

NOISE IMPACT ASSESSMENT

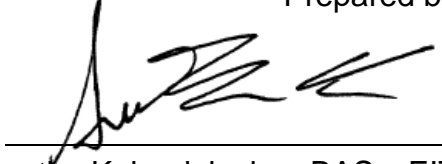
PROPOSED SARAWAK QUARRY EXPANSION

TOWNSHIP OF GEORGIAN BLUFFS, ONTARIO

Prepared for

Harold Sutherland Construction Ltd.
323545 East Linton Road West
R.R #2
Kemble, Ontario
N0H 1S0

Prepared by


Swetha Kulandaivelan, BAsC, EIT

Reviewed by


Corey Kinart, MBA, PEng

October 9, 2018

HGC Engineering Project No. 01501486

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1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by Harold Sutherland Construction Ltd. (“HSC”) to undertake a noise impact assessment of the proposed expansion of the Sarawak Quarry, located in the Township of Georgian Bluffs, Ontario. HSC intends to apply to the Ministry of Natural Resources and Forestry (“MNR”) for a Category 2, Class A license.

The analysis was based on consideration of the pertinent guidelines of the MNR and the Ministry of the Environment, Conservation and Parks (“MECP”), a review of the quarry plans prepared by William Bradshaw, PEng, sound level measurements conducted by HGC Engineering of the equipment to be employed within the quarry expansion, and additional information regarding the planned operation of the site provided by HSC.

The applicable sound level criteria were established at selected points of reception surrounding all phases of planned extraction in the proposed expansion, in accordance with MECP guideline NPC-300. Considering the noise control measures recommended herein, sound levels resulting from the future quarrying activities were predicted at the selected receptor locations. The results of the analysis indicate that, with the benefit of noise control measures outlined herein, the predicted sound levels of the proposed Sarawak Quarry expansion comply with the applicable limits at all surrounding points of reception. Details of the analysis are outlined below.

2 DESCRIPTION OF SITE AND SURROUNDING AREA

The proposed Sarawak Quarry expansion encompasses 15.55 hectares of land on Lot 36, Concession 2 (Grey Road 1), immediately south of the existing Sarawak Quarry in the Township of Georgian Bluffs. The existing Sarawak Quarry is currently active; however, HSC intends to deplete all resources therein prior to extraction commencing in the proposed expansion lands. Like the existing operation, the proposed expansion will be an open aggregate quarry, employing various mobile equipment to extract and process aggregate materials, before products are shipped offsite. The hours of operation of the expansion will be between 07:00 and 18:00 from Monday to Friday and between



08:00 and 12:00 on Saturdays. A copy of the latest operational plan for the Sarawak Quarry expansion, dated March 9, 2018, is included as Appendix A.

Noise-sensitive points of reception (i.e. residential homes) surround the site. A total of five locations, shown as locations R1 through R5 in Figures 2 and 3, were selected to represent the most potentially impacted points of reception; they are located at distances ranging between approximately 225 and 340 metres from the expansion lands. Based on observations by HGC Engineering personnel during a visit to the site and surrounding area on May 11, 2018, the area surrounding the proposed site is best classified as a Class 3 “rural” acoustic environment, as defined in MECP publication NPC-300 (discussed in detail in the following section).

3 CRITERIA FOR ACCEPTABLE SOUND LEVELS

MECP publication NPC-300 “Environment Noise Guideline, Stationary and Transportation Sources – Approval and Planning” [1], is the pertinent guideline for developing sound level limits applicable in the assessment of sound from aggregate operations, which are classified as *stationary sources of sound*. In general, the acceptability limits for stationary sources are site dependent, and are based on the existing ambient background sound levels in the area of the subject site. MECP guidelines also stipulate that the noise assessment shall consider a *predictable worst-case hour*, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound. NPC-300 stipulates that the sound level limit for a stationary source that operates during daytime hours (07:00 to 19:00) in a Class 3 (“rural”) acoustic environment is the greater of the minimum one-hour energy-equivalent sound level ($LEQ-1Hr$) background sound level, or the exclusionary minimum limit of 45 dBA.

Observations by HGC Engineering personnel during a site visit on May 11, 2018 indicate that, during the quietest hours of the day, background sound levels are likely as low as the exclusionary minimum of 45 dBA. Therefore, 45 dBA was assumed for all receptors in the following sections of this report as the criterion by which the impact of the proposed operations is assessed.

Compliance with MECP criteria generally results in acceptable levels of sound at points of reception, although there may be residual audibility during periods of low background sound. The guidelines of



NPC-300 apply to sound from the ongoing day-to-day operations of the subject site. They do not apply to the temporary sound produced during the preparation and rehabilitation of extraction sites, or to the sound produced by road trucks on public roadways. Within each future phase of extraction, the initial operations of building access roadways, stripping top soil, and building localized shielding, as well as the final operations of rehabilitation (and removal of localized shielding) are defined as construction activity. In order to satisfy Provincial Standards, the sound levels emitted by the equipment involved in those construction activities must comply with MECP Guideline NPC-115, "Sound Levels due to Construction Equipment" [2].

4 DESCRIPTION OF PROPOSED QUARRY OPERATIONS

On behalf of HSC, William Bradshaw, PEng, has prepared an operational plan for the proposed Sarawak Quarry expansion (included in Appendix A), which was used to evaluate sound emissions from quarry operations. Note that extraction in the proposed quarry expansion is planned to occur after the existing quarry is depleted.

Extraction within the proposed expansion will progress through four phases, beginning on the northwest side and progressing southward through Phases 1 and 2. Extraction within Phases 3 and 4, which represent the eastern half of the expansion, will progress from west to east. The aggregate materials from the quarry will be removed in a single lift, to a depth of 5-7 metres below existing grade. Extraction activities will involve the use of a rock drill to drill the blast pattern; following blasting, material will be transferred by a front-end loader to mobile aggregate processing equipment consisting of a crusher/screener, which will operate on the finished floor of the quarry (moving with the progression of the working face within each extraction phase). A second front end loader will be used to feed the crusher/screener, manage stockpiles, and load outbound trucks which will enter/depart the site via the main entrance on Grey Road 1. Recyclable asphalt and/or concrete may also be brought to the site to be crushed/screened. Additional details regarding on-site operations considered for the purposes of this study are included as Appendix B.



5 ASSESSMENT METHODOLOGY

The predictive model used for this study (*CadnaA, version 2018 163.4824*) is based on the methods from ISO Standard 9613-2.2 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation” [3] which accounts for reductions in sound levels due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures. The ISO method tends to be conservative, as it assumes a moderate downwind condition (favorable for the propagation of sound from the source to a receiver) in all directions, at all times.

6 NOISE CONTROL MEASURES

Using the predictive model described in the previous section, and the assumptions included in Appendix B, the following noise control requirements were developed for the site:

- All activities within the site shall be restricted to daytime hours only (07:00 to 19:00).
- Prior to commencement of extraction within the proposed expansion, a 6-metre tall berm shall be erected along the eastern boundary of Phases 3 and 4, as shown in Figures 2 and 3.
- While extraction, processing and/or shipping is occurring within/from the expansion quarry, no such activities will occur during the same operational hour within the existing Sarawak Quarry.
- Operation of only one of the following shall be permitted at any given time: the rock drill, crushing/screening of virgin aggregate or crushing/screening of recyclable asphalt/concrete. Receipt of recyclable asphalt/concrete and shipping of product may occur simultaneously or independently of rock drilling or crushing/screening.
- While operating within the orange area highlighted in Figure 2, the rock drill must be shielded by an obstruction that breaks the line-of-sight between the drill and receptors R1 through R5. The localized shielding shall have a minimum height of 4 metres, with the peak located not more than 20 metres from the nearest surface of the drill. This obstruction may take the form of a berm (overburden soil, tailings, etc.) or be of a solid wall construction with a surface density of no less than 20 kg/m². A wall may be constructed from any of a variety of impervious materials such as



wood, metal, brick, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks.

- Operation of crushing/screening equipment (processing either virgin aggregate or recyclable asphalt/concrete) shall be restricted as follows:
 - In order to maximize acoustical shielding, the crushing/screening equipment shall be located as close as possible to the excavated face of each phase. During extraction within Phases 3 and 4 in areas not highlighted in orange in Figure 3, the crushing/screening equipment must remain within 75 metres of the quarry face;
 - During operations within Phases 3 and 4, crushing/screening equipment must not operate within the orange area highlighted in Figure 3. Materials extracted within this area must be transported out of this area for processing.
- Drilling, extraction, and processing equipment employed within the subject licensed area shall be limited to those detailed in this study (including quantity thereof), with sound power levels not greater than those specified in Table B1 of Appendix B.
- All mobile construction equipment used to prepare for, rehabilitate, or maintain the operations on the site shall produce sound levels which comply with MECP Guidelines NPC-115, “Sound Levels due to Construction Equipment”.
- Any proposed changes to the aspects of the extraction, processing and shipping operations detailed above as relating to noise control shall be reviewed by a qualified acoustical consultant for compliance with the relevant noise criteria.
- The operational plan should be updated to include the assumptions and recommendations as stated in this report.

7 ASSESSMENT RESULTS

The sound levels from the proposed quarry, under worst-case operating conditions, were predicted to be up to 45 dBA at each the neighbouring point of reception, which is within the applicable noise criterion. The results are shown in Table 1, below.

Table 1: Predicted “Worst-Case” Sound Levels of Sarawak Quarry, L_{EQ} [dBA]

Points of Reception		Predicted Results	Noise Criterion	Within Criterion?
Description	ID			
Residential Home to East	R1	45	45	Yes
Residential Home to Southeast	R2	45	45	Yes
Residential Home to Southeast	R3	45	45	Yes
Residential Home to Southeast	R4	45	45	Yes
Residential Home to Northeast	R5	45	45	Yes

8 CONCLUSIONS

The results of the acoustical analysis indicate that, with the benefit of the noise control measures outlined in Section 6, the predicted sound levels of the proposed Sarawak Quarry expansion comply with the applicable noise limits of the MECP.



REFERENCES

1. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, August, 2013.
2. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-115, *Construction Equipment*, August, 1978.
3. International Organization for Standardization, *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation*, ISO-9613-2, Switzerland, 1996.
4. Google Maps and Aerial Imagery, Internet application: maps.google.com



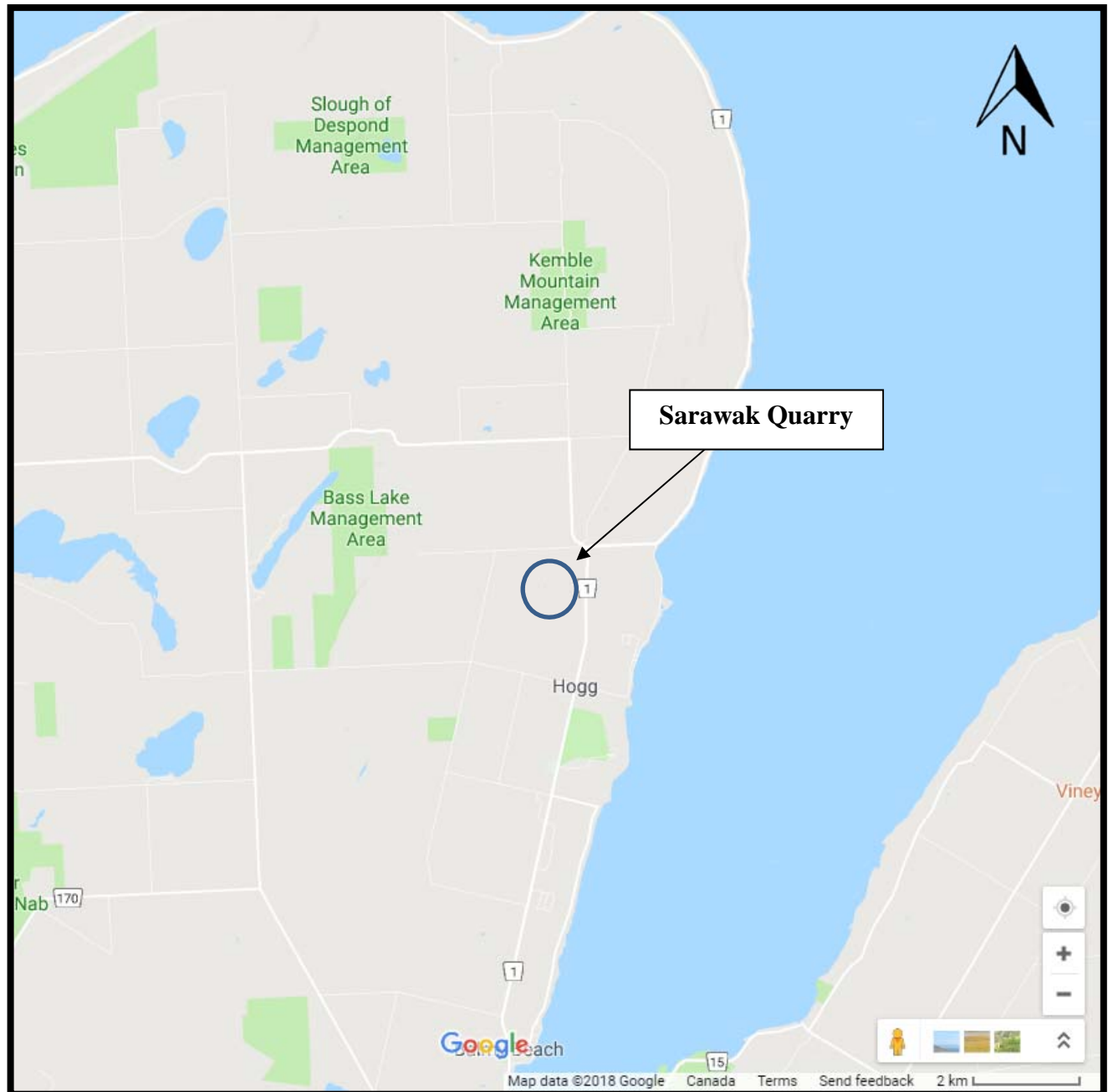


Figure 1: Location Map

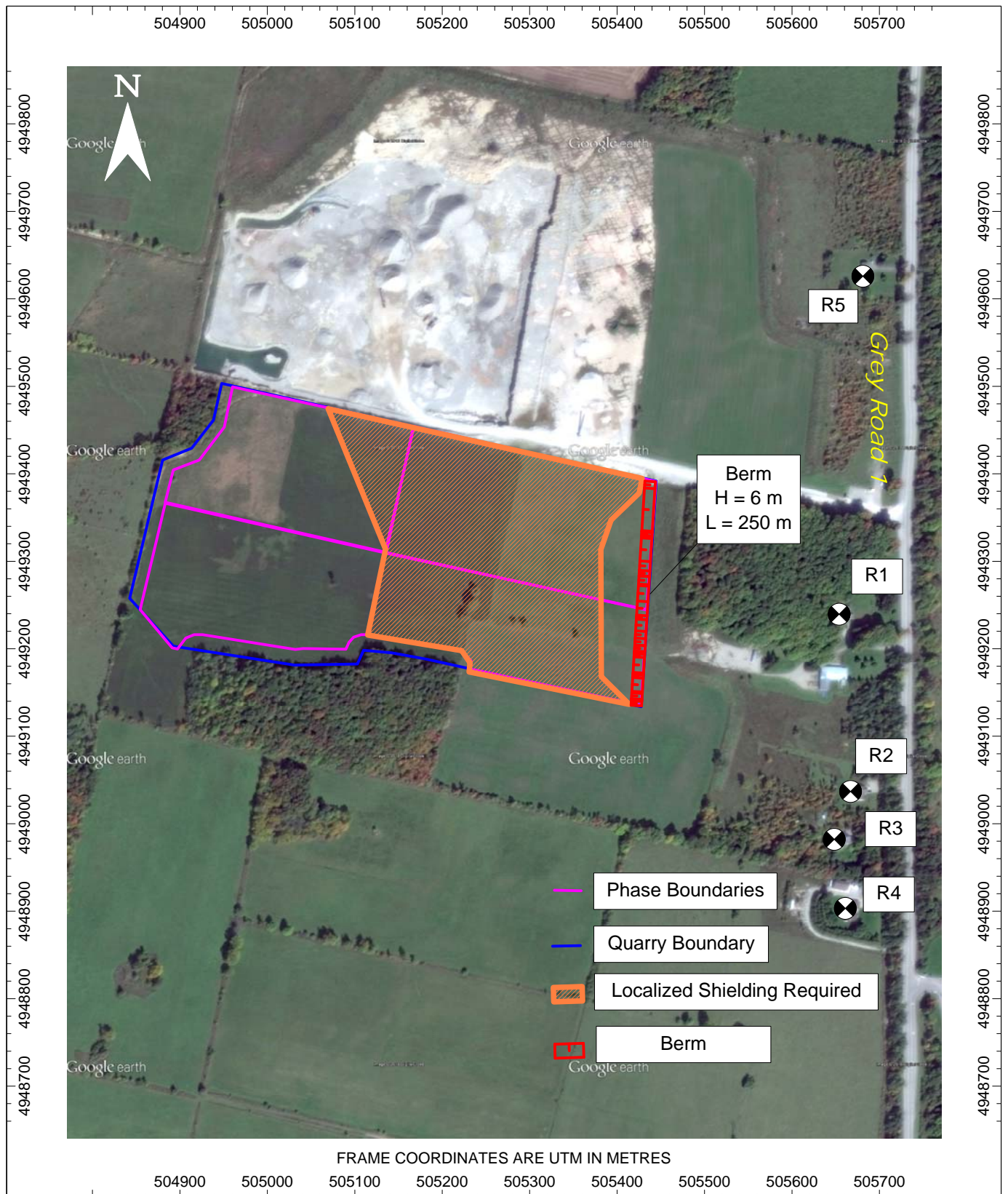


Figure 2: Satellite Image Showing Locations Where Localized Shielding of Rock Drill Is Required

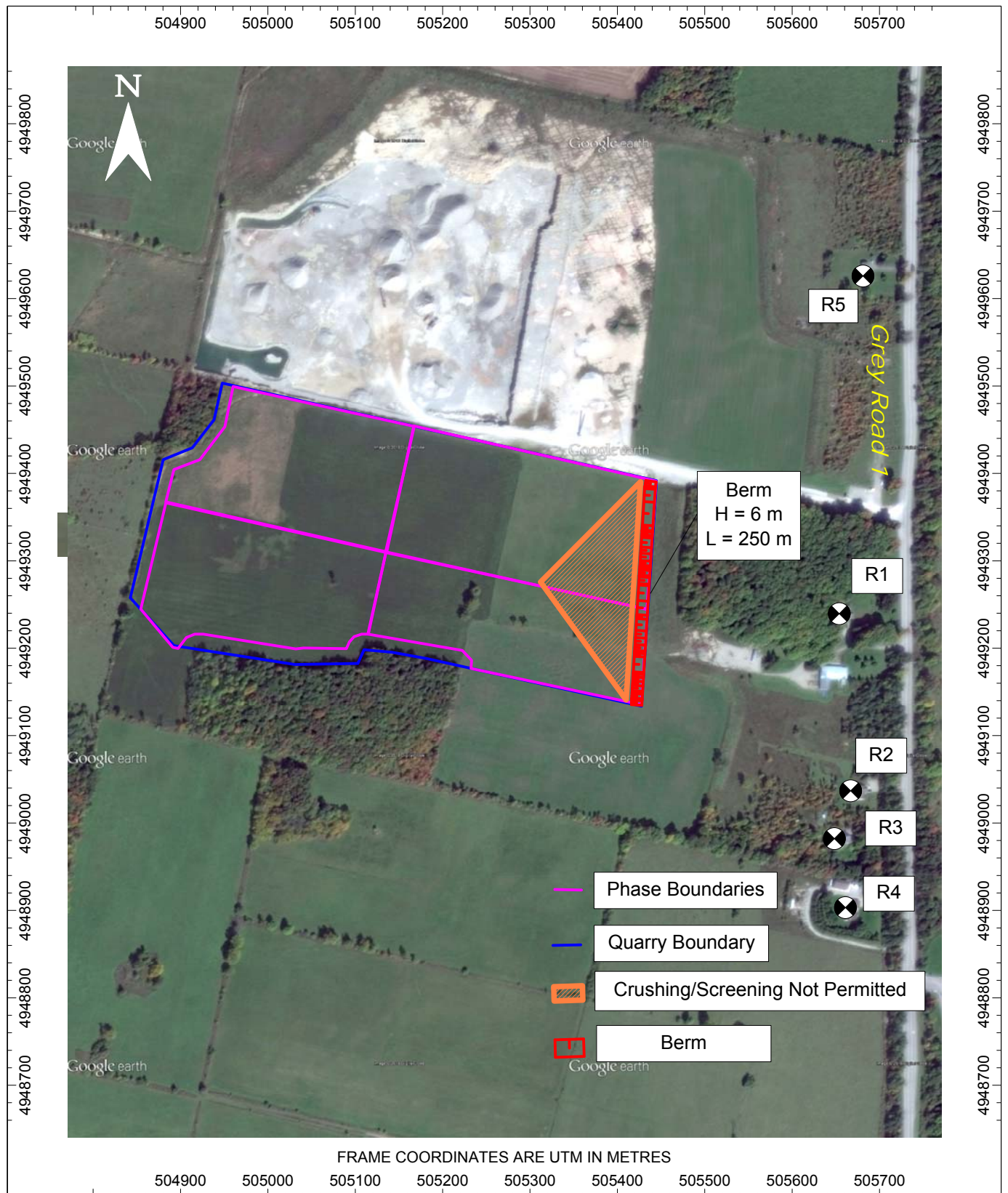


Figure 3: Satellite Image Showing Locations Where Aggregate Crushing/Screening is Not Permitted

APPENDIX A

Operational Plan



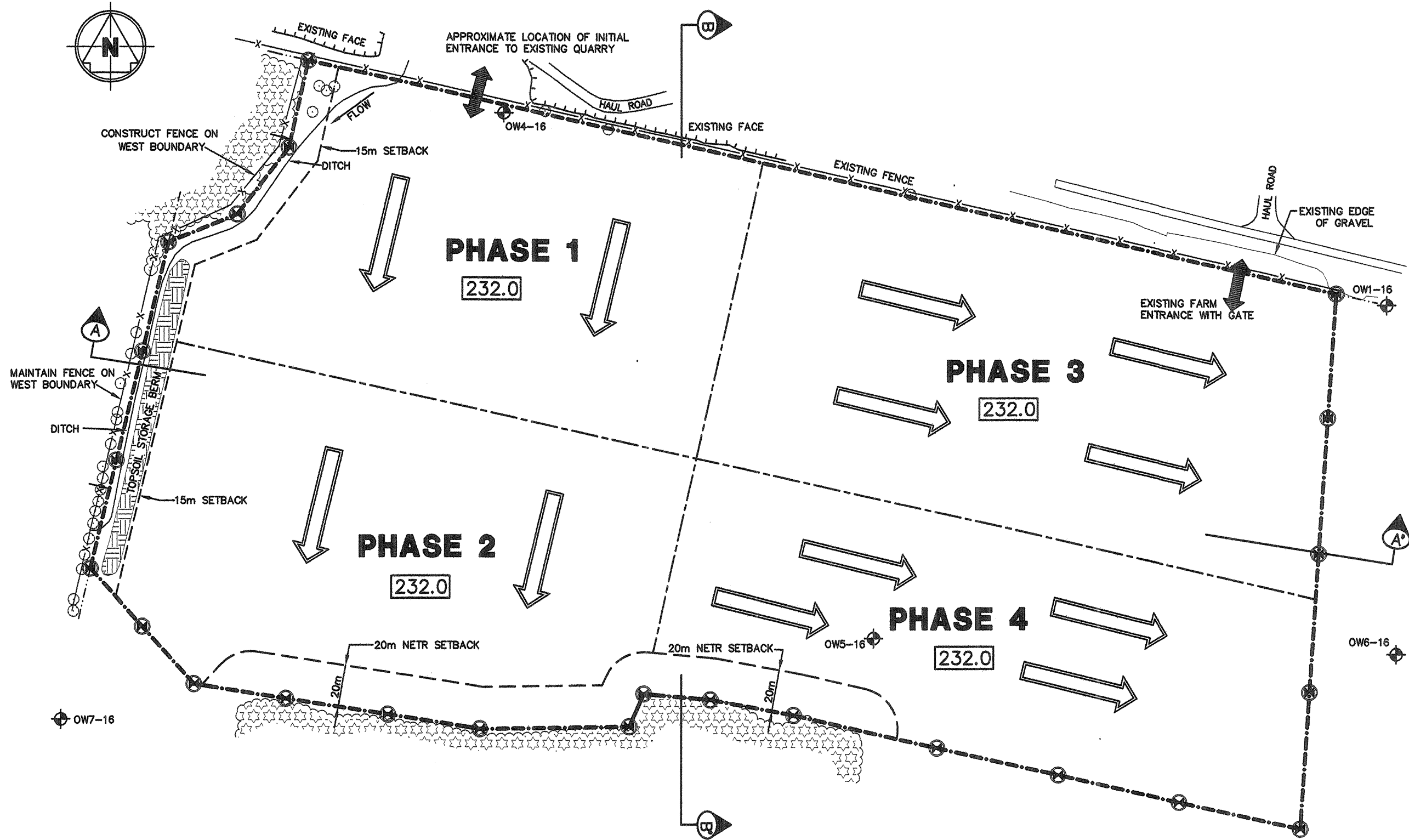
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SEQUENCE OF OPERATIONS

1. Operations shall take place in 4 areas with 1 bench in each area.
2. Areas do not represent any specific or equal time period.
3. Operations shall proceed in the numerical order of Areas and in the direction of the arrows shown.
4. As the limit of extraction adjacent to any extraction limit is reached and any stockpiles are removed, the perimeter slopes shall be rehabilitated as outlined on the Progressive Rehabilitation and Final Rehabilitation Plan.
5. Notwithstanding the operational and rehabilitation notes, demand for certain products or blending of materials may require minor deviation in the extraction and rehabilitation sequence. Any major deviations shall require written MNRF approval.

OPERATIONAL NOTES

1. **SETBACKS:** Extraction setbacks shall be 15m along the west licence boundary and 20 metres where shown on the southern boundary adjacent to the woodlot. The setback is 0m along all other boundaries since the applicant owns the adjacent lands.
2. **MAXIMUM DEPTH OF EXTRACTION:** The maximum depth of extraction shall be 232.0m which is 0 to 5m below the existing water table of 232m to 237m. (See Figure 11 in the Whitewater Hydrogeology Ltd. report)
3. **SIDE SLOPES:** Perimeter side slopes shall be created by backfilling with onsite overburden & clean fill. Final perimeter slopes shall be constructed no steeper than 2(horizontal) to 1(vertical). Final slopes shall be spread with a minimum of 10 cm (4 inches) of topsoil with previously stored topsoil and may be seeded with a combination of native grass mixture such as Virginia Wild Rye, Indian Grass, Little Blue Stem and Switch Grass with some wildflower mix (milkweed, aster, tick-trefoil and Black-eyed Susan).
4. **ENTRANCE/EXIT/GATE:** The entrance to this quarry shall be to the applicant's adjacent quarry to the north. From there, trucks shall proceed on the existing quarry haul roads to the existing entrance at Grey County Road #1. A 1.2m gate is installed at the County road entrance and shall be closed when the quarry is not operating.
5. **FENCING:** Post & wire fencing (minimum height 1.2 metres) shall be repaired or installed on the proposed west licence boundary. There shall be no fencing required on the east, north or south boundaries as the applicant owns the adjacent lands. The existing fence on the north boundary shall be removed as operations may require. See: "Site Plan Variances from the Operational Standards" on this page. Unfenced boundaries shall be marked with 2m high, highly visible marker posts at corners and at intervals distances not to exceed 60m. Some posts may be removed to prevent interference with farming operations.
6. **TOPSOIL/OVERBURDEN STORAGE:** Stripped topsoil and overburden shall be stored in stockpiles within the extraction area or in the west setback area. Stripped topsoil & overburden shall be graded to stable side slopes and shall be vegetated. See the berm detail on this page.
7. **VEGETATION:** Vegetation shall be maintained on all topsoil berms, stockpiles and rehabilitated areas. Vegetation that dies or is otherwise damaged shall be reseeded or replanted.
8. **STOCKPILES:** Stockpiles of aggregate or stripped materials may be located within 30 metres of the licence boundary, west boundary excepted.
9. **PROCESSING EQUIPMENT:** Equipment to be utilised on this site shall include scrapers, bulldozers, loaders, excavators, drill rigs, crushers, screeners, conveyors and dump trucks. Portable equipment will follow the phasing sequence and will not be located within 30m of the licence boundary.
10. **DUST CONTROL:** Dust control shall be maintained through the application of water when necessary.
11. **NOISE, DUST OR GROUNDWATER INTERFERENCE PROBLEMS:** Should noise, dust or groundwater interference complaints be received, the licensee shall take appropriate measures as deemed necessary by the Ministry of the Environment & Climate Change to rectify the problem(s).
12. **SCRAP STORAGE:** Scrap shall be stored in various inconspicuous mobile locations and shall be removed on an ongoing basis.
13. **PETROLEUM STORAGE:** All petroleum storage shall be in above ground containers that meet the requirements of the Technical Standards and Safety Act (as may be amended). Any spills shall be removed and disposed of at a facility approved by the Ministry of the Environment and Climate Change. Mobile fuel tanks shall be the engineered, double-tanked variety with vacuum sealed valves. See the Spills Plan on this page.
14. **BUILDINGS:** Any operational buildings or scales and equipment trailers shall be located a minimum of 30m from the west licence boundary.
15. **DRAINAGE:** Water from precipitation shall be directed to the sump area on the adjacent quarry (MNRF ID: 5041) and shall be pumped in accordance with MOECC regulations under PTTW: 1864-BEXHST.
16. **HOURS OF OPERATION:** The hours of operation for this site shall be from 7am to 6pm from Monday to Friday and from 8am to noon on Saturday. There shall be no processing on Saturdays.
17. **EXTRACTION AREA:** The area to extracted is 14.3 hectares.
18. **TONNAGE CONDITION:** The maximum number of tonnes to be removed from this site in any calendar year is 400,000 tonnes. The combined maximum tonnage that is removed from this site and the adjacent licensed HSC quarry shall also not exceed 400,000 tonnes.
19. **CONSULTANT RECOMMENDATIONS:** Consultant recommendations are shown in a separate section on this page.
20. **BLASTING:** Blasting will take place during the hours of operation noted above. The frequency of the blasts will be dependent on maintaining a sufficient supply of aggregate products for use in local markets.
21. **RECYCLING:** The importation of concrete and asphalt for recycling will be permitted as an accessory use to the aggregate operation.

Any rebar and other structural metal removed during the processing of recyclable concrete will be placed in a scrap area on site (see note 12) and will be removed on an ongoing basis.

Recyclable asphalt and/or concrete materials will not be stockpiled within:
1) 30 meters of any open body of water
2) 2 meters of the surface of the established water table

Recyclable concrete and asphalt materials will be located in an area that is in close proximity to a current working quarry face.

Removal of recycled aggregate is to be ongoing.

Importation of recyclable asphalt and/or concrete materials will cease once the native aggregate material has been depleted from the site. Once final rehabilitation has been completed and approved in accordance with the site plan, all recyclable operations must cease.

CONSULTANT RECOMMENDATIONS: HYDROGEOLOGICAL MITIGATION MEASURES (by Whitewater Hydrogeology Ltd.)

Although there are no anticipated impacts associated with the proposed extraction of aggregate, which will occur below the established water table, there are preventative operational practices that are recommended to further protect groundwater quality:

- Refueling of machinery shall not be conducted in areas of the excavation (i.e., on the pit floor).
- No chemical spray (pesticide/herbicide) shall be used in areas of the excavation.
- Operator training shall include understanding and implementing the preventative measures provided above, in addition to HSC's corporate Spills Contingency Plan.

RECOMMENDED GROUNDWATER MONITORING PROGRAM

1. Monthly water levels at all on-site monitoring locations.
2. Continuous water level measurements at OW1-16, OW2-16, OW4-16, OW5-16, OW6-16 & OW7-16.
3. The monitoring of domestic water wells located within 500 m of the proposed extraction area, if permission is granted. Monitoring shall include continuous water levels & an annual collection of water quality (general water quality parameters and oil and grease).

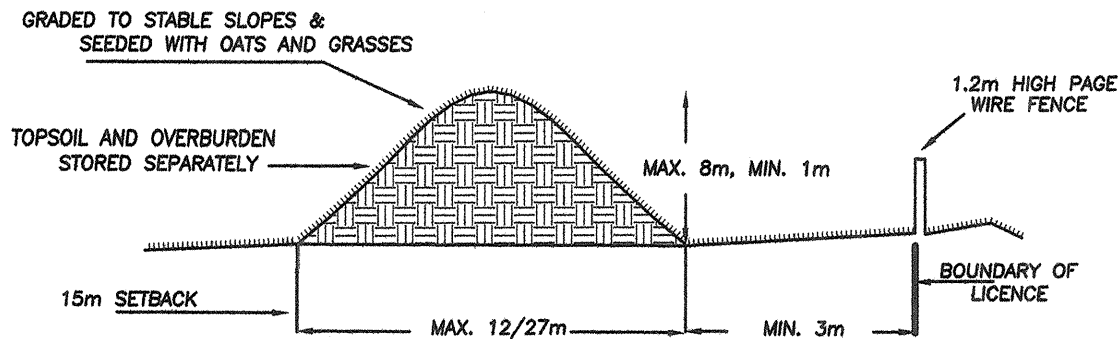
NATURAL ENVIRONMENT MITIGATION MEASURES: (by AWS Environmental Consulting Inc.)

1. The 'Limit of Extraction' is to maintain a minimum 20m separation setback distance from the southerly woodland situated along a portion of the licence boundary south limit.

SITE PLAN VARIANCES FROM THE OPERATIONAL STANDARDS

1. **STANDARD 5.1** - Fencing shall not be required on the south, east and north licensed boundaries which are adjacent to lands owned by the licensee. Unfenced boundaries shall be marked with 2m high, highly visible marker posts at corners and intervals distances not to exceed 60m.
2. **STANDARD 5.10.1** - Setbacks have been reduced from 15m to 0m on the north, east and part of the south licensed boundaries (where shown) which are adjacent to lands owned by the licensee.
3. **STANDARD 5.13** - Stockpiling may take place within 30m of the licensed boundary.

TYPICAL BERM SECTION nts

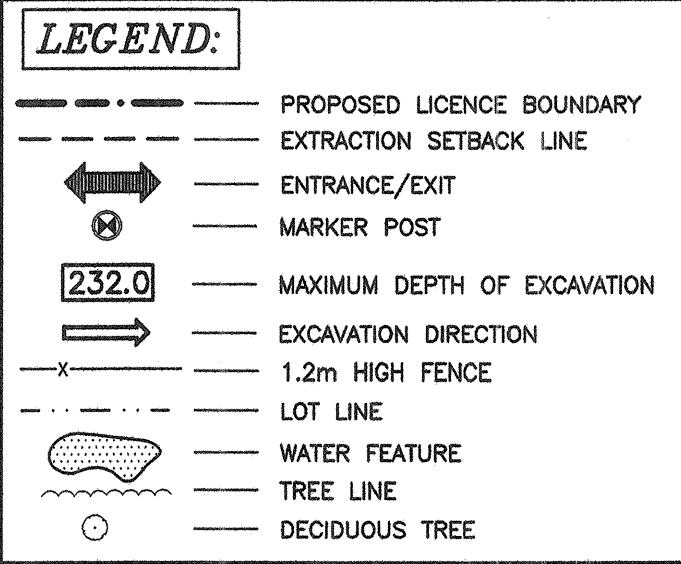


Spills Plan

In case of an accidental spill of petroleum products, the following contingency plan will be activated:

- a) The Ministry of Environment & Climate Change (See address & phone number below) and surrounding landowners will be notified.
- b) For a leakage or spill immediate action will be taken to stop it. At the same time measures will be taken to prevent spreading. These measures may include building a berm or construction of a ditch, for instance.
- c) The quarry operator shall commence recovery procedures by collecting the spilled substance into containers.
- d) The soil in the area affected by the spill or leak shall be removed and disposed of at a location prescribed by the Ministry of the Environment & Climate Change.

Ministry of Environment & Climate Change
Southwest Regional Office
733 Exeter Road, 2nd Floor
London, Ontario, N6E 1L3
Spills Action Centre: 1-800-268-6060



H.S.C. AGGREGATES LTD.
R.R. #2, KEMBLE, ONTARIO, N0H1S0
SARAWAK QUARRY EXTENSION
PART LOT 36, CONCESSION 2
TOWNSHIP OF GEORGIAN BLUFFS (formerly SARAWAK TOWNSHIP)
COUNTY OF GREY

OPERATIONAL PLAN
DRAWING 2 of 3

SCALE 1:2000
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No.	AMENDMENT	DATE

APPENDIX B

Summary of Assessed Operations



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The following on-site operations were considered for the purposes of this study, based on input from HSC personnel, to predict sound levels at the points of reception surrounding the site:

- The quarry will operate during daytime hours only, from 7:00 to 18:00;
- Drilling and material extraction were assumed to occur at the closest possible location to each of the surrounding receptors;
- The rock drill was assumed to be located at grade, as the site has minimal overburden; Mobile equipment operating at the working face were modeled at an elevation representing the bottom of the quarry, which will be approximately 5-7 metres below the existing grade;
- The equipment quantities and sound power levels assumed for the purposes of this assessment are summarized in the following table. With the exception of moving trucks (which are discussed further below);

Table B1: Source Sound Power Levels [dBA re: 10^{-12} W]

Source	Sound Power Level
Rock Drill	115
Front End Loaders (Qty. 2)	110
Crusher/Screener	119
Moving Highway Truck	101

- Up to 12 highway trucks can visit the site during a predictable worst-case hour of operation, to take away products. The trucks were assumed to travel along the access route between the processing area and the site entrance on Grey Road 1, as shown in the site plan, at an average speed of 10 km/hr.



APPENDIX C

Sample Calculations



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Sample Calculations

R5		505681	4949626	242.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
Rock Drilling																
NS-01	Rock Drill	505096	4949308	238.3	115	67	0	0.0	-0.4	0.0	3.6	0.0	0.0	0.0	0.0	44
NS-02	Loader	505063	4949369	234.5	110	67	0	0.0	1.7	2.5	1.9	0.0	0.0	0.0	0.0	36
Aggregate Processing Operations																
NS-03	Crushing Spread	505411	4949382	234.5	119	62	0	0.0	3.0	11.0	1.6	0.0	0.0	0.0	0.0	41
NS-04	Loader	505374	4949358	234.8	110	63	0	0.0	2.1	2.9	1.2	0.0	0.0	0.0	0.0	41
Trucking																
NS-05	Arriving/Departing Highway Trucks	505237	4949452	237.2	103	62	0	0.0	0.3	1.2	3.0	0.0	0.0	0.0	0.0	36

Where: $L_r = L_x - A_{div} + K_0 + D_c - A_{gnd} - A_{bar} - A_{atm} - A_{fol} - A_{hous} + C_{met} + Refl$

The column headings in this table follow the terminology of standard ISO 9613-2. L_x is the A-weighted one-hour energy-equivalent source sound power level, including any time-weighting factors and penalties for distinctive source character, as applicable. L_r is the A-weighted one-hour energy-equivalent sound pressure level at the receptor.



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