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ST. MARYS
FLAMBOROUGH QUARRY

Noise Impact Study
Project#: 06199

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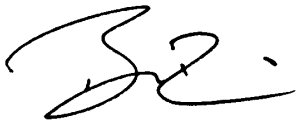

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1.0 EXECUTIVE SUMMARY

Aercoustics has conducted a noise impact study for the proposed St. Marys Cement Inc. (Canada) (St. Marys) Flamborough Quarry. The purpose of this study was to provide noise control recommendations in order that the operation of the proposed extension will satisfy the Ministry of the Environment (MOE) noise guidelines.

The first step in the process was to identify the residential receptors in the vicinity where, based on our experience, there was a potential for the proposed operation to exceed MOE noise limits. Receptors in the vicinity of the proposed quarry have been designated as Class 3 (Rural) receptors. The MOE sound level limits for these receptors is 45 dBA for the daytime period of 07:00-19:00 and 40 dBA for the early morning, evening and night-time period of 19:00-07:00.

Based on the description of the proposed quarry operation provided by St. Marys and illustrated in the site plan drawings, noise impact predictions were performed. The operations in the noise impact evaluation included drilling, extraction, transportation and processing.

An iterative process of predicting noise impact was performed modeling various noise controls and discussion with St. Marys staff and the design team to obtain effective and practical controls. The resulting noise controls are presented in this noise impact study. They included extraction directions to utilize the shielding provided by the working face, perimeter berm/barriers, berm/barriers close to equipment, operation time and distance setback restrictions, and other controls. With their implementation, the MOE sound level limits are predicted to be satisfied.

Any proposed changes to the aspects of the extraction, processing and shipping operations dealt with above as relating to noise control should be reviewed by a qualified acoustical consultant for compliance with the relevant noise criteria.

2.0 INTRODUCTION

Aercoustics has conducted a noise impact study for the proposed St. Marys Quarry in the County of Flamborough, Ontario. The purpose of this study was to provide noise control recommendations in order that the operation within the quarry will satisfy the Ministry of the Environment (MOE) noise guidelines. A key plan has been included as Figure 1.

This noise impact study addresses the environmental noise issues relating to the proposed St. Marys Flamborough Quarry. The purpose of the study is to aid in the design of the proposed quarry with the objective of satisfying the Ontario Ministry of the Environment (MOE) sound level limits, and assuring that the predicted noise impacts of the proposed operation are acceptable.

To this end, noise receptors in the vicinity of the subject project were identified and appropriate sound level limits established, based on the noise guidelines of the Ministry of the Environment (MOE). Next the noise predictions were performed of the quarry operations at these residential receptors. Where the predicted levels were found to exceed the MOE sound level limits, noise control measures were recommended to satisfy these limits.

The general site location is presented as Figure 1. Figure 2 shows a site plan illustrating the proposed quarry and the identified residential receptor groups.

3.0 PROPOSED QUARRY OPERATION

3.1 *OVERVIEW*

The proposed St. Marys Flamborough Quarry is located in Part of Lot 1, Lots 2 and 3 Concession 11, Geographic Township of East Flamborough, City of Hamilton.

The proposed extraction operation is illustrated in Figure 3. The quarry extraction operation will generally occur in four areas, numbered 1 through 4.

The initial operation will consist of constructing the truck entrance/exit route, some perimeter berming, and the making of the sinking cut. The sinking will be made on the southern end of Area 1 as shown in Figure 3. It will be excavated proceeding generally in a Northern direction down to the finished quarry floor at a nominal elevation of EL255m. During this time period, a temporary processing plant site will be located on top of the rock surface after the overburden is removed. Shipment activity, shipment loaders and trucks, will also operate in this area during this initial time period. When the Area 1 is opened up sufficiently to accommodate the permanent processing plant, this plant will be constructed in Area 1. When the permanent processing plant is complete, it will be used for the duration of the quarry life.

The quarry will be extracted first completing Area 1, then continuing extraction in Areas 2 through 4 in sequence. The extraction will be completed with a single lift in all Areas with the quarry floor at a nominal elevation of EL255m.

In Area 3, there may be aggregate processing of the surficial sand and gravel deposits. This would involve the operation of a portable processing plant and front end loader. Shipment trucks would also access this area.

The current design has extraction occurring in one single lift. This report is based on this current operation design. It is understood, however, that in some areas of the quarry a 2 lift operation may be required. Revisions to this noise impact study may be required if this occurs.

3.2 *HOURS OF OPERATION*

The hours of operation of the quarry are presented below.

3.2.1 DRILLING & EXTRACTION

Monday to Friday:	07:00 – 19:00
Saturday:	07:00 – 12:00

3.2.2 AGGREGATE PROCESSING

Monday to Friday:	07:00 – 19:00
Saturday:	07:00 – 12:00

3.2.3 SHIPPING

Monday to Friday:	06:00 – 18:00
Saturday:	06:00 – 12:00

3.3 *SITE PREPARATION*

Site Preparation activity is not included in the noise impact analysis. This activity includes the construction of the perimeter berms/barriers, overburden stripping, initial sinking cuts, rehabilitation, as well as other construction projects that satisfy the following parameters;

- It is not part of the daily normal operation of the pit
- It is of short duration

The equipment used for this activity is required to satisfy the noise emission requirements of MOE NPC-115 “Noise due to Construction Equipment”.

3.4 *DRILLING & EXTRACTION*

The drill will operate on top of the working face after the overburden is removed. Two front end loaders will operate at the base of the working face and load quarry trucks. The typical time for a front end loader to load a quarry truck is 5 minutes. These quarry trucks will transport the aggregate material to the processing plant.

The drilling, extraction and transport equipment of the Quarry Extension is understood to be as follows:

- 1 Rock drill
- 2 Extraction loaders operating at the working face
- Quarry trucks (max 20 trips/hr (40 passes/hr))
    - 100T trucks for transport to the Processing Plant

3.5 *AGGREGATE PROCESSING*

3.5.1 INITIAL TEMPORARY PROCESSING PLANT

During the initial operation of the quarry, during the initial sinking cut, a temporary processing plant will be used. It will be comprised of the following portable equipment:

Table 1: Initial Temporary Processing Plant Components

Typical Equipment List	
1.	Jaw Crusher
2.	Scalping Screen
3.	Secondary Crusher
4.	Classification Screen
5.	Tertiary Crusher
6.	Wash Plant

The temporary processing plant will be positioned in the area illustrated in Figures 12 to 15 on top of the rock surface after the overburden is removed. There will be perimeter berming positioned around this area to provide acoustical shielding.

Quarry trucks will be used to transport the aggregate material from the working face to the processing plant.

3.5.2 PERMANENT PROCESSING PLANT

The permanent processing plant will be constructed when the quarry Area 1 is opened up sufficiently to accommodate it. It will be used for the duration of the quarry life. This plant will be enclosed in buildings. It will be comprised of the following equipment:

Table 2: Permanent Processing Plant Components

Typical Equipment List	
1.	Jaw Crusher(s)
2.	Scalping Screen(s)
3.	Secondary Crusher
4.	Classification Screen(s)
5.	Tertiary Crusher
6.	Wash Plant

Quarry trucks will be used to transport the aggregate material from the working face to the processing plant.

3.5.3 PORTABLE SCREENING PLANT

A portable screening plant may be used in Area 3 to process aggregate material in the overburden. The portable screening plant will be positioned on top of the rock surface after the overburden is removed. The portable screening plant will be a typical single truck trailer unit.

One front end loader will be used for excavation and to deliver material to this screening plant. The front end loader will also be used to load shipment trucks at this location.

3.6 *SHIPPING*

Shipping trucks will access the site along the on-property haul route as illustrated in Figure 4. The maximum shipment truck volumes will be:

Table 3: Maximum Shipment Truck Volumes in Passes/hr

Time Period		Maximum Hourly Truck Volume Trucks/hr	(Passes/hr)
Early Morning	(06:00 – 07:00)	50	(100)
Daytime	(07:00 – 18:00)	70	(140)

The shipping operation equipment is understood to be as follows:

- Up to 5 Shipment loaders
- Shipment trucks

The typical time for a front end loader to load a shipment truck is 2 minutes.

4.0 POINTS OF RECEPTION

4.1 *RECEPTOR LIST AND DESCRIPTION*

Noise sensitive receptors in the vicinity of the proposed St. Marys quarry extension are comprised of single family dwellings. Aercoustics selected receptor group locations, R1 to R15, which were considered to be representative of these noise sensitive receptors in all directions around the perimeter of the proposed quarry extension lands. The receptor numbering is consistent with that used in the Preliminary Noise Impact Study issued in June 2004. Note that R12 is owned by St. Marys and has been included as a receptor.

Figure 2 illustrates the locations of these residential receptors.

5.0 NOISE CRITERIA

5.1 *ACOUSTIC ENVIRONMENT*

Observations on the acoustical environment surrounding the receptors were noted on our site visits. The acoustical environment at all receptors is considered to have quiet background sounds in the daytime, evening and night time, dominated by natural sounds or infrequent human activity. These receptors have therefore been designated as Class 3 rural receptors.

5.2 *SOUND LEVEL LIMITS*

The appropriate noise criteria for the receptors in the vicinity of the St. Marys Flamborough Quarry is based on the Ministry of the Environment (MOE) noise guidelines; specifically MOE Noise Pollution Control publications

1) NPC-233 Guidelines on Information Required for the Assessment of Planned Stationary Sources of Sound

2) NPC-232 Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)

The applicable sound level limits for the residential receptors are provided in the table below.

Table 1: Summary of MOE Sound Level Limits

	Sound Level Limits Leq_{1hr} versus Time of day (dBA)		
Receptor	Morning (06 – 07)	Day (07 – 19)	Night (19 -06)
All Receptors	40	45	40

6.0 CALCULATION PROCEDURE & PARAMETERS

6.1 *NOISE MODEL*

The quarry operations described in Section 3 were modeled for the noise predictions. These predictions were based on design case conditions for noise emission, which is when the quarry is running at capacity with all of the equipment operating simultaneously. The noise impact calculations are based on established prediction methods as per the ISO 9613-2 standard entitled "Acoustics-Attenuation of sound during propagation outdoors - Part 2: General method of calculation". A noise propagation model was created using DataKustik's software Cadna/A.

Using the model, Aercoustics predicted the noise impact of the operation at the receptor locations. Where the MOE sound level limits were calculated to be exceeded, additional noise control measures were modeled and the noise impact recalculated. This process was repeated until the sound level limits were satisfied.

6.2 *GROUND ABSORPTION*

The ground was modelled as being acoustically hard within the quarry extraction and on-site haul route areas. Outside of these areas, all other ground was modelled as being acoustically soft ground.

6.3 *FOLIAGE*

Foliage was not included in this model.

7.0 NOISE SOURCES

The following table presents the reference sound levels used for the quarry equipment.

Table 5: Reference Sound Power Levels for Quarry Equipment

Equipment	Reference Sound Power Level (dB(A))
Rock Drill	117
Extraction Loader	113
Shipment Loader	107
Truck dump into Primary Crusher	111
Primary Crusher	110
Temporary Processing Plant	128
Permanent Processing Plant	131
Portable Screening Plant	112
Rock Drop – Primary Surge Pile	110
Rock Drop – Stockpile	91
Quarry Trucks (100T) @ 30km/hr	119
Highway Trucks @ 40 km/hr	109
Highway Trucks @ 25 km/hr	103 (107*)

* NOTE: PWL accounts for trucks traveling up grade.

8.0 RECOMMENDED NOISE CONTROLS

Noise controls have been specified to satisfy the sound level limits outlined in Table 1 for each phase of extraction. It should be noted that both daytime and early morning, evening and night time operations are outlined below. Daytime hours fall between 07:00-19:00, the early morning, evening and night time periods refers to the hours outside of the daytime period.

The specific noise controls required for each phase are outlined in the following sections of this study. The following sections present noise controls that are recommended.

8.1 *GENERAL*

1) Equipment used for overburden stripping and rehabilitation, as well as other construction projects, should satisfy the noise emission levels of MOE NPC-115 “Noise due to Construction Equipment”.

2) Quarry Equipment should satisfy the reference sound power levels listed in Table 5

3) Drilling should be limited to the daytime period of 07:00 – 19:00.

4) Operation of the All Processing Plants should be limited to the daytime period of 07:00 – 19:00.

5) Excavation should occur with a single lift with a nominal quarry floor elevation of EL255m.

6) The shipment truck speed limit should be restricted to 25 km/hr within the proposed extraction area of the quarry.

8.1.1 ACOUSTIC BARRIER

Acoustic barriers are recommended for noise control. An acoustic barrier should be solid with no gaps or openings and satisfy a minimum surface density of 20 kg/m^2 (4 lb/ft^2). They can take the form of an earth berm, acoustic fence, aggregate stockpile, a combination of these or any other construction satisfying the requirements of an acoustic barrier.

8.1.2 PORTABLE DRILL BARRIER SYSTEM

For some operation areas, a portable drill barrier system is recommended. This portable drill barrier system should be an acoustic barrier, which should be solid with no gaps or openings and satisfy a minimum surface density of 20 kg/m^2 (4 lb/ft^2). The portable barrier should be located within 10m of the drill under operation. The specific orientation of the barrier is defined for each phase of extraction in the following sections when a portable barrier is required. This barrier should have a minimum height of 5m, and be at least 14m long. Examples of a portable barrier system include acoustic fence, an ISO container or a modified truck trailer.

8.1.3 PORTABLE ENCLOSURE SYSTEM

For the Initial Temporary Processing Plant and the Portable Screening Plant, portable enclosure systems are recommended. This portable enclosure system should enclose the processing plant components and provide an insertion loss performance of 15 dB in the 'quiet' orientation(s).

An example of an effective portable enclosure system is constructed out of ISO containers. Figure 20 provides a photograph of this type of enclosure.

8.1.4 ACOUSTIC ENCLOSURE SYSTEM

For the Permanent Processing Plant, acoustics enclosures are recommended for the processing plant components. The acoustic enclosure system should be designed to provide an insertion loss performance of 24 dB.

An example of an effective acoustic enclosure system has a double skin wall construction consisting of 24 ga. flat sheet metal liner, a 150mm girt (18 ga.) on 1400mm spacing, acoustic absorption in cavity, and a 22 ga. ribbed sheet metal cladding. It is also recommended that the acoustic enclosure structure be independent, or at least vibration isolated from, the processing plant components.

8.2 *ON-SITE HAUL ROUTE*

The following noise controls are recommended in addition to the General controls. Figure 4 presents the recommended noise controls.

1) The on-site haul route should generally be level. It should have a maximum grade of 1%.

2) The posted speed limit along the main on-property haul route section should be 40 km/hr.

3) Acoustic barriers should be constructed on both sides of the on-site haul route. They should have a height of 10m relative to the elevation of the haul route road surface and be positioned within 20m of the road centre. The extents of the barriers are as show in Figure 4, with nominal lengths of:

    - On the South side – ~970m in length, positioned almost along its entire length
    - On the North side – ~350m in length, positioned on the East end.

8.3 *AREA 1 - INITIAL OPERATION*

The following noise controls are recommended in addition to the General controls for the Initial extraction operation. Figure 4 outlines the extraction operation in this area and also indicate the required noise controls.

1) Extraction should generally proceed in a Northerly direction.

2) Acoustic barriers should be constructed on portions of the quarry perimeter as shown in Figure 4. These acoustic barriers should have a height of 6m.

3) The Temporary Processing Plant should be positioned in the Temporary Processing Area as illustrated in Figure 4. The nominal floor elevation in this area should be EL290m.

4) Acoustic barriers should be constructed around the perimeter of the Temporary Processing Area. These barriers should have a top elevation of EL297m, approximately 7m above the floor of the Temporary processing plant area, and have extents as shown in Figure 4.

5) The Temporary Plant components should be enclosed in Portable Enclosure Systems (section 8.1.3) with the 'quiet side' oriented in the Project South direction, towards receptor R09. There should also be Acoustic Barriers, 6m in height and a nominal length of 14m, positioned within 10m of the Portable Enclosure System openings and providing shielding in the directions of the openings.

8.4 *AREA 1 - PERMANENT PROCESSING PLANT*

The following noise controls are recommended in addition to the General controls for the Permanent Processing Plant operation. Figure 5 outlines the extraction operation in this area and also indicate the required noise controls.

1) The Permanent Processing Plant should be positioned in Area 1 at a floor elevation at or below EL255m.

2) The Permanent Processing Plant components should be enclosed in Acoustic Enclosures as described in section 8.1.4.

8.5 *AREA 1 - EXTRACTION*

The following noise controls are recommended in addition to the General controls for the Area 1 operation. Figures 5 and 6 outline the extraction operation in this area and also indicate the required noise controls.

1) Extraction should generally proceed in a Westerly or Southerly direction.

2) Acoustic barriers should be constructed on portions of the quarry perimeter as shown in Figure 5. These acoustic barriers should have a height of 6m.

8.6 *AREA 2 - EXTRACTION*

The following noise controls are recommended in addition to the General controls for the Area 2 operation. Figures 7 to 11 outline the extraction operation in this area and also indicate the required noise controls.

1) Extraction should generally proceed in a Westerly direction.

2) Acoustic barriers should be constructed on portions of the quarry perimeter as shown in Figure 7. These acoustic barriers should have heights and extents as identified on the drawings.

3) A northern portion of the acoustical barrier of Area 1 can be removed for the purposes of site progress rehabilitation. Figure 7 illustrate the extent of this barrier that can be removed.

8.7 *AREA 3 - EXTRACTION*

The following noise controls are recommended in addition to the General controls for the Area 3 operation. Figures 12 to 15 outline the extraction operation in this area and also indicate the required noise controls.

1) Extraction should generally proceed in a Southerly direction.

2) A northern portion of the acoustical barrier of Area 2 can be removed for the purposes of site progress rehabilitation. Figure 12 illustrate the extent of this barrier that can be removed.

3) A Portable Drill Barrier as described in section 8.1.2 should be used to provide shielding of the drill in the Project Southeast direction, providing shielding towards the R09 and R10 receptor groups.

4) A portable screening plant may operate in this area, on top of the rock formation. This plant should be housed in a Portable Enclosure (section 8.1.4) with the 'quiet side' oriented towards the Project Southeast direction, providing shielding towards the R09 and R10 receptor groups.

5) A shipment operation may also occur in and around the portable screening plant. The shipment operation should be restricted to a daytime operation of 07:00 – 18:00. The maximum number of shipment trucks should also be limited to 20 Trucks/hr (40 passes/hr) and their speed limited to 25 km/hr when travelling from the main on-property haul route to the portable screening plant area.

8.8 *AREA 4 - EXTRACTION*

The following noise controls are recommended in addition to the General controls for the Area 3 operation. Figures 16 to 19 outline the extraction operation in this area and also indicate the required noise controls.

1) Extraction should generally proceed in a Southerly direction.

2) A Portable Drill Barrier as described in section 8.1.2 should be used to provide shielding of the drill in the Project Southeast direction, providing shielding towards the R09 and R10 receptor groups.

9.0 PREDICTED NOISE LEVELS WITH CONTROLS

Tables 6 through 10 present the predicted noise impacts for each of the quarry operation phases. Refer to Appendix A for a sample noise calculation.

Table 6: Predicted Noise Levels at Receptors

Operation: Initial

	Early Morning (06:00 – 07:00)		Daytime (07:00 – 19:00)	
Receptor ID	Shipment Operation	MOE Sound Level Limit	Full Operation	MOE Sound Level Limit
R01	33	40	40	45
R02	30	40	38	45
R02-2	31	40	36	45
R03	33	40	41	45
R04	35	40	44	45
R05	40	40	45	45
R06	40	40	43	45
R06-2	39	40	44	45
R07	37	40	43	45
R08	40	40	44	45
R09	40	40	45	45
R10	38	40	41	45
R11	33	40	39	45
R12	34	40	40	45
R13	35	40	41	45
R13-2	37	40	42	45
R14	37	40	43	45
R14-2	38	40	44	45
R15	34	40	41	45
R15-2	34	40	40	45

Table 7: Predicted Noise Levels at Receptors

Operation: Area 1

	Early Morning (06:00 – 07:00)		Daytime (07:00 – 19:00)	
Receptor ID	Shipment Operation	MOE Sound Level Limit	Full Operation	MOE Sound Level Limit
R01	31	40	40	45
R02	31	40	37	45
R02-2	29	40	35	45
R03	32	40	40	45
R04	34	40	42	45
R05	40	40	43	45
R06	39	40	42	45
R06-2	38	40	41	45
R07	36	40	40	45
R08	39	40	42	45
R09	39	40	44	45
R10	35	40	40	45
R11	31	40	36	45
R12	32	40	42	45
R13	32	40	40	45
R13-2	33	40	41	45
R14	34	40	45	45
R14-2	34	40	43	45
R15	30	40	37	45
R15-2	31	40	38	45

Table 8: Predicted Noise Levels at Receptors

Operation: Area 2

	Early Morning (06:00 – 07:00)		Daytime (07:00 – 19:00)	
Receptor ID	Shipment Operation	MOE Sound Level Limit	Full Operation	MOE Sound Level Limit
R01	32	40	44	45
R02	31	40	38	45
R02-2	30	40	36	45
R03	32	40	39	45
R04	35	40	41	45
R05	40	40	43	45
R06	39	40	42	45
R06-2	38	40	41	45
R07	36	40	40	45
R08	39	40	42	45
R09	39	40	44	45
R10	36	40	41	45
R11	32	40	37	45
R12	33	40	41	45
R13	34	40	44	45
R13-2	35	40	45	45
R14	31	40	45	45
R14-2	33	40	43	45
R15	29	40	44	45
R15-2	29	40	44	45

Table 9: Predicted Noise Levels at Receptors

Operation: Area 3

	Early Morning (06:00 – 07:00)		Daytime (07:00 – 19:00)	
Receptor ID	Shipment Operation	MOE Sound Level Limit	Full Operation	MOE Sound Level Limit
R01	32	40	41	45
R02	31	40	37	45
R02-2	29	40	34	45
R03	32	40	39	45
R04	34	40	41	45
R05	40	40	42	45
R06	39	40	42	45
R06-2	38	40	41	45
R07	36	40	40	45
R08	39	40	41	45
R09	39	40	44	45
R10	35	40	42	45
R11	32	40	42	45
R12	33	40	45	45
R13	34	40	44	45
R13-2	35	40	44	45
R14	31	40	41	45
R14-2	33	40	42	45
R15	29	40	41	45
R15-2	30	40	40	45

Table 10: Predicted Noise Levels at Receptors

Operation: Area 4

	Early Morning (06:00 – 07:00)		Daytime (07:00 – 19:00)	
Receptor ID	Shipment Operation	MOE Sound Level Limit	Full Operation	MOE Sound Level Limit
R01	32	40	41	45
R02	31	40	39	45
R02-2	29	40	36	45
R03	32	40	39	45
R04	34	40	42	45
R05	40	40	43	45
R06	39	40	43	45
R06-2	38	40	42	45
R07	36	40	41	45
R08	39	40	43	45
R09	39	40	45	45
R10	36	40	43	45
R11	32	40	40	45
R12	35	40	44	45
R13	34	40	43	45
R13-2	35	40	44	45
R14	33	40	41	45
R14-2	35	40	41	45
R15	30	40	40	45
R15-2	30	40	40	45

10.0 CONCLUSION

Aercoustics has conducted a noise impact study for the proposed St. Marys Cement Inc. (Canada) (St. Marys) Flamborough Quarry. The purpose of this noise impact study was to provide noise control recommendations in order that the operation within the quarry will satisfy the Ministry of the Environment (MOE) noise guidelines and that predicted noise impacts from the quarry will be acceptable.

To this end, sound level limits, based on the MOE noise guidelines, were developed. Calculations were then carried out to determine the worst case noise for each of the quarry operation areas at each of the receptors. Where noise was predicted to exceed the MOE sound level limits, noise control recommendations and required equivalent source reference sound levels were provided.

With the implementation of the recommended noise controls, the noise study concludes that the quarry will be in compliance with the MOE noise guidelines.

Any proposed changes to the aspects of the extraction, processing and shipping operations dealt with above as relating to noise control should be reviewed by a qualified acoustical consultant for compliance with the relevant noise criteria.

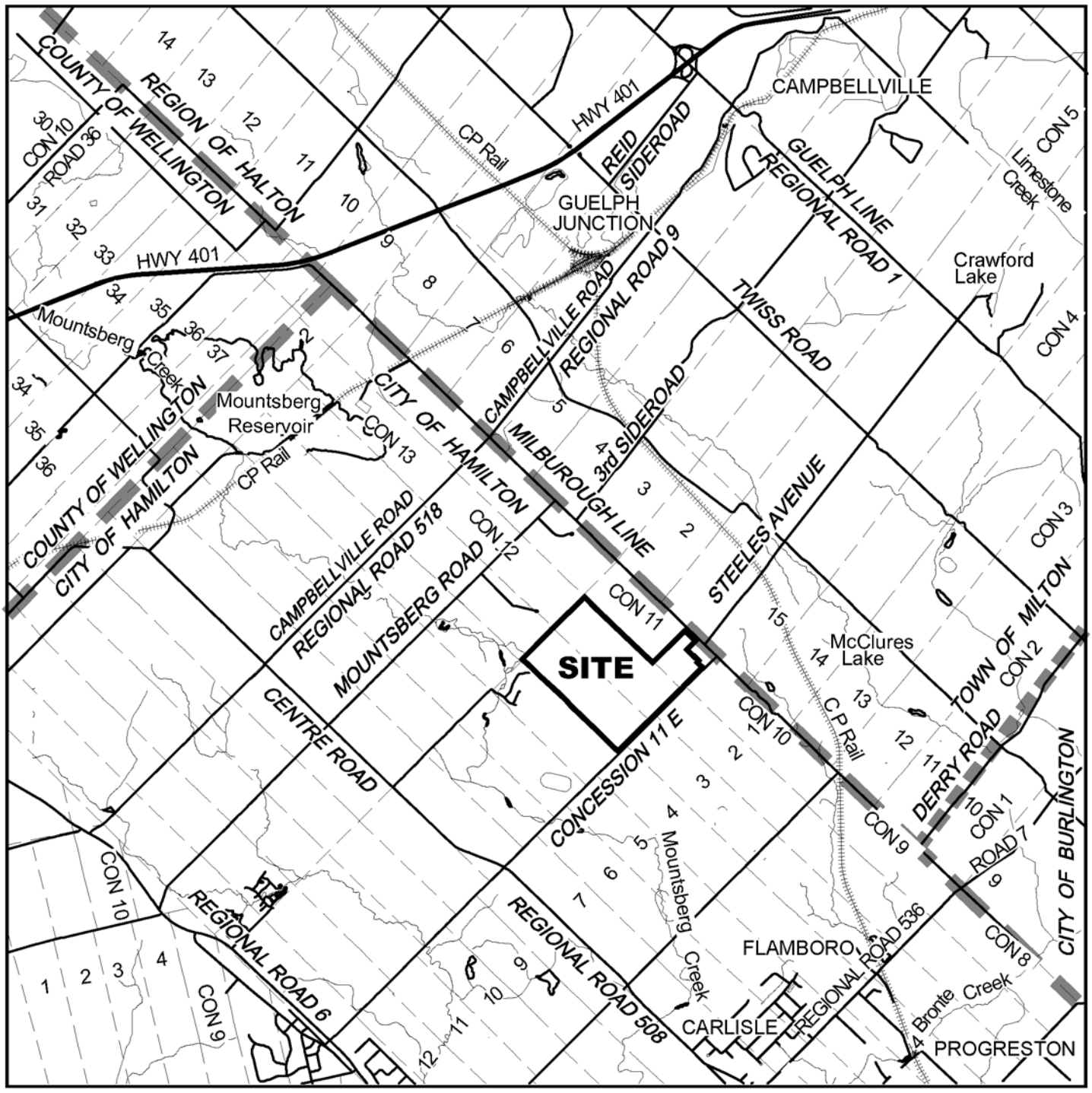

Figure 1:

KEY MAP

Scale: 1 : 60,000

Figure 2: Site Plan illustrating proposed Flamborough quarry and receptor locations

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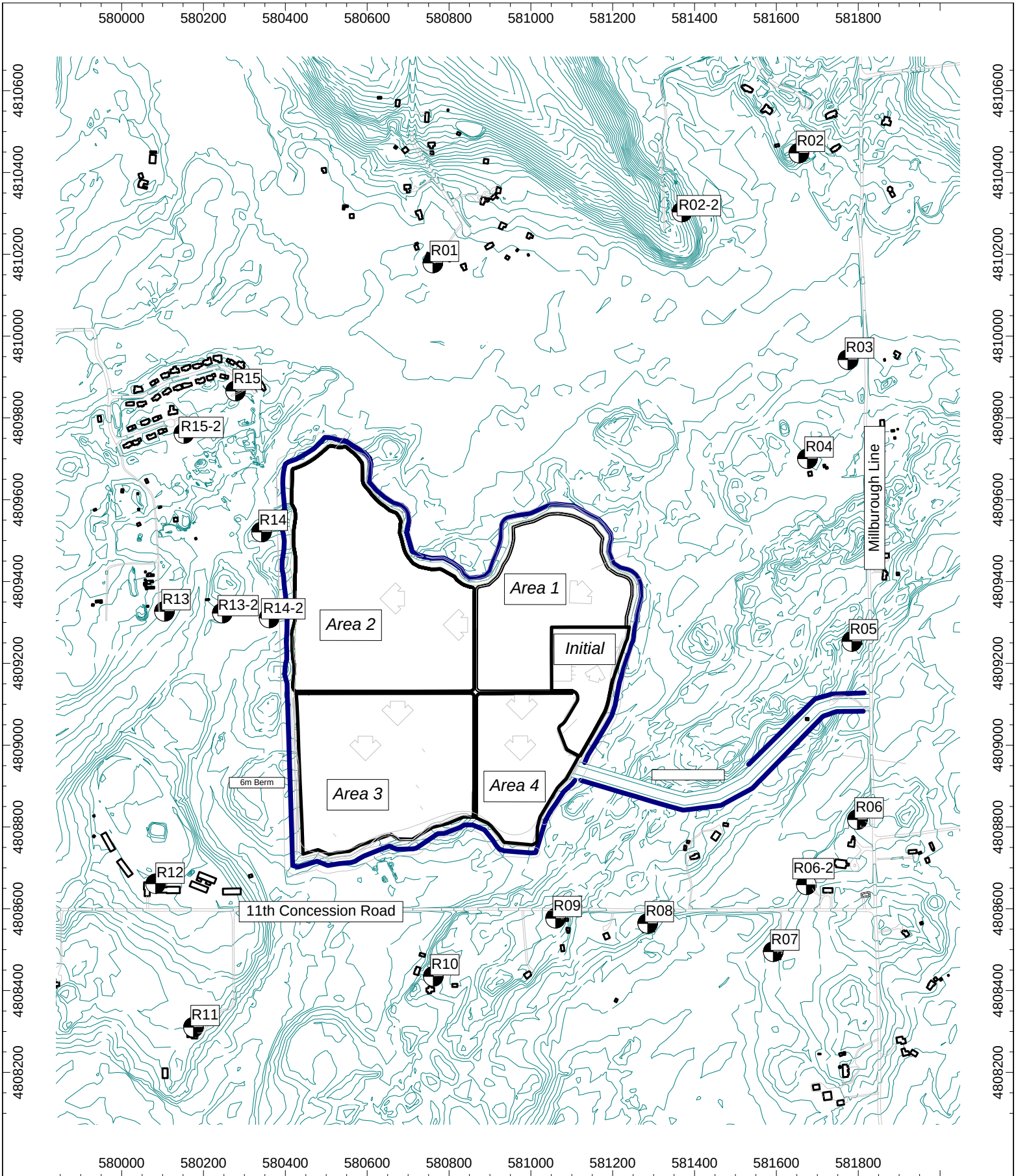

Figure 3: Proposed Flamborough Quarry
Proposed Quarry Extraction Areas

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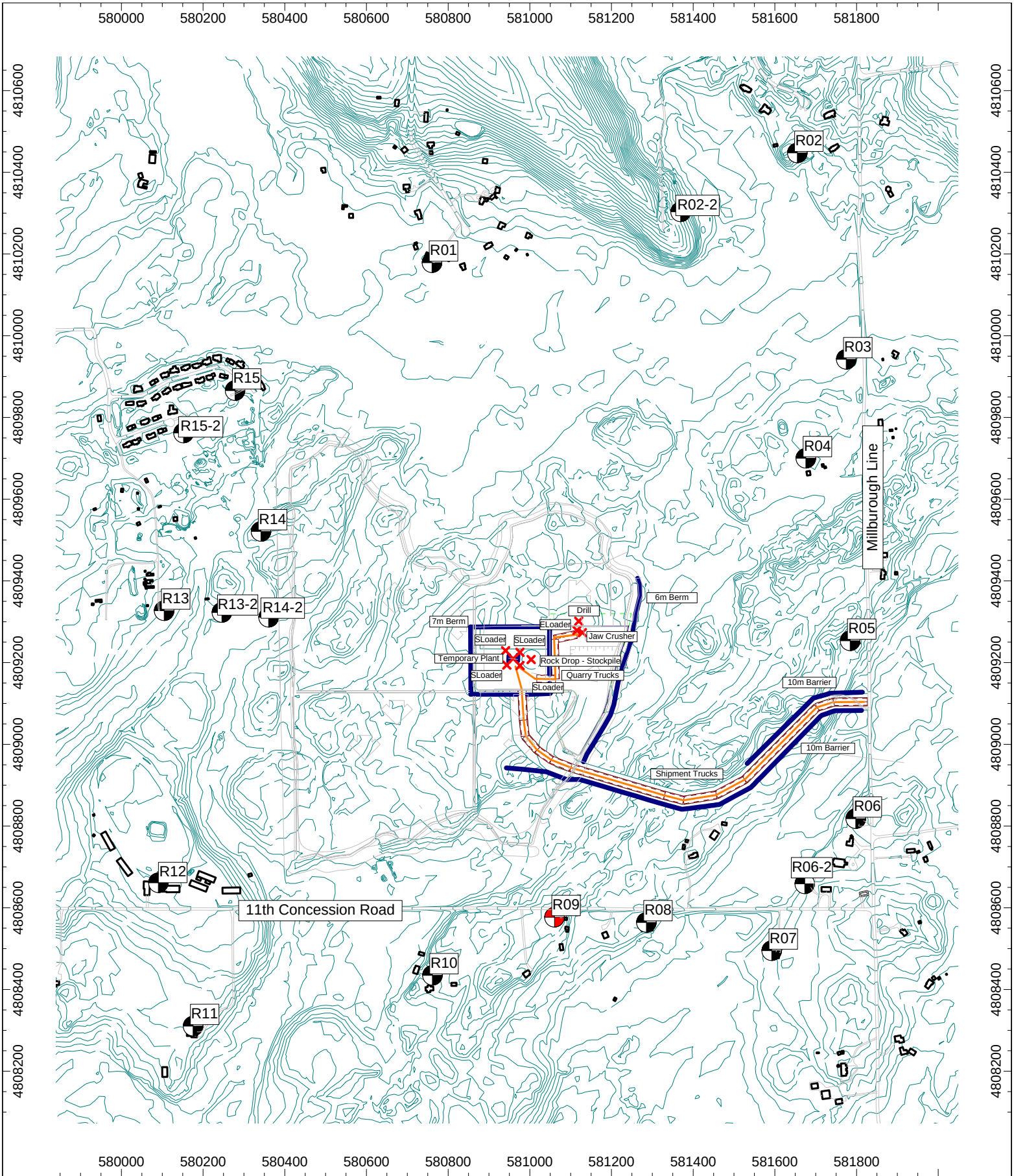

Figure 4: Proposed Flamborough Quarry On-site Haul Route and Initial Operation

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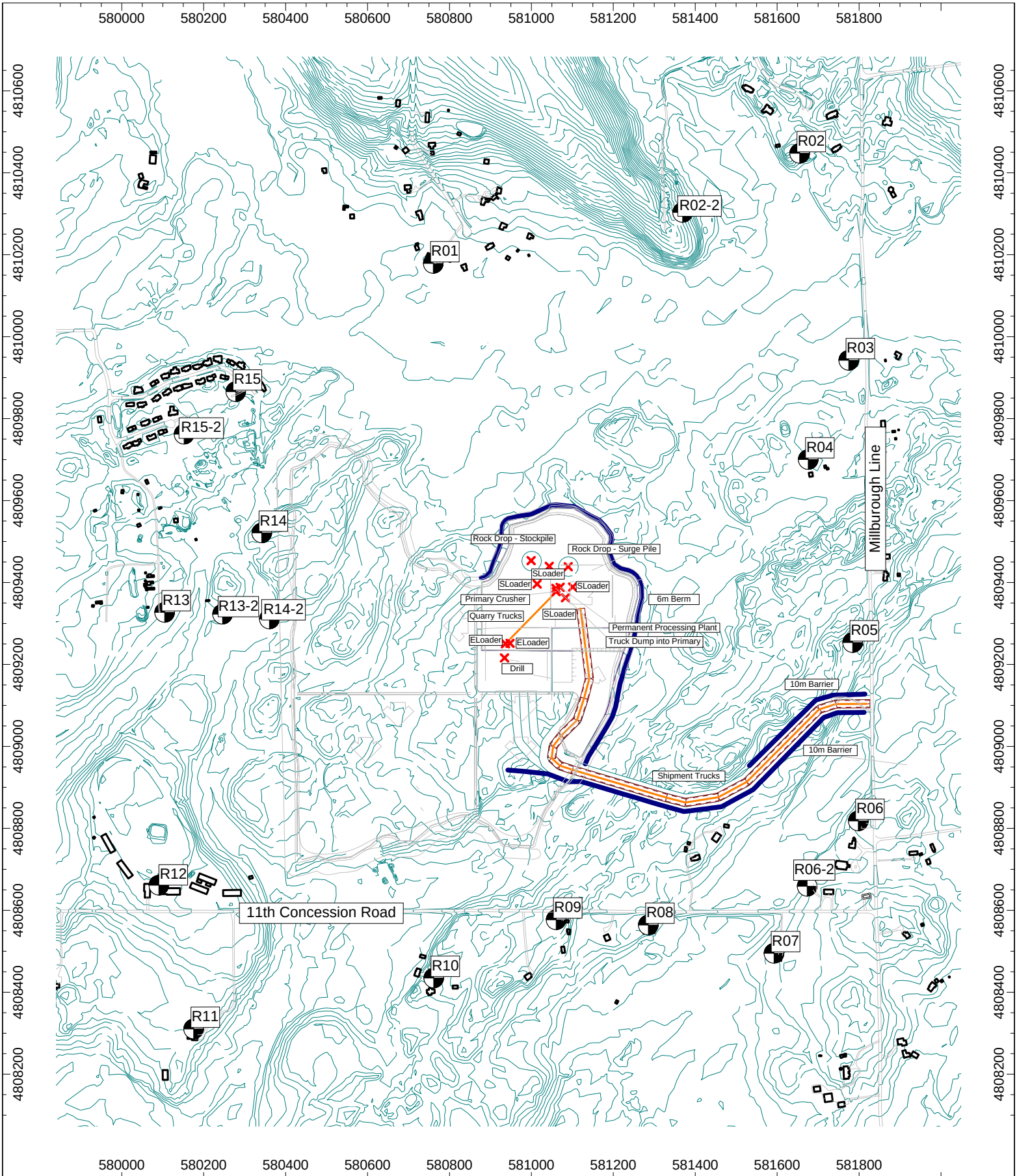

Figure 5: Proposed Flamborough Quarry
Area 1-1

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Date:
February 2009

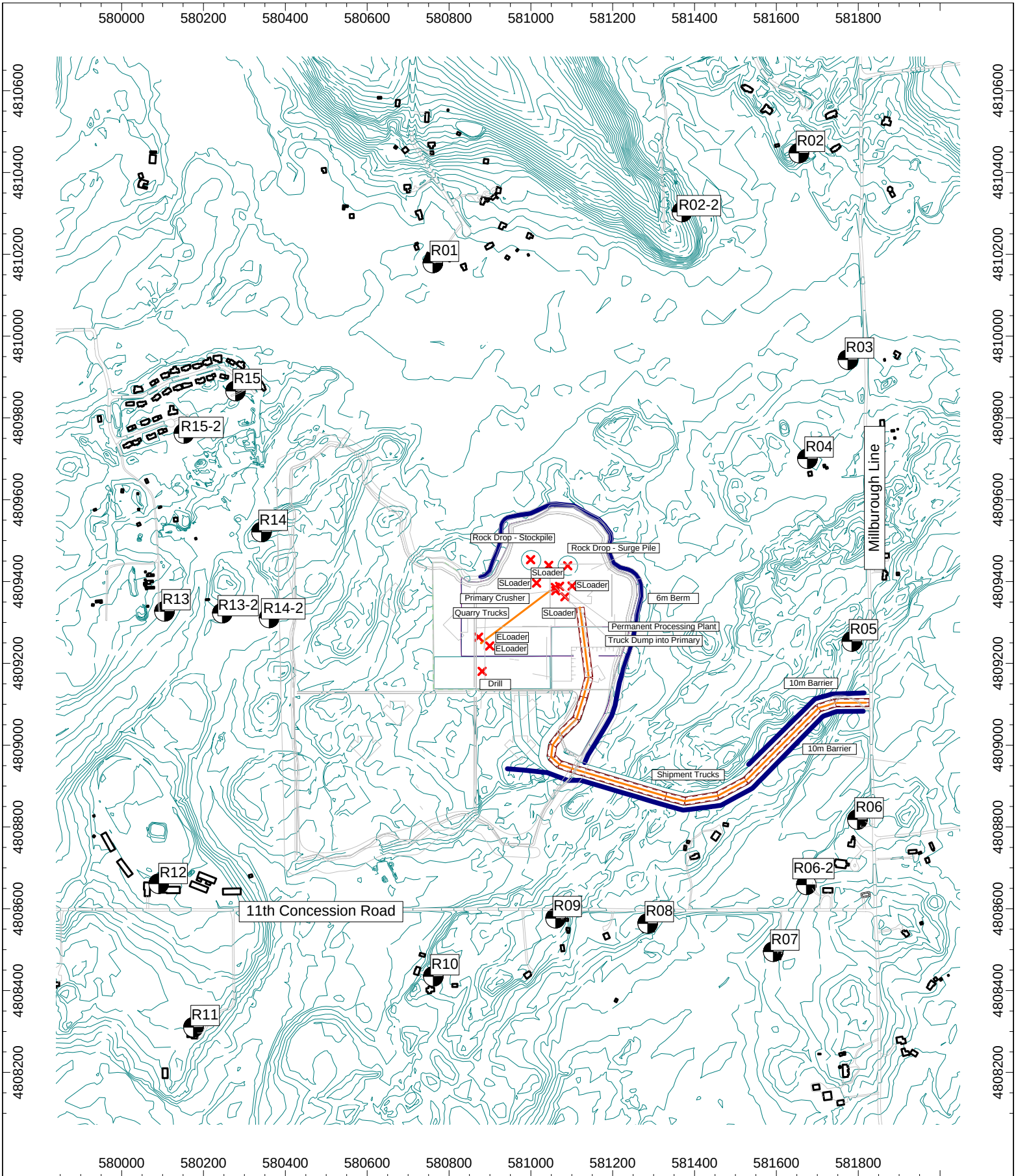

Figure 6: Proposed Flamborough Quarry Area 1-2

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

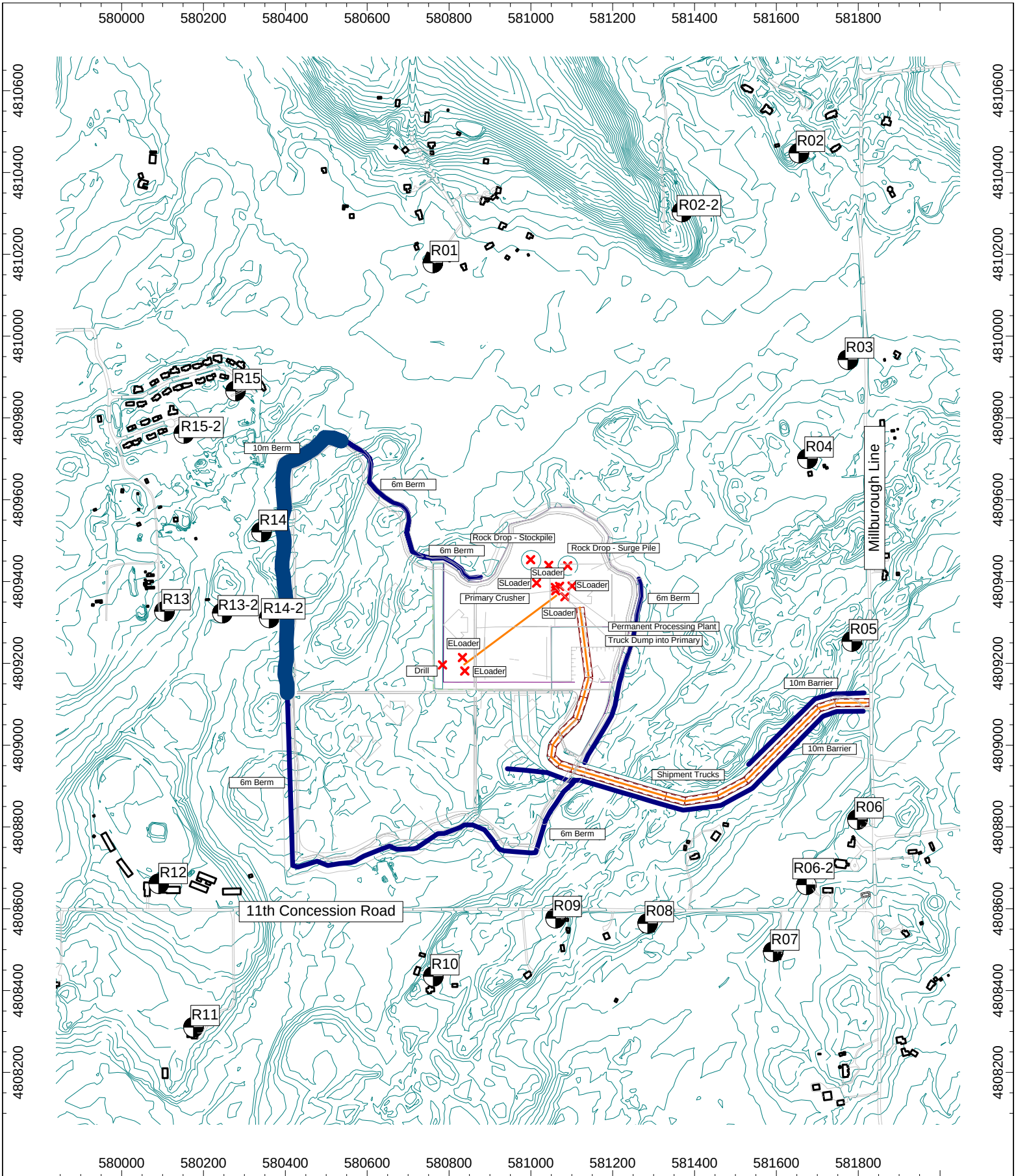

Figure 7: Proposed Flamborough Quarry Area 2-1

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

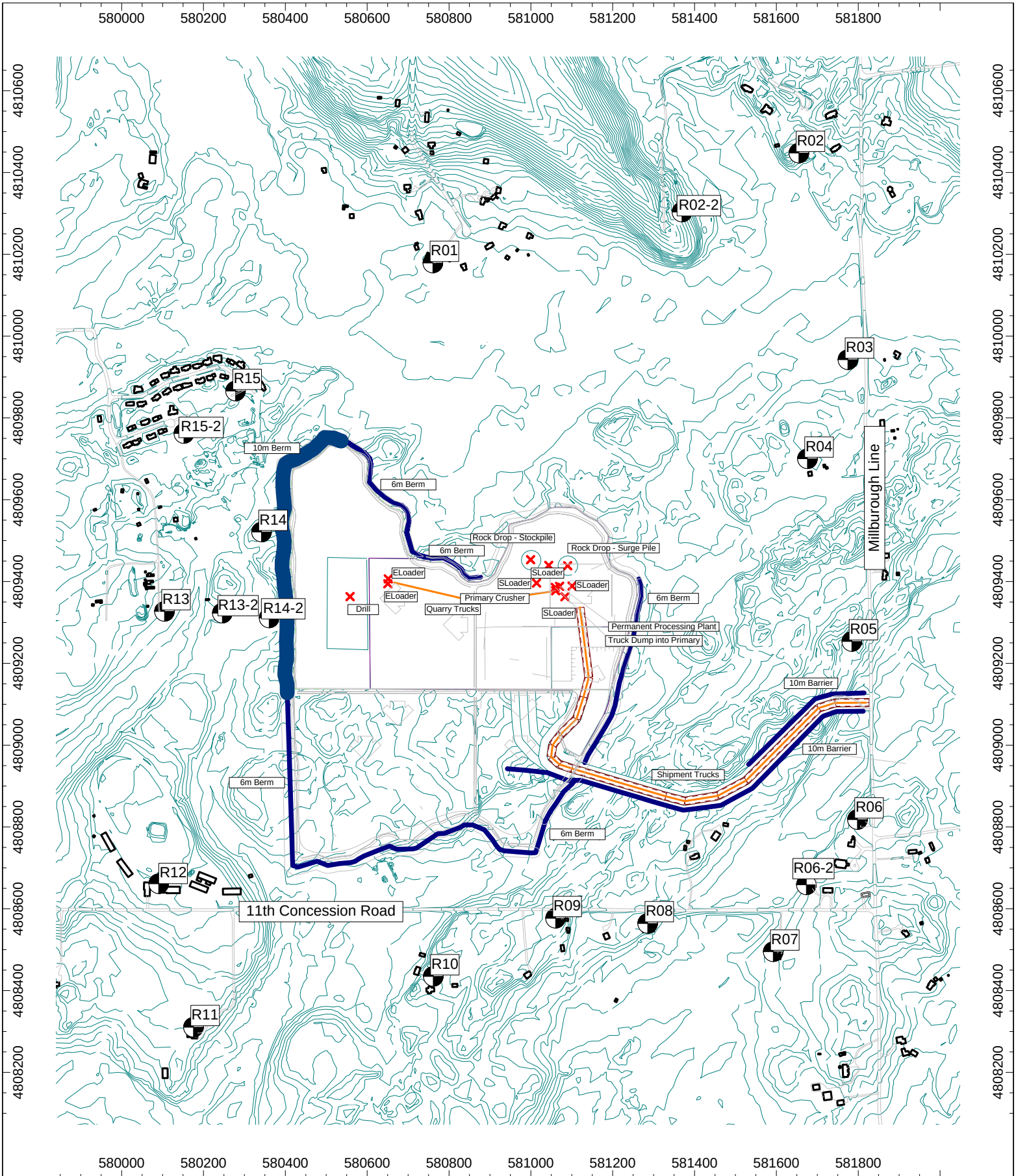

Figure 8: Proposed Flamborough Quarry Area 2-2

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

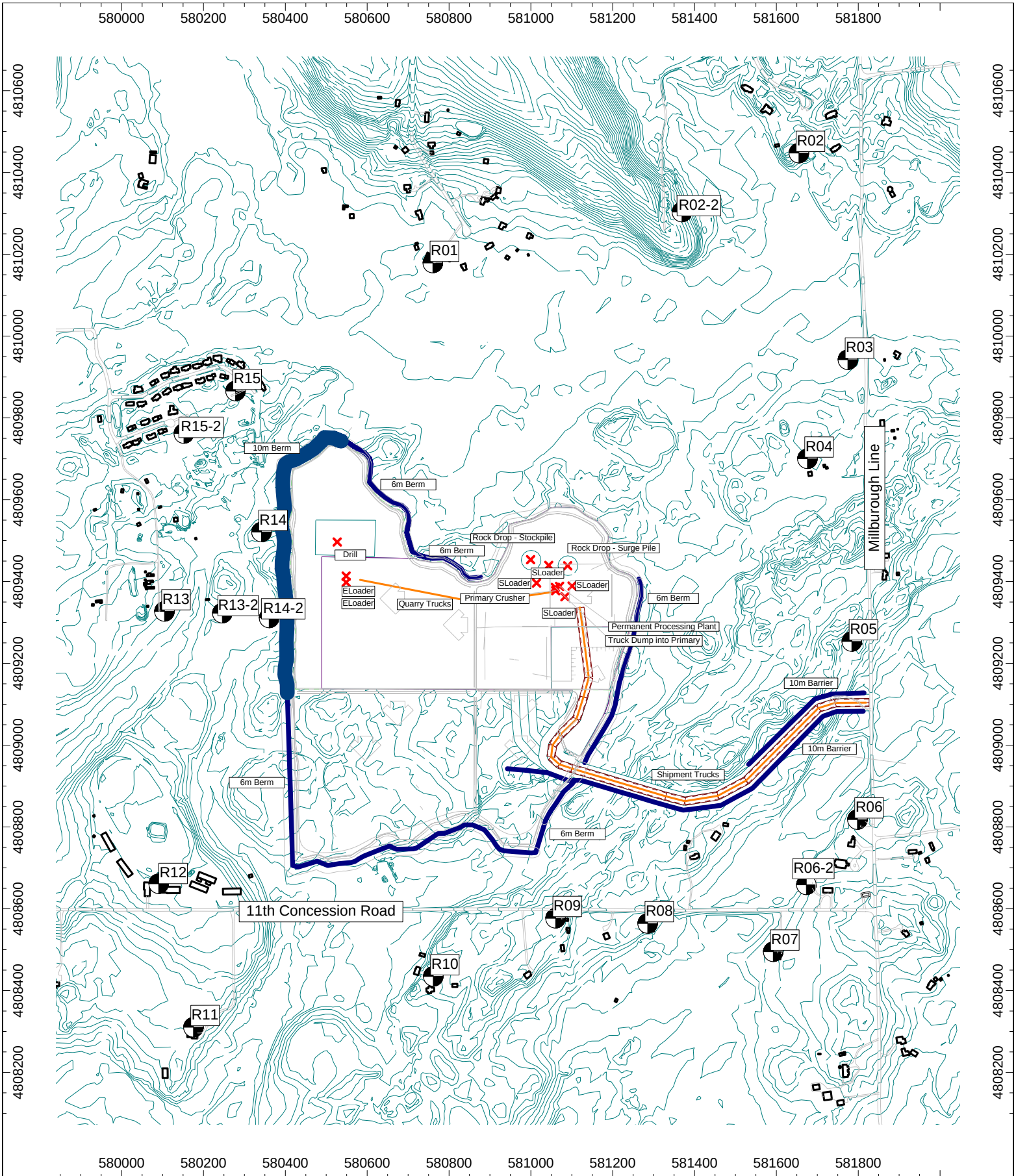

Figure 9: Proposed Flamborough Quarry Area 2-3

AERCOUSTICS ENGINEERING LTD.

Date: February 2009

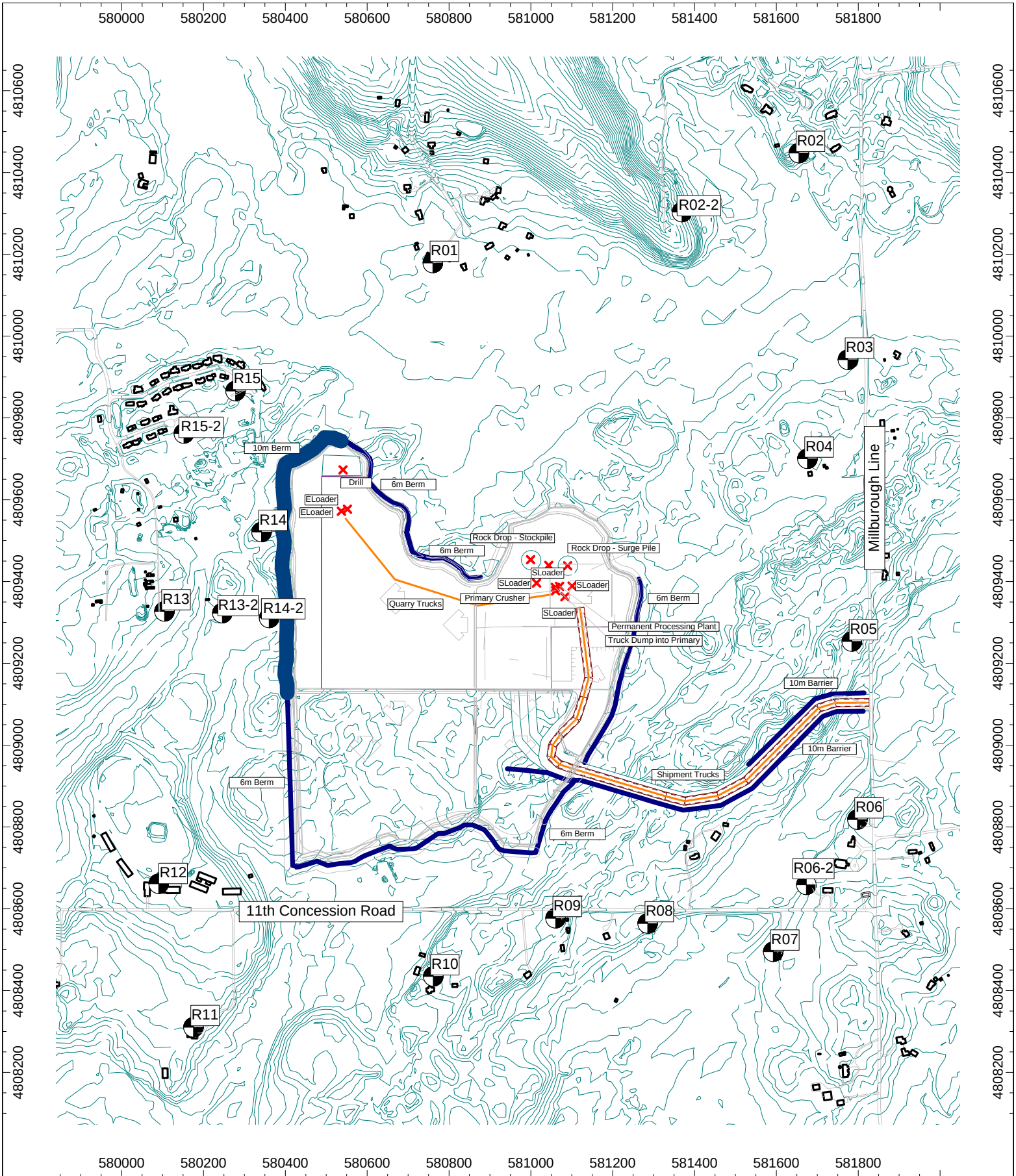

Figure 10: Proposed Flamborough Quarry Area 2-4

AERCOUSTICS ENGINEERING LTD.

Date: February 2009

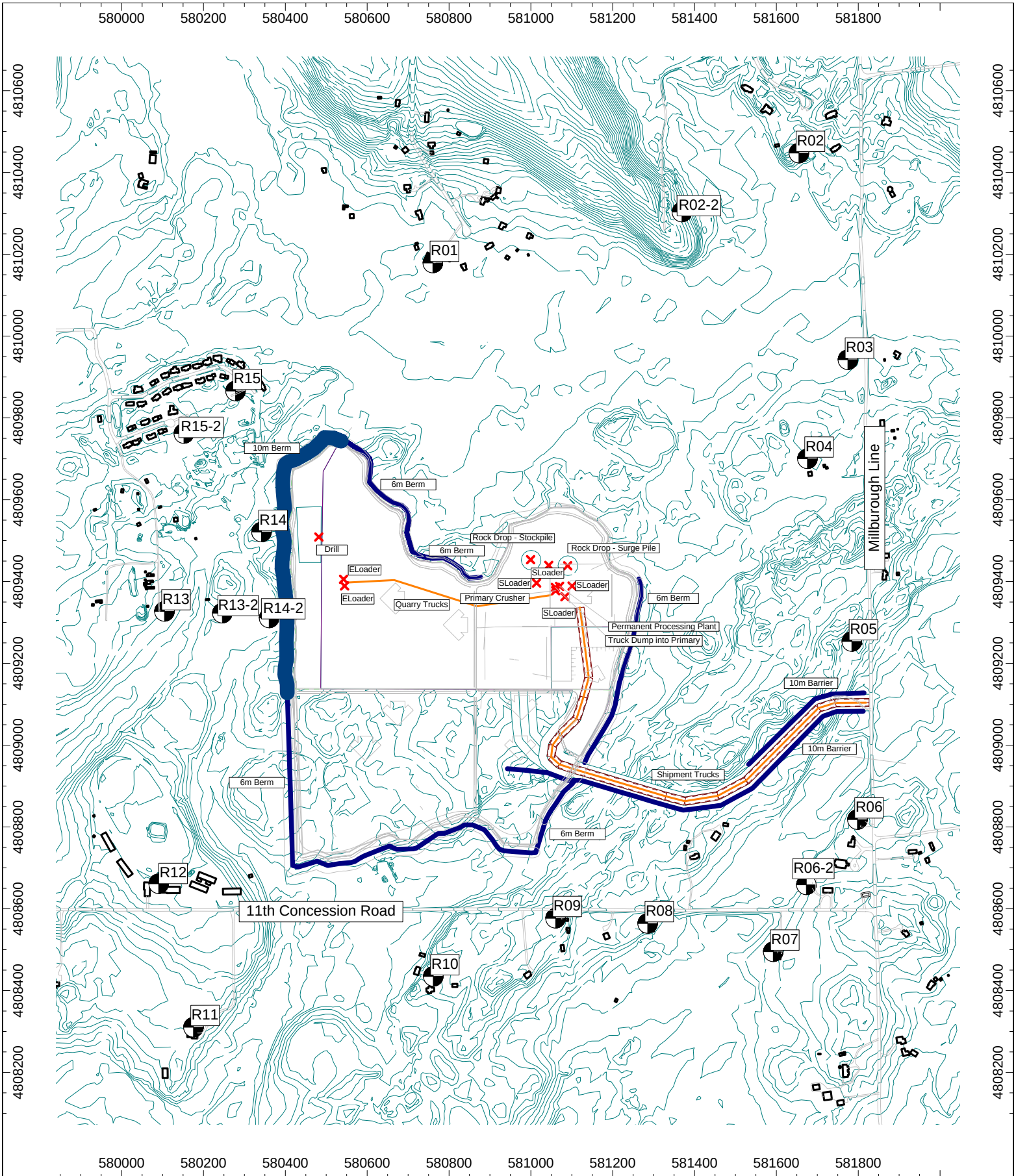

Figure 11: Proposed Flamborough Quarry Area 2-5

AERCOUSTICS ENGINEERING LTD.

Date: February 2009

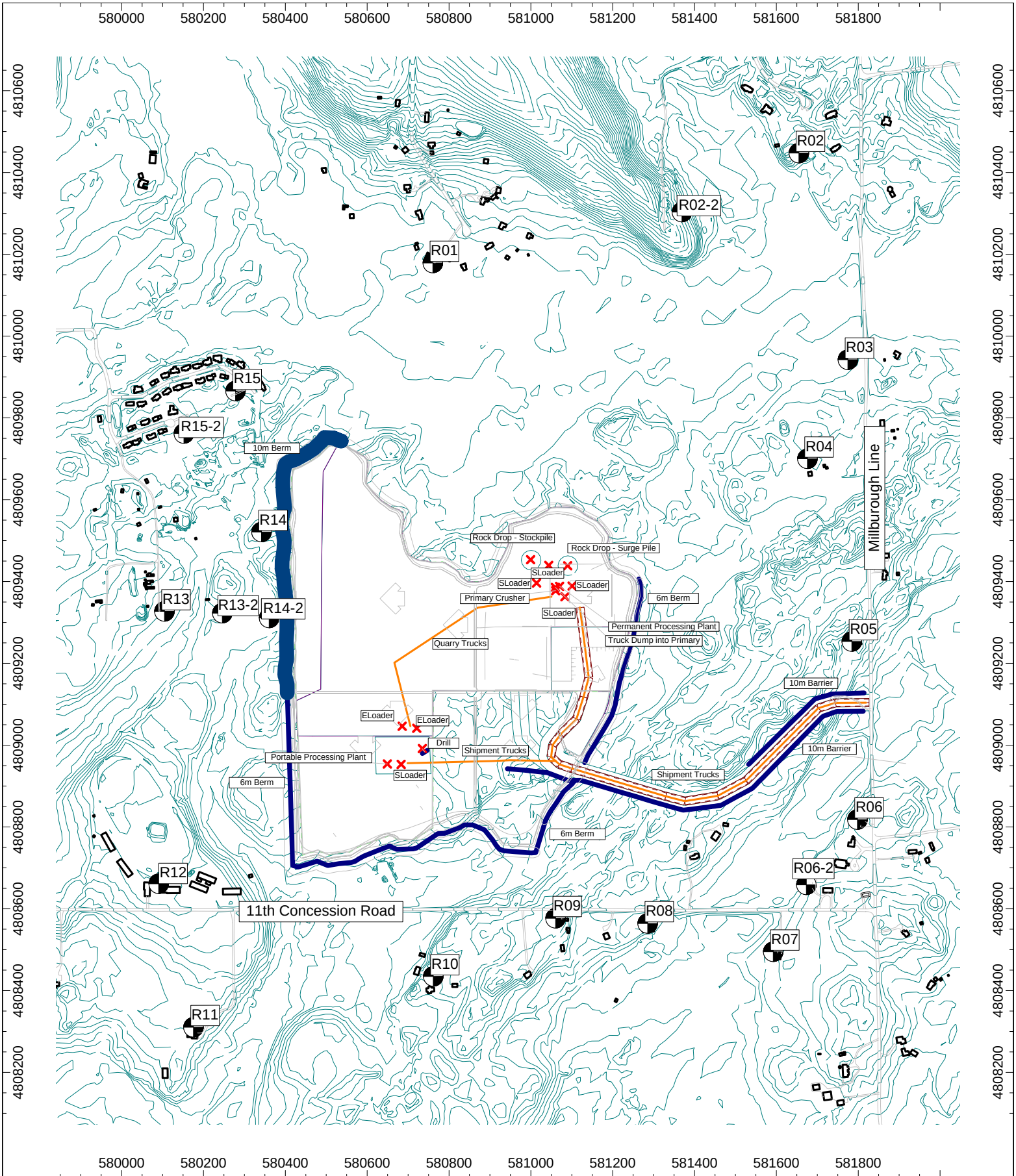

Figure 12: Proposed Flamborough Quarry Area 3-1

AERCOUSTICS ENGINEERING LTD.

Date: February 2009

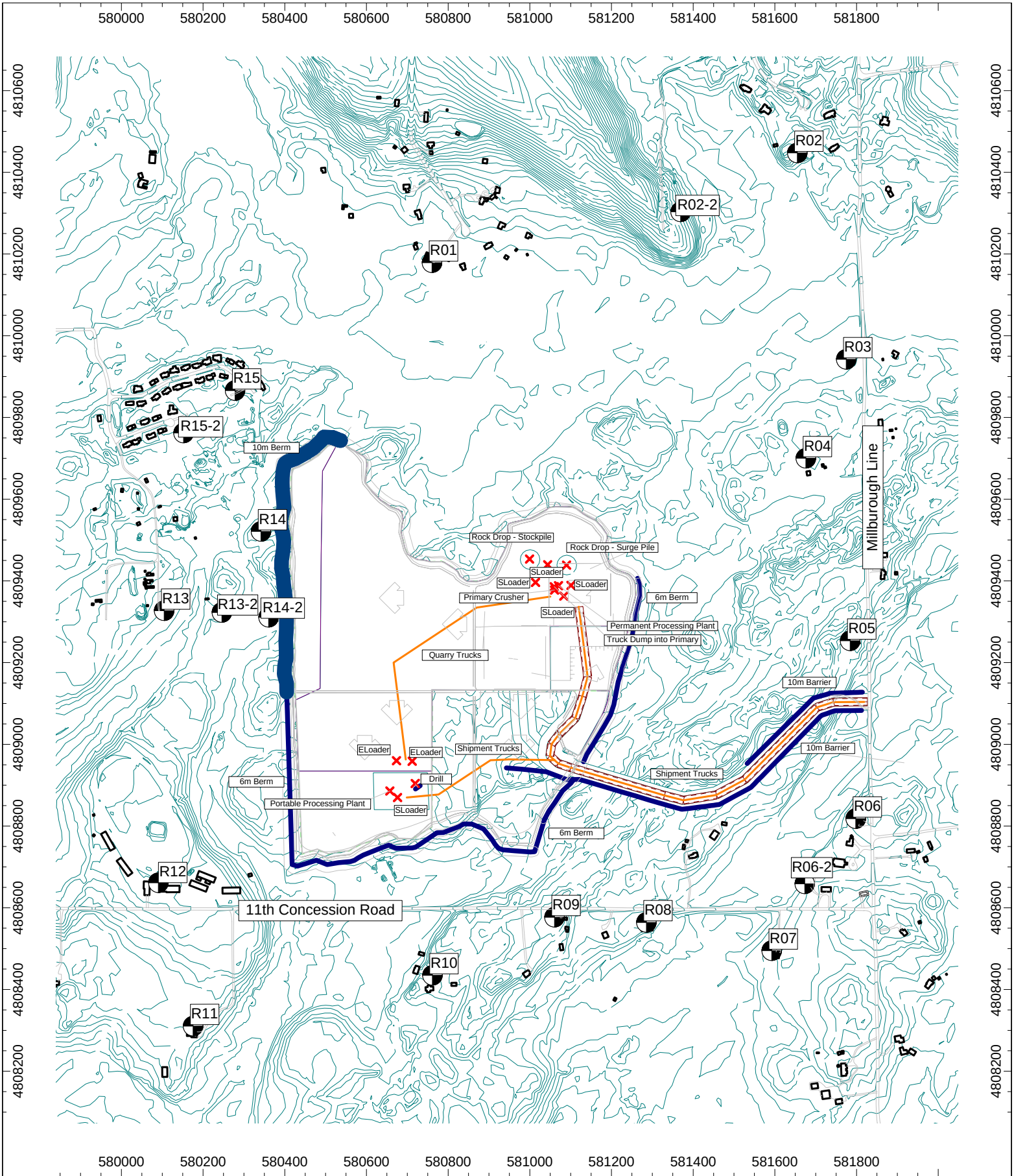

Figure 13: Proposed Flamborough Quarry Area 3-2

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

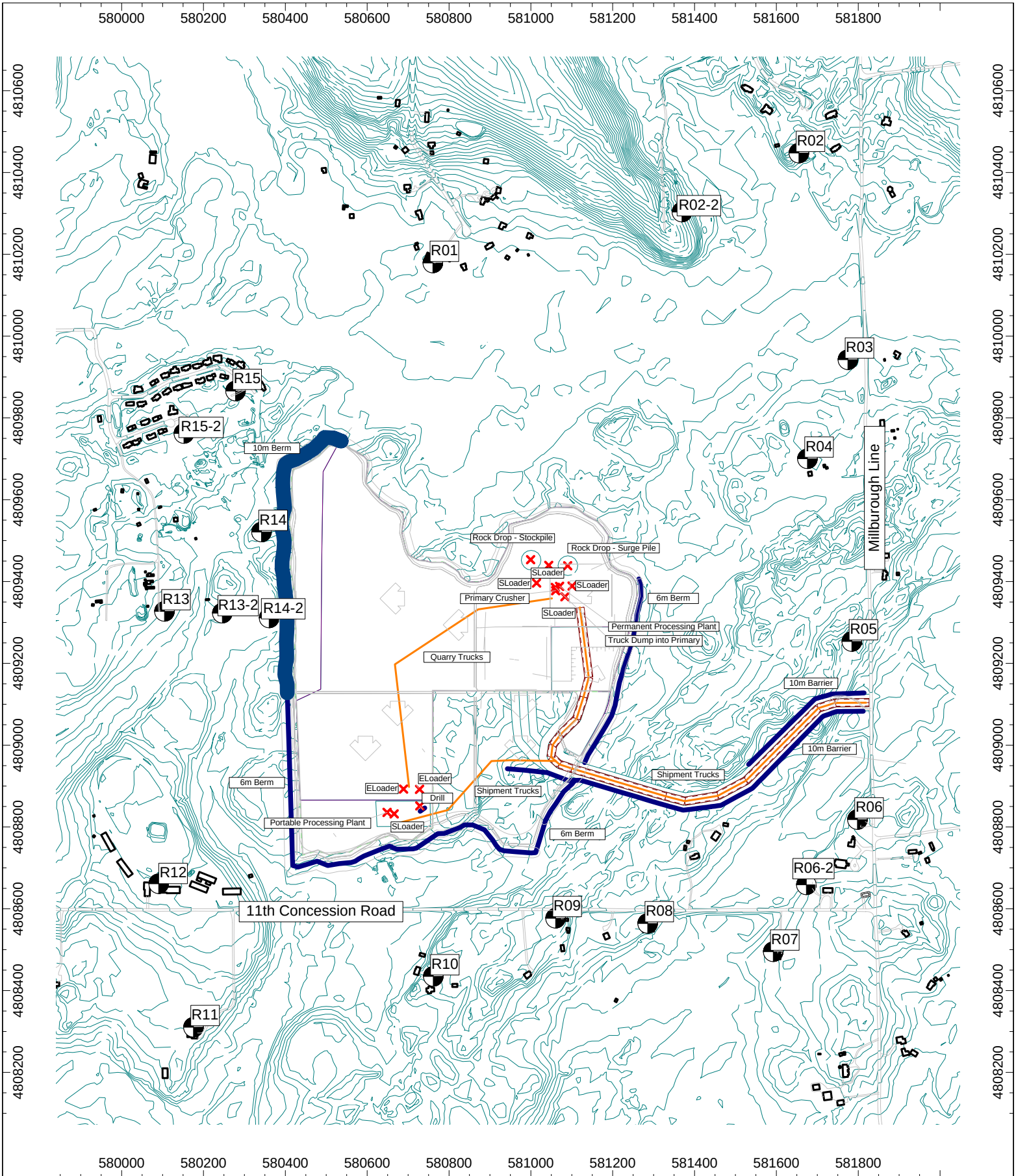

Figure 14: Proposed Flamborough Quarry
Area 3-3

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

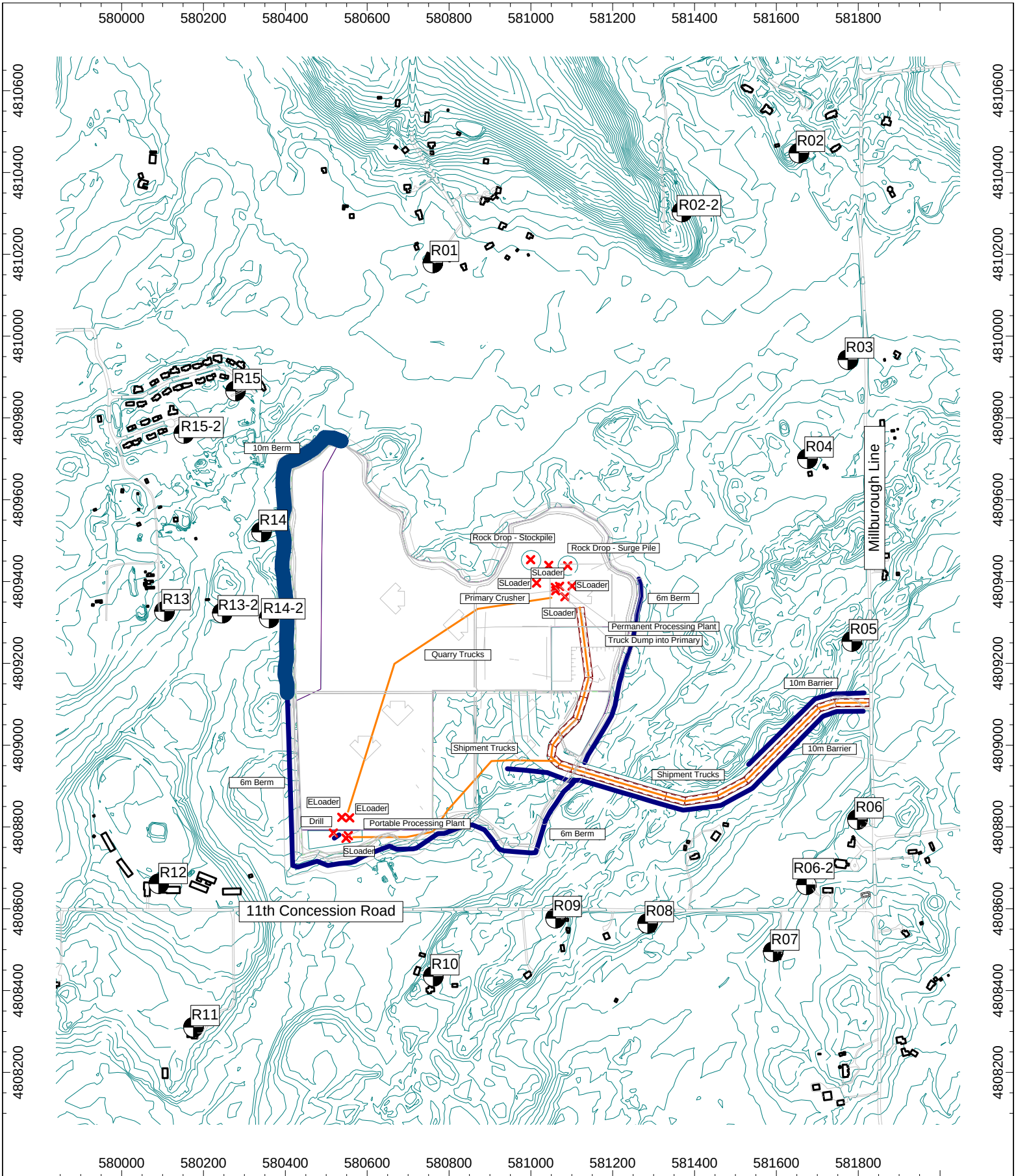

Figure 15: Proposed Flamborough Quarry Area 3-4

AERCOUSTICS ENGINEERING LTD.

Date: February 2009

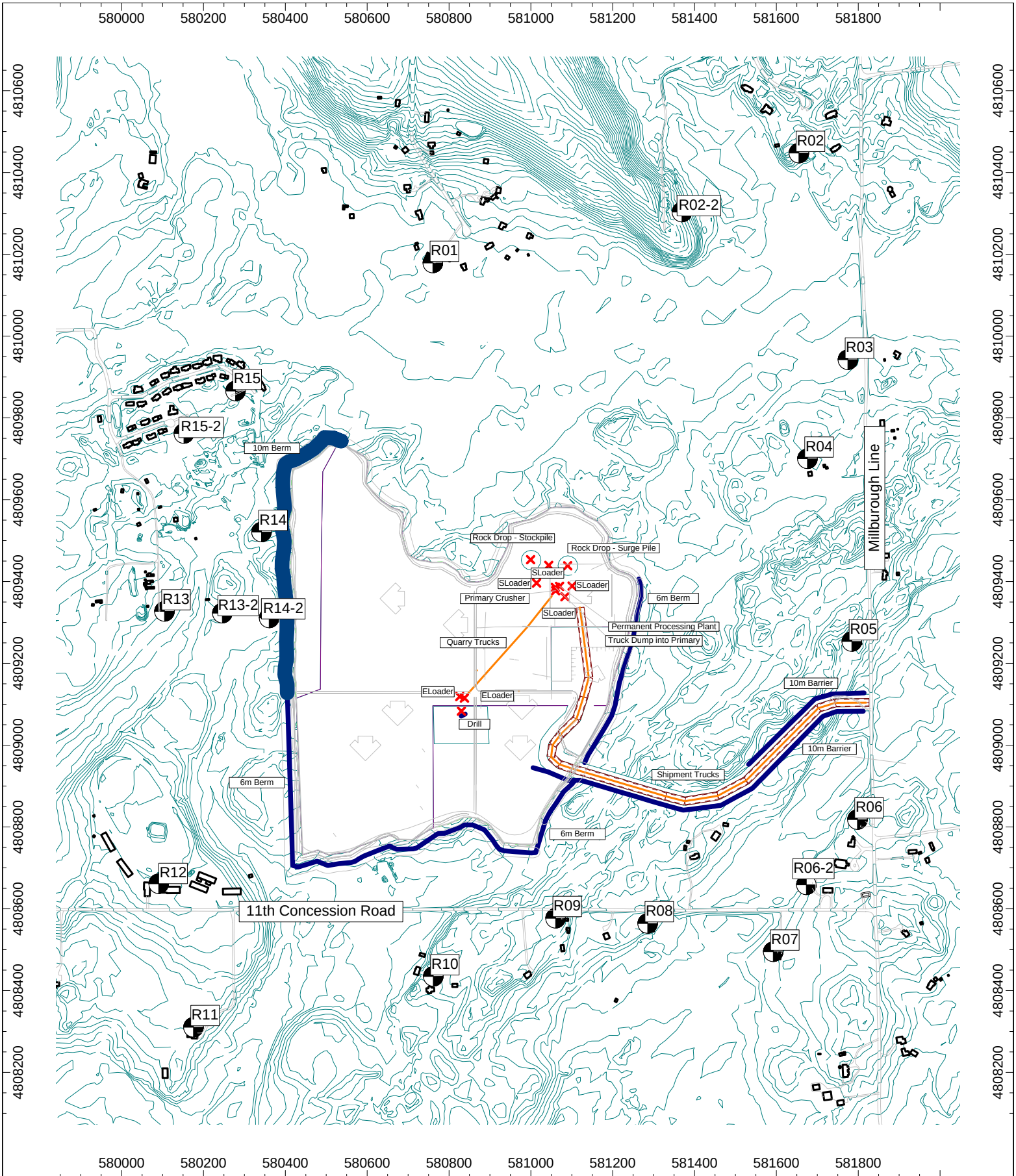

Figure 16: Proposed Flamborough Quarry Area 4-1

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

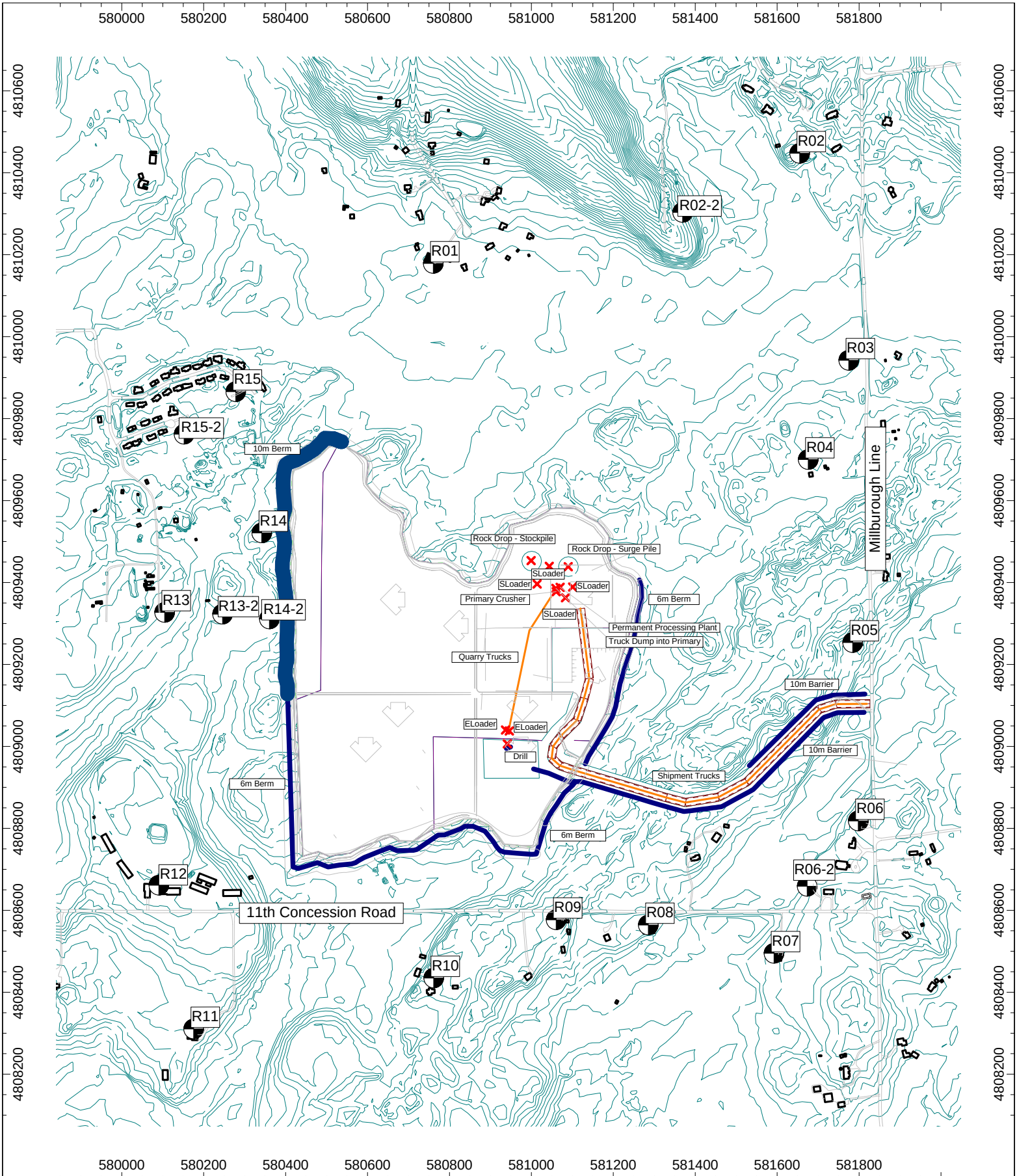

Figure 17: Proposed Flamborough Quarry Area 4-2

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

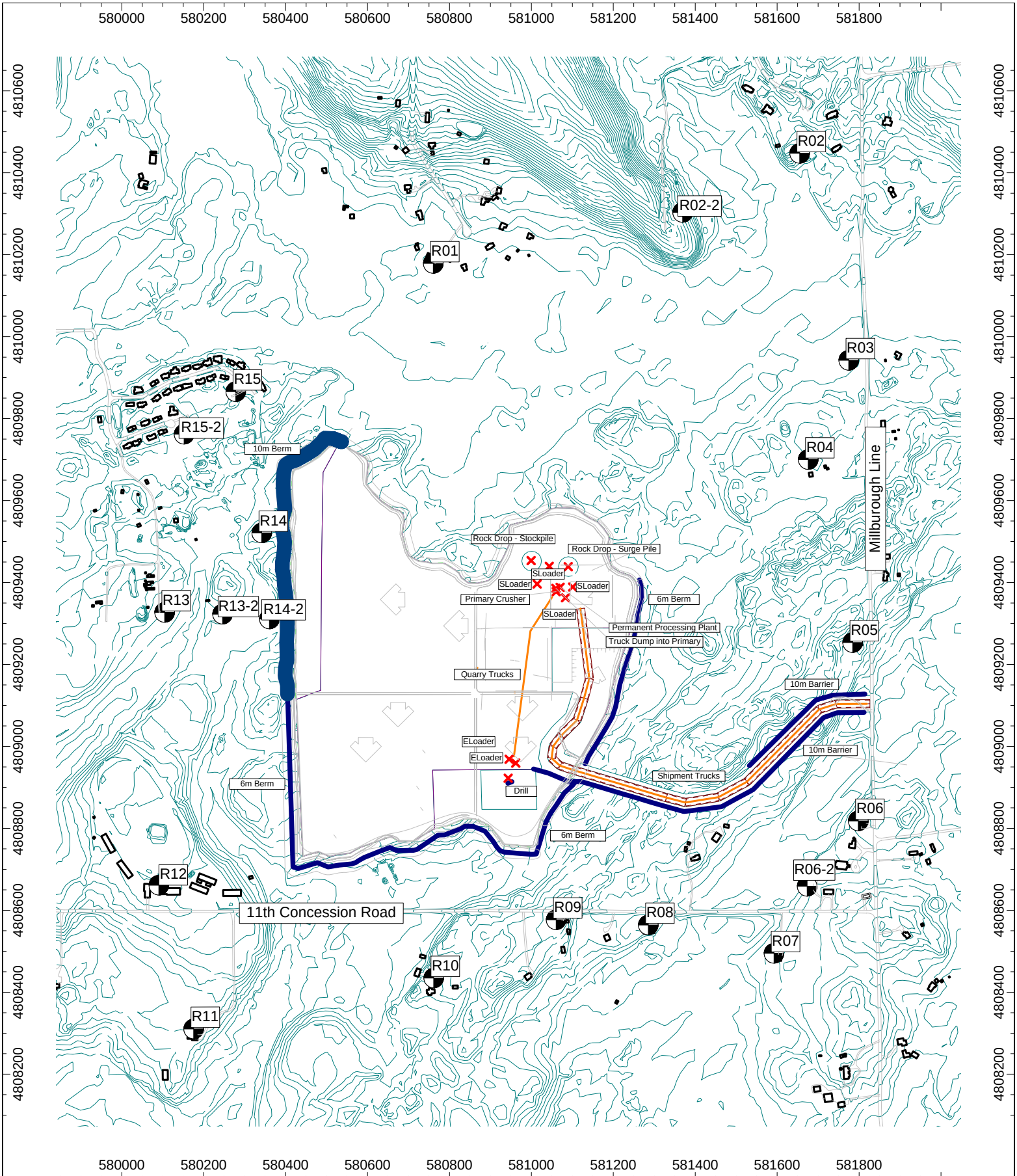

Figure 18: Proposed Flamborough Quarry Area 4-3

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

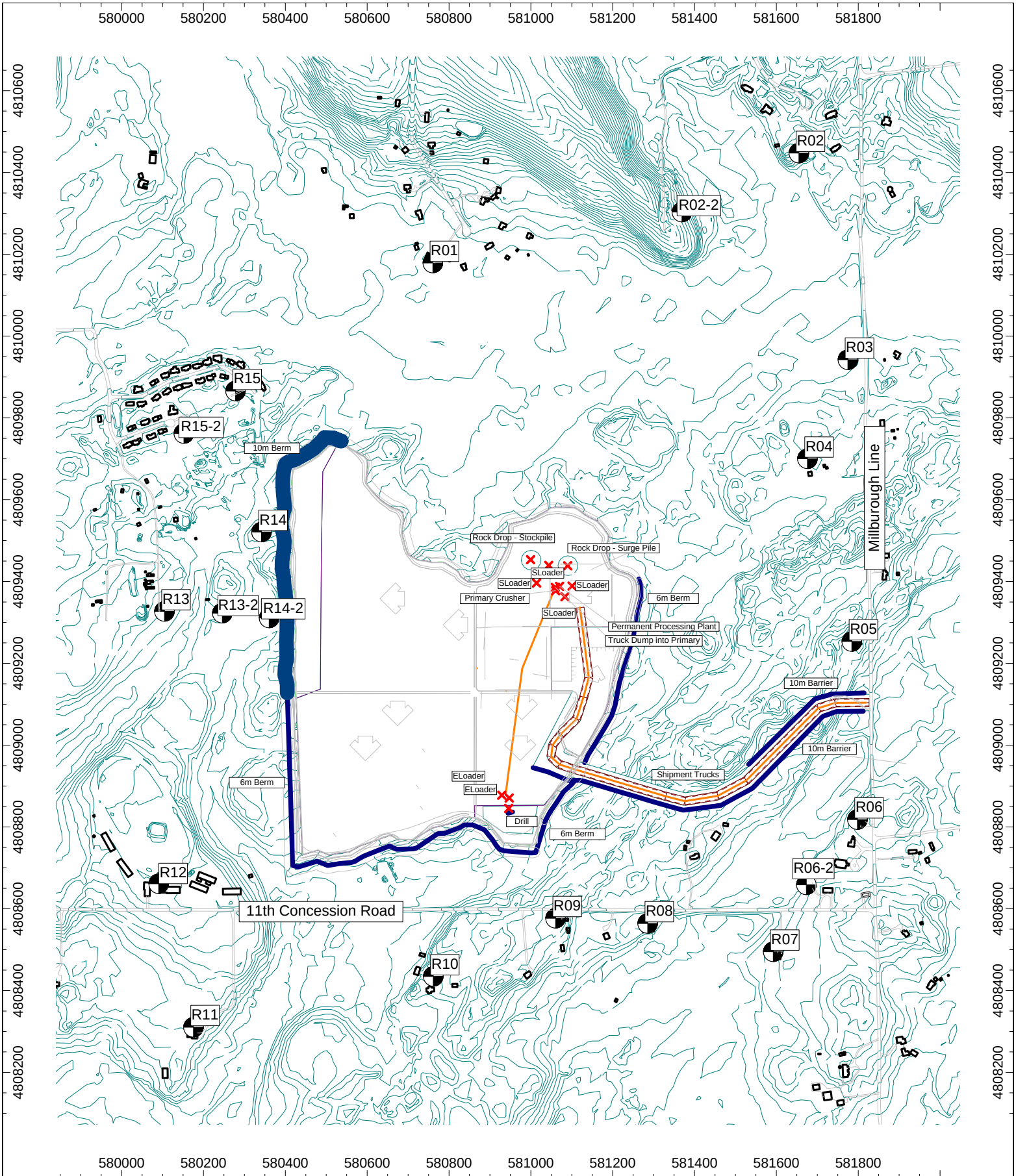

Figure 19: Proposed Flamborough Quarry
Area 4-4

AERCOUSTICS ENGINEERING LTD.

Date:
February 2009

Figure 20: Photograph of Portable Enclosure System
Constructed out of ISO Containers

APPENDIX A

Sample Noise Calculation

Source Sound Power Levels

Name	ID	Type	Oktave Spectrum (dB)											
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin
Drill	P_Drill	Li		105	116	119	107	110	112	111	107	101	117	122
Extraction Loader	LoaderWF	Lw		115	117	112	108	106	109	107	103	102	113	121
Shipment Loader	P_sh_loader	Lw		0	120	113	109	104	101	98	94	91	107	121
Truck Dumping into Primary	T_Dump	Lw		103	116	110	103	106	106	105	99	91	111	118
Primary Crusher	Jaw	Lw		99	111	110	109	108	106	102	95	70	110	126
Temporary Processing Plant	Temp_Plant	Lw		117	125	128	120	123	123	122	117	107	128	132
Permanent Processing Plant	Processing_Area	Lw		120	121	121	121	127	125	125	121	111	131	132
Portable Screening Plant	SPlant	Lw		110	113	111	108	107	106	106	103	99	112	118
Stock Pile Drop - Surge Pile	P_RockDrop	Lw		108	106	104	101	102	107	104	97	90	110	114
Stockpile Drop - Stockpile	SP_Drop_Q	Lw		101	98	93	93	86	84	78	80	86	91	104
Quarry Truck	CAT777	Lw		114	114	115	116	115	114	112	107	103	119	123
Shipment Trucks level (40 km/hr)	S_ShipT40	Lw		100	105	115	109	104	104	103	93	90	109	117
Shipment Trucks level (25 km/hr)	S_ShipT25	Lw		105	106	100	98	100	100	96	88	78	103	111
Shipment Trucks level (25/hr) Up Hill	S_ShipT25_UP	Lw		108	114	111	103	101	102	99	97	91	107	117

Predicted Permantent Enclosure Insertion Loss

Name	ID	Oktave Spectrum (dB)								
		31.5	63	125	250	500	1000	2000	4000	8000
Enclosure	ENCLOSURE	0	0	0	16	24	30	36	42	44

ISO Container Portable Enclosure Insertion Loss

0	-1	-6	-1	-5	-9	-11	-14	-15	-8	
45	3	-6	-4	-6	-7	-9	-14	-17	-14	
90	4	-9	-10	-13	-15	-17	-19	-20	-19	

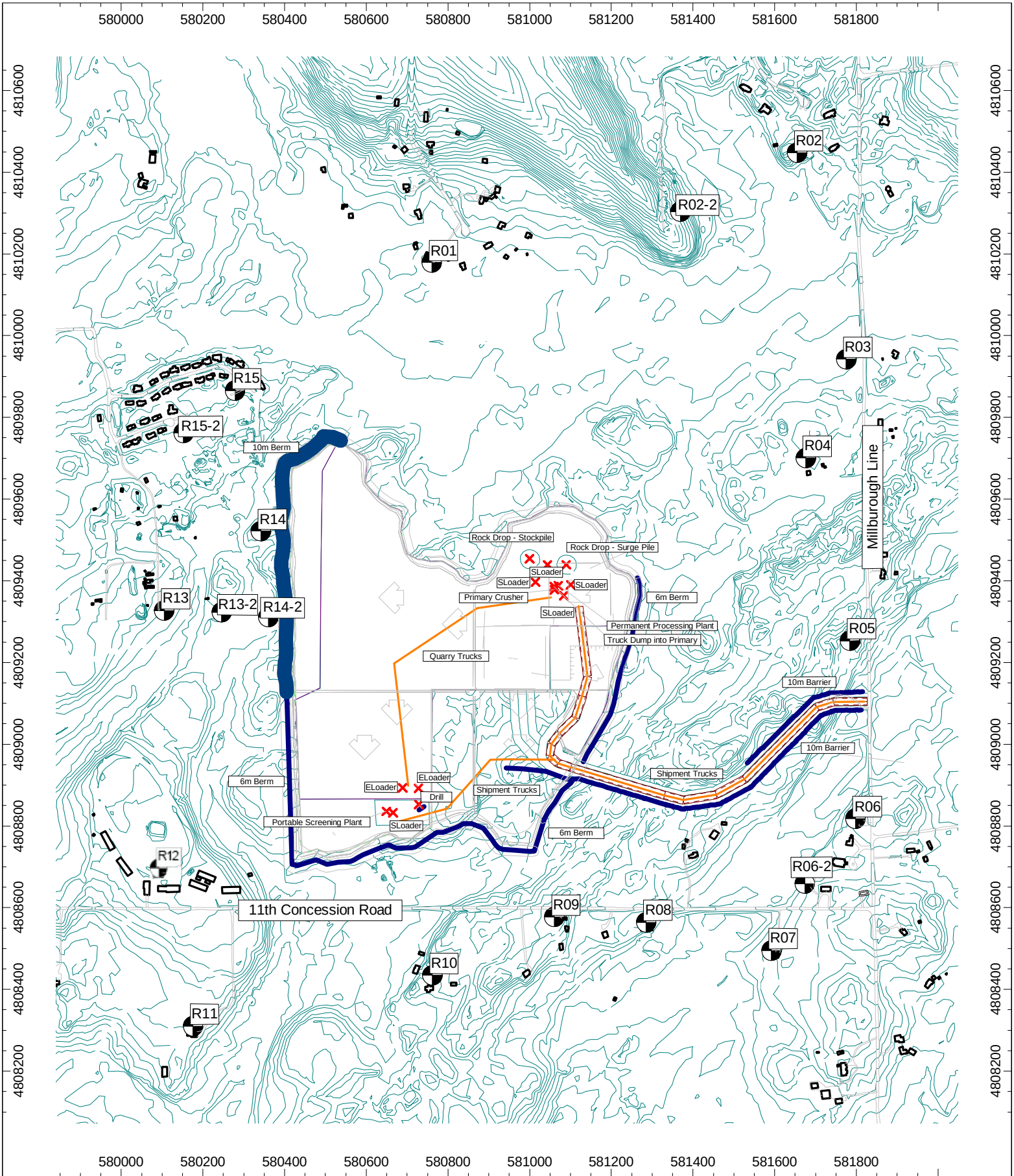

Figure A-1: Proposed Flamborough Quarry
Area 3-3 - Sample Calculation for R09

AERCOUSTICS ENGINEERING LTD.

Date:
August 2008

Cadna/A-Berechnung																														
Version	3.7.124	(32	Bit)																											
Datei:	D:\01Projects\1AEL\Current	Projects\06199-CBM	Lowndes	Flamborou	Quarry\20(	Issued	Documents	2008	Draft	Report\CBI	-	Flamborou	Quarry	(rev.	19).cna															
Start:	11.08.08	15:41:59																												
Berechnungsparameter:																														
	General																													
	Country	International																												
	Max. Error (dB)	0																												
	Max. Search Radius (m)	2000																												
	Min. Dist Src to Rcvr	0																												
	Partition																													
	Raster Factor	0.5																												
	Max. Length of Section (m)	1000																												
	Min. Length of Section (m)	1																												
	Min. Length of Section (%)	0																												
	Proj. Line Sources	On																												
	Proj. Area Sources	On																												
	Ref.	Time																												
	Reference Time Day (min)	60																												
	Reference Time Night (min)	60																												
	Daytime Penalty (dB)	0																												
	Recr. Time Penalty (dB)	0																												
	Night-time Penalty (dB)	0																												
	DTM																													
	Standard Height (m)	275																												
	Model of Terrain	Triangulation																												
	Reflection																													
	max. Order of Reflection	0																												
	Search Radius Src	100																												
	Search Radius Rcvr	100																												
	Max. Distance Source - Rcvr	1000	1000																											
	Min. Distance Rvcr - Reflector	1	1																											
	Min. Distance Source - Reflector	0.1																												
	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	20	0																										
	Temperature (□C)	10																												
	rel. Humidity (%)	70																												
	Ground Absorption G	1																												
	Wind Speed for Dir. (m/s)	3																												
	SCC_C0	0	0																											
	Roads	(RLS-90)																												
	Strictly	acc.	to	RLS-90																										
	Railways	(Schall	03)																											
	Strictly	acc.	to	Schall	3	/	Schall-Transrapid																								
	Aircraft	(AzB)																												
	Strictly	acc.	to	AzB																										
Receiver:	R09																													
ID:	R09																													
X:	581592.13																													
Y:	4808892.84																													
Z:	292.5																													
Ground:	291																													
ISO	Bezeichnung	ID	X	Y	Z	Ground	ReflOrd	LxT	LxN	L/A	Dist.	hm	Freq	Adiv	K0b	Agr	Abar	z	Aatm	Afol	Ahous	Cmet	CmetN	Dc	RL	LtotT	LtotN			
	Drill	D11_Drill	581163.3	4808853	283.5	282	0	116.7	-83.3	1	430.77	6.42	0	63.68	0	2.13	13.58	0.66	3.16	0	0	0	0	-2.03	0	32.16	-167.84			
	Shipment Trucks	AHaul_Route1	581522.5	4809267	286.4	284	0	105.3	103.9	113.93	380.33	3.95	0	62.6	0	7.3	5.94	1.21	1.73	0	0	0	0	0	0	27.75	26.29			
	Shipment Trucks	AHaul_Route1	581422.2	4809213	286.4	284	0	105.3	103.9	113.93	362.09	4.86	0	62.18	0	7.3	6.29	1.27	1.67	0	0	0	0	0	0	27.89	26.43			
	Shipment Trucks	AHaul_Route1	581367.3	4809183	286.4	284	0	95.2	93.7	11.05	367.02	5.16	0	62.29	0	6.87	5.66	0.98	1.68	0	0	0	0	0	0	18.69	17.23			
	Quarry Trucks	D11_Pit_Trucks	581091.6	4808884	258	255	0	107.2	-8.8	52.22	501.8	7.47	0	65.01	0	3.32	17.91	3.25	2.62	0	0	0	0	0	0	18.34	-97.68			
	Quarry Trucks	D11_Pit_Trucks	581070.6	4808900	258	255	0	91.8	-24.2	1.51	522.74	6.39	0	65.37	0	3.1	18.99	3.68	2.7	0	0	0	0	0	0	1.66	-114.36			
	Quarry Trucks	D11_Pit_Trucks	580973.1	4808978	258	255	0	114	-2.1	247.81	625.84	7.26	0	66.93	0	3.06	12.11	3.12	3.08	0	0	0	0	0	0	28.78	-87.24			
	ELoader	D11_ELoader	581134.3	4808881	257.5	255	0	113.3	-86.7	1	459.36	6.71	0	64.24	0	2.31	21.87	6.8	3.06	0	0	0	0	0	0	21.87	-178.13			
	Primary Crusher	A01_Primary	581027.2	4809460	258	255	0	110.4	-79.6	1	801.27	10.16	0	69.08	0	2.65	10.06	1.69	2.83	0	0	0	0	0	0	25.73	-164.27			
	ELoader	D11_ELoader	581106.2	4808854	257.5	255	0	113.3	-86.7	1	488.68	6.71	0	64.78	0	0.99	23.06	6.13	3.19	0	0	0	0	0	0	21.32	-178.68			
	Shipment Trucks	AHaul_Route1	581684.6	4809676	286.4	284	0	103	101.6	67.32	788.52	4.08	0	68.94	0	2.43	2.45	0.06	3.06	0	0	0	0	0	0	26.17	24.71			
	Shipment Trucks	AHaul_Route1	581684.6	4809560	286.4	284	0	106.9	105.4	163.56	674.02	4.8	0	67.57	0	2.1	2.75	0.1	2.72	0	0	0	0	0	0	31.76	30.3			
	Shipment Trucks	AHaul_Route1	581684.6	4809469	286.4	284	0	97.6	96.1	19.21	583.63	4.72	0	66.32	0	2.2	2.84	0.21	2.44	0	0	0	0	0	0	23.79	22.33			
	Shipment Trucks	AHaul_Route1	581637.8	4809351	286.4	284	0	103.9	102.4	81.33	460.76	4.09	0	64.27	0	5.62	4.2	0.63	2.02	0	0	0	0	0	0	27.76	26.3			
	Shipment Trucks	A01_Haul_Route3	581184.9	4809405	257.4	255	0	105.1	103.6	125.28	655.46	6.91	0	67.33	0	1.93	12.68	1.35	3.22	0	0	0	0	0	0	19.94	18.48			
	Shipment Trucks	A01_Haul_Route3	581134.4	4809445	257.4	255	0	88.5	87	2.74	717.73	7.27	0	68.12	0	2.03	9.54	1.14	3.42	0	0	0	0	0	0	5.4	3.94			
	Shipment Trucks	A01_Haul_Route3	581115.6	4809459	257.4	255	0	100.6	99.2	44.76	740.91	9.06	0	68.4	0	2.02	9.82	1.35	3.49	0	0	0	0	0	0	16.9	15.44			
	Quarry Trucks	D11_Pit_Trucks	580895.3	4809148	258	255	0	112.8	-3.2	189.83	742.91	6.33	0	68.42	0	3.26	15.86	3.22	3.49	0	0	0	0	0	0	21.78	-94.24			
	Quarry Trucks	D11_Pit_Trucks	580919.9	4809268	258	255	0	107.4	-8.7	54.1	770.37	8.19	0	68.73	0	2.98	12.5	2.09	3.58	0	0	0	0	0	0	19.55	-96.47			
	Shipment Trucks	AHaul_Route1	581673.1	4809422	286.4	284	0	103.7	102.3	78.63	535.23	4.56	0	65.57	0	3.42	2.93	0.33	2.28	0	0	0	0	0	0	29.52	28.06			
	Portable Screening Plant	D11_Screen	581117.9	4808785	285	282	0	112	-88	1	486.34	6.22	0	64.74	0	2.54	2.43	0.13	1.65	0	0	0	0	-10.13	0	30.55	-88			
	Shipment Trucks	AHaul_Route1	581593.3	4809306	286.4	284	0	101.6	100.1	48.15	413.24	3.77	0	63.32	0	7.05	5.57	1.09	1.85	0	0	0	0	0	0	23.79	22.33			
	Quarry Trucks	D11_Pit_Trucks	580958.5	4809339	258	255	0	110.5	-5.5	111.17	775.53	9.06	0	68.79	0	2.87	10.37	1.63	3.6	0	0	0	0	0	0	24.84	-91.18			
	Quarry Trucks	D11_Pit_Trucks	580992	4809384	258	255	0	91.5	-24.5	1.4	776.16	11.21	0	68.8	0	2.88	11.4	1.83	3.6	0	0	0	0	0	0	4.81	-111.21			
	Quarry Trucks	D11_Pit_Trucks	581013.2	4809412	258	255	0	108.5	-7.6	69.72	778.65	10.71	0	68.83	0	2.88	12.08	2.02	3.61	0	0	0	0	0	0	21.06	-94.97			
	Shipment Trucks	A01_Haul_Route3	581284.1	4809241	284.77	282.37	0	100.6	99.1	44.11	465.08	6.33	0	64.35	0	3.34	2.68	0.28	2.56	0	0	0	0	0	0	27.62	26.16			
	Shipment Trucks	A01_Haul_Route3	581284.5	4809264	283.12	280.72	0	82	80.5	0.61	481.78	5.52	0	64.66	0	3.04	2.25	0.14	2.62	0	0	0	0	0	0	9.42	7.96			
	Shipment Trucks	A01_Haul_Route3	581284.6	4809269	282.75	280.35	0	93.8	92.4	9.39	485.58	7.03	0	64.73	0	3.44	2.68	0.33	2.64	0	0	0	0	0	0	20.37	18.91			
	Shipment Trucks	A01_Haul_Route3	581271.8	4809298	279.9	277.5	0	101.7	100.2	57.03	517.05	7.77	0	65.27	0	2.84	3.27	0.41	2.75	0	0	0	0	0	0	27.55	26.09			
	Shipment Trucks	A01_Haul_Route3	581358.6	4809178	286.4	284	0	91.2	89.8	5.14	368.93	5.32	0	62.34	0	5.23	6.99	0.88	2.19	0	0	0	0	0	0	14.48	13.02			
	Shipment Trucks	A01_Haul_Route3	581356.2	4809177	286.4	284	0	79.1	77.6	0.31	369.53	4.11	0	62.35	0	3.65	3.55	0.24	2.19	0	0	0	0	0	0	7.33	5.87			
	Shipment Trucks	A01_Haul_Route3	581344.8	4809171	286.4	284	0	98.1	96.7	25.17	372.58	5.57	0	62.42	0	5.21	6.91	0.87	2.2	0	0	0	0	0	0	21.38	19.92			
	Shipment Trucks	A01_Haul_Route3	581319.9	4809165	286.4	284	0	98.5	97	27.38	385.01	5.69	0	62.71	0	4.84	6.4	0.74	2.25	0	0	0	0	0	0	22.29	20.82			
	Shipment Trucks	A01_Haul_Route3	581297.3	4809176	286.4	284	0	98.8	97.3	29.14	408.7	5.69	0	63.23	0	3.6	5.07	0.46	2.35	0	0	0	0	0	0	24.52	23.06			
	Shipment Trucks	A01_Haul_Route3	581286	4809203	286.4	284	0	99.2	97.7	32.27	436	5.73	0	63.79	0	2.61	3.82	0.29	2.45	0	0	0	0	0	0	26.53	25.07			
	Shipment Trucks	A01_Haul_Route3	581246.6	4809345	267.4	265	0	101.4	99.9	53.4	569.86	8.39	0	66.12	0	2.54	14.9	1.46	2.93	0	0	0	0	0	0	14.9	13.44			
	SLoader	A01_SLoader	581053.6	4809466	257.5	255	0	105.1	103.6	1	786.98	9.65	0	68.92	0	2.49	8.5	1.65	2.33	0	0	0	0	0	0	22.85	21.38			
	SLoader	A01_SLoader	581047.5	4809497	257.5	255	0	105.1	103.6	1	813.88	10.19	0	69.21	0	2.56	6.89	1.37	2.38	0	0	0	0	0	0	24.05	22.59			

	SLoader	A01_SLoader	580981	4809440	257.5	255	0	105.1	103.6	1	821.34	11.13	0	69.29	0	2.67	7.59	1.68	2.4	0	0	0	0	0	0	23.14	21.68	
	SLoader	A01_SLoader	580971.6	4809492	257.5	255	0	105.1	103.6	1	863.21	13.62	0	69.72	0	2.47	6.31	1.42	2.48	0	0	0	0	0	0	24.11	22.65	
	SLoader	D11_Loader	581132.8	4808795	284.5	282	0	107.4	-88	1	469.74	6.25	0	64.44	0	2.69	2.51	0.2	1.62	0	0	0	0	0	0	36.17	-88	
	Shipment Trucks	AHaul_Route1	581744.6	4809788	286.4	284	0	100.5	99	37.49	908.27	6.03	0	70.16	0	7.69	3.54	0.76	3.39	0	0	0	0	0	0	15.72	14.25	
	Shipment Trucks	AHaul_Route1	581718	4809761	286.4	284	0	100.6	99.1	38.05	877.66	6.2	0	69.87	0	6.63	3.14	0.56	3.3	0	0	0	0	0	0	17.62	16.16	
	Permanent Processing Plant	A01_Processing	581026.4	4809474	260	255	0	107.1	-92.9	1	811.96	10.49	0	69.19	0	2.28	5.4	1.34	0.78	0	0	0	0	0	0	29.47	-170.53	
	Shipment Trucks	AHaul_Route1	581700	4809739	286.4	284	0	97.7	96.2	19.63	853.24	4.67	0	69.62	0	2.84	2.21	0.05	3.24	0	0	0	0	0	0	19.79	18.33	
	Shipment Trucks	AHaul_Route1	581690.1	4809720	286.4	284	0	98.5	97	23.61	832.99	4.13	0	69.41	0	2.37	2.48	0.05	3.18	0	0	0	0	0	0	21.05	19.59	
	Rock Drop - Surge Pile	A01_DROP2	581004.9	4809524	283	282	0	110	-90	1	862.12	14.63	0	69.71	0	-0.61	5.38	0.07	4.41	0	0	0	0	0	0	31.13	-168.87	
	Truck Dump into Primary	A01_DUMP	581020.9	4809465	256	255	0	108.4	-88	1	809.47	9.96	0	69.16	0	1.21	12.44	1.82	4.1	0	0	0	0	0	0	21.46	-88	
	Shipment Trucks	D11_SPlant	Trucks	581214	4808983	292.05	289.55	0	97	-19	143.02	388.72	5.31	0	62.79	0	1.68	0	-0.01	1.79	0	0	0	0	0	0	0	30.77	-85.25
	Shipment Trucks	D11_SPlant	Trucks	581218.3	4808905	291.57	289.07	0	86.6	-29.4	13.04	374.01	6	0	62.46	0	2.74	2.1	0	1.74	0	0	0	0	0	0	0	17.6	-98.42
	Shipment Trucks	D11_SPlant	Trucks	581218.7	4808898	291.52	289.02	0	73.7	-42.3	0.66	373.47	5.65	0	62.45	0	1.66	0	-0.03	1.73	0	0	0	0	0	0	0	7.86	-108.16
	Shipment Trucks	D11_SPlant	Trucks	581218.8	4808896	291.51	289.01	0	81	-35	3.6	373.33	6.44	0	62.44	0	2.33	1.39	0.03	1.73	0	0	0	0	0	0	0	13.15	-102.87
	Shipment Trucks	D11_SPlant	Trucks	581187.1	4808840	288	285.5	0	96.5	-19.5	125.91	408.45	6.72	0	63.22	0	2.62	3.19	0.17	1.87	0	0	0	0	0	0	0	25.58	-90.44
	Shipment Trucks	D11_SPlant	Trucks	581307.2	4809152	287.81	285.31	0	91.4	-24.6	39.29	384.91	5.64	0	62.71	0	4.74	6.9	0.61	1.78	0	0	0	0	0	0	0	15.31	-100.71
	Shipment Trucks	D11_SPlant	Trucks	581292.8	4809138	289.15	286.65	0	74	-42.1	0.71	386.74	5.49	0	62.75	0	4.36	5.68	0.42	1.79	0	0	0	0	0	0	0	-0.6	-116.62
	Shipment Trucks	D11_SPlant	Trucks	581282.5	4809128	290.11	287.61	0	89.9	-26.1	27.95	388.67	5.55	0	62.79	0	5.29	8.22	0.28	1.79	0	0	0	0	0	0	0	11.84	-104.18
	Shipment Trucks	D11_SPlant	Trucks	581256.6	4809103	292.52	290.02	0	91.9	-24.1	44.14	395.8	5.51	0	62.95	0	3.03	2.38	0.05	1.82	0	0	0	0	0	0	0	21.75	-94.28
	Shipment Trucks	D11_SPlant	Trucks	581236.3	4809083	293.78	291.28	0	86.7	-29.4	13.13	403.31	5.55	0	63.11	0	2.96	2.28	0	1.85	0	0	0	0	0	0	0	16.47	-99.55
	Shipment Trucks	D11_SPlant	Trucks	581221	4809066	293.03	290.53	0	90.6	-25.5	32.21	409.63	5.21	0	63.25	0	1.7	0	-0.01	1.88	0	0	0	0	0	0	0	23.74	-92.28
	Rock Drop - Stockpile	A01_DROP1	580930.3	4809471	283	282	0	97.1	-108.9	1	878.65	16	0	69.88	0	2.75	2.02	0.13	3.78	0	0	0	0	0	0	18.72	-187.28	
Limit.	Value	D/N:	45	40																									
Level	D/N:	43.5245	38.0411																										
Receiver:	NR09																												
ID:	NR09																												
X:	581592.13																												
Y:	4808892.84																												
Z:	295.5																												
Ground:	291																												
ISO	Bezeichnung	ID	X	Y	Z	Ground	ReflOrd	LxT	LxN	L/A	Dist.	hm	Freq	Adiv	K0b	Agr	Abar	z	Aatm	Afol	Ahous	Cmet	CmetN	Dc	RL	LtotT	LtotN		
	Drill	D11_Drill	581163.3	4808853	283.5	282	0	116.7	-83.3	1	430.85	7.58	0	63.69	0	0.66	14.56	0.6	3.16	0	0	0	0	-2.03	0	32.66	-167.34		
	Shipment Trucks	AHaul_Route1	581522.5	4809267	286.4	284	0	105.3	103.9	113.93	380.39	5.36	0	62.6	0	3.97	9.05	1.15	1.73	0	0	0	0	0	0	27.97	26.51		
	Shipment Trucks	AHaul_Route1	581422.2	4809213	286.4	284	0	105.3	103.9	113.93	362.15	6.27	0	62.18	0	3.97	9.41	1.2	1.67	0	0	0	0	0	0	28.11	26.65		
	Shipment Trucks	AHaul_Route1	581367.3	4809183	286.4	284	0	95.2	93.7	11.05	367.09	6.55	0	62.3	0	3.88	8.1	0.92	1.68	0	0	0	0	0	0	19.23	17.77		
	Quarry Trucks	D11_Pit_Trucks	581091.6	4808884	258	255	0	107.2	-8.8	52.22	502.02	8.44	0	65.01	0	-0.53	21.43	3.04	2.62	0	0	0	0	0	0	18.67	-97.35		
	Quarry Trucks	D11_Pit_Trucks	581070.6	4808900	258	255	0	91.8	-24.2	1.51	522.95	7.49	0	65.37	0	-0.81	18.01	3.51	2.7	0	0	0	0	0	0	6.55	-109.47		
	Quarry Trucks	D11_Pit_Trucks	580973.1	4808978	258	255	0	114	-2.1	247.81	626.01	8.45	0	66.93	0	-0.97	15.83	2.97	3.08	0	0	0	0	0	0	29.09	-86.94		
	ELoader	D11_ELoader	581134.3	4808881	257.5	255	0	113.3	-86.7	1	459.6	7.77	0	64.25	0	0.07	24.07	6.57	3.06	0	0	0	0	0	0	21.9	-178.1		
	Primary Crusher	A01_Primary	581027.2	4809460	258	255	0	110.4	-79.6	1	801.41	10.81	0	69.08	0	-1.43	13.54	1.56	2.83	0	0	0	0	0	0	26.33	-163.67		
	ELoader	D11_ELoader	581106.2	4808854	257.5	255	0	113.3	-86.7	1	488.91	7.73	0	64.78	0	-1.09	25.08	5.91	3.19	0	0	0	0	0	0	21.38	-178.62		
	Shipment Trucks	AHaul_Route1	581684.6	4809676	286.4	284	0	103	101.6	67.32	788.55	4.9	0	68.94	0	-0.56	5.33	0.03	3.06	0	0	0	0	0	0	26.28	24.82		
	Shipment Trucks	AHaul_Route1	581684.6	4809560	286.4	284	0	106.9	105.4	163.56	674.05	5.79	0	67.57	0	-0.79	5.56	0.07	2.72	0	0	0	0	0	0	31.83	30.37		
	Shipment Trucks	AHaul_Route1	581684.6	4809469	286.4	284	0	97.6	96.1	19.21	583.67	5.91	0	66.32	0	-0.59	5.44	0.17	2.44	0	0	0	0	0	0	23.99	22.52		
	Shipment Trucks	AHaul_Route1	581637.8	4809351	286.4	284	0	103.9	102.4	81.33	460.81	5.45	0	64.27	0	3.13	5.76	0.58	2.02	0	0	0	0	0	0	28.68	27.22		
	Shipment Trucks	A01_Haul_Route3	581184.9	4809405	257.4	255	0	105.1	103.6	125.28	655.62	7.68	0	67.33	0	-0.47	14.31	1.18	3.22	0	0	0	0	0	0	20.71	19.24		
	Shipment Trucks	A01_Haul_Route3	581134.4	4809445	257.4	255	0	88.5	87	2.74	717.88	7.94	0	68.12	0	-0.6	11.45	1.01	3.42	0	0	0	0	0	0	6.12	4.66		
	Shipment Trucks	A01_Haul_Route3	581115.6	4809459	257.4	255	0	100.6	99.2	44.76	741.05	9.74	0	68.4	0	-0.61	11.74	1.2	3.49	0	0	0	0	0	0	17.61	16.15		
	Quarry Trucks	D11_Pit_Trucks	580895.3	4809148	258	255	0	112.8	-3.2	189.83	743.06	7.34	0	68.42	0	-0.82	19.65	3.09	3.49	0	0	0	0	0	0	22.07	-93.95		
	Quarry Trucks	D11_Pit_Trucks	580919.9	4809268	258	255	0	107.4	-8.7	54.1	770.51	8.93	0	68.74	0	-1.11	16.05	1.95	3.58	0	0	0	0	0	0	20.1	-95.92		
	Shipment Trucks	AHaul_Route1	581673.1	4809422	286.4	284	0	103.7	102.3	78.63	535.27	5.84	0	65.57	0	0.78	4.89	0.29	2.28	0	0	0	0	0	0	30.2	28.74		
	Portable Screening Plant	D11_Screen	581117.9	4808785	285	282	0	112	-88	1	486.39	7.34	0	64.74	0	-0.69	5.49	0.1	1.65	0	0	0	0	-10.13	0	30.72	-88		
	Shipment Trucks	AHaul_Route1	581593.3	4809306	286.4	284	0	101.6	100.1	48.15	413.29	5.18	0	63.33	0	3.95	8.28	1.03	1.85	0	0	0	0	0	0	24.18	22.72		
	Quarry Trucks	D11_Pit_Trucks	580958.5	4809339	258	255	0	110.5	-5.5	111.17	775.67	9.76	0	68.79	0	-1.25	13.83	1.49	3.6	0	0	0	0	0	0	25.5	-90.52		
	Quarry Trucks	D11_Pit_Trucks	580992	4809384	258	255	0	91.5	-24.5	1.4	776.3	11.91	0	68.8	0	-1.24	14.93	1.69	3.6	0	0	0	0	0	0	5.39	-110.63		
	Quarry Trucks	D11_Pit_Trucks	581013.2	4809412	258	255	0	108.5	-7.6	69.72	778.79	11.58	0	68.83	0	-1.18	12.96	1.88	3.61	0	0	0	0	0	0	24.23	-91.79		
	Shipment Trucks	A01_Haul_Route3	581284.1	4809241	284.77	282.37	0	100.6	99.1	44.11	465.14	7.43	0	64.35	0	1.6	3.74	0.22	2.56	0	0	0	0	0	0	28.31	26.85		
	Shipment Trucks	A01_Haul_Route3	581284.5	4809264	283.12	280.72	0	82	80.5	0.61	481.85	6.51	0	64.66	0	1.45	3.41	0.09	2.62	0	0	0	0	0	0	9.85	8.39		
	Shipment Trucks	A01_Haul_Route3	581284.6	4809269	282.75	280.35	0	93.8	92.4	9.39	485.65	8.08	0	64.73	0	1.65	3.75	0.27	2.64	0	0	0	0	0	0	21.08	19.62		
	Shipment Trucks	A01_Haul_Route3	581271.8	4809298	279.9	277.5	0	101.7	100.2	57.03	517.13	8.75	0	65.27	0	0.74	4.67	0.33	2.75	0	0	0	0	0	0	28.25	26.79		
	Shipment Trucks	A01_Haul_Route3	581358.6	4809178	286.4	284	0	91.2	89.8	5.14	368.99	6.7	0	62.34	0	2.96	8.75	0.82	2.19	0	0	0	0	0	0	14.99	13.53		
	Shipment Trucks	A01_Haul_Route3	581356.2	4809177	286.4	284	0	79.1	77.6	0.31	369.59	5.41	0	62.35	0	2.01	4.35	0.2	2.19	0	0	0	0	0	0	8.18	6.72		
	Shipment Trucks	A01_Haul_Route3	581344.8	4809171	286.4	284	0	98.1	96.7	25.17	372.64	6.95	0	62.43	0	2.96	8.64	0.8	2.2	0	0	0	0	0	0	21.9	20.44		
	Shipment Trucks	A01_Haul_Route3	581319.9	4809165	286.4	284	0	98.5	97	27.38	385.07	7.05	0	62.71	0	2.71	7.91	0.68	2.25	0	0	0	0	0	0	22.9	21.44		
	Shipment Trucks	A01_Haul_Route3	581297.3	4809176	286.4	284	0	98.8	97.3	29.14	408.76	6.98	0	63.23	0	1.46	6.45	0.4	2.35	0	0	0	0	0	0	25.28	23.82		
	Shipment Trucks	A01_Haul_Route3	581286	4809203	286.4	284	0	99.2	97.7	32.27	436.05	6.93	0	63.79	0	0.47	5.28	0.23	2.45	0	0	0	0	0	0	27.21	25.75		
	Shipment Trucks	A01_Haul_Route3	581246.6	4809345	267.4	265	0	101.4	99.9	53.4	570	9.29	0	66.12	0	0.31	16.62	1.32	2.94	0	0	0	0	0	0	15.41	13.95		
	SLoader	A01_SLoader	581053.6	4809466	257.5	255	0	105.1	103.6	1	787.12	10.31	0	68.92	0	-0.96	11.43	1.51	2.33	0	0	0	0	0	0	23.37	21.91		
	SLoader	A01_SLoader	581047.5	4809497	257.5	255	0	105.1	103.6	1	814.01	10.82	0	69.21	0	-1.03	9.91	1.23	2.38	0	0	0	0	0	0	24.62	23.16		
	SLoader	A01_SLoader	580981	4809440	257.5	255	0	105.1	103.6	1	821.48	11.96	0	69.29	0	-1	7.54	1.54	2.4	0	0	0	0	0	0	26.86	25.4		
	SLoader	A01_SLoader	580971.6	4809492	257.5	255	0	105.1	103.6	1	863.34	14.35	0	69.72	0	-1.38	7.1	1.29	2.48	0	0	0	0	0	0	27.16	25.7		
	SLoader	D11_Loader	581132.8	4808795	284.5	282	0	107.4	-88	1	469.81	7.41	0	64.44	0	-0.74	5.66	0.15	1.62	0	0	0	0	0	0	36.45	-88		
	Shipment Trucks	AHaul_Route1	581744.6	4809788	286.4	284	0	100.5	99	37.49	908.29	7.14	0	70.16	0	3.62	3.77	0.74	3.39	0	0	0	0	0	0	19.56	18.1		
	Shipment Trucks	AHaul_Route1	581718	4809761	286.4	284	0	100.6	99.1	38.05	877.68	7.29	0	69.87	0	2.73	3.42	0.54	3.3	0	0	0	0	0	0	21.24	19.78		
	Permanent Processing Plant	A01_Processing	581026.4	4809474	260	255	0	107.1	-92.9	1	812.09	11.13	0	69.19	0	0.8	6.46	1.21	0.78	0	0	0	0	0	0	29.88	-170.12		
	Shipment Trucks	AHaul_Route1	581700	4809739	286.4	284	0	97.7	96.2	19.63	853.27	5.43	0	69.62	0	-0.1	4.87	0.02	3.24	0	0	0	0	0	0	20.06	18.6		
	Shipment Trucks	AHaul_Route1	581690.1	4809720	286.4	284	0	98.5	97	23.61	833.01	4.9	0	69.41	0	-0.68	5.45	0.02	3.18	0	0	0	0	0	0	21.13	19.67		
	Rock Drop - Surge Pile	A01_DROP2	581004.9	4809524	283	282	0	110	-90	1	862.16	15.23	0	69.71	0	-2.5	7.27	0.04	4.41	0	0	0	0	0	0	31.12	-168.88		
	Truck Dump into Primary	A01_DUMP	581020.9	4809465	256	255	0	108.4	-88	1	809.61	10.6	0	69.17	0	-1.8	14.88	1.68	4.1	0	0	0	0	0	0	22.03	-88		
	Shipment Trucks	D11_SPlant	Trucks	581214.1	4808981	292.04	289.54	0	97.2	-18.8	147.73	388.07	6.81	0	62.78	0	0.41	0	-0.03	1.79	0	0	0	0	0	0	0	32.2	-83.82
	Shipment Trucks	D11_SPlant	Trucks	581218.5	4808903	291.55	289.05	0	84.7	-31.3	8.33	373.83	7.39	0	62.45	0	0.64	2.3	0	1.74	0	0	0	0	0	0	0	17.56	-98.46
	Shipment Trucks	D11_SPlant	Trucks	581218.7	4808898	291.52	289.02	0	73.7	-42.3	0.66	373.49	7.15	0	62.45	0	0.41	0	0	1.73	0	0	0	0	0	0	0	9.12	-106.9
	Shipment Trucks	D11_SPlant	Trucks	581218.8	4808896	291.51	289.01	0	81	-35	3.6	373.35	7.72	0	62.44	0	0.61	2.16	0.01	1.73	0	0	0	0	0	0	0	14.1	-101.92
	Shipment Trucks	D11_SPlant	Trucks	581187.1	4808840	288	285.5	0	96.5	-19.5	125.91	408.5	7.97	0	63.22	0	0.05	5.25	0.13	1.87	0	0	0	0	0	0	0	26.1	-89.92
	Shipment Trucks	D11_SPlant	Trucks	581307.2	4809152	287.81	285.31	0	91.4	-24.6	39.29	384.96	7.03	0	62.71	0	1.87	9.11	0.57	1.78	0	0	0	0	0	0	0	15.96	-100.06
	Shipment Trucks	D11_SPlant	Trucks	581292.8	4809138	289.15	286.65	0	74	-42.1	0.71	386.77	6.89	0	62.75	0	1.69	7.64	0.38	1.79	0	0	0	0	0	0	0	0.09	-115.93
	Shipment Trucks	D11_SPlant	Trucks	581290.5	4809136	289.36	286.86	0	83	-33	5.67	387.16	6.89	0	62.76	0	1.66	7.37	0.35	1.79	0	0	0	0	0	0	0	9.45	-106.57
	Shipment Trucks	D11_SPlant	Trucks	581265.1	4809111	291.73	289.23	0	93.6	-22.4	65.13	393.14	6.87	0	62.89	0	0.97	4.59	0.09	1.81	0	0	0	0	0	0	0	23.36	-92.66
	Shipment Trucks	D11_SPlant	Trucks	581241.3	4809088	293.95	291.45	0	76.6	-39.4	1.29	401.52	6.98	0	63.07	0	0.41	0	0	1.84	0	0	0	0	0	0	0	11.26	-104.76
	Shipment Trucks	D11_SPlant	Trucks	581239.9	4809087	293.95	291.45	0	79.6	-36.4	2.57	402.01	6.97	0	63.08	0	0.41	0	0	1.85	0	0	0	0	0	0	0	14.24	-101.78
	Shipment Trucks	D11_SPlant	Trucks	581235.5	4809082	293.74	291.24	0	85.7	-30.3	10.57	403.64	6.96	0	63.12	0	0.86	4	0	1.85	0	0	0	0	0	0	0	15.89	-100.13
	Shipment Trucks	D11_SPlant	Trucks	581221	4809066	293.03	290.53	0	90.6	-25.5	32.21	409.64	6.71	0	63.25	0	0.41	0	-0.06	1.88	0	0	0	0	0	0	0	25.03	-90.99
	Rock Drop - Stockpile	A01_DROP1	580930.3	4809471	283	282	0	97.1	-108.9	1	878.69	16.76	0	69.88	0	-1.52	6.29	0.09	3.78	0	0	0	0	0	0	18.72	-187.28		
Limit.	Value	D/N:	99	40																									
Level	D/N:	44.113	38.7593																										

APPENDIX B

Qualification of Author

AERCOUSTICS ENGINEERING LIMITED

Established 1971

Mohan Barman
M.A.Sc., P.Eng.

Marc Bracken
M.A.Sc., P.Eng.

Vince Gambino
B.A.Sc., P.Eng.

John O'Keefe
M.Sc., P.Eng. MIOA

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PROFESSIONAL PROFILE
H. ROBERT RIMROTT, M.A.Sc.,P.Eng.

EDUCATION

B.A.Sc., University of Toronto
M.A.Sc., University of Toronto

LECTURES

1995 Noise Measurement, Sound Pressure/Sound Intensity
1995 Dynamic Signal Analyzers

PROFESSIONAL MEMBERSHIPS

Registered Professional Engineer, Ontario (PEO)
Acoustical Society of America (ASA)
American Society of Mechanical Engineers (ASME)

PROFESSIONAL BACKGROUND

In 1987, Mr. Rimrott began his work as an acoustics and vibration consultant. In his many years in this field, he has completed many successful projects. In 1992, he joined Aercoustics Engineering Limited. He is a partner and principal engineer with the firm. Mr. Rimrott is recognized as an expert by the Ministry of Environment and Energy and has provided expert testimony in the forum of the Ontario Municipal Board Hearings.

In the field of environmental acoustics, Mr. Rimrott has completed numerous projects involving noise impact from planned stationary sources as well as noise impact studies for residential developments. These projects included conducting studies for both proposed operations and developments, studies addressing noise concerns for existing operations, and peer review of noise studies conducted by other acoustic consultants. Projects have included Industrial plants, Aggregate Pits and Quarries, and many other operations.

In the land use planning process Mr. Rimrott has completed studies provide assessments of the noise impact on the proposed residential development from the local environment which includes noise from road, rail, and aircraft traffic and stationary noise sources such as industries, and gun clubs. The studies include recommendations on noise control of the sources, dwelling building components, wall, window, and door constructions to satisfy the Ministry of Environment and Energy noise guidelines.

PROFESSIONAL PROFILE
H. ROBERT RIMROTT, M.A.Sc.,P.Eng.

PARTIAL LISTING OF REPRESENTATIVE PROJECTS

PITS AND QUARRIES

Armbro, Pinchin Pit
Wimpey, Nolan Quarry
Truax Pit
United Aggregates, Acton quarry
Cox Construction, Puslinch Pit
Beamish Construction, Coboconk Quarry
The Murray Group, Aggregate Pits
Dufferin Aggregates, Milton Quarry

INDUSTRIAL

Coutrice Steel
Co Steel Lasco
Georga Pacific Flakeboard
Boise Cascade Oriented Strand Board Plant
Boise Cascade Co-Generation Station
Moore Business Forms
Metal Coating
Alcan Foil Products
INCO
Alcan Rolled Products
Townsend Lumber

Blast / Impulse Noises

Quarry Blasting Noise
Meaford Artillery Range
Walker Dog Kennel
Pioneer Sportsmen Club

EDUCATION

Bachelor of Applied Science, University of Toronto, 2002

PROFESSIONAL EXPERIENCE

Mr. Bessey began his career in acoustics as part of the aerospace division of **MTI's (Magnifoam Technologies Inc)** R&D department. At MTI, Mr. Bessey created statistical energy analysis (SEA) models of aircraft interiors using **AutoSEA** in order to evaluate the acoustic performance of custom engineered foam treatments. This work was performed in conjunction with engineers at **Boeing**, **Bombardier**, **Embraer** and the **University of Sherbrooke**.

Since joining Aercoustics in 2003, Mr. Bessey has tackled a wide range of **environmental noise projects** for facilities such as **hospitals, power plants, quarries, manufacturing plants, bus garages** and **composting operations**. Typically these projects consist of field measurements, noise modelling using the **ISO 9613-2** standard for outdoor sound propagation and/or **Cadna.A** noise modelling software, noise control recommendations, and report preparation. Thanks to Mr. Bessey's attention to detail and clear presentation style, his reports are highly regarded by the **Ministry of Environment (MOE)** for **Certificate of Approval (C. of A.)** applications.

Noise intrusion from **mechanical equipment**, **HVAC systems** and the **TTC subway** are other areas where Mr. Bessey has extensive experience. Noise control design was performed by Mr. Bessey for **Sunnybrook Hospital's Neo-Natal Intensive Care Unit** in order to ensure the neo-natal infant's sleep would not be disturbed by mechanical equipment and HVAC noise. **CTV** utilized Mr. Bessey during the **Masonic Temple** HVAC upgrade in order to ensure the acoustic requirements for their **television studios** would be satisfied. For measuring **subway noise intrusion,** Mr. Bessey has developed custom analysis software that allows the noise intrusion into a space to be efficiently and accurately determined. For the **Metropolis Building** at Yonge & Dundas the noise intrusion of subway passbys was determined by performing simultaneous measurements on each of the 6 floors of the structure.

In the field of **vibration**, Mr. Bessey has used his technical abilities with **data acquisition** and **analysis** to take a leadership role in many of Aercoustic's most prominent projects. For example, Mr. Bessey has performed extensive **vibration measurements** at numerous locations across the TTC subway system in order to evaluate the TTC's **rail grinding** and **track defect repair** program. Due to the significance of wheel condition on vibration levels, Mr. Bessey has developed a sophisticated **Wheel Condition Detection System** in order to discern the effect of wheel condition.

Mr. Bessey's experience with vibration has also led him into several **building vibration isolation** projects. For example, Mr. Bessey was responsible for the design of a vibration isolation system at **20 Gothic Avenue Condominium,** which is being built directly above High Park subway station. This system consists of mounting the entire building on natural rubber isolation pads and supporting the base with lateral isolation pads to resist seismic loads. Such a system ensures intrusion from the subway will not be issue for the residents of the condominium.

OTHER INTERESTS

Mr. Bessey is an avid technology enthusiast with interest focused on the computer industry, photographic hardware and techniques and sound production technology. The affinity of Mr. Bessey's interest to the field of acoustics has helped him quickly develop his expertise.