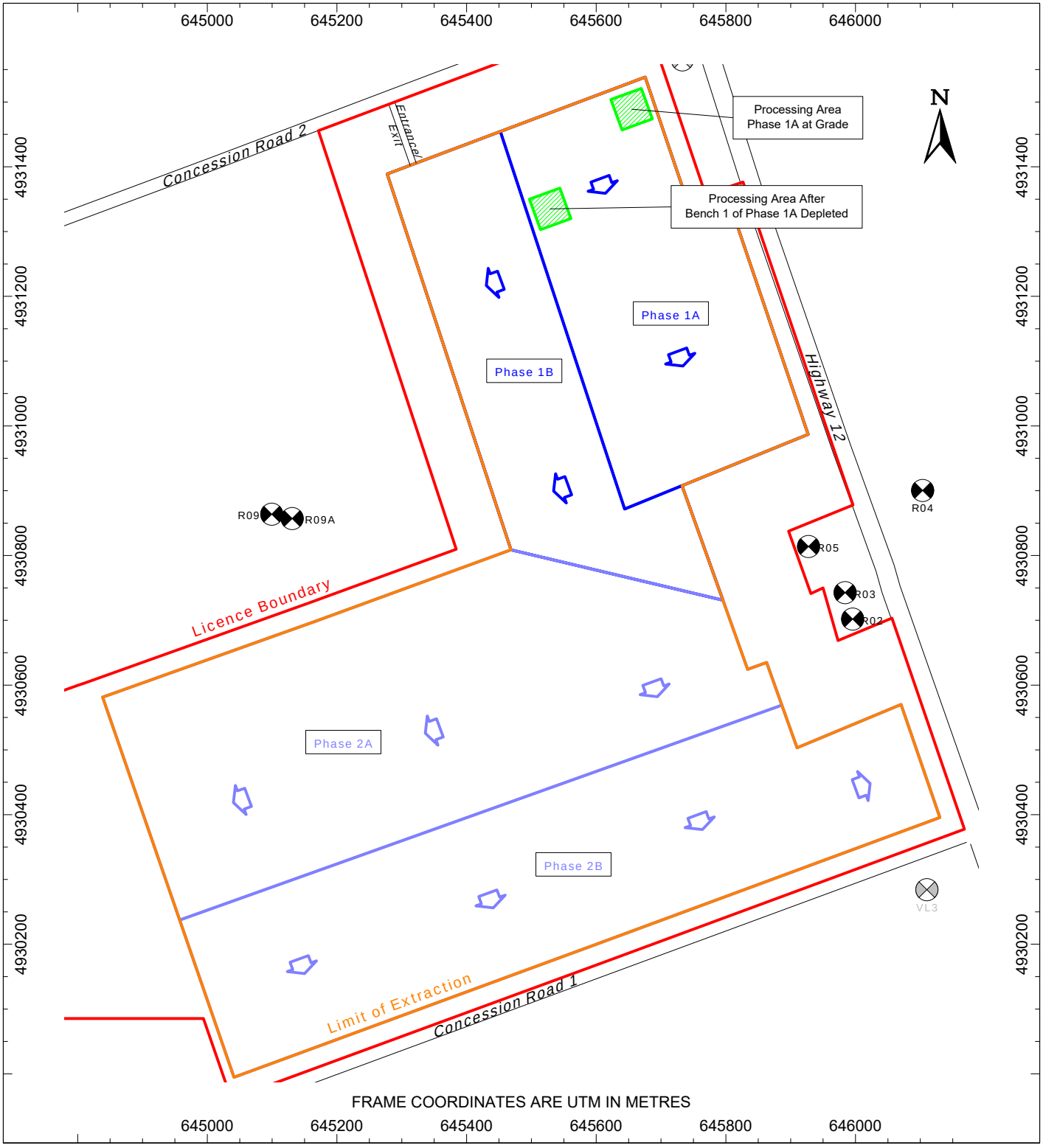

Figure 4: Operational Phases & Locations of Processing Area

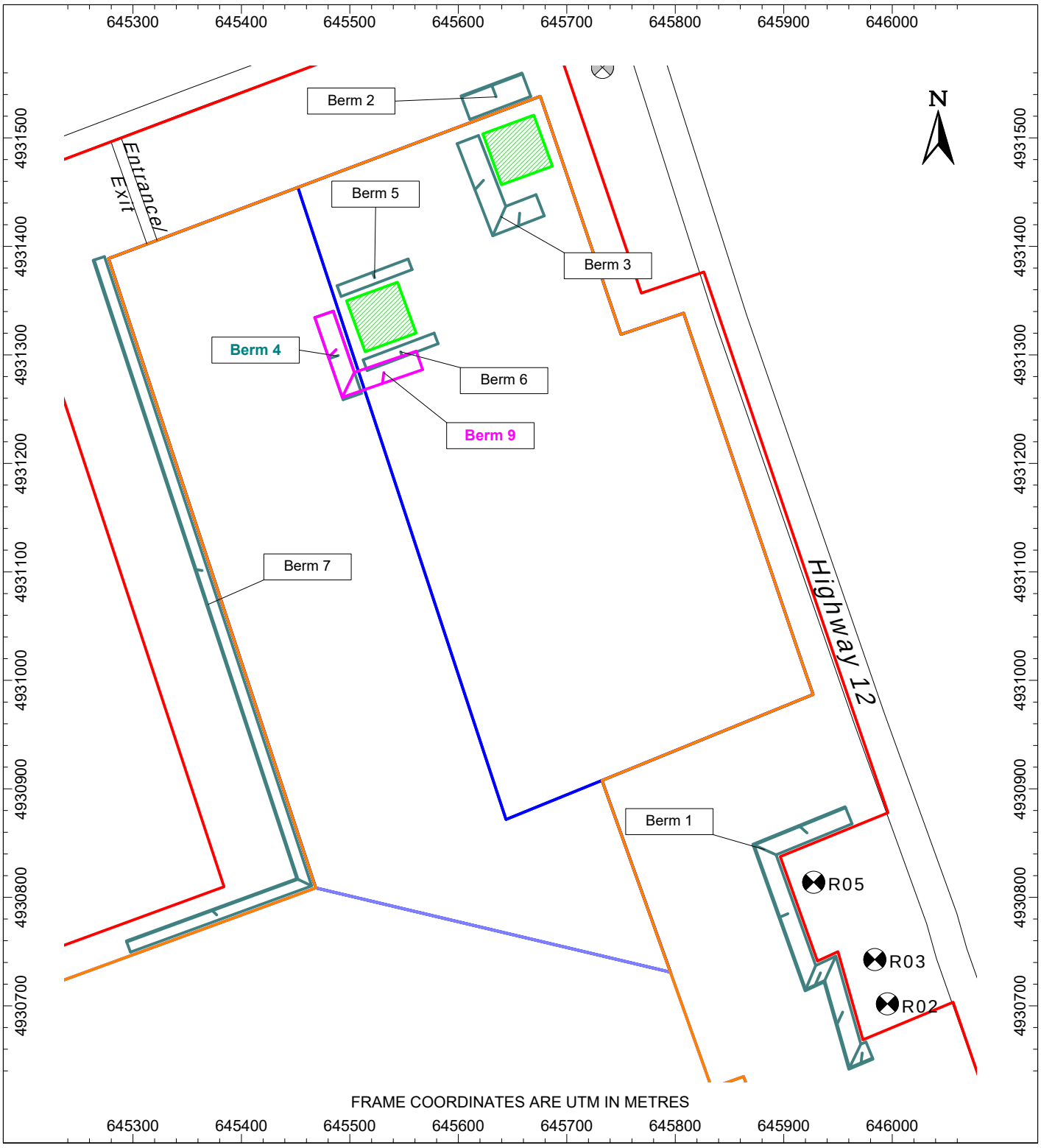

Figure 5: Noise Berms in Phases 1A & 1B

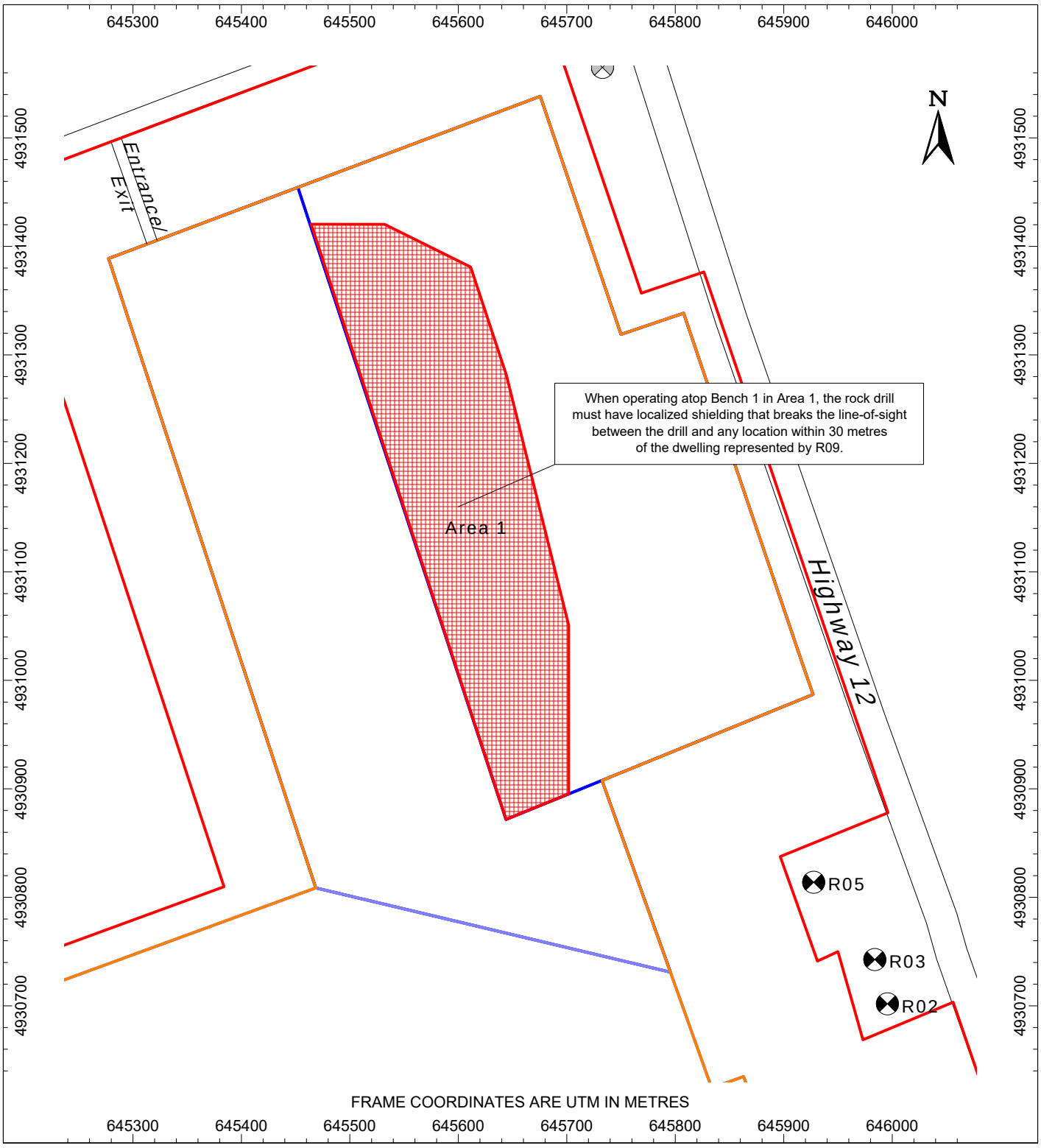

Figure 6: Operating Restrictions in Phase 1A

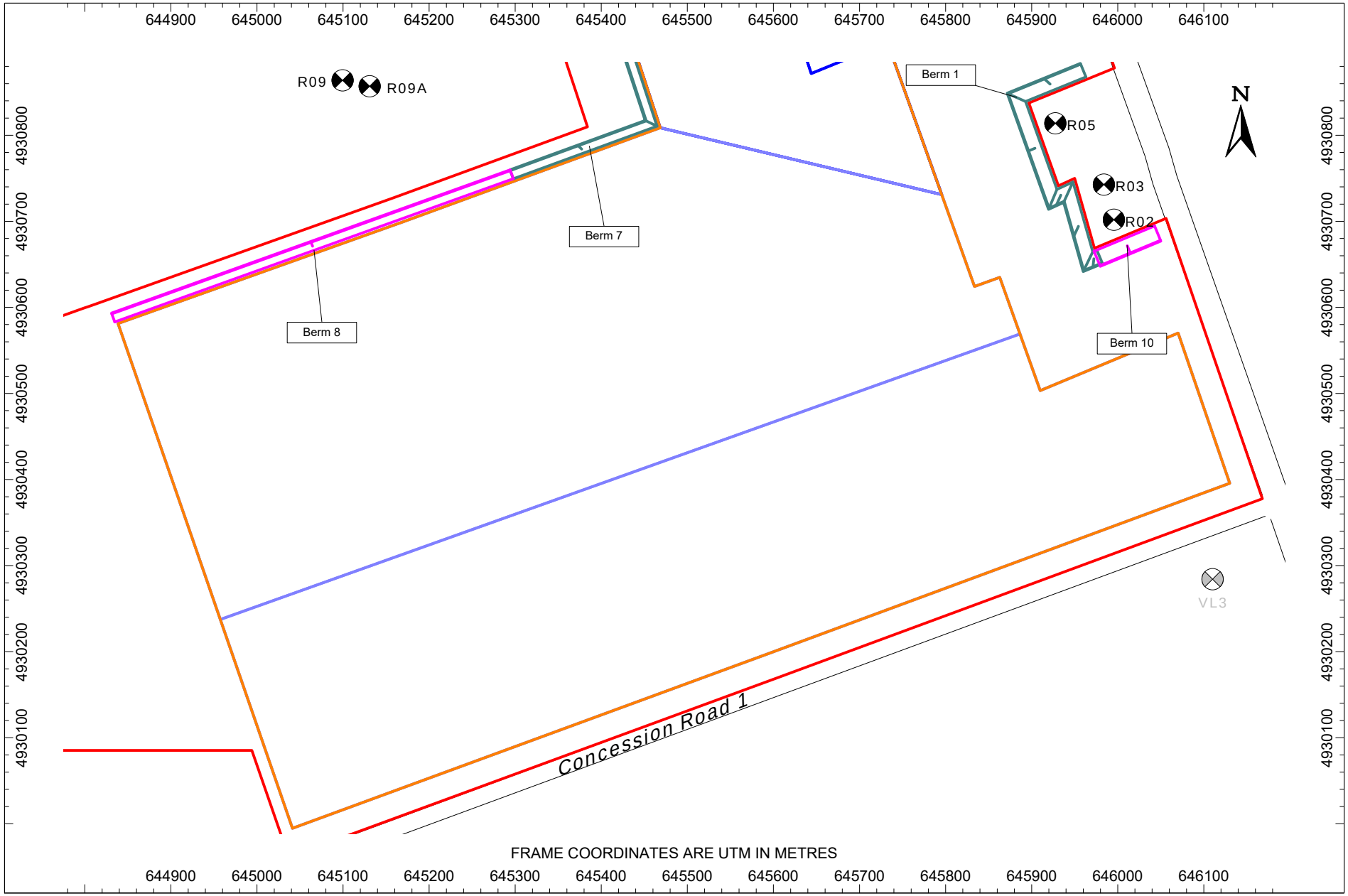

Figure 7: Noise Berms in Phases 2A & 2B

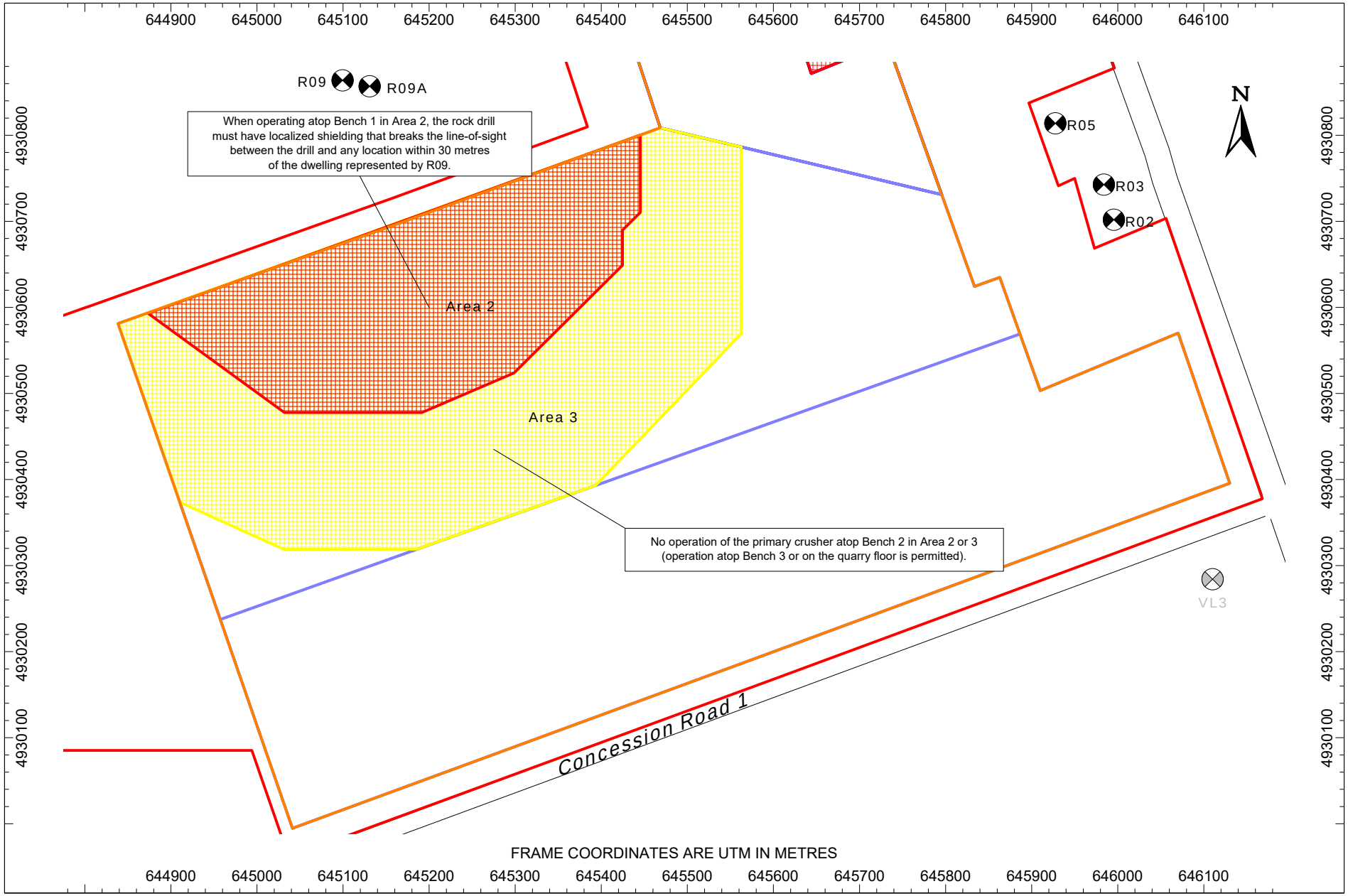

Figure 8: Operating Restrictions in Phase 2A

APPENDIX A

Details of Modelling Assumptions

In the development of worst-case hour operational scenarios with respect to each of the selected points of reception, the following assumptions were made:

- Drilling will occur during the daytime period only (07:00 to 18:00), with a drill assumed be operating at worst-case locations in terms of sound level impact at each of the surrounding receptors.

- The processing area (consisting of a secondary crusher, screens, wash plant, generators, etc.) and movements of highway trucks shipping finished product may occur between 05:30 and 18:00.

- The primary crusher will operate during the daytime period only (07:00 to 18:00) and, when moving throughout the quarry, was assumed to operate near a working face, affording 5 dBA of attenuation (in addition to attenuation afforded by the outer rim of the quarry and any noise berms) and atop Bench 2 or lower.

- One rock drill was assumed to operate atop of the highest material bench (Bench 1); when operating outside the processing area, the primary crusher was assumed to operate atop Bench 2.

- The following table presents the equipment sound emission levels employed in the analysis. All equipment was assumed to operate continuously during a predictable worst-case hour.

Table A1: Source Sound Power Levels [dBA re: 10^{-12} Watts]

Source Type/Name		Sound Power Level
Rock Drill (qty. 1)		120
Processing Area (secondary crusher, screens, wash plant, generators, etc.)		120
Primary Crusher (qty. 1)		121
Highway Trucks (each)	On Level Grade	102
	On Decline Ramps (no Jake Brake)	99
	On Incline Ramps	109

- The processing/stockpiling area will include two shipping/general loaders or excavators, which were not explicitly included in the analysis given their acoustical insignificance relative to the balance of equipment in the processing area. For the same reason, conveyors that will be used to transport material between the working face and the processing area were also not explicitly included in the analysis.

- A predictable worst-case hour of shipping was assumed to include 37 inbound and 56 outbound highway trucks, each assumed to travel along the access route between the main entrance and the processing area at an average speed of 50 km/hr.

- The localized acoustical shielding described in Appendix B was assumed to afford a modest 5 dBA reduction in equipment sound emission level.

APPENDIX B

Noise Control Recommendations

The quarry shall be limited to the following hours of operation:

- Aggregate extraction, including drilling and primary crushing is permitted Monday to Friday between 07:00 and 18:00, and on Saturdays between 07:00 and 12:00.
- Processing, loading and shipping is permitted Monday to Friday between 05:30 and 18:00, and on Saturdays between 07:00 and 12:00.
- No operations are permitted on Sundays or statutory holidays.

Acoustical Shielding

When following the active face of extraction, the primary crusher shall be located as close as possible to the excavated face of each phase, in order to maximize acoustical shielding.

Within Phase 1A the processing plant is permitted to operate at grade. Within all other phases, the primary crusher shall not operate atop Bench 1, but is permitted to operate atop Bench 2 (with the exception of the yellow hatched area in Figure 8), Bench 3, or on the quarry floor.

The following subsections refer to noise berms, the locations of which are depicted in Figures 5 and 7, and heights/extents are tabulated below:

Table B1: Summary of Noise Berm Dimensions, m

Berm	Height	Length
1	8	295
2	11	60
3	14	100
4	12	80
5	7	70
6	7	70
7	5	790
8	5	490
9	12	120
10	9	75

Note: All heights are expressed relative to the natural grade on which the berms will be located, which differs along the length of a given berm.

The berms noted above may be constructed of any earthen material (i.e. overburden or

extracted/processed aggregate materials). Berms 2 and 3, which will shield the processing area while operating at grade, may be constructed of processed aggregate materials provided they are established as soon as sufficient materials become available following initial startup of the processing area at grade.

Phase 1A

- Berm 1 shall be constructed prior to commencement of operations in Phase 1A, along with Berms 2 and 3 on the north and west/south sides of the processing area, respectively, while operating at grade.

- Following depletion of Bench 1 material in the initial extraction area and relocation of the processing area to the top of Bench 2 as indicated in Figures 4 and 5, Berms 2 and 3 may be removed and Berm 4 through 6 shall be constructed prior to extraction within the balance of Phase 1A.

- Following depletion of Bench 2 and 3 material and relocation of the processing area to the quarry floor, Berms 4 through 6 may be removed.

- Operation of the rock drill and primary crusher shall be restricted to between 07:00 and 18:00 and shall not take place simultaneously in any given hour (i.e. only one of the two may operate at a time).

- When the rock drill is operated atop Bench 1 within "Area 1" in Figure 6 (hatched in red), it shall be accompanied by localized shielding that breaks the line-of-sight between the rock drill and location R01.

Phase 1B

- Berm 7 shall be constructed prior to commencement of operations in Phase 1B.

- Operation of the rock drill and primary crusher shall be restricted to between 07:00 and 18:00 and shall not take place simultaneously in any given hour (i.e. only one of the two may operate at a time).

Phase 2A

- Berms 8 and 9 (the latter of which is on the west/south sides of the processing area) shall be constructed prior to commencement of operations in Phase 2A.

- Operation of the rock drill and primary crusher shall be restricted to between 07:00 and 18:00 and shall not take place simultaneously in any given hour (i.e. only one of the two may operate at a time).

- When the rock drill is operated atop Bench 1 within "Area 2" in Figure 8 (hatched in red), it shall be accompanied by localized shielding that breaks the line-of-sight between the rock drill and location R01.

- Within "Area 2" or "Area 3" in Figure 8 (hatched in red and yellow), the primary crusher shall not operate atop Bench 2, but is permitted to operate atop Bench 3 or on the floor of the quarry.

Phase 2B

- Berm 10 shall be constructed prior to commencement of operations in Phase 2B.

- Operation of the rock drill and primary crusher shall be restricted to between 07:00 and 18:00 and shall not take place simultaneously in any given hour (i.e. only one of the two may operate at a time).

Equipment Restrictions

The drill and processing equipment employed within the subject licensed area shall be limited to those detailed in this study, with sound power levels not greater than those in Table A1. All mobile construction equipment used to prepare for, rehabilitate, or maintain the operations shall produce sound levels which comply with MECP Guidelines NPC-115.

Variations

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 to the noise control measures may be permitted, provided that the sound level revisions can demonstrably meet the applicable MECP limits as confirmed through documentation by a professional engineer. Prior to modification, notification shall be given to the MNRF.

Vacant Lots

An updated Noise Impact Assessment, prepared by a professional engineer, will be submitted to the MNRF within 12 months following the quarry operator receiving notification of a building permit issued for a noise-sensitive use on the properties designated as VL1 through VL4 and/or VL6 in the Noise Impact Assessment completed by HGC Engineering dated October 2023. If the updated study concludes that the sound levels of the quarry may not comply with the applicable limits, the report must include the following:

- Details regarding the noise control measures required to reduce the sound levels of the quarry to comply with the applicable limits;
- A timetable for implementation of the noise control measures, including dates for achieving compliance with specific milestones;
- A timetable for submitting further assessments to demonstrate compliance with the applicable sound level limits at the properties designated as VL1 through VL4 and/or VL6.

APPENDIX C

Sample Calculations

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. Lx is the A-weighted, one-hour energy-equivalent source sound power level, which includes the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. Lr is the A-weighted, one-hour energy-equivalent sound level at the points of reception. The results are presented in terms of overall A-weighted results, at the most impacted off-site points of reception.

R01 - 1399 Highway 12	646473	4930093	236.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 2B - Worst Case R01	646112	4930409	233.4	120	65	0	0.0	-0.1	0.0	9.9	0.0	0.0	0.0	0.0	45
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	76	0	0.0	1.7	4.0	4.5	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	76	0	0.0	1.5	3.6	3.9	0.0	0.0	0.0	0.0	3
Shipping Trucks - Phase 1B Inbound Segment 3	645426	4931387	228.5	89	75	0	0.0	0.5	4.2	4.7	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Descending	645520	4931426	218.0	88	75	0	0.0	1.5	3.6	3.8	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	75	0	0.0	0.5	4.2	4.5	0.0	0.0	0.0	0.0	8
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	75	0	0.0	0.5	4.2	4.5	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Outbound Ascending	645519	4931430	217.9	100	75	0	0.0	0.7	4.2	4.2	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	75	0	0.0	0.5	4.2	4.7	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	76	0	0.0	0.6	4.2	4.3	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	76	0	0.0	1.7	4.0	4.5	0.0	0.0	0.0	0.0	6
Processing Area - Floor	645530	4931336	210.1	120	75	0	0.0	0.5	5.5	5.6	0.0	0.0	0.0	0.0	34

R02 - 1544 Highway 12	645996	4930702	237.1												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Primary at Face - Phase 2B - Worst Case R02	646072	4930530	229.0	116	57	0	0.0	6.8	7.0	0.3	0.0	0.0	0.0	0.0	45
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	71	0	0.0	3.7	3.2	2.1	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Inbound Segment 2	645350	4931383	231.6	88	70	0	0.0	3.1	3.6	1.5	0.0	0.0	0.0	0.0	9
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	70	0	0.0	2.9	3.5	1.9	0.0	0.0	0.0	0.0	11
Shipping Trucks - Phase 1B Inbound Descending	645520	4931426	218.0	88	70	0	0.0	3.2	1.8	3.3	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	69	0	0.0	3.3	3.1	2.9	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	69	0	0.0	3.3	3.1	2.9	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1B Outbound Ascending	645519	4931430	217.9	100	70	0	0.0	3.3	1.8	3.2	0.0	0.0	0.0	0.0	22
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	70	0	0.0	2.9	3.5	1.9	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Outbound Ascending	645350	4931385	231.7	99	70	0	0.0	3.2	3.0	2.0	0.0	0.0	0.0	0.0	21
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	71	0	0.0	3.7	3.2	2.1	0.0	0.0	0.0	0.0	12
Processing Area - Floor	645530	4931336	210.1	120	69	0	0.0	3.2	6.9	2.9	0.0	0.0	0.0	0.0	39

R03 - 1554 Highway 12	645984	4930743	238.7												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Primary at Face - Phase 2B - Worst Case R03	645952	4930450	229.0	116	60	0	0.0	3.3	5.5	0.6	0.0	0.0	0.0	0.0	46
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	71	0	0.0	1.6	2.6	4.1	0.0	0.0	0.0	0.0	11
Shipping Trucks - Phase 1B Inbound Segment 2	645350	4931383	231.6	88	70	0	0.0	1.8	1.9	3.6	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	70	0	0.0	0.9	3.1	3.4	0.0	0.0	0.0	0.0	12
Shipping Trucks - Phase 1B Inbound Descending	645520	4931426	218.0	88	69	0	0.0	2.0	2.7	3.0	0.0	0.0	0.0	0.0	11
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	69	0	0.0	1.4	4.7	2.5	0.0	0.0	0.0	0.0	14
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	69	0	0.0	1.4	4.7	2.5	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Outbound Ascending	645519	4931430	217.9	100	69	0	0.0	1.1	3.7	2.9	0.0	0.0	0.0	0.0	23
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	70	0	0.0	0.9	3.1	3.5	0.0	0.0	0.0	0.0	14
Shipping Trucks - Phase 1B Outbound Ascending	645350	4931384	231.8	99	70	0	0.0	1.0	2.9	3.5	0.0	0.0	0.0	0.0	22
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	71	0	0.0	1.6	2.6	4.1	0.0	0.0	0.0	0.0	13
Processing Area - Floor	645530	4931336	210.1	120	68	0	0.0	1.2	8.3	2.6	0.0	0.0	0.0	0.0	40

R04 - 1569 Highway 12	646104	4930901	236.3												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 1A - Worst Case R04	645912	4930991	240.9	120	58	0	0.0	0.3	4.6	5.9	0.0	0.0	0.0	0.0	51
Shipping Trucks - Phase 1A Inbound Segment 1	645359	4931395	234.5	95	70	0	0.0	4.3	2.0	3.7	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1A Inbound Descending	645521	4931425	231.1	88	69	0	0.0	2.9	1.4	3.4	0.0	0.0	0.0	0.0	11
Shipping Trucks - Phase 1A Inbound Segment 2	645580	4931427	228.5	92	68	0	0.0	2.7	1.5	3.4	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1A Outbound Segment 1	645580	4931431	228.5	94	68	0	0.0	2.7	1.5	3.4	0.0	0.0	0.0	0.0	18
Shipping Trucks - Phase 1A Outbound Ascending	645521	4931430	231.0	100	69	0	0.0	3.0	3.0	1.6	0.0	0.0	0.0	0.0	23
Shipping Trucks - Phase 1A Outbound Segment 2	645360	4931403	234.5	96	70	0	0.0	4.2	2.0	3.7	0.0	0.0	0.0	0.0	16
Processing Area - Floor	645532	4931341	229.0	120	68	0	0.0	2.9	4.3	3.2	0.0	0.0	0.0	0.0	42

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

R05 - 1570 Highway 12	645928	4930814	243.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Primary at Face - Phase 1B - Worst Case R05	645632	4930690	228.0	116	61	0	0.0	1.1	6.9	0.7	0.0	0.0	0.0	0.0	46
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	70	0	0.0	0.6	3.3	3.6	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	69	0	0.0	0.2	3.3	3.2	0.0	0.0	0.0	0.0	12
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	69	0	0.0	-0.5	4.3	3.0	0.0	0.0	0.0	0.0	14
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.5	88	68	0	0.0	0.3	4.1	2.7	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	68	0	0.0	-0.4	5.9	2.3	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	68	0	0.0	-0.4	5.9	2.3	0.0	0.0	0.0	0.0	18
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	68	0	0.0	-0.4	4.7	2.5	0.0	0.0	0.0	0.0	25
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	69	0	0.0	-0.5	4.3	3.0	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	69	0	0.0	-0.5	4.0	3.0	0.0	0.0	0.0	0.0	24
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	70	0	0.0	0.6	3.3	3.6	0.0	0.0	0.0	0.0	15
Processing Area - Floor	645529	4931335	210.1	120	67	0	0.0	-0.6	6.7	2.4	0.0	0.0	0.0	0.0	45

R07 - 1842 Highway 12	645412	4932047	237.0												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case R07	645612	4931511	233.5	120	66	0	0.0	0.1	0.0	10.8	0.0	0.0	0.0	0.0	43
Shipping Trucks - At Grade Inbound	645410	4931405	234.5	97	67	0	0.0	0.7	0.3	2.6	0.0	0.0	0.0	0.0	27
Shipping Trucks - At Grade Outbound	645411	4931412	234.5	99	67	0	0.0	0.8	0.3	2.6	0.0	0.0	0.0	0.0	28
Primary in Processing Area - At Grade (Phase 1)	645652	4931485	235.1	121	67	0	0.0	2.0	4.6	1.4	0.0	0.0	0.0	0.0	46
Processing Area - At Grade (Phase 1)	645652	4931485	235.1	120	67	0	0.0	1.4	6.2	2.1	0.0	0.0	0.0	0.0	44

R07A - 1842 Highway 12 - Outdoor Living Area	645416	4932018	233.3												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case R07A	645612	4931511	233.5	120	66	0	0.0	0.5	0.0	10.5	0.0	0.0	0.0	0.0	43
Shipping Trucks - At Grade Inbound	645410	4931405	234.5	97	67	0	0.0	2.5	0.3	2.5	0.0	0.0	0.0	0.0	25
Shipping Trucks - At Grade Outbound	645411	4931412	234.5	99	67	0	0.0	2.5	0.3	2.4	0.0	0.0	0.0	0.0	27
Primary in Processing Area - At Grade (Phase 1)	645651	4931485	235.1	121	66	0	0.0	3.8	4.1	1.3	0.0	0.0	0.0	0.0	45
Processing Area - At Grade (Phase 1)	645651	4931485	235.1	120	66	0	0.0	4.3	4.5	2.1	0.0	0.0	0.0	0.0	43

R08 - 2101 Concession Road 1	646727	4930476	234.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Primary at Face - Phase 2B - Worst Case R08	646092	4930410	229.0	116	67	0	0.0	2.5	2.3	2.0	0.0	0.0	0.0	0.0	42
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	76	0	0.0	1.7	4.0	4.3	0.0	0.0	0.0	0.0	5
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	75	0	0.0	1.4	3.6	3.8	0.0	0.0	0.0	0.0	3
Shipping Trucks - Phase 1B Inbound Segment 3	645426	4931387	228.5	89	75	0	0.0	0.5	4.2	4.5	0.0	0.0	0.0	0.0	5
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.5	88	75	0	0.0	1.6	3.6	3.6	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	74	0	0.0	0.6	4.2	4.3	0.0	0.0	0.0	0.0	8
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	74	0	0.0	0.6	4.2	4.3	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	75	0	0.0	0.7	4.2	4.0	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931392	228.5	91	75	0	0.0	0.5	4.2	4.5	0.0	0.0	0.0	0.0	7
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	75	0	0.0	0.6	4.2	4.2	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	76	0	0.0	1.7	4.0	4.3	0.0	0.0	0.0	0.0	6
Processing Area - Floor	645527	4931329	210.1	120	74	0	0.0	0.3	4.6	5.0	0.0	0.0	0.0	0.0	36

R09 - 2401 Concession Road 2	645100	4930864	241.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case R09	645512	4931431	234.0	120	68	0	0.0	-0.6	0.0	11.8	0.0	0.0	0.0	0.0	41
Shipping Trucks - At Grade Inbound	645412	4931407	234.5	97	67	0	0.0	0.7	0.2	2.7	0.0	0.0	0.0	0.0	26
Shipping Trucks - At Grade Outbound	645416	4931420	234.5	99	67	0	0.0	0.7	0.2	2.8	0.0	0.0	0.0	0.0	28
Primary in Processing Area - At Grade (Phase 1)	645655	4931489	235.1	121	69	0	0.0	1.1	6.8	1.7	0.0	0.0	0.0	0.0	42
Processing Area - At Grade (Phase 1)	645655	4931489	235.1	120	69	0	0.0	0.6	8.5	2.7	0.0	0.0	0.0	0.0	39

R09A - 2401 Concession Road 2 - Outdoor Living Area	645131	4930857	238.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 2A - Worst Case R09A	645452	4930751	240.4	120	62	0	0.0	0.4	5.2	7.9	0.0	0.0	0.0	0.0	45
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931455	234.4	90	67	0	0.0	1.9	2.4	3.1	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	66	0	0.0	3.1	1.8	2.5	0.0	0.0	0.0	0.0	14
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	67	0	0.0	3.0	1.6	2.9	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1B Inbound Descending	645522	4931427	217.5	88	68	0	0.0	3.1	1.8	2.9	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	68	0	0.0	3.2	2.5	2.7	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	68	0	0.0	3.2	2.5	2.8	0.0	0.0	0.0	0.0	17
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	68	0	0.0	1.8	3.1	2.8	0.0	0.0	0.0	0.0	25
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	67	0	0.0	3.0	1.6	2.9	0.0	0.0	0.0	0.0	17
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	66	0	0.0	1.9	2.9	2.5	0.0	0.0	0.0	0.0	26
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	67	0	0.0	1.9	2.5	3.1	0.0	0.0	0.0	0.0	18
Processing Area - Floor	645529	4931335	210.1	120	67	0	0.0	4.4	10.7	1.7	0.0	0.0	0.0	0.0	37

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

R10 - 2549 Concession Road 2	644207	4930993	236.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 2A - Worst Case R10	644852	4930569	238.1	120	69	0	0.0	0.0	0.0	12.3	0.0	0.0	0.0	0.0	39
Shipping Trucks - Phase 1B Inbound Segment 1	645299	4931453	234.4	90	72	0	0.0	1.2	0.1	4.2	0.0	0.0	0.0	0.0	12
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	73	0	0.0	2.2	3.6	2.8	0.0	0.0	0.0	0.0	7
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	73	0	0.0	0.7	4.2	3.8	0.0	0.0	0.0	0.0	7
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.5	88	74	0	0.0	2.1	4.1	3.7	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	74	0	0.0	0.7	4.6	4.1	0.0	0.0	0.0	0.0	8
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	74	0	0.0	0.7	4.6	4.1	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	74	0	0.0	1.2	5.0	3.9	0.0	0.0	0.0	0.0	16
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	73	0	0.0	0.7	4.2	3.8	0.0	0.0	0.0	0.0	9
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	73	0	0.0	1.3	4.1	3.1	0.0	0.0	0.0	0.0	18
Shipping Trucks - Phase 1B Outbound Segment 3	645302	4931452	234.4	92	72	0	0.0	1.2	0.1	4.2	0.0	0.0	0.0	0.0	14
Processing Area - Floor	645524	4931341	210.1	120	74	0	0.0	1.0	8.1	4.2	0.0	0.0	0.0	0.0	33

R11 - 2239 Ramara Road 47	643683	4930518	234.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Primary at Face - Phase 2A - Worst Case R11	644992	4930330	229.0	116	73	0	0.0	1.9	3.0	3.3	0.0	0.0	0.0	0.0	34
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	76	0	0.0	1.6	0.3	5.7	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	76	0	0.0	2.5	3.3	4.0	0.0	0.0	0.0	0.0	1
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	77	0	0.0	1.0	4.0	5.2	0.0	0.0	0.0	0.0	2
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.5	88	77	0	0.0	2.2	3.7	4.3	0.0	0.0	0.0	0.0	1
Shipping Trucks - Phase 1B Inbound Segment 4	645578	4931423	209.6	92	77	0	0.0	1.0	4.1	5.5	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Outbound Segment 1	645578	4931427	209.6	94	77	0	0.0	1.0	4.1	5.5	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	77	0	0.0	1.3	4.4	4.8	0.0	0.0	0.0	0.0	12
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	77	0	0.0	1.0	4.0	5.2	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	76	0	0.0	1.6	4.0	4.4	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	76	0	0.0	1.6	0.3	5.7	0.0	0.0	0.0	0.0	8
Processing Area - Floor	645520	4931340	210.1	120	77	0	0.0	1.4	6.7	5.4	0.0	0.0	0.0	0.0	30

R12 - 2409 Ramara Road 47	643898	4930841	236.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case R12	645512	4931471	233.9	120	76	0	0.0	-0.5	0.0	17.1	0.0	0.0	0.0	0.0	27
Shipping Trucks - At Grade Inbound	645411	4931405	234.5	97	75	0	0.0	1.0	0.1	5.3	0.0	0.0	0.0	0.0	16
Shipping Trucks - At Grade Outbound	645411	4931412	234.5	99	75	0	0.0	1.0	0.1	5.3	0.0	0.0	0.0	0.0	17
Primary in Processing Area - At Grade (Phase 1)	645651	4931487	235.0	121	76	0	0.0	1.4	3.8	4.0	0.0	0.0	0.0	0.0	35
Processing Area - At Grade (Phase 1)	645651	4931487	235.0	120	76	0	0.0	0.9	5.0	5.7	0.0	0.0	0.0	0.0	32

R13 - 2092 Ramara Road 47	643762	4929822	233.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Primary at Face - Phase 2A - Worst Case R13	644992	4930330	229.0	116	73	0	0.0	2.0	3.1	3.3	0.0	0.0	0.0	0.0	34
Shipping Trucks - Phase 1B Inbound Segment 1	645299	4931453	234.4	90	78	0	0.0	1.8	0.8	6.3	0.0	0.0	0.0	0.0	3
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	78	0	0.0	2.6	3.2	4.6	0.0	0.0	0.0	0.0	--
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	78	0	0.0	1.1	4.0	5.8	0.0	0.0	0.0	0.0	0
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.5	88	79	0	0.0	2.3	3.4	4.9	0.0	0.0	0.0	0.0	--
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	79	0	0.0	1.1	3.9	6.1	0.0	0.0	0.0	0.0	2
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	79	0	0.0	1.1	4.0	6.1	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	78	0	0.0	1.5	4.3	5.3	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	78	0	0.0	1.1	4.0	5.8	0.0	0.0	0.0	0.0	2
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	78	0	0.0	1.6	3.9	5.1	0.0	0.0	0.0	0.0	11
Shipping Trucks - Phase 1B Outbound Segment 3	645302	4931453	234.4	92	78	0	0.0	1.8	0.9	6.2	0.0	0.0	0.0	0.0	5
Processing Area - Floor	645529	4931335	210.1	120	78	0	0.0	1.3	5.3	6.4	0.0	0.0	0.0	0.0	29

VL1 - Vacant Lot 1	644718	4931349	235.3												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case VL1	645472	4931449	234.0	120	69	0	0.0	0.0	0.0	12.2	0.0	0.0	0.0	0.0	39
Shipping Trucks - At Grade Inbound	645411	4931405	234.5	97	68	0	0.0	0.8	0.0	2.8	0.0	0.0	0.0	0.0	26
Shipping Trucks - At Grade Outbound	645409	4931410	234.5	99	68	0	0.0	0.8	0.0	2.9	0.0	0.0	0.0	0.0	27
Primary in Processing Area - At Grade (Phase 1)	645650	4931496	235.0	121	71	0	0.0	0.7	4.0	2.5	0.0	0.0	0.0	0.0	43
Processing Area - At Grade (Phase 1)	645650	4931496	235.0	120	71	0	0.0	0.2	4.7	3.9	0.0	0.0	0.0	0.0	41

VL2 - Vacant Lot 2	645778	4931899	236.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case VL2	645672	4931529	233.8	120	63	0	0.0	0.0	0.0	8.8	0.0	0.0	0.0	0.0	48
Shipping Trucks - At Grade Inbound	645410	4931405	234.5	97	67	0	0.0	0.6	2.0	1.7	0.0	0.0	0.0	0.0	26
Shipping Trucks - At Grade Outbound	645415	4931417	234.5	99	66	0	0.0	0.6	1.8	1.7	0.0	0.0	0.0	0.0	28
Primary in Processing Area - At Grade (Phase 1)	645645	4931499	234.9	121	64	0	0.0	0.6	0.3	1.4	0.0	0.0	0.0	0.0	55
Processing Area - At Grade (Phase 1)	645645	4931499	234.9	120	64	0	0.0	0.2	0.4	2.3	0.0	0.0	0.0	0.0	54

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

VL3 - Vacant Lot 3	646110	4930284	235.7												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 2B - Worst Case VL3	646052	4930369	234.1	120	51	0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	65
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	74	0	0.0	0.7	4.2	3.8	0.0	0.0	0.0	0.0	8
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	73	0	0.0	0.4	4.0	3.6	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	73	0	0.0	-0.3	4.4	4.0	0.0	0.0	0.0	0.0	8
Shipping Trucks - Phase 1B Inbound Descending	645521	4931426	217.8	88	73	0	0.0	0.5	4.0	3.4	0.0	0.0	0.0	0.0	7
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	73	0	0.0	-0.4	4.4	3.9	0.0	0.0	0.0	0.0	11
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	73	0	0.0	-0.4	4.4	3.9	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	73	0	0.0	-0.2	4.4	3.7	0.0	0.0	0.0	0.0	19
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	73	0	0.0	-0.3	4.4	4.1	0.0	0.0	0.0	0.0	10
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	74	0	0.0	-0.4	4.4	3.8	0.0	0.0	0.0	0.0	18
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	74	0	0.0	0.7	4.2	3.8	0.0	0.0	0.0	0.0	9
Processing Area - Floor	645533	4931334	210.1	120	73	0	0.0	-0.3	7.3	4.5	0.0	0.0	0.0	0.0	36

VL4 - Vacant Lot 4	644754	4929782	247.5												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 2B - Worst Case VL4/VL5	645032	4930031	244.2	120	62	0	0.0	0.0	0.0	8.6	0.0	0.0	0.0	0.0	49
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	76	0	0.0	2.1	3.9	4.3	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	76	0	0.0	1.7	3.6	3.9	0.0	0.0	0.0	0.0	3
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	76	0	0.0	0.4	4.2	4.9	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.7	88	76	0	0.0	1.5	3.6	4.1	0.0	0.0	0.0	0.0	3
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	76	0	0.0	0.2	4.2	5.1	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	76	0	0.0	0.2	4.2	5.1	0.0	0.0	0.0	0.0	8
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931431	217.6	100	76	0	0.0	0.6	4.2	4.5	0.0	0.0	0.0	0.0	15
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	76	0	0.0	0.4	4.2	4.9	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	76	0	0.0	0.8	4.1	4.3	0.0	0.0	0.0	0.0	14
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931453	234.4	92	76	0	0.0	2.1	3.9	4.3	0.0	0.0	0.0	0.0	6
Processing Area - Floor	645529	4931335	210.1	120	76	0	0.0	0.4	6.0	5.3	0.0	0.0	0.0	0.0	33

VL5 - Vacant Lot 5	644377	4929779	242.2												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - Phase 2B - Worst Case VL4/VL5	645032	4930031	244.2	120	68	0	0.0	0.0	0.0	11.8	0.0	0.0	0.0	0.0	40
Shipping Trucks - Phase 1B Inbound Segment 1	645298	4931454	234.4	90	77	0	0.0	1.8	1.6	5.3	0.0	0.0	0.0	0.0	5
Shipping Trucks - Phase 1B Inbound Segment 2	645348	4931383	231.8	88	76	0	0.0	2.2	3.4	4.1	0.0	0.0	0.0	0.0	2
Shipping Trucks - Phase 1B Inbound Segment 3	645427	4931388	228.5	89	77	0	0.0	0.9	4.1	5.2	0.0	0.0	0.0	0.0	2
Shipping Trucks - Phase 1B Inbound Descending	645522	4931426	217.5	88	77	0	0.0	1.9	3.4	4.4	0.0	0.0	0.0	0.0	1
Shipping Trucks - Phase 1B Inbound Segment 4	645580	4931427	209.6	92	77	0	0.0	0.7	4.1	5.4	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Outbound Segment 1	645580	4931431	209.6	94	77	0	0.0	0.7	4.1	5.4	0.0	0.0	0.0	0.0	6
Shipping Trucks - Phase 1B Outbound Ascending	645521	4931430	217.4	100	77	0	0.0	1.0	4.0	4.8	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Outbound Segment 2	645425	4931393	228.5	91	77	0	0.0	0.9	4.1	5.2	0.0	0.0	0.0	0.0	4
Shipping Trucks - Phase 1B Outbound Ascending	645346	4931386	232.0	99	76	0	0.0	1.3	4.0	4.5	0.0	0.0	0.0	0.0	13
Shipping Trucks - Phase 1B Outbound Segment 3	645301	4931452	234.4	92	77	0	0.0	1.9	1.7	5.3	0.0	0.0	0.0	0.0	7
Processing Area - Floor	645529	4931335	210.1	120	77	0	0.0	1.1	7.0	5.2	0.0	0.0	0.0	0.0	30

VL6 - Vacant Lot 6	645733	4931565	236.7												
Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drill - At Grade - Worst Case VL6	645672	4931529	233.8	120	48	0	0.0	-0.1	0.0	2.7	0.0	0.0	0.0	0.0	69
Shipping Trucks - At Grade Inbound	645407	4931406	234.5	97	58	0	0.0	-0.3	4.3	1.0	0.0	0.0	0.0	0.0	35
Shipping Trucks - At Grade Outbound	645409	4931419	234.5	99	57	0	0.0	-0.3	3.9	1.0	0.0	0.0	0.0	0.0	37
Primary in Processing Area - At Grade (Phase 1)	645658	4931490	235.1	121	52	0	0.0	0.1	0.0	0.4	0.0	0.0	0.0	0.0	68
Processing Area - At Grade (Phase 1)	645658	4931490	235.1	120	52	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	68

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

APPENDIX D

Consultant Curriculum Vitae

Corey D. Kinart

Senior Associate, MBA, PEng

ckinart@hgcengineering.com
Ph: 905-826-4044

Toronto
HGC Engineering
2000 Argentia Road,
Plaza 1, Suite 203
Mississauga, Ontario L5N 1P7
Canada
Ph: 905-826-4044

Calgary
HGC Engineering
444-5th Avenue SW, Suite 1620
Calgary, Alberta, T2P 2T8
Canada
Ph: 587-441-1583

www.hgcengineering.com

ACOUSTICS NOISE VIBRATION

Education

University of Waterloo, Bachelor of Applied Science, Mechanical Engineering, 2001
Schulich School of Business, York University, Master of Business Administration, 2015

Professional Memberships

Professional Engineers Ontario (PEO)
Canadian Acoustical Association (CAA)

Professional History

2009 to present	Senior Associate, HGC Engineering, Mississauga
2006 to 2009	Project Engineer, HGC Engineering, Mississauga
2001 to 2006	Mechanical Engineer, Magellan Aerospace, Mississauga
2000 to 2001	Contract Engineer, HGC Engineering, Mississauga

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 Limited, Numerous sites throughout Ontario
General Dynamics Land Systems, London, Ontario
Vale, Copper Cliff & Garson, Ontario
Suncor Energy Products Inc., Mooretown, Ontario
Lafarge Canada Inc., Numerous sites throughout Ontario
National Gas Company of Trinidad & Tobago, Trinidad & Tobago
General Motors, St. Catharines, Ontario
Enbridge Gas Distribution, Numerous sites throughout Ontario
Petro-Canada, Mississauga, Ontario
TransCanada Pipelines Ltd., Numerous sites in Ontario and Western Canada
Canada Building Materials, Numerous sites throughout Ontario
DeBeers Victor Mine Project, Northern Ontario
Staatsolie, Tout Lui Faut, Suriname
Dufferin Concrete, Numerous sites throughout Ontario
NOVA Chemicals, Corunna, Mooretown & St. Clair, Ontario
Hydro One, Numerous sites throughout Ontario

William J. Gastmeier

Principal, MASc, PEng

bgastmeier@hgcengineering.com
Ph: 905-826-4044

Toronto
HGC Engineering
2000 Argentia Road,
Plaza 1, Suite 203,
Mississauga, Ontario L5N 1P7
Canada
Ph: 905-826-4044

Calgary
HGC Engineering
444-5th Avenue SW, Suite 1620
Calgary, Alberta, T2P 2T8
Canada
Ph: 587-441-1583

www.hgcengineering.com

ACOUSTICS NOISE VIBRATION

Education

University of Waterloo, Master of Applied Science, 1976
University of Waterloo, Bachelor of Science, 1974

Professional Memberships

Professional Engineers of Ontario (PEO)
Acoustical Society of America (ASA)
Audio Engineering Society (AES)
Canadian Acoustical Association (CAA)

Professional History

1994 to Present	Principal, HGC Engineering, Mississauga
1998 to 2017	Lecturer, Dalhousie University, Halifax, NS
1988 to 2018	Adjunct Professor, University of Waterloo, Waterloo
1988 to 1994	Project Coordinator, Vibron Limited, Mississauga
1978 to 1988	Electroacoustics Manager, Unitron Industries, Kitchener
1976 to 1978	Microphone Engineer, Turner Company, Cedar Rapids, IA

Experience

Mr Gastmeier's areas of expertise include the acoustical design of buildings, environmental noise, and mechanical noise control. He specialises in architectural acoustics for lecture, workplace, performance and multi-use spaces and is expert in thedesign of acoustical test facilities, residential developments and community noise issues.

Selected Projects

St. Andrew's College, Toronto
Bishop Strachan School, Toronto
Conrad Grebel College, Waterloo
Upper Canada College, Toronto
Royal St. George's College,
Toronto
Humber Arts & Media Studio, Toronto
Bergeron Centre for Engineering Excellence, York
UniversityThe Maitland Recreation Centre , Goderich
Ontario
Centennial Centre for Integrated Sciences, University of Alberta,
EdmontonPiqqusilirivvik Gathering Place Iqualuit, Nunavit
University of Waterloo School of Architecture, Waterloo
Fanshawe College Centre for Digital & Performance Arts,
LondonUniversity of Toronto's Student Commons, St. George
Campus Mitchel Hall, Queens University, Kingston
University of Windsor School of Creative Arts, Windsor
Lancer Sport and Recreation Centre (LSRC), University of Windsor,
Windsor
L.R. Wilson Hall, McMaster University,