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NOISE IMPACT STUDY – **Project: 16099.01**

Strada Aggregates
Strada Pit/Quarry
Township of Melancthon

Prepared for:

Strada Aggregates
30 Floral Pkwy, Concord,
ON L4K 4R1

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January 24, 2025

Revision History

Version	Description	Author	Reviewed	Date
- -	Initial Report	KC	DF	May 17, 2024
R1	Minor revisions to extraction limit; no changes to noise controls or conclusions.	KC	DF	January 24, 2025

Important Notice and Disclaimer

Table of Contents

1 Introduction

Aercoustics Engineering Limited has been retained by Strada Aggregates to prepare a Noise Impact Study (NIS) for the proposed pit and quarry operation as part of a licence application under the Aggregate Resources Act (ARA).

Strada Aggregates is applying for a Class A licence for the proposed consolidated Strada Pit/Quarry located at Concession 3 Lot 14 through 11, Township of Melancthon, Dufferin County, Ontario. Strada Aggregates currently operates three pits at this location which are licenced under the ARA for extraction of unconsolidated materials under licences 626199, 129167, and 625155.

Strada Aggregates is seeking approvals for an ARA pit and quarry licence application to permit access and extraction of consolidated material below the existing pits. The current license permits up to 1.25 million tonnes per year and the proposed application would increase the limit to 2.0 million tonnes per year.

The total pit extraction area under the existing licences comprises approximately 123.7 HA and the proposed quarry extraction area comprises approximately 65.7 HA.

The purpose of this study is to evaluate the predictable worst-case noise impacts associated with the proposed operations and, where necessary, to provide noise control recommendations to satisfy the Ministry of the Environment, Conservation, and Parks (MECP) noise guidelines.

Sound level limits for the aggregate pit noise on the nearby noise-sensitive receptors were first established based on “Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning”, dated August 2013 (NPC-300). Where the predicted levels were found to exceed the MECP sound level limits, noise control measures are proposed to satisfy these limits.

Figure 1 provides a key plan showing the proposed location of the proposed aggregate pit/quarry. Figure 2 shows the site plan, including the critical noise sensitive receptors. Noise control recommendations are provided in Appendix A and are illustrated in Figures 2 through 14. Figure 15 includes an illustration of the existing and proposed perimeter berms.

This report has been revised from its original version to account for a minor 0.1 HA change to the extraction limit. This change was confirmed not to impact the noise impact predictions or resulting noise controls.

2 Site Description

The existing Strada Pit, which comprises ARA licences 626199, 129167, and 62515, is situated at Concession 3 Lot 14 through 1, in Dufferin County, Ontario. The operation proposed in this licence application will occupy the combined boundary of these existing licences as a consolidated licence boundary.

The site is bounded by 4th Line to the west, Dufferin County Road 17 to the south, 3rd Line to the east, and Side Road 15 to the north. The surrounding land uses are predominantly Agricultural and Extractive Industrial, with rurally-zoned lands further from the site.

There are existing licenced aggregate operations to the immediate west and east of Strada's existing site, having ARA Licence numbers 3726 and 3512.

4th Line, Dufferin County Road 17, 3rd Line, and Side Road 15 are active roadways and sources of noise for receptors in the area.

Figure 1 provides a key plan showing the location of the Strada Pit/Quarry and the surrounding area, which includes existing single-family dwellings identified as Receptors R01 through R29.

3 Noise Criteria

3.1 Acoustical Classification

The appropriate noise criteria for the receptors in the vicinity of the proposed Strada Pit/Quarry were based on the MECP Noise Pollution Control document NPC-300.

During Aercoustics' site visit on November 24, 2022, road traffic noise from 3rd Line, Dufferin County Road 17, and 4th Line was observed to be clearly audible and dominant at dwellings near the roadway.

Points of reception R01 to R13 have an ambient acoustical environment consistent with the Class 2 designation as defined by the MECP Publication NPC 300. In a Class 2 area, the background sound levels during the daytime are dominated by the activities of people, usually road traffic, and during evening and nighttime periods the background sound levels are defined by natural sounds. In this case, the man-made noise sources primarily include road traffic on 4th Line, Dufferin County Road 17, and 3rd Line as observed by Aercoustics staff during a site visit on November 11, 2022.

Points of reception R14 through R29 have an ambient acoustical environment consistent with Class 3 designation. In a Class 3 area, the acoustical environment is dominated by natural sounds with little or no road traffic and infrequent human activity.

3.2 MECP Sound Level Limits

The applicable limits for noise from a stationary source at a noise-sensitive point of reception (receptor) in a Class 2 and Class 3 area are summarized in Table 1 below:

Table 1: Noise Exclusion Limits – Class 2 and Class 3

Time of Day	Sound Level Exclusion Limit* Class 2 Area	Sound Level Exclusion Limit* Class 3 Area
Daytime (07:00 to 19:00)	50 dBA	45 dBA
Evening (19:00 to 23:00)	50 dBA	45 dBA
Nighttime (23:00 to 07:00)	45 dBA	40 dBA

*or the minimum existing hourly background sound level Leq, whichever is higher

The MECP sound level limit is determined by the exclusion limit listed above or the minimum hourly equivalent background sound level, whichever is higher. The background sound level may increase the sound level limit for some of the receptors in this study, particularly those near busy roads. For conservatism and simplicity, the exclusion limit was used for all receptors in this study.

3.3 Vacant Lot Receptors

The MECP requires consideration of vacant lots which are zoned to allow sensitive uses. There are several vacant lots with rural and agricultural zoning surrounding the site which permit the construction of a dwelling. Representative receptors have been included in the assessment and placed according to NPC-300. These vacant lot receptors are designated by receptors VL30 through VL37.

Vacant Lot receptors VL30 through VL37 are consistent with a Class 2 designation, as any future noise-sensitive land uses developed at these locations will have been constructed near licensed aggregate operations, where daytime sound levels would be expected to be dominated by human activity. Class 2 sound level limits are included in Section 3.2 above.

VL37 is located to the northwest of the Strada Pit/Quarry and will require additional noise controls if a dwelling is constructed.

None of the other vacant lots permitting sensitive uses are situated closer to the site than the existing receptors identified; a demonstration of compliance with the sound level limits at nearby receptors is an indication of compliance at those situated further from the site.

4 Aggregate Operations

The site plans for the consolidated Strada Pit/Quarry outline the phases of extraction as well as the direction of operations in each phase. The operations generally comprise the following:

- Site preparation and rehabilitation;
- Extraction and processing; and
- Shipment off-site.

4.1 Hours of Operation

The proposed hours of operation are as summarized below in Table 2.

Table 2: Operating Hours of Strada Pit/Quarry

Time of Day	Day of Week	Operations
07:00 – 19:00	Monday to Friday	Extraction, Processing, and Loading & Shipping
07:00 – 19:00	Saturday	Extraction and Processing
07:00 – 17:00	Saturday	Loading & Shipping
06:00 – 07:00	Monday to Saturday	Loading & Shipping

At no time shall extraction, processing, or shipping take place on a statutory holiday. Equipment maintenance may take place outside of these normal operating hours.

4.2 Site Preparation and Rehabilitation

Site preparations include the removal of topsoil and overburden as well as the construction of berms and visual screens specified on the site plan. While most of the berms considered in this study have already been constructed, some will need to be constructed prior to the extraction and processing of certain phases of the pit/quarry, as described in Appendix A. This work will be done primarily with bulldozers, scrapers, trucks, loaders, and excavators. Rehabilitation phases will involve similar equipment in establishing the final grade of the site.

The site preparation and rehabilitation work described above is not part of the daily operation of the pit and is of short duration. These construction activities are not considered in the noise control analysis. The equipment used for these activities must satisfy the noise emission requirements of the MECP document NPC-115 “Construction Equipment”. By defining a maximum permissible noise emission for construction equipment, rather than directly limiting the noise impact at a sensitive point of reception, the MECP recognizes that construction is a temporary and largely unavoidable source of noise.

In order to minimize the noise impact associated with the construction activities, it is suggested that operations should be restricted to the daytime hours.

4.3 Extraction, Processing, and Transport

The proposed maximum annual tonnage to be removed from the Strada Pit/Quarry is 2 million tonnes per year. The aggregate pit and quarry will operate with a fixed Wash Plant located in a designated area to the south of the licence as indicated on the Operation Plan.

Prior to the commencement of quarry operations, it is expected that extraction of sand and gravel material will be complete for all areas of the existing licences except for the northmost portion of the site, denoted by Phase 2C in Figure 1.

This assessment considered concurrent extraction of sand and gravel material in Phase 2C during quarry operations for all of Phases 1B through 2B. Pit operations will not occur simultaneously within the same worst-case hour as quarry operations in Phase 1A, and will be complete prior to the commencement of quarry operations in Phase 2C.

During pit extraction, an extraction loader will operate at the working face and transfer sand and gravel material to a nearby processing plant operating on the pit floor at an elevation of approximately 490 MASL. A shipping loader will transfer the processed material either to an articulated off-road truck for shipment to the wash plant through on site haul roads, or to a highway truck for shipment to market through the north operational entrance.

Quarry extraction will occur in three benches each of which may comprise multiple lifts between 10-12 m. For each of the areas denoted by Phase 1A through 2C, Benches 1 and 2 will be extracted before progressing to the next phase of the quarry. Phase 3A will include the southward extraction of the third and final bench to the quarry floor for these areas. Quarry extraction in Phase 3B, 4A, and 4B will include progressive extraction of all 3 benches in each area before progressing to the next.

Quarry extraction will similarly feature two extraction loaders at the working face. The primary processing plant will generally follow the working face and convey material to the nearby secondary processing plant. Processed material will be transferred by shipping loader either to articulated off-road haul trucks travelling to the wash plant, or to highway trucks travelling to market through the operational entrances.

4.4 Equipment

The extraction, processing, and shipping equipment operating in the pit and quarry is limited to:

- One Pit Processing Plant;
- Two Quarry Processing Plants:
  - One Primary Processing Plant; and
  - One Secondary Processing Plant
- One Wash Plant;
- Four Shipping Loaders;
- Three Extraction Loaders;
- Two Rock Drills OR Quiet Rock Drills;
- Conveyors;
- 60 Highway truck trips/hr (120 passes/hr); and
- 15 Off-road Trucks trips/hr (30 passes/hr)

The processing plants may consist of multiple pieces of equipment for purposes such as crushing and screening. Since the noise predictions considered a single worst-case location for all the plant equipment, the distribution of each of the plant's equipment is permitted at various locations. However, the combined sum sound power from all equipment locations must be less than or equal to the permitted sound power for each plant, and any local noise controls specific to the processing plants shall apply at each location.

It is noted that the listed highway truck trips per hour represent a conservative estimation of the predictable worst-case one-hour truck volumes and are not expected to occur regularly.

5 Noise Predictions and Controls

5.1 Noise Prediction Methodology

The noise impact calculations were performed using DataKustik's CadnaA environmental noise prediction software. The calculations are based on established prediction methods including the standard ISO 9613-2: "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method and calculation".

The noise predictions are based on the predictable worst-case noise impact for each of the aggregate pit and/or quarry operation areas at each noise-sensitive receptor. This represents a design case where the site is operating at full capacity with all of the permitted equipment operating simultaneously and at locations where the noise impact is highest for each receptor. Specifically, drills were considered to be operating at the top-of-rock within the bench being extracted. The Primary Processing Plant was assessed at the top of the

first lift within the bench being extracted, with the Secondary Processing Plant either at the same elevation, or at the bottom of the first bench as required by the noise controls.

It is expected that a majority of the pit/quarry operations would occur in other areas of the site, or at lower elevations, resulting in lower associated noise impacts.

The noise modelling considered elevation data from a topographic LIDAR survey of the site and surrounding area. Noise levels were predicted under conditions of downwind propagation, generally with hard ground modelled in the pit/quarry area and soft ground conditions elsewhere. Specifically, a ground factor of G=0.2 was assumed for pit/quarry areas, with G=1 assumed for the surrounding area which generally comprises open field and grassy areas. The contribution from acoustical reflections was evaluated during modelling. Appendix B contains sample stationary noise source calculations and CadnaA modelling parameters.

Where noise predictions have indicated the potential of exceedance of the applicable sound level limits, noise control measures have been established to satisfy these limits.

5.2 Aggregate Pit and Quarry Noise Sources

The reference sound levels used for the aggregate pit and quarry equipment are outlined in Table 3. The assumed sound levels for the equipment were based on Aercoustics' measurements of similar equipment at other aggregate operations.

Table 3: Reference Sound Pressure Levels of Aggregate Pit Equipment

Equipment	Reference Sound Pressure Level at 30 m (dBA)
Pit Processing Plant	83
Primary Processing Plant	82
Secondary Processing Plant	84
Wash Plant	77
Shipping Loader	70[1]
Extraction Loader	74
Regular Rock Drill	80
Quiet Rock Drill	75
Conveyors	44[2]
Highway Truck – 25 km/hr	66
Off-road Truck – 25 km/hr	76

1 – The shipping loader were assumed to operate at a 50% duty cycle.
2 – Reference sound level for conveyors is in dBA per metre at a distance of 30 m.

5.3 Recommended Noise Controls

The recommended noise controls presented in this section and in Appendix A have been determined, through noise impact predictions, to be effective in limiting the noise impact from the aggregate pit and quarry activities to levels which comply with the MECP sound level limits. It should be noted that there may be other effective noise control that could replace or revise those put forth in this report. Prior to the implementation of any changes to the noise controls, appropriate studies should be undertaken to demonstrate that the MECP sound level limits will be satisfied.

In the case that a dwelling is constructed on a vacant lot requiring the implementation of additional noise controls, the controls may likewise be revised with the execution of an appropriate study.

An acoustic barrier is required to be solid, with no gaps or openings, and shall satisfy a minimum area density of 20 kg/m2. Such a barrier may take the form of a pit face, earthen berm, stockpile, acoustic fence, ISO containers, some combination of these, or any other construction satisfying the requirements of an acoustic barrier.

Refer to Figures 2 to 14 for a conceptual illustration of noise controls and operations in Phases 1 through 4. These requirements include an illustration of the timing and implementation of noise controls such as local processing plant barriers, drill barriers, and perimeter barriers. Refer to Appendix A for a comprehensive summary of the recommended noise controls for the Strada Pit/Quarry.

5.4 Predicted Sound Levels with Controls

The predicted worst-case noise levels produced by operations within the Strada Pit/Quarry area are summarized in Table 4 below. The predicable worst-case operation in Phases 1 through 4 are associated with simultaneous processing and extraction in close proximity to Receptors R01, R20, R29, and VL37 as illustrated in Figures 2 through 14

Table 4: Strada Pit/Quarry - Worst Case Predicted Sound Levels and Criteria - Hourly L_{AEQ} (dBA)

Receptor	Extraction, Processing, and Shipping Operations (07:00 – 19:00)		Shipping Operations (06:00 – 07:00)	
	Daytime Sound Level Limit	Maximum Predicted Sound Level	Nighttime Sound Level Limit	Maximum Predicted Sound Level
R01	50	50	45	40
R02	50	47	45	37
R03	50	49	45	41
R04	50	50	45	43
R05	50	46	45	39
R06	50	46	45	39

Receptor	Extraction, Processing, and Shipping Operations (07:00 – 19:00)		Shipping Operations (06:00 – 07:00)	
	Daytime Sound Level Limit	Maximum Predicted Sound Level	Nighttime Sound Level Limit	Maximum Predicted Sound Level
R07	50	43	45	35
R08	50	42	45	32
R09	50	43	45	34
R10	50	43	45	34
R11	50	44	45	35
R12	50	49	45	41
R13	50	43	45	31
R14	45	44	40	33
R15	45	45	40	34
R16	45	44	40	33
R17	45	44	40	33
R18	45	44	40	33
R19	45	44	40	33
R20	45	45	40	35
R21	45	45	40	34
R22	45	44	40	33
R23	45	44	40	33
R24	45	39	40	27
R25	45	41	40	28
R26	45	40	40	28
R27	45	43	40	31
R28	45	45	40	33
R29	45	45	40	33
VL30	50	46	45	37
VL31	50	45	45	34
VL32	50	41	45	30
VL33	50	44	45	32
VL34	50	44	45	33
VL35	50	48	45	36
VL36	50	47	45	36
VL37	50	50	45	41

6 Truck Traffic Noise on Haul Route

The noise impact of truck traffic on public roadways is not addressed in the MECP noise guidelines. However, the MECP requires consideration of noise impact in choosing the off-property haul route. Further, the MECP document titled, “Noise Guidelines for Landfill Sites”, dated October 1998, provides general guidelines for evaluating the noise impact of truck traffic associated with external haul routes.

The following section considers these guidelines to qualitatively assess the increase in noise on dwellings along the Strada Pit/Quarry haul route associated with additional truck traffic.

The future noise impact associated with the haul route was assessed based on a Transportation Impact Study (TIS) prepared by HDR Inc. Per the TIS, the aggregate from the pit/quarry will be shipped via the north and south site entrances onto 4th Line along the existing haul route heading east on Dufferin County Road 17 and south on Dufferin Road 124.

While the quantity of trucks leaving the site is expected to increase, the haul route and distribution of trucks leaving from the south and north entrance is expected to remain the same. Accordingly, the predicted noise increase to receptors along the haul route associated with the proposed licence application was based on the proportional increase to annual tonnage. Specifically, the future peak one-hour truck traffic from the site was assumed to be 1.6 times that which occurs under the current permitted operations.

A conservative assessment was carried out which considered only the existing truck traffic from the site as a baseline, disregarding existing background traffic. Compared to this conservative baseline, the proposed operational change and tonnage increase is predicted to cause a worst-case increase to noise along the haul route of 2 dB. Per the MECP’s draft landfill guidelines, a change of 3 dB or less is considered insignificant. Accordingly, the proposed haul route can be considered the preferred option to minimize noise impacts associated with the proposed operational change.

7 Conclusion

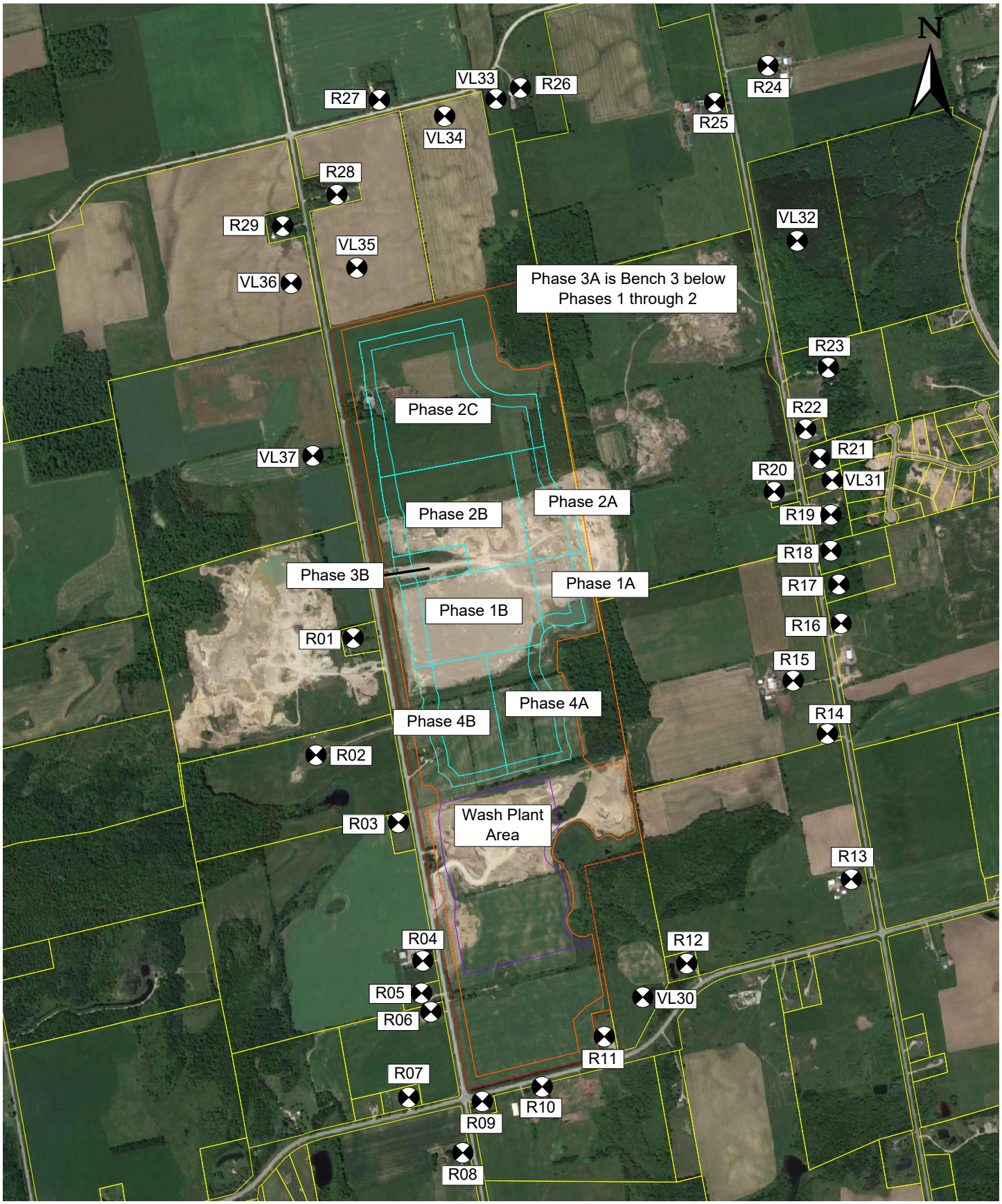
Aercoustics has conducted a noise impact study for the proposed Strada Pit/Quarry. The purpose of this noise impact study was to provide noise control recommendations for the pit and quarry operations to satisfy the MECP noise guidelines. Figure 1 provides a site plan outlining the aggregate pit and quarry areas and the locations of nearby receptors.

Sound level limits were based on the MECP noise guidelines. Calculations were carried out to determine the worst-case noise impact for each phase of the pit and quarry operation at each noise-sensitive receptor. Where noise predictions indicated the potential of exceedance of the MECP sound level limits, noise control recommendations were provided.

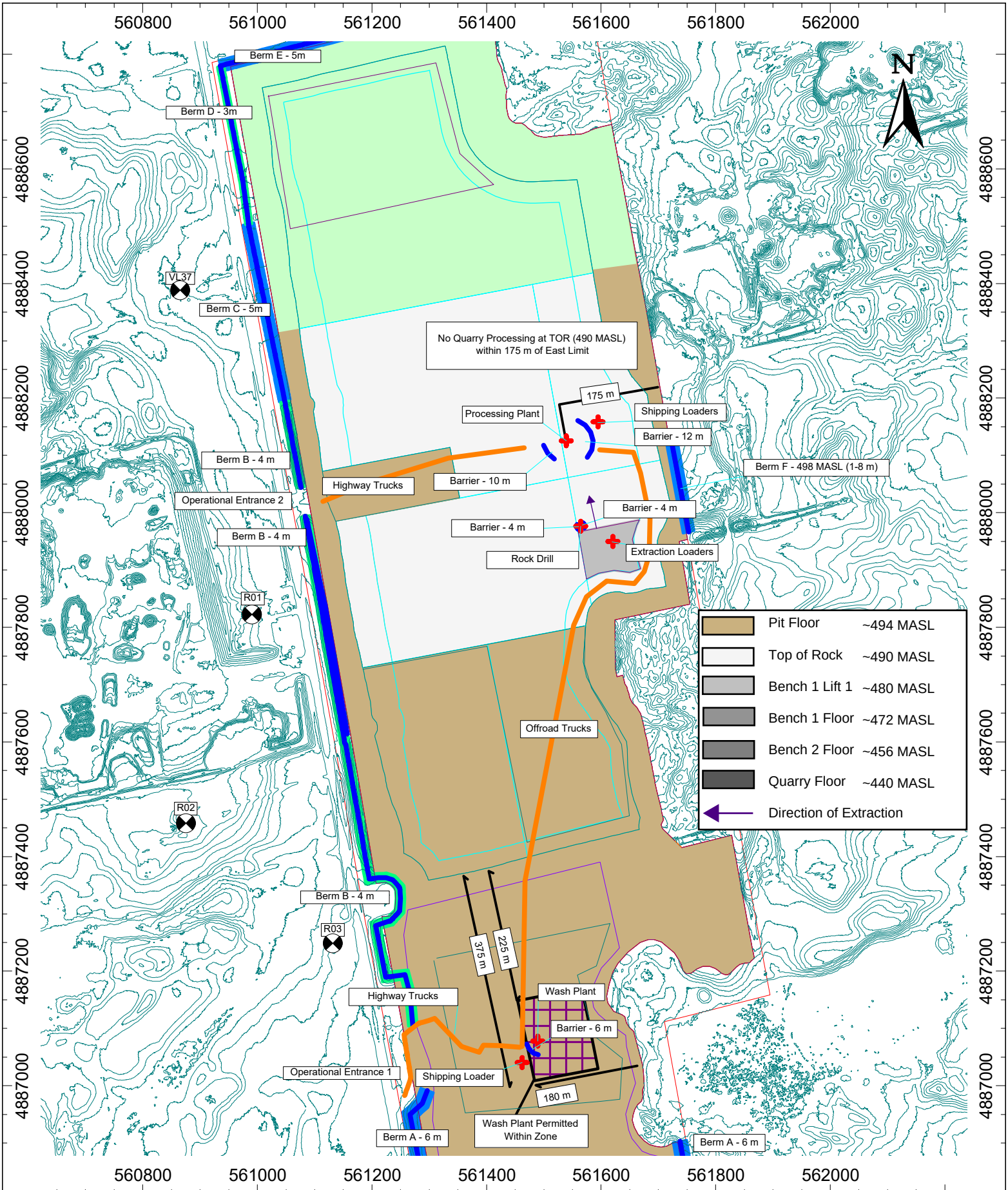
With the implementation of the recommended noise controls included in Appendix A, the proposed aggregate pit and quarry operation is predicted to satisfy the MECP noise guidelines. It is recommended that these noise controls be included on the ARA site plans for the proposed Strada Pit/Quarry.

8 References

- Ontario Ministry of Environment, “Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300)”, August 2013
- International Organization for Standardization, “ISO 9613-2: 2024 – Attenuation of sound during propagation outdoors”, January 2024
- Ontario Ministry of Environment, “Draft Noise Guidelines for Landfill Sites”, October 1998



aercoustics	Project ID: 16099.01 Scale: UTM As Indicated Drawn by: KC Reviewed by: DF Date: Jan 23, 2025 Revision: 1	**Project Name** Strada Pit/Quarry - Noise Impact Study	
		Figure Title Site Overview	**Figure 1**



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Reviewed by: DF
Date: May 16, 2024
Revision: 1

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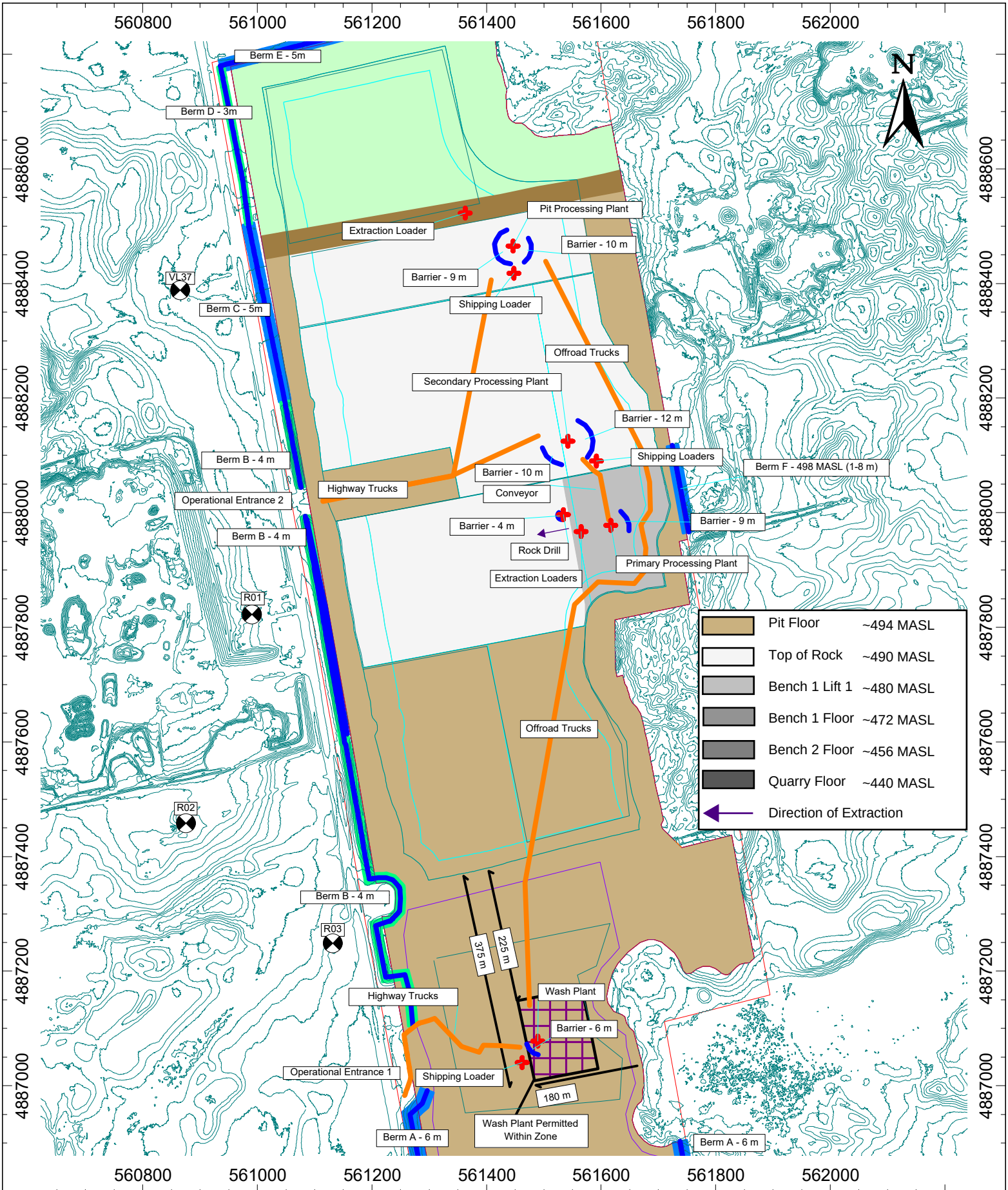
Strada Pit/Quarry - Noise Impact Study

Figure Title

Noise Controls - Phase 1a

Figure 2



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Revision: 1

Project Name

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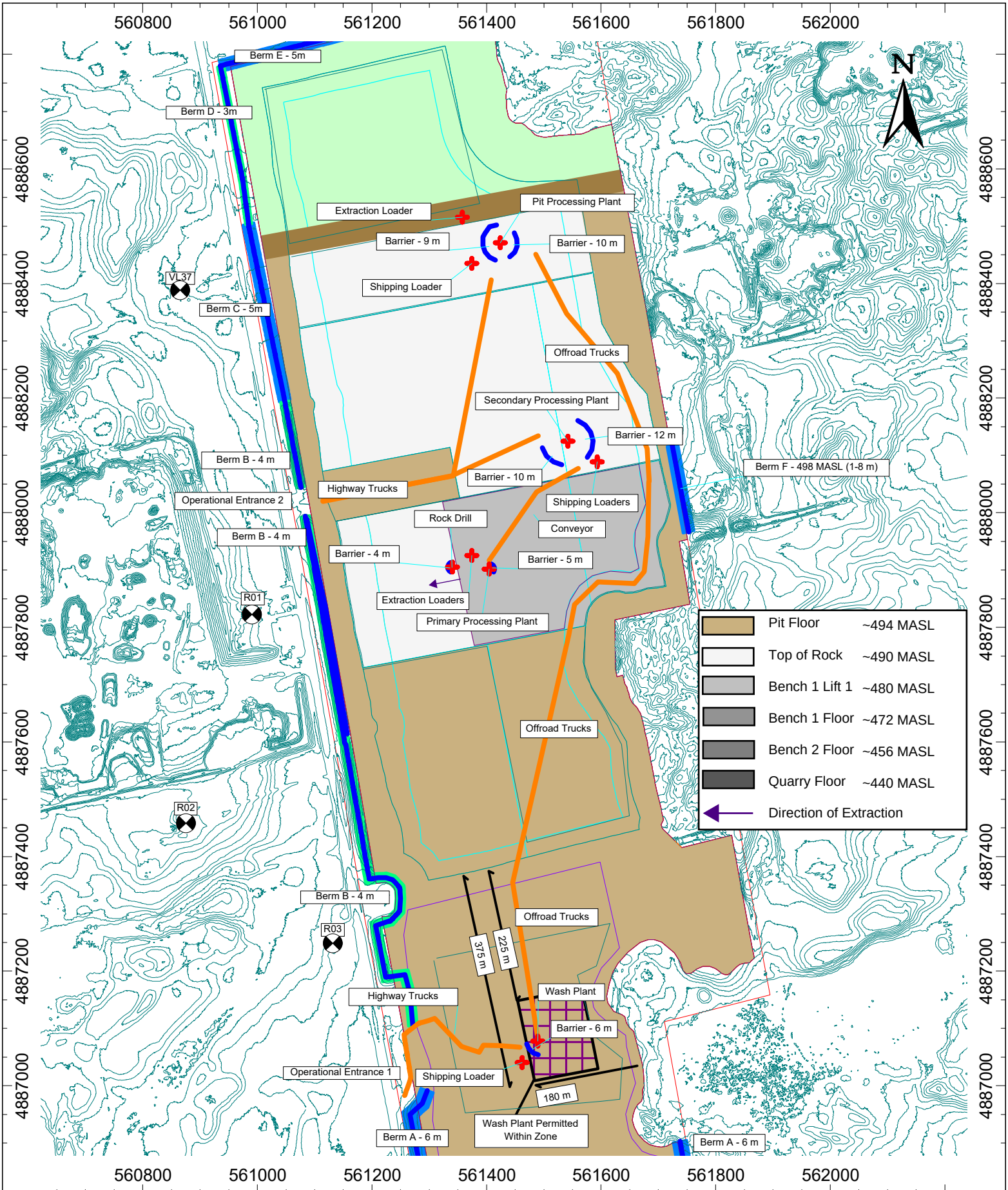
Figure Title

Noise Controls - Phase 1b

Figure 3



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Revision: 1

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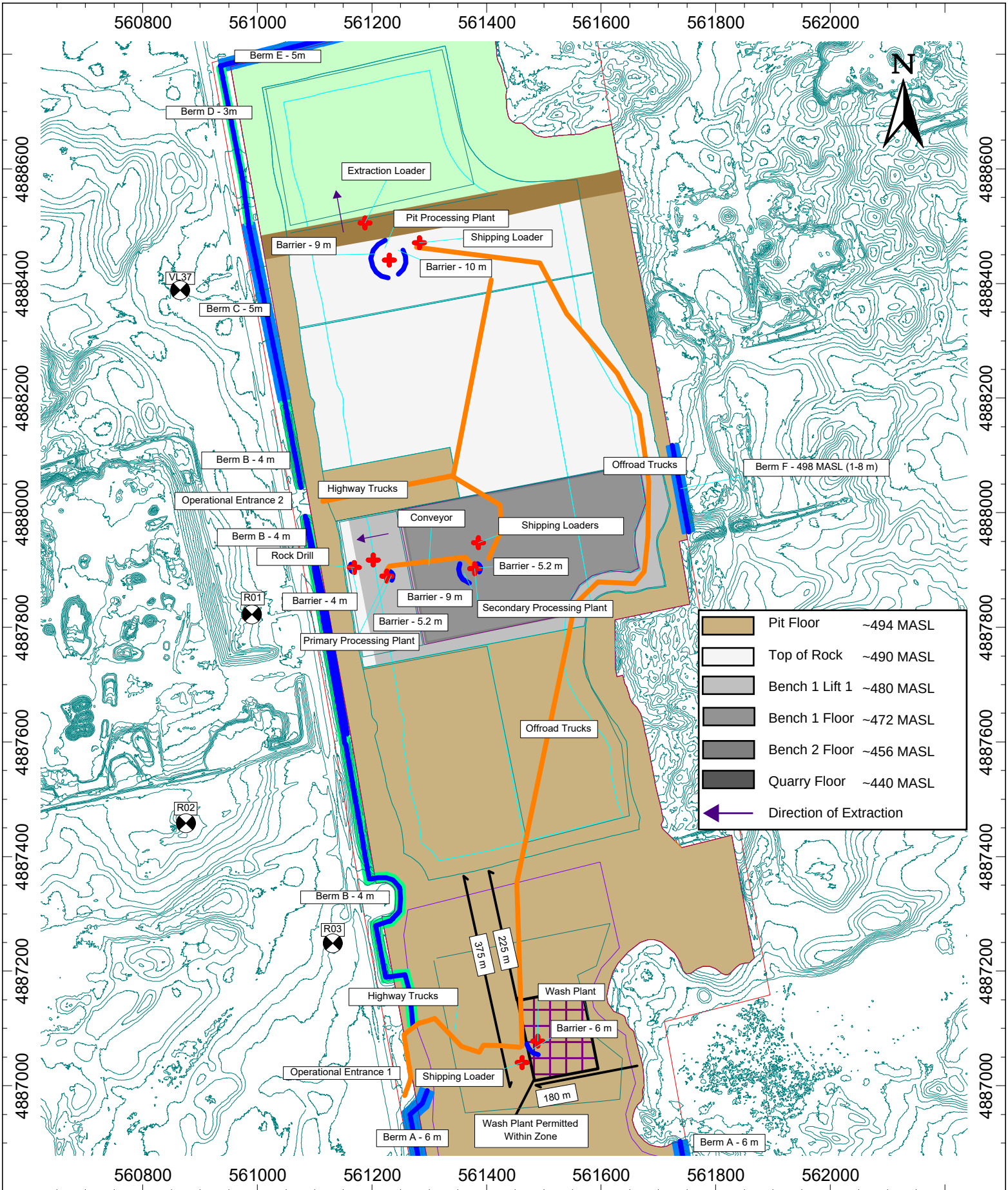
Figure Title

Noise Controls - Phase 1b (2)

Figure 4



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Revision: 1

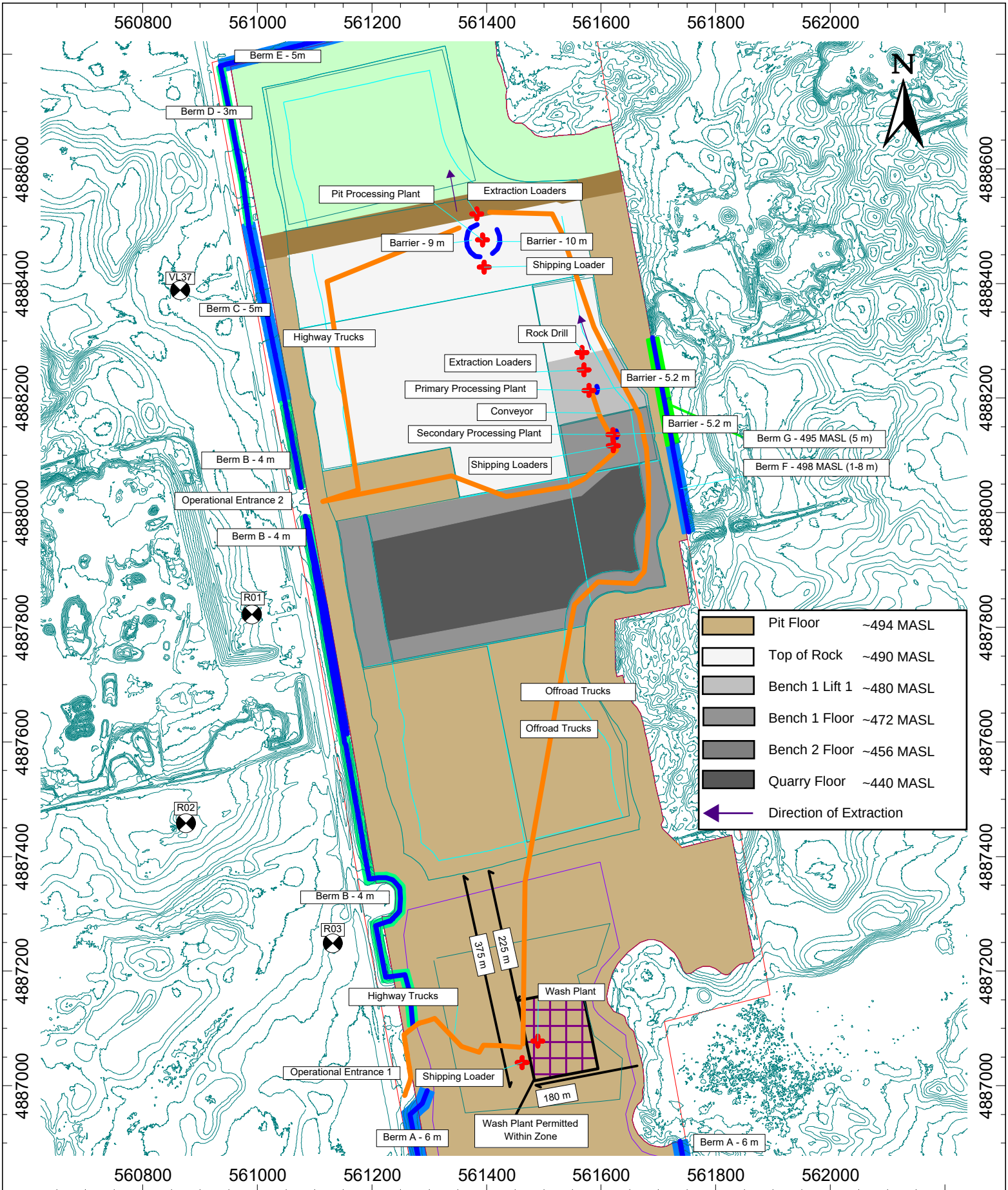
Project Name

Strada Pit/Quarry - Noise Impact Study

Figure Title

Noise Controls - Phase 1b (3)

Figure 5



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Date: May 16, 2024
Revision: 1

Project Name

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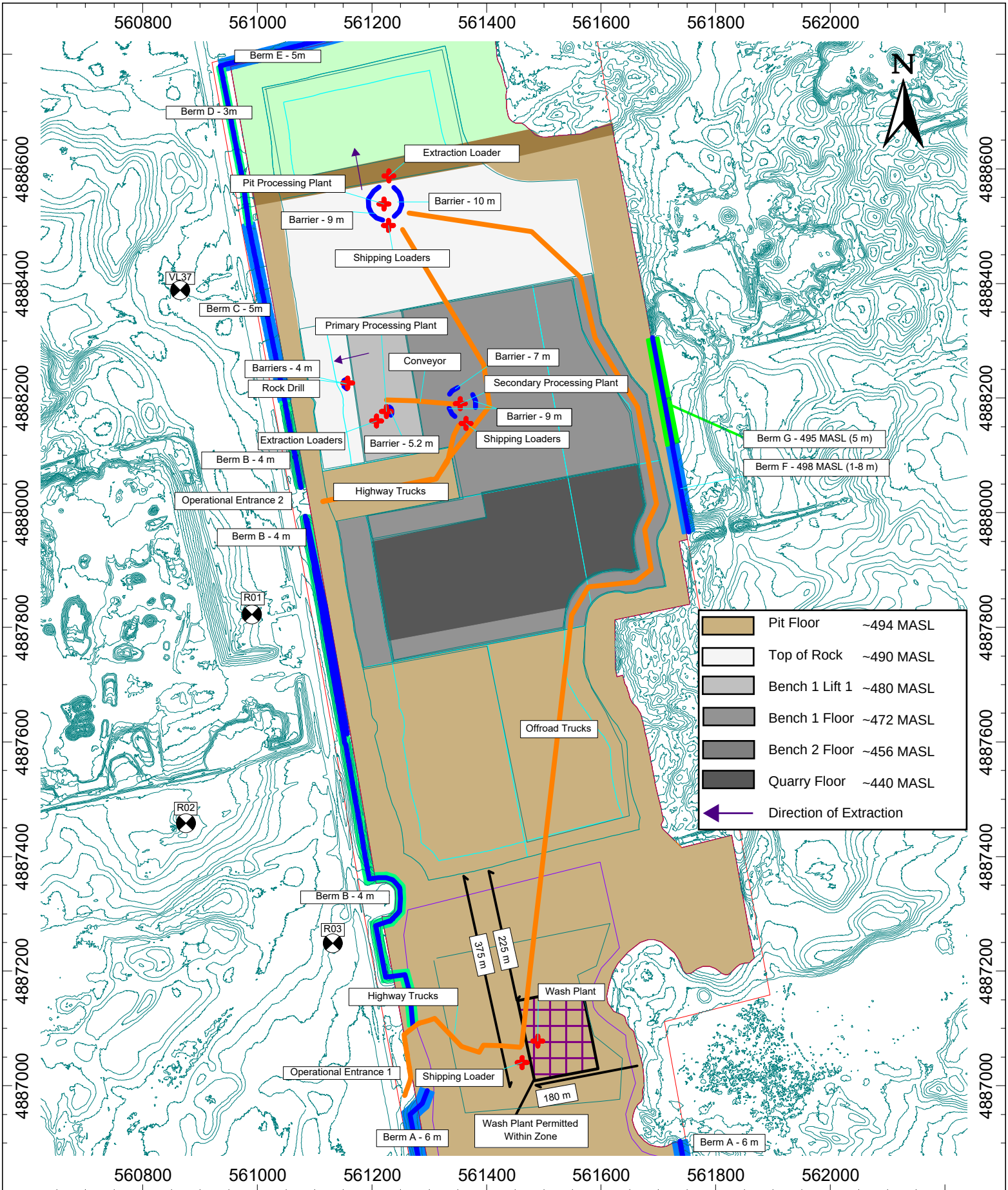
Figure Title

Noise Controls - Phase 2a

Figure 6



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Date: May 16, 2024
Revision: 1

Project Name

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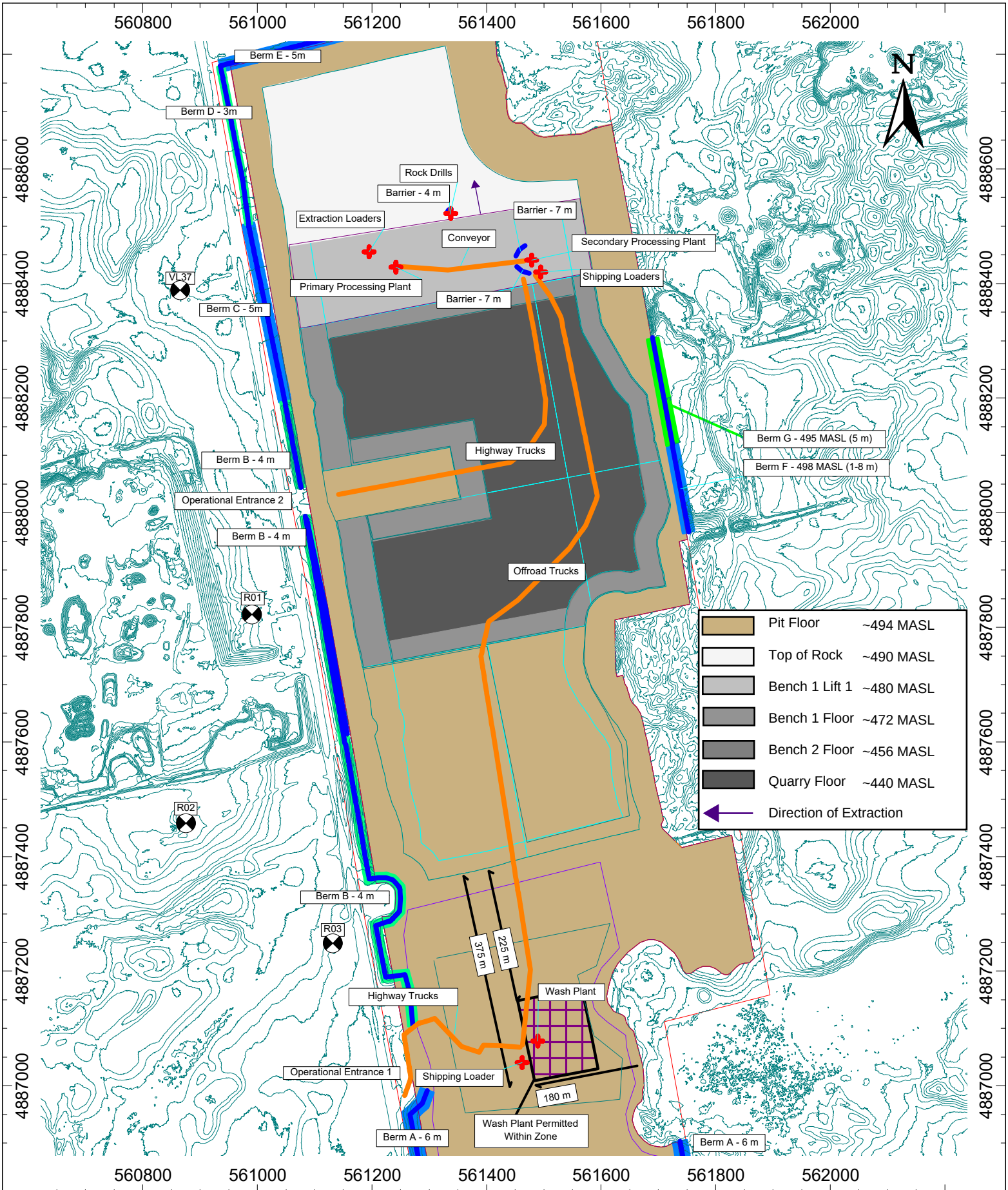
Figure Title

Noise Controls - Phase 2b

Figure 7



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Revision: 1

Project Name

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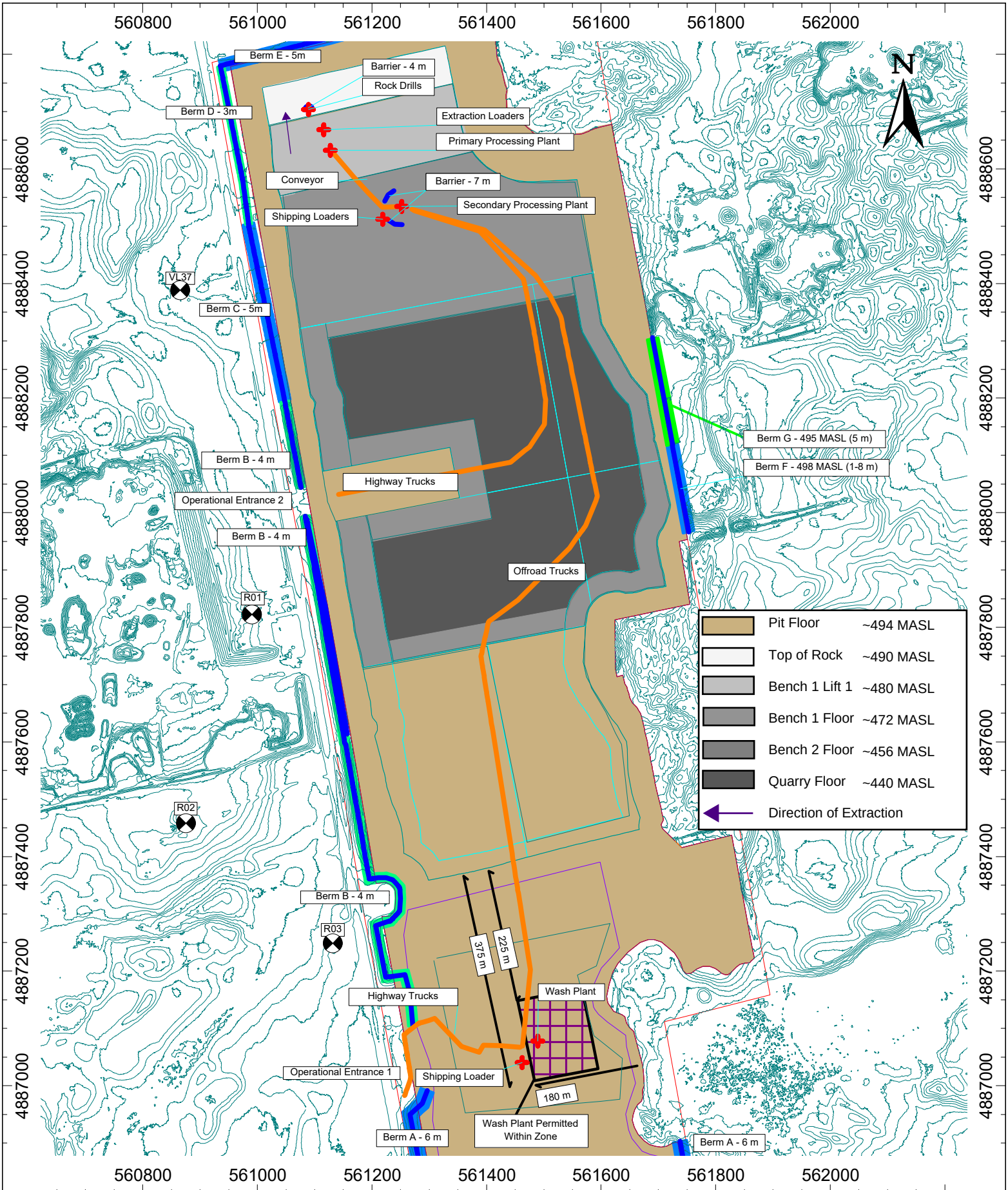
Figure Title

Noise Controls - Phase 2c

Figure 8



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Revision: 1

Project Name

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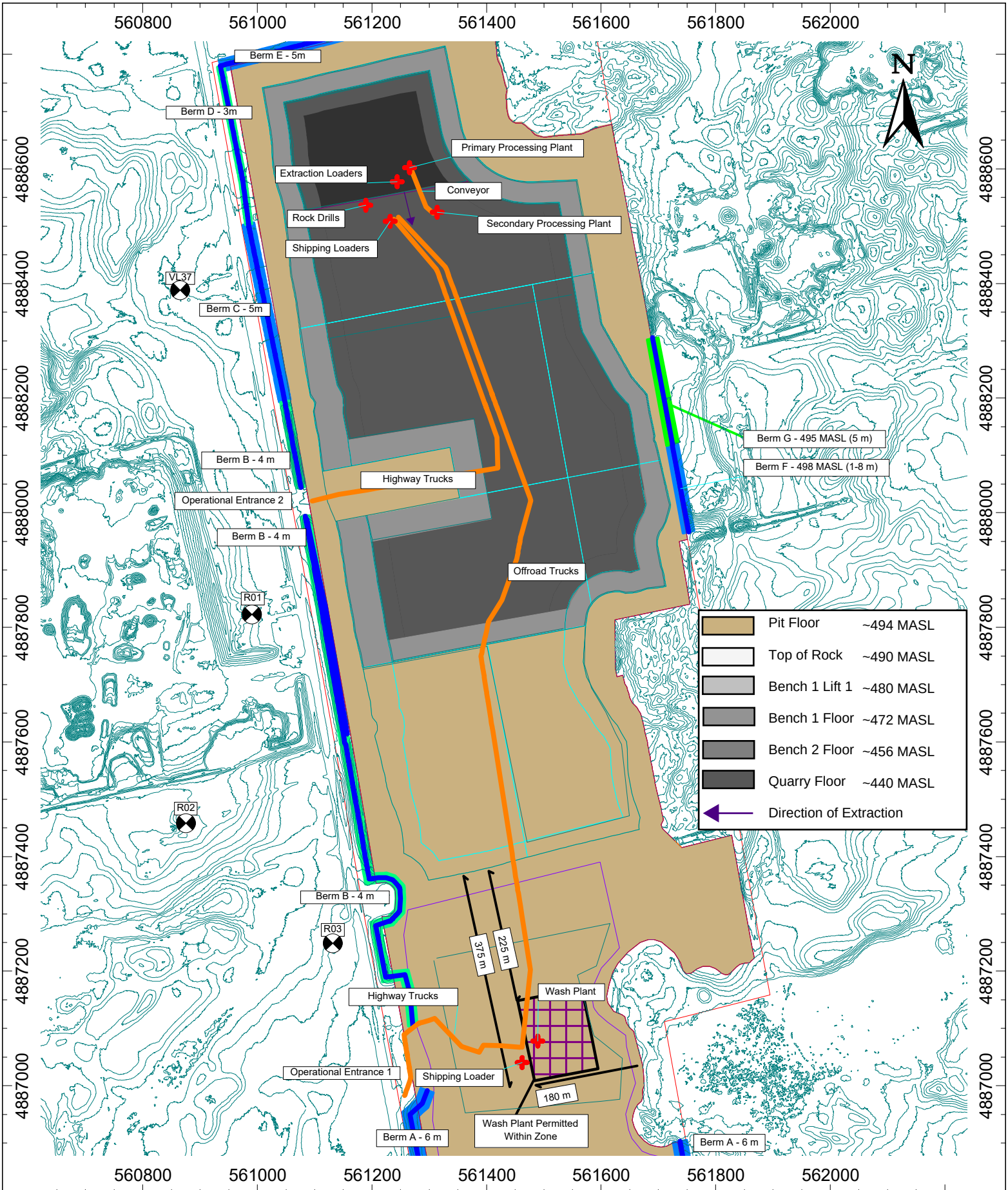
Figure Title

Noise Controls - Phase 2c (2)

Figure 9



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Revision: 1

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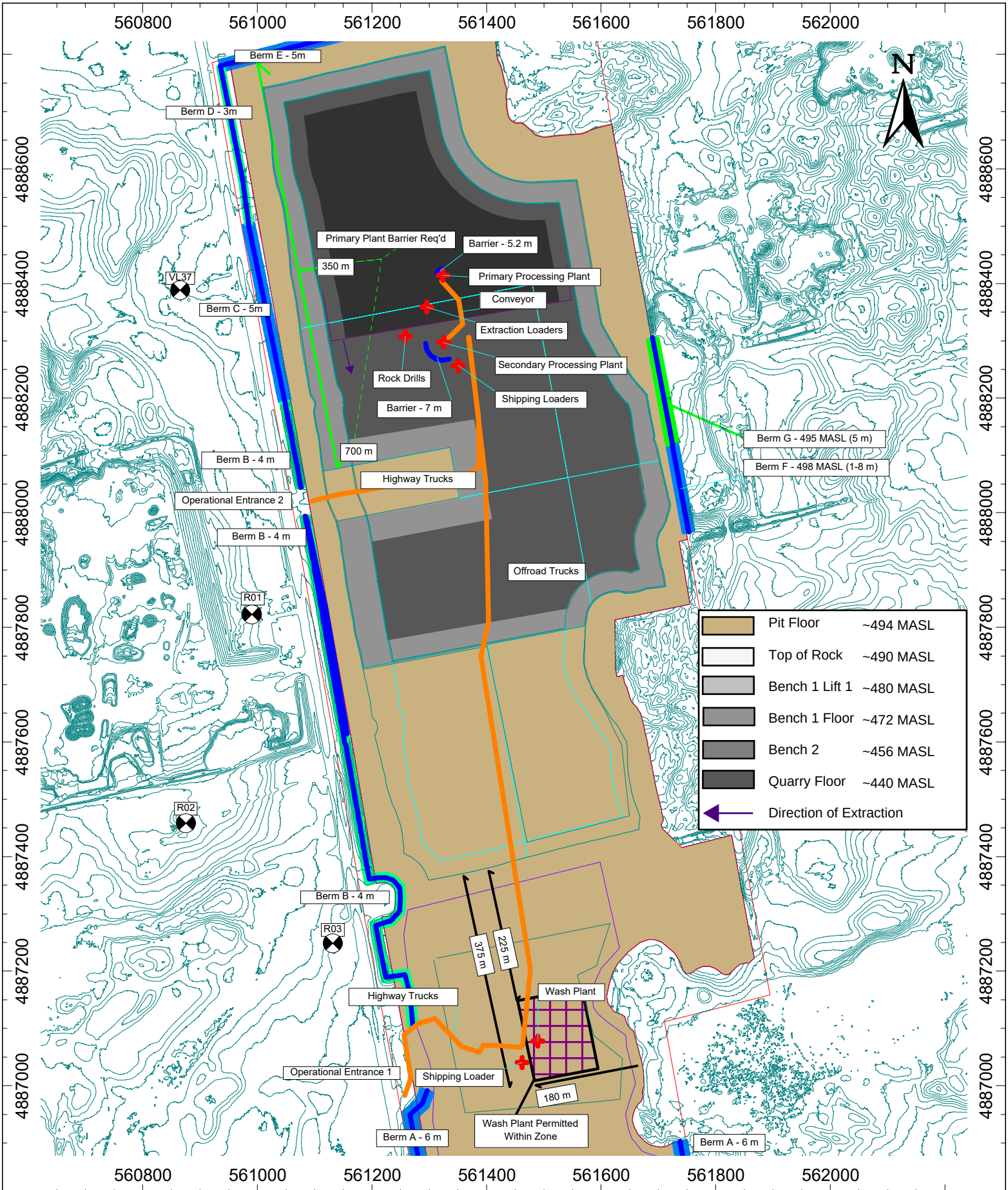
Figure Title

Noise Controls - Phase 3 North

Figure 10



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Revision: 1

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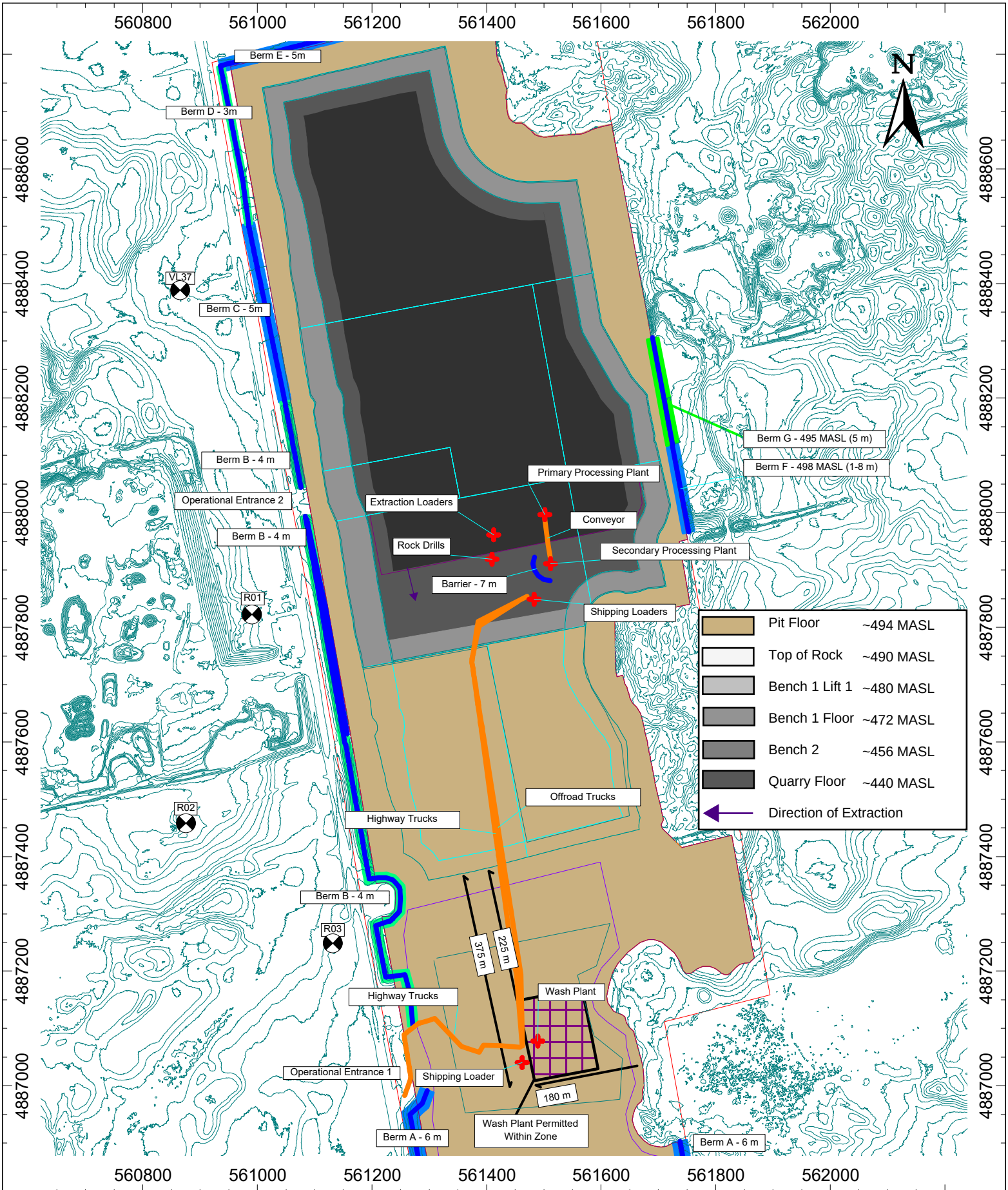
Strada Pit/Quarry - Noise Impact Study

Figure Title

Noise Controls - Phase 3 Middle

Figure 11



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Revision: 1

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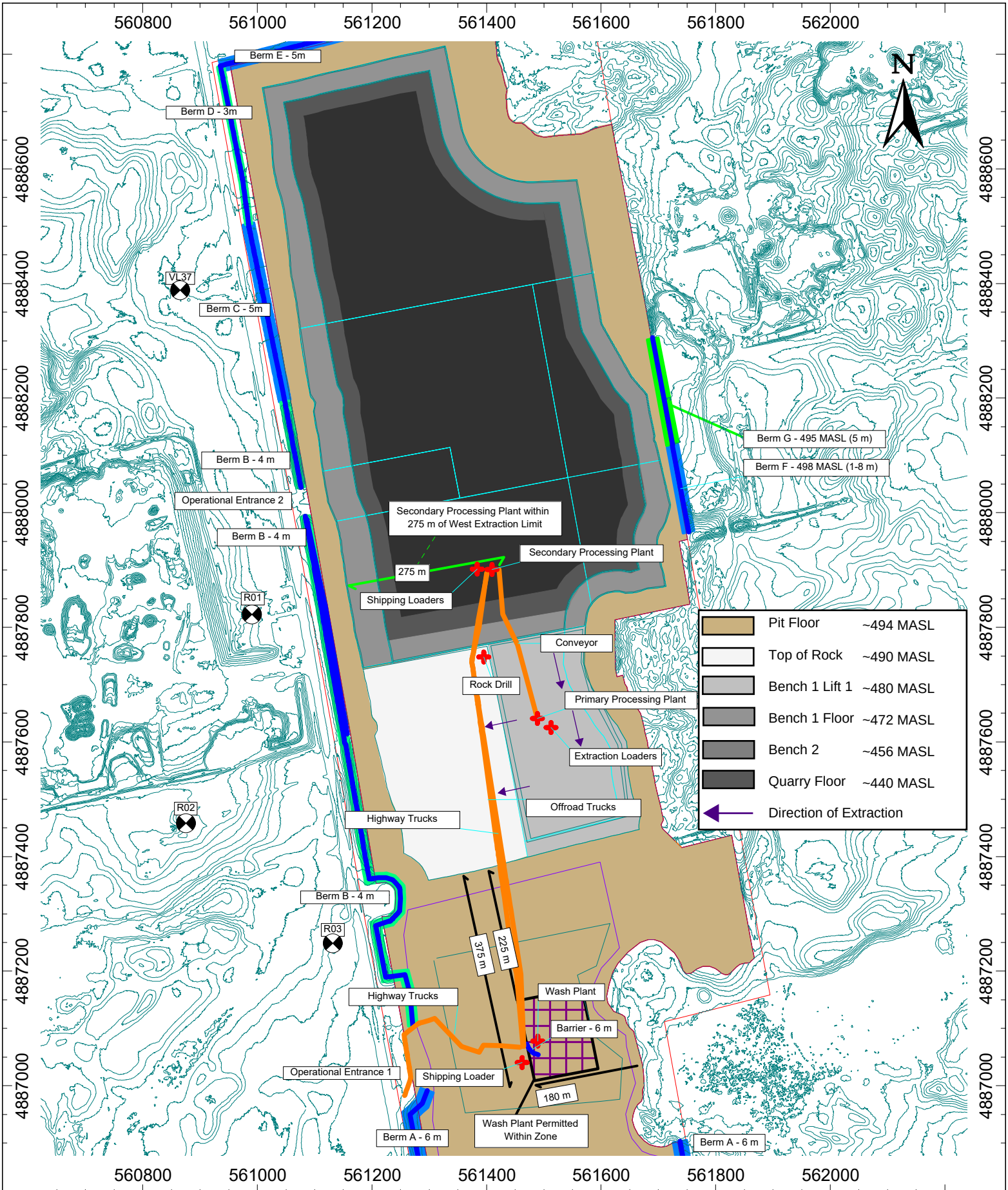
Strada Pit/Quarry - Noise Impact Study

Figure Title

Noise Controls - Phase 3 South

Figure 12



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Revision: 1

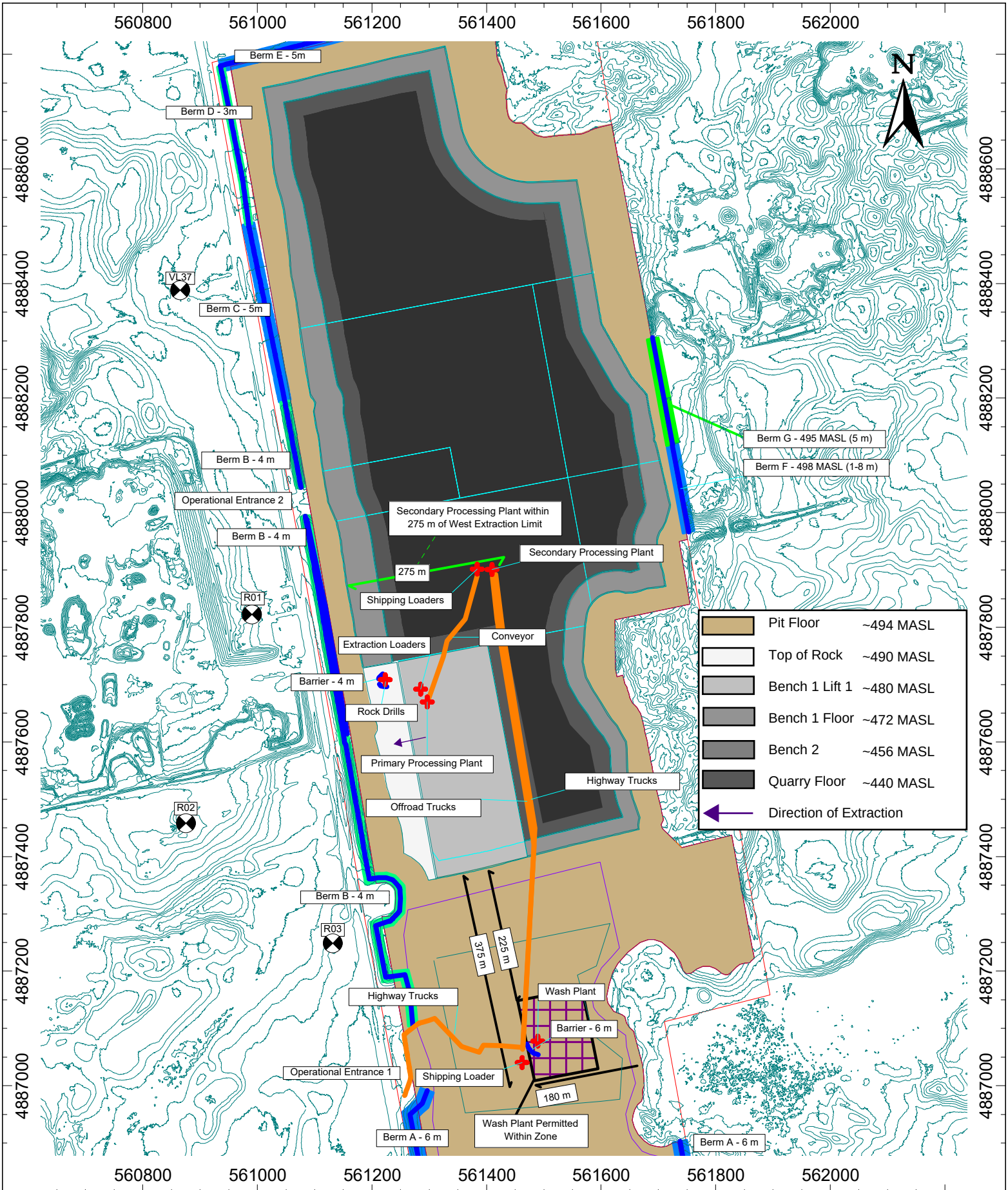
Project Name

Strada Pit/Quarry - Noise Impact Study

Figure Title

Noise Controls - Phase 4A

Figure 13



aercoustics

Project ID: 16099.01

Scale: UTM As Indicated
Drawn by: KC
Reviewed by: DF
Date: May 16, 2024
Revision: 1

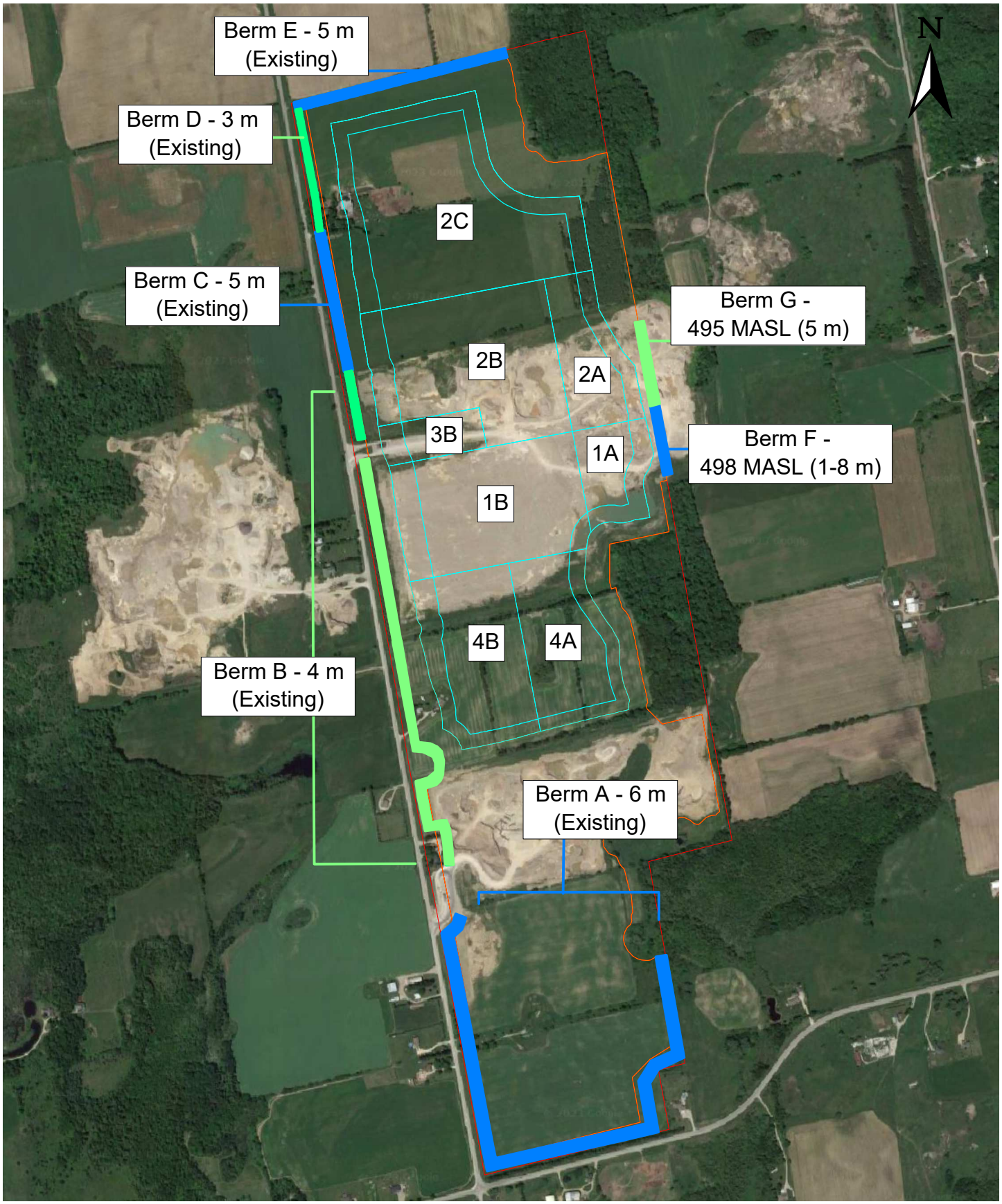
Project Name

Strada Pit/Quarry - Noise Impact Study

Figure Title

Noise Controls - Phase 4B

Figure 14



aercoustics	Project ID: 16099.01 Scale: UTM As Indicated Drawn by: HF Reviewed by: KC Date: May 17, 2024 Revision: 1	**Project Name** Strada Pit/Quarry - Noise Impact Study	
		Figure Title Illustration of Berms Locations	**Figure 15**

Appendix A
Noise Control Recommendations

General:

1. The proposed hours of extraction and processing shall be limited to the daytime hours only (07:00 to 19:00) on Monday to Saturday, with shipping operations limited to the hours of 06:00 to 19:00 on Monday to Friday and 06:00 to 17:00 on Saturdays.

2. The extraction, processing, and shipping equipment operating in the pit / quarry is limited to:

    - One Pit Processing Plant;
    - Two Quarry Processing Plants:
        - One Primary Processing Plant; and
        - One Secondary Processing Plant
    - One Wash Plant;
    - Four Shipping Loaders;
    - Three Extraction Loaders;
    - Two Rock Drills OR Quiet Rock Drills;
    - Conveyors;
    - 60 Highway truck trips/hr (120 passes/hr); and
    - 15 Off-road Trucks trips/hr (30 passes/hr)

3. The aggregate pit equipment shall satisfy the noise emissions levels listed in Table A-1:

Table A-1: Reference Sound Pressure Levels of Aggregate Quarry Equipment

Equipment	Reference Sound Pressure Level at 30 m (dBA)
Pit Processing Plant	83
Primary Processing Plant	82
Secondary Processing Plant	84
Wash Plant	77
Shipping Loader	70[1]
Extraction Loader	74
Regular Rock Drill	80
Quiet Rock Drill	75
Conveyors	44[2]
Highway Truck – 25 km/hr	66
Off-road Truck – 25 km/hr	76

1 – The shipping loaders were assumed to operate at a 50% duty cycle.
2 – Reference sound level for conveyors is in dBA per metre at a distance of 30 m.

4. The sound emissions of all construction equipment involved in site preparation and rehabilitation activities shall comply with the sound level limits specified in the MECP publication NPC-115 “Construction Equipment”.

5. New equipment technology or different configurations may allow proposed changes to any portion of the extraction and processing operations including additional equipment to operate on the site, equipment to be substituted, and/or different berm heights, while still meeting the applicable sound level limits. Changes may be permitted to the site operations and noise controls provided that the changes still meet the sound level limits, as confirmed through documentation prepared by a Professional Engineer specializing in noise control. Prior to any modification, the licensee shall provide MNRF with written notice.

6. Where acoustic barriers are required, they shall be solid, with no gaps or opening, and shall satisfy a minimum area density of 20 kg/m2. It could take the form of a pit or quarry face, stockpile, acoustic fence, ISO containers, a combination of these, or any construction satisfying the requirements of an acoustic barrier.

7. Acoustical barriers shall be implemented and maintained at the heights and lengths specified in Table A-2, below, for the duration of extraction and processing within the pit and quarry.

Table A-2: Perimeter Berms

Berm	Top-of-Berm Height (m)	Top-of-Berm Height (MASL)	Length (m)	Location	Implementation Timing
A	6	512	1360	West, south, and east of Processing Area	Existing Berm
B	4	514	1150	West of Phase 2B, 1, 4, and Processing Area	Existing Berm
C	5	515	320	West of Phase 2	Existing Berm
D	3	513	280	West of Phase 2C	Existing Berm
E	5	515	480	North of Phase 2C	Existing Berm
F	1-8	498	150	East of Phase 1	Prior to Phase 1A Extraction
G	5	495	200	East of Phase 1	Prior to Phase 2A Extraction

8. The Wash Plant shall be located at the pit floor at an elevation of 494 MASL or lower in the area designated on the Operational Plan; between 225 and 375 m of south of the south Phase 4A/4B boundary, and within 180 m of the east licence boundary.

9. A local barrier with a minimum height of 6 m shall be established within 30 m of the Wash Plant, between the Wash Plant and Receptor R04 when quarry extraction of the first and second bench occurs within Phase 1A, 1B, 4A, and 4B.

Extraction of Sand and Gravel ("Pit Operations"):

10. The Pit Processing Plant shall operate on the top of bedrock at a maximum elevation of approximately 490 MASL and shall only operate in the northern area of the licence (Phase 2C).

11. During simultaneous pit and quarry operations, an acoustical barrier shall be established to continuously block the line of sight from the Pit Processing Plant in the direction of the listed receptors in Table A-3.

Table A-3: Pit Processing Plant Barriers during Simultaneous Pit and Quarry Ops

Receptors	Minimum Height @ Maximum Distance to Plant
R01, R28, R29	9 m @ 30 m
R20	10 m @ 30 m

12. Processing of pit material in Phase 2C shall be limited to a single Pit Processing Plant.

13. The Pit Processing Plant shall not operate simultaneously during extraction or processing of quarry material in Bench 1 or 2 of Phase 1A.

Extraction of Consolidated Material ("Quarry Operations"):

Phases 1 and 2:

14. During extraction in Phase 1A and 1B, when the Processing Plants are operating at top of rock, processing shall not occur within 175 m of the east quarry boundary.

15. During extraction of Bench 1 in Phase 1B through 2C, the Secondary Processing Plant shall be located on the Bench 1 floor at an elevation of approximately 472 MASL or lower as soon as practicable.

16. During processing operations in the first two benches of the quarry, acoustic barriers shall be established to block line of sight from the Primary Processing Plant in the direction of the following receptors based on the location of the plant as outlined in Table A-4.

Table A-4: Primary Processing Plant Barriers – Phase 1 through 2

Plant Location (Phase)	Plant Elevation	Receptors to be Shielded	Minimum Height @ Maximum Distance to Plant
1A	Top of rock	R01	10 m @ 40 m; OR 7.8 m @ 10 m
		R20	12 m @ 40 m; OR 7.8 m @ 10 m
	Bench 1 & 2	R01	10m @ 60 m
		R20	9 m @ 30 m; OR 5.2 m @ 10 m
1B	Bench 1 & 2	R01	10 m @ 60 m; OR 5.2 m @ 10 m
		R20	9 m @ 30 m; OR 5.2 m @ 10 m
2A	Bench 1 & 2	R20	10 m @ 60 m; OR 5.2 m @ 10 m
2B	Bench 1 & 2	R01	10 m @ 60 m; OR 5.2 m @ 10 m
		R20	9 m @ 30 m; OR 5.2 m @ 10 m
2C	Bench 1	R28, R29	10 m @ 60 m; OR 5.2 m @ 10 m

17. During processing operations in the first two benches of the quarry, acoustic barriers shall be established to block line of sight from the Secondary Processing Plant in the direction of the following receptors based on the location of the plant, as outlined in Table A-5.

Table A-5: Secondary Processing Plant Barriers – Phase 1 through 2

Plant Location (Phase)	Plant Elevation	Receptors to be Shielded	Minimum Height @ Maximum Distance to Plant	
Top of rock (Phase 1a / 1b Extraction)		R01	10 m 7.8 m	@ 40 m; OR @ 10 m
		R20	12 m 7.8 m	@ 40 m; OR @ 10 m
1B	Bench 1 & 2	R01	9 m 5.2 m	@ 30 m; OR @ 10 m
		R20	9 m 5.2 m	@ 30 m; OR @ 10 m
2A	Bench 1	R20	10m 5.2 m	@ 60 m; OR @ 10 m

Plant Location (Phase)	Plant Elevation	Receptors to be Shielded	Minimum Height @ Maximum Distance to Plant	
2B	Bench 1 & 2	R01	10 m 9 m 5.2 m	@ 60 m; OR @ 30 m; OR @ 10 m
		R20	9 m 5.2 m	@ 30 m; OR @ 10 m
		R28, R29	7 m 5.2 m	@ 30m; OR @ 10 m
2C	Bench 1 & 2	R01	7 m 5.2 m	@ 30 m; OR @ 10m
		R28, R29	7 m 5.2 m	@ 30 m; OR @ 10 m

18. Drilling operations in Phases 1 and 2 shall be limited to any one those outlined in Table A-6 for a specified phase. Receptors listed for the specified arrangement shall be shielded through the provision of the specified noise barrier as required in Table A-6.

Table A-6: Permitted Drill Setups and Required Barriers – Phase 1 through 2

Drill Location (Phase)	Permitted Drill Setups	Receptors to be Shielded	Minimum Height @ Maximum Distance to Drill(s)
1A	1 Regular	R20	4 m @ 7 m
	2 Quiet	R20	4 m @ 7 m
	1 Quiet	No Barrier Required	
1B	1 Regular; OR 2 Quiet	R01	4 m @ 7 m
	1 Quiet	No Barrier Required	
2A	1 Regular; OR 2 Quiet	No Barrier Required	
2B	1 Regular; OR 2 Quiet	R01	4 m @ 7 m
		R29, R28	4 m @ 7 m
	1 Quiet	No Barrier Required	
2C	2 Regular	R28, R29	4 m @ 7 m
	1 Regular; OR 2 Quiet	No Barrier Required	

Phase 3:

19. During quarry extraction in Phase 3A, the Primary and Secondary Processing Plants shall operate at the Bench 2 floor elevation of 456.5 MASL or lower, and the Primary Processing Plant shall be located at an elevation of approximately 446 MASL or lower as soon as practicable.

20. When the Secondary Processing Plant operates in Phase 3A and is more than 350 m from the north licence boundary, an acoustic barrier shall be established between the Secondary Processing Plant and Receptor R01 having a minimum height of 7 m at a maximum distance of 30 m from the plant; OR a minimum height of 5.2 m at a maximum distance of 10 m from the plant.

21. When the Primary Processing Plant operates in Phase 3A and is more than 350 m but less than 700 m from the north licence boundary, an acoustic barrier shall be established between the Secondary Processing Plant and Receptors R28 and R29. The barrier shall have a minimum height of 9 m at a maximum distance of 30 m from the plant; OR a minimum height of 5.2 m at a maximum distance of 10 m from the plant.

22. During extraction in Phase 3B, the Secondary Processing Plant shall operate at the Bench 2 floor elevation of 456.5 MASL or lower.

23. When 2 regular drills are operating simultaneously during extraction of Bench 1 in Phase 3B, an acoustic barrier shall be established between the drills and Receptor R01 with a minimum height of 4 m and a maximum distance of 7 m from the drills.

Phase 4:

24. During extraction of Phase 4A and 4B, the Secondary Processing Plant shall operate at the quarry floor with an elevation of approximately 440 MASL and shall be located within 275 m of the western extraction limit as illustrated on the Operation Plan.

25. Drilling operations during extraction of Bench 1 of Phase 4A shall be limited to a single Regular Drill, or two Quiet Drills.

26. During Extraction of Bench 1 of Phase 4B, when 2 regular drills are operating simultaneously an acoustic barrier shall be established between the drills and Receptor R01 with a minimum height of 4 m and a maximum distance of 7 m from the drills.

Vacant Lot VL37 Noise Controls

If a dwelling at VL37 is constructed and occupied during extraction or processing operations in the pit or quarry, the following noise controls shall apply:

27. During pit extraction, an acoustical barrier shall be established between the Pit Processing Plant and VL37 if quarry operations are occurring simultaneously as noted in Table A-7.

Table A-7: Pit Processing Plant Barriers for VL37

Quarry Ops during Pit Ops	Minimum Height @ Maximum Distance to Pit Processing Plant
Quarry Not Operating	6 m @ 20 m
Quarry Operating	9 m @ 30 m

28. During quarry processing at top of rock in Phase 1A, an acoustic barrier shall be established between the Primary and Secondary Processing Plants and VL37 with a minimum height of 6 m and at a maximum distance of 30 m from the Quarry Processing Plants.

29. During quarry extraction of Phase 2A and 2B with a Regular Drill or 2 Quiet Drills, an acoustic barrier shall be established between the drill(s) and VL37 with a minimum height of 4 m and a maximum distance of 7 m from the drill(s).

30. During quarry processing in Phase 2C, an acoustic barrier shall be established between the Secondary Processing Plant and VL37 with a minimum height of 15 m at a maximum distance of 100 m; OR a minimum height of 9 m at a maximum distance of 30 m; OR with a minimum height of 5.2 m at a maximum distance of 10 m.

Appendix B
Stationary Noise Sample Calculations

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	5000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	1.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receiver: R01n
Project: Strada Pit/Quarry
Project Number: 16099.01

Time Period	Total (dBA)*
Day	49

Receiver Name	Receiver ID	X	Y	Z
R01	R01	560982 m	4887827 m	513.5 m

Source ID	Source Name	X	Y	Z	Refl.	Lw	L/A	Freq	Adiv	K0	Agr	Abar	Aatm	Afol	Ahous	Cmet	Dc	RL	Lr
Conv	Conveyor	561308.0	4888192.6	478.1	0	81	18.3	A	64.8	0.0	-0.9	6.8	0.9	0.0	0.0	0.0	0.0	0.0	28
Conv	Conveyor	561263.2	4888195.6	482.0	0	81	13.5	A	64.3	0.0	-0.8	6.9	0.8	0.0	0.0	0.0	0.0	0.0	23
Conv	Conveyor	561245.2	4888196.2	482.0	0	81	11.4	A	64.1	0.0	-0.7	12.1	0.8	0.0	0.0	0.0	0.0	0.0	16
Conv	Conveyor	561231.9	4888196.5	482.0	0	81	11.1	A	64.0	0.0	-0.7	7.2	0.8	0.0	0.0	0.0	0.0	0.0	21
FELE	Extraction Loader	561229.5	4888587.8	505.4	0	112	0.0	A	69.1	0.0	-1.2	6.0	2.8	0.0	0.0	0.0	0.0	0.0	35
FELE	Extraction Loaders	561207.7	4888159.9	482.4	0	115	0.0	A	63.1	0.0	-1.5	17.9	1.7	0.0	0.0	0.0	0.0	0.0	33
HwyTruck	Highway Trucks	561164.0	4888029.5	492.4	0	80	20.0	A	59.7	0.0	-1.2	15.7	1.3	0.0	0.0	0.0	0.0	0.0	25
HwyTruck	Highway Trucks	561262.9	4888049.5	492.4	0	80	20.0	A	62.1	0.0	-1.9	9.1	1.7	0.0	0.0	0.0	0.0	0.0	29
HwyTruck	Highway Trucks	561370.8	4888299.2	477.5	0	80	18.8	A	66.7	0.0	-2.4	7.5	2.6	0.0	0.0	0.0	0.0	0.0	25
HwyTruck	Highway Trucks	561346.9	4888338.9	480.6	0	80	12.4	A	67.0	0.0	-2.4	7.3	2.7	0.0	0.0	0.0	0.0	0.0	18
HwyTruck	Highway Trucks	561336.5	4888356.2	481.9	0	80	13.7	A	67.1	0.0	-2.4	7.2	2.7	0.0	0.0	0.0	0.0	0.0	19
HwyTruck	Highway Trucks	561294.7	4888425.6	487.2	0	80	20.0	A	67.6	0.0	-2.3	7.1	2.9	0.0	0.0	0.0	0.0	0.0	25
HwyTruck	Highway Trucks	561367.9	4888138.0	483.4	0	80	20.9	A	64.9	0.0	-2.3	16.0	2.2	0.0	0.0	0.0	0.0	0.0	20
HwyTruck	Highway Trucks	561398.3	4888237.2	474.4	0	80	12.4	A	66.4	0.0	-2.4	7.9	2.5	0.0	0.0	0.0	0.0	0.0	18
HwyTruck	Highway Trucks	561396.3	4888252.0	474.4	0	80	11.0	A	66.5	0.0	-2.4	7.8	2.6	0.0	0.0	0.0	0.0	0.0	17
HwyTruck	Highway Trucks	561321.5	4888074.7	492.4	0	80	15.5	A	63.5	0.0	-2.1	7.4	1.9	0.0	0.0	0.0	0.0	0.0	25
HwyTruck	Highway Trucks	561161.8	4888029.3	492.4	0	80	19.8	A	59.7	0.0	-1.2	15.9	1.3	0.0	0.0	0.0	0.0	0.0	24
HwyTruck	Highway Trucks	561256.4	4888048.9	492.4	0	80	19.8	A	62.0	0.0	-1.8	9.3	1.7	0.0	0.0	0.0	0.0	0.0	29
HwyTruck	Highway Trucks	561163.6	4888029.3	492.4	0	77	20.0	A	59.7	0.0	-1.2	15.7	1.3	0.0	0.0	0.0	0.0	0.0	22
HwyTruck	Highway Trucks	561261.8	4888049.0	492.4	0	77	20.0	A	62.1	0.0	-1.9	9.1	1.7	0.0	0.0	0.0	0.0	0.0	26
HwyTruck	Highway Trucks	561321.2	4888073.7	492.4	0	77	15.6	A	63.5	0.0	-2.1	7.4	1.9	0.0	0.0	0.0	0.0	0.0	22

Receiver: R01n
Project: Strada Pit/Quarry
Project Number: 16099.01

Time Period	Total (dBA)*
Day	49

Receiver Name	Receiver ID	X	Y	Z
R01	R01	560982 m	4887827 m	513.5 m

Source ID	Source Name	X	Y	Z	Refl.	Lw	L/A	Freq	Adiv	K0	Agr	Abar	Aatm	Afol	Ahous	Cmet	Dc	RL	Lr
ORT	Offroad Trucks	561457.7	4888494.0	492.4	0	83	13.6	A	69.3	0.0	-2.4	7.2	3.7	0.0	0.0	0.0	0.0	0.0	18
ORT	Offroad Trucks	561431.7	4888497.9	492.4	0	83	14.7	A	69.1	0.0	-2.4	7.2	3.7	0.0	0.0	0.0	0.0	0.0	20
ORT	Offroad Trucks	561405.7	4888501.8	492.4	0	83	13.6	A	69.0	0.0	-2.3	7.1	3.7	0.0	0.0	0.0	0.0	0.0	19
ORT	Offroad Trucks	561342.9	4888511.4	492.4	0	83	20.2	A	68.8	0.0	-2.3	7.0	3.6	0.0	0.0	0.0	0.0	0.0	26
ORT	Offroad Trucks	561269.3	4888522.5	492.4	0	83	9.2	A	68.5	0.0	-2.1	6.9	3.5	0.0	0.0	0.0	0.0	0.0	15
ORT	Offroad Trucks	561680.5	4888099.9	476.3	0	83	22.3	A	68.5	0.0	-2.5	7.3	3.5	0.0	0.0	0.0	0.0	0.0	28
ORT	Offroad Trucks	561626.9	4888244.5	474.4	0	83	21.5	A	68.7	0.0	-2.5	7.3	3.6	0.0	0.0	0.0	0.0	0.0	27
ORT	Offroad Trucks	561641.3	4887877.1	478.4	0	83	15.7	A	67.4	0.0	-2.4	7.3	3.2	0.0	0.0	0.0	0.0	0.0	23
ORT	Offroad Trucks	561583.2	4888331.7	474.4	0	83	17.4	A	68.9	0.0	-2.5	7.3	3.6	0.0	0.0	0.0	0.0	0.0	23
ORT	Offroad Trucks	561574.1	4888369.6	474.4	0	83	13.6	A	69.1	0.0	-2.5	7.3	3.7	0.0	0.0	0.0	0.0	0.0	19
ORT	Offroad Trucks	561570.2	4888386.0	474.4	0	83	10.4	A	69.2	0.0	-2.5	7.3	3.7	0.0	0.0	0.0	0.0	0.0	15
ORT	Offroad Trucks	561566.6	4888400.9	474.4	0	83	12.9	A	69.3	0.0	-2.5	7.3	3.7	0.0	0.0	0.0	0.0	0.0	18
ORT	Offroad Trucks	561510.4	4888460.8	485.7	0	83	19.5	A	69.3	0.0	-2.4	7.4	3.8	0.0	0.0	0.0	0.0	0.0	24
ORT	Offroad Trucks	561681.5	4887936.0	478.0	0	83	18.5	A	68.0	0.0	-2.5	7.3	3.4	0.0	0.0	0.0	0.0	0.0	25
ORT	Offroad Trucks	561686.4	4887993.1	477.8	0	83	17.0	A	68.2	0.0	-2.5	7.3	3.4	0.0	0.0	0.0	0.0	0.0	23
ORT	Offroad Trucks	561668.8	4887886.3	478.8	0	83	13.7	A	67.8	0.0	-2.5	7.3	3.3	0.0	0.0	0.0	0.0	0.0	20
ORT	Offroad Trucks	561680.9	4887896.3	478.7	0	83	9.0	A	67.9	0.0	-2.5	7.3	3.4	0.0	0.0	0.0	0.0	0.0	16
PPROC	Pit Processing Plant	561221.2	4888539.1	493.0	0	120	0.0	A	68.5	0.0	-1.8	14.1	3.4	0.0	0.0	0.0	0.0	0.0	36
QPRIM	Primary Processing Plant	561225.3	4888176.9	483.0	0	120	0.0	A	63.6	0.0	-1.2	9.0	1.6	0.0	0.0	0.0	0.0	0.0	46
DRILL	Rock Drill	561157.8	4888226.0	492.0	0	117	0.0	A	63.8	0.0	-1.5	12.9	2.9	0.0	0.0	0.0	0.0	0.0	39
QSEC	Secondary Processing Plant	561354.3	4888189.9	475.5	0	121	0.0	A	65.3	0.0	-2.0	18.7	2.4	0.0	0.0	0.0	0.0	0.0	37
FELS	Shipping Loaders	561364.5	4888155.5	474.4	0	110	0.0	A	65.1	0.0	-1.8	16.5	2.1	0.0	0.0	0.0	0.0	0.0	25
FELS	Shipping Loaders	561228.8	4888501.6	492.4	0	110	0.0	A	68.1	0.0	-1.7	6.5	2.7	0.0	0.0	0.0	0.0	0.0	31
WP	Wash Plant	561560.9	4887072.9	497.5	0	114	0.0	A	70.6	0.0	-2.4	22.8	4.4	0.0	0.0	0.0	0.0	0.0	19

*The total value shown accounts for all modelled sources and may include small contributions from sources not described in the table above

Receiver: R20
Project: Strada Pit/Quarry
Project Number: 16099.01

Time Period	Total (dBA)*
Day	43

Receiver Name	Receiver ID	X	Y	Z
(untitled)	R20	562299 m	4888276 m	494.5 m

Source ID	Source Name	X	Y	Z	Refl.	Lw	L/A	Freq	Adiv	K0	Agr	Abar	Aatm	Afol	Ahous	Cmet	Dc	RL	Lr
Conv	Conveyor	561318.7	4888191.7	476.9	0	81	17.0	A	70.9	0.0	-0.4	6.0	1.5	0.0	0.0	0.0	0.0	0.0	20
Conv	Conveyor	561284.0	4888194.5	480.9	0	81	12.9	A	71.2	0.0	-0.4	5.2	1.6	0.0	0.0	0.0	0.0	0.0	16
Conv	Conveyor	561260.5	4888195.7	482.0	0	81	14.4	A	71.4	0.0	-0.4	5.2	1.6	0.0	0.0	0.0	0.0	0.0	18
Conv	Conveyor	561236.1	4888196.4	482.0	0	81	13.3	A	71.6	0.0	-0.4	5.2	1.6	0.0	0.0	0.0	0.0	0.0	16
FELE	Extraction Loader	561229.5	4888587.8	505.4	0	112	0.0	A	71.9	0.0	-1.0	5.8	3.7	0.0	0.0	0.0	0.0	0.0	31
FELE	Extraction Loaders	561207.7	4888159.9	482.4	0	115	0.0	A	71.8	0.0	-1.6	6.3	3.7	0.0	0.0	0.0	0.0	0.0	34
HwyTruck	Highway Trucks	561376.3	4888290.1	476.8	0	80	18.7	A	70.3	0.0	-1.6	6.4	3.7	0.0	0.0	0.0	0.0	0.0	20
HwyTruck	Highway Trucks	561305.3	4888407.9	485.8	0	80	23.0	A	71.0	0.0	-1.7	6.5	3.9	0.0	0.0	0.0	0.0	0.0	24
HwyTruck	Highway Trucks	561213.5	4888039.5	492.4	0	80	23.1	A	71.9	0.0	-1.9	6.7	4.3	0.0	0.0	0.0	0.0	0.0	22
HwyTruck	Highway Trucks	561367.9	4888138.0	483.4	0	80	20.9	A	70.5	0.0	-1.7	6.4	3.7	0.0	0.0	0.0	0.0	0.0	22
HwyTruck	Highway Trucks	561400.3	4888222.2	474.4	0	80	18.6	A	70.1	0.0	-1.6	6.7	3.6	0.0	0.0	0.0	0.0	0.0	20
HwyTruck	Highway Trucks	561321.5	4888074.7	492.4	0	80	15.5	A	71.0	0.0	-1.8	6.5	3.9	0.0	0.0	0.0	0.0	0.0	16
HwyTruck	Highway Trucks	561209.1	4888039.1	492.4	0	80	22.9	A	72.0	0.0	-1.9	6.7	4.3	0.0	0.0	0.0	0.0	0.0	22
HwyTruck	Highway Trucks	561212.7	4888039.1	492.4	0	77	23.0	A	71.9	0.0	-1.9	6.7	4.3	0.0	0.0	0.0	0.0	0.0	19
HwyTruck	Highway Trucks	561466.5	4887100.5	496.4	0	80	19.9	A	74.2	0.0	-1.5	6.3	5.2	0.0	0.0	0.0	0.0	0.0	16
ORT	Offroad Trucks	561496.3	4887374.4	491.0	0	83	24.8	A	72.6	0.0	-1.1	5.9	4.9	0.0	0.0	0.0	0.0	0.0	25
ORT	Offroad Trucks	561531.4	4887672.2	481.5	0	83	24.8	A	70.8	0.0	-0.9	12.2	4.2	0.0	0.0	0.0	0.0	0.0	21
ORT	Offroad Trucks	561371.8	4888507.0	492.4	0	83	23.3	A	70.6	0.0	-1.3	7.4	4.2	0.0	0.0	0.0	0.0	0.0	25
ORT	Offroad Trucks	561561.7	4887843.0	476.8	0	83	17.1	A	69.6	0.0	-1.2	12.1	3.9	0.0	0.0	0.0	0.0	0.0	15
ORT	Offroad Trucks	561505.7	4887150.1	496.4	0	83	21.1	A	73.8	0.0	-1.2	6.0	5.4	0.0	0.0	0.0	0.0	0.0	20
PPROC	Pit Processing Plant	561221.2	4888539.1	493.0	0	120	0.0	A	71.9	0.0	-1.3	14.3	4.5	0.0	0.0	0.0	0.0	0.0	31
QPRIM	Primary Processing Plant	561225.3	4888176.9	483.0	0	120	0.0	A	71.7	0.0	-0.9	9.9	3.2	0.0	0.0	0.0	0.0	0.0	36
DRILL	Rock Drill	561157.8	4888226.0	492.0	0	117	0.0	A	72.2	0.0	-1.6	6.4	5.7	0.0	0.0	0.0	0.0	0.0	34
QSEC	Secondary Processing Plant	561354.3	4888189.9	475.5	0	121	0.0	A	70.5	0.0	-1.4	14.4	3.8	0.0	0.0	0.0	0.0	0.0	34
FELS	Shipping Loader	561517.8	4887051.2	496.4	0	107	0.0	A	74.2	0.0	-1.1	5.9	4.3	0.0	0.0	0.0	0.0	0.0	21
FELS	Shipping Loaders	561364.5	4888155.5	474.4	0	110	0.0	A	70.5	0.0	-1.2	6.1	3.3	0.0	0.0	0.0	0.0	0.0	28
FELS	Shipping Loaders	561228.8	4888501.6	492.4	0	110	0.0	A	71.8	0.0	-1.3	6.1	3.6	0.0	0.0	0.0	0.0	0.0	27
WP	Wash Plant	561560.9	4887072.9	497.5	0	114	0.0	A	74.0	0.0	-1.2	5.9	5.7	0.0	0.0	0.0	0.0	0.0	30

*The total value shown accounts for all modelled sources and may include small contributions from sources not described in the table above

Receiver: R29
Project: Strada Pit/Quarry
Project Number: 16099.01

Time Period	Total (dBA)*
Day	44

Receiver Name	Receiver ID	X	Y	Z
(untitled)	R29	560772 m	4889102 m	514.5 m

Source ID	Source Name	X	Y	Z	Refl.	Lw	L/A	Freq	Adiv	K0	Agr	Abar	Aatm	Afol	Ahous	Cmet	Dc	RL	Lr
Conv	Conveyor	561309.0	4888192.5	478.0	0	81	18.5	A	71.5	0.0	-0.9	5.9	1.6	0.0	0.0	0.0	0.0	0.0	21
Conv	Conveyor	561253.1	4888195.9	482.0	0	81	16.3	A	71.2	0.0	-0.8	5.6	1.6	0.0	0.0	0.0	0.0	0.0	20
FELE	Extraction Loader	561229.5	4888587.8	505.4	0	112	0.0	A	67.8	0.0	-0.6	5.4	2.5	0.0	0.0	0.0	0.0	0.0	37
FELE	Extraction Loaders	561207.7	4888159.9	482.4	0	115	0.0	A	71.3	0.0	-1.7	7.0	3.5	0.0	0.0	0.0	0.0	0.0	34
HwyTruck	Highway Trucks	561324.5	4888376.1	483.4	0	80	24.4	A	70.2	0.0	-2.1	7.5	3.6	0.0	0.0	0.0	0.0	0.0	25
HwyTruck	Highway Trucks	561134.1	4888023.4	492.4	0	80	16.0	A	72.1	0.0	-1.4	6.2	4.3	0.0	0.0	0.0	0.0	0.0	15
HwyTruck	Highway Trucks	561190.8	4888034.9	492.4	0	80	18.8	A	72.2	0.0	-1.9	6.6	4.4	0.0	0.0	0.0	0.0	0.0	18
HwyTruck	Highway Trucks	561265.8	4888050.0	492.4	0	80	16.9	A	72.3	0.0	-2.2	7.0	4.4	0.0	0.0	0.0	0.0	0.0	16
HwyTruck	Highway Trucks	561347.2	4888111.3	488.4	0	80	17.4	A	72.2	0.0	-2.4	7.2	4.4	0.0	0.0	0.0	0.0	0.0	16
HwyTruck	Highway Trucks	561400.5	4888220.6	474.4	0	80	18.4	A	71.7	0.0	-2.3	8.6	4.2	0.0	0.0	0.0	0.0	0.0	17
HwyTruck	Highway Trucks	561134.1	4888023.5	492.4	0	80	16.0	A	72.1	0.0	-1.4	6.2	4.3	0.0	0.0	0.0	0.0	0.0	15
HwyTruck	Highway Trucks	561190.7	4888035.2	492.4	0	80	18.8	A	72.2	0.0	-1.9	6.6	4.4	0.0	0.0	0.0	0.0	0.0	18
HwyTruck	Highway Trucks	561265.5	4888050.8	492.4	0	80	16.9	A	72.3	0.0	-2.2	7.0	4.4	0.0	0.0	0.0	0.0	0.0	16
ORT	Offroad Trucks	561379.4	4888505.8	492.4	0	83	23.0	A	69.6	0.0	-1.8	7.6	3.9	0.0	0.0	0.0	0.0	0.0	26
ORT	Offroad Trucks	561488.5	4887308.3	493.2	0	83	23.1	A	76.7	0.0	-2.1	6.9	6.8	0.0	0.0	0.0	0.0	0.0	17
ORT	Offroad Trucks	561533.5	4888439.2	480.9	0	83	19.3	A	71.1	0.0	-1.9	7.5	4.3	0.0	0.0	0.0	0.0	0.0	21
ORT	Offroad Trucks	561490.6	4888479.4	489.9	0	83	15.3	A	70.6	0.0	-1.9	6.9	4.2	0.0	0.0	0.0	0.0	0.0	18
ORT	Offroad Trucks	561626.9	4888244.5	474.4	0	83	21.5	A	72.7	0.0	-2.1	7.3	4.9	0.0	0.0	0.0	0.0	0.0	21
ORT	Offroad Trucks	561676.8	4888118.7	475.9	0	83	21.3	A	73.5	0.0	-2.2	7.0	5.3	0.0	0.0	0.0	0.0	0.0	20
ORT	Offroad Trucks	561630.1	4887876.0	478.1	0	83	17.8	A	74.5	0.0	-2.3	7.1	5.7	0.0	0.0	0.0	0.0	0.0	15
ORT	Offroad Trucks	561681.5	4887936.0	478.0	0	83	18.5	A	74.4	0.0	-2.3	7.1	5.7	0.0	0.0	0.0	0.0	0.0	16
PPROC	Pit Processing Plant	561221.2	4888539.1	493.0	0	120	0.0	A	68.2	0.0	-1.4	15.6	3.3	0.0	0.0	0.0	0.0	0.0	35
QPRIM	Primary Processing Plant	561225.3	4888176.9	483.0	0	120	0.0	A	71.3	0.0	-1.2	6.0	3.1	0.0	0.0	0.0	0.0	0.0	40
DRILL	Rock Drill	561157.8	4888226.0	492.0	0	117	0.0	A	70.6	0.0	-1.6	13.4	5.1	0.0	0.0	0.0	0.0	0.0	29
QSEC	Secondary Processing Plant	561354.3	4888189.9	475.5	0	121	0.0	A	71.7	0.0	-2.1	15.0	4.2	0.0	0.0	0.0	0.0	0.0	32
FELS	Shipping Loader	561517.8	4887051.2	496.4	0	107	0.0	A	77.8	0.0	-1.7	6.5	5.5	0.0	0.0	0.0	0.0	0.0	16
FELS	Shipping Loaders	561228.8	4888501.6	492.4	0	110	0.0	A	68.6	0.0	-1.5	10.4	2.8	0.0	0.0	0.0	0.0	0.0	27
FELS	Shipping Loaders	561364.5	4888155.5	474.4	0	110	0.0	A	72.0	0.0	-1.8	6.8	3.7	0.0	0.0	0.0	0.0	0.0	26
WP	Wash Plant	561560.9	4887072.9	497.5	0	114	0.0	A	77.8	0.0	-2.5	7.3	7.5	0.0	0.0	0.0	0.0	0.0	24

*The total value shown accounts for all modelled sources and may include small contributions from sources not described in the table above

Receiver: VL37
Project: Strada Pit/Quarry - Phase 2B
Project Number: 16099.01

Time Period	Total (dBA)*
Day	50

Receiver Name	Receiver ID	X	Y	Z
VL37	VL37	560865 m	4888388 m	514.5 m

Source ID	Source Name	X	Y	Z	Refl.	Lw	L/A	Freq	Adiv	K0	Agr	Abar	Aatm	Afol	Ahous	Cmet	Dc	RL	Lr
Conv	Conveyor	561309.1	4888201.9	478.0	0	81	18.4	A	64.7	0.0	-0.8	7.7	0.9	0.0	0.0	0.0	0.0	0.0	27
Conv	Conveyor	561250.5	4888201.1	482.0	0	81	16.9	A	63.7	0.0	-0.7	8.4	0.8	0.0	0.0	0.0	0.0	0.0	26
FELE	Extraction Loaders	561207.7	4888159.9	482.4	0	115	0.0	A	63.3	0.0	-1.5	19.0	1.7	0.0	0.0	0.0	0.0	0.0	32
FELE	Extraction Loaders	561229.5	4888587.8	505.4	0	110	0.0	A	63.4	0.0	-0.4	5.2	1.8	0.0	0.0	0.0	0.0	0.0	40
HwyTruck	Highway Trucks	561359.9	4888317.2	478.9	0	80	21.4	A	65.0	0.0	-2.3	9.7	2.2	0.0	0.0	0.0	0.0	0.0	27
HwyTruck	Highway Trucks	561289.0	4888435.0	487.9	0	80	21.4	A	63.6	0.0	-2.1	9.5	1.9	0.0	0.0	0.0	0.0	0.0	29
HwyTruck	Highway Trucks	561155.6	4888027.7	492.4	0	80	19.2	A	64.3	0.0	-1.3	11.6	2.1	0.0	0.0	0.0	0.0	0.0	23
HwyTruck	Highway Trucks	561255.2	4888047.9	492.4	0	80	20.7	A	65.3	0.0	-1.9	7.6	2.3	0.0	0.0	0.0	0.0	0.0	28
HwyTruck	Highway Trucks	561336.4	4888097.4	491.0	0	80	12.8	A	65.9	0.0	-2.2	7.3	2.4	0.0	0.0	0.0	0.0	0.0	20
HwyTruck	Highway Trucks	561346.9	4888111.0	488.5	0	80	11.9	A	65.9	0.0	-2.2	7.5	2.4	0.0	0.0	0.0	0.0	0.0	19
HwyTruck	Highway Trucks	561355.3	4888121.8	486.5	0	80	10.8	A	65.9	0.0	-2.2	7.7	2.4	0.0	0.0	0.0	0.0	0.0	17
HwyTruck	Highway Trucks	561368.3	4888138.6	483.3	0	80	14.9	A	66.0	0.0	-2.3	8.1	2.5	0.0	0.0	0.0	0.0	0.0	21
HwyTruck	Highway Trucks	561384.7	4888159.7	479.4	0	80	13.6	A	66.1	0.0	-2.3	8.5	2.5	0.0	0.0	0.0	0.0	0.0	19
HwyTruck	Highway Trucks	561394.8	4888172.7	476.9	0	80	10.1	A	66.2	0.0	-2.3	8.8	2.5	0.0	0.0	0.0	0.0	0.0	15
HwyTruck	Highway Trucks	561399.6	4888227.2	474.4	0	80	18.0	A	66.0	0.0	-2.3	9.3	2.4	0.0	0.0	0.0	0.0	0.0	23
HwyTruck	Highway Trucks	561321.5	4888074.7	492.4	0	80	15.5	A	65.9	0.0	-2.1	7.2	2.4	0.0	0.0	0.0	0.0	0.0	22
HwyTruck	Highway Trucks	561155.4	4888027.9	492.4	0	80	19.2	A	64.3	0.0	-1.3	11.6	2.1	0.0	0.0	0.0	0.0	0.0	23
HwyTruck	Highway Trucks	561250.7	4888047.7	492.4	0	80	20.3	A	65.2	0.0	-1.9	7.6	2.3	0.0	0.0	0.0	0.0	0.0	27
HwyTruck	Highway Trucks	561155.6	4888027.7	492.4	0	77	19.2	A	64.3	0.0	-1.3	11.6	2.1	0.0	0.0	0.0	0.0	0.0	20
HwyTruck	Highway Trucks	561254.5	4888047.5	492.4	0	77	20.6	A	65.3	0.0	-1.9	7.6	2.3	0.0	0.0	0.0	0.0	0.0	25
HwyTruck	Highway Trucks	561351.9	4888146.5	474.4	0	77	14.7	A	65.7	0.0	-2.2	10.1	2.4	0.0	0.0	0.0	0.0	0.0	16
HwyTruck	Highway Trucks	561321.2	4888073.7	492.4	0	77	15.6	A	65.9	0.0	-2.1	7.2	2.4	0.0	0.0	0.0	0.0	0.0	20

Receiver: VL37
Project: Strada Pit/Quarry - Phase 2B
Project Number: 16099.01

Time Period	Total (dBA)*
Day	50

Receiver Name	Receiver ID	X	Y	Z
VL37	VL37	560865 m	4888388 m	514.5 m

Source ID	Source Name	X	Y	Z	Refl.	Lw	L/A	Freq	Adiv	K0	Agr	Abar	Aatm	Afol	Ahous	Cmet	Dc	RL	Lr
ORT	Offroad Trucks	561371.8	4888507.0	492.4	0	83	23.3	A	65.3	0.0	-2.2	7.2	2.7	0.0	0.0	0.0	0.0	0.0	33
ORT	Offroad Trucks	561480.2	4887238.1	495.4	0	83	18.0	A	73.3	0.0	-2.0	6.8	5.2	0.0	0.0	0.0	0.0	0.0	17
ORT	Offroad Trucks	561487.2	4887297.4	493.5	0	83	17.3	A	73.0	0.0	-2.1	6.8	5.1	0.0	0.0	0.0	0.0	0.0	17
ORT	Offroad Trucks	561492.5	4887342.5	492.1	0	83	15.7	A	72.7	0.0	-2.1	6.9	5.0	0.0	0.0	0.0	0.0	0.0	16
ORT	Offroad Trucks	561521.3	4888450.6	483.4	0	83	20.8	A	67.4	0.0	-2.4	7.3	3.2	0.0	0.0	0.0	0.0	0.0	28
ORT	Offroad Trucks	561626.9	4888244.5	474.4	0	83	21.5	A	68.8	0.0	-2.5	7.3	3.6	0.0	0.0	0.0	0.0	0.0	27
ORT	Offroad Trucks	561694.1	4888029.7	477.8	0	83	14.6	A	70.1	0.0	-2.5	7.3	4.0	0.0	0.0	0.0	0.0	0.0	18
ORT	Offroad Trucks	561689.6	4888052.7	477.3	0	83	12.6	A	70.0	0.0	-2.5	7.3	4.0	0.0	0.0	0.0	0.0	0.0	17
ORT	Offroad Trucks	561684.4	4888079.4	476.7	0	83	15.6	A	69.9	0.0	-2.5	7.3	3.9	0.0	0.0	0.0	0.0	0.0	20
ORT	Offroad Trucks	561672.5	4888140.7	475.4	0	83	19.5	A	69.5	0.0	-2.5	7.3	3.8	0.0	0.0	0.0	0.0	0.0	24
ORT	Offroad Trucks	561577.0	4888357.6	474.4	0	83	20.4	A	68.1	0.0	-2.4	7.4	3.4	0.0	0.0	0.0	0.0	0.0	27
ORT	Offroad Trucks	561618.8	4887874.9	477.9	0	83	19.2	A	70.2	0.0	-2.4	7.2	4.0	0.0	0.0	0.0	0.0	0.0	23
ORT	Offroad Trucks	561684.6	4887917.2	478.4	0	83	15.0	A	70.5	0.0	-2.5	7.2	4.1	0.0	0.0	0.0	0.0	0.0	18
ORT	Offroad Trucks	561680.1	4887945.1	477.9	0	83	13.9	A	70.4	0.0	-2.5	7.2	4.1	0.0	0.0	0.0	0.0	0.0	17
ORT	Offroad Trucks	561563.4	4887846.0	476.8	0	83	17.6	A	69.9	0.0	-2.3	7.1	4.0	0.0	0.0	0.0	0.0	0.0	22
ORT	Offroad Trucks	561505.7	4887150.1	496.4	0	83	21.1	A	73.9	0.0	-2.0	6.8	5.4	0.0	0.0	0.0	0.0	0.0	20
ORT	Offroad Trucks	561682.1	4887983.8	477.7	0	83	14.7	A	70.2	0.0	-2.5	7.2	4.0	0.0	0.0	0.0	0.0	0.0	18
ORT	Offroad Trucks	561673.0	4887889.8	478.7	0	83	15.3	A	70.6	0.0	-2.5	7.2	4.2	0.0	0.0	0.0	0.0	0.0	18
PPROC	Pit Processing Plant	561221.2	4888539.1	493.0	0	120	0.0	A	62.8	0.0	-1.6	17.6	2.1	0.0	0.0	0.0	0.0	0.0	40
QPRIM	Primary Processing Plant	561225.3	4888176.9	483.0	0	120	0.0	A	63.4	0.0	-1.1	10.4	1.6	0.0	0.0	0.0	0.0	0.0	45
DRILL	Rock Drill	561157.8	4888226.0	492.0	0	117	0.0	A	61.5	0.0	-1.4	21.2	2.4	0.0	0.0	0.0	0.0	0.0	33
QSEC	Secondary Processing Plant	561354.3	4888189.9	475.5	0	121	0.0	A	65.5	0.0	-2.0	9.7	2.4	0.0	0.0	0.0	0.0	0.0	46
FELS	Shipping Loader	561517.8	4887051.2	496.4	0	107	0.0	A	74.5	0.0	-1.7	6.5	4.4	0.0	0.0	0.0	0.0	0.0	20
FELS	Shipping Loaders	561228.8	4888501.6	492.4	0	113	0.0	A	62.6	0.0	-1.6	8.6	1.7	0.0	0.0	0.0	0.0	0.0	38
FELS	Shipping Loaders	561376.2	4888216.5	474.4	0	110	0.0	A	65.7	0.0	-1.8	8.7	2.2	0.0	0.0	0.0	0.0	0.0	32
WP	Wash Plant	561559.2	4887071.9	497.5	0	114	0.0	A	74.5	0.0	-2.4	7.1	5.9	0.0	0.0	0.0	0.0	0.0	29

*The total value shown accounts for all modelled sources and may include small contributions from sources not described in the table above

Appendix C
Qualifications of the Authors

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Fax 416-249-3613
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Kohl Clark, B.Eng., P.Eng.

Senior Project Manager

Kohl holds a Bachelor of Engineering in Mechanical Engineering from McMaster University. As an Acoustical Engineer at Aercoustics Engineering Ltd., Kohl brings experience tackling projects in various industries, including architectural design, residential, environmental, aggregate and transit. Kohl is a professional engineer with Professional Engineers Ontario.

Education & Experience

- Bachelor of Engineering, Mechanical Engineering, McMaster University, June 2016
- Acoustical Engineer, Aercoustics Engineering Ltd., August 2016 to Present

Relevant Project Experience

Aggregate site modelling and design experience includes:

Waterford Sand & Gravel	Law Quarry Extension	Wainfleet, ON
CBM Aggregates	North Dorchester Pit	Thames Centre, ON
Brantam Excavating	Elgin Pit	Thames Centre, ON
Teeswater Aggregates	Paris Plains Pit	Paris, ON
Aaroc Aggregates	Wallace Pit	Thamesford, ON
Cornwall Gravel	Greely Quarry	Ottawa, ON
James Thoume Construction Ltd.	Litchy Pit	Centre Wellington, ON
Bruce Peninsula Stone Ltd.	Mar Quarry Bury Road Quarry Wiarton Quarry	Bruce Peninsula, ON

Aggregate site review and audit experience includes:

Waterford Sand & Gravel	Vinemount Quarries	Stoney Creek, ON
CBM Aggregates	Brown Pit Dance & Dabrowski Pit Thomas St. Quarry Codrington Pit	North Dumfries, ON North Dumfries, ON St Marys, ON Codrington, ON
CRH Aggregates	Hennig Pit Cedar Creek Pit	North Dumfries, ON North Dumfries, ON

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Derek Flake M.Sc., P.Eng.

Profile

Derek is an employee of Aercoustics Engineering Limited, an engineering consulting company specializing in acoustics, noise and vibration. Prior to that, he worked for several years at another acoustics, noise and vibration firm and he completed a Master of Science in the field of ultrasound transducer design. Derek is a Professional Engineer with the Professional Engineers Ontario.

Derek has been recognized by the Local Planning Appeal Tribunal (LPAT) and previously by the Ontario Municipal Board (OMB) as an expert in environmental noise and has provided expert opinion testimony to the Board and in civil litigation.

Employment History

2012 – Present	Acoustical Engineer, Aercoustics Engineering Limited
2009 – 2012	Engineering Intern, Jade Acoustics Incorporated

Additional Activities / Committees

2019 – Present	Officer on the Board of Directors and Chair of the Membership Committee at the Air & Waste Management Association (A&WMA) Ontario Section (OS)
2018 – Present	Member of Environment Committee at the Ontario Sand, Stone and Gravel Association (OSSGA)
2014 – Present	Member of Training and Development Committee at the Ontario Sand, Stone and Gravel Association (OSSGA)

Education

Master of Science (M.Sc.)	Medical Biophysics (Ultrasound Physics) University of Toronto
Bachelor of Applied Science (B.A.Sc.)	Engineering Physics (Mechanical) Queen's University

Professional Registration / Affiliations

Licensed Professional Engineer with the Professional Engineers of Ontario (PEO)

Courses and Speaking Events

Instructor, Municipal Law Enforcement Officers' Association (MLEOA) Environmental Noise training courses. This is an annual four-day training program which provides the officers with an understanding of sound measurement and its relationship with environmental noise impact. The officer is trained in the utilization of technical equipment required in the application of sound measurement theories. This course also covers the unique elements of qualitative noise regulations and is authorized by the Ministry of the Environment and Climate Change.

Speaker, "Overview of Noise & Vibration Issues in Land-Use Planning", A&WMA OS Environment Issues in Land-Use Planning, Guelph, October 30, 2019.

Attended A&WMA Course "Consultant Liability and Expert Witness Testimony", Guelph, 2019.

Speaker, "Environmental Noise: Modelling Techniques to Quiet your Acoustic Troubles", ACE 2019, Quebec City, 2019.

Attended PSMJ Resources Project Management Bootcamp, Toronto, 2016.

Attended OSSGA Health and Safety Seminar courses *"Aggregates 101" and "Aggregates 201"*, Toronto, 2015. Mr. Flake both attended and aided in the development for parts of the course.

Speaker, "*The New NPC-300 Noise Guideline: What does it mean for your noise by-law?*" MLEOA Annual General Meeting, Kingston, 2014.

Professional Activities

Land Use Planning

In the field of environmental acoustics, Mr. Flake has completed numerous projects involving noise impact from planned stationary sources as well as noise impact studies for proposed new noise sensitive uses. These projects included conducting studies for proposed operations and developments and addressing noise concerns for existing operations. Peer reviews of noise studies prepared by other acoustic consultants were also conducted by Mr. Flake. In the land use planning process, Mr. Flake has completed studies which provide assessments of the noise impact on proposed residential, commercial, institutional and industrial developments from the local environment which includes noise from road, rail, and aircraft traffic and stationary noise sources such as industrial and commercial uses. Also, vibration measurements and studies were conducted to assess vibration from rail traffic such as trains, streetcars and subways. The studies include recommendations for noise control of the sources, dwelling building components, wall, window, and door constructions to satisfy the Ministry of Environment, Conservation and Parks noise guidelines.

In addition, Mr. Flake has conducted architectural drawing reviews and provided design advice for residential and commercial developments. These have ensured the construction plans will meet the municipal and Ontario Building Code requirements.

Environmental Compliance Approvals & EASR
Mr. Flake was involved in noise and vibration impact studies for industrial, institutional and commercial uses. He has prepared Acoustic Assessment Reports for use in applications for Environmental Compliance Approvals (ECA) and the Environmental Activity & Sector Registry (EASR). These studies provided conceptual as well as detailed designs of noise mitigation to reduce in-plant noise or noise emission into the environment. In-plant projects generally involved noise surveys, detailed noise and vibration measurements of equipment, data analysis and computer modelling of noise controls to evaluate effectiveness. In some cases, detailed designs and specifications have been provided. Mr. Flake has a good record of submitting applications that are accepted as fully complete according to MECP records.

Aggregates
Mr. Flake has done work in the aggregates industry which involved the preparation and support of noise impact studies to determine technical feasibility of aggregate licence applications to the Ministry of Natural Resources & Forestry. This work included preparing the noise impact studies, supporting the findings at public meetings, and performing acoustic audits to confirm compliance with the noise requirements.

Mining
Mr. Flake has acted as a third-party peer reviewer for the City of Timmins, overseeing all aspects of environmental compliance (including acoustics, noise & vibration) for the Hollinger Pit Open Mine in Timmins.

Acoustic Audits were also conducted at Goldcorp's Red Lake Balmerton & Cochenour sites.

Renewable Energy
Mr. Flake has performed IEC 61400 testing of Wind Turbines and Transformer Station noise audits.

Noise Source Investigations and Room Acoustics
Mr. Flake has completed several projects involving design of spaces where sound privacy and room acoustics were critical. These projects have included noise complaint investigation, room acoustics, mechanical noise, noise measurements to quantify sound isolation, and environmental noise impact. Examples of spaces include cinemas, offices, hospitals and residential condominiums.

End of Report